Chintan Research Foundation

RESEARCH ARTICLE NO. 17/2026

STUDY ON TRADE POTENTIAL OF INDIAN NATURAL GAS

JULY 2025

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STUDY ON TRADE POTENTIAL OF INDIAN NATURAL GAS

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The Evolution of International Trade

In its earliest form, trade was a simple exchange of goods through barter systems, where items like spices, textiles, and metals were exchanged without a common currency. Ancient trade routes, such as the Silk Road, connected regions like Asia, Europe, and Africa, facilitating commerce across these regions. However, by the 15th to 18th centuries, mercantilism took hold, with colonial powers accumulating wealth through tightly controlled trade. During this period, trade was constrained by high transportation costs and political barriers, resulting in fragmented and small-scale exchanges. Despite these limitations, these early systems laid the foundation for cross-border exchange of goods.

Post World War II, globalization changed global trade. In 1947, the General Agreement on Tariffs and Trade (GATT) came into effect through collaborative efforts of multiple nations to promote trade liberalization by reducing tariffs and fostering cooperation among nations. As a result, post-war reconstruction in Europe and Japan spurred demand for goods and raw materials, driving unprecedented trade growth. Between 1950 and 1973, world merchandise trade expanded at an average annual rate of over 8%[I], fueled by economic recovery and technological advancements. The GATT rounds, particularly the Kennedy Round (1964-1967), further slashed tariffs, encouraging open markets. However, trade during this period primarily involved finished goods, with limited integration of production processes across borders.

The establishment of the World Trade Organization in 1995 was a significant milestone that enabled further trade liberalization. Replacing GATT, the WTO provided a robust framework for regulating trade, enforcing rules, and resolving disputes. Its scope expanded beyond goods to include services, intellectual property, and agriculture. By 2000, global trade volumes were nearly 25 times higher than in 1950, driven by reduced tariffs, subsidies, and non-tariff barriers. Despite a post-pandemic decline, the current level of world gross exports is almost three times that prevailing in the 1950s (World Bank). The WTO also facilitated the integration of developing nations, notably China's entry in 2001, which dramatically expanded trade interconnectedness. Yet, as trade grew more complex, encompassing services and digital commerce, the WTO struggled to address all emerging issues, prompting countries to seek alternative arrangements.

Consequently, as multilateral negotiations under the WTO, such as the stalled Doha Round (2001–present), faced challenges, nations increasingly turned to bilateral and regional trade agreements. Free Trade Agreements (FTAs), such as the North American Free Trade Agreement (NAFTA, 1994, later replaced by the USMCA in 2020) and the European Union's single market, allowed countries to tailor trade rules to their specific partners. As of today, over 375 Regional Trade Agreements are in force worldwide[II], covering more than half of world trade. These agreements deepened interconnectedness by addressing issues like labor standards, environmental protections, and digital trade. FTAs enabled faster integration of emerging economies, fostering vertical specialization by allowing countries to focus on specific stages of production. During this period, trade agreements were often shaped by political and military relations between nations rather than mutual economic benefits. Alliances or rivalries dictated trade flows, with nations prioritizing strategic interests over comparative advantages.

The emergence of global value chains represents the most transformative change in modern international trade, fundamentally changing how goods are produced and traded. GVCs involve the fragmentation of production processes across multiple countries, where each nation specializes in specific tasks or components. For example, a smartphone may be designed in the United States, with components manufactured in South Korea, assembled in China, and distributed globally. By 2020, GVCs accounted for nearly 50% of global trade[III], reflecting an increase in vertical specialization. Trade liberalization has been a key enabler, reducing costs and barriers to cross-border movement. Advancements in logistics, information technology, and digital platforms, such

as containerized shipping and blockchain, have further streamlined complex supply chains.

Vertical specialization allows countries to leverage comparative advantages. High-skill nations focus on research and design, while others handle labor-intensive assembly. Developing nations like Vietnam and Bangladesh have become integral to GVCs, specializing in textiles or electronics assembly, while advanced economies focus on high-value tasks like innovation. This interconnectedness has boosted efficiency and lowered costs but also increased vulnerability to disruptions, as seen during the COVID-19 pandemic. Additionally, GVCs have elevated the role of services trade, which now account for over 20% of global trade in balance of payment terms[IV]. Trends like "reshoring" or "nearshoring" reflect efforts to localize supply chains, yet GVCs remain central to global trade today.

The fragmentation of manufacturing in turn has also changed the nature of global merchandise trade. Gone are the days when certain countries specialised in certain categories of products/goods. The earlier dichotomy of developed vis-a-vis developing economies (with developed countries producing high-end manufacturing goods and developing countries producing low-end or primary products) and the concepts of comparative advantage has now been replaced by a more nuanced and complex distribution of high or low value added activities in the GVCs.

The roadmap for developing countries to achieve manufacturing prowess has also evolved over time. While earlier developing nations tried achieving indigenous capacities in manufacturing with trade protection (Infant Industry Argument), today such countries have to find a foothold in the GVCs at some level of value addition. The erstwhile isolationist development strategy has now been replaced by a strategy of integration, and trade plays a critical role in this regard.

For developing countries like India, integrating into GVCs and leveraging FTAs is critical to increasing its share of world exports and GVC participation. India has earned its place in the world in the services sector, but still has a handicap in merchandise trade, especially manufactured products. India's merchandise trade is still dominated by traditional products (textiles, gems and jewelry, leather products) with some greenshoots in particular sectors like automotive components or pharmaceuticals. Consequently, India languishes

with only 2% of global merchandise trade[v], leading to higher degrees of import dependence, especially in the electronics or energy sector.

Certain initiatives have been taken (over the last decade) to improve domestic manufacturing capacity across certain sectors/product categories. However, any such initiative, in the modern era of GVCs, need to be suitably complimented by commensurate trade facilitation via Free Trade Agreements (FTA), Bilateral Trade Agreements (BTAs) or any other such mechanism.

By signing FTAs with key trading partners (critical in the GVC for the products), such as the European Union, the United States, or members of the Regional Comprehensive Economic Partnership (RCEP), India can reduce trade barriers, attract foreign direct investment, and integrate more deeply into global supply chains. The present strategy of high tariffs across product lines (mostly to protect Indian industries from being inundated by foreign competition) need to be relooked with a more pragmatic approach. The objective should be to integrate with GVCs and try to build indigenous capacity to attract more value-added activities of these GVCs in the country. Trade agreement needs to recognise the criticality of backward and forward linkages of GVCs and allow for free and easy entry and exit of components/intermediary inputs. A holistic trade policy is required under which imports (as backward linkages) need to be encouraged to allow for greater export competitiveness and broader outreach (as forward linkages) to ensure net gains in terms of value added exports.

