

Open Impact Bonds: pricing and funding a carbon capture breakthrough

If not having efficient CCS costs taxpayers tens of billions in climate damages, then governments should offer billions to the first private entity producing efficient CCS. By Nathan Witkin.

Though it is innovative, the policy idea proposed in this article is relatively simple. Given that climate change costs major global economies billions each year, any of these governments should offer billions to the first private entity producing a solution. Similar policy ideas have been attempted but have problematically failed to directly connect the value to taxpayers with the amount offered to the first group of successful investors who find and fund an effective solution.

This article will first present the economic and policy rationales for this idea. It will then provide evidence as to why this approach benefits taxpayers and how its closest policy analogues indicate this approach is uniquely promising and worthy of consideration.

Economic Analysis

In economic terms, the cost of not having efficient carbon capture should be the price society is collectively willing to pay for it. This approach is efficient on the macro scale and also common sense to the individual. If a broken window increases your home heating cost by £100, and you are not willing to change your energy usage, then you would save money by paying £99 for a new window.

However, when analogized to carbon capture and storage (CCS), this is not only a matter of wise, upfront investment. Because CCS benefits everyone, regardless of whether they invest their own money, there must be a mechanism compelling contributions. Fortunately, the normal power of a government to tax and spend can serve as this mechanism.

Policy Analysis

The resulting policy prescription involves a government defining the CCS technology the public is willing to purchase, assessing how much taxpayers would benefit economically in reduced climate damages, and then offering a slightly lesser amount in free-market competition. While the proposed policy pre-

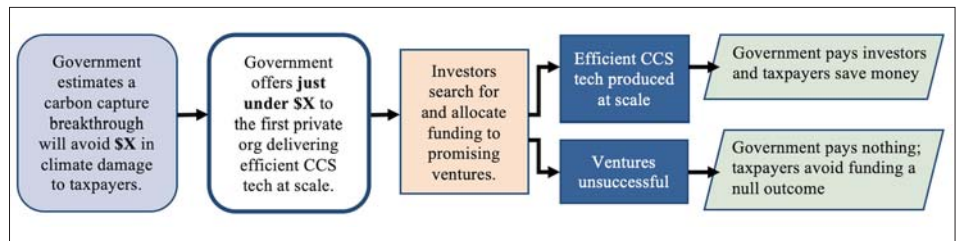


Figure 1: An open impact bond for a CCS breakthrough

sents similarities to past government efforts to spur CCS innovation through monetary incentives, there are crucial differences.

The proposed policy differs from competitions or X-prizes in that the money would only be paid if the submitted technology meets predefined criteria, ensuring taxpayers benefit by more than the prize amount. And while the goal is to attract investors – as with traditional impact bonds – the money could be earned by any competing entity, and not a single private entity engaged in an exclusive pay-for-success contract with the government. Furthermore, government competitions, philanthropic X-prizes, and traditional impact bonds do not base the amount offered on what taxpayers collectively save through successful delivery of the sought-after outcome.

Because the policy idea presented in this article is most similar to a social impact bond (described below) but is not structured under its characteristically exclusive contract, it is best described as an “open” impact bond.

Economic Evidence

This section demonstrates the economic need for an open impact bond and the economic power of using this policy to link the amount taxpayers save through efficient CCS to what governments should be willing to offer for it. To be clear, this open impact bond would pay a private entity if and only if it produces technology that removes carbon from the air at a

measurably lower cost per ton than the carbon would otherwise create in climate damages.

In October of 2021, the World Economic Forum (WEF) issued a report indicating that a net-zero future would require approximately \$50 trillion in investments over the next 25 years. Regarding the carbon capture industry, ExxonMobile recently estimated that a CCS hub with sufficient economies of scale would require \$100 billion in investment. Furthermore, the Global CCS Institute projected the need for investment at \$655 billion to \$1.28 trillion between 2021 and 2050.

