

# Policies to enable Sustainable Infrastructure

## Executive Summary

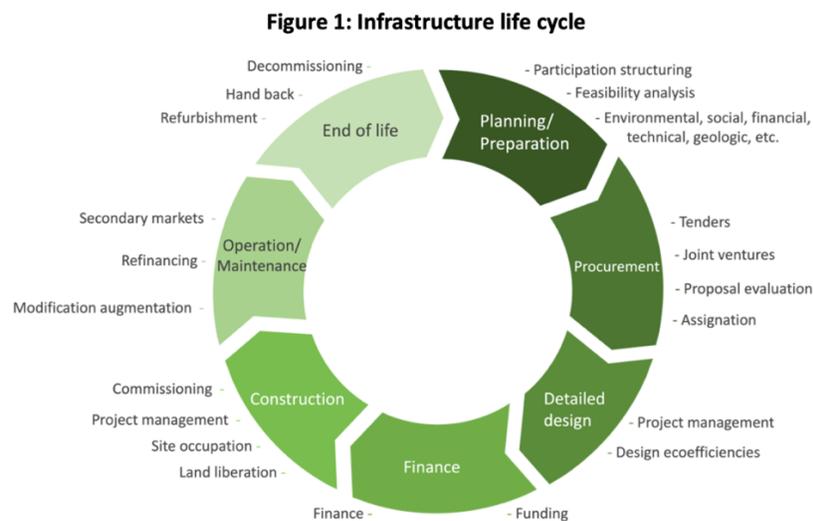
Infrastructure has a critical role in the achievement of country development. From transport systems to power-generation facilities and water and sanitation networks, it provides services that enable society to function and economies to thrive. This puts infrastructure at the heart of efforts to meet the Sustainable Development Goals (SDGs).

With more than 80 per cent of global GDP generated in cities, urbanisation, if managed well, can contribute to sustainable growth by increasing productivity, allowing innovation and new ideas to emerge. However, its speed and scale bring challenges. When failing to invest in making cities more resilient to natural disasters, shocks and stresses have been demonstrated to result in significant human and economic damages – with the urban poor bearing the brunt of losses. With conflicts on the rise and an urgent need for higher investment in infrastructure to solve these issues, the need for a greater focus on resilience in the face of climate change also comes.

The role of the public sector in sustainable infrastructure development is utmost, encompassing from guaranteeing a robust institutional and governance framework to delivering well-developed project planning and development while helping mobilise finance and ensuring absolute value for money from infrastructure projects. There is an untapped opportunity to increase investment in sustainable infrastructure by improving project preparation, management and design capabilities.

**This paper proposes to adopt a life-cycle approach to sustainable infrastructure, focusing primarily on the city level. At the starting point, a city's infrastructure needs can help not only select but finally deliver and manage infrastructure developments sustainably.**

The infrastructure Life Cycle must be understood in a long-term analysis as it may be designed to last for up to 100 years:



Given that cities are growing at an unprecedented rate, governments must take some answers to this growing challenge. Policy coherence and regulatory certainty are necessary for scaling up investment in sustainable infrastructure. Today 55% of the world's population – 4.2 billion inhabitants – live in cities.

In this sense, cities become zones of opportunity for infrastructure policy action as they link through connectivity: roads, rail and air. As cities' clusters invest in infrastructure to facilitate the shipment of goods and bring in the resources needed by the urban population, prosperity is spread through the improvement of infrastructure. Cooperation for a surrounding basic infrastructure needs to occur at all levels – between governments, between and within societies, and at the heart of cities. **At the heart of the matter, cities are in a core position to take on the infrastructure agenda.**

## Key determinants of sustainable infrastructure policy success

### 1) Institutional and governance framework

Infrastructure projects can sometimes fail to meet their time frame, budget and service delivery objectives due to shortcomings in the country's infrastructure governance framework. Good infrastructure governance not only promotes value for money and affordability, but also helps to make suitable projects that develop in a timely and efficient manner. Successful governance of infrastructure demands a clear regulatory and institutional framework, strong coordination across levels of government and sustainable considerations throughout the life cycle of the asset (OECD, 2017).

### 2) Policy planning and project prioritization

Public policies signal and set the regulatory and institutional frameworks that influence the actions of all actors. Governments need to assess the relative importance of project planning and development based on social-environmental impacts, systemic viability, and financial/economic capacity. While being part of a long-term strategic plan, and entailing cost-benefit analyses for shortlisting and financing a project, political motivation is still a key driver of infrastructure investment decisions.

### 3) Feasibility analysis

Before implementing new strategies, policies, or projects, cities and governments need to provide stakeholders with an analysis of the initiative's impact and viability of implementation in order to assess the environmental, societal and economic consequences, minimizing risk and optimizing costs of project development. A well-designed feasibility study should offer a historical background of the business or project to ensure a project is legally and technically feasible as well as economically justifiable.

