

INDIA-MIDDLE EAST-EUROPE ECONOMIC CORRIDOR

Potential For Increasing Energy Flows

Lydia Powell • Akhilesh Sati



INDIA-MIDDLE EAST-EUROPE ECONOMIC CORRIDOR

Potential For Increasing Energy Flows

© 2025 Observer Research Foundation. All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means without permission in writing from ORF.

Attribution: Lydia Powell and Akhilesh Sati, *India–Middle East–Europe Economic Corridor: Potential for Increasing Energy Flows*, Observer Research Foundation, December 2025.

Editorial and Production Team: Vinia Mukherjee, *Editor and Producer*; Monika Ahlawat, *Assistant Editor*; Rahil Miya Shaikh, *Design*; Simi Jaison, *Layout*.

CONTENTS

Key Takeaways	6
I Introduction	9
II The Contours of the IMEC Corridor	11
III Financing IMEC Connectivity Projects	13
IV IMEC Partners: Current Energy Trade	15
V Future Energy Flows	19
A. Hydrogen Flows	24
B. Electricity Flows	30
VI The Impact of Trade Barriers	33
VII Conclusions	36
VIII Recommendations	39

Key Takeaways

- 1** The IMEC corridor is one of the most ambitious transcontinental energy partnerships of the 21st century, linking continents, cultures, and markets in a dynamic new framework for shared prosperity.
- 2** Envisioned as a transcontinental artery of energy trade, IMEC connects regions that together represent 40 percent of the world's population and 50 percent of global GDP. Secure, reliable and affordable energy flows from IMEC partners are the lifeblood of economic growth and prosperity across the world.
- 3** IMEC partners dominate the global energy landscape, collectively accounting for over one-third of world trade in crude oil and petroleum products. IMEC partners accounted for 27 percent of India's crude oil imports in the financial year ending in March 2025. Secure and affordable energy is accelerating economic growth and improving quality of life in India, key IMEC partner and the largest growth market for energy in the foreseeable future.
- 4** In the short-term, the composition of energy flows between IMEC partners will be dominated by conventional energy sources which are unmatched in terms of reliability, affordability, and security.

- 5** India's fast-growing energy demand, combined with its proposal to invest in two greenfield refineries that will expand product export capacity, make it a natural anchor for long-term energy partnerships. The resilience of conventional supply chains, supported by pipelines, tanker fleets, and established logistics infrastructure, ensures that IMEC's energy linkages remain stable even amid global volatility.
- 6** In the long-term, IMEC will attract hundreds of billions of dollars in large-scale investment, creating high-value jobs and unmatched prosperity in the region. While private investment will initiate projects, generous supplement from public funds will be required to reduce geopolitical risks and accelerate the construction of a future-ready energy network.
- 7** Plans for increasing low emission energy flows in the longer term are gathering momentum but the pace of progress will depend critically on cost competitiveness and scale of supply and demand. Without incentives for low-cost production on the supply side and offtake guarantees on the demand side, low emission energy sources are unlikely to become affordable. If the affordability criteria are not met, adoption of low emission energy sources is unlikely to meet expectations.
- 8** Initiatives to enable transcontinental electricity transmission, as envisioned by IMEC, are advancing with notable momentum. The UAE, Saudi Arabia, and India are working together towards the ambition of transforming regional energy trade and accelerating the integration of electricity grids across borders. IMEC partners are harmonising policies and regulatory standards to ensure technical interoperability.
- 9** Transcontinental power pools will enable IMEC partner countries to meet their electricity demand through international trade while also substantially reducing electricity costs by developing the most suitable and least expensive low emission energy sites.
- 10** By optimising resource use across time zones, shared electricity grids between IMEC partners will make conventional and low emission electricity available round-the-clock, reducing costs for millions of consumers.
- 11** Progress in initiatives for transporting conventional and low emission hydrogen from low-cost production sites in India and the Middle East to Europe is evident. India and the Middle East, with their abundant low emission energy resources and strategic geographical locations, are poised to become major supply hubs, with ambitious production targets.

- 12** The EU's commitment to importing low emission hydrogen by 2030 provides a strong demand signal, but production will be curtailed by the EU's Carbon Border Adjustment Mechanism (CBAM), a discriminatory trade barrier disguised as an environmental measure, as pointed out by India.
- 13** Given its developmental goals, India has deferred its net-zero emissions target to 2070, despite sustained diplomatic pressure from the Global North, particularly the EU which is advocating a 2050 timeline. CBAM, which unjustly shifts the burden of emission reductions onto the Global South, will further delay net-zero achievement by India and the rest of the Global South as it will increase costs and slow down low emission energy flows as envisaged by IMEC.
- 14** The implementation of CBAM contravenes the UNFCCC principle of "common but differentiated responsibilities," which allocates a greater burden of emissions reduction to the Global North—a concern prominently raised by India, one of the largest members of the Global South.
- 15** CBAM poses a significant challenge to the energy trade dynamics with the Global South, specifically India within the IMEC framework. Products originating from India exhibit a higher embedded emission intensity compared to EU benchmarks. Imposing CBAM will result in elevated import tariffs, effectively internalising the cost of EU emissions under its Emissions Trading System (ETS).
- 16** By subjecting imports to auction-based carbon pricing equivalent to the EU ETS, CBAM will introduce an economic disincentive for trade diversification, potentially leading to trade friction and impeding economic growth in partner nations. This mechanism fundamentally contradicts the central tenet of the IMEC initiative, which is predicated on fostering enhanced multilateral connectivity and economic integration through trade and infrastructure development. The resulting competitive disadvantage could undermine the strategic geopolitical and economic objectives of the IMEC corridor.
- 17** IMEC partners must call for aligning trade and energy policies to unlock the corridor's full potential. Coordinated action to defer the EU's CBAM in energy trade among IMEC nations must be among the key priorities.
- 18** Redirecting CBAM funds towards technology transfer and improving affordability of low emission technologies in the Global South is essential to ensuring that the transition towards low emission energy sources is fair and inclusive.



Introduction

At the G20 Summit in New Delhi in 2023, Saudi Arabia, the European Union (EU), India, the United Arab Emirates (UAE), France, Germany, Italy, and the United States (US) signed a Memorandum of Understanding (MoU) committing to work together to establish the India–Middle East–Europe Economic Corridor (IMEC).¹ The IMEC is expected to stimulate economic development through enhanced connectivity and economic integration between Asia, the Arabian Gulf, and Europe.² According to the MoU, IMEC partners were to meet within 60 days of signing to develop and commit to an action plan guided by specific timetables. Nearly two years since, progress has been slow, partly due to conflict in the regions along the planned corridor. However, IMEC is gaining attention in important bilateral and multilateral platforms.

At the 15th India-UAE Joint Commission Meeting (JCM) in December 2024, the two countries signed the India-UAE bilateral investment treaty, discussed the implementation of the IMEC corridor, and resolved to shore up ties in the areas of energy, including long-term supplies and collaboration in upstream and downstream projects.³ In February 2025, the EU and India held bilateral meetings that included discussions on the IMEC.⁴ In April 2025, Saudi Arabia and India agreed to boost cooperation in the supply of crude and liquefied petroleum gas (LPG).⁵ A high-level roundtable on IMEC with connectivity and economic growth as themes was held in April 2025 in New Delhi.⁶



The Contours of the IMEC Corridor

The IMEC corridor consists of two branches.⁷ The Eastern corridor will connect India with the Arabian Gulf via sea routes to ports in the UAE (Fujairah, Jebel Ali, Abu Dhabi) and Saudi Arabia (Dammam, Ras Al Khair).⁸ The Northern Corridor will connect the Gulf to Europe via a railway line through Saudi Arabia (Ghuwaifat and Haradh) and Jordan to Israel's Haifa port, and then by sea to ports in Europe like Piraeus (Greece), Messina (Italy), and Marseille (France).⁹

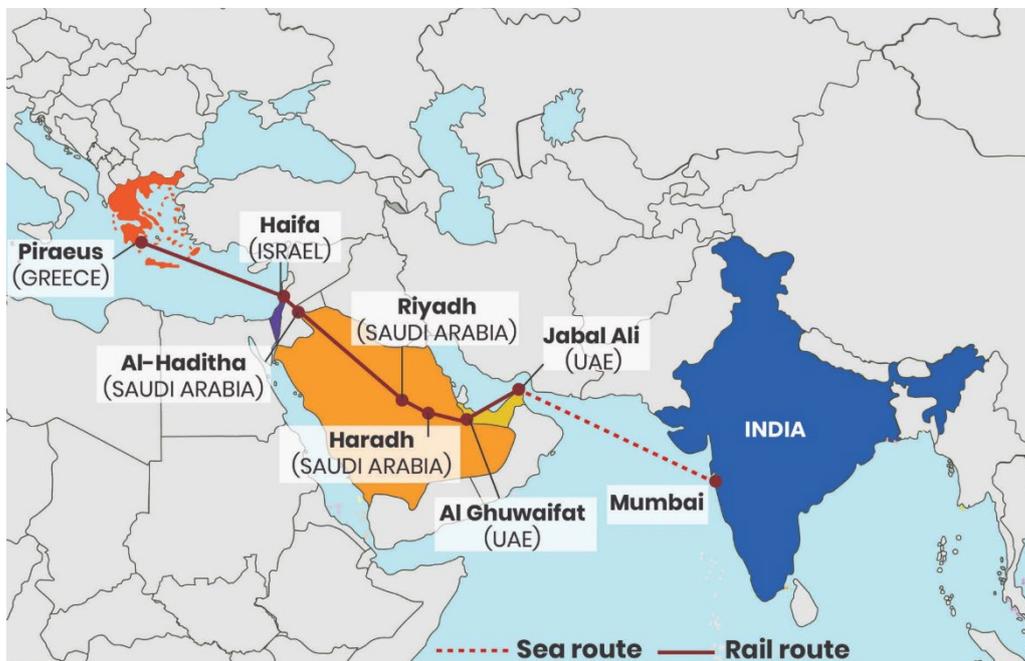
IMEC envisions a trans-continental trade corridor to increase economic integration between the Indian, Middle Eastern and European markets. The goals include enhancing energy security, boosting trade, reducing logistics cost by about 30 percent and transportation time by about 40 percent, creating a reliable

and cost-effective cross-border ship-to-rail transit network and increasing flexibility in shifting supply chains during disruptions caused by geopolitical conflict and natural disasters.¹⁰ The IMEC corridor is expected to increase efficiencies, enhance economic unity, generate jobs, and lower polluting emissions, resulting in a transformative integration of Asia, Europe and the Middle East. In the context of energy, the MoU mentions participants’ intention to lay cables for electricity and digital connectivity, as well as pipelines for low emission hydrogen exports along the railway route.

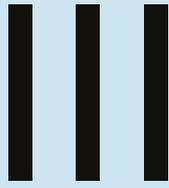
IMEC holds promise to emerge as an important energy and trade corridor that boosts prospects for economic development and the energy security. The countries participating in IMEC constitute 40 percent of the world’s population and roughly 50 percent of the global economy.¹¹ It is thus the largest cooperation project in history.¹²

As pointed out by Piyush Goyal, India’s Minister for Commerce & Industry, in April 2025, IMEC is not merely a trade route, but a modern-day Silk Route: a partnership of equals that fosters synergy, connectivity, and inclusive prosperity.¹³ IMEC will be linking civilisations and cultures—from Southeast Asia to the Gulf, from the Middle East to Central Europe.

