

CCUS: The high road to net zero

Carbon capture utilisation technology can play a crucial role in reducing CO₂ emissions, provided the govt shapes a workable regulatory framework first

S DINAKAR
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What is clear, so far, is that India, the world's third largest emitter of CO₂, needs a "thali" treatment — of renewables, electric vehicles (EVs), hydrogen, and carbon capture utilisation and storage (CCUS) — to meet net-zero commitments. The question is, where does carbon capture fit in this mix?

So far, the Modi government had ignored CCUS — a technology used to capture the odourless, greenhouse gas from factory exhausts and store it — while encouraging other emerging technologies — a ₹19,500-crore package for green hydrogen, ₹18,100 crore for battery chemistry, and a draft policy for hydroelectric storage.

So it came as a relief when New Delhi recently included carbon capture as one of the 13 activities that qualify for carbon credits in India's upcoming carbon trading market. The decision to award carbon certificates, an instrument that rewards reduction in emissions, for CCUS may help state-run explorer ONGC and refiner IOC pioneer the climate mitigation technology in India.

"CCUS is likely to play a crucial role in achieving India's goal to reduce CO₂ emission by 50 per cent by 2050," said Pranav Master, director, consulting, Crisil Market Intelligence. "In order to decarbonise the hard-to-abate industries such as steel,

cement and petrochemicals, CCUS can enable scalable and profitable conversion of emitted gases, especially CO₂. Manufacturing, construction and industry together emit around 662 million tonnes (MT) of CO₂.

But as Shelly Abraham, head of renewables, at state refiner BPCL, pointed out, "There are huge challenges in case of CCUS, because in terms of the technology, in terms of the cost, in terms of the usage of carbon dioxide, what you do with the carbon dioxide." ONGC will use some of the captured CO₂ to extract more oil from mature fields. The gas can also be utilised to make green urea, beverages, building materials and polymers.

But CCUS is no walk in the park. It's expensive, risky, and carries a burden of costly failures in its 50-year history.

For starters, power plants need twice the space to install carbon capture facilities. Imagine attaching a small chemical unit with amine pouring at the exhaust, reactors, pipelines, tank farms, compressor stations and storage, explained Deepesh Nanda, CEO, GE Gas Power, South Asia.

These don't come cheap. It would account for 60-70 per cent of the total capital expenditure incurred in a combined cycle power plant. Moreover, the process of capture consumes energy. However, if we put together the space, cost and energy consumption into a financial model



the levelised cost of electricity — or the average cost of building and operating a plant per unit of total electricity generated over an assumed lifetime — increases only by 30 per cent, Nanda added. These calculations remain on paper, however, since no such projects operate in India yet.

But there are examples elsewhere. Bruce Robertson, an analyst at the Institute for Energy Economics and Financial Analysis (IEEFA) who co-authored a report on CCS last year, cited the example of a \$3.1-billion Gorgon project off the North West Shelf of Australia, which has under-

performed by about 50 per cent. "It arguably has access to the best petroleum engineers on the planet, and it can't seem to operate the CCUS plant successfully," he added. Gorgon is operated by Chevron, with Exxon and Shell as partners.

Of the over 34 billion tonnes of CO₂e (carbon dioxide equivalent) emitted from burning fossil fuels globally, only 39 MT is captured using CCUS. Most of the captured carbon is injected back into the ground to extract more oil, with only 27 per cent stored, according to IEEFA.

But Norway's Equinor, with which state-run ONGC seeks to collaborate, has enjoyed success sequestering CO₂ at Sleipner and Snøhvit. This is mostly due to Norway's unique regulatory environment for oil and gas companies, said Milad Mousavian, co-author of the September 2022 CCUS report. The same Equinor could not replicate its success at the \$2.7-billion In Salah CCS project in Algeria, where operations were suspended in 2011, after storing 3.8 MT of CO₂ in the Krechba Formation during its seven-year lifetime, Robertson said.

CCUS, then, needs a strong regulatory framework, and local solutions, said Aslak Hellestø, business advisor, Northern Lights, the transport and storage component of Longship, Oslo's \$2.7-billion large-scale CCUS project, offering industrial polluters in Europe an option to store CO₂ for a fee. The Norwegian government is funding nearly 70 per cent of the project.

CCUS works better in developed nations where emissions have peaked, said R R Rashmi, programme director, TERI, which is organising the World Sustainable Development Summit in Delhi this week.

But, Master said, CCUS has high potential in large-scale implementations to decarbonise "hard-to-abate" sectors in developing countries also, such as in steel, cement

and petrochemicals. The technology can also help in the production of blue hydrogen, said Swapna Mehra, CEO, Iora Ecological Solutions, a climate consultancy. Blue hydrogen, derived from fossil fuels after storing the discharged CO₂, may be a less expensive bridge on the road to cheap green hydrogen production.

