RESEARCH BRIEF

Investing in climate-resilient decarbonised infrastructure to meet socio-economic and climate change goals

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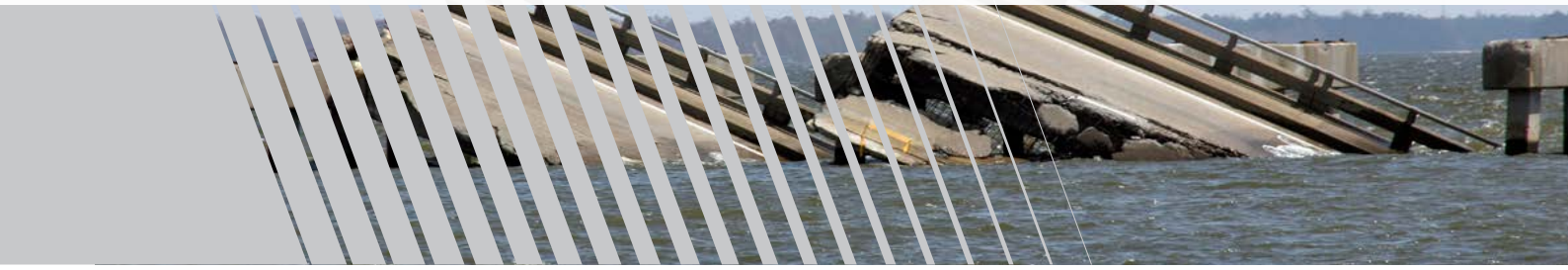

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Solving the global infrastructure challenge, with emphasis on climate resilience and decarbonisation, is fundamental not only to addressing socio-economic goals but also to the drive towards the goal of 2°C warming or less and meeting global climate change targets. This requires coordination, alignment and engagement of governments at all levels as well as other stakeholders. Insurers, as risk managers and long-term investors, are a critical part of the solution.

THE WORLD IS FACING AN INFRASTRUCTURE INVESTMENT GAP CHALLENGE

Critical infrastructure constitutes the backbone of a functioning society. It provides basic services that are fundamental to improving quality of life, economic growth and productivity, commerce, trade and job creation.

> **Infrastructure**: the systems, assets, facilities and networks that provide essential services and are necessary for the national security, economic security, prosperity and health and safety of nations (Critical Five, 2014).
>
> **Critical infrastructure**: that which provides essential support for economic and social well-being, public safety and the functioning of key government responsibilities (OECD, 2008).

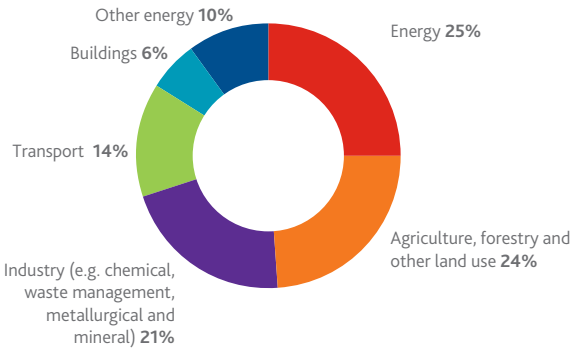
Years of chronic under-investment in infrastructure systems has led to a decline in quality, hindrance of socio-economic growth and perpetuation of a poor quality of life in some countries. There is a need to mobilise capital for upgrading existing infrastructure systems and investing in new ones. Globally, the annual infrastructure investment needed to support socio-economic development until 2030 is estimated to be between USD 3.3 and USD 3.5 trillion (McKinsey & Company, 2016; Global Infrastructure Hub (GIH, 2018)). The Global Infrastructure Hub estimates that the annual investment gap would increase from USD 0.9 trillion to USD 4.4 trillion if climate resilience[1] and decarbonisation[2] were also factored in. These expenditures are particularly relevant to the highest emitting sectors and nations. According to the World Bank Group's Global Infrastructure Facility (GIF), between 60-70% of global infrastructure investments are needed in middle- and low-income countries. Over the next 40 years, as urbanisation continues to progress, more investment in urban infrastructure such as schools, hospitals, road construction, water and sanitation, energy and transport systems will be required (Global Platform for Disaster Risk Reduction, 2017). The scale of the investment gap is well beyond the capacity of the public sector alone. To address this funding deficiency, there is a need to mobilise private capital.

1 In this paper, we define climate resilience as the ability to prepare and plan for, absorb, recover from and successfully adapt to adverse climate events, including extreme events such as floods, severe storms and slow-changing trends such as rising sea levels.

2 Decarbonised, low-carbon or green infrastructure are terms used interchangeably; however, these terms are being defined through the taxonomy work of sustainable finance initiatives, such as the those undertaken by the European Union and Canada.

