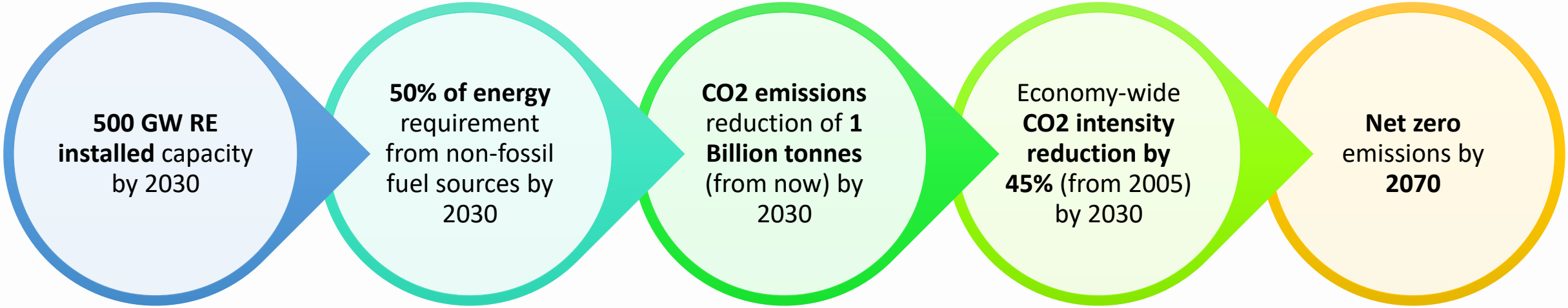
Carbon Capture, Utilization and Storage- Indian Context

By

Balawant Joshi, MD, Idam Infra

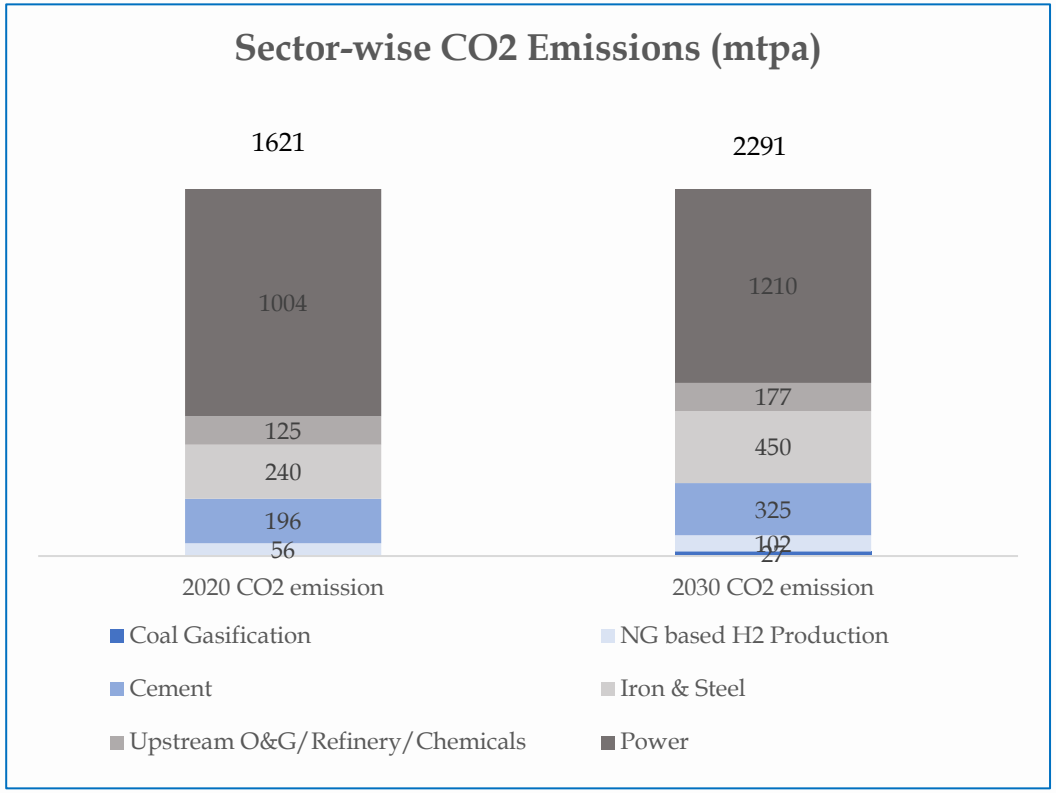
Imperatives for CCUS in India



- Deployment of zero carbon and negative carbon technologies is essential to achieve carbon neutrality
- Even with 500 GW of renewable capacity by 2030, the need of fossil fuel for a stable baseload power supply persists
- With fossil fuels continuing to play an important role, CCUS technologies become essential to achieve net-zero ambition
- Apart from reducing emissions, CCUS technologies also support in production of clean products, providing energy security, enabling sunrise sector such as coal gasification
- Therefore, CCUS is essential in driving sustainable economic growth while addressing the challenges of carbon emissions and climate change.

