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From the Desk of the

Director General

Greetings from Federation of Indian Petroleum Industry (FIPI)!

India is one of the fastest growing economies of the world and is poised to continue with this path. With aspirations to achieve high income status by 2047—the centenary of its independence, the country is building on strong foundations of economic growth and social progress. Currently the world's fourth-largest economy, India is on track to become the third-largest by 2030 with a projected $7.3 trillion GDP. This momentum is powered by decisive governance, visionary reforms, and active global engagement. Notably, growth is accelerating, with real GDP growth by 7.8% in Q1 FY 2025-26, up from 6.5% a year earlier.

The robust economic growth provides a strong case for huge energy requirements in future. This is evident from the fact that the consumption of primary energy is expected to account for 12% of the world's demand by 2050, up from 7% in 2023. Further, the oil demand is expected to grow from 5Mb/d in 2023 to 9Mb/d in 2050 in Current Trajectory which is about 10% of global oil consumption. To meet the rising energy demands of the country, the government aims to provide impetus to the upstream segment, by preparing to launch its first deepwater licensing round as part of the new National Deepwater Exploration Mission. This initiative aims to accelerate the exploration and production of oil and natural gas from the country's vast offshore areas. A natural gas discovery in the Andaman-Nicobar Basin, is a major encouragement in this direction.

Further, in a major step to boost its energy security, India will build its first-ever private sector Strategic Petroleum Reserve (SPR) with capacity of 2.5 MMT in Padur, Karnataka. The additional storage will enhance India's buffer against global supply disruptions and price volatility.

In the downstream segment, Government has approved the release of 25 lakh additional LPG connections under the Pradhan Mantri Ujjwala Yojana (PMUY) during FY 2025-26. With this expansion, the total number of PMUY connections will rise to 10.58 crore. This acted as a significant move aimed at improving the lives of women and ensuring access to clean cooking fuel.

Further, in a pathway to net zero emissions by 2070, it is estimated that most of the growth in India's energy demand would be met by low-carbon energy sources. In this regard, we are overwhelmed with the news that India has already achieved a landmark in its energy transition journey by reaching 50% of its installed electricity capacity from non-fossil fuel sources—five years ahead of the target set under its Nationally Determined Contributions (NDCs) to the Paris Agreement. This significant milestone underscores the country's steadfast commitment to climate action and sustainable development.

Further, India achieved a record milestone in renewable energy installations, adding nearly 34.4 gigawatt (Gw) of new solar and wind capacity during the first nine months of 2025, a 71 per cent growth over the capacity addition in the same period last year.

A transition to clean energy is a huge economic opportunity for India. In this direction, the government has notified the National Policy on Geothermal Energy which seeks to harness the country's largely untapped geothermal resources, positioning this clean and dependable energy source as a key pillar of India's sustainable energy transition, thereby reducing dependence on fossil fuels.

In the green hydrogen space, government-run pilot projects aim to test the feasibility of green hydrogen in road transport by deploying 37 vehicles and 9 refuelling stations across ten different routes in India. This will provide real-world data on safety, technical viability, and economic efficiency to help scale up hydrogen technology and reduce dependence on fossil fuels. The initiative being a part of the National Green Hydrogen Mission aims to decarbonize India's economy and establish clean energy leadership.

FIPI: Quarterly activities (July-September 2025)

FIPI in association with KPMG organized a webinar on 'Green Hydrogen Certification Scheme of India' on 17th July 2025. The webinar was conducted to shed a light on the recently announced Green Hydrogen Certification Scheme in India (GHCSI) that sets out a comprehensive framework to support domestic producers in certifying their hydrogen as "green." The webinar witnessed an overwhelming response with participation of more than 300 professionals working across the energy value chain.

FIPI under the aegis of MoP&NG co-ordinated to set-up the India Pavilion on behalf of the Oil & Gas industry in India at Gastech exhibition & conference held from September 9 to 12, 2025, in Milan, Italy. Seven major oil & gas companies namely- ONGC, IOCL, OIL, GAIL, BPCL, EIL and PIL participated and displayed their technologies & facilities to the global organizations during the event. The theme for this year's India Pavilion was "Energising Progress: India's Path to a Sustainable Energy Future." The Pavilion was a comprehensive representation of India's oil and gas industry, encompassing the entire hydrocarbon value chain.

Further, on 12th September, 2025, FIPI, in association with EY as knowledge partner, organized a webinar on 'GST 2.0 - Impact on Oil & Gas Sector' on. The webinar was conducted to provide insights into the new GST rates as well as to understand the changes and their impact on business. The webinar witnessed an overwhelming response with participation of more than 150 professionals working across the oil and gas value chain.

Further, the 4th edition of India Energy Week will take place from 27th – 30th January 2026 in Goa, under the patronage of Ministry of Petroleum and Natural Gas, being jointly organised by the Federation of Indian Petroleum Industry (FIPI) and DMG events. As India strengthens its role at the heart of the global energy transformation, India Energy Week 2026 will bring together policymakers, business leaders, innovators, and investors to drive pragmatic solutions for a secure, sustainable, and affordable energy future. The event will target 75,000+energy professionals, 700+ exhibitors, 120+ national and international oil companies, 6500+ Indian and foreign conference delegates.

Ongoing FIPI Studies

FIPI also started coordinating a study by BCG for developing the Global Biofuels Alliance (GBA) under India's G20 presidency. The study aims to socialise biofuels, expand GBA's membership base, establishing its governance framework, and position it as a leading advocate for biofuels across major global platforms such as COP, IEW, and New York Climate Week etc. and implement approved initiatives. In Phase 4, the engagement is centred on finalising GBA's governance framework, setting up the GBA secretariat, publishing key thought leadership and promoting biofuel capacity building.

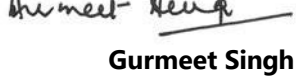
Conclusion

The overall trend for the energy transition market continues to be optimistic. With India's oil demand projected to grow at a rate of 2.2% till FY 2050 led by growing industrial and economic activities as well as rising urbanisation, the future is indeed exciting and full of promise for the oil and gas industry in India.

As India marches towards achieving energy independence by 2047, envisioned by our Hon'ble Prime Minister Shri Narendra Modi Ji, our country remains steadfast in aligning its efforts with the national priorities of 'Atmanirbhar Bharat' and 'Viksit Bharat'. Together, we will continue to undertake tremendous strides in contributing to India's energy security fostering nation's socio-economic development.

I assure you that FIPI stands strong by the industry and will be at the forefront advocating for a supportive policy ecosystem for the larger growth and development of the nation.

I wish all readers and their families a happy festive season!



Gurmeet Singh

Debottlenecking of Once Through Hydrocracker Unit at Mathura Refinery

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Mathura Refinery

1. Abstract

The Once-Through Hydrocracker Unit (OHCU) at Mathura Refinery, licensed by M/s Chevron, is a critical secondary processing unit for upgrading heavy feedstocks. During recent high-throughput test runs at 180 m³/hr, operational challenges such as reactor inlet temperature limitation, main fractionator flooding, excessive naphtha generation, and reactor pressure drop were encountered. A systematic debottlenecking strategy was implemented involving process parameter optimization, equipment limit relaxation, and operating adjustments. Post-optimization, the unit consistently achieved ≥65 wt% conversion and >93% HSD recovery, with estimated annual savings of ₹4.22 crore. This study highlights the significance of adaptive debottlenecking and advanced diagnostics in maximizing refinery throughput, yield, and economic.

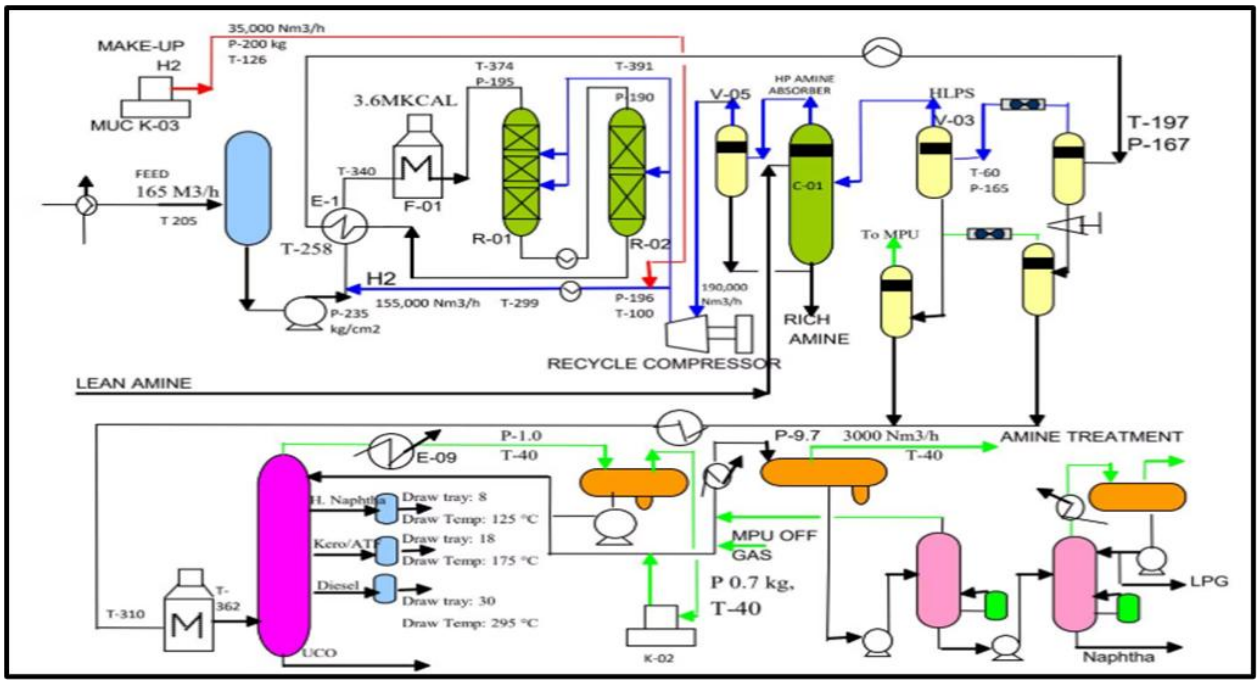
2. Introduction

The Once-Through Hydrocracker Unit (OHCU), licensed by M/s Chevron and originally designed for a capacity of 1.2 MMTPA of high-sulfur vacuum gas oil (VGO) at 60 wt% conversion, serves as a critical unit for upgrading heavy feedstocks. Subsequent revamps in 2004 and 2013 enhanced both capacity and conversion efficiency through catalyst advancements and equipment modifications. The current operating campaign is focused on catalyst changeovers and process optimization aimed at maximizing conversion, product recovery, and overall yield.

In July 2022, the OHCU reactors were fully reloaded with fresh catalyst, followed by a partial catalyst replacement in early 2024. This intervention was driven by accelerated catalyst deactivation, primarily due to reactor inlet temperature (RIT) limitations and the processing challenges associated with Ural crude–derived HSVGO. To assess the performance of the refreshed catalyst system and to confirm the unit's throughput capability, a 72-hour performance test was conducted in February 2025. The test utilized 100% HSVGO at the design throughput of 180 m³/hr.

3. Unit layout:

The OHCU consists of two main reactor trains (Hydrotreating and cracking reactors), an inter-reactor exchanger, high-pressure and low-pressure separator system, enhanced flasher and a main fractionator column along with side strippers. The downstream section recovers LPG, naphtha, kerosene, and HSD products.



4. Limitations In Units

During operations at a throughput of 180 m³/hr, several limitations were encountered in sustaining the minimum conversion target of 65 wt% along with the desired HSD recovery. The key challenges identified were:

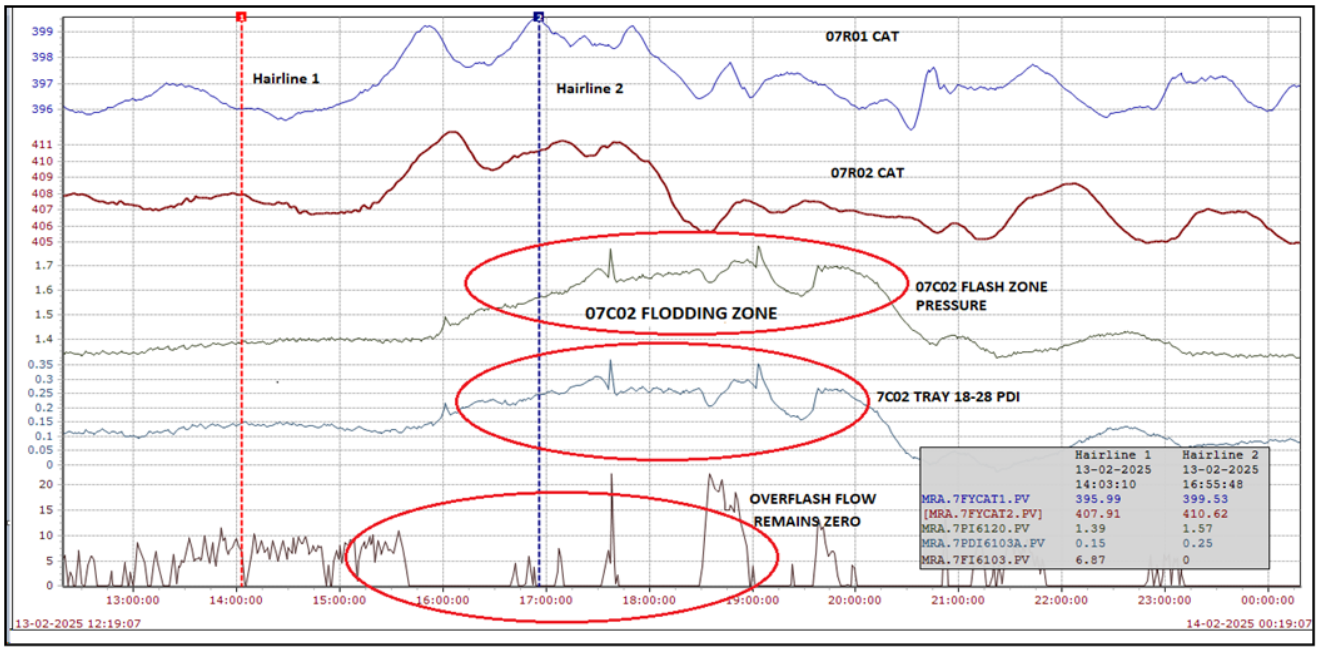
- **Reactor Inlet Temperature (RIT) Limitation:** Constraints in increasing the RIT of Reactor-02, which adversely impacted conversion efficiency at higher throughputs.
- **Main Fractionator Flooding:** Flooding issues in the main fractionator, leading to deterioration in kerosene and HSD recovery as well as product quality.
- **Excessive Naphtha Generation:** Elevated naphtha production attributed to secondary cracking reactions within the reactor system.

5. Debottlenecking actions:

A systematic debottlenecking approach was adopted to sustain the T'put at 180 m3/hr while maintaining the desired product quality and min. conversion of 65 wt%. Temporary relaxation of temperature and pressure limits for critical equipment, notably the Inter Reactor Exchanger (E-07), enabled safer increases in RIT. Optimization of flasher pressure helped mitigate the risk of pressure safety valve (PSV) activation. Flooding in HSD and Kero zones was resolved by maximizing Kero draw and adjusting product draw rates to meet freezing point and product quality criteria.

S.N.	Limitations Description	Reasons	Action taken
1	Limitation in increasing RIT of R-02 at higher t'put more than 170 m3/hr	Increase in temp and pressure of shell side outlet line	➢ PSV set pressure to be increased from existing 15 → 16.5 kg/cm2 ➢ Enhanced Flasher pressure to be reduced (16→ 15 Kg/cm2g)
2a	Restrictions observed during test run at T'put of 180 m3/hr	Flooding in HSD & KERO Zone.	➢ Kero draw has been maximized from 17% → 25%. ➢ Kero maximized flow to be maintained wrt to freezing point(-51°C).
2b		Higher Naphtha generation due to secondary cracking in R-02 B-02.	➢ Issue has been resolved with optimizing R-02 temperatures.

