Sources of Green Financing for Public Banks in North America (Canada, Mexico, and USA)

Alfredo Schclarek Curutchet[1] and Ignacio Juncos[2]

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Abstract

This paper examines how public development banks (PDBs) in North America can scale green lending by redesigning funding architecture. Using a Money-View T-account framework, we analyze three channels: recapitalization, green bond issuance, and originate-to-distribute securitization. Case analyses—Mexico, the U.S. Coalition for Green Capital, and British Columbia's MFABC—show that credible payment assurance plus standardized issuance reduce spreads, extend maturities, and raise volumes. We also assess policies that shift demand (prudential treatment, collateral frameworks, refinancing windows, green QE). The paper offers a practical design menu for larger, cheaper, longer-dated finance. Our thesis: funding architecture is climate policy.

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[1] Department of Economics, Universidad Nacional de Córdoba, Argentina and CONICET, Argentina; e-mail: alfredo.schclarek@unc.edu.ar; www.cbaeconomia.com.
[2] Department of Economics, Universidad Nacional de Córdoba, Argentina.

1. Introduction

Public development banks (PDBs) in North America face a straightforward constraint with outsized climate implications: to lend more for the transition, they must fund more—and fund better. This paper investigates how PDBs can expand green lending at scale by improving their own funding mix and risk-bearing capacity. We take as starting point the policy urgency of mobilizing credit for low-carbon investment and the distinctive position of PDBs to do so, while acknowledging that their effectiveness hinges on deliberate funding strategies.

Our research question is simple and practical: Which funding architectures enable PDBs to raise larger, longer-dated, and cheaper resources for green projects—without undermining balance-sheet resilience? To answer it, the paper pursues three objectives: (i) develop a theoretical account of PDB funding mechanisms; (ii) provide an empirical review and critical analysis of how North American public banks currently raise funds for green activities; and (iii) derive policy recommendations to support a just green transition. We frame the study's hypothesis explicitly: specialized financial mechanisms can lower PDB funding costs and lengthen maturities, thereby expanding green credit supply.

Methodologically, we ground the analysis in the Money View, using sequential T-accounts to trace payment and funding across agents, presented in Mehrling (2011, 2012, 2022), which has also been used in Schclarek and Xu (2022, 2025), and Schclarek et al. (2023). This lens clarifies how specific instruments—capital injections, bonds, guarantees, and securitizations—rearrange liquidity and risk across balance sheets. It also disciplines the discussion of trade-offs (leverage, refinancing risk, liquidity risk) when PDBs scale with market instruments.

Substantively, the paper analyzes three main funding channels and their complements. First, recapitalization—paid-in equity and functionally equivalent grant capitalization—strengthens loss-absorption and enables subsequent leverage; we formalize its funding dynamics with T-accounts and discuss predictable replenishment via earmarked revenues. Second, green bond issuance allows PDBs to lever a given capital base; we examine how coupon, tenor, security, and ratings shape volumes and pricing, and we review evidence on the "greenium," investor clienteles, and the necessity of robust verification to avoid greenwashing. Third, an originate-to-distribute (OTD) pathway recycles capital by securitizing seasoned green loans through bankruptcy-remote vehicles (green ABS/CLOs), shifting credit risk to investors and restoring lending headroom once leverage constraints bind. Across channels, we emphasize the governance functions of green guarantees and inter-institutional coordination (with green banks and IFIs) as demand and credibility enhancers for labeled issuance.

Empirically, the paper analyzes three cases to show how funding architecture shapes scale, tenor, and cost: Mexico's build-out of the MXN green-bond market and its policy scaffolding (taxonomy, disclosure) with outsized roles for NAFIN, FIRA, and BANOBRAS (via sustainability bonds); the United States' Coalition for Green Capital—capitalized by EPA's NCIF—channeling funds through local entities, standardizing pipelines, and recycling capital via warehousing and take-outs (CGC bonds, green ABS/CLO); and Canada's MFABC pooled-issuer model, where layered guarantees (Debt Reserve Fund, province-wide levy, joint-and-several security) support large, labeled debentures at tight spreads and long maturities, converting credibility into low-cost funding.

The policy contribution targets instruments that shift demand curves for PDB green bonds and green ABS. We discuss green macroprudential policies, collateral-framework adjustments, targeted refinancing windows, and, where appropriate, balance-sheet policies (e.g., green QE) that can compress yields, extend maturities, and improve market liquidity—while warning against design pitfalls that would dilute integrity or crowd out private capital.

The paper proceeds as follows. Section 2 develops the theoretical framework and T-account sequences for recapitalization, green bond issuance, and OTD. This section also reviews instrument design—bond features, ratings, verification, investor clienteles—and formalizes the leverage–liquidity trade-offs in scaling green lending. Section 3 presents case analyses that illustrate how specific architectures mobilize funding at scale and at cost. Section 5 concludes and distills policy recommendations for supervisors, central banks, and fiscal authorities to crowd in demand and institutionalize credible, high-integrity green financing.

In sum, our thesis is that funding architecture is climate policy: when PDBs combine robust risk-bearing capacity with well-designed market instruments and credible labeling, they unlock larger, cheaper, and longer-dated resources for the transition—at speed and at scale. The analysis that follows is intended to equip policymakers and practitioners with a tractable blueprint for doing exactly that.

2. Theoretical analysis of PDBs' funding for Green Financing

This section provides a theoretical analysis of the main funding strategies available to PDBs. We examine three key mechanisms: recapitalization, green bond issuance, and the "originate-to-distribute" model. Understanding how PDBs mobilize financial resources is essential for identifying ways to optimize these processes and expand their lending capacity. A strong and diversified funding base is crucial for enabling PDBs to scale up green financing and investment. In this context, the ability of PDBs to mobilize, manage, and leverage funding effectively is a critical factor shaping their contribution to sustainable development.

2.1 Recapitalization

One of the key mechanisms for PDBs to expand their capital base is recapitalization through increases in paid-in capital, typically achieved via direct equity injections from their shareholders—most often national governments, donor countries, or Multilateral Development Banks (MDBs). A functionally equivalent approach is grant-based capitalization that strengthens the balance sheet without conferring ownership or control. Beyond episodic injections, PDBs may also receive regular recapitalizations through periodic fund transfers from public budgets or through replenishments financed by earmarked revenues, such as carbon taxes or utility surcharges (OECD, 2016). These earmarked replenishments provide a more sustainable and predictable means of strengthening the capital base, reducing reliance on general fiscal resources.

This recapitalization process is illustrated in Figure 1, which depicts the sequential balance sheet dynamics of financing a green investment project through a PDB in coordination with a commercial bank. The figure presents, at each point in time, the balance sheets of the involved agents using T-accounts, that is, assets on the left-hand side and liabilities on the right-hand side, following the "money view" monetary theory, presented in Mehrling (2011, 2012, 2022), which has also been used in Schclarek and Xu (2022, 2025), and Schclarek et al. (2023). Every entry in an account has a subscript which refers to the agent for which that entry represents an asset, and a superscript which refers to the agent for which that entry represents a liability. In the initial period (*T = 0*), all agents begin with zero assets and liabilities. In period 1 (*T=1*), the PDB receives a capital injection from the government (+*Capital*), and the resulting funds are deposited with a commercial bank (+*Dep*).[3][4] These deposited funds provide the financial basis for the PDB to extend credit to the green project, as will be analyzed below.

T	PDB		Commercial Bank		Green Project	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
0						
1	$+Dep^{CB}_{PDB}$	$+Capital^{PDB}_{Govt}$		$+Dep^{CB}_{PDB}$		
2	$+Dep^{CB}_{PDB}$	$+GBonds^{PDB}_{CB}$	$+GBonds^{PDB}_{CB}$	$+Dep^{CB}_{PDB}$		
3	$-Dep^{CB}_{PDB}$ $+GLoan^{GP}_{PDB}$			$-Dep^{CB}_{PDB}$ $-Dep^{CB}_{GP}$	$+Dep^{CB}_{GP}$	$+GLoan^{GP}_{PDB}$
Final Situation	$GLoan^{GP}_{PDB}$	$Capital^{PDB}_{Govt}$ $GBonds^{PDB}_{CB}$	$GBonds^{PDB}_{CB}$	Dep^{CB}_{GP}	Dep^{CB}_{GP}	$GLoan^{GP}_{PDB}$

Figure 1: Funding of a Public Development Bank through direct capital infusions and issuance of green bonds to finance the green lending to green projects.

Another important source of capital for PDBs is the issuance of hybrid capital instruments—financial instruments that combine characteristics of both equity and debt. A common example is perpetual subordinated bonds with contingent interest payments[5], which are classified as

[3] It is important to note that we assume PDBs are not part of the national payment system and therefore do not hold accounts at the central bank. As a result, they must maintain an account with a commercial bank in order to execute payments. If PDBs did hold an account at the central bank, it is likely that recapitalization funds would be deposited directly into that account. This, in turn, would imply that PDBs are integrated into the payment system and able to make direct transfers to other banks via the central bank infrastructure. However, this distinction does not alter the conclusions of our analysis.

[4] For reasons of space, the government's balance sheet is not shown, but the operation would be reflected as an increase in its capital holding in the PDB and a corresponding reduction in its deposits.

