

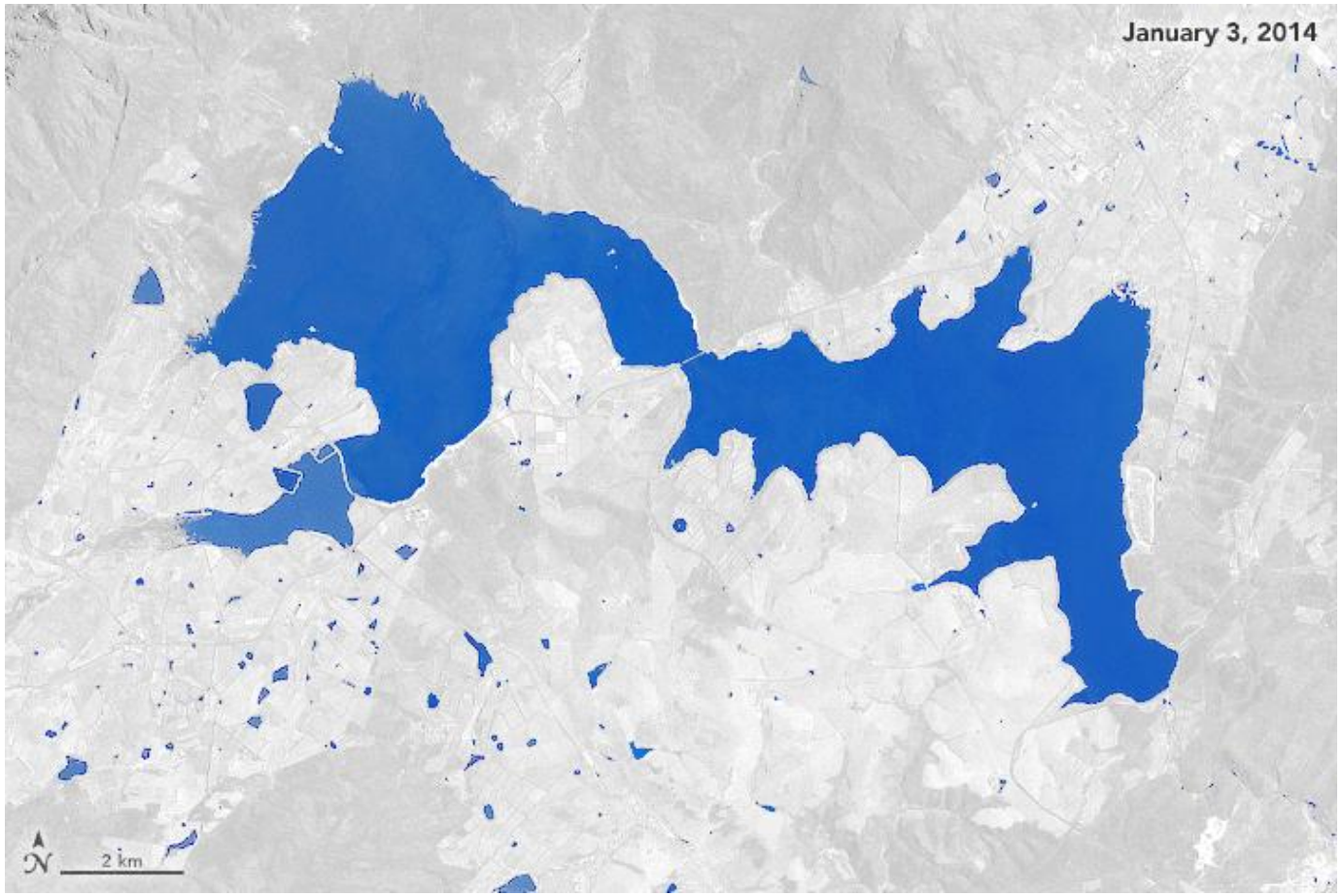
Funding and Financing Models for the Next Decade of Infrastructure Investment

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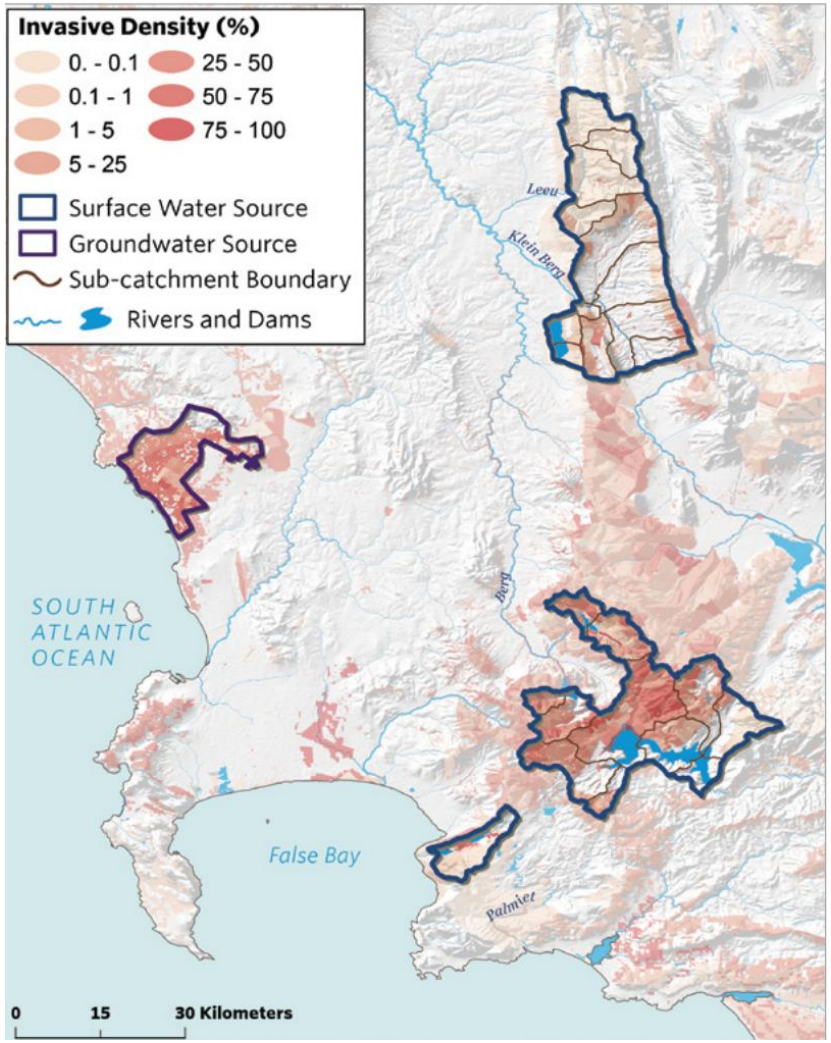
Approaching ‘Day 0’ in Cape Town, South Africa