This series consists of four comprehensive papers that explore how India can enhance its GVC participation and export share in the key sectors of automotive components, electronics, pharmaceuticals, and natural gas. The series tries to cover a gamut of different products (goods and natural resources, manufacturing and chemical industry, traditional manufacturing goods and new age manufacturing goods) in an attempt to cover the diversity of merchandise trade. Each paper examines each sector with the simple stated objective; how to reduce import dependency of India, increase India's integration in the GVC and ensure export competency of higher value added products from India. ●

Introduction

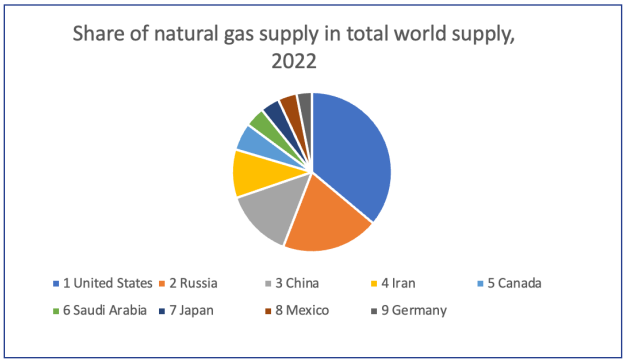
Natural gas has emerged as an alternative to fuels with higher emission content. While many countries have been dependent on coal and other fossil fuels for their energy requirements, the focus has been shifted to using natural gas. Natural gas is consumed in 2 different forms - Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG). To process CNG, natural gas (primarily methane) is compressed to less than 1% of its original volume using high pressure. This process makes it suitable as a fuel when combined with air and ignited. CNG's advantages include lower production costs, unlimited storage life, and reduced emissions of hydrocarbons, carbon monoxide, and nitrogen oxides compared to gasoline. On the other hand, LNG is created by purifying natural gas to remove impurities like carbon dioxide, hydrocarbons, and water vapor, then cooling it to -260°F to achieve a liquid state, reducing its volume by about 600 times[1]. This makes LNG ideal for storage and transportation, as it can easily revert to a gaseous state. In both forms, handling natural gas is challenging and hazardous as they require specialised equipment and precautions.

Despite being a non-renewable resource, natural gas has one major advantage over other non-renewables. Using natural gas for energy generates lower emissions compared to burning coal or petroleum for the same energy output. Scientifically, natural gas emits 50 to 60 percent less carbon dioxide (CO2) than other fossil fuels.[2] This makes it a preferred "bridge fuel" for countries transitioning from more carbon-intensive fossil fuels toward cleaner energy sources. Natural gas, widely recognized for household uses like cooking and heating, plays a significant role now in power generation and the production of chemicals and plastics. In recent decades, its role in electricity generation has expanded due to its increased availability, flexibility, and lower CO2 emissions compared to coal and oil.

Global Natural Gas Market

Globally, natural gas accounted for 23% of the energy supply in 2022. United States (22.4%), Russia (12.3%), China (8.7%), and Iran (6.1%) are the top producing countries. Nations like China and Saudi Arabia are increasingly investing in natural gas to reduce coal reliance and meet domestic demand, with Saudi Arabia aiming for a 50% natural gas and 50% renewable energy mix by 2030.[3] Despite energy security concerns, the shift toward natural gas continues as a strategic move to balance economic growth, energy needs, and climate objectives. The pie-chart below shows the major suppliers of natural gas by their share in world supply.

Figure 1: Source: International Energy Agency, 2022.

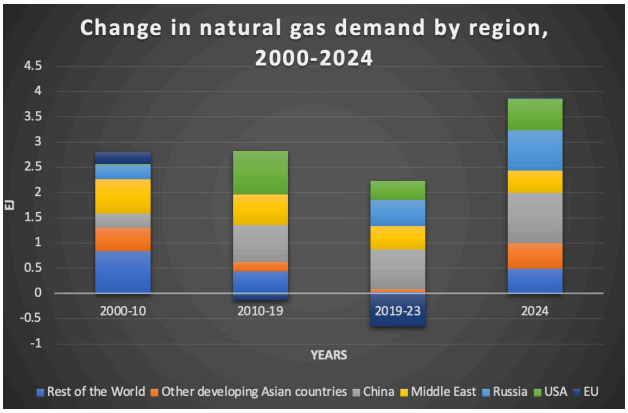


The global demand for natural gas has also seen a shift. The stacked column chart below depicts the change in natural gas demand by regions over the period 2000-2024, taken from the 'Global Energy Review 2025' by the International Energy Agency, IEA. The graph[4] shows a significant increase in the period 2024, with regions like China (26.051 bcm from 20.53 bcm in 2019-23), Russia (21.052 bcm from 13.42 bcm in 2019-23), and the U.S. (16.3145 bcm in 2024 from 10 bcm in 2019-23) increasing their demand for natural gas, after the decline in demand by these regions during the period 2019-23 due to COVID. The rise in demand is a consequence of major industrial changes in these countries.

In 2024, global natural gas demand saw steady growth, largely driven by the industry and power sectors, which accounted for about 75% of the increase. The power sector alone saw a 2.8% rise in gas consumption, fuelled by scorching heatwaves in

places like China, India, and the United States, where extreme temperatures boosted electricity needs and accounted for roughly one-fifth of the global demand surge. In Asia's fast-growing markets, economic expansion pushed up gas use. While Europe saw a modest recovery in industrial demand, though it still lagged far behind pre-crisis levels. Meanwhile, natural gas continued to edge out oil in various sectors, like power generation in the Middle East and trucking in China, where record sales of gas-powered trucks cut diesel use. Residential and commercial sectors came in with a modest 1% growth, reflecting uneven demand patterns across regions.

Figure 2: Source: Global Energy Review 2025, IEA.



Major Markets For Natural Gas

There are five major markets for natural gas.

U.S. Natural Gas Market

The U.S. is the world's largest LNG exporter, shipping 11.9 billion cubic feet per day (Bcf/d) in 2024, primarily to Europe (Netherlands, France, UK) and Asia (China, India). Prices are set by the Henry Hub benchmark, reflecting futures and spot prices, driven by supply factors (storage, exports, imports) and demand (high in winter for heating, summer for power generation). Domestic production has surged, reducing import reliance. Minimal imports come via pipelines from Canada and LNG from Trinidad and Tobago, especially in winter at the Everett, Massachusetts terminal. Increased production supports export growth, but winter imports remain crucial for heating demand. The U.S.'s robust production and export infrastructure ensure its global LNG dominance, with prices sensitive to seasonal demand and storage levels.

