



NDC INSIGHTS

n°2

What role for Carbon Capture and Storage? A measured look at its place in the transition

As countries prepare their next round of NDCs, one technology consistently sparks both hope and hesitation: Carbon Capture and Storage (CCS). In this second edition of *NDC Insights*, we focus on [what the latest DDP report reveals about CCS](#)—and where it fits in national pathways to net zero and what lessons we can derive for NDCs.

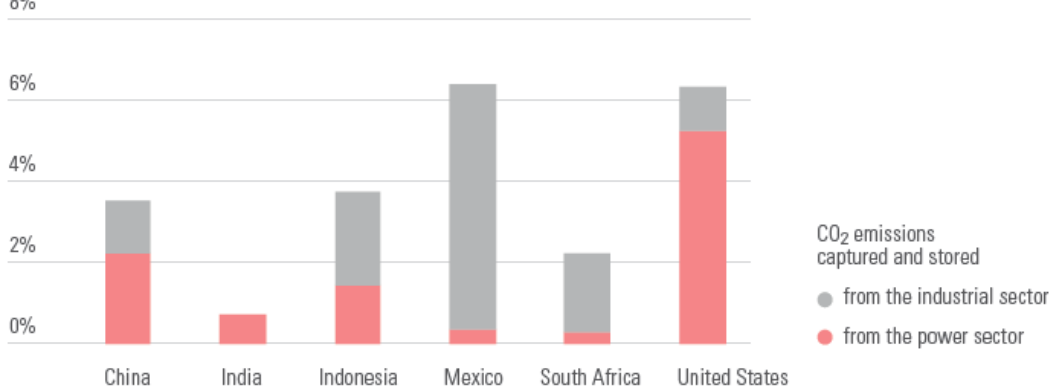
What national scenarios say about the role of CCS

Across the DDP network, the analysis of national carbon neutrality scenarios makes one thing clear: CCS is not expected to play a major role in reducing emissions by 2050, and in many cases, its role is marginal even in the long term.

In many countries net-zero scenarios were developed with little or no reliance on CCS at all. In others, the scenarios assign it a very limited and highly targeted role, focusing only on industrial sectors where few alternatives exist.

Even in countries with early CCS ambitions, such as [China](#) and the [U.S.](#), the scenarios show that **CCS would only mitigate around a quarter or less of emissions from energy and industry by 2050—and far less before 2040**. Even in these most ambitious cases, CCS therefore does not play a core role in the cumulative reduction of emissions, but can be at most a useful complement to other dominant mitigation strategies.

Figure 9. Share of CO₂ emissions captured and stored over total 2020-50 cumulated energy & industrial CO₂ emissions



These results are a consequence of detailed accounting in national pathways to net zero of constraints and challenges of CCS. Indeed CCS is often promoted as a key mitigation solution and does not lack potential altogether, but the barriers to deploying it at scale and on time are significant and deeply context-specific:

- Geological limits (such as storage capacity or long-term leakage risk)
- High capital and operational costs, especially in transport and infrastructure
- Energy penalties for capture processes, reducing net climate benefits
- Economic constraints, especially when applied to the power sector
- Long lead times, meaning CCS cannot contribute significantly before mid-century

Where CCS might still matter: Insights from industry-focused case studies

South Africa: Distance, cost, and a narrow window

In [South Africa](#), CCS is constrained by geography: the country's CO₂ storage potential is offshore, hundreds of kilometers away from major emission hubs in Gauteng and Mpumalanga. According to the scenario developed by in-country experts, CCS is likely to play a role only after 2040, and only for specific hard-to-abate industries.

- The cement industry is projected to require the capture of ~15 MtCO₂ by 2050
- Steel and ferroalloy production could contribute another ~9 MtCO₂
- A limited role for gas-fired power remains, primarily as backup for renewables

The pathway emphasizes that CCS in [South Africa](#) is not a broad solution—it's a targeted measure to complement, not replace, deeper transformations in the energy system.

Mexico: Targeting cement and looking to the future

The scenario for [Mexico](#) includes the gradual rollout of Carbon Capture, Utilization and Storage (CCUS) from 2030 to 2050, focused on the growing cement sector, which produces a high-purity CO₂ stream suitable for capture.

- By 2050, the scenario envisions 71 MtCO₂ captured, 90% of which come from industrial sources
- Depleted oil fields could offer viable geological storage
- Existing pipeline infrastructure and potential CO₂ utilization pathways (e.g. synthetic fuels, enhanced oil recovery) could support the value chain

CCUS is not seen as a solution for power generation in [Mexico](#), where renewable energy is expected to dominate. Instead, the emphasis is on linking CCUS with industrial policy, and exploring synergies with green hydrogen and low-carbon fuel production—especially for hard-to-decarbonize transport sectors.

What this means for NDCs

The message from these scenarios is not that CCS should be ruled out—but that its role must be carefully considered, based on country-specific contexts and long-term needs. For many countries, especially in the Global South, CCS may offer niche applications in certain industries, but is unlikely to contribute significantly to emission reductions by 2030 or even 2040.

As governments revise their NDCs, this highlights a key design challenge:

Don't over-rely on future technologies that may not scale in time

Prioritize mitigation actions that can deliver near-term impact

Recognize where CCS fits—and where other solutions are more effective



Expert insights from India: Prof. Amit Garg

In this edition, we're featuring **Prof. Amit Garg**, Professor at the Indian Institute of Management Ahmedabad ([IIMA](#)), where he specializes in energy, climate change, and sustainable development. Prof. Garg shares how [India's](#) climate policy has evolved over the past decade—and what its NDC priorities say about balancing development and transition.

In this exclusive video, Prof. Garg reflects on:

- 1 How [India's](#) climate actions and negotiations have remained aligned with the Paris Agreement, with the country on track to meet its three key NDC targets for 2030.
- 2 [India's](#) development-first approach to the energy transition, and how coal remains essential in the short term to ensure energy access for all.

[\[Watch the video here\]](#), where Prof. Garg explains why India's pathway emphasizes a "just, sustainable energy transition," combining rapid renewable energy expansion with continued support for development needs—especially in energy security and affordability.

Next in NDC Insights: Land use and carbon sinks

Our next edition will explore how national pathways are using land to support climate goals—through forest conservation, sustainable agriculture, and biodiversity protection.

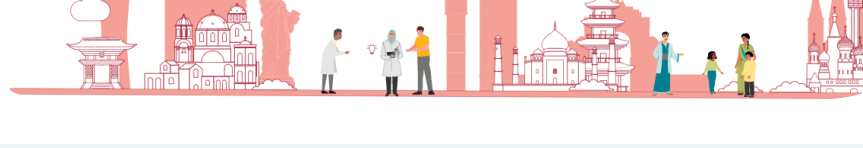
We'll highlight how carbon sinks connect with food security and rural development, especially in countries with high land-based emissions.

Missed our first issue? Download "[Beyond pledges: Are NDCs addressing the transformations we need?](#)"

About the DDP and why this newsletter matters

The [Deep Decarbonization Pathways \(DDP\)](#) initiative supports countries in designing strategies for deep emissions cuts aligned with development goals.

Since 2013, DDP has worked with local experts to build bottom-up, country-driven pathways that turn climate ambition into real, grounded action.



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27 Rue Saint-Guillaume
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Paris 75007
France

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