

The Potential Role of Enhanced Bond Structures in Forest Climate Finance

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Abbreviations

ABC	Low Carbon Agriculture Program
ABS	Asset-backed security
APP	Area of Permanent Protection
BNDES	Brazilian Development Bank
CAR	Environmental Rural Cadastre
CLO	Collateralized loan obligation
CPPB	Climate policy performance bond
CRA	Environmental Reserve Quota
DETER	Real Time System for Detection of Deforestation
DFI	Development finance institution
ESG	Environment, social and governance
FDI	Foreign direct investment
FSC	Forest Stewardship Council
FX	Foreign exchange
Gt	Gigaton
ha	Hectare
IBAMA	Institute for Environment and Renewable Natural Resources
IFC	International Finance Corporation
IFI	International financial institution
ILM	Integrated landscape management
IPCC	Intergovernmental Panel on Climate Change
ISA-Carbon	Forest Carbon Incentive Program
LULUCF	Land use, land-use change and forestry
Mha	Million hectares
MIGA	Multilateral Investment Guarantee Agency
MRV	Measuring, reporting and verification
NDC	Nationally determined contribution
NGO	Non-government organization
NPCC	National Plan on Climate Change
PBP	Performance-based payments
PES	Payments for ecosystem services
PRA	Environmental Compliance Program
PRONAF	National Program for the Strengthening of Family Farming
REDD+	Reducing Emissions from Deforestation and Forest Degradation
REM	REDD+ Early Movers
RSPO	Roundtable on Sustainable Palm Oil
SFM	Sustainable forest management
SiCAR	Federal Rural Environmental Registry System
SISA	Environmental Services Incentives Program
SPV	Special purpose vehicle
TIMO	Timberland Investment Management Organization
TPS	Territorial protection system
VER	Verified emissions reduction

Executive Summary

This report develops innovative bond structures that respond to challenges currently limiting the financing of forest-based NDC activities,¹ with the intention to catalyze significant increases in financing flows. The report sets out a detailed shortlist of three potential *enhanced* bond structures, which have the potential to catalyze funding across the gamut of forest-based nationally determined contribution (NDC) activities. The focus is on bond structures that blend donor-funded performance-based payments (PBP) alongside some upfront grant funding to improve the financial performance of the use of proceeds for issuers, and hence enable larger-scale financing from capital markets.

These structures seek to achieve greater scale and efficiency in meeting NDC goals by offering all counterparties a better deal: i) for issuers (whether forest country governments, public banks or private commercial actors) they offer financial instruments with more attractive terms than those currently obtainable in the market; ii) for donors,² they offer a payment instrument that more effectively drives forest-based emission reductions, harnessing additional resources from forest countries alongside greater private sector leverage; iii) for investors, they offer yields and credit ratings that are competitive with mainstream markets but where the use of proceeds are ring-fenced for pro-forest outcomes.

While the structures and recommendations of this report are applicable globally, the case of Brazil is used as a case study to concretely describe and test the opportunity. This report follows a recent World Bank report on the implementation of INDC in Brazil (World Bank 2016a), and a subsequent World Bank report on the potential role of Green Bonds in supporting INDC implementation more generally (World Bank 2016b). The explicit focus on Brazil follows a request from the Brazilian government to the World Bank to explore the concept of a Forest Bond and its potential to finance NDC-related forest investments.

Globally, the forest-based emission reduction activities (and corresponding financing) required to achieve the commitments in the NDCs far exceed current levels. Although precise estimates do not exist, NDC commitments imply annual forest-based emission reductions that are roughly three times what is currently being achieved. This number increases to over ten times if activities are considered that appear relatively cost-effective versus emissions mitigation options in other sectors. The financing gap appears to be of similar magnitude.

There remains no clear pathway for closing this gap. With constrained public budgets, achieving this scale of financing will require extremely effective use of available climate finance, and the most efficient

¹ In this report, forest-based NDC activities refer to mitigation-focused activities that increase the amount of carbon sequestered in forests and related productive land use, whether directly or through the avoidance of deforestation or forest degradation. Although NDCs may also encompass broader, adaptation-related forest activities, the report does not focus on the potential for enhanced bond structures in this regard. The structures proposed could potentially be applicable to such adaptation-focused activity, but this would need to be assessed in more depth.

² The report uses the term “donor” as an imperfect short-hand for all actors willing to pay for greenhouse gas (GHG) emission reduction activities, whether results-based or input-based. This might include foreign governments, philanthropies, private sector companies or impact investors, or individuals. Donors might provide funds via bilateral or multilateral mechanisms, or carbon markets. However, the bulk of such payments has to date come from foreign governments through bilateral and multilateral mechanisms. The base-case assumption is that PBP will take the form of governments or multilateral institutions making PBP as per the Paris Agreement.

financing vehicles possible. Accordingly, policymakers and other stakeholders are seeking more integrated approaches that would increase the volume and stability of finance at lower costs. Recently, a broad group of multilateral development finance institutions emphasized the need for continued innovation in developing additional, efficient and effective financing solutions (African Development Bank et al. 2015).

The 2015 Paris Agreement commits the international community to scaled-up PBPs as the key instrument for valuing the global public goods provided by tropical forests and helping forest countries overcome the upfront costs of transitioning to a low-emission development model – one that in the long term should result in more resilient, productive and competitive agriculture and timber sectors. PBP allows donors to commit more resources to verifiable results where the risk of achieving those results is transferred predominantly to the countries responsible. Another advantage is that forest countries are better able to choose their own pathways to achieving goals. However, these payments alone will not provide the scale of financing required. Complementary private financial flows will be essential, enabled by appropriate financing instruments.

In some countries and sub-national regions, poor underlying readiness conditions form a barrier to at-scale NDC forest finance which financing instruments will not be able to overcome. Deep market and political risks, poor legal and regulatory conditions, and insufficient institutional commitment and capacity can constitute an insurmountable barrier to at-scale finance, whether via bonds or other instruments. A number of countries and sub-national regions continue to suffer from such an underlying lack of readiness. In these cases, pure public funding may first be required to create these readiness conditions.

Nevertheless, there appears to be a critical mass of countries and regions, including Brazil, that have achieved a sufficient level of readiness, and where the major challenges to scale lie in government fiscal constraints and the currently available terms of commercial and climate finance. Policymakers in these countries are seeking more integrated approaches that would increase the volume of finance and provide flows of higher quality and stability, and at lower costs. In particular, they have emphasized the need to tap capital markets to finance NDCs and other pathways for forest protection and restoration.

In countries that have achieved reasonable underlying readiness, the deficit in NDC-related forest financing results from a number of well-documented challenges, which in broad terms boil down to two fundamental gaps between different counterparties. First, the risk-adjusted return that most forest-based NDC activities (whether private or public sector) can offer is lower than what private investors or public funders are willing to accept. Second, the carbon price attractive to most emission reduction providers (or “recipients”), given the underlying risk of (not) generating emissions reductions, is higher than what potential donors are willing to pay.

From the perspective of private sector developers, the challenge is one of insufficient commercial return, and the inability of current carbon prices to close the gap. From the perspective of governments, the challenge is that forest-based NDC activities have lower economic returns and come at greater fiscal cost than business as usual over the short-to-medium term (World Bank 2016b). This limits the ability of governments in both undertaking public NDC activities and creating carbon price signals that would result in greater finance for private sector activities, such as sustainable forest management or improving the productivity of agriculture alongside conservation.

These challenges limit the availability of finance for forest-based NDC activities, which are locked in a corresponding double bind. On the one hand, the economic or commercial returns from NDC activities are not attractive or certain enough to drive large-scale project or program development under current financing mechanisms and modes of support. Those public and private actors (or potential actors) in the forest-related land use sector simply do not feel confident enough that the scale of PBP will be sufficient to offset sub-commercial returns, or to ensure better economic returns than those offered by other public-spending priorities. On the other hand, the pipeline of developed projects or programs that meet financing requirements is too shallow to garner the larger-scale commitments from donors and financiers required to improve economic or commercial returns. Some donors already have large REDD+ (Reducing Emissions from Deforestation and Forest Degradation) funding commitments, yet they are hesitant to push more aggressively owing to the slow disbursement rate and mixed performance results to date.

The most attractive instruments for catalyzing greater finance will be those that can best mitigate these underlying challenges, and overcome this double bind. This can be achieved through mechanisms that lower the cost of capital for public or private actors undertaking forest-based NDC activities, improve the overall risk-adjusted rate of return to those activities, or provide greater certainty and value for money for donors. This report identifies six underlying improvement mechanisms from the perspective of different counterparties, and assesses the attractiveness of the proposed bond structures against their ability to deliver these.

From the perspective of issuers and investors, an improved bond structure would: i) increase the rate of return – for example, by improving the level or certainty of expected revenue streams associated with the use of financing; ii) reduce credit risk – for example, by lowering the risk of default, improving the timing and liquidity of revenues, or enhanced recourse mechanisms; and iii) reduce the transaction costs associated with identifying appropriate activities, carrying out due diligence, and monitoring performance. Such improvements would aim to ensure that investors can achieve their required market rates of return, and hence ensure that issuers can raise capital at lower cost and sufficient scale.

From the perspective of donors and recipients, providing PBP streams for future performance to support an NDC bond would: i) increase value for money through efficient leverage of private capital or better targeting of resources to low marginal abatement cost activities; ii) reduce the risk of underuse or unrelated use of PBP, through efficient disbursement and a clear link to future mitigation performance; and iii) achieve low-cost, robust and effective measuring, reporting and verification (MRV), ensuring the “additionality” of projects supported by the proceeds of the bond, and reducing reputation risk from misuse of funds. Such improvements would aim to encourage scaled-up international support (e.g. PBP and upfront grants), which in turn harnesses additional fiscal resources from recipient countries and leverages capital market finance at lower capital costs.

Currently available financing instruments have not proven capable of achieving such improvements and overcoming the fundamental challenges. While a thorough assessment of existing instruments is beyond the scope of this report, a high-level examination of current experience highlights a number of drivers of underperformance. This underperformance affects direct grant payments for emission reductions (not directly blended with financing), non-bond blended finance instruments, as well as unenhanced Green Bonds.

Direct, non-blended PBP schemes leave an upfront funding gap – that is, they do not ensure sufficient investment to achieve the results for which payments would be made. Money is fungible. Governments, public banks or private actors can issue bonds for general budget purposes and in the future receive PBP, without having any explicit link between those payments and the issuing of bonds. Yet unblended PBP schemes to date have not proven as effective as hoped in harnessing forest country public resources or achieving private sector leverage to drive results *prior to* payments being received. Related to this, a number of non-blended PBP schemes have not performed well, with potential funds remaining unused. Even *after* the receipt of payments, funds are often disbursed slowly, and with lower than hoped leverage against other sources of funding. As such, they have not contributed sufficiently to improving the conditions of public or commercial finance for forest-based NDC activities.

Non-bond blended finance instruments, primarily green loan funds, have had difficulty integrating PBP owing to the complexity and costs of project-by-project MRV. Moreover, for some large actors (governments and corporates) with direct access to capital markets, such funds involve high transaction costs relative to their readily available alternatives of self-financing or vanilla bond financing. While for smaller project developers some bank intermediation will be an essential part of the financing chain, blending PBP at the project level imposes a number of inefficiencies. In addition, while such non-bond instruments, often using upfront grant payments, have achieved some leverage, donor willingness to increase such upfront payments for project-by-project loans is limited given the high risk of ineffectual use.

Finally, while bond markets provide the opportunity for much greater scale of financing flows in general, unenhanced “Green Bonds” or “Climate Bonds” do not – and are not designed to – incorporate the type of revenue (public goods subsidy) or credit enhancements necessary to enable at-scale financing for NDC goals. This is evidenced by the small and inconsistent green premiums achieved to date, and the fact that most projects financed today with such bonds are commercial or near commercial, and could have been financed with simple vanilla bonds. As such, some integration of donor support or funding for carbon emission reductions will be pivotal to enabling bond finance at scale, at least in the short run. Yet enhanced bond structures still need to demonstrate improvements in the mobilization of resources for both donors funding the necessary enhancements and issuers taking on the risk of greater scale financing.

This report recommends three *enhanced* bond structures as offering potentially significant improvements on existing financing instruments, best fulfilling the performance criteria that have been set out. In particular, such enhanced bond structures seek to use PBP for future mitigation performance (as a form of climate finance) to attract upfront private capital toward forest-based NDC activities at a much greater scale than might be achieved through currently available financing instruments.

These instruments would offer financing solutions to all key actors – governments, public banks and corporates – and are also potentially implementable in the near term.

- 1. National-level or sub-national outcomes for REDD+ PBP** – a bond issued by the government with proceeds ring-fenced for the full breadth of NDC forest activities, with or without commercial return. The bond integrates REDD+ PBP alongside a smaller upfront grant to provide credit enhancement to increase issuers’ expected economic return and reduce their cost of capital. Credit enhancement may not be necessary for some countries, especially those with an investment-grade credit rating. However, combining REDD+ PBP with credit enhancement could in some circumstances be a more

cost-effective way to bring down capital costs. The upfront credit enhancement also reduces the issuer's risk, and hence increases their willingness to take on leverage. The bond provides donors with greater certainty that PBP will achieve an increase in forest-based mitigation action by the government, effectively mobilizing domestic resources.

2. **REDD+ PBP to support concessional lending** – a bond issued by a sovereign-backed public bank with proceeds usable for concessional lending that supports NDC forest activities with sub-commercial returns. The bond integrates REDD+ PBP, channeled from the government to the public bank, to allow the bank to provide concessional finance to landowners implementing activities that increase forest-related mitigation, while still achieving the bank's target return on capital. This structure again includes a smaller upfront grant from donors to contribute to the cost of credit enhancement. The bond provides donors with greater certainty that PBP will achieve an increase in forest-based mitigation action through a well-established financing institution.
3. **Corporate sustainable forest management bond issued via a special purpose vehicle (SPV)** – a privately issued bond with proceeds usable for a relatively narrow set of large-scale NDC forest activities with sub-commercial return (e.g. sustainable forest management). The bond integrates REDD+ PBP, channeled from the government to the SPV, to enhance issuers' expected return on investment. It also includes a smaller upfront grant to support credit enhancement through subordinate debt into the SPV. The bond provides donors with greater certainty that PBP will achieve an increase in forest-based mitigation action through well-defined, at-scale activities.

For all three bond structures, the fundamental dynamic of performance improvement is similar:

- *the issuers (whether forest country government, public bank or private company)* take on more risk and transaction costs than they do today by committing large pools of funding at relatively low financial (or social) return, to achieve uncertain emissions reductions; while
- *the donors* offset some of this risk and transaction cost by committing to PBP at a pre-agreed price, and potentially supplementing this with a small upfront grant toward credit enhancement;
- *the investor* is provided with the simplest financial instrument possible that meets market requirements for risk-adjusted returns, primarily through a suitable combination of coupon and credit rating.

It is also hoped that this will drive a virtuous cycle in which issuers deepen their capacity to identify and manage NDC-related projects pushing greater underlying efficiency, while donors feel more confident in the value for money of their payments and hence increase the size of those commitments.

The first bond structure increases the capital deployed by governments toward forest-related mitigation activities, and could be used for the widest breadth of activities, including the direct expansion of protected areas and technical assistance programs; the expansion of public capital to financing institutions for concessional credit or other financing instruments; and the expansion of payment for ecosystem services incentives to project developers. The second structure would more directly focus on the expansion of public capital to financing institutions. In both cases, expanding such activities would then further leverage private investment “on the ground” from farmers, commercial forestry enterprises, agribusiness and private financial institutions. The third structure would support a

lower cost of capital aimed directly at the project level for large-scale projects, like sustainable forest management.

More complex structures – for example those featuring variable coupons or forms of refinancing – can add costs and risks without improving on this fundamental dynamic that makes the simpler bond approaches attractive. However, it is possible that their additional features might be appealing under very specific circumstances, such as if the issuer had additional goals beyond mitigation, or investors were seeking to hedge climate risk within their portfolios.³

Despite the appeal of the three shortlisted structures, a number of more concrete steps are required to test their ability to catalyze large-scale NDC-related forest finance. In particular, this report recommends three critical next steps. These are informed by the assessment of the readiness of forest countries, project developers, investors and donors to support these bonds, and by stakeholder feedback from institutions in Brazil and from the international donor community.

- **Recommendation 1:** Convene interested counterparties into one or more action-oriented working group committed to advancing such bond structures. A working group should include potential issuers from forest countries, donors, and relevant multilateral finance institutions, and potentially private investors and expert advisors. A working group should align around the bond structure of common interest, identify critical issues to be resolved, and agree a process for moving from concept to implementation.
- **Recommendation 2:** Develop one or more context-specific “pilot” bond structure to work through technical issues, including the currency of issuance and optimal bearer of foreign exchange (FX) risk across the issuers, domestic and international investors; the implications of potential debt constraints on issuers; and the exact MRV systems and contractual relationships required to deliver the PBP across the counterparties
- **Recommendation 3:** Develop a detailed financial model of a specific issuance and use of proceeds to investigate the most efficient financial engineering of the bond structure. For example, donor REDD+ PBPs have generally been at US\$ 5/ton of carbon, but negotiations might change this variable. Moreover, for some countries, using a smaller upfront grant to offset the cost of credit enhancement (e.g. from a multilateral development bank) could be effective in broadening the universe of potential investors, lowering the cost of capital, and potentially reducing the required PBP payments.

³ See Annex B for a detailed discussion of these alternative structures.

1. Introduction

This report examines the potential to use new types of bond structures in tropical forest countries as a means of scaling up financing to help meet their nationally determined contributions (NDCs). It focuses on bond structures that blend international support, such as REDD+ (Reducing Emissions from Deforestation and Forest Degradation) performance-based payments (PBPs) and other sources of climate finance.⁴ The overarching aim of such “enhanced” bond structures is to catalyze forest-based mitigation actions at scale by increasing both the effectiveness with which payments for emission reductions are applied, and the efficiency with which private financing is obtained.

This report builds on two supplementary World Bank reports. The first (World Bank 2016a) highlights, for example, that US\$ 2 billion per annum is the estimated financing required to meet Brazil’s restoration targets. While this may seem achievable considering that this sum represents only 1–2% of total public expenditure for agriculture credit, it is the types of investment required that present some challenges. In particular, return on investment from reforestation and forest restoration projects will be much lower than the returns required by commercial investors for a similar risk profile. In addition, the NDC targets the restoration of 15 million hectares (Mha) of currently degraded pasture to expand agricultural production on existing farmland rather than in forest areas. The report highlights the importance of more ambitious targets for deforestation than simply “no illegal deforestation”. In light of this financing challenge, the World Bank has produced a second report analyzing the extent to which the bond markets are currently contributing to forest finance globally.

This second report (World Bank, 2016b) examines the potential role of unenhanced Green Bonds – without any blending of public funding – in meeting forest-based NDC targets. The report focuses on the appropriateness of such bonds as a financing vehicle for forest finance, and whether green certification improves the terms (e.g. reduces the cost) of such financing. It highlights a number of important challenges to bond financing for forest-based NDC activities, and finds minimal net value of certified Green Bonds in reducing the cost of capital. However, the report also recognizes the limitations of its scope of analysis, and highlights the need for additional research looking at *enhanced* bond structures. The issues raised and recommendations made by these supplementary reports serve as an important starting point for this analysis.

This report draws on a number of other reports that have looked at various aspects of this issue. These include studies that consider the importance of forest-based NDC activities, and the underlying challenges; as well as work proposing various potential financial innovations that could help catalyze NDC-

⁴ The term “performance-based payment” (PBP) is used to broadly refer to the delivery of a pre-determined level of funding from one party to another in exchange for a given quantity of verified emission reductions (VERs). A level of payment per unit of VER is agreed in advance such that the overall funding increases with the level of emission reductions verified. Several different certification procedures are operational but common features include the establishment of a reference emissions level agreed between both parties; regular collection of data on mitigation activities; and the provision of this data to a certification agency. The UN Framework Convention on Climate Change (UNFCCC) sets strict guidelines for such a payment to qualify as REDD+. Throughout the report, PBP is used to refer to payments from any party to any other for VERs, and hence includes, but is not limited to, UNFCCC REDD+ payments. Hence the report does not prescribe set rules for certification or the transfer of ownership of the VERs.

related finance at scale (Birdsall et al. 2015; Edwards et al. 2014; Nepstad et al. 2015; Seymour & Busch 2016).

As such, this report seeks to make two important additional contributions. First, it clarifies the potential role and limitations of enhanced bond structures in scaling up forest-based NDC activities in the context of a shortfall in existing financing flows. Second, it proposes a series of bond structures and discusses what it would take to make such structures viable options for the primary counterparties – issuers, investors, donors and other funders of carbon emission reductions.

While the structures and recommendations of this report are applicable globally, Brazil is used as a case study to describe and test the opportunity. The focus on Brazil follows a request from the Brazilian government to the World Bank to explore the concept of a Forest Bond and its potential to finance NDC-related forest investments. However, the analysis supporting the report was conducted in such a way that it is also relevant to other tropical forest countries.

The remainder of the report is structured as follows.

- Section 2 sets out the context for this report, reviewing the major challenges to NDC-related forest finance with reference to the points raised in the supplementary reports.
- Section 3 reviews the underlying readiness of tropical forest countries for at-scale NDC-related forest finance, to examine the broad feasibility of such aspirations in the near-to-medium term.
- Section 4 reviews the shortcomings of existing instruments for catalyzing NDC-related forest finance at scale, as a basis of comparison for potential enhanced bond structures.
- Section 5 describes the initial longlist of enhanced bond structures, and provides the rationale for selecting the shortlist.
- Section 6 describes the shortlist of the three most promising bond structures (structures 1, 2 and 8 from the longlist of ten), with a detailed assessment of their strengths and weaknesses.
- Section 7 summarizes stakeholder feedback and aspects for consideration in implementing the proposed shortlisted bond structures.
- Section 8 summarizes the main recommendations, and suggests next steps.

2. The Need for Greater NDC-related Forest Finance

2.1 The shortfall in forest-based activity and finance toward NDC goals

There is no globally agreed standard for what constitutes forest-based action to meet NDC goals. Some forest activities that have been labelled “green” or “low-carbon” (e.g. as part of a Green Forest Bond issuance) would likely fall outside the broader consensus view of what qualifies as meeting the NDCs. Although efforts have been made to establish broadly agreed standards, considerable ambiguity remains about where the line should be drawn, and this report does not attempt to resolve this ambiguity. Nevertheless, for the purposes of this analysis, the report assumes that activities of a relatively high standard are likely to count as meeting NDC goals.

Following from this, forest-based NDC activities differ from standard forest activities as they clearly generate mitigation or adaptation benefits. In practice, carbon sequestration is more often than not the primary benefit of forest-based NDC activities. As a result, the terms of an NDC-related financial instrument can be made contingent on the generation of these benefits, whereas this is not possible with standard forest finance.

Current forest-based action to meet NDC goals appears to be far from optimal. A number of studies have established that: i) the cost of mitigation through forest-related activities is low relative to the current and expected cost of mitigation in other sectors; and ii) the absolute scale of feasible forest-related emissions reductions is large. For example, the Intergovernmental Panel on Climate Change (IPCC 2014) found that up to 9.5 Gt of CO₂e per year could be mitigated through the forestry sector at less than US\$ 50/ton, and another 4.3 Gt at less than US\$100/ton. Moreover, these represent upper-bound estimates for the net cost per ton, as many studies drawn upon by the IPCC did not incorporate the potential commercial revenues associated with these mitigation activities. NDC commitments imply global ambitions of 2.3–3.1 Gt of CO₂e mitigation per year by 2030 from the land use, land-use change and forestry (LULUCF) sector as a whole (Grassi and Dentener 2015). This contrasts with upper estimates for 2014 of approximately 0.9 Gt of CO₂e (FAO 2013; UNFCCC 2016).

NDC-related finance for LULUCF is also far from the estimated requirements. Although there are no precise global figures for both financing needs and current financing levels, the specific example of Brazil points to the extent of the current financing gap. Brazil’s NDC forest commitments account for only 12% of global NDC LULUCF-related mitigation commitments. Yet the estimated funding requirement of US\$10–16 billion is more funding than REDD+ programs had attracted in total (globally) prior to the Paris Agreement (Grassi and Dentener 2015; World Bank, 2016b).

There remains no clear pathway for closing this gap. With constrained public budgets, achieving this scale of financing will require extremely effective use of available climate finance, and the most efficient financing vehicles possible. Accordingly, policymakers and other stakeholders are seeking more integrated approaches that would increase the volume and stability of finance at lower costs. Recently, a broad group of multilateral development finance institutions emphasized the need for continued innovation in developing additional, efficient and effective financing solutions (African Development Bank et al., 2015).

To better define the financing needs and challenges, and to test potential solutions, it is useful to divide forest-related mitigation actions into three broad categories. Although these are only indicative archetypes, they help focus the later analysis of possible financing options:

1. **Public-good project or program activities** – activities which exclusively or predominately deliver GHG mitigation (and possibly other social benefits) with little or no commercial return. These might include public funding for protected areas or for natural reforestation, as well as public schemes to price externalities (e.g. payments for ecosystem services, PES) or to provide publicly available MRV systems. These are most suited to direct government or philanthropic funding through a variety of channels. In some cases, these public incentives serve to incentivize (quasi-) commercial activities (as below).
2. **Large-scale quasi-commercial activities** – activities that deliver mitigation benefits alongside significant commercial returns through relatively large projects involving larger companies. Third-party finance may come from a lending institution, or directly from a share or bond issuance.
3. **Small-scale quasi-commercial activities** – activities that deliver mitigation benefits alongside significant commercial returns through relatively small projects, predominantly involving small producers. Third-party finance is generally through lending institutions, usually with some form of public subsidy.

In addition to these direct mitigation activities, there are a number of underlying public-good-enabling activities that create the necessary environment for emission mitigation activities, and more broadly for land-use-related commercial investments. These activities do not in themselves deliver emission reductions, but are generally a necessary condition for such activities. This might include regulation related to land titling, land-use zoning, or to the creation of markets for emissions reduction trading.

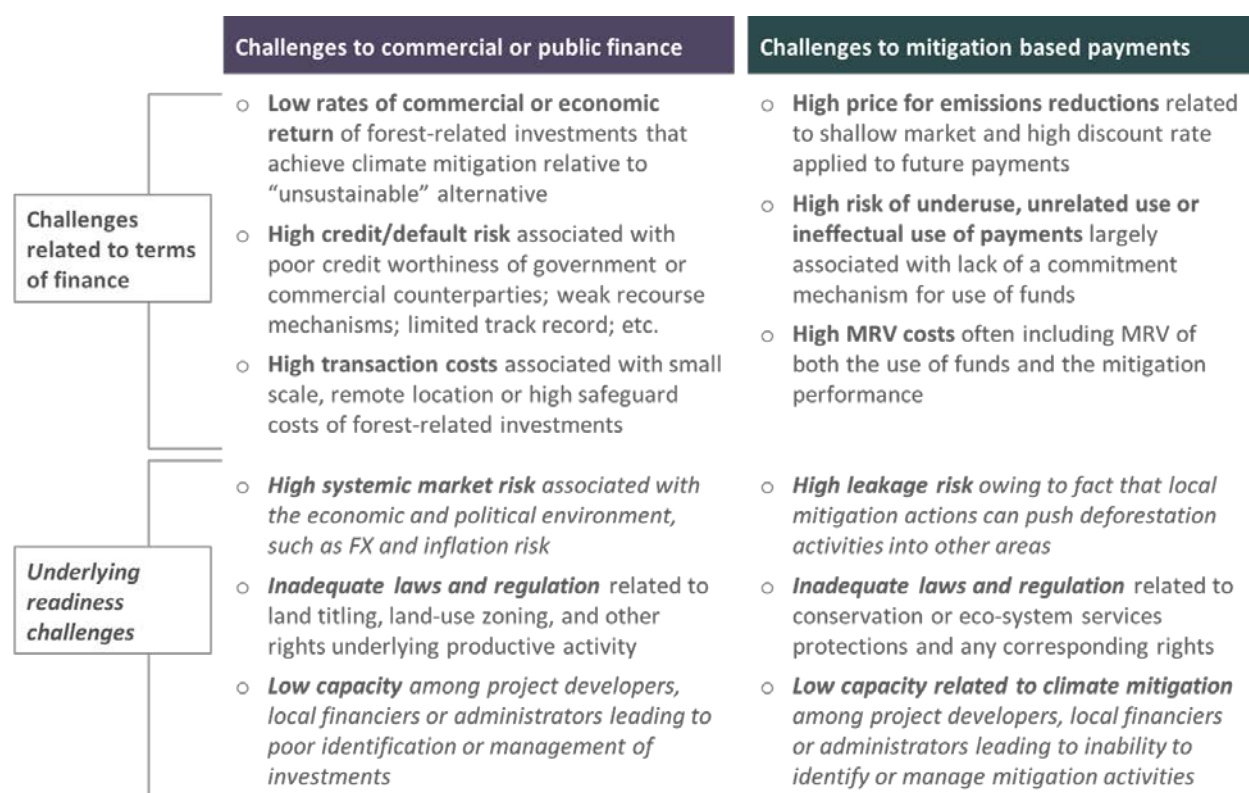
2.2 The challenges to NDC-related forest finance

NDC-related forest finance suffers from a number of well-documented challenges, which in broad terms boil down to two fundamental gaps between different counterparties. First, the risk-adjusted return that most forest-based NDC activities (whether private or public sector) can offer is lower than what private investors or public funders are willing to accept. Second, the carbon price attractive to most emission reduction providers (“recipients”), given the underlying risk of (not) generating emission reductions, is higher than what potential donors are willing to pay. While many investors and donors will characterize this situation in terms of an “insufficient project pipeline”, and many (potential) climate finance recipients and project developers will characterize it as “insufficient available funding”, these phenomena can be considered as results of these two fundamental gaps.

From the perspective of private sector developers, the challenge is one of insufficient commercial return, and the inability of current carbon prices to close the gap. From the perspective of governments, the challenge is that forest-based NDC activities have lower economic returns and come at greater fiscal cost than business as usual over the short-to-medium term (World Bank, 2016b). This limits the ability of governments both to undertake public NDC activities and to create carbon price signals that would result in greater finance for private sector activities, such as sustainable forest management or improving the productivity of agriculture alongside conservation.

To better differentiate the challenges faced by NDC-related forest finance, Figure 1 lays them out under these two headings. The report will later use these as performance criteria to assess the relative attractiveness of different climate finance and commercial financing solutions (whether separate or blended). That is, those solutions that better address these challenges can be said to perform better; and the relative strengths and weaknesses of different solutions can be pinpointed against specific challenges.

