



# Financial Aggregation for Cities

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## ABOUT THE CITIES CLIMATE FINANCE LEADERSHIP ALLIANCE

The Cities Climate Finance Leadership Alliance is a coalition of leaders committed to deploying finance for city-level climate action at scale by 2030. Trillions of dollars will be required to help cities build the low-emissions, resilient infrastructure necessary to combat and react to climate change. The Cities Climate Finance Leadership Alliance is the only multi-level and multi-stakeholder coalition aimed at closing the investment gap for urban subnational climate projects and infrastructure worldwide.

## DESCRIPTORS

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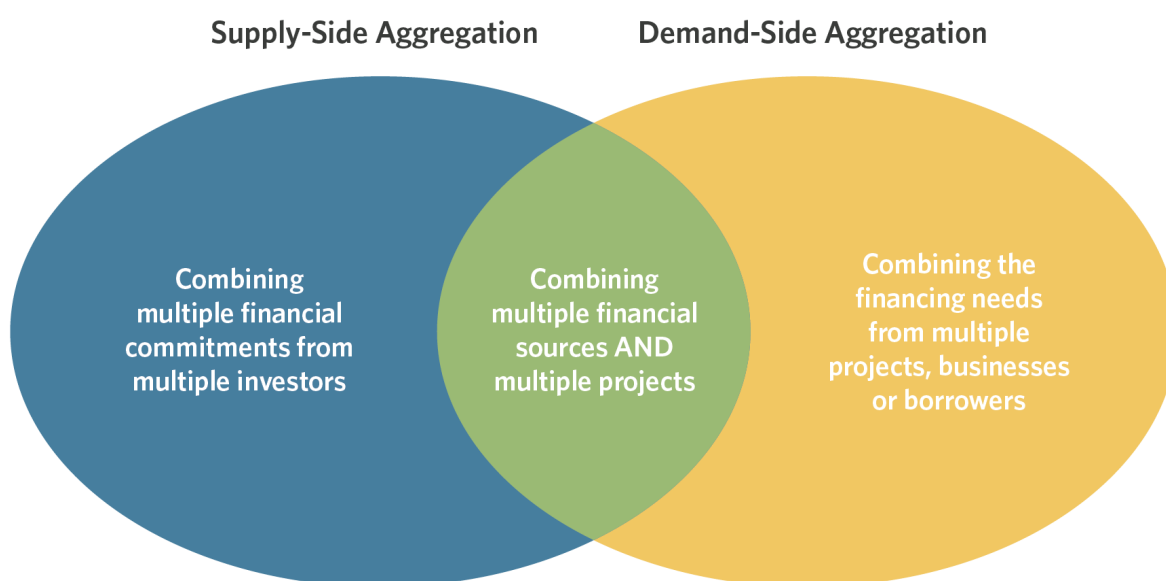
# EXECUTIVE SUMMARY

Investment in urban climate projects is urgently needed worldwide. Cities hold most of the global population and economic activity and contribute approximately three-quarters of the global greenhouse gas (GHG) emissions, underlining the urgent need for projects to reduce emissions in urban areas and increase climate resilience.

Cities face a variety of barriers in accessing climate finance, posing a clear need for innovative financial strategies. However, cities' ability to attract and facilitate investment in badly needed climate-smart urban infrastructure is constrained by a variety of barriers. Chief among these is municipal creditworthiness; weak or non-existent regulatory, fiscal, and governance systems; risks associated with both forex and interest rates; insufficient revenue collection from city services; technological risks and high upfront costs; and organizational or jurisdictional limitations on cities' ability to finance and fund major projects.<sup>1</sup>

This brief presents one potential strategy for cities to increase access to urban climate finance, which is financial aggregation. This brief defines **financial aggregation as financial instruments or enterprises that combine multiple investments, participants, projects, or sectors to scale up financing for urban climate mitigation or adaptation needs**. These strategies may target either one or both of the supply- and demand-sides of financial transactions. The supply-side aggregation strategies bring together multiple groups of finance providers and other actors, while demand-side aggregation strategies combine the purchasing or borrowing power of recipients of finance, including project developers, operating companies, and individual consumers.

ES Figure 1: Supply- and demand-side aggregation model



1 White and Wahba 2019; Carter and Boukerche 2020



## KEY FINDINGS

**Supply- and demand-side aggregation are potential strategies to alleviate many of the barriers that cities face in financing urban climate projects.** This includes overcoming external barriers related to project size, high upfront costs, and interest rate risk by combining projects into a single, larger financial vehicle, utilizing financial mechanisms that attract a broad range of investors, and mobilizing private and early-stage finance. It can also help address internal barriers, such as municipal creditworthiness and organizational barriers like capacity building through risk pooling, project preparation facilities, and other blended finance instruments.

**On the supply-side, successful aggregation projects often include risk-mitigation instruments to attract funding commitments from different investor classes.** While many cities' governments lack the expertise to structure these types of innovative financial instruments, development banks, national and regional governments, and philanthropies can play a key role in providing technical assistance facilities and other capacity building programs to assist cities in developing creative risk-mitigation financing solutions.

The Emerging Africa Infrastructure Fund invests multilateral development bank capital across a variety of climate development sectors through a single fund vehicle, which reduces transaction costs and offers investors a diversified investment portfolio. The Climate Investor One Initiative is a mix of public and private financing that consists of three funds (development fund, construction fund, re-financing fund), each designed to appeal to different investor risk-appetites, with a structured tranche system to attract a diverse range of capital.

**Demand-side aggregation can help fund climate infrastructure projects by offering larger ticket sizes and more predictable returns to private investors.** This approach can be used to combine multiple small capital needs into a single financeable entity capable of attracting institutional financing, or combine multiple parties' individual demand for products via pooled procurement, enabling the group to obtain affordable financing for a given set of funding needs more easily. Another form of demand-side aggregation is the creation of an entity that combines multiple firms or agencies that provide similar products or services, creating a larger venture that can leverage economies of scale in its procurement of financing to build and operate new projects.<sup>2</sup>

The Water and Sanitation Pooled Fund in India is a pooled bond that combines the borrowing power of multiple cities through risk pooling to reduce transaction and borrowing costs for small and medium-sized urban areas to finance water and sanitation infrastructure. The Philippines City Disaster Insurance Pool is an insurance scheme for cities that pools climate risks and the purchasing power of ten cities to gain access to cheaper and higher-quality disaster insurance.

**Cities have successfully combined both supply- and demand-side aggregation.** Green bonds are a particularly successful way to aggregate financing from multiple institutions on the supply-side and fund the execution of multiple climate projects on the demand-side. The Cape Town Green Bond aggregated financing from the public bonds market to address the city's existing water infrastructure portfolio. The Green Receivables Fund

<sup>2</sup> Shakya and Byrnes 2017

used a structured finance instrument with multiple investment tranches to attract capital from a diverse group of commercial investors to fund numerous small-scale community solar development projects in Brazil.

## RECOMMENDATIONS

Aggregation can attract larger pools of investors and increase the number of projects funded, thereby expanding the scale of cities finance. For this to happen, this brief recommends the following on both the supply- and demand-sides of financial aggregation.

**Strengthen technical capacity for financial structuring on the supply side.** Supply-side aggregation often deploys common elements of structured finance, such as investment tranches, guarantees, equity funds, municipal trusts, or green bond structures. These structures typically require technical expertise to be implemented by cities.

**Utilize public finance de-risking tools where possible.** Development Finance Institutions (DFIs) and other public institutions have a key role to play in providing technical assistance and reducing or mitigating risks to attract private investment. Blended finance, the strategic use of public/philanthropic funds to mobilize multiples of additional private capital, underpins many of the case studies in Section 2 and is a common theme in projects that successfully utilized supply-side aggregation.

**Develop and implement more impactful financial mechanisms on the demand side.** On the demand-side, municipalities have more financial mechanisms that allow for direct action, such as joint procurement and insurance pooling. Both tools are designed to reduce transaction expenses that drive high upfront costs.

**Fostering solutions that combine supply- and demand-side aggregation strategies have the highest potential for scale and can have the most impact.** Green bonds play a unique role in aggregation, as they can act as both demand- and supply-side aggregators. The growing trend of cities issuing climate and sustainability bonds is likely to continue, as the tool allows for the financing of multiple green projects and provides steady returns with low risk, which attracts a large pool of investors.

