RESILIENT CITIES NETWORK

TOKIO MARINE GROUP

Under Pressure, Overdue:

The Portfolio Approach and Financing Cities for Resilience

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RESILIENT CITIES NETWORK

Forward

Resilience strategies were always meant to be a blueprint for action. But to make the shift from the pages of reports to real life, cities need to be able to raise significant amounts of capital. Under conditions of uneven development, growing inequality and rising threats from the climate crisis to global conflicts, the case for investing in urban resilience has never been stronger, even as the terrain becomes more challenging.

As a city-led network, R-Cities identified financing resilience as a strategic priority following our March 2024 convening "Investing in Resilience for All" held at The Rockefeller Foundation Bellagio Center, Italy. That critical convening marked the 10-year anniversary of the urban resilience movement that R-Cities succeeds and a turning point in the Network's journey, expanding from strategy development to financing and delivering measurable resilience action. R-Cities formed the Resilience Finance Taskforce with public sector leaders and private sector experts from the across the insurance and financial sectors to deepen this work and explore approaches, strategies and frameworks for cities to finance and implement their resilience goals.

After a decade of work on the ground, it has become clearer with time that urban resilience cannot be built through funding one-off resilience initiatives alone.

Cities need to strengthen their capacity to design, finance and manage investments as a coherent portfolio that builds resilience. With this publication, we lay out the starting points for what this City Resilience Portfolio Approach could look like and how it can transform the future of cities.

As of this writing, we are weeks away from the opening gavel at COP30 in Belém, where countries will negotiate over how to mobilize $1.3 trillion USD in annual financing to put climate plans into action. While we do not know what the outcome of those critical negotiations will be, we hope the Portfolio Approach outlined in this paper will embolden cities with further tools they can take advantage of to meet our global goals for a safer, more prosperous future.

Lauren Sorkin

Executive Director,
Resilient Cities Network

TOKIO MARINE GROUP

Forward

The global risk landscape is becoming more volatile, and cities sit at the center of this challenge. Insurance is built on a promise to provide stability in uncertain times, and today, that promise is being tested as never before. Too many risks remain unmanaged resulting in a growing insurance protection gap, and too many cities lack the resources to transform resilience strategies into investable solutions.

At Tokio Marine Group, we believe insurance has a vital role to play in closing the coverage gap. Our industry is not only about helping people and businesses recover after devastating events — it is also about working with partners to develop solutions that bend the arc of insured losses through mitigation and prevention. This is why we have partnered with the Resilient Cities Network and become the inaugural underwriting partner of the Resilience Finance Taskforce. Together, we are helping cities build the frameworks and methodologies needed to scale resilience finance.

The Portfolio Approach, described in this paper, is central to that mission. It reframes resilience as a multi-dimensional investment strategy. For insurers, this approach provides a clearer, data driven understanding of urban risks, setting the basis for pricing risk, aligning capital with resilience measures and supporting long-term economic competitiveness. The case studies — from Broward County to Cape Town — demonstrate that when leaders align planning, finance and community action, resilience is not only achievable but also investable.

For our part, insurers must move to the front line with our customers by developing and delivering resilience solutions that aid in rapid recovery as well as reducing or preventing losses. By leveraging our technical expertise in risk modelling, our financial strength and our global networks, we can become true partners in building resilience into the fabric of society. This ambition goes well beyond our core role of protecting cities after disaster strikes — it is about shaping their long-term competitiveness, stability and ability to thrive.

The road ahead demands bold leadership and a willingness to rethink how cities are financed, governed and protected. With the right partnerships, we can close the protection gap, mobilize capital and enable cities worldwide to chart a more resilient future.

Brad Irick

Managing Executive Officer and
Co-Head of International,
Tokio Marine Holdings

Table of Contents

1 **Executive Summary**
p 6

2 **Introduction: Two Cities, Two Directions**
p 10

3 **The City Portfolio for Resilience Approach**
p 18

4 **Six Practices for The Portfolio Approach**
p 25

5 **Governance, Finance, and Enablers of the Portfolio Approach**
p 34

6 **Conclusion**
p 38

1

Executive summary

Cities everywhere have entered a new era where the stakes could not be higher. Geopolitical and economic tensions are rising, and national balance sheets are stretched. Climate shocks are intensifying, raising the cost and even reducing the availability of insurance. For some cities, this cocktail poses an existential threat: if areas become too expensive to insure, or worse, become uninsurable, capital will leave. **Decisions today, and how they are carried out, will determine if communities thrive or are lost for good.**

This paper examines the experiences of cities under pressure and the essential role of finance in their resilience journeys. In Florida, Broward County shows what happens when leadership and local business align around a challenge. By modelling the explicit impact of climate change on economic activity and real estate prices, the county identified a positive return on investment for flood adaptation — and proposals include raising local taxes to fund it. Furthermore, they acted without state or federal help, recognizing that their collective future depended on decisive action. In contrast, a company in Asia faces insurance premiums so high they may exit the city entirely. For that city, inaction by leaders risks triggering an exodus of investment, jobs and a collapse in asset and real estate values. The potential cost of failing to anticipate, organize and respond is the hollowing out of the city.

This paper proposes that cities embrace what we call the City Resilience Portfolio Approach (the Portfolio Approach) to build resilience. This means adopting a holistic, interconnected strategy that addresses climate adaptation alongside other factors such as water security, economic development and community benefits in addition to embedding the need to finance these initiatives. This thinking builds on a decade of advocacy and practice led by the Resilient Cities Network and its member cities, which have developed and published more than 90 Resilience Strategies worldwide. These strategies have helped cities understand and act on their systemic risks and opportunities, laying the foundation for more sophisticated, investment-focused approaches. The Portfolio Approach represents the next step in this evolution: connecting resilience planning with the strategic mobilization of capital, so cities can proactively build and maintain their resilience and competitiveness over the long term.

Cape Town in South Africa has pioneered this Portfolio Approach. Over several years, the city was able to execute a strategy of building investor confidence so that today, its financiers include a broad range of sources, including private sector banks. Their journey provides lessons on how a city can attract and retain capital, both human and financial, to strengthen its resilience.

By identifying common threads from case studies, we developed the Six Practices to help cities put the Portfolio Approach into action. These Six Practices – holistic planning, stakeholder coordination, capital allocation, data strategy, project management and transparency – together reflect a broader perspective of governance and management. By articulating a systematic approach to building resilience, from strategy to execution, cities can better communicate their value to investors and stakeholders.

The Six Practices are pragmatic, aimed at providing a roadmap for assessing capabilities, improving competencies and tracking progress. To help cities identify where they are, each of the Practices is also broken down to specific "target outcomes," allowing cities to diagnose their own readiness and priority areas. Such analyses also help stakeholders, including financiers and the broader resilience ecosystem, to work with the city on targeted capacity building and solution sharing. In Canada, Green Municipal Fund (GMF) does this. As an impact fund, GMF assists cities in their climate efforts by providing technical assistance, grants and loans to strengthen capacity and increase resilience. GMF has been able to accelerate city-level impact, including catalyzing private sector capital. While there are never any guarantees, honest assessment and transparent progress are reliable indicators to unlock capital and avoid decline.

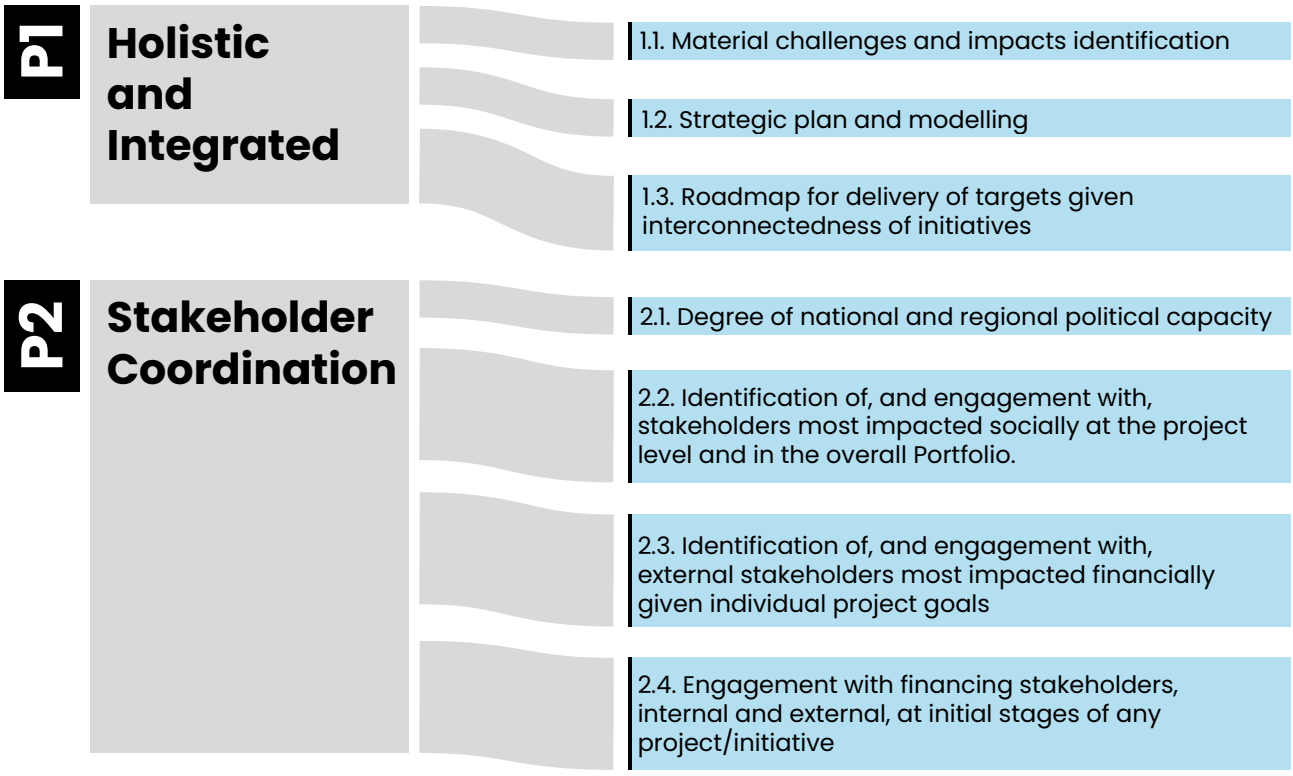
A critical lesson: cities and financiers must work together from the start on building urban resilience, including at the planning stage. This ensures a mutual understanding of challenges and trade-offs faced. This has been foundationally embedded into the Portfolio Approach.

Experience shows perfection is not required: cities can succeed by focusing on critical areas and improving step-by-step. The Portfolio Approach also steers away from ad-hoc, piecemeal projects and focuses on the strategic needs rather than responding to what funding is available. For investors, credibility is built through a systematic understanding of the challenges and a process to develop and execute solutions in a collaborative, transparent way. Ultimately, credibility helps to attract capital and lower its cost.

Building resilience is a long-term endeavor, requiring agility in what is a constantly changing environment. The changing environment applies to more than just cities. For example, the insurance sector is also formulating new solutions in response to the changing nature of risk: Tokio Marine's acquisition of an engineering firm, a first for the industry, signals a potentially increased and deeper capacity to understand asset prices and risk at the city level. With the right partnerships and leadership, insurance premiums can become a catalyst for positive change—helping cities not only survive but thrive.

Cities face many challenges, including for some, a lack of autonomy. But even having autonomy is no guarantee of success. The case studies in this paper prompt a rethinking of how cities can be managed and financed toward building resilience. They also identify steps and practical tools for cities and financiers, including piloting the Portfolio Approach and the Six Practices to a wider group of cities, and sharing the creative solutions that are being implemented. In the case of Broward County and Cape Town, both cities faced immediate challenges requiring urgent response. Already having a resilience team in place helped greatly in accelerating their innovations and solutions. Given the state of current global affairs, we ignore these lessons at our peril. The time for meaningful, collective action is now.

