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India's First Commercial Coal-to-Ammonium-Nitrate Plant in Odisha

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WHY IN NEWS

On June 20, 2026, Prime Minister Narendra Modi laid the foundation stone of India's first commercial-scale coal-to-ammonium-nitrate project at Lakhanpur in Jharsuguda district, Odisha. The Rs 25,016 crore venture, developed by Bharat Coal Gasification and Chemicals Ltd (BCGCL), is the flagship of the National Coal Gasification Mission and a marquee test of India's push to convert its vast coal reserves into high-value chemicals rather than merely burning them for power.

THE LAKHANPUR PROJECT: WHAT IS BEING BUILT

The project marks the first commercial application of indigenous coal gasification technology in the chemicals sector. Instead of combusting coal, the plant will gasify it to produce synthesis gas (syngas), which is then chemically converted into ammonium nitrate, a critical input for the mining-explosives and fertiliser industries that India currently imports in large volumes.

KEY FACT	DETAIL
Project cost	Rs 25,016 crore
Location	Lakhanpur, Jharsuguda district, Odisha
Developer	Bharat Coal Gasification and Chemicals Ltd (BCGCL)
JV partners	BHEL (Bharat Heavy Electricals Ltd) + Coal India Ltd (CIL)
Output capacity	~2,000 tonnes per day (TPD) of ammonium nitrate
Technology	Indigenous coal gasification designed by BHEL
Land	~350 acres leased from Mahanadi Coalfields Ltd (MCL), a CIL subsidiary
Foundation stone	June 20, 2026, by PM Narendra Modi

The land-leasing agreement with MCL, the Odisha-based CIL arm whose Lakhanpur mines sit adjacent to the site, was signed in April 2026, giving the plant pithead access to feedstock (https://ujiyari.com/vocab/feedstock/) and cutting coal-transport costs and emissions.

What Coal Gasification Actually Is

Coal gasification is a thermochemical process in which coal is reacted with a controlled amount of oxygen and steam at high temperature and pressure. Rather than full combustion, this partial oxidation breaks coal down into syngas, a mixture chiefly of carbon monoxide (CO) and hydrogen (H_2).

Syngas is a versatile chemical building block. After cleaning and conditioning, it can be routed to several downstream products:

- **Methanol**, a fuel and chemical feedstock.
- **Ammonia and urea**, the backbone of nitrogenous fertilisers.
- **Ammonium nitrate**, explosives and fertiliser, the focus of the Lakhanpur plant.
- **Synthetic natural gas (SNG)** and hydrogen.

Because the carbon is processed in a controlled, enclosed environment, gasification allows easier capture of pollutants and (potentially) carbon dioxide than open combustion in a thermal power plant.

THE NATIONAL COAL GASIFICATION MISSION

Lakhanpur is one node in a much larger strategy. The government has set a target of gasifying **100 million tonnes (MT) of coal by 2030**, aimed at extracting greater value from India's abundant coal and cutting imports of methanol, ammonia and related chemicals.

MISSION ELEMENT	DETAIL
2030 target	100 million tonnes of coal gasification
Anchor incentive	Rs 8,500 crore Viability Gap Funding (https://ujiyari.com/terms/viability-gap-funding/) (VGF) scheme, approved January 2024
Expected investment	Rs 2.5 lakh crore to Rs 3 lakh crore across ~25 projects
Employment	~50,000 direct and indirect jobs
Beneficiaries	Both PSUs (CIL with BHEL/GAIL) and private players

The VGF scheme de-risks early projects by covering part of the funding gap, since gasification plants are capital-intensive and commercially unproven at scale in India. Several pilot and commercial ventures are being executed through CIL joint ventures, including the CIL-BHEL JV (BCGCL) and a separate CIL-GAIL collaboration.

WHY AMMONIUM NITRATE MATTERS

Ammonium nitrate (NH_4NO_3) is a dual-use industrial chemical:

- **Explosives:** As ANFO (ammonium nitrate fuel oil) and related formulations, it is the workhorse blasting agent for coal, metal and limestone mining, quarrying and large infrastructure projects.
- **Fertiliser:** It is a high-nitrogen fertiliser input.

