



Financial Aggregation Blueprints for Urban Climate Infrastructure

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EXECUTIVE SUMMARY

Cities contribute to 70% of global CO₂ emissions (UN HABITAT, 2011), are home to over half of the global population, and generate over 80% of global GDP (World Bank, 2023). Undoubtedly, cities urgently need to invest in climate change mitigation and adaptation to deliver their climate action plans and boost resilience. However, of the USD 5 trillion required annually, only USD 384 billion is currently being invested (Negreiros et al. 2021).

Bundling smaller projects (demand-side financial aggregation) or investors (supply-side financial aggregation) is a promising strategy for a city to sponsor their green transition. Building on the Cities Climate Finance Leadership Alliance's previous work [Financial Aggregation for Cities](#), this report helps mainstream municipal financial aggregation by expanding the evidence base for relevant case studies. It aims to provide cities and CCFLA members with detailed "how-to" guidance that can be used as a reference when developing their financial aggregation instruments.

In particular, this report examines eight blueprints from three different kinds of financial aggregation instruments:

1. **Municipal pooled procurement:** The combination of demand for products or services from two or more cities to enable the group to obtain more affordable prices than each party would get if they acted individually (Pinko et al. 2022).
2. **Municipal green bonds:** Debt instruments issued by cities to raise finance from capital markets to make investments that support climate change mitigation and adaptation in line with a green finance framework (MSRB 2018).
3. **Municipal insurance pooling:** The combination of cities' demand for insurance to buy coverage as a block, enabling the group to achieve economies of scale and pay lower premiums (Pinko et al. 2022).

The eight blueprints were selected to highlight some of the different shapes and formats these instruments can adopt. They highlight their implementation pathway in different geographies with contrasting institutional frameworks and enabling conditions. ES Table 1 summarizes the blueprints presented in this report.

ES Table 1: Summary of financial aggregation blueprints included in the report

Instrument Type	Blueprint	City	Country or Region	Sector	Implementation Status
Municipal Pooled Procurement	RAMCC Trust Fund	30+ cities	Argentina	Energy Efficiency	Ongoing
	The Grand Challenge	Delhi, Kolkata, Bengaluru, Surat, Hyderabad	India	Transport	Implemented in 2022
	Climate Mayors Electric Vehicle Purchasing Collaborative	400+ cities	United States	Transport	Ongoing
Municipal Green Bonds¹	Mexico City's Green Bond	Mexico City	Mexico	Transport, Water & Energy Efficiency	Issued in 2016
	Reykjavik's Green Bond	Reykjavik	Iceland	Green Building, Waste, Sustainable Land Use, Energy Efficiency & Transport	Issued in 2018
	Manila Water's Sustainability Bond	Manila	The Philippines	Water & Wastewater	Issued in 2020
Municipal Pooled Insurance²	Urban Infrastructure Insurance Facility	10 cities	Latin America & the Caribbean	Adaptation and Resilience	Design Phase
	Municipal Risk Pool in Western Cape	5-6 cities	South Africa	Adaptation and Resilience	Design Phase

Looking across the blueprints, the report highlights insights about the benefits, challenges, and success factors of the different financial aggregation instruments analyzed.

¹ In this report blueprints for municipal green bonds and private utility sustainability bonds were examined. Throughout the report, the term “municipal green bonds” is used for simplicity rather than the more unwieldy “municipal green and private utility company sustainability bonds”.

² Given that municipal insurance pooling is an emerging area of practice with few existing cases of operational mechanisms in place, the examples presented in this section draw on municipal insurance pooling mechanisms that are currently in the design phase. The blueprints are thus less comprehensive than in Sections 2 and 3.

ES Table 2: Report main takeaways

Benefits	Challenges	Success Factors
Municipal Pooled Procurement		
<ul style="list-style-type: none"> • Achieves economies of scale leading to lower costs. • Reduces transaction costs. • Improves access to technologies or services. • Promotes catalytic potential for green market development. • Facilitates peer learning. • Improves regional planning and coordination. 	<ul style="list-style-type: none"> • May require long-term political commitments, which can wane over time due to election cycles. • Global and national economic instability and supply chain constraints threaten instruments’ success. • Extremely large pooled procurements may require suppliers with sufficient room for capital expenditure and manufacturing capacity which can be hard to find. • Public officials need capacity building to implement complex procurement processes. • Municipalities’ agreeing on technical standards. 	<ul style="list-style-type: none"> • Cities’ interest and engagement in the pooled procurement. • Partnership across different levels of government and with other institutions such as city networks and technical partners. • Procurement flexibility and third-party technical advice to help cities agree on technology standards. • Consultations with potential suppliers before the tender announcement can help fine-tune the tender to market realities. • Avoids upfront costs by procuring services instead of goods.
Municipal Green Bonds		
<ul style="list-style-type: none"> • Provides access to new potential long-term investors supporting diversification of financing sources. • Serves as tool to deliver and communicate climate ambition. • Increases collaboration between municipal departments. 	<ul style="list-style-type: none"> • The lack of municipal borrowing authority and credit worthiness. • The high operational and human resource costs required to develop green bond frameworks. • Identifying appropriate indicators and delivering robust data to report on using proceeds from green bonds. • Fear of the market’s reaction and acceptance of green bonds. 	<ul style="list-style-type: none"> • City leadership on the process, collaboration across municipal departments, and external cooperation with other government levels. • Enabling conditions, such as strong credit scores, existing climate action plans and local “champions” • Experience issuing traditional bonds and reporting impact. • Building local officers’ and investors’ knowledge capacity. • Hiring financial brokers well positioned to structure the bond and sell them to target investors. • The inclusion of financial guarantees. • Following international best practices throughout the development of green bond frameworks.
Municipal Pooled Insurance		
<ul style="list-style-type: none"> • Achieves economies of scale leading to lower costs. • Reduces transaction costs. • Facilitates peer learning. • As a network of cities, obtains easier access to external disaster risk management technical support. • When co-owned by cities, provides profit retention to cities. • Like individual insurance, provides predictability of finance. • When the insurance is parametric, quicker access to emergency relief funds. 	<ul style="list-style-type: none"> • Lack of municipal pooled insurance examples implemented to learn from. • Insufficient regulation supporting the establishment of pooled insurance mechanisms. • Lack of technical capacity of local officers. • Premiums can be too expensive for municipal budgets and cities may need premium subsidies to purchase insurance. 	<ul style="list-style-type: none"> • Third-party leadership, coordination, and cities’ commitments. • Partnership with specialized institutions supporting financial and climate risk modelling exercises. • Disaster risk management capacity -building.

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1. INTRODUCTION

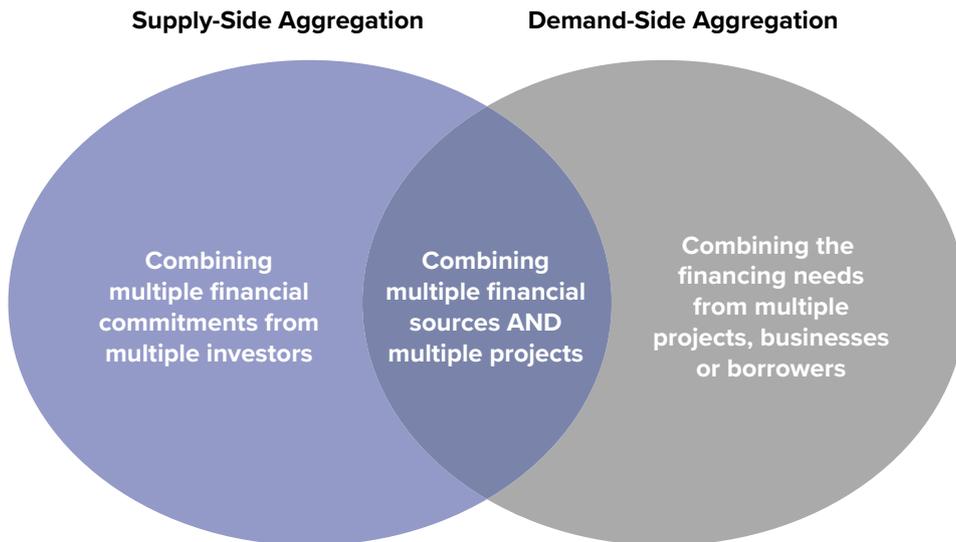
Cities contribute to 70% of global CO₂ emissions (UN HABITAT, 2011), are home to over half of the global population, and generate over 80% of global GDP (World Bank, 2023). By 2050, the United Nations estimates that two-thirds of the world's population will live in cities (UN DESA, 2018). With urbanization rates outpacing access to services in many urban centers around the world, urban dwellers are also increasingly vulnerable to the impacts of climate change.

There is an urgent need for cities to invest in climate change mitigation, adaptation, and resilience. However, of the USD 5-6 trillion required annually, the average annual climate finance flow to cities is only USD 384 billion (Negreiros et al., 2021) – representing a considerable shortfall known as the urban financing gap (Gorelick et al., 2021). In particular, cities in lower- and middle-income countries require significant green finance to make urban infrastructure investments in priorities such as energy efficiency, transport, water, waste management, and the built environment.