FIGURE 1: CHALLENGES TO NDC-RELATED FOREST FINANCE



Source: Vivid Economics; Cranford et al. (2011); World Bank (2016b)

Taken together, these challenges limit the availability of finance for forest-based NDC activities, which are locked in a corresponding double bind: i) the economic or commercial returns from NDC activities are not attractive enough to drive large-scale project or program development under current financing mechanisms and modes of support; while ii) the pipeline of developed projects or programs that meet financing requirements is too shallow to garner the larger-scale commitments from donors and financiers required to improve economic or commercial returns.

Although these challenges tend to affect all types of forest-based NDC actions and investments, a number of broad differences are worth noting.

- 1. Public-good project or program activities** will involve large-scale funding requirements, but will not involve (significant) direct revenue streams in the absence of a carbon price, meaning that the financing challenge falls heavily on the government’s credit rating. Similarly, the aim of the government (as the recipient of international NDC financing) is “economic” or “social” return, often defined differently by different stakeholders, which can make it difficult for even government recipients themselves to determine the acceptable carbon price. Transaction costs are relatively inconsequential.
- 2. Large-scale quasi-commercial activities** will generally face the greatest challenge in relation to generating sufficient revenue and financial return, especially in the face of alternative uses of land and capital. Credit risk is sometimes an issue, but a relatively smaller concern. Similarly, while

transaction costs are not trivial, they are relatively small for larger projects. In fact, for many project developers, access to sufficient capital is not a major constraint, and some already have relatively easy access to bond markets.

3. **Small-scale quasi-commercial activities** face the broadest set of challenges, with credit risk and transaction costs representing major issues. These activities can also be most significantly affected by broader capacity issues – for example, smaller producers or project developers will generally face greater challenges in overcoming broad market risk. As a result, these activities often face problems accessing finance, and financing is heavily intermediated by locally located banks.

Some of the challenges to NDC-related forest finance concern fundamental readiness levels, which are beyond the scope of what even a blended financial instrument can overcome. These are denoted in italics in Figure 1. Overcoming these challenges requires the type of public-good-enabling activities referred to above. Such activities do not require large amounts of funding per se, and hence do not primarily rely on unlocking large-scale finance. Rather, they depend on convincing stakeholders (mostly public sector actors) of the net positive “economic” or “social” return associated with establishing such enabling conditions. At the same time, were NDC-related forest finance at-scale deemed more likely, it would certainly strengthen the economic case for policymakers.

These readiness issues are a barrier not only to the use of bonds, but also to the implementation of any form of at-scale forest finance (whether bond or otherwise). World Bank (2016b) highlights some of these fundamental readiness issues with regard to the challenges to commercial or public finance. The following section extends this list to cover the challenges of particular relevance to mitigation-based land-use activities and associated PBP.

Since a basic level of readiness precludes the use of any enhanced bond structure, section 3 considers readiness levels for mitigation-based payments across several key tropical forest countries. In particular, it considers how significant a challenge leakage risk⁵ and capacity related to climate mitigation, as defined above, pose to at-scale forest finance.

⁵ “Leakage risk” refers to the possibility that forest-based actions to reduce GHG emissions in one geographic area simply push high-emissions activities into another geographic area, (partially) cancelling out the expected benefits of the original forest-based mitigation action. Adequate laws and regulations across a jurisdiction can help reduce leakage risk, but only global restrictions on forest-based emissions (e.g. laws and regulations in every jurisdiction in the world) can ensure no leakage.

3. The Readiness of Forest Countries for Mitigation-based Payments

3.1 Definition of readiness

While the design of a financial instrument determines its potential for scale, so does the underlying context in which it is deployed. Even the most promising NDC-related bond structure will fail to gain traction if basic readiness conditions are not met in the target geography.

As discussed in section 2, World Bank (2016b) identified two underlying readiness challenges that prevent commercial finance for NDC-related forest investments at scale: market risk and absorptive capacity. Market risk encompasses systemic risks related to prevailing market (as opposed to project) conditions which negatively impact the expected risk-adjusted return of NDC investments outside of the control of those undertaking the investment (whether public or private sector). Absorptive capacity issues reflect the fact that project developers, financial institutions or administrators lack the technical or financial capacity to manage an investment of the required scale and complexity. This might be due to underlying skills or institutional gaps affecting the entire country or region.

This report complements that assessment by considering readiness challenges that prevent at-scale mitigation-based donor finance for NDC-related forest investments. This assessment considers a small but broadly representative sample of tropical forest countries, with a particular focus on Brazil.

The analysis frames the discussion of the performance criteria of enhanced bond structures in section 4 by demonstrating:

- how a country’s “readiness” can support mitigation-based payments; and
- how “ready” key tropical forest countries could be in the short-to-medium term.

Following from section 2, one can define three enabling conditions associated with leakage risk and inadequate laws and regulations related to land-use; and three enabling conditions associated with capacity related to climate mitigation.⁶ These conditions are not exhaustive, but capture the most important determinants of whether a country or region is ready for mitigation-based payments.

- **Leakage risk and inadequate laws and regulations related to land-use and climate mitigation:**
 1. *legal and regulatory conditions*: planning processes and underpinning laws which govern land-use;
 2. *integrated landscape management (ILM) approaches*: multi-stakeholder efforts to develop specific interventions which support compliance with land-use laws and minimize leakage;
 3. *measuring, reporting and verification (MRV) systems*: data collection, audit and accountability.
- **Capacity related to climate mitigation:**
 4. *Public finance institutions’ commitments and capacity*: dedicated institutions with demonstrable expertise in relevant sectors, as indicated by successful programs;

⁶ A more detailed definition of each of the enabling conditions is provided in Annex C along with a justification of why it is relevant to supporting mitigation-based payments at-scale.

5. *Private sector commitments and capacity*: private sector commitments to sustainable land-use practices, such as sustainable supply chain assurance, and demonstrated capacity to meet those commitments;
6. *International funding commitments and capacity*: secured lines of public climate finance as well as private financial flows, with institutional capacity to channel that funding.

For each of the six readiness conditions, this report asks the following questions:

- How does this condition support mitigation-based payments?
- How does Brazil’s progress compare with the other comparator countries?

3.2 Brief evaluation of readiness

For the analysis that follows, Annex C provides a more detailed description of Brazil and other countries’ progress against each indicator, including source data. Brazil has a relatively favorable environment across all six readiness conditions, as shown in Figure 2.

FIGURE 2: BRAZIL SCORES EITHER GREEN OR YELLOW COMPARED WITH OTHER TROPICAL FOREST COUNTRIES FOR EACH CONDITION

1. ILM approaches <ul style="list-style-type: none"> Several comprehensive jurisdictional approaches Past reductions in deforestation rates (though recent rise) and credit received Positive lessons learned in the regions of Para and Acre 	2. Legal and regulatory conditions <ul style="list-style-type: none"> Ambitious national policy on climate change, REDD+ strategy and stringent land-use goals in NDC New deforestation regulation yet uncertainty over land tenure and budget cuts inhibit enforcement efforts 	3. MRV systems <ul style="list-style-type: none"> MRV systems recognised as relatively advanced Regular and transparent publication of emissions Innovative satellite monitoring system (DETER)
4. Public finance institutions’ commitments and capacity <ul style="list-style-type: none"> Public banks with agriculture- and forestry-specific expertise could facilitate bond issuance Strong pipeline of sustainable forestry-related investment opportunities 	5. International funding commitments <ul style="list-style-type: none"> Highest level of public international funding for forest-based mitigation; Although only modest when adjusting for forest area FDI flows from private companies are high Slow pace of disbursement relative to other sectors 	6. Private sector commitments <ul style="list-style-type: none"> Relatively ambitious sustainability commitments addressing deforestation from large multinationals in Brazil Little evidence on implementation of commitments Large shares of key commodity production remain uncertified

Source: Provided within detailed descriptions of indicators below

Note: Each condition is graded green, yellow or red. This assessment is made relative to other major forest countries, not on an absolute scale of “readiness”. FDI, foreign direct investment.

1. ILM approaches

- a. *How do ILM approaches support mitigation-based payments?*

Compared with working at the project level, ILM approaches can reduce transaction costs and achieve mitigation outcomes at a greater scale by preventing leakage, particularly in the absence of national

policies or drivers. ILM approaches develop interventions to support compliance with land-use regulations over a large enough region to address leakage concerns, yet small enough to use a limited number of effective levers (Global Canopies Programme 2015). As a result, ILM approaches can enable attractive investment opportunities for the use of proceeds of enhanced bond structures or broader forest financing.

b. How do ILM approaches in Brazil compare with others?

Brazil is the most advanced proponent of ILM approaches among the comparator group, with some benefits and positive lessons learned in the regions of Para and Acre.⁷ Indeed, Acre and São Félix do Xingu, a municipality within Para, saw initial reductions in deforestation rates by 80% following the introduction of ILM approaches, although there has been a recent uptick (Earth Innovation Institute 2015; Fishbein & Lee 2015; WWF 2016b). However, it is too early to conclude whether they have the desired impact on the ground as practical examples are few and far between, not enough time has passed since their introduction, and attribution of impact can be a challenge.

Progress in Acre has been driven by its relatively small size and the coordinated and comprehensive suite of policies. Acre has been receiving compensation for emission reductions from KfW under its REDD+ Early Movers (REM) Programme (Fishbein & Lee 2015). Preliminary analysis suggests that Acre has developed an effective combination of supply- and demand-side policies which give local smallholders both the capacity and incentive to engage in forest restoration activities.

Brazil's National REDD+ Strategy, published in 2015, is set to become Brazil's central jurisdictional approach, with the potential to attract finance that could drive a more comprehensive and complementary set of programs across regions (Brazilian Ministry of the Environment 2016). Since the strategy does not allow the transfer of carbon rights to purchasers of carbon offsets, innovative financing mechanisms are needed to leverage REDD+ opportunities in Brazil.

Among the comparator countries in this study, Peru, Ghana and Indonesia are all exploring several ILM approaches, albeit on a smaller scale than Brazil. In addition, all of these countries have been invited by the Forest Carbon Partnership Facility's Carbon Fund to begin the process of establishing a purchase agreement for emission reduction, indicating potential to achieve significant results in the future.

The region of San Martín is the only example of a sophisticated jurisdictional approach in Peru, although it is still in development. The approach addresses multiple commodities such as beef, coffee, cacao and palm oil, and includes support for command-and-control systems, incentives for adoption of sustainable production systems, and capacity-building programs (Fishbein and Lee 2015).

Integration of regional ILM efforts with parallel national forestry strategies has proven challenging in Indonesia and Peru. The regency of Berau in Indonesia has struggled to coordinate multiple initiatives and levels of government (Fishbein and Lee 2015). San Martín in Peru has needed to incorporate emerging national carbon verification and REDD+ schemes into its approach, which has increased the effort and cost involved, even though it may have benefits in the long term.

⁷ See Annex C for full details of all ILM approaches.

2. Legal and regulatory conditions

a. How do legal and regulatory conditions support mitigation-based payments?

Clear, appropriate and inclusive legal and regulatory conditions encourage investments in the land-use sector which can generate mitigation benefits while preventing leakage. The planning processes and underpinning laws which govern land-use are key determinants of high-quality project pipelines. They determine how land should be used and by whom, how this is incentivized, and how policies are enforced. Regulatory conditions also recognize and protect the rights of landowners, investors, and local communities, ensuring that investments and mitigation activities are sustainable.

b. How do legal and regulatory conditions in Brazil compare with others?

Brazil has achieved great success in deforestation reduction and is now implementing its ambitious national policy on climate change and well-coordinated and inclusive national REDD+ strategy.⁸ Land-use management in a country with large territorial areas of forest and farming lands requires relatively sophisticated legislation that needs constant improvement of enforcement and administration capacity. For example, despite having laws regulating land tenure, there is still a lack of clear property rights which encourages land-grabbing and conflict, and blunts the effectiveness of key land-use regulations (GiZ 2017).

The Forest Code is the cornerstone of Brazil's national command-and-control regulations. The original Forest Code of 1965 established a minimum proportion of rural land that should be maintained permanently as forest, and prohibited the clearing of vegetation in sensitive areas (WWF 2016a). A number of changes were made to the Forest Code in 2011 to address poor compliance (Earth Day Network 2015; The Woods Hole Research Center 2014; WWF 2014, 2016a). These included strengthening institutional accountability and establishing the Environmental Rural Cadastre (CAR), which will be the basis for adjusting compliance and monitoring in the future. Setting aside jurisdictional issues, states and the federal government will jointly manage the adjustments to the compliance process, which will require a great deal of financing.

Implementation of the Forest Code could result in as much as 20 Mha of reforestation, depending on the extent to which landowners achieve compliance through reforestation itself or through use of the compensation mechanism such as Environmental Reserve Quota (CRA) quota trading (World Bank 2016a). The World Bank has suggested that full implementation of the Forest Code should be the central element in achieving sustainable land use in Brazil. It also states that forest restoration targets require investments ranging from R\$ 48 billion for 12 Mha to R\$ 85 billion for 20 Mha over 15 years.

Brazil has achieved significant success, although recent budget cuts and coordination difficulties have limited enforcement agencies' ability to act in recent years. Annual deforestation rates in the Amazon biome fell by almost 80% between 2004 and 2014, while agricultural production continued to rise overall. Command-and-control instruments (monitoring and sanctions) contributed almost half of the rate of decline during this period, while the other half was attributed to the worsening economic return from logging and agricultural expansion due to poor transportation facilities and perverse rural credits (Assunção 2015). The deforestation rate, however, subsequently increased between 2015 and 2016,

⁸ Further details of these policy documents are provided in Annex C.

although it is still 70% lower than in 2012 (Brazilian National Institute for Space Research 2016). This upwards trend can be explained by the national political crisis which has pushed deforestation down the political agenda and cut the federal budget for deforestation control by 72% (Climate Change News 2016). The diminishing scope of economic instruments for deforestation control has also played a role (Nepstad et al. 2014).

Our comparator countries demonstrate a similar story: legislatures are generally engaged but not all the incentives are in place to generate effective processes for enforcement. Peru and Ghana have both made considerable progress on land-use regulation, as reflected, for example, in Peru's Forest and Forest Fauna Law and Regulation, finalized in 2015. Both countries have also ensured that the forestry sector is a priority in their climate change strategies.⁹

In Indonesia, key legislation is complicated and in places counterintuitive. Although forestry has received considerable attention in Indonesia, issues concerning incentives and tenure have hampered progress on the ground. The coverage and enforcement of a moratorium on new forestry licenses and the development of peat land have been stifled by excessive exemptions and regulatory work-arounds (Grantham Research Institute et al. 2015).

3. MRV systems

a. How do MRV systems support mitigation-based payments?

Strong and credible MRV systems are essential pre-conditions for mitigation-based payments and to manage leakage risk. An accurate and accessible MRV system (including reference levels) is critical to identify and compensate emissions reductions. This requires developing data collection capacity and assigning responsibility for ongoing MRV management within government. Measurement systems must be transparent, replicable and regularly audited, and require both technical and administrative capacity. Moreover, they must cover appropriate geographies to ensure that jurisdiction-level leakage impacts are captured.

b. How do MRV systems in Brazil compare with others?

Brazil's forest-related MRV systems are among the most advanced across all tropical forest countries. This is underpinned by a national government which places a relatively high priority on MRV, and the forest sector in general. As a result, Brazil's MRV strategies have historically been ambitious and well-funded.

Brazil has made good progress on technical MRV systems. It has implemented systems to collect and manage remote sensing data, established a national forest inventory, and has begun work to estimate country-specific emissions factors (Ochieng et al. 2016). In addition, the satellite-based Real Time System for Detection of Deforestation (DETER) enables frequent and quick identification of deforestation hot spots. Improvement in monitoring was identified as one of the main drivers of the 2000s-deforestation slowdown (Assunção et al. 2013; Nepstad et al. 2014).

⁹ For full details of the comparator countries' performance, see Annex C.

The administration of Brazil’s MRV system is also reliable and efficient. All datasets and methodologies are publicly disclosed through an online portal – as are MRV results – generally within less than a week of data acquisition (Ochieng et al. 2016).

Other tropical forest countries have struggled to achieve technically advanced methodologies in combination with reliable administration. While Indonesia has made considerable technical progress with its MRV system, its methodologies and results are not fully transparent, and hence not fully credible. MRV systems in Peru and Ghana are still under development as “readiness” programs continue (Ghana Forestry Commission 2015; Ochieng et al. 2016). Both countries have developed generic methodologies, based on globally available tools, and have begun to build deeper expertise at the national and sub-national level. However, they have not yet fully leveraged their broader expertise – for example, in the area of remote sensing. Neither Peru nor Ghana use country-specific emissions factors, leading to a greater level of inaccuracy (Ochieng et al. 2016). In addition, systems are yet to fully integrate REDD+ or land-use emissions into wider GHG accounting, which could potentially offer useful lessons.

4. Public finance institutions’ commitments and capacity

a. How do public finance institutions’ commitments and capacity support mitigation-based payments?

Dedicated sectoral financial institutions signal the importance of the forest (land-use) sector in a country and are likely to have considerable capacity to manage flows of forest finance. They indicate the presence of both investment opportunities and the available funding sources these can be matched with. A dedicated finance institution is well placed to assess project viability, can form an efficient vehicle for forest finance, and may even support or undertake Forest Bond issuance.

Existing publicly funded reforestation programs demonstrate this capacity. The success of publicly funded reforestation programs signals progress on a number of dimensions:

- First, it demonstrates that there is (at least some) public financial capacity for reforestation, although this will be much less than the scale required to support NDC-related forest investments.
- Second, it demonstrates that governments have at least basic administrative and technical capacity to implement and manage land-use policies.
- Third, it demonstrates an ongoing relationship with private sector actors in the forestry sector.

b. How do public finance institutions’ commitments and capacity in Brazil compare with others?

Three strong public banks demonstrate potential capacity to manage PBPs and some commitment to operating in the forestry and related sectors. This capacity is evident from the large number of successful programs which extend credit to project developers undertaking activities similar to those required under Brazil’s NDC. All three have adopted sustainability principles.

Banco do Brasil has a proven track record in agribusiness and forestry-related projects. Banco do Brasil is the biggest bank serving the Brazilian market by assets under management. It offers successful public rural credit lines with socioenvironmental features such as the National Program for the Strengthening of Family Farming (PRONAF), and the Low Carbon Agriculture Program (ABC), and the Sustainable Rural Project (Banco do Brasil 2011, 2015). These all provide financing to support the adoption of low-carbon technologies or sustainable practices.

While Caixa Econômica (2017), the third largest bank in Brazil by assets, does not have an explicit focus on agriculture or forestry, it has experience in lending to agents active in these markets. Caixa operates as a strategic partner of the federal government in the infrastructure, housing, and sanitation sectors. It also operates public rural credit lines with socioenvironmental features, although at much smaller scale than that of Banco do Brasil.

The Brazilian Development Bank (BNDES), Brazil's primary public investment bank, manages the Amazon Fund, which raises finance for combating deforestation and the sustainable use of the Amazon biome forests (BNDES 2016). Donations to the Fund are made through mutual agreements with international donors based on the Amazon's past performance in reducing deforestation rates. Box 1 provides additional information on the current status of the fund. Although performance is jurisdictionally measured, the fund itself allocates finance on a project basis within broad categories of conservation activities. This could pose a challenge to financing jurisdictional approaches. In addition to managing the Fund, BNDES raises additional finance, selects projects, and monitors project progress.

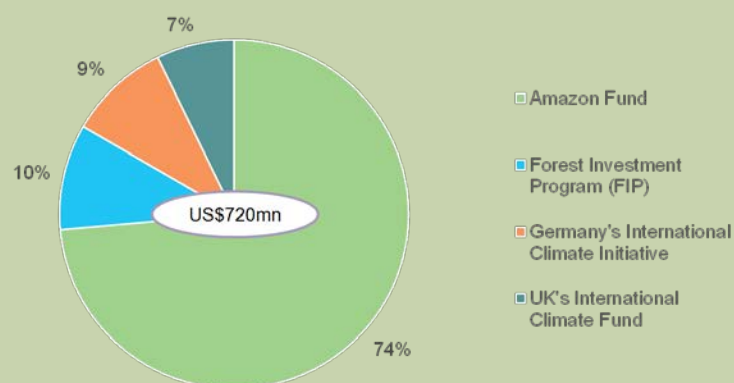
Box 1: THE AMAZON FUND

The Amazon Fund aims to raise donations for non-reimbursable investments in efforts to prevent, monitor and combat deforestation, as well as to promote the preservation and sustainable use of forests in the Amazon biome. To date, more than US\$ 1.7 billion has been committed to the Fund from the governments of Norway and Germany, as well as Petrobras (Amazon Fund 2017a; Climate Funds Update 2016). US\$ 1.1 billion of this has been deposited in the Fund.

The Amazon Fund supplies the majority of forest finance to Brazil and the variation in project scope is wide. Figure 3 shows that 74% of the funding approved for forestry projects in Brazil is from the Amazon Fund (Climate Funds Update 2016). Projects include:

- supporting the implementation of the CAR;
- funding the Green Municipalities program;
- developing sustainable value chains for non-wood forest products;
- technological research and development;
- dissemination of sustainable forest management techniques;
- monitoring and enforcement capacity building;
- preventing and fighting forest fires;
- developing and maintaining the national forest inventory;
- promoting low-carbon agricultural production techniques.

FIGURE 3: THE AMAZON FUND IS THE MAIN PROVIDER OF PUBLIC INTERNATIONAL FOREST FINANCE IN BRAZIL



Source: Climate Funds Update (2016)

Note: Data correct as of September 2016 – the last date at which climate funds were reported to Climate Funds Update.

Capacity varies across other tropical forest countries. While the “big four” public banks in Indonesia account for approximately one-third of all assets in the banking sector, demonstrating clear financial capacity, institutions in other countries are less dominant (UNEP Inquiry, 2015). An IMF (2016) assessment of public investment management in Peru commented that public institutions score exceptionally well in the area of financial planning, more modestly in resource allocation, and poorly in project implementation. Efforts to strengthen public financial management in Ghana have been limited by “significant institutional, policy, and system weaknesses” (World Bank 2015). Across Peru, Indonesia and Ghana, public financing institutional capacity in relation to sustainable agriculture or forestry-related investments is particularly weak relative to capacity in other sectors.

5. International funding commitments and capacity

a. *How do international funding commitments and capacity support mitigation-based payments?*

International funding commitments help finance mitigation projects directly, support ‘readiness’ activities and develop capacity, and signal high-quality projects. Funding commitments to forest activities are a sign that institutions or projects meet donors’ standards and that there are suitable recipients of mitigation-based payments. If commitments to readiness activities have been made, donors have identified potential for mitigation-based payments within the country, and financial resources exist to make progress on broader readiness conditions.

The level of private financial flows for commercial forestry activity also provides additional information about how attractive the broader investment environment is. This will help attract other forms of finance to support mitigation projects.

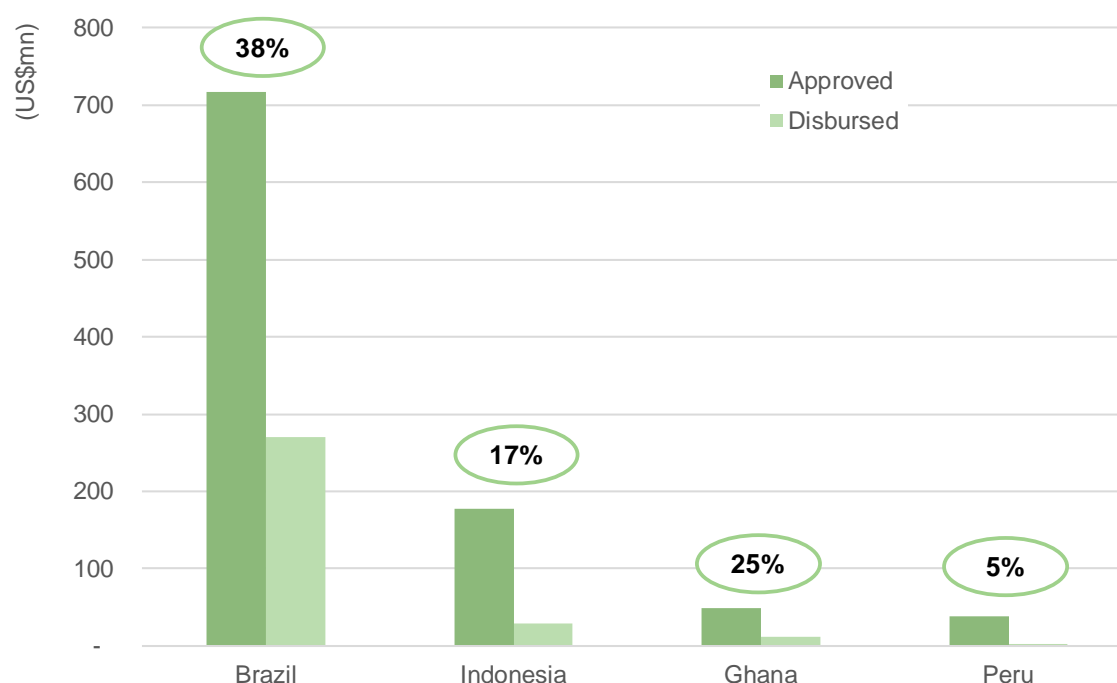
b. *How do international funding commitments and capacity in Brazil compare with others?*

Brazil has been the largest recipient of international public forest funding globally, although this funding is relatively modest considering the national forest area. To date, US\$ 720million has been approved for forestry activities in Brazil from national, bilateral and multilateral climate funds (Climate Funds Update 2016). The Amazon Fund has supplied 74% of this funding out of the US\$1.1 billion deposited into the fund largely in the form of PBP. However, this equates to only US\$ 1.5/ha of forest area – a relatively modest figure across the comparator group.

As Figure 4 shows, only 38% of Brazil’s approved finance has been disbursed to projects. Brazil’s disbursement rate is relatively high among the comparator countries, and is within the top third of all countries covered by Climate Funds Update (2016). Low levels of disbursement may indicate issues with project implementation such as securing partners and co-finance, although this is difficult to disentangle from administrative delays from financiers and other factors.

FDI flows to Brazil’s forestry sector are high relative to similar countries, but most assets are domestically owned. Brazil has the largest amount of foreign-owned forest land in Latin America, with 0.6 Mha owned by Timberland Investment Management Organizations (TIMOs), and a further 1 Mha owned by primary producers in the forest industry (RISI 2016). This is over three times larger than the total for Africa. However, FDI from TIMOs still accounts for approximately only 20% of all planted forest area in Brazil. In response to increased FDI in the forestry sector, in 2010 the Brazilian government placed a restriction on land purchases by foreigners, allowing domestic companies to gain market share.

FIGURE 4: BRAZIL'S LEVEL OF APPROVED FUNDING AND DISBURSEMENT RATE ARE RELATIVELY HIGH



Source: Climate Funds Update (2016)

Note: Data correct as of September 2016 – the last date at which climate funds were reported to Climate Funds Update.

While some comparator countries have received less international public forest funding than Brazil in absolute terms, they fare better after adjusting for national forest area. Indonesia, Peru and Ghana have all secured less than US\$ 200 million to date (Climate Funds Update 2016). However, relative to forest area, this is equivalent to US\$ 5.2/ha and US\$ 1.9/ha in Ghana and Indonesia respectively. Moreover, Indonesia set up a REDD+ PBP deal with Norway in 2010, with potential payments of up to US\$ 1 billion (similar to the Amazon Fund), even though it has secured only US\$ 60 million in actual payments owing to sub-optimal performance. Peru has set also set up a REDD+ PBP arrangement with up to US\$ 300 million in potential payments from Norway.

Disbursement rates were lower than Brazil in all other comparator countries. This was most pronounced in the case of Peru, where only 5% of approved funding had reached project developers (Climate Funds Update 2016).

6. Private sector commitments and capacity

a. How do private sector commitments and capacity support mitigation-based payments?

Supply chain commitments demonstrate that private sector firms are searching for alternatives to unsustainable producers and may be willing to pay a premium for sustainable intermediary products. This creates pressure further up the value chain for primary producers to switch to sustainable forms of production, thereby generating suitable project opportunities for mitigation-based payments.

The degree to which the private sector engages in sustainable land-use practices, such as sustainable supply chain assurance, provides an indication of both:

- **willingness** – companies see value in ensuring production methods are sustainable whether this is driven by internal motivation or consumer demand; and
- **capacity** – companies are able to employ these methods while remaining profitable.

b. How do private sector commitments and capacity in Brazil compare with others?

Brazil has relatively high levels of sustainable product certification, yet there is still room to grow. Nearly half of all palm oil production in Brazil is Roundtable on Sustainable Palm Oil (RSPO)-certified, and over 80% of planted forest areas are Forest Stewardship Council (FSC)-certified. These relatively high shares suggest that private sector organizations are actively responding to end-consumer demand for sustainability assurance (Food and Agriculture Organization of the United Nations 2017; FSC 2016; RSPO 2015).

A relatively high number of multinationals operating in Brazil have made public commitments to sustainable supply chain assurance, signaling intent but not necessarily action. These mainly focus on timber and cattle, two of Brazil's most important export commodities. Most commitments are relatively stringent, requiring all commodity production to be deforestation-free and certified as conforming to international standards or similar (Supply Change 2017). However, as supply chains contain numerous and intricate relationships, commitments are difficult to disentangle, monitor, and consequently pass judgement on (Nepstad et al. 2014).

Much lower levels of product certification are seen across the comparator group. Approximately 20% of palm oil is RSPO-certified in Indonesia and Ghana – roughly half that in Brazil (Food and Agriculture Organization of the United Nations 2017; FSC 2016; RSPO 2015). Between 40% and 60% of palm oil production in Indonesia and Peru is certified. In Ghana, this figure is less than 5%, indicating that private sector organizations are not actively pursuing sustainability agendas.

3.3 Implications for the analysis

Countries face common issues in developing their readiness for at-scale mitigation-based payments. Uncertainties regarding land tenure rights have blunted enforcement efforts across many of the countries examined. MRV systems are typically opaque and suffer from long lag times from data acquisition to publication. Excluding the case of Brazil, even when considerable sums of international finance have been received, it appears that institutions struggle to disburse it in a timely manner.

As Brazil continues to develop its readiness for at-scale mitigation-based payments, it may pave the way forward for others. Although tropical forest countries are at very different stages of readiness, the similarities between the problems they face suggest that common solutions can be found. As a relative leader in this field, experiences in Brazil may well provide guidance on how best to improve readiness in other countries.

Drawing together this assessment of climate (or mitigation-based) finance readiness with the assessment in World Bank (2016b) of broader commercial readiness shows a glass half-full and half-

empty. Of the four countries examined here, Brazil has the highest climate finance readiness level, yet credit ratings are higher in both Peru and Indonesia (S&P Global, 2017). Indeed, Brazil has a higher country risk rating than both Peru and Indonesia, reflecting the ramifications of the recent economic and fiscal crises (World Bank 2016b). Ghana, and Africa more broadly, remains the furthest behind in general, although some sub-national jurisdictions in Africa may have readiness levels comparable to countries in other regions.

