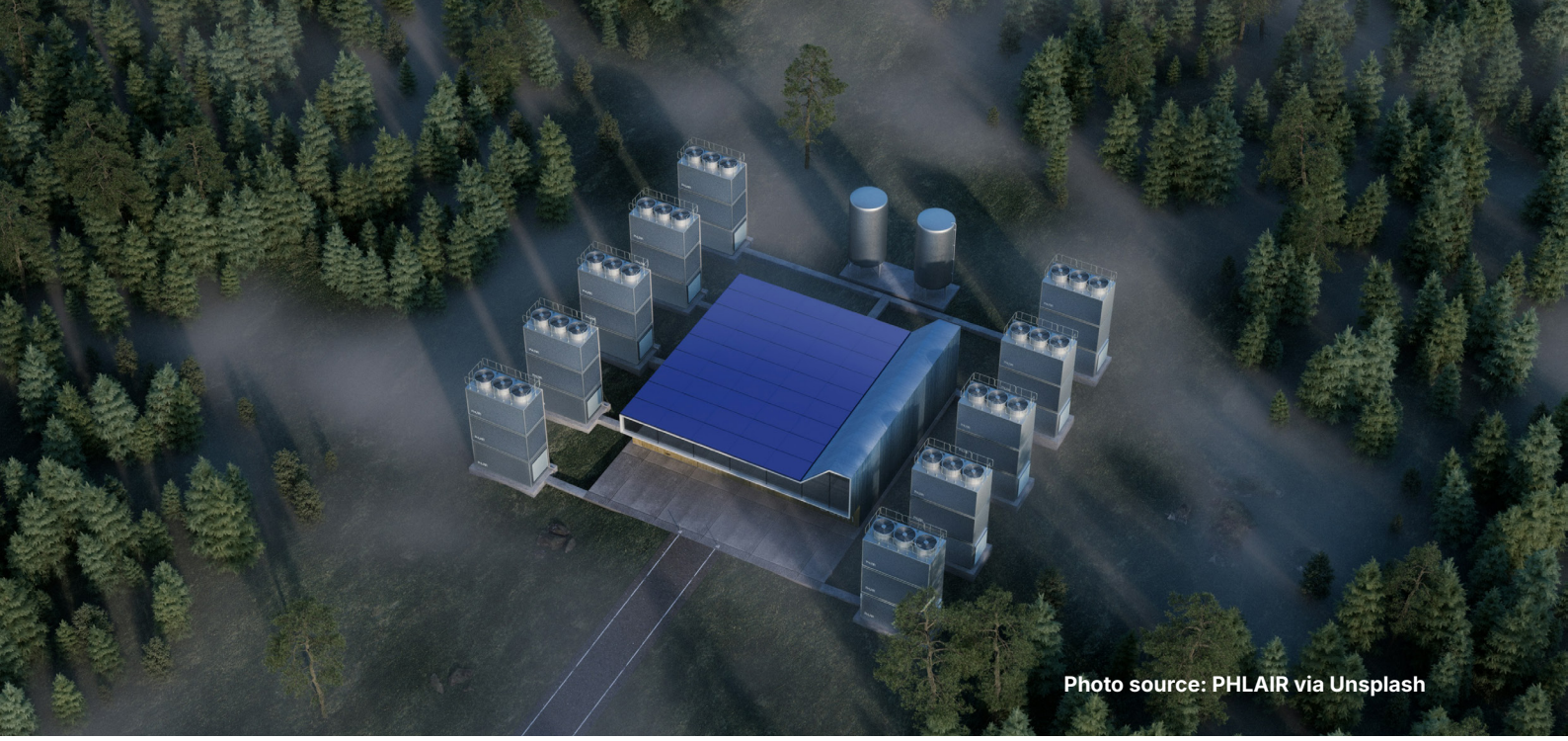

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A Factsheet Series

Carbon Capture and Storage (CCS) and Bioenergy CCS (BECCS): Implications on Food Systems and Agriculture in Asia

The worsening climate crisis has spurred interests on technological solutions that promise to address the concentration of greenhouse gases in the atmosphere either by capturing and separating gases that are already emitted, or before they are emitted in industrial processes. These technologies are not designed to stop fossil fuel production and dependent industrial processes that emit massive greenhouse gases into the atmosphere which is at the root of the climate crisis, but only present a fix by capturing gases that cause global warming to allow fossil fuel production and consumption to proceed with business as usual. They are technological examples of false solutions to the climate crisis.

