



# Coal Gasification

Source: LM

## Why in News?

The Ministry of Coal requested proposals from public and private sector participants for [coal gasification projects](#) as part of an Rs 8,500 crore [viability gap funding \(VGF\) scheme](#).

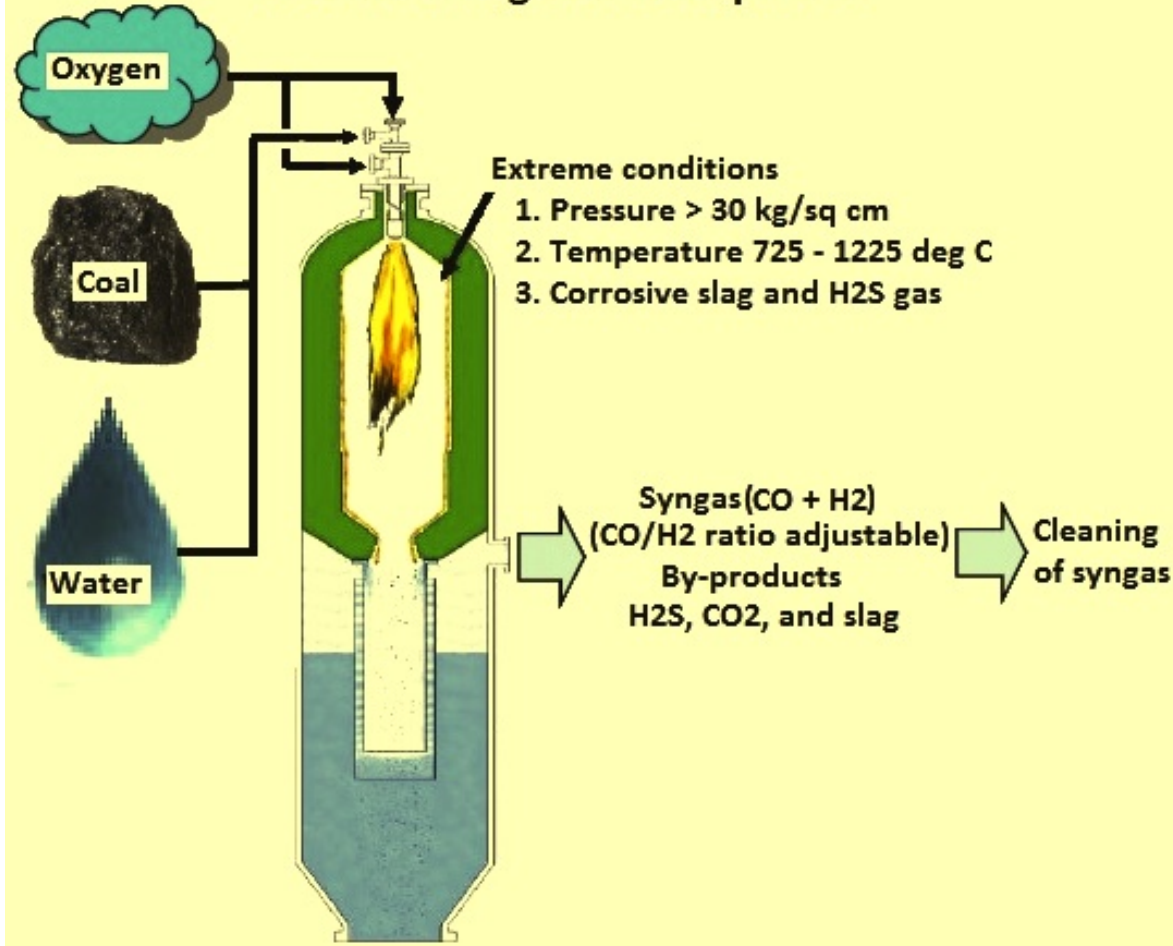
- **Viability Gap Funding (VGF)** is a financial tool used to support projects that are economically justified **but not financially viable on their own**.

## What is Coal Gasification?

- Coal gasification is a process that **transforms Coal into a Synthetic gas (Syngas)**, consisting of mixture of gasses such as **Carbon monoxide (CO), Hydrogen (H<sub>2</sub>), Carbon dioxide (CO<sub>2</sub>), Methane (CH<sub>4</sub>) and Water vapor (H<sub>2</sub>O)**.
  - Coal is reacted at high temperatures (typically 1,000-1,400°C) with a controlled amount of oxygen and steam.
- **Syngas can be used to produce a wide range of [Fertilizers](#), Fuels, solvents and synthetic materials.**
- The Process is as given:
  - **Preparation:** Coal is **crushed into a fine powder to increase its surface area** and enhance the chemical reactions during the process.
  - **Gasification Reactor:** The crushed coal is **introduced into a high-temperature and high-pressure reactor** along with limited oxygen or air and steam.
  - **Chemical Reactions:** In the absence of **sufficient oxygen for complete** combustion, the coal undergoes a series of complex chemical reactions.
    - These reactions **break down the coal molecules into the components of syngas**.
  - **Gas Cleaning:** The raw syngas produced from the reactor contains impurities like tar, sulfur, and dust. These **impurities need to be removed through a gas cleaning process** before the syngas can be used further.
- **Benefits of Coal Gasification:**
  - **Cleaner Alternative to Coal Combustion:** Coal gasification burns cleaner than coal for electricity. It captures pollutants before using the gas for power generation.
  - **Versatile Syngas Usage:** The syngas produced can be used for various purposes, including **electricity generation, production of cleaner fuels** like hydrogen and **production of chemicals** like ammonia and methanol.

