SUPPLY AND DEMAND 
EVOLUTION IN THE VOLUNTARY 
CARBON CREDIT MARKET

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EXECUTIVE SUMMARY

Carbon offsets are increasingly becoming a strategy to reduce environmental impacts, with the market for new offsets being the largest it has ever been in 2019. The original credits were traded on the Clean Development Mechanism established via the Kyoto Protocol in 1997, but after a few years the carbon markets experienced a crash in carbon prices due to the unreliability of certain carbon credit projects.

Today, recent gains have been driven by an increase in voluntary demand for these credits, as many private companies wish to participate in the offset market. Shareholder and public pressure have pushed these companies in recent years to drive this, and projects with societal benefits along with emissions reductions are seen as more attractive to voluntary buyers. Forestry carbon is the largest category of these credits, representing the most issuances of new credits per year over the past decade.

Within the forestry subcategory, Latin America and Southeast Asia have been the biggest recipients of carbon emissions reduction projects.

In Latin America, many of these projects are related to Amazon conservation, and the rate of deforestation of the Amazon has been slowed by more than half from its peak in the early 2000s due to REDD+ conservation projects as well as other carbon credit contributions. However, many forestry credit projects in Brazil and other bordering nations have not delivered the amount of credits promised at project outset. The reasons for this include insufficient funding, lack of cooperation of local authorities, and disruption of conservation by local communities. Future issuers of forestry credits will need to price their credits appropriately, and work in jurisdictions where they feel that forests can be protected to the extent promised in the credit sold. Otherwise, these credits will not fill their purpose, and the agreed emissions reduction won’t materialize.

CORSIA, or the UN’s effort to mandate carbon offsetting by airlines for their emissions growth, makes it even more important to get carbon offset projects correct. CORSIA requires airlines to offset gains in their emissions after 2020, and when using the pre-COVID airline traffic increase predictions, this could result in ~4-20x multiples of demand for credits from the carbon market size today. Once implemented, CORSIA has the potential to be the biggest non-voluntary driver of carbon credit growth.

Thus, providers of credits will need to ensure quality, appropriate funding, and cooperation with local institutions to meet the growing demand for these key instruments in the fight against climate change and focus on corporate social responsibility.
Companies and individuals that care about climate change and want to curb their own emissions are increasingly considering carbon offsets as one strategy for reducing environmental impacts. The recent high profile decisions by Google, Microsoft, Unilever, and Amazon to go carbon neutral or negative over the next several decades have set an example for other businesses to make climate change a defining factor of their environmental, social and governance (ESG) strategies.

Large companies like Google have the ability to make their own capital outlays (for example by self-financing renewable energy projects for its data centers). Other companies who wish to follow suit, however, may lack the same procurement power. These enterprises can turn to carbon offsets in addition to other measures in order to balance their emissions.

Carbon offsets are tools that enable investment in projects that pass a set of screening criteria. Various providers (such as VCS and Gold Standard) make it their business to certify projects taking place around the world. The projects must demonstrate that they 1) reduce one or more greenhouse gases, and 2) would not have been undertaken without the offset money, proving their additionality.

Moreover, unlike a typical nonprofit donation, the proprietors of the carbon-reducing assets can make a financial return from them. For example, funding a renewable energy project ensures that the cash flows of the project go to the ultimate owner of the invested asset; not necessarily the holders of the carbon credit. As compensation for the capital, the carbon credit owner earns a profit based on the reduced emissions.

Typical project classifications include forestry (preserving or planting new trees and forests), energy efficiency, and renewable energy. Despite some high profile successes, many projects have suffered from the inability of the certification agencies to protect them from changes in government regulations and incentives. For example, some forest credits in the past have been abandoned by state governments in favor of expanding agriculture.

This digest focuses on the increased demand for carbon credits, due to improved participation from private companies as well as regulatory requirements placed on international airlines. Demand from these actors has increased meaningfully since the UN’s Paris agreement, straining the supply of carbon credits.