On the other side of this tall order for investors is very little incentive to make risky bets on the CCS ventures. That same WEF report calling for trillions in CCS investment also indicates that, without paying customers, market forces do not support the necessary private investment in net-zero technologies. This conclusion was voiced earlier by the Carbon Capture and Storage Association (CCSA) in a postmortem analysis of the U.K.’s 2008-2015 CCS competitions. Evidence of this lack of market incentive is found in a 2021 analysis by Business Wire, valuing the global CCS industry at \$1.5 billion and projecting growth to nearly \$3 billion by 2025.

The mismatch between \$100 billion needed for one CCS hub and \$1.5 billion in worldwide investment characterizes a classic market failure. But this market failure is not unavoidable. Though there is almost no paying market for any product that would equally benefit

customers and non-customers, investors and non-investors, CCS does offer measurable monetary benefits to society as a whole.

The collective economic benefit of efficient CCS technology is found in the avoidance of property damage from flooding, wildfires, and hurricanes caused by climate change. The U.S. National Oceanic and Atmospheric Administration (NOAA) reported the annual inflation-adjusted cost of weather events in the U.S. at nearly \$20 billion per year in the 1980s and nearly \$90 billion per year in the 2010s. Similarly, the European Environment Agency (EEA) estimated annual damage of €13 billion in floods, draughts, and heatwaves during the last decade. Furthermore, a collaboration of researchers estimated flooding damages in China would increase by 82% to USD\$389 billion over the next 20 years.

Because climate change is currently creating billions of dollars in property damage to these developed economies – with the cost of inaction only estimated to increase – any of these societies should collectively value a CCS breakthrough with a very large price tag. The problem is that competitive free markets for innovative technologies are currently organized around individual consumers/investors, not the collective valuation by an entire society. However, a novel application of the impact bond concept may offer a solution, in this context.

Policy Evidence

If a CCS breakthrough could avoid tens of billions in property damage from climate events, then any developed society should offer this amount in an open impact bond to the

first private entity producing such a breakthrough. This policy would motivate investors to seek out and fund promising R&D, allowing the private sector to manage risk while the public sector organizes public buy-in – each side doing exactly what they were designed to do.

While an open impact bond for efficient CCS seems intuitive, it is not currently available in any jurisdiction. And, though similar policies – social impact bonds and government competitions – have paved the way for this new policy idea, these existing policies exhibit particular flaws which further highlight the strength of the open impact bond.

According to a 2016 OECD report on the subject, a social impact bond (SIB) is a financing mechanism in which investors provide upfront capital for a social service and then the government repays the investors with a premium only if a predefined outcome is achieved. The main problem with SIBs are that they do not organize competition among different approaches, the conditions producing innovation under free-market capitalism. Instead, SIBs involve a contract between the government and a single private service-provider, sometimes taking years to negotiate, and then adding a layer of bureaucratic oversight to evaluate whether the outcome was achieved.

Because they are based on an exclusive contract between investor-backed private service providers and the government entity that would otherwise provide those services, SIBs have garnered growing criticism for being unnecessarily complex and ineffective. Under this approach, SIBs either (1) attract insufficient funding by not offering private rates of

return or (2) offer a low-risk investment by paying private investors for services the government could offer more efficiently. An open impact bond avoids this inefficiency by simply defining the value to taxpayers of a particular innovation and then paying that amount to the first private entity producing that good.

Another similar policy idea is a CCS competition, providing a defined amount of government grants or philanthropic funds for groups submitting the best technology. In contrast to the open impact bond, these competitions appear to provide funding to the best applicant rather than to the first applicant whose submission meets the defined criteria. Furthermore, the amounts offered in these competitions are not based on or justified by the amount they benefit taxpayers, who ultimately fund them. Finally, these competitions have not served as reliable mechanisms for attracting private investment, as most vividly illustrated by the U.K. cancelling its most recent £1 billion CCS competition mere months before it would have been awarded.

Thus, an open impact bond for efficient CCS would offer billions to the first private entity producing this technology to a specified quality and scale. It would attract investors who otherwise face little incentive to pour private funds into CCS R&D, and it would only pay out if it produces technology that would save taxpayers a greater amount in mitigated climate change damages.

More information

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