**Encourage the right enabling environment.** One of the first steps of successful aggregation lies in creating an environment that encourages and supports tools like supply- and demand-side financial aggregation to address climate change. Cities need both more autonomy and more support on climate from larger government entities. This includes access to financial aggregation tools like bond markets and the ability to improve revenue collection, establish public-private partnerships, and fast-track project approvals. Local government associations can be strengthened to better represent municipal interests and lobby for changes at the regulatory level. Private finance institutions can work with cities in the early stages of project design to ensure projects are bankable.

**The financial sector must be more open to tools like aggregation.** Aggregation has large potential benefits for cities and urban climate finance, particularly when combining public and private financial action.

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# 1. INTRODUCTION

Cities worldwide have urgent investment needs for climate mitigation, adaptation, and resilience. The average annual climate finance flows for cities reached only an estimated USD 384 billion in 2017 and 2018, which is far short of the urban climate finance needs counting for around USD 4.5 – 5.4 trillion per annum from 2015-2030<sup>3</sup>. These needs exist across a wide range of sectors and functions, including transport, energy, water, waste, and the built environment, underlining the critical importance of enhanced urban infrastructure and public services in maintaining and improving human quality of life in the face of stronger storms, extreme temperatures, and other immediate consequences of climate change. Cities cover 2% of global landmass, but account for approximately three-quarters of carbon dioxide emissions, which underlines the importance of reducing and eliminating urban GHG emissions as rapidly as possible.<sup>4</sup> At the same time, 90% of urban areas are on coastlines and up to USD 4 trillion in urban assets are at risk from climate change, providing an immediate imperative to invest in infrastructure and services that strengthen cities' adaptation and resilience capacity.<sup>5</sup>

However, cities' ability to attract and facilitate investment in badly needed climate-smart urban infrastructure is constrained by a variety of barriers. Chief among these is municipal creditworthiness; weak or non-existent regulatory, fiscal, and governance systems; risks associated with both forex and interest rates; insufficient revenue collection from city services; technological risks and high upfront costs; and organizational or jurisdictional limitations on cities' ability to finance and fund major projects.<sup>6</sup>

Financial aggregation is a potential strategy to alleviate many of these barriers. Used here, the term **“financial aggregation”** refers to **financial instruments, structures, and strategies implemented to combine many smaller projects, enterprises, customers, service providers, or finance providers into a larger unit**. Table 1 provides details on the barriers and how they can be addressed through financial aggregation strategies.

**Table 1:** Urban climate investment barriers

Barrier	Details	How financial aggregation helps
High upfront costs from climate-smart projects	Cities are responsible for providing many social services and maintaining existing infrastructure. This reduces resources available to cover the upfront costs of new capital projects, especially for climate solutions like solar energy and battery-electric buses with lower operating expenses but higher upfront costs than existing assets.	Aggregated financing arranged for multiple projects or sourced from multiple providers can achieve economies of scale, reducing transaction and procurement expenses that drive high upfront costs.

<sup>3</sup> Negreiros et al. 2021

<sup>4</sup> Smallridge et al. 2021

<sup>5</sup> Smallridge et al. 2021

<sup>6</sup> White and Wahba 2019; Carter and Boukerche 2020

Municipal creditworthiness	City governments often rely on fiscal outlays from state and national authorities, and struggle to collect adequate revenues from municipal services and fees. <sup>7</sup>	Risk pooling, blended finance instruments, and other financial aggregation strategies can enable cities to access debt financing and insurance products at reasonable costs as they work to strengthen creditworthiness.
Organizational barriers	Lack of finance and project management capacity, along with risk-averse leadership, limit cities' ability and willingness to pursue complex climate-related investment strategies. <sup>8</sup>	PPPs and other collaborative financial aggregation strategies can pair cities with private investors and/or operators, providing the expertise required to develop successful climate projects.
Foreign exchange rate and interest rate risk	When projects are financed using foreign hard currency <sup>9</sup> or variable-rate debt, fluctuations in Forex (FX) <sup>10</sup> and interest rates create risks for investors, as local-currency project cash flows may be insufficient to meet equity return targets or debt service requirements, especially in nations with high inflation or volatility and limited access to local institutional capital. <sup>11</sup>	Structured finance instruments can blend multiple currencies or combine traditional asset class tranches <sup>12</sup> with hedges against adverse FX or interest rate events.
Smaller projects with low ticket sizes	Cities may have a variety of smaller climate projects, which are too large for the city to finance directly, but too small to attract investment due to per-project transaction costs and minimum ticket requirements.	Combining multiple smaller projects, particularly when grouped by region or type, into a single financial vehicle can limit the transaction costs and help cities meet minimum ticket requirements.

Financial aggregation can assist in overcoming certain barriers and unlock significant benefits for urban climate investment, helping to deliver on investment requirements and meet cities' financing needs by:

- **Reducing transaction costs:** The financial engineering, legal, and compliance costs of structuring and executing transactions are generally fixed or quasi-fixed, meaning that the larger a deal is, the smaller the impact of these costs on the overall return profile of the investment. Financial aggregation combines multiple projects, companies, or funds into one to share these costs across a larger portfolio and achieve cost efficiency.<sup>13</sup>
- **Meeting minimum institutional ticket sizes:** Many institutional investors maintain minimum ticket sizes for investments, to both reduce transaction costs and ensure that they can deploy capital at a scale befitting their assets under management. Financial aggregation strategies can help multiple smaller projects or companies

<sup>7</sup> White and Wahba 2019

<sup>8</sup> Micale et al. 2018

<sup>9</sup> Hard currency is currency expected to remain relatively stable and retain value over time, such as USD or EUR.

<sup>10</sup> Forex refers to the global marketplace for trading international currencies and currency derivatives.

<sup>11</sup> Monaco 2017

<sup>12</sup> Tranches are segments of a pool of securities that have been divided up by risk, time to maturity, or other characteristics, with the intention that each tranche will appeal to a different set of investors.

<sup>13</sup> Samuelson 2021



combine their individual financing needs into one larger ticket that meets the minimum requirements of these institutional investors.<sup>14</sup>

- **Attracting a broader range of investors:** Aggregating projects through strategies like bonds, listed equity, and other vehicles with an acceptable risk and return profile creates attractive investment opportunities for a much broader range of investor classes with diverse risk tolerance and return requirements, unlocking access to new sources of capital for urban climate investment.<sup>15,16</sup> Increasing a project's bankability, the ability of the project to deliver competitive returns (detailed in Box 2), is a critical part of appealing to investors in the private sector.
- **Affordable early-stage project finance:** The landscape of early-stage project finance is dominated by direct investment of equity sponsors and short-term bridge lending from banks or non-bank financial institutions. These sources of finance are both limited in the overall quantity of financing available, and costly, especially for projects that must borrow in hard currency but receive revenues in local currency and are therefore exposed to both FX and interest rate risk.
- **Mobilizing private finance:** Blended finance instruments, detailed in Box 1, that aggregate commercial and concessional investment in a single fund help de-risk private investment by using concessional funds to provide subsidized below-market debt, first-loss equity, or guarantees, attracting commercial investors who otherwise would not have invested.<sup>17</sup>

There are other barriers that cities face while accessing finance that cannot be solved by financial aggregation, such as difficulty monetizing public services and benefits, and jurisdictional barriers on municipal revenue authority. Such problems are most effectively addressed by enabling environment interventions rather than financial aggregation instruments. For example, cities often provide services like parking, water, and waste disposal for free or below actual cost. In some contexts, such as in low-income communities in cities and throughout low-income countries, this subsidization is vitally important. Applied more broadly, it does, however, have the negative externality of compromising funding streams for public services and especially for sustainable infrastructure, and making it difficult to monetize public services. Outdated payment and enforcement systems often exacerbate this problem.<sup>18,19</sup>

Cities are often subject to jurisdiction barriers on their authority as well; municipal debt ceilings, restrictions on local governments' taxation authority, and legal limitations on municipal infrastructure ownership that limit cities' ability to autonomously finance climate and development projects.<sup>20</sup> These issues are most effectively addressed through policy interventions to address the source of the barrier, rather than financial instruments like financial aggregation that would only address the symptoms.