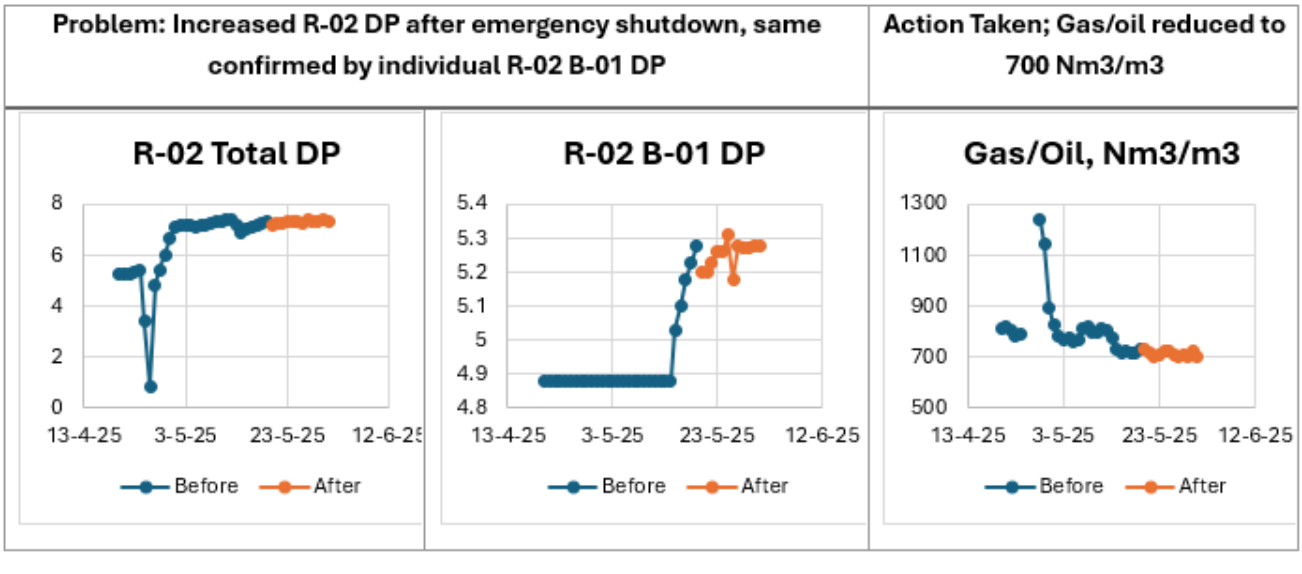
The given below graph represents the flooding zone of Main Fractionator column (7C02) and overflash flow condition before troubleshooting the unit.



6. Planned and Emergency Shutdown:

Following the implementation of debottlenecking measures, a unit test run was scheduled for April 2025, subject to throughput availability. However, two shutdowns occurred during this period: a planned seven-day shutdown from 6–13 April 2025 to address recurrent RGC vibration issues, and an emergency shutdown on 24 April 2025 caused by a pressure safety valve (PSV) malfunction in the CHPS system. After the emergency shutdown, a new bottleneck was identified in the form of a pressure drop increase across Reactor (R-02) by approximately 1 kg/cm²g, bringing it close to the catalyst design limit of 7 kg/cm²g at a throughput of 170 m³/hr.

For continued operation, a relaxation up to 10.54 kg/cm²g (the hydraulic limit) was approved. Detailed bed-wise monitoring revealed that R-02 Bed-01 exhibited a differential pressure of 5.3–5.5 kg/cm²g, approaching its hydraulic limit of 5.9 kg/cm²g. This constraint was subsequently mitigated by reducing the gas-to-oil ratio to the minimum permissible level, and further optimization was achieved by lowering the ratio to 700 through adjustment of the RGC antisurge system.



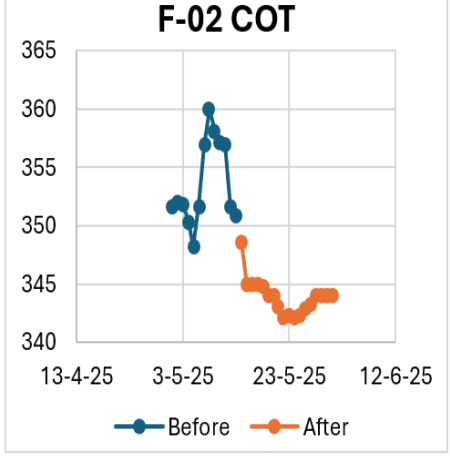
7. Unit Test Run:

By early May 2025, all previously identified bottlenecks had been addressed, and the unit was prepared for a full test run. However, during the first week of May, off-specification results were observed, with HSD tanks failing the copper corrosion test due to kerosene quality issues. The root cause was traced to severe flooding in the main fractionator, which not only compromised HSD recovery but also resulted in kerosene failing the Doctor test. The flooding caused significant instability in the column profile, necessitating detailed diagnostic efforts, including simulation studies and gamma scanning.

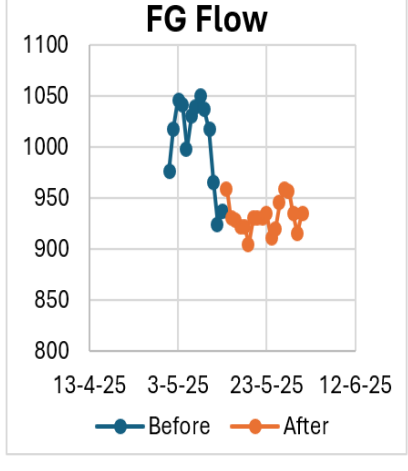
Comprehensive analysis of column parameters was carried out, followed by systematic troubleshooting and corrective adjustments. Once the column was stabilized, product sampling confirmed compliance with specifications. To achieve and sustain conversion levels of ≥65 wt% along with the targeted HSD recovery, major optimization measures were undertaken in both the Main Fractionator and reactor systems.

The details of the major actions taken are provided below.

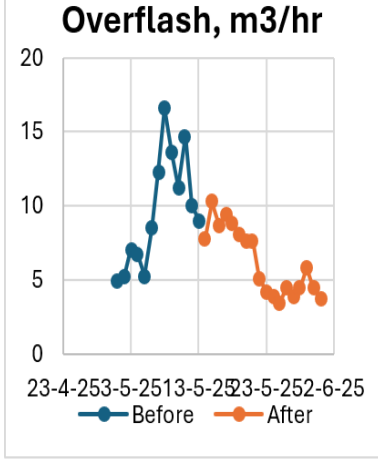
- F-02 COT reduced (355→345 Deg C) to reduced vapor load in Main fractionator, which helps in stabilizing the column and avoiding flooding scenarios.
- C-02 Steam reduced (3500→2500 Kg/hr) to reduce excessive vapor load in Main fractionator.
- C-02 top temp. maintained >100 Deg C.
- R-02 CAT maintained as per desired conversion.
- Heavy Naphtha draw temperature maintained in the range of 140–141 °C.
- KERO draw temperature maintained in the range of 188–190 °C {Increased ATF draw, contributing to ATF maximization at MR}.
- HSD draw temperature maintained in the range of 285–286 °C.
- Reduction of off gas generation and LPG production resumed by optimizing de-ethanizer and sponge oil absorber.
- LN flow maintained and HN flow maximized by routing HN to autoblender.



-02 COT reduced to offload column (355→345 Deg C)



FG flow to F-02 reduced (1050→950 Kg/hr)



Over flash optimized, column stabilized (12→5 m3/hr)

Finally, the planned 48-hour test run began on 21st May'25 at 06:00 hrs. The unit operated steadily at 180 m³/hr, achieving ≥65 wt% conversion and desired HSD recovery. However, the test run was concluded after 38 hours due to a throughput reduction caused by increased R-02 DP.

8. Feed Quality:

During the test run of unit after troubleshooting the unit all feed parameters are well maintained within design limits. Feed is slightly lighter as compared to design. Backwash Frequency was normal with time period of around 5-6 hours while operating at throughput 180 m3/hr. The detail of the design and actual parameters in feed to unit of all the critical parameters is provided below.

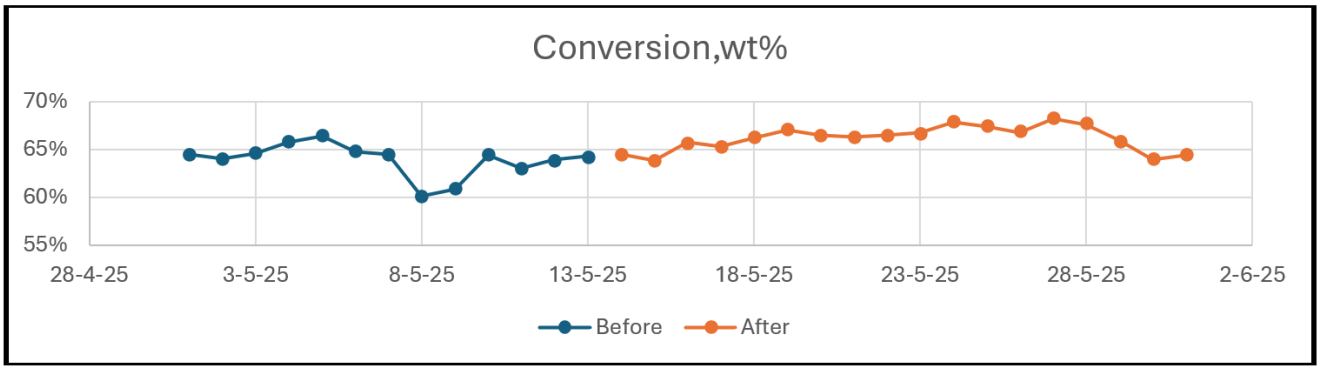
S. No.	Attributes	Design Feed Case-1	Design Feed Feed Case-2	Actual (21.05.25)	Actual (22.05.25)
		(60%:40% HS:LS)	(100% HS)	(100% HS)	(100% HS)
1	Specific Gravity @ 15°C, ASTM D-4052	0.9260 Max	0.9302 Max	0.9261	0.9251
2	Max S content, wt%, ASTM D-2622	3.11	3.11	2.60	2.62
3	Max N content, ppm, ASTM D-4629	1400	1250	660(Total) 236 (Basic)	646(Total) 231(Basic)
4	Max CCR, wt% ASTM D-4530	0.6	0.6	0.38	0.39
5	ASTM D1160, vol% distilled				
	IBP ° C	295	325	265	254
	5	357	364	364	368
	10	376	380	382	385
	30	413	412		
	50	441	442	452	454
	70	456	473		
	90	519	515	519	522
	95	540	550	535	540
	FBP	568	570	560	552
6	Asphaltenes, wppm, IP-143	<500	<500	185	192
7	Color			7	6.5
8	Metals content, ppm				
	Ni	<1	<1	<0.3	<0.3
	V	<1	<1	0.5	0.5
	Fe	<1	<1	<0.3	<0.3
	Cu	<1	<1	<0.3	<0.3
	Na	<1	<1	<0.3	<0.3
	As	0.5	0.5	<0.3	<0.3
	P	<1	<1		

Product Yields:

The combined light and heavy naphtha (LN+HN) yield was observed to be higher than the design limit, reaching 11–12 wt% against a maximum specification of 10 wt%. Conversely, LPG generation was lower than expected, with noticeable slippage of C_3 and C_4+ components into the fuel gas stream (V-13 off-gas). To address this, optimization of the sponge oil absorber and de-ethanizer was carried out, resulting in improved LPG recovery. Additionally, the ATF draw was maximized and routed to the HSD pool as per operational requirements. This strategy not only optimized ATF utilization but also contributed significantly to achieving the targeted HSD recovery of at least 93%.

Parameter	Design Feed Case-1	Design Feed Case-2	Actual (21.05.25 08:00hrs to 22.05.25 08:00 hrs)	Actual (22.05.25 08:00 hrs to 22.05.25 20:00 hrs)
	(60%:40% HS:LS)	(100% HS)	(100% HS)	(100% HS)
H_2 Consumed, % wt	Maximum hydrogen consumption to match the make-up capacity		2.32	2.38
Mass Balance, % wt				
H2S & NH3	As per feed S & N content		4.59	4.57
C1 & C2 (Fuel Gas)	0.3-0.6			
LPG	1.0-3.0		0.55	0.59
Light Naphtha (LN)	10 max.		9.23	9.84
Heavy Naphtha (HN)			2.28	2.24
ATF	Balance		23.27	23.33
Diesel	Min 24		26.97	26.95
UCO (OHCU bottoms)	Min 29		33.18	32.87
Min. Conversion,% wt	65		66.82	67.13
Imbalance, %			2.19	1.94

Conversion based on UCO flow achieved around 67 wt% against min requirement of 65 wt%.



Total Saving:

The debottlenecking initiatives resulted in an estimated total annual saving of approximately ₹4.22 crore. The major contributor was the reduction of the F-02 coil outlet temperature (COT) from 355 °C to 345 °C, which decreased the vapor load in the main fractionator, stabilized column operation, and prevented flooding, yielding a saving of about ₹4 crore per year. Additionally, optimization of C-02 steam consumption from 3,500 kg/hr to 2,500 kg/hr further reduced the vapor load in the main fractionator, contributing an additional saving of ₹22 lakh per year.

Conclusion:

The OHCU test run at Mathura Refinery stands as a model case of evidence-based debottlenecking and process optimization in hydrocracking operations. The study underscores the importance of adaptive process management, advanced diagnostic techniques, and agile troubleshooting in achieving higher throughput, improved product quality, and significant operational cost savings in modern refinery practice. The results confirm that there are no hydraulic limitations in operating the unit at 181.5 m^3/hr (110% of design capacity), while consistently maintaining conversion above 65 wt% and HSD recovery above 93%. Furthermore, Reactor R-02 catalyst loading can be increased without constraint, and light naphtha flow does not pose a limitation due to routing of heavy naphtha to the MS Autoblender and the successful debottlenecking of the LPG circuit.

Green Ammonia - The Carbon Agnostic Clean Energy Solution

Papia Mandal
General Manager

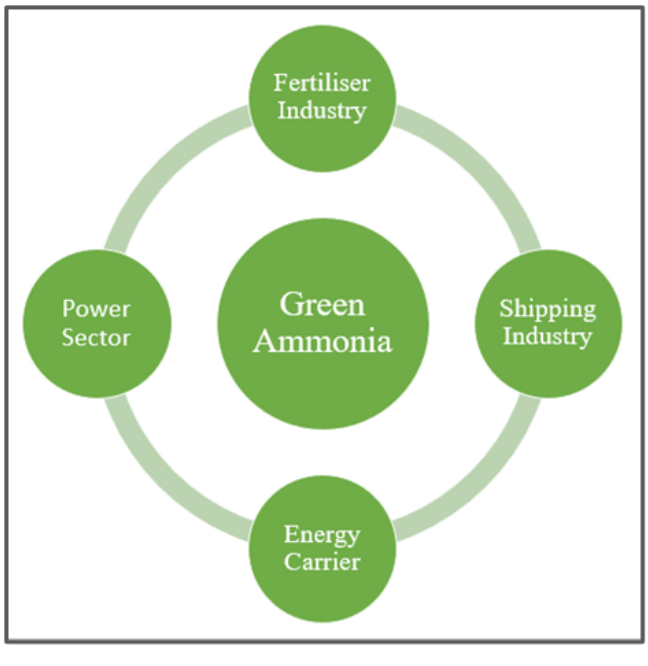
Engineers India Limited

Background

India's renewable energy expansion is not just enabling shift in the country's energy mix, but also, substantially reshaping the energy security strategy of the Nation. As the nation advances toward becoming the world's third-largest economy, it faces the challenge of sustaining growth and meeting the rising aspirations of its people, while ensuring energy security. At the same time, it must address greenhouse gas reduction, environmental concerns, and reduce import dependence to achieve true Atmanirbharta.

Over the past decade, the country has invested a lot of energy and strategy in its energy landscape by expanding its base and domains in solar, wind, nuclear, hydro, bio-energy and green hydrogen etc. to evolve and present a more versatile, succinct, and substantive clean fuel energy solution for the country. In continuity with this legacy, Green Ammonia, as a carbon free fuel, emerges as a potential game changing solution to enable a concrete step forward for reconfiguring the dynamics and composition of the Energy Basket. While Ammonia had been an integral part of our life balance over the centuries for its predominant usage in fertiliser production, in refrigerant and various industrial applications, green ammonia is emerging as a clean, carbon-free fuel for its multi-faced benefits (Exhibit-1).

Exhibit-1: Primary usage of Green Ammonia



Pathways for Green Ammonia

Fertiliser Industry – On account of its significant agricultural base, India not only has a huge demand of Urea, but also, remains the second largest Urea producer, after China. In FY 2023-24, the country produced about 31.4 million metric tonne per annum (MMTPA)[1] of Urea. Ammonia is essentially required for Urea production and therefore, the demand for Ammonia remains high. The country's ammonia requirement for various fertilisers, namely urea and non-urea based, is about 17 to 19 MMTPA[2]. Though, the country is the third largest producer of Ammonia, after China and Russia, there is still some import requirement. Further, as per the current trends this demand is likely to increase to 18.3 MMTPA by 2030 and 19.5 MMTPA by 2040 for the fertiliser sector only [3].

For each 1000kg of Ammonia production, about 177-180 kg of H_2 is needed. Traditionally, this requirement was met with grey H_2 through the SMR process, which emits huge amount of CO_2 alongside. On an average, for each kg production process of grey H_2, about 12 kg of CO_2 is emitted[2]. Typically, as part of the Urea Production, the Hydrogen produced is converted to ammonia as part of synthesis between Hydrogen and Nitrogen and the CO_2 produced in the SMR process is captively consumed in reaction with Ammonia to produce Urea.