In broad terms, if enhanced bond structures featuring mitigation-based payments are feasible in Brazil (the country for which feasibility is examined in most detail), it seems likely that such structures could be feasible in a significant number of other tropical forest countries in the short-to-medium term. Indeed, even in Ghana, which scored lowest in both commercial and climate finance readiness levels, there are clear “green shoots” and efforts to improve readiness levels. This further motivates the focus on Brazil in the remainder of this report.

Section 4 develops performance criteria against which potential enhanced bond structures can be assessed. This is directly informed by the analysis on readiness conditions above to ensure that structures are judged: i) solely on how well they meet challenges related to the terms of finance and not related to external readiness; and ii) on their broad feasibility given readiness levels in the short-to-medium term.

4. The Shortcomings of Current Instruments for Scaling Up NDC-related Forest Finance

Although greater flows of NDC-related forest finance are needed, and at least some major countries and regions have established basic readiness, current instruments have a number of shortcomings which enhanced bond structures *could* help overcome. Before looking at the possibility of more specific bond structures, this section lays out the basic logic for why enhanced Forest Bonds might be worthwhile, and what they offer which current instruments do not.

This report is concerned with the financing of forest-based NDC actions, and focuses on the blending (or explicit linking) of emissions mitigation payments into bond structures. As a result, the focus is on generating low-cost capital for governments, public banks or private companies to pursue a broad gamut of approaches to forest protection and financing for a high standard of “green” forest activity where commercial finance is not readily available today. This implies structures that would finance activities well beyond what is covered by current Green (labelled) Forest Bonds, which tend to be strongly commercial activities, as highlighted in World Bank (2016b).

Enhanced bonds represent one of many possible instruments for catalyzing forest-based NDC action.

On the one hand, enhanced bonds are one of a family of blended finance instruments – that is, any financing vehicle through which grant payments (justified in this case by the achievement of emissions reductions) are integrated into the terms of private or public financing to make projects or programs financially viable when they would not otherwise have been. At the same time, apart from blended finance instruments, there are direct “cash payment” mechanisms (e.g. PES) whereby recipients of such payments seek financing for projects or programs in ordinary financial markets without any explicit blending per se.

This section is structured as follows:

- **First, the section lays out a set of performance criteria derived from the previous analysis of challenges.** Instruments for catalyzing forest-based NDC action are deemed to perform better if they are more able to overcome the challenges identified in section 2.
- **Second, the section describes the alternatives to enhanced bond structures.** There are a number of alternative mechanisms against which the enhanced bond structures need to be compared.
- **Third, the section briefly assesses those alternatives against the performance criteria.** This allows the following sections to identify whether enhanced bonds actually outperform these alternatives.

4.1 Performance criteria to compare instruments for catalyzing NDC-related forest finance

To demonstrate the benefits and feasibility of enhanced Forest Bonds, their attractiveness versus other options for each of the main counterparties – issuers, donors and investors – needs to be shown. For the purposes of clarity, the report considers “issuers” to be those who take on financing from capital markets and receive payments for mitigation actions, with a focus on forest country governments, their public banks, or private developers of large-scale projects. Issuers may themselves then pass on financing and PBPs to other actors, such as small producers. “Donors” are those seeking to pay for non-financial

benefits, especially GHG emission reductions, which are the focus of this report. “Investors” are institutional investors that require yields and credit ratings that are no worse than otherwise available in the capital markets. For this analysis, “impact investors” are treated as part-investor and part-donor. There is no standard definition of impact investor, but to the extent that an impact investor is unwilling to invest at a sub-commercial return, they are considered commercial investors. Any acceptance of sub-commercial returns represents a form of grant or implicit payment for non-financial performance. In the latter regard, an impact investor is acting as a donor and should have the same objectives.

As set out in section 2, there are two fundamental gaps that inhibit timely, at-scale financing for forest-based NDC action, once basic readiness is established: i) an investor-issuer gap between the risk-adjusted return required by investors, and the actual risk-adjusted return (whether financial or economic) that issuers can achieve; and ii) a donor-issuer gap between the terms of an emission reduction payment required by donors, and the terms that an issuer (and recipient) is willing to accept.

As Figure 1 above shows, these gaps are driven by a set of challenges related to the terms of financing or emission reduction payments. These challenges have a particularly large impact on the timing and scale of NDC-related forest finance due to the tight fiscal constraints facing many forest countries.

The most attractive instruments for catalyzing greater finance will be those that can best close these gaps by addressing the underlying challenges identified. The challenges therefore serve as performance criteria used to compare the performance of enhanced bonds, other blended finance instruments, and different types of cash payments (where financing arrangements are left to the market). Figure 5 and the following paragraphs describe these performance criteria in more detail.

FIGURE 5: EVALUATION CRITERIA FOR LONGLISTED POTENTIAL BOND STRUCTURES

Does the structure outperform other options for **issuers and investors**, in terms of:

1. Rate of return on investments

- increased expected revenues
- lower operational costs
- less volatility in revenues

2. Credit risk

- lower default risk
- improved recourse mechanisms
- improved timing of revenues

3. Transaction costs

- reduced cost of identifying transactions
- reduced cost of due diligence on transactions
- reduced cost of monitoring performance

Does the structure outperform other options for **donors and recipients**, in terms of:

4. Value for money

- better targeting of payments to lowest marginal abatement cost activities
- more efficient for leveraging private finance
- complementarity across project portfolio

5. Risk of underuse or unrelated use of payments

- stronger link from PBP to mitigation activities
- more binding commitments to use funds toward mitigation activities
- faster and more efficient administrative process

6. MRV cost and effectiveness

- sufficiently robust MRV mechanism
- lower risk of leakage
- lower reputational risk for donor or for recipient

Source: Vivid Economics

The first three criteria focus on the commercial attributes of the instrument and ask whether it improves performance for issuers and investors:

1. *How does the proposed instrument affect the expected rate of return on investments?* The challenge identified is that the underlying projects may in many cases provide low financial or social returns, with high volatility. The assessment therefore considers the extent to which an instrument mobilizes alternative (non-project) sources of revenue, reduces project costs, or provides greater certainty and stability to the returns.
2. *How does the proposed instrument reduce credit risk?* Forest finance is often focused in countries where government and corporate credit ratings are below investment grade, and where many project developers have no credit score whatsoever. Furthermore, forestry projects have further credit risks – for example, in relation to the long time horizon of investment and long upfront periods with no revenues. The report considers whether and how instruments reduce credit risk – for example, by contractual arrangements, specific recourse mechanisms, and third-party guarantees.
3. *How does the proposed instrument affect transaction costs associated with the underlying commercial transaction?* More complex forms of finance could increase transaction costs for issuers in terms of identifying transactions, conducting due diligence, contractual arrangements, and multiple layers of intermediation required. The report considers the implications of potential instruments in terms of reducing these transaction costs, while maintaining or improving the quantity and quality of transactions.

Criteria 4, 5 and 6 consider how an instrument performs in delivering climate finance and ask whether it improves performance for donors and recipients:

4. *Does the instrument provide better value for money to donors?* Donors and most recipients are extremely concerned with ensuring that their funding achieves the best possible results. This report considers whether the instrument helps better target investment to higher-impact activities in terms of emission reductions with lower cost (e.g. carbon price). Related to this, the report considers whether it can leverage a greater share of *additional* private finance, and potentially limit the long-term requirement for donor support.
5. *Does the instrument reduce the risk of underuse or unrelated use of funds?* Donors and recipients are often keen to show the direct relationship between donor funding and activities on the ground; and they may also be concerned about reputational risk associated with funding that is unused or used for unrelated purposes. This report considers whether an instrument is more likely to garner timely and full disbursement, and whether there will be a clear link to underlying mitigation activities that can help assure donors that their funding has supported “*additional*” mitigation that would not have occurred otherwise.
6. *Does the instrument reduce MRV cost and/or improve its effectiveness?* Donors want strong assurances that declared results match actual results, and both donors and recipients are broadly keen to minimize the cost at which performance outcomes are monitored, reported and verified. The report considers whether an instrument might reduce monitoring, reporting and verification costs while preserving or improving its effectiveness.

Greater success in meeting these performance criteria should indicate that an instrument is better placed to catalyze forest-based NDC activities at scale by offering an attractive way for:

- investors to channel capital that is competitive with available market alternatives;
- issuers to raise capital at the cost and scale required; *while also* offering an attractive way of garnering cash payments at the price and scale required; and
- donors to fund emission reductions at the price and scale desired.

4.2 The shortcomings of private instruments

A broad review of current instruments for catalyzing greater forest-based NDC action provides a good basis for the analysis of enhanced bond structures. It is beyond the scope of this report to make a thorough assessment of all the possible instruments that might be said to compete with enhanced bonds. However, the report lays out some of the most prominent instruments currently available in order to understand their strengths and weaknesses, and to clarify the major alternatives that an enhanced bond must surpass to be relevant. Instruments are grouped into cash payment and blended finance instruments.

4.2.1 Cash payment instruments

There are three primary instruments for delivering pure cash (grant) payments not blended with financing:

- **Upfront activity-based payments** – upfront grant payment for mitigation activities, with the expectation of emission reductions but no absolute assurance against under-performance or reward for over-performance.
- **Project-based payment for performance** – post-performance payment based on emission reductions achieved by a specific project against agreed results-based indicators and MRV procedures.
- **Jurisdiction-based payment for performance** – post-performance payment based on emission reductions achieved in a (large) legal jurisdiction against agreed results-based indicators, reference scenario and MRV procedures.

If they desire, the recipients of these cash payments can then separately seek commercial financing, whether in the form of equity, lending or bond finance. Providers of finance can determine independently whether to value these (potential) cash payments in terms of reducing the investment risks, and enabling a lower cost of capital to be provided.

Upfront grant payments have been a large proportion of forest-based financing related to NDCs, but mixed results have limited donors' willingness to use them going forward. Much of this has been for “readiness activities” to prepare countries to deliver emission reductions from forest-related activities in return for payments (Forest Trends 2016), with focus on ensuring that adequate MRV systems are in place to assure donors of results. As described above, this is a valuable enabling activity, but it has been hard to gauge the effectiveness of these grant payments. In some cases, the payments seem to have been largely ineffectual in achieving the desired emission reductions, as in the case of the US\$ 80 million in upfront payments provided to Indonesia through its bilateral agreement with the government of Norway (Forest

Trends 2016). Some upfront grant funding has been used to actually implement mitigation reduction projects on the ground, but largely through “pilot projects” with very little leveraging of these grant payments by project developers to attract private finance. Indeed, in a survey of carbon offset project developers, 24% of start-up funding was found to be from loans or public sector grants and a further 15% from non-profit grants (Forest Trends 2016). In general, uncertainty over impact has limited donors’ appetite to expand grant payments apart from readiness activities for lower-income countries.¹⁰

Donors have also used PBPs at the project level with mixed results. While in general, PBP eliminates the risk that disbursed funding does not generate results, as funds are only disbursed when results have been achieved, project level PBP (e.g. payments for ecosystem services (PES) schemes) have faced a number of performance issues. First, they have been subject to significant leakage risk, and as such, are often perceived as ineffectual despite positive project level results. Second, they have faced high MRV costs owing to project by project implementation of MRV.

Critically, project-level PBP have also not succeeded in leveraging large amounts of private finance, potentially decreasing the value for money achieved. This is in part owing to the novelty of such payments to financiers, who had trouble knowing how to build them into credit risk models. However, such payments also failed to address the underlying credit risk issues preventing leverage. For small project developers this relates to generally poor access to private finance owing to lack of strong collateral and high financial intermediation costs. For larger project developers, and even some governments, this relates to relatively poor credit ratings which greatly increase the cost of accessing private finance.

National and Jurisdiction level PBP has become a major vehicle for mitigation-based cash payments. In response to some of the challenges with project-level PBP, major donors and development finance institutions (DFIs) have pioneered REDD+ PBP at the jurisdiction level. Efforts like those by Norway (including via the Amazon Fund in Brazil), the World Bank Carbon Funds and Germany’s REM are already making significant funding commitments in specific countries. PBP is central to the Paris Agreement, with a strong role envisaged for the UN Green Climate Fund, because donors are able to commit more resources to verifiable results where the risk of achieving those results is transferred predominantly to the countries responsible.

Such PBP schemes help improve the terms of forest-based NDC activities. Like project-based PBP, they increase the commercial or economic return on investment for forest-based NDC activities. They also go further in resolving some leakage risks, in reducing MRV costs versus other funding mechanisms, and in avoiding the bottleneck of due diligence processes that accompany development finance in the form of grants or loans for specific projects (Birdsall et al. 2015; Seymour and Busch 2016).

Nevertheless, these unblended PBP schemes still face issues against the performance criteria. Most critically, in the absence of a formal linking mechanism, it has been challenging to ensure that future results-dependent revenue streams actually engender upfront finance for forest-based NDC activities. The absence of formal linking is not in itself a drawback for recipients, who may prefer greater independence regarding financing commitments. However, it does suggest that such unblended PBP flows have not been

¹⁰ In the case of Brazil’s Amazon Fund, payments were provided upfront to the Fund, and justified as payment for past performance.

large enough to cause recipient to prioritize the scaling-up of forest-based NDC activities relative to other public spending priorities. It may also suggest that investors do not (sufficiently) recognize the revenues of from such PBP schemes so as to reduce the cost of financing. From the donor perspective, this weak link represents a risk that their funding is (perceived as) underused and ineffectual, with the lack of demonstrable leverage also undermining the (perceived) value for money. Perhaps most importantly, these challenges point to the fact that when PBP schemes are not explicitly linked to upfront financing it can be very difficult to determine the terms of such donor payments that are capable of catalyzing such upfront financing. This is in the interest of neither donor nor recipient.

In order to reduce this perception risk, donors have moved to encourage greater leveraging of PBP *after* the payment has been received, and in some cases sought greater MRV of the uses made of these earned PBPs. While measures aimed at encouraging blending are helpful, they fail to address the underlying challenge of increasing *upfront* action, since any blending achieved occurs only if and after PBP has been received. On the other hand, measures to increase the MRV associated with the use of payments essentially subjects these schemes to more costly project-level MRV, further slowing the disbursement of these funds.

A number of the shortcomings of unblended performance-based cash payments could be addressed through blended finance, which the report discusses in section 5. Blended finance could help resolve the disconnect between payments and mitigation activities, driving PBP to fulfil the potential for closing the “return gap” and attracting capital market finance toward the required investments. Blended finance could also potentially resolve the underlying problems with credit risk that inhibit private sector leverage. Finally, blended finance can accelerate capacity building among private financiers, who now participate in the process of investment due diligence and risk assessment, overcoming financial market barriers related to the lack of a proven track record or lack of experience in valuing risks related to mitigation projects.

4.2.2 Blended finance instruments

In addition to enhanced bonds, there are three blended finance instruments of most relevance to forest-based NDC action. For the purposes of this report, these are examined at a high level, while recognizing that they do not encompass all of the possible instruments available:

- **Green equity funds** – equity investments are made on advantageous terms (reflecting the implicit payment for emission reductions) in projects or companies undertaking activities that contribute to GHG mitigation.
- **Green loan funds** – loans are made on concessional terms (reflecting the implicit payment for emissions reductions) for projects or companies undertaking activities that contribute to GHG mitigation.
- **Unenhanced Green Forest Bonds** – vanilla bonds for which proceeds are earmarked for activities that contribute to GHG mitigation, and where a green premium (if it exists) comes through disproportionate investor demand, and not explicit grant funding.

It is important to note that these instruments are not mutually exclusive, and it may be the case that they (along with enhanced bonds) are utilized side-by-side as part of the financing chain for the same project. In fact, various forms of convertible instruments may act as hybrids of these three categories.

Green equity funds investing in forest-based NDC actions exist, but remain relatively small and novel.

Across the types of potential project developers, such equity funds are not suitable ways for either governments or very small project developers to raise capital, although they have been used by medium-sized project developers. As with equity more generally, green equity has various advantages and disadvantages versus green debt instruments, depending on the stage and nature of the investment. Where a tranche of high-risk, high-return capital is needed to reduce credit risk, equity may be the most attractive means of raising capital. In this regard, equity may be catalytic in facilitating debt finance, but realizing its catalytic role depends on having effective complementary debt instruments in place.

As a blended finance instrument, equity funds face a number of challenges against the performance criteria.

From an issuer's perspective, beyond a certain amount of capital (essential to reducing credit risk), equity will reduce the issuer's expected rate of return and increase transaction costs. This inherently limits its ability to directly provide financing at scale (as mentioned above). For donors, such green equity cannot easily serve as a channel for PBP since terms of the investment are generally fully agreed upfront with no conditionality. This means a high-risk profile with no guarantee of results. Such equity can provide better than expected returns, and could be judged as catalyzing additional debt finance, which may compensate donors for this risk. However, very few donors have the risk appetite for such arrangements.

Green loan funds are the most common channel for grant donor funding, enabling a breadth of financing terms suitable for different types of project developers.

Across potential project developers, loan funds can be suitable for governments, large project developers and small project developers. Loan funds can also serve as a channel for PBP schemes, as had been the case with the World Bank Carbon Fund. Importantly, for small project developers that often lack other means of accessing capital, bank intermediated loans are a particularly essential instrument in the financing chain. Loan funds can also be structured with different layers of seniority and different forms of guarantee, enabling investors to enter with different levels of risk-return appetite, and also enabling them to address underlying credit risk.

In terms of the performance criteria, loan funds are often not an efficient means for closing the “returns gap” between issuers and investors.

To the extent funds are not raised via public capital markets, the transaction costs can be high, requiring quite bespoke arrangements, and making it difficult to attract institutional investors. Similarly, for governments and large project developers with access to other sources of capital, an additional layer of intermediation can increase their cost of capital. Hence, such loan funds are not a particularly efficient means of achieving capital market leverage against PBP.

In addition, where PBP is channeled through loans funds it is difficult to align jurisdiction-level PBP with upfront project-level blending.

Even if projects receiving loans from such funds achieve their results, jurisdictional results could fail to meet the requirements to receive PBP. This represents “basis risk” whereby the loan fund achieves its results, but the (jurisdictional) basis for PBP is not met. This makes it excessively risky for the lender to commit upfront PBP to loan recipients when the lender's own receipt of PBP is uncertain. As a result, loan funds to date have generally relied on upfront grant payments to avoid this risk, or else the incorporation of PBP from donors has been at the project level similarly avoiding

basis risk. For donors, the use of upfront grant payments means higher risk of payments being used without achieving results, while the use of project level PBP involve high leakage risk and relatively high MRV costs.

Given the limitations of green equity and loan funds, some attention has turned to the role of bond financing either in place of, or as a complement to, these two instruments. The above overview suggests two broad performance issues that challenge the ability of green equity and loan instruments to catalyze at-scale forest-based NDC activity:

- 1. High transaction costs and the difficulty of attracting at-scale institutional investment, and hence the relatively high cost of capital for potential issuers.** For those issuers facing challenges accessing public capital markets, these blended instruments do not overcome these challenges. For issuers that already have the ability to directly access institutional investors, accessing capital via green equity or loan funds may add more costs than benefits.
- 2. High “basis risk” and the difficulty in blending jurisdiction-level PBP into these instruments prior to the achievement of results.** This then leads to greater reliance on upfront or post-performance payments, the associated risk of underuse or ineffectual use of committed payments, and the related difficulty in showing value for money. This further drives greater project-level MRV and safeguarding requirements from donors, and hence increased costs.

The focus on Green Bond financing to date has largely been motivated by the desire to resolve the first issue. In this regard, Green Bonds could be substituted for other instruments (e.g. for governments or large corporates able to issue directly to the market), or complement other instruments (e.g. for banks or private equity firms seeking access to large pools of lower-cost financing).

Issuances of unenhanced Forest Bonds show some signs of growing, but remain a small share of overall Green Bond issuances. Green Bonds focusing specifically on the forestry sector are examined in World Bank (2016b), which noted that the scale of such issuances is relatively small to date, and that they faced significant challenges in driving future scale. Fewer than 10% of companies operating in agriculture, forestry and land-use-related sectors have issued bonds, and those that have are largely pulp and paper companies (Climate Bonds Initiative 2016). While the Climate Bonds Initiative is currently developing guidelines for the certification of Green Bonds within the land-use sector, the size of this market is limited to a few players, and is far less advanced than other types of climate-aligned bonds – for example, in energy and transport markets.

Moreover, such bonds have not generated a clear net benefit in reducing the cost of capital. After examining Green Forest Bond issuances to date, World Bank (2016b) concludes that the levels of green premium achieved were inconsistent, and where they existed, did not appear to outweigh the additional MRV and safeguarding costs. For issuers, this means little overall impact on transaction costs (or at least a highly uncertain impact), and points more broadly to the fact that unenhanced bonds do not help resolve the first challenge highlighted above. It is therefore not surprising that issuers are unlikely to propose projects that are not already commercially viable, or very close to it. Indeed, most issuances to date have been for commercially profitable ventures that do not clearly qualify as meeting NDCs, and that probably would have gone ahead without the Green Bond issuance.

In addition, unenhanced bonds by their nature cannot serve as a channel for PBP since any green premium is built into the agreed rate of return upon issuance. This means that donors face a relatively high risk of funds being used to no effect. As a result, such bonds are unlikely to attract donors willing to provide a green premium with a high implicit carbon price. More broadly, it highlights the fact that unenhanced bonds cannot help resolve the first challenge highlighted above. Sections 5 and 6 assess potential enhanced bond structures against the performance criteria set out in section 4.1 in order to test if – and how well – they overcome the challenges faced by alternative funding mechanisms in catalyzing NDC-related forest finance at scale.

5. Longlist of Enhanced Bond Structures

Drawing from the assessment of the shortcomings of current instruments in catalyzing at-scale financing, a long-list of “innovative” enhanced bond structures was developed. Each bond was defined along the six attributes set out in Table 1; the possible options below cover all structures on the longlist. The longlist of structures draws on previous reports, expert opinion, experience to date with Green Forest Bonds, and broader experience with enhanced bonds in other environmental or social sectors outside of LULUCF. A range of options were explored to cover a wide variety of enhancement options, and a wide gamut of relevant counterparties. The analysis attempted to cover the most promising opportunities for combining different bond types with different forms of available cash payments (both upfront grants and PBP). However, this does not represent a comprehensive list, and other options certainly exist which may be attractive in particular circumstances. A summary of the longlist and the process for selecting a shortlist are set out below. A more detailed description of each of the longlisted bonds is provided in Annex B.

TABLE 1: SIX KEY ATTRIBUTES DEFINE EACH BOND STRUCTURE

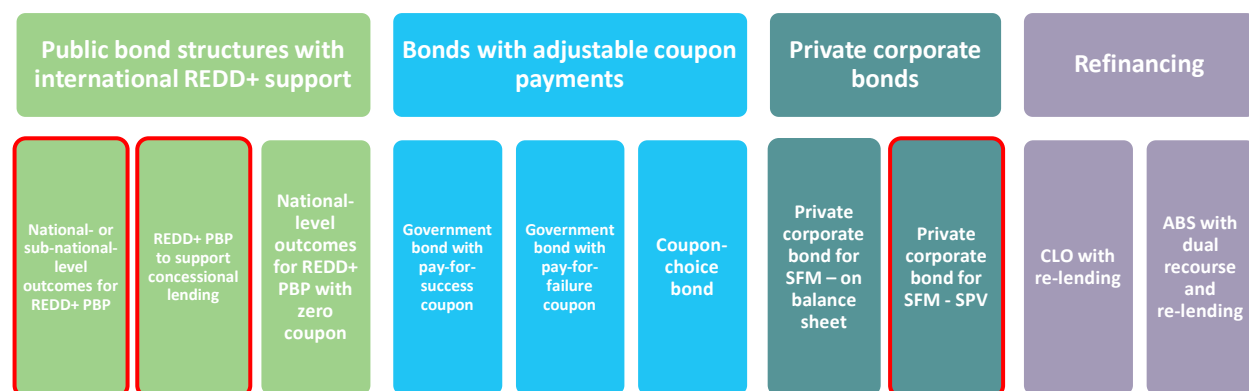
Attribute	Possible options			
Issuer	Public bank	National government	Development bank	Corporate
Use of proceeds	National	Jurisdictional	Multiple project loans	Commercial
Coupon structure	Fixed cash	Pay for success	Pay for failure	Fixed with choice
MRV	Existing	Partially existing	New	
Additional revenue streams	REDD+ PBP	PES	VER sales	Outcomes funded
Recourse mechanism and enhancement	MIGA credit enhancement	Issuer guarantee	Dual recourse	Seniority tranches

Source: Vivid Economics

Notes: MIGA, Multilateral Investment Guarantee Agency. VER, verified emissions reduction. More detail on specific options is presented within the relevant bond structures in Annex B.

In total, ten potential bond options were evaluated, as set out in Figure 6. The three shortlisted structures (1, 2 and 8) are highlighted in red and considered in detail in section 6. Most of the structures would be issued by a national government or public bank. The report considers two structures that could be issued by a corporate – one on its balance sheet (structure 7, see Annex B), and one off the balance sheet through a special purpose vehicle (SPV) (structure 8, see section 6).

FIGURE 6: LONGLIST OF ENHANCED BOND STRUCTURES CONSIDERED



Source: Vivid Economics

Note: SFM, sustainable forest management.

For each bond structure, the assessment procedure followed two steps:

1. identify the relevant status quo from the instruments discussed in section 4.2; and
2. for each performance criterion, assess whether the structure performs better or worse than the “status quo” instrument.

The relevant status quo, and hence the baseline to score potential structures against, was defined somewhat differently for different types of bond structure, depending primarily on the issuer. The report compared government and corporate issued bond structures against a combination of vanilla bonds and non-blended climate finance. For public bank issued bonds, the comparison was against blended loan funds with upfront donor grants for mitigation investments.

Bonds that consistently outperformed the status quo instrument were selected for the shortlist. Each bond was given a qualitative score between -2 and +2 against each of the six criteria to represent worse or better performance than the status quo instrument. Thus, each bond was awarded a total score, summing across all criteria, in the range of -12 to +12. Bonds with a total score above 6 were selected for a shortlist to be developed in more detail and tested in wider stakeholder engagement. A summary of this assessment, detailing the scores of each bond structure against each criterion, is shown in Figure 7.

The assessment against the performance criteria is based on current market readiness for the structures. While some of the bond options may be theoretically attractive, they may not score well if they are not well suited to the current forest country bond and PBP markets, as informed by the analysis of readiness in section 3. The focus of this report is on evaluating bond structures that have the potential to be implemented in the next few years. More information on the assessment of the longlist is provided in Annex B. Section 6 describes the three shortlisted bonds in more detail.

FIGURE 7: ASSESSMENT OF LONGLIST AGAINST ENHANCEMENT ATTRIBUTES

#	type	issuer	Rate of return on investments	Credit risk	Transaction costs	Value for money	Risk of under / unrelated use of PBF	MRV cost and effectiveness
1	National or regional REDD+ Concessional	government	✓	✓✓		✓✓	✓✓	
2	lending REDD+ National REDD+	public bank	✓	✓✓		✓✓	✓✓	
3	zero coupon Forest impact	government	✓	✓	×	✓✓	✓✓	
4	bond Climate performance	government	✓✓	×	×	✓✓	✓	×
5	bond	government	✓	✓	×	✓✓		
6	Coupon-choice SFM - on	government	✓✓		×	✓✓	✓	×
7	balance sheet	corporate	✓✓	✓		✓		
8	SFM - SPV	corporate	✓✓	✓✓		✓✓		
9	CLO with re- lending	public bank	✓✓	✓	×			×
10	ABS with dual recourse	public bank	✓✓	✓✓	×	✓		×

Source: Vivid Economics

6. Potential Future Bond Structures

This section describes a shortlist of three bond structures, which have the potential to improve on the status quo. For each bond, it describes the key elements of the structure and how it differs from other sources of forest finance, the financial and contractual structure, and a summary of the structure's performance against the evaluation criteria set out in section 4.

The remainder of this section is structured as follows:

- Section 6.1 describes a public bond structure (structure 1 from the longlist of ten), supported by REDD+ PBP for national or sub-national outcomes.
- Section 6.2 describes a public bank issued bond in support of concessional lending for sustainable forest activities, supported by REDD+ PBP for plot-level outcomes (structure 2 from the longlist of ten).
- Section 6.3 describes a corporate issued bond for sustainable forest management, supported by REDD+ PBP for project level outcomes (structure 8 from the longlist of ten).

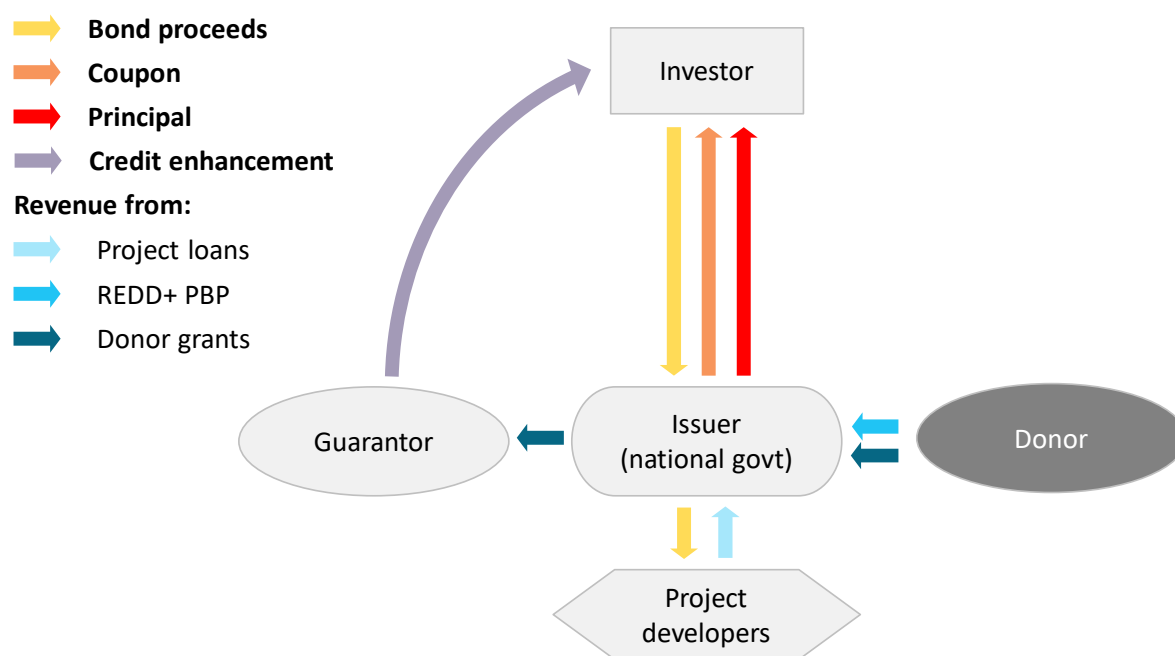
6.1 Structure 1: national-level or sub-national outcomes for REDD+ PBP

TABLE 2: SUMMARY OF BOND STRUCTURE 1

Issuer	National government
Use of proceeds	National/sub-national
Coupon structure	Fixed cash
MRV	Existing
Additional revenue streams	REDD+ PBP
Recourse mechanism and enhancement	Credit enhancement

Source: Vivid Economics

FIGURE 8: STRUCTURE 1 COMBINES CREDIT ENHANCEMENT, REDD+ PBP AND SMALL, UPFRONT DONOR GRANTS



Source: Vivid Economics

Note: Arrows represent contractual financial flows (PBP is dependent on verified results).