The Six Practices of the City Resilience Portfolio Approach



P3 Capital Allocation Strategy

- 3.1. Financial flexibility, including on long term capital initiatives
- 3.2. Capacity and skillset to design plans, including on long term capital initiatives
- 3.3. Organization is set up to adapt and respond rapidly to challenges

P4 Data Strategy and Use

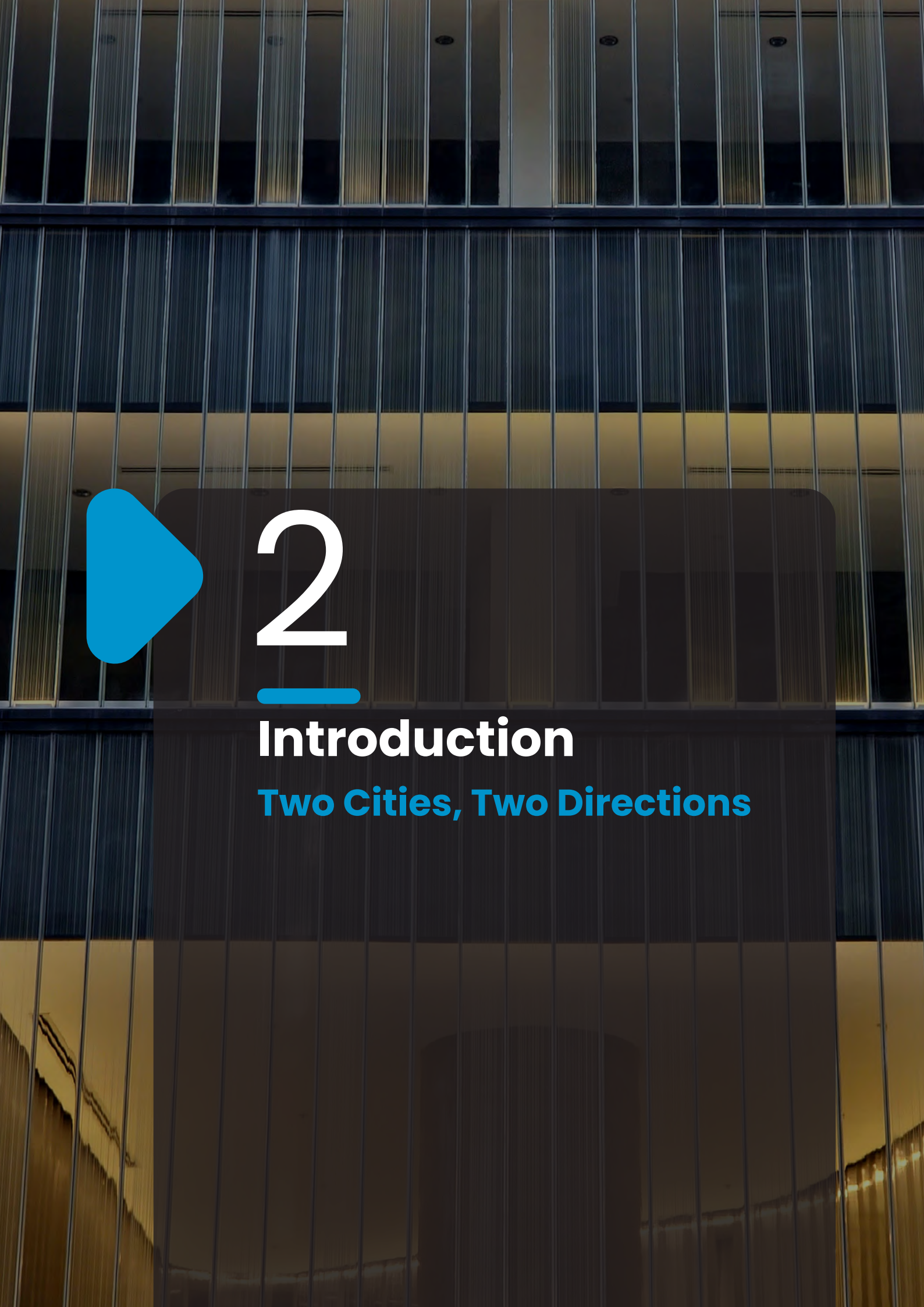
- 4.1. Management system to identify data collection strategy
- 4.2. Quality and quantity of social data available for decision making
- 4.3. Quality and quantity of financial data available for decision making
- 4.4. Analytical tools and skills, either internal or external, used to calculate social and financial outcomes and costs of proposed projects
- 4.5. Resilience benefits/co-benefits connected to city goals for each project

P5 Project Management and Execution Skills

- 5.1. System to manage projects under development and data on all target outcomes.
- 5.2. Management skillsets and execution abilities
- 5.3.Training and development of teams
- 5.4. System to track and respond to unintended consequences and leakages

P6 Transparency and Accountability

- 6.1. Reporting on strategic approach to selecting projects
- 6.2. Reporting detail and standards adopted on projects and deliverables
- 6.3. Clear accountability on projects selected and developed
- 6.4. Mechanisms for whistleblowing and grievances



2

Introduction

Two Cities, Two Directions

The Premium Wake-up Call

With more extreme weather events, one trend has been rising insurance premiums for both businesses and city residents. In some cases, these have risen to prohibitively high levels while in others, insurers have withdrawn coverage completely. **Higher premiums reflect the rising price of protection from climate change risk, forcing everyone to respond whether they believe in the urgency of climate change or not.** For cities, individuals and businesses, the responses to this trend could have very different consequences.

Two cases illustrate two very different pathways. First, in Broward County, Florida, recurring flooding and spiking insurance costs pushed the County's elected officials and professional staff to begin co-designing a resilience strategy. The innovative planning approach that followed involved multiple stakeholders and quantified economic impacts of solutions from the beginning of the process. The cost of not doing anything was continued community losses in addition to financial losses, and particularly the risk of much lower real estate values. External advisors were engaged to calculate the cost of inaction versus the costs and the benefits of two adaptation solutions involving better drainage and seawalls. In short, a Return-on-Investment (ROI) was calculated, and local businesses even proposed a sales tax rise to fund the project.

In the second case, a listed company in Asia chose to reduce coverage for business reasons in the face of rising insurance rates, risking climate-related losses. The company's management also decided that they could not absorb significant losses and may have to move the company to a safer, lower risk – and therefore cheaper to insure – area. Unlike in Broward County, there was no structured and empowered convening of all stakeholders at the municipal level. For the city where the company is currently located, inaction counts as a particularly powerful action. Given the risks, the company could move out of the city, and other companies could perform a similar calculation and take the same decision. The area could lose jobs and employment, a decline in real estate values, and this could become a vicious cycle eventually resulting in a hollowing out of the city. In short, even if there is "some" insurance, the impact is as if there was none and the protection gap[1] widens.

CASE STUDY 1: Broward County, Florida, U.S.

Climate vulnerability

On the Atlantic coast, just north of Miami, Broward County is exposed to hurricanes and sea level rise and is considered among the most vulnerable regions to climate risks in the United States. There have been a number of significant climate events, including April 12, 2023, when a 1-in-1000 year rainfall event occurred in South Florida,[2] with Fort Lauderdale most impacted by 4 days of flooding.[3]

Impact on the community, activity and asset prices

The impact within communities of persistent flooding is complex. There are personal losses, including in health and well-being.[4] There are also financial impacts. For example, during flooding there is a decline in economic activity and as shops close, sales fall and so too does city tax income. Additionally, there is the potential loss of property values from water damage (including growth of mold in drywalls, etc.). Rising flood risk is mirrored by rising insurance rates, which have increased by over 400% in some cases.[5] Without insurance, the ability to qualify for either a residential or commercial mortgage is also hampered, creating additional downward pressure on a municipalities tax base.

If the County chose not to strengthen systems and build resilience, these additional expenses and risks will increase the overall of cost of living and doing business. That translates to fewer business prospects, falling asset values, including the value of the real estate, particularly in areas exposed to swells and sea level rise or areas where existing infrastructure is ill-suited. As a consequence of losses or expected losses, some in the community may consider moving. Understanding what is at stake, particularly from a quantitative perspective and accounting for cascading impacts, was a catalyst moment for Broward County and offers a roadmap for other local governments when developing a portfolio-approach inspired resilience strategy.

The right stakeholders for decision-making

Broward County responded by engaging and organizing key stakeholders under the leadership of its Chief Resilience Officer (CRO), who has been instrumental in spearheading this work. The CRO not only convened but also guided the process to ensure that resilience priorities were grounded in both technical expertise and community realities. Supported by a Resilience Plan Steering Committee, the effort brought together.[6] Broward County officials (including finance), specialists (including engineers), community leaders and the CEOs of several local Chambers of Commerce.

Third-party analysis of the risks

Broward County then engaged Hazen and Sawyer, engineering consultants to conduct a countywide risk assessment and resilience plan.[7] Different adaptation combinations were offered, which included project solutions, pumps and drainage systems, distributed stormwater storage and elevated seawalls accounting for 2070 conditions. Each solution was assessed for performance based on different scenarios and longer-term adaptation. In the context of inherent uncertainties, all components in the solution suites are adaptable and build an interconnected system of solutions.

Cost-Benefit analysis of solutions, calculating the Return-on-Investment

McKinsey was also engaged to calculate the economic value of this suite of solutions. These included economic activity benefits, property damage savings and increased real estate values and taxes and increased flood insurance coverage (as risk and premiums fall). Harder to estimate community benefits, such as improved well-being, were not included in the calculations. For the two identified adaptation strategies, capital and operational costs were estimated. These were compared to the benefits and, for one scenario, the expected outcome was a calculated real rate of return of "at least 9%."[8]

Identifying financing solutions

To fund the major resilience projects, leaders and business groups have discussed the need for potential new local taxes, including options such as a sales tax, but as of 2025, no resilience-specific sales tax increase has been formally enacted for Broward County's adaptation plan. Importantly, by including city finance and local business leadership throughout the decision-making process, understanding of the assumptions, models, trade-offs, outcomes and benefits of the project have been accelerated. This collaborative approach has made any resulting investment decisions more informed and efficient.

Helpful enablers: municipal and insurance markets

Two advantages that Broward County benefits from are deep insurance and municipal bond markets. The insurance market has helped to frame how the "externality" of climate change (in this case, flood risk) has been "internalized" in the context of building county resilience via solutions that avoid losses and generate a positive rate of return. In the municipal bond market, investors in Broward County's securities are setting the County's cost of capital and will assess the challenges faced and responses undertaken. Given recent climate events and future projections, failure to build resilience will result in losses and higher borrowing costs. Interestingly, there are initial signs that the municipal bond markets are beginning to price climate risks.[9]

Acting with autonomy

There is no real mention of the role of the Florida state nor the US Federal government in Broward County's strategy. The County did its own analysis, took on the responsibility of engaging and involving stakeholders, understanding risks (addressing any knowledge gaps withsubject matter experts), identifying solutions and planning its financing strategy. The state and federal governments were not needed and might even have been a negative if state insurance is subsidized and mispriced.[10]

By estimating future costs and benefits using the indisputable costs and impacts of climate events so far, Broward County's strategy has achieved a degree of acceptance and de-politicization.

Critical enabler: a broader perspective of governance

For many investors, the most important element in making investment decisions is "Governance," which from a broader perspective, includes not only decision-making processes and skillsets, but also disclosure, transparency and critically, accountability. As such, it also includes management. For example, by providing regular updates on discussions and progress, including how decisions are made, being more transparent, all stakeholders in the community, including investors, are able to understand how the County is working to strengthen critical systems and managing its investments and plans. Resilience-building infrastructure projects will take several years to complete. As such, decision-making processes, including managing intended and unintended consequences, will need to be robust.