India is a major consumer of ammonium nitrate but produces only part of its requirement domestically, importing a significant share. A 2,000 TPD plant therefore directly advances **import substitution** and shores up supply security for the mining sector, which itself underpins steel, cement and power. Locating the plant beside CIL's own coalfields creates a closed loop: coal feeds the gasifier, and the resulting explosives feed the mines.

ENVIRONMENTAL CONCERNS

Coal gasification is cleaner than combustion, but it is not clean. Its environmental trade-offs are central to the policy debate.

CONCERN	EXPLANATION
Carbon intensity	Gasification still releases substantial CO_2; without carbon capture, coal-derived chemicals carry a heavy carbon footprint
Water use	The process is highly water-intensive (steam, cooling, gas cleaning), a serious issue in water-stressed mining regions
Coal lock-in	Large, long-life capital invested in coal infrastructure can slow the transition away from fossil fuels
Local pollution	Ash, slag and process effluents require careful handling near mining communities

Proponents argue gasification is a transitional pathway that monetises domestic coal while enabling future carbon capture; critics counter that scarce capital could instead accelerate genuinely low-carbon alternatives such as green ammonia from renewable hydrogen.

ANALYSIS AND WAY FORWARD

The Lakhanpur project crystallises a genuine policy tension. On the **energy-security and self-reliance** side, the logic is strong: India holds the world's fifth-largest coal reserves yet imports methanol, ammonia and ammonium nitrate. Gasification converts a domestic resource into high-value chemicals, supports the Atmanirbhar Bharat goal of import substitution, validates indigenous BHEL technology, and creates jobs in the mineral belt of eastern India.

On the **environmental and resource** side, gasification remains carbon-intensive and water-hungry, and committing Rs 25,016 crore to a single coal-based asset risks long-term lock-in even as the world decarbonises. In water-stressed districts, the freshwater demand of gasification competes directly with agricultural and domestic needs.

A balanced path forward involves:

- **Pairing gasification with carbon capture, utilisation and storage (CCUS)** so coal-derived chemicals can be progressively decarbonised.
- **Mandating water recycling and zero-liquid-discharge** norms for gasification plants in water-stressed zones.
- **A just-transition framework** that uses these coal-belt investments to build durable, future-proof employment rather than deepening fossil dependence.
- **Comparing lifecycle costs** against green-ammonia alternatives so public capital is allocated to the lowest long-run carbon pathway.

The plant is best read as a calculated bridge: it buys energy security (https://ujiyari.com/terms/energy-security/) and import substitution today, but its environmental legitimacy depends on water discipline and an eventual carbon-capture overlay.

UPSC RELEVANCE

Prelims:

- Coal gasification produces syngas (CO + H2); BCGCL is a JV of BHEL and Coal India Ltd.
- Project at Lakhanpur, Jharsuguda district, Odisha; cost Rs 25,016 crore; capacity ~2,000 TPD ammonium nitrate.
- National target: 100 MT coal gasification by 2030; Rs 8,500 crore VGF incentive scheme (approved January 2024).
- Ammonium nitrate (NH4NO3): explosives (ANFO) and fertiliser.

Mains (GS3, Energy, Infrastructure, Environment):

- Discuss coal gasification as a route to energy security and import substitution, and weigh it against its carbon and water costs.
- Examine how India can balance monetising domestic coal reserves with its net-zero-by-2070 commitments.
- Evaluate the role of PSU joint ventures (CIL-BHEL, CIL-GAIL) in delivering the National Coal Gasification Mission.

FACTS CORNER

Project cost: Rs 25,016 crore

Location: Lakhanpur, Jharsuguda district, Odisha

Developer: BCGCL = BHEL + Coal India Ltd (CIL) joint venture

Capacity: ~2,000 tonnes per day (TPD) of ammonium nitrate

Technology: Indigenous BHEL coal gasification (produces syngas: CO + H2)

National target: 100 million tonnes of coal gasification by 2030

Incentive: Rs 8,500 crore Viability Gap Funding scheme (approved January 2024)

Foundation stone: PM Narendra Modi, June 20, 2026

Sources: Ministry of Coal (https://coal.nic.in), Press Information Bureau (https://pib.gov.in), Business Standard (https://www.business-standard.com)

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