Significant barriers exist to cities accessing the finance needed to invest in green infrastructure priorities. Cities face challenges in developing pipelines of priority green projects, linking these projects to finance, demonstrating creditworthiness to lenders, and learning from the initiatives of their peers. Cities also often need more human resources, detailed technical knowledge of green technologies and investment options, and expertise to structure and deliver green infrastructure projects. The multiple barriers cities face in accessing climate finance pose the need for innovative financial strategies to scale up green investments.

Financial aggregation is an emerging and promising strategy for cities to mobilize finance for their green infrastructure priorities. 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” (Pinko et al., 2022). Financial aggregation can involve bundling several smaller projects or investments into a single investment package to improve access to finance (demand-side aggregation), the mobilization of financial resources from several investors (supply-side aggregation), or even both, as shown in Figure 1.

Figure 1: Supply-side and demand-side aggregation



Source: Pinko et al., 2022

For cities, the main benefits of developing financial aggregation instruments emerge from bundling demands from multiple projects, which helps them achieve economies of scale, lower unit transaction costs, meet minimum ticket size for institutional investors, and attract private finance (Pinko et al., 2022). Nevertheless, for various reasons, the uptake of this approach falls short of its potential, particularly in developing economies.

Building on the Cities Climate Finance Leadership Alliance’s previous work, “[Financial Aggregation for Cities](#),” this report aims to help mainstream municipal financial aggregation by expanding the evidence base on successful and emerging case studies. This study will also provide cities and partners with detailed “how-to” guidance that can be used as a reference when developing their financial aggregation instruments.

To this end, this report presents and analyzes a series of financial blueprints based on case studies of municipal pooled procurement, green bonds, and municipal insurance pooling developed by cities worldwide. We collected the presented data and information through desktop research and interviews with instrument proponents. Table 3 summarizes the financial aggregation blueprints included in this report.

Sections 2 to 4, in this order, present an overview of municipal pooled procurement, municipal green bonds, and municipal pooled insurance and the analysis of the respective blueprints (further detail for each blueprint is available in the annexes). Section 5 provides the conclusion.

Table 3: Financial aggregation blueprints included in the report

Instrument Type	Blueprint	City	Country / Region	Sector	Aggregation Type	Implementation Status
Municipal Pooled Procurement	RAMCC Trust Fund	30+ cities	Argentina	Energy Efficiency	Demand-side	Ongoing
	The Grand Challenge	Delhi, Kolkata, Bengaluru, Surat, Hyderabad	India	Transport	Demand-side	Implemented in 2022
	Climate Mayors Electric Vehicle Purchasing Collaborative	400+ cities	United States	Transport	Demand-side	Ongoing
Municipal Green Bonds ³	Mexico City’s green bond	Mexico City	Mexico	Transport, Water & Energy Efficiency	Both	Issued in 2016
	Reykjavik’s green bond	Reykjavik	Iceland	Green Building, Waste, Sustainable Land Use, Energy Efficiency & Transport	Both	Issued in 2018
	Manila Water’s sustainability bond	Manila	The Philippines	Water & Wastewater	Both	Issued in 2020
Municipal Pooled Insurance ⁴	Urban Infrastructure Insurance Facility	10 cities	Latin America & the Caribbean	Adaptation and Resilience	Both	Design phase
	Municipal Risk Pool in Western Cape	5-6 cities	South Africa	Adaptation and Resilience	Demand-side	Design phase

³ In this report blueprints for municipal green bonds and private utility sustainability bonds were examined. Throughout the report, the term “municipal green bonds” is used for simplicity rather than the more unwieldy “municipal green and private utility company sustainability bonds”.

⁴ Given that municipal insurance pooling is an emerging area of practice with few existing cases of operational mechanisms in place, the examples presented in this section draw on municipal insurance pooling mechanisms that are currently in the design phase. The blueprints are thus less comprehensive than in Sections 2 and 3.

2. MUNICIPAL POOLED PROCUREMENT

2.1 INTRODUCTION

Pooled procurement refers to combining the demand for products or services from two or more parties to enable the group to obtain more affordable prices than each party would get if they acted individually (demand-side aggregation). Municipal pooled procurement involves multiple cities working together to purchase goods or services. For example, this could be an initiative led by a network of cities, state or national governments, or third-party institutions providing technical support to municipalities.

Cities are increasingly using pooled procurement to implement their green transition. They can use pooled procurement mechanisms to purchase green technologies, such as solar panels, LED lights, electric vehicles (EVs), and electric vehicle charging infrastructure. They can also be used to purchase services or service contracts, for example, climate risk data and analytics across multiple cities or operating contracts for new green technologies.

2.2 BENEFITS

For cities, there are multiple benefits to participating in a pooled procurement financial mechanism for the purchase of goods or services:

1. **Economies of scale:** By aggregating demand across multiple buyers, cities can achieve economies of scale with larger purchase orders, which reduce the unit price for the good or service they are purchasing, providing them with better value for money.
2. **Reduced transaction costs:** Pooled procurement also reduces the transaction costs for each city, which does not need to devote the same human resources and budgets to conduct feasibility studies, issue requests for proposals, select a supplier and issue contracts. Often the cost of financial, engineering, legal, and compliance are fixed - meaning that multiple cities can spread these costs amongst themselves for larger financial deals.
3. **Improved access technologies or services:** By aggregating demand for a technology or service across multiple cities and issuing joint purchase orders, cities can increase the overall contract size, often attracting larger and more established suppliers. It can benefit the quality and diversity of technologies that cities can choose from in their procurement, particularly smaller ones that would not otherwise have access to suppliers focused on larger markets.

4. **Catalytic potential for green market development:** Pooled procurement can have a significant impact in shaping markets and accelerating their green transition by signaling to manufacturers that there is a huge demand for more sustainable alternatives (e.g., EVs) and to private owners that the infrastructure required for their transition will be quickly deployed (e.g., charging stations in the case of EVs).
5. **Facilitated peer-learning:** Pooled procurement also provides cities a network to share lessons and help cities learn from each other. These networks can also often have access to specialized technical support from civil society organizations, governments, and international networks such as CCFLA to help them scale-up access to green finance.
6. **Improved regional planning and coordination:** When cities engage in pooled financial planning with neighboring jurisdictions, they may also enhance, more broadly, their ability to plan and coordinate actions regionally.

2.3 BLUEPRINTS

As municipal pooled procurement networks begin to proliferate, it is useful for other cities and partners to learn from early pooled procurement platforms and initiatives. This section introduces three financial blueprints of pooled procurement mechanisms, outlined in Table 4 and comprehensively presented in the annexes.

Table 4: Municipal pooled procurement financial blueprints

Blueprint	Cities	Country	Purchase	Governance	Process
RAMCC Trust Fund	30+ cities	Argentina	LED Lighting	Led by a City Network	Public Tender
The Grand Challenge	Delhi, Kolkata, Bengaluru, Surat, Hyderabad	India	5,450 E-buses	Led by the National Government	Pooled Procurement
CMEVPC	400+ cities	United States	Electric Vehicles for City Fleets and Charging Infrastructure	Led by a City Network	Pooled Procurement Platform

We have selected the blueprints presented in this section to showcase pooled procurement mechanisms for various green technologies, contracting models, and institutional arrangements. Cities have various options as they design their pooled procurement mechanisms, yet each of these mechanisms’ design features reflects each country’s unique governance contexts.

2.3.1 RAMCC TRUST FUND

(see [“Annex 1: Municipal Pooled Procurement Blueprints”](#) for more detailed information)

Sectors: Energy efficiency.

