Increasing Subnational Pension Funds' Climate Investments

September 2022

CITIES CLIMATE FINANCE LEADERSHIP ALLIANCE

CLIMATE POLICY INITIATIVE

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ABOUT THE CITIES CLIMATE FINANCE LEADERSHIP ALLIANCE

The Cities Climate Finance Leadership Alliance (the Alliance) is a coalition of leaders committed to deploying finance for city level climate action at scale by 2030. It is the multi-level and multi-stakeholder coalition aimed at closing the investment gap for urban subnational climate projects and infrastructure worldwide. Climate Policy Initiative (CPI) serves as Secretariat for the Alliance. Funding for the Alliance's activities is jointly made available through two German government ministries: The Federal Ministry for Economic Cooperation and Development (BMZ) and the Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU).

ABOUT CPI

CPI is an analysis and advisory organization with deep expertise in finance and policy. Our mission is to help governments, businesses, and financial institutions drive economic growth while addressing climate change. CPI has six offices around the world in Brazil, India, Indonesia, the United Kingdom, and the United States.

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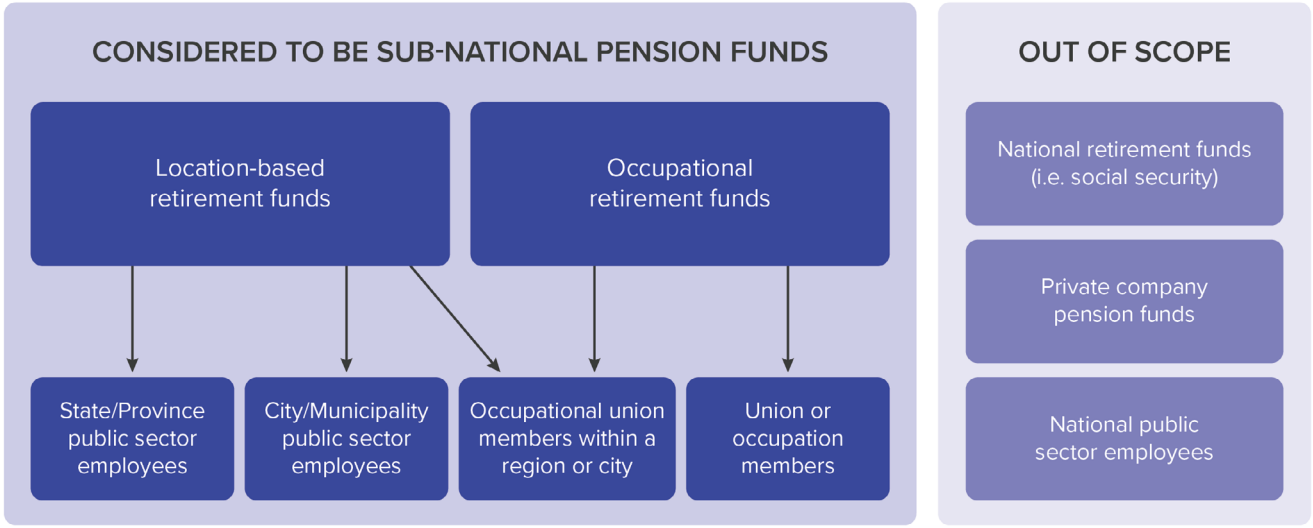
EXECUTIVE SUMMARY

Meeting the goals of the Paris Agreement will require increasing the current rates of global climate investments by six times by 2030. In cities alone, trillions of dollars will be needed across sectors such as renewable energy, public transportation, water and waste, and green buildings. This infrastructure is often too large for city governments to fund on their own despite the potential for financial and social benefits. Pension funds, which represent USD 56 trillion in assets globally, will be a key source of private capital for climate action in the next decade.

Subnational pension funds, in particular, represent significant sources of untapped capital. As shown in Figure 1, this brief defines subnational pension funds as those that limit membership to a set location beyond the national level (province, region, state, city) or occupation (i.e. healthcare workers or union members). Subnational pension funds are long-term investors willing to prioritize consistency over the possibility of outsized returns and are familiar with local investment conditions and opportunities. With these factors in mind, subnational funds have an opportunity to be leaders in financing a just climate transition.

Figure 1 ES: Diagram of pension funds considered in this report



Subnational pension funds vary widely in their size, membership demographic, and management of assets, even within a country. This brief examines seven countries with varying types of subnational pension funds – Brazil, Canada, Germany, Netherlands, South Africa, United Kingdom, and United States – with an estimated aggregate of at least USD 9.5 trillion in assets under management. In examining the subnational pension funds within each country, this brief identifies several common structural elements of a subnational pension fund and examines how these elements impact a fund's willingness to invest in urban climate-smart infrastructure.

Subnational pension funds face a variety of barriers to investing in urban climate-smart infrastructure. Most institutional investors face a common set of barriers to these investments, including technology risk (both real and perceived), navigating local and national regulations, and a lack of investment-ready, bankable projects with suitable investment mechanisms. Subnational pension funds face some of these common barriers more acutely due to their size and low risk appetite, as well as additional challenges to scaling their climate infrastructure investments. Funds with different structural elements and attributes will face each of these barriers to varying degrees.

There are also a variety of opportunities for subnational pension funds to overcome barriers and increase investment in urban climate-smart infrastructure projects. These include opportunities within fund structure, such as changing asset management strategies and directing investment toward local projects, which can increase available capital and reduce risks. There are also financial vehicles that that can overcome specific barriers and build capacity, ranging from guarantees and first-loss tranches to green bonds and supply-side aggregation. Some of these opportunities can be pursued by the subnational pension funds themselves while others require the involvement of other actors like public finance institutions and city governments, but all require assistance from enabling environmental factors, such as a strong pipeline of bankable projects.

Looking forward, there are steps that subnational pension funds, city and state governments, infrastructure developers, and public finance institutions can take to facilitate subnational pension fund investment in climate-smart infrastructure.

- Subnational pension funds can make net zero commitments and set interim targets, build internal capacity, and utilize aggregation mechanisms to tap into benefits of scale.
- Local governments can provide long-term regulatory stability and help align priorities, in addition to working with developers to set up project preparation facilities to boost the supply of bankable projects.
- Infrastructure developers can work closely with city governments and subnational pension funds to provide financing options that both appeal to subnational pension fund investment teams and address city infrastructure needs.
- Public finance institutions can invest in blended finance instruments to de-risk investments and crowd-in private finance.