EU Natural Gas Market

The EU is a major natural gas importer, relying on LNG and pipeline supplies. Prices are determined by the TTF benchmark in the Netherlands, used for spot transactions, futures contracts (ICE/European Energy Exchange), and long-term import contract indexing, alongside demand, supply, and global prices. Historically, the EU imported pipeline gas from Russia (138.1 BCM in 2023), the largest exporter, followed by Norway (116 BCM). Post-Russia's invasion of Ukraine, the EU reduced Russian dependence, boosting LNG imports from Norway and the U.S. This shift reflects a strategic pivot to diversify supply sources for energy security. The TTF's role ensures transparent pricing, but high import reliance underscores vulnerability to global price volatility and geopolitical risks, with no significant domestic production mentioned.

Asia-Pacific Natural Gas Market

The Asia-Pacific region, the world's largest natural gas importer, is driven by demand from China, Japan, and India. Prices are set by the Japan-Korea Marker (JKM) for spot LNG, oil-indexed long-term contracts (e.g., Qatar, Australia), and spot market dynamics influenced by supply-demand, shipping costs, weather, and geopolitical risks. China, the region's top producer, still relies on imports from the U.S., Qatar, and Australia due to high consumption. Australia, a top global LNG exporter, leverages projects like Gorgon and Ichthys to supply the region. Southeast Asian countries like Indonesia and Malaysia prioritize domestic gas use for energy security, while Vietnam and the Philippines use gas as a transitional fuel. Papua New Guinea's PNG LNG project is expanding, enhancing export capacity.

Middle East Natural Gas Market

The Middle East is primarily an LNG exporter, with

Qatar and the UAE as leading players. Domestic prices are government-regulated, while trading prices rely on oil-indexed long-term contracts, influenced by global factors and pipeline gas trade via Iran and Qatar. The region's focus on LNG exports over piped gas reflects its export-oriented strategy, targeting global markets with high demand. Qatar's dominance stems from its vast reserves and established infrastructure, while the UAE complements with growing LNG capacity. Price determination balances regulated domestic markets with international oil-linked contracts, ensuring stability but sensitivity to global oil price fluctuations. The Middle East's export focus limits domestic consumption discussions, but its role as a reliable LNG supplier underscores its global market influence.

African Natural Gas Market

Africa is a significant natural gas exporter, using a hybrid model of pipeline and LNG exports. Nigeria and Algeria hold the largest proven reserves, with Nigeria, Algeria, Egypt, Mozambique, Congo, and Equatorial Guinea as key LNG suppliers. Pipeline exports, notably from Algeria to Spain and Italy via Medgaz and Trans-Mediterranean pipelines, are substantial. Prices are determined by regulated domestic markets, oil-indexed contracts, gas-on-gas competition, demand-supply dynamics, and geopolitical influences. Africa's export focus supports global LNG markets, particularly Europe, while domestic reserves ensure long-term supply potential. The continent's infrastructure supports both pipeline and LNG exports, balancing regional and international demand, with pricing reflecting global trends and local regulatory frameworks.

Natural Gas: The Indian context

India ranks as the third-largest energy consumer globally, yet natural gas constitutes only 6.3% of total energy consumption in 2023, compared to 40% in the U.S. and 15% in China for residential use.[6] Coal dominates India's commercial and public services sector at 24%, with natural gas's share remaining negligible. In 2024, global natural gas demand rose, with India's demand increasing by 10%, driven by a robust economy, expanded gas grids, and heatwaves boosting power generation needs. However, reliance on imports (48.6% of supply in 2023) reflects weak domestic production, making natural gas less competitive against cheaper coal.[7] India primarily follows the Japan-Korea Marker (JKM) for pricing LNG in spot market transactions. Additionally, oil-indexed long-term contracts are significant, particularly with major suppliers like Qatar and Australia.

In this backdrop, India, the world's third-largest greenhouse gas emitter, is all set to transition towards a sustainable energy mix, with natural gas playing a pivotal role. Natural gas currently holds a modest 6.4% share of the energy mix. Recognizing that natural gas emits 50-60% less CO2 than coal, the Indian government has committed $67 billion to boost its share to 15%.[8] Natural gas serves critical sectors like fertilizers, power, refineries, petrochemicals, and trucking fuel. However, low domestic production (44% of natural gas is imported) and infrastructure challenges hinder progress. Underutilized LNG terminals, limited city gas distribution (CGD), insufficient pipelines, and inadequate underground storage struggle to meet rising energy demand, projected to triple by 2050 with GDP growth. Regulatory issues, including the Petroleum and Natural Gas Regulatory Board's (PNGRB) third-party access policy, create information asymmetries and reduce producer profits, further stalling natural gas adoption.

India's domestic natural gas market faces significant challenges, with domestic production meeting approximately 50% of demand. Imports, accounting for 48.6% of supply in 2023, create price competition, pushing producers toward coal.[9] India's domestic natural gas reserves are limited and insufficient to meet the 15% target. As of 2023, India's proven natural gas reserves were approximately 1,138 billion cubic meters (BCM), equivalent to about 40 trillion cubic feet (Tcf), which is modest compared to global leaders like Qatar (871 Tcf). India's offshore and deepwater fields, such as those in the Krishna-Godavari basin, are technically challenging to exploit

due to complex reservoir structures, high-pressure conditions, and deepwater drilling requirements. Onshore fields, like those in Assam and Gujarat, are mature and depleting.

Even if domestic production increased, India's pipeline infrastructure (23,000 km in 2023) is insufficient to distribute gas to demand centres, particularly in eastern and southern India. Projects like the Jagdishpur-Haldia-Bokaro-Dhamra Pipeline (JHBDPL) face delays due to land acquisition and environmental clearances. Infrastructure gaps, such as underused LNG terminals and limited CGD and pipeline networks, fail to keep pace with rising demand. Regulatory hurdles, such as PNGRB's third-party access, lead to reduced profits and information gaps for producers. To counter these, the government has introduced measures like flexible pricing and marketing for select gas sources, strategic gas reserves, and investments in hydrogen production to bolster clean energy. The "One Nation, One Gas Grid" initiative and unified pipeline tariffs aim to enhance affordability and access. Until domestic production expands, imports remain critical to meeting India's energy needs and achieving a sustainable natural gas driven energy mix by 2070.