Broward County's strategy is an instructive case study of how to develop a pragmatic solution in collaboration with private sector stakeholders. However, in other cities and counties, a lack of collaboration and shared understanding can lead to fatal challenges for the municipality and its stakeholders.

CASE STUDY 2: The Corporate Exit Risk

This case study reflects a situation observed in several cities across Asia, illustrated here through an indicative example. Discussions with corporations and investors indicate that this experience is not uncommon and indeed could increase with time. In this example, a major company faces rising costs linked to climate and insurance risks. Yet in the city where it operates, there is no organized function within local government dedicated to resilience, leaving businesses exposed and uncertain about the future.

Higher insurance premiums and cost-benefit analysis

Like many in climate vulnerable cities, this company was presented with much higher insurance premiums. In response, management decided to reduce coverage. Effectively, if there were to be a climate event that is not covered, the company would bear a larger loss. Furthermore, management also discussed that if there were to be a loss taken, the company would need to consider moving their operations. Given the risk of continued losses, and the likelihood of rising insurance premiums, relocation may be a much more attractive option from a cost-benefit perspective. It would not be surprising if the company is already weighing the benefits of relocation. That would be in the interest of shareholders and part of management's fiduciary responsibilities.

The very real "walking away" possibility and its impact

Cities that are particularly vulnerable need to be prepared that companies and communities could conduct their own individual analysis and decide to move away if no actions are taken to build resilience. And while a business "exiting a city" may seem extreme, if the business is concerned about a decline in the value of its assets (for example, its real estate), then management would be failing in its duties not to move. It is also important to appreciate that many businesses will want to engage the municipal government on strategies and actions to address these challenges. However, if the city is not organized or has little agency or even institutional or economic autonomy to act, then these challenges may be too great to overcome.

The company moving away could have material impact on asset prices for the city. There could be banks who have lent against real estate valuations and if there is a loss of confidence in the city, then these collateral values could fall rapidly. For these banks, these exposures could become stranded assets. The city, without leadership to address these challenges, could hollow out.

Insurance: an enabler that cuts both ways?

In this scenario, "some insurance" is as effective as "no insurance." Insurance is frequently touted as a potential solution to building climate resilience.[11] And while there is much to this thesis, a recent paper by the Bank of International Settlements, "Too hot to insure – avoiding the insurability tipping point"[12] examines how inaction on strengthening systems can lead to points where insurance is no longer available, such as in the Palisades in Los Angeles. The report also recognizes that insurers have to be aware of their own financial soundness.[13] In this scenario, rising premiums and

the "under-insurance" of assets catalyze a sequence of actions that could have far reaching and dramatic outcomes.[14]

The risk is that, with no action, the protection gap will widen rather than narrow. The European Central Bank expects the climate insurance protection gap to increase[15], and there are proposals and innovations under discussion at multiple levels.[16]

Protection Gaps and Recent Data from the US

Protection gap data is thin at the municipal level, although there is data at the national level.[17] It is typically the case that outside of the high-income economies, protection gaps are wider.[18] That said, data and analysis on behavior is beginning to show the sensitivity of consumers to rising insurance premiums. The US Senate Budget Committee reported on rising non-renewal rates in the counties most exposed to climate risk in December 2024,[19] connecting non-renewal rates to rising premiums. Climbing insurance rates already appear to be driving consumers to drop coverage.

A recent study by Sastri et al[20] using US data from 2013 to 2022 confirms that as premiums increase, coverage decreases (with 1% rise reducing coverage by 0.107%). While this difference appears small, cumulative impacts can become significant. Additionally, the average US household only insures 70% of the cost to fully rebuild their home. Interestingly, this dataset also includes mortgage data and finds that as premiums rise, households also take on more mortgage debt. However, while higher income households can increase mortgage debt, lower income households are forced to cut coverage, exposing them to higher potential losses. In short, not only are higher premiums impacting coverage, but they are hurting lower income households more.

While this is not surprising, it is important to note that the data in these studies does not reflect recent trends. A report[21] by JPM Private Bank illustrates how home insurance premiums are outpacing Consumer Price Index (CPI) and also that Florida condo price declines have been, at least in part, due to climate risks and by insurers voting "with their feet." In short, in the US, where the insurance markets are deep and the data is more available, the pressure to respond to higher insurance rates is accelerating. These protection gap dynamics underscore the urgency – examined throughout this paper – of embedding resilience and financing solutions that match the new risk realities faced by cities and their residents.

Emerging tools and capabilities

There is rapidly improving data on the probabilities of different hazards in areas using both satellite/remote sensing and terrestrial data. Investors and real estate asset owners can use this data to understand their individual investments in greater detail and can develop strategies to mitigate risks. It is therefore not surprising that there are important emerging trends in the insurance industry. For example, in 2024, the Tokio Marine Insurance Group acquired Integrated Design & Engineering Holdings (ID&E), an engineering consulting firm. This strategic acquisition, rare for an insurance company, looks to be a first, although other insurance companies have partnerships with engineering companies (eg, MunichRe). The combination of financing and engineering insight at the municipal level creates new capabilities.

There are three areas to highlight where this collaboration enhances both financial solutions and rewards for cities.

First, ID&E's capabilities in disaster prevention, risk assessment and resilience engineering complement Tokio Marine's existing natural disaster risk assessments. This has the potential for better solutions from disaster-resilient and mitigation capability perspectives. Second, Tokio Marine is expanding into the "pre-incident" area (such as accident prevention and early disease detection) and the "post-incident" area (such as rapid recovery and recurrence prevention). Given that ID&E provides expertise in engineering, disaster prevention, and smart infrastructure, this potentially supports cities' mitigation and adaptations strategies. Third, there is potential for climate change risk assessment, decarbonization solutions and smart mobility among other areas. ID&E had previously acquired BDP Architects, which is part of the Urban & Spatial Development

Business. The company launched "Good City" initiative,[22] bringing together experts from different disciplines to identify ten themes, including resilience, that help to make a good city. Each of the ten themes are linked to solutions cities can take.

Missing enablers

For the company in Asia, unfortunately there are currently many barriers and not enough enablers to provide a promising outlook. For example, they were unable to go to a group at the municipal government level dedicated to building city resilience. Even if this group existed, are the key stakeholders and decision makers empowered and have agency to design mitigation and adaptation strategies and actions? Does the group have resources (such as to collect data and analyze the problem systematically for material considerations and identify solutions) or the ability to outsource this? Do they have the skillsets to execute these projects? And finally, given their efforts, can they attract capital to finance any solutions? Who would they go to? How could they reduce their cost of capital?

The City Resilience Portfolio Approach

While both case studies refer to a specific set of hazards, brought on by an event or a repricing of risks, cities face multiple challenges not limited to the impacts of climate change. They also must provide a range of services. Building resilience requires that any material issues must also encompass an understanding of all the city's assets, and their ability to provide these services reliably.

Summary of the research questions

A formal statement of the research questions of this paper is:

a) What is and why do we need a Portfolio Approach?

b) What operational practices enable cities to finance and implement resilience strategies? And,

c) How can these be systematically applied to attract and retain both human and financial capital?

3

The City Resilience Portfolio Approach

Within Resilient Cities Network, urban resilience is defined as the capacity of a city's systems, businesses, institutions, communities and individuals to survive, adapt and thrive, no matter what chronic stresses and acute shocks they experience. Resilience therefore encapsulates impacts of climate change, healthcare systems, education facilities, technology and connectivity, the surrounding areas which feed the city and is fed by the city's constituents.[23] The city's cultural and natural capital is also relevant as it captures where and how the city's residents gather, share experiences, interact and what attracts visitors to the city. This suggests any resilience solution must therefore be holistic, local and make a city future ready.

What is therefore needed is a Portfolio Approach: recognizing building resilience as a set of projects to be designed, implemented and managed that together serve to make the city a place where communities grow and prosper. This City Resilience Portfolio Approach (the Portfolio Approach) is emerging within the Resilient Cities Network, led by cities such as Cape Town, San Francisco and New York. Furthermore, financing is embedded by design in the Portfolio Approach. Our baseline assumption is that many national governments face tight budget constraints and the private sector will be needed. **Engineering the Portfolio Approach with financier stakeholders as a core collaborative partner has the potential be innovative and may also be able to reach a wider range of capital providers.**

Structural challenges are unlikely to disappear: avoiding the 'ad-hoc' trap

Unfortunately, there are considerable barriers for cities and communities to overcome in building urban resilience. For example, some cities have little agency and are unable to access their own financing directly, particularly in economies that are still developing. In some cases, regional versus federal politics will impact capital allocations to cities. These problems are unlikely to disappear, whether due to geopolitical tensions that spillover to domestic politics, higher interest rates that put pressure on debt service or stretched country fiscal positions.[24] Consequently, cities could be budget-constrained not only for project development but also to attract talent or pay for experts.

Sometimes, cities know they will not get funding from government sources and so try to find alternative avenues. For example, there may be funds from philanthropy or even impact investors,[25] which could be targeting a specific, typically measurable, social or natural capital outcome. As a consequence, a project may be designed ad- hoc to meet the capital provider's requirements. While this can work out very well, it can also be suboptimal: the project may be undersized, may not always interconnect with other projects, and may not be the most important project the city needs.

Defining the Portfolio Approach

The Portfolio Approach is a strategic model for organizing, planning and developing projects across various city priorities and essential services, aimed at increasing the city's capacity to manage and financially plan for investments that build and strengthen the resilience of its systems.

Building resilience for cities is not just about "playing defense" against challenges such as climate change but about building a city that adapts, grows and prospers. Attracting capital, both human and financial, is therefore a necessary component of the Portfolio Approach. **A successful strategy serves to lift up communities, improve well-being and enhance lives.** From a financial perspective, a thriving city allows for rising asset values (including real estate) and a broadening tax base.

Two case studies – Financing for a portfolio of projects

In this section, two case studies on the City of Cape Town in South Africa and Canada's Green Municipal Fund offer critical insights into the Portfolio Approach, how it can be implemented and the benefits it brings. Some context helps. First, building resilience involves a collection of interconnected projects, which must be financed. Second, the need for financiers to work with cities early and throughout the process, which is typically multiyear, is critical. And finally, credibility is key in attracting wider pools of capital and especially the private sector.

CASE STUDY 3: Learnings from Cape Town's Portfolio Approach

Cape Town's experience offers an example of the Portfolio Approach, which took several years, and during which time credibility was built through design and a continued focus on improving the delivery of targets and critical outcomes. Of the many learnings from Cape Town's journey, for the purposes of this report, we focus on a few salient points.