14 Shakya and Byrnes 2017

15 Samuelson 2021

16 Garside et al 2019

17 Carter and Boukerche 2020

18 Lonsdale et al. 2020

19 Richmond et al. 2021

20 White and Wahba 2019

**Box 1: Blended Finance**

Blended finance is the strategic use of public/philanthropic funds to mobilize multiples of additional private capital. As used in financial aggregation, blended finance is a supply-side financial aggregation tool that uses concessional capital to de-risk projects and attract market-rate investors both directly within the financing structure of an investment and indirectly by using concessional capital to catalyze investment. Blended finance has a long history of helping finance many public service projects, including decades of blended finance structures used in both developed and developing countries.<sup>21,22</sup>

A successful example of blended finance in use is Climate Investor One (see case study 2.1.3, which is a blended finance facility that leverages first-loss finance from public finance, particularly Development Finance Institutions (DFIs) in order to attract significantly more commercial investment for small to midsize projects in climate infrastructure. One of the difficulties of successfully implementing blended finance is that it requires effective coordination and incentive alignment between public actors, such as cities and national governments, private investors, and philanthropic or concessional capital providers. Blended finance can be difficult to structure and execute, making technical assistance an important part of the investment structure itself.<sup>23</sup>

**Box 2: Bankability**

For commercial investors, bankability means that a project or fund is expected to deliver competitive risk-adjusted returns. In accessing funds earmarked for climate finance, the bankability of a project is a key factor in whether financing is achieved.<sup>24</sup> There are several ways to improve a project's assessed bankability:

- Minimize technical risk, including using proven or commercialized technologies.
- Sign long-term creditworthy offtake contracts to establish stable cashflows for assets and projects once built.
- Diversify risk by bunding with projects that face different risks.
- Obtain insurance, first loss funds, guarantees, hedges, or other concessional or risk mitigation instruments to enhance risk-adjusted returns.

Financial aggregation can help with these key issues of bankability by pooling risk across a variety of investors. Aggregation would also reduce transaction costs, again improving the return profile of the investment. Demand-side aggregation, with assistance from Project Preparation Facilities (PPFs), can help match investors to high-quality, shovel-ready projects, addressing any concerns from commercial investors about a lack of vetted, reliable, and ready projects. While PPFs were not created to aggregate city-level projects, they can assist cities in identifying and aggregating projects ready for financing where financing facilities and appropriate instruments exist. Due to the growing interest in financing shovel-ready projects, assisting in project aggregation is a potential area of growth for PPFs.

<sup>21</sup> IFC 2018

<sup>22</sup> Convergence 2022

<sup>23</sup> Negreiros et al. 2021

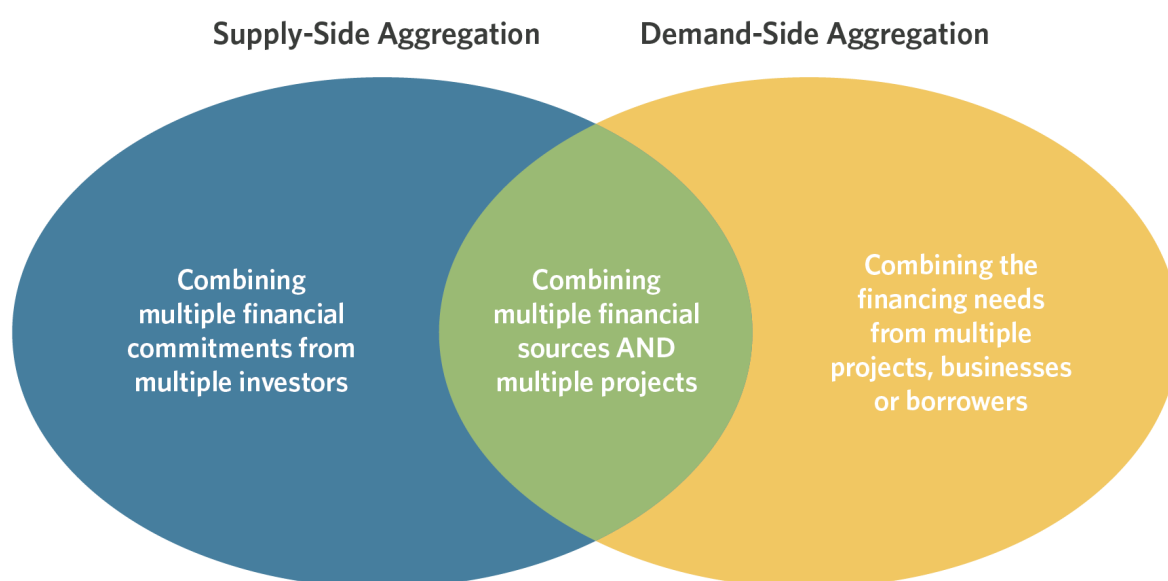
<sup>24</sup> Ellis and Pillay 2017

## TYPES OF FINANCIAL AGGREGATION

Mortgage-backed securities, consumer cooperatives (co-ops), and local government procurement alliances are all examples of mainstream financial aggregation approaches. In mortgage-backed securities, multiple home loans are bundled into a single investment that is then sold by the bank. Consumer co-ops are businesses or organizations that are financially owned by the people who run them, an example of supply-side aggregation. Local government procurement alliances are purchasing cooperatives that aggregate public agency demand to leverage purchasing power, receiving lower prices by buying in larger quantities. In the context of urban climate finance, financial aggregation strategies have the potential to streamline, standardize, and scale up the process of funding critical projects and programs.

These strategies can be mapped onto two types of financial aggregation based on where an aggregation strategy is used in a given financial structure or transaction, and what type of entity is responsible for deploying it. The two main types of financial aggregation identified here are supply-side aggregation and demand-side aggregation. A single instrument can combine both supply and demand aggregation, as shown in Figure 1.

Figure 1: Supply- and demand-side aggregation model



Both supply- and demand-side aggregation are powerful tools, helping to scale up urban climate finance by applying uniform investment templates to unlock economies of scale, engaging a wider range of potential investors, aligning timelines and financial incentives for actors involved with project development and operation, and diversifying investors' exposure within and across sectors and asset classes to mitigate risk.

For both supply- and demand-side aggregation strategies to accelerate growth in urban climate finance and meet cities' climate mitigation and adaptation needs, a strong foundation of cooperation and leadership from local, state, and national governments is required. Public institutions must support not only forward-thinking policies to enable

urban climate finance, but also the proactive development and leadership of innovative partnerships, and enable the creation and maintenance of key analytical tools and metrics to track progress in promoting climate-smart investment.

Table 2 provides an overview of seven instrument case studies that illustrate how supply- and demand-side aggregation has been used in urban climate finance.

**Table 2:** Financial aggregation instrument case studies

Instrument	General Information	Aggregation Description	Supply-side Aggregation	Demand-side Aggregation
<b>Resilient Community Impact Fund</b>	A supply-side aggregation fund for members of the Resilient Cities Network to invest in small to medium scale resilience projects with community impacts within member cities.	Aggregates funding from local and global financial institutions, with the goal of leveraging additional funds for larger projects.	✓	
<b>Emerging Africa Infrastructure Fund</b>	Invests multilateral development bank (MDB) capital in projects across eight crucial climate and urban development sectors.	Creates a single fund vehicle, reducing transaction costs and offering investors exposure to a diverse array of infrastructure projects	✓	
<b>Sub-National Climate Finance Initiative</b>	Blended finance fund using USD 150M in Green Climate Fund first-loss to mobilize 600M in commercial investment for urban climate infrastructure	Blends concessional and commercial finance from international investors to enable rapid execution of investment in small to midsize projects	✓	
<b>Climate Investor One Initiative</b>	Mix of public and private sector financing that consists of a development fund, a construction fund, and a re-financing fund.	Uses a structured financial system with different risk tranches and funds to attract to a diverse range of public and private capital.	✓	
<b>Water and Sanitation Pooled Fund</b>	Pooled bond enabling small and medium-sized urban areas to access financing for water and sanitation infrastructure	Combines borrowing power of multiple cities and risk pooling to reduce transaction and borrowing costs		✓

Instrument	General Information	Aggregation Description	Supply-side Aggregation	Demand-side Aggregation
<b>Philippines City Disaster Insurance Pool</b>	Parametric disaster insurance scheme for cities, managed as partnership between Asian Development Bank and state-owned insurance agency	Pools climate risks and purchasing power of ten cities to access cheaper disaster insurance with quicker payout timeline after extreme weather events or other disasters		✓
<b>Cape Town Green Bond</b>	USD 83B green bond certified by Climate Bonds Initiative. The proceeds were used to refinance municipal water infrastructure.	Aggregates financing from public bonds markets and aggregates projects in need of financing from city's existing water infrastructure portfolio	✓	✓
<b>Green Receivables Fund</b>	Structured finance instrument securitizing cashflows from community solar arrays to attract risk-averse institutional capital. It is a USD 36 million to fund community solar development in Brazil.	Bundles many small projects to pool risk and offers multiple investment tranches to attract a wide range of investors with various risk appetites	✓	✓
<b>The Argentinian Network of Municipalities Facing Climate Change (RAMCC)</b>	Organization of Argentine municipalities that work together to increase both financing and purchasing power to fund discrete climate projects for member cities.	Pools purchasing power for multiple cities for climate-resilient equipment, and a voluntary trust of 21 municipalities that leverage city funds to attract third-party financing, aggregate funding on the supply-side.	✓	✓

Sections 2 and 3 present the supply- and demand-side aggregation models, including financial tools that assist in aggregation, and case studies. Section 4 outlines single instruments that combine both supply- and demand-side aggregation and includes case studies to illustrate these models. Section 5 discusses the role of the enabling environment in supporting cities to create aggregation instruments, and Section 6 concludes with an examination of actions available to public and private actors and our subsequent recommendations, with financial aggregation and their enabling environments in mind.