[5] Contingent interest payments refer to interest that is only paid if certain predefined conditions are met. These conditions typically relate to the financial situation of the issuer, such as maintaining adequate capital levels or having sufficient profits. If the conditions are not fulfilled, the issuer can suspend or reduce the interest payment—often without the obligation to pay it later. This mechanism helps preserve the issuer's financial stability during periods of stress, while offering flexibility in managing payment obligations.

equity on the balance sheet, even though they exhibit some debt-like features (IMF, 2024). One major advantage of these instruments is that they enable PDBs to raise capital without requiring direct contributions from their original owners and without diluting their ownership or decision-making power. However, a key limitation is that, due to their subordinated status and the non-market-determined nature of their interest payments, these instruments may not appeal to private investors. As a result, governments, central banks, donor countries or mission-oriented institutions, such as philanthropic organizations or MDBs, are often the only likely subscribers.

Additionally, PDBs may benefit from callable capital, which refers to a legally binding commitment by their shareholders to provide additional capital if requested—typically under exceptional circumstances, such as financial distress or to prevent default (Humphrey, 2024). Unlike paid-in capital, callable capital is not disbursed upfront. Instead, it acts as a contingent guarantee that strengthens the bank's credit profile and provides reassurance to bondholders. In this sense, callable capital operates similarly to implicit or explicit forms of government support, such as sovereign guarantees. Crucially, in institutions with multiple shareholders, callable capital also serves as a pre-agreed coordination mechanism, reducing the need for ad hoc negotiations and ensuring timely recapitalization when needed. Although it does not directly supply liquidity or working capital, callable capital can significantly improve access to market-based funding—enabling the issuance of larger, longer-term bonds at lower interest rates (Marodon, 2022).

3.2 Green bond issuance

Beyond recapitalization, green bond issuance is another key strategy for mobilizing funds. By leveraging their existing capital base—including callable capital and government guarantees—PDBs can expand their balance sheets and raise resources for immediate green onlending. The combination of recapitalization and bond issuance enables development banks to rapidly scale up credit provision by tapping into banking system liquidity.

Figure 1 illustrates this green bond issuance process. In period 2 ($T = 2$), the PDB issues green bonds that are purchased by the commercial bank (+*GBonds*). The commercial bank pays for these bonds by creating new deposits in favor of the PDB (+*Dep*), thereby expanding its own balance sheet: it records the green bonds as assets and the new deposits as liabilities.[6] This transaction is profitable for the commercial bank, as it earns interest on the bonds while typically paying little or no interest on the PDB's deposits. The PDB then uses these deposits (-*Dep*), in period 3, to grant a green loan to the project (+*GLoan*), which receives the funds as

[6] A fundamental point to clarify is that most PDBs are not integrated into the national payment system. As such, they do not accept deposits from the public and cannot create bank deposits through lending, unlike commercial banks (Mehrling, 2011; 2012; 2022). Nevertheless, PDBs can obtain liquidity by issuing bonds or borrowing from commercial banks, thereby gaining indirect access to bank deposits. Notably, when a PDB issues bonds that are purchased by a commercial bank, the commercial bank effectively creates new deposits as part of the transaction. In this way, PDBs indirectly contribute to deposit creation within the banking system, even though they themselves lack the ability to generate deposits directly (Cingolani, 2019; Schclarek et al., 2023).

a deposit in the same commercial bank (+*Dep*).[7] In the final situation, the PDB holds a green loan on the asset side and green bonds plus capital on the liability side; the commercial bank holds green bonds issued by the PDB as assets and bank deposits as liabilities; and the green project holds bank deposits and owes a loan to the PDB. This structure demonstrates how capitalization and bond issuance enable PDBs to leverage banking system liquidity and channel it toward environmentally sustainable investments.

However, while recapitalization strengthens the PDB's equity position—reducing leverage and enhancing its capacity to absorb losses—bond issuance does the opposite by increasing leverage and adding liabilities to the balance sheet. This trade-off allows for greater lending but also introduces maturity mismatches, refinancing risks, liquidity risks, and increased exposure to adverse financial conditions, such as funding shocks, sudden stops in market access, or borrower defaults. As a result, PDBs must carefully navigate this dynamic by balancing the objective of maximizing developmental impact and financial returns with the need to limit credit and liquidity risks. Striking this balance is essential for ensuring the long-term effectiveness and sustainability of their operations. Moreover, depending on the country, this leverage-based strategy is also constrained by banking regulations and capital adequacy requirements, which impose legal and prudential limits on how much leverage PDBs and other banks can assume (Barros de Castro, 2018; Gottschalk et al., 2021).

Moreover, the scale of green bond issuances depend not only on the PDB's capital base, liquidity position, and regulatory constraints but also on several key structural features of the bonds themselves. These include the coupon rate, which determines investor returns; the maturity or tenor, which sets the investment horizon and repayment profile; the currency of denomination, which affects exposure to foreign exchange risk[8]; and whether the bond is secured or unsecured, which influences its perceived risk and attractiveness. Credit ratings assigned by rating agencies play a central role in shaping investor confidence and determining both the pricing and success of the issuance. While these features are common to all types of bonds, they are equally important in the context of green bonds and must be considered alongside environmental criteria to ensure their viability and market appeal.

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[7] Although the example shows a direct loan to the project, the PDB could instead—among other options—(a) extend a loan, purchase a bond, or take an equity stake in a green project company, green investment fund, local green bank or other public/mission-driven green intermediary; or (b) provide a grant to a local green bank or other public/mission-driven green intermediary. Grants are typically used when the PDB itself has been recapitalized with a grant, to align inflows and outflows—i.e., a non-repayable inflow funding a non-repayable outflow—and avoid repayment-mismatch issues.

[8] For developing countries, currency mismatch adds an additional layer of complexity to the funding strategies of development banks. Borrowing in hard currency often allows access to longer-term financing at lower interest rates than borrowing in local currency, which is typically more expensive and shorter in duration. It also brings an inflow of hard currency that can be used to purchase imported inputs required for green projects—such as renewable energy technologies, specialized equipment, or construction materials not produced domestically. However, as Schclarek and Xu (2022) discuss, this strategy exposes development banks to significant exchange rate risk, particularly when the projects they finance generate returns in local currency. If the domestic currency depreciates, the real burden of hard currency repayments increases, which can heighten credit risk and erode capital buffers. This, in turn, may lead to credit rating downgrades and higher future borrowing costs for PDBs. For this reason, there is growing discussion on how MDBs can expand local currency lending without exposing themselves to excessive foreign exchange risk (Schclarek and Xu, 2025).

In addition, as Bongaerts and Schoenmaker (2024) argue, a key advantage of green bonds is that they can attract "climate investors" who are willing to accept lower yields and longer maturities in exchange for the non-monetary value of supporting environmentally beneficial projects. This willingness by specific investors to accept lower returns and longer maturities is known as the "clientele premium." In addition, Daubanes et al. (2021) and Maltais and Nykvist (2020) highlight that investors are often drawn to green bonds for non-financial reasons, such as branding, signaling commitments to sustainability, and responding to growing demand for green investments from their clients. However, the empirical evidence on the existence and size of this clientele premium is mixed. While studies such as Baker et al. (2022) and Caramichael and Rapp (2024) find that green bonds are issued at a modest premium over comparable conventional bonds, other research, such as Warmath (2021), suggests that issuing green bonds does not always translate into lower borrowing costs.

However, to ensure the environmental integrity and market credibility of green bonds, external verification and certification are critical. These processes help align issuances with established frameworks—such as the Green Bond Principles—and involve independent environmental assessments to confirm that proceeds are allocated to projects meeting recognized green criteria (Deschryver & Mariz, 2020; Gilchrist et al., 2021). Such mechanisms are essential for mitigating the risk of greenwashing and enhancing transparency.[9] Beyond the initial issuance phase, ongoing monitoring and environmental reporting play a vital role in maintaining accountability and reinforcing stakeholder confidence. When these practices are systematically integrated into the governance structures of Public Development Banks (PDBs), they not only safeguard investor interests but also help institutionalize green bonds as credible instruments for scaling climate-aligned finance.

Furthermore, Schclarek et al. (2023) note that, unlike private commercial banks (PCBs), which rely primarily on short-term deposits that can be withdrawn at any time, PDBs often use longer-term liabilities—such as bonds—to finance their lending. This approach reduces the risk of maturity mismatches and refinancing risk and enables PDBs to offer longer-term credit.[10] Schclarek et al. (2023) also argue that PDBs can extend longer-term loans because the bonds they issue often have higher perceived collateral value than those issued by PCBs. This is largely due to the greater willingness and capacity of the state, as owner, to recapitalize PDBs, which enhances the perceived safety of their bonds.[11] Furthermore, the study highlights that

[9] One of the main challenges, as highlighted by Stumphius and Bezemer (2024), is measuring the additionality of green bonds—specifically, whether these bonds lead to genuine environmental improvements or simply reclassify existing projects as "green." Their study finds that measurable impacts, such as reductions in carbon emissions or energy intensity, are often marginal or difficult to quantify at the firm level. This underscores the need for more robust measurement tools and greater transparency in how green bond proceeds are used to ensure that these instruments deliver meaningful environmental benefits.

[10] Hu et al. (2022) provides empirical evidence that PDBs grant longer-term loans compared to commercial banks.