The supply side of credits has suffered challenges of accountability and competing government incentives and there are examples of both successes and failures. The supplier of these credits will need to price them appropriately—striking the right balance between providing adequate funding to projects without demotivating interested parties—so that carbon credit systems can become resilient enough to support a surge in growth.

The first widely used emissions trading program began with the amended Clean Air Act in 1990, which was put into place in the United States to reduce sulfur dioxide emissions, a compound that can cause acid rain when emitted into the environment. The system achieved a 40 percent reduction in SO2 emissions, largely because it employed a simple cap-and-trade model between American states.

This model allowed polluters to trade permits, with caps based on historical emissions reductions (Rico 1995). This system afforded efficient pollution reduction, which the Kyoto protocol sought to achieve through a similar program for countries through its Clean Development Mechanism (CDM). However, this rollout was more complicated due to the divergent interests of the participants.

An interview with Professor Arthur van Benthem of the Wharton School at the University of Pennsylvania revealed some unfortunate economic consequences that went along with the original establishment of the CDM (Van Benthem 2020). Carbon reductions need to be “additional” in order to qualify as credits, and it was challenging to prove whether the credits established by the CDM were additional.

The concept of additionality refers to actions or projects that are above and beyond the scope of what the government was planning to fund in a given year, and the Kyoto protocol’s purpose was to mandate reductions on top of what the countries were already doing. Given that these decisions are fungible based on what the lawmakers decided to include in the country’s annual budget, it became hard to prove whether a conservation project or a renewable energy project was truly additional.

Moreover, there is a perverse incentive for countries to claim offsets in certain industries, such as energy, and then let other industries produce more. This can lead to negative outcomes, where emissions are falsely saved in one sector and then created in another. Lastly, many energy projects in state payer systems (where the government pays private companies for producing electricity) can be net present value (NPV) positive if the state offers a high enough electricity price. The state could claim that such a project is unfeasible if it has artificially lowered the power price in that region, which results in the same project being NPV negative.

If the state does this, and then builds the energy installation anyway, it could claim the project to be “additional,” as the project could not have been built without generating a positive NPV return. Therefore, economists have worried that the use of carbon credits in energy trading systems (ETS) could cause overall emissions from a country to increase if incentives were misaligned with emission reduction.

These factors contributed to the CDM’s collapse in 2012, as there was insufficient political will to mandate tight controls on the credits, resulting in the decreased use of carbon credits as a currency in ETS projects around the world. This is not to say that cap and trade programs are ineffective, or not growing. On the contrary, cap and trade is now in wide use around the world, with the EU being the biggest market to use this system of carbon accounting.

However, these largely national programs don’t necessarily accept all carbon credits from third parties as tradeable goods, and can pick and choose between programs and regions that they are willing to qualify.

INTRODUCTION

Kyoto Protocol and the Establishment of the CDM
Carbon markets only truly picked up in the late 2000s, and growth overall can be traced to large international accords or industry decisions to participate in carbon markets. As one can see in the following chart describing total voluntary carbon credits issued and retired by year, the market was very nascent in 2008 (the start of the Kyoto Protocol’s first commitment period). Over time, it has grown with a slight downturn in 2012 when the CDM collapsed. There was a huge increase in the use of credits in 2017 with the Paris agreement, and the latest industry reports show total credit volume increased from 46.2 MtCO₂e in December 31, 2017 to 98.4 MtCO₂e (Donofrio 2019) in December 31, 2018, post-agreement.

This increase is likely to be linked to the Paris agreement’s Article 6. This article replaces Kyoto’s guidelines for the CDM and continues to push for a cap and trade system that spans across international markets. Unfortunately, the implementation of Article 6 still hasn’t been agreed upon despite lengthy negotiations at the COP 25 summit held in Madrid last December, likely because of the issues that existed with the original market (Farand 2019).

Indeed, disagreements over this article intensified after COP 25. A post-mortem analysis of COP 25 indicates the main issues with Article 6 are 1) some countries wanting to transfer their surplus of old credits from the CDM into the new system, 2) the stringency of rules designed to prevent double counting, and 3) the overall mitigation goals of the system (as it is important to make sure the overall numbers of emissions decrease).

