

Explainer: India's energy security



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Table of content

Executive summary	4
Introduction	6
Overview of India's energy demand	8
Overview of India's energy supply	10
Way forward for India	31
Concluding observations	33

Executive summary

Energy security is pivotal for a country's economic growth and sustainable development. The country's oil and gas resources, be it imports or domestic production, have the wherewithal to insulate its economy from global market fluctuations, currency movements and conflicts. This lends oil and natural gas resources or hydrocarbons, a strategic edge apart from playing a key role in economic development and imparting prosperity.

In the last few decades, nation states have become increasingly aware of the limitation on exploitation of hydrocarbon resources within their own geographies and formulated pointed strategies to ensure they have sufficient energy resources to keep their economy on expansion mode. In the last year, when the conflict between Russia and Ukraine deepened, global supply chains of raw energy material have come under closer scrutiny. Several countries have imposed full or partial bans on Russian oil and gas while others have increased the intake of these Russian hydrocarbons owing to price slide and discounts on offer. The West, specially, the US, EU and other NATO countries have been urging other nations like India to snap trade ties with Russia and to reduce their dependence on Russian crude oil and gas. In the recent past, when the European Union imposed a ban on Russian oil supplied through the sea, the US slapped a complete ban on all Russian oil. G-7, European Union and Australia also aligned to enforce price caps on Russian oil. There has also been a lingering push from the West to other nation states to reduce their oil and gas dependency on Russia. The US, which has rich shale gas reserves, imported just three per cent crude oil from Russia in 2021. Shunning Russian oil and gas may not have a significant impact on US energy security. The US has shale gas deposits that may last for about 100 years and five years of proven crude oil reserves. In contrast, India, which has far greater energy demand, maintains a measly nine days of petroleum reserves¹. A similar analysis for the EU shows that the 27-nations reserves account for nearly 90 days of consumption.

¹ *Indian Strategic Petroleum Reserve Limited* (no date) *INTERNATIONAL COOPERATION - ISPRL | Ministry of Petroleum and Natural Gas | Government of India - Ministry of Petroleum And Natural Gas*. Available at: <https://mopng.gov.in/en/international-cooperation/ispri> (Accessed: January 3, 2023).

In this backdrop, as data suggests, India may have to secure its energy requirements to sustain healthy 6 – 9 per cent annual economic growth, accelerate social progress and development. India's energy interests *vis-a-vis* the supply, access, pricing of energy raw materials may demand a closer analysis notwithstanding the fact that India continues to diversify its energy supply chain. As India becomes the third biggest importer of crude oil from Russia, it is essential for other nation states to holistically view her energy demand patterns, production, refining and imports.

Key Observations:

1. India's electricity and household fuel consumption is largely rooted in crude oil and its derivatives. To meet its growing demand, India relies heavily on imports of crude oil from over half a dozen countries.
2. India's imports of Russian crude oil have increased from around 7 million barrels in April 2022 to over 30 million barrels in September 2022. Both Iraq and Saudi Arabia continue to be other large exporters of crude oil to India. All these imports are critical for meeting India's growing energy demand.
3. Russian oil exports to the US account for a statistically minor quantity compared to other large exporters like Canada and Mexico. In 2021-22, US imports of Russian crude oil were as low as three per cent. However, in April 2022, before the conflict between Russia and Ukraine flared up and consequently imposed a ban on Russian oil, the US imported over 10 million barrels of Russian oil. The ban does not significantly affect the energy security of the US.
4. The European Union (EU) relies on natural gas and crude oil to meet over 60 per cent of its energy needs. Till 2021, nearly 40 per cent of this requirement was met from Russia.
5. In June 2022, the EU imposed a partial ban on Russian oil and gas. However, compared to previous years, the EU dependence on Russian oil and gas did not reduce significantly. It still imports 23 percent of natural gas and 20 percent of crude oil from Russia. The EU still relies on Russia to meet their energy needs.

Introduction

India's economic, social, technological, auto, and infrastructural development has a direct implication on its energy necessities. India's energy needs are mammoth with over 5 million barrels of oil consumed per day², which is growing at 3 percent annually compared to 1 percent globally. The processing and refining capacity stands at 250 million metric tons per annum (MMTPA)³. Indian petrol pumps and gas stations serve over 60 million visitors on a daily basis⁴. To ensure energy security for its people, India imports crude oil and petroleum products from all major oil companies of the world. In the last few years, India's power demand has grown rapidly. In 2010, India's energy requirement stood at 8.6 lakh billion units (BU) and in 2021-22, the energy demand had risen to 13.8 lakh BUs (which is over 60 percent growth in electricity demand). At the same time, India's ambitious power sector has also kept pace in meeting this growing requirement. While the energy deficit for the year 2010-11 was 8.5 percent, the deficit reduced to a mere 0.4 percent in the 2021-22. Not only has the installed generation capacity of Indian power plants (including thermal, renewable, and nuclear) gone up but the efficiency of these plants has also improved⁵. India deploys various sources of energy to meet its needs, viz., coal, oil and gas, along with renewable energy sources like wind, solar, tidal, biomass, and nuclear. India is the third largest consumer of crude oil and imports nearly 80 percent of the total required. Of the demand of 5 million barrels per day, India imports approximately 4.2 million barrels per day⁶. While coal and other imports are largely used in electricity generation, crude oil is refined and used for gasoline, diesel, petrol, and for aviation fuels. In this backdrop, where Indian energy needs continue to soar enormously, the need for meeting India's growing power and energy demand is quintessential. Right from providing fuel for vehicles, to serving the electricity needs of industries and factories, to providing cooking fuel to millions of households, India has to ensure it never faces an energy crisis.

² Puri, H.S. (2022) *With the current daily consumption of 5 million barrels a day, India will be the critical driver of demand in energy sector in the next 10- 20 years. Strong Leadership & several measures taken by the Indian Govt will ensure India's energy security.* pic.twitter.com/hvo54dgujp. Available at: <https://twitter.com/hardeepsuri/status/1528259697173704705> (Accessed: January 3, 2023).

³ *Refining - history and evolution: Ministry of petroleum and natural gas: Government of India* (no date) *REFINING - HISTORY AND EVOLUTION | Ministry of Petroleum and Natural Gas | Government of India*. Available at: <https://mopng.gov.in/en/refining/history-and-evolution#:~:text=Today%20India%20is%20the%20global,United%20States%2C%20China%20and%20Russia.> (Accessed: January 3, 2023).

⁴ *Press statement* (no date) *Press Information Bureau*. Available at: <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1822665> (Accessed: January 3, 2023).

⁵ *Power sector at a glance* (no date) *Ministry of Power*. Available at: <https://powermin.gov.in/en/content/power-sector-glance-all-india> (Accessed: January 3, 2023).

⁶ Monthly crude oil import data from Ministry of Trade and Commerce, commodity selected: Petroleum crude. Conversion factor - 1 Kg = 0.0062898 barrels of oil. Monthly import of crude oil is 127.8 million barrels.

Unlike the West, specially the US and EU, which have put sanctions on Russian oil, India needs to ensure there its reserves not only meet the requirements of the present times but also meet the needs of the future. While sanctions on Russian oil can have a direct impact on oil trade emanating from West Asia and Saudi Arabia, India has become the hinge that is balancing the global oil trade by increasing its imports from Russia.

Overview of India's energy demand

The energy demand of India emanates from fuel needed for transportation, for household purposes, heating in industries, and power generation. India's energy consumption has grown manifold in the last few years. To support rapid growth and development, Indian agencies have ensured that there is sufficient fuel and raw materials. For this, India has improved and expanded its production capacity, diversified its energy supply, and enlarged its import portfolio. India's energy demand can be understood as follows:

1. Electricity:

- a. India's power demand has soared immensely over the last decade. Fig. 1. shows the growing requirement for electricity in India from 2009 to present. While the demand for electricity has peaked in 2021, Indian power plants (specially, thermal power plants) have also improved their efficiency over the years⁴. The Indian government's push for green energy has also helped in meeting the energy supply in a more sustainable manner.

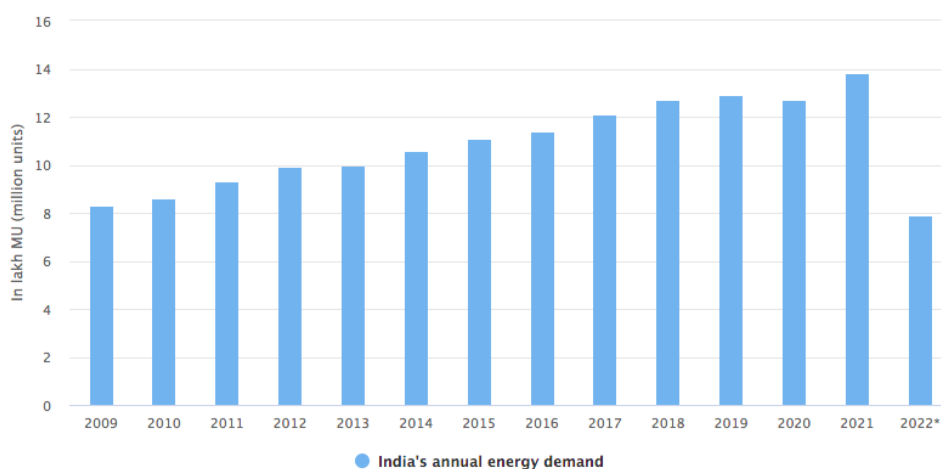


Fig. 1. India's annual electricity demand from 2009 to present. Data for 2022 only available till September. Source: Power Sector at a Glance, Ministry of Power.

2. Transport fuel and household fuel:

- a. Fuel consumption is considered as a proxy for oil demand. India became the third largest consumer of oil after its consumption rose by 17.9 percent in June 2022 compared to June 2021. Diesel consumption rose about 24 percent year-on-year in 2022, with a net value of 7.6 million metric tons. Gasoline or petrol consumption increased by 23.2 percent year-on-year and stood at nearly 3 million metric tons. Fig.

2. shows an overview of India’s fuel consumption year-on-year from April to June 2021-22. It includes household consumption as well⁷.