1. INTRODUCTION AND CONTEXT

In order to meet the goals of the Paris Agreement, climate finance will need to increase almost six times to reach USD 4.35 trillion by 2030.[1] Reducing emissions and building climate resilience will require both scaling innovative technologies and expanding mature technologies that provide stable economic returns over decades.[2] Public finance, from actors such as governments and multilateral development banks, will play a crucial role in de-risking and crowding-in private investment in novel technologies and developing economies. Public finance is limited in size, however, and private finance will need to fill the multi-trillion-dollar gap.

In cities alone, mitigating and adapting to climate change will require substantial amounts of capital, as outlined in the 2021 State of Cities Climate Finance report. In 2017/2018, climate finance flows for cities reached an estimated USD 384 billion annually on average, far short of the estimated trillions needed.[3] Highlighting the gap between financial need and potential, in 2018 the International Finance Corporation (IFC) estimated that cities in emerging markets globally had the potential to "attract more than $29.4 trillion in cumulative climate-related investments in six key sectors by 2030", those sectors being waste, renewable energy, public transportation, water, electric vehicles, and green buildings.[4] These climate-smart infrastructure projects, ranging from transit systems to waste processing plants, are often too large for city governments to fund on their own and therefore are not built quickly, despite the potential for financial and social benefits.

One of the key sources of private capital for climate action will be pension funds, sources of patient, long-term capital interested in consistent positive returns. Overall, a growing number of pension funds are looking to decarbonize their whole portfolio. In addition to commitments to increase investment in sustainable equities and fixed income instruments, these funds can increase their impact through investing in sustainable alternatives, including climate-smart infrastructure. Pension funds, which are estimated to manage more than USD 56 trillion in total assets globally[5], are well suited to investing in large infrastructure projects in mature markets, such as wind and solar, battery storage, and mass transit. To this point, however, pension funds make up a small portion of overall climate finance investment[6], despite interest from asset owners in expanding climate action.[7]

Subnational pension funds specifically represent significant sources of untapped capital. This brief defines subnational pension funds as those that limit membership to a set location beyond national level (province, region, state, city) or occupation (i.e. healthcare workers or union members). Similar to other pension funds, subnational funds are well-

1 Climate Policy Initiative, 2021.
2 Intergovernmental Panel on Climate Change, 2022.
3 Cities Climate Finance Leadership Alliance, 2021.
4 IFC, 2018.
5 OECD, 2022.
6 Climate Policy Initiative, 2021.
7 UNEP FI, 2022.

positioned to make investments in climate infrastructure, especially in local projects and portfolios given their familiarity with market conditions and regulations. In addition to the climate benefits, these investments are often fiduciarily responsible and benefit local communities, which is a mandate for some funds and an ancillary benefit for others. Given the urgency of the needed transition, the stark need for long-term capital to develop, build, and operate climate solutions, and the growing number of investors interested in being socially responsible, subnational pension funds have an opportunity to be leaders in financing a just climate transition.

This report focuses on the ways subnational pension funds can increase investments in climate-smart urban infrastructure.[8] There is no universally accepted definition of climate-smart urban infrastructure, but consistent with previous research it is defined here as any physical projects which directly contribute to greenhouse gas mitigation or provide adaptation benefits within a city. These projects can cover a wide range of sectors, including renewable energy, low-carbon transport, nature-based solutions, waste and wastewater, and green buildings.

This brief includes an overview of the current landscape of subnational pension funds, barriers and opportunities for investing in climate-smart urban infrastructure, and recommendations for subnational pension funds, infrastructure developers, and policy-makers to increase and support such investments. This evaluation was undertaken through a combination of desk research, literature review, and expert interviews.

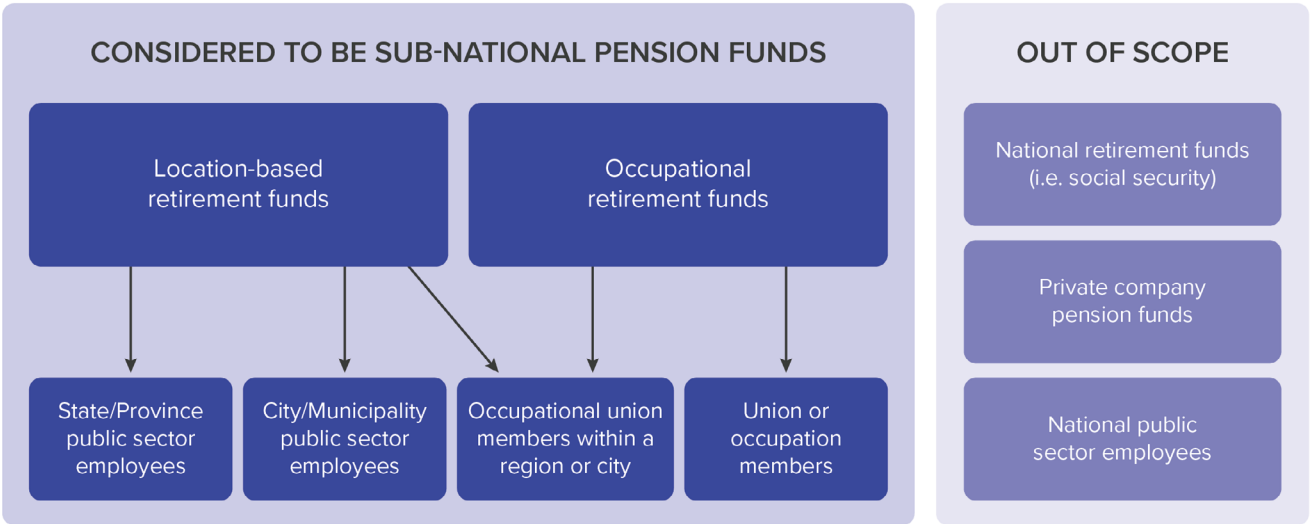
8 Within this brief, all mentions of "climate-smart infrastructure" will refer to this definition.

2. LANDSCAPE OF SUBNATIONAL PENSION FUNDS

This brief defines subnational pension funds as pension funds that limit membership to a set location or occupation. This includes funds for public sector employees within a location – province, region, state, city – and occupation-specific funds that cover a variety of unions and occupations. Occupational funds are included as they are often convened at a city or state level and have a clear link back to city residents, as well as being a common form of available pension fund capital. Although varying over their structure, these types of subnational pension funds can have similarities regarding membership, structure, and fiduciary duty, and face many of the same barriers and opportunities when it comes to investing in climate-smart infrastructure. To note, this excludes national pension funds that cover the general populace, such as Social Security in the United States, and others with a national mandate, as well as private pension funds for private or state-owned entities. We do include subnational pension funds where the assets are managed by a national board (such as in Brazil and South Africa), as each fund in theory retains decision-making authority.

Figure 1 illustrates which types of pension funds are considered in and out of scope for this brief.