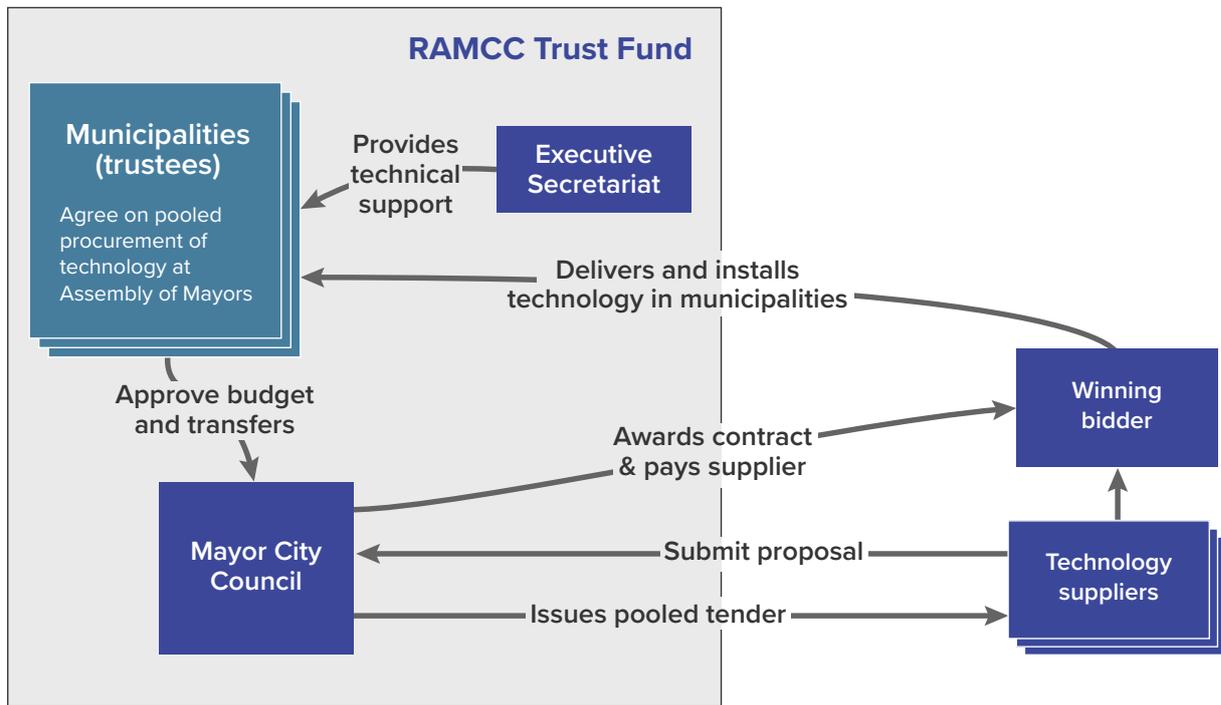
Problem: Argentinian municipalities often lack the finance and technical knowledge needed to deliver their climate action plans (CAP), relying on external support to invest in efficient energy solutions.

Solution: The RAMCC (Argentinian cities network) has developed the RAMCC Trust Fund, a pooled procurement platform, for Argentinian municipalities to purchase suited climate-smart technologies (e.g., LED lights) at lower costs.

INSTRUMENT MECHANICS:

- RAMCC established the RAMCC Trust Fund – currently comprising 30 municipalities, all of which developed a CAP as a pre-condition to joining.
- Each participating municipality is a Trustee and is represented by its mayor in the Assembly of Mayors. It sets out projects for the coming year and provides strategic oversight for the Trust’s financing activities through the elected Mayor City Council. The Secretariat provides technical support to develop climate plans and financing proposals.
- Trustees need to agree to launch a pooled procurement for a specific technology aligned with their CAPs and allocate funding from their public budgets. The Secretariat provides technical support to municipalities to define the technical specifications for the technologies they want to purchase.
- Municipalities approve the budget and transfer funds to the Trust bank account, managed by the Municipal Bank of Rosario and overseen by the Mayor City Council.
- RAMCC Trust Fund manages the funds and is responsible for issuing a public tender for the participating municipalities. To date, RAMCC launched four tenders focused on purchasing LED lighting for urban public spaces.
- Companies submit bids to the Trust Fund, which selects the technology provider based on the best value in terms of price ratio to energy savings.
- RAMCC Trust Fund pays for the delivery and installation of the technology in each municipality.

Figure 2: The RAMCC Trust Fund financial mechanism



2.3.2 THE GRAND CHALLENGE

(see “[Annex 1: Municipal Pooled Procurement Blueprints](#)” for more detailed information)

Sectors: Transport.

Problem: India must replace its aging bus fleet and add new buses to municipal fleets to meet ridership demands. Despite political support for using this opportunity to transition municipal fleets from fossil fuel to electric buses, the up-front cost of e-buses was too expensive for municipal authorities to invest.

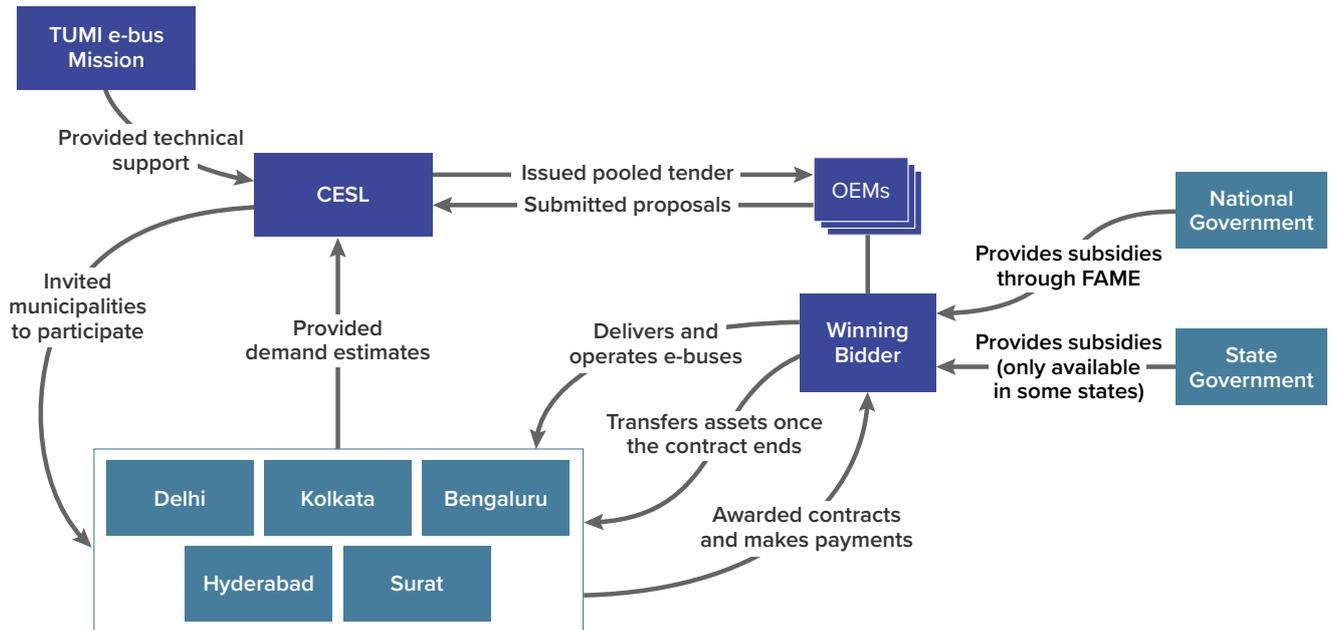
Solution: The Indian Government, led by Convergence Energy Service Limited (CESL), launched ‘The Grand Challenge’ in 2022 to aggregate demand from cities and deploy 5,450 e-buses under a mobility-as-a-service model. Assets will be transferred to municipalities once the 12-year contract is over.

INSTRUMENT MECHANICS:

- The Grand Challenge was led by Convergence Energy Service Limited (CESL), a public exclusively owned subsidiary of Energy Efficiency Services Limited, under the administration of the Indian Ministry of Power.
- The Transformative Urban Mobility Initiative (TUMI) E-bus Mission, an international coalition assisting cities worldwide in developing their electric bus fleets, provided technical assistance to CESL for the Grand Challenge.

- CESL invited cities to participate in the Grand Challenge and requested an estimation of how many e-buses they wanted to procure.
- CESL aggregated information submitted by cities into a pooled tender document and consulted with private businesses manufacturing the e-buses (OEMs) to adjust the tender to bidders' possibilities.
- CESL released the public procurement announcement for eligible suppliers to submit bids.
- CESL selected the winning bid based on the lowest operational cost.
- Cities awarded contracts to the winner, and the national Department of Heavy Industries (DHI) provided subsidies to suppliers. In the case of some cities, state government contributions and cities' funding topped these subsidies.
- The supplier will manufacture the e-buses and charging infrastructure, deliver them to cities, and operate the fleet for 12 years.
- Once the 12-year contract ends, operators will transfer the e-buses and charging infrastructure ownership to cities.

Figure 3: The Grand Challenge financial mechanism



2.3.3 CLIMATE MAYORS' ELECTRIC VEHICLE PURCHASING COLLABORATIVE

(see "[Annex 1: Municipal Pooled Procurement Blueprints](#)" for more detailed information)

Sectors: Transport.