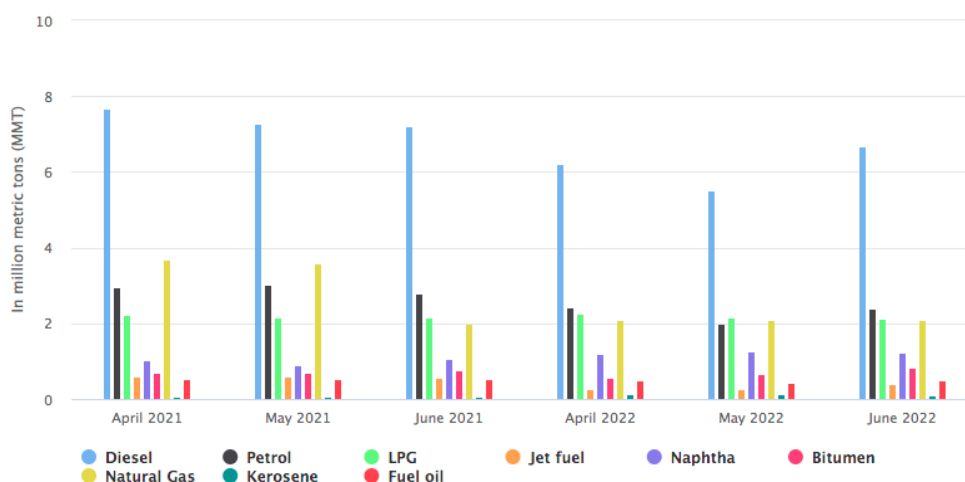


Fig. 2. Fuel consumption in India compared over a period of three months, April - June year-on-year for 2021 and 2022. Source: Petroleum Planning and Analysis Cell. Conversion 1 MMT = 1325 MMSCM.

b. It is crucial to understand the sources of fuels used for meeting the energy requirement of the country. A brief outline of these fuel types is given in the table below. Apart from transport fuel, household consumption also makes a significant part of India’s energy requirement. As seen from the Table, crude oil is a prominent part of India’s energy security. Crude oil not only provides gasoline and petroleum products but also is the source for cooking gas.

Type of fuel	Source	Uses
Diesel	Crude oil and biomass	Transport fuel
Petrol	Crude oil	Transport fuel
LPG	Oil extraction	Domestic heating, cooking, transport fuel
Jet Fuel	Crude oil	Aviation fuel
Naphtha	Crude oil refining	Solvent used as a cleaning fuel
Bitumen	Crude oil distillation	Road construction, roofing, boiler fuel
Natural Gas	Coal and oil	Power generation, transport fuel, household fuel for cooking, heating
Kerosene	Crude oil distillation	Cooking fuel, lighting, heating
Fuel Oil	Distillation of crude oil	Power generation, industrial heating, boiler fuel

⁷ MONTHLY REPORT ON Natural Gas Production, Availability and Consumption November 2022 (no date) Petroleum Planning and Analysis Cell (PPAC). Available at: https://ppac.gov.in/uploads/rep_studies/1672033256_Monthly%20Gas%20Report-%20November%202022%20WebV.pdf (Accessed: January 3, 2023).

Overview of India's energy supply

In order to meet its energy demand, India has implemented pointed strategies for energy supply. Apart from coal-based energy supply, India has also dramatically increased its capacity for production of energy from renewable sources. India is a key driver of the International Solar Alliance and has increased its production of solar-based energy significantly in the last few years. As mentioned by the Indian leadership time and again, India will continue to source its energy from non-fossil sources in the years to come and meet its 2030 target of 500 GW of energy production by renewable sources⁸. A granular analysis of India's energy supply is given below.

1. India's energy mix is shown in Fig.3. About 58 percent of Indian energy needs are met through non-renewable energy sources like coal, lignite, gas, and petroleum. Over the years, India's energy policies have pledged to reduce dependency on fossil fuels and to increase the domestic production of renewable energy, like hydro, solar, wind, and biomass. The total generation capacity is over 407 GW⁴.

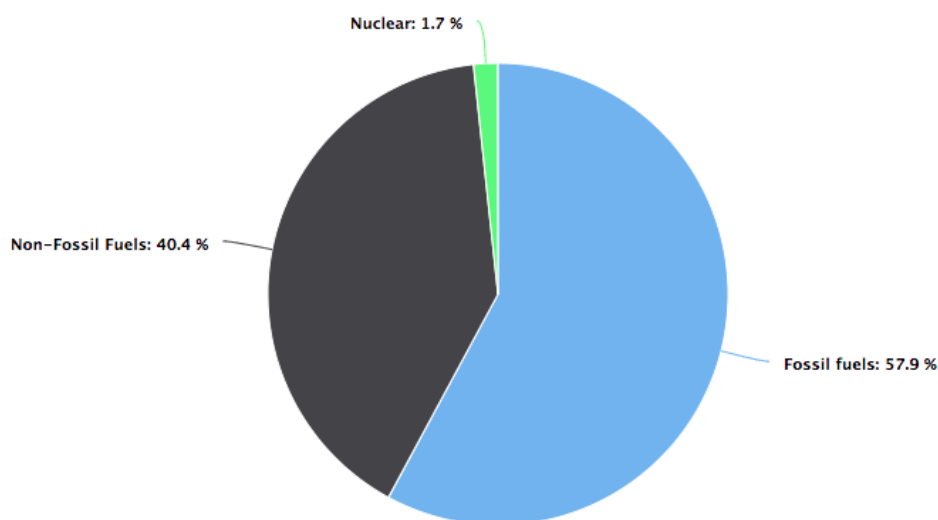


Fig. 3. An overview of India's energy mix. Source: Power Sector at a Glance, Ministry of Power

2. A detailed view of India's non-renewable energy mix is shown in Fig. 4. Thermal power generation (coal-based) accounts for over 50 percent of total power generation. Installed capacity of coal-fired plants is over 200 GW at present. In the category of non-renewable energy, coal-fired plants account for over 86 percent⁴.

⁸ *Renewable energy in India* (no date) Press Information Bureau. Available at: <https://pib.gov.in/FeaturesDeatils.aspx?NoteId=151141&ModuleId+=+2> (Accessed: January 3, 2023).

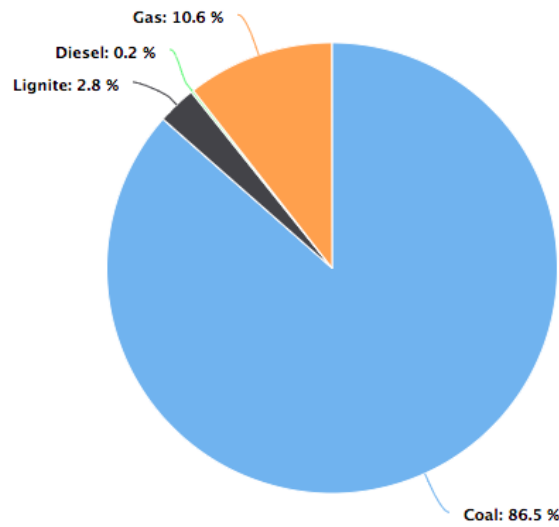


Fig.4. Fossil-based energy mix. Source: Power Sector at a Glance, Ministry of Power

3. Similarly, Fig. 5 shows a granular detail of energy generation from renewable sources. Solar energy accounts for nearly 37 percent of total power generation from renewable sources, followed by hydro and wind power. There has been over 13 percent growth in renewable energy production in 2022-23 as compared to 2021-22⁴.

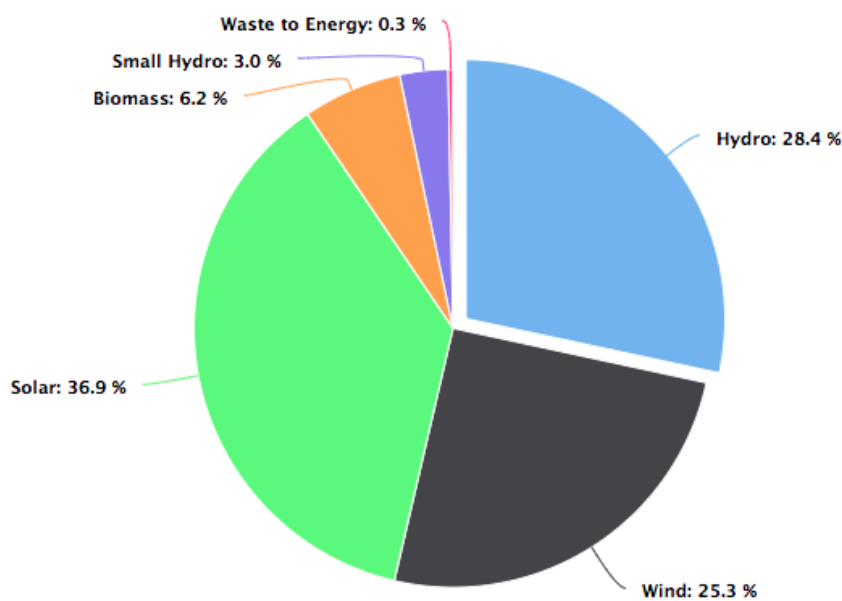


Fig. 5. Renewable energy mix for India. Source: Power Sector at a Glance, Ministry of Power.

Sourcing India's raw materials for energy production:

After a review of the energy demand and supply equation in India, it is critical to analyse the sources of India's energy production. Majority of the energy comes from coal, natural gas, and crude oil. Their exploration and production has been explained in detail in this section.

- 1. Coal** - India is the second largest importer of coal in the world after China and over 55 percent of Indian energy needs are met through coal. Fig. 6. shows India's coal import *vis-a-vis* domestic coal production. With a push by the government towards domestic manufacturing and improved processing facilities, coal imports are set to gradually decline. Coal production peaked in 2021-22 when India manufactured nearly 800 million tons of coal⁹.