Indian Trade in Natural Gas

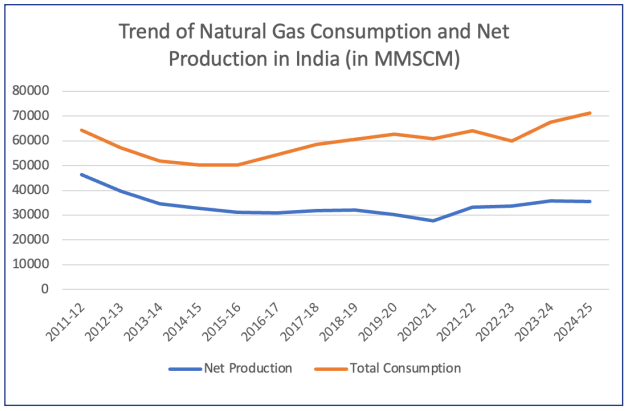
The Harmonized System (HS) codes for natural gas fall under Chapter 27 (Mineral fuels, mineral oils, and products of their distillation), specifically within the subheading for petroleum gases and other gaseous hydrocarbons. The 4-digit HS code level is a broader classification that encompasses natural gas in its various forms (liquefied and gaseous). Based on the standard HS nomenclature and the provided context, the relevant 4-digit HS code for natural gas is 2711, petroleum gases and other gaseous hydrocarbons. This code covers natural gas, both in its liquefied form (e.g., liquefied natural gas, LNG) and gaseous state (e.g., compressed natural gas, CNG, or pipeline gas). It includes subheadings like 27111100 (liquefied natural gas) and 27112100 (natural gas in gaseous state).

First, we look at the 2711 category which includes the following 6-digit categories given in the table.

HSN Code	Description
271111	Natural gas, liquefied
271112	Propane, liquefied
271113	Butanes, liquefied
271119	Other petroleum gases and gaseous hydrocarbons, liquefied
271121	Natural gas, in gaseous state
271129	Other petroleum gases and gaseous hydrocarbons, in gaseous state

The line graph below shows the trend of natural gas consumption and its net production, both measured in MMSCM, from the years 2011-12 to 2024-25. The orange line depicting total consumption stays significantly higher than the blue line, which represents domestic production. This indicates that domestic production is incomplete and cannot fulfil the domestic consumption. The gap between these two is met through imports of natural gas.

Figure 3: Source: Petroleum Planning & Analysis Cell



Indian exports are minimal and negligible as compared to its imports. So, for this paper, we only focus on the imports.

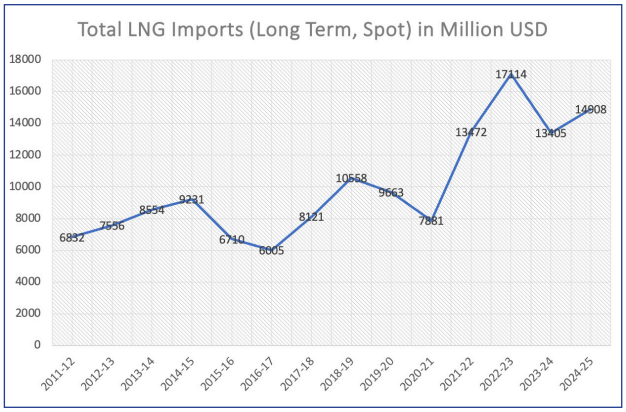
Liquified Natural Gas, 271111 & Gaseous Natural Gas, 271121

India imports gas in the LNG form in huge quantity, as it is not able to import it in gaseous form via pipelines. India's northern borders are dominated by deserts and mountains (e.g., Himalayas), making pipeline

construction technically challenging and costly. Neighbouring countries like Pakistan, Afghanistan, and Bangladesh present geopolitical hurdles. Even the domestic network of pipelines is inadequate. While India has 23,000 km of gas pipelines, many regions, especially in the south and east, lack connectivity from coastal LNG terminals to inland demand centres[12]. For instance, the Kochi terminal's utilization was limited until the Kochi-Mangalore pipeline was commissioned in 2020-2021. On the other hand, India's LNG imports are more flexible, arriving at coastal terminals and requiring less geopolitical coordination than pipelines. Therefore, we focus only on the LNG imports.

India imports its LNG from different countries. In this study we show the import trend of LNG for the years 2011-12 to 2024-25. The LNG imports suffered two major falls – one in the years 2015-17 and another in the years 2018-21. Other than this fall, LNG imports have actually increased, and will continue to increase. The 2018-21 fall is attributed to the COVID period and its damaging effect on global trade.

Figure 4: Source: Petroleum Planning & Analysis Cell



The major exporters of LNG for India are given below in the table. The largest supplier is Qatar with a share of ~50%, followed by UAE with a share of ~17% and then USA with ~11% share. In the next session, we delve deeper into our top 5 exporting countries.

Table 1: India's Import Sources, 2023.

Country	Trade Value (USD)	% in World Trade Value
Qatar	6527147780	49.22
United Arab Emirates	2231903760	16.83
United States	1431695470	10.80
Angola	450445200	3.40
Oman	448696520	3.38
Nigeria	415046240	3.13
Russian Federation	296400340	2.24
Cameroon	255615100	1.93
Algeria	221861640	1.67
Australia	214007220	1.61
Mozambique	185122040	1.40
Trinidad and Tobago	161472750	1.22
Egypt, Arab Rep.	149467140	1.13
Equatorial Guinea	144654900	1.09
Guinea	46410640	0.35
Belgium	37688420	0.28
China	35261110	0.27
Singapore	8235580	0.06

Qatar

Qatar is a major producer and exporter of natural gas. It is a part of the Middle-eastern natural gas market. The top 5 countries to which Qatar exports its natural gas are: China, South Korea, India, UAE, and Pakistan. While India is Qatar's third largest export destination, Qatar stands as the largest import source of natural gas to India.

Country	Trade Value (USD)
China	10892000000
South Korea	10388000000
India	9352000000
UAE	3556000000
Pakistan	3500000000

Source: The Observatory of Economic Complexity, OEC.

There is no specific bilateral FTA between China and Qatar for natural gas or other goods as of the latest available data. However, China is negotiating an FTA with the Gulf Cooperation Council (GCC), which includes Qatar, Saudi Arabia, UAE, Kuwait, Oman, and Bahrain. These talks began in 2004, with 10 rounds held by 2023, covering goods, services, investment, and customs procedures. A China-GCC FTA could facilitate LNG trade by reducing tariffs and streamlining trade processes, but it remains under negotiation and is not yet finalized. However, Qatar and China have signed significant long-term LNG supply agreements, which are not FTAs but critical for their trade relationship. On the other hand, India and Qatar are also not part of a FTA or any agreement regarding natural gas. But China's large domestic market makes it a better destination for Qatari natural gas.

What India needs to do?

Strategies that India must take to increase Qatari LNG imports:

- Negotiate a Bilateral Free Trade Agreement (FTA) or Energy-Specific Agreement: Initiate bilateral talks with Qatar for a dedicated energy trade agreement, focusing on liquefied natural gas (LNG) supply. Advocate for inclusion of natural gas trade benefits in broader India-GCC FTA negotiations, emphasizing India's growing energy demand.
- Expand LNG Import Infrastructure: Accelerate the development of LNG regasification terminals, such as those planned in Gujarat, Andhra Pradesh, and Odisha, to handle larger import volumes. Invest in pipeline networks and storage facilities to improve distribution efficiency across India, particularly in energy-deficient regions.
- Strengthen Diplomatic and Economic Ties with Qatar: Enhance high-level diplomatic engagements, including state visits and energy-focused summits, to underscore India's commitment to Qatar as a strategic energy partner.
- Offer Competitive Market Incentives: Provide tax incentives or subsidies for Qatari LNG imports to offset costs and make pricing competitive. Streamline regulatory processes for LNG imports, reducing bureaucratic delays and improving trade efficiency.