[11] Governments are typically better positioned than private bank owners to provide liquidity for the recapitalization of PDBs, as they may not only hold more liquid assets but also possess the legal authority to raise funds through taxation—particularly from successful investment projects and the banks that finance them (Brei and Schclarek, 2015; Gorton and Huang, 2004; Holmström and Tirole, 1998; Schclarek et al., 2023). This advantage hinges on the government maintaining a strong and sustainable fiscal stance; in cases of fiscal distress—such as those caused by poor governance, corruption, or populist policies—it is significantly reduced. Governments are also generally more willing

PDBs, as significant bond issuers, often benefit from greater market liquidity, which facilitates trading in secondary markets. This enhanced liquidity increases the attractiveness of their bonds to investors, who value the ability to sell them easily when in need of cash.[12] Taken together, these factors suggest that, all else equal, green bonds issued by PDBs can be issued in larger amounts, with longer maturities and lower interest rates than those issued by PCBs.[13]

An additional way to enhance the demand for green bonds issued by PDBs is through the implementation of green macroprudential policies, green credit allocation frameworks, and green quantitative easing (QE) by central banks. When well designed, these instruments can significantly strengthen investor demand for green bonds—thereby increasing their issuance volumes, lowering interest rates, extending maturities, and improving market liquidity. Realizing these benefits, however, requires central banks and financial supervisors to adopt a more proactive role, often involving a broadened mandate that includes addressing climate-related risks and supporting climate mitigation and adaptation policies. This paradigm shift is increasingly discussed in the literature, including in the works of Aguila and Wullweber (2024), Campiglio et al. (2018), Dafermos et al. (2018), Dikau and Volz (2021), Kedward et al. (2024), van Lerven and Ryan-Collins (2017), Schoenmaker (2021), and Vestergaard (2024).

The concrete policy proposals advanced by these papers provide a compelling foundation for adapting central banking instruments to support the issuance of green bonds by PDBs. These could include green macroprudential policies, such as reducing capital requirements for commercial banks that hold green bonds issued by PDBs, thereby increasing the attractiveness of these securities. Central banks could also revise their collateral frameworks by applying lower haircuts to green bonds issued by PDBs and granting preferential treatment to green assets more broadly, which would enhance incentives for holding these securities. In addition, green credit allocation mechanisms—such as imposing quotas on green bonds issued by PDBs, which would require banks to hold a minimum share of these assets, and introducing green refinancing schemes, whereby banks purchasing green bonds could refinance their loans with the central bank at preferential interest rates—could further direct banks toward green bonds. Finally, green quantitative easing (Green QE), through which central banks directly purchase green bonds issued by PDBs, could boost demand, improve market liquidity, lower yields, and extend maturities, thus strengthening the role of green bonds in financing climate-aligned development.

3.3 The “originate-to-distribute” model

to recapitalize PDBs, given the broader financial, economic, and political consequences of bank failure. While private owners risk only their own capital, governments may face rising unemployment, falling tax revenues, electoral backlash, and the erosion of state capacities in finance and industry. Thus, both the capacity and willingness to recapitalize are typically greater for governments, provided fiscal conditions remain sound.

[12] The literature on market liquidity shows that bonds with lower market liquidity tend to carry higher interest rates at issuance (i.e., higher coupon rates) and trade at a discount in secondary markets (Amihud et al., 2006; Vayanos & Wang, 2013).

[13] These favorable green bond issuance conditions depend on the PDB operating efficiently, particularly in its monitoring capacity—such as project evaluation, borrower screening, and repayment collection. Poor governance or political interference can undermine these functions and reduce issuance effectiveness (Schclarek et al., 2023).

An alternative strategy to obtain funds for green lending by PDBs, as also argued by Guter-Sandu et al. (2024) and Pinko et al. (2023), is through the "originate-to-distribute" model, which allows development banks to recycle capital by securitizing the green loans they originate. In this model, PDBs bundle a pool of green loans that have already been granted—such as those for renewable energy, energy-efficient housing, or clean transport—and sell them to a legally separate Special Purpose Vehicle (SPV).[14] The SPV finances the purchase of these loans by issuing green asset-backed securities (GABS) or green collateralized loan obligations (GCLOs) to investors, backed by the cash flows—interest and principal payments—of the loan pool.[15] Investors who buy these securities assume the credit risk of the underlying borrowers, while the PDBs transfer the exposure off its balance sheet and regains the funds for new lending. Also, the SPV is structured to be bankruptcy-remote from the bank, ensuring that the underlying loan assets of the GABS remain protected even in the event of the originator's insolvency.

T	PDB		SPV		Commercial Bank		Green Project	
	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
0	Dep^{CB}_{PDB}	$Capital^{PDB}_{Govt}$				Dep^{CB}_{PDB}		
1	$+GLoan^{GP}_{PDB}$ $-Dep^{CB}_{PDB}$					$-Dep^{CB}_{PDB}$ $+Dep^{CB}_{GP}$	$+Dep^{CB}_{GP}$	$+GLoan^{GP}_{PDB}$
2	$-GLoan^{GP}_{PDB}$ $+GABS^{SPV}_{PDB}$		$+GLoan^{GP}_{SPV}$	$+GABS^{SPV}_{PDB}$				$-GLoan^{GP}_{PDB}$ $+GLoan^{GP}_{SPV}$
3	$-GABS^{SPV}_{PDB}$ $+Dep^{CB}_{PDB}$			$-GABS^{SPV}_{PDB}$ $+GABS^{SPV}_{CB}$	$+GABS^{SPV}_{CB}$	$+Dep^{CB}_{PDB}$		
Final Situation	Dep^{CB}_{PDB}	$Capital^{PDB}_{Govt}$	$GLoan^{GP}_{SPV}$	$GABS^{SPV}_{CB}$	$GABS^{SPV}_{CB}$	Dep^{CB}_{GP} Dep^{CB}_{PDB}	Dep^{CB}_{GP}	$GLoan^{GP}_{SPV}$

Figure 2: The "originate-to-distribute" model with a Public Development Bank creating a special purpose vehicle that issues green asset-backed securities (GABS).

Figure 2 illustrates the sequential balance sheet dynamics involved in financing a green project under the "originate-to-distribute" model using Green Asset-Backed Securities (GABS). Four agents interact over time: a Public Development Bank (PDB), a Special Purpose Vehicle (SPV), a Commercial Bank, and the Green Project. In the initial period 0, the PDB is capitalized by the state and, thus, receives bank deposits at the commercial bank. In period 1, the PDB uses those deposits to grant a green loan; the project receives the proceeds as deposits in the same bank and undertakes the investment. At that point the PDB is effectively out of

[14] The bank or entity that originates the loans and sets up the SPV is called the originator or sponsor.

[15] An SPV is the standard, bankruptcy-remote issuer for both ABS and CLOs. In ABS, the SPV purchases consumer/asset receivables (e.g., rooftop-solar or efficiency loans, auto/consumer loans) and typically issues bonds and notes backed by a static pool (or a master trust with replenishment but no active trading). In CLOs, the SPV purchases a diversified pool of leveraged corporate loans and is overseen by a collateral manager with a multi-year reinvestment period, allowing portfolio buying/selling within preset eligibility and risk limits.

lendable funds unless it waits for amortizations, or—illustrated in period 2— follows the "originate-to-distribute" model and securitizes the green loans.

Thus, in period 2, the PDB sells the green loan to an SPV, which finances the purchase by issuing GABS, backed by the green project's future repayments.[16] In this setup, the repayment of the loans by the green projects are the funds that back up the repayment of the GABS. In period 3, the PDB sells these securities to the commercial bank, which pays for them by creating new deposits in favor of the PDB.[17] This restores the PDB's liquidity, allowing it to originate additional green loans without fresh recapitalization or increasing leverage through new green bond issuance. In the final configuration, the PDB holds deposits it can recycle into new loans—again distributing them via the SPV—; the SPV books the underlying green loans as its assets; and the commercial bank holds the GABS and assumes the associated credit risk. This structure simultaneously expands the PDB's lending capacity, positions the SPV as a securitization conduit, and lets the commercial bank act as both liquidity provider and risk bearer—although, in reality, other financial investors may end up holding the GABS.

The "originate-to-distribute" strategy is particularly well suited to continue expanding green lending even when a PDB has reached the leverage limits imposed by banking regulations and capital requirements, but also prudent management, and can no longer raise new funds through green bond issuance. Once this leverage threshold is reached, the PDB must typically wait for outstanding green loans to be repaid before providing new ones—unless additional capital is injected. As a result, the capacity to scale up green lending through bond issuance becomes tightly constrained by the bank's capital base. In contrast, the originate-to-distribute model offers a more flexible alternative: rather than waiting for repayments, the PDB can fund the new loans by securitizing its existing loan portfolio through the creation of the SPV and the issuance of GABS. This approach enables the bank to recycle capital and sustain lending beyond regulatory leverage limits, significantly enhancing its ability to speed-up lending and finance the green transition.

The success of this strategy, however, depends on the existence of a strong pipeline of bankable green projects. In this regard, the originate-to-distribute model is particularly well suited for financing many small, standardized green loans—such as those for residential solar panel systems—rather than a few large and complex infrastructure projects. Creating a robust pipeline of large projects requires significant time, specialized expertise, and tailored financing structures, which often raise development and transaction costs and reduce scalability.[18] By

[16] Asset-backed securitization allows the originator to pool otherwise illiquid loans and convert them into tradable instruments.