Figure 1: Diagram of pension funds considered in this report



Due to the difficulty in obtaining information on subnational pension funds based in least-developed economies, this brief will largely focus on subnational pension funds based in developed and middle-income economies.

2.1 REPRESENTATIVE STRUCTURES OF SUBNATIONAL PENSION FUNDS

Subnational pension funds vary widely in their size, membership demographic, and management of assets, even within a country. Table 1 is an attempt to corral a set of common structural elements as best as possible into representative categories, but there will be exceptions within each country. Each of the structural elements outlined in this section influences a subnational pension fund's appetite to invest in climate-related infrastructure projects and portfolios, to different degrees, as explained in the table below.

Table 1: Structural elements of representative subnational pension funds

Country	Membership Demographic	Asset Management	Defined Benefit or Contribution	Representative Assets Under Management (billions)	Relevant Information	Representative Funds
Brazil	Public sector employees by geography Unions by occupation	Many pooled and management outsourced to the Federal Pension Fund	Defined contribution	Under USD 10bn	Over 2,000 individual pension funds for public employees, determined by geography and position	Pension Regimes for Government Workers (RPPS)
Canada	Geographically by Province for public sector employees, with some occupational differentiation	Directly managed	Defined benefit	USD 100bn	Pooled into a set of eight large funds, known for infrastructure and climate investments	CDPQ, Ontario Teachers' Pension Plan, Ontario Pension Board
Germany	Combination of geographic and occupational for both public sector and unions	Directly managed, with an occasional pooled structure	Defined benefit or defined contribution	Under USD 50bn	One large, pooled fund covering several occupations, while un-pooled funds remain small	BVK, Nordrheinische Arzteversorgung, BWVA
Netherlands	Occupational, including public sector	Directly managed	Defined benefit	USD 50bn – 150bn	Broad spread of fund size depending on occupation covered	PFZW, bpfBOUW, PMT
South Africa	Public employees by geography or role	Management often outsourced to the national pension fund GEPF	Defined benefit or defined contribution	Under USD 10bn	Originally over 10,000 funds, many have now been pooled and externally managed	MEPF, CMPF
United Kingdom	Public employees by geography	Mix of managed directly and externally managed by third parties	Defined benefit	Under USD 50bn	Local public employee funds have combined into more than eight pools that operate as asset managers.	LGPS, GLIL
United States	Public employees by geography	Mix of managed directly and externally managed by third parties	Defined benefit	USD 50bn – 100bn	Most states and cities have funds for public employees, varying widely in size	CalPERS, NYS

Pension Demographic: A subnational pension fund's membership demographic can help determine its contribution profile – the size and stability of members paying into the fund – which plays a part in determining the fund's risk appetite for climate-smart investments. In the countries evaluated here, subnational pension funds' membership is most often determined by geography or occupation, or a combination of both. Public employees, a stable demographic, were found to have pension funds at city and state/province levels for each of the countries evaluated, and are particularly prevalent in the U.S., UK, and Canada. In Germany and the Netherlands, subnational pension fund membership is based on occupation (and often location), expanding beyond public employees to include other careers such as doctors, veterinarians, orchestra musicians, and stage artists.

Asset Management: Some of the subnational pension funds surveyed are large enough to directly manage their own investments, particularly large subnational pension funds in the U.S., UK, and Canada. For smaller pension subnational pension funds, it may be more economical to outsource some or all of the investment decisions and oversight to an asset management firm due to the time and expense of conducting due diligence. In South Africa and Brazil, an increasing number of smaller subnational pension funds are managed by the country's national pension fund board. The pooled UK funds, which have successfully centralized asset management and directly manage most investments, allow each individual subnational pension fund of the pool to maintain control over the fund's strategy. While climate-friendly investments are largely encouraged in the UK, this control is critical for the implementation of net zero commitments and including climate investments into the understanding of fiduciary duty.

Defined Benefit or Contribution: Another distinguisher of the potential risk appetite of a subnational pension fund is whether it is a defined benefit plan or a defined contribution plan. In a defined benefit plan, employers fund and guarantee a specific retirement benefit for each employee and assume the risk of financial obligation. In a defined contribution plan, such as a 401(k)[9] or other voluntary retirement plans, the burden of saving and investing is on the employee, and the contributions received in retirement are determined by the amount contributed. A defined benefit fund has the advantage of being able to estimate its annual contribution flows in and its payments out with relative certainty, allowing the fund to have a clear view of assets that need a stable return and those that can be directed towards riskier or alternative[10] investments, although these funds have traditionally been risk averse and need higher yielding investments.[11] While defined contribution plans may need more liquidity given the potential variance in payments in, they are largely considered to be less risk-averse as the risk is distributed across the participants.[12]

Size: The sizes of subnational pension funds vary significantly, both between countries and within countries, as discussed in Section 2.2, and can have a significant impact on both a fund's risk appetite and opportunities to invest in climate-smart infrastructure. Larger subnational pension funds have more financing for capacity building and in-house strategy and investment, which can support increased climate investments, while

9 A 401k plan is a retirement savings plan offered by many employers in the United States. They are usually defined contribution plans that offer tax advantages for the saver.
10 "Alternative investments" generally includes non-equity or bond investments, including real estate, infrastructure, and other real assets.
11 Franzen, 2010
12 Ibid

smaller subnational pension funds may have to aggregate with others, may be more impacted by risk, and may not have as much control on individual investment decisions due to the need to outsource asset management.

Representative Funds: The table above pinpoints several funds in each country that are well known and representative of the country's approach to subnational pension funds, and some have evidence of climate-friendly infrastructure investments. These are often larger subnational pension funds, but their structural elements have been adopted by many of the smaller subnational pension funds within the same country.

2.2 ESTIMATED SIZE OF SUBNATIONAL PENSION FUNDS

For the seven countries described in the previous section, this report estimates subnational pension funds manage **at least USD 9.5 trillion in aggregate.** The total assets under management for each country's subnational pension funds differ dramatically. State and local pension funds in the United States have nearly USD 6 trillion in assets, spread across dozens of subnational pension funds which themselves vary in size. CalPERs and CalSTRs, two of the largest subnational pension funds both globally and within the U.S., have USD 426 billion and USD 259 billion in assets under management (AuM), respectively, while the Orange County public employees' pension fund has less than USD 20 billion under management.[13] Other countries have less than USD 500 billion in assets managed by subnational pension funds – in Brazil and South Africa, most of the individual municipal pension funds have AuM well under USD 10 billion. Several countries have a large concentration of assets in just a few subnational pension funds.

There are no data estimating the total size, by assets under management, of subnational pension funds globally or within most countries. This brief uses two methodologies to calculate the approximate size of the subnational pension fund market when country-level data are unavailable. While none of these figures are exact due to the fractured nature of the market and the ever-changing value of market-based assets, the goal is to provide a sense of scale and distribution.