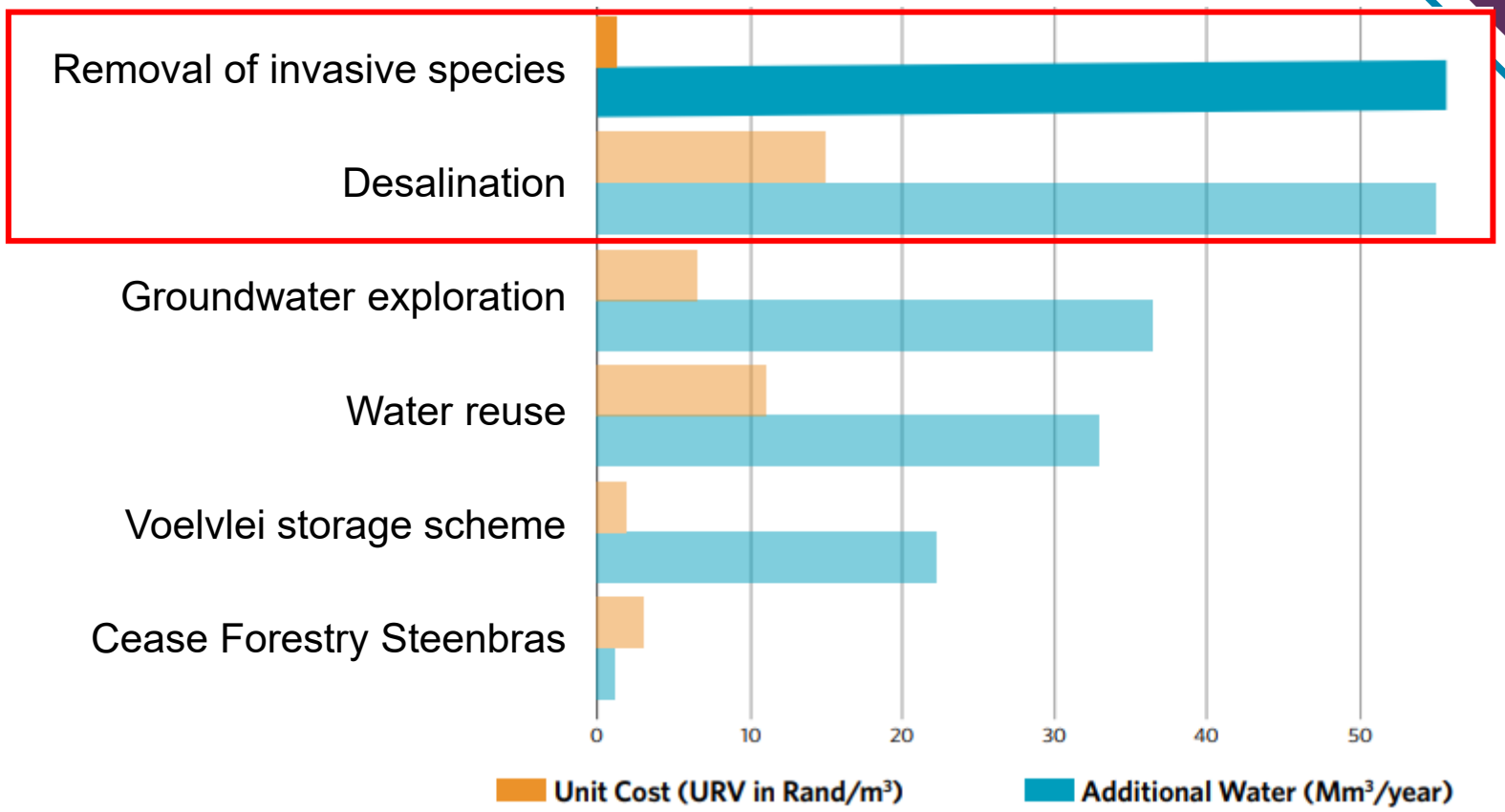


- Water demand outstrips supply
- Additional 300-350 million liters needed by 2028
- Demand management not enough
- ~US$ 540m in public funding – augmenting water supply

Source: NASA Earth Observatory (2018)
Source: The Nature Conservancy (2019)