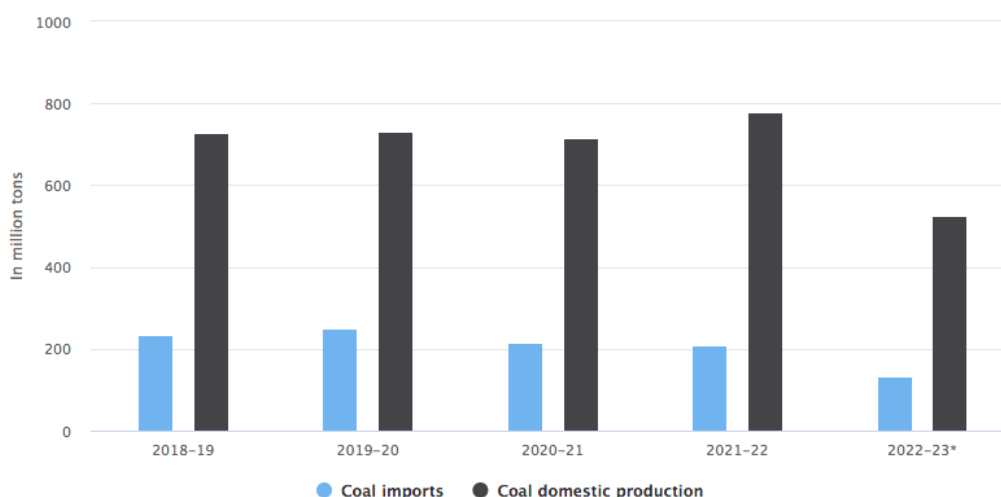


Fig. 6. Source: Data for 2022-23 available till September end 2022. Source: Production and Supplies. Ministry of Coal

India largely avails its imports from Indonesia, South Africa, Australia, US, Colombia, Mozambique, and Russia. However, in July 2022, Russia became the third largest exporter of coal to India with their exports rising by more than a fifth, standing at a value of over 2 million tons¹⁰. Russian coking coal is used in steel production in India and recently, India has also decided to use Russian coal for thermal power and meet India's energy requirement. Import pattern of coal (thermal and coking coal) has been shown in Fig. 7.

⁹ *Production and Supplies, Ministry of Coal, Government of India*. Available at: <https://coal.gov.in/en/major-statistics/production-and-supplies> (Accessed: January 3, 2023).

¹⁰ *Provisional Coal Statistics 2018 to 2022, Ministry of Coal, Government of India*. Available at: <http://coalcontroller.gov.in/writereaddata/files/download/provisionalcoalstat/Provisional%20Coal%20Statistics%202021-22.pdf> (Accessed January 3, 2023).

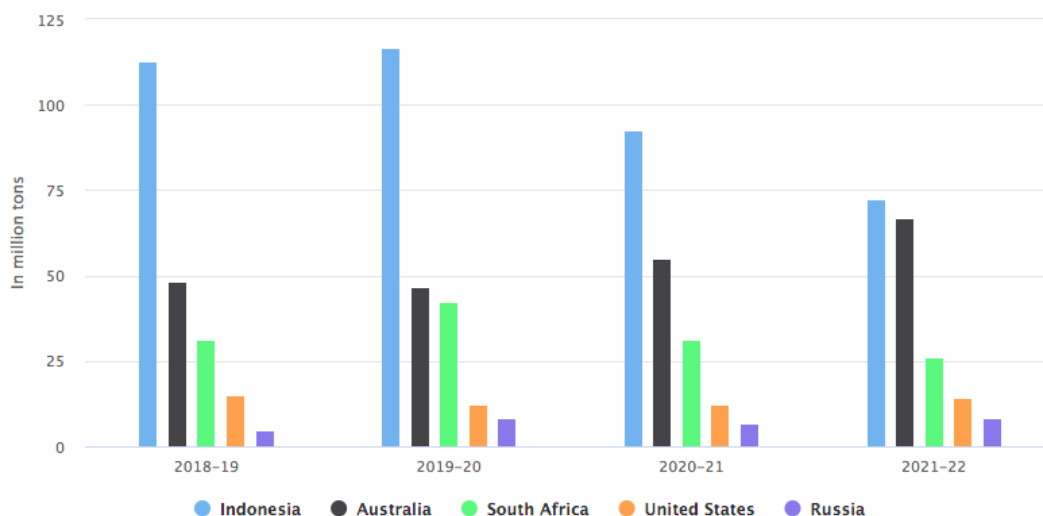


Fig. 7. India's net coal imports from top 5 suppliers. Source: Provisional Coal Statistics (2018-22).

Coal reserves - As a means to safeguard India's national interests, India has installed several facilities to stock coal for emergency purposes. Keeping in mind the growing demand for coal, the government has ensured that it has sufficient reserves of coal. As stated by the Union Minister of Coal, India adds about 4000 million tons to 6000 million tons of coal to its inventory every year¹¹. From 2013 to 2018, India's coal stock inventory increased as shown in Fig. 8¹².

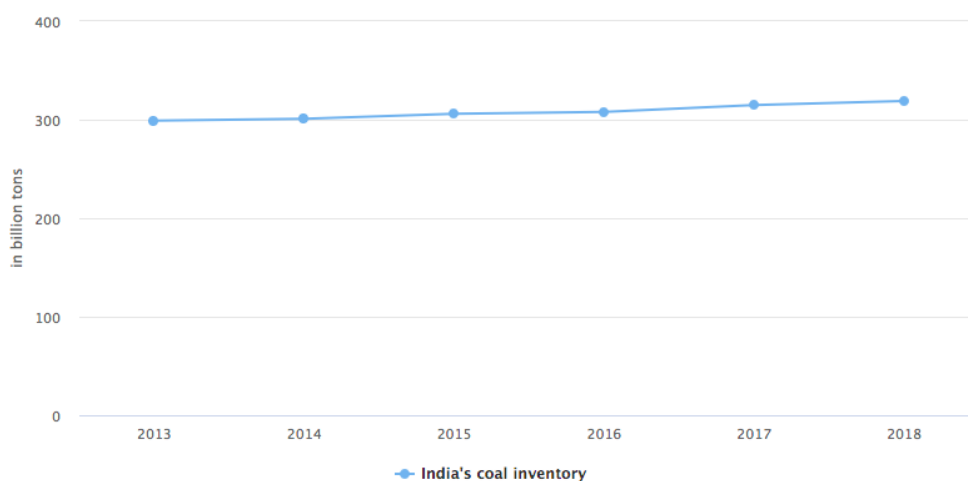


Fig. 8. India's coal inventory over the years. Source: Coal Reserves, Ministry of Coal.

¹¹ *Details of coal reserves in India - Ministry of Coal*. Available at: <https://www.coal.nic.in/sites/default/files/2022-04/PressReleasePagedet08.pdf> (Accessed: January 3, 2023).

¹² *Coal Reserves (no date) Ministry of Coal, Government of India*. Available at: <https://coal.gov.in/en/major-statistics/coal-reserves> (Accessed: January 3, 2023).

2. Petroleum - Petroleum and gasoline are the other major fuel sources to meet India’s energy demand. For petroleum and its derivatives, India largely relies on domestic production. Imports are largely arranged from China and as seen from Fig. 10 and there has been an increase in imports from UAE and Indonesia in the last two fiscal years¹³.

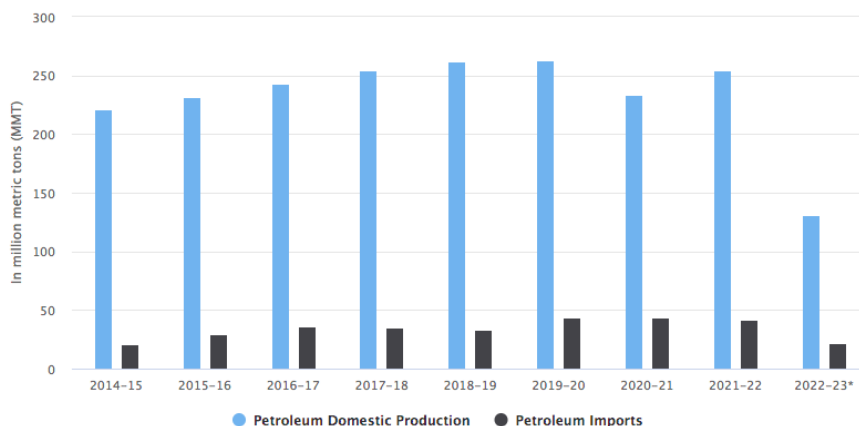
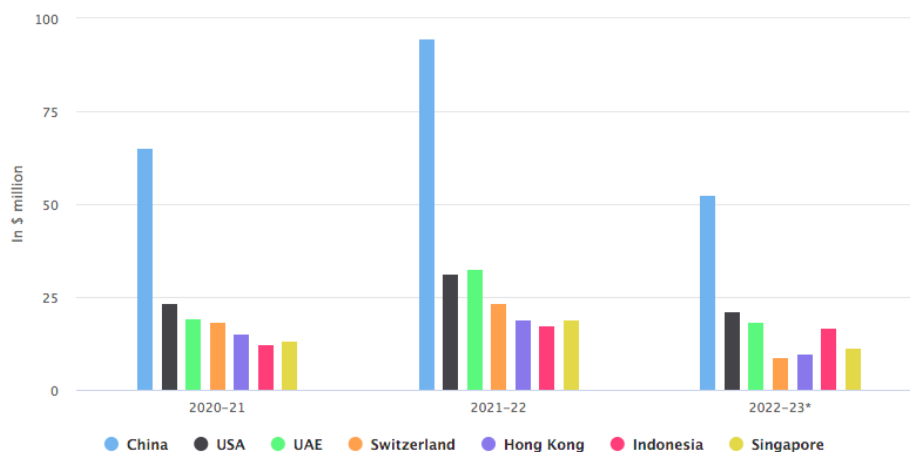


Fig. 9. Domestic production vs. import of petroleum in India. Source: Indian Petroleum and Natural Gas Statistics, Ministry of PNG. Data for 2022 available till September.

In Fig. 10. shows the country-wise imports of petroleum and petroleum products in India. China, the US, and UAE continue to be top exporters for India in both value and volume. India has significantly increased imports from Indonesia while reducing imports from Switzerland and Hong Kong.



¹³ *Petroleum and Natural Gas Statistics 2021-22*. Available at: https://mopng.gov.in/files/TableManagements/IPNG-2021-22_L.pdf (Accessed: January 3, 2023).

Fig. 10. Country-wise import of petroleum and products for India. Source: Indian Petroleum and Natural Gas Statistics, Ministry of PNG.

3. LNG imports - Natural gas (both CNG and LNG) plays a vital role in meeting India's energy requirements. India is the fourth largest importer of LNG in the world and imports the majority of the LNG used in the country. In the last few years, however, there has been a push by the government to reduce LNG imports. Fig. 11 shows the net LNG imports in India in the last few years. India's dependence on LNG has seen an increase since 2019-20¹⁴.

