Why Indian methanol producers will miss the "Methanol Economy" bus

SAPTARAG HOTA
Consultant, Avalon Consulting

The value proposition of methanol

Methanol serves as a versatile solvent, a fundamental building block for various chemicals, and an alternative fuel source. The Indian government's initiative to promote cleaner fuels aims to reduce the rising import bill and greenhouse gas emissions, making methanol increasingly commercially attractive. While ethanol has gained significant traction through the Ethanol Blending Program (EBP), which targets a 20% blending with gasoline by 2025, it faces challenges that could hinder its widespread adoption. Ethanol production primarily relies on sugarcane or foodgrains like rice, raising concerns about food security and resource allocation, as extensive cultivation of a land and water-intensive crop like sugarcane may divert resources from food production. Additionally, the reduction of the Goods and Services Tax (GST) on ethanol from 18% to 5% presents a challenge by resulting in substantial foregone tax revenues for the government.

In contrast, methanol and dimethyl ether (DME) present promising alternatives for blending with petrol and diesel. Methanol can be blended with gasoline at varying ratios, enhancing octane ratings while reducing emissions. Similarly, DME can be used as a clean substitute for diesel, offering significant reductions in particulate matter and greenhouse gas emissions. The blending potential of methanol and DME not only addresses the challenges faced by ethanol but also aligns with India's goals for energy security and sustainability. By investing in a methanol economy, India can capitalize on its domestic resources while fostering innovation in cleaner fuel technologies.

Current market scenario

Domestic methanol consumption has grown from 1.8-mt (million metric tonnes) in FY17 to 2.8-mt in FY23, registering a CAGR of 9%. At the same time, domestic methanol production was 0.18-mt in FY17 and decreased to 0.07-mt in FY23, indicating ~95% of domestic consumption, during this period, was fulfilled by imports. The installed methanol production capacity has remained stagnant at 0.47-mtpa, with a paltry capacity utilization of 14% in FY23.

What explains this predicament of domestic methanol producers?

It boils down to the choice of feedstock. Methanol can be produced from feedstocks such as natural gas, naphtha, coal, and biomass. Domestic producers rely on natural gas as a feedstock since the production technology is mature and can produce methanol with attractive unit economics when operated at scale. A methanol plant using natural gas as a feedstock will require around 28-31 million British Thermal Units (MMBTU) of natural gas to produce a tonne of methanol. Domestic natural gas prices have hovered around the $8/MMBTU mark while domestic methanol prices have remained around Rs. 25/litre. Hence, domestic producers' contribution over raw material is a meagre Rs. 6 per tonne of methanol.

Moreover, of the natural gas consumed in India roughly 50% is imported, which could lead to further erosion of contribution over raw material of the domestic producers due to higher landed cost of imported natural gas owing to transportation, storage, and handling of natural gas in liquified form. Additionally, the fixed costs of running a methanol-producing facility will further erode the profitability of the domestic producers. This is evident from the fact that Gujarat Narmada Fertiliser and Chemicals (GNFC), one of India's major producers of methanol, shut its methanol plants in FY24 due to unfavourable cost economics.

An argument can be made for the domestic producers to raise their prices, but approximately 75% of methanol imported to India comes from the producers in the Gulf countries, who possess pricing power due to either the availability of cheap natural gas or captive production of natural gas. Hence, operations of the domestic methanol plants will remain intermittent depending on the price of natural gas.

Biomass as a feedstock

Biomass is an alternate feedstock to produce methanol. Its source – forestry & agricultural waste, landfills, and municipal solid waste (MSW) – makes it the only feedstock that can be used to produce renewable methanol.

However, the adoption of biomass as a feedstock is beset with challenges, such as a fragmented supply chain and high production costs.

To begin with, the supply of biomass is highly fragmented. Securing large quantities of biomass from fragmented sources of supply will pose a significant logistical challenge, leading to high inbound freight costs, higher raw material inventory days, and high operational risk in case supply is disrupted.