United Arab Emirates

UAE is India's second largest supplier of LNG. It is also a part of the Middle-eastern natural gas market. The top countries that UAE exports its natural gas to are given below in the table.

Table 3: UAE's import destinations.

Country	Trade Value (USD)
India	2230000000
Japan	663000000
China	435000000
Chinese Taipei	118000000
Philippines	51800000

Source: The Observatory of Economic Complexity, OEC.

India is the largest importer of UAE's LNG. This trade is primarily facilitated through long-term supply agreements between Abu Dhabi National Oil Company (ADNOC) and Indian companies like Petronet LNG, with contracts dating back to 2016 and likely renewed to support India's growing energy demand for power generation and industrial use. The India-UAE Comprehensive Economic Partnership Agreement (CEPA), signed on February 18, 2022, and effective from May 1, 2022, plays a crucial role in facilitating LNG trade. The CEPA reduces or eliminates tariffs on over 80% of product lines, including LNG (HS code 271111), potentially lowering India's standard 2.5% Basic Customs Duty (BCD) to 0% for UAE-origin LNG with a certificate of origin. This makes UAE LNG more competitive in India's market compared to non-FTA suppliers. The agreement also promotes energy cooperation, streamlining logistics and encouraging UAE investments in India's energy infrastructure, such as LNG terminals and storage facilities. Moreover, the CEPA serves as the primary trade framework, complemented by ongoing India-GCC FTA negotiations, which include the UAE as a Gulf Cooperation Council member. These talks aim to further liberalize trade and could enhance LNG import terms.

United States of America

The United States is the world's largest exporter of liquefied natural gas (LNG) after Australia. The table below provides the top countries to which the U.S. exports LNG, along with their estimated trade values. While the US is India's third largest exporter of LNG, India nowhere comes near to being an important importer of LNG for USA.

Table 4: USA's import destinations.

Country	Trade Value (USD)
Japan	9320000000
Mexico	6660000000
China	6190000000
Netherlands	4380000000
South Korea	3890000000

Source: The Observatory of Economic Complexity, OEC.

The United States has comprehensive FTAs with 20 countries, but not with Japan. Instead, the U.S. and Japan have a limited trade agreement that does not fully meet the World Trade Organization's (WTO) requirement for FTAs to cover "substantially all" trade. However, this agreement includes provisions relevant to LNG trade. While the USJTA primarily covers agricultural products (e.g., beef, pork, green tea) and industrial goods (e.g., machine tools, bicycles), it does not impose specific tariff reductions for LNG. However, LNG trade benefits indirectly from the agreement's broader trade facilitation measures, such as streamlined customs procedures and reduced non-tariff barriers, which lower transaction costs for energy exports. Additionally, Japan's commitment to import more U.S. LNG (e.g., through deals like JERA's tripling of purchases in 2025) aligns with the agreement's goal of promoting "fairer, more balanced trade." On the contrary, there is no comprehensive Free Trade Agreement (FTA) or specific bilateral trade agreement explicitly dedicated to natural gas between India and the United States.

What India needs to do?

Strategies that India must take to increase US imports:

- Negotiate a Targeted U.S.-India Energy Trade Agreement: Initiate bilateral negotiations for a sector-specific energy trade agreement focused on LNG, emphasizing reduced non-tariff barriers and streamlined customs processes, like the U.S.-Japan Trade Agreement (USJTA). Propose long-term LNG supply contracts with U.S. exporters like Cheniere Energy or ExxonMobil, incorporating flexible pricing tied to Henry Hub benchmarks to compete with Middle Eastern suppliers.
- Leverage Diplomatic Channels to Prioritize India as a U.S. LNG Market: Strengthen U.S.-India energy cooperation through platforms like the U.S.-India Strategic Energy Partnership, emphasizing LNG as a critical component of bilateral trade. Engage U.S. policymakers to highlight India's potential as a stable, high-demand market for LNG, countering competition from Japan and China.
- Align with U.S. Geopolitical and Energy Export Goals: Emphasize India's role in diversifying U.S. LNG export markets, reducing U.S. reliance on China and other geopolitically sensitive destinations. Highlight India's clean energy transition goals, positioning U.S. LNG as a bridge fuel to replace coal in power generation and industrial applications.
- Develop Infrastructure to Accommodate U.S. LNG Imports: Expand LNG regasification terminals on India's eastern and western coasts, such as those in Andhra Pradesh or Gujarat, to handle U.S. LNG shipments, which often involve longer trans-Pacific routes.

Angola

Angola is India's fourth largest import source for LNG. India is Angola's third largest importing country, while Netherlands is the largest importer of Angolan LNG.

Table 5: Angola's import destinations.

Country	Trade Value (USD)
Netherlands	519000000
France	481000000
India	462000000
Germany	269000000
United Kingdom	264000000

Source: The Observatory of Economic Complexity, OEC.

There is no evidence of a standalone Free Trade Agreement or a specific bilateral agreement dedicated to natural gas trade between the Netherlands and Angola. However, this trade appears to be facilitated through commercial arrangements and market mechanisms, such as the Title Transfer Facility (TTF), a virtual trading point for natural gas in the Netherlands operated by Gasunie Transport Services B.V. The TTF is a major hub for gas trading in Europe, handling futures, physical, and exchange trades, and has seen significant growth in LNG trade, partly due to increased imports from countries like Angola. On the other hand, there is no specific Free Trade Agreement or bilateral agreement exclusively for natural gas between Angola and India. This trade is primarily conducted through commercial contracts, such as long-term LNG supply agreements with Angola LNG Limited (ALNG), which operates Angola's sole LNG export terminal in Soyo.

What India needs to do?