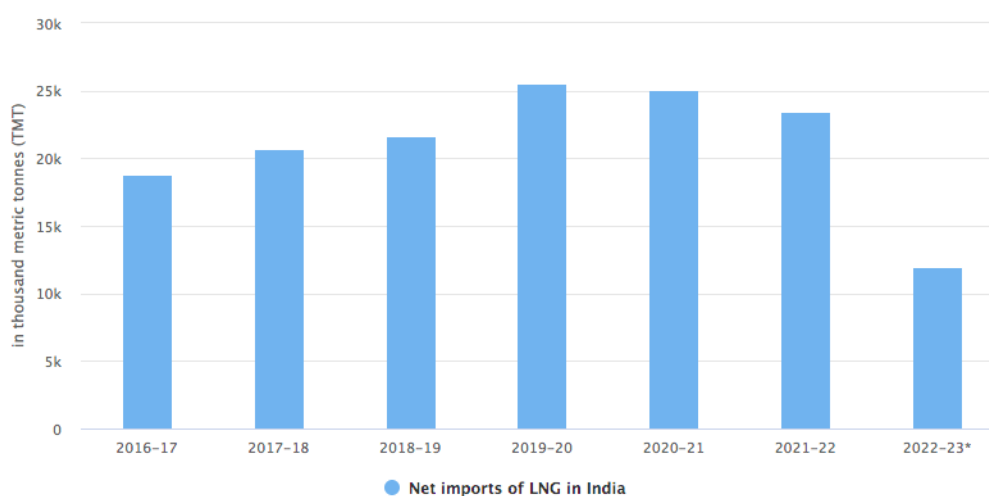


Fig. 11. Indian LNG imports over the years (2016 - 2022). Data for 2022 available only till September. Source: Indian Petroleum and Natural Gas Statistics 2021-22; Ministry of Trade and Commerce.

Fig. 12 shows the top exporters of LNG to India. Qatar remains to be the top exporter while India has increased imports of LNG from the US and UAE in the last two years. This drives the point home that India has a diverse import portfolio to meet the demand for raw materials. While the discourse on Russian crude oil has taken centre stage in India's oil and gas imports, a holistic view shows that all imports are unequivocally relevant for India's energy security.

¹⁴ Dashboard of Ministry of Trade and Commerce. Commodity selected: LNG

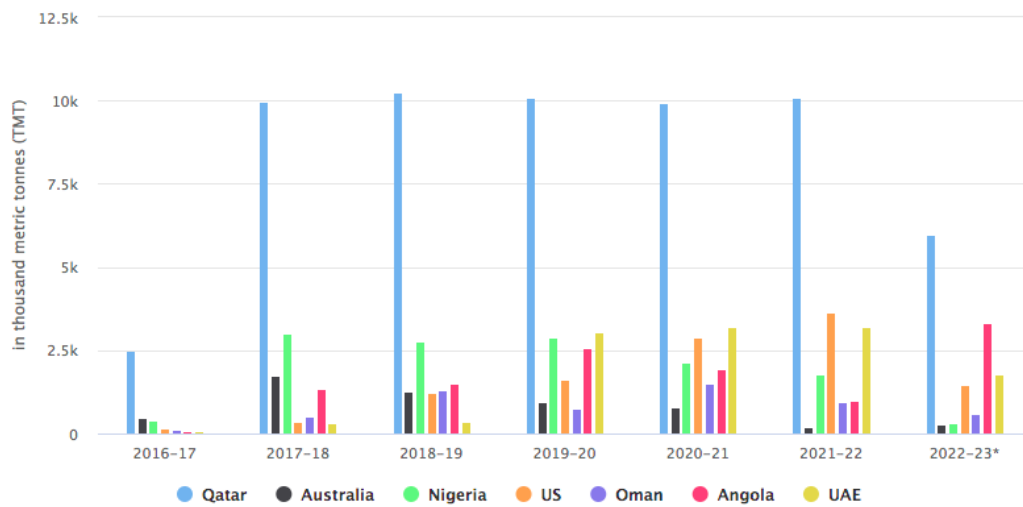


Fig. 12. Top exports of LNG to India. Data for 2022 available till October. Source: Ministry of Trade and Commerce.

4. Crude oil - A large share of India’s energy demand is met through crude oil. It imports crude oil in huge quantities as shown in Fig. 13. Crude oil demand has soared in the last few years and is expected to keep rising in the future. India’s production of crude oil is small compared to the imports of crude oil^{12 15}.

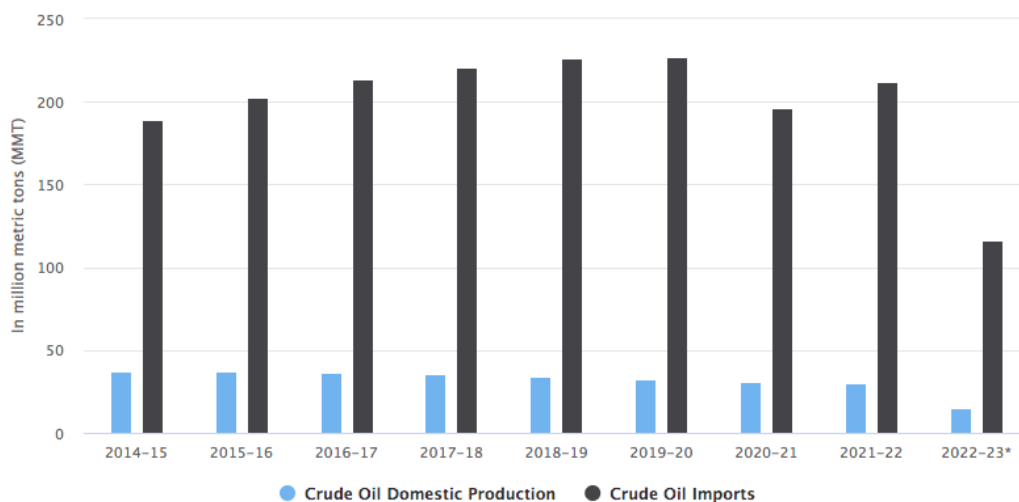


Fig. 13. Crude oil domestic production vs. imports. Source: Indian Petroleum and Natural Gas Statistics; Ministry of PNG. Data for 2022-23 available till September 2022.

¹⁵ Dashboard of Trade and Commerce. Commodity selected: Crude Oil.

Fig. 14 shows the country-wise imports of crude oil to India in the last two years. India’s import of Russian crude oil has increased in 2022-23 owing to the lower rate of Russian oil. Iraq and Saudi Arabia continue to be other significant exporters of crude oil to India^{12 14}.

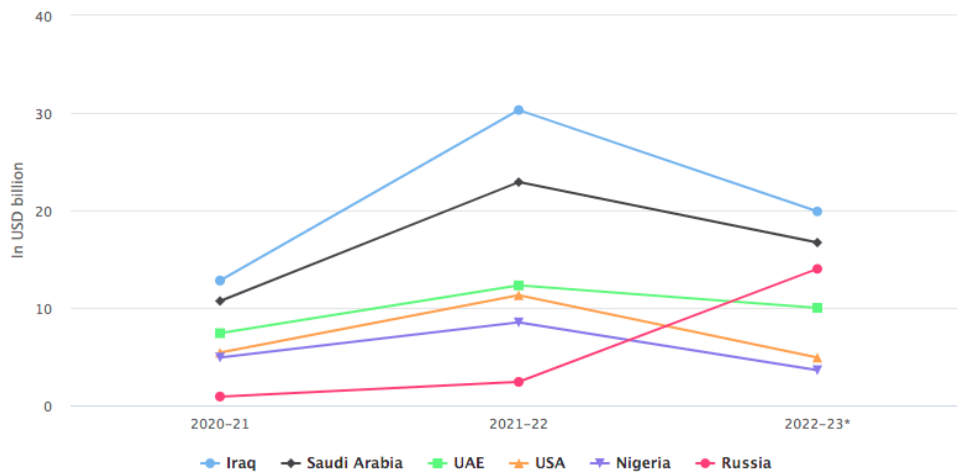


Fig. 14. Top 5 crude oil suppliers over three years. Source: Ministry of Trade and Commerce. Data for 2022-23 available only September 2022.

Fig. 15 and Fig. 16 show the monthly-wise import of Russian crude oil to India from April to September 2022 in both value and volume. As can be observed, Indian imports of Russian crude oil have dramatically increased in the last few months which is indicative of Russia’s decision to supply oil at lower prices and India’s push towards meeting its ever-increasing demand for crude oil.

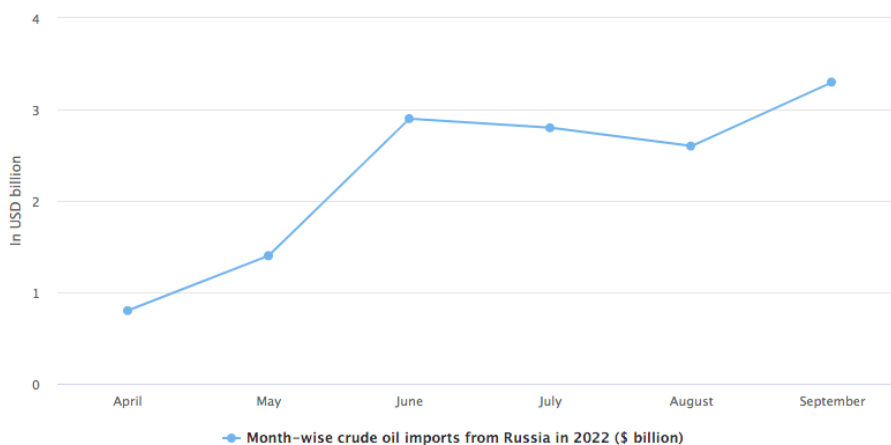


Fig. 15. Russia crude oil imports to India (in billion dollars) during April to September 2022. Source: Ministry of Trade and Commerce.

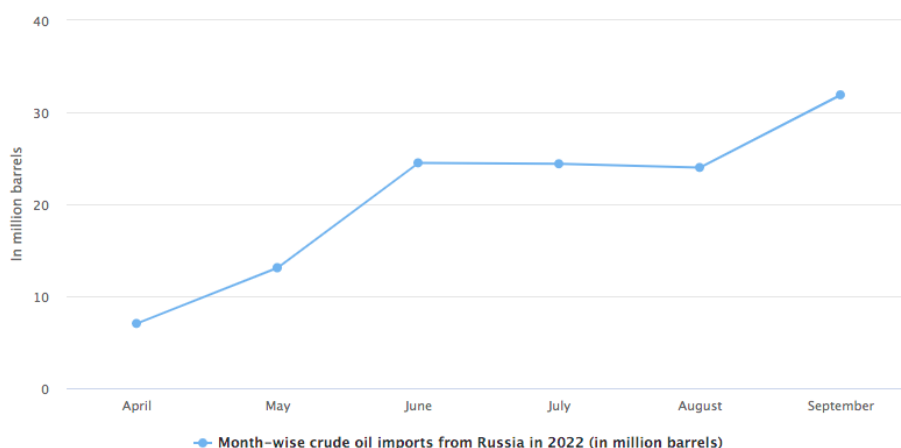


Fig. 16. Russian crude oil imports in mn barrels during Apr-Sept 2022. Source: Ministry of Trade and Commerce.