Removal of invasive alien plant species



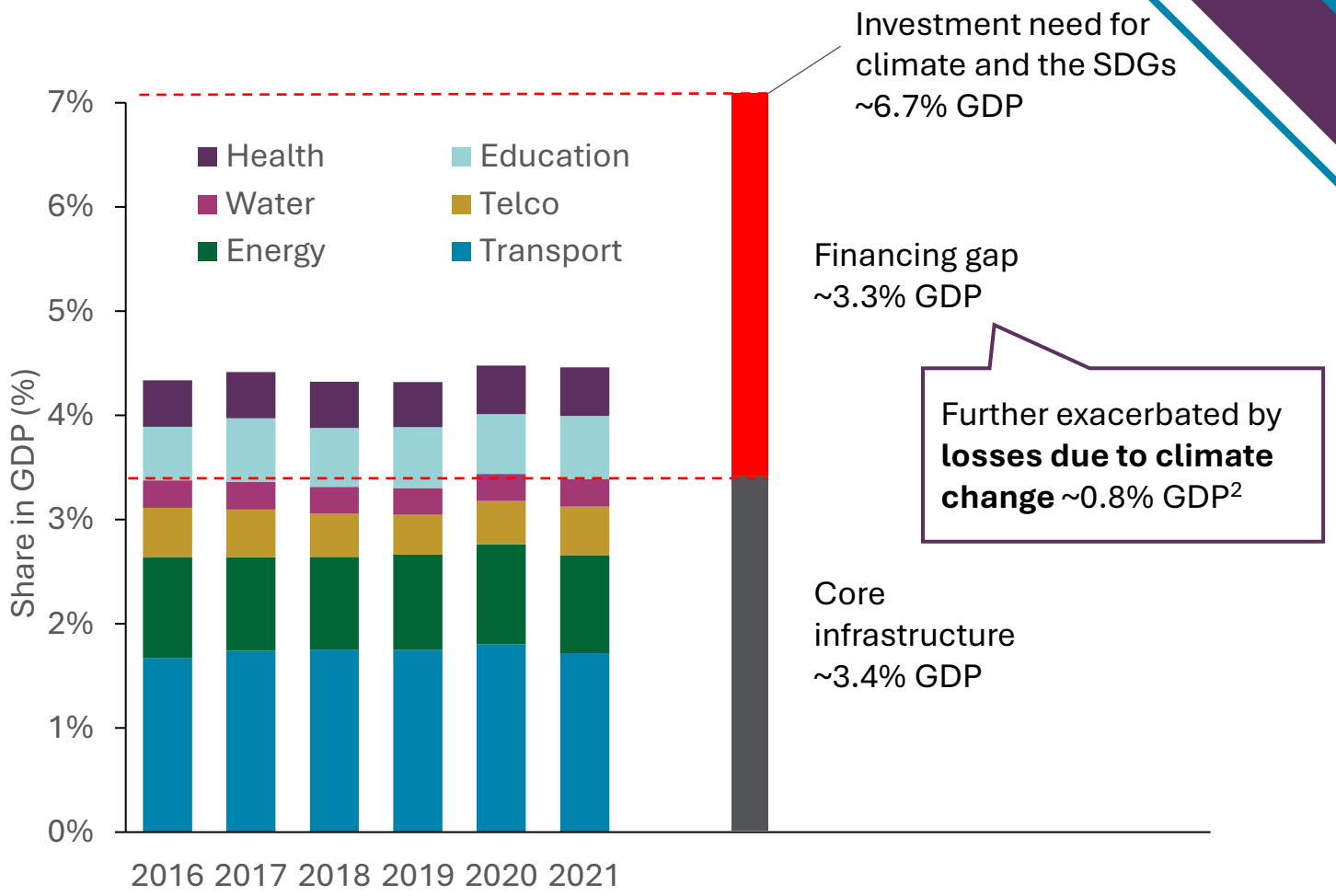


Infrastructure financing gap

Public spending:
Tightening fiscal policies, rising public debt

Infrastructure costs:
Increasing construction costs and interest rates

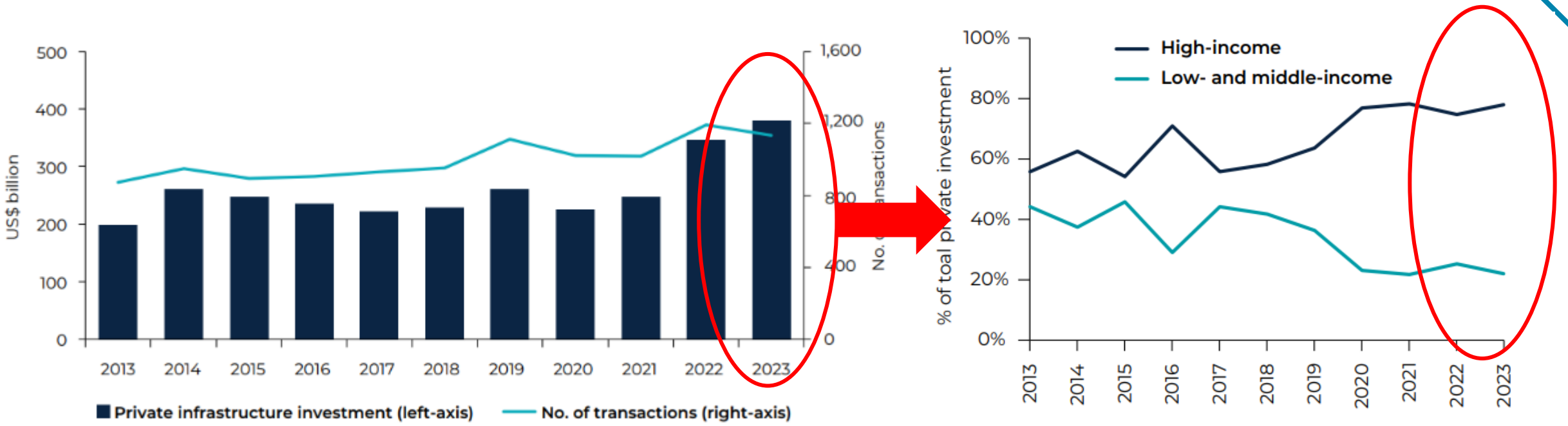
Effects of climate change:
Cost of responding and restoring assets and services



Global total infrastructure investment (public and private)