Despite such polarised views, ONGC sees a future for the technology, and is taking the lead to adapt it for India, said Sushma Rawat, exploration director, ONGC, which has collaborated with both Shell and Equinor to study the technology.

Norway wants to be a catalyst for large-scale CCUS projects globally, Aslak said. The first phase of Northern Lights, expected by 2024, involves collecting 1.5 MT of CO₂ from industrial emitters, transporting, injecting and permanently storing carbon at 2,500 metres below the seabed in the North Sea; phase 2 will

near quadruple CO₂ capturing capacity, and project partners Equinor, Shell and Total are already in discussions with potential customers around Europe, representing 48 MT of CO₂ per year, more than is currently stored worldwide. Shell and Aker are providing the capture technology, Aslak said.

"I think around 30 per cent of our solution has to come from the carbon capture itself," Abraham said. "Otherwise it will be difficult for us to meet net zero."

So, if India seeks carbon neutrality by 2070 it needs to find a way to make it work, locally.

ONGC is in talks for a CCUS project with IOC's Koyali refinery to capture the gas and transport it for use in incremental oil recovery, Rawat said. Right now, CCUS is cost-

intensive, she added, but at \$25 a tonne of CO₂ it can become viable. The closest India came to a carbon tax is the ₹400 a tonne it levies on coal. That is 5 per cent of what it costs to sequester CO₂. So, industries are financially better off polluting than paying ONGC to capture carbon.

The key drivers that enabled Norway's success in CCUS were the CO₂ tax and climate quota obligation, introduced by the Norwegian government in 1991 and 2005, respectively. The Indian government should come up with incentives for carbon capture, and a carbon pricing mechanism, Nanda said. There is also a lack of clear regulations in place for CCUS technology, making it difficult for companies to invest, Master said.

New Delhi may have to take a leaf out of Oslo's playbook if it wants to put India in the global CCUS map.

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Brent crude oil drops to \$80 on bearish outlook



Crude oil slumped as long-term headwinds overwhelmed the positive sentiment from a strong US labour market. Brent crude plunged below \$80 a barrel, reaching the lowest since mid-January. While oil futures were boosted by a positive US jobs report earlier in the session, the fundamental picture for the commodity remains bearish. BLOOMBERG

Petrol, diesel can be brought under GST ambit if council takes a call: FM

STATESMAN NEWS SERVICE

JAIPUR, 21 FEBRUARY

Union finance minister Nirmala Sitharaman on Monday explained that the Goods and Services Tax (GST) Council will have to decide the inclusion of petroleum products in its ambit if the state governments' finance ministers put up an agenda for discussion.

"The central government has made its intent clear by saying that it will put it up into the GST, if the states agree, and let them (Congress-ruled states demanding it) come up with petroleum products' rate for open debate," FM told at a press conference on the occasion of post-budget interaction here.

When asked that the Congress-ruled states demanded petrol, diesel and other products under the GST, she said any political party, (be it the Congress), may want it, we will bring it to the GST Council for 'khuli charcha' (open debate) with a price tag on each item.

The Modi government has reduced the excise duty on petrol and diesel twice, but a few states did not follow it, she said, adding, the Congress' Himachal Pradesh government raised the fuel prices after winning the election now. Why was it so?

Similarly the LPG cylinder price for Ujjwala beneficiaries



was subsidised by Rs 200 per cylinder, she assured on the rising cooking gas prices.

When her attention was drawn on the alleged ED/IT raids in Chhattisgarh and the central government's vindictive politics on the eve of the Congress plenary session beginning from February 24, Sitharaman said, "The investigating agencies like ED/IT/CBI do huge homework and collect evidences before making a prima facie case and when the agency does not get a complete reply or no response, they go for raids. It is not overnight, like any sting operation."

"It is a strange thing that a party (Congress) whose past president(s) are on bail for corruption and money mismanagement. That is true, they speak of vindictive politics. Each of the agencies is going there and coming out with tangible evidence," she remarked.

Time to bring petroleum products under GST ambit

Union finance minister Nirmala Sitharaman was speaking on behalf of most Indians on the biggest reform they would like to see implemented immediately when she spoke of the Central government, under Prime Minister Narendra Modi's leadership, being willing to bring petroleum products, including petrol and diesel, under the ambit and framework of the Goods and Services Tax (GST), if a consensus could be built around it amongst the participating states and the GST Council passed the move.

India taxes petrol at both the Central and state levels, and together, they make petrol and diesel amongst the highest taxed and most expensive in the world when compared with equivalent societies and economies. The GST must expand its horizon and include petroleum products, but the issue has several contentious sides.

First, it is an issue of our federal structure. India is a quasi-federation, not a perfect federation like the USA, and it gives Centre huge power over the states, varying from legislative through the instrument of concurrent lists, or finances, in which states varying but invariably depend on the Centre for their financial viability.