Indian oil and gas assets abroad - In order to protect economic interests and also to diversify oil exploration and production, India has adopted several measures, of which, investing in oil assets abroad is key. At present, Indian oil and petroleum companies have assets in about 25 countries and 55 active projects globally. The overall investments account for over \$36.5 billion (as of November 2022). These investments have been mapped in Fig. 17 and a company-wise break-up is given in Table 2¹⁶. As can be observed, India has assets and exploration projects across the world with a huge concentration of these projects in the Middle East and Africa region. India has also recently initiated projects in Latin America and South East Asia.

¹⁶ International Cooperation - Oil Gas Assets: Ministry of Petroleum and Natural Gas: Government of India - Ministry of Petroleum and Natural Gas INTERNATIONAL COOPERATION - OIL GAS ASSETS | Ministry of Petroleum and Natural Gas | Government of India - Ministry of Petroleum And Natural Gas. Available at: <https://mopng.gov.in/en/international-cooperation/oil-gas-assets> (Accessed: January 3, 2023).



Fig. 17. Indian oil projects and assets abroad.

Table. 2. India’s oil and gas exploration and production projects abroad

Indian oil co.	Oil and gas assets abroad	Number of projects
Indian Oil Corporation Ltd.	10	12
Hindustan Petroleum	1	2
Oil India Limited	9	12
ONGC Videsh	17	37
Bharat Petroleum	8	12
GAIL (India) Limited	2	5

Fig. 18 and Fig. 19 show a comparative between the volume of crude oil and natural gas produced domestically and that sourced from assets abroad. As can be seen, the production of energy materials from global projects has been ensured to meet a certain level of production (for crude oil between 10 MMT and 20 MMT and for natural gas between 8 MMT to 10 MMT). These assets have played a key role in achieving oil and gas production targets for India and for meeting Indian energy needs. They have also bolstered trade and have added to global economic growth¹².

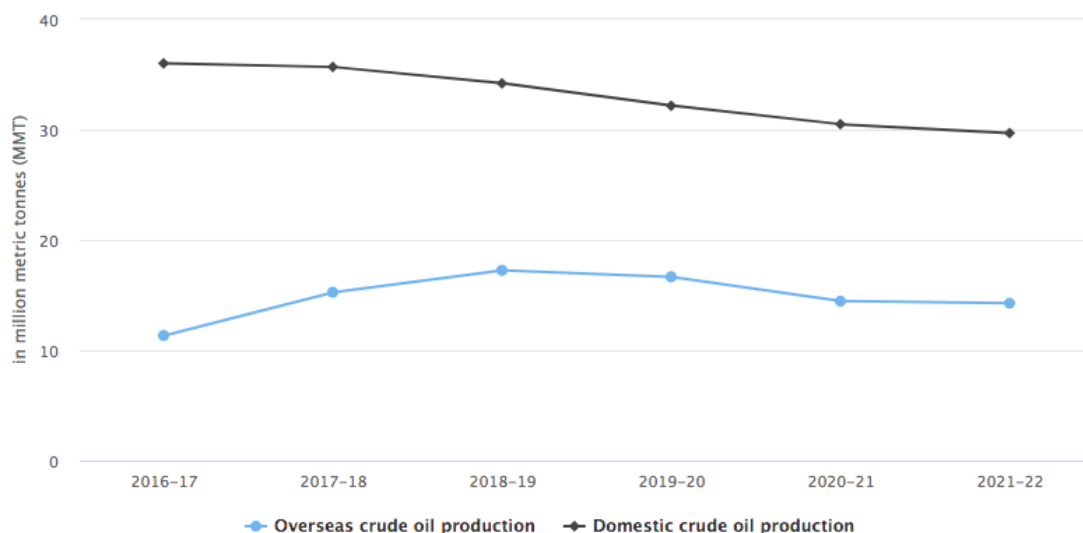


Fig. 18. A comparative between crude oil production domestically and from assets abroad. Source: Petroleum and Natural Gas Statistics 2021-22; Ministry of PNG.

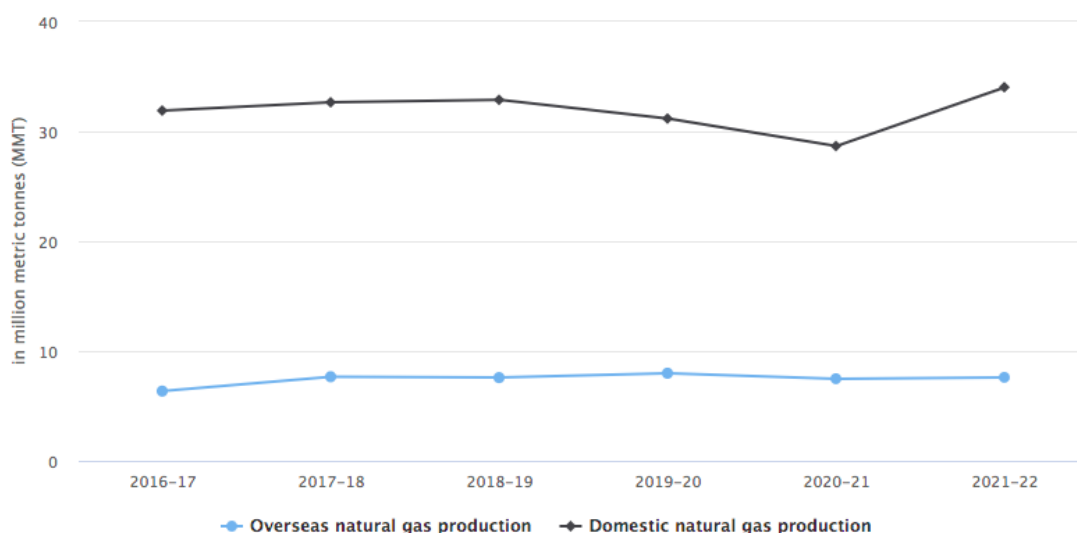


Fig. 19. A comparative between natural gas production domestically and from assets abroad. Source: Petroleum and Natural Gas Statistics 2021-22; Ministry of PNG.

Diversification of fuel - A key feature of Indian energy security is the diversification of fuel to produce energy. In the last few years, especially since 2014, the government has introduced and implemented schemes to find alternatives to fossil fuels. Here are a few of such measures:

- 1. Ethanol blending** - A strong focus of the present government is to move towards green energy in the coming years. The government has pledged to produce 50 percent of its energy through non-fossil sources and reduce 1 billion tons of emissions by 2030. This implies that

Indian energy needs to be diversified in a way that its dependence on carbon reduces significantly while still augmenting energy security. To this end, initiatives to produce and use Ethanol Blended Petrol (EBP) have come into effect as laid out in the National Biofuels Policy, 2018. The Policy states that by 2030, 20 percent blending of ethanol in petrol will be achieved^{12 17}.

In 2022-23, India achieved its target of 10 percent ethanol blending 5 months ahead of the scheduled target of November. Fig. 20 shows the extent to which India has saved expenditure of foreign currency by ethanol blending of petrol. As can be observed from Fig. 20, India's saving of foreign currency nearly quintupled from 2015-16 to 2020-21^{12 16}.

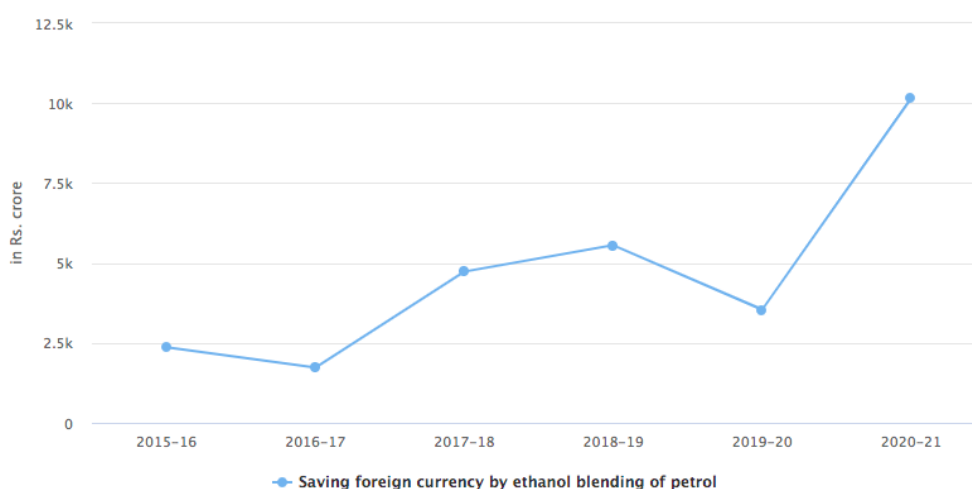


Fig. 20. Foreign currency saved by ethanol blended petrol in the last few years. Source: Petroleum and Natural Gas Statistics 2021-22; Ministry of PNG.

Fig. 21 shows production of ethanol blended petrol (EBP) by litres and its supply to Indian oil and gas companies over the last six years. As can be seen from the figure, there has been a substantial increase in production of EBP. Compared to 2016-17, the production of EBP in 2021-22 has increased by more than three times.

¹⁷ ROADMAP FOR ETHANOL BLENDING IN INDIA 2020-25. Available at: https://niti.gov.in/sites/default/files/2021-06/EthanolBlendingInIndia_compressed.pdf (Accessed: January 3, 2023).

