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COAL GASIFICATION IN INDIA

Rs. 37,500 Crore Scheme and Strategic Priorities

1. Latest Developments

A joint study by the Centre for Domestic Economy Policy Research (C-DEP) and the Centre for WTO Studies (CWS) has identified 23 coal-derived products. It recommends prioritising hydrogen, synthetic natural gas, methanol and ammonia under India's Rs. 37,500-crore coal gasification scheme to reduce dependence on imported fuels, fertilisers and industrial chemicals.

2. Understanding Coal Gasification

Coal gasification is a process that converts coal into a combustible gas mixture, commonly known as syngas, primarily consisting of carbon monoxide and hydrogen.

- The process is achieved by reacting coal with controlled quantities of oxygen, air or steam at high temperatures.
- The resulting syngas can be used directly as a fuel or processed further to produce hydrogen, synthetic natural gas, methanol, ammonia, fertilisers and other industrial chemicals.
- Unlike conventional coal combustion, which primarily generates heat and electricity, gasification enables coal to serve as a feedstock for manufacturing a range of industrial products.

3. India's National Coal Gasification Mission

- The Government of India has committed Rs. 37,500 crore towards promoting surface coal and lignite gasification projects.
- The scheme aims to facilitate the gasification of an additional 75 million tonnes of coal and lignite annually.
- India's broader target is to achieve 100 million tonnes of coal gasification capacity by 2030.
- The initiative seeks to leverage India's substantial coal reserves to reduce dependence on imported energy and fertiliser products, strengthen domestic chemical manufacturing and improve strategic supply security.

4. C-DEP-CWS Study and Priority Products

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The study, titled "Coal-to-Chemicals Policy in India: A Strategic Framework for Product Prioritisation under the National Coal Gasification Mission", ranks 23 coal-derived products across eight economic, industrial and strategic parameters.

It recommends directing investments towards products that offer significant import-substitution potential, economic returns and strategic supply security.

Priority Products Identified

- Hydrogen: Ranked as the highest-priority product, with applications across refining, fertilisers and industrial processes.
- Synthetic Natural Gas (SNG): Can serve as a substitute for natural gas in several applications and help reduce gas-import dependence.
- Methanol: An important industrial chemical and feedstock used in multiple downstream industries.
- Ammonia: A key input for fertiliser manufacturing and other chemical applications.
- Dimethyl Ether (DME): A potential alternative fuel and industrial chemical.
- LNG and LPG: Domestic production could help reduce dependence on imported gaseous and liquefied fuels.
- Urea and Diammonium Phosphate (DAP): Important fertilisers for which India has significant import requirements.

5. Import Substitution Potential

India's dependence on imported fuels and fertilisers highlights the economic significance of developing domestic coal-based production. The study estimates that India imported nearly US$37 billion worth of LPG, LNG, urea and DAP in 2024.

- LPG and LNG imports exceeded US$27 billion.
- Urea and DAP imports accounted for another US$9.6 billion.

Domestic production of these products through coal gasification could help substitute a portion of these imports, strengthen domestic supply chains and reduce exposure to international price fluctuations and supply disruptions.

6. Lessons from China's Coal-to-Chemicals Industry

The study draws lessons from China's experience in developing its coal-to-chemicals industry. Integrated industrial clusters helped China expand domestic production of fertilisers, methanol and downstream chemicals.

However, China's experience also highlights important risks associated with rapid capacity expansion:

- Underutilisation of industrial plants.
- High capital investment requirements.

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- Significant water constraints.

The study therefore recommends that India avoid rapid, uncoordinated expansion and adopt a phased investment approach. It also proposes developing integrated manufacturing clusters where common coal gasification facilities can supply multiple downstream chemical industries. This approach could improve infrastructure utilisation and support economies of scale.

7. Challenges in Commercialising Coal Gasification

- Commercial viability: The economic feasibility of technologies suited to Indian coal needs to be established before large-scale investments are undertaken.
- Technology suitability: Industry must test available technologies and demonstrate their performance under Indian coal conditions.
- Capital intensity: Coal gasification and downstream chemical manufacturing require substantial investment, making project viability and utilisation critical.
- Water constraints: Coal gasification and associated chemical processes can require significant quantities of water, creating challenges in water-stressed regions.

Addressing these challenges will be essential before the sector can achieve commercial scale.

8. Way Forward

- Adopt a product-focused strategy that aligns investment decisions with import dependence, strategic importance and economic returns.
- Build on the policy and financial support already created by the government, while ensuring that projects are commercially viable.
- Follow a phased approach to investment and capacity creation.
- Develop integrated manufacturing clusters to improve infrastructure utilisation and support economies of scale.
- Carefully assess technology suitability and resource requirements, particularly water availability, before project implementation.

9. Conclusion

Coal gasification offers India an opportunity to use its domestic coal reserves as a feedstock for producing fuels, fertilisers and industrial chemicals, thereby improving strategic supply security and reducing import dependence. However, commercial viability, technology suitability, capital intensity and water constraints must be carefully addressed. A phased, product-focused approach supported by integrated manufacturing clusters can help India develop a sustainable domestic coal-to-chemicals industry.

Source: Economic Times (ET) | BusinessWorld (BW)