This brief applied two methodologies:

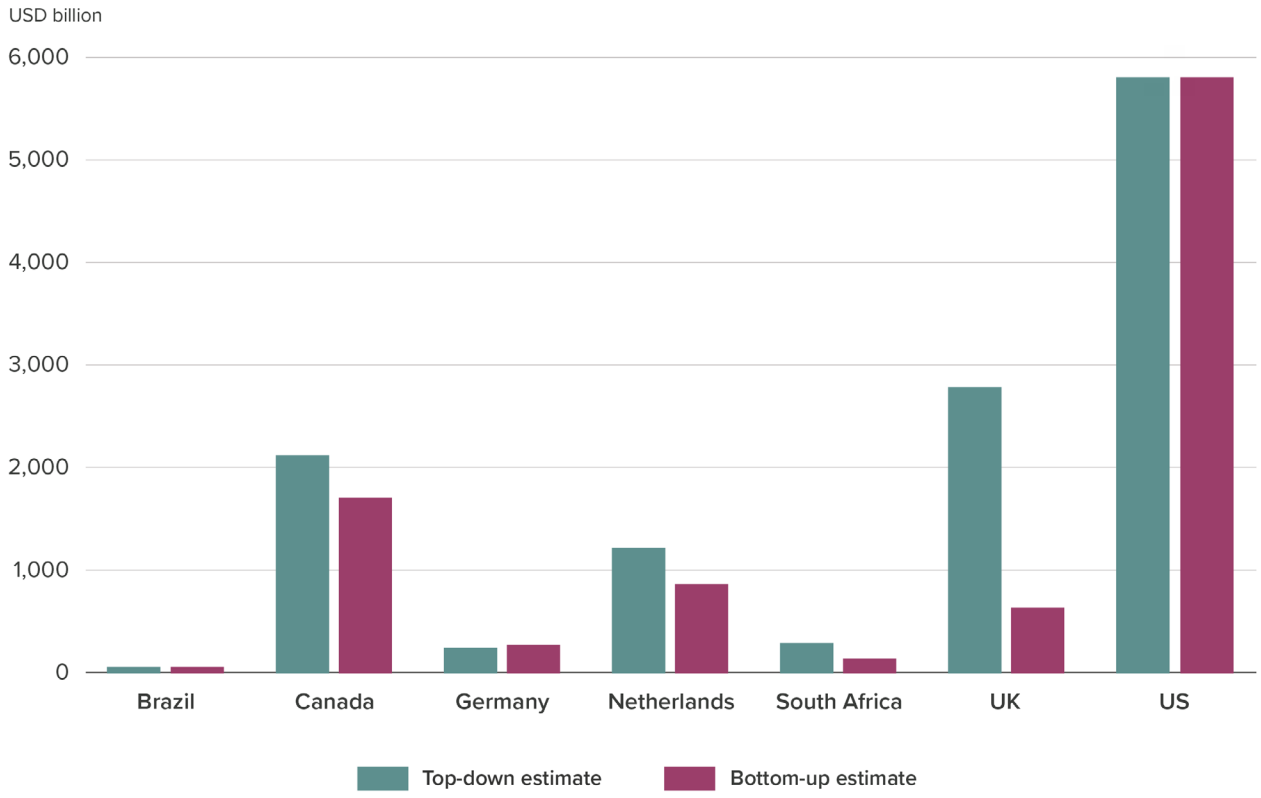
- Top-down: uses the OECD's Pension Markets in Focus report and data[14] as the total amount of retirement assets in each country. Then, for each country identifies the funds for the national population, national public employees, and private companies through desk research, including the Pensions & Investments (P&I) list of the world's 300 largest retirement funds.[15] These funds are then excluded from the OECD figure for each country. For countries with a high number of smaller, private pension funds, such as the United Kingdom, the top-down approach is much more of an overestimate.

13 Pensions & Investments 2021
14 OECD 2022, Table A.B.2 Total assets in retirement savings plans, in millions of USD, 2010-2020.
15 Pensions & Investments 2021

- Bottom-up: based on desk research, including the P&I list of largest retirement funds and other country-specific data, identifies the largest subnational funds and sums within each country.

Figure 2 provides an overview of the top-down and bottom-up estimates of aggregated subnational pension fund size by country.

Figure 2: Estimated size of subnational pension fund assets by country



3. BARRIERS AND OPPORTUNITIES FOR SUBNATIONAL PENSION FUNDS INVESTING IN CLIMATE-SMART INFRASTRUCTURE

3.1 BARRIERS

Investing in climate-smart urban infrastructure generally presents unique barriers for financiers, as described in previous CCFLA research.[16] These infrastructure projects, ranging across sectors such as energy, transport, buildings, waste, water, and adaptation and resilience, often face planning and strategic barriers. These barriers can include higher perceived risks of new technologies and biases that favor the status quo over innovation with few incentives to make the low-carbon transition. Local and national regulations on infrastructure and planning may also limit the ability of developers and investors to integrate solutions efficiently and with low development costs and risks. Additionally, investors that are interested in scaling their climate ambition may face a relative lack of investment-ready, bankable projects, high upfront construction and development costs with long-term payback periods, and a lack of suitable investment mechanisms.

The structural and external barriers that subnational pension funds face are listed in Table 2 and described more fully later in this section. Subnational pension funds seeking to invest in climate-smart infrastructure can face some of the more common barriers more acutely than other investors due to size and a low-risk appetite, in addition to facing barriers that are unique to subnational pension funds. Funds with different structural elements and attributes will face each of these barriers to varying degrees.

16 Conway et al. 2020

Table 2: Barriers faced by subnational pension funds

Structural vs. External	Category	Barrier	Short Description
Structural	Inherent to each fund	Risk appetite	Climate-smart infrastructure is newer/has less established track records, and therefore viewed as risky by investment committee.
		Fund size	Small funds are unable to afford the bespoke due diligence required for infrastructure projects and portfolios.
	Internal strategic decisions	Fund strategy	Not all funds have a dedicated strategy or only have a limited potential allocation for actively managed alternative investments (climate-related or not), and may see climate-smart investments as separate from fiduciary duty.
		Outsourced management	Smaller funds can use external asset managers to save costs, and may not have input into specific investments or strategies.
External	Projects and investments	Ticket size	Climate-smart urban infrastructure projects or portfolios can be too small for large funds that have a minimum investment size.
		Lack of project pipeline	Insufficient number of, or support structure to develop, commercially viable, bankable projects without taking on origination and development risks.
	Markets and policy	Varied regulatory environments in foreign markets	Funds tend to be located and well-versed in a single jurisdiction, developing familiarity with regulations, taxes, and policy goals. For funds that want to diversify by investing in foreign markets, varied regulations create additional development costs to understand the new context. Funds may also be unable by mandate to invest in developing economies.
		Market conditions	Changing regulations and political environments can lead to instability and jeopardize consistent long-term returns, especially in international investments.