## 2. SUPPLY-SIDE AGGREGATION

The first major type of financial aggregation relevant to urban climate finance is supply-side aggregation. This type of aggregation involves combining smaller financial commitments from multiple investor and/or lender entities to obtain sufficient financing for a given funding need.<sup>25</sup> Supply-side aggregation is a common part of many mainstream financial transactions, as when entrepreneurs raise venture capital funding from several firms (e.g. a single series A equity investment split between three funds), or when multiple banks underwrite a credit facility for a mature, profitable firm.

In and of itself, this type of aggregation is neither novel nor inherently transformative. However, more sophisticated, tailored investor aggregation approaches often hold the key to meeting cities' climate finance needs. Such approaches often utilize common elements of structured finance, such as tranches, guarantees, and other risk mitigation instruments including concessional capital from public or philanthropic sources, resulting in a blended finance solution that increases the potential pool of investors.

**Table 3:** A variety of financial instruments can be used in supply-side aggregation of climate projects

Financial mechanism	Details	Implementation in subnational climate finance aggregation
<b>Tranched financial instruments</b>	Involves breaking a set of securities into segments by risk, time maturity, or other characteristics so that each tranche is designed to appeal to a different set of investors. It is used in supply-side aggregation to expand the types of investors willing to put funds into the projects.	The Climate Investor One fund (outlined in the case studies below) uses f three tranches to allocate risk and make the fund more appealing to commercial investors. The Fannie Mae Green Mortgage-backed Securities are a more traditional example of tranching in green investments. <sup>26</sup>
<b>Guarantees/Insurance</b>	Act as an insurance policy in guaranteeing a bond or loan will be repaid if the borrower defaults.	The Climate Investor One fund, outlined in the case studies below, reduced the risk to the investor in its senior debt tranche by incorporating a guarantee, thereby increasing the field of potential investors and increasing the potential for commercial investment.
<b>Blended Equity Funds</b>	Concessional equity is a common form of blended finance that can include first-loss equity and equity that bears risk at below-market financial returns.	In the Sub-national Climate Fund Initiative, which is structured as an equity fund, the public financial institution absorbs the brunt of potential losses, increasing the appeal of the investment to commercial investors.

<sup>25</sup> Barnard 2015

<sup>26</sup> Fannie Mae 2022

Financial mechanism	Details	Implementation in subnational climate finance aggregation
<b>Municipal Trusts</b>	Third-party organizations can manage and invest funds for a set purpose, such as climate-resilient projects or investments.	With buy-in from multiple public trustors, trusts can both provide ‘first loss’ capital to attract commercial investors via blended finance. The RAMCC trust, in Section 4, provides an example of this aggregation.
<b>Green Bonds</b>	An asset-linked instrument that raises a set amount of money from investors that is earmarked for climate and environmental projects and can be used in both demand- and supply-side aggregation.	By issuing a green bond, a city can raise funding from multiple investors via one instrument with stable returns and low risk. The Cape Town Green Bond, also in Section 4, provides an outline of this instrument in practice.

Successful development and implementation of supply-side aggregation combined with risk-mitigation instruments, however, generally depends upon extensive technical, legal, and financial expertise to structure a novel financial instrument or investment vehicle, attract funding commitments from different investor classes, and deploy capital to develop and operate high-quality projects.<sup>27</sup> Many cities’ governments and public utilities lack this expertise, underlining the critical roles of development banks, national and regional governments, and philanthropies in creating technical assistance facilities and other capacity building programs to support knowledge transfer and empower cities and others such as fund managers to develop creative climate financing solutions.<sup>28</sup>

## 2.1 CASE STUDIES ON SUPPLY-SIDE AGGREGATION

### 2.1.1 RESILIENT COMMUNITY IMPACT FUND

An example of a supply-side aggregation mechanism is the recently launched Resilient Community Impact Fund, a supply-side aggregation fund for members of the Resilient Cities Network to invest in pilot projects. The financing will be directed towards small to medium scale resilience projects with community impacts within member cities. The fund aggregates funding from local and global financial institutions, with the goal of leveraging additional funds for larger projects. Currently, the Resilient Cities Network is raising funds for the impact fund, targeting a minimum size of USD 10 million.

### 2.1.2 EMERGING AFRICA INFRASTRUCTURE FUND

While it is a fairly conventional infrastructure fund backed by the combined finance of major bilateral development banks, the Emerging Africa Infrastructure Fund nonetheless demonstrates the benefits of financial aggregation for cities climate finance, and specifically for urban critical infrastructure projects. The fund is a mix of government,

<sup>27</sup> White and Wahba 2019

<sup>28</sup> Smallridge et al. 2021

development finance institutions (DFIs), and private investment. As of 2021, the fund had over USD 1 billion in capital in a mix of equity and debt finance.<sup>29</sup>

The fund invests in projects across Africa and the Middle East in eight crucial sectors: affordable housing, energy, telecom, water and waste, infrastructure components, gas transport and storage, transportation, agribusiness, and mining.<sup>30</sup> This broad investment scope enables the fund to commit capital to a diverse array of projects, mitigating sectoral risks that would arise in a fund solely committed to one sector or project type.<sup>31</sup> The fund's flexibility to invest in many types of projects also helps it prioritize projects in many areas of need, with the option to bundle these projects into a single financial vehicle to drive the construction of important urban infrastructure while offering its investors – a mix of public and private funders - exposure to a variety of industries and infrastructure types, including many assets serving the needs of large urban areas.

### 2.1.3 SUB-NATIONAL CLIMATE FINANCE INITIATIVE

The Sub-National Climate Finance Initiative (SCF), which is under development, was designed as a tranching finance fund to overcome project-level barriers to attract private investment in subnational climate adaptation and mitigation projects. Using supply-side aggregation and structured as an equity fund, the initiative will use USD 150 million in approved funding from the Green Climate Fund as a first-loss tranche to mobilize an estimated USD 600 million in commercial investment from a consortium of private-sector partners, focusing on urban infrastructure projects.<sup>32</sup>

Aggregating concessional and commercial funding at this scale into a blended finance instrument will enable SCF to quickly evaluate and execute investment opportunities in individual small to midsize projects that contribute meaningfully to the UN Sustainable Development Goals, rather than needing to arrange separate financing for these projects on a case-by-case basis.<sup>33</sup> In addition, the fund includes a USD 28 million grant-funded technical assistance facility managed by the International Union for Conservation of Nature (IUCN), through which the IUCN will provide technical assistance to identify suitable projects for investment. This technical assistance will enable more efficient aggregation and deployment of investor capital within the instrument's commercial fund structure.

