Gas-to-Graphene:
Materials Sovereignty in Indian Manufacturing

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Abstract

India's manufacturing ambition is real and accelerating. Policy commitment, rising FDI, and a growing share of medium- and high-technology industries are creating serious demand for advanced materials in construction, coatings, performance fluids, batteries, and more. But the materials ecosystem has not kept pace. Supply chains for high-value additives remain exposed, production routes are carbon-intensive, and sustainability claims rest on assumptions that are hard to verify. For a country pursuing genuine industrial self-reliance, these are strategic vulnerabilities, not just operational inconveniences.

This presentation explores a different pathway: locally mining graphene from methane-containing gas streams, whether fossil-derived or biogenic sources such as wastewater treatment or agriculture, producing graphene alongside a hydrogen-rich gas. Carbon already present in these streams, typically vented, flared, or combusted, becomes a high-value engineered material. We outline what makes this credible at industrial scale: controllable conditions, consistent and characterisable quality, and tunable process parameters. The goal is materials sovereignty and cleaner, more secure supply chains.

References

Figures