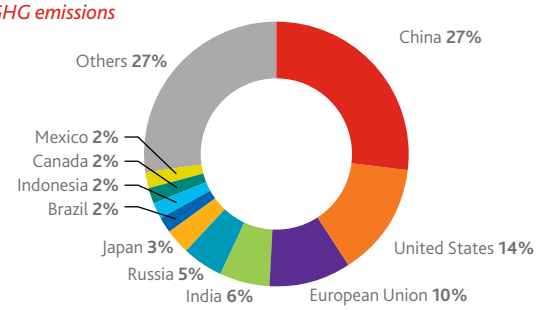
Highest carbon-emitting sectors and countries

Highest carbon-emitting economic sectors (and related infrastructure systems) of total global greenhouse gas (GHG) emissions



Source: Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (IPCC, 2014)

World's highest greenhouse gas-emitting countries in 2013 of total global GHG emissions



Source: (World Resources Institute, 2017)

Investors in infrastructure need to manage a multitude of political, regulatory, economic, financial and operational risks associated with fragmented infrastructure governance, long infrastructure life cycles and infrastructure jurisdiction. These risks need to be addressed to attract long-term capital.

Infrastructure governance, life cycle phases and related investor risks

Infrastructure governance includes ownership, operation modelling and delivery across the entire life cycle of the project. There are five different governance models:

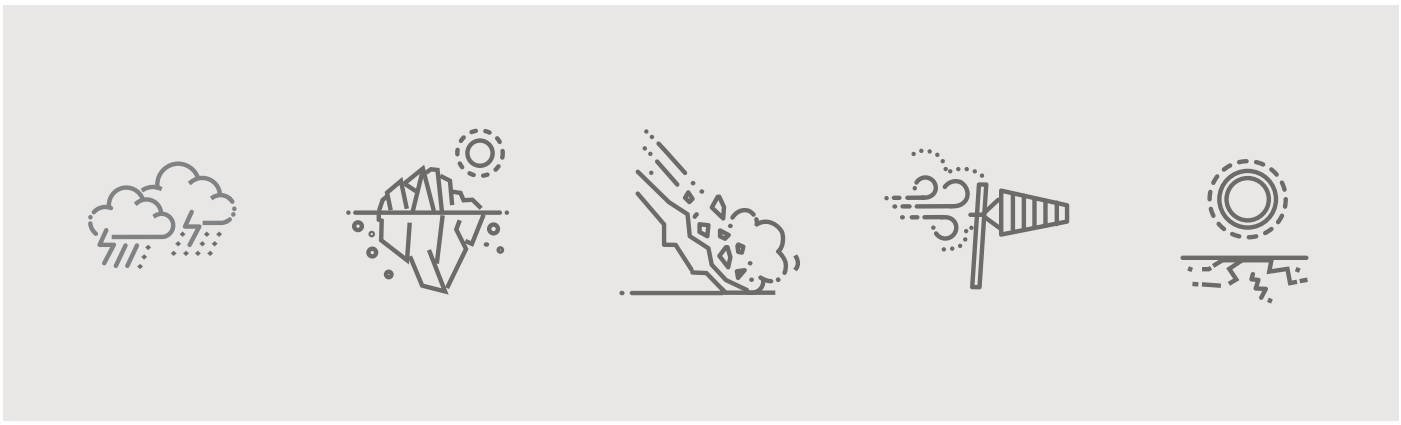
1. Direct provision by the government (federal, provincial and/or local)
2. Traditional public procurement
3. State-owned enterprises (in full or part)
4. Public-private partnerships and concessions
5. Full privatisation with regulation

The infrastructure life cycle is comprised of several phases, each engaging different stakeholders and together spanning several decades. There are six phases of the infrastructure life cycle:

1. Planning and acquisition
2. Project financing
3. Project design
4. Construction
5. Operation and maintenance
6. Upkeep and improvement

The following risks arise from complexities of infrastructure governance and life cycle and jurisdiction:

1. Regulatory risks, or changes in the regulations of investments
2. Political risks, such as nationalism, expropriation, civil war, terrorism, riots and coups
3. Supply-chain risks, or disruptions along the supply chain
4. Economic and financial risks in different jurisdictions, particularly in emerging economies, where unexpected fluctuations in inflation and exchange rates can impact rates of return and deter investment



Disruptions to infrastructure—such as those from weather-related extreme events—can have adverse effects on economies, both domestically and internationally, harming people's well-being and impairing economic growth. The increasing frequency and severity of hazards linked to climate change, the growing concentration of people and assets in high-risk regions, such as coastlines and cities, as well as poor development planning and construction practices further exacerbate these impacts. Rapidly expanding urban areas and high-risk zones like coastal regions and flood plains are particularly vulnerable.

Four economic costs of post-disaster infrastructure failures:

1. Governmental post-disaster spending on uninsured or underinsured public infrastructure, government buildings and low-income dwellings;
2. Decreased tax revenues as a result of business interruptions caused by infrastructure damage and failure (e.g. electricity, transportation, water);
3. The opportunity cost of diverting public funds from development plans to infrastructure reconstruction recovery efforts;
4. Reduced economic productivity, economic output and trade.

World Bank Group, 2014, 2017

The insurance sector is a natural investor in and risk absorber of infrastructure and can contribute to solving this challenge.