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The Modi government has been trying to strengthen our economy, and strongly unify and integrate our society through the creation of uniformity in several areas — one economy, one tax; increasingly one market; one ration card, among others. However, the states, more specifically the non-BJP ruled states, have been up in arms politically, calling it an attempt to weaken the federal structure of the country and reducing the power of states.

India does not have a rating or grading of states based on their financial situation, save for their own independent budgets but it would be easy to conclude all of them depend heavily on the taxation on petrol, being a range of products whose market comes with great demand elasticity and near zero purchase resistance to pricing.

In such a scenario, most states, including the BJP ruled ones, would be resistant to losing power to impose, change or hike taxes on petrol — which would be the result of bringing it under the GST ambit. States would seek compensation for the loss of revenue, but that too would be for a short term, and in the long-term, all states would lose a sizable chunk of revenue.

The other issue would be the rate of taxation. Currently there are four sets of GST rates and all products and services are divided into these four blocks, with the states and Centre sharing the total tax. Even if petrol, diesel and others are brought into the highest slab of 28 per cent, both Centre and state would lose a huge portion of revenue; but citizens would gain, and the economy would benefit from lower levels of inflation.

So the state representatives in the GST Council must resist any move to introduce a higher slab of taxation, even as they move the petroleum products into its ambit. The Centre has given a great vision and it is now its moral responsibility to build a consensus amongst all, and address the grievances and concerns of all states and UTs, before bringing in the reform.

But citizens deserve petrol pricing in India to be on parity with other developed and growing nations.

एशिया के सबसे बड़े बायो सीएनजी प्लांट की कार्बन डाइआक्साइड का उद्योगों में होगा उपयोग

उदय प्रताप सिंह, इंदौर

मध्य प्रदेश के इंदौर में स्थित एशिया के सबसे बड़े गीले कचरे से गैस बनाने वाले बायो सीएनजी प्लांट में अब मीथेन गैस निर्माण के दौरान अलग की जाने वाली कार्बन डाइआक्साइड का कोल्ड ड्रिक्स, रेफ्रिजरेशन व ड्राई आइस के निर्माण में इस्तेमाल किया जाएगा। अभी प्लांट में मीथेन गैस उत्पादन के दौरान प्रतिदिन बनने वाली 15 टन कार्बन डाइआक्साइड वातावरण में छोड़ी जा रही है।

कंपनी प्लांट में सीओटू (कार्बन डाइआक्साइड का रासायनिक सूत्र नाम) की रिकवरी यूनिट लगाने की तैयारी कर रही है। इस पर करीब तीन करोड़ रुपये खर्च होंगे। यहां उद्योगों के उपयोग के लायक भी कार्बन डाइआक्साइड तैयार होगी। कंपनी कार्बन डाइआक्साइड 20 प्रतिशत फूड और 80 प्रतिशत उद्योगों के उपयोग के लिए तैयार करेगी। हालांकि, इस पूरी प्रक्रिया में एक साल का समय लग सकता है।

प्रतिवर्ष करीब दो करोड़ कार्बन क्रेडिट

सीओटू रिकवरी यूनिट लगाने की तैयारी



इंदौर का सीएनजी प्लांट।

फाइल फोटो

से कमाएंगे: वातावरण में कार्बन डाइआक्साइड छोड़ने के कारण वायुमंडल को नुकसान होता है। रिकवरी यूनिट और गैस के उपयोग से कंपनी हर वर्ष कार्बन उत्सर्जन में कमी कर सकेगी। अनुमान है कि कंपनी प्रतिवर्ष करीब दो करोड़ कार्बन क्रेडिट हासिल करने में कामयाब होगी।

रिकवरी बैलून में रहती है गैस : बायो सीएनजी प्लांट में जो गैस निकलती है, उसे अभी रिकवरी बैलून में रखा जाता है। इसमें से मीथेन गैस को निकालकर

बायो सीएनजी प्लांट के शुभारंभ को हुआ एक साल

550 टन गीले कचरे से बन रही 12 हजार किलो बायो सीएनजी।

17 हजार किलो बायो सीएनजी बनाने की योजना है इस प्लांट से।

110 सिटी बसों को दिया जा रहा है ईंधन

200 बसों को जल्द देने की योजना।

शेष कार्बन डाइआक्साइड को वायुमंडल में छोड़ दिया जाता है। इंदौर ग्रीन एनर्जी के प्लांट मैनेजर नितेश त्रिपाठी कहते हैं कि कार्बन डाइआक्साइड के उपयोग के लिए उद्योग जगत से बात की जा रही है। जल्द ही हम सीओटू रिकवरी सेंटर तैयार करेंगे। इसके माध्यम से कार्बन डाइआक्साइड की शुद्धता का स्तर बढ़ाएंगे। प्लांट में ऐसा सिस्टम लगाएंगे ताकि कोल्ड ड्रिक्स, रेफ्रिजरेशन के निर्माण में इसका उपयोग हो सके।