Map 1: IMEC Corridor: Rail and Sea Routes



Source: India-Middle East Europe Economic Corridor¹⁴



Financing IMEC Connectivity Projects

The IMEC MoU does not specify financial obligations from stakeholder countries.¹⁵

Most of the funding for new infrastructure initiatives is expected through the G7's Partnership for Global Infrastructure and Investment.¹⁶ The figure of US\$600 billion by 2027-30 is quoted in some of the deliberations on IMEC, but this could be the value of trade generated by the IMEC corridor or the investment required to boost trade.¹⁷ Saudi Arabia is said to have committed US\$20 billion to the IMEC initiative.¹⁸

In April 2025, the Minister for Commerce & Industry of the Government of India observed that leaving the initiative solely to the government would limit its efficiency and financial viability, and that IMEC must be viewed through the lens of a public-private partnership (PPP).¹⁹ The Minister called for a collaborative model where the private sector leads

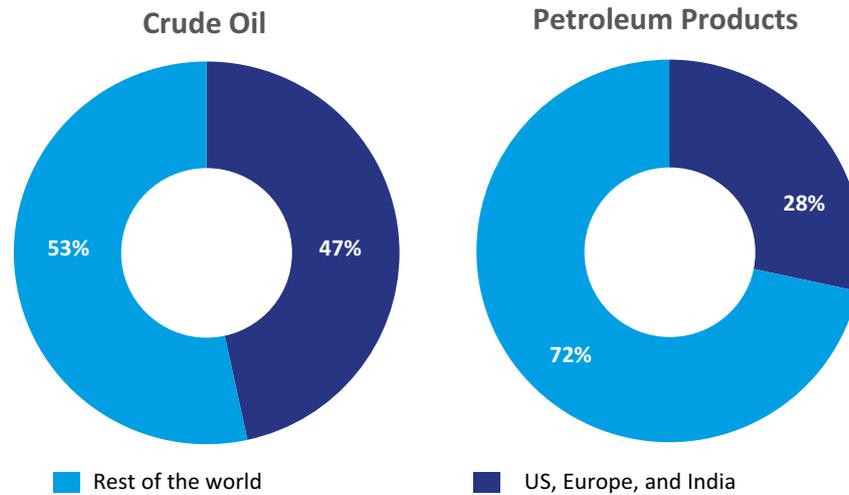
with its real-world expertise, and innovative capabilities. This approach would ensure smarter and more cost-effective planning, as the private sector can propose solutions that reflect practical utility, he noted.²⁰ It would also allow policymakers to think systematically while the private sector introduces flexibility and innovation, ensuring that the corridor remains viable, efficient, and sustainable in its execution.²¹ There is probably a need for innovative financing models to support both the development of the IMEC corridor and the trade it will generate. Active involvement of multilateral financial agencies and instruments like green bonds and the creation of long-term 'IMEC bonds' have been suggested as funding channels for the transcontinental infrastructure in a sustainable and future-proof manner.²²

There is also a strong case for public funding of IMEC infrastructure.²³ The energy corridor will primarily create global public goods, such as energy security, affordability, geopolitical stability, and economic efficiency.²⁴ These are significant public benefits that may not translate into proportional private profit to incentivise private investment. The embedded geopolitical, economic and environmental risks may also discourage private investment. It is therefore critical to commit public funds to IMEC's infrastructure initiatives that would signal confidence in their long-term success. This would attract private investors and, in turn, reduce the economic and geopolitical uncertainty necessary for private investment.

IV

IMEC Partners: Current Energy Trade

As major net exporters of conventional energy that dominate the current global energy basket, the Middle East, in general, and IMEC partners Saudi Arabia and UAE, in particular, play a significant role in supplying the energy that fuels economic growth worldwide. In 2023, Saudi Arabia, the UAE, and the US accounted for over 46 percent of total crude oil exports globally, with Saudi Arabia alone accounting for about 16 percent.²⁵

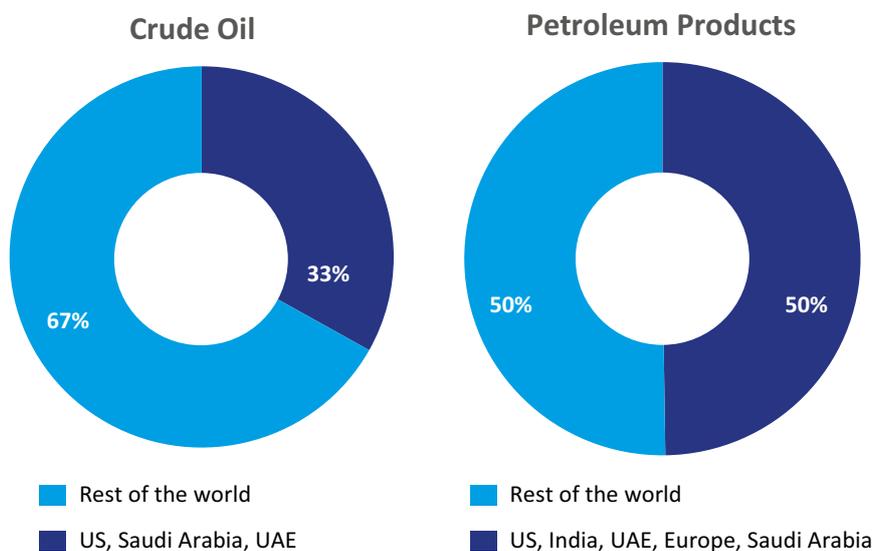
Figure 1: Global Imports, by Region (2023, in %)

Source: *Statistical Review of World Energy 2024*²⁶

India, Saudi Arabia, the EU, the US, and the UAE also accounted for over 34 percent of total global petroleum product exports.²⁷ India, the US and the EU alone accounted for over 46 percent of global crude imports and over 28 percent of petroleum product imports in 2023. Trade among IMEC partners is also significant.²⁸ Approximately 28 percent of the EU's crude oil imports and about 30 percent of its petroleum product imports came from Saudi Arabia, the UAE and the US.²⁹

Energy trade between India and its IMEC partners is significant as India is among the few countries where energy demand will grow in the foreseeable future. The US and India were the largest and third-largest consumers of oil in 2023, respectively.³⁰ India is expected to record the fastest energy and oil consumption growth driven by population growth, a newly prosperous middle class with spending power, higher energy intensity rates, slow pace of transport electrification, and higher economic growth rates, among other factors. In 2023, conventional fuels were the source of 89 percent of commercial (excluding biomass) energy consumption in India. Domestic production of crude oil has been stagnant, meeting only about 12 percent of India's needs.³¹ Consequently, the country is expected to remain one of the most significant destinations for the export of crude oil, petroleum products, including LPG (Liquefied Petroleum Gas) and natural gas from IMEC partners.

Figure 2: Global Exports, by Region (2023, in %)



Source: Statistical Review of World Energy 2024

In 2024-25, India imported over 244 million tonnes (MT) of crude oil, and IMEC partners Saudi Arabia, the UAE, and the US met about 27 percent of India’s crude imports.³² Saudi Arabia supplied about 13 percent of India’s total crude oil imports, followed by the UAE, which accounted for about 9 percent of total imports, and the US another 4 percent.³³ In 2024-25, the three countries accounted for over 48 percent of India’s petroleum product imports, excluding LPG.³⁴ The US constituted about 23 percent, the UAE about 13 percent, and Saudi Arabia about 11 percent.³⁵ IMEC partners accounted for over 55 percent of India’s LPG imports in 2024-25, with the UAE leading with a market share of about 39 percent, followed by Saudi Arabia at 15 percent and the US at less than 1 percent.³⁶

Domestic natural gas production in India met about half of India’s natural gas consumption in 2024-25. The UAE and the US accounted for just under 27 percent of India’s LNG (liquefied natural gas) imports, with a share of about 13 percent of total LNG imports each.³⁷ India exported refined petroleum products of about 65 MT in 2024-25.³⁸ The primary destination of India’s petroleum product exports in 2017-18 was the UAE, but after sanctions were imposed on Russian oil exports in 2022-23, Europe became the primary destination for India’s exports and to a lesser extent, the US.³⁹

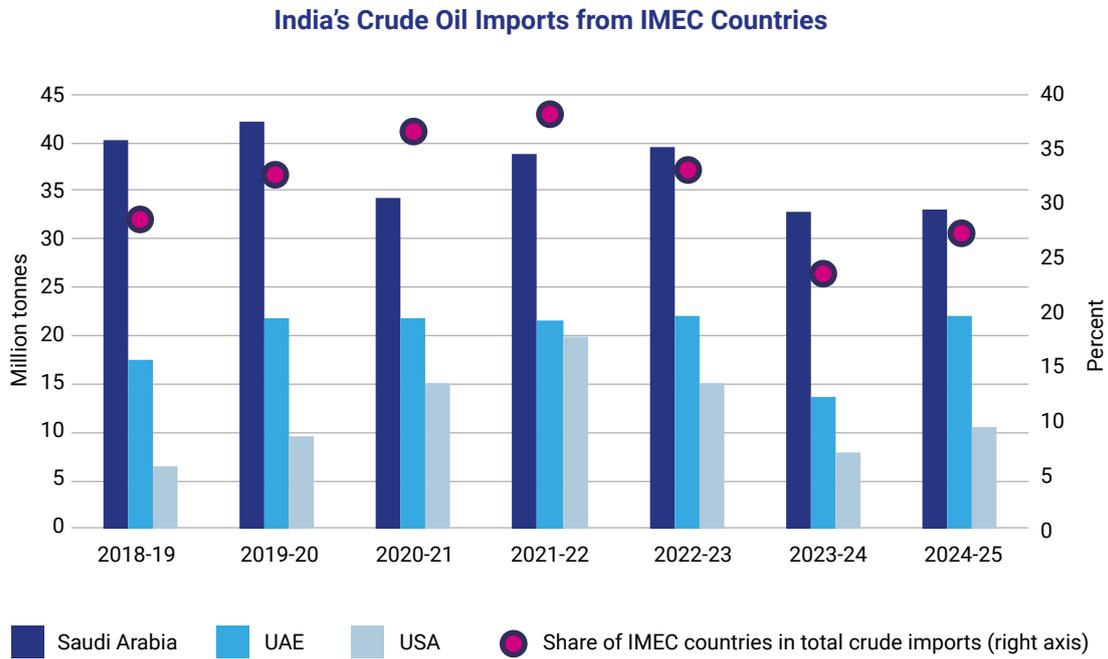
IMEC partners play a significant role in securing and stabilising the oil market as they account for at least a third or more of global trade in crude oil and petroleum products. Oil's critical role in the importer and exporter economies, along with robust demand growth in India, makes IMEC energy flows resilient to disruptions. The Corridor's trade links may not be completely immune to worldwide economic, geopolitical and environmental instability, but existing supply chains between partners are robust, with established infrastructure like pipelines and tanker fleets.