3.1.1 STRUCTURAL BARRIERS

Risk appetite: Pension funds have a legal fiduciary responsibility to provide for their members and, for defined benefit funds, need to have a consistent and reliable return to pay out liabilities. This leads many subnational pension fund investment committees to be conservative in allocating capital and wary of embarking on expensive and uncertain projects, even if there is the potential upside of an outsized return. This concern applies to new climate solutions, emerging fund managers (such as those with less than five years of track record, which is common in climate investments), and investments in

countries with higher perceived risks, such as in emerging markets and developing economies.[17]

In addition to board biases, risk-aversion can manifest through credit rating pressure. Subnational pension funds may have a requirement to invest in projects or funds with a certain credit rating, and rating agencies may penalize climate-smart infrastructure since it can be viewed as novel and therefore carries some uncertainty. As technologies continue to mature and investment in the sector grows, this barrier lowers, as has been seen with large-scale renewable energy projects in developed economies. On the flip side, the low operating costs of typical clean technologies can compare favorably to fossil fuel projects which can exhibit higher operating cost volatility.

Fund size: Larger subnational pension funds are often associated with in-house managers and a broader investment portfolio. Infrastructure investments can require more due diligence and staff time than allocating the same capital to an index fund tracking listed equities and bonds and require more in-house capacity. As many subnational funds are small, this due diligence may be too costly without the benefits of scale.[18]

Fund strategy: Often, pension funds have set percentage allocations for their portfolio, and only allow a small portion of the overall fund to be invested in "alternatives," which generally includes illiquid equity or debt investments like real estate, infrastructure, and other real assets. The percentage allocated is often in the range of 5-10%, of which a fraction will be climate-focused, although for some funds alternatives can be up to half of the portfolio.[19] Without a higher allocation or the option for actively managed alternative investments, subnational pension funds cannot devote capital to climate-smart infrastructure projects and portfolios. To address this CDPQ, discussed in Box 1, put climate-smart infrastructure at the forefront of its investment strategy.

Outsourced management: Due to size constraints, some subnational pension funds outsource investment management to private asset managers to save costs. Depending on the size of the allocated capital and the asset manager, the fund may have limited say over specific investments or strategies, including climate strategies.

17 OECD, 2018.
18 Climate Policy Initiative, 2013.
19 OECD 2021a.

Box 1: CDPQ Case Study

CDPQ was initially created in 1965 to manage the funds of the Quebec Pension Plan and has since grown to be the aggregated hub for over 45 pension and insurance plans in Canada.[20] The fund has a mandate to "achieve optimal financial returns and contribute through its activities to the vitality of the economy while safeguarding the capital under management." It now holds approximately USD 330 billion in assets under management and the subnational pension fund has spent the last 20 years specializing in infrastructure, becoming the second-largest institutional investor in infrastructure worldwide.[21] The fund currently aims to double the size of the infrastructure portfolio and to triple the value of its low-carbon assets by 2024, to reach its net zero by 2050 goal. Unlike GLIL, CDPQ has a global spread of investments, although approximately 70 percent of investments are in the United States or Canada.

Source: CDPQ website[22]

The CDPQ model is unique in that the CDPQ Infra subsidiary serves as the principal contractor for all major public infrastructure projects, allowing it to manage the project from planning to financing to execution. The relationship between the fund and the CDPQ subsidiary acts as a de-risking mechanism, since CDPQ not only has a strong pre-existing relationship with the contractor but both the fund and contractor have a long-term specialization and experience in infrastructure projects.

In 2015, CDPQ worked with the Quebec government to develop a 67-kilometer public transit system in Montreal, the Reseau Express Metropolitan (REM). The project was financed through a joint public-private partnership, with most of the USD 53 billion funding coming from CDPQ, the Government of Quebec, and the Canada Infrastructure Bank. Due to the geographic spread of the project and the need to collaborate with the 12 cities and boroughs of the greater Montreal area, clear frameworks were put in place with the Quebec government on how to secure land and address bylaws, reducing policy risks for CDPQ.

Due to CDPQ's size and unique specialization in large-scale infrastructure projects, the REM project was aligned with the fund's risk appetite and served its mission to support local development. This serves as an example of how fund size and maturity, along with a stable membership base and a mandate for local investment, can increase the risk appetite for large-scale climate-smart infrastructure projects.

20 CDPQ 2021
21 CDPQ 2021
22 CDPQ Infra 2022

3.1.2 EXTERNAL BARRIERS

Ticket size: To offset the cost of due diligence and given their multi-billion-dollar size, investors typically want to allocate hundreds of millions of dollars to an infrastructure project or portfolio.[23] For subnational pension funds, to manage risk they may also only be able to comprise a fraction of the overall project or portfolio investment. As an example, a subnational pension fund might have a USD 100 million minimum investment but a maximum holding in a project of 20% - therefore the project needs to be at least USD 500 million. However, many climate-smart urban infrastructure projects and portfolios are not this large as coordinating a project of that size is beyond the expertise of most city government staff. The high diversity of term sheets and project details makes aggregating projects across jurisdictions difficult for subnational pension funds to manage on their own. GLIL Infrastructure, outlined in Box 2, is a dedicated infrastructure fund designed to overcome ticket size and internal capacity issues through specialization.

Box 2: GLIL Infrastructure Case Study

The GLIL Infrastructure fund was established in 2015 by two subnational pension funds in the UK, the Greater Manchester Pension Fund and the London Pension Funds Authority, with the explicit aim to deploy capital into alternative investments such as solar and wind farms, battery storage, and waste-to-energy facilities. Since then, additional UK subnational pension funds have joined, bringing current assets under management to approximately USD 4.5 billion and including seven subnational UK pension funds.[24]

GLIL's funding is provided by multiple subnational pension funds, making it a "fund of funds." This allows GLIL to specialize in alternative investments while allowing the original subnational pension funds to avoid the capacity costs associated with infrastructure and real estate investments. While infrastructure investments can be burdensome or require experts to conduct due diligence for a smaller, diversified fund, GLIL specializes in evaluating alternate investments which capitalizes on specialized capacity and lowers the in-house cost of investment. The infrastructure fund also focuses on investments in individual projects and fosters close relationships with invested projects and local developers.