### 4) Participation scheme structuring

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## Life-Cycle stages of Sustainable infrastructure

### Life-Cycle Stage 1: Project planning and preparation

- The infrastructure pre-planning stage needs to assess community readiness for the project, integrate an infrastructure planning team, conduct a stakeholder analysis, and develop a work plan, a budget, and a schedule.
- The feasibility analysis is essential since it provides information on the financial, technical, environmental, and social project potentialities, to know the benefits and also negative externalities.
- Well-developed infrastructure plans – including climate impact, disaster risk assessments and resilience, as well as social assessments to provide a long-term vision – are needed to address infrastructure gaps.

### Life-Cycle Stage 2: Bidding and Procurement

- All bidding and procurement processes should maximize the value of all goods and services received for the amount expended. Therefore, competitive bidding and procurement processes need to be clearly documented.
- Tendering is a critical activity in capital works projects and is usually the accepted mean of obtaining a fair price and best value for undertaking construction works.
- Using public procurement as a strategic governance tool can help shape an effective infrastructure delivery and help address risks of inefficiency and corruption that are often associated with significant infrastructure projects due to their complexity.

### Life-Cycle Stage 3: Detailed design

- Preliminary and detailed designs are vital in achieving cost efficiency, improving the performance of infrastructure systems, and reducing negative social and environmental impacts of infrastructure facilities. Design of infrastructure facilities needs to consider not only construction stage aspects but also post-construction impacts (Haupt & Nuramo, 2017).
- Infrastructure resilience includes planning and designing it and considering how it interacts within a more extensive infrastructure system and how it impacts sustainability and resilience at a community and national level.
- Sustainable design is an alternative approach which leads toward a less consumptive mindset that embraces global interdependence, environmental stewardship, social responsibility, and economic viability. It considers the impacts of design choices at local, regional, and global levels (Blizzard, 2011).

### Life-Cycle Stage 4: Funding, financing and investment

- Markets alone cannot provide effective and sustainable infrastructure services. On the one hand, spillover effects such as externalities and social benefits of the investment may be significant but difficult to measure. On the other hand, long-term infrastructure investments require significant upfront investments and generate cash flows after many years. They are subject to high risks, especially in the initial phases, since they are typically complex, involve many parties, and are vulnerable to policy and political risks.
- City governments should develop urbanisation strategies across sectors with an assigned budget, while national governments should assist them in developing sustainable urban infrastructure by establishing legal frameworks that favour them.

- Substantial benefits can be realised by better managing public infrastructure investment through the life cycle of an asset and across levels of government. To ensure public infrastructure is affordable, governments usually set up different participation schemes to finance their projects. The benefits of participation will depend on the return on investment and the country's tax regulations.

### Life-Cycle Stage 5: Construction

- Project management should incorporate knowledge and skills for sustainable construction, since it is an essential prerequisite to designing, delivering, and managing this environment.
- Innovation and technology enhancement plays a crucial role in sustainable construction.
- Regulations of green practices are a need for all types of projects, that should also be formally monitored for compliance.
- The construction should follow a strict waste management strategy, including mitigation of water wastage and enhancing efficient water use in construction sites.
- Measurement tools are needed, such as strategic metrics to analyse sustainable construction practices, rating systems to evaluate whether impacts on the environment, and buildings sustainable index to assess whether there is a potential improvement in the long and short term.

### Life-Cycle Stage 6: Operation and Maintenance (O&M)

- O&M is identified as the key to enhancing sustainability in existing infrastructure and assets. For governments, this responsibility consists of "securing maximum value for money from O&M of a country's existing infrastructure assets."
- Three broad strategies are available to governments for managing their infrastructure assets and maximizing the return on those past investments:
  - Increase the utility of the existing infrastructure asset by maximising its utilisation and enhancing its quality for each user.
  - Decrease the total costs of providing the infrastructure service – not just by reducing internalized O&M costs but also by mitigating the environmental and social externality costs.
  - Increase the lifetime value, either by extending the asset's life to maintain the benefits over an extended period, or by organizing a rehabilitation, replacement or upgrade plan that takes whole life-cycle considerations properly into account.
- A regulatory framework and policy coherence are two critical elements for a proper O&M of public assets. Good regulatory design and delivery are necessary to ensure sustainable and affordable infrastructure over the asset's life.

### Life-Cycle Stage 7: End of life

- The facilities that have reached their end-of-life need to be safely decommissioned. Their life extension is not an easy decision to take, mainly if it refers to safety critical systems and installations, including nuclear power, offshore oil and gas, petrochemical, renewable energy, and rail transport. Nowadays, there are needs to monitor and evaluate the financial and physical health of the actual infrastructure assets.
- In G20 countries, there is no evidence for an act, regulation or national program designed to address public infrastructure at the final stage. There are some international standards that governments could implement in



a national and sub-national way. The ISO 55000 provides a management framework for the coordinated activity of an organisation to realise value from its assets to support the delivery of its strategic plan and objectives.