Strategies by which India can increase its Angolan LNG imports:

- Secure Expanded Long-Term LNG Supply Contracts: Negotiate extended or expanded long-term supply agreements with ALNG, building on existing contracts to secure larger LNG volumes at competitive prices tailored to India's market. Incorporate flexible pricing mechanisms linked to global LNG indices, such as Brent-linked pricing, to ensure cost-competitiveness compared to European markets like the Netherlands.
- Enhance LNG Import Infrastructure for Angola's Supply: Invest in specialized storage facilities compatible with Angola's LNG specifications, ensuring efficient handling and distribution within India. Collaborate with ALNG to develop dedicated berthing facilities for Angola's LNG carriers, improving port efficiency and import throughput.
- Foster Bilateral Energy Cooperation with Angola: Strengthen India-Angola diplomatic ties through high-level engagements, such as energy-focused summits or trade delegations, to elevate India's status as a preferred LNG buyer. Offer technical expertise or investments in Angola's energy sector, such as upstream gas exploration or LNG plant maintenance, to create mutual economic benefits.
- Provide Market Incentives to Attract Angola LNG: Offer tax exemptions or reduced import duties for Angola-origin LNG, lowering India's standard 2.5% Basic Customs Duty (BCD) to compete with the Netherlands' TTF market advantages.

Oman

Oman is a significant exporter of liquefied natural gas (LNG), with exports primarily managed by Oman LNG and Qalhat LNG under the Ministry of Oil and Gas. Oman is a part of the Middle-eastern natural gas market. The table below provides the top countries to which Oman supplies it LNG exports.

Table 6: Oman's import destinations.

Country	Trade Value (USD)
China	2800000000
Japan	1400000000
Croatia	559000000
India	526000000
Thailand	491000000

Source: The Observatory of Economic Complexity, OEC.

Oman is India's fifth largest supplier of LNG, and India is also Oman's fourth largest importing country for LNG. There is no Free Trade Agreement or a specific bilateral agreement dedicated to natural gas or LNG trade between China and Oman. This trade is primarily facilitated through commercial contracts managed by Oman LNG and Qalhat LNG, under the oversight of Oman's Ministry off Energy and Minerals. For instance, Oman LNG signed a 10-year gas supply agreement with Shell in January 2025, indicating that long-term commercial contracts are a key mechanism for Oman's LNG exports, including to major markets like China. Additionally, Oman is a member of the Gulf Cooperation Council (GCC). The GCC has been negotiating a potential FTA with China,

but as of the latest updates, these negotiations have not been finalized, and no specific provisions for LNG trade have been highlighted in public sources. The absence of a specific FTA suggests that China's imports of Omani LNG are driven by market demand and commercial agreements rather than a formal trade agreement.

India and Oman are actively negotiating a Comprehensive Economic Partnership Agreement, but issues remain unresolved. Indian-Omani trade is primarily conducted through commercial contracts, notably long-term agreements such as the Urea Off-take Agreement (UOTA) with the Oman India Fertilizer Company (OMIFCO). The OMIFCO, a joint venture between Oman Oil Company and Indian firms IFFCO and KRIBHCO, produces anhydrous ammonia and granular urea, with India importing significant quantities under a renewed UOTA signed in 2022 for 1 million tons of urea per year for three years. While this agreement includes ammonia (a derivative of natural gas), it is not specific to LNG.

What India needs to do?

Strategies that India must take to increase Omani imports are:

- Accelerate India-Oman CEPA Negotiations with LNG Focus: Prioritize LNG-specific provisions in the ongoing India-Oman CEPA talks, advocating for zero or reduced tariffs on LNG (HS code 271111) to lower India's 2.5% Basic Customs Duty (BCD), making Omani LNG more competitive than non-FTA suppliers.
- Expand Long-Term LNG Supply Contracts: Negotiate extended long-term LNG supply contracts with Oman LNG and Qalhat LNG, like Oman's 10-year agreement with Shell, to increase India's share of Oman's LNG exports.
- Optimize LNG Import Infrastructure for Omani Supplies: Develop dedicated storage facilities for Omani LNG, ensuring compatibility with Oman's LNG specifications and improving distribution efficiency.
- Deepen Economic Ties Through Joint Ventures: Expand the scope of the Oman India Fertilizer Company (OMIFCO) model to include LNG supply agreements, linking ammonia and urea production to increased LNG imports.
- Promote Omani LNG for India's Industrial and Energy Needs: Incentivize the use of Omani LNG in India's fertilizer industry, building on OMIFCO's ammonia production, to create a direct link between LNG imports and industrial output.

Market diversification: Attempt to optimize Indian imports

From the analysis above, India has trade (import-dependent) relationship with only the US, 3 middle-eastern and one African partner. However, the natural gas market is huge, with many possible partners as well as blocs. India must undertake a cost-benefit analysis for diversifying its natural gas import sources. Some of the pressing concerns driving this need are:

Geopolitical Tensions and Supply Risks: Middle East

India imports a bulk of its natural gas from West Asia which is prone to conflicts, causing volatility in LNG supply and prices. Qatar, a major supplier to India, ships LNG through the Strait of Hormuz, a critical chokepoint during conflicts. Escalations during conflicts usually delay deliveries thereby increasing logistics costs and tightening global supply. The LNG market's limited spare capacity worsens these risks, as even minor disruptions lead to price spikes, impacting India's import bills. Middle East LNG prices, often oil-indexed (e.g., Qatar's contracts), are sensitive to global oil price fluctuations and regional tensions. Disruptions raise costs, straining India's price-sensitive market, where LNG must compete with cheaper coal and renewables.

There are also institutional problems. For instance, Kurdistan's gas reserves have export potential but Iraq's constitutional framework grants regions limited control, creating legal and political risks. Domestic opposition from Baghdad hinders exports, making Kurdistan an unreliable source compared to Qatar or UAE. This highlights Middle East's

instability as a supply source. Amidst all, FTAs are a saviour. While the India-UAE CEPA already helps reduces tariffs, the ongoing FTA talks with Qatar and Oman are critical to lower costs further. Without long-term agreements, India faces higher import costs compared to competitors like South Korea, which benefits from long-term SPAs with Qatar and Oman. India must diversify away from over-reliance on Middle East LNG to mitigate supply disruptions and price volatility.

Exploring African LNG

African countries with the highest LNG exports are Algeria, Libya, and Egypt, with Algeria leading due to its significant exports in 2023, accounting for approximately 11% of Europe's natural gas consumption.[13] These countries are in North Africa, the region which enjoys a closer proximity to the European markets. This section attempts to look at the trade relations or lack thereof between India and these 3 African countries.

Algeria

Algeria is Africa's leading LNG exporter, with exports in 2023 reaching the highest levels since 2010, supplying about 11% of Europe's natural gas. It has a robust export capacity of 29.3 million metric tons per year, driven by its proximity to Europe and established infrastructure like the Medgaz and Trans-Mediterranean pipelines.14 The key markets primarily include Europe (e.g., Spain, Italy), with 64% of North African LNG exports, including Algeria's, directed to Europe in 2023.[15]

Libya

Libya is a significant but smaller LNG exporter compared to Algeria, with its potential hampered by internal instability. Its exports are marginal, primarily to Europe (e.g., Italy, accounting for 6% of Italy's gas imports). The key markets include Europe, particularly Italy, is the primary destination due to the Green Stream pipeline.[16]

Egypt

Egypt is a major LNG exporter, though exports declined by 3.41 million tons in 2023 due to higher domestic demand, declining gas production, and a temporary halt in Israeli pipeline imports. Egypt exported 0.9 Bcf/d in 2021 and 2022, with peaks during winter when domestic demand is lower.[17] The key markets include Asia (78% of exports, with Pakistan at 22%, China and the UK at 10% each) and Europe (e.g., Turkey, Greece).[18]

The table below shows India's trade status with these 3 countries.