In case of green ammonia production, green H_2 is used through the Electrolytic process, which produces < 2 kg of CO_2 during production of green H_2. Since no fossil fuel is used to produce green hydrogen, the import bill of the sourcing of natural gas as feedstock to the SMR process will not be required. The conversion of green hydrogen would again happen in the typical synthesis reaction between Hydrogen and Nitrogen. The critical aspect will be CO_2. Since the green hydrogen process does not produce CO_2, it produces a clear avenue of sourcing CO_2 from alternative sources, so that the green ammonia could be converted to green Urea. Sourcing CO_2 from the emitting streams of a Refinery, for instance, could be great synergy in terms of Urea production but would also enable CO_2 footprint reduction. Thus, while fulfilling the basic requirement of fertiliser production for food security, environment could be made cleaner too.

Shipping Industry – The global shipping industry is actively evaluating ammonia as an alternative marine fuel because of its potential to provide a cleaner and more sustainable energy solution. One of the key advantages of ammonia (NH_3) is that it is a carbon-free molecule. This means that, unlike traditional fossil-based marine fuels, its combustion does not release carbon dioxide (CO_2), a major greenhouse gas contributing to climate change. In addition, ammonia combustion generates negligible sulphur oxides (SO_x) and particulate matter (PM), both of which are harmful air pollutants. This makes it a significantly cleaner option, that can contribute to improving air quality in coastal and port regions, where shipping-related emissions are a pressing concern.

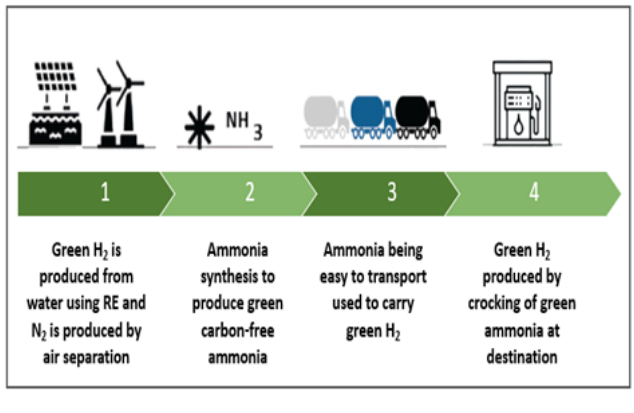
Another practical benefit of ammonia as a marine fuel lies in its storage and handling characteristics. Unlike hydrogen or liquefied natural gas (LNG), which require cryogenic temperatures or high-pressure containers to remain stable, ammonia can be stored and transported under relatively mild conditions, around 3.5-4.5 times[3] lower as compared to Liquid Natural Gas (LNG). Though, energy density of ammonia, 18.7 MJ/kg[3] almost half as compared to the traditional shipping fuels, i.e. heavy fuel oil having energy density around 40.5 MJ/kg[3], it is comparable with other green fuels such as methanol, ethanol etc.

This feature simplifies the logistics of adopting ammonia as a shipping fuel and reduces associated infrastructure costs. Combined with its environmental benefits, ammonia presents itself as a promising candidate to help the maritime sector transition toward low-carbon and cleaner energy solutions.

Energy Carrier – Ammonia is increasingly being recognized as a highly effective hydrogen carrier, particularly for large-scale and long-distance transport. One of the major reasons behind its suitability is the extensive global experience in handling ammonia, given its long-standing use in fertilizer production and chemical industries. Over the decades, a strong and reliable infrastructure has already been established for its production, storage, and transportation. This existing network can be effectively adapted and expanded to support the transition toward hydrogen energy distribution, reducing the need for building new infrastructure from scratch.

A further advantage of ammonia lies in its physical properties, which make it easier to manage compared to other hydrogen carriers. Ammonia can be liquefied and stored in liquid form for long periods under relatively moderate conditions. Specifically, it remains in liquid state at ambient pressure when cooled to below -33°C[4], a temperature that is technologically simple to achieve and maintain with current storage and refrigeration systems. This contrasts with hydrogen, which requires either extremely low cryogenic temperatures or very high pressures for storage, both of which present technical and economic challenges. At the destination ammonia cracking takes place at high temperature and in the presence of catalyst to extract H_2 back from ammonia (Exhibit-2). These characteristics make ammonia a practical, scalable, and cost-effective option for enabling the hydrogen economy.

Exhibit-2: Ammonia as Hydrogen Carrier [3]



Power Sector – Green ammonia holds strong potential as a sustainable fuel for future power generation, particularly once its production achieves economies of scale. It can be utilized in two main ways: direct combustion or hydrogen extraction. In the direct combustion approach, green ammonia is burned in gas turbines to generate electricity. Alternatively, it can undergo a process known as "cracking," where ammonia is broken down into green hydrogen, which is then used as a fuel in turbines for power production. Both pathways provide opportunities to transition away from conventional fossil fuels.

Traditionally, power generation has relied heavily on coal and natural gas, both of which contribute significantly to carbon emissions. Substituting these fuels with green ammonia offers a pathway to substantially reduce greenhouse gas emissions. This transition not only supports cleaner energy systems, but also, aligns with global climate commitments and national net-zero targets. The scalability of green ammonia, coupled with its ability to integrate into existing power plant infrastructure with appropriate modifications, makes it a promising option for large-scale decarbonization of the power sector. As adoption grows, green ammonia could become a cornerstone in balancing energy security with environmental sustainability.

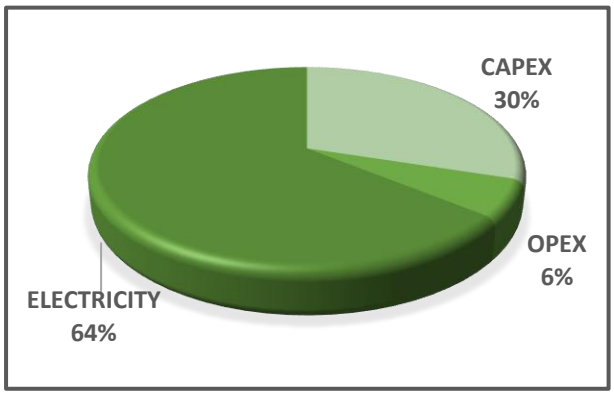
Global Race for Cost Competitiveness

The successful adoption of green ammonia in the future will depend largely on its ability to achieve cost competitiveness. A detailed understanding of production economics is essential, as costs remain a critical barrier to large-scale deployment. Table-1 and Exhibit-3 highlight the key elements that shape the overall cost structure of green ammonia production, providing insights into areas where efficiency improvements, technology advancements, and supportive policies could drive down expenses and enhance its global viability.

Table-1: Component-wise Cost of Green Ammonia Production [3]

Component	Cost (INR/ Ton)	% of Total
CAPEX	24,640	30%
OPEX	4,930	6%
Electricity	52,800	64%
Total	82,370	100%

Exhibit-3: Percentage-wise Cost components of Ammonia Production



Based on the cost breakdown, it is evident that the competitiveness of green ammonia production largely depends on reducing electricity or renewable energy expenses. Among renewable sources, solar power offers a significant opportunity to achieve this cost advantage.

India possesses vast potential for solar energy generation, supported by its favourable geographical conditions, abundant sunlight, and extensive coastline. By expanding solar power capacity through large-scale installations, the country can lower the input cost of renewable electricity, which is a major component of green ammonia production.

This strategy not only enhances cost competitiveness, but also, strengthens India's position in the global green fuel market. Scaling up solar infrastructure, therefore, is a critical lever for making green ammonia a viable and sustainable energy solution.

Additionally, sourcing Power from Nuclear facilities or Hydropower can be an interesting option too; where the power costs would be low and hence the green Ammonia cost would directionally reduce. The emergence of the modular Reactors in this connection is an important development; wherein, nuclear power could be available at low costs and at a relatively low gestation period.

Policy Interventions

The Government has launched multiple measures to promote and simplify the adoption of green hydrogen and green ammonia projects. These initiatives are designed to encourage participation from diverse stakeholders, enhance production capacity, and accelerate the integration of clean energy solutions across sectors, supporting India's sustainable energy transition goals.

National Hydrogen Mission (NHM) and National Green Hydrogen Policy – With the introduction of the National Hydrogen Mission (NHM) and the

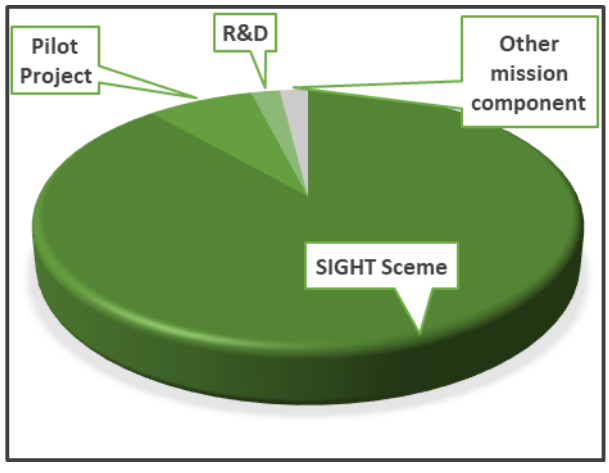
Green Hydrogen Policy, significant focus has been placed on scaling up the production and adoption of green ammonia. The policy framework is designed to create a supportive ecosystem by offering multiple advantages to producers and related stakeholders. With an aim to establish India as a major hub for green H_2 and green ammonia, and with a target of achieving an annual production of 5 million tons of H_2 by 2030, projects with an aggregate capacity of around 0.5 MMTPA have already been awarded. One of the key provisions includes the easy procurement of renewable energy (RE), ensuring reliable and cost-effective power supply for green ammonia manufacturing. Additionally, industries are allowed to store surplus renewable energy with distribution companies (DISCOMs) for up to 30 days, enabling greater flexibility and efficient utilization of resources.

Further, the policy facilitates access to distribution licenses, allowing manufacturers to directly procure renewable power at concessional rates, thereby reducing overall production costs. Waivers on inter-state transmission charges provide another major boost, making the transportation of renewable energy across regions more affordable. Moreover, special permissions have been granted for establishing bunkers near ports for the storage of green ammonia, supporting its export and use in the shipping sector.

Together, these initiatives aim to create a robust infrastructure for green hydrogen and green ammonia, fostering cost competitiveness, improving logistics, and strengthening India's position as a leader in the global clean energy transition. A total allocation of INR 19,744 crore has been made under the National Green Hydrogen Mission (NGHM). While the majority of the funding is directed through the SIGHT scheme, additional allocations include INR 1,466 crore[5] for pilot projects, INR 400 crore[5] for R&D initiatives, and INR 388 crore[5] for other mission components (Exhibit-4)

Strategic Interventions for Green Hydrogen Transition (SIGHT) Scheme – As part of the NGHM, the SIGHT scheme has been formulated to provide financial support amounting to INR 17,490 crore[5], aimed at driving the production of green ammonia on a significant scale. This scheme is designed to encourage the deployment of green ammonia as both a clean energy carrier and a sustainable raw material for fertilizer manufacturing. By offering targeted incentives, it seeks to make large-scale production more viable and cost-efficient, thereby strengthening its competitiveness against conventional alternatives.

Exhibit-4: Fund Allocation through various initiatives under NGHM



The initiative holds the potential to transform several key industries by reducing their dependence on fossil fuels and minimizing greenhouse gas emissions. In particular, the fertilizer sector, which contributes substantially to carbon emissions, stands to benefit by adopting green ammonia as an eco-friendly substitute. Likewise, its applications in the shipping industry and power generation are expected to create further avenues for clean energy use. The scheme also paves the way for emerging opportunities across other industrial domains where ammonia can be utilized.

In essence, the SIGHT scheme not only promotes industrial decarbonization, but also, accelerates India's broader clean energy transition, reinforcing its commitment to achieving long-term sustainability and global climate goals.

Key Concerns

CAPEX for Installation of Ammonia Plants – Setting up ammonia plants requires substantial upfront investment, including costs for land acquisition, advanced technology, and reliable power infrastructure.

Regulatory Challenges – As of now, a comprehensive regulatory framework has not yet been established.

Gaining Cost Competitiveness – Achieving cost competitiveness will require large-scale installations, supported by market demand that aligns with the added production capacity. Additionally, tapping into export markets in harmony with domestic output will be essential to realize economies of scale.

Transitioning from Grey to Green Ammonia – With grey ammonia having been in use for decades, transitioning to green ammonia—requiring additional investment—faces inherent resistance and mindset barriers that slow down its widespread adoption.

Global Competition – The wide-ranging advantages of green ammonia have motivated several countries to position themselves as global hubs. In this race for market leadership, speed remains the key to success.

Path Forward

Electricity expenses make up a significant share of the overall cost of producing green ammonia. While capital expenditure remains largely uniform worldwide and apparently do not impact the cost of green Hydrogen/ Ammonia as much, operating expenses are critical which is directionally dependent on the cost of power. In case the cost of power is low, it will impact the total production cost of the green Ammonia substantially; thereby, positively impacting the total production costs of green Ammonia. Therefore, reducing renewable energy costs at the national level is crucial for the successful adoption of green ammonia.

Careful site selection for green ammonia plants when integrated with refinery complexes, can ensure economical access to key inputs like CO_2 for green urea production, thereby supporting effective synergy and large-scale expansion. Alternatively, proximity to renewable energy sources, especially solar, nuclear and hydro power, plays a vital role. Hence, the location of green ammonia facilities should be strategically planned to maximize access to energy and raw materials while aligning with down-stream industries such as urea plants, enabling economies of scale in the green ammonia market.

Reference

[1]https://fert.gov.in/sites/default/files/2025-04/Annual_Report_fertilizer_English.pdf
[2]https://www.pib.gov.in/PressReleasePage.aspx?PRID=2138823
[3]https://energyforum.in/fileadmin/india/media_elements/publications/20230515_GNH3_Deloitte_Study
[4]https://www.topsoe.com/ammonia-cracking?
[5] https://www.gh2.org.in/resources

South-South Cooperation Addressing the Energy Trilemma

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The fight for climate change intensified in the past few years, with countries around the world coming together in the 21st Conference of the Parties (COP21) to the UNFCCC and taking a resolve to limit global warming to below 2°C above pre-industrial levels. As the starting points for the nations were different, the Paris Agreement provided a framework for financial, technical and capacity-building support to the nations requiring assistance from the developed countries or the multilateral institutions or both.

The Nationally Determined Contributions (NDCs) form the core of COP21 commitments by the countries to reduce their greenhouse gas emissions. Accelerated actions amidst the growing climate disasters across the globe and the anticipation of higher levels of NDC ambitions compared to the previous versions warrant close collaboration among the contributors. South-South Cooperation could be an instrumental pivot in driving the ongoing energy transition, particularly in the Global South, through sharing resources and technical expertise to become self-reliant in meeting their sustainable development objectives in the dynamic global energy landscape.

It is worth noting that nations in the Global South contribute more than 55% of global oil production, with the 80% proven crude oil reserves of the world held by the OPEC member countries only, indicating the abundance of natural energy resources, that may be one of the levers of the south-south cooperation as complementary to the triangular cooperation in the years to come.

Fig: Global South Countries (Group of 77 countries and China)

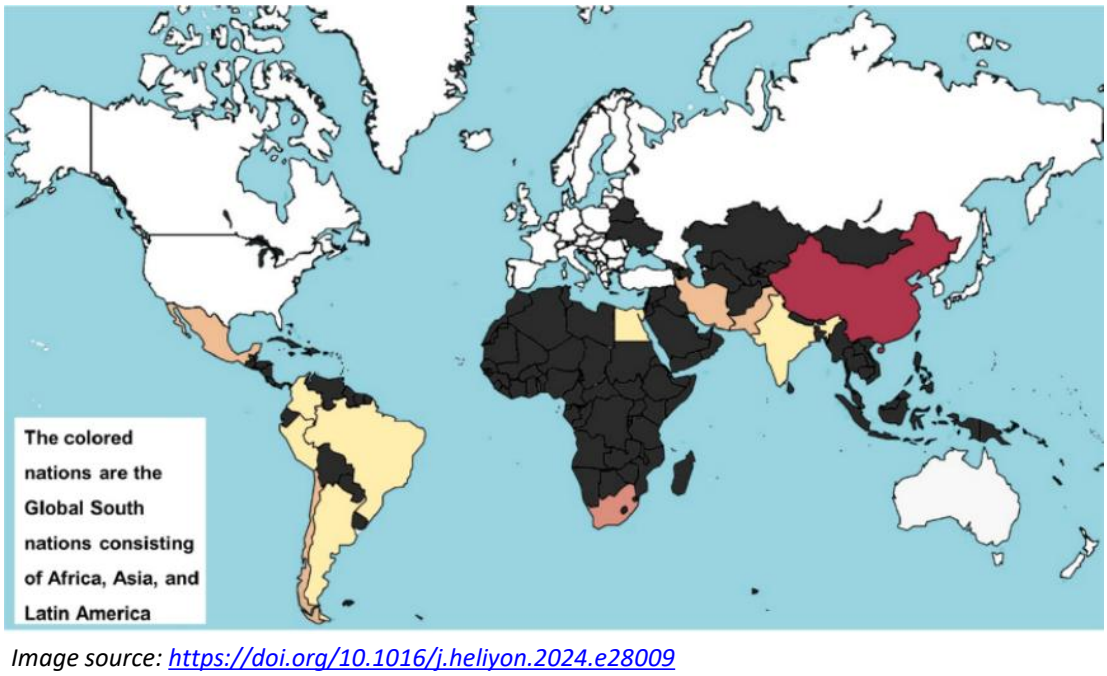

Image source: https://doi.org/10.1016/j.heliyon.2024.e28009

Hence, it is pertinent to reflect upon and deliberate on the prospects of cooperation among the developing nations on the pressing issues such as healthcare, hunger, energy security and climate change, among others.