In regard to financial tools, GLIL benefits most directly from the pooling of resources (supply-side aggregation), which allows it to invest in scale and opens more investment opportunities. GLIL has ongoing investments in wind farms, solar farms, train cars, ports, water utilities, waste-to-energy plants, battery storage, and smart metering. As an example, GLIL has a minority stake in Scotland's Clyde Windfarm, one of the largest wind farms in Europe. The investment has both outperformed GLIL Infrastructure's base case assumptions for the period of ownership and has supported the UK's target for all electricity to come from zero-carbon generation by 2035.[25,26]

By diversifying within the climate-friendly alternative investment sphere, GLIL has hedged against potential issues within one particular investment type and is weighted heavily toward UK investments. This is in part due to a push from the UK government to increase local infrastructure investment, and in part to avoid the risks that come from overseas investments.[27] Approximately half of GLIL's investments are in the UK, while the other half are in other countries or niche industries, though most of the investment stays within Europe to reduce risks and due to the lack of de-risked investment vehicles in developing economies.

23 Climate Policy Initiative 2013.
24 GLIL Infrastructure 2022
25 GLIL Infrastructure 2020
26 NationalGrid 2022
27 The Good Economy 2022

Lack of project pipeline: Subnational pension funds interviewed for this report almost universally indicated that there are not sufficient commercially viable climate-smart urban infrastructure projects meeting their investment requirements. Many funds do not want to take on development or construction risk and would prefer to invest in well-developed projects that offer more consistent, if somewhat smaller, returns. This means that they are dependent on other parties originating projects and can result in subnational pension funds chasing too few opportunities, driving up the cost, and reducing potential returns. This is especially the case for adaptation programs, where projects are more context-dependent, require more public finance, and are typically less scalable across geographies.

Even in cities where the municipal or state government has done the leg work to identify necessary projects and move the process forward, there is often a disconnect between subnational pension funds and these investments. In interviews, funds identified that this might be due to a lack of investment vehicles to create commercial-level returns from projects and portfolios or simply that the investments do not appear on a fund's search radar. For example, subnational pension funds look for projects with very low risks, even if the overall returns are lower. A bankable project or portfolio would have very low operation risk through a clear off-take agreement and would fit into a pre-established investment category such as debt, equity, or real estate.

Varied regulatory environments in foreign markets: To overcome the lack of project pipeline (for both pipeline strategy and number of projects) in a fund's home country and to diversify their portfolio, subnational pension funds may seek to invest in infrastructure projects in foreign markets. Investing in foreign markets increases the potential pool of projects but reduces familiarity with taxes and regulations, requiring more administrative capacity to understand these new contexts.[28] Regulations may change over time, creating potential instability and investment uncertainty. Regulators may mandate that subnational pension funds only invest a portion of their assets in certain markets to reduce risk.

Market conditions: In some markets, there is a perception of economic, currency, and political risk. These risks have the potential to create instability and jeopardize consistent long-term returns. Some risks are manageable, such as using hedges for foreign exchange volatility, but market and political variations can change the fundamental economics of a project or portfolio more dramatically. This limits exposure to many infrastructure portfolios in developing countries, even if the perceived risk is higher than the actual risks.

28 OECD 2021b.

External Factors

Macroeconomic factors, such as COVID-19, can deeply impact the development of infrastructure projects. Due to the continuing pandemic, according to the S&P Global Ratings, subnational government debt will remain high over the coming years, with elevated borrowing needs to finance large infrastructure projects.[29] This has the potential to be more challenging in developing economies due to vaccination access. Additionally, private creditors are expected to pull back investments in developing markets due to inflation, higher interest rates, and rising debt burdens. This reinforces the need for public finance to play an active role in de-risking projects and attracting long-term investments in developing economies.

3.2 OPPORTUNITIES

There are multiple ways subnational pension funds can increase investment in climate-smart infrastructure. Those that can be undertaken by the subnational pension fund unilaterally relate to the structural elements of that pension fund, as described in Section 2. Other methods will require the assistance of additional actors and improved enabling environments.

3.2.1 STRUCTURAL ELEMENTS THAT PROVIDE OPPORTUNITIES

- **Asset management:** Internally managed assets will likely find it easier to implement long-term climate strategies and increase investment in climate-friendly projects and portfolios. At least 14 subnational pension funds are currently members of the Net Zero Asset Owners Alliance, part of the Glasgow Financial Alliance for Net Zero (GFANZ), which speaks to the potential of subnational pension funds to make net zero commitments and join coalitions for climate action. In Europe, many subnational pension funds seek out investments in wind farms and solar farms given their climate benefits and reliable returns. In addition, having the ability to invest in riskier projects run by established developers can help eliminate some of the risks from new technologies, like "waste-to-energy" projects.
    - In asset management, it is critical to understand the role of climate-smart investments in relation to fiduciary responsibilities. While there is a perception that focusing on climate-smart projects and portfolios may not provide the best return for the fund, many of these infrastructure projects rely on well-proven technologies with a stable and demonstrated rate of return comparable to other investments. In addition, these investments will have no negative impacts or risks if climate change regulation is enacted. By reducing potential risks and providing comparable returns, investments in climate-smart infrastructure fall under fiduciary duty for subnational pension funds.[30]

29 IFC 2021
30 UNPRI 2020

- **Size:** A subnational pension fund with a larger size will likely have the capacity to undertake the due diligence necessary to take on new or riskier investments and have the necessary capital to finance large-scale projects and portfolios without relying on other financial instruments like supply-side aggregation. They are also more likely to be directly managed, allowing for more climate-related investments and a climate-friendly strategy. While the maximum holding thresholds may limit smaller investments, it does make investments in green infrastructure bonds and aggregated project funds more viable. For smaller subnational pension funds, financial tools like aggregation can increase potential investment and provide access to more opportunities.
- **Geography:** Due to the potential complications of international investments, mentioned in the barriers, subnational pension funds have an incentive to finance national projects. In the UK, the government has pushed for pension funds to invest 5% of their portfolios in UK infrastructure projects. Steering investments towards national projects, while in some ways limiting, also helps funds overcome the challenges of foreign regulations, tax policies, and market risks like foreign exchange fluctuations.[31] Making investments in the local currency is an important tool to reduce currency risks, and mobilizing local investors is a key method to fill this gap. This is particularly true for large infrastructure projects, where the large cost can bring higher currency risks for both the projects and the investors.[32] Investing locally can also respond to the increasing interest in local investment, where the subnational pension fund is able to directly invest in its city or region. The main difficulty in this approach is potential limits in the number of projects ready for investment.

3.2.2 FINANCIAL INSTRUMENTS TO OVERCOME BARRIERS

While subnational pension funds, in particular, are more likely to have barriers associated with structural elements due to size and membership, there are a variety of financial vehicles that can assist in overcoming these barriers. Some of these opportunities can be pursued by the subnational pension funds themselves while others require the involvement of other actors like public finance institutions and city governments, but all require assistance from enabling environmental factors, such as a strong pipeline of bankable projects.