Carbon capture and storage (CCS) and carbon capture, utilization and storage (CSUS) are technologies that intend to separate carbon dioxide (CO_2) on-site from emissions in industrial processes, particularly in fossil fuel extraction and processing like in coal mines and in gas and oil fields, as well as in heavy industries such as cement manufacturing and in power plants. Bioenergy with carbon capture and storage (BECCS) has an

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associated CCS component and in particular aims to achieve net negative emissions by storing CO_2 supposedly permanently after generating energy from burning of biomass such as agricultural wastes. All three technologies are developed to store CO_2 permanently, at least theoretically, in geological formations such as abandoned coal mines, old or depleted gas reservoirs or oil wells deep underground or in the seabed in offshore locations. In order to have any significant impact on the climate, these technologies need to be deployed on a large scale. The processes in capturing, separating, transporting and storing CO_2 require massive energy and involve technologies and facilities that are expensive, ironically affordable only to rich companies and countries that are often the biggest CO_2 emitters. Because of this, the deployment of CCS technologies have been limited to a few rich fossil fuel-producing-countries. The political attention and growth of CCS, CCUS and BECCS in recent years can be largely attributed to the certification and approval of carbon removal credits that these technologies generate for trading in voluntary carbon markets. Carbon credits verified and earned from these technologies are traded in the carbon market to incentivize carbon dioxide removal technologies while mobilizing investments from public and private sources.

It is very important to note that CCS and CCUS are technically not considered as carbon dioxide removal (CDR) technologies, which is a category of geoengineering, the planetary-scale manipulation of earth systems to counteract some of the effects of climate change.[1] While CCS and CCUS capture CO_2 at source supposedly to prevent gases from entering the atmosphere, CDR removes and separates existing CO_2 from the atmosphere and stores them permanently in geological formations or through biological or chemical processes. While CCS prevents new CO_2 from entering the atmosphere (emission reduction), CDR removes existing CO_2 from the atmosphere. CCS cannot remove CO_2 that are already in the atmosphere.[2] CCS, however, is considered part of CDR when applied to emissions from biomass or agricultural wastes such as BECCS and also in Direct Air Capture with CCS (DACCS) which are designed to deliver net negative emissions.

This Fact Sheet focuses on this set of new technologies that are intended to capture CO_2 from industrial and agricultural processes for the purported claim of addressing climate change. The Fact Sheet will present the status and trends in deployment of CCS, CCUS and BECCS in Asia.

What is CCS, CCUS and BECCS?

Carbon capture and storage (CCS) is a technology that involves capturing carbon dioxide emissions especially in fossil fuel extraction and refinery and in heavy industrial processes such as cement and steel factories and power generation plants. Captured CO_2 is often converted from gas to liquid form which is then injected into depleted oil or gas wells which are geological formations often located in the deep underground,

1 https://www.ciel.org/why-geoengineering-is-a-false-solution-to-the-climate-crisis/
2 https://www.imperial.ac.uk/grantham/publications/background-briefings/carbon-dioxide-removal-cdr/#:~:text=A%20subset%20of%20CDR%20methods,in%20addition%20to%20carbon%20dioxide.

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subsea bed or deep-water reservoir. In most cases, these geological formations are abandoned coal mines, old gas wells or depleted oil reservoirs which explains why CCS is also employed as a technological strategy for enhanced oil recovery (EOR) which involves injecting compressed CO_2 as an energy-efficient means to extract more gas or oil from old or depleted wells.