CO2 Emissions from Major Industries in India

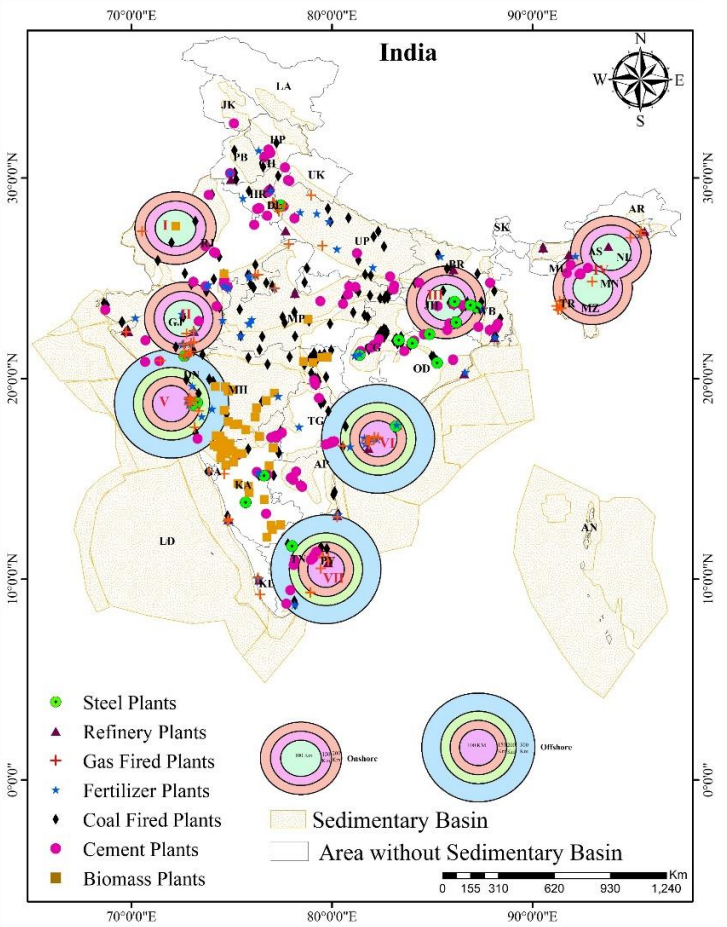
- India's power and industrial sectors contributed around 1,600 mtpa of CO2 emission (around 60%) out of 2,600 mtpa in 2020
- The remaining 40% CO2 emissions are contributed by distributed point emissions sources like agriculture, transport, and buildings
- Emissions from power and industrial sectors are expected to increase to nearly 2,300 mtpa by the year 2030

