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Carbon storage units and carbon storage obligations: A review of policy approaches

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ABSTRACT

Policies that incentivize the capture and geological storage of CO_2 from large point sources ('CCS'; and more recently, atmospheric removals), have so far tended to reward the resultant avoided CO_2 emissions (or CO_2 removals) achieved by operators at the point of capture. The expectation has been that geological CO_2 storage sites, as well as the connecting infrastructure, will be developed and operated based upon the funding delivered from the single point of incentive (e.g. under an emissions trading system or a carbon tax, only CO_2 capture installation operators are absolved of the obligation to acquire and surrender CO_2 emission rights or to pay the tax). Project-based crediting mechanisms (e.g. in the voluntary carbon market) tend to treat the entire chain of operations as a single entity to be supplied with emission reduction or removal credits. Consequently, there has been minimal explicit financial incentive to store CO_2. Yet a multiple gigaton-per-year scale capture and storage industry requires complex CO_2 networks to evolve, with multiple sources connecting to multiple sinks, with installations owned by different operators with different technical expertise, climate mitigation goals and obligations. This multiplicity of goals and incentives can create agency problems and cross-chain risks, which impact negatively upon investment decisions. In this paper, we review the history, evolution and potential of geological net zero (GNZ) and carbon storage (or takeback) obligation concepts applied to fossil carbon *producers* and *suppliers* as a means to address these risks alongside policies aimed at atmospheric net zero (ANZ) and fossil carbon *emitters*.

1. Introduction

The idea of polluter or emitter pays and the pricing of greenhouse gas (GHG) emissions based on Pigouvian tax principles is well embedded into the global policy framework for climate governance. As Nordhaus amongst many has argued, applying a cost to GHG emissions is theoretically more efficient than implementing direct government mandates or controls on GHG reducing technologies (Nordhaus, 1994; Nordhaus, 2015).

However, policy approaches that incrementally increase the cost of emitting GHGs to the atmosphere over time – such as the linearly declining cap in the EU emissions trading system (EU ETS) – have not proved effective in supporting near-term deployment of large-scale capital-intensive climate mitigation technologies such as carbon capture and geological storage (CCS). Building such technologies at a significant and repeatable scale requires long-term stable incentives driven by clear and reliable climate change policies and support mechanisms (IEA, 2012; IEA, 2016). Carbon pricing measures, such as the value of avoiding costs under the EU ETS or carbon taxes in South Africa or Colombia, generally establish a compliance cost from the short-run marginal cost of abatement, rather than the long-run cost of meeting future climate change mitigation commitments. Other existing mechanisms, such as the value of carbon credits in the voluntary carbon market, remain uncertain as to the long-term demand and price signal. As such, carbon prices are generally lower and less reliable than needed

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