6.1.1 Description of structure 1 and enhancement attributes

The bond is issued by a national or sub-national government, and offers the most flexible structure in terms of use of proceeds. Repayment is not dependent on revenues generated by the underlying projects or programs and is instead guaranteed by the government. This facilitates access to finance from large institutional investors such as pension funds or sovereign wealth funds, which have little capacity to do research on or invest in complex long-term structures in emerging markets where returns are a function of uncertain projected forestry or agriculture revenues.

Proceeds from the sale of the bond are ring-fenced to finance a broad range of activities, which contribute to meeting NDC goals for reduced deforestation, reforestation and sustainable agriculture. This might include pure fiscal spending on public good activities like forest conservation, or technical assistance, or interventions expected to generate a financial return to the government from lending to farmers for improved agriculture productivity or co-investing in SFM.¹¹ Disbursement could also operate through an SPV, such as Brazil's Amazon Fund, or equivalent established by the national or sub-national public bank to increase credibility and transparency.

Donor organizations commit to providing REDD+ PBPs, enabling forest investments to compete with other forms of public investment. The PBPs are made to the government in return for verified forest-related mitigation outcomes at the national or sub-national level. The national or sub-national

¹¹ Note that as the use of proceeds are broadly undefined, structure 1 could be used to fund the activities defined under structures 2 and 8.

government enters into a commitment to achieve these verified emissions reductions (VERs), for which it receives PBP flows.¹²

This approach does not require attribution of mitigation outcomes to specific projects, and hence the expected MRV costs would be the same as current non-blended PBP arrangements. As with current arrangements for PBP, the VERs would be measured against a pre-agreed reference level and MRV standard. Hence it would leverage existing national or sub-national MRV systems already used for such GHG accounting.

Donors are keen that PBP harness forest country fiscal resources, and they are also keen to develop instruments that can be seen to leverage private institutional investment. In this structure, REDD+ funding commitments are explicitly tied to the additional mobilization and hypothecation of fiscal resources from the bond issue and to achieving leverage of private capital.

To compensate the issuer for taking on the additional risk inherent in the issuance of the bond, and the mobilization of fiscal resources at large scale, some combination of larger PBP volumes, better price for VERs or some upfront grant payment could be necessary compared with PBP schemes to date. Prior to the actual negotiation of such a deal, it is impossible to say what the most efficient and acceptable terms will be in this regard.

Structure 1 incorporates a credit enhancement paid for with an upfront grant as a way of incorporating non-PBP payments into the deal. For some countries, particularly with sub-investment-grade credit ratings, combining PBP with support for credit enhancement could be cost-effective. An investment guarantee of the payments made to bond holders would be provided from a multilateral development finance institution (DFI) such as MIGA. The DFI guarantees a sufficient portion of the coupon and principal (e.g. 95%) against default to ensure the bond achieves an improved investment grade. It does not guarantee the wider solvency of the issuer. The mitigation benefits of the bond must be clear to be able to present a compelling case to the DFI for the provision of the guarantee.

The cost of this additional credit enhancement is met by an upfront grant from a donor. In some cases, this upfront grant could be in recognition of previous performance in reducing deforestation, which may help reduce exposure to risk from forward-looking PBP mechanisms. In cases where particularly strong donor commitments are deemed appropriate, the remaining portion of the coupon and principal not guaranteed (e.g. 5%) could be covered directly with grant funding, as ratings agencies are much more likely to give strong credit ratings to international bonds with 100% guarantees (Humphrey and Prizzon 2014).

The bond could be issued in USD or a local currency such as BRL. Public banks would generally prefer to issue in BRL and avoid currency risk. However, the Ministry of Finance might be willing to take on currency risk (including on behalf of public banks) depending on arbitrage conditions in capital markets, relative levels of demand from domestic or international investors, and overall currency reserve management.

Although the evaluation was conducted with a national jurisdiction in mind, sub-national jurisdictional approaches have become increasingly common. Some regions have already developed low-deforestation

¹² As stated in section 1, these PBP flows may or may not be official UNFCCC REDD+ payments.

development programs and relatively sophisticated MRV systems, and this could enable progress to move more quickly than would otherwise be possible if a full national approach were required. For example, the state of Acre has developed jurisdictional REDD+ baselines and has received approximately US\$ 25 million in REDD+ PBP commitments from Germany's REM. Acre is actively looking for further REDD+ funding commitments to allow it to raise capital, including through bond structures.

Nevertheless, sub-national approaches require alignment with national commitments, and there are risks of competing claims for emission reductions. Under Brazil's national REDD+ strategy, states have rights to UNFCCC REDD+ credits and, hence, there would be no issue if PBP flows under structure 1 followed this process. However, the federal government currently does not recognize the validity of sub-national REDD+ credits exported to compliance carbon markets and, hence, PBP flows could not be generated in this way.

By supporting jurisdictional approaches, this type of bond could encourage additional investment from commodity buyers and food companies. These companies may have regional strategies to operationalize sustainable sourcing commitments at a scale above farm-level certification and could preferentially target investment in regions with credible "protection" strategies (Edwards et al. 2014; Nepstad et al. 2014). Hence the strengthened commitment indicated by a large bond issuance could have spillover effects on the commitments of other actors able to drive emissions reductions.

In the case of some countries, including Brazil, government fiscal constraints may lead to ministries of finance preferring public banks to act as the bond issuer instead of the national, or a sub-national government. Using a public bank to issue an enhanced bond structure linked to REDD+ PBP would clearly separate such a structure from general government borrowing programs and, in some countries, would not be counted as public debt.¹³

6.1.2 Evaluation of structure 1

A qualitative evaluation of national or sub-national outcomes bond supported by PBP for REDD+ outcomes is shown in Figure 7.

Structure 1 could create a balance of risks and responsibilities among the different stakeholders that should result in scaled-up commitments from all parties versus a status quo of unblended PBP schemes. Money is fungible. Governments and public banks can issue bonds for general budget purposes and in the future receive PBP, without having any explicit link between those payments and the issuing of bonds. However, the lack of an explicit link introduces a significant risk that PBP commitments will not in fact mobilize financing at scale, and results will not be delivered. It also leaves a high degree of uncertainty about whether and to what extent PBP agreements will actually reduce the cost of capital.

The core enhancement attribute in structure 1 is a REDD+ payment stream to the issuer, effectively reducing the cost of capital for the national or sub-national government vis-à-vis a vanilla bond. This could allow the forest country to commit greater fiscal resources to NDC goals, which would otherwise not compete with other spending priorities. These payments are not guaranteed, and this structure

¹³ A full discussion of the advantages and disadvantages of a public bank issuer is given in section 6.2.

increases the risk borne by the issuer versus the status quo. However, the issuer has a large degree of control over whether performance is achieved.

From the donor perspective, the bond issuance ensures that PBP agreements are clearly linked to large commitments of action by the issuer, with easily measurable leverage ratios (against private capital).

This will reduce the risk of underuse of funds, and should increase the value of money for donors, as the bond-financing commitments and desire to ensure PBP payments create a strong incentive for the issuer to find projects and disburse funds. Just as with unblended PBP arrangements, payments dependent on the attainment of VERs, so donors do not in this respect face any additional risk of payments being made without the achievement of results. However, PBP commitments beyond five years can be challenging for donors – in part for internal accounting reasons, and in part due to the additional risk of underuse or poor value for money inherent in such long-term payment commitments. This can partially be addressed by channeling donor payments through fund or trust structures such as the World Bank carbon funds, but this challenge will need to be addressed more broadly in light of the Paris Agreement commitments for scaled-up PBP.

For this and all other structures, another expected benefit to donors from at-scale funding commitments is the expectation of greater NDC-related capacity building by the issuer.

Most potential bond issuers are likely to have underinvested in capacity vis-à-vis what would be required for at-scale activity. To date, the scale of forest-based NDC activities has been limited. Moreover, most such activities, funded by unleveraged grants or PBP *already received* are perceived as involving very little financial risk. At-scale commitments, with relatively high leverage of private capital will most likely lead issuers to improve their capacity, and hence improve the effectiveness with which donor funding is used vis-à-vis the status quo.

Another benefit of this structure is the use of upfront grants from donors for credit enhancement to reduce the cost of capital for the issuer, helping offset the greater risk taken on versus the status quo whereby PBP schemes do not commit the recipient to mobilizing domestic sources of finance.

As these upfront grants are not directly tied to outcomes, there is a risk they could be “lost” if the targeted VERs are not achieved. A relatively small upfront grant (relative to the size of the PBP payments) could bring down the yield on the bond and thus require fewer emission reductions or lower PBP to achieve the same outcome in terms of overall reduction in the cost of capital.

For countries that do not need credit enhancement or are reluctant to interfere with their existing sovereign bond yield curves, other channels for upfront or non-performance-based payments are possible.

Although not explored here, for such countries grant payments could be used in other ways in order to provide a similar risk-reduction function for the issuer. For example, upfront grant payments could be provided to cover some portion of program set-up or project due diligence costs, or non-performance-based grants could cover some portion of the bond coupon payments. Norway, Germany, the UK and the World Bank carbon funds combine PBP with smaller grants (often based on historical emission reductions) to try and help overcome the challenge of upfront costs for target programs and to recognize early action from counterparties. These smaller upfront grants could be utilized instead to contribute to higher-certainty forms of enhancement in this bond structure, leveraging much greater upfront capital from institutional investors.

The critical benefit of this structure is that the issuer takes on more risk by committing large pools of funding to achieving the target emission reductions, while the donor offsets some of this risk through some combination of greater PBP volumes or a higher price per VER, potentially combined with an upfront grant to enhance the bond's credit rating. The required price points for this arrangement are difficult to assess prior to negotiation between all parties. It is possible in some circumstances that the existence of REDD+ PBP commitments allow credit enhancement to be provided at lower risk and thus lower cost. It might also be possible that providing upfront grants that improve the bond's credit rating reduces the amount of future PBP funding commitments required, as the cost of capital to issue the bond will be lower, potentially providing better value for money for donors than PBP alone. If the entire deal, owing to its better overall expected value for money, encourages larger donor commitments, then issuers might also be willing to accept a lower price per VER, and a reduced or forgone upfront grant component.

BOX 2: AN ILLUSTRATIVE EXAMPLE OF STRUCTURE 1

Table 3 shows a simplified illustration of the reduction in cost of capital for a given number of emission reductions and PBP against a series of face values. It assumes a US\$ denominated 10-year bond maturity with a coupon of 6% (close to recent market rates for Brazil sovereign bonds) and a PBP of US \$6/tCO₂e (slightly higher than recent donor payments of US \$5/tCO₂e). This shows that for a bond issuance size of US \$ 1 billion, cumulative emissions reductions of 100 MtCO₂e would bring the net cost of capital down to 0%, while 60 MtCO₂e would reduce the cost of capital to 2.4%.

A US\$ 600 million REDD+ PBP commitment over ten years (around US\$ 450 million in present value terms for OECD countries) would in this case leverage immediate upfront institutional investor capital of US\$ 1 billion, while only committing to paying for demonstrable results. In addition, this US\$ 1 billion should in turn leverage a further multiple of private investment “on the ground”.

1 million hectares of reforestation could potentially be funded at zero cost of capital to the issuer. Based on costs of reforestation of US\$ 1,000/ha,¹⁴ US\$ 1 billion could reforest 1 Mha. With cumulative carbon sequestration per ha of 100 tCO₂e,¹⁵ emissions reductions could reach 100 MtCO₂e over ten years, while reducing the cost of capital to 0% for the issuer. These assumptions are also relevant for structures 2 and 8. Structure 2 below illustrates an enhanced bond issue designed to focus use of proceeds on expanded concessional lending programs for reforestation.

Further modelling and negotiation is required to ascertain the viability of these assumptions and optimal balance between issue size, bond maturity and PBP (and credit enhancement in those countries where this is a consideration).

TABLE 3: FOR THIS ILLUSTRATIVE BOND, PBP COULD MORE THAN OFFSET THE ENTIRE YIELD

Net cost of capital (%)	Face value (US\$ m)		
Cumulative mitigation (MtCO ₂ e)	800	1,000	1,200
60	1.5%	2.40%	3.0%
80	0.0%	1.20%	2.0%
100	-1.5%	0.0%	1.0%
120	-3.0%	-1.2%	0.0%

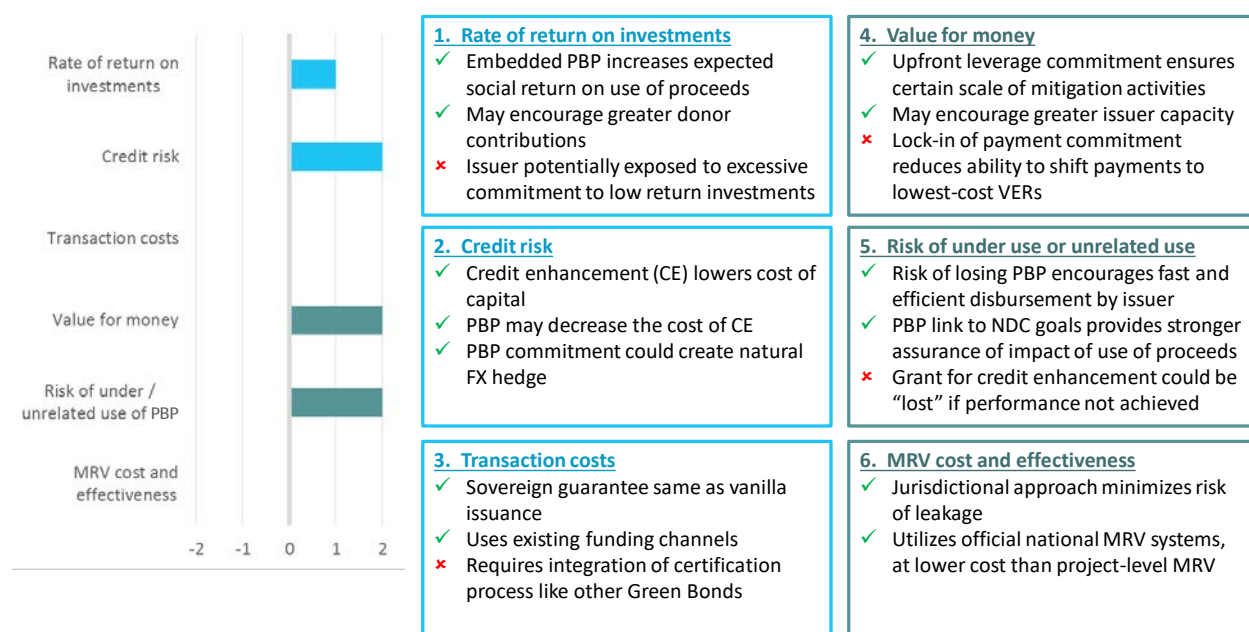
Source: Vivid Economics

Note: This example assumes a 10-year bond, a 6% coupon, and PBP of US\$ 6/tCO₂e.

¹⁴ A recent estimate from the Instituto Escolhas estimates the cost of restoration of 12 Mha at R\$ 31–52 billion, or a median of US\$ 1,051/ha (*Jornal do Brasil* 2015).

¹⁵ World Bank (2016a) suggests that if 20 Mha were reforested, up to 2,300 MtCO₂e would be sequestered: a restored area can sequester from 22.5 tC/ha (Caatinga) to 97 tC/ha (Amazon), implying an average of 115 tCO₂e/ha, where tCO₂e is equivalent to 3.67 tC.

FIGURE 9: QUALITATIVE ASSESSMENT OF STRUCTURE 1



Source: Vivid Economics

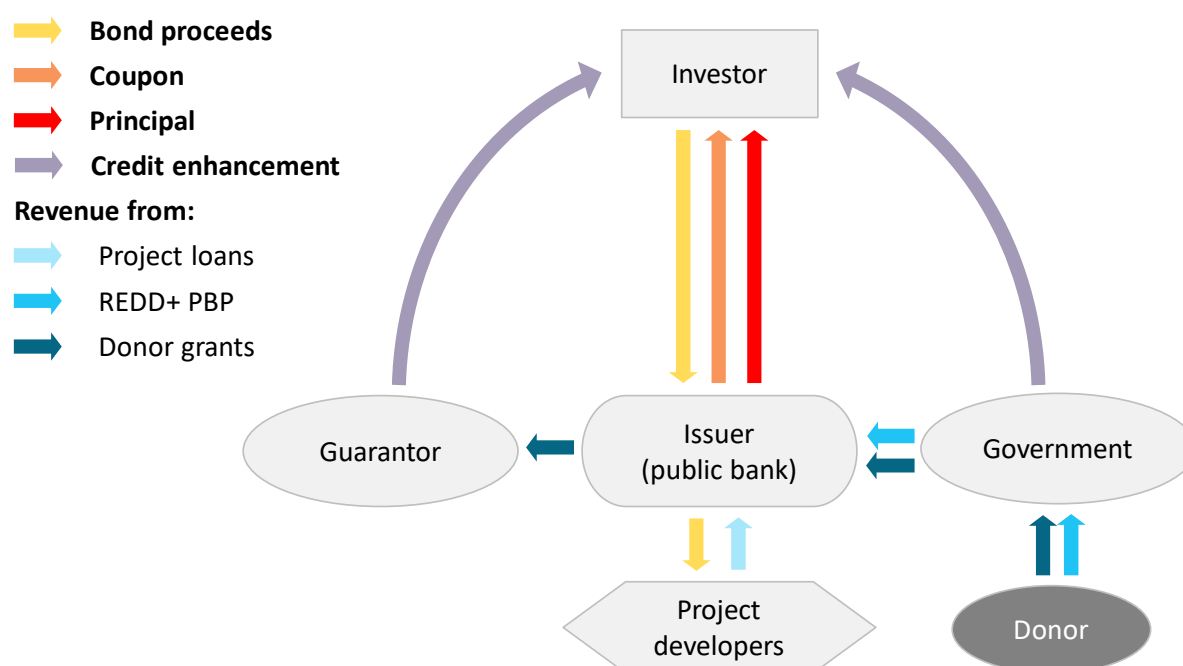
6.2 Structure 2: REDD+ PBP to support concessional lending

TABLE 4: SUMMARY OF BOND STRUCTURE 2

Issuer	Public bank
Use of proceeds	Multiple project loans
Coupon structure	Fixed cash
MRV	Partially existing
Additional revenue streams	REDD+ PBP
Recourse mechanism and enhancement	MIGA credit enhancement

Source: Vivid Economics

FIGURE 10: STRUCTURE 2 COMBINES CREDIT ENHANCEMENT, REDD+ PBP AND SMALL, UPFRONT DONOR GRANTS



Source: Vivid Economics

Note: Arrows represent contractual financial flows (PBP is dependent on verified results).

6.2.1 Description of structure 2 and enhancement attributes

This structure is the same as structure 1 in terms of the two most critical components: a PBP scheme linked to the bond issuance, and upfront donor grant payments to provide credit enhancement. See above description of these elements. The structure differs from the first in terms of the issuer, use of proceeds, and potentially the MRV arrangements. The issuer is now a public bank, working in close cooperation with the federal government, but focused on a narrower set of activities (excluding those providing a predominantly public good). The proceeds are used for investment activities that support NDC goals. In the strongest case, use of proceeds would be linked to the implementation of national legislation – for example of the Forest Code and the ABC in Brazil. This involves the extension of existing concessional

loan schemes to support sustainable investment by private landowners. This would ideally draw on existing plot-level or regional MRV, but may require additional MRV to be able to scale up.

Using the specific case of Brazil, proceeds of the bond would support the implementation of Brazil's Forest Code and reforestation under the Environmental Compliance Program (PRA). Brazil's NDC goals include a 12 Mha restoration/reforestation target by 2030. Full implementation of the Forest Code could result in as much as 20 Mha of reforestation, depending on the extent to which landowners achieve compliance through reforestation itself or through the use of a compensation mechanism such as Environmental Reserve Quota (CRA) trading.

Specifically, the proceeds of the bond would support the expansion of concessional credit schemes to private landowners for reforestation. The Forest Code commits the federal government to providing incentives to support landowners in complying with the law, such as concessional credit for reforestation investment. REDD+ PBP commitments could expand the capacity of the federal government to make equalization payments to public banks when they lend on sub-commercial terms, and thus support expanded lending to landowners seeking compliance with the PRA – for example, by providing lower rates of interest. Payments are therefore not being made to landowners to comply with the law. But they are being made to assist Brazilian public institutions to overcome barriers to providing the concessional credit to which landowners are entitled under the law. The landowner would have benefited from the ex ante access to concessional credit prescribed by the Forest Code legislation, but could also receive discounts on borrowing rates over time, having cleared hurdles including, finally, successful compliance (Edwards 2016).

REDD+ PBP would be based on outcomes measured in hectares of reforestation and would use existing MRV systems where possible. PBP could be made when landowners achieve compliance as determined by the Federal Rural Environmental Registry System (SiCAR), but payments would be made to the public bank, flowing through the federal government. These revenue streams help the issuing public banks to overcome barriers to providing the concessional credit to which landowners are entitled under the law. The landowner benefits from the ex ante access to concessional credit prescribed by the Forest Code legislation.

The bond structure could easily be extended to other forest country contexts. Public banks could create or expand concessional credit schemes to private landowners for reforestation activities. However, it is likely that without legislation similar to Brazil's Forest Code, new MRV systems will need to be established to monitor and verify emission reductions attributed to the scheme.

6.2.2 Evaluation of structure 2

A qualitative evaluation of the public bank issued concessional lending bond is presented in Figure 9.

This structure shares the main performance benefits of structure 1. For donors, it ensures a link between PBP and large-scale mitigation actions, reducing the risk of underuse of payments, and likely increasing the overall value for money. For issuers, it reduces the cost of capital associated with NDC-related project activities, and ideally increases the overall PBP volumes it receives.

There are three key differences between structures 1 and 2, as follows.

First, there may be a need for additional/bespoke MRV at plot level, and a need for mapping plot-level outcomes to the outcomes required by donors to generate PBP payments. Since the basis for performance will remain jurisdictional, and since such payments will come via the government to the public bank, there is an underlying “basis risk” associated with this structure. That is, the public bank’s interventions could achieve its target outcomes, while the jurisdiction could fail to deliver overall performance. To eliminate this risk for the bank a separate agreement between the government and the bank would be needed in which PBPs for bank-driven outcomes are defined, and corresponding MRV arrangements are agreed. Nevertheless, it should be possible for such MRV arrangements to be relatively efficient and less costly than project-level REDD+ MRV to date, since these secondary MRV arrangements are not tied directly to donor PBP.

Second, this structure leverages existing concessional lending programs by public banks, and should drive significant gains in the effectiveness of such programs. By leveraging existing programs, this structure should increase investor confidence in the use of proceeds – such concessional lending programs are more narrowly defined than the potential use of proceeds in structure 1, and there is more of a track record to refer to. Similarly, it may provide donors with greater assurance of the proper use of payments, and tighter MRV arrangements. In addition, supported by PBP, the loan portfolio from public banks to landowners (e.g. for PRA) could still generate sufficient returns to ensure that even if the bond issue shows up as an increase in public bank debt over the short term, there would be no increase in debt over the lifetime of the bond and lending program.

Finally, for many countries including Brazil, an issuance by a public bank would not count as increased public debt, which although largely an accounting issue, could make this approach more attractive. Public banks in Brazil are private entities in which the federal government holds a majority share. When they compete with private banks to sell credit lines, the Treasury equalizes the difference between the inter-bank rate and the concessional rate offered by rural credit lines. Public banks may choose to further reduce these concessional rates with their own resources to increase their market share. They may issue Forest Bonds to fund this activity. The Central Bank allows public banks to issue bonds abroad at that their own risk. Since resources from the Treasury do not directly guarantee an issuance, and the proceeds from an issuance are not diverted to public expenditures, bond debt is not counted as public debt. Nevertheless, a public bank’s solvency and credit rating may impact the sovereign credit rating due to the government’s share holdings.

BOX 3: AN ILLUSTRATIVE EXAMPLE OF STRUCTURE 2

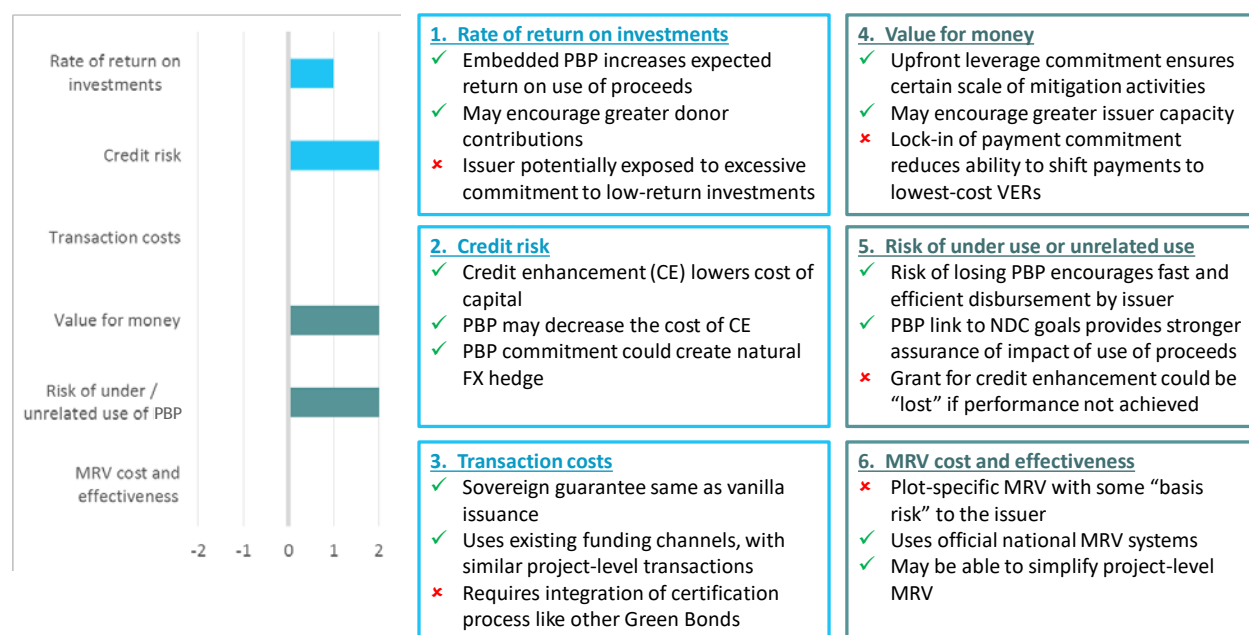
In Brazil's case, this structure could offer landowners seeking compliance with the Forest Code via reforestation under the PRA regularization program a cost of capital significantly below the current ABC rate of 7.5%.

PBP commitments should lower public banks' internal assessment of credit default risks across their loan portfolios by reducing interest rates, hence making loans easier to repay. In this way, PBP targeting PRA compliance would allow a reduced interest rate, first, for the direct reason that payments would subsidize interest rates and, second, for the indirect reason that they would lower default risk.

More research is needed to understand the relationship between the cost of credit enhancement and its impact on risk premia. A full 100% AAA guarantee or "credit wrap" could reduce the 3.5% risk premium of a ten-year US\$ Brazilian sovereign issue from 6% toward that of US Treasury Bonds at 2.5%. If the cost of credit enhancement is significantly lower than this 3.5% risk premium for this structure, donors could contribute to the cost of credit enhancement. An upfront grant used in this way would carry greater risk for donors than the PBP element where results are not achieved. However, the improved credit rating and lower bond yield could be cost-effective in reducing the amount of PBP ultimately required from the donor to offset the bond coupon costs. If this reduction in PBP outweighed the cost of credit enhancement, the grant would increase the overall leverage ratio of international climate support to upfront bond investor capital.

As suggested in structure 1, 1 Mha of reforestation could potentially be funded at zero cost of capital to the issuer. Emissions reductions of 100 MtCO₂e over ten years across 1 Mha could be achieved via PRA at cumulative carbon sequestration per hectare of 100 tCO₂e. At a cost of reforestation US\$ 1,000/ha, this could be funded by a US\$ 1 billion bond leading to a net zero cost of capital to the issuer.

FIGURE 11: QUALITATIVE ASSESSMENT OF STRUCTURE 2



Source: Vivid Economics

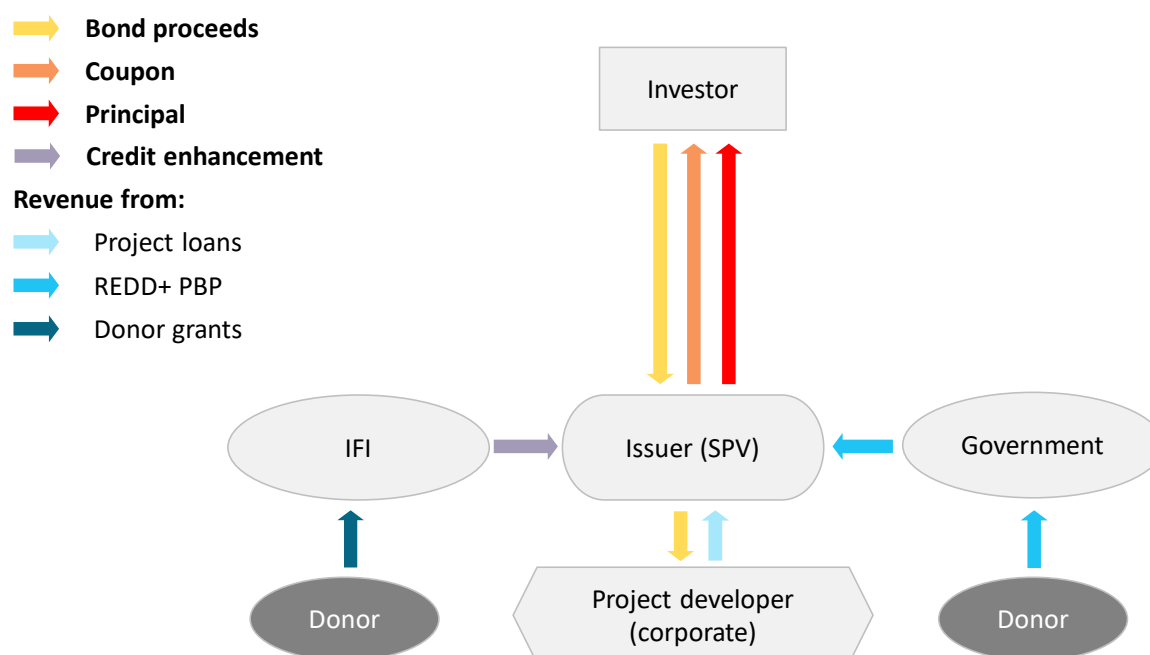
6.3 Structure 8: private corporate bond for sustainable forest management

TABLE 5: SUMMARY OF BOND STRUCTURE 8

Issuer	SPV (set up by corporate in forestry sector)
Use of proceeds	Commercial
Coupon structure	Fixed cash
MRV	New
Additional revenue streams	REDD+ PBP or other forms of PBP
Recourse mechanism and enhancement	Credit enhancement

Source: Vivid Economics

FIGURE 12: STRUCTURE 8 FEATURES A CORPORATE BOND ISSUED THROUGH AN SPV SUPPORTED BY RESULTS-BASED DONOR FINANCE



Source: Vivid Economics

Note: IFI, international financial institution. Arrows represent contractual financial flows (PBP is dependent on verified results).

