Sustainable Infrastructure to Deliver Basic Services at the City-Level

UNEP

Infrastructure such as roads, water supply and sewers, electrical grids and telecommunications is the backbone of our economies and enables human well-being. Long lifespans make today's infrastructure investments decisive for our ability to reach the SDGs: infrastructure must be reliable, of good quality and future-proof, meaning low-carbon, resource efficient, socially viable and resilient. Innovation capacity and agglomeration economies of cities allow for transformative solutions. To provide citizens with viable choices, partnership across all levels of government and with the private sector will be key.

Infrastructure plays a critical role in the development of modern equitable societies, providing basic services such as energy, transportation, water and sanitation, as well as information and communication. Depending on the choice of infrastructure and how it is planned, constructed, operated and maintained, infrastructure can come at immense environmental and social cost. For example, fossil fuel based energy generation and transportation come with emissions that contribute to local air pollution and global warming, and thereby impact human health and well-being. At the same time, infrastructure is vulnerable to shocks and stresses. For example, extreme weather events due to climate change pose a risk to weaken infrastructure and even threaten its very functioning and service provision. Hence, both unintended consequences of infrastructure on environment and human health, as well as the resilience of infrastructure to natural hazards and man-made changes need to be factored in at the outset of any infrastructure development.

The global demand for new infrastructure till 2030 amounts to 93 trillion USD and is almost double the volume of the world's existing infrastructure value. This represents a unique opportunity to get our infrastructure investments right. Given the long lifespans, often across several decades, investment in low-carbon, resource efficient and climate-resilient as well as nature-based infrastructure solutions becomes an imperative to avoid technology lock-in into out-dated technologies that would threaten both the very value of these investments, as well as our ability to achieve the SDGs and the aim of the Paris Agreement to keep the global temperature rise this century well below 2 degrees Celsius.

Much of this infrastructure can be found or will be built in cities to cater for the estimated 75% of global population that will live in cities by 2050.

About **2.6 billion** people in developing countries face difficulties in accessing electricity full time.

2.5 billion people lack access to basic sanitation and 800 million lack access to water.

93 trillion USD global infrastructure demand

Globally, an infrastructure investment gap of around **15-20 trillion USD** is predicted over the next 15 years.

Creating 80% of global economic output, accounting for 70% of green-house gas emissions and running networks of intertwined infrastructure, cities are uniquely placed to innovate integrated infrastructure solutions.

Sustainable Infrastructure is critical to delivering multiple Sustainable Development Goals.

Infrastructure is explicitly mentioned in SDG 9 - Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation, and will pave the way for several other SDGs including:

SDG 1 - end poverty in all its forms everywhere with targets on access to basic services, building resilience and reducing vulnerability to climate-related extreme events, and other economic, social and environmental shocks, and SDG 11 - make cities and human settlements inclusive, safe, resilient and sustainable with targets relating to infrastructure planning, waste management and transportation, all requiring a sound sustainable infrastructure development. Along the same vain, SDG 2 refers to an increase in investment for rural infrastructure, SDG 3 to access to quality essential health-care services, SDG 4 to the construction and upgrading of education facilities, SDG 6 to availability and sustainable management of water and sanitation for all, and SDG 7 to access to affordable, reliable, sustainable and modern energy for all. Finally, to deliver against SDG 13 – climate change, infrastructure development needs to contribute to climate mitigation and adaptation; and to deliver against SDG12 – sustainable consumption and production, infrastructure development needs to be resource efficient.

Infrastructure also means nature-based solutions.

The natural environment, such as rivers, watersheds, forests and coral reefs provide important benefits known as 'ecosystem services', which can often replace human infrastructure services. Nature-based solutions that are inspired or supported by nature are cost-effective, and simultaneously provide environmental, social and economic benefits while improving infrastructure resilience. For example, green open space in cities can help with flood control, reduce heat islands or contribute to cleaning the air. By including ecosystem services into future visions of cities and their infrastructural layout, planners can increase the options for resource decoupling and promote social equity.