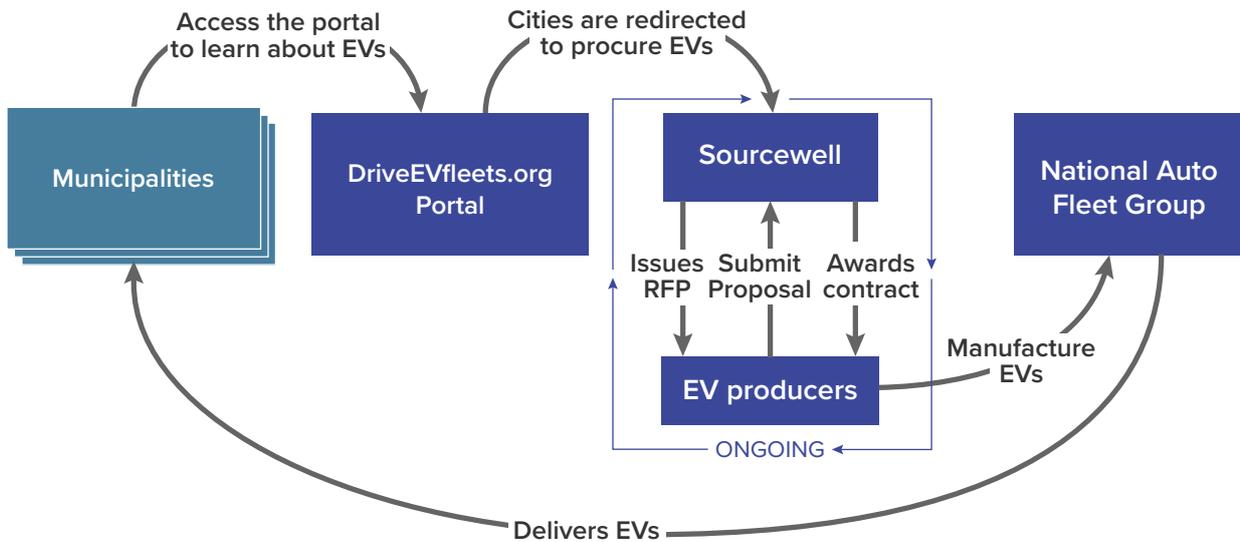
Problem: Transport emissions are the largest and fastest-growing source of U.S. emissions, making the transition to e-vehicles a clear option to achieve goals set in the Paris Agreement. However, a shift in the national government's policy direction culminated in the withdrawal from the Paris Agreement in 2017. Large upfront costs and a lack of charging infrastructure have inhibited the transition.

Solution: The Climate Mayors Electric Vehicle Purchasing Collaborative (CMEVPC) established a procurement portal for municipalities to transition their public fleets to EVs. Through the portal, municipalities access a platform that uses the pooled demand of cities to negotiate contracts at or below market rates from EV manufacturers.

INSTRUMENT MECHANICS:

- CMEVPC is a partnership between three organizations: Climate Mayors (national city network comprising 470 cities), Electrification Coalition (technical support provider), and Sourcewell (procurement platform).
- CMEVPC provides cities with a one-stop shop online portal (DriveEVFleets.org) where member cities can learn about different EV technologies, the lifecycle costing of EVs versus other vehicles, and case studies and access the Sourcewell platform to order EVs and charging infrastructure.
- Sourcewell provides cities with prices lower than manufacturers' suggested retail prices as they continuously negotiate with suppliers on favorable fixed vehicles and charging infrastructure prices before cities place their orders.
- Cities use the platform to make their EV purchase.
- The National Auto Fleet Group, the Sourcewell-awarded supplier, delivers the EVs and charging infrastructure to the cities.

Figure 4: The CMEVPC financial mechanism



2.4 KEY TAKEAWAYS FROM THE BLUEPRINTS

In this section, we summarize the key takeaways based on our analysis of green bonds blueprints and have divided it into “Challenges” and “Success factors”.

2.4.1 CHALLENGES

- Global and national economic instability and supply chain constraints threaten instruments’ success.** In the case of the RAMCC Trust Fund, the Argentinian currency devaluation heavily increased the price of LED lights, as they import 70% of the components, making municipalities pay up to three times more for the same technology purchased the previous year. For the Grand Challenge and the CMEVPC, shortages in labor, goods, and services increased the risk of delays in deliveries and increased components price, making it less attractive for manufacturers to participate in the pooled procurement instruments.
- Public officials’ need financial budgeting and planning capacity to implement complex procurement processes.** For instance, deploying energy efficiency measures (e.g., LED lights in the RAMCC Trust Fund blueprint) or electric vehicles (e.g., in the Grand Challenge and EV Purchasing Collaborative blueprints) involves upfront capital investment, with longer-term overall cost savings through reductions in operational budgets. This longer-term thinking requires cities to change their planning and budgeting processes, which often calls for the assistance of external advisors.

- **Municipalities’ agreeing on technical standards.** Although the implementor in each case overcame this issue in the three investigated blueprints, coordinating with cities to decide on the technical specifications of the procured technologies was cited by experts as one main barrier preventing more cities from starting pooled procurement.
- **Structuring pooled procurement platforms may demand time and require long-term commitments that can wane over time.** Political cycles can shift cities’ priorities, harming pooled procurement processes as members can only negotiate lower prices by acting as a block, as reported in the RAMCC Trust Fund and The Grand Challenge blueprints.
- **Extremely large pooled procurements may require suppliers with sufficient room for capital expenditure and manufacturing capacity which can be hard to find.** This challenge was particularly felt in The Grand Challenge blueprint, where municipalities made the largest purchase of e-buses in history, and only selected manufacturers could bid.

2.4.2 SUCCESS FACTORS

- **Cities’ interest and engagement in the pooled procurement are essential.** As shown across the blueprints, the pooled procurement instruments would hardly work without cities committed with the process and to promote their climate transition.
- **Need partnerships across different levels of government and with city networks and technical partners.** In all three blueprints, the pooled procurement instrument was implemented by a coordinated coalition of stakeholders that understood cities’ needs and guided them throughout the process. In the RAMCC Trust Fund and CMEVPC blueprints, the city networks (RAMCC and Climate Mayors, respectively) played a key role in engaging cities in the process – a part played by the Indian Government in The Grand Challenge blueprint. In the Indian case, subsidies from national and regional governments greatly helped cities in their purchases. Technical advice from third-party organizations at different stages of the procurement process was also a common feature of the three blueprints.
- **Procurement flexibility and third-party technical advice can be powerful tools to help cities agree on technology standards.** In the Grand Challenge blueprint, the tender was split into five lots with different EV technical specifications, keeping the flexibility based on each city’s need. In the CMEVPC example, a platform was developed for municipalities to order the vehicles best suited to their needs. In the RAMCC Trust Fund, the technical support the Fund and its partners provide to cities helps manage their expectations throughout the process and agree to the LED standards to be procured.
- **Consultations with potential suppliers before the tender announcement can help fine-tune the tender to market realities.** As shown in The Grand Challenge blueprint, collecting feedback and comments from potential private suppliers before the tender release helped adjust the tender to suppliers’ needs and attract more-high quality bidders.

- **Avoids upfront costs by procuring services instead of goods.** Particular to The Grand Challenge blueprint, where a one-of-a-kind quantity of procured electrical buses, the procurement of mobility-as-a-service enabled cities to accelerate their transition and deploy a larger number of e-buses. They did this by moving away from an upfront capital expenditure model to an ongoing operational expenditure model where they dilute investments on time.

3. MUNICIPAL GREEN BONDS

3.1 INTRODUCTION

Green bonds are debt instruments to finance investments supporting climate change mitigation and adaptation. They often combine multiple smaller green infrastructure projects that may not be sufficiently large to attract individual financing from portfolio investors looking to make large investments (demand-side aggregation). They can also pool finance from various investors to source larger finance volumes (supply-side aggregation).

Cities, companies, Special Purpose Vehicles (SPVs), public utilities, and other actors are increasingly issuing green bonds to access private sector financing to accelerate their local climate transition. Unlike traditional bonds, green bonds follow a particular green bond framework⁵ that provides an extra layer of transparency to investors so they can be sure that their money is being used to deliver specific environmental objectives.

3.2 BENEFITS

There are several benefits to issuing green bonds to finance municipal infrastructure:

1. **Access to new investors:** By bundling smaller projects into a single investment vehicle, they increase the combined investment ticket-size, unlocking private investors with minimum ticket-size investment requirements (e.g., institutional investors).
2. **Access to long-term and diverse sources of capital:** The long maturity of green bonds provides cities and others investing in municipal green infrastructure access to long-term capital to deploy their projects. Furthermore, green bonds allow issuers to diversify their financing sources, bringing private sector investment to add to existing tax and fiscal transfer revenue streams. For cities in particular, such diversification can serve as a more balanced and sustainable way to manage the city's finances instead of relying solely on one or two sources of finance.
3. **Tool to deliver and communicate climate ambition:** As green bonds bundle multiple projects together, they can serve as mechanisms to translate climate change action plans and commitments into tangible financing strategies, particularly through developing green bond frameworks. Due to the strict reporting required in green bond frameworks, they can become an important opportunity for governments (and utilities) to communicate with the public about climate change and build trust in how public resources are being used.

⁵ Green bond frameworks set out the rules and procedures for how the issuer will use the funds to meet its specific green goals, and typically include the specific projects the issuer has already earmarked for using the proceeds, or a set of decision-making steps or criteria that the issue will follow to identify and select eligible green investments. They are generally designed in line with international standards such as the Green Bond Principles (ICMA 2022)

4. **Increased collaboration between different municipal departments:** Issuing green bonds can help cities strengthen cooperation across departments. For instance, creating the green bond framework requires teams from different departments, such as Environment and Finance, to work together to develop a shared investment framework.