In theory, these geological formations could permanently store CO_2. In reality though, there are serious concerns on carbon leakage from geological storage sites that are used for CCS since CO_2 in high concentration is toxic and highly hazardous to humans and the environment. CO_2 leakage could pose serious threats in and around locations of CCS facilities and in areas where captured CO_2 are transported from source to storage formations. Legal issues on accountability and liability are highly contested especially for CCS projects that cross national or state boundaries. The first large-scale CCS project in the world, Norway's *Sleipner CCS* project in the North Sea which started in 1996 made use of empty gas wells in porous rock formation located offshore and capped with shale which raised concerns on carbon leakage throughout its existence.[3] [4] Algeria's *In Salah CCS* facility in the central Sahara region operated only for 7 years and has been suspended since 2011 due to serious concerns on seal integrity and high pressures in the sandstone storage that could compromise the safety of the huge gas refinery where it is located.[5] Both projects are operated and largely owned by state-owned oil companies.

Carbon Capture, Utilisation and Storage (CCUS)

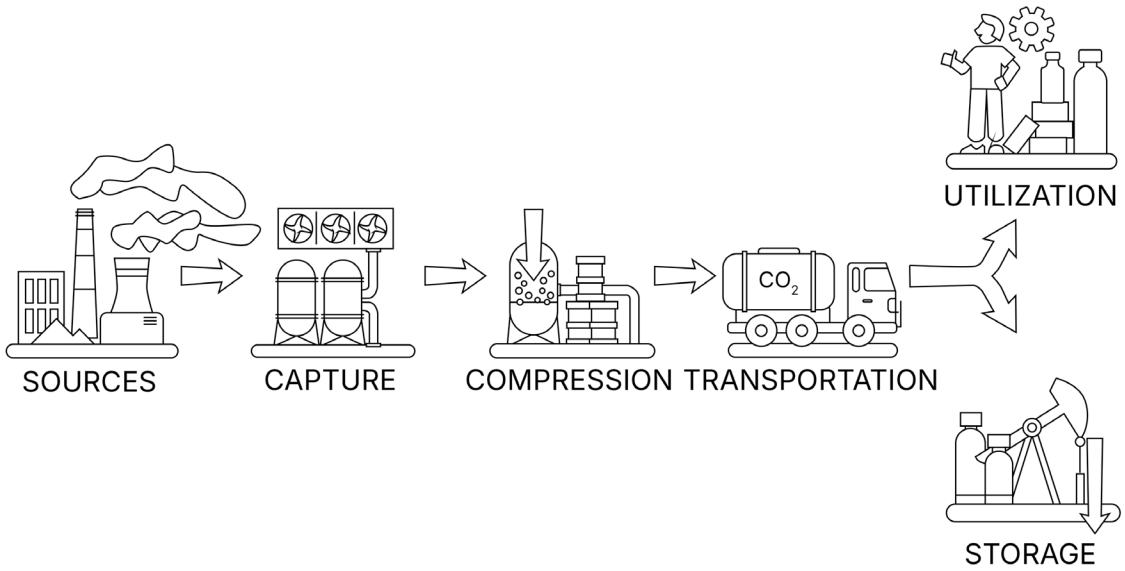

Illustration reference: Vectormine via Shutterstock

3 https://www.geoengineeringmonitor.org/geo-map-ccs-jan-2023

4 https://www.realzeroeurope.org/resources/faq-road-to-nowhere#:~:text=Leakage%2C%20seepage%2C%20and%20unanticipated%20migration,of%20reliable%20underground%20carbon%20storage.

5 https://www.carboncommentary.com/blog/2021/7/30/the-struggles-to-make-ccs-work#:~:text=The%20In%20Salah%20experience,the%20possibility%20of%20a%20leak.

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Carbon Capture, Utilisation and Storage (CCUS) involves CCS technology coupled with utilisation components, such as by converting the captured CO_2 into substances that can be used to develop new materials for construction and industrial manufacturing. An example is converting dissolved CO_2 into calcium carbonate which is then used for manufacturing of new construction materials. The use of CO_2 to produce other substances and materials as a form of storage raises concerns on the high energy demand in conversion and manufacturing processes, re-releasing greenhouse gases into the atmosphere, leakage into the environment, and unknown effects on human health from exposure to these new materials.[6]