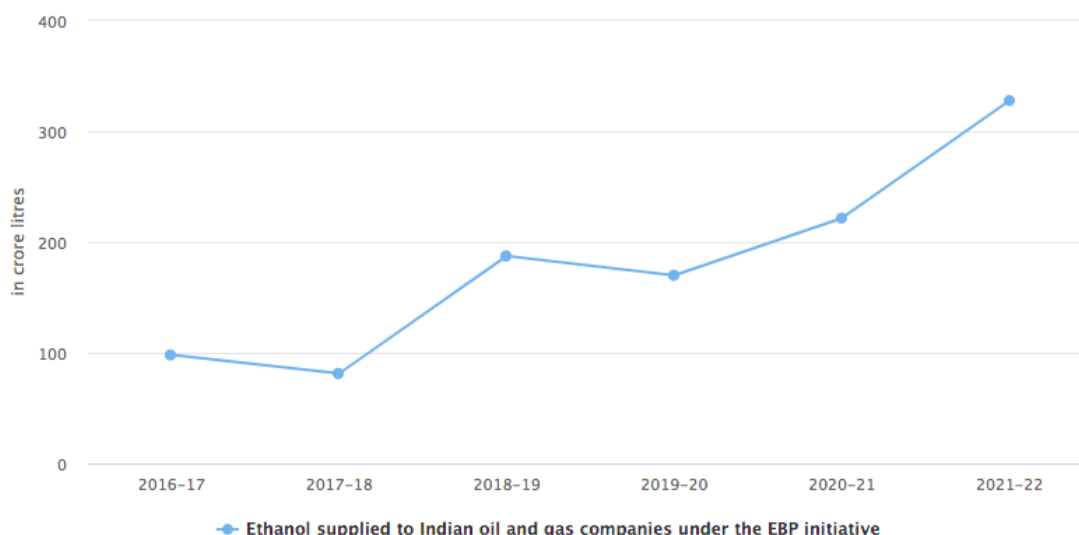


Fig. 21. Supply of EBP to Indian oil and gas companies under the EBP initiative (2016-2021). Source: Petroleum and Natural Gas Statistics 2021-22; Ministry of PNG.

- 2. National Green Hydrogen Mission, 2021** - The Mission was announced and launched in 2021 with an objective of reducing crude oil imports and decreasing dependency on fossil fuels for energy production. It is stated that by 2047, the annual production capacity will reach 25 million tons. In April 2022, India's first green Hydrogen plant was set up in Jorhat, Assam, with Oil India Limited commissioning the plant with installed capacity of 10 kgs per day¹².
- 3. Strategic oil reserves** - Another key initiative to uphold India's energy security and to propel India on the path of self-sufficiency has been the setting up of the Indian Strategic Petroleum Reserve Limited (ISPRL)¹⁸. At present, it has petroleum caverns located at three locations with a total capacity of 5.33 MMT. These are situated in:
 - Visakhapatnam (1.33 MMT)
 - Mangaluru (1.5 MMT)
 - Padur (2.5 MMT)

In case of exigencies, when global crude oil supplies are dramatically impacted, these reserves can provide crude oil to India for a total of 9 days¹. These reserves have been filled to their maximum capacity with the help of the private sector. The Government of India signed an MoU with Saudi-based oil firm, Aramco and UAE-based Abu Dhabi National Oil

¹⁸ International cooperation - ISPRL: Ministry of Petroleum and Natural Gas: Government of India - Ministry of Petroleum and Natural Gas INTERNATIONAL COOPERATION - ISPRL | Ministry of Petroleum and Natural Gas | Government of India - Ministry of Petroleum And Natural Gas. Available at: [https://mopng.gov.in/en/international-cooperation/isprl#:~:text=\(ISPRL\)%20under%20Phase%20%E2%80%931.global%20crude%20oil%20supply%20chain](https://mopng.gov.in/en/international-cooperation/isprl#:~:text=(ISPRL)%20under%20Phase%20%E2%80%931.global%20crude%20oil%20supply%20chain). (Accessed: January 3, 2023).

Company to procure the necessary quantities of crude oil. This made up for the Phase I of the initiative and was implemented all through 2020. For Phase II of the initiative, the government has approved in principle another reserve of capacity 4 MMT at Chandikhol.

Energy scenario in the West - The West has been specially sceptical of importing Russian oil and gas since the conflict between Russia and Ukraine heightened since February 2022. From imposing bans (both partial and complete ones) to capping prices of Russian oil and gas, the left has been discouraging other non-European and non-NATO nations from purchasing Russian oil and gas. In this backdrop, it becomes crucial to analyse the energy security situation of the US and of the EU and their reliance on Russian oil and gas. Just like these nation states keep a stock of their energy, it is imperative that other non-NATO and non-EU countries also ensure availability of energy raw materials.

The West, specially the European Union (EU), is a heavy consumer of Russian oil and gas. Even after the conflict worsened between Russia and Ukraine in 2014, energy imports continued to soar. While the oil and gas imports of the US from Russia contribute a small percentage of their net oil and gas imports, the EU has a different import scenario. Fig. 22 shows USA's imports of crude oil from the top five of its exporters. Russia accounted for nearly 3 percent of net crude oil imports, which was the highest in the last few years. Total value in 2021 was 209,000 barrels per day of crude oil (an average of 6 million barrels per month) and 500,000 barrels per day of petroleum products. This implies that even if the US imposes strict import measures and sanctions on Russian oil and gas, there will not be a significant impact on their energy security¹⁹.

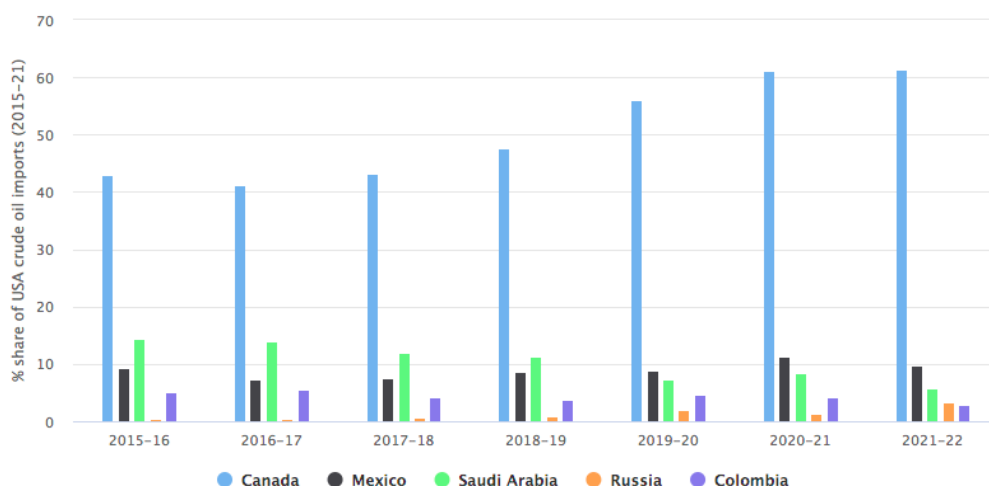


Fig. 22. USA's crude oil imports and petroleum products during 2015-22. Source: US Energy Information Administration.

¹⁹ U.S. imports from Russia of crude oil and petroleum products (Thousand Barrels). Available at: https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MTTIM_NUS-NRS_1&f=M (Accessed: January 3, 2023).

Compared to 2021, after the conflict, the USA banned Russian oil and imports fell dramatically²⁰. In April 2022, it imported 10.8 million barrels of crude oil before imposing the ban. This has been shown in Fig. 23. It can be observed that even after the conflict escalated between Russia and Ukraine in early 2022, the US continued to import crude oil from Russia till April¹⁸.



Fig. 23. USA's import of Russian crude oil during Jan to April 2022 before it imposed sanctions on Russia. Source: US Energy Information Administration.

The EU is heavily dependent on Russian oil and gas. Russia has a significant impact on the EU's energy security. Fig. 24 shows the energy mix for the EU²¹. About 60 percent of the EU's energy needs are met through natural gas and crude oil. And around 40 percent of this natural gas and oil is imported from Russia²².

²⁰<https://www.whitehouse.gov/briefing-room/statements-releases/2022/03/08/fact-sheet-united-states-bans-imports-of-russian-oil-liquefied-natural-gas-and-coal/>

²¹ *Where does our energy come from? Shedding light on energy in the EU*. Available at: <https://ec.europa.eu/eurostat/cache/infographs/energy/bloc-2a.html> (Accessed: January 3, 2023).

²² *Oil and Petroleum Imports by Partner Country Eurostat*. Available at: https://ec.europa.eu/eurostat/databrowser/view/NRG_TI_OIL__custom_1940303/bookmark/table?lang=en&bookmarkId=5bd0ea50-4ff5-4a4e-9c8a-43b19a4107c0 (Accessed: January 3, 2023).

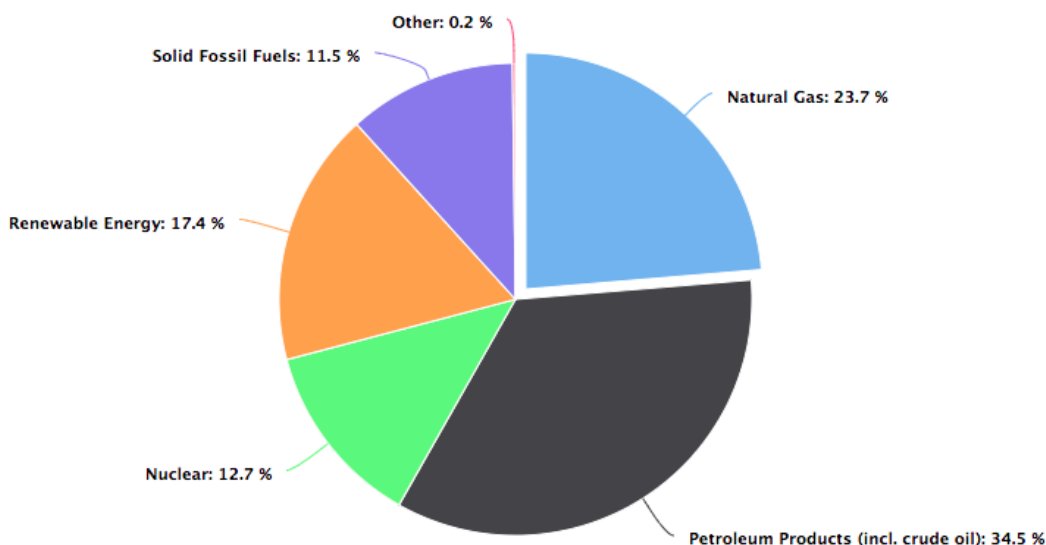


Fig. 24. Energy mix of the European Union. Source: Eurostat.

Even though the Russia - Ukraine conflict is not new for NATO and the EU, the EU has continued to import oil and gas from Russia for decades. Fig. 25 shows imports of Russian crude oil and natural gas into the EU from 2015-22. It can be observed that the percentage share of Russian gas imported to the EU peaked in 2021. Every year, nearly 30 percent of crude oil imports come from Russia and approximately 40 percent of natural gas imports to the EU are sourced from Russia²¹.