> ❝ The way investments will be made, in transport, energy, water, buildings and land, will determine whether we can hold global warming to well below 2° degrees, or whether we are doomed to cities where people can neither move nor breathe, and to ecosystems that will collapse. [,,,] If we do get it right, making all future infrastructure investment sustainable, we will boost growth in the shorter term, launch a dynamic wave of innovation and growth in the medium term, and embark on the only long-term growth path which can be sustained. The consequences of getting it wrong are unthinkable. ❞
>
> Lord Nicholas Stern
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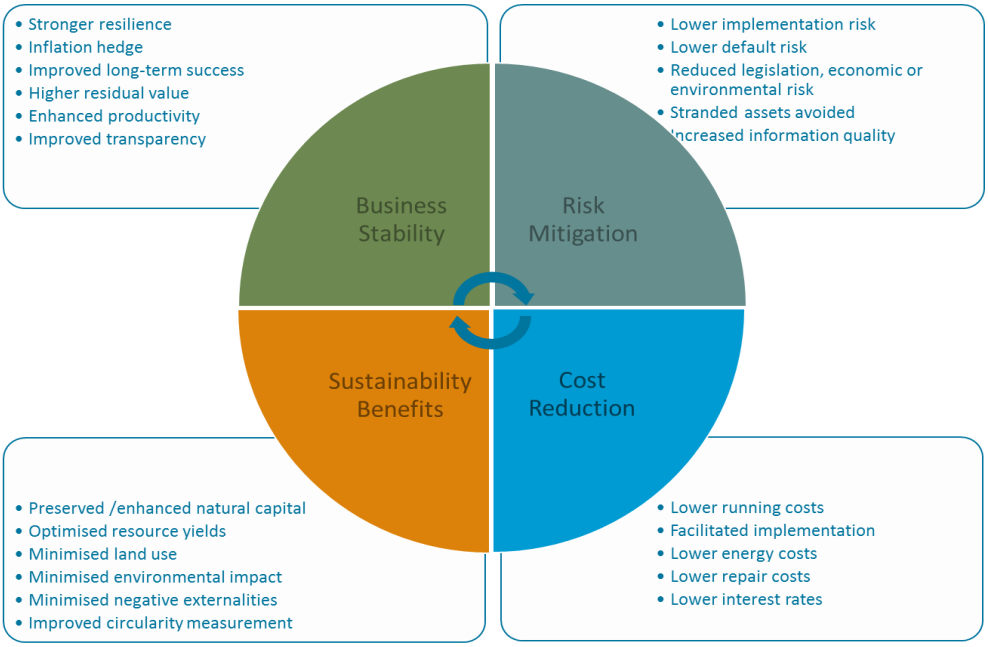
> *Chair of the Grantham Research Institute on Climate Change and the Environment and the ESRC Centre for Climate Change Economics and Policy, Professor of Economics and Government, at London School of Economics & Political Science.*

Potential benefits of Sustainable Infrastructure



Source:
Global Infrastructure Basel Foundation, SuRe Standard

Long-term policies, based on material flow analysis and lifecycle impact and cost.

Policies conducive of low-carbon, resource efficient and resilient infrastructure development are needed to trigger innovation and investment in sustainable infrastructure. These policies need to be long-term, taking into account life-cycle impact and cost, and built based upon material flow analysis.

Cities are complex networks of interlocked infrastructures that bring resources in, use the resources to provide services, generate wealth, and dispose of the waste that is generated by consumption. This flow can be seen as a city's "metabolism" (International Resource Panel, Decoupling at city-level). More circular urban metabolism that treats outputs from one as inputs to another would help cities decouple resource use from the provision of better services and economic opportunities and adapt to a future of resource limitations and climate uncertainty. Analysis of material flows can help set priorities and inform policies and measures. Measured over time, this can also contribute to monitoring of effectiveness of policies and measures. Establishing targets for desired resource flows per capita based on the economic and ecological context of any given city can provide a clear-cut and understandable framework for assessing progress towards more sustainable resource use. Targets for water, energy consumption, and carbon emissions are being used in some cities already.

While up-front cost may be higher at the outset, many of the sustainable solutions lead to cost savings due to lower operating cost and sound economic returns, while generating important additional benefits including reduced risks and negative externalities and increased health and quality of life. For example, infrastructure energy efficiency improvements will help lower the need for additional energy supply infrastructure, and hence generate important savings in the longer run.