- Cape Town always had a focus on building resilience and strengthening systems. The city joined 100 Resilient Cities in 2016. Avoiding "Day Zero" in April-May 2018, after three years of severe drought, preceded key policy events. The city developed a comprehensive water strategy to build and ensure water security.[26] At the same time, from August 2017 to August 2019, the city was developing its Resilience Strategy. This took a holistic approach that covered ten shocks.[27] The continued investment in the city's resilience strategy underscores political commitment to building resilience.[28]
- Since then, resilience as a strategic competency has been advanced in multiple strategies. Importantly, resilience was integrated into the city's most important plan, the Integrated Development Plan 2017-2022 in which resilience is one of the six guiding principles to be "institutionalized across the organization and be incorporated into the city's strategic planning and decision-making mechanisms." Doing so involves stakeholder engagement with communities and experts. Thus, the process is bottom-up,[29] allowing for an on-the-ground understanding of challenges and bottlenecks.
- The Future Planning & Resilience Directorate, formed after the development of the Resilience Strategy, collocates impactful functions including corporate portfolio and project management, risk management, business continuity management, engineering management, strategic planning, performance management and data science. The directorate works very closely with other directorates in the city government, including the finance directorate. Resilience has been embedded structurally through the organization. Doing so allows coherence of policy across all the initiatives but also considers the financing needs and understanding of what different investors, either development finance institutions or local lenders, require. The team also liaises with grant providers, including those that provide funds for technical needs.[30]

- There is an emphasis on data, which drives decision-making and operations throughout the organization. The Integrated Annual Report[31] includes detail on targets and goals across multiple services and progress made and there are disclosures on individual projects. These include services linked to initiatives such as ease of doing business, underlining the link between resilience and economic activity. Effectively, for the city, "infrastructure is the agent of change."[32]
- The investment in data gathering also supports the financing strategy. Some borrowings by the city are tied to revenue collected. The revenue collection ratio is at 97% and is available by service and reported monthly to the Mayor and quarterly to the National Treasury. As a comparison, Johannesburg can be below 90%.[33] The organization is therefore incentivized to keep collections high or risk a rise in the cost of borrowing. As such, rates and services need to be appropriately modeled and any trade-offs understood and managed.
- Significant investment has been made in project management systems and capabilities. Cape Town has developed a system with SAP that allows them to know "where every project is in development at any point in time." This has significant benefits for managing resources: if one project is facing bottlenecks, then resources can be switched to accelerate another. The portfolio of projects spans more than 10 years in duration. Given there are over 2,000 projects, this also implies continued investment in appropriate skillsets and training.
- Cape Town is also, for key positions, a competitive payer. This demonstrates not only commitment from a budgetary perspective but also the ability to attract and retain talent. Furthermore, some key personnel performance scorecards are available online, reflecting the commitment to transparency in operations.
- While South Africa ranks 80th out of 180 countries in Transparency International's Corruption Perceptions Index, the city government has secured three straight clean audits from the Auditor General of South Africa. Cape Town has a zero tolerance for corruption. It has 5 "A" ratings in a row from the CDP.[34]
- Cape Town publishes an Infrastructure Report each year that shows the state of infrastructure and outlines the state of the portfolio of projects intended to address the needs of the city, including incorporating demographics and climate change.
- Cape Town, like all others, has material issues to continuously manage, respond and adapt to. As part of ensuring "resilience thinking" is embedded into all aspects of decision making, every project or major spending initiative must be marked to have direct resilience benefit or co-benefits (ie, no direct benefit but connects to another project or service that does). Such practical methods serve to remind how projects are interconnected to each other in addition to the higher-level strategic imperative.[35]

Over time, Cape Town has built strong credibility with both public and private lenders by developing and maintaining a well-documented, city-wide resilience strategy. This strategic direction has reassured financiers that the city's investments are grounded in robust planning and sound governance. As a result, Cape Town enjoys greater flexibility in raising and allocating resources across its portfolio of projects. This credibility also gives the city the agility to respond to shifting priorities — for example, accelerating investments in energy security, addressing water scarcity or upgrading transport systems — while maintaining investor confidence and alignment with its long-term resilience objectives.

Cape Town has yet to take on any project finance transactions. It can do so within the Portfolio Approach, allocating specific revenues for some services. To achieve this, there are many innovations and well-established practices and resources developed within the project finance ecosystem.[36] From the Portfolio Approach perspective, a key consideration is how the project finance fits into the city's strategy, so it's not the case that a project is executed simply because it is expedient to do as "finance is available" for it. In short, resilience-building explicitly recognizes the interconnectedness of projects within the overall portfolio, including risks and trade-offs in prioritization.

Financing for the Cape Town's portfolio of capital projects, comes from a range of sources, and different methods of have been deployed. For example, the city issued a Green Bond, which also requires specific processes and disclosures, and continued to steadily build credibility in being able to execute its strategy. Private sector banks continue to lend to the city on favorable terms, while AFD and KfW are international financial partners. In May 2025, Cape Town's credit rating was upgraded by Moody's. While many factors go into any upgrade, the City's financial management abilities were a key driver even though its resilience and infrastructure-led growth strategy will mean greater borrowing and rising debt burdens. Being somewhat biased, we would argue that the upgrade reflects how pragmatic governance and building credibility opens new sources of capital and ultimately lowers the cost of that capital. In sum, Cape Town's story reminds us: credibility unlocks doors.

The Cape Town team have been open about sharing their journey and experiences. This has allowed other cities and those in the resilience-building and finance ecosystems to learn their achievements, the steps they took and continue to take. Cape Town shows that building resilience demands much more than isolated strategies but rather a structured, integrated process. Its success and the experiences of other cases help provide insights into how the Portfolio Approach could be implemented. In Cape Town's case, there was also no need to be perfect to attract capital: the city was able to raise financing even as their resilience strategy was being designed and executed.

While Cape Town demonstrates the journey to portfolio planning from a city's perspective, Canada's Green Municipal Fund (GMF), an impact fund, provides an insightful perspective on how a city's efforts can be accelerated and supported from an external stakeholder. To help Canadian cities, GMF also built a valuable tool to measure progress on "competency areas" for cities. Before elaborating on the Six Practices, which have a link to competency, it is useful to first introduce GMF; and second, the learnings from their capital allocation process.

CASE STUDY 4: Learnings from Canada's Green Municipal Fund (GMF)

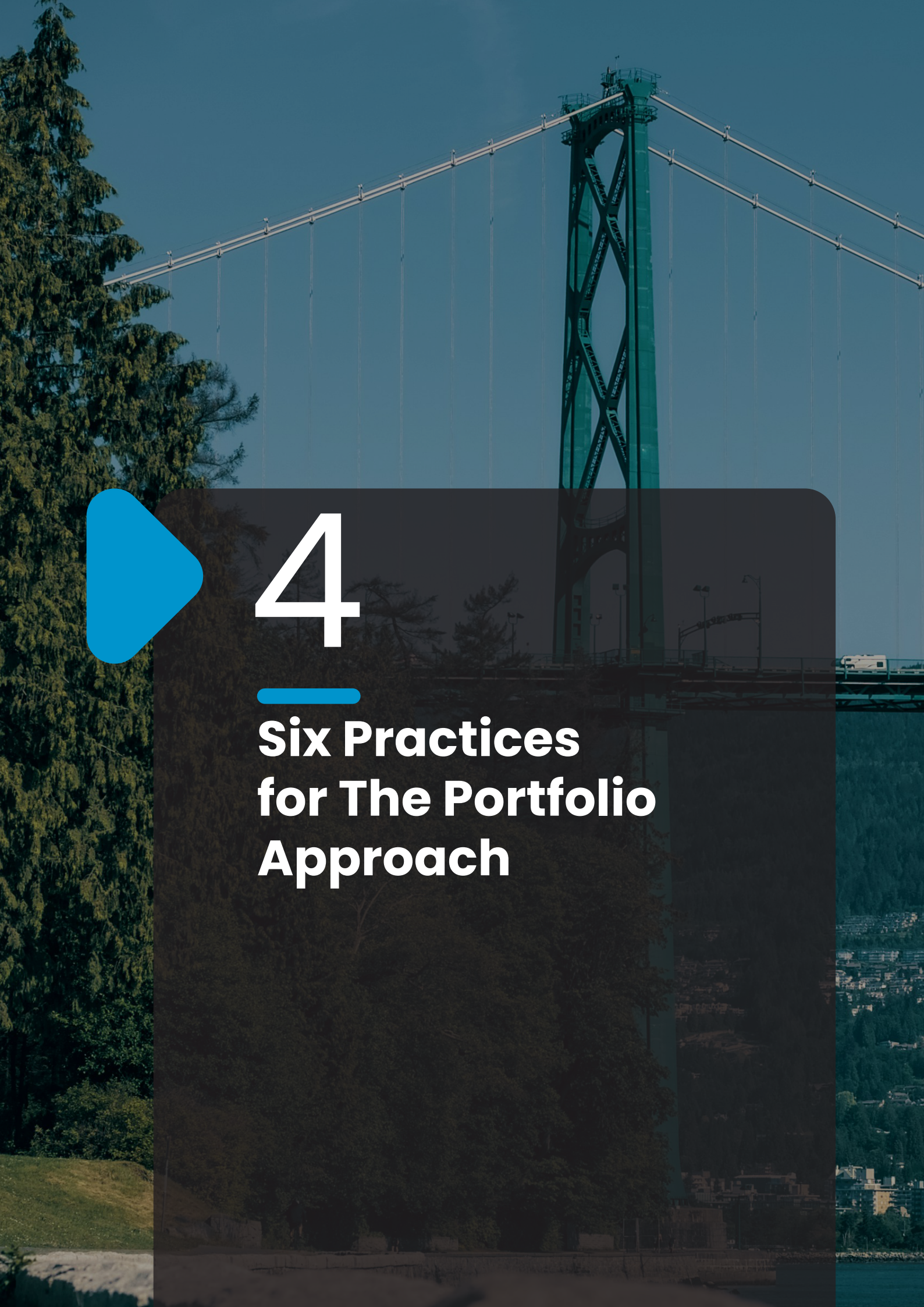
GMF is part of the Federation of Canadian Municipalities (FCM)[37] and is a fund that provides grants, loans and capacity building programing to support municipalities toward resilience and net zero. GMF started in 2000 with funding from the Government of Canada and has a current endowment at $1.65 billion CAD. Since its inception, GMF has approved over 2,300 projects worth $1.6 billion CAD and achieved almost 3m tons of avoided greenhouse gases, almost 1m gigajoules of energy savings per year and 282m cubic meters of water treated per year.

- GMF combines both capacity building and funding. The fund covers cities from highly urbanized metropolises to very small towns. The diversity of cities requires different solutions around both learnings and trainings, as well as providing financing in the form of grants or loans. GMF can also attract private sector capital by partial funding of approved solutions or through catalyzing follow-on financing.
- GMF and other FCM programs also build tools for cities, of which the "Asset Management Readiness Scale" (AMRS) is particularly useful.[38] Asset management here refers to the assets which the city manages to provide services to the community. The tool, developed under the Municipal Asset Management Program,[39] covers five competencies: Policy and governance; People and leadership; Data and information; Planning and decision-making; and Contribution to asset management practice. For each of these competences, there are three defined "outcome areas" and the ability the city has in achieving the target outcomes. Cities are guided to self-assess themselves on a scale 1 to 5, each level representing a different capacity. For example, in the context of asset data, level 1 could refer to being at an early stage such as having some asset inventory data and anecdotal data on the conditions of some assets. Comparatively, level 5 indicates there is expanded data at the asset level and an evaluation of the life cycle investment requirements for most assets has been performed. This allows a clear understanding of where the cities at multiple levels stand given there are a total of 15 such outcome areas.
- By understanding their position, and where target outcomes could be, cities can use the AMRS to establish a path toward better management of their assets. For the funder, there is better understanding of risks and needs and where resource interventions can have greatest possible impact. Importantly, a low score is not an impediment to funds: the tool identifies areas to develop which then sets the stage for funding and financing.
- GMF provides funding from early-stage planning to studies to pilot projects as well as capital projects. There are 13 initiatives from energy efficiency to net zero transformations to sustainable affordable housing. Grants are defined by objectives and open to cities and, depending on the objectives, other eligible parties, including from the private sector.