Bioenergy with carbon capture and storage (BECCS) adopts CCS technology combined with bio-energy. It involves the burning of biomass from trees, plants, agricultural wastes and other organic matters to generate energy and storing the emission in underground geological formation which are mainly depleted oil reservoirs, gas wells and coal mines. Pilot BECCS projects, mainly in the US (Archer Daniel Midlands' corn ethanol plant in Decatur, Illinois[7]) and the UK (at the Drax Power Station in northern England[8]), are all attached to industrial plantations. The technology claims to result in negative emissions and will bring such co-benefits as reduction of agricultural wastes, production of bio-fertilizers and additional income for local farming communities. The claim is strongly challenged as industrial farms involve massive use of synthetic fertilizers and chemical pesticides, operations involve use of large machineries and the transportation of inputs and produce across distances, all of which continue to depend on fossil fuels and not factored in quantification of overall energy use and greenhouse gas emission of BECCS.[9] The technology also raises serious concerns on adverse impacts on biodiversity, water use, competition for land and food security since BECCS is primarily anchored on burning massive amounts of biomass as feedstock for generating bio-energy.[10]

State of Play of CCS, CCUS and BECCS in Asia

CCS and CCUS

Many governments in Asia have embraced the promotion and adoption of CCS and CCUS as part of their national climate mitigation strategy. Some have conducted assessments, feasibility studies and computer modeling of carbon capture and storage potentials in their countries, but only a few have so far taken concrete steps to implement or even

6 https://www.mdpi.com/2071-1050/17/17/7871, https://doi.org/10.3390/su17177871
7 https://www.carbonbrief.org/analysis-negative-emissions-tested-worlds-first-major-beccs-facility/
8 https://www.drax.com/bioenergy-with-carbon-capture-and-storage-beccs/
9 https://www.biofuelwatch.org.uk/wp-content/uploads/BECCS-factsheet-with-footnotes-April-23.pdf#https://www.biofuelwatch.org.uk/2022/beccs-factsheet/
10 https://www.fern.org/fileadmin/uploads/fern/Documents/2022/Six_problems_with_BECCS_-_2022.pdf

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launch pilot cases. Key challenges identified in implementing CCS and CCUS projects in these countries are the high capital requirements, energy intensity, technological requirements, and gaps in legal and regulatory framework, as well as concerns on underground carbon leakage that could damage the environment and contaminate water sources which could be exponentially problematic in transboundary CCS and CCUS projects. Industry lobby groups like the **Asia Natural Gas and Energy Association (ANGEA)** have developed a framework for agreements on cross-border CCS in Asia in 2024 involving the transport of CO_2 captured in one country for storage in another jurisdiction which the group has been promoting to governments in the region.[11]

Countries engaged in extracting hydrocarbons are deeply invested in CCS and CCUS, both for permanent storage of CO_2 and for enhanced oil recovery in depleted oil and gas wells. Among the 8 Asian countries studied for this Fact Sheet, Malaysia and Indonesia are frontrunners in their aggressive and strategic in adopting CCS and CCUS as key components of their respective national decarbonisation strategy. **Indonesia** boasts of implementing the first CCS pilot project in Southeast Asia that started in 2014, in the Gundih gas fields in Central Java, which is expected to be completed in 2027.[12] The government is positioning the country as the leading regional hub for CCS and has adopted an aggressive stance on CCS as a climate mitigation strategy. A few months after his election, President Prabowo signed Presidential Regulation 14 in December 2024 as the overarching regulatory framework that covers earlier regulations issued by government ministries on permitting and licensing of offshore CCS projects adopted since 2023.[13] The government expects to have at least 15 CCS and CCUS projects to be operational by 2030.[14]

After years of deliberation in its national parliament and policy making circles, **Malaysia** adopted a CCUS Act in October 2025 which serves as the legal basis for a regulation on CCUS permitting and licensing. The CCUS Act covers the capture, use, transport and storage of CO_2 from domestic sources. It also allows the transport and permanent storage of imported CO_2 for up to 30% of the storage capacity of a CCS facility, but prohibits their use in Malaysia. The much vaunted Kasawari CCS offshore facility located in Sarawak was expected to start operating in late 2025. The CCS facility was constructed as a component of an offshore natural gas field operated by **Petronas**, the national oil and gas company of Malaysia.[15] Soon after the CCUS Act was signed, the Malaysian government signed a cooperation memorandum with Japan on cross-border transport of CO_2 from Japan for permanent storage in Malaysia. The transport of liquified CO_2 from industrial facilities in Japan for storage in depleted oil and gas fields