Secondly, the production of methanol

from biomass is still in the early commercialization stage, which limits the scale of production, leading to a higher cost of production when compared to plants operating on fossil fuel feedstocks.

Additionally, to make renewable methanol cost-competitive domestic producers will have to drive down either the landed cost of biomass or reduce the capital expenditure of such plants. Both seem to be difficult to achieve in the short and medium term.

Hence, despite its attractiveness as an alternate feedstock, switching to biomass will remain a challenge for the domestic methanol producers.

Coal as a feedstock

India's abundant coal reserves offer a significant opportunity for methanol production through coal gasification, a cleaner alternative to traditional coal combustion. This process generates synthesis gas (syngas), essential for producing methanol and other high-value chemicals, while also addressing the challenges posed by the high ash content typical of Indian coals. The Indian government envisions a gradual reduction of coal in the overall energy mix, and promoting a coal-to-chemicals complex aligns with initiatives like *Atmanirbhar Bharat*.

By leveraging its approximately 307 billion tonnes of thermal coal reserves for methanol production, India can reduce dependence on imported fuels, enhance domestic capabilities, and position itself as a leader in the emerging methanol economy.

Complication

Although coal is a viable and cheaper alternative, switching the feedstock to coal will not be straightforward for the incumbents. This is due to three factors: quality of Indian coal; investment in new technology; and re-orientation of the supply chain.

To begin with, take the quality of Indian coal. Indian coal has a high ash content, which negatively impacts its calorific value. This inherent drawback would mean that larger than necessary quantities of such coal will be required to produce methanol. Argument can be made for beneficiation of the low-grade coal, but building such a facility will require additional capital investment. Additionally, the problem of ash residue management will require domestic producers to invest.

The incumbents will have to invest in coal gasification technology for synthesis gas production, with an additional investment for a cryogenic distillation unit for generating oxygen required for production. Moreover, the technology for producing methanol from high ash coal has not matured yet, affecting the cost competitiveness of the finished product and making investment unattractive.

Finally, switching the feedstock to coal may require the incumbents to revamp their inbound supply chain. To begin with, they will need to onboard suppliers who can provide coal from a single source with minimal content of fine particles. This will ensure a steady quality of feedstock needed to streamline the operations. Furthermore, they may have to set up facilities near coal mines to optimize inbound logistics, leading to lowest possible landed cost of raw material. However, incumbents desiring synergies with their existing production facilities and downstream supply chain will find the dedicated facility unattractive and a costly affair.

CONCLUSION

The government's roadmap for a methanol economy, coupled with the potential for substantial import substitution and the availability of cheaper alternative feedstocks, makes domestic methanol production appealing to both established players and new entrants.

However, challenges such as significant capital investment, inferior raw material quality, and the need for a potential redesign of the supply chain could hinder competitiveness against imports, which are predominantly sourced from the Middle East and China. Consequently, any impact on the existing supply chain may be minimal.

Moreover, by the time domestic producers achieve competitiveness, the burgeoning hydrogen economy could overshadow the methanol market, further complicating prospects for growth in this sector.

ABOUT THE AUTHOR

Sapratag Hota is a strategy consultant with expertise in the Chemicals sector and Supply Chain domain. He has worked with clients on multiple engagements developing market entry strategies, logistics network design, and financial models. Prior to consulting, Saptarag worked in an integrated fertilizers and chemicals manufacturing firm.

ABOUT AVALON CONSULTING

Avalon is a strategy and management consulting firm that advises on strategy, performance improvement, organizational transformation, and transactions.

Avalon Consulting is the highest-ranked Indian strategy consulting firm in Asia Pacific in Vault's Best Consulting Firms in Asia for Strategy Consulting multiple times, including for 2024. Its client list includes the likes of the Tata Group, Aditya Birla Group, Hero Group, DCM Shriram, TVS Group, and other top MNCs who value its way of collaboration.