Future Energy Flows

In the short term (2025-2030), the composition of energy flows between IMEC partners is not likely to change overall, as conventional energy trade will continue to dominate. According to projections by the IEA (International Energy Agency)— which is generally optimistic on the prospect of low emission energy sources replacing conventional energy—total global final energy consumption is projected to increase from 445 EJ (exajoules) in 2023 to 485 EJ in 2030 under the existing policy scenario.⁴⁰

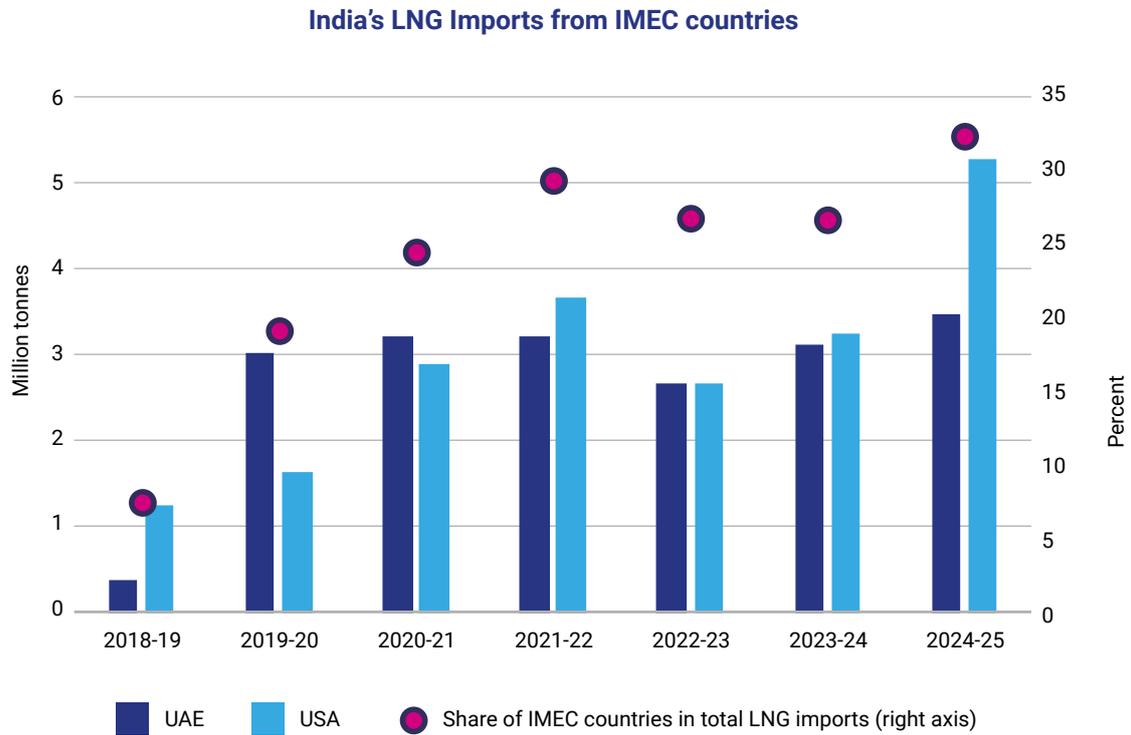
Figure 3a: India’s Import Sources, by Region (in %)



Source: Ministry of Commerce and Industry, Government of India

Oil consumption is expected to increase from 172 EJ to 181 EJ by 2030, and natural gas consumption from 70 EJ to 78 EJ by 2030, with the demand being primarily driven by India and countries in the Middle East and Africa region.⁴¹ Oil demand in India is expected to grow from 5.2 million barrels per day (mb/d) in 2023 to about 6.6 mb/d in 2030, and natural gas demand from 64 billion cubic meters (BCM) to 99 BCM in the same period.⁴² India’s proposal to invest in two greenfield refineries that will expand product export capacity make it a natural anchor for long term energy partnerships. India’s projections for natural gas consumption are far higher, almost tripling to 133 BCM by 2030 and quadrupling to about 229 BCM under optimistic assumptions.⁴³

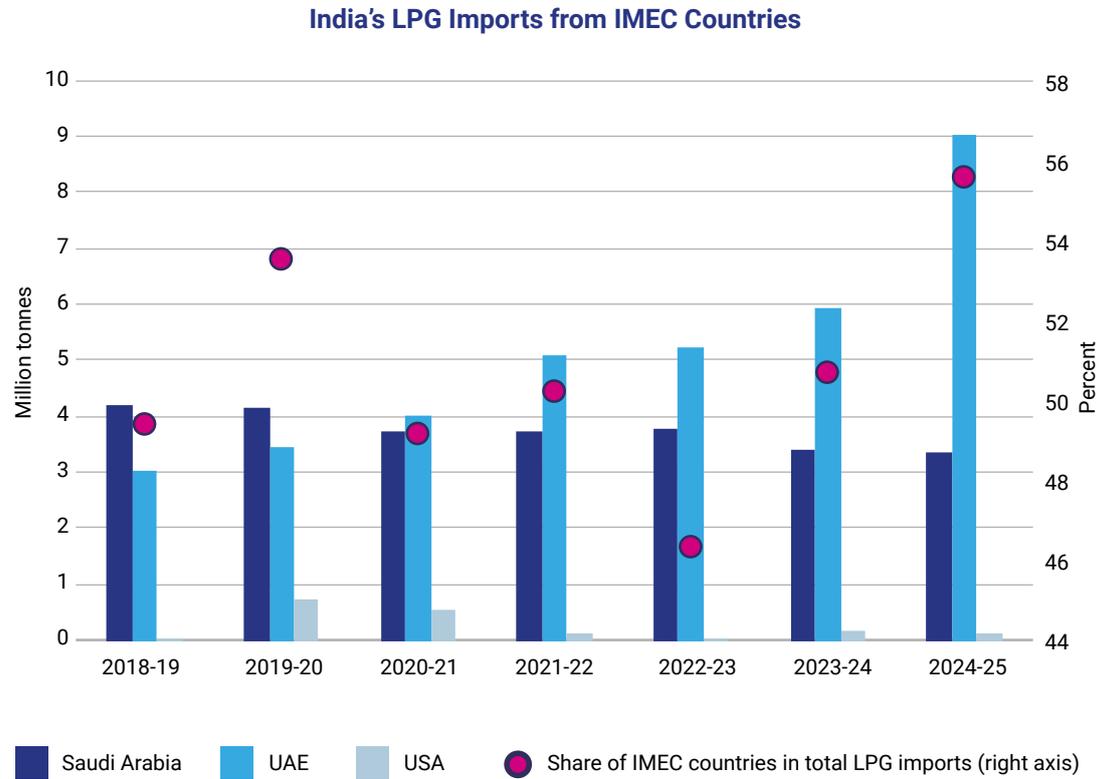
Figure 3b.



Source: Ministry of Commerce and Industry, Government of India

Plans for the transmission of low emission electricity and hydrogen across the borders of IMEC partners are yet to take off. However, there is scope for optimism. Geopolitical instability in regions along the IMEC corridor is likely to reduce in the long term. The economic viability of projects with pending final investment decisions (FIDs) could improve with technological and economic breakthroughs in the production and transport of hydrogen and electricity that reduce costs.

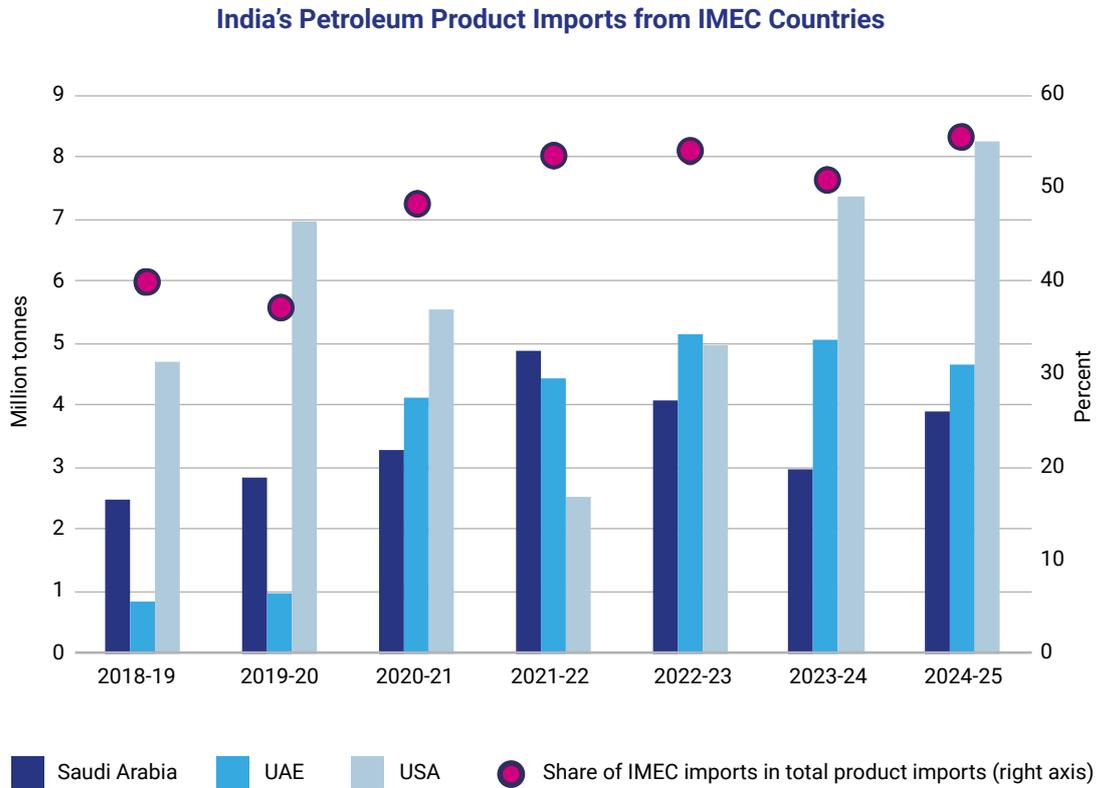
Figure 3c.



Source: Ministry of Commerce and Industry, Government of India

In the longer term (2030-45), the composition of energy flows between IMEC partners has the potential to change in favour of low emission fuels. An increase in India's share of natural gas imports is also highly likely. Low emission electricity flows may be initiated between the Middle East and India after 2030, as plans for constructing sub-sea cables are already underway. The prospect for low emission hydrogen flows across the energy corridor towards Europe is less optimistic, but there are a few promising projects. Prospects for the flow of low-emission hydrogen, which includes hydrogen produced from natural gas with carbon capture and storage, could improve in the longer term.

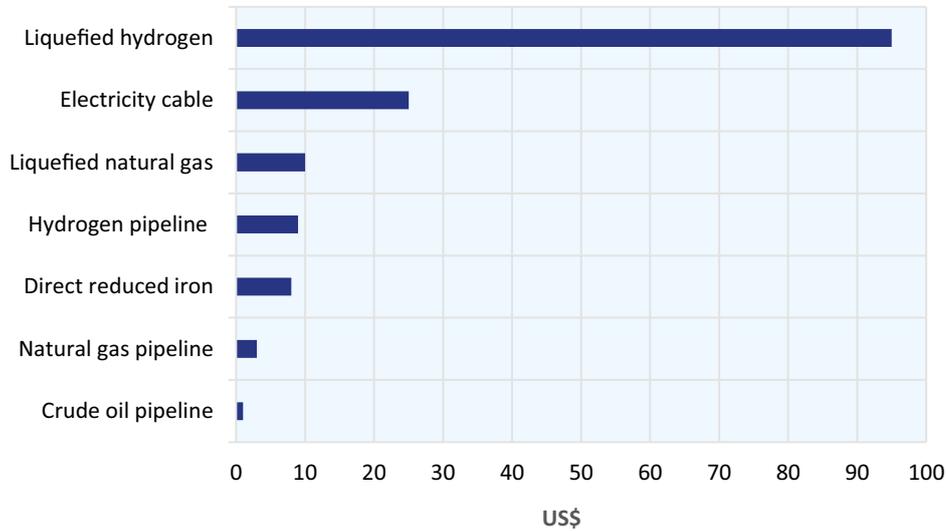
Figure 3d.



Source: Ministry of Commerce and Industry, Government of India

Given the development needs of India, its pace of reducing emissions will be slower than that of its IMEC partners, particularly the US and the EU. The country's net-zero goal is set for 2070, primarily to accommodate development. This must increase conventional energy consumption per capita, which is currently below the world average. In this context, energy exports from India to IMEC partners must accommodate hydrogen derivatives produced from conventional energy sources in the short term. This will help establish the end-to-end value chain in time for longer-term, low emission energy exports.