11 https://angeassociation.com/wp-content/uploads/2024/12/ANGEA-Cross-border-CCS-Study_final1.pdf
12 https://www.sciencedirect.com/science/article/pii/S2666759224000507
13 https://www.ashurst.com/en/insights/indonesia-ccs-new-regulation-on-carbon-storage/
14 https://carbonherald.com/indonesia-to-transform-energy-sector-with-15-ccs-and-ccus-projects-by-2030/
15 https://www.spglobal.com/energy/en/news-research/latest-news/energy-transition/101725-japan-signs-cooperation-memorandum-with-malaysia-opens-door-to-first-cross-border-ccs

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in Malaysia is expected to start as early as 2028.[16] [17] Anticipating a business boom in the coming years, **Petronas** formed a joint venture subsidiary with the Japanese shipping giant **Mitsui** to build ships specializing in cross-border transport of liquified CO_2.[18]

India's Department of Science and Technology adopted a strategy in 2023 that aims to nurture CCUS through research and development and capacity building[19], while the Ministry of Petroleum and Natural Gas drafted a 2030 Roadmap for CCUS[20]. The government launched its first full-scale pilot CCS project at the beginning of 2026 in Gandhar oilfield in Gujarat. Operated by the state-owned Oil and Natural Gas Corporation (ONGC), the project is developed to inject CO_2 in depleted oil wells in Gandhar which have been operating since 1983. CO_2 from the Koyali oil refinery of the Indian Oil Corporation located in another site in Gujarat were earlier injected in the formation.[21] In this new pilot project, ONGC will capture CO_2 from its Hazira power plant and nearby industrial facilities in the Dahej region for permanent storage in its Gandhar oil field CCS facility while at the same time extracting more hydrocarbons from those old wells.[22] These ongoing CCS projects make the state of Gujarat in India's western coast at the forefront of the government's push for CCS as its key climate mitigation strategy in hard-to-abate industrial sectors. Neighboring Pakistan also currently does not have a national policy framework for CCS and CCUS, but adopted a Policy Guidelines for Trading in the Carbon Market in 2024.[23]

CCUS

In early February 2026, Indian government announced that it is allocating the equivalent of about US$2.4 billion over the next five years to support the development of CCUS to help abate greenhouse gas emission in carbon-intensive industries like steel, cement and power plants.[24] Even before this new financial commitment from the national government, the state-owned National Thermal Power Corporation (NTPC) is already operating two large-scale CCUS projects. Its **Sipat project** in the state of Chhatisgarh which captures CO_2 from flue gas used in the power station to produce urea fertilizers.[25] NTPC's CCUS project in Vindhyachal Super Thermal Power Station located in Madhya

16 https://asia.nikkei.com/spotlight/environment/japan-to-ship-co2-emissions-to-malaysia-for-storage-underground;
17 https://www.reuters.com/sustainability/climate-energy/japan-petronas-discuss-storing-japanese-co2-malaysian-sites-2023-09-27/
18 https://carbon-pulse.com/408859/
19 https://dst.gov.in/carbon-capture-utilisation-and-storage-ccus
20 https://www.dghindia.gov.in/assets/downloads/62bbedfa49947DraftUFCCRoadmap2030.pdf
21 https://auto.economictimes.indiatimes.com/news/oil-and-lubes/ongc-to-store-co2-in-depleted-wells-at-gujarats-gandhar-field-in-first-ccs-pilot/126331468
22 https://www.gasworld.com/story/india-energy-firm-to-launch-co2-storage-pilot-at-gujarat-oil-field/2170605.article/#:~:text=By%20Anthony%20Wright%20on%20Jan,deployment%20across%20ONGC's%20asset%20base.
23 https://mocc.gov.pk/SiteImage/Policy/Pakistan Policy Guidelines for Trading in Carbon Market.pdf
24 https://carbon-pulse.com/479386/
25 https://www.tataconsultingengineers.com/blogs/carbon-capture-utilization-and-storage-ccus-in-india-an-overview/