Affordable and Clean Energy (SDG-7) is one of the important Sustainable Development Goals. A long-term sustained investment is quintessential to achieve energy security in the wake of transforming the global energy mix to keep pace with the evolving energy demand and supply scenarios. However, the World Investment Report 2025, released by UN Conference on Trade and Development (UNCTAD), reveals a sharp decline of around 31% in international investment in developing economies in the renewable energy sector. The slump in global FDI necessitates the constitution of financial institutions catering particularly to the regions of the global south, with contributions based on their GDP share.

For instance, the New Development Bank (NDB), established by the BRICS nations, has recently approved financial support of RMB 1.448 billion for the Shanxi Taiyuan Wusu zero-carbon airport project, China's first regional hub-scale airport to meet its heating and cooling requirements with 100% renewable energy. Similarly, the Asian Infrastructure Investment Bank (AIIB) has been funding several clean energy and infrastructure projects in India, Egypt, Maldives etc., assisting the countries in achieving their climate change commitments.

Alternative Energy Traction in the Global South

The countries in the south need to collaborate further and pool their resources to accelerate advancement in the emerging energy sectors, such as fuel-grade ethanol, Sustainable Aviation Fuel (SAF), and energy storage technologies. Countries like Brazil, India and Indonesia have already implemented national biofuels programs, which are at different levels of implementation based on the availability of suitable feedstocks in their territory. For instance, Brazil's national biofuels policy, 'RenovaBio', sets annual decarbonisation targets for ten years, which are allocated to fuel distributors based on their market share of fossil fuels. The producers issue the decarbonisation credits from the biofuel sales that can be traded in the financial market, thereby incentivising the obligated entities. It is important to note that 21% of the transportation energy requirement of Brazil is fulfilled by Biofuels.

Also, the Government of India has already amended the National Biofuels Policy 2018 which allows more feedstocks for biofuels production, promotes biofuels production in Special Economic Zones (SEZs), and permission for export of biofuels in addition to advancing the 20% ethanol blending target to 2025 and successfully achieving it on time. Ethanol Blending Program (EBP) has helped the country in reducing around 70 million tons of CO_2 emissions since 2014. Further, a multistakeholder alliance such as the Global Biofuel Alliance (GBA) launched during the G20 summit 2023 in India has the potential to accelerate the advancement of biofuel technology development and its commercialisation to fulfil the growing sustainable energy needs.

Indonesia, being the world's largest palm oil-producing nation, has progressed its biodiesel derived from palm oil blending target to 40% (B40) in 2025. This has resulted in savings of around $3.68 billion in foreign exchange already by the country as of June this year through its palm oil blending program, which was around $9.3 billion last year.

The above examples from leading biofuel producing nations validate the successful biofuel use cases and their impact on the reduction of carbon footprints. This traction can be leveraged to deepen the South-South cooperation, contributing towards energy security for the emerging markets of Africa and Asia.

Solar energy is another important area for South-South cooperation owing to its abundance across the regions and untapped opportunities to harness it. Statistics suggest that most of the countries in the global south could meet their energy requirements with less than 0.1% of land covered by solar panels. However, it will require investment and adequate infrastructure to accelerate the growth of this sector. India has already surpassed 100 GW of solar power installed capacity and has aimed to produce 500 GW of electricity through non fossil based energy sources.

In this direction, collaborative initiatives such as the International Solar Alliance (ISA), headquartered in India, with an objective to develop and deploy solar powered energy solutions with a mandate to mobilise $1000 billion investment in solar energy solutions by 2030 have a greater role to play in scaling the solar energy infrastructure particularly in the Least Developed Countries (LDCs) and Small Island Developing States (SIDSs).

Further, cross border electricity trade could be a potential solution for close cooperation among the nations of Global South to meet their burgeoning electricity needs. For instance, India is a net exporter of electricity to its neighbouring nations such as Nepal, Bhutan (net import), Bangladesh and Myanmar. The country exported more than 2400.

million units of electricity through cross-border trade in the year 2022-23. Multilateral trade agreements, bidding route and framework agreements could be instrumental in establishing a close network among the nations to meet the energy demands of the developing nations through cooperation in a cost-effective manner.

In conclusion, South-South cooperation presents a unique opportunity to bridge the global North-South economic disparity while meeting the shared global net-zero objectives. A multistakeholder approach, including promotion of innovative technological solutions through technology transfers, robust regulatory frameworks, forging cross-border cooperation agreements for sharing resources on mutually agreed terms, partnerships with development finance institutions, effectively utilizing the climate finance of at least $300 billion per year by 2035 pledged by developed countries to support climate-resilient solutions in the developing countries, among others are some of the potential pathways to address the energy trilemma of energy security, energy equity and sustainability in the Global South.

Pioneering innovations by EIL: A Transformative Methodology for Achieving 65% Capacity Augmentation of CDU-VDU by Selecting Optimum Configuration with Benchmark Energy Efficiency in India

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The leading Indian refiners have entrusted Engineers India Limited (EIL) with conducting a configuration study for the revamp of the Crude and Vacuum Distillation Unit (CDU/VDU) along with the Naphtha Stabilization Unit (NSU), as part of their expansion project. The revamp aims at achieving a capacity enhancement of approximately 65%.

To increase CDU/VDU capacity, the study should include a comprehensive evaluation of different configuration options, including but not limited to:

- **Series configuration:** Installation of a new pre-fractionator upstream of the existing crude column.
- **Parallel configuration:** Addition of a new crude column operating in parallel with the existing unit.
- **Alternative configurations:** Any other arrangements as recommended based on the licensor's experience and expertise.

Best suited configuration for the revamp shall be selected based on the following:

- Best in class energy intensity of the unit.
- Minimize new / modifications in existing equipment's, maximize the reuse of existing
- Assets and minimize the Capex.
- Accommodate any major equipment addition in the available plot area.
- Modifications doable in 30 days turnaround time.
- Ease of implementation by progressing the modifications/new additions during normal operation of the unit.

Configurations Evaluated for Revamp:

1. **CONFIG 1:** A new Pre-fractionator with Naphtha only cut from the overhead of Pre-fractionator, Modified Existing Crude Column, an existing Vacuum Column and the new Stabilizer parallel to the existing Stabilizer. A new crude heater in parallel to the Existing Crude heater.
2. **CONFIG 2:** A new Pre-fractionator with Naphtha and partial Light Kero Draw from the Pre-fractionator Column, existing Crude Column, an existing Vacuum Column and the new Stabilizer parallel to the existing Stabilizer. Also, a new furnace u/s of Pre-fractionator Column and a modified Existing Crude Heater.
3. **CONFIG 3:** A new Parallel Crude Column to the existing modified Crude Column, an existing Vacuum Column and the new Stabilizer parallel to the existing Stabilizer. A new Crude heater in parallel to the existing Crude heater.
4. **CONFIG 4:** A new Pre-fractionator with Naphtha and total Light Kero Draw from the Pre-fractionator Column, existing Crude Column, an existing Vacuum Column and the new Stabilizer parallel to the existing Stabilizer. Also, a new furnace u/s of Pre- fractionator Column and a modified Existing Crude Heater.
5. **CONFIG 5:** A new Pre-fractionator with Light Naphtha, Heavy Naphtha and full range Light Kero Draw from the Pre-fractionator Column, existing Crude Column, an existing Vacuum Column and the new Stabilizer parallel to the existing Stabilizer. Also, a new furnace u/s of Pre-fractionator Column and an existing Crude Heater.

Description of Configurations:

1. Configuration 1

1.1 Major Equipment

New major Equipment / modified Equipment under this configuration are as follows:

- A New Prefractionation Column.
- A Modified Existing Crude Column
- The new Stabilizer parallel to the existing Stabilizer.
- A new crude heater in parallel to the existing Crude heater.
- A new train for the Preheat exchangers.
- A new exchanger in the Prefractionation Column overhead circuit, the 2 new drums (Reflux drums and the Naphtha accumulator) and the associated Pumps.

Details of Modification in the existing Crude Column are as follows:

The crude column

1. Tray #1-18 and 21-24: New High-capacity trays to be placed in place of existing trays
2. Trays No. 19 and 20 are to be removed to accommodate the new Chimney draw- off tray.
3. Tray# 25-27: Trays 25-27 shall be removed to provide structured packed bed ~1.4m high along with a Spray header distributor for CR2 nozzle.
4. Tray# 28-50: New Conventional valve trays (modified geometry) in place of existing trays.
5. Modification in Column Nozzles, 5 Nozzle Sizes to be increased and 3 new Nozzles to be added.

The nozzle to be modified includes a) ST nozzle, new size is 16", (b) VR3 nozzle, new size is 12" (c) CR2 nozzle, new size is 18", (d) VR2 nozzle, new size is 14", (e) CR1 nozzle, new size is 14", (f) The new nozzles are LGON(A/B) of 10" each and VR4 nozzle of 14".

1.2 Energy Intensity of this Configuration:

Refer Table-1 for Energy Intensity stand-off of this configuration vis-à-vis Configuration-2, Configuration-3 and Configuration-5.

1.3 Construction Feasibility in the Shutdown time:

For the modification envisaged in this configuration the modification in the existing crude Column as detailed above is of the major order and shall be executed during the turnaround time of the unit only. For the crude Column modification, the time line envisaged is 40 to 45 days, with following assumptions:

1. All the nozzle sub-assembly including weld overlay will be ready before shut down
2. Modification of 5 existing nozzles and addition of another 3 nozzles will be in the critical path and same work shall be carried out simultaneously by deploying Four exclusive gang of competent and adequate work force. No modification of Nozzle F1.
3. Tray removal and arranging scaffolding work for facilitating modification of Nozzle works will be done simultaneously.
4. Work will be done continuously round the clock without any stoppage.
5. No major rectification/ rework is envisaged.
6. Adequate capacity of crane and other handling/lifting equipment will be available at site to facilitate insertion, holding and assembly/welding of fresh Distributor pipe of size 18" and other nozzles at elevation and insertion of distributor pipes through nearest Man hole.
7. Removal and fresh installation of Trays will be done simultaneously without effecting other activities of nozzle modification works except 7-10 days Hold period of tray modification activities will be on HOLD near to these CR1, CR2, VR2 and ST nozzles areas.

No TSR modification work is required except TSR no. 25-27 where in TSR modification will be required for replacement of existing Valve trays with Chimney tray.

1.4 Capex Involve in the Configuration:

Refer table-2 below for the capex involved for the new equipment and capex ranking vis-à-vis the other configurations.

2. Configuration 2

2.1 Major Equipment

- A new Pre-fractionator with Naphtha and partial Light Kero Draw from the Pre-fractionator Column.
- An existing Crude Column.
- An existing Vacuum Column.
- The new Stabilizer parallel to the existing Stabilizer.
- A new furnace u/s of Pre-fractionator Column and a modified Existing Crude Heater.
- A new train for the Preheat exchangers.
- A new exchanger in the Prefractionation Column overhead circuit, the 2 new drums (Reflux drums and the Naphtha accumulator) and the associated Pumps

Details of Modification in the existing Crude Column are as follows:

1. Modification in Column Nozzles are envisaged in the Crude Column.

2.2 Energy Intensity of this Configuration:

Refer Table-1 for Energy Intensity stand-off of this configuration vis-à-vis Configuration 1 and Configuration 3.

2.3 Construction Feedback in the Shutdown time:

The Time required for the Column modification will be of the order of 10-15 Days.

3. *Configuration 3*

3.1 Major Equipment

- A new Parallel Crude Column to the existing Crude Column,
- An existing Vacuum Column
- A new Stabilizer parallel to the existing Stabilizer.
- A new crude heater in parallel to the existing Crude heater.
- A new train for the Preheat exchangers.
- The new exchangers in the new Column overhead circuit, the 2 new drums (Reflux drums and the Naphtha accumulator) and the associated Pumps.
- The associated Side strippers of the New Crude Column.

Details of Modification in the existing Crude Column are as follows:

1. Trays No. 19 and 20 are to be removed to accommodate the new Chimney draw- off tray.
2. Modification in Column Nozzles, and 3 new Nozzles to be added

3.2 Energy Intensity of this Configuration:

Refer Table-1 for Energy Intensity stand-off of this configuration vis-à-vis Configuration -1 and Configuration 2.

3.3 Construction Feedback in the Shutdown time:

The modification in the existing Crude Column can be accomplished in 15-20 Days.

3.4 Costing of the Configuration

Refer Table-2 for the capital investment for the new equipment only for this configuration.

4. Configuration-4

4.1 Major Equipment

- A new Pre-Distillation column with Light Naphtha from Column overhead and side draws of Heavy Naphtha and full range Light Kero from this Column.
- An existing Vacuum Column.
- The new Stabilizer parallel to the existing Stabilizer.
- A new furnace u/s of Pre-fractionator Column.
- A new train for the Preheat exchangers.
- A new exchanger in the Prefractionation Column overhead circuit, the 2 new drums (Reflux drums and the Naphtha accumulator) and the associated Pumps.
- The associated Side strippers of the Pre-Distillation Column.

Details of Modification in the existing Crude Column are as follows:

Modification in Column Nozzles are envisaged in the Crude Column.

4.2 Energy Intensity of this Configuration:

Refer Table-1 for Energy Intensity stand-off of this configuration vis-à-vis Configuration 1 and Configuration 3.

4.3 Construction Feedback in the Shutdown time:

The Time required for the Column modification will be of the order of 10-15 Days.

4.6 Costing of the Configuration

Refer Table-2 for the Capex investment for the new equipment only required for this configuration.

Conclusion and Recommendation

A comprehensive review of all configurations was conducted, taking into account several crucial factors such as energy benefits, constructability, equipment layout, and capital investment. Based on this detailed analysis, It was recommend that for the revamp of such magnitude the Refiner must adopt the Configuration 3, which involves the addition of a parallel new crude column alongside the existing crude column. This configuration is proposed for the revamp of the CDU, VDU and NSU offering an optimal solution that balances efficiency and cost-effectiveness.

TABLE-1 : ENERGY INTENSITY OF THE CONFIGURATIONS

Summary of Configurations				
Description	Pre frac with Naphta only	Pre frac with Naphtha and Partial Light kero (25% Kero)	Crude ColumnParallel Case	Light Nap. + Hy Nap.+ Total Light Kero from Prefrac
	CONFIG 1	CONFIG 2	CONFIG 3	CONFIG 5
Prefrac ovhd Pressure KGcm2g	1.4	1.6	NA	1.6
Prefrac ovhd Temperature Deg C	127	158.6	NA	134.7
Crude Column ovhd Pressure KGcm2g	1.4	0.8	1.6	0.5
Crude Column ovhdovhd Temperature Deg C	138	185.9	153	144.6
Prefrac Heater Inlet / outlet temp	NA	230 / 260	NA	230 / 275
Crude Heater Inlet / outlet temp	291 / 377	310 /377	305 / 368	321 / 378
Pre frac Heater Duty MMKcal/hr	NA	44.9	NA	60.7
Crude Heater Duty MMKcal/hr	87.3	65	81.3	45.7
Vacuum Heater Duty MMKcal/hr	45.2	45.2	45.2	45.2
Energy Number (Note-1)	**Y**	**1.08Y**	**0.93Y**	**1.05Y**

NOTE-1 : 'Y' IS THE BASELINE ENERGY NUMBER CONSIDERED FOR CONFIGURATION 1.

Table-2

COMPARISON OF DIFFERENT CONFIGURATIONS IN TERMS OF ENERGY NUMBER AND CAPEX.

CONFIGURATIONS	Energy Number	Energy Ranking	Capex Values	Capex Ranking
CONFIG 3 (Crude ColumnParallel Case)	**0.93 Y**	**1**	**1.11 X**	**2**
CONFIG 1 (Pre frac with Naphta only)	**Y**	**2**	**X**	**1**
CONFIG 5 (LN + Hy Nap+ Total Kero from Prefrac)	**1.05Y**	**3**	**1.17 X**	**3**
CONFIG 2 (Pre frac with Naphtha and Partial kero (25% Kero))	**1.08Y**	**4**	**NA**	

NOTE-1: 'X' AND 'Y' ARE BASE LINES VALUES CONSIDERED FOR CONFIGURATION 1

About the authors:

Diwakar Malik (Assistant General Manager) and Abhijit Kumar Ram (Sr. General Manager) are working with the Process engineering department of EIL and have a vast experience involving designing, start-up and Commissioning and troubleshooting of Crude and Vacuum Distillation units and the licensing and engineering of indigenous Delayed Coker Units for major Refiners of India.

Income Tax Act 2025: Key Changes and Implications


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I Backdrop

In a major effort to make the Income Tax Act of 1961 (ITA 1961) easier to understand and remove unnecessary sections without changing its core policies, the Income Tax Bill 2025 (ITB 2025) was first introduced in the Lok Sabha on 13 February 2025. On that same day, a Parliamentary Select Committee (PSC) was established to examine the ITB 2025.