Furthermore, case studies for projects are available online, allowing anyone to understand what outcomes are achieved.[40]

- Another tool, the Climate-Ready Communities Assessment Tool,[41] released last year, is more focused on adaptation. The tool is a process to help cities understand where they are and therefore what steps are needed. Solutions for climate adaptation can be very local and so a pragmatic approach needs to be taken that also recognizes the diverse potential solutions.
- GMF's approach underlines the importance of building momentum for cities. The capacity building exercises allow progress to be measured even while developing projects. Furthermore, GMF can also understand what learning interventions and projects are successful and share these with other cities, creating scale.
- As financiers, GMF's annual report includes assessment criteria and weights for its evaluation and scoring of projects. While these vary by the initiative (eg, waste) and the stage of the project (for example, plans versus pilots), they include weights for "systems approach" and "sustainability considerations" and "links to existing plans and policies" and "project management." These help to capture the inter-connectedness of projects, particularly as the objective of solutions is also to be innovative and as scalable as possible.
- By providing grants and loans to de-risk projects, the GMF also serves to bring in private sector capital, which now exceeds $75 million CAD. GMF's successful strategy has helped to raise public sector capital: most recently, the GMF secured two new program mandates with the Government of Canada—Local Leadership for Climate Adaptation (LLCA) and Growing Canada's Community Canopies (GCCC) which added more than $820 million CAD in new funding for municipal climate solutions and adaptation.

GMF's process for allocating capital, including defining "competency areas," experiences and targeted capacity building interventions, provides inspiration and validation for the Six Practices of the Portfolio Approach. The Practices can be designed to guide cities in building credibility over time in ways which have the potential to attract capital and tracking progress.



4

Six Practices for The Portfolio Approach

Both Cape Town and the GMF have common threads, particularly in the context of building capacity, improving project development and execution and linking these with finance. Not coincidentally in several areas, there are similarities to ideas in the governance and management of a company, which we adapt for cities to include into the Six Practices. The Six Practices can be broken down into 23 target outcomes. For each of these areas, we can define a scale to represent which stage a city is in that helps both the city and potential investors understand needs. All target outcomes are measured using a scale from 1 to 4.

Furthermore, cities can assess themselves. Some cities may be much further ahead than others in some Practice areas and not in others but, as observed, this not an impediment to funding. The Practices also take into consideration issues related to countries with different institutional and legal structures and apply to large and small cities. Each city can assess its own strengths and challenges and opt for a more targeted approach to working with partners and financier stakeholders on critical areas. **The Portfolio Approach empowers cities and their stakeholders to frame their own futures.** The following section sets out the rationale for the target outcome areas associated with each of the Practices.

The Six Practices to implement of the Portfolio Approach have been derived from the case studies and experiences, and are:

1. Holistic & Integrated:
Understanding of existing city assets and the material issues, challenges and risks facing the city. From this comes a strategy and roadmap to build resilience;

2. Stakeholder Coordination:
Engagement with stakeholders, governments and local communities to understand societal and economic impacts and early engagement with financing stakeholders to understand needs and wants;

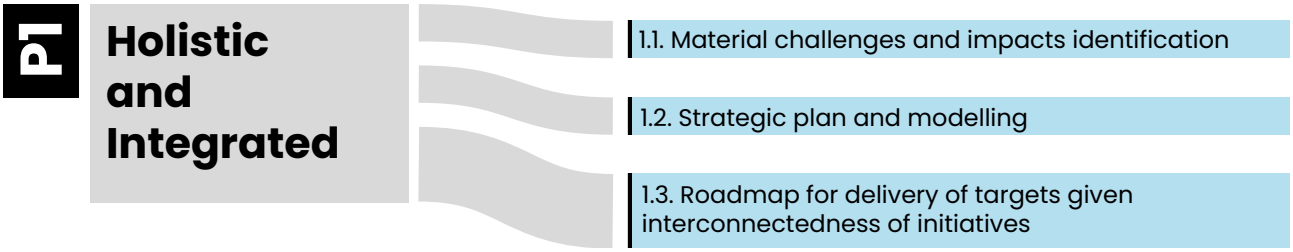
3. Capital Allocation Strategy:
How capital initiatives are designed and trade-offs are assessed, including how much financial flexibility and necessary skillsets the city has;

4. Data Strategy & Use:
Development of a robust data strategy, including the quantity and quality of data, and how it is used to arrive at estimates of Returns on Investment (ROIs);

5. Project Management and Execution skills:
Capacity to deliver projects, including working across departments and teams and continuing to invest in training and capacity building; and,

6. Accountability and Transparency:
Including in reporting and disclosure to all stakeholders and mechanisms for reporting and addressing grievances and a critical component of building credibility.

Practice #1:
Holistic and Integrated



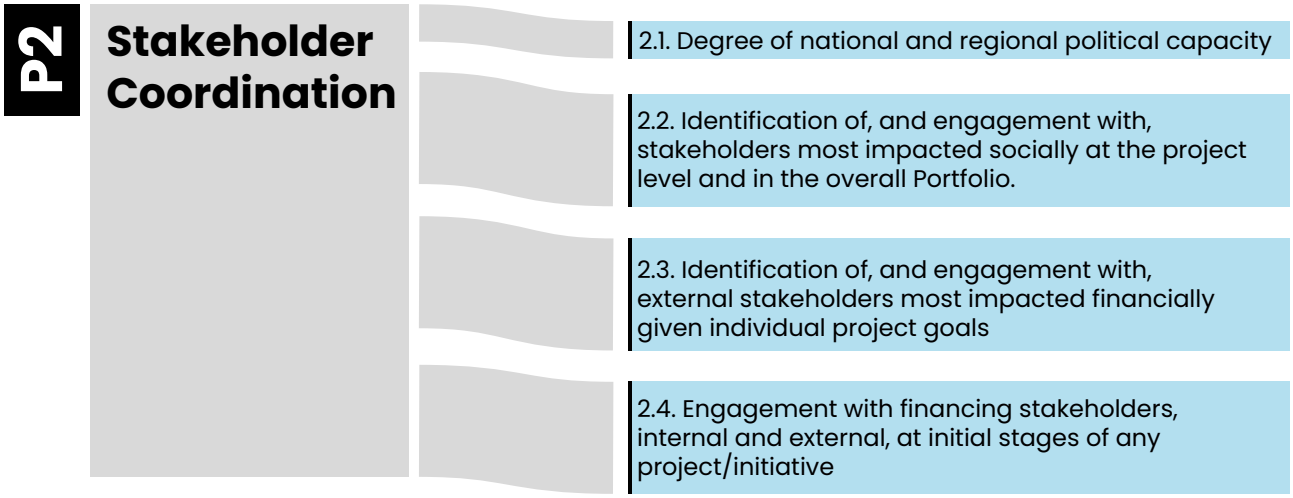
Urban resilience requires systems thinking, given the need to integrate multiple projects which address both risks (eg, climate change impacts) and opportunities (becoming a "smart city"). Projects across different initiatives connect to each other and reflect the underlying stresses: for example, a green data center that is flood protected is more useful than one that is regularly flooded.

Having a clear understanding of the material challenges and impacts requires an understanding of the existing assets of the city and therefore where key points of stress lie. For some cities at the early stage of developing this Practice, such understanding may be patchy. While some new projects may be well-researched, other assets may include unstructured or informal data. Other cities will have developed rigorous processes to evaluate material issues, collect relevant data and also constantly refining these methodologies. In our scale, the first city scores a "1" while the latter a "4".

The second target outcome is around the Strategic plan and the process for decision making. Some cities will be able to compare different projects against each other and have a robust risk management framework that helps to identify the best risk-return profiles. There is also some effort to measure social outcomes to help understand the value of projects. This helps to avoid relying on ad hoc decision making and better appreciate the trade-offs of different projects.

The third target outcome is working toward or establishing a roadmap for delivery of city targets given many initiatives are interconnected. For example, strengthening one city service while not addressing a related area may achieve only marginal improvements. Instead, a clearly identified direction plus targets gives all stakeholders an understanding of the city's strategy for building resilience.

Practice #2:
Stakeholder Coordination



As the Broward County case demonstrated, engaging stakeholders is an important and critical enabler. Understanding material risks and opportunities involves regular engagement and appreciation of local conditions and how larger trends are impacting constituents.

While shared values are great, shared pockets are more effective. Co-ordinating stakeholders who have the greatest to lose by a project not being implemented effectively allows a coalition of the willing (and across political lines) who have "internalized" the effects into their decision making. Indeed, from a financing perspective, the latter is more valuable. Therefore, it is key to involve the city finance team as a key internal stakeholder early in the project development cycle if more creative financing solutions may be required and be available.

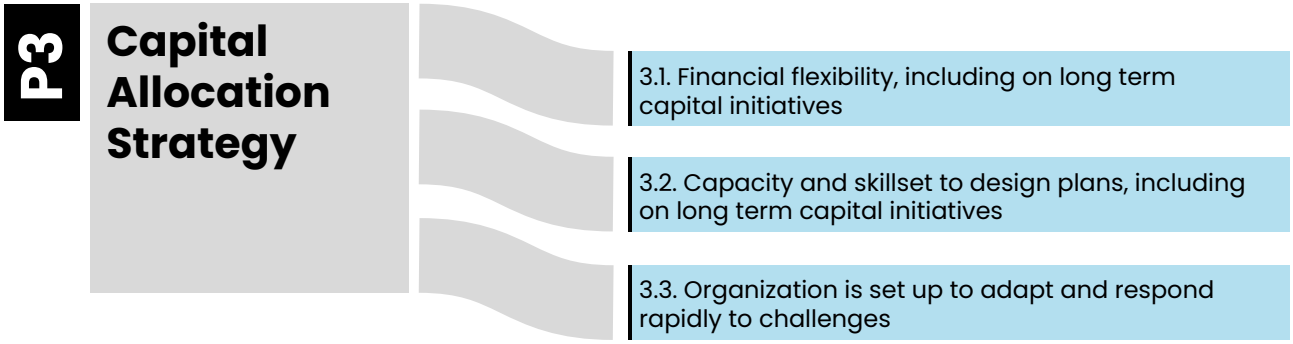
We propose four target outcomes for this practice. Firstly, in the context of being able to frame a strategy and raise financing, cities need to have political capacity and flexibility to introduce, prioritize and execute projects. Furthermore, the more "de-politicized" the municipality and more professionally managed, arguably the greater the potential that outcomes and targets, especially long-term initiatives, can be designed and implemented. The target outcome scale here is more complex and reflects the degree of this capacity.

Secondly, external stakeholders need to be engaged consistently to understand the social and financial outcomes of projects. While it can be tempting to translate social outcomes into a monetary value, such as calculations on economic value added or activity metrics such as GDP, the target social outcomes are worth being explicitly defined and measurable. These can be linked to SDGs or reflect specific social or natural capital metrics which appeal to specific pools of capital, such as issue-focused impact investors or philanthropic funds.

Similarly, financial impacts on external stakeholders and communities also need to be estimated and calculated, including returns (economic activity, etc), expected contributions (eg, taxes or spending on services) as well as the impact on asset or real estate valuations (particularly in the context of climate risk impacts).

Finally, it is critical to formalize structures for collaboration with finance stakeholders early and throughout. One example, though not of a city, is the Wyre Natural Flood Management project.[42] Through direct engagement with stakeholders, a project using natural solutions for reduced flood risk was developed. Stakeholder engagement included understanding how the community would be contributing to the solutions and how the project would be funded. Triodos Bank was present early and built the financial models. The eventual financing solution was a grant from a foundation and a 9-year loan by impact investors where the interest rate drops based on achieved outcomes. While not all solutions may be as creative, the project does show how to benefit from an understanding where the pools of capital are and what they are most interested in.