[17] As analyzed by Adrian et al. (2013) and Gorton & Souleles (2007), among others, in a securitization, the SPV pools the loans and assets and issues multiple debt classes ("tranches") with different payment priorities defined by a cash-flow waterfall. Tranching produces securities with distinct ratings, loss cushions, yields, and maturities, allowing investors to select the slice that matches their risk appetite and horizon. To shield senior notes, the structure layers in credit enhancements—overcollateralization, excess spread or reserve accounts, and subordination triggers—so losses are absorbed first by junior pieces. Moreover, securitizations are typically engineered so the ABS maturities broadly align with the tenor of the underlying assets, limiting refinancing pressure and the risk of forced asset sales.

[18] Moreover, infrastructure projects—especially greenfield developments—require very long-tenor financing and follow a pronounced "J-curve": during construction they absorb capital without generating revenue, and once operational their returns are often capped by contractual or regulatory arrangements. This risk-return profile may deter profit-driven investors seeking higher and quicker pay-offs.

contrast, standardized lending products with clearly defined purposes, eligibility criteria, repayment terms, and environmental performance benchmarks lower transaction costs and facilitate due diligence, making them easier to originate. For this reason, PDBs must invest in the design of standardized green credit lines to enhance the efficiency and replicability of the originate-to-distribute model and ensure its alignment with market and investor demand.[19]

The effectiveness of this model depends not only on the bank's ability to originate a pipeline of standardized, fundable green projects, but also on its capacity to structure, price, and distribute the securities.[20] Ultimately, in this context, the development bank must take on a central role as a market maker—not just as a passive originator, but as a dealer of the asset-backed securities that fosters market liquidity and investor confidence in the green ABS market (Schclarek et al., 2022). This means being responsible for structuring, pricing, and placing the securities in the market, and providing the initial market liquidity necessary to attract investors. Without this role, the market for green ABS may remain too shallow or illiquid to support scalable green lending. By acting as a dealer, the development bank helps to create the conditions under which credit risk can be offloaded to investors through the SPV structure, thereby freeing up its balance sheet for new rounds of lending. This market-making function is therefore essential—not only for the success of the originate-and-distribute model, but for establishing a self-sustaining ecosystem of green finance.

A further factor in making the "originate-to-distribute" approach—and, by extension, the placement of GABS—work is the same triptych highlighted for green bonds in Section 3.2: robust external certification, the prospect of a greenium, and supportive green-central-bank policies. What differs is the credit back-stop. Because the SPV is legally remote from the PDB, the latter's implicit or explicit sovereign guarantee usually does not extend to the securities the SPV issues. All else equal, investors therefore would demand higher yields and shorter tenors on GABS than on green bonds placed directly by the PDB. One workaround is an explicit wrap—such as a guarantee or insurance policy—provided by the PDB or another public entity.[21] Yet, as Acharya et al. (2013) warn, these guarantees create large contingent liabilities that can amplify losses in a crisis. They also defeat the purpose of the SPV: shifting credit risk off the PDB's balance sheet so it can originate additional green loans. Reassuming that risk

[19] Accordingly, the PDB and the SPV need to operate in lockstep. When investors trust that the PDB has originated high-quality, cash-flow-sound green loans, the SPV can place the resulting GABS at higher issue prices, with lower coupons and longer maturities (Gorton and Souleles 2007).

[20] In this sense, standardization plays a critical role not only in facilitating the origination of green loans but also in enabling external investors to correctly assess and price the GABS issued by the SPV. By increasing transparency, ensuring consistency across loan contracts, uniform underwriting standards and robust risk assessment frameworks, standardization allows for the creation of sufficiently homogeneous loan pools, thereby enhancing their attractiveness and liquidity in capital markets.

[21] *Credit* guarantees require the sponsor—typically the PDB—to repay maturing asset-backed securities (ABS), in full or in part, regardless of the performance or value of the SPV's underlying assets. In contrast, *liquidity* guarantees obligate the sponsor to cover maturing ABS—again, fully or partially—only if the underlying assets are not in default. This last instrument is specifically designed to mitigate the SPV's rollover risk. This risk arises from the inherent maturity mismatch in SPV structures: while their assets—typically medium- to long-term loans—are relatively illiquid, their liabilities (the issued ABS) are often short-term. Consequently, SPVs must frequently refinance by issuing new ABS to repay those coming due, making them highly vulnerable to disruptions in market access. A related mechanism is the extendible note guarantee, which functions similarly to a liquidity guarantee but allows the conduit issuer to unilaterally extend the maturity of the ABS for a limited period (usually up to 60 days), offering temporary relief during periods of market stress.

through a guarantee would erode the PDB's capacity to expand lending and blunt the advantages of the "originate-to-distribute" model.

3. Case studies

3.1. Mexico

3.2.1 The green bond market in Mexico.

The first green bond in Mexico was issued in 2015 by the National Financiera (NAFIN). It was denominated in dollars by an amount of 500 million and a maturity of five years and was certified as a Climate Bond by the Climate Bond Standard Board[22]. Since then the Mexican Green, Social, Sustainability, and Sustainability-Linked Bond (GSS+) market has reached USD 55.7 billion. Mexico became Latin America and Caribbean's largest sustainable bond market (CBI, 2023). The green bond market accounts for 13% of the total GSS+ market in Mexico, with a cumulative volume of USD 5.33 billion. This positions Mexico as Latin America's third-largest source of green bonds, following Brazil and Chile (CBI, 2023).

A critical aspect in the development of the green bond market in Mexico was the strategic decision of the Federal State of Mexico to align its development strategy with the Sustainable Development Goals (SDG). That determination includes initiatives such as the General Law on Climate Change[23], the National Climate Change Strategy[24], the Energy Transition Law[25] and the Sustainable Finance Mobilization Strategy[26], all aimed at command investments towards green and sustainable activities.

As key specific policies that have fueled the sustainable and green bond market in Mexico, we identify: The integration of the SDG in the federal budget linked budgetary programs to specific SDG targets; the development of the Sustainable Taxonomy of Mexico by the Ministry of Finance and Public Credit (SHCP) in 2023; the issuance of sovereign bonds linked to SDG reaching an allocation of USD 17.5 billion in 2020-2024[27]; the obligation to the pension fund managers to share information regarding the alignment with the ESG principles of their investments[28] and that the profits from GB are tax-deductibles for investors (Zapata Garza et. al., 2017). The National Banking and Securities Commission (CNBV) and the Mexican Central Bank (Banxico) are other fundamental actors in this process. The CNBV has taken actions as the mandate that companies issuing securities must disclose information on their

[22] https://www.nafin.com/portalnf/content/sobre-nafin/sala-de-prensa/boletin_bono_verde.html

[23]https://www.gob.mx/cms/uploads/attachment/file/40811/2015_mexican_general_law_climate_change.pdf

[24] https://faolex.fao.org/docs/pdf/mex180914.pdf

[25] https://www.diputados.gob.mx/LeyesBiblio/ref/lte.htm

[26]https://www.gob.mx/shcp/documentos/documento-de-consulta-de-la-estrategia-de-movilizacion-de-financiamiento-sostenible?state=published

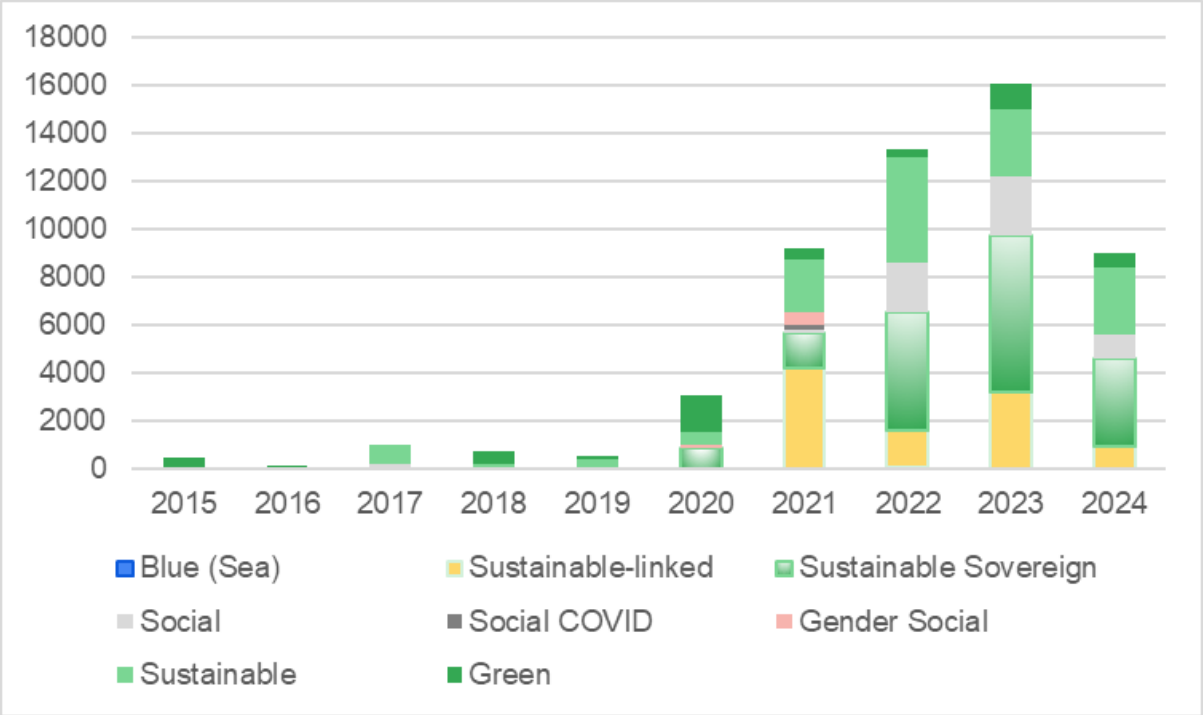
[27] It is not possible to differentiate exactly how much of this money was used strictly to green activities. But as a benchmark we can note that of the US$6.95 Initial Eligible Expenditures identified for 2022, USD5.58 billion or 80.3% were aligned to Social SDGs, whereas USD1.36 billion or 19.7% were addressed to Green SDGs (United Nations Development Programme, 2023)

