

Next Gen Carbon Markets

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To meet the 'well-below two degrees' objective of the Paris Agreement we need to have a negative carbon footprint ('net zero') globally by mid-century. Net zero will allow us to stabilise the stock of carbon in the atmosphere and thus also stabilise global warming, but that means reducing carbon emissions to literally zero in every sector we can, while also extracting and sequestering carbon from the atmosphere using biological, chemical, and industrial processes at incredibly large scales.

Achieving this will require new funding mechanisms, operating at global scales, to pay for the activities that can achieve this. These mechanisms will need to remunerate outcomes in ways that are lowest cost, transparent, accountable, and verifiable. These mechanisms must also be designed in a way that allows banks and investors to deploy capital efficiently towards them.

The ultimate sources of money that will underpin these mechanisms will need to be both public and private, and the sources of capital for financing will also need to be a combination of public and private. The reason for this is simple: the public sector doesn't have the money or the borrowing capacity alone to do this and nor does the private sector. Both must work together and/or fund and finance activities best suited to their risk appetites taking account of the needs of different countries and different sectors.

These basic questions of how we create cash flows that can then motivate public and private investment in solutions to environmental challenges are critical. Funding mechanisms that can then be financed are a necessary condition for tackling climate change, but are also fundamental to how we scale up the required investment in climate resilience, as well as how we deliver the restoration of natural capital and save global nature and biodiversity.

So how do we do this? And what can we learn from previous or current attempts? And what opportunities do we have to get this right and scale up what works or what could work?

Here I briefly outline the potential of what I call "next generation" carbon markets enabled by new technologies that didn't exist when carbon markets first developed. These include ubiquitous mobile banking (particularly in developing countries), smart phones with intuitive user interfaces (also becoming ubiquitous), distributed ledgers (that can log transactions more efficiently, transparently, and securely), smart contracts (that are partially or fully self-executing, self-enforcing, or both), developments in earth observation (cheaper sensors and platforms, particularly new satellite constellations with much more regular revisit periods), dramatic improvements in data processing (developments in AI and cloud-based computing to scan and interpret information quickly), and continuous improvements in predicative modelling (that help to turn data into insights) as well as software (to operate markets and auctions efficiently and to do so in intuitive ways).

All of these technological developments are proven and are developing rapidly. This is a virtuous cycle. The underlying technologies keep getting better and better, and cheaper

and cheaper. Our experience of using these technologies in combination is also growing as the huge number of use cases becomes increasingly apparent. We are gaining experience and doing so at pace.

We can bring these proven technologies together to create a new generation of funding mechanisms for climate mitigation, as well as for climate resilience and biodiversity loss. What might this look like?

For example, if we want to halt deforestation undertaken by smallholder farmers in Indonesia, we need to get money to the individuals and communities actually responsible for making decisions, i.e. deciding whether to cut down a tree or not.

Using developments in earth observation and AI, we can tell whether a particular tree or part of a forest has been cut down on a daily basis. If a tree or part of a forest is still standing, a smart contract could be executed on a daily or weekly basis that makes payments to individuals, families, and/or communities with payments being made to mobile banking accounts, with a proportion potentially going into a longer-term incentive account or scheme.

The details of the smart contract (the amount, under what conditions a payment is made, and to whom) is designed to achieve an outcome (in this case stopping deforestation in a particular part of Indonesia). Contracts could be allocated to individuals, families, and/or communities in different ways, from reverse auctions to offering a cost-plus price.

The funding that underpins the contract could come from any combination of governments (e.g. developed or developing countries, regional, and/or local government), the private sector (e.g. companies either being mandated to pay for outcomes or doing so voluntarily), and philanthropy (e.g. foundations or individual donations). The funders of the smart contract can be recorded on a distributed ledger, including details of recipients, so if you wanted you could see which organisation or individual (or what combination) has paid for or received a particular results-based payment and when.

And finally, this smart contract has been designed so that local and international banks, as well as investors and insurers, understand how it works and are willing to deploy capital against it, which could be used by the holders of the contract to raise capital for other activities or alternative livelihoods.

This example highlights the huge potential of these technologies for funding and financing solutions to environmental challenges. Clearly designing the mechanisms and tailoring them to the outcomes you are trying to achieve and the context in which you are trying to achieve them in is critical. But that is entirely doable and contracts can be tailored all the way down to the individual or community level if required.

These approaches have multiple benefits. They can be as complex or as simple as required to solve any given problem in any particular context. They can blend funding from multiple sources and can deploy funding transparently and efficiently, using auctions whose complexity is hidden via well designed software and user interfaces. The mechanisms are scalable and can be as large or as small as needed and can operate across countries or within countries. Funding can go straight to the agent(s) making decisions and be provided

in ways that align incentives over the long term. Contracts can be designed to be bankable, investable, and insurable. Concessional finance from the public sector or philanthropy can also be made available and tied to issued contracts.

These approaches, unlocked by technology, are entirely different to that taken by international carbon markets to date, where the rules of the mechanisms are designed by governments in slow moving, cumbersome, and politicised processes. These showed early promise (e.g. the Kyoto Protocol's Clean Development Mechanism), but have generally failed to deliver since. You just need to look at the state of REDD+ to see how little progress has been made to operationalise a mechanism for funding reduced emissions from deforestation relative to the urgency of the problem.

We have a unique opportunity in the UK to make a difference and to bring these technologies together in ways that can efficiently and effectively fund and finance solutions to environmental challenges. The UK has world-leading expertise in each of the technological families mentioned above, from satellites to fintech.

Brexit gives us the opportunity to design the world's first ever net zero aligned emissions trading scheme that can and should require firms to acquire significant emissions reductions using next gen carbon markets. We are also developing a new post-Common Agricultural Policy framework called the Environmental Land Management Scheme (ELMS) that will replace farm subsidies based on acres farmed with payments to land managers for natural capital restored and ecosystem services provided. The UK Presidency of UNFCCC COP26 could provide a landing point for us to show how these mechanisms can work and how they can be scaled globally.

Undoubtedly there will be challenges in designing these mechanisms, but they are far from insurmountable. We need a systematic series of UK and international pilots to test out how they will work in practice. Next gen carbon (or environmental) markets set out how we can commission the solutions we need to solve the global environmental challenges. We must embrace them. The alternative is inaction and further delay.

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