Figure 4: Stylised cost (US\$) of transporting 1 MWh of energy across 1000 km



Source: Brugal⁴⁴

A. Hydrogen Flows

Short Term (2025-30)

According to projections by the IEA, global hydrogen consumption as a share of total energy consumption will remain negligible by 2030 under current trends, and account for less than 1 percent of the world's final energy consumption by 2050 even under an optimistic net-zero scenario.⁴⁵ The last few years have seen a slowdown in the pace of the shift towards low emission fuels, raising questions over the future of low emission hydrogen. Anticipated reductions in equipment and capital costs (e.g., electrolyzers) have not materialised.⁴⁶ The IEA has hiked electrolyser costs based on available data from more advanced projects. The future cost evolution for electrolyzers will depend on numerous factors, such as technology development, and particularly on the level and pace of deployment. In the short term, the flow of hydrogen across the IMEC corridor is likely to remain largely on the drawing board, as the FIDs for many planned projects are pending.⁴⁷

Hydrogen is not an energy source but an energy carrier like electricity; it must be produced using other primary energy sources, such as conventional fuels, nuclear energy or low emission energy.⁴⁸ However, hydrogen is a stock-based chemical energy carrier that has several advantages over flow-based energy carriers like electricity.⁴⁹ The calorific value (thermal power) of hydrogen per unit volume is much lower when compared to natural gas, LPG, petrol and diesel.⁵⁰ The calorific value of hydrogen per unit mass is high (roughly three times that of jet fuel), but it has to be liquefied at -253°C to be compared with petroleum-based liquid fuels.⁵¹

The process of converting electricity to hydrogen, shipping, storing, and then converting it back to electricity in a fuel cell could potentially reduce the delivered energy to about 30 percent of the initial energy used.⁵² This makes hydrogen more expensive than electricity or natural gas used to produce it.⁵³ Globally, hydrogen has about 300 km (kilometres) of pipelines while natural gas has 3 million km of pipelines, reflecting the versatility and competitiveness of natural gas in meeting global energy needs.⁵⁴ The current cost of producing hydrogen varies from region to region depending on the method used, the price of electricity/natural gas/wind and solar and increasingly, the price of carbon with emissions.⁵⁵

The biggest advantage of hydrogen over other fuels is that its use yields only water and no polluting gases, particulates, sulphur dioxide or ground-level ozone.⁵⁶ As a stock-based energy carrier, hydrogen can be used to store, move, and deliver energy produced from other sources in cars, in houses, for portable power, and in many other applications.⁵⁷ Hydrogen-based fuel cells are far more efficient than heat or combustion engines.⁵⁸ While heat and combustion engines that convert heat to mechanical (or electrical) energy are subject to the Carnot efficiency limit for energy conversion, fuel cells that directly convert chemical energy to electricity are not subject to this limit, and can have efficiency rates of 60 percent or more.

The cost-effective transportation of hydrogen over vast distances is a critical factor for export viability. Due to its low volumetric energy density, hydrogen is typically converted into more easily transportable carriers.⁵⁹ Ammonia is widely considered a promising hydrogen carrier due to its higher volumetric density and existing infrastructure for production, storage, and shipping.⁶⁰ For shorter-to-medium distances and large volumes, dedicated hydrogen pipelines are the most economical option.⁶¹ While cross-continental pipelines for hydrogen are technically feasible, the initial investment is substantial, and their construction depends heavily on long-term demand certainty and geopolitical stability. While offering high purity, liquid hydrogen requires extremely low temperatures, making liquefaction energy-intensive and transportation complex and expensive.⁶² The shipping costs for liquid hydrogen can be two to four times higher than for LNG, making it a costly proposition.⁶³

“Green” hydrogen is produced from the electrolysis of water using wind, solar and other low emission energy; “yellow” hydrogen is produced using electrolysis of water using nuclear energy; “blue” hydrogen is produced by reforming methane with carbon capture and storage; “grey” hydrogen is produced by reforming methane without using carbon capture and storage.⁶⁴ “Green” hydrogen is almost four times more expensive than “grey” hydrogen.⁶⁵

According to the IEA, global hydrogen demand reached 97 million tonnes (MT) in 2023, marking a 2.5-percent increase when compared to 2022.⁶⁶ Demand remains concentrated in the refining and chemical sectors, and is principally covered by hydrogen produced from unabated conventional fuels.⁶⁷ As in the previous years, low-emissions hydrogen (“blue” and “green” hydrogen) played only a marginal role, with production of less than 1 MT in 2023.⁶⁸

According to global estimates, the lowest hydrogen production costs are in the Middle East, as they utilise natural gas without CCUS (carbon capture utilisation and storage), and the most expensive are through the electrolysis of water using solar and wind electricity in Europe.⁶⁹ The idea of hydrogen trade is based on leveraging the cost arbitrage between the two regions.⁷⁰ An increasing number of projects envision zero-emission hydrogen as an endpoint, but in the near term, more tangible fuels such as low-emission hydrogen are likely to record growth in production and consumption.⁷¹ Furthermore, the new global trade environment, with increased tariffs and other protectionist measures, has raised questions about how low emission hydrogen, ammonia, and methanol (liquid and transportable fuels derived from hydrogen) will be impacted. The economic viability of hydrogen transport remains moderate but could

improve under certain conditions. Hydrogen markets may mature: if Europe enforces policies to reduce emissions, hydrogen demand could grow substantially. If India industrialises rapidly, it could also import low emission fuels, particularly low emission hydrogen.

Demand from Europe, considered a key market for low emission hydrogen, is limited (about 10 MT by 2030), and long-term offtake contracts are yet to be signed.⁷² In the near term, geopolitical and security risks are high for hydrogen transport projects.⁷³ Desert pipelines carry local environmental risks, but such projects are still on paper. Risks can be minimised by following certain best practices.⁷⁴ Taxing and pricing emissions, lowering the cost of capital, sustaining subsidies for low emission energy generation, along with mandating the purchase of hydrogen by industries through long-term hydrogen purchase agreements, are expected to trigger the transition to low emission hydrogen.⁷⁵ Progress in initiatives for transporting hydrogen from low-cost production sites in India and the Middle East to Europe will depend critically on incentives for such production, along with the reduction of trade barriers and offtake guarantees by European markets.⁷⁶

Long Term (2030-45)

The realistic prospects of exporting hydrogen from India and the Middle East to Europe are substantial, and are underpinned by ambitious targets and strategic initiatives for production and consumption from all partners. Europe is set to become a significant importer of low emission hydrogen, while India and the Middle East possess the abundant low emission energy resources necessary for large-scale, cost-competitive production. However, significant logistical, infrastructural, and economic challenges must be meticulously addressed for these prospects to materialise fully.

Europe has established clear and ambitious targets for hydrogen imports as part of its emission reduction strategy.⁷⁷ The REPowerEU Strategy of 2022 aims to produce 10 MT and the importation of an additional 10 MT of low emission hydrogen by 2030.⁷⁸ By 2050, low emission hydrogen is projected to constitute approximately 10 percent of the EU's total energy requirements, crucial for reducing emissions energy-intensive industrial processes and the transport sector.⁷⁹ This potential demand could become a significant market opportunity for exporting regions. The EU's policy framework, including the revised "renewable" energy directive, sets binding targets for low-emission hydrogen uptake in industry and transport by 2030, reinforcing the import imperative.

The Middle East is exceptionally well-positioned to become a major global exporter of low emission hydrogen due to its vast, low-cost low emission energy potential, particularly solar and wind.⁸⁰ The UAE's National Hydrogen Strategy 2050 targets

1.4 MT of hydrogen production annually by 2031, comprising 1 MT of low emission hydrogen and 0.4 MT of “blue” hydrogen.⁸¹ The country aims to reach 7.5 MT of hydrogen production by 2040 and 15 MT by 2050.⁸² This involves massive investments in the form of 15.3 GW of solar PV (photovoltaic) and 8.7 GW of electrolyser capacity for low emission hydrogen production. A conceptual pipeline connecting the Middle East to Europe could transport 10 TWh (approximately 2.5 MT) of hydrogen per year at a levelised cost of around US\$2.9/kg by 2030, potentially decreasing to US\$2.46/kg by 2040.⁸³ With the deployment seen in the IEA’s net-zero emissions by the 2050 scenario, the cost of low-emissions hydrogen production with solar and wind is projected to fall to US\$2-9/kg by 2030 – half of today’s value – with the cost gap shrinking from US\$1.5-8/kg today to US\$1-3/kg by 2030.⁸⁴

As natural gas prices are expected to fall in many regions, low-emissions hydrogen production from natural gas with CCUS is also set to experience cost reductions. In the long term, cost reductions are expected through much larger electrolysers and a transition to lower-cost raw materials.⁸⁵ Despite the vast potential, only about 1 percent of the estimated 242 GW pipeline of export-focused low emission hydrogen projects in the Middle East region have reached FID.⁸⁶ This indicates a need for stronger demand signals, policy certainty, and significant investment to move projects from planning to operational status.

An exception to the pessimism over low emission hydrogen production and export is Saudi Arabia’s flagship NEOM project that has crossed a milestone, with 80 percent of its construction work complete across multiple sites.⁸⁷ The project includes a large-scale low emission hydrogen production facility, solar and wind power farms, and an integrated transmission grid.⁸⁸ The entire complex is expected to begin operations in 2027, positioning it as the largest low emission energy-powered ammonia production facility globally.⁸⁹ 4 GW of combined solar and wind generation capacity remains on track for completion by mid-2026, with the first shipments of ammonia-based low emission hydrogen projected to start in 2027.⁹⁰

Located in NEOM—the futuristic megacity under development in Saudi Arabia—the low emission hydrogen venture NEOM Green Hydrogen Company (NGHC) is jointly owned by ACWA Power, Air Products, and NEOM.⁹¹ Once fully operational, the facility aims to produce up to 600 tonnes of low emission hydrogen daily, converted to ammonia for easier transport and export—a key solution for industrial and transportation decarbonisation worldwide.⁹² The NGHC estimates that its production could offset approximately 5 MT of emissions annually, roughly equivalent to removing 210,000 vehicles from the road. In March 2025, Saudi utility ACWA Power signed a memorandum of understanding with Germany’s SEFE (formerly Gazprom Germania) to supply up to 200,000 tonnes of low emission hydrogen annually by 2030.⁹³ While

not yet a binding sales contract, the agreement signals strong interest from European buyers and contributes to ongoing efforts to establish a 'hydrogen bridge' between Saudi Arabia and Europe.⁹⁴ As a result, the NGHC has tentative demand commitments for a significant portion of its projected production capacity.