Incentives for sustainable infrastructure projects can help overcome initial cost barriers. These need to be complemented by pricing and market mechanisms that help reduce excessive demand for infrastructure services, and encourage shifts to conservation while ensuring provision of basic services. This involves redirecting subsidies that encourage wasting of resources or hinder uptake of more environmentally friendly solutions. For example, cutting water subsidies will reduce unnecessary depletion of water. Instead of kerosene subsidies for lighting or cooking, support mechanisms for solar lighting or alternative cooking solutions fulfil the same socio-economic objects with lower environmental footprint.

green infrastructure

smart cities

efficient, low-carbon and resilient energy systems

non-motorised and public transport

efficient and clean water and sanitation

Multi-level partnership is essential in lifting the challenge of providing sustainable infrastructure for all.

Public-private partnerships (PPP) and innovative finance schemes help leverage the innovation and investment power of the private sector and thereby overcome initial cost barriers as well as the investment capacity at the national and local levels.

Partnership across all levels of government is critical to overcome the present fragmentation of policies. Energy ministries are in charge of energy infrastructure, transport ministries of transport infrastructure, etc. which leads to fragmented approaches rather than integrated solutions. National environmental strategies informed by strategic environmental assessments will help bring the necessary cohesion, avoid negative impacts and improve service provision within the planetary boundaries. This will require a strengthening of the national environmental management. Besides this horizontal integration, coherence of policies across national, regional and local governance levels with regard to both policy and implementation, is needed.

SDG 17—the means of implementation of the SDGs and post-2015 agenda—the targets refer among others to multi-stakeholder partnerships. Public-private partnerships (PPPs) will become increasingly important as a way of delivering infrastructure.

Leading the way with Public Procurement

Public procurement represents on average 20 per cent of a country's GDP and hence provides a powerful lever to create the necessary certainty of demand for innovative and sustainable infrastructure solutions.

Sustainability criteria in public procurement methods help raise the bar of environmental credentials. Beyond the sensu stricto environmental criteria, evaluation criteria need to take a longer term perspective, factoring into the value-for-money an assessment that spans across the entire asset lifecycle. This would allow to move away from an assessment of only the initial capital investment to incorporate also operational cost, maintenance, and end of life (dismantling or disposal) of the asset. But public procurement could also take the form of public private partnerships where the different risks and responsibilities for infrastructure development are distributed among the public and private partners.

SDG 12—sustainable consumption and production patterns target 12.7 refers to the implementation of sustainable procurement practices and policies.

UNEP - Sustainable Public Procurement Guidelines
www.unep.org/resourceefficiency/Consumption/SustainableProcurement

Tools for sustainable, resilient infrastructure development

Developed by Global Infrastructure Basel Foundation (GIB) in a multi-stakeholder process, SuRe® – The Standard for Sustainable and Resilient Infrastructure is an example of existing tools. A global voluntary standard, it helps to integrate state-of-the-art sustainability and resilience aspects into infrastructure development and upgrade, through:

- establishing a common language and understanding of sustainable and resilient infrastructure projects between project developers, financiers, local authorities and end-users;
- providing guidance on how to manage sustainability and resilience aspects, from a risk management and a benefit creation perspective, and starting from as early as possible in the projects' life cycles.

SuRe®consists of 66 criteria divided into 14 themes spanning environmental, social and governance (ESG) aspects and relies on the independent verification and certification of infrastructure projects.

SuRe® ESG themes

Environment
- Climate
- Biodiversity and Ecosystems
- Environmental Protection
- Natural Resources
- Land use and Landscape

Society
- Human Rights
- Labour Rights and Working Conditions
- Customer Focus and Inclusiveness
- Community Impacts
- Socioeconomic Development

Governance
- Management and Oversight
- Sustainability and Resilience Management
- Stakeholder Engagement
- Anti-corruption and Transparency

Conclusion

At times of increasing shocks and stresses, not least due to climate change and natural resource constraints, it is imperative for infrastructure investments to be low-carbon, resource efficient and resilient to reduce economic, social and environmental risk for these assets. Urban infrastructures must take into account the long-term flows of strategic resources, which requires linking urban systems to the wider regional flow of ecosystem services and natural resource extraction.

Cities in many developing countries can benefit from large-scale investments in new urban infrastructures aimed at poverty alleviation. To facilitate this, national sustainable urban development policies need to promote sustainable urban infrastructures, and urban development must align spatial planning guidelines, infrastructure investment strategies, financial capability, social equity, and long-term sustainability goals. The social dimension is critical to the health and function of cities. Investors should promote sustainability-oriented innovations that avoid the obsolete technologies that many developed country cities are seeking to replace, often at great cost.

For more information:

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