29 Emerging Africa Infrastructure Fund 2021

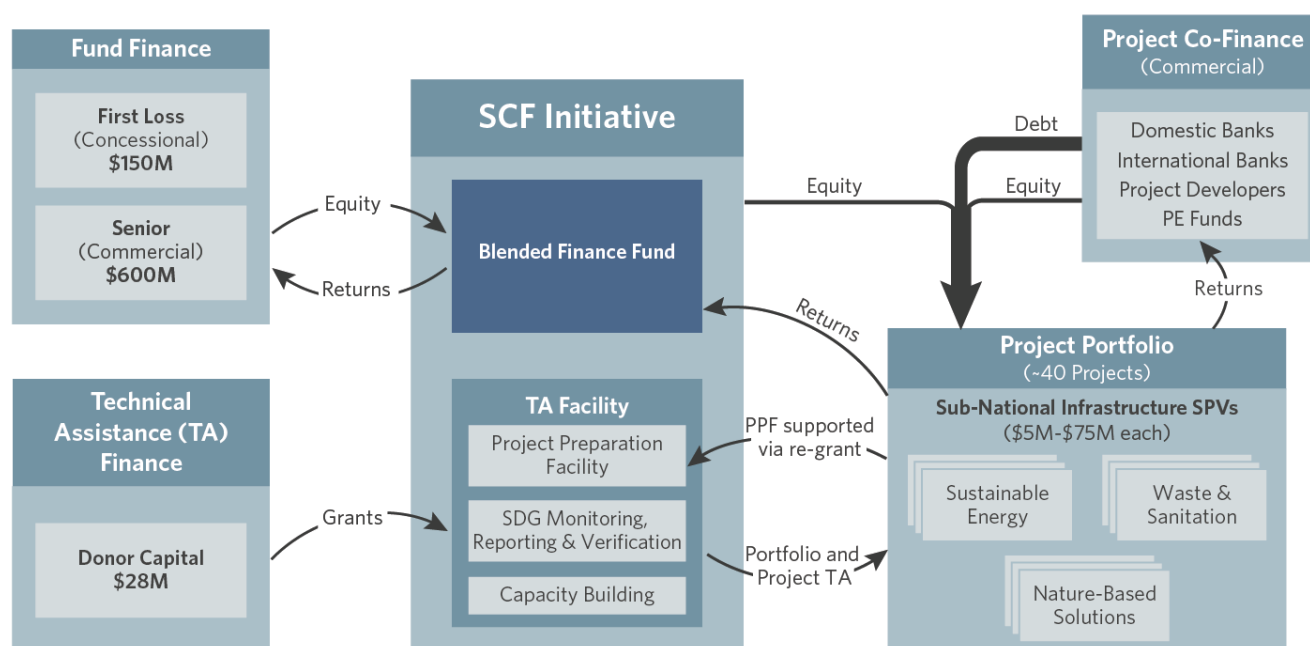
30 Ibid.

31 Emerging Africa Infrastructure Fund 2017

32 Pegasus Capital Advisors 2021

33 Van Caenegem et al. 2020

Figure 2: SCF initiative design



Source: Global Innovation Lab for Climate Finance<sup>34</sup>

## 2.1.4 CLIMATE INVESTOR ONE

Climate Investor One was developed to finance wind, solar, and hydro projects in low and lower middle-income countries. The fund employs a mix of public and private-sector financing as well as commitments from DFIs and incorporating an export credit agency guarantee. The overall fund consists of three stages:

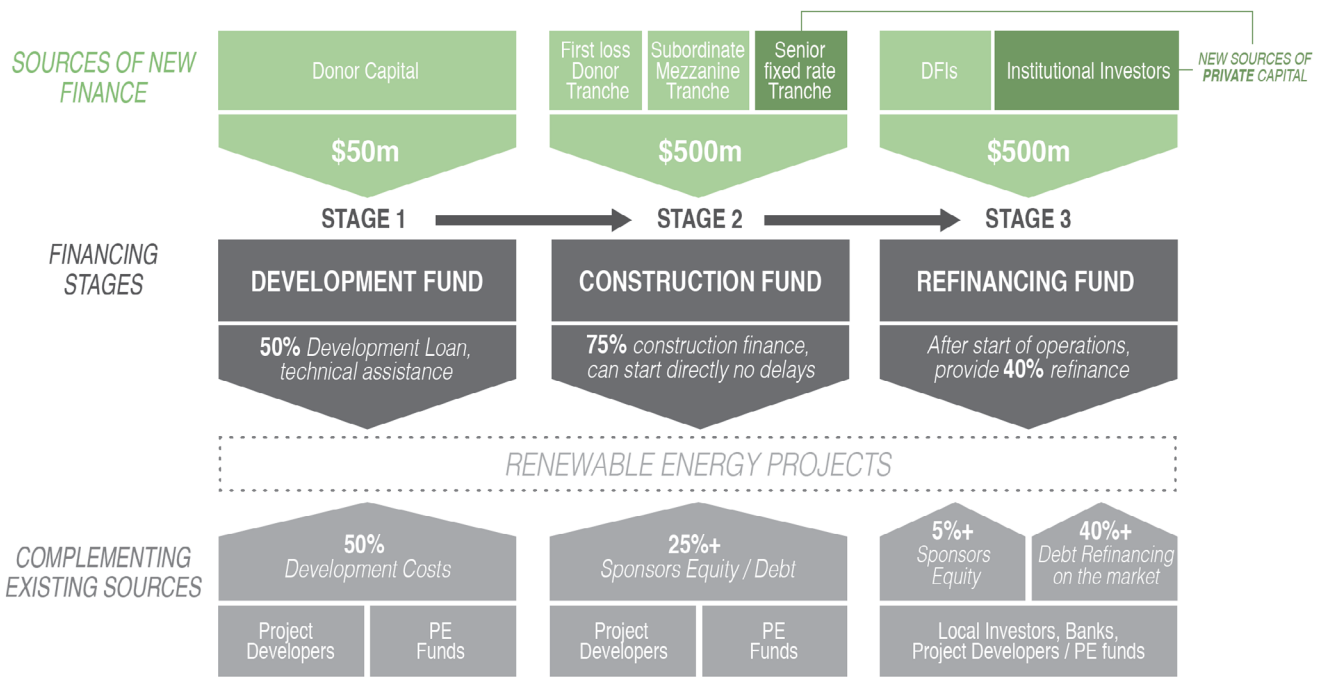
- A development fund, funded by donor contributions that finance up to 50% of development costs for projects by private sector developers, with the aim of improving a project's bankability from an early stage.
- A construction fund, which provides up to 75% of investment costs on commercial terms. This fund has three different tranches to appeal to different risk and return positions, and the Senior Fixed Rate tranche incorporates a guarantee to reduce risk further.
- A re-financing fund, which has right of first refusal on up to 50% of the long-term refinanced debt of products after they've proven commercial viability. This consists of investors seeking long-term, de-risked infrastructure debt to attract new investors to clean energy projects in developing countries.<sup>35</sup>

Climate Investor One announced first close at USD 412 million in June 2017, and Climate Fund Managers is building off its success with Climate Investor Two, which will deliver water, sanitation, and oceans infrastructure projects in emerging markets with a similar facility design.

<sup>34</sup> Global Innovation Lab for Climate Finance 2020

<sup>35</sup> Global Innovation Lab for Climate Finance 2015

Figure 3: Climate Investor One facility design



Source: Global Innovation Lab for Climate Finance<sup>36</sup>

36 Global Innovation Lab for Climate Finance 2015



### 3. DEMAND-SIDE AGGREGATION

Demand-side aggregation involves combining demand for financing or services from multiple projects, businesses, or other borrower entities to obtain sufficient financing for a given set of funding needs. In 2021, 530 global cities publicly disclosed 1500+ projects worth USD 88 billion seeking USD 58 billion in investment, according to recent CDP Project Data.<sup>37</sup> Taken individually, many of these projects are likely too small to justify the transaction costs of private sector investment, but if effectively aggregated within regions and/or defined sectors this would enable entities seeking financing for projects and businesses to improve efficiency, achieve greater scale, and pool risks, all of which are important to enhance creditworthiness and bankability for large financial institutions. Demand-side aggregation can therefore help urban stakeholders fund and build urgently needed climate infrastructure projects by offering larger ticket sizes and more predictable returns to private investors.

**Table 4:** Like supply-side, demand-side aggregation can utilize different types of financial mechanisms

Financial mechanism	Details	Implementation in subnational climate finance aggregation
Green Bonds	An asset-linked instrument that raises a set amount of money from investors that is earmarked for climate and environmental projects and can be used in both demand- and supply-side aggregation.	By issuing a green bond, a city can raise funding via one instrument for multiple climate projects, some of which may be too small to raise funding individually. The Cape Town Green Bond case study in Section 4 is an example of this instrument.
Special purpose vehicles (SPVs)	A subsidiary created by a parent entity to isolate financial risk, as it operates under a separate legal status and its financial obligations are secure, regardless of the financial state of the parent entity.	A city can create an SPV based on future revenues to raise secure and attractive funds for climate projects. The local municipal water utilities in Veneto, Italy, created an SPV in 2014. <sup>38</sup>
Joint Procurement	Combining the purchasing power of two or more parties, under a single agreement on behalf of all involved parties.	Cities with similar equipment needs can join together and pool purchasing power to ensure better products at a lower cost by buying in bulk. This is a technique used by the RAMCC, outlined in section 4.
Insurance Pools	A practice where smaller parties join together to secure better insurance rates and coverage by buying as a block.	As demonstrated by the Philippines City Disaster Insurance Pool, by combining insured parties, the parties have increased buying power and are able to purchase better products at a lower price.