Practice #3:
Capital Allocation Strategy



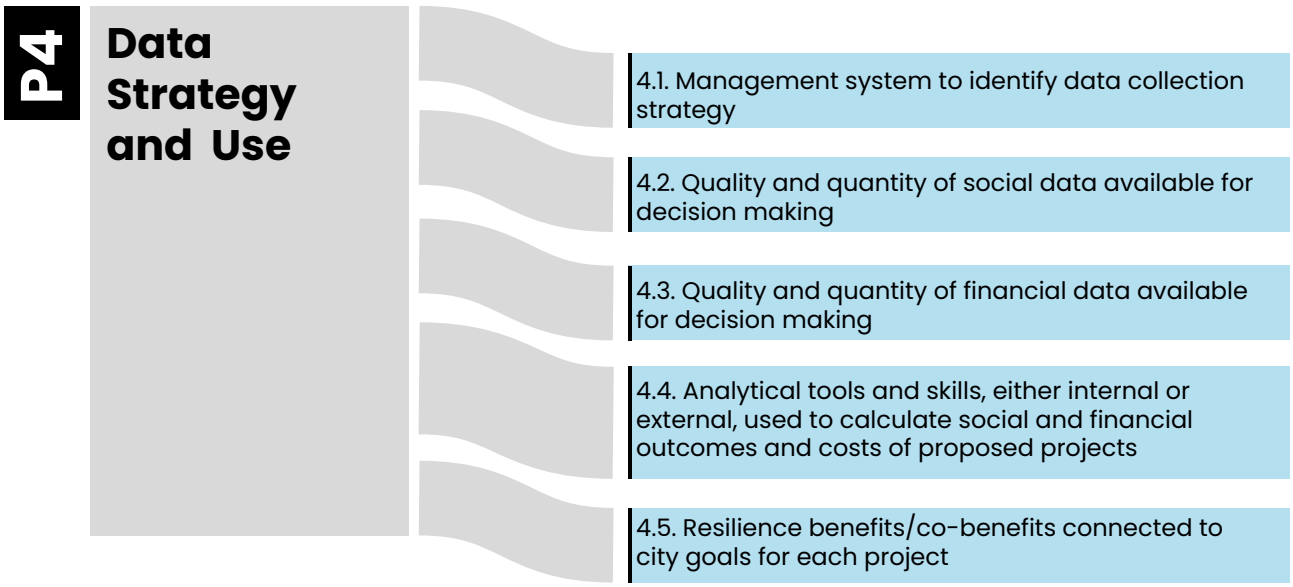
Building urban resilience involves a multi-decade strategy and decision-making that is both flexible and forward-looking. Many infrastructure standards use climate data from the last 30 years which does not account for future projections in a rapidly changing climate. City resilience leaders need to assess projects as rigorously as possible and understand trade-offs. Furthermore, climate change impacts on future projections are subject to regular revisions. Solutions must also therefore have flexibility by design while still integrating into the broader resilience plan.

Crucially, city governments need to have some financial flexibility and stability. If there is no legal or institutional framework to allow revenue collection and capital raising, it will be difficult for any city to plan to build resilience. At the same time, financial flexibility may not extend to having the skillsets, internally or externally, to design plans, including on longer term capital initiatives.

There are methodologies to measure the degree of autonomy local governments have: namely, the Local Autonomy Index (LAI).[43] This includes assessments of Legal Autonomy, Financial Autonomy and Political Discretion (captured in Practice #2). These are elaborated into seven dimensions and then measured through 11 variables. This is tracked through an index over 30 years. The LAI 2.0 has been built for 57 countries, mainly in the Global North. While there can be debate over the weights and metrics, the framework provides a useful tool to understand which cities have agency in designing and implementing solutions.

Another critical component is organizational and management ability to adapt and rapidly respond to challenges. For city leaders, in critical areas, there may be the ability to respond rapidly to crisis events (eg, Covid response learnings). There may also be an organizational structure and culture that is set up to be able to appreciate challenges and be able to adapt and respond quickly to any event.

Practice #4:
Data Strategy and Use



A core building block for decision making is the organizational data strategy. Framing a data strategy can be resource intensive, particularly given the breadth of data that can be collected. Technological improvements allow for more data sources and types, from early warning indicators to in depth locational data. With more data and AI, arguably a paradigm-shifting technological advancement, there could be better understanding in multiple areas, such as affordability in service provision and therefore more efficient pricing models and optimization of city revenues.

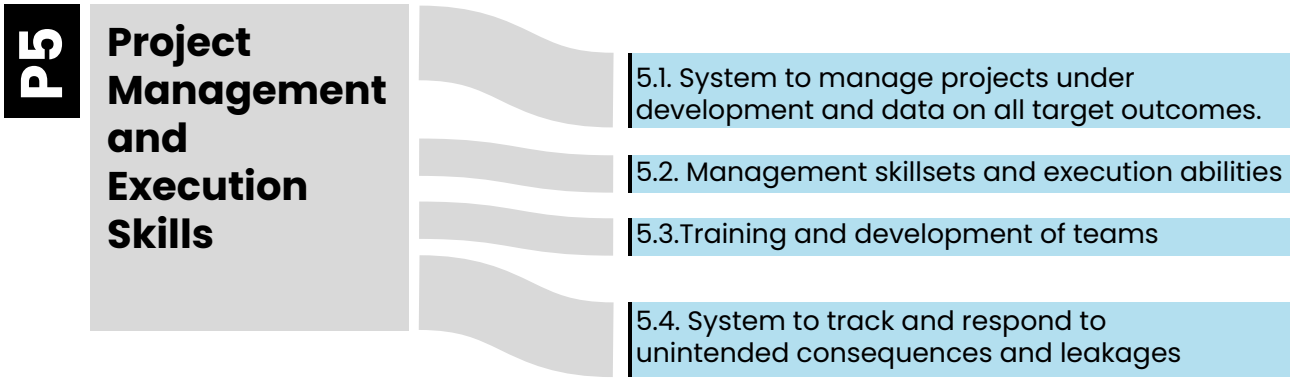
Ultimately, the data strategy needs to reflect the objectives of the city government and there is clear accountability on how the strategy is formed and trade-offs managed. Given the focus on measuring impact, this practice emphasizes collecting data on societal (including natural capital) and financial metrics. The latter is likely to be more available. For societal or community targets, there might be qualitative or even anecdotal data which may be correct but for which there are challenges to verify. Even so, such data availability is improving rapidly and working to collect better data supports decision making for both cities and financiers.

Another target outcome focuses on how knowledge and modelling gaps are addressed. Some cities may have advanced tools but where there are gaps, partnerships can provide additional resources or methodologies. For example, through the Global Risk and Resilience Fellowship for The Hague a set of modified Probable Maximum Loss curves were developed to help the city analyze identified shocks and stresses and eventually prioritize these for investment focus. Such capacity building can be both brought to in-house teams or shared across cities allowing others to replicate.[44] Using tools to help prioritize projects can make RoIs easier to calculate, including comparing RoIs to the cost of inaction. However, some projects may not have high RoIs or may even have low to negative ROIs. These projects may have high social value and may be urgent (eg, healthcare facilities), these would be more attractive to other pools of capital, such as concessional, development, impact or philanthropic.

Cities must therefore be clear on which inputs are used in the project selection process. One frequent challenge is that resilience calls for the building out of redundant systems and this is hard to finance. In many cases, only after a catastrophe has occurred might a city have the resources and support to respond to the risk. It is important to understand that a build-back-better approach post-disaster often requires more capital than is available. However, redundant systems are not a foreign concept in business. Investors in companies understand Business Continuity Planning: for example, the importance of having a resilient supply chain rather than one supplier in a high climate risk environment. In short, "costly redundancy" might be prudent planning.

Lastly, as demonstrated in the case study on Cape Town, there is value in clearly articulating direct resilience benefits or co-benefits as this provides data for impact measurement and emphasizes the importance of robust, quality project design.

Practice #5:
Project Management and Execution Skills

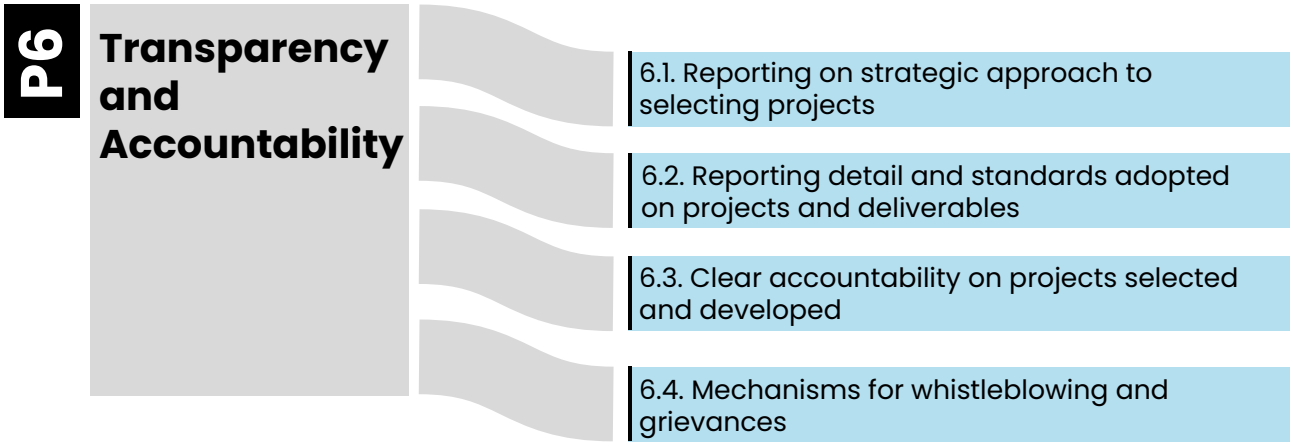


The Cape Town case study underscores the importance of investment into project management and execution capability. The number of projects in development can run into the hundreds and thousands for cities, a robust system and skilled project managers need to be in place to manage and execute projects. Lowering execution risk is crucial for meeting financing requirements given that many projects are funded through interest-bearing liabilities. Failure to do so could mean a lower credit rating and therefore a higher cost of funds.

Building management and staff capacity is a continuous process that requires a structured training and development strategy. Each city has its own strategic direction, and it is crucial that capacity building and management systems support this. Resilience-building requires collaboration across different city teams, such as finance and urban planning departments. Difficult working relationships can slow relevant information flow and effective solutions on interconnected projects. Capacity, training and management programs must focus on building the appropriate skillsets for cross-team collaboration and an organizational structure designed for success.

An additional outcome to include is a system to track and respond to unintended consequences and establish frameworks to reduce leakage in project delivery. Unintended consequences can be missed, particularly if there are specific targets around societal and environmental outcomes which get measured and reported but others do not. Leakage can be reduced through better technology systems that monitor activity throughout the supply and process chains.

Practice #6:
Transparency and Accountability



The last Practice, and by no means the least important, is Transparency and Accountability. A well-constructed, data-informed disclosure and reporting framework serves to support stakeholder confidence. There are increasingly accessible technologies for monitoring and evaluation of projects which serve as third-party verification.