[1] IMF World Economic Outlook, April 2024.
[2] Sources: IEA, OECD, ITF, ITU, WHO, UNICEF, World Bank, InfraLatam, CDRI, GIHub Outlook.
[3] Global Infrastructure Hub, 2023. Infrastructure Monitor (based on Realfin data). Available at: https://cdn.gihub.org/umbraco/media/5462/gihub_infrastructuremonitor_2023-02.pdf

Private investment in infrastructure is growing, but it is not enough

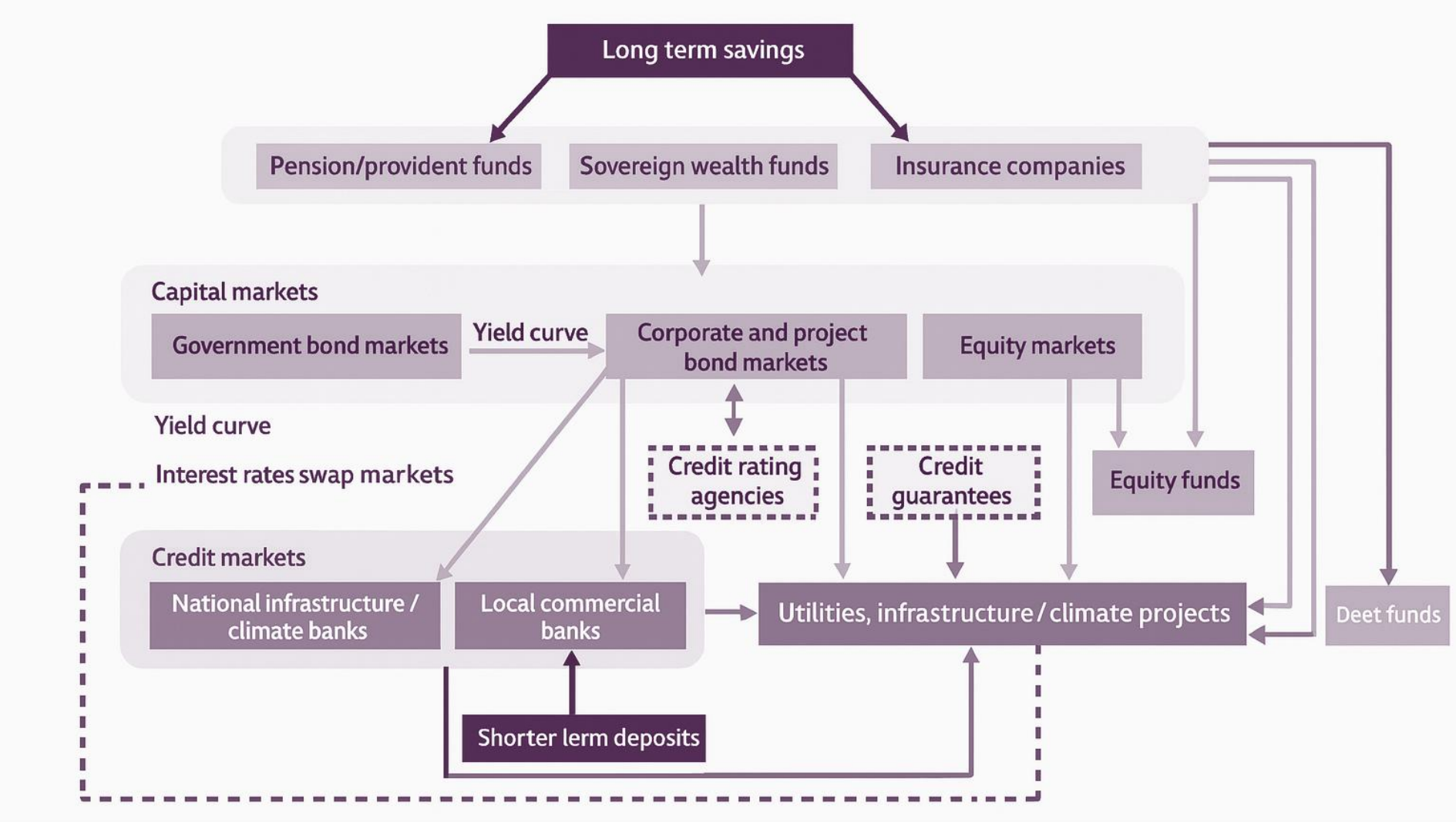


US$ 380 billion in 2023

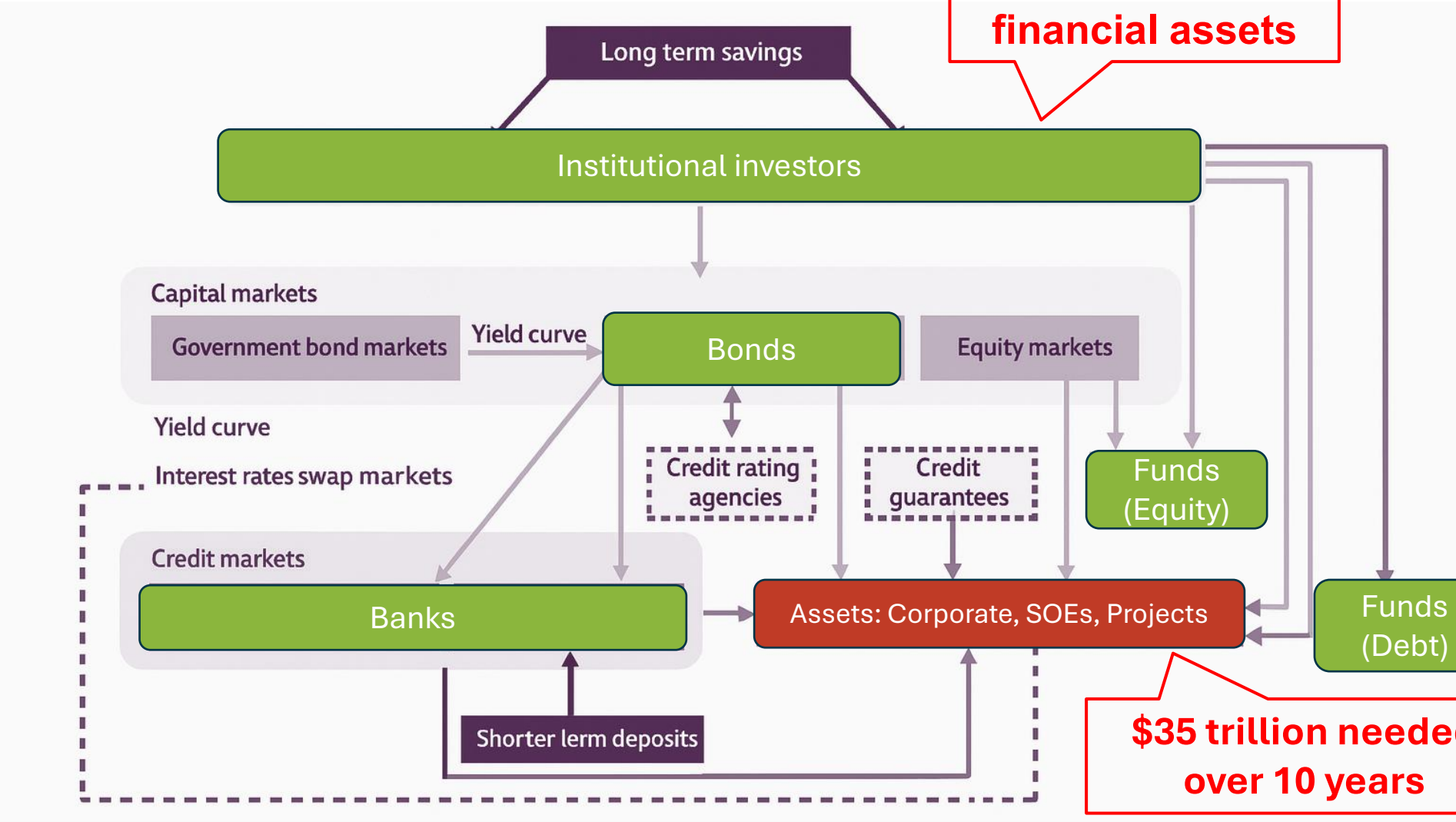
45% higher than 5-year average

Note: Delivery costs and inflation have also been high

Where is the money coming from?



Where is the money coming from?



Who is the World Bank?

Our vision is to create a world free of poverty and boost shared prosperity on a livable planet.







IFC
INTERNATIONAL FINANCE CORPORATION

Promotes development by financing private sector enterprises in developing countries.



MIGA
MULTILATERAL INVESTMENT GUARANTEE AGENCY

Promotes foreign direct investment into developing countries by offering political risk insurance (guarantees) to investors and lenders.



ICSID
INTERNATIONAL CENTRE FOR THE SETTLEMENT OF INVESTMENT DISPUTES

Provides international facilities for conciliation and arbitration of investment disputes.

Who is the World Bank?



PEOPLE

- **69 million** beneficiaries of social safety net programs
- **218 million** students supported with better education
- **49 million** people receiving quality health, nutrition, and population services



PLANET

- **139 million** tCO2eq/ year anticipated reduction in greenhouse gas emissions
- **21 million** people with strengthened food and nutrition security
- **31 million** people provided with water, sanitation, and/or hygiene



PROSPERITY

- **2 million** people and businesses using financial services
- **27 million** female beneficiaries of actions that expand and enable economic opportunities



DIGITAL

- **35 million** people using digitally enabled services



INFRASTRUCTURE

- **24 million** people provided with access to electricity
- **5** Gigawatt of renewable energy capacity enabled
- **30 million** people with improved access to sustainable transport infrastructure and services