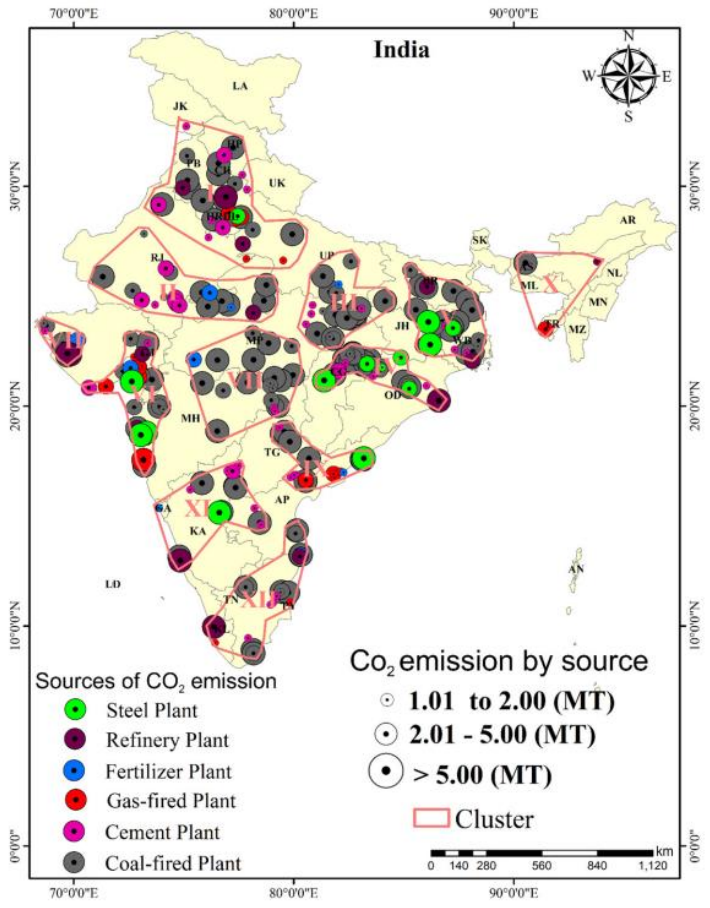


Source: CCUS Policy Framework and its Development Mechanism in India by Niti Aayog; Nov 2022

Source-sink matching and CCS hub-clusters in India

- 244 large point sources (LPSs) and 7 sedimentary basins (3 offshore and 4 onshore) considered for the study.
- For offshore basins, LPSs considered within 300 km radius, while LPSs within 200 km for onshore ones.
- 32%, 43% and 25% LPSs fall within 100, 200 and 300 km respectively from the Euclidean center.
- Highest emission in cluster 3 (Eastern India coal belt), lowest emission in cluster 4 (Assam basin)
- Maximum number of LPSs in cluster 5 (Cambay) and minimum in Cluster 1 (Rajasthan)





Sources :

Vikram Vishal et al., 2021, Int J. Greenhouse Gas Control, Vol. 111, p.103458.

Vikram Vishal et al., 2023, Geological Society of London Sp. Pub., Vol. 528, p. 209 - 225

CCUS Projects implemented in India

Sr. No.	Projects	Capacity (TPD CO2)	Start of Operation	Utilization of CO2
1	Indo Gulf Corporation Ltd, Jagdishpur	150	1988	• Manufacturing of urea
2	IIFCO, Aonla, UP	450	2006	• Manufacturing of urea
3	IFFCO Phulpur (UP)	450	2006	• Manufacturing of urea
4	Nagarjuna Fertiliser and Chemical Ltd. Kakinada (AP)	450	2009	• Manufacturing of urea
5	National Fertiliser Ltd., Vijayapur (MP)	450	2012	• Manufacturing of urea
6	Tuticorin Alkali Chemicals and Fertilizers Limited (TFL)	~200	2016	• For converting into soda ash (sodium carbonate) – an ingredient used in household products, glass manufacturing, and paper production
7	Tata Steel Jamshedpur Works	5	2021	• Reuse on site to promote circular carbon economy
8	BHEL Hyderabad	1.4	2021	• Producing methanol with purity of more than 99 percent from high-ash Indian coal
9	Jindal Steel & Power Angul Plant	2000	2022	• Using CO2 through bio reactors to produce an algae "Spirulina" (Dietary supplement) • Soda Ash Pilot project • Methanol through Catalytic hydrogenation route; and Bio-Ethanol Pilot Project
10	NTPC Vindhyachal Super Thermal Power Station	20	2022	• Production of Methanol
11	Indian Oil Corporation Koyali refinery	~1,500	Announced*	• For enhanced oil recovery (EOR) • Liquefied and purified CO2 to food and beverage sector industry
12	Dalmia Cement (Bharat) Limited	~1500	Announced**	• Production of Urea

*Techno-commercial Feasibility Study completed; funded by USTDA
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Way forward for CCUS in India

- CCUS technologies faces various challenges such as high capital cost and financial unviability.
- Despite these challenges, the successful deployment of CCUS has taken place across the world, due to government support and strong policy framework
  - Capital support such as EU Innovation fund (€40 billion) for low carbon technologies in Europe;
  - UK CCUS infrastructure fund (£1 billion) support CCUS projects in UK
  - Operation subsidies and tax credits such as Sequestration Tax Credit in USA
  - Development of roadmap and policies such as China CCUS Roadmap 2015
- GoI has been providing incentives/support to other technologies such as Green Hydrogen, Electrolyzer manufacturing and EVs
- Stronger policies and market certainty would provide necessary financing for deployment CCUS supply chains & commercial infrastructure
- In this roundtable, we hope to discuss the challenges faced by CCUS sector in India and identify potential solutions for CCUS Roadmap for India.

Thank you for your kind attention