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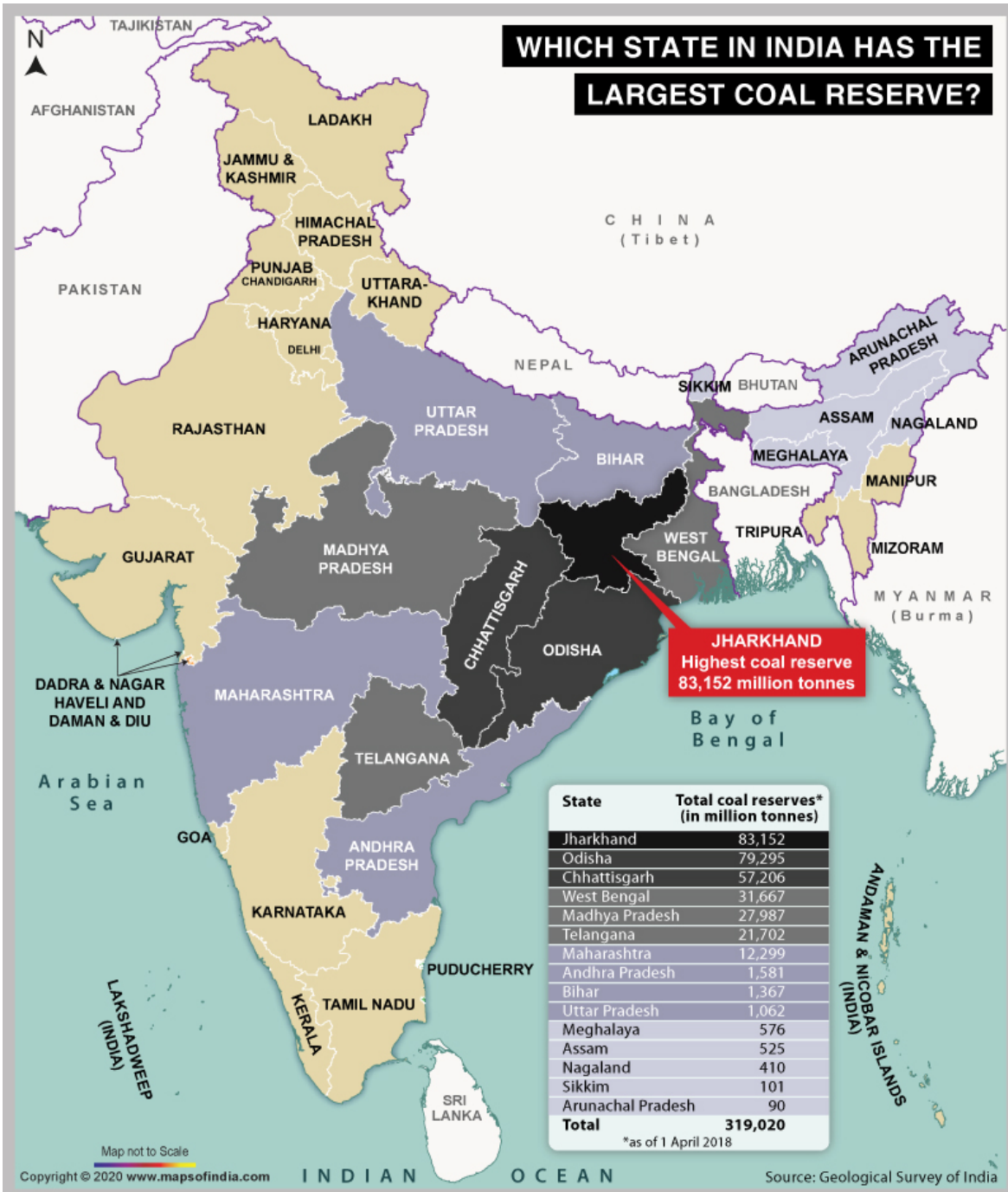
## Basics of coal gasification process



### Note

- The Government is promoting **coal-to-chemical and gasification processes** due to the expected **surplus of domestic coal** in the future after meeting the **power and other sectors' needs**.
  - India aims for **100 million tonnes (MT) coal gasification by 2030** with investments worth over Rs. 4 lakh crores.
- In addition to **VGF**, the government is supporting the coal industry in 2 ways:
  - **Long-term linkage window:** This creates a stable market for coal producers.
  - **Coal utilization for gasification:** Coal mine owners can use their coal for gasification projects and get a discount on revenue sharing.
- Production of **coal and lignite** reached **1 billion tonnes** in FY 2024, target of **1.08 billion tonnes** is set for the current fiscal year 2024-25.
- India has the **fourth largest coal reserves** in the world, with reserves of **361.41 billion tonnes**.
  - **Top 3 Coal Reserves:** US, Russia and Australia.
  - **Top 3 Coal Production:** China, India and US.

## WHICH STATE IN INDIA HAS THE LARGEST COAL RESERVE?



Read more: [Coal Gasification](#), [Coal Logistics Plan and Policy](#)

## UPSC Civil Services Examination, Previous Year Questions (PYQs)

### Prelims

#### Q1. Consider the following statements: (2019)

- Coal sector was nationalized by the Government of India under Indira Gandhi.
- Now, coal blocks are allocated on lottery basis.
- Till recently, India imported coal to meet the shortages of domestic supply, but now India is self-sufficient in coal production.

**Which of the statements given above is/are correct?**

- (a)** 1 only
- (b)** 2 and 3 only
- (c)** 3 only
- (d)** 1, 2 and 3

**Ans: (a)**

**Q2. Which of the following is/are the characteristic/characteristics of Indian coal? (2013)**

1. High ash content
2. Low sulphur content
3. Low ash fusion temperature

**Select the correct answer using the codes given below:**

- (a)** 1 and 2 only
- (b)** 2 only
- (c)** 1 and 3 only
- (d)** 1, 2 and 3

**Ans: (a)**

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