[28] https://www.dof.gob.mx/nota_detalle.php?codigo=5572645&fecha=18/09/2019#gsc.tab=0

environmental policies, certifications, and projects and the development of the "Green Bond Principles MX" in 2018 in collaboration with the Climate Finance Advisory Group which is part of Banxico.

In addition to its role in the development of the Green Bond Principles MX, Banxico is a member of the Network for Greening the Financial System (NGFS) and incorporates Environmental, Social, and Governance (ESG) factors into its investment strategies including green bonds in its portfolio of eligible investments. The role of Banxico was crucial also in the issuance of Green Bonds through the Trusts Established in Relation to Agriculture (FIRA by its acronyms in Spanish). As FIRA functions under Banxico, the central bank's governance and regulatory framework provided the necessary institutional backing for the bond issuance. Finally, Banxico promotes sustainable finance and encourages the integration of ESG considerations within the financial sector, however, this is not mandatory for commercial banks. No regulation indicates commercial banks allocate a specific portion of their portfolios to green investments.

GSS+ bond issuing in México, millions of dollars



Source: Own elaboration based on CMFS.

Since 2015, 32 green bonds have been issued. 8 between 2015 and 2019 and 23 in the period 2020-2024, including a record in 2023 with 8 green bond issuances. A similar picture is derived when analysing the amount of emissions where USD 1.28 billion was raised between 2015 and 2019 and 4.05 in 2020-2023 (almost USD 1.1 billion only in 2023).

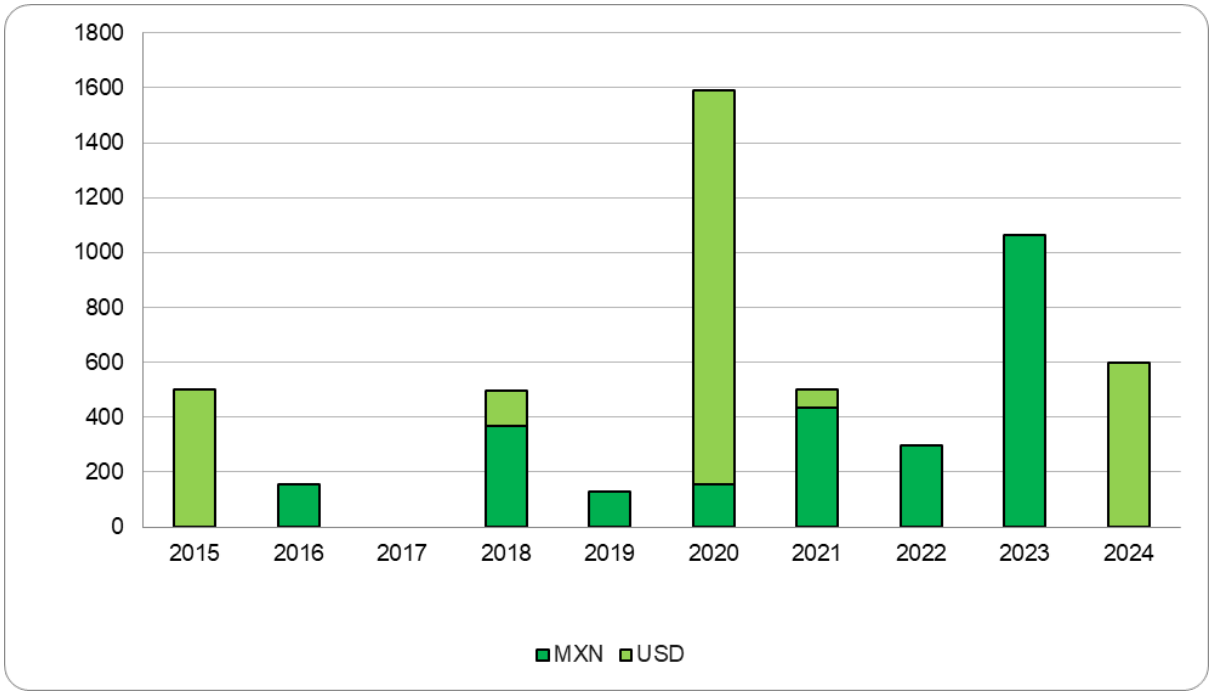
It is important to note that a crucial element of the development of the green bond market in Mexico has been the creation of a market of Green Bonds denominated in local currency. NAFIN issued 2016 the first green bond denominated in Mexican peso (MXN) and raised MXN 2 billion (approximately 100 million dollars). Since then the issuing in local currency averaged 71% of the total of the Mexican green bond market. Despite the predominance of the

issuances in the local currency, financing through the Mexican peso has been more expensive and short-term than dollar-denominated green bonds. The weighted average of the coupon rate and maturity of green bonds denominated in Mexican peso were 7,46% and 5,83 years respectively. In comparison, these values were 3,55% and 10,09 years for the dollar-denominated green bonds.

Nevertheless, the Mexican green bond market is still incipient and in a developing stage, and despite that they have a differentiated demand it is not clear that they offer cheaper financing (Arellano Cadena y Perez Delgado, 2019; Zapata Garza et. al., 2017). The ammount raised remains significantly below the estimated USD 136–791[29] billion required for Mexico to meet its nationally determined contribution commitments for the 2016–2030 period[30] (Holmes, et. al., 2018). As a benchmark of the size of the green bond market, the total bond issuances —sovereign and corporate combined— in Mexico in 2023 reached USD 15.12 billion (CEPAL, 2024). It is almost three times the ammount raised in the green bond market since 2015. This call our attention to the necessity of deepening the Mexican's green bond market and increasing its liquidity.

Regarding how to achieve that Deschryver and De Maris (2020) enmuerates several measures as strengthening regulatory frameworks, standardising reports and increasing the transparency of the green aspect of projects and bonds. Specifically for Mexico, Holmes et. al. (2018) argue that for improve its financing of the green transition Mexico needs better coordination in their policies and in particular between is national DBs. They propose as a solution a Green Investment Agency that centralizes the green financing policy and could be a issuer of sovereign green bonds.

Green bond issuing in México by currency, millions of dollars



[29] USD 136 billion correspond to INNEC estimation and USD 791 billion to IFC estimation.
[30] https://unfccc.int/process-and-meetings/the-paris-agreement/nationally-determined-contributions-ndcs.

Source: Own elaboration based on CMFS.

3.2.2 The participation of Development Banks in the Green Bond market.

DBs are key actors in the green bond market in Mexico. Between 2015 and 2023, they issued green bonds by more than 1,2 billion dollars representing 23% of the total Green Bond market in Mexico only below the corporate sector, which represents 44% of the issuances[31]. However, it is important to note that the first Green Bond issue by the corporate sector was in 2020. Before that the issuance of DBs represented 68% of the total Mexican green bond market, meaning that DBs had a key role in the market development as expected by the literature (Griffith-Jones & Ocampo, 2018).

Considering only the Green Bonds issued in local currency, the importance of DB is even stronger accounting for 27% of the total amount between 2015 and 2023. The Green Bond issued in 2015 by NAFIN was the only one issued by a DB denominated in foreign currency in the period. On the other hand, dollar-denominated corporate Green Bonds represented 64% of total dollar-denominated Green Bonds in 2015-2023 (against 44% in the total Green Bonds market).

Looking inside the DB green bond issuances, we find that NAFIN and FIRA are the actors that issued taht instrument. Nafin issued the two already mentioned green bonds, in 2015 and 2016 dollar and MXN-denominated respectively. FIRA has issued five green bonds between 2018 and 2023 all denominated in MXN, raising around 620 million dollars.

Considering only the the MXN-denominated green bonds issued by the DBs the weighted average of the interest rate and the maturity were 8,33% and 3,9 years respectively. Although the small number of green bonds issued doesn't allow a systematic comparison between the interest rate and the maturity achieved by the DB and other actors, we can reference two green bonds issued by Mexico City's Government. On the one hand, in 2016 a Mexican-peso-denominated green bond raised the equivalent of USD 49 million, with a maturity of 5 years and a coupon rate of 6,54%. On the other hand, in 2018 another Mexican-peso-denominated green bond raised the equivalent of USD 54 million, with a maturity of 10 years and a coupon rate of 9,93%. In comparison, in 2016 NAFIN raised USD 107 million (in local currency) with a maturity of 7 years and a coupon rate of 6,1% and in 2018 FIRA collected the equivalent of USD 130 with a maturity of 4 years and a coupon rate of 8,3%. This analysis shows the relevance of DB to finance the green transition, showing that the DB could get better conditions in the green bond market than an important public office such as the Government of the City of Mexico.