The PSC delivered a comprehensive report on 16 July 2025, which was over 4,500 pages long and included its suggestions along with a revised version of the ITB 2025. This revised version was presented to the Lok Sabha on 21 July 2025. The Government of India (GoI) accepted most of the PSC's recommendations and feedback from other stakeholders to ensure clarity in the legislation. This required adjustments in wording, alignment of phrases, and necessary cross-references. To prevent confusion from having multiple versions of the ITB 2025, the GoI withdrew the original bill and planned to introduce a new one (Revised ITB 2025) that would clearly incorporate all changes. The Revised ITB 2025 was then tabled in the Lok Sabha on 11 August 2025 and was approved the same day. The Rajya Sabha also approved it on 12 August 2025.

As of 21 August 2025, the Revised ITB 2025 has received Presidential Assent and is now a law. The Act will be published in the Official Gazette, to take effect on 1 April 2026, replacing the ITA 1961.

II. Key features of ITA 2025

The ITA 2025 aims to simplify and streamline the previous law without any change in tax policy or tax rates by reducing word count and sections. It replaces "assessment year" and "previous year" with the clearer "tax year" for better understanding and compliance without any change in dispute resolution and litigation system. The language has been modernized by eliminating provisos and explanations, using active voice, and shorter sentences. Additionally, new formulas and tables have been introduced to clearly present information on salary perks and tax deduction rates.

Additionally, various exempt incomes have been organized into separate schedules, and related provisions have been grouped together for easier access. Cross-referencing has been made simpler, and compliance requirements have been eased, allowing more applications for lower TDS/TCS certificates. Outdated sections, such as those related to investment allowances and fringe benefits, have been eliminated, resulting in a more relevant and user friendly tax system.

III. Key amendments in the ITA 2025

A. Changes introduced by ITA 2025 vis-à-vis ITA 1961

i. Presumptive taxation for Oil &Gas service providers:

ITA 1961 provides a presumptive tax regime for a non-resident engaged in providing services or facilities or supplying plant and machinery on hire to be used, in the prospecting for, or extraction or production of, mineral oils. This regime provides for an effective tax rate of 3.822% on receipts (i.e. gross basis). As per ITA 1961, where the taxpayer opts to be governed by the presumptive tax regime, no set off of unabsorbed depreciation and brought forward business loss is allowed to such taxpayer.

Under ITA 2025, the provision has been amended to prohibit set-off of any loss and the claim of any deduction or allowance against the income computed under this presumptive tax regime. To illustrate, under the ITA 1961, the taxpayer may claim a deduction from its total income computed as per Section 44BB in respect of donations under Section 80G. However, under the ITA2025, such deduction would no longer be allowed. Even though the purpose of the amendments made by the ITA 2025 is to simplify the language of the provisions, the aforesaid change has resulted into denial of deductions where income is offered on presumptive basis.

ii. Taxability of export incentives:

Under the ITA 1961, the scope of business income includes specific types of export incentives and hence, one could argue that export incentives not listed are not business income and therefore not taxable. Similar provision in ITA 2025 states that the amount of any profit on sale of input license, cash assistance against export, duty drawback or duty remission or any other export incentives, received or receivable shall be treated as business income. Accordingly, ITA 2025 expands the scope to cover all export incentives, regardless of whether it is in cash or kind, and regardless of the purpose for which it is granted – so long as it has nexus with business activities and exports. Given the above scope expansion, companies receiving export incentives are required to track the incentives received and offer them to tax.

iii. Reduction of subsidy from actual cost of asset:

Under the ITA 1961, any portion of the actual cost of an asset acquired by the taxpayer, that has been met directly or indirectly by the government/authority in the form of a subsidy, is excluded from the actual cost of such asset. Further, where such subsidy is not directly relatable to an asset, such subsidy is prorated amongst all the assets in respect of or with reference to which the subsidy is so received, to be excluded from the actual cost of such assets (pro-rata formula). Similar provisions are introduced in the Income Tax Act 2025 ('*ITA 2025*'). However, there is slight change in the wording which may lead to difference of interpretation.

The ITA 2025 provides that "any subsidy relatable to the acquisition of an asset, received, directly or indirectly, by the taxpayer from the government/authority" shall be reduced from the actual cost along with pro-rata formula. Since 'met' has been replaced by 'received', it may be interpreted as the ITA 2025 seems to cover subsidies that have a direct nexus with the acquisition of the asset and are acquired from the subsidy received directly or indirectly from the Government. This change introduces a slight ambiguity in interpretation from the ITA 1961.

iv. Carry forward of losses in closely-held companies

As per ITA 1961, closely-held companies were permitted to carry forward and set off losses if at least 51% of the voting power was beneficially held by the same 'persons' who owned shares during the year in which the losses were incurred. The use of the plural term 'persons' allowed for inter-se transfers of shares within the same group of shareholders, enabling them to maintain their collective ownership of at least 51% without triggering the lapsing of losses.

In contrast, the successor provision in the ITA 2025, replaces the plural term 'persons' with the singular phrase 'the person'. This change introduces ambiguity regarding the conditions under which losses may lapse due to inter-se transfers of shares. Interpreting 'the person' as a single shareholder could lead to complications in various practical scenarios, such as when no single shareholder holds 51% voting power at the time of loss or when shareholders collectively maintain the 51% threshold through inter-se transfers. Additionally, the entry of a new strategic investor could dilute a key promoter's shareholding below the 51% mark, despite the existing shareholders retaining a collective majority. Thus, such shift in the language of the provision raises various interpretational concerns at the time of carry forward and setting off losses.

v. Meaning of associated enterprise

ITA 1961 defined 'Associated Enterprises' ('AEs') by establishing a framework for determining the relationship between enterprises based on specific criteria. It comprised two main parts: sub-section (1) outlined general criteria for identifying AEs, focusing on aspects such as "management," "control," or "capital." Subsection (2) further elaborated on these criteria by specifying 13 conditions, if met at any time during the previous year, would lead to enterprises being deemed to have an AE relationship, stating that these conditions were to be considered "for the purposes of sub-section (1)." This structure allowed for a cumulative evaluation of the criteria, providing clarity on the circumstances under which entities could be classified as AEs.

ITA 2025 has introduced significant changes to the definition of "Associated Enterprises" (AEs). Notably, the new legislation eliminates the phrase "for the purposes of sub-section (1)," thereby merging the criteria from both subsections into a single framework. This alteration would thereby lead to making all the clauses as alternative conditions for testing AE relationship. This, in turn, may lead to various interpretational challenges such as inclusion of horizontal AE relationships in the definition of AE, the implications of minimal voting rights participation, and the treatment of familial or commercial relationships in establishing AE status. The deletion of the phrase "at any time during the year" may further complicate the definition, raising questions about the temporal scope of the AE relationship. Thus, these changes necessitate careful consideration while evaluating AE relationships.

vi. Revision of withholding tax return:

As per ITA 1961, the time limit for submission of any correction statement is six years from the end of the financial year in which the statement was initially required to be delivered. The said time limit has been reduced to two years as per the provisions of ITA 2025. In view of revision in the timeline for submission of correction statement w.r.t withholding tax return under ITA 2025, a new pop-up is being displayed on the TRACES portal, which states that correction statements for the following periods shall be accepted only upto 31 March 2026:

1. Quarter 4 of FY 2018-19,
2. All quarters of FY 2019-20 to FY 2022-23, and
3. Quarter 1 to Quarter 3 of FY 2023-24

All correction statements for the aforesaid periods will be considered time-barred on 31 March 2026 and hence will not be accepted from 1 April 2026 onwards. Accordingly, it is pertinent to clear the outstanding demands and file correction statements for the aforesaid periods before 31 March 2026.

vii. Information maintained in electronic form presumed to be true for the purpose of prosecution proceedings:

Under both the ITA 1961 and ITA 2025, if specified assets (such as money, bullion, jewellery, and virtual digital assets) or evidence (like books of account and documents) are found in a person's control during search proceedings, it is presumed that the evidence is true and that any signatures or handwriting belong to the person in possession. Additionally, these assets or evidence are considered to belong to the searched individual.

In ITA 2025, the above presumption is extended in prosecution cases to include information controlled and possessed by a person in electronic form and information on a computer system controlled and possessed by the searched person.

B. Amendments incorporated in Revised ITB 2025 to align with ITA 1961

i. Rationalization of source rule for taxability of income in India:

Under the ITA 1961, income from a business connection in India is deemed to accrue or arise in India resulting in that portion of income which is "reasonably" attributable to operations in India as taxable in India. ITB 2025 omitted the term "reasonably," raising concerns that tax authorities could have unfettered discretion to attribute income on an adhoc basis. The ITA 2025 reinstates the word "reasonably," reaffirming the existing scope and settled principles for income attribution under the ITA 1961.

Additionally, under the ITA 1961, income from royalties paid by a non-resident is deemed to accrue or arise in India if the royalty/ FTS is paid for the purposes of a business or profession carried on by such person in India or for the purposes of making or earning any **income from any source in India**. The ITB 2025 proposed such royalty to be deemed to accrue or arise in India if it is paid for the purposes of business or profession carried on by the non-resident in India or making or earning any **income from any source outside India**.

This may cover any situation of royalty being paid by one non-resident to another nonresident to be taxed in India. Since the ITA 2025 doesn't propose tax policy changes or expand scope of income, ITA 2025 resolves this ambiguity by reinstating the original language of the ITA 1961.

ii. Dividend deduction under concessional tax regime

Under the ITA 1961, domestic manufacturing companies may choose a 15% tax regime (excluding surcharge and cess) by forgoing certain deductions, while other domestic companies have a 22% option. Presently, under these regimes, companies can deduct dividends received from other entities if they redistribute them by a set date, with conditions.

Under the ITB 2025, the provisions of the concessional tax regimes were similarly phrased to that in the ITA 1961. It is important to note that the ITB 2025, permitted a domestic company following the 15% concessional tax regime to claim the dividend deduction as previously described. However, the 22% concessional tax regime did not allow for this deduction, unlike ITA 1961. The Amended ITB 2025 and ITA 2025 now allows companies opting for the 22% CTR to claim deductions for inter-corporate dividends, aligning this benefit with what is already available under ITA 1961.

iii. Definition of company in which the public are substantially interested, (commonly referred to as widely held company)

ITA 1961 defines a widely held company ('WHC') as any entity listed on a recognized stock exchange on the last day of the year. Further, for unlisted entities, the following conditions need to be satisfied cumulatively to be regarded as WHC:

a. It should not be private company as defined under Companies Act, 2013;

a. Shares in such company are held 50% or more by another WHC or 100% subsidiary of WHC or by Government/ Corporation established by Central, state or provincial Act

The definition as contained in ITB 2025 required the following conditions to be fulfilled cumulatively:

Condition 1: The company is not private company as defined under Companies Act, 2013;

Condition 2: It is listed on recognized stock exchange on last day of the Tax Year; and

Condition 3: Shares in such company are held 50% or more by another WHC or by Government/Corporation established by Central, state or provincial Act of 100% of such subsidiary of WHC.

Accordingly, the definition as contained in ITB 2025 suggests that only companies listed on a recognized stock exchange shall be regarded as WHC. This was a drafting error in the ITB, as it introduces no policy changes. Definition of WHC is restored to fulfil if either of the conditions are satisfied in the ITA 2025.

iv. Undefined terms in the treaty but defined in ITA 1961

The Income Tax Act (ITA) 1961 includes specific provisions regarding the interaction between tax treaties that India has entered into with other countries. According to these provisions, any term that is not defined in a tax treaty (an undefined term) but is defined in the ITA 1961 should be interpreted according to its definition in the ITA 1961, along with any explanations provided by the Central Government (CG). However, this provision does not indicate the date from which this interpretation should be applied to treaty undefined terms that are defined in the ITA 1961, particularly in cases where the relevant definition was added after the treaty took effect.

ITB 2025 introduced a similar provision, stating that the definitions in the ITA 1961 and any explanations from the CG would apply retrospectively from the date the relevant treaty came into effect.

In response to feedback from stakeholders, the ITA 2025 has reverted to the original provisions of the ITA 1961 by eliminating the reference to the effective date for applying the definitions of treaty undefined terms that are defined in the ITA 1961.

Apart from the above, ITA 2025 additionally provides that if a term is not defined in the tax treaty or ITA 2025 or under any notification issued by Central Government, then unless the context requires otherwise, such term will have the same meaning as it has under any Act of the Central Government dealing with taxes and in any other case, reference may be made to meaning assigned under any other Act of the Central Government. As per FAQ issued by CBDT, this amendment is intended to reduce litigation and provide certainty as to how any term is interpreted in a tax treaty situation reflecting India's present treaty position aligned with international tax treaty practices.

IV. Transitional provisions and way forward

The ITA 2025 upholds the validity of directions, instructions, notifications, orders, or rules from the ITA 1961, provided they are consistent with the new provisions. It also affirms that Circulars from the ITA 1961 will remain in effect. Initially, the ITB 2025 addressed only specific faceless proceedings,

but the updated version now encompasses all schemes, ensuring the continuity of directives such as the Dispute Resolution Scheme. Furthermore, the transitional provisions indicate that the ITA 1961 will still govern tax proceedings for years beginning before 1 April 2026. The ITA 2025 specifies that this applies to any ongoing proceedings as of its effective date and to those that commence after 1 April 2026.

In light of this, it is relevant to note that as the Income Tax Department may transition its efiling portal to align with the ITA 2025, taxpayers are advised to proactively monitor the outstanding demands and follow-up on pending refunds. System changes may temporarily affect processing visibility or timelines.

V. Concluding thoughts

While the ITA 2025 largely retains the policies of the ITA 1961 in clearer language, businesses should review the new provisions to ensure compliance by making the necessary adjustments to their systems and processes before 1 April 2026.

Furthermore, stakeholders are encouraged to maintain ongoing dialogue with the government to influence future regulations, with the goal of reducing disputes and compliance difficulties, as well as addressing any outstanding issues during the upcoming Budget discussions. At the same time, the Government is assessing the income tax rules and forms to ensure they align with the new legislation, and stakeholders may want to contribute their feedback on this matter.

The information contained herein is of a general nature and is not intended to address the circumstances of any particular individual or entity. The views and opinions expressed herein are those of the author.

Evolution of Indian Raffia Industry

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Introduction:

Packaging sector is the 5th largest contributor of Indian economy with it growth CAGR touching almost 30% in 2025. Indian Raffia industry plays a significant part role in flexible and bulk packaging segment, with more than 1200 industries, of medium and small scale, being spread across India.

Industry Mono-axially stretched and consequently oriented (predominantly towards MD) Polypropylene (PP) and High Density Polyethylene (HDPE) flat tapes, produced by typical extrusion process are generally regarded as "Raffia" in Polymer industry. These flat tapes are generally weaved in looms to produce fabrics and/or sacks for various usage as well as can be converted to different other products like twins, ropes, knitted fabrics, rachel etc.

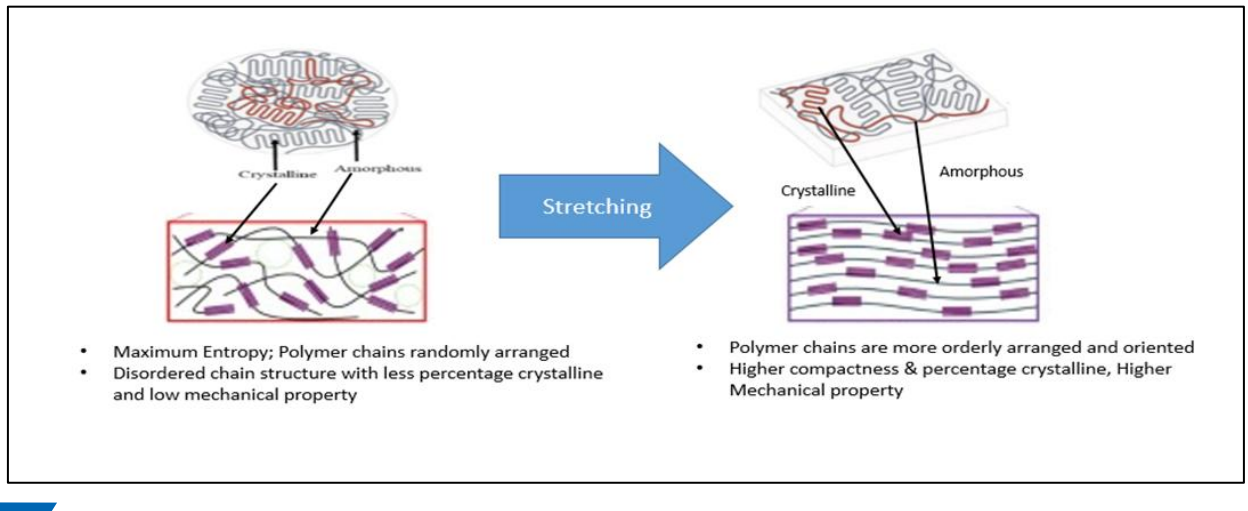
Though the method of producing mono-axially oriented tapes from tubular blown film process using an annular die is also known, however, modern raffia tape manufacturing process predominantly involves a slot die (coat hanger die) extruder, producing a flat melt curtain, which is subsequently casted into a sheet in a water bath. The sheet is slit into number of tapes by thin metal blades, which are placed on a tie bar (generally at 30° - 60°) and spaced equidistantly by Spacers. These Spacers are crucial in controlling the final width of flat tapes, which is mathematically represented as "SW = √SR x W";

Where SW = Spacer width, SR = Stretch ratio, W = Final tape width.