3.3 BLUEPRINTS

This section presents three financial blueprints of green bonds issued to finance green climate infrastructure worldwide. Table 5 gives an overview of the green bonds examined in this report, which are fully presented in the annexes:

Table 5: Municipal green bonds financial blueprints

Blueprint	City	Country	Type	Sector	Issuance	Amount	Issuer
Mexico City Green Bond	Mexico City	Mexico	Green Bond	Transport, Water & Energy efficiency	2016	USD 50 Million	City
Reykjavík Green Bond	Reykjavík	Iceland	Green Bond	Green Building, Waste, Sustainable Land Use, Energy Efficiency & Transport	2018	USD 33 Million	City
Manila Water Sustainability Bond	Manila	The Philippines	Sustainability Bond	Water & Wastewater	2020	USD 500 Million	Private Utility

The selection of blueprints aims to inspire municipalities and other stakeholders developing urban climate infrastructure. To this end, it captures the existing diversity of bond types (e.g., green and sustainability bonds⁶), use cases (e.g., sectors and amount), and issuers (i.e., cities and utilities) for bonds issued to finance urban climate infrastructure in developing and developed countries. Local interests and conditions should be considered before replicating any of the blueprints.

⁶ Sustainability bonds operate very similar to green bonds. However, unlike green bonds, sustainability bonds can also be used to finance green objectives as well as social objectives – for example access to housing, public health, and education.

3.3.1 MEXICO CITY'S GREEN BOND

(see "[Annex 2: Municipal Green Bonds Blueprints](#)" for more detailed information)

Sectors: Transport, water, energy efficiency.

Problem: Mexico City's Climate Action Plan for 2014-2020 outlined key strategies and actions that the city will undertake to improve the quality of life for citizens, reduce carbon emissions and promote sustainable development. Mexico City needed to raise funds to finance its climate action plan.

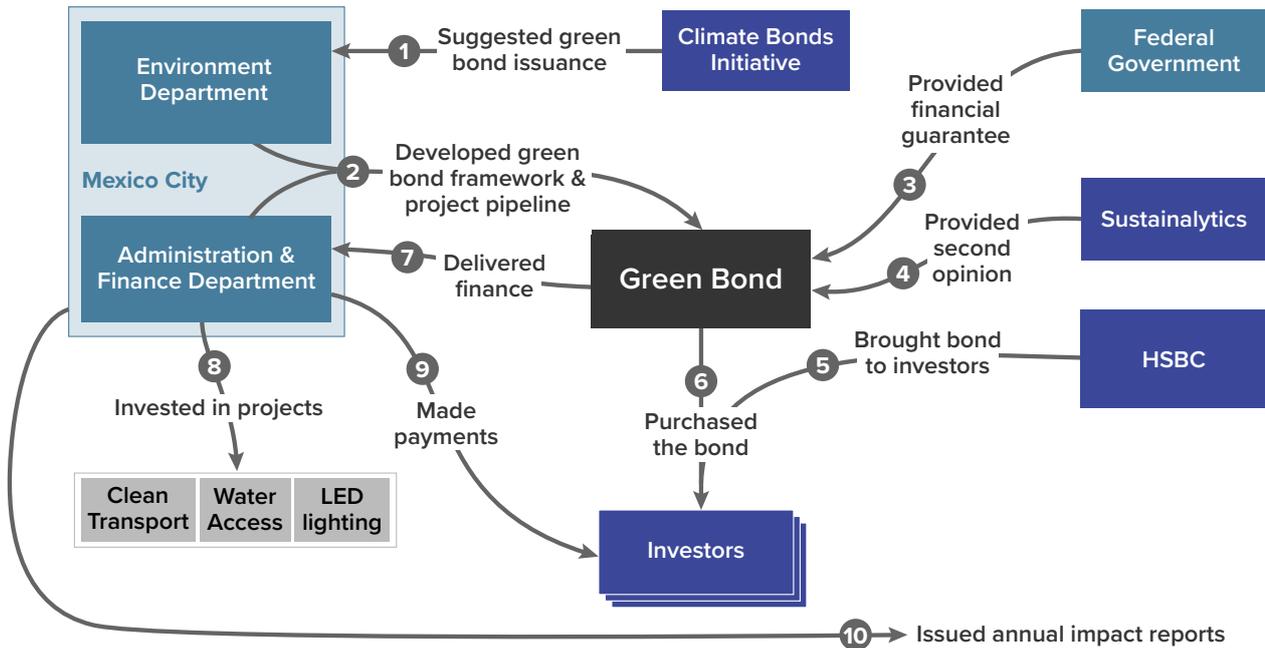
Solution: Mexico City launched the first municipal green bond in Latin America in 2016 to deliver its plan and finance clean transport investments in bus-rapid transit, light rail and metro lines, upgrades to the city's water distribution network, and energy-efficient LED street lighting.

INSTRUMENT MECHANICS:

- Mexico City's Environment Department developed the green bond framework following the Green Bonds Principles⁷, relying on financial analysis support from the Administration and Finance Departments.
- The Administration and Finance Department presented the framework to Federal Government and sought financial guarantees, as municipal borrowing is not allowed by national regulation in Mexico.
- Mexico City hired the sustainability ratings agency Sustainalytics to provide a "second opinion" on the bond and HSBC to negotiate it on the Mexican Stock Exchange market.
- HSBC transferred the proceeds to the Mexico City Administration and Finance Department, which financed the infrastructure projects foreseen in the green bond framework.
- The Environment Secretary reports annually on the projects financed with the bond and their environmental, social, and economic impact.
- Annual interests are paid annually by Mexico City's Administration and Finance Department, and once the bond reaches maturity, it will repay the principal to investors.

⁷ Voluntary best practice guidelines established in 2014 by a consortium of investment banks monitored and developed by an independent secretariat hosted by the International Capital Market Association (ICMA).

Figure 5: Mexico City’s green bond financial mechanism



3.3.2 REYKJAVÍK’S GREEN BOND

(see “[Annex 2: Municipal Green Bonds Blueprints](#)” for more detailed information)

Sectors: Green buildings, waste, sustainable land use, energy efficiency, transport.

Problem: Reykjavík’s climate action plan sets the goal of achieving carbon neutrality by 2040, and the city needed to mobilize funds for its transition.

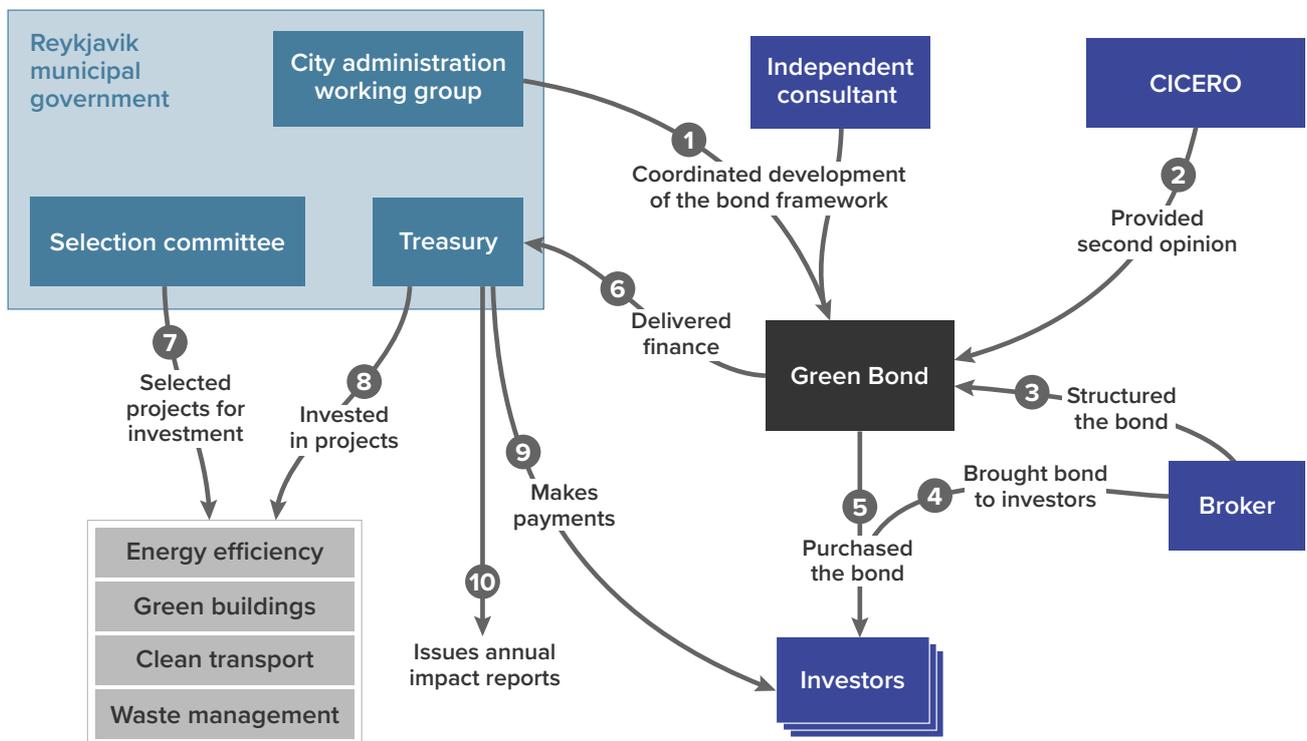
Solution: Reykjavík issued Iceland’s first municipal green bond to finance investments that will help it meet its climate commitments.