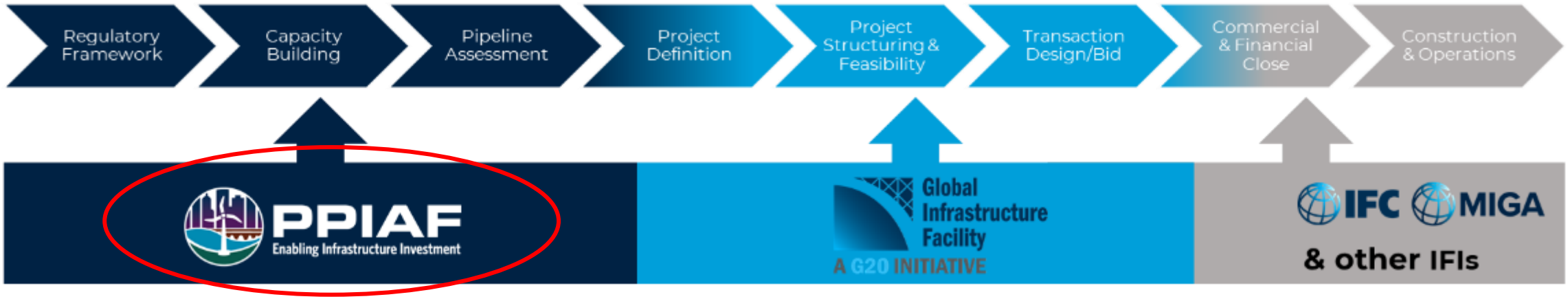
Infrastructure Finance Department

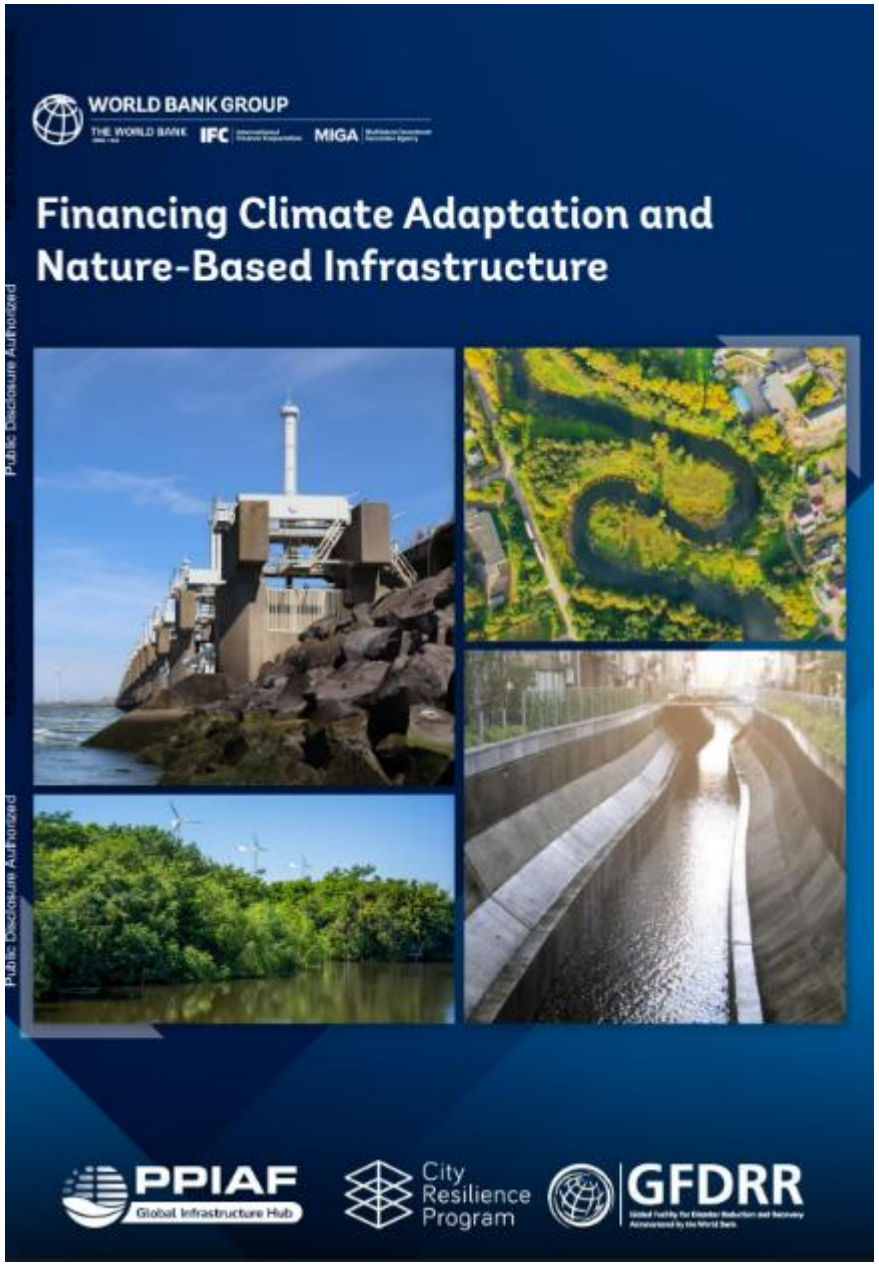
Enabling and mobilising private capital for infrastructure in EMDEs

Skills

Knowledge, Tools and Instruments

Funding and Partnerships





2 Climate Adaptation Infrastructure

The infrastructure solutions needed to address climate change, as well as the corresponding financing and cost recovery options, will vary substantially according to the type of climate hazard that needs to be addressed. As such, this chapter will explore these in turn, across the categories of flood risk management and coastal resilience, water security, and urban heat management.

This chapter focuses on projects that relied primarily on grey infrastructure solutions, while Chapter 3 focuses on projects that relied heavily on NbS. However, several examples in this chapter also utilized NbS to some degree, while examples provided in the next chapter may also provide adaptation benefits, as described in the text. Table 1 provides a summary of the projects covered in this chapter, while more detailed versions of these case studies are available in Annex 1.

Table 1: Climate Adaptation Infrastructure Projects Reviewed in Depth

Climate adaptation goals	Project name	Infrastructure solution description	Financing m
Flood risk management and coastal resilience	Fargo-Moorhead River Diversion Project (USA)	• Grey - Flood channel to store and divert stormwater	PPP with priv finance Public finance
	Broadland Flood Protection (UK)	• Grey - Elevating and strengthening dykes and levees • NbS - Wetlands and natural floodplains	PPP with priv finance
	Canal del Dique (Colombia)	• Grey - Elevating and strengthening dykes and levees • NbS - Wetlands and natural floodplains	PPP with priv finance
	Mission Rock, San Francisco (USA)	• Grey - Sea wall and pier rehabilitation	PPP with priv finance
	Msimbazi River Basin (Tanzania)	• Grey - Elevating and strengthening dykes and levees	Public finance including don funds
Water security	As-Samra Wastewater Recycling Plant (Jordan)	• Grey - Wastewater reuse for agricultural use	PPP with priv finance
Urban heat management	Paris District Cooling PPP (France)	• Grey - District cooling networks • NbS – Natural water reuse	PPP with priv finance

Paris District Cooling PPP (France)

Context:

Paris faces increasing temperatures due to climate change, leading to heightened demand for air conditioning, which traditionally relies on energy-intensive systems contributing to urban heat islands and elevated greenhouse gas emissions. The city's dense infrastructure and limited green spaces further compound these issues, making it imperative to adopt sustainable cooling solutions that mitigate environmental impacts while addressing the rising cooling needs of residents and businesses.

In 1991, the City of Paris built a district cooling system that utilizes water from the Seine River within cooling generation plants, which then distribute chilled water through underground pipes to various buildings. Today, the system has ten generation plants and four energy storage sites supplying over 700 customers, cooling around six million square meters of space across the city[1]. This system replaces the use of traditional air conditioning units, which not only reduces energy consumption but also eliminates heat discharged into the environment by these units. The cooling network has been running on 100 percent renewable electricity since 2013[1]. This case study demonstrates the combination of grey (the pipework and cooling stations) and green (using water from the Seine) infrastructure solutions to protect against the effects of extreme heat.