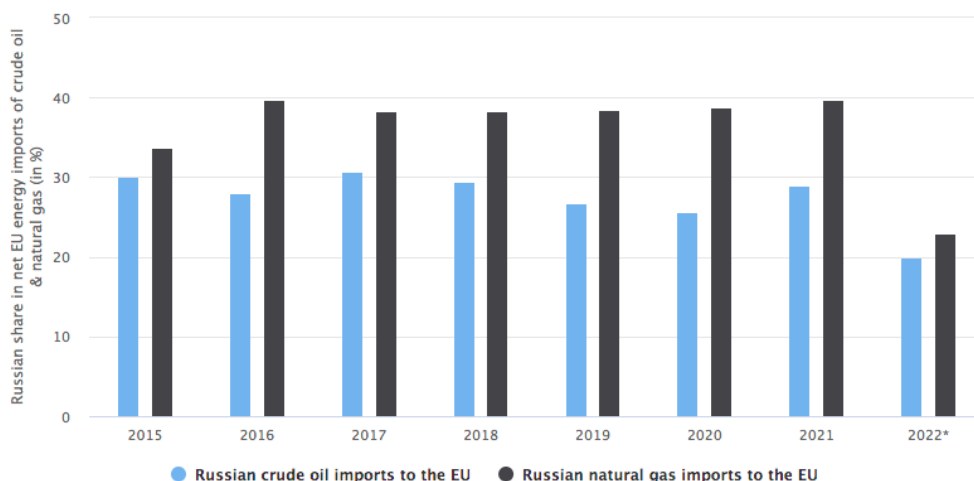


Fig. 25. Russian imports of petroleum and crude oil and natural gas to the EU (2015 - 2022). Data for 2022 available till November. Source: Eurostat.

Even in 2022, after sanctions were placed on Russia for war crimes against Ukraine, the import of natural gas and oil stands at 23 percent and 20 percent of EU's total energy imports respectively. The EU has been importing Russian crude oil in significant quantities over the years, with a peak of

3.7 million barrels per day in April 2016 and April 2017. In August 2022, the lowest crude oil import was marked at 1.7 million barrels a day. Fig. 26. shows EU's crude oil imports in 2022-23²¹.



Fig. 26. Russian crude oil imports to the EU in 2022. Source: Bloomberg²³

It can be observed that the EU's dependence on Russian crude oil has reduced only partially and it still relies on Russia to meet its energy requirements. The largest importers of Russian fossil fuels and oil are the EU and China both in terms of value and volume. Of the EU countries, Germany, the Netherlands, and Italy have been the top importers of Russian oil since the conflict between Russia and Ukraine magnified this year.

Reserves of crude oil and natural gas in the US and the EU -

Apart from imports, the West (both the EU and the US) have significant reserves of crude oil, petroleum, and natural gas to ensure energy security in their countries. The US has a geostrategic edge over other countries as it is home to massive shale gas reserves. The extent of these reserves has been shown in the following section.

1. **United States** - Over the years, the US administration has ensured that their country can run for several years without the need for importing energy raw material. Fig. 27 shows the proved reserves of crude oil in the US vs. the consumption of crude oil annually. As can be observed, the annual consumption of crude oil is a small fraction of the total reserves of

²³ Prem, P. (2022) *Europe's oil imports at 2-year high even as Russia share shrinks*, Bloomberg.com. Bloomberg. Available at: <https://www.bloomberg.com/news/articles/2022-10-12/europe-s-oil-imports-at-2-year-high-even-as-russia-share-shrinks?leadSource=verify+wall> (Accessed: January 3, 2023).

crude oil. As per estimates of the Energy Information Administration, the US has about 5 years worth of crude oil in reserves at any given point in time²⁴.

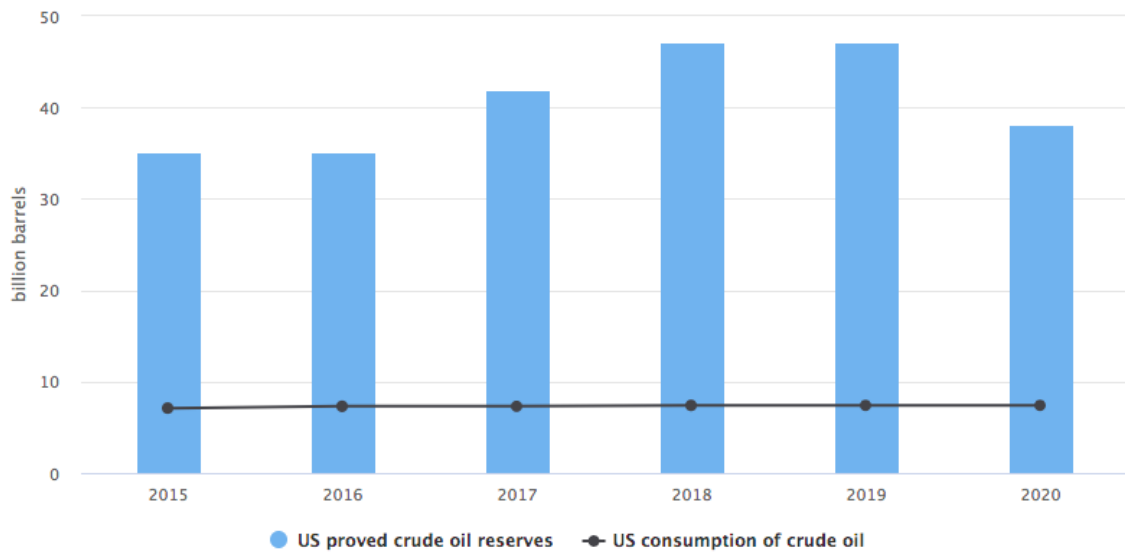
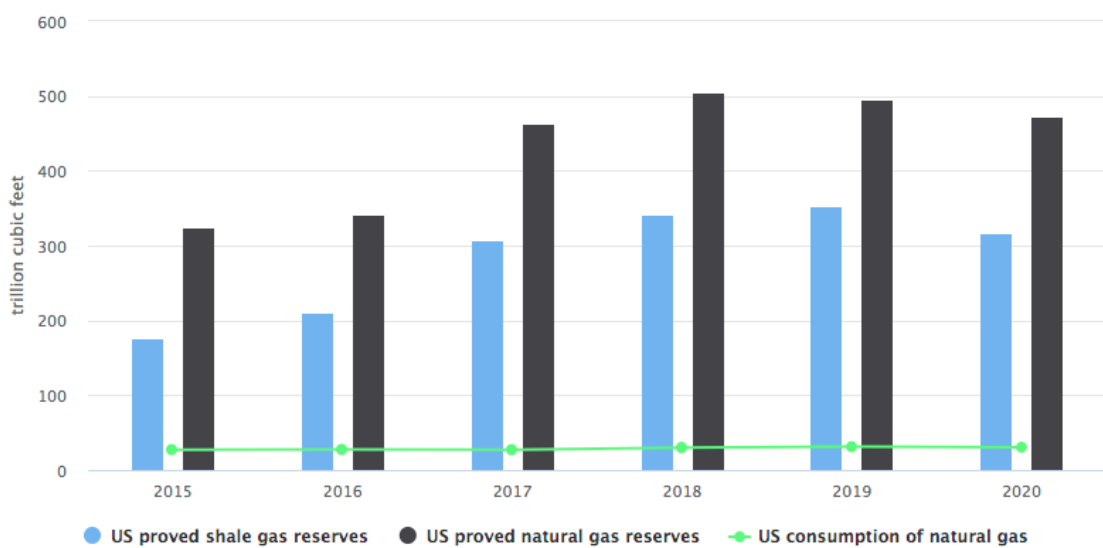


Fig. 27. Proved reserves of crude oil vs. the consumption of crude oil in the US. Source: US Energy Information Administration

Just like crude oil, the US has massive reserves of natural gas and shale gas. Natural gas and shale gas both lead to gas production. Extraction of shale gas also contributes to stocking of natural gas. In Fig. 28, reserves of shale gas and natural gas vs. consumption of natural gas has been depicted. It can be observed that the annual consumption of natural gas is a mere fraction of the reserves. The Energy Information Administration suggests that the US has about 100 years of natural gas and shale gas reserves at any given point in time²³.



²⁴ U.S. Energy Information Administration - EIA - independent statistics and analysis Proved Reserves of Crude Oil and Natural Gas in the United States, Year-End 2021. Available at: <https://www.eia.gov/naturalgas/crudeoilreserves/> (Accessed: January 3, 2023).

Fig. 28. Proved natural gas and shale gas reserves in the US compared to the annual consumption of natural gas. Source: US Energy Information Administration

Apart from natural gas and crude oil, the US also has significant strategic petroleum reserves²⁵. The installed capacity is estimated to be 714 million barrels and the US ensures that the reserves are stocked every year. Fig. 29 shows the extent to which the US has maintained its strategic petroleum reserves in the last few years (2015 - 2020). As can be observed, the US has been able to meet its petroleum reserves suitably, even though the reserves have declined marginally since 2015.

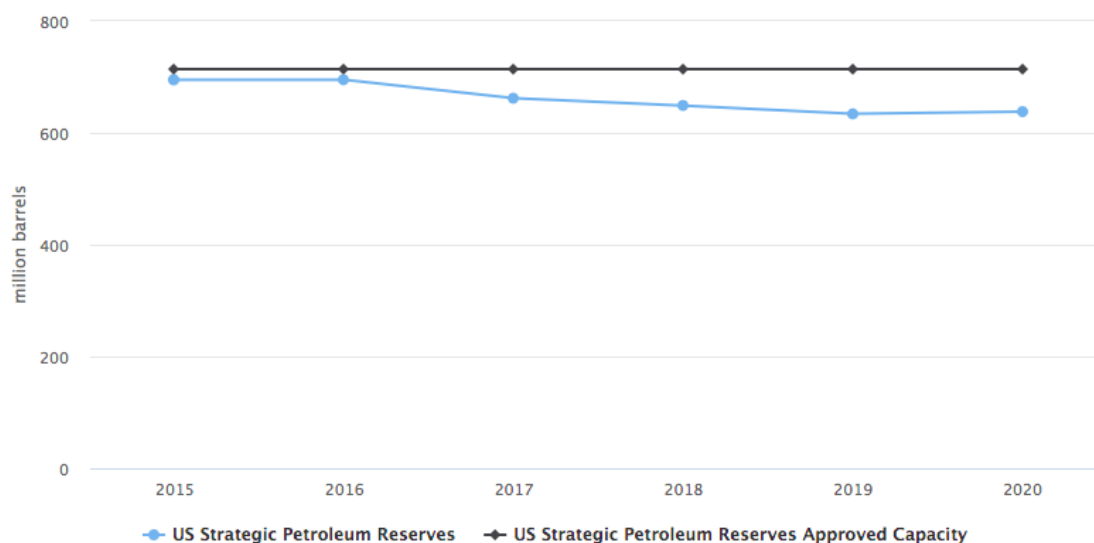


Fig. 29. US strategic petroleum reserves vs the installed capacity (2015 - 2020). Source: US Energy Information Administration

1. **EU** - The EU, just like the US, has a significant stockpile of crude oil and natural gas reserves. In Fig. 30, the proven natural gas reserves of the EU are shown from the years 2015 - 2020. As can be observed, these have grown steadily over time except for 2020 when global supply chains were impacted owing to the COVID-19 pandemic. As per estimates, these reserves could last up to about three months of consumption²⁶.