INSTRUMENT MECHANICS:

- Reykjavík hired a green bond expert consultant to coordinate the development of its green bond framework.
- Throughout the process, the consultant worked closely with the city’s administrations, establishing a working group to align information across departments and feed the consultant with information.
- The green bond framework received a “second opinion” from the external service provider CICERO Shades of Green.
- Reykjavík hired a financial broker to structure the bond and take it to investors – the broker pitched it to various investors, explaining the concept of green bonds and their benefits for investors.

- Investors submitted their financial offers of how much they wanted to invest and paid to a separate bank account by the Treasury.
- A Selection Committee composed of the city’s administrations was formed to evaluate and shortlist projects financed by the bond – the City Council approved the final list.
- Reykjavík releases an annual green bond impact report outlining the investments made using proceeds from the green bond.
- Reykjavík pays annual interests semi-annually; once the bond reaches maturity, it will repay the principal to investors.

Figure 6: Reykjavík’s green bond financial mechanism



3.3.3 MANILA WATER SUSTAINABILITY BOND

(see “[Annex 2: Municipal Green Bonds Blueprints](#)” for more detailed information)

Sectors: Water, wastewater.

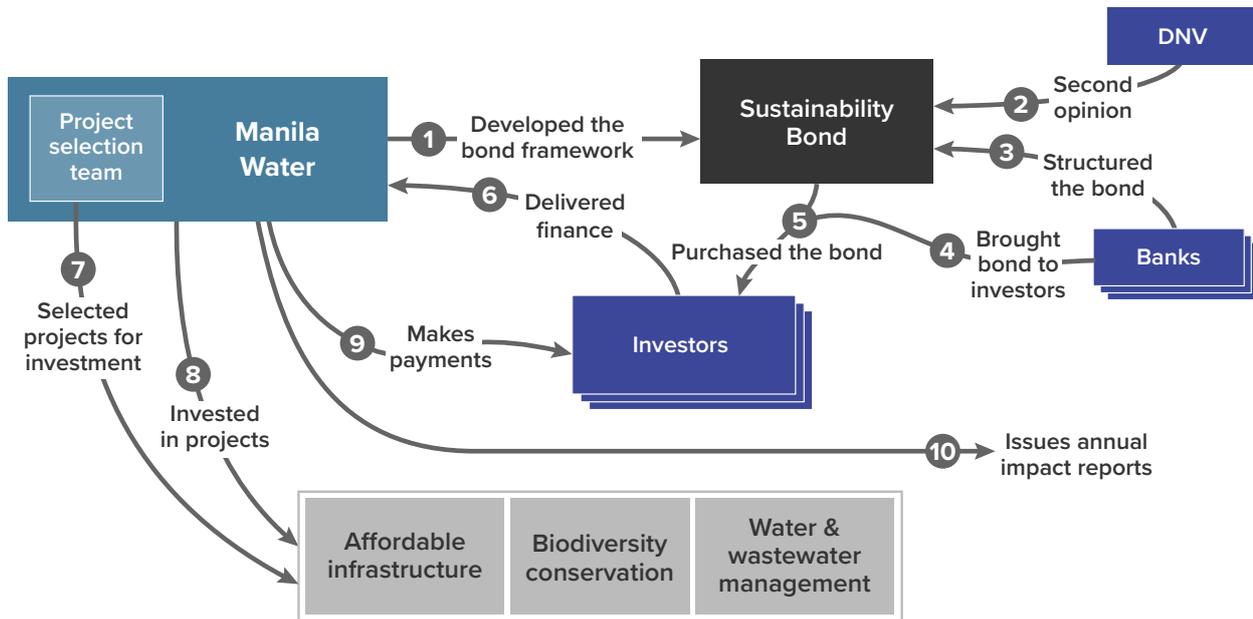
Problem: Manila Water, a publicly listed company with a concession agreement to provide water and wastewater management services in Manilla, faced liquidity issues in the domestic capital market after the COVID-19 pandemic.

Solution: Manila Water issued a sustainability bond in international markets to attract international ESG investors to finance investment in water and wastewater treatment facilities.

INSTRUMENT MECHANICS:

- Manila Water developed its sustainable financing framework in line with the Green Bond Principles 2018, the Social Bond Principles 2018, and the ASEAN Sustainability Bond Standards 2018.
- The sustainable bond framework received a “second opinion” from the external service provider DNV GL Business Assurance Australia Pvt Ltd.
- Manila Water hired a group of banks to help define the bond terms, take the bond to market, and manage transactions.
- Investors submitted their orders and transferred funds to Manila Water – the bond was later listed on Singapore Stock Exchange.
- A project selection team composed of senior executives from Manila Water was formed to evaluate projects eligible for investment.
- Manila Water annually discloses a report on the impact of the bond and the status of proceeds allocation.
- Manila Water pays annual interest to investors and will repay the principal once the bond reaches maturity.

Figure 7: Manila Water’s sustainability bond financial mechanism



3.4 KEY TAKEAWAYS FROM THE BLUEPRINTS

In this section, we summarize the key takeaways based on our analysis of green bonds blueprints and have divided it into “Challenges” and “Success factors”.

3.4.1 CHALLENGES

- **The cities’ lack of municipal borrowing authority and creditworthiness.** In many countries, cities are not legally allowed to borrow money from capital markets under the constitutional arrangements for municipal governance. In the Mexico City blueprint, we highlighted this challenge where the city had to request federal government financial guarantees to issue its green bond. Even where they are eligible to borrow, many cities do not have sufficient creditworthiness to borrow from capital markets.
- **The high operational and human resource costs are required to develop green bond frameworks.** As shown in the Mexico City and Reykjavík blueprints, many cities struggle to train staff on green finance, build their green bond issuance capacity, and develop the systems and processes needed to screen projects and track their investments’ impact due to budgetary constraints. While hiring external experts can help limit the need to train local offices, as shown in the Reykjavík blueprint, it also increases the financial burden on cities. Beyond building local capacity, developing green bond frameworks following international standards also requires hiring expensive external financial service providers for their “second opinions”.
- **Identifying appropriate indicators and delivering robust data to report on using proceeds from green bonds.** Green bonds require transparent reporting of how funds are managed and allocated in line with the issuer’s green bond framework. As illustrated in the Manila Water blueprint, identifying appropriate metrics and tracking the outcomes across a portfolio of investments requires cities or companies to develop new systems and processes, which can be time-consuming and challenging to implement.
- **Fear of the market’s reaction and acceptance of green bonds.** The three blueprints in this section analyze cases where green bonds were issued for the first time in their region or targeting a particular kind of investor. Indeed, leading the way comes with benefits, but challenges are also associated with uncertainty around investors’ appetite for the financial instrument. Several strategies exist to mitigate this risk, including following international best practices (the three blueprints), relying on federal government guarantees (Mexico City blueprint), pitching bonds to potential investors (Reykjavík blueprint), partnering with local financial institutions to raise funds in the domestic market (Mexico City and Reykjavík blueprints) and with international financial providers to raise funds internationally (Manila Water blueprint).

3.4.2 SUCCESS FACTORS

- **City leadership and internal and external cooperation are essential.** City leadership and effective collaboration across city departments were vital for issuing the two municipal green bonds. In the Mexico City blueprint, partnership with the federal government also played a key role, as financial guarantees provided by the national government were needed to launch the bond.
- **Enabling conditions, such as strong credit scores, existing climate action plans, and local “champions”.** In the Mexico City and Reykjavík blueprints,

high ratings based on regular issuance of municipal debt were critical in showcasing the creditworthiness of the cities to investors. Similarly, in both blueprints, the cities had existing climate action plans with strategic investment priorities for which they could use green bond finance, providing a strong grounding for their green bond frameworks. Finally, both blueprints benefited from the leadership of internal key political champions who advocated for the importance of greener investment strategies.