India is rapidly positioning itself as a global leader in low emission hydrogen production and utilisation, with a clear export-oriented strategy.⁹⁵ The national green hydrogen mission (NGHM) was launched in January 2023 with an outlay of approximately US\$2.2 billion, accompanied by an ambitious target of achieving a low emission hydrogen production capacity of 5 MT annually by 2030.⁹⁶ This includes installing 60-100 GW of electrolyser capacity and adding 125 GW of dedicated low emission energy generation capacity.⁹⁷ India has explicitly stated its aim to export a significant portion of its domestic low emission hydrogen production, with discussions initiated with the EU to explore opportunities to export 10 MT of low emission hydrogen to European buyers.⁹⁸ The strategy involves exporting at least 70 percent of India's low emission hydrogen production, as domestic use is expected to be limited in the initial phases, and overseas sales are crucial for price stabilisation and hedging against oversupply.⁹⁹ The country aims to reduce low emission hydrogen production costs from the current range of US\$5.57-US\$7/kg to approximately US\$1.5/kg by 2030. This reduction is anticipated through the leveraging of low-cost low emission energy and promoting local electrolyser manufacturing.¹⁰⁰

India is forging collaborations to accelerate progress. India's AM Green and the Port of Rotterdam Authority signed an MoU to create a low emission energy supply chain linking India and Northwestern Europe.¹⁰¹ AM Green plans to produce 5 MT of low emission ammonia annually by 2030 (equivalent to 1 MT of low emission hydrogen), with the potential to meet 10 percent of Europe's low emission hydrogen goals.¹⁰² Despite its cost advantages, India faces multiple hurdles, including the current lack of dedicated infrastructure for large-scale hydrogen transport and storage.¹⁰³ A mismatch between production costs and buyers' willingness to pay for low emission hydrogen currently limits firm off-take agreements, which are essential for attracting substantial investment.¹⁰⁴ Regulatory uncertainty in export markets further complicates growth.¹⁰⁵

Progress in some low emission hydrogen projects is noteworthy, but they could face significant headwinds. Globally, offtake agreements, a critical component for project financing, remain scarce.¹⁰⁶ Only about 12 percent of low emission hydrogen plants worldwide have secured firm customer purchase commitments.¹⁰⁷ High upfront costs and the need for expensive industrial retrofits deter many potential buyers. Compounding this, low emission hydrogen remains up to four times more expensive than hydrogen produced from natural gas ("grey" hydrogen).¹⁰⁸

B. Electricity Flows

Short Term (2025-30)

The prospects for transmitting electricity across continents as envisaged by IMEC are comparatively brighter in the short term. Plans to create a HVDC (high voltage direct current) link between the UAE, Saudi Arabia and India are already in place with the ambition to transform regional energy trade and accelerate the integration of low emission energy across borders.¹⁰⁹ HVDC is highly efficient for transmitting large amounts of electricity over long distances, integrating low emission energy interconnecting grids, and for opening up for new sustainable transmission solutions.¹¹⁰

The Comprehensive Economic Partnership Agreement (CEPA) between India and the UAE, which entered into force in May 2022, includes provisions for energy cooperation.¹¹¹ In 2024, India and the UAE signed an agreement to explore grid connectivity.¹¹² In 2023, Saudi Arabia and India signed an MoU to establish a general framework for cooperation in the field of electrical interconnection; consenting to the exchange of electricity during peak times and emergencies; co-production of low emission hydrogen and other low emission energy sources; and also to establish secure, reliable and resilient supply chains of materials used in the production of low emission hydrogen and the other low emission energy sources.¹¹³ During a visit to Saudi Arabia in April 2025, the Indian Prime Minister said that the two countries were working on feasibility studies for electricity grid interconnectivity.¹¹⁴

The proposed HVDC interconnector between the UAE, Saudi Arabia and India, part of the IMEC connectivity project, is one of the most important milestones in electricity transmission across continental borders. The proposed subsea HVDC interconnectors, with an estimated capacity of 2,000–2,500 MW, would enable large-scale transmission of low emission electricity from the Middle East to India, marking a major milestone in transnational grid connectivity.¹¹⁵ The initiative aims to enhance energy security, support the reduction of emissions, and promote economic competitiveness through cross-border electricity trade.

The electricity transmission link will leverage abundant low emission energy resources in both regions. The UAE and Saudi Arabia have made major investments in solar energy, while India is targeting 500 GW (gigawatts) of non-fossil fuels including hydro and nuclear fuel power generation capacity by 2030.¹¹⁶ By enabling the flow of surplus low emission electricity to where it is needed most, the interconnector between the IMEC partners will optimise resource utilisation, reduce curtailment of low emission

electricity generation, and help balance grid demand across time zones.¹¹⁷ The project is anticipated to require an investment of approximately US\$4–5 billion and could be completed within five years of approval.¹¹⁸

The Gulf Cooperation Council Interconnection Authority (GCCIA) has already demonstrated the viability of regional interconnections by linking the power grids of Saudi Arabia, the UAE, Bahrain, Qatar, Kuwait, and Oman.¹¹⁹ The proposed HVDC link represents a logical extension of this model, leveraging proven HVDC and submarine cable technologies for long-distance, high-capacity power transfer.

The Indian government, through Power Grid Corporation of India (POWERGRID), is actively engaged in discussions with counterparts in the UAE, Saudi Arabia, and Oman to finalise project modalities. Technical feasibility studies are underway, with POWERGRID providing supporting data for the project's next phase. The undersea power interconnector would be 1600 to 1700 km in length, and the proposal is to start with 3 GW (2 x 1.5 GW) of links in Phase I. In the future, other parallel links could be created, totalling 20 GW over the next decade.¹²⁰ Once operational, it would set the stage for a new era of cross-border electricity trade, supporting India's ambition to become a global hub for low emission energy exports and strengthening energy ties between Asia and the Middle East.

The advantage of a regional grid is that low emission electricity will be available round the clock because each region is in a different time zone. In the case of countries in the Middle East, the morning peak demand period would coincide with the peak sunshine period in India, and low emission electricity can then play a role in supporting demand from the Middle East. During seasonal peaks and other required times, access to cheaper solar electricity leveraging time arbitrage will significantly reduce the tariffs for end consumers. For solar generators, this would imply the possibility of exporting surplus generation at times, with low local prices. Nationally, it will enhance energy security as it will open access to additional low emission electricity generation capacity from states endowed with solar and wind resources. Globally, this will reduce emissions by displacing thermal generation.

Long Term (2030-45)

In the long term, the HVDC link between Saudi Arabia, the UAE and India is expected to operate under the One Sun One World One Grid (OSOWOG) initiative, which ambitiously aspires to create a globally interconnected low emission electricity energy grid.¹²¹ The OSOWOG initiative is a joint effort by India and the UK as part of their bilateral collaboration in conjunction with the International Solar Alliance (ISA) and the World Bank Group.¹²² This first-ever international network of interconnected solar grids seeks

to connect over 100 countries to continuous solar power, and has been endorsed by 80 ISA member countries.¹²³ The OSOWOG initiative, under which the IMEC electricity transmission interconnector will function, has a geographical perimeter composed of 117 countries from Europe, Africa, and South-East Asia, across seven time zones and representing one-third of the global power demand.¹²⁴ The first concrete objective of OSOWOG is to identify two or three cross-border power interconnection projects, like that of IMEC, which can be initiated within one or two years with India as the fulcrum of an intercontinental interconnected power system.¹²⁵ Regional initiatives such as the IMEC electricity transmission will foster connectivity, shaping the landscape for low emission energy integration. Junction countries of the interconnected network could become the energy hubs of a future Euro-Asia intercontinental power market.¹²⁶ Estimates suggest that pooling low emission electricity generation through cross-border collaboration in the form of an intercontinental power grid will reduce unit low emission electricity costs.¹²⁷

The optimistic view is that by 2040, technology maturity could lead to the development of a 2 GW under-sea cable between India and the GCC.¹²⁸ By 2050, the sum of intercontinental power corridors could hit 49 GW, from which 24 GW will be around the GCC.¹²⁹ By 2050, emission restrictions along with shadow pricing of emissions could lead to massive low emission energy development, decreasing unit electricity costs by 50 percent.¹³⁰

VI

The Impact of Trade Barriers

The effort to reduce energy emissions offers IMEC partners the opportunity to influence the international trade regime and establish mechanisms that protect the poor and most vulnerable from the impacts of climate change, as well as from the adverse consequences of energy transition and trade policies.¹³¹ IMEC partners could potentially seek alignment of international trade law with the effort to reduce energy emissions towards a just and sustainable energy future. To realise this objective, IMEC partners may review underlying assumptions in current trade rules and facilitate change in the fragmented and exception-based approach to tackling non-trade issues such as climate change in the multilateral trade regime. Exceptions to international trade rules, such as those captioned in the EU's carbon border adjustment mechanism (CBAM), allow

the pursuit of environmental objectives through trade-restrictive measures.¹³² These restrictions will negatively influence the goals of IMEC for energy flow in the longer term and slow down the energy transition in the Global South. This will reduce the pace of the global effort to reduce emissions.

CBAM is the first of trade restrictive measures to be applied to imported goods by any jurisdiction in the world.¹³³ It is intended to address emission leakage by equalising the emission price paid by EU industries in certain emission-intensive, trade-exposed industries under its emission trading system (ETS), by requiring importers to purchase and surrender CBAM certificates sufficient to bridge the carbon price differential.¹³⁴ For India, CBAM will apply to the cement, iron and steel, aluminium, fertilisers, electricity, and hydrogen sectors from January 2026.¹³⁵ From 2026 onwards, EU imports will face a price on their emissions, which will increase with time as subsidies embedded in the current EU ETS are phased out.¹³⁶ In the context of IMEC, inclusion of electricity and hydrogen under CBAM is of critical importance for India, Saudi Arabia and the UAE that are positioning themselves as exporters of low-emission electricity and hydrogen to the EU.

Under the reporting period for CBAM from October 2023 to December 2025, industries in India and the Middle East (as well as industries in other countries) exporting to the EU are obligated to report their embedded emissions as per CBAM guidelines.¹³⁷ By instituting a transition period until December 2025 and mandating emission reporting for all importers to the EU, the EU seeks to gather emission data from importers Worldwide.¹³⁸ This data is expected to help the EU expand or revise the scope of CBAM in the future.¹³⁹ When emission subsidies for these industries are phased out, the cost increase for exporting industries in India is calculated to be as high as 25-50 percent, which will effectively close the market for many Indian exporters to the EU.¹⁴⁰ India has raised apprehensions about sharing sensitive and confidential data with customers to comply with EU CBAM reporting requirements.¹⁴¹ India has also categorically stated that CBAM is an unfair trade practice and has challenged its provisions at the WTO (World Trade Organisation), but a resolution cannot be expected in the short term.¹⁴²

The EU's official document on CBAM has stated that: "While the objective of the CBAM is to prevent the risk of emission leakage, this regulation would also encourage producers from third countries to use technologies that are more efficient in reducing greenhouse gas (GHG) emissions. For that reason, the CBAM is expected to effectively support the reduction of GHG emissions in third countries."¹⁴³

This expectation ignores the developmental divergence between the Global North and the Global South. It disregards the widely accepted fact that the Global South requires a slower pace of emission reduction to help attain developmental outcomes,

such as increasing per capita energy consumption, without which increasing education, healthcare and quality of life outcomes will be impossible. The net-zero target for India, which accounts for one of the largest populations in the Global South, is set for 2070 to accommodate its ambitious development objectives.¹⁴⁴ The assumption in the caption above that the use of technologies that are more efficient in reducing GHG is as affordable for industries in the Global South as it is for industries in the Global North is untenable. In the case of generating electricity and hydrogen using low emission energy, the need for round-the-clock stable power makes investment in storage and back-up essential, thus increasing production cost substantially. The lack of clarity in the definition of low emission hydrogen also creates complexities and uncertainty in both the demand and supply sides. Exporters of hydrogen and electricity are expected to align with EU standards for emissions accounting and certification. Infrastructure for traceability, MRV (Monitoring, Reporting, Verification), and certification of origin and emission intensity add substantial costs to exporters.

The report submitted in February 2024 by the Standing Committee on Commerce—set up by the Government of India (GoI) to maximise exports—has observed that small- and medium-scale industries in India may not have the financial resources needed to make changes to counter CBAM. It recommended that the GoI seek extension of the CBAM’s application on small- and medium-scale industries by at least three years.¹⁴⁵ India is engaging in free trade agreement (FTA) negotiations with the EU and the UK, but CBAM could offset the benefits of market access gained through the FTAs.¹⁴⁶

Inserting clauses to defer CBAM in bilateral negotiations is being considered to safeguard Indian interests.¹⁴⁷ IMEC could also potentially call for deferring CBAM in energy trade agreements between partners.¹⁴⁸

In addition, IMEC deliberations need to address the question of how the EU plans to allocate funds raised through CBAM restrictions. Funds in the form of technology transfer and direct financial assistance should be utilised to reduce emissions smaller exporters in the Global South.¹⁴⁹ The EU could also consider longer transition periods for the Global South, both within and outside the context of IMEC.¹⁵⁰ Redirecting CBAM proceeds to support energy transitions in the Global South will advance the principle of “common but differentiated responsibilities” embedded in the United Nations Framework Convention on Climate Change (UNFCCC), which is also endorsed by the Paris Agreement.¹⁵¹

VII

Conclusions

Promoting energy connectivity and regional cooperation between IMEC partners, Saudi Arabia, the UAE, the US, and the EU could be a strong driver of trade, economic growth, and the transition to low emission energy systems. In the short term, energy flows among IMEC partners are likely to be dominated by oil and gas. These partners play a significant role in securing and stabilising the oil market as they account for at least a third or more of global trade in crude oil and petroleum products. The critical role of oil in the importer and exporter economies, along with robust demand growth in India, makes IMEC energy flows resilient to disruptions.