<sup>37</sup> CDP 2022

<sup>38</sup> Climate Policy Initiative 2016

Demand-side aggregation approaches can be used by both for-profit enterprises and subnational governments (cities, counties, and states) to combine multiple small capital needs into a single financeable entity or initiative capable of attracting institutional financing. For example, a city government that identifies climate adaptation and resilience needs across multiple agencies or service providers under its jurisdiction could issue a green bond, with proceeds to fund construction and operation of a diverse group of climate-related projects. This tactic has become more popular on a city level, with the cities of Malmo, Manchester, and Toronto all issuing municipal green recovery bonds in 2021 and 2022.<sup>39</sup>

Cities could also incorporate special purpose vehicles (SPVs) to spearhead fundraising, contracting, construction, and operation of their projects. SPVs are subsidiaries created by a parent company to isolate financial risk, which would allow municipalities to invest in multiple projects without facing risk from potential bankruptcies or low returns. However, this approach to project aggregation is more commonly used by private project developers, as many city governments lack the legal and/or financial expertise to set up the complex ownership structures and system of contractual obligations necessary to establish one or more project-level SPVs, and such an approach may even be prohibited by national or local regulations restricting the financial autonomy of city governments. Similar to supply-side aggregation, incorporating risk-reduction instruments into aggregated vehicles makes them more costly and complicated.

Demand-side aggregation can also entail combining multiple parties' individual demand for products or services to form a larger, aggregated demand, enabling the group to obtain affordable financing for a given set of funding needs more easily. One example of this is the RAMCC-led purchase of solar panels for multiple cities that are members of the organization; by supporting multiple projects that have the same needs, cities were able to receive a higher-quality product at lower cost. Another example of this approach is in risk pooling for extreme weather insurance, as detailed in the Philippines Climate Disaster Insurance Pool case study. This type of risk pooling instrument harnesses the combined purchasing power of cities and aggregates the risk profiles of geographically disparate areas to help urban areas access more affordable climate insurance solutions.<sup>40</sup>

A final example of demand-side financial aggregation is when a private or public entity combines multiple firms or agencies that provide similar products or services, creating a larger venture that can leverage economies of scale in its procurement of financing to build and operate new projects.<sup>41</sup> This variety of demand-side aggregation can be used by governments and other public actors to meet public needs for social services and infrastructure through public procurement processes.

For example, some cities and counties in the United States have used their procurement power to set up community choice aggregators, combining individual demand for clean, affordable electricity service from thousands of individuals and using this demand to negotiate low-carbon power supply agreements or develop and operate their own utility-scale renewable generation as an alternative to standard electricity service

<sup>39</sup> Climate Bonds Initiative 2022

<sup>40</sup> Samuelson 2021

<sup>41</sup> Shakya and Byrnes 2017

provided by incumbent regulated utilities. However, there are few strong case studies for similar models in developing countries, as cities' procurement and contracting processes vary widely across local, regional, and national jurisdictions, complicating the process of aggregating purchasing power for public services either within a single city or across multiple cities at once.

## 3.1 CASE STUDIES ON DEMAND-SIDE AGGREGATION

### 3.1.1 WATER AND SANITATION POOLED FUND (WSPF)

In the Indian state of Tamil Nadu, the WSPF issued a pooled bond with the goal of providing small and medium-sized urban areas access to financing for water and sanitation infrastructure. This demand-aggregated pooling approach enabled thirteen urban local bodies (ULBs) to mobilize funds from a single instrument, avoiding the high transaction costs that made financing for each individual city's water projects prohibitively expensive. The aggregation of payments from each ULB's project cash flows and other municipal revenue streams enabled the bond to be issued at a relatively low interest rate, as bondholder returns were linked to many projects rather than one, reducing dependence on any single project to perform and enabling the bond to continue paying out even if a few individual projects failed.<sup>42</sup> Additionally, because the Fund was established with local Tamil Nadu state and World Bank funding and backed by a partial credit guarantee from USAID, private investors regarded it as a creditworthy entity, allowing it to issue AA-rated bonds, whereas the individual ULBs participating in the bond did not have good enough credit to issue municipal bonds individually.<sup>43</sup> In order to secure international financial backing, the thirteen ULBs had to foster cooperation and shared goals, which strengthened partnerships between ULBs in the region.<sup>44</sup> By aggregating municipal demand, the organization had to put forth a single, agreed upon set of goals and priorities, which streamlined work with the international development organizations involved.

### 3.1.2 PHILIPPINES CITY DISASTER INSURANCE POOL

Another example of purchasing power aggregation comes from the Philippines, which is vulnerable to earthquakes, volcanic eruptions, and typhoons due to its location on the Pacific Rim, in addition to floods, droughts, and landslides. This baseline disaster risk is amplified by increased incidence of extreme weather events driven by climate change, and Philippines cities face especially high risk given their high proportion of the nation's population, economic activity, and critical infrastructure. In response, the Philippines Department of Finance has collaborated with the Asian Development Bank to design the Philippines City Disaster Insurance Pool (PCDIP) to provide rapid post-disaster recovery funding for cities. The pool has been fully designed but is not yet implemented.

<sup>42</sup> Samuelson 2021

<sup>43</sup> World Bank Global Water Practice 2016

<sup>44</sup> Samuelson 2021

The instrument is a parametric insurance pool, meaning that pay-outs are based not on actual losses suffered, but rather on a disaster event's physical features, such as wind speed or earthquake magnitude, which closely correlate with actual losses and are easier to measure and verify.<sup>45</sup> The planned pool would allow cities to buy parametric insurance policies from the Government Service Insurance System (GSIS), a state-owned social insurance agency, with premiums set for each city's policy based on risk modelling services from an external provider. GSIS would take a small fee for acting as the policy and payout issuer, passing on the remaining premium to the PCDIP pool, which will seek reinsurance from domestic and international providers. This parametric risk pooling system enables cities to receive payouts channelled from PCDIP through GSIS within 15 business days, aiding cities in recovering more quickly and effectively than would be possible under traditional indemnity insurance policies that require detailed loss assessments. Ten cities from across the country agreed to pool their insurance purchases for the pilot, with each city engaging in exposure data collection, needs assessment, and capacity building activities as the project progresses.<sup>46</sup> By aggregating the insurance pool across multiple municipalities to create the PCDIP, the program allows cities to receive funds more quickly in the wake of a natural disaster, leading to more proactive recovery and adaptation efforts.

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45 Asian Development Bank et al. 2018

46 Asian Development Bank 2021

## 4. JOINT SUPPLY- AND DEMAND-SIDE AGGREGATION

The case studies outlined in the demand-side and supply-side sections are intended to provide clear examples of how aggregation has been used to provide financing for cities focusing on one aggregation model. While not exhaustive, each case study discusses the need answered by the aggregation format and its ultimate result. In addition, there are also some examples on how a joint approach using both supply- and demand-side aggregation was able to tackle some financing challenges.

### 4.1.1 CAPE TOWN GREEN BOND

In 2017, the City of Cape Town, South Africa issued a USD 83 million green bond, marking two firsts: the issue was the first externally certified green bond to be listed on the Johannesburg Stock Exchange, and the first to be issued by a South African municipality. The use-of-proceeds bond carries a 10-year maturity, pays a coupon of 10.17%, and was certified by the Climate Bonds Initiative.<sup>47</sup> Proceeds of the bond were used to refinance multiple municipal water projects within the city's capital program that were already under construction or in operation, including water capture, storage, and distribution infrastructure; flood defences; and alternative water treatment plants. By aggregating the multiple water projects into a single financial vehicle, the city was able to secure financing that may have been unavailable to smaller projects.