Especially challenging is the issue of the old CDM credits, which are today viewed as having little to no value. These credits could be included in any refresh of the CDM, and would dilute the value of any new carbon credits sold within the same system. This is because not every reduction per metric ton of carbon would be viewed as equal, as some of the old credits are viewed as not actually reducing the amount of emissions promised.
The most common type of carbon credit has traditionally been forestry, with this trend continuing in the most recent available data (Q1 2018).

Forestry credits can occupy two main categories: afforestation / reforestation (creating new forest or restoring existing), and improved forest management (preventing the destruction of certain forests for commercial uses like logging or agriculture). The most common certification designation for these projects, especially when conserving important swathes of forest around the world, is REDD+.

REDD+ includes these two main types of forestry credits, and these types of credits are popular because they are easy to understand, often meet criteria for “additionality,” since forests naturally sequester carbon and have the co-benefit of protecting endangered species. Not all REDD+ projects produce carbon credits, as funding also comes from other sources. These projects can often be focused on conservation (38 percent) rather than carbon sequestration (20 percent), but each is generally able to achieve both goals if successful (Simonet 2014).

For example, the Rimba Raya project in Indonesia is one of the country’s most important sites for protecting the Bornean Orangutan (Rimba Raya 2018). These conservation efforts are very popular among individual consumers and companies. However, forests are naturally a risky investment since they can be affected by natural disasters like fires, and are vulnerable to illegal human interventions if not properly protected. Various forestry projects have failed in past years, contributing to some mistrust in carbon credits in the wider international market.

Deforestation was slowed after the 2000s, but has continued at a rate of >5,000 km² per year. A study by Simonet et al. shows that local rainforest communities stopped their deforestation by 50% when presented with a REDD+ alternative, but only when the participants in the program cannot make a significantly larger sum of money if using the land for agriculture versus conservation (Simonet 2018).

Despite the REDD+ designation of the forest, however, tree degradation still continues and the ability of local authorities to enforce policies is in question. The main challenge for REDD+ projects is that they cannot be as easily verified as other carbon credits.
for a variety of reasons. First, there is the potential
Unfortunately, some of the projects in Acre have
ETS declined.
projects from Acre in September 2019, while the EU
accept
produced
agreements with entities in both the UK and Germany
for forest conservation projects, having ironed-out
mechanisms to make sure that leakage doesn’t happen.
There is a lack of reporting of rainforest land coverage
and degradation by the local government (NICFI 2020).
This is especially concerning, as trees release some of
the carbon they sequester during their lifetime back into
the atmosphere when they are cut down, hampering the
effectiveness of the carbon credit if leakage occurs.
The second key issue is the lack of sufficient funding
raised for REDD+ projects. In Acre the government has
adopted a policy favoring soy and cattle production over
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financial incentives were provided.
The particular program in Acre that was analyzed seems
unlikely to produce the amount of carbon offsets that
were sold, because more capital was needed. Despite
all these issues, these financial contributions to Brazil’s
anti-deforestation programs have helped the overall
deforestation amount per year in km² to decline from a
peak in 2004.
A counter-article to the ProPublica report written by
the Environmental Defense Fund (EDF) discusses this
in length, showing that financial contributions were key
to slowing the destruction of one of the world’s most
precious resources (Schwartzman 2019). Unfortunately,
the future in Brazil remains unclear, as Norway has
paused donations into the Amazon Fund, and the
government of Bolsonaro is opening up more areas of
the protected forest to deforestation (Boffey 2019).
Figure 4 estimates how many km² of land was
deforested per year in the Amazon, with the highest
periods coming in the early 2000s before significant
forestry conservation funding began.
It’s clear that forest conservation in order to attract
capital investments from wealthy countries has run into
roadblocks in Brazil, despite the positive effects that
REDD+ programs have had on slowing the spread of
deforestation. More needs to be done to account
for, protect, and quantify these conservation efforts.
Although today most REDD+ programs are not credit
related and rather utilize the funding of international
aid arms of governments, the need for certification will
increase as the market for carbon credits grows via
private actors who value and demand transparency.