6.3.1 Description of structure 8 and enhancement attributes

A corporate-issued Forest Bond has good potential for achieving scale, leveraging private finance and providing donors with value for money. But there are some challenges to using external resources to scale up this market, including concerns about “additionality” and picking winners, as well as some donors’ concerns with providing payments to large corporates, even if this is agreed with the forest country government.

This proposed bond structure would be issued by a corporate forestry company, through an SPV, to support commercial SFM activities that meet high standards for both mitigation and enhancement of biodiversity. Since the aim is to go beyond the commercial investments currently funded by vanilla bonds, and to ensure achievement of relatively high SFM standards, the expectation is that these investments will be of significantly lower commercial value than the alternative investments available to these companies.

REDD+ PBP or other forms of PBP would help make a high standard of multi-species SFM commercially viable. Brazil's current high interest rate environment may constrain expansion of investment in such activities, resulting in a loss of opportunities created by increasing global demand for timber, pulp and paper. Investments in areas like multi-species SFM must compete with standard commercial forestry activities to maximize value for shareholders. The integration of REDD+ PBP or other forms of PBP from an external donor could be used to effectively reduce the cost of capital, improving the rate of return for shareholders. REDD+ PBP would most likely need to flow through the federal government, as depicted in Figure 10. However, it might also be possible for other forms of PBP to be used. If voluntary carbon markets were capable of generating the necessary donor payments, PBP could flow directly to the issuer, although some form of government participation might be desirable in terms of MRV or other public commitments to underlying enabling conditions.

This structure would likely require new and potentially costly MRV systems. Although exact data are unavailable, it is unlikely that many commercial forestry companies routinely collect the specific data required to verify emissions reductions. It may be that corporates must invest in MRV systems such that they can provide the federal government, and ultimately international donors, with sufficient evidence to unlock REDD+ PBP or PES payments.

The default risk, and hence credit rating, of the bond will depend on the investment portfolio of the SPV. The SPV guarantees both the payment of coupons and the repayment of the principal to investors, funded by the income it receives from its own investment portfolio. If the SPV has no other investment activities, this portfolio would simply be the project activities funded by the proceeds of the bond. Thus, the bond's credit rating will depend on the risk-adjusted return expected from these project activities. A variation on this could include a guarantee from the corporate parent company, which alongside the SPV revenues would make for dual recourse.

The bond structure features a subordinated loan or credit line to the SPV provided by an IFI. Through this arrangement, the IFI purchases a "junior debt tranche" – that is, a portion of the bond absorbs first losses from the underlying project activities. This protects commercial investors, lowering the default risk and raising the credit rating of their specific investments.

6.3.2 Evaluation of structure 8

A qualitative evaluation of the corporate sustainable forestry management bond structure is provided in Figure 13. This structure shares the broad performance benefits of the previous structures. For donors, it ensures a link between PBP and timely, large-scale mitigation actions, unlocking activities that have been hitherto small-scale, while limiting the risks of payments being used ineffectually. For issuers, it should very significantly reduce the cost of capital associated with sustainable forest production activities compared with today's levels, and it should increase the overall PBP volumes available.

In addition to the benefits of achieving high upfront private sector leverage, this bond structure could potentially facilitate greater price competition between companies. As the market develops, this structure could make it more feasible to use an auction process to allocate available PBP. As opposed to a pure PBP, the bond-embedded PBP provides donors with greater assurance that any forward PBP commitments are accompanied by mitigation activities at a high standard, and that companies will not underbid and then under-deliver. If successful, such price competition could further improve the value for money for donors providing PBP.

The establishment of an SPV also increases transparency and reduces the risk of unrelated use of the PBP payments. By legally separating the activities financed by this bond from those financed by the corporate, it provides an additional stringency to assurances of proper use of proceeds, and should increase confidence in additionality.

From the issuer's perspective, the PBP enhancement both increases the expected commercial returns to the project, and could reduce revenue uncertainty by providing (subject to performance) a fixed-price PBP revenue stream. It will be critical that the PBP levels available far exceed the minimal green premium seen to date in unenhanced Green Bonds, and that the volumes are at a much greater scale than existing government PES schemes. But it should also be noted that the committed PBPs are a much more certain revenue stream than the long-term commodity prices such companies generally face. To the extent that PBP streams may be provided in a different currency to the domestic currency of issuance, this may also provide value to the issuer as a natural FX hedge.

As default risk ultimately depends on the quality of revenue streams of projects supported by the SPV, investment may be subject to high due diligence costs and insufficient credit ratings. The underlying credit rating of a portfolio of forestry projects is unclear and difficult to evaluate. Investors will need good access to project information to be able to evaluate project revenue streams, thereby raising transaction costs. For such a bond structure to be attractive to an *institutional* investor, other counterparties (for example, the corporate parent, a supporting DFI or the donor) will need to ensure that sufficient due diligence is conducted such that a rating agency can give the SPV a credit rating.

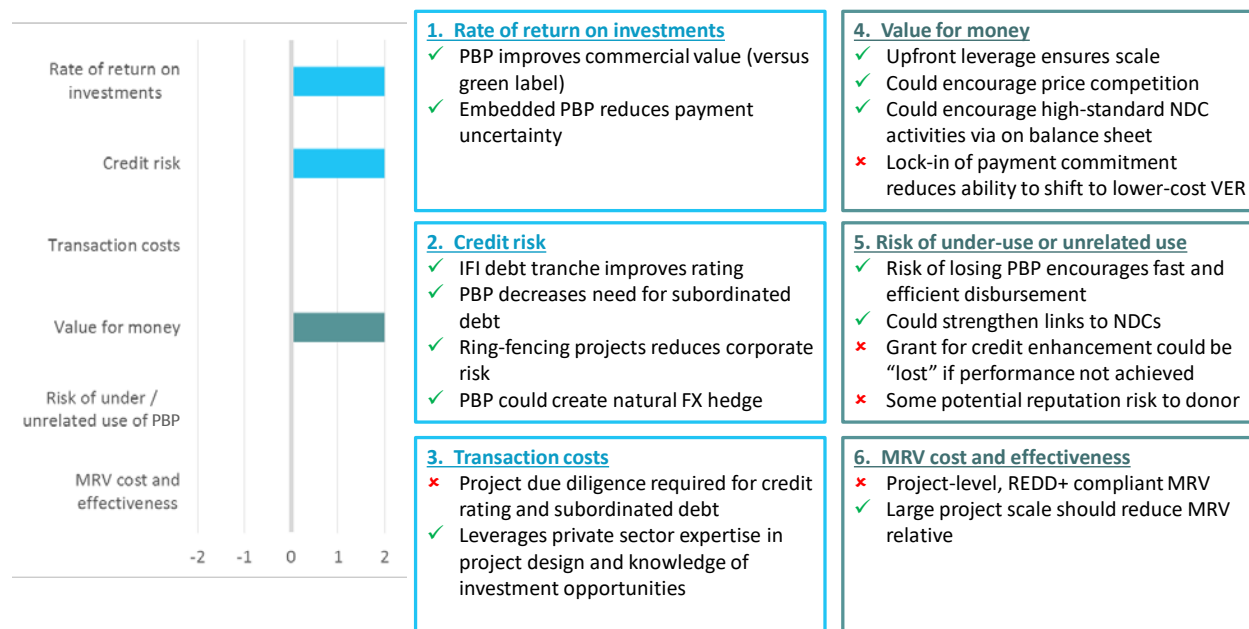
However, the SPV structure makes it easier to incorporate credit enhancements, which can ensure a reduced cost of capital, and greater attractiveness to issuers and investors. An IFI investing in a junior debt tranche could further reduce credit risk for private sector investors. As with previous structures, the bond issuance exposes the issuer to significant risks given the uncertainty of PBP payments. Depending on the specific situation and price, a supplemental credit enhancement paid for by donors may be appropriate, and offer best value for money.

As with structure 2, this structure would involve project-level MRV, although the scale of proposed projects should mean a relatively lower cost of MRV compared with project-level MRV to date.

If this structure is built around REDD+ PBP, it will involve significant basis risk, which is likely to pose an even greater challenge than under structure 2. REDD+ PBP payments will be made by donors at the government level for jurisdictional outcomes, while the government makes PBP payments to the issuing SPV at the project level. In contrast to the National Development Bank issuing structure 2, the SPV issuing structure 8 may not have as tight an institutional relationship, or as clear an alignment of their investment

activities with broader government policy. For the forest country government, incurring obligations to pay the SPV without assurance of receiving the REDD+ PBP from donors might represent too great an economic or political risk.

FIGURE 13: QUALITATIVE ASSESSMENT OF STRUCTURE 8



Source: Vivid Economics

7. Critical Issues in the Implementation of Enhanced Bond Structures (Based on Stakeholder Feedback)

The shortlist of potential bond structures was tested through a stakeholder engagement exercise, including consultations with potential implementing agencies in Brazil, donors and supporting international stakeholders, and through a World Bank workshop. The stakeholder engagement process is summarized in Annex A. A summary of practical recommendations arising from the stakeholder feedback is provided in section 8. This section synthesizes the stakeholder feedback for each of the shortlisted bond structures.

7.1 Stakeholder feedback – structure 1

A clear message is that issuers and investors want a simple product that is easy to understand. Where structures are made more complex, there must be a clear benefit, and one that can be clearly laid out to both investors and issuers. In particular, investors are unlikely to view PBP as a game-changer, so the PBP enhancement must be clearly articulated as a support to the issuer, and not related back directly to investor returns.

The appeal of PBP to issuers may be limited if the availability of PBP funding is limited. In order for the proposed bond structures to achieve scale, they would also require PBP to be available to support that scale.

From a donor perspective, the missing link at the moment is a mechanism to provide “financing” to projects that can help achieve NDC outcomes. There is no shortage of “funding” in that there are resources available and committed by donors, but there is a shortage of ways to translate this funding into finance for actual projects. A priority – not covered in depth in this report – will be to identify issuers with a sufficient pipeline of underlying projects, or capacity to generate such a pipeline.

The concept of providing upfront donor grant funding for credit enhancements would need to be clearly linked to improving value for money. In circumstances where a forest country would benefit from credit enhancement, one needs to compare the marginal benefit – in terms of (expected) carbon mitigation per donor dollar spent – of providing grant finance to improve the credit rating of the issuer/bond versus providing additional PBP to improve the returns of mitigation action. Although upfront grant funding for credit enhancement is higher-risk (since performance is not guaranteed), it may be a cost-effective way of reducing the (financing) cost of mitigation action, and hence reducing the quantity of the PBP needed to achieve a given level of carbon mitigation.

The reputational risk for donors would need to be considered in the case of more complex financial instruments. The implication of this may be that further MRV mechanisms are required to demonstrate the additionality of outcomes supported by the PBP streams. These need to be included within the discussion on transaction costs.

In some instances, the issuing government may face constraints on issuing further debt. There may be legal limits, or constraints imposed by country debt-management offices, for issuing additional

government debt, which sits on the government balance sheet. One option – as discussed in this report – is to issue through public banks, in which case there needs to be a clear contractual relationship between the issuing bank and the government, which would face risk on the PBP outcome-based revenue stream. Another option would be to set up the guarantees contractually such that the debt could be considered off the government’s balance sheet.

7.2 Stakeholder feedback – structure 2

The MRV requirements for donor REDD+ PBP streams may not match the current MRV systems in place among the issuing public banks. While a public bank may carry out some verification of activities among the projects supported by the proceeds of concessional lending, it is unlikely to measure emissions reductions in the same way that the government would have to in order to generate PBP payments for VERs. This may imply that some additional MRV is required that is not already undertaken by the issuer, which would be heavily dependent on national/state-level government processes.

Similarly, the public bank will not bear risk on outcomes it does not control – for example, sub-national or national emission reductions, which are also affected by broader government environmental policy and initiatives. The government would have to be the agency taking risk on the generation of VERs, and the associated PBP streams from donors. That is, the government would guarantee these revenue streams to the issuing public bank.

If the bond is to be issued in a foreign currency to attract PBP and international investors, public banks would need the government to provide an FX hedge.

7.3 Stakeholder feedback – structure 8

Government will be exposed to basis risk to some extent, as a counterpart for donor PBP streams. If the host government is taking on risk on the achievement of outcomes (VERs), it needs to be clear that the commercial projects are contributing to these outcomes.

From the donor perspective, contractual arrangements need to be clear. The PBP stream would be provided to government in support of VERs. There would, however, need to be a clear link between the PBP revenue streams and “additional” environmental outcomes that would not have been achieved in the absence of the PBP support.

There is a trade-off between increasing complexity and transaction costs, and the potential impact of PBP in making the issuance commercially worthwhile. Making projects worthwhile might require a substantial commitment of PBP.

8. Recommended Next Steps

This report examines a longlist of potential innovative bond structures against a set of evaluation criteria. It focuses on enhanced bond structures that blend some form of donor PBP linked explicitly to a use of proceeds ring-fenced for achieving forest-based NDC. The proposed structures draw on an analysis of the current conditions for both bond finance and PBP funding for forest-based NDC activities.

The analysis suggests that these enhanced bond structures could overcome a number of persistent challenges to achieving NDC-related forest finance at scale. These structures enable future results-dependent revenue streams from PBP to be effectively used to source large-scale, low-cost upfront investment from capital markets. They do this by helping to close two interrelated gaps inhibiting financing at-scale: i) the gap between the economic and commercial returns achievable from forest-based NDC activities, and the returns required by investors; and ii) the gap between the terms on which donors are able and willing to provide mitigation-related payments, and the terms that make it attractive for issuers to take forest-based mitigation action. In particular, the commitment made by issuers in leveraging at-scale finance increases the value for money and reduces the risks for donors, encouraging in turn the faster mobilization of donor commitments. These donor commitments then close the “returns” gap between issuers and (institutional) investors, unlocking the scale and cost-efficiency of capital markets.

This report focuses on a shortlist of three bond structures, which appear to have the greatest potential. These three structures are generally simpler than the other structures on the longlist, while still effectively overcoming the main challenges faced by current financing and funding mechanisms. These three structures also appear to be most feasible in the short-to-medium term, and they offer solutions relevant to the major actors (or issuers) required to deliver forest NDC activities – governments, public banks (and the small-to-medium-sized producers to whom they lend), and large corporates.

The shortlisted bond structures may not be appropriate in all country contexts. A high-level review of current conditions for forestry finance highlights the importance of various readiness conditions to the financing environment. The contribution of this report is to develop structures that can be applied in geographies that have achieved such underlying readiness conditions. The focus is on the testing of these structures in Brazil to ensure some real-world feedback. These structures could also be applied in other regions, although the appropriateness of each structure will depend on each region’s particular institutions and broader enabling environment.

Moreover, as the market for innovative bond structures grows, other options on the longlist may become relevant. For example, while the impact bonds market is relatively new and completely untested in a forestry context, it could have potential once confidence is developed in other Forest Bond structures, and greater appetite for risk emerges. Similarly, CLO structures have been successfully issued under a green label, particularly in China, and could be attractive once large asset pools have been established in the NDC-related forest sector.

A number of hurdles remain between the three shortlisted structures and the actual issuance of NDC Forest Bonds, but some specific actions might help move them closer to implementation. These hurdles and potential near-term actions were raised in the course of the research and through stakeholder feedback. By way of a conclusion, the recommended next steps are summarized below.

Recommendation 1: Convene interested counterparties into one or more action-oriented working group committed to advancing such bond structures. A working group should include stakeholders from forest countries (governments, public banks or large corporates), donors (whether government or non-government), relevant multilateral finance institutions and, potentially, private investors and expert advisors. A working group would be aligned on the broad outlines of the bond structure of common interest to them; it would identify critical issues to be resolved, and agree a process for moving from concept toward implementation. The working group would also commit to providing or securing the necessary resources to support the effort over the required time frame.

Recommendation 2: Develop one or more context-specific “pilot” bond structure to work through technical issues. This could be a core task for a working group. The structures were broadly well received by stakeholders during the course of this research, and the underlying principles clearly offer potential improvement on the status quo. However, a number of crucial issues exist which can be meaningfully tackled only in the context of a more specific proposal, especially in terms of the issuing entity and targeted forest-based NDC activities. For example:

1. Defining the use of proceeds likely to be acceptable to issuers, donors and investors given their different interests. This might include some consideration of liquidity and tenor.
2. Defining the contractual arrangements between donors, issuers and national governments as the basis for PBP commitments, especially where the issuer is a public bank or private entity facing basis risk.
3. Working out constraints to issuers in relation to the potential size or terms of a bond issuance.
4. Determining the currency of issuance, and the feasible management of FX risk across issuers, national and international investors, and donors providing PBP.

Recommendation 3: Develop a detailed financial model of a specific issuance and use of proceeds to investigate the most efficient financial engineering of the bond structure. The greater leverage and commitment of issuers should attract strong PBP from donors, but the exact quantity and pricing that is feasible remains uncertain. The combination of a PBP revenue stream and grant funding for credit enhancement may be attractive, but the “optimal” amount of each and the trade-offs needs to be considered in greater detail. For example, more secure PBP streams may reduce the need for grant-funded credit enhancement. Conversely, relatively small amounts of grant-funded credit enhancement could require fewer emission reductions or lower PBP to achieve the same outcome in terms of overall reduction in cost of capital. These should be considered in a full financial model for a potential bond structure that could be developed by the potential bond issuer, perhaps supported by the working group.

References

- African Development Bank, Asian Development Bank, European Bank for Reconstruction and Development, Inter-American Development Bank, International Monetary Fund, & World Bank. 2015. FROM BILLIONS TO TRILLIONS: Transforming Development Finance : post-2015 financing for development: multilateral development finance.
- Amazon Fund. 2017a. Donations. Available at:
http://www.amazonfund.gov.br/FundoAmazonia/fam/site_en/Esquerdo/doacoes/
- _____. 2017b. Monitoring & Evaluation. Available at:
http://www.amazonfund.gov.br/FundoAmazonia/fam/site_en/Esquerdo/Monitoramento_Avaliacao/
- Assunção, J. 2015. Strengthening Brazil's Forest Protection in a Changing Landscape. As Amazon deforestation shifts to small-scale clearings, policymakers should adapt, (August), 1–4.
- _____. Gandour, C., and Rocha, R. 2013. DETERRing Deforestation in the Brazilian Amazon: Environmental Monitoring and Law Enforcement TL. May. *Climate Policy Initiative Report, May VN-(May)*.
- Banco da Amazonia. 2017. FNO - Biodiversidade - Reserva legal APP.
- Banco do Brasil. 2011. *SUSTAINABLE CREDIT GUIDELINES OF BANCO DO BRASIL: Agribusiness , Irrigated Agriculture , Electric Power , Construction and Building , Mining , Oil and Gas , Transportation , Pulp and Paper*.
- _____. 2015. Annual Report 2015.
- Banco do Nordeste. 2017. Linhas de Crédito Verde.
- Birdsall, N., Kuczynski, P., & de Nevers, M. 2015. *Look to the Forests - How performance payments can slow climate change*.
- BNDES. 2016. The BNDES. Available at:
http://www.bndes.gov.br/SiteBNDES/bndes/bndes_en/Institucional/The_BNDES/
- Brazilian Ministry of the Environment. 2016. *National Strategy for Reducing Emissions from Deforestation and Forest Degradation, and the role of Conservation of Forest Carbon Stocks, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks*.
- Brazilian National Institute for Space Research (INPE). 2016. PRODES estima 7.989 km2 de desmatamento por corte raso na Amazônia em 2016.
- Caixa. 2017. About Caixa. Available at: <http://www.caixa.gov.br/sobre-a-caixa/Paginas/default.aspx>
- Climate Bonds Initiative. 2016. *Bonds and Climate Change: The state of the market in 2016*. Retrieved from [https://www.climatebonds.net/files/files/CBI State of the Market 2016 A4.pdf](https://www.climatebonds.net/files/files/CBI%20State%20of%20the%20Market%202016%20A4.pdf)
- _____. 2017. Market development: Aggregation, securitization, covered bonds.
- Climate Change News. 2016. Brazil forest clearance is rising in a recession – that's worrying.
- Climate Funds Update. 2016. Climate Funds Update: The data. Retrieved May 26th 2016 from <http://www.climatefundsupdate.org/data>
- _____. 2017. Amazon Fund.

- Cranford, M., Parker, C., & Trivedi, M. 2011. Understanding forest bonds: a guide to raising up-front finance for tropical forests. Available at: http://globalcanopy.org/sites/default/files/documents/resources/UnderstandingForestBonds_0.pdf
- Earth Day Network. 2015. The Brazilian Forest Code, Three Years Later.
- Earth Innovation Institute. 2015. *Territorial performance system*.
- Edwards, R. 2016. *Linking REDD+ to Support Brazil's Climate Goals and Implementation of the Forest Code*.
- _____, Tepper, D., & Lowery, S. 2014. Jurisdictional REDD+ Bonds: Leveraging Private Finance for Forest Protection, Development, and Sustainable Agriculture Supply Chains, 29. <http://doi.org/10.1007/s13398-014-0173-7.2>
- Federative Republic of Brazil. 2015. Intended Nationally Determined Contribution: Towards achieving the objective of the United Nations Framework Convention on Climate Change, 9, 6.
- Fishbein, G., & Lee, D. 2015. Early Lessons from Jurisdictional REDD+ and Low Emissions Development Programs, 52 pages. Retrieved from http://www.nature.org/media/climatechange/REDD+_LED_Programs.pdf
- Food and Agriculture Organization of the United Nations (FAO). 2013. FAOSTAT. Retrieved from <http://faostat.fao.org/site/567/DesktopDefault.aspx?PageID=567#ancor>
- _____. 2017. FAOSTAT: Forestry Production and Trade.
- Forest Trends. 2016. *View from the Understory: State of Forest Carbon Finance 2016*.
- Friedmann, V., Michaelowa, A., & Bouzidi, A. 2016. Boosting climate action through innovative debt instruments: Combining debt for climate swaps and climate policy performance bonds.
- FSC. 2016. Facts & Figures. Available at: <https://ic.fsc.org/en/facts-and-figures>
- Ghana Forestry Commission. 2015. Ghana National REDD+ Strategy, (January), 61.
- GiZ. 2017. Land tenure regularisation in the Amazon – Terra Legal.
- Global Canopies Programme. 2015. *The Little Sustainable Landscapes Book*.
- Grantham Research Institute, GLOBE, & Inter Parliamentary Union. 2015. *The 2015 Global Climate Legislation Study*. Retrieved from http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/05/Global_climate_legislation_study_20151.pdf
- Grassi, G., & Dentener, F. 2015. Quantifying the contribution of the Land Use sector to the Paris Climate Agreement, (November), 20. <http://doi.org/10.2788/096422>
- Humphrey, C., & Prizzon, A. 2014. *Guarantees for development: a review of multilateral development bank operations*. Retrieved from <https://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/9398.pdf>
- IFC. 2016. Forests Bond Factsheet. Available at: <http://www.ifc.org/wps/wcm/connect/90a302d4-b968-4261-90df-4740ad478389/FINAL+Forests+Bond+Factsheet+10-5.pdf?MOD=AJPERES>
- IMF. 2016. Fiscal Multipliers and Institutions in Peru: Getting the Largest Bang for the Sol. *IMF Working Paper*.

- InfoAmazonia. 2017. Monthly Deforestation, Brazil – DETER. Available at: <https://infoamazonia.org/en/datasets/monthly-deforestation-brazil-deter/>
- IPCC. 2014. *2014: Agriculture, Forestry and Other Land Use (AFOLU)*. In: *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*.
- Jornal do Brasil*. 2015. Quanto custa reflorestar 12 milhões de hectares?
- Ludeña, C., & Netto, M. 2011. Brazil: mitigation and adaptation to climate change. *Inter-American Development Bank*, (August).
- Mongabay. 2017. Calculating Deforestation Figures for the Amazon.
- Nepstad, D., McGrath, D., Stickler, C., Alencar, A., Azevedo, A., Swette, B., ... Hess, L. 2014. Slowing Amazon deforestation through public policy and interventions in beef and soy supply chains. *Science*, 344(6188), 1118–1123. <http://doi.org/10.1126/science.1248525>
- _____, Tepper, D., McGrath, D., Seroa da Motta, R., Edwards, R., Swette, B., & Shimada, J. 2015. Research and Financial Innovations in Support of Brazil’s INDC Process, (July).
- Ochieng, R. M., Visseren-Hamakers, I. J., Arts, B., Brockhaus, M., & Herold, M. 2016. Institutional effectiveness of REDD+ MRV: Countries progress in implementing technical guidelines and good governance requirements. *Environmental Science and Policy*, 61, 42–52. <http://doi.org/10.1016/j.envsci.2016.03.018>
- Proforest. 2017. *Assessing compliance with the Forest Code : A practical guide*.
- RISI. 2016. *Institutional Investment in Forestry : A Good Fit for the Pulp and Paper Industry ?*
- RSPO. 2015. RSPO Impact Update 2015, Kuala Lumpur: RSPO Impacts Department.
- S2BIOM. 2017. Factsheet: BNDES Forestry.
- S&P Global. 2017. Sovereign Ratings List.
- Seymour, F., & Busch, J. 2016. *Why Forests? Why Now? The Science, Economics and Politics of Tropical Forests and Climate Change*.
- Supply Change. 2017. Commitment Profiles. Available at: <http://supply-change.org/#company-profiles>
- The Woods Hole Research Center. 2014. Untangling Brazil’s Controversial New Forest Code.
- UNEP Inquiry. 2015. *Towards a Sustainable Financial System in Indonesia*.
- UNFCCC. 2016. Technical annex: Aggregate effect of the intended nationally determined contributions: an update, (May), 16–7126. <http://doi.org/10.1093/iclqaj/24.3.577>
- World Bank. 2015. Public Finance Management Reform in Ghana Receives World Bank Support.
- _____. 2017. *Brazil’s INDC Restoration and Reforestation Target*. Washington, DC, World Bank
- _____. 2017. *Demystifying Forest Bonds: Assessing the Suitability of Bonds as a Financing Instrument to Meet Forest-based NDC Targets*. Environment and Natural Resources Global Practice, Washington, DC, World Bank.
- WWF. 2014. Brazilian Forest Law. Available at: http://wwf.panda.org/wwf_news/brazil_forest_code_law.cfm

- _____. 2016a. Brazil's new Forest Code. Available at:
http://assets.wwf.org.uk/downloads/wwf_brazils_new_forest_code_guide_1.pdf
- _____. 2016b. Jurisdictional Approaches To Zero Deforestation Commodities. Available at:
http://wwf.panda.org/wwf_news/?283050/JAZD

Annex A Stakeholder engagement

In testing the shortlist of bond structures, a series of stakeholder engagement interviews were conducted with implementing agencies in Brazil and with donors and other international stakeholders.

Table 6 lists the stakeholders consulted in Brazil and the areas covered with each stakeholder. Table 7 presents the same information for the international stakeholder consultations.

TABLE 6: BRAZILIAN STAKEHOLDER ENGAGEMENT AND OBJECTIVES

Date	Institution	Objectives
March 22nd Rio de Janeiro	Ministry of Finance	Introduce the concepts and test institutional readiness/constraints Discuss need and potential for FX hedge, and position to government-backed bonds Consider jurisdictional approaches, including MRV arrangements
March 22nd Rio de Janeiro	Ministry of The Environment	Discuss previous experience in Green Bond issuance Test technical potential of bonds to support NDC objectives and Forest Code Consider the practical implications for institutional and contractual arrangements Consider MRV
March 22nd Rio de Janeiro	Civil Cabinet	Test how well proposed bond structures fit within policy objectives and current government efforts in financing NDC and forestry activities
March 22nd Rio de Janeiro	Forest Service	Follow up on MRV capabilities and how existing systems could be used to support the proposed bond structures
March 23rd Rio de Janeiro	Caixa Econômica Federal	Discuss FX hedge and how to deal with currency issues Consider potential practical implementation of proposed bond structures by public bank, and allocation of outcomes risk and PBP streams
March 23rd Rio de Janeiro	Banco do Brasil	Discuss FX hedge and how to deal with currency issues Consider potential practical implementation of proposed bond structures by public bank, and allocation of outcomes risk and PBP streams

Source: Vivid Economics

TABLE 7: BRAZILIAN STAKEHOLDER ENGAGEMENT AND OBJECTIVES

Date	Institution	Objectives
March 24th and 28th Conf call	Centre for Global Development	Discuss availability of donor funds and where these bonds fit within existing donor funding Consider which attributes are most interesting and key constraints to implementation for donors Allocation of risk between stakeholders (investors, issuers, and donors) Existing use of REDD+ funds and how these can be used in bond structures
March 24th London	BEIS	Donor funding and budget cycles Constraints for donors, MRV requirements and need for project pipeline
March 29th Conf call	Climate Bonds Initiative	Broader Green Bond space and recent developments Issues faced in development of Green Bond market and similarities / differences between these potential bond structures
April 3rd Conf call	KLD	Consider how to apply PBP to the proposed bond structures and constraints to use of PBP in this context Advantages from issuing donor government perspective, and from donor perspective Do bonds result in more efficient channelling of resources to end-users?
April 3rd Conf call	Inter-American Development Bank	Discussion of existing activities to support Brazil and how proposed structures improve FX issues from donor perspective Consider need for and extent of PBP required to make structures attractive in the short term and long term
April 21st London	BNDES/ Amazon Fund	Discussion of exiting activities including support for forestry activities as well as broader bond issuances Understand resources for and constraints to activities of BNDES Explore appetite and will to support bond issuance as any of issuer, investor, guarantor or supporting IFI

Source: Vivid Economics

Annex B Detailed Description and Assessment of Longlist of Potential Bond Structures

To develop a shortlist of potential bonds, a long-listing process was undertaken to identify a range of potential enhancement options and bond structures. This annex sets out the longlist and the evaluations for the shortlisting process. This report considers ten potential bond structures:

Public bonds using REDD+ PBPs:

1. national-level or sub-national outcomes for REDD+ PBP (presented in section 6.1);
2. REDD+ PBP to support concessional lending (presented in section 6.2);
3. zero coupon bond.