The bond is a prime example of how both supply-side and demand-side aggregation can unlock more affordable long-term financing for creditworthy subnational borrowers. By refinancing several existing projects using one debt instrument, Cape Town was able to pool risk across multiple assets throughout the construction and operational phases via demand-side aggregation, while also accessing a broader market of investors by publicly issuing the bond on the Johannesburg Stock Exchange via supply-side aggregation. This built-in combination of risk mitigation, accessibility, and liquidity allowed the city government to issue the bond at a relatively low interest rate, and the issuance was four times oversubscribed, confirming the appetite of local and global investors to invest in green cities initiatives when they are properly developed and vetted.

Green bonds have gained momentum in recent years as part of a push for a green recovery from the Covid-19 pandemic. While the largest green bonds have been issued by national governments like Italy and Hungary, there is an opportunity for cities to use green bonds as a way of effectively aggregating projects on the demand side and aggregating funders on the supply side.<sup>48</sup>

<sup>47</sup> Climate Bonds Initiative 2020

<sup>48</sup> Climate Bonds Initiative 2022



## 4.1.2 GREEN RECEIVABLES FUND

In April 2021, Albion Capital launched the first-ever Green FIDC, raising USD 36 million to fund community solar development in Brazil.<sup>49</sup> A FIDC (Portuguese: Fundo de Investimentos em Direitos Creditórios), also known as a receivables fund, is a securitization instrument composed of bundled future cash flows from a variety of assets. The Green FIDC was the first of its kind security to be certified as a climate bond for the Brazilian market. Brazil's 2030 climate goal of 23% non-hydro renewables for power generation has increased both the demand for renewable energy projects and drawn climate finance to the country, including the lower-cost, long-term capital to renewable energy projects included in the Green FIDC.

On the demand-side, the Green FIDC uses the initial capital to construct the project and buy the Power Purchase Agreement between the consumer and the energy projects, in this case regarding the community solar energy, which provides a long-term future incomes stream for the FIDC via the Purchase Power Agreement cashflows. Once the project is operational, senior shares of the Green FIDC can be sold to private investors, with the new capital used to fund new projects. By aggregating multiple projects of the same type, such as community solar development projects, the Green FIDC can bundle multiple smaller projects together to receive the best financing options and lower transactional costs.<sup>50</sup>

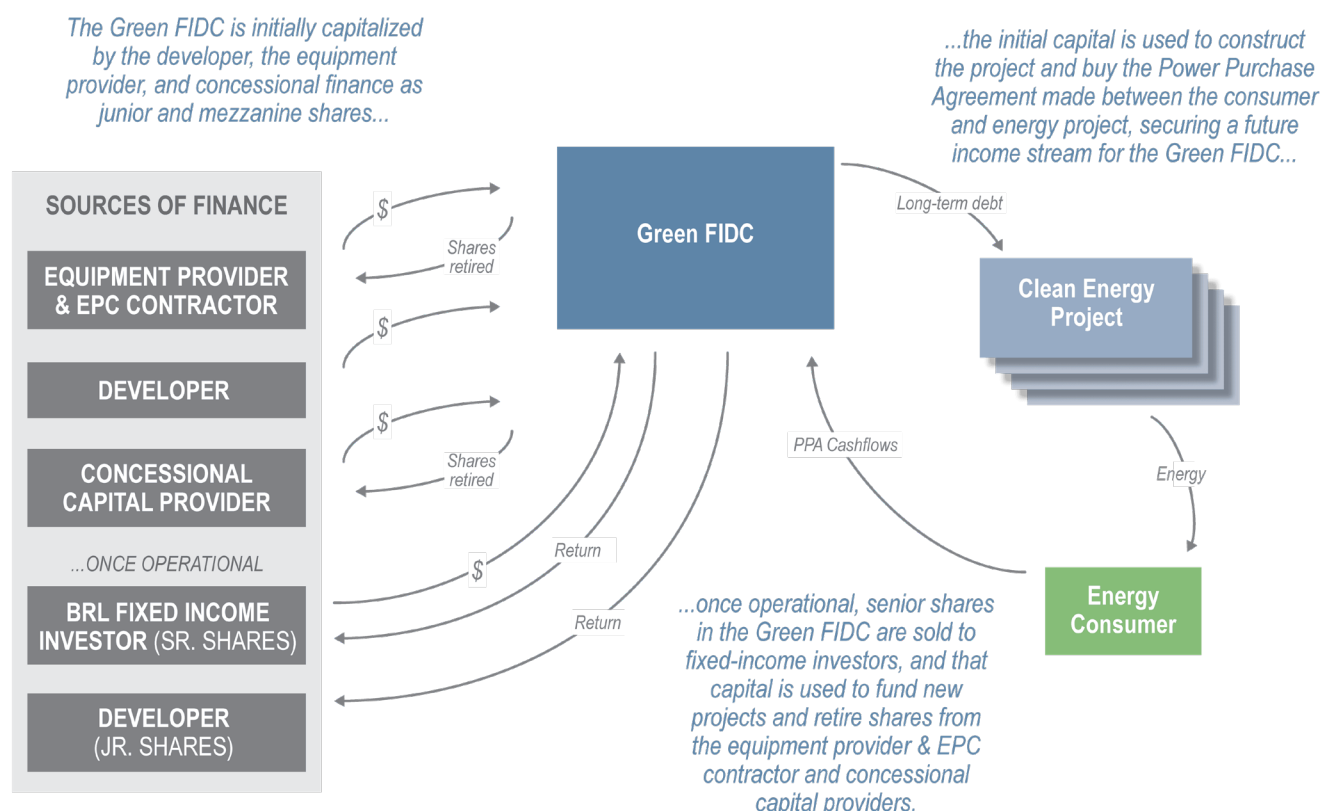
The supply-side aggregation feature of the instrument was designed to combine financing from a variety of sources, including the developer, the equipment provider, and concessional finance in a tranche structure. Under the Green FIDC tranche structure, which allows the tranches to be adjusted to accommodate the supply-side needs, a set group of investors are paid out first, lowering their risk, but at a lower rate of return. Subsequent tranches are paid higher returns but suffer a greater chance of risk if the underlying solar assets default on their repayment obligations. This enables the instrument to attract a wide range of investors with various risk-return preferences, from risk-seeking hedge funds to risk-averse institutional asset managers and pension funds seeking the stable, long-term yield profile of the senior tranche.<sup>51</sup> Similar to other supply-side aggregation, the aim of the FIDC is to attract a wide range of investors at various rates of return and timelines.

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<sup>49</sup> CPI 2021

<sup>50</sup> Climate Finance Lab 2017

<sup>51</sup> Escalante et al 2017

**Figure 4: FIDC financial structure**

Source: Global Innovation Lab for Climate Finance<sup>52</sup>

### 4.1.3 THE ARGENTINIAN NETWORK OF MUNICIPALITIES FACING CLIMATE CHANGE

The Argentinian Network of Municipalities Facing Climate Change (Red Argentina de Municipios Frente al Cambio Climatico), or RAMCC, is a coalition of 250 Argentine municipalities that work under an executive secretariat to coordinate and promote strategic plans to address climate change.<sup>53</sup> The RAMCC regularly facilitates both supply- and demand-side aggregation tools to secure financing and equipment for the municipalities under its purview.

The RAMCC Trust, which pools funds from 21 local municipalities, aims to leverage city funds to attract additional financing from international public and philanthropic sources in order to execute joint climate projects or programs at a subnational level across member municipalities. Trust-funded projects are intended to promote economies of scale and networking to deliver the best opportunities and resources to the involved municipalities, and typically utilize both supply- and demand-size aggregation vehicles.<sup>54</sup> While the 21 involved municipalities' annual contributions is a key source of funding for the trust, third party contributions assist in large-scale projects and equipment that benefit multiple cities and projects.

<sup>52</sup> Climate Finance Lab 2017

<sup>53</sup> RAMCC 2022b

<sup>54</sup> Ibid.

In 2021, the member municipalities of the trust agreed to acquire solar water tanks, solar panels, micro water meters, and electric vehicles through the trust. Together, the trust was able to leverage the large scale of projects, grouped via demand-side aggregation, to overcome logistical and technological hurdles to purchase the best technology for the programs at the best price.<sup>55</sup>

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<sup>55</sup> Ibid.