Table 3 outlines several financial vehicles that could be useful to subnational pension funds seeking to overcome barriers in increasing their climate-smart infrastructure investments. In particular, the table outlines the instrument's potential use by subnational pension funds and the enabling environment factors required for that use-case.

31 OECD 2021b.
32 Global Innovation Lab for Climate Finance 2021

Table 3: Financial instruments to support infrastructure investments

Instrument	Instrument Definition	Use by Subnational Pension Funds	Enabling Environment Factors
First Loss Tranche	Uses public financing as a "first loss" investment tranche to bring in additional private financing by reducing the project risk to private investors.	Pension funds can participate in blended finance vehicles to increase investment in climate projects and portfolios that would otherwise be considered too risky.	As a blended finance instrument, dependent upon the availability of public finance institutions to provide capital. Needs a pipeline of bankable projects.
Guarantees	A credit-enhancement tool, often provided by international organizations, which lowers the risk profile of an investment and mobilizes cheaper money from investors.	Investments with a guarantee provide a reasonable rate of return while decreasing potential risks.	As a blended finance instrument, dependent upon the availability of public finance institutions to provide capital.
Loan Loss Reserve	A credit enhancement approach that provides partial risk coverage to investors where local governments agree to cover a prespecified amount of loan losses.	Investments with a loan loss reserve can appeal to pension funds due to the decreased risk without sacrificing returns.	As a blended finance instrument, dependent upon the availability of public finance institutions to provide capital.
Risk Insurance Products	International financial institutions can catalyze private sector investment by covering insurance costs to protect commercial investors from a wide range of risks.	Risk insurance products can decrease risk to investors without impacting the expected return on investments.	As a blended finance instrument, dependent upon the availability of public finance institutions to provide capital
Green bonds	Green bonds are fixed-income financial instruments that mobilize resources from domestic and international capital markets for environmentally friendly projects.	By investing in a green bond, pension funds can reduce risk and have a stable return while investing in green projects.	Needs to adhere to a clear taxonomy or have clarity on standards and classifications. Needs a pipeline of bankable projects.
Municipal Climate/Green Funds	Municipal funds for green projects use city revenue to establish funds to leverage private investment, including from institutional investors, which are invested directly into projects within the city boundaries through a variety of forms. This can also be established at the state level.	Pension funds can invest in green funds as a low-cost, singular vehicle for green investments in a city.	Requires cities to have a positive track record & strong monitoring system. Needs a pipeline of bankable projects.
Supply-side Aggregation (Pooling)	Supply-side aggregation, or the pooling of smaller pension funds into a larger fund, combines the assets of multiple financial investors.	Smaller pension funds can aggregate financial resources (AuM) to reduce administrative or investment costs.	Requires multiple subnational pension funds to agree to a unified strategy.

Instrument	Instrument Definition	Use by Subnational Pension Funds	Enabling Environment Factors
Demand-side Aggregation	Demand-side aggregation involves combining multiple projects, and their financing needs, into a single financial vehicle for one or more investors.	Cities and project developers can combine multiple projects with a similar profile into a single financial vehicle to streamline investment and avoid issues with small ticket sizes.	Requires cities and developers to have the resources and knowledge to develop financial vehicles for investment, access to an available intermediary.
Fund of Funds	A form of supply-side aggregation, characterized by an aggregated pool of investment funds with a set scope for investment decisions, created and contributed to by a set of other funds.	Subnational pension funds within a country or region could create an infrastructure investment fund, which would reduce capacity costs through specialization.	Requires multiple subnational pension funds to agree to a unified strategy.

Blended Finance Vehicles can take many forms, including guarantees, first loss tranches, and other ways to de-risk investments for private finance. Under these instruments, public finance is designed to absorb most of the risk, in the case of bankruptcy, if the project is not feasible or commercially viable, or if there are regulatory or risk issues in-country that otherwise jeopardize the viability of the project. Because subnational pension funds are often focused on minimizing risk as opposed to maximizing returns, these can be a good vehicle for subnational pension funds to invest in either riskier technologies or invest in riskier geographies.

Green bonds are a low-risk financial vehicle that can be issued at a city, regional, or national level. In recent years, Malmo, Manchester, Toronto, Mexico City, Cape Town, and other cities have issued green bonds with success. The role of bonds overall is to be traded on the public market (or increasingly over-the-counter between borrower and lender) and available to a wide range of investors. Once funded, the bond will be used to fund a variety of green or climate projects, all through the same financial vehicle. Bonds promise a consistent, de-risked return, although the value of the return can be less than market rates, making it a prime investment option for subnational pension funds.

Municipal Climate/Green Funds are, in essence, small-scale bonds or blended finance vehicles that leverage city revenue to bring private investment into city projects. While the size of these projects can be small, the fund is often combined with demand-side aggregation to create a single financial vehicle that will invest in multiple projects. As with blended finance, the city funds work to reduce the risk in the investment for the private investors and can be a way for cities and subnational pension funds to work together to invest in multiple local green or climate projects at a scale acceptable to the size of the fund and without the transaction or due diligence costs for each project.

Supply-side Aggregation[33], or pooled funds, has been a successful strategy for subnational pension funds in the UK. While originally there were 89 subnational pension fund schemes for local government employees, many of them small and lacking capacity, there are now eight pooled subnational pension funds that also aggregate

33 Pinko et al. 2022

capacity and management along with investment assets. The strategy has largely been a success, with the funds able to invest in larger and more involved projects and portfolios, and the individual funds within the pool still having sway over larger investment decisions. This becomes particularly important on issues of climate strategy and net zero commitments.

Demand-side Aggregation[34] is the pooling of projects into a single financial vehicle, which would be a more attractive investment for subnational pension funds. This happens automatically under bonds and municipal funds, as the financing is spread across multiple projects that may be too small to attract financing individually, particularly from sources like subnational pension funds. Cities have also worked to pool similar projects among them, such as the RAMCC in Argentina, or the projects under the Marshall Plan for Middle America. Currently, the UK is planning to aggregate the needs of multiple cities through UK Cities Climate Investment Commissions and the EU is setting up a capital facility and investment planning process to aggregate the investment needs for 112 cities under its Climate Neutral and Smart Cities Programme.

A **Fund of Funds** is essentially a separate entity that is created by a series of other financial institutions via supply-side aggregation to pool resources, as demonstrated in the GLIL case study. A set infrastructure fund could be financed by several subnational pension funds with the explicit mandate to invest in climate-smart infrastructure. By specializing, the financing institutions can reduce their management costs and the infrastructure fund has lower capacity costs due to specialization. The infrastructure fund can also branch out into newer technologies, given the capacity specialization.

