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Community Paper

Global Future Council on Infrastructure

Six Qualities of Sustainable Infrastructure

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Executive Summary

The power that infrastructure has to affect economies and societies is enormous. Infrastructure undergirds commercial life, provides vital social services, and supports human interaction around the world and across the street. Increasingly, however, decision-makers and experts are looking to infrastructure to move from supporting the world, to shaping the world. Leaders in the public and private sector are becoming ever more aware of the importance of building a more economically, socially and environmentally sustainable world. But this world cannot be built without the corresponding sustainable infrastructure.

With this in mind, the World Economic Forum's Global Future Council on Infrastructure met in Dubai, United Arab Emirates, in November 2019 to understand how they could do their part to encourage the development of a widely accepted sustainable infrastructure asset class to draw more private capital into sustainable infrastructure investment. The Council, leveraging the diverse experience of its members, decided the best way to achieve this would be to construct an overall vision of what sustainable infrastructure was, and then explore frameworks and case examples that can help bring this vision into reality.

Out of this came the Council's Six Qualities of Sustainable Infrastructure (GFC-6) presented in this document. Through rigorous research and exploration, the Council created the GFC-6 to take into account multiple aspects of sustainability, including economic, social, environmental and technological components. This paper also contains suggestions and an example of tools that can be used to operationalize the GFC-6.

The Council is supportive of the creation and application of any framework, model or tool that supports the incorporation of the GFC-6 and will produce a series of articles for the World Economic Forum's Agenda blog platform that highlights different strategies, frameworks and case examples that show how the GFC-6 can be achieved and why it is important to achieve them.

Without proper support, sustainable infrastructure risks becoming a niche issue. A nice to have, rather than the global imperative it truly is. By laying out clear and achievable qualities, and providing strategies and examples to amplify their adoption, the Global Future Council on Infrastructure hopes to do its part to encourage the development of infrastructure projects and systems that can help create the more inclusively and sustainably prosperous future the world deserves.

Formulating the Six Qualities of Sustainable Infrastructure

Following the 2019 Annual Meeting of the Global Future Councils in Dubai, and through several follow-up calls, the Global Future Council on Infrastructure coalesced around a goal for its 2019-2020 term: to find a way to encourage greater private capital flows into sustainable infrastructure projects and systems. The demand from institutional investors for infrastructure assets, as well as investments that further global sustainability goals, is large and growing. The Council surmised that increasing flows of capital into sustainable infrastructure by supporting the creation of a sustainable infrastructure asset class would be an effective avenue for achieving both of these goals. To do this, the Council set out to define a vision for what sustainable infrastructure is.

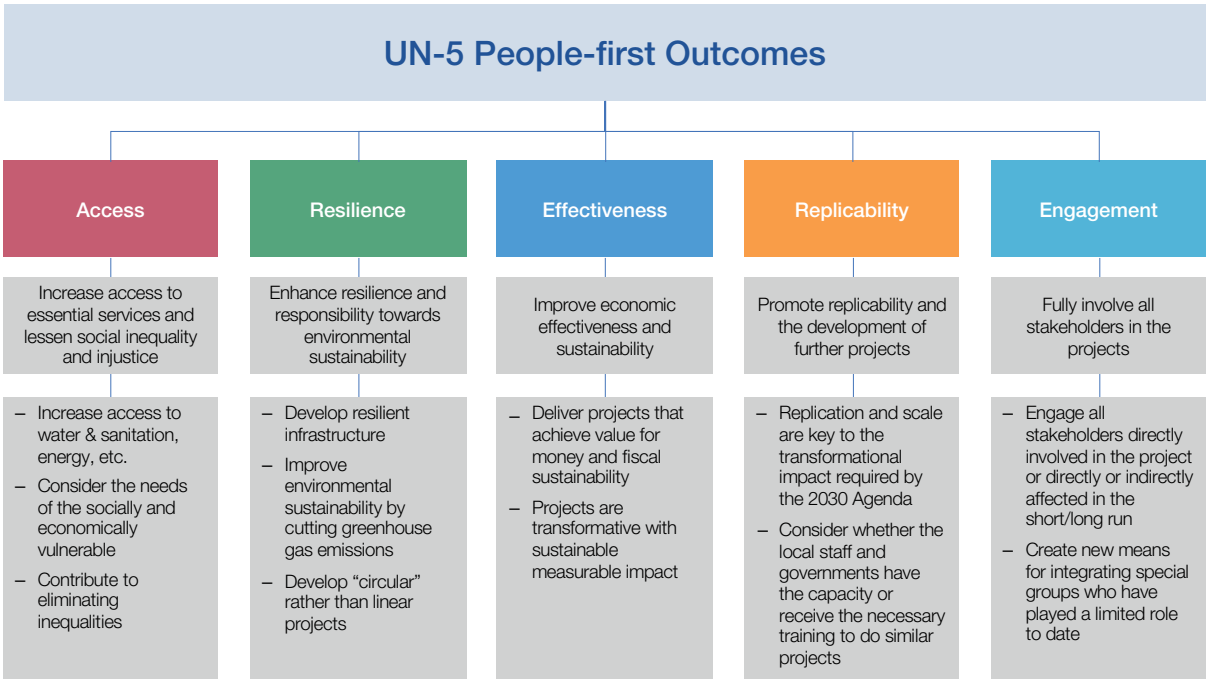
To devise a vision for what sustainable infrastructure is, the Council consulted prior research and existing standards from other organizations. Existing frameworks and research were surveyed to understand the state of the conversation around sustainable infrastructure, and areas where more attention was needed. This exercise found scope for a sustainable infrastructure vision that encouraged long-term lifecycle viability.