In the longer term, the prospects for cross-continental low emission electricity transmission and hydrogen exports from India and the Middle East

to Europe are promising, albeit contingent upon overcoming a number of hurdles. India and the Middle East, with their abundant low emission energy resources and strategic geographical locations, are poised to become supply hubs, with ambitious production targets. Europe's firm commitment to importing low emission hydrogen by 2030 provides a strong demand signal, but trade and non-trade barriers could increase costs and slow down low emission energy flows.

The proposed transcontinental power pool can not only enable IMEC partners to meet their electricity demand through international trade but also substantially reduce electricity costs by developing the most suitable and least expensive low emission energy sites. Given the uneven spatial distribution and temporal variability of solar and wind resources, cross-border integration of the grid can increase the balancing area that could better address changes in supply and demand of electricity when relying on close to 100 percent shares of low emission energy.¹⁵²

In the short term, IMEC partners need to focus on regulatory connectivity, going beyond the physical infrastructure. Greater alignment in low emission electricity and hydrogen trade processes, tariff procedures, and completion of bureaucratic requirements among participating countries should be the near-term goal. Interoperable systems, digitisation, reducing emissions, and synchronised regulations would be key to unlocking economies of scale. Initiation of dialogue on the removal of tariff barriers between India, the GCC and EU countries will bolster joint work in low emission hydrogen and low emission energy.

The transition from ambitious targets to large-scale operational exports will require massive investment in low emission energy generation and the complex infrastructure for hydrogen production, conversion (especially to transportable fuels like ammonia), storage, and dedicated shipping or pipeline networks. It will also require technological maturation and cost reduction. Further advancements and economies of scale are needed to reduce the cost of low emission hydrogen production and its various transport modalities to make it competitive with conventional fuels and economically attractive for long-term off-take agreements. Policy and regulatory certainty are essential for progress in cross-border energy trade under IMEC. Stable and harmonised international policies, certification schemes, and robust regulatory frameworks are essential to de-risk investments and facilitate cross-border trade. Geopolitical stability will enable long-term intergovernmental agreements and mechanisms to ensure energy security and address geopolitical sensitivities, especially those concerning shared infrastructure.

While challenges persist, the confluence of climate imperatives, technological advancement, and strategic economic interests suggests that these intercontinental electricity grids and hydrogen supply chains are not merely aspirational but are becoming increasingly tangible components of the future global energy architecture.

Exceptions to international trade rules, such as those captioned in the EU's CBAM, allow the pursuit of environmental objectives through trade-restrictive measures.¹⁵³ These restrictions will negatively influence the goals of IMEC for the flow of energy in the longer term and slow down the energy transition in the Global South. This will reduce the pace of the global energy transition.

VIII

Recommendations

In the short term, IMEC partners need to focus on regulatory connectivity, going beyond the physical infrastructure. Greater alignment in low emission electricity and hydrogen trade processes, tariff procedures, and completion of paperwork among participating countries should be the near-term goal. Interoperable systems, digitisation, reducing emissions and synchronised regulations would be key to unlocking economies of scale. Initiation of dialogue on the removal of tariff barriers between India, Saudi Arabia, UAE and EU countries will bolster joint work in low emission hydrogen and low emission energy.

In the longer term, attracting investments in low emission energy generation and the complex infrastructure for hydrogen production, conversion, storage, and dedicated shipping or pipeline networks should be prioritised.

Governments should promote technological advancement for cost reduction and offer policy and regulatory certainty that are essential to de-risk investments and facilitate cross-border trade.

IMEC partners should call for deferring the CBAM in energy trade agreements between partners. In addition, IMEC deliberations need to address the question of how the EU plans to allocate funds raised through such restrictions. CBAM funds in the form of technology transfer and direct financial assistance should be utilised to reduce emissions smaller exporters in the Global South. [ORF](#)

Lydia Powell is Distinguished Fellow, Observer Research Foundation.

Akhilesh Sati is Programme Manager, Observer Research Foundation.

Endnotes

- 1 The White House, Briefing Room, "Memorandum of Understanding on the Principles of an India – Middle East – Europe Economic Corridor," Statements and Releases, September 9, 2023, <https://bidenwhitehouse.archives.gov/briefing-room/statements-releases/2023/09/09/memorandum-of-understanding-on-the-principles-of-an-india-middle-east-europe-economic-corridor/>
- 2 The White House, "Memorandum of Understanding on the Principles of an India – Middle East – Europe Economic Corridor."
- 3 Press Trust of India, "India, UAE discuss IMEEC; Resolve to Expand Energy, Trade Ties," *Economic Times*, December 13, 2024, <https://economictimes.indiatimes.com/news/economy/foreign-trade/india-uae-discuss-imeec-resolve-to-expand-energy-trade-ties/articleshow/116295662.cms?from=mdr>
- 4 Asian News International, "India, EU Hold Bilateral Meeting on Connectivity, IMEC, and Security," *DD News*, February 28, 2025, <https://ddnews.gov.in/en/india-eu-hold-bilateral-meeting-on-connectivity-imec-and-security/#:~:text=India%2C%20EU%20hold%20bilateral%20meeting,strengthening%20India's%20engagement%20with%20Europe.>
- 5 *Reuters*, "Saudi Arabia and India agree to Boost Cooperation in Energy and Defence," April 23, 2025, <https://www.reuters.com/business/energy/saudi-arabia-india-agree-boost-cooperation-energy-including-crude-lpg-2025-04-23/>
- 6 Abhishek Dayal, Nihi Sharma, and Ishita Biswas, "India Poised to Become a Trusted Bridge of Global Connectivity through India-Middle East-Europe Economic Corridor (IMEC): Shri Piyush Goyal," Ministry of Commerce & Industry, Press Information Bureau, April 16, 2025, <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2122299>
- 7 IMEC, "India-Middle East-Europe Economic Corridor (IMEC)," <https://www.imec.international/about/>
- 8 IMEC, "India-Middle East-Europe Economic Corridor (IMEC)."
- 9 IMEC, "India-Middle East-Europe Economic Corridor (IMEC)."
- 10 Dayal et al., "India Poised to Become a Trusted Bridge of Global Connectivity through India-Middle East-Europe Economic Corridor (IMEC): Shri Piyush Goyal."
- 11 Arab Centre, "The Geopolitics of the India-Middle East-Europe Economic Corridor," October 10, 2023, <https://arabcenterdc.org/resource/the-geopolitics-of-the-india-middle-east-europe-economic-corridor/>
- 12 Outlook News Desk, "India-Middle East-Europe Economic Corridor 'Largest Cooperation Project' In History, Will Benefit World: Israel PM Netanyahu," January 18, 2024, <https://www.outlookindia.com/international/india-middle-east-europe-economic-corridor-largest-cooperation-project-in-history-will-benefit-world-israel-pm-netanyahu-news-317040>.
- 13 Dayal et al., "India Poised to Become a Trusted Bridge of Global Connectivity through India-Middle East-Europe Economic Corridor (IMEC): Shri Piyush Goyal."
- 14 IMEC, India-Middle East-Europe Economic Corridor (IMEC) Progress Update, September 9, 2023, <https://www.imec.international/progress/>
- 15 India's World, "The India-Middle East-Europe Economic Corridor," February 25, 2025, <https://indiasworld.in/the-india-middle-east-europe-economic-corridor/>

- 16 Abdul Moiz Khan, "The India-Middle East-Europe Economic Corridor (IMEC): Too Little, Too Late?" December 12, 2023, <https://carnegieendowment.org/sada/2023/12/the-india-middle-east-europe-economic-corridor-imec-too-little-too-late?lang=en>
- 17 Prateek Chakraborty, "How India-Middle East-Europe Corridor is Gateway to India's Global Power Status," *India Today*, June 5, 2025, <https://www.indiatoday.in/india/story/how-india-middle-east-europe-corridor-is-gateway-to-indias-global-power-status-2736322-2025-06-05>
- 18 Alberto Rizzi, "Grand designs: Linking Europe to India via the Gulf," September 14, 2023, <https://ecfr.eu/article/grand-designs-linking-europe-to-india-via-the-gulf/#:~:text=Saudi%20Arabia%20has%20committed%20to,bond%20instrument%20to%20collect%20resources.>
- 19 Dayal et al., "India Poised to Become a Trusted Bridge of Global Connectivity through India-Middle East-Europe Economic Corridor (IMEC): Shri Piyush Goyal."
- 20 Dayal et al., "India Poised to Become a Trusted Bridge of Global Connectivity through India-Middle East-Europe Economic Corridor (IMEC): Shri Piyush Goyal."
- 21 Dayal et al., "India Poised to Become a Trusted Bridge of Global Connectivity through India-Middle East-Europe Economic Corridor (IMEC): Shri Piyush Goyal."
- 22 Dayal et al., "India Poised to Become a Trusted Bridge of Global Connectivity through India-Middle East-Europe Economic Corridor (IMEC): Shri Piyush Goyal."
- 23 Vitalik Buterin, Zoë Hitzig and E. Glen Weyl, "A Flexible Design for Funding Public Goods," *Management Science*, Volume 65, No. 11, November 2019, pp. 5171–5187, <https://www.jstor.org/stable/48760860>.
- 24 Buterin et al., "A Flexible Design for Funding Public Goods."
- 25 Energy Institute, "Statistical Review of World Energy 2024," <https://www.energyinst.org/statistical-review>
- 26 Energy Institute, "Statistical Review of World Energy 2024."
- 27 Energy Institute, "Statistical Review of World Energy 2024."
- 28 Energy Institute, "Statistical Review of World Energy 2024."
- 29 Energy Institute, "Statistical Review of World Energy 2024."
- 30 Ministry of Commerce and Industry, Government of India, "Trade Statistics," Department of Commerce, <https://www.commerce.gov.in/trade-statistics/>
- 31 Ministry of Petroleum & Natural Gas, Government of India, "Import & Export: Current Reports," Petroleum Planning & Analysis Cell, <https://ppac.gov.in/import-export>
- 32 Ministry of Petroleum & Natural Gas, "Import & Export: Current Reports."
- 33 Ministry of Commerce and Industry, "Trade Statistics."
- 34 Ministry of Commerce and Industry, "Trade Statistics."
- 35 Ministry of Commerce and Industry, "Trade Statistics."
- 36 Ministry of Commerce and Industry, "Trade Statistics."
- 37 Ministry of Commerce and Industry, "Trade Statistics."
- 38 Ministry of Commerce and Industry, "Trade Statistics."
- 39 Ministry of Commerce and Industry, "Trade Statistics."