Figure 4: Annual Estimated Deforesting of the Amazon, 1988–2018

Source: Tropical Conservation Science Journal on Amazon Deforestation in Brazil (Buchner and CN 2018)
When looking outside the lens of just forestry credit contributions, there is a clear trend of wealthy OECD countries investing in projects located in less wealthy countries (Yeo 2019). These wealthy countries consume more carbon than other nations and then often shift their carbon offsetting projects to regions where natural resources may be less expensive. If taking overall climate finance transfers either expressed as credits or debt financing, the capital in this chart would include investments in energy projects and electric car production, for example. The results show that most of this capital is invested domestically rather than in other countries, but the capital that moves internationally is primarily moving from OECD to non-OECD markets.

The CPI data introduces the hypothesis that high-emissions per capita countries (generally developed markets) are using these carbon negative projects in developing markets as an excuse to continue their behavior of consuming too much carbon. Although it is a positive thing that $93Bn of capital was transferred to development projects in non-OECD markets, regulators need to be aware that reducing carbon emissions is a better option until additionality, leakage, and other problems of credits can be solved.

Another version of this analysis is to look at all financial flows, facilitated by additional data on all funding sources (public and private) from the Climate Policy Initiative (CPI). This is different from the analysis done by Nature because it includes money not purely focused on climate initiatives and encompasses both equity and debt financing. The capital in this chart would include investments in energy projects and electric car production, for example. The results show that most of this capital is invested domestically rather than in other countries, but the capital that moves internationally is primarily moving from OECD to non-OECD markets.

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For industries that currently have carbon emissions as a necessary feature of their operations, carbon credits may be the only solution. These companies will be the next main driver for carbon market growth. Examples include businesses like Unilever that is offsetting all Scope 1 and Scope 2 emissions via credit purchases. However, the next demand shock to the system will come from airlines.

The ICAO has decided to establish the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) as a methodology to offset any increase in airline carbon emissions after 2020. CORSIA has two key provisions that make it more effective than the original offsets proposed in the Kyoto Protocol, which are banning the double-counting of credits (counting by the country originating the credit, and by the country purchasing the credit), and requiring host country approval for the establishment of credits. Prior to these changes, credits could be provided by private actors within countries without host approval, which at times resulted in projects being tampered with (such as the situation in Acre) in the absence of government protection.

CORSIA will have voluntary test participation in two phases from 2021–26, and then mandatory UN state participation from 2027–35, according to the EDF. Since this will be compulsory, the majority of developed countries’ airlines are expected to participate in the primary phases.
CONCLUSION

Carbon credits were originally established by international agreements, showing the cooperation of countries who wanted to make a dent in climate change. Since then, forestry credits have proven effective at slowing deforestation in the Amazon, but have not yielded their full promised results. It’s unclear whether the increased government cooperation outlined by Article 6 of the Paris agreement will increase the verifiability of these credits. For example, the current presidential administration in Brazil has feuded with European countries looking to create forestry credits and it’s not obvious that international requirements will change the administration’s stance.

Given only 98.2 MtCO₂e worth of carbon credits were purchased in 2019, and by 2026 CORSIA expects to be solely responsible for ~400 MtCO₂e worth of annual government cooperation and increased capital provided per ton of carbon. Other industry agreements may emerge, inspired by the airline industry, and will require even more new credit solutions.

Some solutions (like that of the EU ETS) have focused on sponsoring projects within the nation or alliance where the capital originated, or reducing emissions via efficiency gains rather than projects. Other solutions could include increasing the price per MtCO₂e offset to ensure that there is enough capital to support and ensure the operations of different types of credits. This would avoid the underfunding of projects that lose out to competing economic interests. No matter what, public cooperation is critical for these projects, as that protection will be needed to ensure the value of emissions meets the level promised.

On the demand side, as a method of mitigating climate change, these credits will probably remain the domain of the private market, which will need to find the best way to cooperate with these public institutions to achieve the carbon emissions reduction they hope for. This cooperation will be the only way to ensure that the future growth of carbon credits is maintained as a key solution to the world’s greenhouse gas emissions crisis.

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