- **Experience issuing traditional bonds and reporting impact.** In the Mexico City and Reykjavík blueprints, the expertise of traditional bond issuance facilitated the local teams to develop their green bond capacity. In the case of the Manila Water blueprint, the company leveraged its impact reporting expertise when developing its sustainable financing framework. Cities that have developed their first green bond frequently have a smoother experience issuing subsequent bonds.
- **Building local officers' and investors' knowledge capacity is critical to developing green bond frameworks and taking bonds to market.** For instance, in the Mexico City blueprint, exchanges with the Climate Bonds Initiative were crucial for the Environment Department to understand the benefits of using green bonds to finance its climate action plan. In the Reykjavík blueprint, the issuers also opted to hire an external technical adviser to coordinate the development process of the green bond framework. Reykjavík also held a series of meetings with potential private investors to help them understand more about sustainable finance and the benefits of investing in municipal green bonds.
- **Hiring financial brokers well positioned to structure the bond and sell them to target investors is vital.** In the Mexico City and Reykjavík blueprints, the selected financial advisor was embedded in the local market and greatly connected to local investors. In contrast, the goal of the Manila Water blueprint was to sell it to international ESG investors keen on sustainable investment options. Manila Water hired multiple financial service providers outside the Philippines to negotiate the bond with foreign investors.
- **The inclusion of financial guarantees.** In Mexico, municipalities are not allowed to borrow directly from capital markets. As seen in the Mexico City blueprint, the city's Administration and Finance Department overcame this issue by signing an agreement with the federal government to provide financial guarantees to the bond, reducing the risks to investors. Depending on the institutional borrowing framework, cities seeking to mitigate their bonds' risks in other countries can explore public debt issuance with guarantees from their national governments, development banks, or other financial institution.
- **Following international best practices throughout the development of green bond frameworks is essential.** In the three blueprints, the issuers followed international standards for developing the frameworks, including the International Capital Market Association's Green Bond Principles and hiring a third party to provide a "second opinion".

4. MUNICIPAL INSURANCE POOLING

4.1 INTRODUCTION

Individual municipal climate insurance provides cities with coverage in the event of climate hazards. Municipal insurance pooling is a financial mechanism where several city governments join together to purchase insurance coverage at better rates by buying as a block for one or more climate-related hazards (demand-side aggregation⁸). Insurance providers can offer better rates by spreading the likelihood of individual claims (i.e., payments to municipalities when a climate shock occurs) across a group of cities and by transferring some of that risk to the reinsurers in the event of significantly high payouts triggered by one or more high-impact climate shocks.

There are no operational municipal insurance pools for climate hazards in developing countries and scarce examples in developed ones⁹. Nevertheless, several municipal risk pools are currently in the design stage, giving some insights into how they could be designed and operationalized. The design of municipal insurance pools could vary depending on several features - including whether it is a national or regional pool, whether it provides insurance against one specific hazard or multiple hazards, whether it is parametric thresholds or through loss assessments, whether there is a single primary insurance provider or various providers and whether reinsurance backs the pool.

4.2 BENEFITS

For cities, there are multiple benefits to participating in pooled insurance financial mechanisms against climate-related hazards:

1. **Economies of scale:** By buying insurance policies as a block, cities can increase their bargaining power, achieve economies of scale, and pay lower premiums than buying individually. It is particularly relevant to more vulnerable cities, which typically pay proportionally more for individual insurance policies.
2. **Reduced transaction costs:** Cities joining pooled insurance mechanisms reduce their transaction costs as they do not need to spend the same resources to evaluate and negotiate policies with insurance companies.
3. **Facilitated peer learning on disaster risk reduction:** Creating a network or a platform with their peers can support cities in learning about disaster risk reduction (DRR) and disaster risk management (DRM) approaches taken elsewhere, which they can apply to their context to reduce their exposure and vulnerability to climate risk.

⁸ Can also be supply-side aggregation if different primary insurers cover each city and a reinsurance provider provides coverage to the overall pool.

⁹ There are several examples of sovereign parametric disaster insurance pools operating at the regional level, which provide valuable insights into the overall design of climate risk pools. These include African Risk Capacity, Caribbean Catastrophe Risk Insurance Facility and the Pacific Catastrophe Risk Insurance Facility.

4. **Easier access to external technical support:** As a network, cities may be able to access additional support from specialized agencies and donors to help them conduct risk modeling exercises, build their capacity and technical knowledge on climate insurance, and design the financial models for their risk pooling facility — this can become an opportunity for cities to collect data and update their risk management strategies, plans, and actions.
5. **Profit retention (for insurance mechanisms co-owned by cities instead of third parties):** When the pool makes limited payouts due to a lack of climate shocks, cities can retain profit and growth of the pool’s resources. They can use this profit for emergency claims in future years.
6. **Predictability of finance** (also applies to individual municipal insurance): By paying regular insurance premiums, cities gain more predictability on their recurrent budget expenditure, as, without insurance, cities have strain placed on their budgets when a disaster occurs.
7. **Quick access to emergency relief funds** (also applies to individual municipal insurance): Cities owning parametric insurance are eligible for fast transfers when disasters occur, helping helps them deliver emergency services and fund reconstruction efforts.

4.3 BLUEPRINTS

Municipal insurance pooling is still an emerging concept within the disaster risk management community of practice. The existing municipal risk pools are either in the feasibility or design stages. Therefore, developing complete step-by-step guidance on setting up these initiatives is not possible yet.

For this reason, this section introduces two municipal pooled insurance financial mechanisms that cities and partners can reflect on when developing their instruments. We have presented the blueprints examined in this section in Table 6 and have thoroughly investigated them in the annexes.

Table 6: Municipal insurance pooling financial blueprints

Blueprint	Cities	Country or Region	Sector	Pool Type	Insurance Type	Hazard
UIIF	10 Cities	Latin America & Caribbean	Adaptation and Resilience	International Region Risk Pool	Multiple Providers	Multiple Hazards
MRPWC	5-6 Cities	South Africa	Adaptation and Resilience	Sub-National Risk Pool	Single Provider	Flooding

We have selected the blueprints presented in this section to inspire national and international region pooled insurance financial mechanisms adopting various set-ups. For this reason, they cover different pool, insurance, and hazard types.

4.3.1 URBAN INFRASTRUCTURE INSURANCE FACILITY

(see “Annex 3: Municipal Pooled Insurance Blueprints” for more detailed information)

Sectors: Adaptation and resilience.

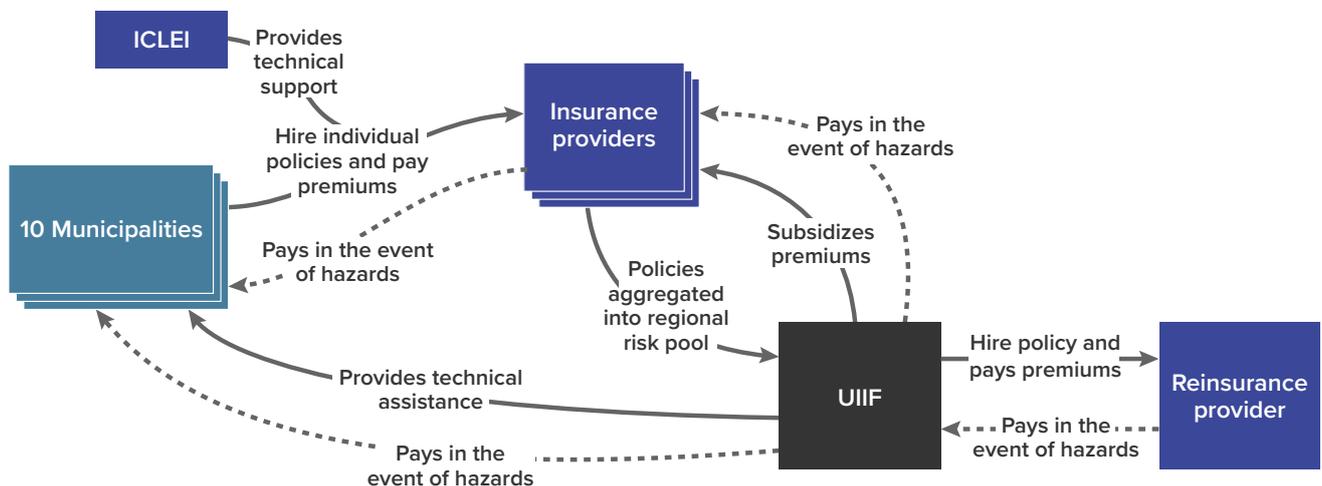
Problem: Cities in Latin America and the Caribbean are vulnerable to various climate hazards but do not have access to affordable insurance mechanisms and rely on national or municipal budgets to pay for disaster response and recovery when shocks occur.

Solution: Implemented by ICLEI, the Urban Infrastructure Insurance Facility (UIIF) aims to help cities access insurance against specific hazards they face. UIIF aggregates the insurance policies into a regional pool that will transfer risk to the reinsurance market, driving down the price of individual city premiums. The UIIF is in its initial stages, and we expect it to be operational by 2025.

INSTRUMENT MECHANICS:

- 10 cities will be selected for the UIIF, considering the region’s diversity to mitigate liquidity risks.
- With support from ICLEI and partners, cities will decide the climate hazards they want to cover under insurance and buy policies from local primary insurance providers.
- Insurance premiums paid by cities to their insurers will be partially subsidized by the UIIF.
- UIIF will aggregate insurance policies into a regional pool, buy group reinsurance, paying them annual premiums.
- UIIF will help build municipalities’ disaster risk reduction, management capacity, and policies.
- In the event of climate hazards, primary insurance companies will pay affected cities.
- If a certain number of individual policies deliver payments, the reinsurance will also pay UIIF, which will pay cities and primary insurance providers.