The uniaxial drawing operation of these tapes is accomplished by passing it through a set of rollers and hot air oven (or heated plates) to heat them simultaneously, while being stretched. Though draw ratio from 1:5 to 1:8 are common for PP (and 1:4 to 1:6 for HDPE), however with staged drawing (e.g. placing an extra roll between 1st godet and hot oven) higher draw ratio can be attained, leading to higher tape tenacity.

Heated rolls are installed in process line for heat setting of oriented tapes to prevent their shrinkage and are finally taken up in bobbins for subsequent operations.

Fig1: Orientation of polymer chains on stretching



Raffia flat tapes are characterised by high width to thickness ratio. Generally, the width of raffia tapes varies between 2-5 mm, with 2.5mm (approximately) being maintained by majority of producers. Tape thickness are generally maintained / measured in microns and are adjusted, according to width and linear density requirement of final flat tapes.

Building blocks for Flat Tapes:

High Density Polyethylene (HDPE) and Polypropylene (PP) are polymers, predominantly used in Raffia Industry.

Generally, for HDPE flat tapes, resins of MFI ($I_{2.16}$ @ 190°C) between 0.4 – 2.0 gm/10 min. are used {most commonly 0.5 – 1.4 gm/10 min of density around 0.960 gm/m^3 are preferred}.

For PP tapes, grades have MFI ($I_{2.16}$ @ 230°C) between 1.5 – 7.0 gm/10 min are generally used, with MFI between 2 – 4 gm/10 minute being most popular. Higher tenacity (gpd) tapes can be achieved with lower MFR grades, at a given stretch ratio, with a compromise in line outputs.

Raffia tapes are typically made from resins with a broad molecular weight distribution (MWD), often including both high and low molecular weight components to entice a balance between process-ability and strength. For HDPE raffia grades, typical polydispersity index (PDI) varies between 2 -10, whereas, for PP raffia grades, PDI generally falls in the range of 6-10, with conventional Zeigler-Natta catalyst, based of design of reaction. With much narrower MWD, tape breakage become more frequent, even with regular line speeds.

Either HDPE or PP being used in tape production, selection of proper additive is crucial to avoid any water carryover on the flat sheet surface, due to hydrophilic effect of those additives.

Wherein, due to its superior weather resistance, HDPE is preferred where sacks are supposed to be exposed in external atmosphere, PP sacks are favoured in hot filling sectors due to its higher temperature endurance.

Additionally, lower density (and hence crystallinity) confers higher flexibility in PP, compare to HDPE. Presence of methyl groups ($-CH_3$) in alternative carbon atoms of polypropylene backbone accounts for its higher stiffness and rigidity.In stability front, both PE & PP are susceptible towards oxidation, which proceeds through a free radical mechanism, as depicted below in equ1 & equ2.

$$R\text{-}H \longrightarrow R\,.\, + H\,. \quad \text{(eq.1)}$$
$$R\text{-}R \longrightarrow R\,.\, + R\,. \quad \text{(eq.2)}$$

In eq.1 & eq.2, R-R & RH represent PE/PP backbone with C-C and C-H linkages respectively.

Radicals such formed, gets stabilization through hyperconjugation. More the number of possible hyperconjugating structures for a radical, more is its thermodynamic stability. Hence, the stability of carbon radicals follows the pattern 3° > 2° > 1° > -CH3

Since removal of hydrogen atom from Polypropylene backbone leads to formation of 3° radical structure, polypropylene is more susceptible towards radical formation, compare to Polyethylene and hence, as mentioned above, outdoor stability of PP is less than PE.

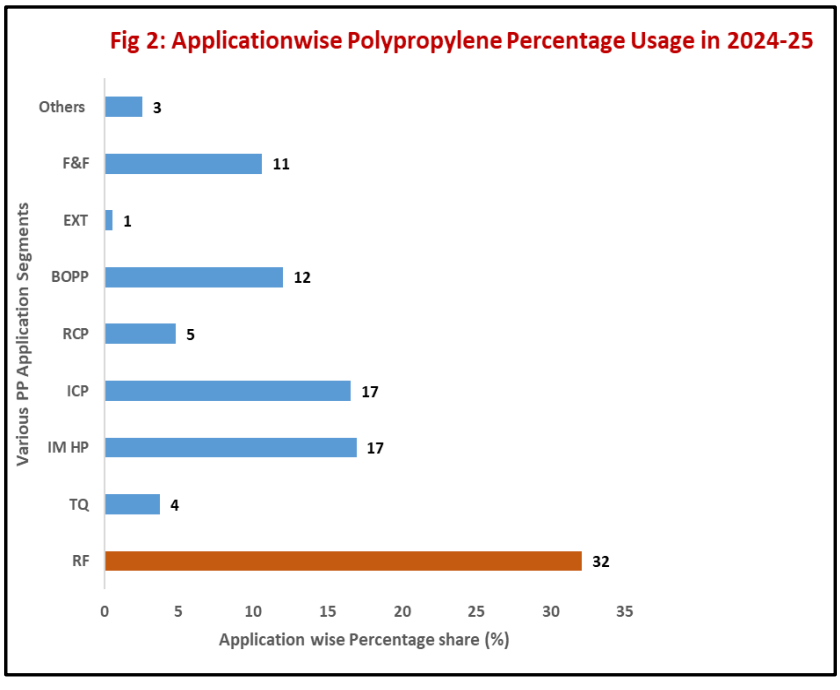
However, off late, with introduction of advanced additive packages, polypropylene too, are gradually getting en-route in outdoor applications.

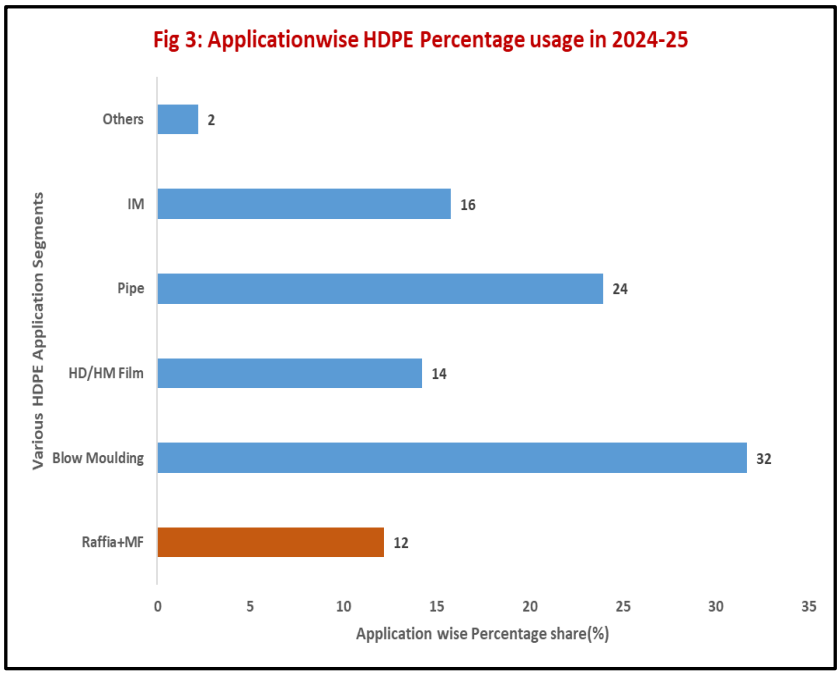
Domestic Raffia (PE & PP) market analysis – 2024-25 and its future prospect:

Among various categories of Polyethylene (i.e. LDPE, LLDPE, HDPE etc.), HDPE is commonly used for making raffia tapes / sacks.

Among various usage and applications of HDPE, around 11-12% is contributed by Raffia and allied industry.

Akin, among various applications of PP, around 31-32% is contributed by raffia sector. Following graphs (Fig 2 & Fig 3) are a representation on same.





Last year in 2024-25, counting HDPE and PP together, Indian domestic raffia industry witnessed approximately 3000 KT of material consumption (i.e. demand), as depicted in following Table 1.

Description	Domestic Supply (KT)- 2024-25	Imports (KT) - 2024-25	Total Consumption(KT) – 2024-25	Growth (%) w.r.t Previous Year (i.e. 2023-24)
Raffia _ PP	2300	250	2550	08 %
Raffia _ HDPE	450	03	453	02 %

** Figure mentioned are tentative.*

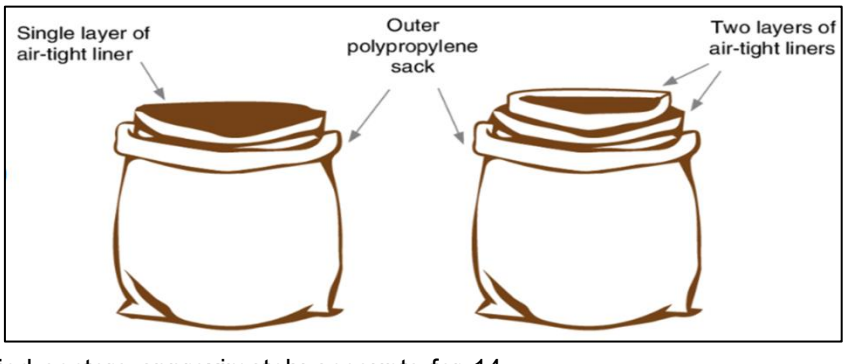
Among various technical textiles segments, PE/PP raffia products find their usage in myriad of categories, like Packaging textile (Packtech), Agricultural Textile (Agrotech), Geo Textile (Geotech), Building textile (Buildtech) etc. as referred in following table 2:

Packaging Sector/ Usage	Polymer used commonly	% contributed towards overall domestic Raffia Consumption / demand
Cement	PP	26
FIBC	PP	22
Fertilizers	HDPE	13
Food grains, seeds, sugar	HDPE & PP	12
Wrapping	HDPE & PP	10
Polymer Packaging	HDPE & PP	5
Tarpaulin (Build-tech)	HDPE	3
Chemicals	HDPE, PP	2
Others	HDPE, PP	7

** Figure mentioned are tentative.*

Another significant recent development registered in terms of usage of raffia woven sacks in Hermetic Storage sacks. Hermetic storages sacks are sealed storage sacks that maintains an atmosphere of low oxygen and moisture levels and high carbon di oxide, through the respiration of living organism with in the commodities. The structure of such bags blocks the entry of any outside gas (oxygen or other) from entering inside the bag that can potentially damage the commodity inside. The hermetic packaging sacks are used to store commodities like rice, green coffee, grains, beans, spices etc. to keep their aroma, taste, freshness and colour intact, so that their quality remain preserved till they reach the final user.

Fig 4: Hermetically Sealed PP/ PE Sacks



Though raffia and allied sectors approximately accounts for 14-18% of total polymer consumption in India, however, in post covid scenario, the industry has survived multiple downturns in last few years.

Fig 5: High Strength, Load bearing capacity of PP Raffia Bags

Geo-political instability, exchange rate fluctuation, tariff uncertainty, supply chain disruption, global recession and inflation, longer pay-back period triggered intermittent slump and uncertainty in demand aspect, slowing down any notable investment towards new commissioning or capacity expansion in the domestic raffia industry, over the past few years.

Lacklustre demand from finished sectors, cheaper imports followed by price volatility kept convertors sceptical and conservative in any bigger planning. Recession and inflation in several parts of Europe and USA, two major destinations for Indian FIBC import, affected the demand for big bag sectors. Recent tariff uncertainty between India and US, also left imports of Indian FIBC to western countries unpredictable, at least in temporary basis.

Cement industry had remained a major user of PP woven sacks for years. However, with an alternative option of dispatching cement in bulk silos, trimmed the demand of PP woven sacks in cement industry, to some extent.

Nation wise ban on usage of single use plastic imparted relevant consolidation in usage of thermoformed products, where convertors of thermoformed articles had an informal practise of blending polypropylene raffia material for cost advantages. Generally, melt rate (MVR/MFI) for both PP thermoformed and raffia grades varies between 3 – 5 gm/10 min.

Fig 6: FIBC Bags of Load Bearing Capacity between 500 Kg to 2000 Kg

However, the industry has pull it through all these odds, registering a healthy growth of around 9% last year. Though certain other packaging alternatives have taken inroad in last few years, however, a balanced combination of multiple desired properties (e.g. strength, ease of handling, reuse potentiality) in raffia woven sacks are yet unparalleled. Usage of raffia woven sacks in secondary packaging are often preferred and acclaimed by convertors.

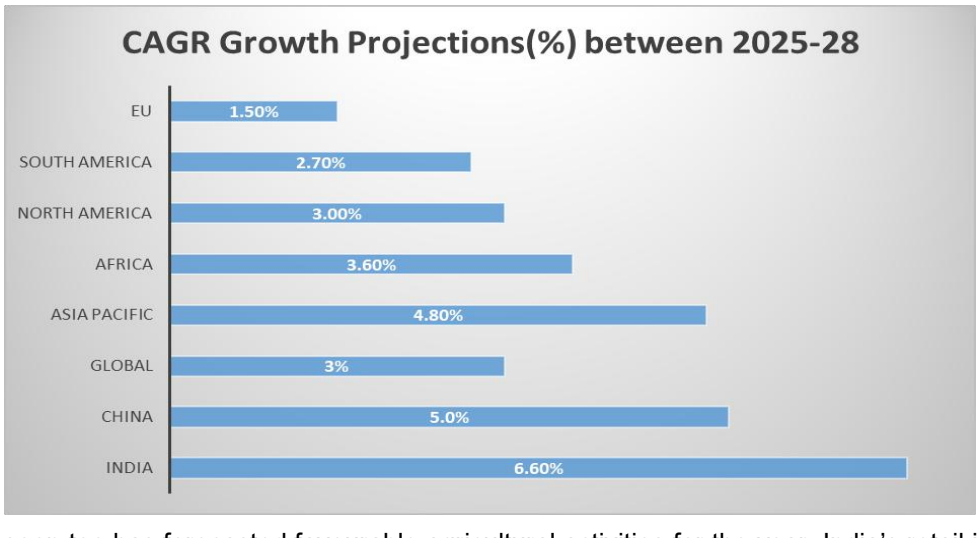
In another significant move last year, with commissioning of new PE & PP production facilities by two domestic suppliers, there was a remarkable drop in import dependence for these polymers.

Polymer	Import Share(%) -2023-24	Import Share(%) -2024-25
PP	21	18
HDPE	38	26

** Figure mentioned are tentative.*

According to IMF, global real GDP grew by 0.7% & 1% on quarter-on-quarter basis respectively in Q1 and Q2 2025-26, with slowdowns in major geographic regions. However, Asia maintaind its growth by 1.1% significant whereby remaining the spearhead in growth of global GDP by 0.6%.

India's economy is projected to grow by 6.3-6.8%% in 2025-26 and 6.4% in 2026-27. Infrastructure activities of India is likely to be boosted amid higher income and lower personal income tax. India's Q4 GDP growth recorded at 7.4% in Q4 of 2024-25 compared to 6.2% in previous quarter.

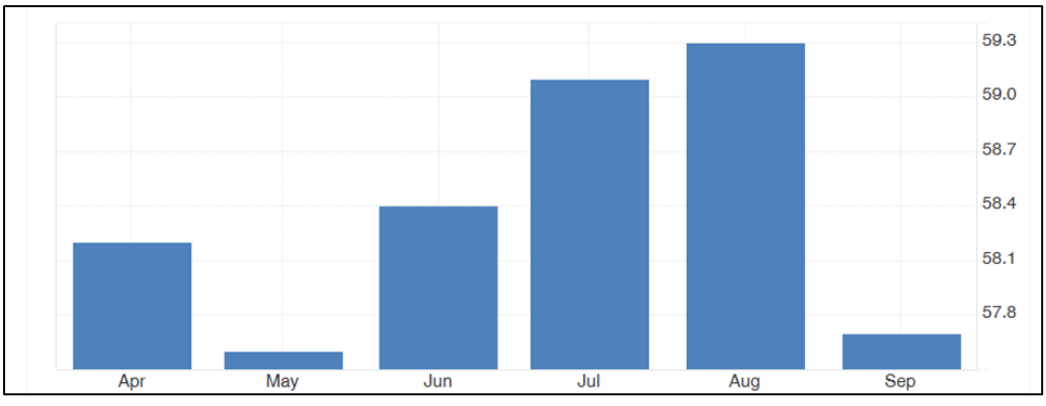


Abundent monsoon too has forecasted favourable agricultural activities for the year. India's retail inflation eased to 2.82% in May, compared to 3.2% in April'25. Both of these two values are less than RBI's medium term inflation target for the year. For upcoming 2026-27 also, RBI has lowered its inflation forecast to 3.7%, compare to 4%, predicted earlier.