Country	Trade Value (USD)
Algeria	Limited trade; minor importer
Libya	No significant trade
Egypt	No significant trade

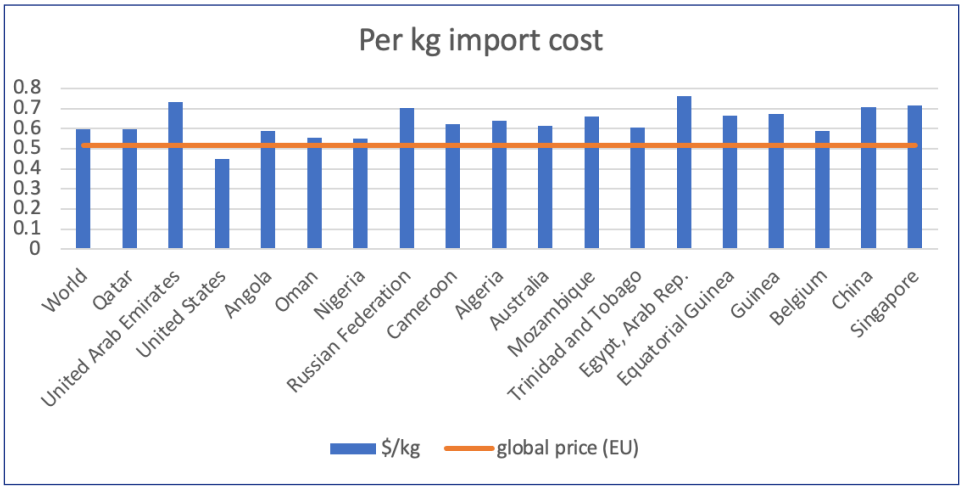
India has limited LNG trade with Algeria. In 2022, India was in talks with Algeria to procure LNG through long-term contracts, driven by concerns over global gas shortages due to the Ukraine crisis. However, Algeria's LNG exports are predominantly directed to Europe due to geographic proximity and established pipelines, with no specific bilateral FTA or LNG-focused agreement with India. Trade is likely facilitated through commercial contracts with Algeria's state-owned Sonatrach, but India is not a major destination compared to Europe. Between India and Libya, there is no clear evidence of significant LNG trade. Libya's LNG exports are limited due to internal instability and are primarily directed to Europe (e.g., Italy via the Green Stream pipeline). India's import data does not highlight Libya as a major LNG supplier, and no specific bilateral agreements or commercial contracts for LNG are noted in available sources. For Egypt, India has some LNG trade, though it is not among Egypt's top export destinations (Pakistan, the UK, and China are prioritized). Egypt's LNG exports are primarily directed to Asia, but India is not as important for Egypt as Pakistan or China. No specific FTA or bilateral LNG agreement exists between India and Egypt, with trade likely occurring through commercial contracts

Shifting to US LNG

The United States, India's second-largest LNG supplier in 2024 after surpassing the UAE, offers competitive pricing for LNG imports. In 2023, U.S. LNG had a lower per kg import cost for India compared to the EU natural gas price (used as a reference for global price), as reported by the World Integrated Trade Solution. This affordability stems from the U.S.'s abundant shale gas production, which lowers costs. U.S. LNG contracts, often tied to the Henry Hub index, provide pricing stability compared to oil-indexed contracts from suppliers like Qatar or Nigeria. The U.S. spot market also allows India to access LNG at lower prices during periods of global surplus.

Increased U.S. LNG imports support India's aim to raise U.S. energy purchases from $10B to $25B, contributing to a $500B bilateral trade target by 2030.[19] Reducing India's 12.5% tariff on U.S. LNG could enhance affordability, unlike China's 15% tariff on U.S. LNG, potentially strengthening India's access to cost-effective supplies and supporting energy security. The U.S.'s expanding LNG export infrastructure and surplus supply contribute to stable pricing, though winter freeze-offs, caused by cold weather disrupting wells and pipelines, can temporarily affect supply reliability. Unlike some Middle Eastern suppliers, U.S. LNG avoids risks like Strait of Hormuz disruptions, though India must account for seasonal supply challenges.

Figure 5: India's per kg import cost.



Source: World Integrated Trade Solution, 2023.

Should Southeast Asia be India's go-to strategy?

The Southeast Asia region offers potential for India to diversify its LNG sources beyond current suppliers like Qatar, UAE, USA, Oman, and Nigeria. However, establishing robust LNG trade with the countries in this region faces significant challenges due to infrastructure gaps, lack of trade agreements, and regional competition. For this paper, we look at the following Southeast Asian countries: Indonesia, Malaysia, and, Brunei.

> ***U.S. LNG offers India cost-effective, stable supplies, boosting energy security despite seasonal risks.***

The table below provides the South-Asian countries ranked according to their reserves of natural gas as well as their production levels. Indonesia is the largest source of natural gas, followed by Malaysia.

The table is also depicted in a pie-chart form.

Table 9: Source: Newly Sanctioned Gas Reserves in Southeast Asia Risk 1.5 degree C Target, Briefing, 2023.

Country	2020 Proven Reserves (TCM)	2022 Production (BCM)
Indonesia	1.25	57.7
Malaysia	0.91	82.4
Vietnam	0.85	7.8
Myanmar	0.43	16.9
Brunei	0.22	10.6
Thailand	0.14	25.6

To determine which country India should choose for imports, we look at the current trade status of these southeast Asian countries with India.

India does not have any trade agreements related to LNG with any South-Asian countries. India is also not an important partner to any of these countries. So, India should prioritize importing LNG from Malaysia and Indonesia, with a secondary focus on Brunei for spot deals. Malaysia, with 0.91 TCM in proven reserves and 82.4 BCM in production (2022), offers significant supply potential through its Bintulu LNG plant (30 MTPA capacity). Indonesia, with 1.25 TCM reserves and 57.7 BCM production, has robust export infrastructure via Bontang and Tangguh plants. Both countries' proximity to India will reduce shipping costs compared to distant suppliers like the U.S., and their JKM-indexed pricing supports competitive spot purchases.