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Pradesh started operating in 2023, using a proprietary carbon capture technology developed by the UK-based carbon capture company **CarbonClean** that produces methanol for industrial uses CO_2 from flue gas.[26] [27]

Vietnam is also focusing more on CCUS. The government has not adopted a clear policy on CCS or CCUS, but has incorporated CCS in coal-fired power plants as part of its commitment to phase out inefficient coal plants by 2050 under its 8th Power Development Plan.[28] The country's National Energy Master Plan for 2021-2030 encourages industrial production facilities and power plants to adopt CCUS technology.[29] In 2024, Vietnam Petroleum commissioned the US engineering and construction consulting firm Black and Veatch to assess the feasibility of CCUS technology in coal-fired power plants in three provinces across the country.[30] Vietnam has also implemented an emission trading scheme in August 2025. **TBM**, a Japanese startup specializing in manufacturing of new materials as an alternative to paper and plastic that has since expanded to carbon capture technology, announced in December 2025 that it has invested in Vietnam to produce calcium carbonate from CO_2 captured from a coal-fired power plant in Ha Tinh in the north central coast.[31] The calcium carbonate will then be blended with resin for manufacturing of new construction materials in Vietnam. Why TBM chose to establish its CCUS facility and scheme in a coal-fired power plant in Vietnam instead of testing existing coal-fired power stations in Japan is obviously driven by costs and regulatory reasons.

BECCS

Governments around Asia have conducted or contracted feasibility studies, economic assessment and computer modeling on the potentials of BECCS as a carbon dioxide removal approach particularly in the agriculture sector. Only Indonesia so far has taken concrete strides in implementing BECCS on an industrial scale, with technological and financial help from private sector partners in Japan. Indonesia's state-owned energy company **Pertamina** signed a memorandum of understanding with Japanese conglomerate **Marubeni** and **Japan Petroleum** in February 2022 to develop a BECCS project in Marubeni's **Tanjugeni Lestari pulp** mill in South Sumatra with the aim of producing biomass fuel and earning carbon credits from the capture and storage of CO_2.[32] The partnership announced in August 2024 that they are conducting a joint feasibility study on capturing CO_2 emission from biomass-fueled boilers in Marubeni's pulp mill for injection and storage in synclinal or downward-folding aquifers in the

26 https://www.gasworld.com/story/india-power-project-taps-captured-carbon-to-make-methanol/2166525.article/
27 https://www.powermag.com/carbon-capture-begins-at-indias-largest-coal-power-plant/
28 https://climateactiontracker.org/countries/vietnam/policies-action/
29 https://www.vietnam-briefing.com/news/vietnams-national-energy-master-plan-key-takeaways.html/
30 https://www.bv.com/news/black-and-veatch-to-identify-carbon-capture-opportunities-in-vietnam
31 https://carbonherald.com/japans-tbm-takes-carbon-capture-to-vietnams-coal-heartland/
32 https://www.marubeni.com/en/news/2022/release/00016.html#:~:text=Marubeni is enhancing its climate,both economic growth and decarbonization

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onshore Limau oil and gas fields located in South Sumatra owned by Pertamina.[33] The BECCS project is expected to be operational in 2030.

In **India**, there is ongoing research that is looking into the feasibility of incorporating BECCS using agricultural wastes as feedstock in Gujarat with CO_2 storage in the Gandhar oilfield CCS facility which would require a massive amount of biomass from farms.

Summary of CCS, CCUS and BECCS projects in selected countries in Asia

Country	Relevant Policies	CCS/CCUS projects	BECCS projects
India	Department of Science and Technology adopted a strategy in 2023 that aims to nurture CCUS through research and development and capacity building. Ministry of Petroleum and Natural Gas has a draft 2030 Roadmap for CCUS.	Several CCS and CCUS projects at various development operated by state-owned companies with the private sector: > Gandhar oilfield pilot CCS project in Gujarat owned by the state's Oil and Natural Gas Corporation (ONGC) launched in January 2026; mainly for enhance oil recovery (EOR) > National Thermal Power Corporation (NTPC) CCUS projects: - Sipat project in Chhatisgarh: CO_2 capture from flue gas to produce urea fertilizer - Vindhyachal Super Thermal Power Station in Madhya Pradesh, with UK-based carbon capture company CarbonClean: CO_2 from flue gas to produce methanol for industrial uses since 2023	Ongoing research in incorporating BECCS from agricultural wastes in Gujarat in the Gandhar oilfield CCS