- 40 IEA, "World Energy Outlook 2024," International Energy Agency, Paris, <https://www.iea.org/reports/world-energy-outlook-2024>
- 41 IEA, "World Energy Outlook 2024."
- 42 IEA, "World Energy Outlook 2024."
- 43 Anil Kumar Jain, "How can Natural Gas shape a New Energy Future for India?" Petroleum & Natural Gas Regulatory Board, 2025, Government of India, https://pngrb.gov.in/pdf/press-note/20250407_DrAKJain.pdf
- 44 Ben McWilliams, Simone Tagliapietra & Jeromin Zettelmeyer, "Reconciling the European Union's Clean Industrialisation Goals with Those of the Global South," Policy Brief 18/2025, Bruegel, <https://www.bruegel.org/policy-brief/reconciling-european-unions-clean-industrialisation-goals-those-global-south>
- 45 IEA, "World Energy Outlook 2024."
- 46 Oil Price Information Service (OPIS), "Blue Hydrogen Emerging as a Long-Term Enabler of Green Hydrogen," 2025, <https://www.opis.com/product/pricing/spot/global-hydrogen-report/>
- 47 David R Baker, "Almost Nobody Is Buying Hydrogen, Dashing Its Green Power Hopes," *Bloomberg Law*, August 12, 2024, <https://news.bloomberglaw.com/environment-and-energy/almost-nobody-is-buying-hydrogen-dashing-its-green-power-hopes>
- 48 Nicolae I. Badea, "Hydrogen as Energy Sources—Basic Concepts," *Energies* 14, No.18: 5783, 2021, <https://www.mdpi.com/1996-1073/14/18/5783>
- 49 Nicolae I. Badea, "Hydrogen as Energy Sources—Basic Concepts."
- 50 Md Monjur Hossain Bhuiyan and Zahed Siddique, "Hydrogen as an Alternative Fuel: A Comprehensive Review of Challenges and Opportunities in Production, Storage, and Transportation," *International Journal of Hydrogen Energy*, Volume 102, 2025, pp. 1026-1044, <https://www.sciencedirect.com/science/article/pii/S0360319925000382>
- 51 Bhuiyan and Siddique, "Hydrogen as an Alternative Fuel: A Comprehensive Review of Challenges and Opportunities in Production, Storage, and Transportation."
- 52 Paul Breeze, Hydrogen Energy Storage, Chapter 8, in Paul Breeze (Ed), *Power System Energy Storage Technologies*, Academic Press, 2018, Pages 69-77, <https://www.sciencedirect.com/science/article/pii/B9780128129029000080>
- 53 Meiling Yue et al., "Hydrogen Energy Systems: A Critical Review of Technologies, Applications, Trends and Challenges," *Renewable and Sustainable Energy Reviews*, Volume 146, 2021, <https://www.sciencedirect.com/science/article/pii/S1364032121004688>
- 54 International Energy Agency, "Global Hydrogen Review 2024," IEA, Paris <https://www.iea.org/reports/global-hydrogen-review-2024>
- 55 International Energy Agency, "Global Hydrogen Review 2024."
- 56 Wafa Suwaileh et al., "Exploring Hydrogen Fuel as a Sustainable Solution for Zero-Emission Aviation: Production, Storage, and Engine Adaptation Challenges," *International Journal of Hydrogen Energy*, Volume 121, 2025, Pages 304-325, <https://www.sciencedirect.com/science/article/pii/S0360319925014983>
- 57 International Energy Agency, "Global Hydrogen Review 2024."
- 58 Michel Noussan, Pier Paolo Raimondi, Rossana Scita and Manfred Hafner, "The Role of Green and Blue Hydrogen in the Energy Transition—A Technological and Geopolitical Perspective," *Sustainability*, Volume 13, Issue 1, 2020, <https://www.mdpi.com/2071-1050/13/1/298>

- 59 Furat Dawood, Martin Anda and G.M. Shafiullah, "Hydrogen Production for Energy: An Overview," *International Journal of Hydrogen Energy*, Volume 45, Issue 7, 7 February 2020, Pages 3847-3869, <https://www.sciencedirect.com/science/article/abs/pii/S0360319919345926?via%3Dihub>
- 60 Muhammad Aziz, Agung Tri Wijayanta & Asep Bayu Dani Nandiyanto, "Ammonia as Effective Hydrogen Storage: A Review on Production, Storage and Utilization" *Energies*, Volume 13, Issue 12, <https://www.mdpi.com/1996-1073/13/12/3062>
- 61 Winston Cheng and Y. Frank Cheng, "A Techno-Economic Study of the Strategy for Hydrogen Transport by Pipelines in Canada," *Journal of Pipeline Science and Engineering*, Volume 3, Issue 3, 2023, <https://www.sciencedirect.com/science/article/pii/S2667143323000045>
- 62 Tongtong Zhang et al., "Hydrogen Liquefaction and Storage: Recent Progress and Perspectives," *Renewable and Sustainable Energy Reviews*, Volume 176, 2023, <https://www.sciencedirect.com/science/article/pii/S1364032123000606>
- 63 Peggy Shu-Ling Chen, Hongjun Fan and Nagi Abdussamie, "Evaluation of Hydrogen Shipping Cost for Potential Trade Routes," *WMU Journal of Maritime Affairs*, Volume 24, Pages 315–338, 2025, <https://link.springer.com/article/10.1007/s13437-025-00365-w>
- 64 Jimena Incer-Valverde, Amira Korayem, George Tsatsaronis and Tatiana Morosuk, "Colors of Hydrogen: Definitions and Carbon Intensity," *Energy Conversion and Management*, Volume 291, 2023, <https://www.sciencedirect.com/science/article/pii/S0196890423006404>
- 65 Riya Roy et al., "Comparative Techno-environmental Analysis of Grey, Blue, Green, Yellow and Pale-Blue Hydrogen Production," *International Journal of Hydrogen Energy*, Volume 116, 2025, Pages 200-210, <https://www.sciencedirect.com/science/article/pii/S0360319925011991>
- 66 International Energy Agency, "Global Hydrogen Review 2024."
- 67 International Energy Agency, "Global Hydrogen Review 2024."
- 68 International Energy Agency, "Global Hydrogen Review 2024."
- 69 Hafiz Muhammad Uzair Ayub et al., "A Cost Comparison Study for Hydrogen Production Between Conventional and Renewable Methods," *Process Safety and Environmental Protection*, Volume 186, 2024, Pages 921-932, <https://www.sciencedirect.com/science/article/pii/S0957582024004336>
- 70 McKinsey & Company, "Global Hydrogen Flows - 2023 Update," Hydrogen Council, <https://hydrogencouncil.com/en/>
- 71 International Energy Agency, "Global Hydrogen Review 2024."
- 72 Martin Lambert et al., "State of the European Hydrogen Market Report," June 2024, Oxford Institute for Energy Studies, <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2024/06/2024-State-of-the-European-Hydrogen-Market-Report.pdf>
- 73 Jacopo Maria Pepe, Dawud Ansari and Rosa Melissa Gehring, "The Geopolitics of Hydrogen," SWP Research Paper 2023/RP 13, <https://www.swp-berlin.org/publikation/the-geopolitics-of-hydrogen>
- 74 Calabrese Marcella et al., "Hydrogen Safety Challenges: A Comprehensive Review on Production, Storage, Transport, Utilization, and CFD-Based Consequence and Risk Assessment," *Energies*, Volume 17, Issue 6, <https://www.mdpi.com/1996-1073/17/6/1350>
- 75 Moongyung Lee and Deger Saygin, "Financing Cost impacts on Cost Competitiveness of Green Hydrogen in Emerging and Developing Economies," November 29, 2023, OECD Environment Directorate, https://www.oecd.org/en/publications/financing-cost-impacts-on-cost-competitiveness-of-green-hydrogen-in-emerging-and-developing-economies_15b16fc3-en.html
- 76 Parimal Kogekar, Ankur Malyan and Jagabanta Ningthoujam, "Green Hydrogen Production Pathways for India," July 10, 2025, <https://rmi.org/green-hydrogen-production-pathways-for-india/>

- 77 Lambert et al., "State of the European Hydrogen Market Report."
- 78 European Commission, "Hydrogen," https://energy.ec.europa.eu/topics/eus-energy-system/hydrogen_en#:~:text=The%20priority%20for%20the%20EU,%2Dzero%2C%20and%20sustainable%20development.
- 79 European Commission, "Hydrogen."
- 80 Heba Hashem, "Middle East Hopes Hang on Hydrogen," January 29, 2024, <https://breakbulk.com/articles/middle-east-hopes-hang-on-hydrogen>
- 81 Green Hydrogen Organisation, "Green Hydrogen Vision," Government Green Hydrogen Lead, Ministry of Energy and Infrastructure, United Arab Emirates, <https://gh2.org/countries/ united-arab-emirates#:~:text=Capacity%20Targets,15%20mtpa%20by%202050.>
- 82 Green Hydrogen Organisation, "Green Hydrogen Vision."
- 83 Green Hydrogen Organisation, "Green Hydrogen Vision."
- 84 International Energy Agency, "Global Hydrogen Review 2024."
- 85 Oil Price Information Service (OPIS), "Blue Hydrogen Emerging as a long-term enabler of Green Hydrogen."
- 86 Rachel Parkes, "Green hydrogen export projects in the Middle East and North Africa should be re-directed to Green Steel," *Hydrogen Insight*, March 6, 2025, <https://www.hydrogeninsight.com/industrial/green-hydrogen-export-projects-in-the-middle-east-and-north-africa-should-be-re-directed-to-green-steel-analyst/2-1-1788549>
- 87 Saudi Gulf Projects, "NEOM Green Hydrogen Project reaches 80% Construction Completion," June 2, 2025, <https://www.saudigulfprojects.com/2025/06/neom-green-hydrogen-project-reaches-80-completion/#:~:text=NEOM%20Green%20Hydrogen%20Company%20%28NGHC%29%20announced%20that%20it,facility%2C%20wind%20garden%2C%20solar%20farm%2C%20and%20transmission%20grid>
- 88 NEOM, "NEOM Green Hydrogen Company Completes Financial Close at a Total Investment Value of USD 8.4 Billion in the World's Largest Carbon-Free Green Hydrogen Plant," 22 May 2023, <https://www.neom.com/en-us/newsroom/neom-green-hydrogen-investment>
- 89 NEOM, "NEOM Green Hydrogen Company Completes Financial Close at a total Investment Value of USD 8.4 Billion in the World's Largest Carbon-Free Green Hydrogen Plant."
- 90 NEOM, "NEOM Green Hydrogen Company Completes Financial Close at a Total Investment Value of USD 8.4 Billion in the World's Largest Carbon-Free Green Hydrogen Plant."
- 91 ACWA Power, "NEOM Green Hydrogen Project," <https://acwapower.com/en/projects/neom-green-hydrogen-project/>
- 92 ACWA Power, "NEOM Green Hydrogen Project."
- 93 ACWA Power, "NEOM Green Hydrogen Project."
- 94 NEOM Green Hydrogen Company, "World's Largest Green Hydrogen Plant Reaches 80% Construction Completion across all sites," <https://nghc.com/>
- 95 Press Information Bureau, Government of India, Ministry of New and Renewable Energy, "India to Lead the World in Green Hydrogen: Union Minister Shri Pralhad Joshi," March 4, 2025, <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2108170>
- 96 Press Information Bureau, Government of India, Ministry of New and Renewable Energy, "National Green Hydrogen Mission (NGHM)," July 24, 2024, <https://www.pib.gov.in/PressReleasePage.aspx?PRID=2039091#:~:text=The%20overarching%20objective%20of%20the%20Mission%20is%20to,have%20been%20announced%20as%20part%20of%20the%20Mission%3A>