Government bonds with variable coupon:

4. forest impact bond;
5. climate policy performance bonds;
6. coupon-choice bond.

Corporate-issued sustainable forest management (SFM):

7. corporate-issued bond on the company balance sheet;
8. corporate bond for SFM issued via an SPV (presented in section 6.3).

Refinancing bond structures:

9. collateralized loan obligation (CLO) with re-lending;
10. asset-backed security (ABS) with dual recourse and re-lending.

The following is presented for each bond structure:

- A table that summarizes the structure in terms of the issuing authority, how the proceeds are used, coupon structure, MRV requirements, sources of revenue to service the bond, and recourse mechanisms or credit enhancement.
- A diagram demonstrating financial flows between different counterparties.
- The context of the main elements of each bond structure, a description of how the structure works, and how it differs from current bond offerings and other structures.
- An assessment against the evaluation criteria.

This annex provides details about the longlist bonds not included in the main report. For a detailed discussion of structures 1, 2 and 8, refer to section 6.

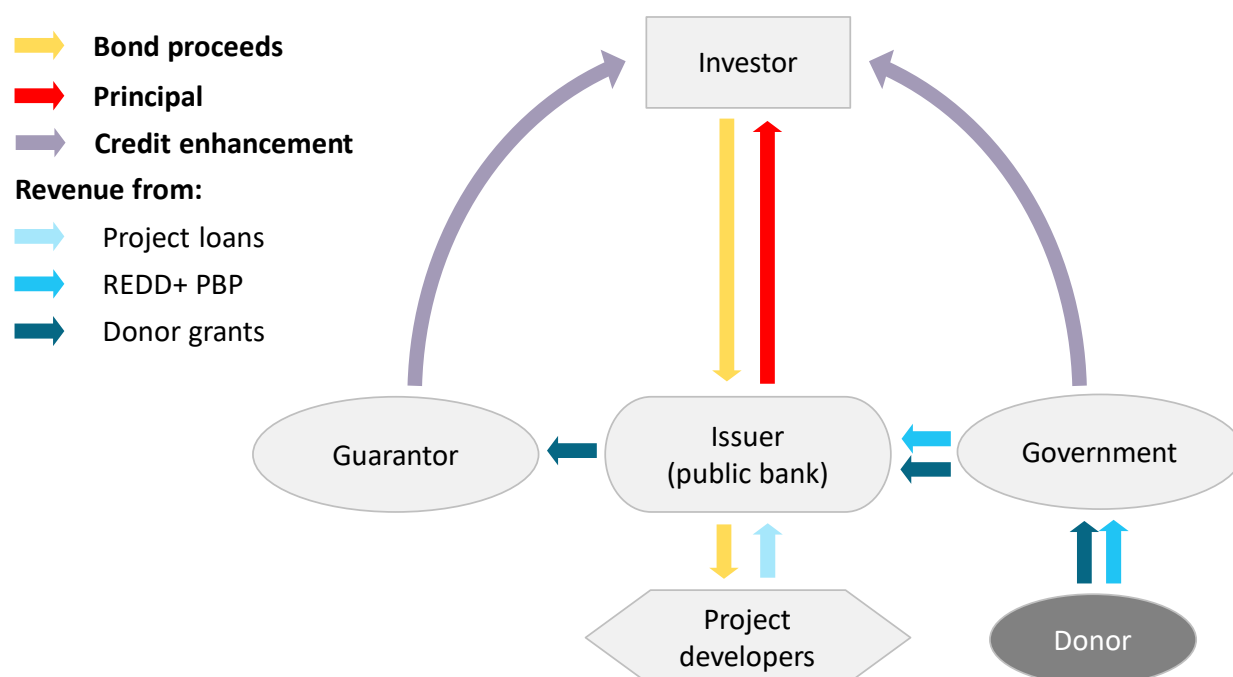
Structure 3: zero coupon REDD+ bond

TABLE 8: SUMMARY OF BOND STRUCTURE 3

Use of proceeds	National/jurisdictional
Coupon structure	Zero coupon
MRV	Partially existing
Additional revenue streams	REDD+ PBP
Recourse mechanism and enhancement	Credit enhancement

Source: Vivid Economics

FIGURE 14: STRUCTURE 3 FOLLOWS THE SAME CONTRACTUAL STRUCTURE AS STRUCTURE 2



Source: Vivid Economics

Note: Arrows represent contractual financial flows (PBP is dependent on verified results).

Description of structure 3 and enhancement attributes

The broad principles of the REDD+ PBP enhancement and issuer are the same as for structure 2. The bond would be issued by a public bank, and the PBP would provide enhanced revenue streams for verified emission reductions.

What the zero coupon bond does differently to structure 2 is:

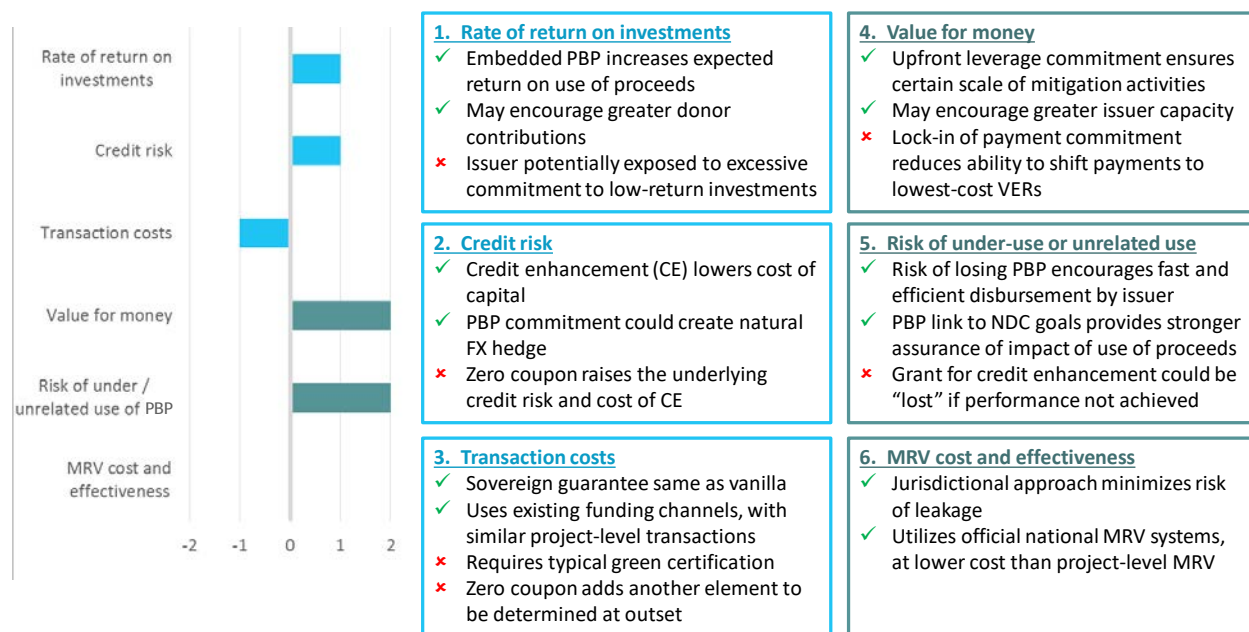
- It offers no rate of return (no coupon) to investors;
- the bond is issued at a discount relative to its face value. This means that investors pay a lower “price” for the bond, and recover a larger amount (the face value) upon maturity.

The structure of the zero coupon bond does not provide any obvious improvement over its fixed-income counterpart in the context of PBP-backed Forest Bonds. The theoretical advantages of the zero coupon

bond to investors are relatively limited, and relate to the timing of payments (liquidity), exposure to changes in interest rate over time and, potentially, tax differences. It is not obvious that any of these types of attribute offer a fundamental enhancement that addresses the challenges facing bond finance for forest activities, and if anything adds another layer of complication in designing the instrument.

Evaluation of structure 3

FIGURE 15: QUALITATIVE ASSESSMENT OF STRUCTURE 3



Source: Vivid Economics

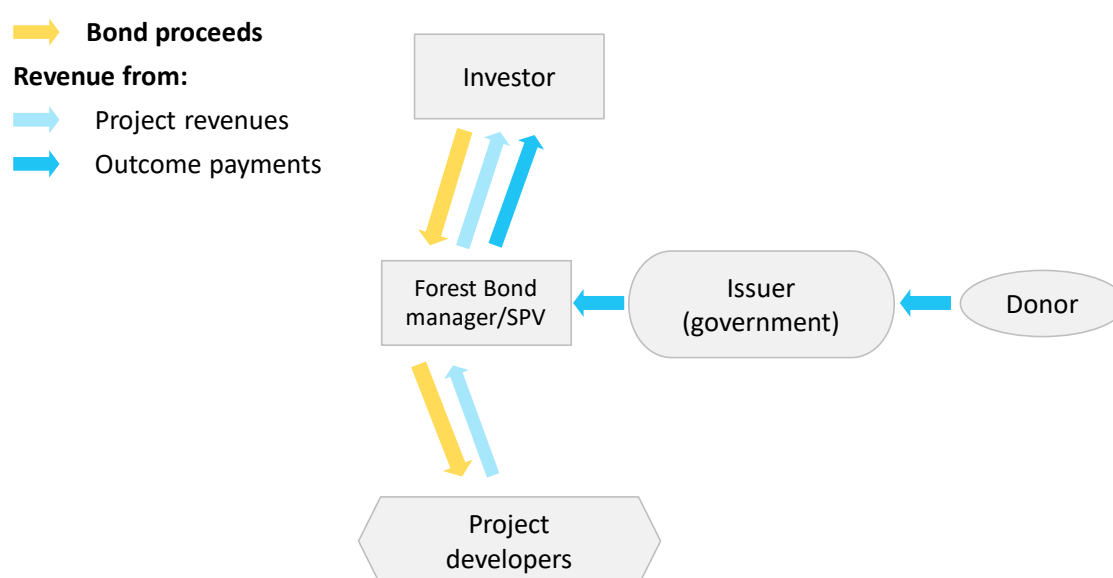
Structure 4: forest impact bond

TABLE 9: SUMMARY OF BOND STRUCTURE 4

Issuer	National government
Use of proceeds	National/bespoke
Coupon structure	Pay for success
MRV	New
Additional revenue streams	Donor outcome fund
Recourse mechanism and enhancement	Issuer guarantee

Source: Vivid Economics

FIGURE 16: INVESTORS TRANSFER PROCEEDS DIRECTLY TO PROJECT DEVELOPERS AND THE ISSUER PAYS ONLY FOR VERIFIED OUTCOMES



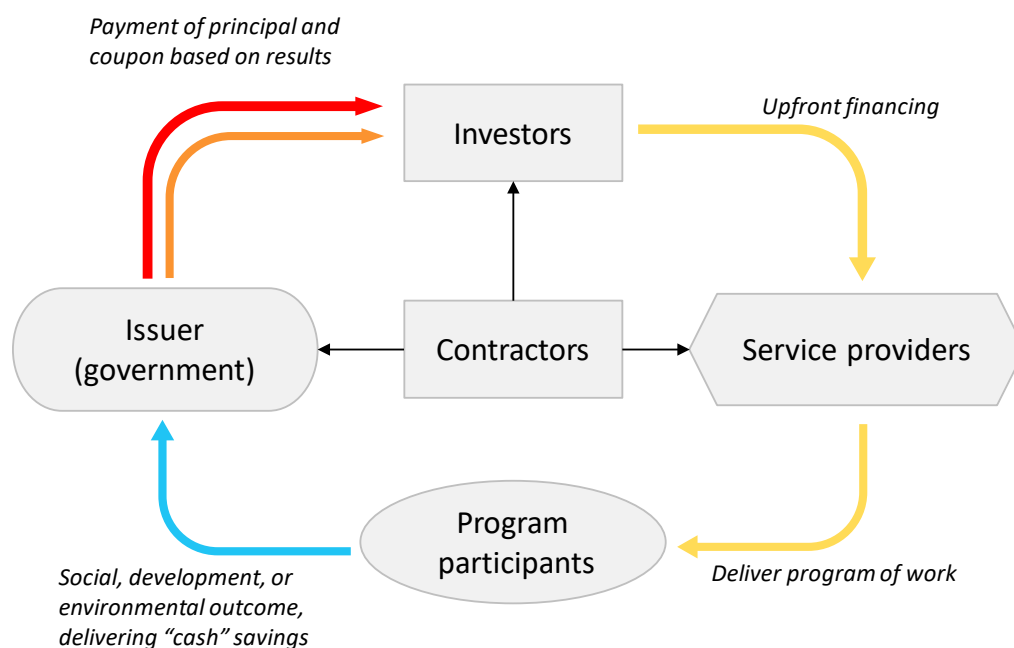
Source: Vivid Economics

Note: Arrows represent contractual financial flows (outcome payments are dependent on verified results).

Description of structure 4 and enhancement attributes

Impact bonds represent a growing area, with over 100 “social” impact bonds issued worldwide, and the first “development” impact bonds under development. A general description of the impact bond approach is provided in Figure 17. Investors provide upfront financing for service providers to deliver a program of work which aims to achieve a pre-defined set of social, development, or environmental outcomes. Only if these outcomes are achieved do the investors recover the entire investment made, including a rate of return. Impact bonds are typically contracted through a separate contracting agency, which provides a link between the investors and the service providers to bring together knowledge and innovation to deliver the desired outcomes, and ensures a degree of control over the outcomes for investors to align risks and incentives across parties.

FIGURE 17: UNDER AN IMPACT BOND APPROACH INVESTORS PROVIDE UPFRONT FINANCING TO DELIVER A PROGRAM OF WORK RELEASING SAVINGS FOR THE COMMISSIONING AGENCY



Source: Vivid Economics

A forest impact bond would work by allowing investors or a contracting agent to agree a set of target outcomes with commissioning forest country governments. The investors would then provide all upfront financing for the delivery of the program of work to achieve these outcomes, with no guarantee of payment of either principal or a rate of return.

Part of the principal is repaid by the project developers, funded by project revenues, and part of the principal is repaid by the issuer, funded by cost savings. The issuer must repay its portion of the principal and the coupon, the “outcome payments”, only if outcomes are achieved. The issuer guarantees that, in the event that outcomes are achieved, the appropriate outcome payments will be made. Thus, repayments from the issuer are relatively low-risk for the investor (provided the issuer has a high credit rating and outcomes are achieved), and repayments from the project developers are relatively high-risk. Thus, the partition of the principal balances risks between the issuer and the investor. This partition is defined within the terms of the bond issuance.

For issuers, this is attractive as it moves all risk of delivery of the program and its outcomes onto investors, and provides full upfront program finance. The corollary of this risk allocation, however, is that issuers would be expected to pay a (relatively) large premium if outcomes are achieved – i.e. outcome payments would be relatively large. In the case of a Forest Bond, the outcomes would be related to verified emissions reductions, or specific intermediary outcome targets. These could be associated with environmental externalities, which provide the “cash” savings which the issuer can use to fund outcome payments for successful delivery. Donor-funded payments for verified emission reductions also contribute to the financial value of outcomes to the issuer.

For investors impact bonds provide both a potentially high rate of return and high value from an environment, social and governance (ESG) perspective. If the investors and contracting agent are confident they can achieve the desired outcomes, they could expect to achieve a relatively high rate of return to recompense exposure to this risk. It also gives investors the opportunity to finance innovative programs aimed at tackling environmental issues, with a legacy if outcomes are achieved. The downside for investors is that they are exposed to a high degree of risk, as repayment of the coupon and the principal are potentially contingent on successful delivery of the program outcomes.

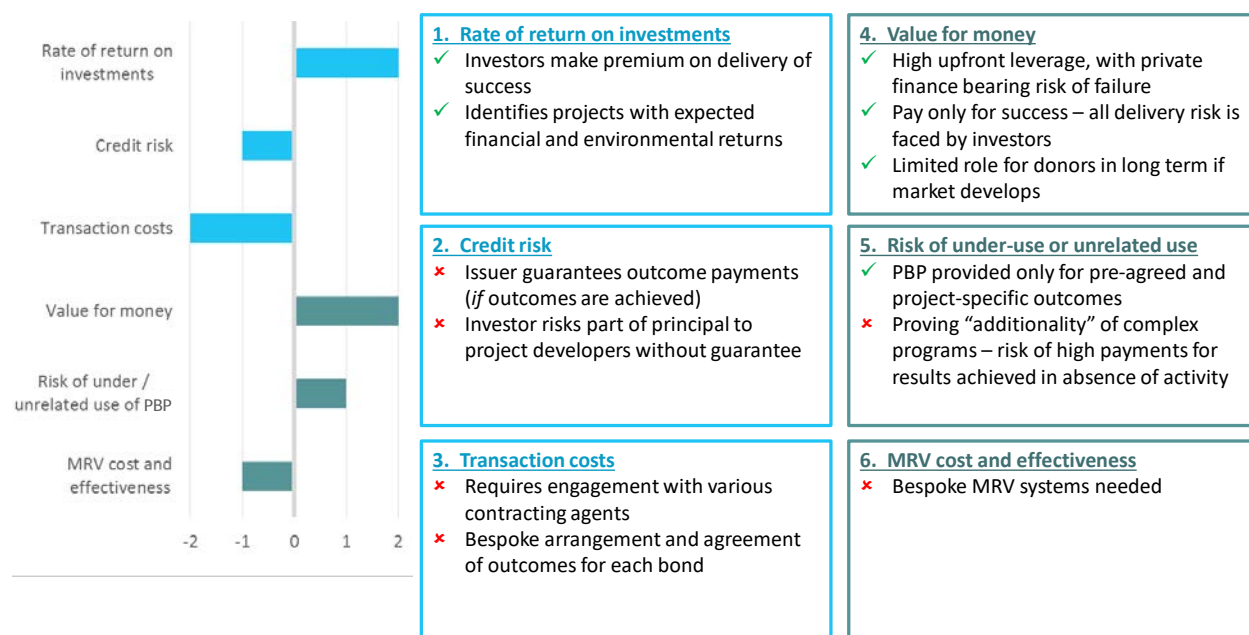
For donors, impact bonds provide a “guarantee” of successful achievement of target outcomes. This means that any donor support required is provided only if the desired social, development, or environmental outcomes are achieved.

In general, impact bonds are most likely to offer advantages over other forms of project finance where:

- Conventional government-led programs have tried, but not succeeded, in delivering the desired outcomes.
- A clear link can be made between the savings generated by successful delivery of the project outcomes, which defines the upper limit of funding the commissioning body (the issuer) may want to provide. This will include explicit payments from the donor to the issuer for outcomes.
- Control over successful delivery of outcomes can be transferred to investors and the contracting agent, and these outcomes can be monitored and verified. This is important in ensuring that: i) investors are not exposed to risks in achieving outcomes which they do not control; and ii) investors are not rewarded with a potentially high rate of return for achieving outcomes that may not be linked to the investment made.

Evaluation of structure 4

FIGURE 18: QUALITATIVE ASSESSMENT OF STRUCTURE 4



Source: Vivid Economics

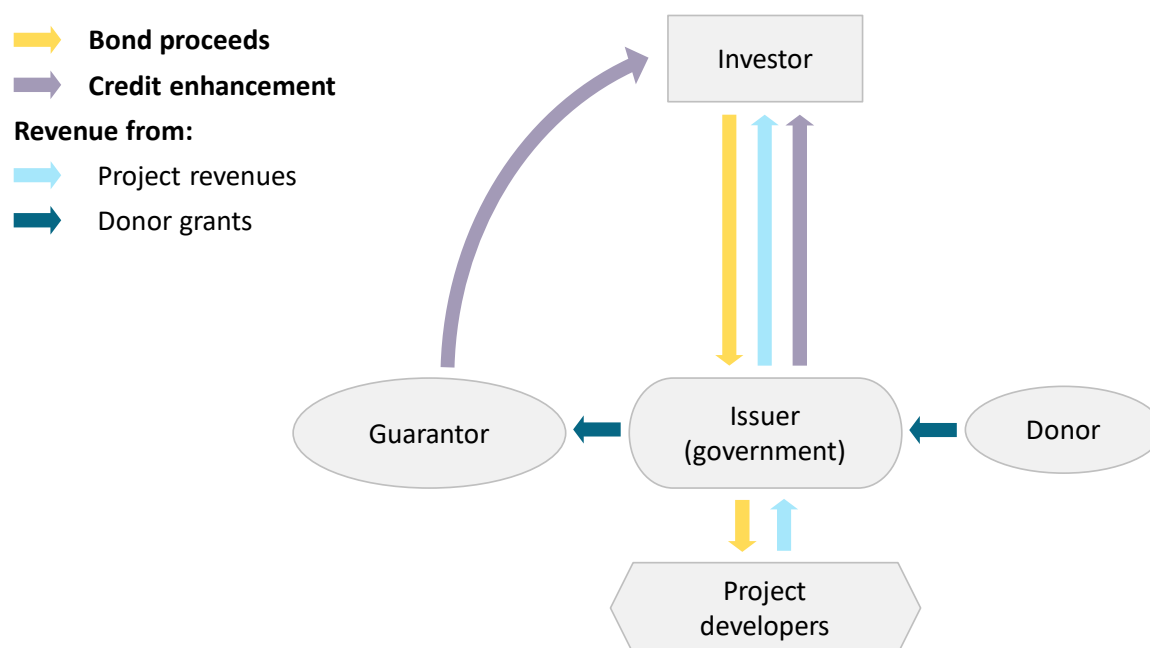
Structure 5: climate policy performance bonds

TABLE 10: SUMMARY OF BOND STRUCTURE 5

Issuer	National government
Use of proceeds	Support NDC policy objectives
Coupon structure	Pay for failure
MRV	Existing
Additional revenue streams	None
Recourse mechanism and enhancement	Credit enhancement

Source: Vivid Economics

FIGURE 19: STRUCTURE 5, FINANCIAL FLOWS TO INVESTORS INVERSELY RELATED TO ACHIEVEMENT OF GOVERNMENT CLIMATE POLICY OBJECTIVES



Source: Vivid Economics

Note: Arrows represent contractual financial flows.

Description of structure 5 and enhancement attributes

The basic principle of a climate policy performance bond (CPPB) is that the issuing government pays a higher coupon to investors if climate policy performance objectives are not met. The CPPB can be regarded as a hedge against the risk of climate change for investors, across a portfolio of investments. It provides a return in a world where the government does not achieve its climate change policy objectives, over which investors have little or no direct influence.

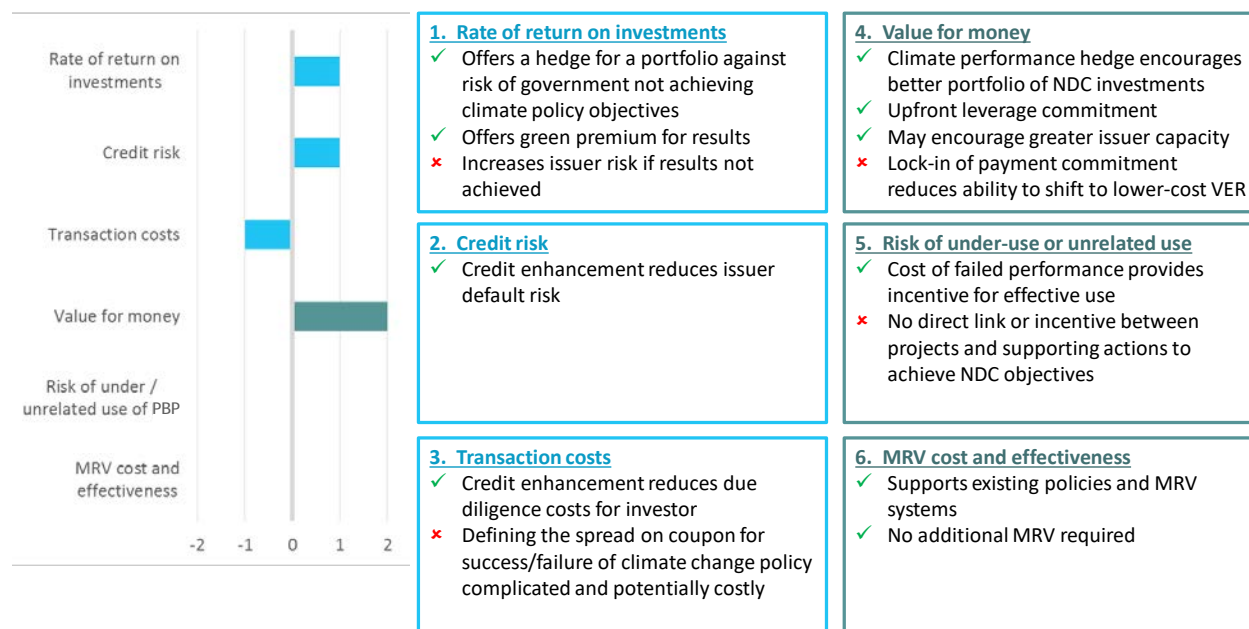
CPPBs have been suggested as a way of encouraging commitment for national governments to achieving climate policy objectives (Friedmann et al. 2016). From the issuer's perspective, it lends credence to the objectives of its climate policy, and may help mobilize other forms of support. Furthermore, if the climate policy objectives – which are largely within the control of the issuing

government – are met, only a small coupon is repaid. Thus while the issuer bears the risk on performance, it also stands to gain from successful policy delivery.

From the investor’s perspective, the CPPB offers a hedge against non-achievement of climate policy objectives. This may be useful in diversifying risk associated with assets which are expected to perform better if climate change policy is successful. This risk diversification value may mean that the CPPB is a useful investment for investors who wish to encourage governments to achieve climate change objectives, but also hedge their portfolio in the event of failure.

Evaluation of structure 5

FIGURE 20: QUALITATIVE ASSESSMENT OF STRUCTURE 5



Source: Vivid Economics

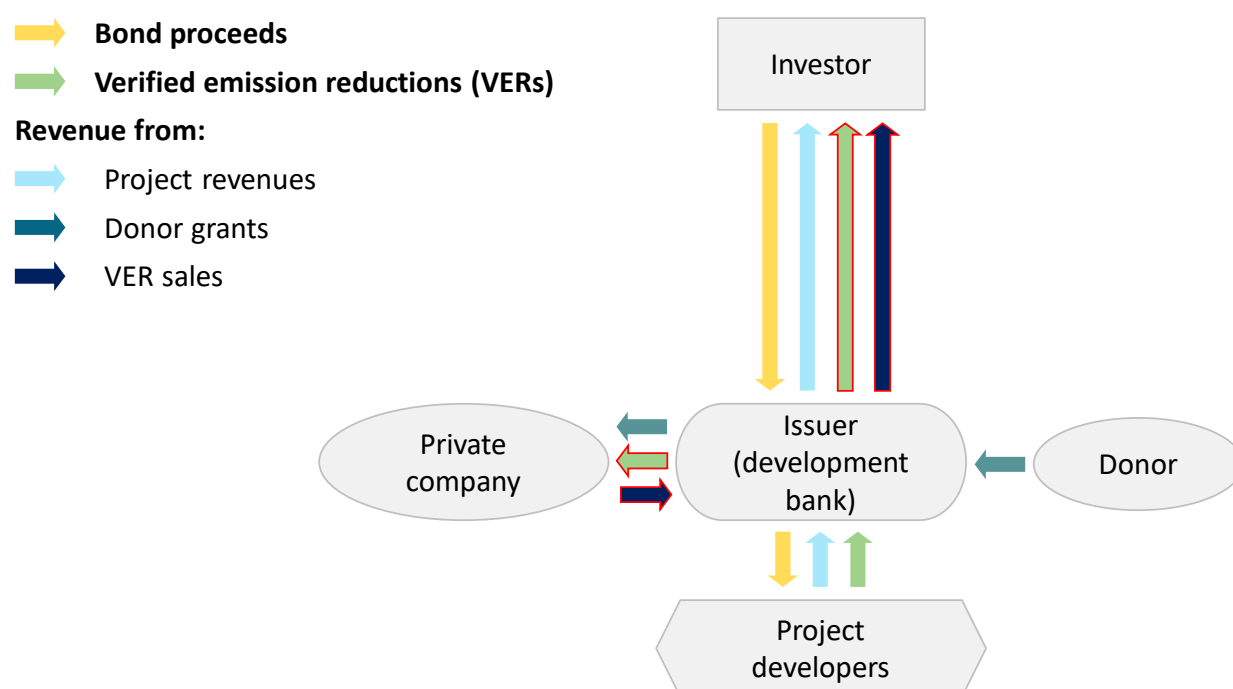
Structure 6: coupon-choice bond

TABLE 11: SUMMARY OF BOND STRUCTURE 6

Issuer	Development bank
Use of proceeds	National – NDC
Coupon structure	Fixed with choice
MRV	New
Additional revenue streams	None
Recourse mechanism and enhancement	Issuer guarantee

Source: Vivid Economics

FIGURE 21: INVESTORS CHOOSE BETWEEN A FIXED CASH COUPON AND CARBON CREDITS, FOR EXAMPLE



Source: Vivid Economics

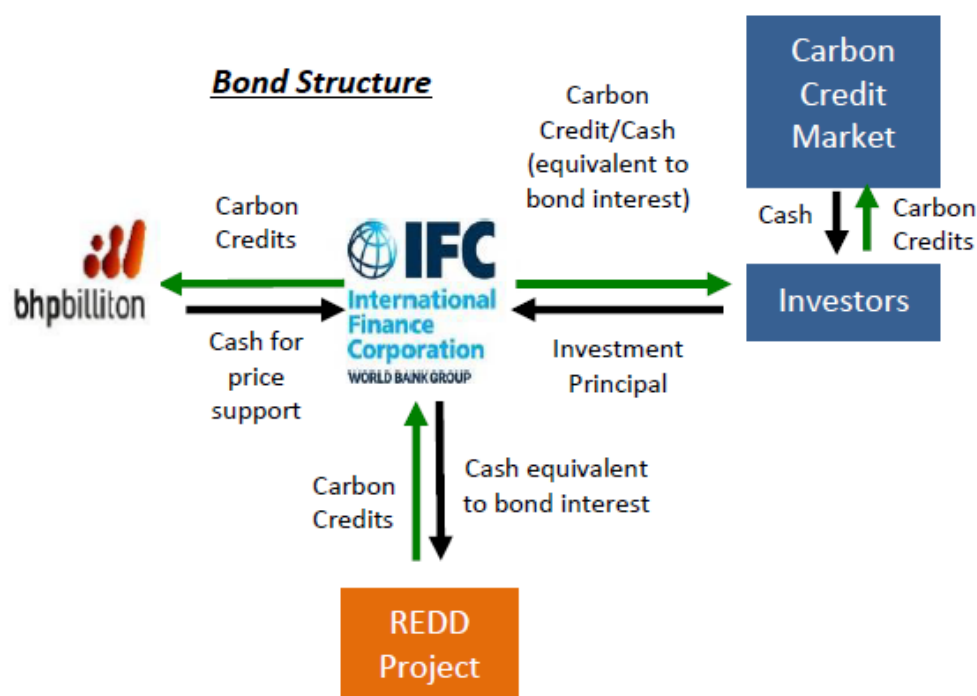
Note: Arrows represent contractual financial flows. Arrows outlined in red are conditional on the investor's choice of coupon.

