





## 5.

# Capturing the Resilience Dividend

## 5.1. Introduction

All new investments need to be disaster- and climate-resilient to avoid accumulating new contingent liabilities, increasing asset loss and damage, and service disruption

The analysis presented in this Biennial Report highlights the depth and breadth of the multifaceted challenge to strengthen infrastructure resilience in LMICs, particularly in low-income countries. These countries need to increase both public and private investment to reduce their infrastructure deficit and achieve the SDGs. They also need to ensure that this major new infrastructure investment enables them to transition to net-zero economies and reduce systemic risk. Above all, all new investments need to be disaster- and climate-resilient to avoid accumulating new contingent liabilities, increasing asset loss and damage, and service disruption.

There is no 'one size fits all' solution to address these challenges. Countries with large economies, such as India and China, have the capacity to increase public investment and are attractive markets for private capital. In contrast, in smaller developing economies, the fiscal space to increase public investment may be heavily constrained and there is little to attract private capital. Moreover, the capacity to address the multifaceted resilience

challenges described above is mediated by broader macroeconomic factors, such as indebtedness, political stability, and the strength and quality of governance. How much countries want or can invest in strategic economic infrastructure to boost productivity, competitiveness, and growth or in local infrastructure systems to strengthen social development and welfare, and in the resilience of both, is a question that pertains to national development and political priorities.

However, while recognizing the specificity of the governance challenges in each country, there are several pathways that, if followed, may unlock opportunities to strengthen infrastructure resilience. These opportunities can be grouped into three categories:

- 1. Knowledge and capacities:** how to identify and estimate the resilience dividend.
- 2. Infrastructure governance:** how to create an enabling environment to capture the resilience dividend and attract additional investment.
- 3. Markets for resilience:** how to mobilize untapped private capital for investment in infrastructure resilience.

## 5.2. Knowledge and Capacities

### 5.2.1. Knowledge Systems

**Knowledge systems that enable policymakers, planners, designers, contractors, regulators, and financiers to access up-to-date information on ways of strengthening infrastructure resilience, including through NbIS, are a core requirement.**

What are currently incipient CoPs at the national, regional, and global levels and for specific infrastructure applications need to be nurtured to encourage the systematization and production of knowledge on resilience and ensure that this knowledge is widely accessible through information systems in different languages.

A critical knowledge component is the creation of accurate and updated national infrastructure registries or audits, which provide ministries and investors alike with a baseline to assess the risk and resilience of infrastructure and the services provided. A systematic overview of infrastructure assets and services is essential for planning and programming capital investment and operating expenses.

Another core knowledge component is a national risk information system (for example, a digital national risk atlas). This should include information on the risk internalized in each

infrastructure sector, associated with all major hazards, based on probabilistic risk identification and estimation, a georeferenced database on loss and damage to infrastructure assets and service disruption, spending on repair and rehabilitation, as well as input data, such as exposure databases, vulnerability functions, and hazard maps.

Taking advantage of new investments being made in smart city infrastructure in many parts of the world, national risk information systems could be integrated with existing data collection and monitoring systems at the local, sub-national, and national levels. Technologies such as remote sensing and smart sensors can be leveraged to get regularly updated and automated information processes, thus enabling regular monitoring of the status of infrastructure systems.

Strengthening knowledge systems on infrastructure resilience is critical to introducing resilience concepts in professional education (for example, for engineers, planners, and architects) and public policy (for example, public investment planning and evaluation systems). South–South and North–South knowledge exchange can also contribute to raising awareness and understanding of infrastructure resilience and strengthening capacities.

## 5.2.2. Economic and Financial Risk Metrics

**Financial risk metrics are required for each infrastructure sector and geological- and climate-related hazards at the global, national, and sub-national levels.**

Such metrics provide an evidence-based framework to identify and estimate the contingent liabilities internalized in each infrastructure system. They can help to reveal the resilience dividend that is latent in all infrastructure investments and contribute to informed infrastructure planning and project formulation.