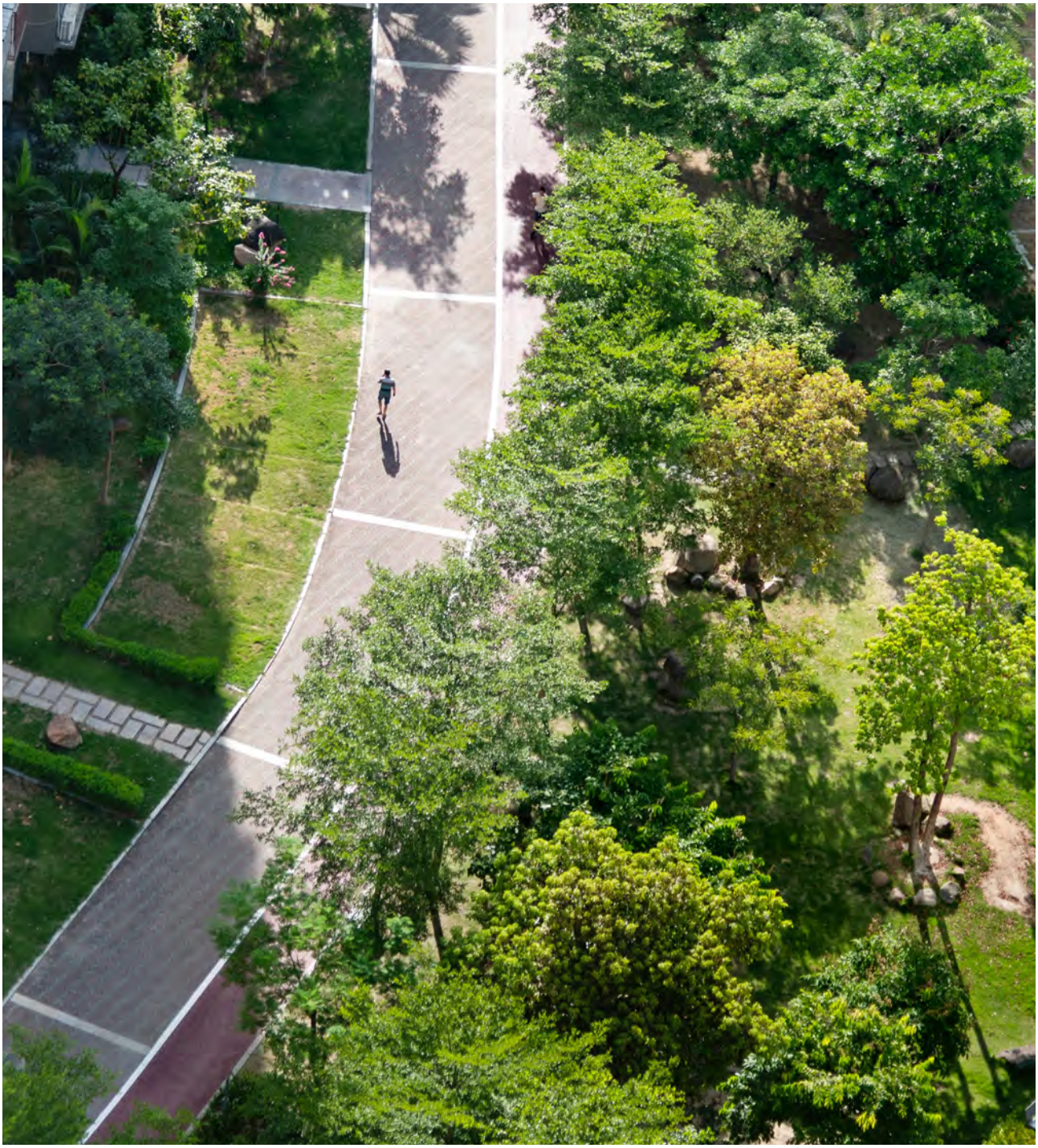
There must be clear lines of responsibility for the resilience strategy. The formalization of the role of the CRO enables accountability for transparent stakeholder engagement, data collection and project assessment. In the urban context, the resilience office plays a key role in engaging both city staff and external stakeholders, collecting relevant data, filling knowledge gaps, identifying solutions and identifying partners who can support these solutions.

Strengthening mechanisms for whistleblowing and grievances is critical for transparency and accountability. That said, there are independent third-party providers of such services who can manage the necessary confidentiality considerations of any whistleblowing accusations.

What we do not do with the Six Practices

It is important to emphasize that there are no weights attached to any of the "target outcomes". Rather outcomes can be scored to understand where cities are, identify challenges and areas where improvements can result in tangible benefits. Furthermore, investors will value different target outcomes differently: for example, a city's path to improving practices and building capacity could be enough to raise funding.

While the Practices areas will not change significantly, the maturity of the target outcomes are expected change with advances in technology, and regulation. For example, AI and Robotics could have a revolutionary change to city management systems and data analyses. This could mean target outcomes evolve. We have tried to capture some of this by including social impact data, including nature-related, as well as economic and financial data. Similar to the history of corporate governance, there have been shifts in emphasis over time from "minority shareholder rights" to "sustainability governance".



5

Governance, finance, and enablers of the Portfolio Approach

In many ways, the Portfolio Approach and Six Practices highlight the importance of the broader idea of resilience governance. The goal is to align with how the private sector, and particularly the financial sector, can partner with cities so that a resilience strategy can be funded. The Portfolio Approach could also benefit, and benefit from, other stakeholders in the resilience ecosystem.

Financing the Portfolio Approach

The case studies in this report underscore how investors see a city's progression toward resilience. The example of Cape Town shows that the city was able to attract financing at multiple stages. Instead of raising funds for stand-alone projects, the city secures borrowing against revenues it collects and deploys this across an inter-connected set of projects There are grant allocations for technical assistance, funding at the project level (Greater Cape Town Water Fund), and loans for specific purposes (aligning to the requirements of a Green Bond) and for the city's general spending and other projects (given the confidence in revenue collection capability). The providers of financing range from development organizations to stock exchange-listed banks.

Furthermore, Cape Town's Portfolio Approach arguably aligns with how investors typically fund enterprises. There is one, a strategic plan formed with a vision; two, an understanding of priorities, risks and challenges; three, a systematic approach to addressing these, including existing assets and the costs and benefits of new projects or initiatives; four, systems and abilities to execute; and, five, accountability, regularly reporting and disclosure relevant data that is verified.

This visibility is not always available to project finance investors. Understandably, there can be a relatively specific focus on the key variables surrounding the project in question.[45] However, enshrining the commitment to a holistic resilience approach potentially gives investors insight into how a city intends to strengthen its interconnected systems. This is the basis of the Six Practices, borrowing heavily from case studies plus learnings from corporate governance to raise the probability of attracting capital from a range of providers.

There is also support for cities in capacity building from the broad range of public and private sectors. As described, the self-assessment identifies areas for development which the cities network and partners can help to address. **Different cities are at different stages and the ability to share experiences and target specific learning outcomes also has the potential for accelerating a city's ability to establish and execute the Portfolio Approach.**

GMF's success in building capacities and progress in fostering sustainability and resilience in Canadian cities is evidenced by their increased funding capacity and trust in introducing areas such as climate adaptation strategies. And while GMF is focused on climate, the impact on communities is consistently assessed in analyses and funding. In short, for cities looking to take a complete picture, being methodological and data-intensive, building capacity and having ambition, helps.

Creativity in financing

In the case of Penang in Malaysia, despite reduced funding from the central government, a creative solution to get around these challenges was found. Penang had little ability to fund critical infrastructure projects. Penang worked with the private sector to engineer a swap: private sector property developers reclaimed land and built infrastructure in exchange for giving up some of that land to the government. The local government was therefore able to work with developers on the project (skillset sharing, etc) and generate growth for the city (as new businesses set up), a revenue stream for itself (taxation), as well as enable developers to generate a financial return.

For the developers, a thriving, growing Penang would boost economic activity and potentially real estate values. While not every city can achieve this, the lesson is that by working together with the private sector, and designing solutions to benefit both, they were able to "de-couple" from the lack of central government funding.[46]

The Portfolio Approach and The City Resilience Framework

The Portfolio Approach can also be combined with existing frameworks such as Arup's City Resilience Framework (CRF).[47] While there are overlaps in detail, the Portfolio Approach complements and reinforces the CRF by emphasizing the financing dimension of resilience. After a decade of application across hundreds of cities worldwide, the framework was redesigned in 2024 as CRF'24, drawing on collaboration with the Resilient Cities Network and the experience of Chief Resilience Officers. The new edition aims to be a more accessible and actionable tool — created with cities, for cities — to help leaders embrace collaborative and coordinated action, whatever challenges they face. CRF'24 measures city performance across four dimensions: Infrastructure & Environment; Health & Wellbeing; Economy & Society (including financial systems); and Local Governance & Planning (including informed, inclusive, and integrated decision-making). The Portfolio Approach builds on this foundation, aligning resilience planning with the mobilization of capital and investment, thereby reinforcing the CRF'24 and accelerating city action.

The CRF'24 multiple applications can help cities identify gaps and interconnectedness, develop strategies and masterplans and also prepare cities for investment. The Portfolio Approach complements this with a greater focus on the financing component, particularly with the private sector. Combining both the results of CRF'24 with the Six Practices potentially provides a rich maturity assessment for cities. This is a potential future area of study and collaboration.

Continuity of vision and standards

A challenge for all cities is to establish a "continuity of vision": that is, given that many solutions would be implemented over years, is there an acceptance across political and technical levels to build resilience? To be clear, some cities come together after a major catastrophe. Even so, a key risk is that, without regular engagement or an established 10-year plan, any progress could be lost.

Broward County found a way to "de-politicize" the process with the central government and get around the problem. Cape Town arguably was able to build solutions that effectively bypassed central government pressures. Given that many government balance sheets are stretched, it is difficult to expect that the central government would be in a position to provide all the necessary capital in case of a climate event. For example, the Spanish government's offer to Valencia after flash floods in 2024 still means the city could still be short an estimated €10 billion EUR.[48] With National Adaptation Plans being released and refined, there could be significant project design and financing gaps that need to be filled. Allowing city stakeholders to frame their solutions would be a logical solution.

Using technology and other enablers

This research has emphasized the importance of having a robust data strategy, given the increasing quantity and quality of available data. While there are more solutions emerging, we highlight two. First, using satellite and remote sensing data, early warning systems can improve adaptive responses, and there are now companies who provide data on hazard risks such as fire, wind and flood for any location. These solutions will only improve over time as data quality improves and connects with terrestrial data including response infrastructure.

One particularly promising area is the use of digital twins. Jason Pomeroy's "Hardware, Software, Heartware: Digital Twinning for more Sustainable Built Environments"[49] explore cities where the digital twin (DT) is used for urban governance and also enhancing communities. The "heartware" explicitly emphasizes the ability to understand the impact of disasters on communities. Such DTs could be used to not only understand hazards, but design solutions that help a city to become

more future ready and resilient. For example, strategies to reduce urban heat islands could be analyzed in combination with wind patterns as a result of new developments and then assessed for impact and optimization. Furthermore, the costs of DTs are likely to fall with greater adoption providing cities and communities with tools to make better decisions and better cities that attract human and financial capital. It would not be surprising if such DTs eventually become public goods.

Financing, going local and advocating for the Portfolio Approach

A lack of autonomy for local governments can be a deal-breaker for many investors.[50] One additional learning is that local autonomy is even more important in the context of building resilience. Problems and solutions can be very local and specific. It is difficult to expect the central government of a country with many urban areas to have the time and resources to understand in detail the specific challenges and trade-offs a city faces. To be clear, local autonomy is not sufficient: local leaders still must act in a transparent manner for example. That said, local communities are already aware of the material issues to be addressed, and the more agency they have, arguably the more they are also able to engage and identify stakeholders who understand their needs and are genuinely invested in solutions. Ideally, greater autonomy for cities also involves deeper collaboration with national governments to ensure alignment with overall strategy for the country. However, this is not always possible.

We have tried to account for this dynamic in the Six Practices. As argued earlier, greater local autonomy is needed to make the Portfolio Approach easier to execute. National governments are important stakeholders to collaborate with to ensure consistency with national plans. Furthermore, some autonomy is a pre-requisite for municipal bond market success. In that sense, this research supports the efforts of groups that encourage countries to give cities financial flexibility to be able to develop municipal bond markets in more countries. There are few examples of successes in the Global South, but this will need to change if more cities are to build more resilient systems.[51]

6

Conclusion

The case studies exposed several common threads which helped to define the Portfolio Approach and Six Practices which serve to implement it. In many ways, these cases brought to the forefront a broader perspective of governance, one that investors would understand and value. What cities such as Cape Town and Broward County are doing, by being pioneers and innovators, is working to preserve and grow asset values. Together, they serve to attract both communities and financial capital.