33 https://www.argusmedia.com/es/news-and-insights/latest-market-news/2602284-marubeni-japex-pertamina-to-study-bioenergy-with-ccs

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Indonesia	President Decree No. 14 of 2024, December 2024: provides the framework for CCS regulation includes permitting and licensing of offshore CCS Allows storage of imported CO_2 up to 30% of total capacity	The first CCS pilot in Southeast Asia in 2014: Gundih gas fields in Central Java, expected to be completed in 2027 15 CCS and CCUS projects currently at different stages of development expected to be operational between 2026 and 2030, specifically in Sunda Asri and Bintuni basins	South Sumatra Pulp Mill BECCS project: Pertamina with Japan's Marubeni, MoU signed in 2022; expected to be operational in 2030
Malaysia	Carbon Capture, Utilisation and Storage (CCUS) Act of 2025 established the Malaysian CCUS Agency CCUS Offshore Permit and Licensing Regulation of 2025	Kasawari CCS, off Sarawak: owned by Petronas, expected to start in late 2025 Duyong CCS, off Terangganu assessment permit granted, November 2024	
Pakistan	No stand-alone CCS framework, only adopted Policy Guidelines on Trading in the Carbon Market in 2024		

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Vietnam	National Energy Master Plan (2021-2030) encourages the use of CCUS in industrial facilities and power plants 8th Power Development Plan incorporates CCS in coal-fired power plants	Vietnam Petroleum contracted Black and Veatch to assess the feasibility of CCUS technology in 3 thermal power plants: Vung Ang 1 in Ha Thin province, Song Hau 1in Hau Giang province, and in Thai Binh 2 in Thai Binh province Japanese startup TBM announced in December 2025 that it is establishing a CCUS facility in Vung Ang 1 Thermal Power Plant in Ha Thin Province that will convert CO_2 to calcium carbonate to be mixed with resin for production of construction materials

Implications of CCS, CCUS and BECCS on Food Systems and Agriculture

While there are only a handful industrial-scale projects on CCS, CCUS and BECCS currently exist in Asia, governments generally embrace these technologies because of their climate mitigation promises while allowing highly-polluting industries that are heavily dependent on fossil fuels to continue doing business. Already, national policies and regulations on these specific technologies are adopted or are being deliberated, pointing to aggressive push by proponents and the willingness of governments to enable deployment in the coming years. It is high time for civil society and communities to raise critical awareness and take action on these technologies and address their potential implications on food systems, agriculture and the environment. There is urgency in working with communities that are already being affected by the handful of big projects that are underway in India, Indonesia and Malaysia as they are in the frontline and key in shaping the public narrative around these technologies.

Impacts on ecosystems and biodiversity. CCS, CCUS and BECCS projects have direct impacts on the environment and biodiversity, whether they are in terrestrial locations such as in Gujarat in India, South Sumatra in Indonesia and in Ha Tinh in Vietnam, or in

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offshore sites as in Sarawak, Malaysia. These projects involve large operations in vast swathes of land or marine areas that often encroach fragile forest or marine ecosystems. Researchers have concluded that gas leaks from CCS facilities would be highly damaging for marine organisms, could aggravate ocean acidification and alter sea water chemistry which could reduce biodiversity and disrupt marine life cycles especially in deep-sea environments.[34] Proponents may argue that they have complied with environmental impact assessments (EIA) required by government agencies and have been given official approval to operate. The integrity of the EIA system in developing countries, however, has been long criticized as procedurally flawed, mechanistic, and are not conducted independently nor with community participation.[35] Also, EIA only covers proposals and plans for a project but does not extend to assessing the impacts of construction and operation of CCS, CCUS and BECCS facilities, particularly in offshore oil and gas reservoirs, and even those in highly-secured complexes such as power stations.