Risk models and indices such as the GRI provide a first-level global estimation of infrastructure risk and, thus, help to articulate a clear economic and financial rationale for investing in resilience. Without such evidence-based risk estimates, policies and strategies to strengthen infrastructure resilience will likely be unfocused, rhetorical, and ultimately hollow.

The GRI, however, is only a starting point. Hazards such as wildfires and heatwaves, and systems such as ecosystems and food systems, need to be integrated into the risk analysis. It is also important to model asset risk and the risks posed by service disruption and climate change to identify the resilience dividend that can drive increased investment. Higher resolution models are needed to inform national resilience policies, strategies, and plans and develop pipelines of bankable projects.

At the same time, it is important to strengthen detailed loss and damage accounting to estimate the impacts associated with high-frequency, low-severity extensive risks. This risk layer may not be adequately captured in prospective risk models but is highly

relevant for the local infrastructure systems that provide essential public services. Improving the quality and reliability of public services is an imperative that may generate important political momentum in favour of infrastructure resilience.

## 5.2.3. Estimating the Resilience Dividend

**Developing and adopting standardized methodologies that enable the integration of financial risk metrics into the calculations of costs and benefits and risk-adjusted rates of return is essential for identifying and estimating the dividends that can be obtained from investing in strengthened resilience.**

As a first step, this would require assessments of the additional costs and resulting benefits for different strategies to strengthen infrastructure resilience. Estimating the resilience dividend means considering the avoided asset loss and damage and avoided service disruption over the lifecycle of an infrastructure system. It also means quantifying the broader economic, social, and environmental benefits and co-benefits, including cleaner water and air, enhanced biodiversity, and reduced carbon emissions. This is particularly important in the case of NbIS.

Estimations of the resilience dividend in infrastructure projects must also account for changes in the net present values over different time horizons. NbIS, for example, may take longer to provide returns on investments but may appreciate over time. Grey infrastructure options, in contrast, may depreciate. The role of MDBs in developing and applying such methodologies in their lending operations is critical to introducing such concepts and ensuring that they become standard features of infrastructure project formulation.

### 5.2.4. Resilience Standards and Certification

**The development and adoption of performance-based resilience standards, informed by enhanced financial risk metrics and enhanced estimations of the resilience dividend, is essential to enable investors, regulators, planners, and policymakers to differentiate between infrastructure projects that contribute to strengthening resilience and those that do not.**

In evolving infrastructure areas, such as NbIS, compendiums of good practices provide a vehicle through which appropriate standards can gradually evolve. Meanwhile, unifying and enhancing the existing global resilience standards and facilitating their adaptation to national contexts and adoption in formalized codes, norms, and standards is also essential. Resilience standards reduce uncertainty

and help to de-risk projects for potential investors. They also enable the technical certification of infrastructure resilience. Without explicit standards, professional liability insurance may be invalid, particularly in the case of new approaches such as NbIS.

One way to encourage the adoption of resilience standards in infrastructure projects could be to strengthen the professional norms and rules that regulate the conduct of planners, engineers, architects, and contractors. In many LMICs, professional regulations are often weak or insufficient, leading to a loss of accountability.

The widespread adoption of resilience standards would facilitate third-party certification of infrastructure resilience. Credible international certification is a step towards the creation of an infrastructure resilience asset class, as proposed in [Section 5.4.1](#).

## 5.3. Infrastructure Governance

### 5.3.1. National Infrastructure Resilience Policies, Strategies, and Plans

**Formulating infrastructure resilience policies, strategies, and plans integrated with existing development policies by national governments is critical for strengthening infrastructure governance.**

When countries develop national resilience policies and plans, they send a strong political signal to potential investors that they are taking resilience seriously and have found a political and economic imperative to do so. These instruments need to be aspirational, highlighting a resilience pathway in infrastructure development. They also need to connect to broader development objectives. At the same time, they should be evidence-based, building on financial risk metrics and retrospective information from national loss and damage databases.