The 1991 project was procured through a 20-year Public-Private Partnership (PPP) contract with Climespace, which was a wholly owned subsidiary of ENGIE. In 2022, a new PPP (20-year concession) was awarded to Fraîcheur de Paris, which is also majority-owned by ENGIE. Fraîcheur de Paris aims to expand the network to cover all Parisian arrondissements by 2042, tripling its current length with an additional pipelines[2]. Whereas the previ system served mainly service- expanded network will serve buildings, including hospitals, retirement facilities, and care

Financing Models:

PPPs with private finance: being delivered by a Special Pu Fraîcheur de Paris, which is co- percent) and RATP (15 perce initially capitalized with US$ two owners (debt and equity The new concession covers maintenance of the existi infrastructure as well as expansion of the district cooling by the end of the contract per



Source: ENGIE, 2022

[1] ENGIE (2022). *What carbon-free solution can we offer for the Paris district cooling system?* Available at: https://www. ogie/engie-x-fraicheur-de-paris

[2] Fraîcheur de Paris (2022). *The City of Paris selects the ENGIE group and its partner, the RATP group, to manage its cold* https://www.fraicheurdeparis.fr/actualite/la-ville-de-paris-retient-le-groupe-engie-et-son-partenaire-le-groupe-ratp-p fr.pdf

6 Enabling Environment Priorities

While the preceding discussion on financing and cost recovery helps to break down the different mechanisms through which projects may be financed, the ability to tap into these sources at scale will ultimately rely on the strength of the economic or business case for the underlying investment. For projects requiring government funding, this means a clear economic justification that the project represents an optimal use of scarce fiscal resources. For the private sector, it means access to sources of revenue that will generate a return on investment commensurate with the risks involved in the project. Without a clear business case, project activities are likely to remain small and constrained by the limits of grants or NGO funding.

The preceding review of global experience and project case studies points to a range of different supportive interventions in the enabling environment that can help to strengthen the business case for investment. This final chapter will therefore briefly explore lessons on the enabling conditions that have proven necessary or beneficial to creating a positive business case for investment in adaptation and nature-based infrastructure.

The importance of a strong enabling environment is reinforced by the fact that many of the more successful cases to date come from developed economies, where the financial sector and public administration are sufficiently developed to support the types of capital markets instruments, new tax revenues, and long-term PPP structures utilized by the projects discussed so far. However, while strengthening these fundamentals is clearly important, the case studies also point to three broad enabling environment factors specific to developing the economic and business case for investment in adaptation and nature-based infrastructure projects, namely: (i) improving access to climate data, (ii) creating investment incentives to address market failures, and (iii) strengthening multi-stakeholder organization and governance. These findings closely mirror the conclusions of the 2021 World Bank report, *Enabling Private Investment in Climate Adaptation and Resilience: Current Status, Barriers to Investment and Blueprint for Action*[106], which provides a valuable resource for readers interested in a detailed analysis of these topics.

6.1 Improving Access to Data

There are three essential data building blocks to better, more effective investment decision-making: 1) the metrics that define success, 2) comparable and consistent data, and 3) methodologies to evaluate risk, performance, and impact (Figure 1).

Figure 1: The Role of Data, Metrics, and Evaluation Methods in Making More Informed Investment Decisions



Developing metrics for success

Metrics and indicators play a critical role in articulating the value of climate adaptation and nature-based infrastructure. By making benefits more visible and measurable, they help build demand for these investments. Over time, this can support monetization and strengthen the

[106] https://openknowledge.worldbank.org/entities/publication/6219bf23-87e1-5f30-aaf9-30e0cd793ce3

Adaptation vs nature-based infrastructure

Climate adaptation infrastructure

<u>Additional</u> infrastructure that is specifically designed to modulate climate hazard impacts



Source: Red River Valley Alliance

Nature-based infrastructure

Infrastructure that integrates nature-based solutions (NbS) in place of physical or “grey” infrastructure



Source: DC Water

The knowledge gap

- What are the financing models?
- What are the sources of revenue?
- Projects are typically public by nature - revenue generation not straightforward