Description of structure 6 and enhancement attributes

The core feature of the coupon-choice bond is that it offers investors either a fixed cash coupon or VERs. The emissions reductions could then be retired for further ESG impact.

The first coupon-choice bond was recently issued by the International Finance Corporation (IFC) to support private sector sustainable development for a REDD project in East Kenya. A summary of this structure is shown in Figure 22. Investors are not exposed to project risk – the bond is an IFC obligation. Investors choose between a cash coupon, carbon credits, or a combination of both.

FIGURE 22: THE IFC BOND ENSURES A MARKET FOR CARBON CREDITS AND OFFERS INVESTORS A CHOICE BETWEEN CASH AND CARBON CREDITS



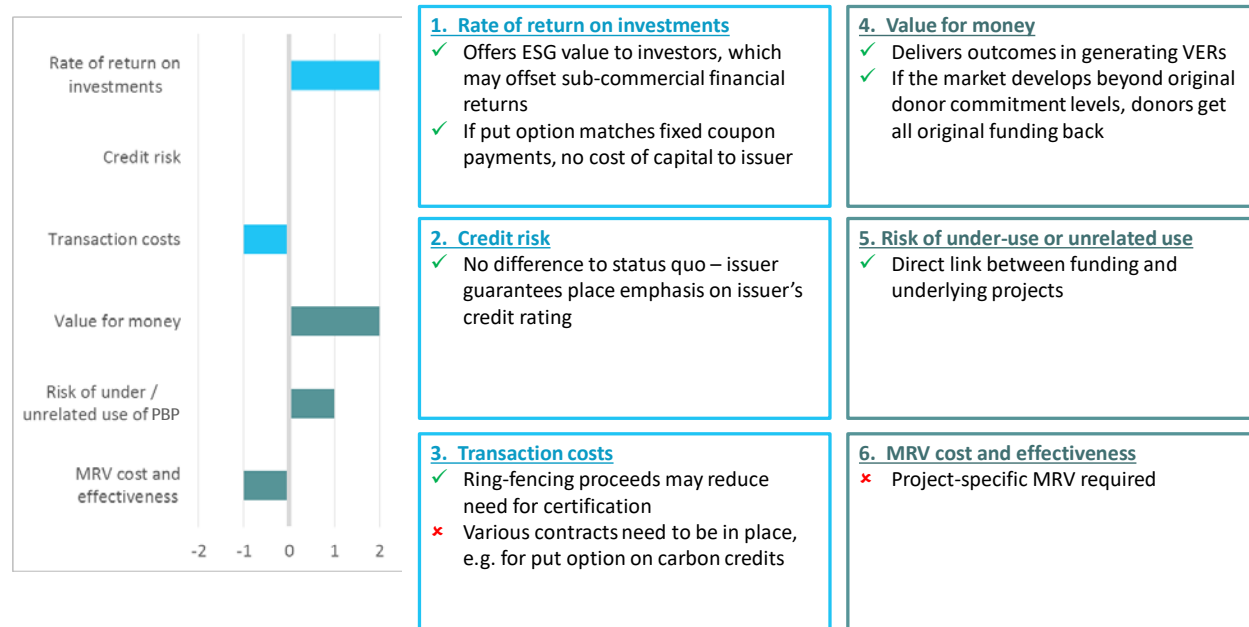
Source: IFC (2016)

From the perspective of the issuer and investor, the flexible coupon provides a way to offer a rate of return on forestry activities that otherwise offer only sub-commercial financial returns. The projects offer a mechanism to monetize environmental value through carbon credits for verified emissions reductions. For a bond issued by a forest country government, it may need some form of guarantee to reach investment-grade rating (which in the case of the IFC bond is provided by being an IFC obligation, rather than issued as a project bond). The version issued by a development bank is included in this report's longlist.

Emission reductions are monitored and verified on a project-by-project basis. This may imply additional MRV costs compared with the status quo.

Evaluation of structure 6

FIGURE 23: QUALITATIVE ASSESSMENT OF STRUCTURE 6



Source: Vivid Economics

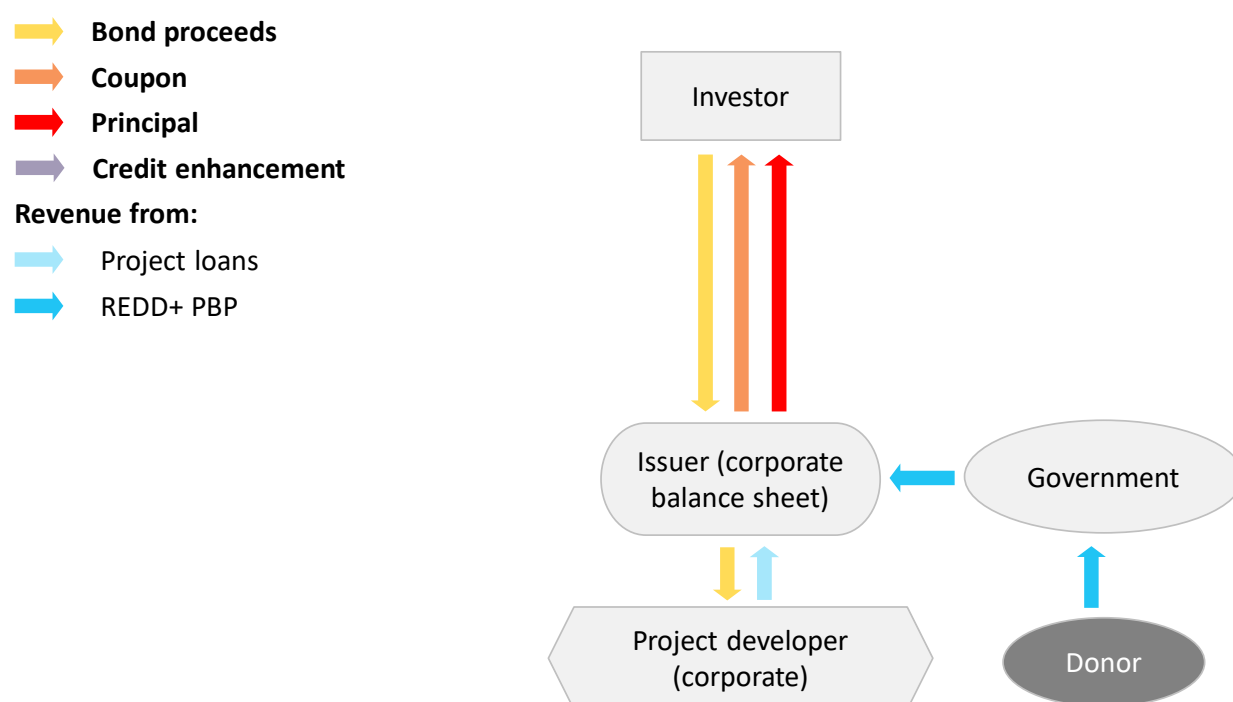
Structure 7: private corporate bond for SFM – on balance sheet

TABLE 12: SUMMARY OF BOND STRUCTURE 7

Issuer	Corporate
Use of proceeds	Commercial
Coupon structure	Fixed cash
MRV	New
Additional revenue streams	PES or REDD+ PBP
Recourse mechanism and enhancement	Issuer guarantee

Source: Vivid Economics

FIGURE 24: STRUCTURE 7 FEATURES A CORPORATE BOND, ISSUED ON THE BALANCE SHEET AND SUPPORTED BY RESULTS-BASED DONOR FINANCE



Source: Vivid Economics

Note: Arrows represent contractual financial flows (PBP is dependent on verified results).

Description of structure 7 and enhancement attributes

See section 6 for a full description of the potential for corporate SFM bonds in forestry. This section describes an alternative to the SPV-issued corporate bond, instead issuing on the corporate's balance sheet.

This proposed bond structure would be issued by a corporate forestry company, on its balance sheet, to support its own commercial activities in SFM. It shares many of the attributes of the corporate SFM bond issued through an SPV:

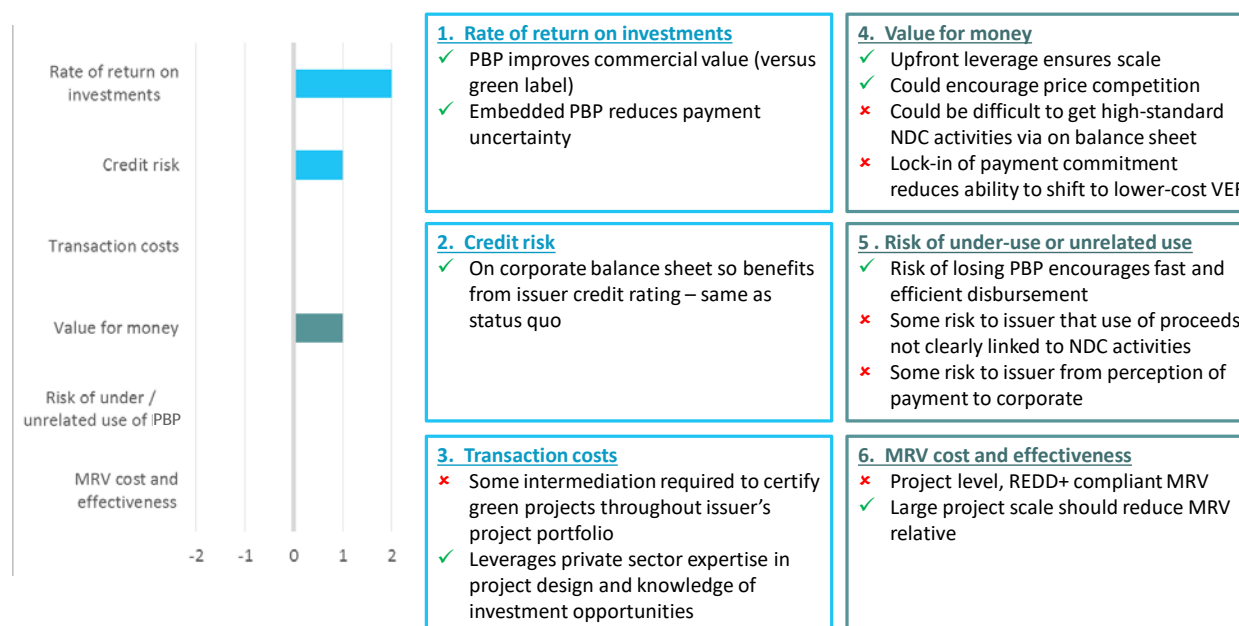
- REDD+ PBP or PES payments could help make SFM activities commercially viable, effectively reducing the cost of capital, improving the rate of return for shareholders.
- Corporates are likely to require new and potentially costly MRV systems to collect the data required to verify emission reductions in order to provide the requisite evidence to unlock REDD+ PBP or PES payments.

The key differences with the SPV model are:

- This version is issued on the company's balance sheet. It is in this sense backed by the issuer, so the credit risk is of the issuer defaulting, not the underlying assets.
- The use of proceeds is somewhat less transparent, in that the proceeds and project revenue streams may not match exactly (or would require an additional layer of monitoring and evaluation or certification).

Evaluation of structure 7

FIGURE 25: QUALITATIVE ASSESSMENT OF STRUCTURE 7



Source: Vivid Economics

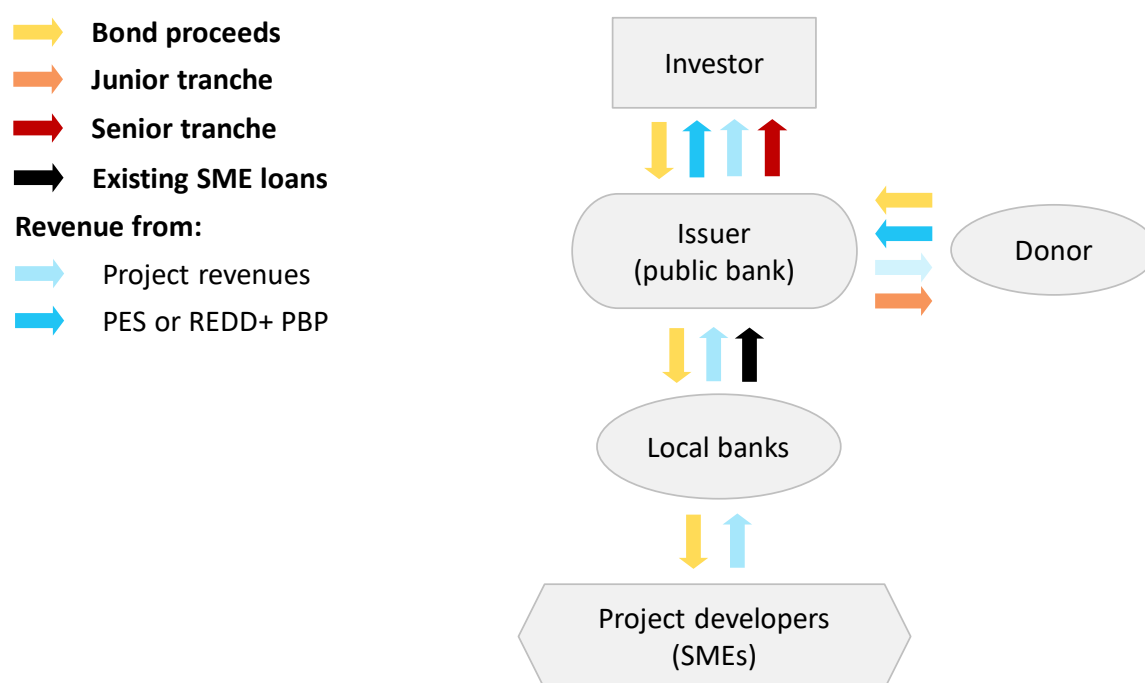
Structure 9: CLO with re-lending

TABLE 13: SUMMARY OF BOND STRUCTURE 9

Issuer	Public bank
Use of proceeds	Multiple project loans
Coupon structure	Fixed cash
MRV	New
Additional revenue streams	PES or REDD+ PBP
Recourse mechanism and enhancement	Seniority tranches

Source: Vivid Economics

FIGURE 26: STRUCTURE 9 IS A CLO OF PROJECT LOANS TO SMEs DISTRIBUTED THROUGH LOCAL BANKS



Source: Vivid Economics

Note: Arrows represent contractual financial obligations (although PBP is dependent on verified results).

Description of structure 9 and enhancement attributes

A CLO is sold to investors, with the proceeds of this sale going on to finance additional loans to the forestry sector. A CLO structure packages together a portfolio of existing project loans on the issuer's balance sheet into a single financial product providing a single revenue stream. This financial product is then sold on to investors, who then have claim to the revenue stream and take the CLO off the issuer's balance sheet. The issuer uses the revenue generated from the sale of the CLO to finance additional loans to SMEs. SME loans are distributed through local banks which have better access and expertise in dealing with SMEs. SMEs ultimately use this funding to undertake NDC forestry activities eligible for PES or REDD+ PBP.

Thus, the CLO structure has relatively demanding prerequisites. The benefits of CLOs are generally realized only at a relatively large scale, and hence they require an issuer to already hold a relatively large portfolio of loans on its balance sheet. It might be difficult to identify an institution that has a suitable portfolio of loans to the forestry sector. In addition, a CLO is a complex product which generally requires levels of investor expertise seen in more mature markets.

The CLO is divided into tranches of different seniority; a donor pre-subscribes to the most junior tranche. Each tranche can be thought of as claim to a separate share of the revenue stream generated by the CLO. If any of the underlying project loans default, losses are first absorbed by those who have invested in the most junior tranche (“junior investors”). If total project loan defaults exceed the loans in the most junior tranche, the junior investors receive no return and losses are then absorbed by the next most senior tranche. In this way, junior tranches have higher default risk and senior tranches have lower default risk. A donor commits to invest in the most junior tranche and hence, absorb first losses.

A donor also provides REDD+ PBP or PES to the issuer for VERs. These VERs are generated by the NDC forestry activities supported by the new loans made by the issuer after the sale of the CLO. These payments allow the issuer to offer the SMEs concessional rates on their loans, and hence the SMEs also benefit from the payments. Allowing the issuer to collect the REDD+ PBP or PES payments reduces administrative costs for both the donor and issuer, but shifts some financial risk to the issuer.

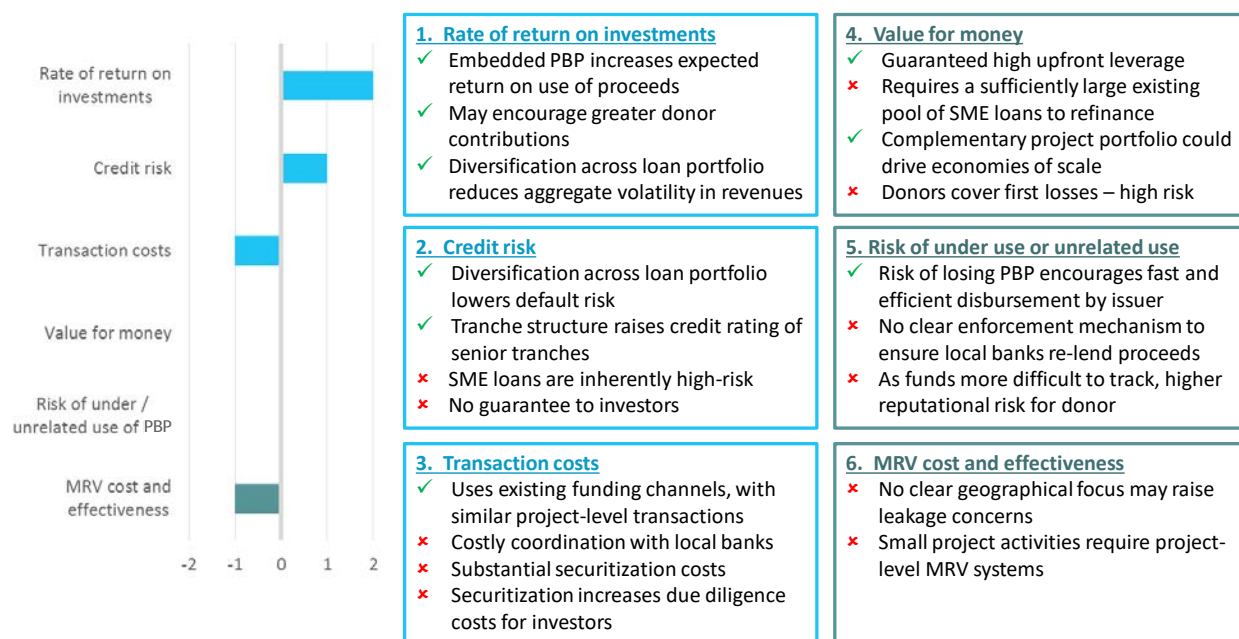
This structure is attractive to issuers as they are able to offload existing risk from their balance sheet through the sale of the CLO. Once investors have purchased the CLO, they take on the full risk of the existing loan portfolio. If existing project loans default, the issuer does not absorb any losses. Nonetheless, the issuer does face high securitization costs and takes on additional financial risk from the new project loans it makes.

The CLO structure directly benefits investors in two ways: seniority and diversification. As a third-party donor provides the full investment for the most junior tranche, investors are protected from first losses. In addition, the process of collateralization itself reduces default risk for the investor as individual project risks are diversified and if they do bear any losses, these are shared among all investors within the relevant tranche.

A considerable amount of financial and reputational risk is placed on donors. Financial risk accrues directly from the fact that donors absorb first losses and hence face the highest default risk. Reputation risk occurs as there is no clear enforcement mechanism to ensure that local banks relend funding on to SMEs, and that SMEs use the funding to support NDC forestry activities.

Evaluation of structure 9

FIGURE 27: QUALITATIVE ASSESSMENT OF STRUCTURE 9



Source: Vivid Economics

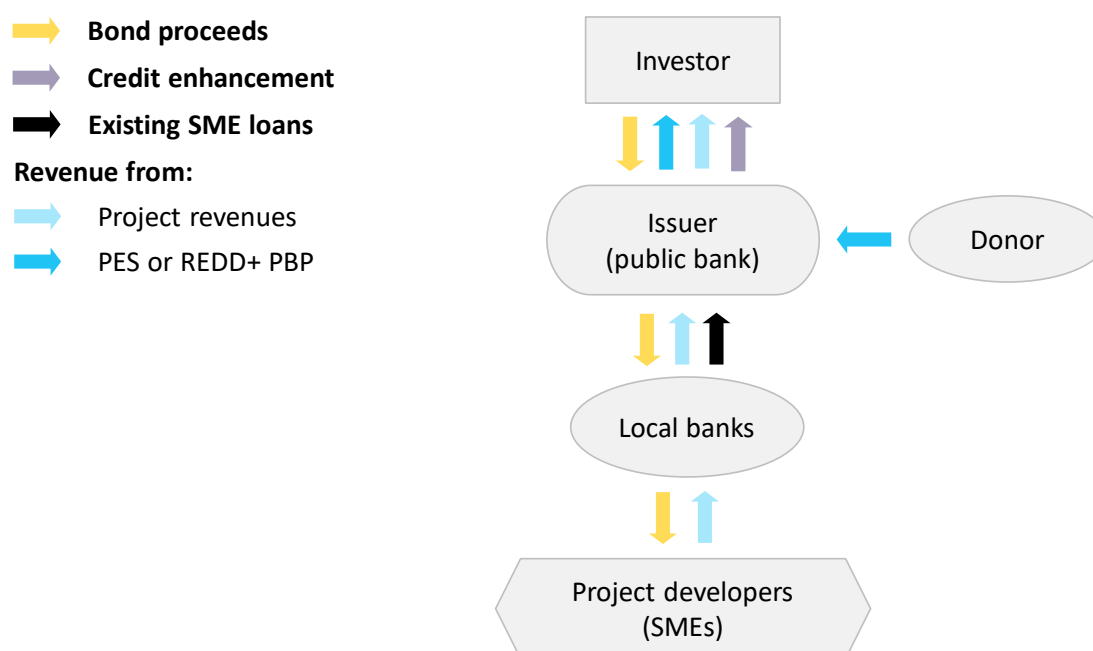
Structure 10: ABS with dual recourse and re-lending

TABLE 14: SUMMARY OF BOND STRUCTURE 10

Issuer	Public bank
Use of proceeds	Multiple project loans
Coupon structure	Fixed cash
MRV	New
Additional revenue streams	PES or REDD+ PBP
Recourse mechanism and enhancement	Dual recourse

Source: Vivid Economics

FIGURE 28: AS WITH STRUCTURE 9, STRUCTURE 10 IS BACKED BY SME LOANS DISTRIBUTED BY LOCAL BANKS; HOWEVER, THESE REMAIN ON THE ISSUER'S BALANCE SHEET



Source: Vivid Economics

Note: Arrows represent contractual financial obligations (although PBP is dependent on verified results).

Description of structure 10 and enhancement attributes

A portfolio of existing loans is again collateralized; however, these remain on the issuer's balance sheet and underpin a bond issuance to support NDC forestry activity by SMEs. In this sense, the existing portfolio of loans is not sold to investors. Instead, the investors purchase a bond which is underpinned by the existing loan portfolio, an asset-backed security (ABS). The proceeds from the sale of this bond are then used to finance loans to SMEs to undertake NDC forestry activities eligible for REDD+ PBP or PES. Again, SME loans are distributed through local banks which have better access and expertise in dealing with SMEs.

Investors have “dual recourse” in the sense that they have claim both over the issuer, through a guarantee, and over the loan portfolio. The issuer guarantees repayment of both the coupon and the

principal to investors. In the event that the issuer defaults and cannot make these repayments, the investor also has direct claim to any revenue streams generated by the portfolio of existing loans underpinning the bond. Covered bonds use the same dual recourse mechanism: particularly large bonds are underpinned by a portfolio of existing smaller bonds. In the market for covered bonds, dual recourse mechanisms have historically proved very successful in reducing default risk and raising credit ratings (Climate Bonds Initiative 2017).

The portfolio of loans is actively managed throughout the bond's lifetime. Issuers must continually adjust the portfolio to ensure it meets a minimum asset value and credit rating defined at the issuance of the bond. While this entails greater transaction costs to the issuer, it also provides flexibility. If the lifetime of the bond exceeds that of the SME loans, the issuer could use new SME loans to underpin the bond once their revenue streams stabilized. This allows issuers to exploit the risk profile of forestry investments and improve financial efficiency.

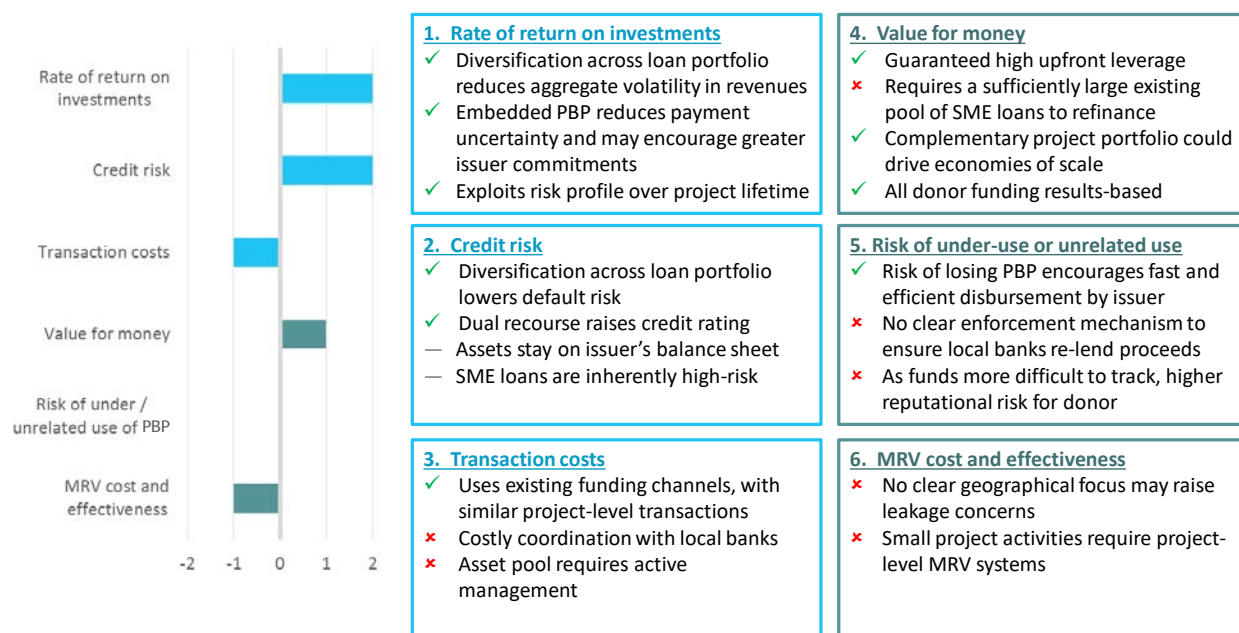
Relative to structure 6, the dual recourse mechanism shifts risk back from the investor to the issuer. This is because the issuer now offers a guarantee and the loan portfolio remains on the issuer's balance sheet. Thus, in the case that an existing loan defaults, the issuer absorbs the loss. The investor faces less risk compared with a vanilla bond with an issuer guarantee as they also have claim over revenues generated from the existing loan portfolio.

The financial burden on the donor is lighter although the same reputational risks apply. As the donor no longer purchases the financial product itself, it faces no direct financial risk from the default of existing loans. However, structure 10 offers nothing new to address the issues around enforcement faced by structure 9.

In addition, the same demanding prerequisites may prevent issuance at scale. Structure 10 faces the same key bottlenecks as structure 9. It requires a relatively sophisticated investor base and for the issuer to hold a large portfolio of existing loans. These enabling conditions may prove hard to satisfy.

Evaluation of structure 10

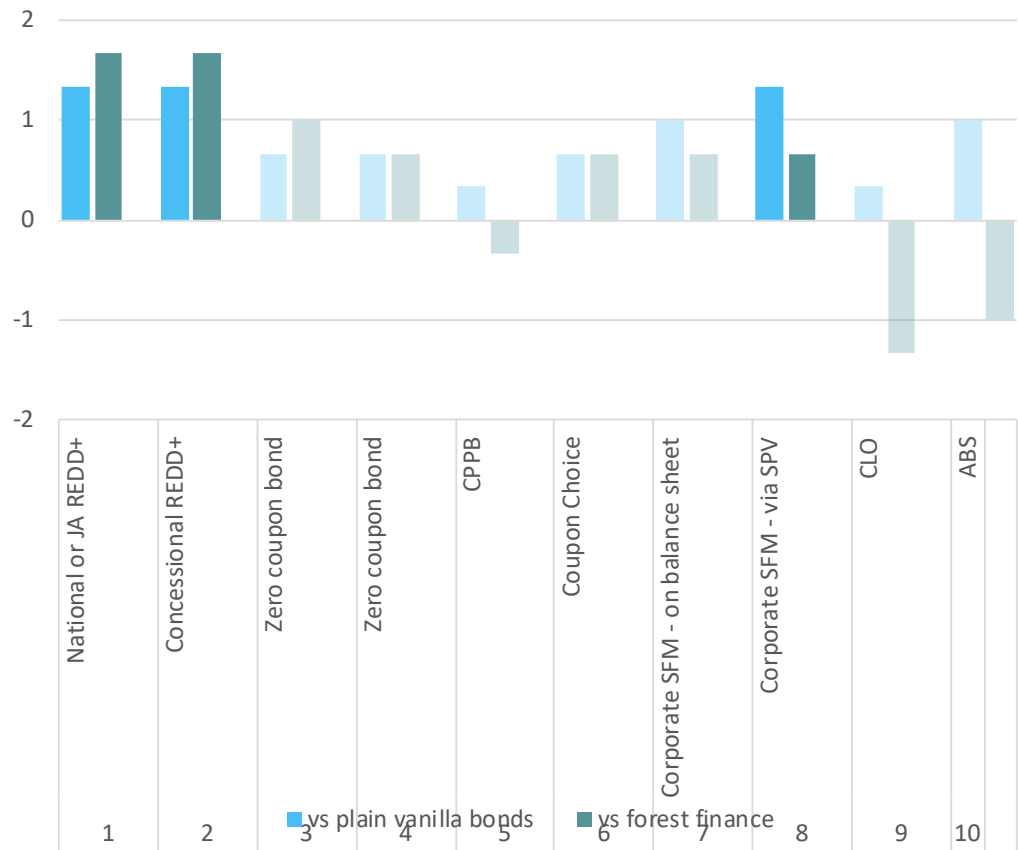
FIGURE 29: QUALITATIVE ASSESSMENT OF STRUCTURE 10



Source: Vivid Economics

Evaluation of the longlist and shortlist for stakeholder engagement

FIGURE 30: ASSESSMENT OF THE LONGLIST OF BOND OPTIONS AND IDENTIFYING SHORTLIST OF POTENTIAL BOND STRUCTURES



Source: Vivid Economics

The qualitative assessment of the longlist of potential bond structures against the evaluation criteria was used to select a shortlist to develop in further detail. Figure 30 summarizes this assessment, and highlights the bonds that score at least six aggregate points across all enhancement options. This motivates the shortlist presented in section 6.