National infrastructure resilience policies could include recommendations to introduce NbIS in sectors such as water, where the benefits and co-benefits of designing with nature can be maximized. Similarly, policies may include the adoption of resilience standards in national legislation, and the introduction of performance standards for urban planning and design, in ways that dramatically reduce infrastructure

costs and maximize the resilience dividend.

National infrastructure resilience strategies and plans could provide a national framework for all infrastructure investment directly linked to national development plans and targets, public investment planning, and budgeting. In this way, the strategies can link infrastructure investment to the broader social and environmental resilience dividends that could be generated in other sectors. National strategies can then be used to guide specific resilience strategies in each sector and territory.

Strategies should include clearly defined goals, targets, and indicators (for example, to reduce the AAL in each infrastructure sector by a given percentage over a determined period). Such targets could provide guidance for each sector, while indicators can allow the monitoring of whether the target is being achieved or not.

To highlight the political imperative for resilience, these policies, strategies, and plans must be endorsed as a priority at the highest level of government and used as *'all of government'* instruments rather than being owned by a specific sector. Sectors such as environment or disaster risk management are often politically weak and have limited influence over investment decisions.

Demonstrating a strong political and economic imperative for resilience will help improve a country's risk perception by risk analysts, rating agencies, and markets. If a government is seen as serious about reducing risk and strengthening resilience, the country will become more attractive for potential investors, its sovereign risk may be lowered, and capital costs reduced.

### 5.3.2. Public Investment Planning and Evaluation Systems

**Integrating resilience considerations into national systems for public investment planning and evaluation is critical to implementing national-level infrastructure resilience policies, strategies, and plans.**

Ensuring that resilience is factored into all new public investment in infrastructure is critical to reducing risk, avoiding the disruption of public services, and achieving the targets defined in a national resilience strategy.

In Latin America and some countries in Asia, significant progress has been made in the development and adoption of normative standards and methodological guidelines. However, implementation at the sub-national and local levels has often been undermined by weak local government capacities to formulate and evaluate projects. Integrating resilience into public investment planning and evaluation requires the adoption of methodologies, as discussed in [Section 5.3.1](#). It requires the integration of financial risk metrics to identify the broader resilience dividend into project evaluation over the entire lifecycle of the project. This is critical for ensuring that the budgeting processes make adequate provision for future operating and maintenance requirements.

Public investment planning and evaluation is ultimately both a political and technical process,

given that it reflects a trade-off between strengthening resilience and increased capital investment. Clearly identifying the resilience dividend over the design life of a project can create an imperative for investments in strengthening resilience, even in contexts characterized by a constrained fiscal space.

### 5.3.3. National Resilience Funds

**National resilience funds can provide a new mechanism to finance project pipelines and implement national resilience strategies and plans. A national resilience fund could allow the blending of public resources, climate finance, loans from MDBs, private capital, risk financing, and other sources in a way that allows governments to de-risk infrastructure investment for private capital while at the same time optimizing the use of different resources.**

National resilience funds would also provide a vehicle for applying standardized agreements for concessions and PPPs, further increasing predictability in implementation and streamlining the project design and evaluation process.

National resilience funds could feature mechanisms to monetize the resilience dividend. As described in [Section 4.5.7](#), monetization mechanisms for infrastructure resilience would need to be multifaceted, considering, as far as possible, the internal and external and tangible and intangible benefits that could accrue over the lifecycle of the asset, a clear identification of all the relevant stakeholders and transparent and efficient procedures to distribute the monetized resilience dividend. At present, experience in this area is still incipient and emerging. However, it has the potential to attract currently untapped private capital for investment in infrastructure resilience.