Table x: Development Banks green bond issuing in México

[31] After the DB the main actor issuing green bonds are the commercial banks (13%) of the market, the multilateral banks (9%) , parastatal agencies (9%) and government organisms (2%).

Ticket	Issuer	Year	Currency	Amount (millions of dollars)	Maturity (years)	Interest rate (voucher rate)
NAFF 15V	NAFIN	2015	USD	500	5	3,4%
NAFF 16V	NAFIN	2016	MXN	107	7	6,1%
FEFA 18V	FIRA	2018	MXN	130	4,0	8,3%
FEFA 19V	FIRA	2019	MXN	129	3,2	8,2%
FEFA 20V	FIRA	2020	MXN	132	3,0	6,3%
FEFA 23V	FIRA	2023	MXN	166	3,1	11,6%
FEFA23-2V	FIRA	2023	MXN	63	3,5	s/d

Source: Own elaboration based on CMFS.

The biggest player in the development bank's scheme in Mexico is the National Bank of Public Works and Services (BANOBRAS). Nevertheless that strictly BANOBRAS has not issued green bonds, since 2017, as part of the Banobras Sustainability Bond Framework, it has been issuing sustainable bonds. These operations raised over 3 billion dollars, with all the bonds denominated in MXN. Sustainable bonds finance a combination of social and green activities[32], between 2017 and 2024 BANOBRAS has issued 18 sustainable bonds. Filtering those related to green activities[33] we found 13 bonds[34] issued by BANOBRAS totalling 2.2 billion dollars.

In summary, DBs have an important role in Mexico's green bond market, representing almost 30% of the funds raised. Furthermore, they had a key role in the initial stages of the market when corporate green bonds were still small. Finally, the importance of DBs is stronger when considering the issuance of green bonds in local currency, which contributes to the deepening of this market.

Table x: Mexican main development banks.

[32] https://cmfs.org.mx/principios-de-bonos/

[33] The CMFS database allows to select the bonds that use resources to certain activities, we computed the Sustainable Bonds issued by BANOBRAS that included at least one of the following areas of use of resources: Wind energy, Solar energy, Hydroelectric energy, Renewable energies, Biogas recovery, Energy savings and efficiency, Sustainable transport, Waste management, Sustainable agriculture, Forest management, Biodiversity conservation, Air quality Pollution control, Adaptation to climate change, Sustainable infrastructure, Sustainable housing, Energy efficiency in buildings.

[34] The sustainable bonds not classified as green are four gender-oriented bonds issued in 2022 and 2023 which resources were aim to affordable basic infrastructure and mobility to support women. And a bond from 2024

	BANOBRAS	NAFIN	FIRA
Foundation Date	1933	1934	1954
Type of Bank	Public Development Bank	Public Development Bank	Development Banking Institution
Main Objective	Promote infrastructure development and public services across Mexico.	Support micro, small, and medium enterprises and national priority projects.	Promote and consolidate an inclusive, sustainable and productive agri-food and rural sector.
Total Assets (2022)	USD 843 billion	USD 593 billion	USD 181 billion
Geographical Range of Operations	Primarily national	National, with international presence	National

Source: Own elaboration based on official websites and DFI Database.

3.2.3 The complete scheme of sources of green financing of Development Banks in Mexico

To complete the analysis of the sources of green financing for public banks in Mexico we introduce a key actor of the global climate finance architecture: the bilateral and multilateral institutions. Considering the multilateral climate funds tracked[35] by Climate Finance Update Mexico received green financing of 686 million dollars between 2003 and 2017 (Watson & Schalatek, 2020). INECC (2018) identifies[36], for 2017-2018, climate finance from International Financial Institutions (IFIs) to 30 new projects with almost 1.3 billion dollars. As a benchmark, the green bond market in Mexico raised 5.3 billion dollars since its first issuance in 2015 until 2023. The year with the highest amount of issuances was 2020 totalling 1.6 billion dollars raised.

Drawing upon the cases of BANOBRAS, NAFIN and FIRA, we validate foreign loans from IFIs as a non-negligible source of funds for DB. In the case of BANOBRAS in 2023, the current portfolio of foreign loans from IFIs was 723 million dollars: 632 from the Inter-American Development Bank (IDB), 73 from the World Bank (WB) and 18 from other IFIs (BANOBRAS, 2023). To illustrate this kind of financing, between 2011 and 2017 BANOBRAS received 150 million dollars from the WB, to be paid in 20 years with 5 years of grace and 200 million dollars from the Clean Technology Fund (CTF) also to be paid in 20 years with 10 years of grace both as part of a project regarding the transformation of the urban transport toward a lower carbon growth path (World Bank, 2010).

[35] A list of the 27 multilateral climate funds tracked by Climate Funds Update is available in https://climatefundsupdate.org/the-funds/.
[36] The accounting includes resources granted in 2017 and 2018 by GEF, GCF, IDB, World Bank, ICF, KfW, IKI, GIZ and DEA.

NAFIN had a portfolio of 10 loans totalling 1.2 billion dollars contracted with multiple IFIs, such as the German Development Bank (KfW), the IDB, the European Investment Bank (EIB), the WB, and the Latin American Development Bank (CAF). Additionally, there were 7 donations from these institutions, totalling 88.4 million dollars. Also, there is technical cooperation from the IDB and the CTF to fund the Geothermic Financing, this cooperation includes a loan of 54.3 million dollars from the IDB for infrastructure, a non-reimbursable financing with contingent recovery of 51.5 million dollars and a donation of 2.8 million dollars both from the CTF (NAFIN, 2023). Also, NAFIN became, in 2021, Mexico's first development bank accredited as a Direct Access Entity to the Green Climate Fund (GCF). This makes NAFIN eligible to mobilize funds from the GCF through concessional loans, which are primarily directed towards high-impact climate projects.

These examples show that the funds obtained from IFIs generally offer more favorable conditions than those accessed through market mechanisms, as reflected in their significantly longer maturity periods and the fact that a portion of these funds is often non-reimbursable. However, these loans are exclusively granted and repaid in foreign currency, posing a potential risk to balance of payments stability, particularly since the projects financed do not necessarily generate export revenues, and the associated export mandate may conflict with the green objectives of these loans.

To summarize, while development banks play a crucial role in financing the green transition in Mexico, their current funding efforts still need to be improved to meet the scale of the challenge. There is a critical gap in the existing financial framework. Although funding through market mechanisms is gradually increasing, it remains in its nascent stages. Similarly, contributions from multilateral development banks, though valuable and with easier financing conditions, are limited to loans in foreign currency and also restricted in scope and volume.

As a policy recommendation, the allocation of public funds for green financing should be prioritized. This could take the form of state capitalization of development banks, direct cash injections through the central bank, or establishing dedicated green funds, similar to models implemented in the United States. Furthermore, it is essential to differentiate funding streams for social objectives from those for the green transition to ensure targeted and effective resource allocation.

Additionally, this analysis of Mexico underscores the need to address North-South inequalities in the global green transition. Developed countries should contribute to the green transition beyond their borders, focusing on the Global South. These contributions should include mechanisms to provide funding in local currencies, as highlighted in previous work (Schclareck & Xu, 2022), to avoid exacerbating balance of payments risks in recipient countries. This perspective is particularly relevant given the observed challenges in Mexico, where multilateral development banks have not adequately structured local currency funding for Mexican development banks, and where green bond market financing in local currency proves more costly than in U.S. dollars. These findings highlight the importance of coordinated national and international efforts, innovative financing strategies, and an equitable approach to ensure a just and effective green transition.

3.2. USA: The Coalition for Green Capital: the creation of a national green bank through recapitalization

The Coalition for Green Capital (CGC) is a U.S. nonprofit dedicated to accelerating investment in clean-energy technologies to address climate change. Founded in 2009 and incorporated as a District of Columbia 501(c)(3) on July 10, 2012, CGC's mission has been to mobilize public and private capital at scale for emissions-reducing projects—especially in underserved communities. CGC is governed by an independent Board of Directors and is not owned or controlled by its members, reinforcing its public-purpose mandate.

CGC initially pursued the creation of a single, federally backed "national green bank." It supported the Green Bank Act and broader congressional efforts—most notably the 2009 American Clean Energy and Security Act (ACES). When ACES failed to pass, CGC pivoted from a centralized model to a network-first strategy: seeding and advising state and local green banks; building a practitioner community; and advancing policy, market design, and technical assistance. Over the next decade, it helped stand up more than twenty local institutions and convened them in the American Green Bank Consortium (AGBC), which counted 42 members as of April 2024 and 53 by mid-2025, with operations spanning over 40 states.

Figure XX shows the consortium's investment curve steepening in recent years, reflecting both member growth and per-member lending expansion. In 2022, clean-energy investments reached $4.6 billion—about $1.5 billion from consortium partners and $3.1 billion from private co-investors.[37] Activity accelerated in 2023 to $10.6 billion (up more than 130%), split between $5.2 billion in green-bank capital and $5.4 billion in private capital. Cumulatively, AGBC-related investments since 2011 total $25.4 billion, underscoring the durability of the public–private model.