India Manufacturing PMI continues to signal solid improvement in business conditions. Growth speculation remained strong, supported by robust demand in various sectors, where PE/PP raffia and applied products find their applications.

The HSBC India Manufacturing PMI was revised down to 57.7 in September 2025 from a preliminary estimate of 58.5. Despite the fall, the figure remained well above the long-term average, signaling continued strength in the sector.

Fig6: Indian Manufacturing PMI



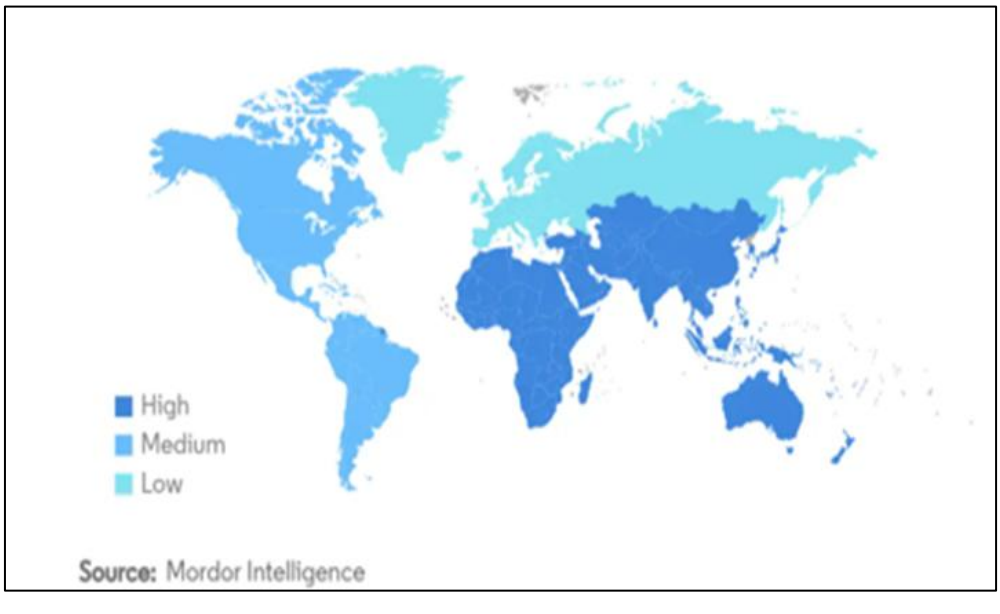
**Source: Indian trading economics*

Indian export is expected to be moderate in near future, amid weaker global demand and tariff uncertainties. While the US and Europe are major export markets for Indian FIBC, these big bags are also being exported to countries like Bahrain and Italy and other promising market like Japan and South Korea. India has a 75% share in European FIBC import and a 72% share in the US import market. The global FIBC market size was valued at USD 8.77 billion in 2025 and expected to reach at USD 12.86 billion by 2033, growing at a CAGR of 4.9% during the forecast period (2025-2033).

Chemicals and petrochemicals accounted for 42% of FIBC usage in 2024-25, while food and agriculture is advancing at 7.35% CAGR. In terms of FIBC usage, North America lead the market with 38.74% market share in 2024-25, while Asia-Pacific is the quickest climber at 8.12% CAGR.

Though, virgin PP is generally used as main building block for FIBC (60.42%), however, use of recycled PP is also increasing in significant amount (9.2% approximately) over time.

Following figure depicts the worldwide growth of FIBC between 2025-2030



Nevertheless, various BIS initiatives in reviewing and developing standards for different Packteck categories help supported overall domestic raffia industry to match ever changing property requirements in products, without any compromise in quality and approach towards sustainability and resource management.

All these seconds, a promising and encouraging upcoming future of Indian Raffia Industry, that is likely to be more pragmatic, progressive & futuristic. It is expected that Indian Raffia Industry is expected to register a growth of 6- 8 % in 2025 -26.

India Pavilion at GASTECH 2025, Milan: Showcasing India's Vision for a Sustainable Energy Future

The Federation of Indian Petroleum Industry (FIPI), under the aegis of the Ministry of Petroleum and Natural Gas (MoP&NG), Government of India, exhibited the India Pavilion at GASTECH 2025, held from September 9 to 12, 2025, in Milan, Italy. Recognized as one of the world's largest and most influential events for natural gas, LNG, hydrogen, climate technologies, and AI in energy, GASTECH 2025 served as a vital global platform for dialogue, collaboration, and knowledge-sharing among key stakeholders in the evolving energy landscape.

The event, Co-hosted by Chevron, Eni, ExxonMobil, and Shell, welcomed over 50,000 attendees, 7,000 delegates, 1,000 exhibitors, and 1,000 speakers from more than 150 countries, including 25 international ministers and top executives from Shell, TotalEnergies, Eni, Cheniere Energy, Vitol, Uniper, Snam, and YPF.

With 20 international country pavilions, Gastech 2025 served as a global platform for cross-border collaboration and energy policy dialogue—driving progress toward an integrated, low-carbon energy future. The event fostered new partnerships, unlocked emerging markets, and inspired actionable strategies to support long-term decarbonisation goals.

Themed “Energising Progress: India’s Path to a Sustainable Energy Future,” the India Pavilion effectively showcased the country’s achievements, innovation, and policy direction in the energy sector. The Pavilion was a comprehensive representation of India’s oil and gas industry, encompassing the entire hydrocarbon value chain.

Seven leading Indian energy companies participated in the Pavilion, reflecting the strength and diversity of India’s energy ecosystem:

- Oil and Natural Gas Corporation (ONGC)
- Indian Oil Corporation Limited (IOCL)
- Oil India Limited (OIL)
- GAIL (India) Limited
- Bharat Petroleum Corporation Limited (BPCL)
- Engineers India Limited (EIL)
- Petronet LNG Limited (PLL)

The India Pavilion was inaugurated by Mr. Lavanya Kumar, IFS, Consul General of India in Milan, who commended the initiative and lauded the contributions of Indian energy companies on the global stage. Following the inauguration, Mr. Kumar visited individual company desk in the pavilion and interacted with company representatives, gaining insights into India's energy transition roadmap and ongoing efforts to attract global investment into clean energy initiatives.

Mr. Kumar also engaged in substantive discussions with senior officials from participating organizations, during which he was apprised of India Energy Week 2026, scheduled to take place in Goa from January 27–30, 2026. The upcoming event, being held under the patronage of the Ministry of Petroleum and Natural Gas, will further amplify India's role in shaping the global energy dialogue.

Senior officials from the Indian oil and gas industry engaged in detailed discussions with Mr. Kumar, during which he was briefed on India Energy Week 2026, scheduled to be held in Goa from January 27–30, 2026

Leaders and senior representatives from the Indian oil and gas industry, along with their respective teams, showcased their presence at the India Pavilion during Gastech 2025, highlighting India's growing capabilities and initiatives in the global energy landscape

Visitors actively explored the India Pavilion at Gastech 2025 and engaged in meaningful discussions with the participating Indian organizations, fostering valuable exchanges of ideas, collaborations, and business opportunities.

India's participation in GASTECH 2025 served as a strong testament to its commitment to a solution-oriented, inclusive, and sustainable energy future. The Pavilion highlighted the country's growing influence as a reliable energy partner and a key contributor to global decarbonization efforts.

From showcasing cutting-edge innovations in LNG and hydrogen to presenting emerging business opportunities across upstream, midstream, and downstream segments, the Pavilion reflected India's rapid evolution into a global energy powerhouse.

The India Pavilion drew significant attention from international energy companies, government representatives, technology providers, researchers, and thought leaders. The impressive footfall and active engagement at the Pavilion signified the global confidence in India's energy sector, as well as strong interest in participating in the country's energy transition journey.

The Pavilion received widespread appreciation for offering a collaborative platform where policy makers, industry experts, and investors could explore synergies, exchange ideas, and initiate partnerships.

The India Pavilion at GASTECH 2025 not only showcased the country's energy capabilities but also reinforced its strategic vision for a clean, secure, and sustainable energy future. As India continues to emerge as one of the fastest-growing major economies and a global leader in energy transition, its participation in such prestigious forums plays a crucial role in driving international cooperation, attracting investment, and promoting innovation across the energy value chain.

Seminar on Offshore Energy Logistics – Terminals, Transfers & Beyond

The Federation of Indian Petroleum Industry (FIPI), in association with Marine Solutionz and MSZ Offshore, organized the **7th Annual Technical Seminar on "Offshore Energy Logistics – Terminals, Transfers & Beyond"** on October 8–9, 2025, in New Delhi.

The inaugural session witnessed participation from eminent dignitaries including Mr. Pankaj Kumar, Director (Production), Oil and Natural Gas Corporation Ltd.; Mr. Amitabh Kumar, Former Director General of Shipping; and Capt. Anish Joseph, Deputy Nautical Adviser to the Government of India.

Mr. Deb Adhikari, Director (E&P), FIPI, delivered the Welcome Address, setting the tone for the two-day deliberations. In his opening remarks, he emphasized the growing importance of offshore energy logistics in ensuring India's energy resilience and sustainability.

The seminar emerged as a pivotal platform that united industry leaders, government representatives, and technology innovators to deliberate on the evolving dynamics of offshore energy logistics. It served as a distinguished forum for National and International marine logistics companies, Oil Marketing Companies (OMCs), Exploration & Production (E&P) operators, EPC contractors, shipyards, regulators, and technology providers to exchange insights and explore collaborative frameworks aimed at strengthening India's offshore energy ecosystem.

Encompassing the full spectrum of offshore energy transfer, logistics, and strategic infrastructure, the seminar highlighted India's expanding ambitions and emerging leadership in the offshore energy and maritime domains. Against the backdrop of a rapidly transforming global energy landscape driven by the growing adoption of LNG, hydrogen, ammonia, and carbon capture technologies the 2025 edition examined how marine assets, floating infrastructure, and offshore terminals are redefining India's energy trajectory. The event further emphasized the pivotal role of offshore logistics in strengthening energy accessibility, reliability, and resilience in the midst of the global energy transition.

The two-day seminar featured a series of insightful technical sessions and panel discussions encompassing a wide range of themes, including offshore pipe-lay and construction, LNG transfer and bunkering preparedness, marine assets and offshore logistics, and the design and operation of SPMs, FSOs, FSRUs, and FLNGs. Deliberations also covered critical areas such as offshore energy transfer terminals, offshore logistics and support vessels, LNG and FSRU operations, ship-to-ship transfers, project execution, and supply chain support, alongside discussions on energy security and risk preparedness. Complementing these technical exchanges, sessions on the digitalization of offshore operations, shipbuilding and fleet development, ESG frameworks, and energy security offered a comprehensive perspective on the evolving challenges and emerging opportunities shaping the offshore energy landscape.

In one Keynote Address, Rear Admiral Rahul Shankar, Nau Sena Medal, Flag Officer Offshore Defence Advisory Group (FODAG) and Advisor, Offshore Security & Defence to the Government of India, delivered on the theme **"Strategic Security: Offshore Asset Protection through Collaboration."** In his insightful address, Rear Admiral highlighted the critical aspects of energy security in offshore domains, underlining the significance of enhanced coordination, inter-agency collaboration, and strategic preparedness to safeguard India's offshore energy infrastructure.

Mr. Subhash Kumar, Director General, Association of CGD Entities (ACE), in another keynote address talked about **"Emerging Role of Shipping in Sustainable Growth of Global Energy Industry".** He underscored the vital role of the maritime sector as the backbone of global energy trade and its growing significance in facilitating the energy transition. He further highlighted how advancements in ship design, adoption of alternative fuels such as LNG, hydrogen, and ammonia, and integration of digital technologies are redefining shipping efficiency and environmental performance. He then emphasized the importance of global collaboration, policy support, and industry innovation in achieving net-zero ambitions. His address reinforced the need for aligning shipping strategies with sustainability goals to ensure long-term resilience and competitiveness of the global energy ecosystem.

International experts from the marine industry delivering insightful presentations encompassing a wide range of topics.

During the seminar, several experts from international companies such as Trelleborg and Monobuoy delivered insightful presentations covering a wide range of topics, including offshore operations and logistics and infrastructure development. Their contributions provided valuable global perspectives, highlighting best practices, emerging technologies, and collaborative approaches to addressing challenges in the offshore energy and logistics sectors.

The seminar reaffirmed FIPI's commitment to fostering knowledge exchange and cross-sectoral collaboration in the offshore energy domain. By integrating perspectives from policymakers, industry experts, and defence strategists, the event emphasized the importance of synergy between technological advancement and national security in sustaining offshore operations.

The event witnessed significant participation from the industry and was widely appreciated for its engaging knowledge-sharing and technical sessions.

As India advances toward a diversified and sustainable energy future, this Annual Technical Seminar continues to serve as a vital forum for shaping discourse on offshore energy logistics, marine innovation, and strategic energy security. The 2025 edition successfully reinforced India's position as a leader in facilitating resilient, secure, and efficient offshore energy operations, aligned with the nation's long-term energy goals.

Webinar on GST 2.0 - Impact on Oil & Gas Sector

Federation of Indian Petroleum Industry (FIPI), in association with EY as knowledge partner, organized a webinar on '**GST 2.0 - Impact on Oil & Gas Sector'** on 12th September, 2025. The webinar was conducted to shed light on the much-anticipated GST rate rationalization as well as to understand the changes and their impact on business with next steps to be undertaken. The webinar witnessed an overwhelming response with participation of more than 150 professionals working across the oil and gas value chain.

Mr. Vivekanand, Director (Finance, Taxation & Legal), FIPI began the session with the opening remarks. He said that India's economy is growing at a robust rate of 7.8% for the first quarter of the fiscal year 2025-26, the fastest in five quarters. This surge, driven by the strong performance of the services, manufacturing, and construction sectors, positions India as the fastest-growing large economy globally. He then mentioned that the government is focused on realizing the goal of "Viksit Bharat 2047" through various reforms, including recent next-generation GST changes. He highlighted that over eight years, GST has steadily evolved through rate rationalization and digitalization, becoming the backbone of India's indirect tax framework. In a landmark achievement, India's GST returns reached a record high of ₹2.37 lakh crore in April 2025, making the highest monthly collection ever. Further, on the energy front, he welcomed the restructuring of taxes on solar, wind, biogas components and electrolyzers to promote renewable energy, by reducing GST to 5 per cent, but noted that petroleum industry expectation of bringing 5 items in GST is yet to be met.

Setting the context for the session, Ms. Neetu Vinayek, Partner EY, gave a broad overview about a robust Indian economic scenario. She mentioned that with strong GDP growth at 7.8 % in Q1 2025-26, manufacturing PMI soaring at 59.1, current account deficit under control with forex reserves near record high, and growth in direct tax collection by 13.57%, India is poised to become the second largest economy by 2038. She then highlighted the main aspects related to the next gen GST reforms- mainly rationalization of 4-slab structure to 2-slab structure, removal of PoS of intermediary services, operationalizing GSTAT, relaxation of post sales discount requirements, and automated registration for low-risk applicants. She said that these reforms will lead to increase in consumption levels, ensure simplification in terms of fewer rates and lower incidence of inverted duty structure and will also provide long term signaling for making business and investment decisions.

Ms. Uma Iyer, Partner EY talked about the GST rate changes on goods for oil and gas/petroleum operations from 12% to 18%; and a hike from 12% to 18% on professional, technical, and business services for petroleum exploration. Further, she mentioned that as part of broader GST reforms approved by the Council, the GST rate on coal increased from 5% (plus compensation cess) to 18%. She also said that IGST on imports for oil & gas operations is expected to increase from 12% to 18%. She also mentioned that a letter that was needed from the Operator for BCD exemption in case of import of goods, remains in place irrespective of the GST rate being increased from 12% to 18%.

She then talked about the proposed GST rate changes on the procurement side such as air transport of passengers in other than economy class -up from 12% to 18%; Solar water heater and system, majority of renewable energy devices and parts for their manufacture, fuel cell motor vehicles- reduced from 12% to 5%; Multimodal transport of goods within India- to change from 12% to 5% (where no leg of transport is through air, with restricted ITC) or 18% with ITC; etc. She said rate reduction in case of renewable energy is a welcome step that shows clear motive of the government to accelerate India's trajectory towards clean energy transition.

She welcomed the operationalization of GST Appellate Tribunal (GSTAT) for accepting appeals before end of Sept'25 and commence hearing before end of Dec'25. Principal bench of GSTAT will also serve as National Appellate Authority for Advance Ruling. She said that the operationalization of GSTAT would help address litigation timelines and resolution of pending disputes.

She also shed light on the sunset clause for BCD exemption benefit on imports for petroleum operations available till 31 March 2026 only, unless amended / extended.

She concluded by mentioning that organizations need to take key considerations while inventory & transition planning which includes- IT readiness, revisiting existing contracts as well as prior period supplies which covers price variations/ returns & Job-work.

Ms. Uma Iyer from EY, then conducted the Q&A session and provided her views and opinions on various queries posted by participants.