Annex C Detailed Readiness Assessment for At-scale NDC-related Forest Finance

This annex provides more detail on each of the six enabling conditions summarized in the main report:

1. *Legal and regulatory conditions*: planning processes and underpinning laws which govern land-use.
2. *Integrated landscape management (ILM) approaches*: multi-stakeholder efforts to develop specific interventions which support compliance with land-use laws and minimize leakage.
3. *Measuring, reporting and verification (MRV) capacity*: data collection, audit and accountability.
4. *Capacity of sector-specific public finance institutions*: dedicated institutions with demonstrable expertise, as indicated by successful programs.
5. *International funding commitments*: secured lines of public climate finance as well as private financial flows.
6. *Private sector commitments*: private sector engagement in sustainable land-use practices, such as sustainable supply chain assurance.

This annex provides an applied context for Brazil, with reference points from other countries with large-scale forestry activities. It provides a more detailed description of the current policy, regulatory and financing context for forestry activities.

Legal and regulatory conditions

Legal and regulatory conditions refer to the planning processes and underpinning laws which govern land use. It is common for governments to create explicit land-use planning processes, sometimes embedded in broader sustainability or low-carbon strategies, which define clear channels and responsibilities for decision-making. Such decisions determine how land should be used, are typically translated into laws, and should be consistent with national land-use targets.

Planning processes will specify participation and consultation rules, while land-use laws will specify rights to forests and carbon and forest definitions. However, in order to be effective, it is not sufficient for processes and laws to exist – they must also be enforced.

The National Policy on Climate Change, announced at the 2009 Conference of the Parties in Copenhagen, is Brazil's first attempt at a broad cross-sector climate change strategy and forms the center-point of several more specific strategies (Ludeña and Netto 2011). The headline target for GHG mitigation is a 36.1–38.9% reduction by 2020 relative to business as usual. It states two key objectives for the forestry sector:

- zero net loss of forest cover by 2015; and
- zero illegal deforestation.

Brazil's NDC, submitted to the UNFCCC in 2015, reaffirmed the commitments made within the National Policy on Climate Change to the international community and expanded on land-use interventions (Federative Republic of Brazil 2015). The NDC states specific land-use-related activities as a route to

achieving mitigation targets such as an 80% reduction in deforestation in the Amazon biome and 40% in the Cerrado biome by 2020; the recovery of degraded pastures; and the extension of livestock-crop-forest integration projects.

The National REDD+ Strategy released in December 2015 provides a forestry-specific land-use strategy policy (Brazilian Ministry of the Environment 2016). It aims to “contribute to climate change mitigation through the elimination of illegal logging, the conservation and restoration of forest ecosystems and the development of sustainable forest low carbon economy, generating economic, social and environmental benefits”. It also establishes the National Commission for REDD+, which has direct responsibility and accountability for the implementation of the strategy. It builds on the pre-existing Ecological-Economic Macro-Zoning of the Legal Amazon tool, by providing technical assistance to ensure that land-use incentives are appropriate and effective.

The Native Vegetation Protection Law, or Forest Code, is the cornerstone of Brazil’s national command-and-control regulations. The original Forest Code of 1965 established a proportion of rural land that should be maintained permanently as forest (Legal Reserves), and also prohibited the clearing of vegetation in sensitive areas (APPs) (WWF 2016a). However, compliance was low due to high potential costs for farmers coupled with a lack of enforcement on behalf of the government.

A number of changes were made to the Forest Code in 2011 to address poor compliance (Earth Day Network 2015; The Woods Hole Research Center 2014; WWF 2014, 2016a):

- The PRA clarified the definition of Legal Reserves and APPs.
- The PRA also reassigned responsibility and accountability for the mapping and registering of rural properties from the federal government to state governments.
- Full amnesty was given to smallholders for any illegal deforestation prior to July 2008.
- Larger farmers were granted amnesty on 50% of their land. Penalties are waived if they sign an agreement to reforest the remaining 50%.
- The online CAR was established which streamlines the process through which landowners register their property, reducing the costs of monitoring and enforcement.
- A new trading system allows landowners to “offset” their Legal Reserve debts (the difference between actual forest area and the stated Legal Reserves) by purchasing surpluses from other landowners.

Despite these changes, compliance remained low for some time. The deadline for registering all 5.5 million rural properties through the CAR was extended from 2015 to 2017 as only 1.4 million properties had registered as of June 2015 (Proforest 2017).

The enforcement issues discussed above relate primarily to small farms and landowners within the Amazon. Indeed, annual deforestation rates fell by almost 80% between 2004 and 2012, and Assunção (2015) notes that “once driven by large-scale clearings, Amazon deforestation now occurs mostly in small increments”. This may suggest that enforcement has been broadly successful with regard to large-scale commercial deforestation.

Broadly speaking, recent budget cuts may have negatively impacted enforcement agencies' ability to act. The federal government cut 72% of the budget for deforestation control between 2011 and 2014 (Climate Change News 2016). Subsequently, the Amazon Fund provided financial support for the enforcement agencies including for the development of the satellite-based Real Time System for Detection of Deforestation (DETER). Deforestation rates in the Amazon have also risen from their low of 0.46 Mha in 2012 to 0.80 Mha in 2016 (Mongabay 2017).

It is suggested that while command-and-control policies have seen some success to date, sanctions will need to be strengthened for Brazil to meet its NDC targets. In recent times, the government has struggled to coordinate this amid the political crisis.

Similarly, in Indonesia, land tenure issues continue to be central challenges, despite an active legislative response to climate change and success in establishing international funding agreements enforcement. A moratorium on new forestry licenses and the development of peat land has been central to the climate change partnership between the governments of Norway and Indonesia (Grantham Research Institute et al. 2015). However, the moratorium has several key weaknesses, reducing its coverage and blunting enforcement:

- it applies only to natural primary forest;
- existing concessions are exempt;
- projects of national significance such as geothermal, oil and natural gas are exempt;
- associated regulations provide the legal basis to change the status of convertible production forests into non-forest lands for development purposes such as mining, plantations and road development;
- where protected forests designated for conservation have already been degraded, a law allows them to be converted into logging concessions.

Integrated landscape management approaches

ILM approaches develop interventions which support land-use law compliance over a large enough region to address leakage concerns, yet small enough to use a limited number of effective levers (Global Canopies Programme 2015). This report has explored the potential of two approaches to ILM which might provide an effective vehicle for forest financing.

A jurisdictional approach operates according to the administrative boundaries of sub-national or national governments. Such approaches leverage existing government mechanisms to drive action and accountability. They can vary in focus from a single sector or objective to several.

A landscape approach aims to reconcile competing economic and social objectives among stakeholders and sectors within a landscape. Through consultation, this drives local action. While stakeholders outside the landscape do not participate in this process, their goals and views are taken into account.

Relative to working at the project level, ILM approaches can reduce transaction costs and achieve mitigation outcomes at a greater scale, particularly in the absence of national policies or drivers. Accordingly, ILM approaches may present attractive investment opportunities for the proceeds of enhanced bond structures or broader forest financing.

ILM approaches typically include one or more of three components:

- command-and-control policies or “sticks”;
- positive incentive schemes or “carrots”; and
- capacity-building programs and/or direct project investments for demonstration purposes.

ILM initiatives in Brazil are largely jurisdictional and cover a number of commodities and regions. The most developed of these are in Acre, Para and Matto Grosso.

- In the state of Acre, the Forest Carbon Incentive Program (ISA-Carbon), a subset of the wider Environmental Services Incentives Program (SISA), established a framework to provide incentives for sustainable forestry, agriculture and cattle production through tax breaks, subsidies and economic zoning, as well as strengthening tenure and providing technical assistance (Fishbein & Lee 2015).
- The municipality of São Félix do Xingu in Para was subject to a series of heavy sanctions following its placement on the government’s “priority municipalities” blacklist, including an embargo on the sale of goods produced on illegally deforested areas, reduced access to credit lines for farmers from Banco do Brasil, and active enforcement by the Institute for Environment and Renewable Natural Resources (IBAMA), the agency responsible for issuing environmental fines (Fishbein and Lee 2015).
- The “Produce, Conserve and Include” strategy implemented for soy and beef production in the state of Matto Grosso follows a territorial protection system (TPS). A TPS drives progress toward targets agreed among a wide set of stakeholders by combining financial, regulatory and contractual incentives with transparent online monitoring platforms (Earth Innovation Institute 2015; WWF 2016b).

Acre and São Félix do Xingu have seen initial reductions in deforestation rates by approximately 80% over the last ten years, although there has been a recent uptick. It is difficult to attribute changes in deforestation rates directly to the ILM approaches in place. Although it is also relevant to note that Acre has been receiving compensation for documented emissions reductions from KfW Development Bank under its REM program.

Progress in Acre has been driven by its relatively small size and the coordinated and comprehensive suite of policies which support the Forest Carbon Incentive Program. The combination of supply- and demand-side policies gives local smallholders both the capacity and incentive to engage in forest restoration activities.

The National REDD+ Strategy is set to become Brazil’s central jurisdictional approach targeting all forest areas in Brazil (Brazilian Ministry of the Environment, 2016). The strategy sets out how specific forestry interventions will be identified and coordinated across the National Policy on Climate Change as well as Brazil’s biome-wide Action Plans. There is currently insufficient evidence to make a comprehensive evaluation of the policy’s impact.

A number of key risks to further progress across Brazil have been identified:

- additional deforestation pressure driven by increased market access as infrastructure is improved;
- shortage of finance for upfront investments in capacity-building programs; and
- integration of sub-national jurisdictional areas with relatively slow-moving national deforestation programs.

Integration of regional ILM efforts with parallel national forestry strategies has proven challenging in Indonesia and Peru. The reGENCY of Berau in Indonesia has struggled to coordinate multiple initiatives and levels of government (Fishbein and Lee 2015). San Martín in Peru has needed to incorporate emerging national carbon verification and REDD+ schemes into its approach, which had increased the effort and cost involved, even though it may have benefits in the long term.

In contrast to Brazil's wide commodity coverage, efforts to reduce deforestation in Indonesia have focused on palm oil. These have faced challenges in competing with the high-value proposition offered by unsustainable production. For instance, the Indonesian Palm Oil Platform and the RSPO jurisdictional pilots aim to increase the commercial value of sustainable practices, although wide-scale impacts are yet to be seen.

Measuring, reporting and verification capacity

Strong and credible MRV systems are essential for investments in the forest sector. An accurate and accessible MRV system (including reference levels) is critical for identifying and compensating carbon reductions. This requires assessing data availability and data collection capabilities, and assigning responsibility for MRV within government. Measurement systems must be transparent, replicable and regularly audited, and require both technical and administrative capacity.

Brazil, along with some other key forest countries, has made good progress on technical capacity. Brazil, Peru, Indonesia and Ghana have implemented systems to collect and manage remote sensing data. Brazil and Indonesia have established a national forest inventory and begun work to estimate country-specific emissions factors, while progress on both of these fronts has been slower in Peru and Ghana (Ghana Forestry Commission 2015; Ochieng et al. 2016).

Brazil has implemented DETER, a satellite-based system that enables frequent and quick identification of deforestation hot spots (Assunção et al. 2013). It identifies monthly changes in forest cover, but cannot identify which areas have been deforested in the past (InfoAmazonia 2017). DETER's enhanced monitoring and targeting capability helps law enforcers identify and act upon areas with illegal deforestation activity. Studies have identified this development as the main driver of the deforestation slowdown during the 2000s (Assunção et al. 2013). From 2007 through 2011, DETER-based environmental monitoring and law enforcement policies are estimated to have prevented the clearing of over 59,500 km² of Amazon forest area.

REDD+ MRV strategies are ambitious in terms of scope and integration with wider MRV activities. Brazil, Indonesia and Peru's MRV systems aim to cover all forests, land uses and carbon pools, while the ultimate goals of Ghana's land-use MRV system are unclear (Ochieng et al. 2016). Brazil and Indonesia have also developed mechanisms to integrate REDD+ or land-use emissions into wider GHG accounting.

MRV systems typically have dedicated bodies or teams for REDD+. This is the case for Brazil, Indonesia, Ghana, and Peru; in addition, Brazil, Indonesia and Ghana explicitly recognize in public policy that regular recruitment of technical experts is necessary for an effective MRV system. All four countries have also established (or plan to establish) a number of links with pilots and research institutes to bolster this expertise (Ghana Forestry Commission 2015; Ochieng et al. 2016).

The administration of Brazil's MRV system is reliable and efficient. All datasets and methodologies are publicly disclosed through an online portal, as are MRV results – generally within less than a week of data acquisition. Data dissemination systems in other countries are less efficient and transparent but there are plans to improve on this.

MRV systems in Brazil are relatively advanced as they combine technical and country-specific methodologies with efficient and reliable administration. While other countries such as Indonesia have made considerable technical progress with their land-use MRV systems, their methodologies and results are less transparent and hence less credible. MRV systems in countries like Peru and Ghana are largely still under development as forestry finance readiness programs continue.

Capacity of sector-specific public finance institutions

Dedicated sectoral financial institutions signal the importance of the forest (land-use) sector and are likely to have considerable capacity to manage flows of forest finance. They indicate the presence of both investment opportunities and the available funding sources they can be matched with. A dedicated finance institution is well placed to assess project viability; can form an efficient vehicle for forest finance; and may even support or undertake Forest Bond issuance.

Existing publicly funded reforestation programs demonstrate this capacity. The success of publicly funded reforestation programs signals progress on a number of enabling conditions:

- First, it demonstrates that there is (at least some) public financial capacity for reforestation, though this will be much less than the scale required to support NDC-related forest investments.
- Second, it demonstrates that governments have at least basic administrative and technical capacity to implement and manage land-use policies.
- Third, it demonstrates an ongoing relationship with private sector actors in the forestry sector.

Banco do Brasil has a proven track record in agribusiness and forestry-related projects (Banco do Brasil 2015). It is the largest Latin American bank by assets, and the third by market value. It offers a range of environmentally and socially responsible products and services for its clients, such as special investment funds and lines of credit for investments in sustainable agricultural activities, forestation and reforestation, agro-ecology, organic production, and reduction and absorption of GHG.

Some of Banco do Brasil's (2011, 2015) most successful products with socioenvironmental features are:

- PRONAF, which features subsidized credit tailored to smallholder farmers, and explicitly targets the forest sector in its PRONAF Floresta module;
- Pronamp, which finances investment requirements for mid-size farmers;
- Custeio Agrícola com Plantio Direto, which finances the use of the Direct Straw Planting System through which farmers grow and use their own organic fertilizer;
- the ABC which aims to reduce GHG emissions from agriculture, reduce deforestation, and prevent land degradation. ABC is funded by BNDES and distributed by Banco do Brasil;

- the Sustainable Rural Project, distributed through a partnership between Banco do Brasil and the Inter-American Development Bank, which provides technical support and financial incentives to rural producers in the Amazon biome to adopt low carbon technologies.

The BNDES is the main financing agent for development in Brazil. It is one of the largest development banks in the world and lends to a wide range of sectors and clients. BNDES Florestal is its forestry-dedicated program to finance the conservation and reforestation of degraded or converted land, and sustainable forest management (S2BIOM 2017).

BNDES is the manager of the Amazon Fund, created in 2008 to raise finance for non-refundable investments in preventing, monitoring and combating deforestation, in addition to the conservation and sustainable use of the Amazon biome forests (BNDES 2016). While donations to the Fund are made through mutual agreements with international companies and governments, the fund itself allocates finance on a project basis. This can make it challenging to finance jurisdictional approaches. In addition to managing the Fund, BNDES raises funds and selects projects, and monitors project progress.

Several other institutions and programs are also active in the area:

- **FNE Verde**, distributed by Banco do Nordeste (2017), aims to promote the development of economic activities that encourage the conservation and restoration of the environment. It is part of Brazil's Northeast Financing Constitutional Fund and only producers located in the North and Northeast of Brazil are eligible.
- **FNO Biodiversidade**, distributed by Banco da Amazonia (2017), is available only in the North region and has credit lines exclusively intended for projects that standardize and recover Legal Reserve areas and APPs.

While Caixa (2017), the third-largest bank in Brazil by assets, does not have an explicit focus on agriculture or forestry, it has experience in lending to agents active in these markets. Caixa is linked to the Ministry of Finance and operates as a strategic partner with the federal government in the infrastructure, housing, and sanitation sectors. Caixa also operates government funds, such as the Student Funding Program, Social Housing Guarantee Fund, and the Social Development Fund, and manages federal lotteries that contribute to public social programs. It also offers guided productive credit to rural producers, companies, and organizations committed to sustainable development, and it has recently adopted sustainability principles.

Capacity varies across other tropical forest countries. While the “big four” public banks in Indonesia account for approximately one-third of all assets in the banking sector, demonstrating clear financial capacity, institutions in other countries are less dominant (UNEP Inquiry 2015). An IMF (2016) assessment of public investment management in Peru commented that public institutions score exceptionally well in the area of financial planning, more modestly in resource allocation, and poorly in project implementation. Efforts to strengthen public financial management in Ghana have been limited by “significant institutional, policy, and system weaknesses” (World Bank 2015). Across Peru, Indonesia and Ghana, public financing institutional capacity in relation to sustainable agriculture or forestry-related investments is particularly weak relative to capacity in other sectors.

Private sector commitments

Advancing a sustainable land-use agenda requires motivation and engagement from the private as well as the public sector. Large multinational companies often make voluntary commitments to sourcing specific intermediary products sustainably. The degree to which the private sector engages in sustainable land-use practices, such as sustainable supply chain assurance, provides an indication of both:

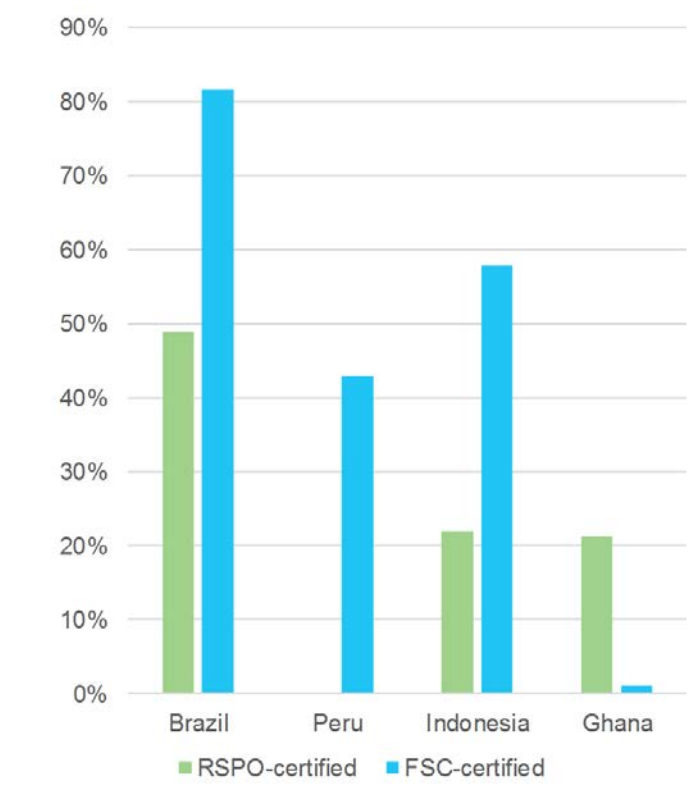
- **willingness:** companies see value in ensuring that production methods are sustainable, whether this is driven by internal motivation or consumer demand;
- **capacity:** companies are able to employ these methods while remaining profitable.

Supply chain commitments demonstrate that private sector firms are searching for alternatives to unsustainable producers and may be willing to pay a premium for sustainable intermediary products. This creates pressure further up the value chain for primary producers to switch to sustainable forms of production. This generates suitable project opportunities for a potential “enhanced bond” to fund.

High levels of private sector commitment in a given geography will encourage a healthy pipeline of sustainable forestry and land-use projects, and can in some instances help drive policy change. Furthermore, the degree to which products are certified in a country measures the private sector’s progress in meeting internationally recognized sustainability standards.

Against comparators, Brazil has relatively high levels of product certification, yet there is still room to grow. As shown in Figure 31, nearly half of all oil palm production in Brazil is RSPO-certified, and over 80% of planted forest areas are FSC-certified. These relatively high shares suggest that private sector organizations are actively responding to end-consumer demand for sustainability assurance. While Brazil fares well among the comparison group, there is still a considerable expansion of these standards required until all production is certified.

FIGURE 31: PALM OIL AND TIMBER CERTIFICATION LEVELS ARE RELATIVELY HIGH IN BRAZIL



Source: Food and Agriculture Organization of the United Nations (2017); FSC (2016); RSPO (2015)

Note: No data on RSPO-certified production were available for Peru.

A relatively high number of multinationals operating in Brazil have made public commitments to sustainable supply chain assurance. These are mainly focused on timber and cattle, two of Brazil's most important export commodities. Table 15 sets out the commitments of the four largest (by foreign assets) Brazilian food and chemical companies, as well as two key international multinationals, across the four key supply chains of palm, soy, timber and cattle. Most commitments are relatively stringent, requiring all commodity production to be deforestation-free and certified against international standards or similar.

TABLE 15: SEVERAL KEY PRIVATE SECTOR COMPANIES IN BRAZIL HAVE MADE SUPPLY CHAIN COMMITMENTS

Company	Palm	Soy	Timber/pulp	Cattle
JBS	N/A	100% of soy from signatories of the Soy Moratorium for the Amazon biome by 2014	100% of wood products will be deforestation- and exploitation-free following the biomass normative instruction	100% of cattle products sourced from direct suppliers operating in the Amazon Biome will be deforestation-free
Marfrig Group	N/A	N/A	100% of wood products will be certified by either FSC or PEFC	100% of cattle products sourced from direct suppliers operating in the Amazon Biome will be deforestation-free
Minerva	N/A	N/A	N/A	100% of cattle products sourced from direct suppliers operating in the Amazon Biome will be deforestation-free by 2017
Natura	100% of palm oil is RSPO-certified as “segregated” by 2020	N/A	N/A	N/A
Nestlé	100% of palm oil is deforestation-free by 2020	100% of soy is deforestation-free by 2020	100% of paper is deforestation-free by 2020	100% of beef is deforestation-free by 2020
Unilever	100% of palm oil is RSPO-certified as “segregated” by 2019	100% of soy is sustainably sourced by 2014	100% of fibre is from certified sustainably managed forest or from recycled material by 2020	100% of beef is sustainable by 2020

Source: Supply Chain (2017)

Supply chain commitments should be viewed as a signal of intent but not necessarily of action. Supply chains contain numerous and intricate relationships, from primary producers via aggregators, traders and importers. This means that commitments are difficult to disentangle, monitor, and consequently pass judgement on. Developments are currently taking place to improve the visibility of commitments, including projects such as Trase, managed by the Stockholm Environmental Institute, and Supply Change, managed by Forest Trends, yet it will take some time for these new tools to be fully operational.

International funding commitments

International funding commitments are important for the provision of finance for projects and to support readiness activities. Funding commitments to forest activities is a sign that institutions or projects meet donors’ standards. If commitments to readiness activities have been made, donors have identified potential for forest finance within the country, and there are resources to make progress on enabling conditions.

International public finance has historically been distributed in the form of grants or concessional loans, although results-based funding is becoming more common. Several types of institution offer these:

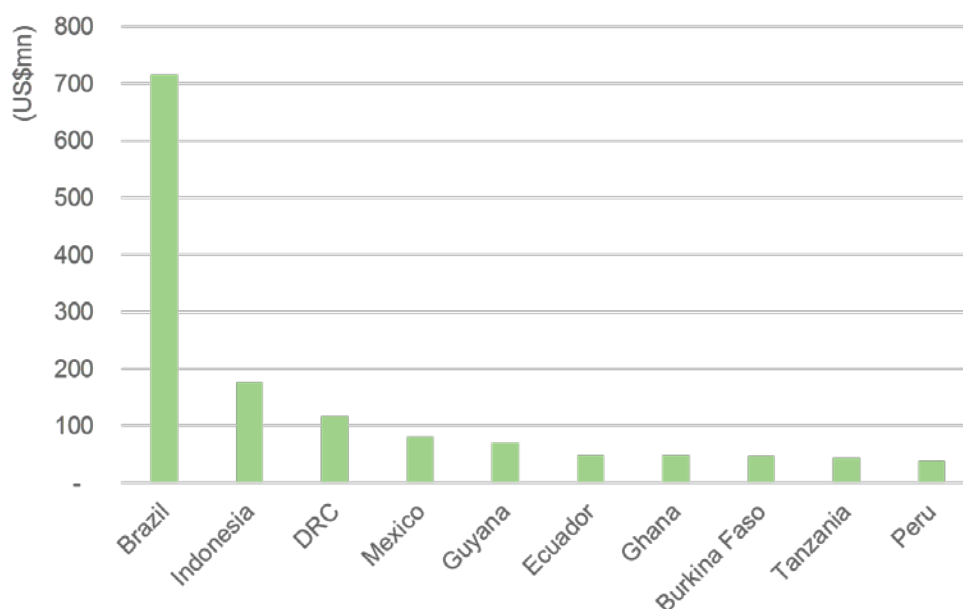
- **national funds** offer finance exclusively to a host country, often capitalized by international donors;
- **multilateral funds** offer finance on a competitive basis to a wide range of countries based on set criteria such as mitigation potential, needs/vulnerability of the recipient, and country ownership; and
- **bilateral arrangements**, through which international country governments offer financing exclusively to the country of focus on bespoke terms.

The level of private financial flows for commercial forestry activity also provides additional information about the broader investment environment.

According to Climate Funds Update (2016), globally, Brazil is the largest recipient of international public forest funding to date. As shown in Figure 32, Brazil has the largest absolute amount of public international finance approved for forest projects to date: US\$ 720 million. This is more than US\$ 500 million more than the second-highest country analyzed, Indonesia.

However, given national forest area, international funding for forestry activities in Brazil is relatively modest. Indeed, using a forest-adjusted metric, Ghana has received a higher amount of funding (per ha of forest): equivalent to US\$ 5.2/ha and US\$ 1.9/ha in Ghana and Indonesia respectively, compared with US\$ 1.5/ha in Brazil. Moreover, Indonesia set up a REDD+ PBP deal with Norway in 2010, with potential payments of up to US\$1 billion (similar to the Amazon Fund), even though it has secured only US\$ 60 million in actual payments owing to the failure to achieve performance. Peru has set also set up a REDD+ PBP arrangement, with up to US\$ 300 million in potential payments from Norway.

FIGURE 32: BRAZIL HAS THE LARGEST AMOUNT OF PUBLIC INTERNATIONAL FINANCE APPROVED FOR FORESTRY PROJECTS



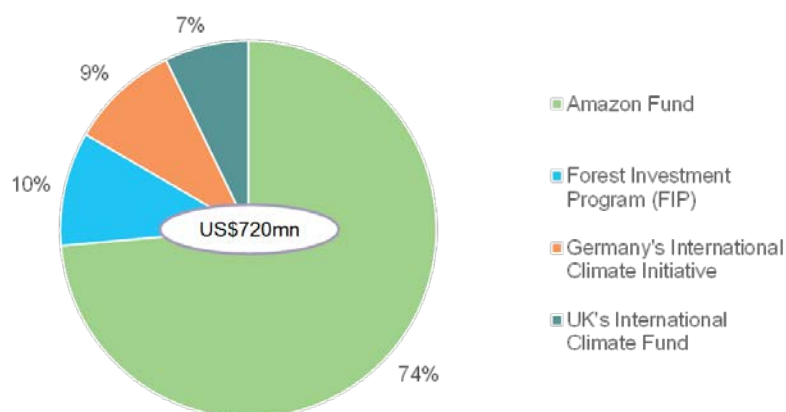
Source: Climate Funds Update (2016)

Note: Data correct as of September 2016 – the last date at which climate funds were reported to Climate Funds Update.

The Amazon Fund supplies the majority of forest finance to Brazil, but the variation in project scope is wide. Figure 33 shows that 74% of the funding approved for forestry projects in Brazil is from the Amazon Fund. Projects cover a range of activities, including:

- supporting the implementation of the CAR;
- funding the Green Municipalities program;
- developing sustainable value chains for non-wood forest products;
- technological research and development;
- dissemination of sustainable forest management techniques;
- monitoring and enforcement capacity building;
- preventing and fighting forest fires;
- developing and maintaining the national forest inventory.
- promoting low-carbon agricultural production techniques.

FIGURE 33: THE AMAZON FUND IS THE MAIN PROVIDER OF PUBLIC INTERNATIONAL FOREST FINANCE IN BRAZIL



Source: Climate Funds Update (2016)

Note: Data correct as of September 2016 – the last date at which climate funds were reported to Climate Funds Update.

While only 38% of Brazil's approved finance has been disbursed to projects, most countries' disbursement rates are even lower. Indeed, Brazil's disbursement rate is within the top third of all countries covered by Climate Funds Update (2016). Low levels of disbursement may indicate issues with project implementation such as securing partners and co-finance, although this is difficult to disentangle from administrative delays from financiers and other factors.

FDI flows to Brazil's forestry sector are high relative to similar countries, but most assets are domestically owned. Brazil has the largest amount of foreign-owned forest land in Latin America, with 0.6 Mha owned by TIMOs, and a further 1 Mha owned by primary producers in the forest industry (RISI 2016). This is more than three times larger than the total for Africa. Eleven of the top 30 TIMOs by assets under management have investments in Brazil, indicating that Brazil is an investment destination of importance to this investment group. However, FDI from TIMOs still accounts for approximately only 20% of all planted forest area in Brazil. In response to increased FDI in the forestry sector, the Brazilian government in 2010 placed a restriction on land purchases by foreigners, allowing domestic companies to gain market share.



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