[37] CGC defines private capital mobilization as the sum of direct and indirect private investment in qualified projects; indirect includes private capital raised by AGBC members, including CGC (e.g., debt/green bonds/green ABS/green CLOs) that expands project-level private investment.

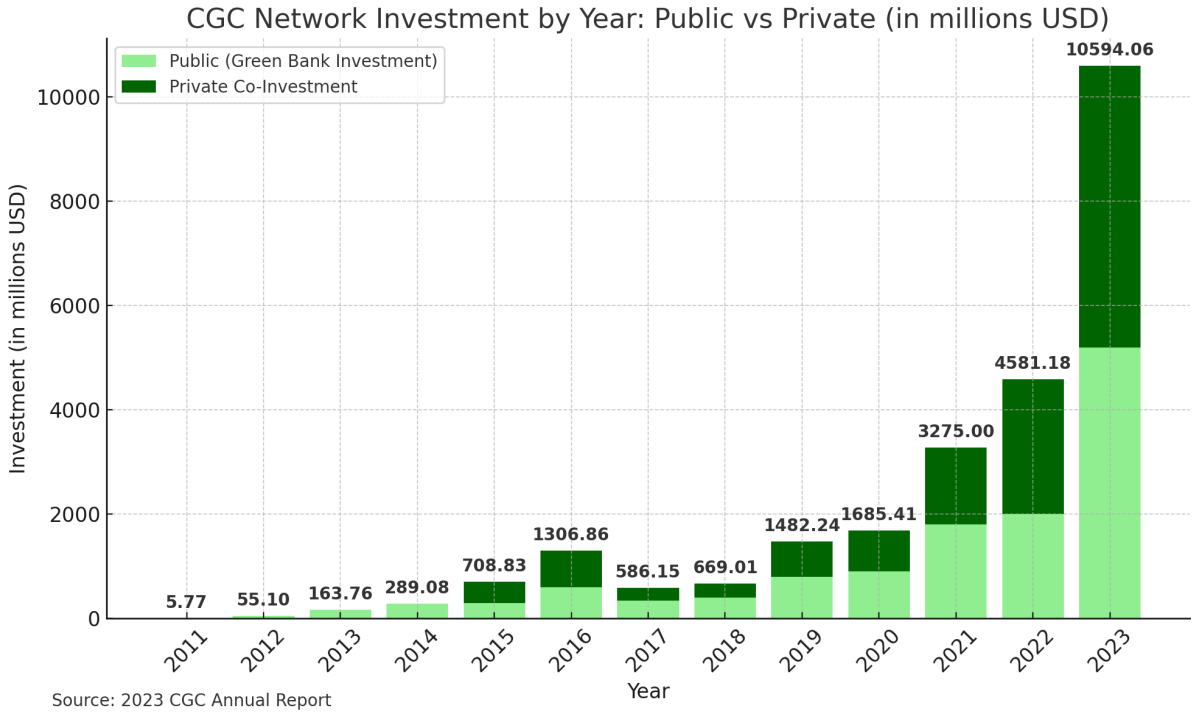


Figure XX: CGC Network Investment by Year

That network-first footing positioned CGC to act quickly once a federal pathway emerged. The Inflation Reduction Act (2022) created EPA's $27 billion Greenhouse Gas Reduction Fund (GGRF), including the $14 billion National Clean Investment Fund (NCIF). In April 2024, EPA selected three national nonprofits for NCIF awards, functionally akin to a recapitalization but without proprietary rights; CGC received $5 billion, with funds obligated in August 2024. Under its EPA-approved plan, CGC has to capitalize a national CGC Fund and front-load deployment in Year 1 to jump-start lending, investing both directly and through 18 named Coalition Members (formal subrecipients) while supporting a broader network of local financial institutions (33 plus two national nonprofits as of August 2025).[38] Beginning Year 3, CGC expects to recycle capital as standardized portfolios are taken out via green bond issuance on CGC's balance sheet and via green ABS/CLOs backed by pooled green loans.

CGC's EPA-approved plan channels recapitalization through two complementary lanes: (1) direct project finance, where CGC places catalytic tickets into qualified projects; and (2)

[38] As of August 15, 2025, CGC lists the following 35 network partners on its "Our Network" page: California Infrastructure Bank; City First Enterprise Inc.; Clean Energy Fund of Texas; Collective Clean Energy Fund; Connecticut Green Bank; District of Columbia Green Finance Authority; Efficiency Maine Trust; Elemental Impact*; Finance New Orleans; Freedmen Capital Foundation; Groundswell Capital; Hawaii Green Infrastructure Authority; Illinois Finance Authority; Indiana Energy Independence Fund; Iowa Energy Fund; Louisiana Clean Energy Fund; Michigan Saves; Minnesota Climate Innovation Finance Authority; Montgomery County Green Bank Corporation; Nevada Clean Energy Fund; New Jersey Green Bank; New Mexico Climate Investment Center; New York City Energy Efficiency Corporation (NYCEEC); North Carolina Clean Energy Fund; NY Green Bank; Ohio Air Quality Development Authority; Philadelphia Green Capital Corp.; Solar and Energy Loan Fund (SELF); Spruce Roots, Inc.; State Environmental Improvement and Energy Resources Authority; Sustain Energy Finance; The Center for Rural Affairs; The Community Development Venture Capital Alliance (CDVCA)*; Vermont Economic Development Authority; Washington State Green Bank. *National nonprofits.

member funding, where CGC supplies capital to Coalition Members and other local lenders so they can on-lend at scale in their markets. The twin-track design preserves speed via large, centralized deployments while converting national resources into distributed origination capacity across states and sectors. On the project side, the product menu is built for scale and recyclability—senior debt (term loans, revolvers, warehouse lending), junior/subordinated debt, credit enhancements (guarantees, loan-loss reserves), equity, and loan purchases—with structures expected to be standardizable and securitizable for capital-markets take-outs (green ABS and green CLOs). On the member-funding side, CGC provides subawards/loans to Coalition Members, makes targeted network investments in emerging green lenders, extends warehouse credit facilities to finance pipelines, and runs loan-purchase programs to buy seasoned assets.

After EPA legally committed the NCIF grant in August 2024, CGC issued a November request for proposals for financial assistance to (i) local green banks and community lenders (including AGBC members), (ii) institutional investors and intermediaries, and (iii) project developers, asset owners, and operating businesses—including startups and SMEs. By year-end, it received 82 proposals ($30.9B requested), advanced 24 ($5.3B), and moved four strategic partners—asset managers/investment firms—into final diligence with $2.6B in dedicated co-investment capacity. CGC will allocate funds to separately managed vehicles run by these partners; they add matching capital and execution and deploy across priority areas: distributed energy and storage, community solar, building efficiency, microgrids, and EV/charging. Governance gives CGC veto/consent rights and requires ≥50% deployment in under-invested markets.

In addition, CGC committed $100 million to Coventry Structured Investments (CSI), a Los Angeles–based asset management firm, to establish a revolving warehouse facility for portfolios of Commercial Property Assessed Clean Energy (C-PACE) loans. The facility provides revolving funding to purchase and hold eligible loans until the pool is large and seasoned enough for capital-markets term take-out;[39] proceeds from the resulting green asset-backed securities (ABS) repay the line, enabling multiple turns of recycled lending. C-PACE—enabled by state law and administered locally—lets commercial, industrial, nonprofit, and multifamily property owners finance eligible efficiency, renewable-energy, water, and resilience upgrades and repay via a voluntary property-tax assessment; terms typically run 20–30 years to match asset life. By partnering with CSI, CGC taps an existing C-PACE aggregation platform, accelerating its warehouse-to-term recycling pathway and expanding capacity to crowd in private capital.

[39] Term take-out is to replace short-term or interim financing (e.g., warehouse) with longer-tenor term financing once assets are seasoned and aggregated—typically via term ABS notes. Proceeds retire the interim facility, match funding to asset cash flows, lower funding cost, transfer risk to investors, and free the warehouse to finance the next origination wave (i.e., capital recycling).

On December 30, 2024, CGC executed its first EPA–NCIF subaward to Coalition Members; by January 2025 it had executed approximately $1.8 billion in subawards with all 18 Coalition Members identified in its EPA application. Structured primarily as grants (with some loans), these non-equity, non-control recapitalizations are governed by CGC's EPA-approved Investment Policy and formal Subaward Agreements that flow down federal requirements and set use-of-proceeds, risk-limit, reporting, and independent-review obligations. The aim is to recapitalize local lenders so they can provide financial assistance to qualified projects—through loans, credit enhancements, and loan purchases, and build portfolios designed for later aggregation and recycling via green ABS and CLOs.

Early 2025, CGC added a catalytic loan program—flexible loans of up to $10 million per emerging green lender—to stand up origination capacity in new markets (14 institutions; $135 million committed). The funds support institution-building (teams, systems, underwriting) and jump-start clean-power lending; while originations may later feed CGC's aggregation/securitization channels, the near-term goal is to build local pipelines to a self-sustaining scale (target ~$50 million AUM or equivalent operating income). Most of these 14 recipients sit outside the EPA–NCIF subaward cohort—which largely comprises more established coalition members (often >$50 million AUM)—underscoring CGC's differentiated funding by institution type and readiness.