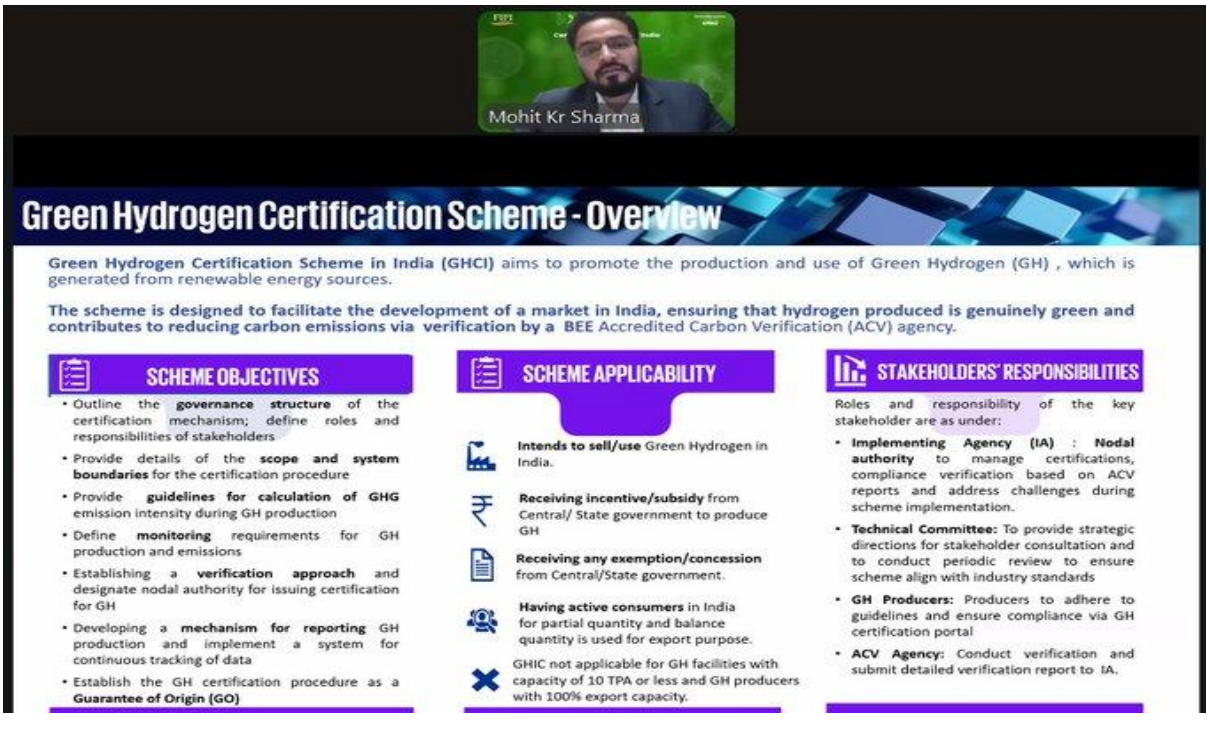
Lastly, FIPI complimented the EY team for an elaborative presentation on the topic covering GST impact on oil and gas sector. FIPI also thanked the participants from the energy industry for their active and interactive participation during the event.

Webinar on 'Green Hydrogen Certification Scheme of India'

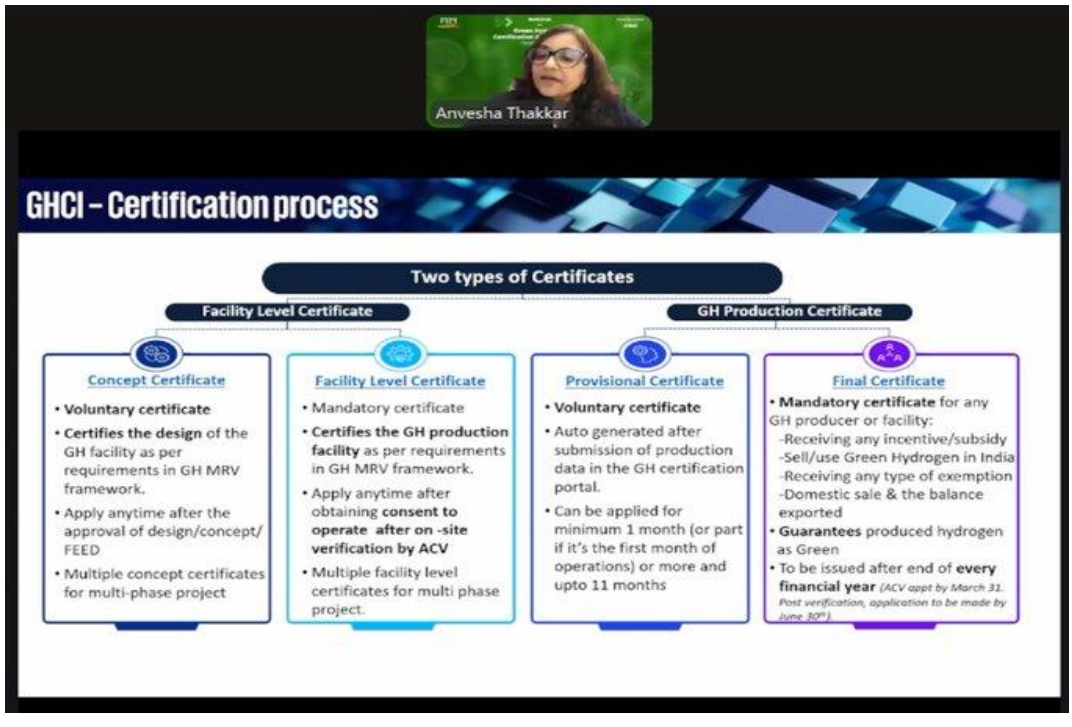
The Federation of Indian Petroleum Industry (FIPI) in association with KPMG organized a webinar on 'Green Hydrogen Certification Scheme of India' on 17th July 2025. The webinar was conducted to shed a light on the recently announced Green Hydrogen Certification Scheme in India (GHCSI) that sets out a comprehensive framework to support domestic producers in certifying their hydrogen as "green." The webinar witnessed an overwhelming response with participation of more than 300 professionals working across the oil and gas value chain.

Mr. Vivekanand, Director (Finance, Taxation & Legal), FIPI began the session with the opening remarks. He said that with need to combat climate change, the oil and gas industry today, is transitioning towards more clean energy initiatives and opportunities. He highlighted India's remarkable achievement of achieving more than 50 per cent of its total installed electricity generation capacity from non-fossil fuel sources as of June 30, 2025—five years ahead of the 2030 target set under its Nationally Determined Contribution (NDC) targets to the Paris Agreement. This shows India's commitment towards environmental sustainability and climate change. He then talked about the importance of National Green Hydrogen Mission announced by Honourable Prime Minister, Shri Narendra Modi, in making India a hub for production He said such government initiatives will help India achieve net-zero carbon neutrality by 2070 and also ensure energy security.

Mr. Mohit Sharma, Director, Policy, Incentives and Tax Regulatory practice of KPMG India, talked about the objective of GHCSI and said that the scheme is designed to facilitate the development of a green hydrogen market in India, ensuring that hydrogen produced is genuinely green and contributes to reducing carbon emissions via verification by a BEE Accredited Carbon Verification (ACV) agency. He mentioned that the scheme provides guidelines for calculation of GHG emission intensity during green hydrogen production; defines monitoring requirements for green hydrogen production and emissions & designates a nodal authority for issuing certification for green hydrogen.



Ms. Anvesha Thakker, Partner & National Lead, Clean Energies, KPMG India highlighted that the scheme specifies the applicability of renewable energy (RE) for certification purposes including sources and claims of RE. She talked about the RE consideration that is to be excluded from emissions computation which includes- electricity generated from RE sources, RE stored in energy storage system & RE banked with the grid. She also said that if there are renewable energy certificates or carbon credits that are being claimed, then that is not excluded & electricity to that extent will be considered in the emissions calculation. She also highlighted that a valid power purchase agreement should be present to cover the entire electricity that is required by the green hydrogen plant.



The presentation was followed by 'Panel Discussion on Implementation challenges of the GHCSI and learnings from the global comparative landscape. The panel comprised of Mr. Rafael Velazquez Monroy, Tetra Tech, Mr. Nishaanth Balashanmugam, GH2 India & Ms. Apurba Mitra, Partner, KPMG India. The panel discussion was moderated by Ms. Anvesha Thakkar, Partner, KPMG.

The panel discussion was concluded with a detailed analysis on the implementation challenges related to GHCSI and the useful learnings India can draw from the global landscape. All the panellists had the consensus that despite challenges, India has a very strong, science-based threshold for production emissions which aligns to the international benchmarks and with the evolving market scenario, it will be able to achieve its goal of 5 MMT of green hydrogen by 2030.

The presentations were followed by conducting a Q&A session wherein various queries posted by our participants were well addressed by the panellists.

Lastly, DLN Sastri, Director (Oil Refining & Marketing), FIPI in his vote of thanks, emphasized the key importance of green hydrogen in India's journey towards attainment of energy security & sustainability. He thanked the panellists for providing an international perspective on implementing green hydrogen certification in India and highlighting various challenges that India's needs to overcome for successful deployment of green hydrogen in India's energy sector. He complimented the KPMG team for giving insight on GHSCI along with its modalities from the point of view of a green energy producer. He thanked the KPMG and FIPI team who worked hard to make this event successful. He also thanked the participants for their active and interactive participation during the event.

NEW APPOINTMENTS

Saumitra Priya Srivastava assumes charge as Director (Marketing) of IOCL

Mr. Saumitra Priya Srivastava has assumed charge as Director (Marketing) of Indian Oil Corporation Limited on 3rd October 2025.

Mr. Saumitra Priya Srivastava is a Civil Engineer from IIT, Roorkee and an MBA from SP Jain Institute of Management & Research, Mumbai. With over three decades of rich and diverse experience in the Oil and Gas industry, he has made significant contributions across downstream operations, marketing, and strategic planning, including serving as the State Head for Maharashtra.

Prior to his elevation as Director (Marketing), Mr. Srivastava led the Corporate Strategy Group, where he championed initiatives focused on enhancing customer satisfaction and streamlining operations. He played a key role in the rollout of SPRINT, a company-wide transformation programme launched in April 2025, aimed at fostering agility, innovation, and future-readiness.

He has also been instrumental in driving several other transformative projects at IndianOil, including the structured Non-Fuel Convenience Store initiative, the Dhruva - Retail Transformation Project, and a range of technology and digitalisation programmes that have reshaped the retail landscape.

Renowned for his collaborative and results oriented leadership style, Shri Srivastava has consistently delivered business growth, improved profitability, and elevated customer experience.

Member Organizations

S.No	Organization	Name	Designation
1	Adani Welspun Exploration Ltd.	Mr. Arvind Hareendran	Sr. Vice-President (Exploration)
2	ASAP Fluids Pvt. Ltd.	Mr. Vivek Gupta	Managing Director
3	Axens India (P) Ltd.	Mr. Siddhartha Saha	Managing Director
4	Baker Hughes, A GE Company	Mr. Neeraj Sethi	Country Leader
5	Bharat Petroleum Corporation Ltd.	Mr. Sanjay Khanna	Director (Refineries) with Additional Charge of Chairman & Managing Director
6	Bliss Anand Pvt. Limited	Mr. Vikas Anand	Managing Director
7	BP Exploration (Alpha) Ltd	Mr. Kartikeya Dube	Head of Country, bp India
8	Cairn Oil & Gas, Vedanta Ltd	Mr. Rakesh Agiwal	Chief Policy and Regulatory Officer
9	Central U.P. Gas Ltd.	Mr. Rajib Lochan Pal	Managing Director
10	Chandigarh University	Mr. Satnam Singh Sandhu	Chancellor
11	Chennai Petroleum Corporation Ltd.	Mr. H. Shankar	Managing Director
12	CSIR- Indian Institute of Petroleum	Dr Harender Singh Bisht	Director
13	Decom North Sea	Mr. Will Rowley	Interim Managing Director
14	Dynamic Drilling & Services Pvt. Ltd.	Mr. S.M. Malhotra	President
15	Engineers India Ltd.	Ms. Vartika Shukla	Chairman & Managing Director
16	Ernst & Young LLP	Mr. Rajiv Memani	Country Manager & Partner
17	ExxonMobil Gas (India) Pvt. Ltd.	Mr. Monte Dobson	Chief Executive Officer
18	FMC Technologies India Pvt. Ltd.	Mr. Arjun Kumar Rumalla	Managing Director
19	GAIL (India) Ltd.	Mr. Sandeep Kumar Gupta	Chairman & Managing Director
20	GSPC LNG Ltd.	Mr. Sanjay Sengupta	Chief Executive Officer
21	Goa Natural Gas Private Limited	Mr. Mohd Zafar Khan	Chief Executive Officer
22	Hindustan Petroleum Corporation Ltd.	Mr. Vikas Kaushal	Chairman & Managing Director
23	HPCL Mittal Energy Ltd.	Mr. Prabh Das	Managing Director & CEO
24	IIT (ISM) Dhanbad	Prof. Sukumar Mishra	Director
25	IMC Ltd.	Mr. A. Mallesh Rao	Managing Director
26	Indian Gas Exchange Ltd.	Mr. Rajesh Kumar Mediratta	Managing Director & CEO
27	Indian Oil Corporation Ltd.	Mr. A S Sahney	Chairman
28	Indian Strategic Petroleum Reserves Ltd.	Mr. L.R. Jain	CEO & MD
29	IndianOil Adani Ventures Ltd.	Mr. Anubhav Jain	Managing Director
30	Indradhanush Gas Grid Ltd.	Mr. Subrata Das	Chief Executive Officer
31	Indraprastha Gas Ltd.	Mr. Kamal Kishore Chatiwal	Managing Director
32	International Association of Drilling Contractors: IADC	Mr. Jason McFarland	President
33	International Gas Union	Mr. Milton Catelin	Secretary General

Member Organizations

S.No	Organization	Name	Designation
34	IPIECA	Mr. Brian Sullivan	Executive Director
35	Jindal Drilling & Industries Pvt. Ltd.	Mr. Raghav Jindal	Managing Director
36	Lanzatech Pvt. Ltd.	Dr. Jennifer Holmgren	Chief Executive Officer
37	Larsen & Toubro Ltd.	Mr. S.N. Subrahmanyan	CEO & Managing Director
38	Lummus Technology LLC	Mr. Leon de Bruyn	President & Chief Executive Officer
39	Mangalore Refinery & Petrochemicals Ltd.	Mr. M Shyamprasad Kamath	Managing Director
40	Marine Solutionz Ship Management Private Limited	Mr. Sumit Kumar	Director
41	MIT World Peace University Pune	Mr. Rahul V. Karad	Executive President
42	Nayara Energy Ltd.	Mr. Prasad K. Panicker	Executive Chairman
43	Numaligarh Refinery Ltd.	Mr. Bhaskar Jyoti Phukan	Managing Director
44	Oil and Natural Gas Corporation Ltd.	Mr. Arun Kumar Singh	Chairman & CEO
45	Oil India Ltd.	Dr. Ranjit Rath	Chairman & Managing Director
46	Petronet LNG Ltd.	Mr. Akshay Kumar Singh	Managing Director & CEO
47	Petronet MHB Ltd.	Mr. Sudhir Kumar	Managing Director
48	Pipeline Infrastructure Ltd.	Mr. Akhil Mehrotra	Chief Executive Officer
49	Rajiv Gandhi Institute of Petroleum Technology	Prof. Harish Hirani	Director
50	Reliance BP Mobility Ltd.	Mr. Akshay Wadhwa	Chief Executive Officer
51	Reliance Industries Ltd.	Mr. Mukesh Ambani	Chairman & Managing Director
52	S&P Global Commodity Insights	Mr. Anupam Bagri	President
53	Seros Energy Private Limited	Mr. Devashish Marwah	CEO (Seros Well Services)
54	Shell Companies in India	Ms. Mansi Madan Tripathy	Country Chair
55	Siemens Ltd.	Mr. Guilherme Vieira De Mendonca	CEO (Siemens Energy - India)
56	SLB	Mr. Lalit Aggarwal	Manging Director
57	South Asia Gas Enterprise Pvt. Ltd.	Mr. Subodh Kumar Jain	Director
58	Sun Petrochemicals Pvt. Ltd.	Mr. Padam Singh	President
59	THINK Gas Distribution Pvt. Ltd.	Mr. Abhilesh Gupta	Managing Director & CEO
60	Topsoe India Private Limited	Mr. Alok Verma	Managing Director
61	TotalEnergies Gas and Power Projects India Pvt. Ltd.	Dr. Sangkaran Ratnam	Country Chair
62	University of Petroleum & Energy Studies	Dr. Ram Sharma	Vice-Chancellor
63	VCS Quality Services Pvt. Ltd.	Mr. Shaker Vayuvegula	Director
64	World Biogas Association	Ms. Charlotte Morton OBE	Chief Executive
65	World LP Gas Association	Mr. James Rockall	CEO & Managing Director

FIPI

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