Figure 8: Proposed structure of the Urban Infrastructure Insurance Pool



4.3.2 MUNICIPAL RISK POOL IN SOUTH AFRICA'S WESTERN CAPE

(see “Annex 3: Municipal Pooled Insurance Blueprints” for more detailed information)

Sectors: Adaptation and resilience.

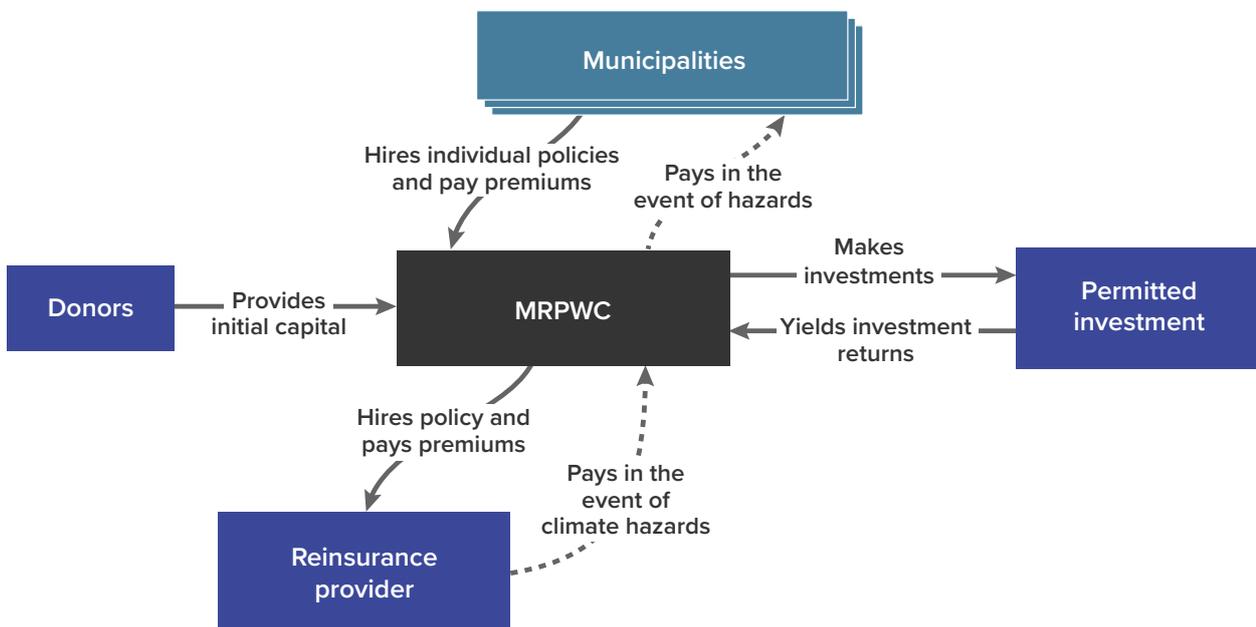
Problem: The Western Cape in South Africa is vulnerable to flooding. When disasters occur, municipalities rely on central government transfers for emergency support. These payments are not always rapid enough to provide immediate disaster relief to those affected by the crisis.

Solution: With the provincial government’s leadership and support from multiple partners, municipalities in the Western Cape are developing the Municipal Risk Pool in South Africa’s Western Cape (MRPWC). As the world’s first sub-sovereign pooled insurance facility, the facility will be a special-purpose company owned and managed by municipalities. It offers parametric disaster insurance coverage to cities, helping them provide emergency support to their affected citizens. Still, at the design stage, MRPWC is expected to offer premiums lower than those negotiated individually by private companies and become operational by 2025.

INSTRUMENT MECHANICS:

- Donors will provide initial capitalization.
- Municipalities will buy policies from MRPWC, paying annual premiums which donors could partially subsidize.
- MRPC will allocate the money in permitted investments to grow capital reserves.
- MRPWC will purchase reinsurance coverage in the private market.
- In the event of climate hazards, MRPWC will pay cities, and the reinsurance company will pay MRPWC.

Figure 9: Proposed structure of South Africa’s municipal risk pool



4.4 KEY TAKEAWAYS FROM THE BLUEPRINTS

In this section, we summarize the key takeaways based on our analysis of green bonds blueprints and have divided it into “Challenges” and “Success factors”.

4.4.1 CHALLENGES

- **Lack of implemented municipal pooled insurance examples to learn from.** As there are no operational municipal insurance pools for climate hazards in developing countries, creating instruments requires “learning by doing”, which depends on strong leadership and immense political commitments. This phenomenon exemplifies in the case of the two blueprints where arrangements have been (and are expected to be) at the design stage for a long period. For instance, in the UIIF blueprint, ICLEI and partners spent significant resources developing and fine-tuning the instrument to ensure it is fit for purpose and capable of attracting municipalities from different countries, as well as private insurance and reinsurance companies.
- **Insufficient regulation supporting the establishment of pooled insurance mechanisms.** Designing and implementing first-of-a-kind financial instruments can require enhancements in the local enabling environment, for which political will is key. The MRPWC blueprint, for instance, places political commitment to test, as the instrument’s creation now depends on the outcome of a participatory process to determine if pooled insurance mechanisms are permissible under South African law.
- **Premiums can be too expensive for municipal budgets, and cities may need premium subsidies to purchase insurance.** Due to competing priorities and stretched budgets, cities in the two blueprints may require premium subsidies to participate in the risk pool in the long term.

4.4.2 SUCCESS FACTORS

- **Third-party leadership, coordination and cities’ commitments are crucial.** As a financial mechanism that has not been applied in developing countries, the design of municipal insurance pools requires experimentation, innovation, and collaboration, for which leadership and coordination are key. Third parties embedded in the local context assumed this role in the two blueprints. In the UIIF blueprint, the city network ICLEI took the lead in engaging and selecting the right mix of cities to participate in the instrument. In the WRPCW, the Western Cape Provincial Government played this role. Still, despite third-party leadership and engagement, the two instruments would hardly work without cities committed to fighting climate change and interested in participating in the pooled insurance.

- **Need partnerships with specialized institutions supporting financial and climate risk modeling exercises is essential.** The challenges of designing and implementing pioneering innovative municipal pooled insurance are better met with top-notch technical expertise. For example, great financial modeling considering the right pool size and cities mix is incredibly important to ensure the viability of the insurance instrument.
- **Disaster risk management capacity-building.** Technical knowledge is key to understanding cities' exposure to climate hazards of different severities. Specialized support from technical partners plays a big role in the instruments' design in the two blueprints. In the UIIF blueprint, external support was also topped by local officials' capacity-building efforts to support instrument implementation and improve municipalities' responses to climate hazards.

5. CONCLUSION

Financial aggregation is an essential tool for cities to scale green investment, help deliver climate action plans and boost adaptation and resilience against climate hazards. In addition, it can be a powerful resource to deepen green capital markets, particularly in developing countries. Furthermore, it can improve overall climate action coordination and peer learning between city departments and cities in the same international region or country. Nevertheless, financial aggregation falls short of its potential in many parts of the world, often offering limited successful experiences cities and partners can learn from to develop their instruments. This report aims to address this gap by examining eight financial aggregation case studies and providing cities and local partners with a practical reference they can use when developing their instruments.

Looking across the blueprints, many challenges cities and partners face in implementing financial aggregation instruments refer to the enabling environment. Pooled procurement platforms struggle to sustain long-term commitments from municipalities due to elections and changes in the political leadership; lack of municipal borrowing authority and cities' creditworthiness prevents municipal green bonds; and to legally establish insurance pooling facilities, municipalities may require regulatory changes.

Additionally, local officials and partners often lack the technical expertise to develop complex pooled mechanisms such as pooled procurement platforms, municipal green bonds, or pooled insurance facilities. Lack of sufficient knowledge also exists on the supply side. Even in developed markets, the private sector needs to have the necessary green finance understanding of the benefits of investing in green assets such as green municipal bonds.

Overcoming these barriers requires cities' strong political commitment and engagement. Third parties – such as city networks or other government levels – can play a key role in leading and coordinating the instrument implementation. They are often well-positioned to attract and select the right cities to participate in the instrument. These parties often have easier access to donors (e.g., countries and international agencies) and technical partners (e.g., NGOs, consultants, and international agencies) that can cover initial instrument set-up costs and help fill the technical knowledge gaps cities and partners face. Finally, private investors should build their climate finance capacity to consider more green infrastructure opportunities to align their portfolios with Paris Agreement goals.

Future efforts should disseminate best practices worldwide through workshops and events to continue main streaming municipal financial aggregation. Research-wise, future studies could investigate other aggregation experiences and examine different financial aggregation instruments, such as pooled debt finance. Finally, as there are no operational municipal pooled insurance instruments in emerging markets, developing blueprints for this financial aggregation type carried out in this report could also be reconducted in the future.

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