## 5.4. Markets for Infrastructure Resilience

### 5.4.1. A Resilient Infrastructure Asset Class

**Adopting national resilience policies, strategies, and plans; developing project pipelines; establishing national resilience funds and mechanisms to monetize and distribute the resilience dividend, if combined, would send signals to capital markets that could increase the mobilization of private capital in infrastructure resilience.**

If resilience standards and certification mechanisms, as described in [Section 5.2.4](#), are adopted, conditions would then exist for the emergence of a resilient infrastructure asset class. Such an asset class could demonstrate attractive rates of return, which would mean financial markets may respond by creating resilient infrastructure investment funds and other vehicles to attract private capital interested in capturing the resilience dividend.

A first step towards such a process, however, would be developing a common set of standards in order to reduce the risk associated with investing in resilient infrastructure, thereby, bringing down the cost of capital for developers.

### 5.4.2. Project Pipelines and Project Aggregation

**Many countries at present are not attractive for private capital due to real or perceived risks, weak infrastructure governance, and a high cost of capital. At the same time, there may be too few bankable projects of a sufficient scale to interest private investors.**

Financing small-scale projects increases transaction costs and risk, while investing in *one-off* projects is less attractive than a predictable stream of investment opportunities. Attracting private investment depends on generating confidence and building relationships between governments and private capital, which take time to establish.

In the context of national infrastructure plans, developing a project pipeline can increase the offer of bankable projects in a way that offers greater predictability and lower risk for investors. At the same time, many identified small infrastructure projects can be aggregated or bundled, territorially or by sector, to achieve the economies of scale necessary to reduce transaction costs and become attractive for private investment.

For example, several hundred small water projects can be bundled as a single aggregated project or a combination of road, water, and energy projects in each province or department. Project aggregation lowers risk, given that a project bundle will include a mix of higher- and lower-risk projects. The overall risk to potential investors of the project bundle will be lower than if any specific project was chosen.

Project bundles can form a part of the project pipeline, along with major infrastructure projects, providing potential investors with a medium-term horizon to build relations and generate confidence in working in the country, further de-risking the investment process. From the perspective of national governments, project pipelines can increase certainty regarding the achievement of targets and indicators in national resilience strategies.

Project pipelines may also be a way of reducing the costs of risk transfer. Insurance premiums are often insensitive to investments in resilience as they are estimated with respect to bundles of both higher- and lower-risk assets. However, if many aggregated projects in a pipeline integrate resilience features linked to measurable targets and indicators in a national strategy, it may be possible to reduce the cost of risk finance over time in the same way that car insurance is reduced through the mechanism of a *no-claims bonus*.

### 5.4.3. Innovative Financial Mechanisms

**Apart from vehicles such as resilient infrastructure investment funds, it is likely that markets will respond through the development of other innovative financial mechanisms.**

Existing instruments include resilience and catastrophe bonds, which can be adapted and expanded to take advantage of the reduced risk associated with resilient infrastructure.

Debt for climate swaps is another way to generate new funding or release finances otherwise bound up in servicing the crippling national debt. This can increase the fiscal space and room for manoeuvre for countries with limited resources to invest in resilience while meeting longer-term development and climate goals.

Carbon markets and tied adaptation grants, such as those developed under the Paris Agreement, as well as grants and loans that are accessible through existing and new climate funds, provide another source of funding. However, as discussed in [Chapter 4](#), these funds are still not operating to their full potential and, thus, will only be able to meet a fraction of the demand in financing.

Specialized instruments of the private sector such as green or blue bonds, private equity investments for resilience, and sector-specific PPPs hold much promise for single projects and distinct portfolios, particularly for new technologies. However, they need to be scaled up significantly, particularly in LMICs, to become a relevant source of funding resilience in the future.

Finally, new domestic funding sources will become increasingly important for LMICs, especially in emerging economies. National resilience funds may become useful mechanisms if coupled with the national resilience strategies discussed above and if tied to business and insurance-relevant resilience standards. In addition, national revenues from incremental tax reforms and progressive tax regimes can generate significant additional funding in LMICs with dynamic markets and high capital levels, such as Brazil, India, and South Africa.