In addition, CGC launched a Municipal Investment Fund (MIF) to help local governments and Tribes—ideally teamed with a not-for-profit partner such as a local or state green bank—build public-private pipelines of NCIF-qualified clean-energy projects with a strong focus on low-income and disadvantaged communities (LIDACs). The inaugural cohort targets communities with 10,000–750,000 people and at least one LIDAC. To support this effort, CGC awarded ICLEI USA a $66.5 million subgrant to provide market-building, predevelopment, and technical assistance so communities can originate scalable, replicable projects in distributed power & storage, net-zero buildings, and zero-emission transport. Selected communities becoming candidates for CGC direct investments (≥$50M) and network co-investment ($10–$50M). Through this initiative, CGC strengthens collaboration among green-finance actors, and fosters an enabling environment for financing green projects in LIDACs.

Strategically, in early 2025 CGC invested $200 million in GreenieRE, a public-purpose reinsurance platform that fills insurance-capacity gaps for clean-energy assets;[40] by backstopping primary insurers, GreenieRE reduces execution bottlenecks and standardizes risk coverage across portfolios—improving bankability now and supporting future securitizations.[41] With CGC's capitalization, GreenieRE can develop/scale innovative green

[40] At least 50 percent of CGC's investment will be dedicated to insure projects located in neglected markets, ensuring these communities have access to affordable clean energy while fostering private sector engagement.

[41] GreenieRE targets four fast-growing markets for renewable energy insurance where insurance premiums are high because traditional insurers see them as risky. By specializing in these markets,

insurance products for green banks, community lenders, and other FIs——such as kWh Analytics' Solar Revenue Put. A founding member of GreenieRE, kWh offers a long-tenor production-shortfall policy that pays the revenue gap when net generation falls below an insured baseline, with pricing informed by extensive performance data and diversification across geographies, vintages, and equipment.[42] Although CGC and GreenieRE have not publicly disclosed the precise instrument for this recapitalization, one plausible capital form is insurance surplus notes—a hybrid capital instrument (debt legally, equity-like under statutory accounting) that is unsecured, deeply subordinated, long-dated (15–30 years), and payable only with prior regulator approval—commonly used by insurers to boost statutory capital without altering control.

3.3. Canada — Municipal Finance Authority of British Columbia (MFABC)

The Municipal Finance Authority of British Columbia (MFABC) is a provincial statutory issuer without share capital, created to finance regional districts and their member municipalities by issuing securities and lending the proceeds. Governance is by a board of trustees drawn from regional districts. In law, MFABC's core object is to pool local-government borrowing and on-lend the proceeds to the requesting regional district; municipalities participate through their regional district (and, where applicable, regional hospital districts). Operationally, borrowing follows a standardized chain. A municipality passes a Municipal Security Issuing Resolution (MSIR); the regional district then adopts a Security Issuing Bylaw and submits it for Inspector of Municipalities approval. Only after the Inspector's certificate does the request proceed to MFABC for inclusion in a pooled debenture. This process embeds ex-ante provincial oversight and creates the legal basis for pooled security.

At settlement, MFABC remits 99% of loan proceeds to the regional district and withholds 1% into the statutory Debt Reserve Fund (DRF) as security; the 1% (plus interest) is returned when the related debt is fully repaid. Debt service flows from municipalities to the regional district and then to MFABC, which services its debentures.

MFABC funds itself through public debentures (with regular benchmark tenors) and a complementary commercial paper program. The debentures are senior unsecured obligations of MFABC; credit strength is anchored in the pooled security and statutory backstops described below. Investor materials and rating reports consistently note very high credit quality and strong market access.

GreenieRE lowers these barriers, reducing upfront costs for developers and adoption costs for consumers: a) Renewables: solar, wind, hydro, geothermal, b) Grid Infrastructure: battery storage, transmission, c) Electric Vehicles: EV leasing, manufacturing, charging infrastructure, and d) Building Energy Efficiency: HVAC, lighting, and appliances.

[42] kWh Analytics is a climate-insurance managing general agent (MGA) focused on risk transfer for renewable portfolios. Its flagship product, the Solar Revenue Put (SRP), insures production shortfalls and converts volatile generation risk into insured cash flows—supporting larger, lower-cost debt, longer tenors, and smoother paths to securitization.

For labeled issuance, MFABC adopted a Sustainable Bond Framework aligned with ICMA Green/Social/Sustainability Principles. Under this framework, pooled debentures are brought as Sustainability Bonds when proceeds are allocated to eligible environmental and/or social categories typical of local infrastructure (e.g., water/wastewater, transit, energy efficiency, adaptation). Offering circulars include the associated sustainability language and disclosures.

The labeled bond issuance is the transmission mechanism through which institutional risk-bearing capacity is translated into pricing and tenor outcomes. MFABC's ability to issue large, labeled debentures at tight spreads and extended maturities—thereby increasing the scale of green on-lending—rests on the credibility of its guarantee/backstop stack and oversight regime.

Although MFABC has no share capital, it is capitalized in the functional sense by a layered, callable payment-assurance architecture that operates as robust risk-bearing capacity for its bond program:

1. Debt Reserve Fund (DRF) — cash + callable notes.
   For each security issue, every participating regional district must contribute an amount equal to one-half of the average annual debt service related to its borrowing. By statute, this can be satisfied via 1% cash (withheld at settlement) plus a non-interest-bearing demand note for the balance; if unpaid at settlement, MFABC must deduct the needed amount from proceeds. Money in the DRF is invested conservatively and is an obligation of MFABC back to the contributing regional district once the associated debt is repaid or for application to final instalments. In short, the DRF combines immediate liquidity (1% cash) with callable contingent resources (demand notes) tied to each borrower's participation.

2. Mandatory first call on the DRF.
   If at any time MFABC lacks funds to meet payments or sinking-fund contributions on its securities, the payment must be made from the DRF. This hard-wires a first-loss liquidity backstop for bondholders.

3. Province-wide property-tax levy to restore the DRF.
   If DRF payments are unlikely to be recovered within a reasonable period, MFABC's trustees may levy a property tax on all taxable land and improvements in British Columbia to restore the DRF to the level it would have had absent the draw—and must levy if the DRF falls below 50% of its required level. This is a powerful, explicit statutory call on the provincial tax base, dedicated solely to restoring the DRF.

4. Joint-and-several security via the Security Issuing Bylaw.
   Provincial guidance makes clear that the regional district security issuing bylaw provides regional joint-and-several liability, increasing assurance against default and reducing debenture risk. The Inspector's approval of the bylaw is a prerequisite for MFABC issuance.
5. Sinking-fund mechanics and supervisory flex.
   MFABC maintains series-specific sinking funds and, with Inspector approval, may apply surpluses to reduce future requirements or credit them back after repayment—

adding another layer of liquidity management over the life of each issue.

Since MFABC's inception in 1970, there have been no loan defaults and the DRF has never been used to make debt service payments. Financial statements and rating reports reiterate this point and note that MFABC has never had to invoke its joint-and-several guarantee or tax-levy powers.

4. Conclusions and policy discussion

This paper examined how public development banks can expand green lending by redesigning their funding architecture. We built a balance-sheet framework (sequential T-accounts) to trace how capitalization, guarantees, and market instruments reallocate liquidity and risk; mapped the mechanics of labeled bond programs and green securitization; and analyzed institutional designs that translate risk-bearing capacity into lower borrowing costs, longer maturities, and larger issue sizes. Across cases, the mechanism is consistent: credible payment assurance and disciplined governance create investor confidence; standardized, repeat issuance converts that confidence into depth and tenor; coordinated public action sustains the cycle so each issue strengthens the next.

Our findings suggest the importance of putting funding architecture and cooperation at the center of climate finance. Roles should be explicit—who provides payment assurance, who originates and standardizes pipelines, who verifies and reports—and decisions sequenced accordingly. Consolidating issuance calendars, reopening benchmark lines rather than proliferating small taps, and adopting common eligibility, verification, and data-tape standards turn one-off deals into a program investors can underwrite repeatedly.

Our findings also suggest the importance of building market liquidity for green bonds and eventual green ABS through policy levers. Standardized taxonomies and reporting make instruments substitutable; clear prudential treatment avoids penalizing high-integrity green holdings; and admitting verified green bonds and seasoned green ABS as eligible collateral in repo and standing facilities deepens two-way markets. Debt-management choices—coordinated auctions, syndications for debuts, and commitments to reopenings that reach benchmark size—reinforce depth. Within their mandates, central banks can recognize these assets in refinancing operations and, where justified, conduct measured, transparent purchases to anchor liquidity.

Finally, our findings highlight the importance of well-governed guarantees paired with timely government recapitalization. Explicit, capped guarantees tied to clear eligibility and pricing—such as portfolio first-loss tranches, debt-reserve mechanisms with automatic replenishment triggers, and callable obligations from participating public entities—lower perceived loss and rollover risk, reducing spreads and extending maturities. Periodic recapitalization preserves long-run risk-bearing capacity and ratings, ensuring that scale can be maintained. Exposure limits, sunsets, public reporting of utilization and losses, and independent audits keep incentives aligned.

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