Source: San Francisco Public Press



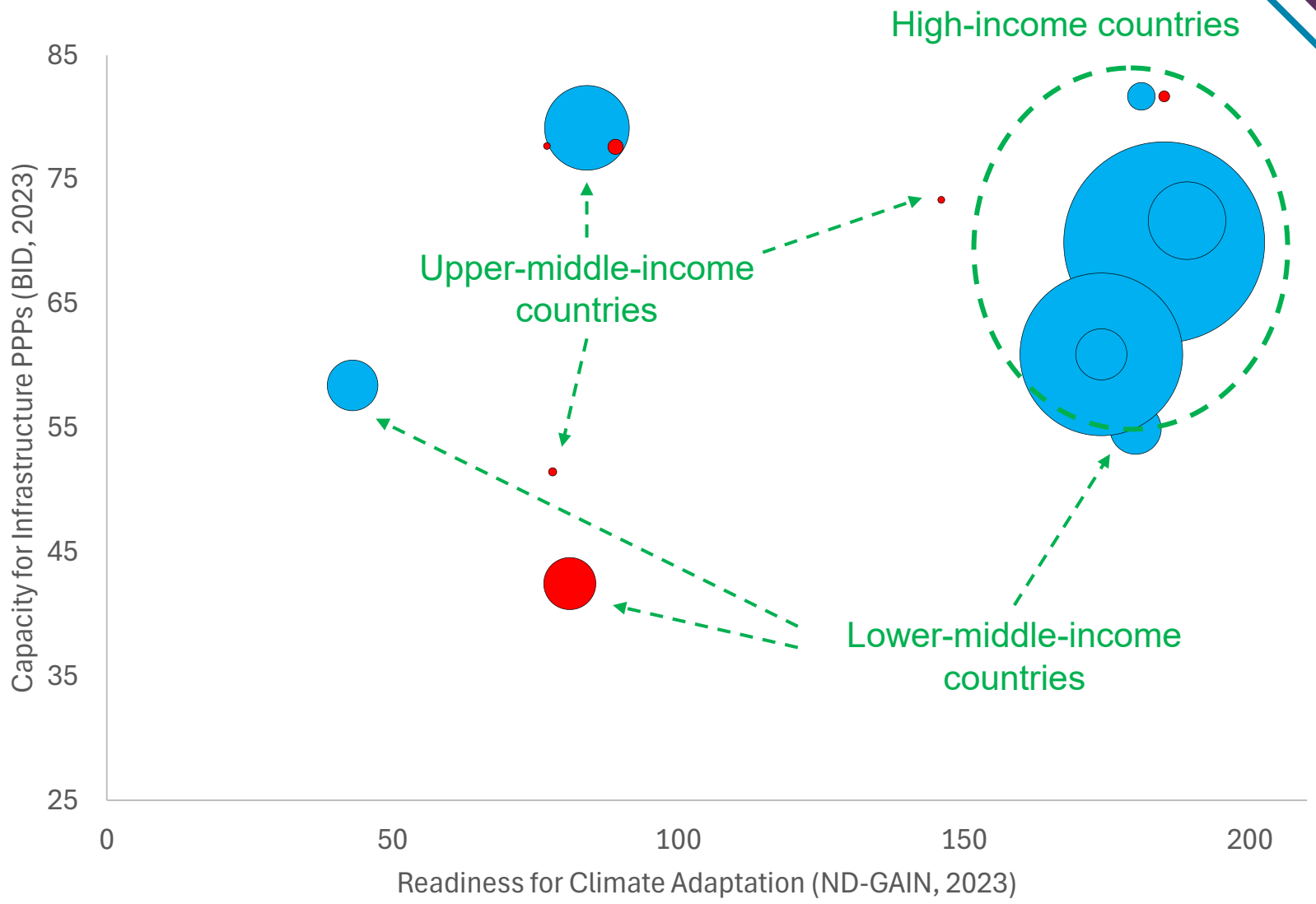
Source: Vida Manglar



Source: Conservation International

Variability based on different country contexts

- Large adaptation projects - observed in HIC countries with higher readiness and/or capacity.
- Those with lower readiness typically had DFI donor support.
- NBI as alternative to “grey” infrastructure – significantly lower investment needed.



Financing and Cost Recovery

Financing model and instruments	
PPPs with private finance	• Corporate budget • Mix of equity, debt, and subsidy • Project bonds
Capital markets finance	• Biodiversity bond • Blue bonds • Green bonds • Municipal bonds
Own-source financing	• Carbon credits • Corporate budget • Municipal budget, donor grants
Public finance	• Donor grants and loans • Government grants and loans • Parametric insurance payout

Cost recovery model and revenue sources	
Government pays	• Performance-based payments • Viability gap funding • Availability payments • Public debt repayments
User pays	• Tariffs (water, transport, energy) • Commercial loan repayments • Special sales tax • User fees (airport fees)
Land / commercial value capture	• Developer rights payments • Special property taxes • Property sales and leases
Climate-related funding	• Carbon credits

Climate Adaptation Infrastructure

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Nature-based infrastructure

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Water Security | Water

Greater Cape Town Water Fund (South Africa)

Technical solutions

- Cleared 46,000 ha of invasive plants.
- This recovered 15bn liters water annually.





Key insights

- Removing invasive species was 10x more cost effective than desalination.
- Business case driven by avoided losses and efficiency gains.
- Collective action key to funding and implementation.
- Complex and costly to coordinate.
- Partnership with The Nature Conservancy

Financing	• $20m fund: grants from public, private, and philanthropic sources. • Certain companies funded specific projects.
Cost recovery	• Project benefits of increased water supply. • City of Cape Town budget and water tariffs.

Flood Risk Management and Coastal Resilience | Water

Fargo Moorhead River Diversion (USA)

Technical solutions

- Dam embankments and diversion channel
- 85,000 trees planted


Source: S&B USA


Source: Red River Valley Alliance

Key insights

- PPP used for economic efficiency
- Saving $330m and 10 years on completion.
- Cost recovery for ‘government pays’ can vary (special taxes and levies)
- Access to localized climate data was key
- Tax-exempt municipal bonds incentivized the private sector

Financing	• $2.8bn project; 30-year PPP • $1.2bn private finance (project bonds, equity & debt). • $1.6bn public finance (federal and state)
Cost recovery	• Government pays: Availability payment • User pays: Special taxes and levies

Flood Risk Management and Coastal Resilience | Water

Delta Programme (Netherlands)

Technical solutions

- Reinforced dikes and storm surge barriers.
- Groundwater management; alternative water sources; water distribution.

Key insights

- Access to capital markets financing.
- Investors interested in ‘green’ and ‘blue’ finance instruments.
- Programmatic approach - aggregating smaller projects under a framework.
- Strong enablers – green bond framework and transparent reporting.


Source: Government.nl

Financing	• Sovereign Green Bond issued in 2019. • In 2023, $1.6bn was funded through bond proceeds and national budget.
Cost recovery	• Green bond debt service payments – from national budget.

Enabling Environment



Developed financial markets

Well-developed financial sectors, governance frameworks, and public financial management



Improving Access to Climate Data

Making better investment decisions and strengthening the business case for projects



Creating Investment Incentives

Making private sector participation more attractive



Strengthening Multi-Stakeholder Governance

Effective organization and localized stakeholder engagement for the successful implementation at scale



THANK YOU

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