Project Preparation Facilities (PPF) support the development of bankable, investment-ready projects through technical and/or financial support.[35] While not a financial tool, cities, national governments, and venture capitalists can support the growth of PPF and their involvement in climate-smart projects to ensure a steady pipeline of projects to invest in. As they have no natural revenue stream, their development requires financial support from governments or third parties to function in the intended manner.

3.2.3 ENABLING ENVIRONMENT CHANGES TO OVERCOME BARRIERS

While subnational pension funds can use financial instruments and strategic changes to overcome some barriers, external actors can take steps to address others that are outside of a subnational pension fund's control.

Central governments can provide short- and long-term climate targets to provide strategic clarity for subnational pension funds. While central governments do not typically have any direct authority over subnational funds, federal-level targets such as Nationally Determined Contributions can indicate the direction of regulations and incentives and help provide funds confidence in the speed and scale of the climate transition. These targets can also act as a baseline for a subnational pension fund's board to set their own climate targets, create a climate plan, and incentivize leadership

34 ibid
35 CCFLA, 2022

at multiple levels to comply, ensuring it is a priority woven into fund management and operations – including for funds that outsource to an external asset manager. Industry coalitions like the Net Zero Asset Owner's Alliance, of which 14 subnational pension funds are currently members, provide guidance to making long-term commitments and transition plans, lowering the capacity threshold for setting climate targets.

Outside of targets, central governments can also implement mitigation and adaptation mandates into their central systems. The UK and several of the EU countries have already mandated TCFD disclosure by financial institutions, including subnational pension funds.[36] South Africa has required its pension funds – both national and subnational – to report on how they implement ESG in their investment strategy since 2018.[37] In some jurisdictions, state or local governments may be able to more directly mandate or recommend that a subnational pension fund invest a certain percentage of assets in climate solutions and/or located in a home city or country. For example, the UK government has set a target for pension funds to invest 5% of assets in local areas.[38] This type of mandate requires a positive enabling environment from both local and national governments and public finance institutions so that it's not viewed as an inefficient imposition that may conflict with fund return goals.

On the project pipeline side, developers seeking long-term investment from asset owners need to ensure investment opportunities are visible to subnational pension funds. This can involve capacity building for city governments, educating private sector actors on what criteria subnational pension funds need to make an investment decision, and supporting PPFs and other robust project pipeline strategies. Financial institutions ranging from venture capital funds to DFIs can also participate in project or portfolio design to make investments more attractive, whether that is through connecting funds with projects, aggregating projects, or providing financing directly.[39] The financing does not need to be a direct subsidy – any step that reduces risk, such as expedited and predictable permitting, long-term policy stability, or off-take agreements to reduce ongoing operations risk, improves the risk-return trade-off, and makes investments more attractive. Policymakers must design these interventions and market structures to limit unintended consequences on subnational pension funds' ability to invest in climate-smart urban infrastructure.[40]

36 Net Zero Knowledge Hub, 2022.
37 Responsible Investor, 2018.
38 UK Government, 2022.
39 OECD 2018.
40 Climate Policy Initiative 2013.

4. CONCLUSION AND RECOMMENDATIONS

Based on the barriers and opportunities identified in Section 3, we have identified recommendations for how subnational pension funds can increase investment in climate-smart urban infrastructure. While many of these recommendations are for the subnational pension funds directly, others are for project or portfolio developers, local governments, and public finance institutions.

National pension funds and private pension funds should also consider increasing their investments in climate-smart urban infrastructure and may find many of the recommendations here to apply to their own set of challenges. However, they are still not the target audience for this brief due to size, structure, membership, and interpretations of fiduciary duty.

Recommendations for subnational pension funds:

- **Subnational pension funds need to make net zero commitments.** While a growing number of subnational pension funds (14 as of June 2022) have joined the GFANZ Net Zero Asset Owners Alliance and made climate commitments, there is a significant amount of potential subnational pension funding for climate projects and portfolios that could be mobilized. Integrating climate into the forefront of an investment strategy opens opportunities for climate-friendly investments, particularly at the local level, and can decrease the climate risks faced by the traditional portfolio holdings. Additionally, a climate commitment guarantees some control over the fund's asset allocation to align with the strategy and can address outdated concerns about fiduciary duty. A significant number of pension funds around the world, both private and public, already support the TCFD disclosure recommendations, suggesting the risks and opportunities that come from climate change are already being considered by some funds.[41]
- **Build internal capacity to identify climate-smart infrastructure investment opportunities, particularly locally.** Integrating climate into an investment strategy can require a different way of thinking, and a dedicated climate-smart infrastructure investment team could help identify the costs and benefits of such investments. A dual mandate to provide both returns to beneficiaries and benefit local communities could also drive local climate-smart investment. Additionally, subnational pension funds should consider working with cities, developers, and public finance institutions to proactively build and aggregate project pipelines for future commercial investment.
- **Utilize aggregation mechanisms to increase climate investment opportunities.** If the fund is small, and the due diligence and capacity required for climate infrastructure investments seem daunting, there are financial mechanisms that can

41 TCFD 2022

support investment. Aggregating or syndicating with other subnational pension funds in a similar position, such as described in the UK GLIL Infrastructure case study, allows to pool resources and capacity.

Recommendations for cities, developers, and national governments:

- **Work closely with subnational pension funds to align priorities.** Local governments could collaborate with subnational pension funds to identify climate opportunities and support project pipelines, as local investment is mutually beneficial to both the government and subnational pension fund. Project and portfolio developers could work more closely with subnational pension funds to learn more about their specific needs, including the development of the most appropriate financing instruments.
    - This could be supplemented by joint efforts on project preparation facilities to support the development and scale-up of innovative climate solutions that need financial and technical support.
    - A closer connection could also support demand-side aggregation efforts, where cities and developers bundle multiple projects into a single, diversified financial vehicle.

Recommendations for public finance institutions:

- **De-risk climate-smart urban infrastructure investments through blended finance instruments**. Blended finance vehicles need to be offered to subnational pension funds to help drive investment in either newer technologies or investments in climate-smart infrastructure in developing economies. Subnational pension funds rarely have the capacity to undertake such investments, and often see investment in developing markets as risky and potentially outside their fiduciary duty. By de-risking infrastructure projects and portfolios for the subnational pension funds, public finance institutions can direct financial flows to where they are needed most, while still supporting private investments.

Subnational pension funds represent a largely untapped market for potential investment in climate-smart infrastructure, a sector that is sorely lacking in financing. These recommendations are intended to assist subnational pension funds in increasing these investments, while acknowledging the barriers subnational pension funds may face due to their unique circumstances regarding size, memberships, and fiduciary duties.

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