There is barely any independent published study on the impacts of large-scale deployment of these technologies in developing countries, prompting some researchers to propose the development of an EIA protocol designed for monitoring the impacts of offshore CCS projects.[36] The same rigid protocol should be developed for terrestrial CCS and CCUS projects as these could have direct impacts on forests and agricultural ecosystems around their locations. Even more so for BECCS which is directly linked to agricultural processes as this technology is pitched around the use of agricultural biomass as feedstock for energy generation. The BECCS facility in Sumatra, for example, depends on biomass and residues from the operation of an existing pulp mill that would inevitably have to expand to provide required feedstock to generate energy and deliver the projected CO_2 removal credits to achieve the promised net negative emission.

Encroachment in forests and farm lands. Construction and expansion of massive CCS, CCUS and BECCS facilities require land. The locations of current and planned projects to demonstrate or deploy these technologies across Asia are mostly in either forests and agricultural areas where indigenous peoples and farmers live and make a living. The story of people and communities who are impacted by these projects, both in terrestrial and off-shore locations, are not heard at all. There is an urgent need to connect to affected communities and those who are potentially impacted to raise awareness and monitor on-the-ground developments with and from the lens of local peoples.

Competition for land and water. Production of feedstocks for the bioenergy component of BECCS, mainly biomass from agricultural wastes, needs land and water for cultivation of such crops. The BECCS project in South Sumatra is attached to Marubeni's Lestari Pulp Mill which has been commercially cultivating and processing Eucalyptus pellita, a water-hungry exotic tree species, in over 100,000 hectares of land.[37] Already, even

34 https://www.sciencedirect.com/science/article/abs/pii/S0141113616302331
35 https://www.researchgate.net/publication/393163879_Assessing_the_Effectiveness_of_Environmental_Impact_Assessments_EIAs_in_Developing_Countries#
36 https://www.sciencedirect.com/science/article/abs/pii/S0195925515001201#:~:text=-Gas%20leaks%20from%20offshore%20CCS,provide%20suggestions%20for%20better%20practice.
37 https://asia.nikkei.com/spotlight/environment/climate-change/sumatra-forest-becomes-decarbonization-lab-for-japan-s-marubeni#

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without BECCS attached, pulp mills operating across Asia are encroaching on forest lands, adversely impacting biodiversity and forest ecosystems, and guzzling up water for their industrial tree species. Expansion of their operations to realize the promises of BECCS would only exacerbate the impacts of their business operations.

Contamination of land and water resources. Industrial plantations use agrochemicals to protect their uniform tree species from pests and diseases, and there is barely any independent monitoring of impacts on the environment and water resources that are shared by surrounding communities and farms. BECCS will build on this harmful operation, and could potentially aggravate the harm depending on the actual technology for burning biomass is adopted. The particular technology used in a CCUS facility attached to industrial production or coal-fired power generation could involve processes or by-products that could affect the environment or could cause contamination. Thorough analysis on new construction materials from substances derived from captured CO_2 in CCUS projects need to be independently conducted.

Promotes monocropping and uniformity. BECCS is largely designed to work in industrial plantations with a mono-cropping system that could provide predictable, measurable and verifiable supply of biomass to generate green energy and deliver the projected carbon removal that could bring the promised net emissions. This scheme runs counter to diversity principles and practices of indigenous communities and small-scale farmers who traditionally plant multiple crops in small plots which involve varying amounts of agricultural residues and biomass, and a mosaic of agricultural practices and systems where livestock and poultry raising is integrated in farming, forestry and gathering.

Who shall be liable for damages? Questions on liability and redress for accidents such as leakage in storage sites and in the process of transporting liquified CO_2 from the source to the location in geological formations continue to haunt discussions around CCS, CCUS and BECCS over the years. Despite these serious concerns, the deployment of these technologies has substantially progressed in recent years primarily due to the clarion call for global action to address the climate crisis that is steered towards acceptance of false solutions mainly pushed by corporate actors such as these technological fixes regardless of the serious harms that they pose to people and the planet.

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48, Persiaran Mutiara 1, Pusat Komersial Bandar Mutiara, 14120 Simpang Ampat, Penang, Malaysia
Tel: (604) 5022337 | Email: info@panap.net | Homepage: www.panap.net