## 5. ENABLING ENVIRONMENT

While the previous instrument case studies are important examples of well-executed financial aggregation strategies, even the most creative and sophisticated financial instruments and approaches depend on an effective enabling environment to successfully secure and deploy large-scale financing for urban climate infrastructure. This enabling environment factor encompasses several areas, such as collaboration between subnational and national entities and clearly defined roles, responsibilities, and jurisdictions for all relevant public actors. It also needs to consider governmental capacity in the fields of project development and financial engineering and the ability to create and enforce contracts between counterparties, especially for complicated financial structures. Key is also a regulatory environment that provides cities with a certain degree of fiscal and financial autonomy, including control over local taxation and municipal budgeting.<sup>56</sup>

The relative strength of a given city or region's ability to attract climate infrastructure financing depends on the combination of these and other factors, and weaknesses in any individual area of the enabling environment are likely to rule out a large swath of possible financial aggregation approaches as possible avenues for funding climate projects. For example, a city that has no authority to levy local taxes on sales, income, or land value will not be able to borrow against future tax revenues to finance new infrastructure projects, and will instead be reliant on often unpredictable budget outlays disbursed from national or regional government entities. With unpredictable cash flows, this city would struggle to attract financing through an instrument that aggregates investment from multiple firms and/or across different asset classes, no matter how well-designed the instrument may be.

Similarly, cities legally bound by debt ceilings may find it difficult to issue new debt to fund aggregated project portfolios, regardless of whether they are able to obtain cheaper financing by creating a separate SPV to develop and operate projects. Outdated procurement rules may also prevent the establishment of city-controlled demand aggregation instruments, especially those involving public-private partnerships or long-term service contracts.<sup>57</sup> Therefore, cities must take stock of their enabling environment circumstances and, where required, work with others to overcome general fiscal and regulatory barriers to enable the use of innovative financial aggregation strategies.

Local government associations can be strengthened to better represent municipal interests and advocate for changes enabling environments. Associations like the United Cities and Local Governments, an umbrella organization that represents local and regional governments, can be a helpful conduit in supporting these efforts.

The private sector also has a role in supporting the development of an enabling environment for urban climate action, although private financial institutions are

<sup>56</sup> Cartwright et al. 2018

<sup>57</sup> Bipartisan Policy Center 2015

largely relegated to partnering with cities to develop financial tools and instruments from the early stages of project design. Where possible for large projects, such as climate-smart urban infrastructure, the private sector should be engaged from an early stage. This ensures attention is paid to bankability and potential revenue generation opportunities.<sup>58</sup>

There are several existing approaches that can assist cities in improving their enabling environment. Table 5 contains examples of enabling environment initiatives that have paved the way for deployment of financial aggregation solutions in several cities.

**Table 5:** Enabling environment initiatives that have supported financial aggregation<sup>59</sup>

Intervention type	Examples	What it accomplishes	Relevance to aggregation
<b>Municipal creditworthiness and financial management training</b>	World Bank City Creditworthiness Initiative <sup>60</sup>	Strengthens the municipal balance sheet which potentially enables cities to issue the new debt needed to fund climate projects	Creditworthiness enables access to financial aggregation through bond markets and insurance
<b>Revenue collection</b>	Freetown Property Tax Reform <sup>61</sup>	Budgetary control and guaranteed revenues generate the cash flow necessary for a city to fund projects, or increase city creditworthiness to borrow against future tax revenues	Creditworthiness enables access to financial aggregation through bond markets and insurance
<b>Fiscal decentralization</b>	2010 Constitution of Kenya <sup>62</sup>	Gives cities increased financial autonomy, reducing dependence on national or regional authorities	Empowers cities to improve revenue collection, establish public-private partnerships, and fast-track project approvals, enabling the execution of instruments to mobilize climate finance
<b>Development of climate project standards and impact metrics</b>	Carbon Initiative for Development <sup>63</sup>	Sets consistent project management and evaluation criteria for climate projects across local and national jurisdictions	Allows investors to more easily evaluate and execute investments in multi-city projects or funds, enabling supply-side aggregation to finance multiple investment opportunities in different cities and/or countries

<sup>58</sup> Negreiros et al. 2021

<sup>59</sup> Table sources: Smalldridge et al. 2021; Negreiros et al. 2021; Cartwright et al. 2018

<sup>60</sup> World Bank 2021

<sup>61</sup> IGC and ICTD 2019

<sup>62</sup> Nijia Kaburu 2013

<sup>63</sup> Carbon Initiative for Development 2021



## 6. CONCLUSION AND RECOMMENDATIONS

Financial aggregation strategies and instruments must be widely implemented and rapidly scaled up to help fill the cities climate finance gap and drive transformative, sustainable investment in urban areas. Such strategies and instruments may aggregate either the supply of finance, demand for finance, or both supply and demand. In addition, targeted enabling environment interventions are vital to create a foundation on which these aggregation strategies can be successfully implemented.

The role of the private sector in mobilizing climate finance for cities will focus on the development, implementation, and scale of financial aggregation instruments themselves, while public actors may contribute by both promoting and participating in such instruments directly, and by reforming laws, regulations, and governance practices to provide a stronger institutional foundation for investment. A common factor in successful aggregation projects has been the involvement of DFIs to support initial project development, leverage private investment with de-risking instruments, and provide capacity-building assistance to ensure longevity.

Table 6 contains a full list of recommended interventions for various types of public and private stakeholders.

**Table 6:** Recommendations for urban climate finance stakeholders

Actor type	Actor	Recommended Interventions
Public	National, regional, or state government	<p>Decentralize fiscal authority and increase city autonomy to guarantee city control over tax levies and collection, allowing cities to issue debt via supply-side aggregation.</p> <p>Provide targeted grants and budgetary allocations for city climate projects, directing national, state, and regional finance to the city for demand-side aggregation.</p> <p>Identify a pipeline of local projects that are investment-ready to aggregate demand for financing, creating a platform for cities to work together to aggregate projects and financing opportunities.</p>
	City government	<p>Reform revenue collection to a more stable, reliable system so cities can increase their creditworthiness and borrow against future revenue, increasing their supply-side aggregation options.</p> <p>Form public-private partnerships with investors to expand the scope of potential investment for climate projects.</p> <p>Improve financial management practices to increase creditworthiness and increase appeal to outside investors, increasing options for supply-side aggregation.</p>
	Development finance institution/ climate fund	<p>Provide technical assistance to support municipal creditworthiness and financial management, which provide more supply-side aggregation options for cities to fund climate projects.</p> <p>Channel concessional finance to de-risk projects by taking on first-loss investments and crowd in private investment through supply-side aggregation.</p> <p>Support project feasibility studies and execution through PPFs, which provide financial and technical assistance to potential climate projects to increase viability and bankability to the private sector, providing opportunities for both demand- and supply-side aggregation and potential upscaling.</p>
	NGO/civil society/ philanthropies/ project preparation facilities	<p>Provide technical assistance to launch aggregation instruments and be an intermediary for cities with shared interests to utilize aggregation vehicles.</p> <p>Fund grants for pilot projects, allowing them to increase bankability and move to private financing.</p> <p>Channel concessional finance to de-risk projects by taking on first-loss investments and crowd in private investment through supply-side aggregation.</p>

Actor type	Actor	Recommended Interventions
Private	Commercial banks and insurance companies	Develop early-stage financing strategies and for climate projects and equipment that serve the needs of urban clients.
	Pension funds, private equity, infrastructure funds, and asset managers	Develop and scale commercial investment strategies that aggregate and deploy investor capital toward urban climate projects/firms as an infrastructure investment sub-class.
	Impact investors and philanthropies	Develop and scale commercial or blended investment strategies that aggregate and deploy impact capital toward urban climate projects/firms
	Non-financial corporates	Establish public-private partnerships with cities to provide climate-critical infrastructure and public services

There have been a growing number of successful demand- and supply- side aggregation strategies for urban climate finance in recent years, some of which are documented here in the case studies. Most of these vehicles benefited from support, such as the RAMCC in Argentina, which helps cities create their own autonomous climate plans and climate budgets. While aggregation is a useful tool in creating larger pools of investors and increasing the number of projects funded, the first steps lie in creating an environment that encourages and supports tools like supply- and demand-side financial aggregation to address climate change.

The recommended interventions laid out in Table 6 largely point to the same thing: cities need both more autonomy and more support on climate from larger government entities; public sector organizations should provide technical assistance and increase concessional financing for climate projects; and private investors should consider urban climate infrastructure opportunities as they seek to meet their climate investment and net zero alignment goals, and develop additional tools such as insurance products and new financing products to mitigate and better allocate risks. With such interventions, the cities will be more able to make use of aggregation methods to progress against their climate goals.

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