- 97 Press Information Bureau, "National Green Hydrogen Mission (NGHM)."
- 98 Press Information Bureau, Government of India, Ministry of New and Renewable Energy, "PM Narendra Modi Unveils Vision to Make India Global Hub for Green Hydrogen: Outlines ambitious plans to lead in production, utilisation and export of sustainable fuel," September 11, 2024, <https://www.pib.gov.in/Pressreleaseshare.aspx?PRID=2053689>
- 99 Press Information Bureau, "National Green Hydrogen Mission (NGHM)."
- 100 Press Information Bureau, Government of India, Ministry of New and Renewable Energy, "How National Green Hydrogen Mission seeks to Reduce Cost of Green Hydrogen," September 9, 2023, <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1947136>
- 101 AM Green and Port of Rotterdam, "AM Green and Port of Rotterdam Authority to Establish Green Energy Supply Chain Enabling up to 1,000,000 tons per year / USD 1 Billion Trade Between India and Europe," May 26, 2025, https://www.amgreen.com/wp-content/uploads/2025/05/Press-Release-AM-Green-and-Port-of-Rotterdam_26-May.pdf
- 102 AM Green and Port of Rotterdam, "AM Green and Port of Rotterdam Authority to Establish Green Energy Supply Chain Enabling up to 1,000,000 tons per year / USD 1 Billion Trade Between India and Europe."
- 103 Parimal Kogekar, Ankur Malyan and Jagabanta Ningthoujam, "Green Hydrogen Production Pathways for India," July 10, 2025, <https://rmi.org/green-hydrogen-production-pathways-for-india/>
- 104 Tom Terlouw, Lorenzo Rosa, Christian Bauer & Russell McKenna, "Future Hydrogen Economies imply Environmental trade-offs and a Supply-Demand Mismatch," Nature Communications volume 15, Article number: 7043, August 15, 2024, <https://www.nature.com/articles/s41467-024-51251-7>
- 105 Terlouw et al., "Future Hydrogen Economies imply Environmental Trade-offs and a Supply-Demand Mismatch."
- 106 Polly Martin, "Ambition vs Reality: Only a Tiny Proportion of the World's Clean Hydrogen Projects have firm Offtake Deals: BNEF," Hydrogen Insight, November 14, 2023, <https://www.hydrogeninsight.com/production/ambition-vs-reality-only-a-tiny-proportion-of-the-worlds-clean-hydrogen-projects-have-firm-offtake-deals-bnef/2-1-1554275>
- 107 Martin, "Ambition vs reality: Only a Tiny Proportion of the World's Clean Hydrogen Projects Have Firm Offtake Deals: BNEF."
- 108 Martin, "Ambition vs reality: Only a Tiny Proportion of the World's Clean Hydrogen Projects have firm Offtake Deals: BNEF."
- 109 HVDC World, "Proposed UAE-India HVDC Interconnection," April 22, 2025, <https://www.hvdcworld.com/news/proposed-uae-india-hvdc-interconnection?authReq=false>
- 110 Hitachi Energy, "Offshore grids: The Energy Transition's Next Frontier", August 24, 2022, <https://www.hitachienergy.com/products-and-solutions/hvdc#applications>
- 111 Ministry of External Affairs, Government of India, "List of documents launched/signed during the India-UAE Virtual Summit," February 18, 2022, https://www.mea.gov.in/bilateral-documents.htm?dtl/34880/List_of_documents_launchedsigned_during_the_IndiaUAE_Virtual_Summit
- 112 Press Trust of India, "India, UAE Ink Pact for Possible Energy Grid Connectivity Between Two Countries," January 11, 2024, <https://energy.economictimes.indiatimes.com/news/renewable/india-uae-ink-pact-for-possible-energy-grid-connectivity-between-two-countries/106712767>
- 113 *Economic Times*, "India, Saudi Arabia Mull High-Voltage Connect at the Bottom of Arabian Sea," April 22, 2025, <https://economictimes.indiatimes.com/news/india/india-saudi-arabia-mull-high-voltage-connect-at-the-bottom-of-arabian-sea/articleshow/120523803.cms>

- 114 Ministry of External Affairs, Government of India, "Joint Statement at the Conclusion of the State Visit of Prime Minister to the Kingdom of Saudi Arabia," April 23, 2025, https://www.mea.gov.in/bilateral-documents.htm?dtl/39440/Joint_Statement_at_the_conclusion_of_the_State_Visit_of_Prime_Minister_to_the_Kingdom_of_Saudi_Arabia_April_22_2025
- 115 HVDC World, "Proposed UAE–India HVDC Interconnection."
- 116 Rystad Energy, "UAE and Saudi Arabia Lead Middle East Energy Transition," February 10, 2025, <https://oilprice.com/Energy/Crude-Oil/UAE-and-Saudi-Arabia-Lead-Middle-East-Energy-Transition.html>
- 117 HVDC World, "Proposed UAE–India HVDC Interconnection."
- 118 HVDC World, "Proposed UAE–India HVDC Interconnection."
- 119 GCC Interconnection Authority, "The GCC Interconnection: Interconnection Benefits," <https://gccia.com.sa/gccia-grid/interconnection-benefits/>
- 120 Pratik Agarwal, "India to UAE Interconnector for Low-cost Evening Peak Solar to Asian region," Sterlite Power, [https://www.unescap.org/sites/default/d8files/event-documents/2.%20Pratik%20Agarwal%20Sterlite.pdf#:~:text=India%20can%20connect%20to%20the%20power%20grid%20of,\(2%20x%201.5%20GW\)%20of%20links%20in%20Phase-I](https://www.unescap.org/sites/default/d8files/event-documents/2.%20Pratik%20Agarwal%20Sterlite.pdf#:~:text=India%20can%20connect%20to%20the%20power%20grid%20of,(2%20x%201.5%20GW)%20of%20links%20in%20Phase-I)
- 121 Dewangi Sharma, "One Sun, One World, One Grid: Empowering Sustainability," *Invest India*, January 10, 2024, <https://www.investindia.gov.in/blogs/one-sun-one-world-one-grid-empowering-sustainability#:~:text=In%20October%202018%2C%20Prime%20Minister.by%2080%20ISA%20Member%20Countries>.
- 122 Sharma, "One Sun, One World, One Grid: Empowering Sustainability."
- 123 Sharma, "One Sun, One World, One Grid: Empowering Sustainability."
- 124 Nicolas Chamollet, "Global Sustainable Energy System Coupling Electricity and Hydrogen," June 2024, <https://electra.cigre.org/334-june-2024/global-connections/road-map-for-implementing-one-sun-one-world-one-grid-an-intercontinental-power-grid-from-europe-to-south-east-asia.html>
- 125 Chamollet, "Global Sustainable Energy System Coupling Electricity and Hydrogen."
- 126 Chamollet, "Global Sustainable Energy System Coupling Electricity and Hydrogen."
- 127 Chamollet, "Global Sustainable Energy System Coupling Electricity and Hydrogen."
- 128 Chamollet, "Global Sustainable Energy System Coupling Electricity and Hydrogen."
- 129 Chamollet, "Global Sustainable Energy System Coupling Electricity and Hydrogen."
- 130 Chamollet, "Global Sustainable Energy System Coupling Electricity and Hydrogen."
- 131 Henok Asmelash, "The Role of International Trade Law in the Energy Transition," *The Journal of World Investment & Trade*, Volume 24, Issue number 6, Pages 847–878, December 1, 2023, <https://research.birmingham.ac.uk/en/publications/the-role-of-international-trade-law-in-the-energy-transition>
- 132 Asmelash, "The Role of International Trade Law in the Energy Transition."
- 133 Kaushik Ranjan Bandyopadhyay and Kasturi Das, "CBAM and Steel Decarbonisation in India," *Economic & Political Weekly*, Volume 60, Issue No. 25, June 21, 2025, <https://www.epw.in/insight>
- 134 European Union, "Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism," <https://eur-lex.europa.eu/eli/reg/2023/956/oj/eng>

- 135 Prachi Priya, "Decoding CBAM: How will EU's Carbon Levy Impact India," Policy Circle, March 7, 2024, <https://www.policycircle.org/opinion/cbam-india-eu-carbon-border-tax/#:~:text=The%20actual%20EU%20carbon%20levy%2C%20scheduled%20to%20take,India%E2%80%99s%20exports%20to%20the%20EU%2C%20totaling%20%248.5%20billion.>
- 136 Directorate-General for Taxation and Customs Union, European Commission, "Carbon Border Adjustment Mechanism," https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en
- 137 Carbon Complete, "Transitional Period Vs Permanent System & CBAM Reporting Obligations," <https://carboncomplete.com/cbam-reporting-obligations-and-transitional-period/#:~:text=Throughout%20the%20CBAM%20transitional%20period%2C%20which%20commenced%20on,embedded%20in%20CBAM%20goods%20without%20incurring%20financial%20adjustments.>
- 138 Prachi Priya, "Decoding CBAM: How will EU's Carbon Levy Impact India."
- 139 Bandyopadhyay & Das, "CBAM and Steel Decarbonisation in India."
- 140 Giovanni Sgaravatti, "How to Fill the Remaining Gaps in Pricing the Emissions of the EU's Energy-Intensive Industries," November 26, 2024, <https://www.bruegel.org/analysis/how-fill-remaining-gaps-pricing-emissions-eus-energy-intensive-industries>
- 141 Prachi Priya, "Decoding CBAM: How will EU's Carbon Levy Impact India."
- 142 Saptakee S, "India Challenges EU's Carbon Border Adjustment Mechanism (CBAM)," Carbon Credits, March 10, 2024, <https://carboncredits.com/india-challenges-eus-carbon-border-adjustment-mechanism-cbam/>
- 143 European Union, "Regulation (EU) 2023/956 of the European Parliament and of the Council of 10 May 2023 establishing a carbon border adjustment mechanism."
- 144 Press Information Bureau, Government of India, Ministry of Science & Technology, "India is Committed to achieve the Net Zero Emissions target by 2070 as announced by PM Modi, says Dr. Jitendra Singh," September 28, 2023, <https://www.pib.gov.in/PressReleaselframePage.aspx?PRID=1961797>
- 145 PRS Legislative Research, "Strategy to Maximise Exports and Minimise Imports," <https://prsindia.org/policy/report-summaries/strategy-to-maximise-exports-and-minimise-imports#:~:text=Engineering%20exports:%20India's%20engineering%20exports,by%20at%20least%20three%20years.>
- 146 Mukesh Jagota, "India-EU now aiming for full-scale FTA," *Financial Express*, June 3, 2025, <https://www.financialexpress.com/policy/economy-india-eu-now-aiming-for-full-scale-fta-3867211/#:~:text=India%20and%20the%20EU%20are%20aiming%20to%20finalise,sensitive%20sectors%20like%20dairy%20and%20autos%20under%20negotiation.>
- 147 Amity Sen, "CBAM: India holding discussions with EU on mechanisms to avoid levies," *The Hindu Businessline*, June 14, 2024, <https://www.thehindubusinessline.com/economy/cbam-india-holding-discussions-with-eu-on-mechanisms-to-avoid-levies/article68290251.ece>
- 148 Anusha Arif, "India vs. EU's CBAM: Trade Wars & Green Tariffs," Social Policy Research Foundation, March 7, 2025, <https://sprf.in/india-vs-eus-cbam-trade-wars-green-tariffs/>
- 149 Prachi Priya, "Decoding CBAM: How will EU's carbon levy impact India."

- 150 Prashant Prabhakar Deshpand, "A critique of Carbon Border Adjustment Mechanism (CBAM) – Implications for Global South," *The Times of India*, August 20, 2024, <https://timesofindia.indiatimes.com/blogs/truth-lies-and-politics/a-critique-of-carbon-border-adjustment-mechanism-cbam-implications-for-global-south/>
- 151 Deshpand, "A critique of Carbon Border Adjustment Mechanism (CBAM) – Implications for Global South."
- 152 Haozhe Yang, Ranjit Deshmukh & Sangwon Suh, "Global Transcontinental Power Pools for low-carbon electricity," *Nature Communications*, Volume 14, December 15, 2023, <https://www.nature.com/articles/s41467-023-43723-z.pdf>
- 153 Asmelash, "The Role of International Trade Law in the Energy Transition."



Ideas . Forums . Leadership . Impact

**20, Rouse Avenue Institutional Area,
New Delhi - 110 002, INDIA**

Ph. : +91-11-35332000. Fax : +91-11-35332005

E-mail: contactus@orfonline.org

Website: www.orfonline.org