²⁵ *US Strategic Petroleum Reserves U.S. ending stocks SPR of Crude Oil and Petroleum Products (thousand barrels)*. Available at: https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=M_EP00_SAS_NUS_MBBL&f=A (Accessed: January 3, 2023).

²⁶ *EU Stocks of Natural Gas*. Available at: https://ec.europa.eu/eurostat/databrowser/view/NRG_STK_GAS/default/table?lang=en&category=nrg.nrg_quant.nrg_quanta.nrg_stk (Accessed: January 3, 2023).

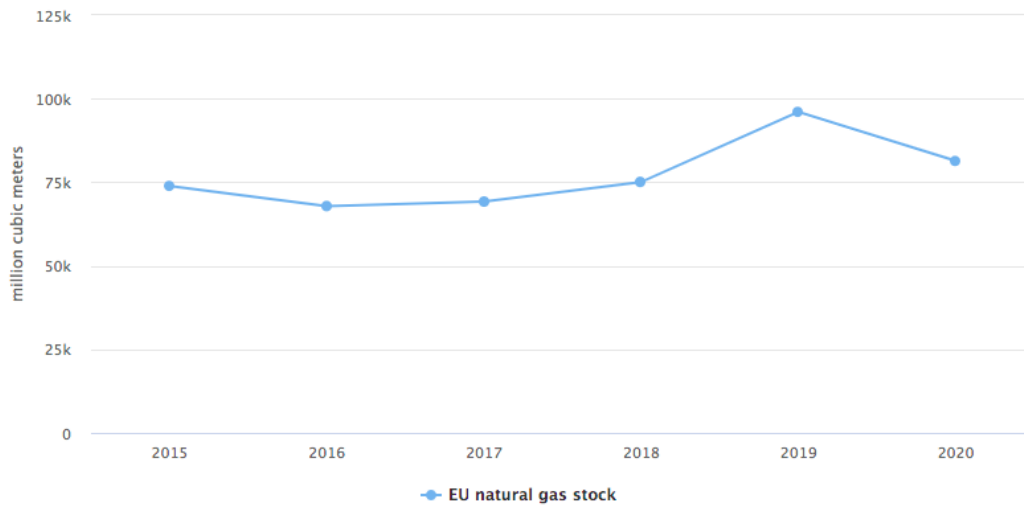


Fig. 30. Natural gas reserves in the EU. Source: Eurostat.

Just like natural gas, the EU also has noteworthy reserves of crude oil. Fig. 31 shows the extent of proven crude oil reserves in the EU in the last few years, from 2015 - 2020. Most EU nations have met the reserve requirement which has been set to 90 days of net imports of 61 days of consumption, whichever has been higher for them. There has been a decrease in the EU's emergency oil reserves in 2022. In July 2022, EU's oil reserves were 4.5 percent lower than January 2022 and 10.3 percent lower than June 2021²⁷. Like oil and gas, the EU also mandates 90 days of strategic petroleum reserves.

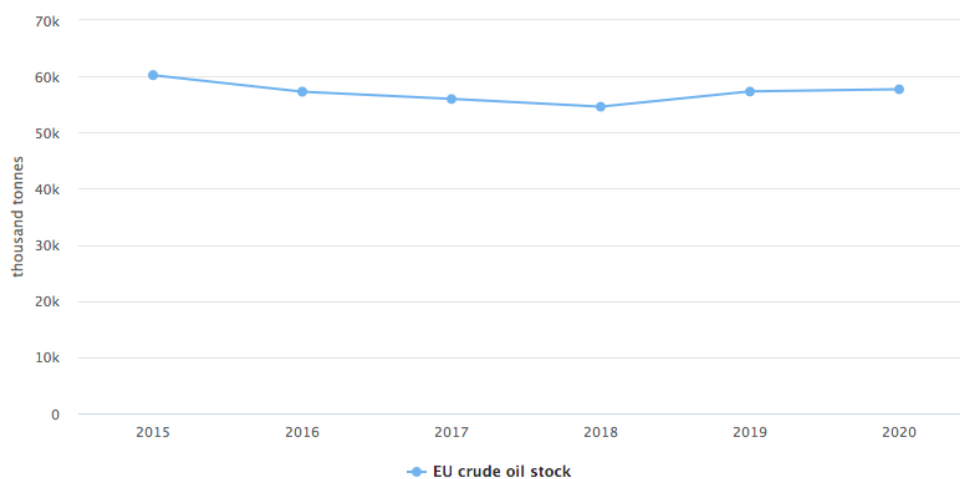


Fig. 31. EU stocks of crude oil. Source: Eurostat.

²⁷ *EU Stocks of Crude Oil and Products*. Available at: https://ec.europa.eu/eurostat/databrowser/view/NRG_STK_OIL/default/table?lang=en&category=nrg.nrg_quant.nrg_quanta.nrg_stk (Accessed: January 3, 2023).

Way forward for India

- 1. Strategic Reserves** - As suggested by data, India needs to widen its crude oil, natural gas, and other strategic petroleum reserves. Owing to volatility in the market, currency fluctuations and conflicts, India will have to maintain strategic reserves that last for about 30 days. Only then, India will have the buffer to tide over conflicts and market induced emergencies.
- 2. Conserving resources** - Like the West, specially the US, India may have to consciously conserve and preserve its own resources of crude oil and natural gas. While it would be beneficial to map these resources, India will have to put in place alternative measures to achieve energy security needs rather than exhausting its fossil fuel deposits.
- 3. Reducing wastage** - As per a report by the Comptroller and Auditor General of India (CAG), India lost about four million tonnes of crude oil due to deficient water injection by ONGC. When it comes to transmission and distribution of electricity losses or pilferage, India faces an ignominious chunk of losses over 20 per cent. This calls for massive reduction in losses of crude as well as electricity. Apart from judicious deployment of its scarce crude oil, natural gas, and coal, pointed strategies should be formulated to reduce energy wastage's and pilferage. Technological developments in the energy sector should be commensurate with consumption.
- 4. Increase oil equity** – In the last few years, India has invested in oil assets abroad, continues to draw crude oil and natural gas from these assets to meet its demand. The time is ripe to expand these global assets and increase their value and volume steadily apart from making larger oil equity investments globally. India must ensure it has strong and firm buyback arrangements for these assets.
- 5. De-carbonise economy** – There has been a consistent push from the government to diversify India's fuel sources. Right from the setting up of the International Solar Alliance to the National Green Hydrogen Mission, the government has given a strong thrust to non-fossil energy sources. India should continue to diversify its renewable and non-renewable energy baskets. Apart from de-risking, India will move towards sustainable energy consumption patterns.
- 6. Leverage forex payouts** – India spends over \$ 100 billions annually in oil and gas imports every year. It should formulate policies and strategies to leverage oil and gas imports *vis a*

vis its strategic interests. Trade of oil and gas can help India to shape its offensive and defensive interests globally

- 7. Carbon sequestration:** India is one of the few countries which have the capability to undertake deep sea carbon sequestration for coal extraction from the seabed. These techniques should be checked for long-term viability and should be commercialised for large-scale extraction.
- 8. Energy sovereignty –** India should revisit foreign investments in its domestic oil and gas companies. The stake of foreign companies in India oil and gas companies could be reduced to ensure energy sovereignty.
- 9. Aligning imports and exports of energy –** India's oil and gas imports should be interlinked and directly proportional to export of end-use energy end products. As India continues to import more energy raw material, increased capabilities to export finished oil, gas, and petroleum products (like ethanol blended petrol) could not only add to more foreign exchange but also cover a major cost of imports.
- 10. Cartel of oil and gas guzzlers:** Just like the OPEC, India can take the lead to forge a group of heavy oil and gas importing countries to have a say in global prices of oil and gas.
- 11. Alternatives to be improved and expanded –** As suggested in this paper, there have been several measures taken by India to diversify its energy resources. Alternatives like ethanol blending needs to be scaled up and encouraged. Also, the quest for new energy sources should be pursued for sustainable development.

Concluding observations

As suggested by the analysis of Indian oil and gas data, it can be concluded that India has put significant measures in place to ensure it has sufficient energy to meet its incessantly increasing demands. These measures, some of which are novel to India, have led to more green energy production, increased production of oil and natural gas from assets abroad, and diversification of India's import portfolio. Several nation states which were not significant energy exporters to India in the past, now play a key role in India's energy security. Right from exponentially increasing installed capacities, to expanding India's import capacity, to amping up domestic production and exploration of oil and gas, India has left no stone unturned to keep its energy resources broadened.

A comparative analysis of the US, the EU, and India shows that these global mega economies have kept energy as the primary vehicle for economic growth and development. Ranging from months to years of reserves, both the US and the EU outpace India when it comes to securing their economic vitality. In this backdrop, India must expand its reserves exponentially and ensure that it has sufficient stock of crude oil, petroleum, coal, and natural gas in case of emergencies. Compared to the US and the EU, India lags behind in strategic and proven reserves.

While there has been much ado in global discourse apropos of Russian crude oil and natural gas imports, it becomes clear that the West has been sourcing their crude oil and natural gas in significant quantities from Russia over the entire last year even though the conflict grew more tense and the West and NATO called for bans on Russian oil. Even though the EU has banned Russian oil and gas coming from the sea, it will still continue to import oil and gas from pipelines.

The misinformation and propaganda campaigns against India on its endeavour to meet its energy needs and to amplify its energy pool need to be dissipated. India's mere attempt to secure its energy demand and provide for the economic security of its billion plus people at a time when the world is strained with conflict should be assessed with facts and not with biases of the West against Russia.