As risk managers and underwriters, insurers assess, price, carry and transfer risk. Non-life insurers already underwrite infrastructure; however, the industry's engagement varies by country and depends on specific national governance, policies and regulatory frameworks. There are a number of challenges that prevent the insurance sector from making a more powerful contribution to infrastructure risk management:

- Insufficient access to reliable data to assess and price risk across the infrastructure life cycle, also reflecting inadequate consideration given to assessing the impacts of physical climate risks;
- A lack of public spending in ex-ante risk-reduction measures;
- Until recently, the preference of governments for self-insurance and post-disaster spending.

As institutional investors, insurance companies engage in investment strategies that are liability driven and constrained by regulations, fiduciary responsibility and other factors. Institutional investors—especially those with a long-term horizon, such as life insurers and pension funds— consider infrastructure projects as attractive investments because of their risk-return profile, diverse and long-term exposure and improved diversification across asset classes and geographies. However, they require a stable and predictable regulatory and political framework, a pipeline of investment-grade projects[3] and an efficient market.[4] Taxonomy, asset classification, risk-based capital requirements for long-term investments, different contractual requirements and related high due diligence costs are among the obstacles to scaling up investments. With the emergence of sustainable finance frameworks to enable long-term investing in transitioning to resilient net-zero economies, increasingly, institutional investors are joining coalitions, such as the G7 Investor Leadership Network. Members of these coalitions aim to leverage each other's resources and expertise, particularly in emerging economies, to enable long-term investment in areas such as infrastructure with a focus on climate resilience and decarbonisation.

The scale and complexity of the investment gap challenge require a concerted multi-stakeholder effort, involving the public sector and the insurance industry as experts in risk management and long-term investing.

Five recommendations to tackle the global resilient low-carbon infrastructure investment challenge at scale:

1. **Governments need to establish clear and aligned public policy, supported by effective legislative and regulatory frameworks, to mandate climate resilience requirements as a pre-requisite for the entire infrastructure life cycle.** Examples include land zoning, updated standards and building codes and investments in other risk-reduction measures, such as natural infrastructure as buffers (e.g. wetlands, mangroves).

2. **Infrastructure data policies are needed to enable access to reliable data for the entire infrastructure life cycle.** Data is critical for assessing and pricing risks, identifying sensitive ecosystems, evaluating the overall resilience of infrastructure projects, anticipating failures and conducting proactive maintenance and preventive retrofits.

3 These should be established with well-justified user fees, public revenue and ancillary funding and aligned with national infrastructure plans, stakeholder management and approval, project preparation facilities, early-stage funding, unsolicited bidding frameworks and public–private partnership units and capabilities.

4 'Efficient markets' refers to the development of infrastructure as an asset class and taxonomy, standardisation of terms, development of indices, project pooling into funds, securitisation of projects, and development of securities exchange platforms together with multilateral development banks, governments and market makers.

3. **Advanced technologies should be leveraged to improve and even transform the delivery of infrastructure systems.** Examples include 'smart green' infrastructure systems and new opportunities for data collection and predictive risk analysis on the back of digitization, cloud platforms, sensors and artificial intelligence.

Examples of technological advancements that are disrupting the infrastructure life cycle:

1. Green, efficient and carbon-capture technologies and storage (CCS) (e.g. solar, wind, battery storage) are leading to new green infrastructure systems with different risk profiles
2. Digitization, big data, cloud platforms and computing, the Internet of Things and artificial intelligence are introducing new capacities for system-wide predictive risk analysis, responsive management and predictive maintenance
3. Advanced control systems and sensors, satellites and drones are enabling system-wide monitoring for optimisation, anticipation of system failures, proactive maintenance and preventive retrofits
4. Smart grids, IT-based power systems, are helping utilities conserve energy and reduce costs, among other benefits
5. Real-time design, construction and performance management, and cloud collaboration platforms are enabling supply chain optimisation
6. Advanced materials, construction practices and standardisation for building are resulting in more resilient low-carbon structures

4. **Collaboration between governments and (non-life) insurers from an early stage could be instrumental in assessing, pricing and allocating risks between governments and the private sector.** This is fundamental for mobilising long-term capital from institutional investors. Building on advanced risk analytics, insurers could consider innovative products and services that incentivise risk-sharing mechanisms, responsive project management, preventive maintenance and proactive retrofits.

5. **Long-term institutional investors, such as life insurers and pension funds, could engage with governments to make climate resilience and decarbonisation a pre-condition for their investments** in infrastructure. These pre-conditions need to be integrated in their investment strategies and decision-making.

This issue brief is based on *Climate Change and the Insurance Industry: Taking Action as Risk Managers and Investors* (The Geneva Association, 2018); discussions from The Geneva Association's high-level forum, *Pathways to resilient, low-carbon infrastructure in the 21st Century*, co-hosted by Intact Financial and Sun Life Financial (Toronto, Sept. 2018) and the corresponding discussion paper; and discussions at the Geneva Association General Assembly 2019 (Buenos Aires, May 2019).

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