



# CO<sub>2</sub> to CO Conversion Technology

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## Why in News?

The **National Centre of Excellence in Carbon Capture and Utilisation (NCoE-CCU)** at IIT Bombay has developed a new technology for converting [carbon dioxide \(CO<sub>2</sub>\)](#) to [carbon monoxide \(CO\)](#).

- The technology is energy-efficient and can be used in the steel sector. It aligns with India's goal for [net-zero emissions by 2070](#).

## How Does the CO<sub>2</sub> to CO Conversion Technology Work?

### ▪ Working Process:

- The CO<sub>2</sub> to CO conversion technology operates through an **electrocatalytic process**.
- Unlike traditional methods that **require high temperatures (400-750 °C)**, and the presence of the equivalent amount of hydrogen, this process can operate at **ambient temperatures (25-40 °C)** in the presence of water, **eliminating the need for high-temperature conditions**.
  - The energy for this electrocatalysis reaction can be sourced directly from [renewable energy, such as solar panels or windmills](#), ensuring a carbon-neutral operation. Making it highly energy-efficient process and environmentally friendly and sustainable.

### ▪ Significance for the Steel Industry:

- CO is a crucial chemical in the steel industry, used in the **conversion of iron ores to metallic iron in blast furnaces**.
  - CO is a widely used chemical in the industry especially in the form of syn gas.
- Traditionally, CO is produced through the partial **oxidation of coke/coal, resulting in significant CO<sub>2</sub> emissions**.
  - The new CO<sub>2</sub> to CO conversion technology presents an opportunity to establish a [circular economy](#), reducing **carbon footprint and associated costs in steel production**.

## Electrocatalytic Process

- It is a catalytic process that involves the **direct transfer of electrons between an electrode and reactants**.
- This process is environmentally friendly, efficient, and inexpensive. It can be used in many sustainable energy technologies.

## Carbon monoxide (CO)

- It is a **colorless, odorless, and tasteless** gas that is slightly less dense than air.
- **Sources of CO:** CO is a byproduct of the **incomplete combustion of hydrocarbons**. Common sources include burning fossil fuels like natural gas, petrol, coal and oil, wood smoke, car and truck exhausts etc.

- It is toxic to humans insofar as it forms a complex thereby displacing oxygen from the hemoglobin of the blood.
- In the atmosphere CO is short lived because of the role it plays in the formation of **ground-level ozone**.

## UPSC Civil Services Examination Previous Year Question (PYQ)

**Q. Consider the following: (2019)**

1. Carbon monoxide
2. Methane
3. Ozone
4. Sulphur dioxide

**Which of the above are released into atmosphere due to the burning of crop/biomass residue?**

- (a) 1 and 2 only  
(b) 2, 3 and 4 only  
(c) 1 and 4 only  
(d) 1, 2, 3 and 4

**Ans: (d)**

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