Country	LNG Trade Status	Trade Details
Malaysia	Active (Spot)	Sporadic LNG spot imports (<1% of India's LNG). Bintulu plant serves China, Japan; no India contracts.
Indonesia	Active (Spot)	Occasional LNG spot imports (<1% of India's LNG). Bontang/ Tangguh prioritize regional markets.
Brunei	Active (Spot)	Infrequent LNG spot cargoes. Lumut plant's small scale limits exports.

Other Southeast Asian countries are not viable for LNG imports. Myanmar's political instability and lack of LNG export infrastructure, despite 0.43 TCM reserves, hinder trade, with stalled pipeline plans due to Bangladesh tensions. Thailand (0.14 TCM reserves) is a net LNG importer, while Vietnam (0.85 TCM reserves) focuses production domestically or regionally, lacking export facilities. India should focus on Malaysia and Indonesia for their established export capabilities and invest in trade agreements to compete with China and Japan, ensuring energy security and cost-effectiveness while complementing primary suppliers like the U.S. (35% target share) and Qatar (28% target share).

Way Forward

The findings so far indicate that India's import optimization is a strategic task and must be undertaken to meet its sustainability goals. India must diversify its imports across the world, considering African (particularly, North African) and southeast Asian players (like Indonesia, Malaysia, and Brunei). While India has a negligible trade with these players, a novel strategy, involving these countries, can help India achieve its goals. The diversification of imports not only provides a safety net in times of geopolitical risks but also provides a price control for Indian imports. For instance, the different countries discussed above follow different pricing for natural gas. The U.S. follows gas-on-gas pricing, while much of the Middle eastern and Asian countries follow oil-indexed or fuel-indexed pricing. This often makes the pricing of natural gas very volatile. India can therefore leverage the gas-on-gas pricing rates of the U.S. LNG to reduce its import bills. Diversification can provide a cushion against such price shocks.

Bridging the Infrastructure Gap

Even if India can strike agreements with these countries, it requires requisite domestic infrastructure to utilise it. For instance, importing LNG requires regasification facilities, which further require better transport and strong City Gas Distribution (CGD) system. Re-gasified LNG is often liquefied for use, which requires liquefaction facilities. The import terminals where the LNG arrives must be at their full utilization. Such base-level changes require a robust infrastructure at India's end, and not just developing a trade agreement with our potential import sources. Thus, India must develop and work towards bridging this infrastructure gap.

To increase Southeast Asian (Malaysia, Indonesia, Brunei) imports:

- Expand regasification capacity at Dahej and Kochi terminals to handle increased LNG from Malaysia's Bintulu plant and Indonesia's Bontang and Tangguh plants, optimizing for shorter shipping routes.
- Upgrade Kochi terminal with additional storage tanks and vaporizers to process JKM-priced LNG from Malaysia, Indonesia, and Brunei's Lumut plant.
- Develop dedicated berthing facilities at Dahej for Brunei's infrequent spot cargoes to reduce turnaround times.

To improve the US LNG imports:

- Upgrade Mundra and Dahej terminals to accommodate larger U.S. LNG carriers for Henry Hub-priced shipments, addressing trans-Pacific logistics.
- Develop contingency storage at Mundra terminal to buffer disruptions from U.S. winter freeze-offs, ensuring supply reliability.
- Enhance terminal automation and digital monitoring at Dahej to improve efficiency for U.S. spot market purchases.

Middle Eastern (Qatar, UAE, Oman) imports will require:

- Investing in storage facilities at Ennore terminal to buffer Strait of Hormuz disruptions for Qatar, UAE, and Oman's oil-indexed LNG.
- Extending Kochi-Mangalore and Kochi-Bangalore pipelines to southern cities like Coimbatore to distribute Oman and UAE LNG efficiently.
- Completing Jagdishpur-Haldia-Bokaro-Dhamra Pipeline (JHBDPL) to connect Dhamra terminal to inland demand centers for Qatar's LNG.

India can expand African (Algeria, Egypt) imports:

- Upgrade Kochi terminal to handle LNG specifications from Algeria (29.3 MTPA capacity) and Egypt (0.9 Bcf/d winter exports).
- Develop storage facilities at Kochi to manage limited Algerian and Egyptian LNG imports, ensuring supply stability.
- Enhance port facilities at Ennore for larger African LNG carriers to support minor import volumes.

In conclusion

India's pursuit of a 15% natural gas share by 2030 and net-zero emissions by 2070 will keep it heavily reliant on LNG imports due to limited domestic production and geopolitical constraints for piped gas. To achieve these goals, India must optimize its LNG imports by prioritizing cost-effective and stable sources. However, optimizing imports alone is insufficient without robust infrastructure improvements. India requires to adopt strategic trade policy with comprehensive domestic capacity building to achieve its desired target of utilising natural gas for its sustainable energy needs. ●

By Dr. Amitayu Sengupta and Udhai Rawat

Endnotes

1. Source: https://afdc.energy.gov/fuels/natural-gas-basics#:~:text=Natural%20gas%20is%20an%20odorless,up%20of%20methane%20(CH4)

2. Source: https://www.gasvessel.eu/news/natural-gas-vs-coal-impact-on-the-environment/

3. Source: https://www.iea.org/world/natural-gas

4. The vertical axis is expressed in exajoules (EJ) as it is one of the standard units used by the IEA for natural gas. Mathematically, 1 EJ ≈ 26.315 bcm. For instance, if the IEA reports a natural gas demand increase of 4 EJ in 2024: in bcm, it is 4×26.315≈105.26 bcm.

5. Source: https://www.iea.org/reports/global-energy-review-2025/natural-gas

6. Source: https://www.iea.org/

7. Source: https://www.iea.org/

8. Source: https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=1987803

9. Source: https://www.iea.org/

10. Source: https://pgjonline.com/news/2025/april/gail-nears-completion-of-2-054-mile-urja-ganga-pipeline-project

11. Source: https://www.pib.gov.in/PressReleasePage.aspx?PRID=1986249

12. Source: https://pgjonline.com/magazine/2024/october-2024-vol-251-no-10/features/india-sets-67-billion-goal-to-expand-gas-pipeline-network-by-9-630-miles

13. Source: https://www.lngindustry.com/special-reports/21112024/meeting-the-demands-the-lng-industry-in-africa/

14. Source: https://www.statista.com/statistics/1297972/lng-export-capacity-in-africa-by-country-and-status/

15. Source: https://www.spglobal.com/commodity-insights/en/news-research/latest-news/lng/030624-africas-big-five-lng-exporters-optimistic-for-growth-despite-recent-slump

16. Source: https://www.gisreportsonline.com/r/natural-gas/

17. Source: https://www.eia.gov/todayinenergy/detail.php?id=61042

18. Source: https://www.gisreportsonline.com/r/natural-gas/

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Recommended Citation

Sengupta, A & Rawart, U (2025). Study on Trade Potential of Indian Electronic Components Industry, Chintan Research Foundation (CRF), New Delhi

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