For the Resilient Cities Network and its members, this paper is both an exploration and a statement. It recognizes the collective progress made through more than 90 published resilience strategies and years of experimentation, learning and iteration. The Portfolio Approach builds on this foundation, offering a way to connect resilience planning to the strategic mobilization of capital — a critical evolution of the resilience agenda that speaks to the realities cities face today.

There are several action areas. For city leaders, a core takeaway is the need to lead collaboration and begin to assess themselves on the Six Practices and 23 target outcomes. This helps to identify areas and priorities that need support and promotes a deeper engagement with stakeholders. For the resilience community, the provision of such readiness or maturity assessments itself is a call to action: targeted interventions can help cities accelerate improvements in critical areas. For example, cities may need support to better understand materiality and their existing assets. Others may need help to frame a robust digital and data strategy given the risks and opportunities of AI. For financiers, early engagement allows for a better understanding and appreciation of trade-offs and more effective solution-building. For example, different pools of capital could be present at different stages of development: at early capacity building stages, there may be more development, philanthropy or impact capital. Ultimately, the goal is to lower the cost of capital by helping build credibility and therefore attract wider pools of capital. For businesses, it is to recognize that that they too play a role in the future of cities. To build resilience, local communities and governments need to appreciate that they are all in the same boat. In short, "shared wallets," we think, trumps "shared values."

The next steps are to pilot the Six Practices with a representative group of cities, both in the Global North and South, and both small and large. The member cities of the Resilient Cities Network and other similar communities are natural candidates. The broader resilience community, working with these cities, can help accelerate their development, demonstrating measurable progress. Learnings, successes and failures add to the body of case studies that can then be leveraged and scaled by a wide group of cities.

Resilience is not a destination. It is a continuing process, one that requires agility and humility to question ideas and biases. The Six Practices are working tools, shaped by the case studies. As more cities take the lead in implementing the Portfolio Approach, share solutions to the well-known and complex problems, including acknowledging and reporting where and why efforts fell short, the Six Practices will gain depth and deliver more actionable insights. We therefore also call upon the resilience community to challenge and fine tune the Six Practices and 23 target outcomes further. With honest iteration, we believe, comes tangible results.

Capital flows to where it is treated well: but in today's world, we cannot assume that cities will grow and thrive or that asset prices will always rise. As we have seen, failure to act, such as the case of the company in Asia facing higher insurance costs, can begin a process that leads to worsening outcomes for the city. The Portfolio Approach also needs time to implement, with each city facing and addressing their own individual, and typically very local, challenges. Embarking too late, or with too little agency, or with insurmountable obstacles, can result in similar painful outcomes for cities and their communities. While giving cities more autonomy isn't a solution in itself, it gives them a fighting chance. In the end, cities need to take action and shape their futures as they can: the time is now and the tools here are a start.

Endnotes

1 Essentially, the difference between what losses could occur and what is actually covered by insurance. A formal definition would be: the protection gap is the difference between the amount of insurance that is economically beneficial and the amount of coverage that is actually purchased.

2 A quick google search for "1-in-1000 year rainfall event in Florida" reveals 3 such events in 2022 (Hurricane Ian), 2023 and 2024 (Hurricane Milton).

3 https://www.cbsnews.com/miami/news/deluge-2023-remembering-fort-lauderdales-historic-flooding-1-year-later/ . The extent of the flooding was such that residents were advised to call 911 only if there was a "true emergency."

4 For example, the 2022 floods in Pakistan continue to be analyzed for impacts. https://thinklandscape.globallandscapesforum.org/68862/two-years-on-pakistan-is-still-reeling-from-its-worst-ever-floods/

5 https://www.local10.com/news/local/2024/08/26/heres-why-thousands-of-south-florida-homeowners-are-being-told-they-need-flood-insurance/ , with residents facing insurance premium rises of over 400%, which many have to buy as their mortgages require them to have flood insurance if they are in a zone designated by the Federal Emergency Management Agency (FEMA).

6 https://www.broward.org/ResiliencePlan/Pages/steeringcommittee.aspx

7 https://www.broward.org/ResiliencePlan/Documents/2024-08-28_BC-ResPlan-Steering-Comm-Presentation-final.pdf

8 https://www.broward.org/ResiliencePlan/Documents/2024-08-28_BC-ResPlan-Steering-Comm-Presentation-final.pdf, see page 47 and the slides preceding it for the calculations.

9 https://www.breckinridge.com/insights/details/heating-up-the-muni-market-inches-closer-to-pricing-climate-risk/ . The ratings agencies have also been integrating climate risk scenarios into ratings. https://www.ice.com/insights/the-us-municipal-bond-market-does-not-price-in-physical-climate-risk-yet

10 The federal government requires flood insurance for designated areas and Broward County's actions will also help ultimately lower flood risk. Sometimes, the federal government provides subsidized insurance through the National Flood Insurance Program (NFIP), which could help alleviate costs in the short term. However, there are two caveats with this solution. The first is the risk of subsidies producing perverse incentives: effectively, by under-pricing risk, one possible outcome is excessive development (and redevelopment) of storm-stricken areas. The second is that climate change is a persistent and rising risk: unless adjusted regularly, the dollar amount of the subsidy could rise rapidly, putting greater pressure on government finances. This is already a problem in the US, where some of the National Flood Insurance Program's debt was cancelled in 2017 (a manageable $16 billion USD) by the federal government. But with rising climate and other risks, eventually the costs will have to be borne by the taxpayer. Unfortunately, this can be a challenging political conversation. Seen from this perspective, perhaps it is not surprising that Broward County took the initiative to address the risks and identify a resilience strategy.

11 https://www.cisl.cam.ac.uk/news-and-resources/publications/investing-tomorrow-guide-building-climate-resilient-investment

12 https://www.bis.org/fsi/publ/insights54.pdf and see also https://www.wtwco.com/en-sg/insights/2023/10/the-potential-for-rate-induced-climate-tipping-points-in-insurance-markets

13 This also raises the possibility that there may not be enough insurance capital either globally.

14 These resilience questions are not captured in "sustainable finance" metrics as they exist today. Investors using these metrics may not be aware that their investee companies are taking on

this risk as it may not be in required disclosures and companies may not be asked explicitly either. And at time of writing, we have not yet found this data included in ESG ratings.

15 https://www.ecb.europa.eu/ecb/climate/climate/html/index.en.html

16 https://www.climateforesight.eu/articles/climate-change-insurance-protection-gap/

17 https://www.swissre.com/risk-knowledge/mitigating-climate-risk/natcat-protection-gap-infographic.html#/

18 See for example, commentary by WEF https://www.weforum.org/stories/2025/08/global-insurance-industry-gap/

19 https://www.budget.senate.gov/imo/media/doc/next_to_fall_the_climate-driven_insurance_crisis_is_here__and_getting_worse.pdf

20 http://e-axes.org/research/the-limits-of-insurance-demand-and-the-rising-protection-gap/ with the full paper at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4909444.

21 https://privatebank.jpmorgan.com/nam/en/insights/markets-and-investing/ideas-and-insights/how-climate-risk-and-losses-are-creating-high-prices-for-home-insurance#fn11

22 See https://www.bdp.com/sg/in-depth/the-good-city

23 For example, Pegasus Capital Advisors, a resilience focused investment firm, looks for food security, health security, water security and energy security in its investments. See https://www.pcalp.com

24 See https://documents1.worldbank.org/curated/en/801991638297695658/pdf/What-Has-Been-the-Impact-of-COVID-19-on-Debt-Turning-a-Wave-into-a-Tsunami.pdf

25 Generating a positive measurable environmental or social return in additional to a financial one. See also: https://thegiin.org/publication/post/about-impact-investing/#what-is-impact-investing.

26 https://greencape.co.za/assets/Resilience-Lessons-Learnt-1.pdf

27 https://resource.capetown.gov.za/documentcentre/Documents/City%20strategies%2C%20plans%20and%20frameworks/Resilience_Strategy.pdf

28 For example, the Future Planning & Resilience Directorate had 370 staff in 2022.

29 See particularly, from 2020, how the thinking evolved from then to now. https://www.mdpi.com/2071-1050/12/2/550#:~:text=Cape%20Town%20has%20been%20a,100%20RC%20network%20since%202016

30 https://www.afd.fr/en/carte-des-projets/consolidate-cape-towns-resilience-climate-change

31 https://resource.capetown.gov.za/documentcentre/Documents/City%20research%20reports%20and%20review/CCT_Integrated_Annual_Report_2023-24.pdf

32 At the same time, the city's progress allows the capacity to look ahead and invest in emerging tools such as AI to optimize the data that has been and is being collected.

33 https://joburg.org.za/work_/Documents/ConsolidatedSection71reportMay2024.pdf

34 https://www.cdp.net/en/data/scores

35 The City's longer-term goal is to make such thinking so endemic and part of the organization's DNA that "resilience" as a term can be retired.

36 See for example on Project Preparation Facilities: https://www.shiftcities.org/post/unlocking-urban-finance-vital-role-project-preparation-city-projects

37 GMF is an impact fund, which is one of the fastest growing pools of capital. The size of the global impact investing market is still relatively small at $1.7 trillion USD. That said, the growth rate has been 21% CAGR since 2019. An impact fund will typically target measurable societal, environmental as well as financial (which may or may not be market beating) outcomes. Consequently, these funds are arguably more scalable than grant or philanthropy capital. For

the goal of building city capacity and accelerating finance for building resilience, such funds which combine values and finance are a promising source of capital.

38 https://greenmunicipalfund.ca/resources/tool-asset-management-readiness-scale

39 Municipal Asset Management Program | FCM

40 https://greenmunicipalfund.ca/case-studies

41 https://greenmunicipalfund.ca/resources/climate-ready-communities-assessment-tool

42 See https://hive.greenfinanceinstitute.com/gfihive/toolkit/developing-a-business-case-and-financial-model/the-wyre-catchment-natural-flood-management-project/

43 Andreas Ladner, Nicolas Keffer & Alexander Bastianen (2025) Local autonomy around the world: the updated and extended Local Autonomy Index (LAI 2.0), Regional & Federal Studies, 35:2, 163-185, DOI: 10.1080/13597566.2023.2267990 and link to the article is https://doi.org/10.1080/13597566.2023.2267990

44 We cannot resist but to add, "and, in due course, an AI algorithm to produce."

45 And then including a guarantee for the top-down country risk.

46 https://www.penangpropertytalk.com/2015/12/land-reclamation-the-only-way-fund-transport-plans-in-penang/

47 The 2024 edition of the City Resilience Framework aims to provide a more accessible tool to help a wider cohort of leaders, planners and investors to embrace collaborative and coordinated action on the resilience priorities their cities face. https://resilientcitiesnetwork.org/city-resilience-framework-2024-edition/

48 See https://www.ft.com/content/619959ae-7bf2-4619-82cf-2d1ce2399f56 and also https://www.bloomberg.com/news/articles/2024-11-05/valencia-asks-for-31-billion-rescue-package-after-deadly-floods?embedded-checkout=true

49 https://pomeroyacademy.sg/books/digital-twin/

50 See for a very useful treatment, Simon, D., Vora, Y., Sharma, T., & Smit, W. (2021). Responding to Climate Change in Small and Intermediate Cities: Comparative Policy Perspectives from India and South Africa. Sustainability, 13(4), 2382. doi:10.3390/su13042382.

51 India's market is nascent and continues to face challenges, for example. https://www.careratings.com/uploads/newsfiles/1740743181_Indian%20Municipal%20Bond%20Market%20-%20CareEdge%20Report.pdf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