Among the research found, two key sources were identified. First, the latest version of the United Nations' Guiding Principles on People-First Public-Private Partnerships in support of the United Nations Sustainable Development Goals ("UN people-first model").[1] The UN people-first model lists desired outcomes and guiding principles for public-private partnerships in general, but can also be applied to infrastructure projects. Second, the Inter-American Development Bank's Framework to Guide Sustainability Across the Project Cycle ("IDB Sustainability Framework").[2] The IDB Sustainability Framework is intended to support planning, designing, and financing of infrastructure that is economically, financially, socially, environmentally and institutionally sustainable.

[1] United Nations, Economic Commission for Europe. "Guiding Principles on People-First Public-Private Partnerships in Support of the United Nations Sustainable Development Goals." http://www.unece.org/Fileadmin/DAM/Ceci/Ppp/Standards/ECECECI201905-En.pdf, 2019.

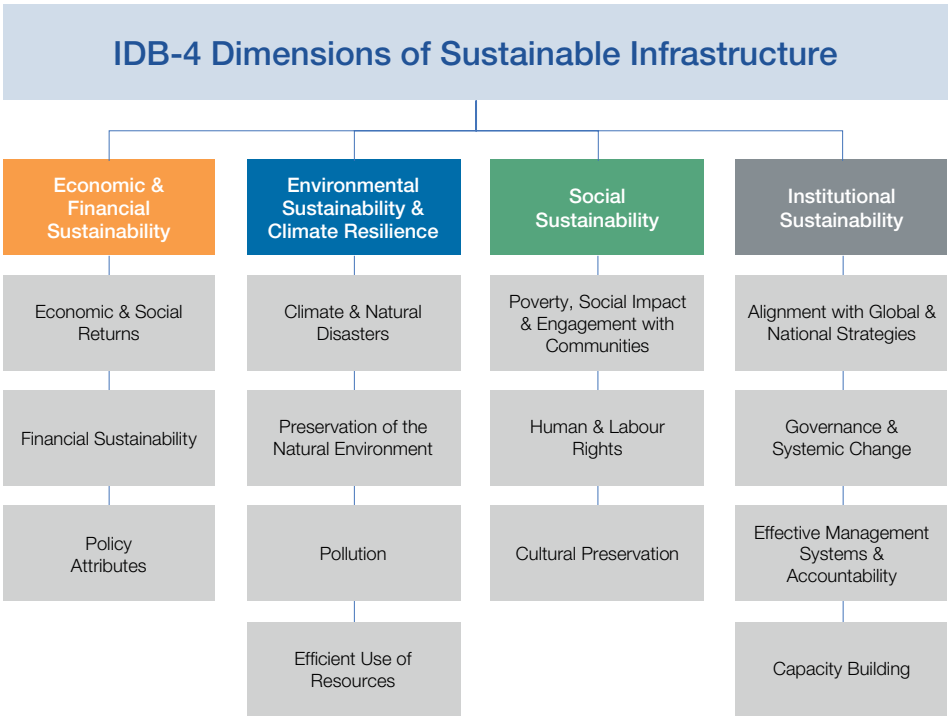
[2] What Is Sustainable Infrastructure: A Framework to Guide Sustainability Across the Project Lifecycle. Https://Publications.iadb.org/Publications/English/Document/What_is_Sustainable_Infrastructure__A_Framework_to_Guide_Sustainability_Across_the_Project_Cycle.Pdf, 2018.

The UN people-first model is meant to be consistent with the Sustainable Development Goals (SDGs) so that public-private partnerships would be made "fit for purpose" and oriented towards meeting the needs of "people-first". The UN people-first model stipulates five desirable outcomes (UN-5) that can be applied to infrastructure projects:



Source: UN, GFC

The IDB Sustainability Framework, on the other hand, refers to sustainable infrastructure as projects that are planned, designed, constructed, operated and decommissioned in a manner to ensure economic and financial, social, environmental (including climate resilience) and institutional sustainability over the entire life cycle of the project. This is broken down into four dimensions (IDB-4):



Source: IDB, Global Infrastructure Hub, GFC

The UN-5 and IDB-4 cover similar, but not completely overlapping, concepts. Hence, the two lists are not interchangeable. Common themes are environment and climate, social and engagement, and economic sustainability. However, the Council noted that other elements ought to be considered, notably:

– *Technological sustainability*: Is a project's technological design likely to withstand the disruption from emerging technologies that could turn it into a stranded asset? Are the tech giants exploring innovations in a project's sector that could make its business model obsolete?

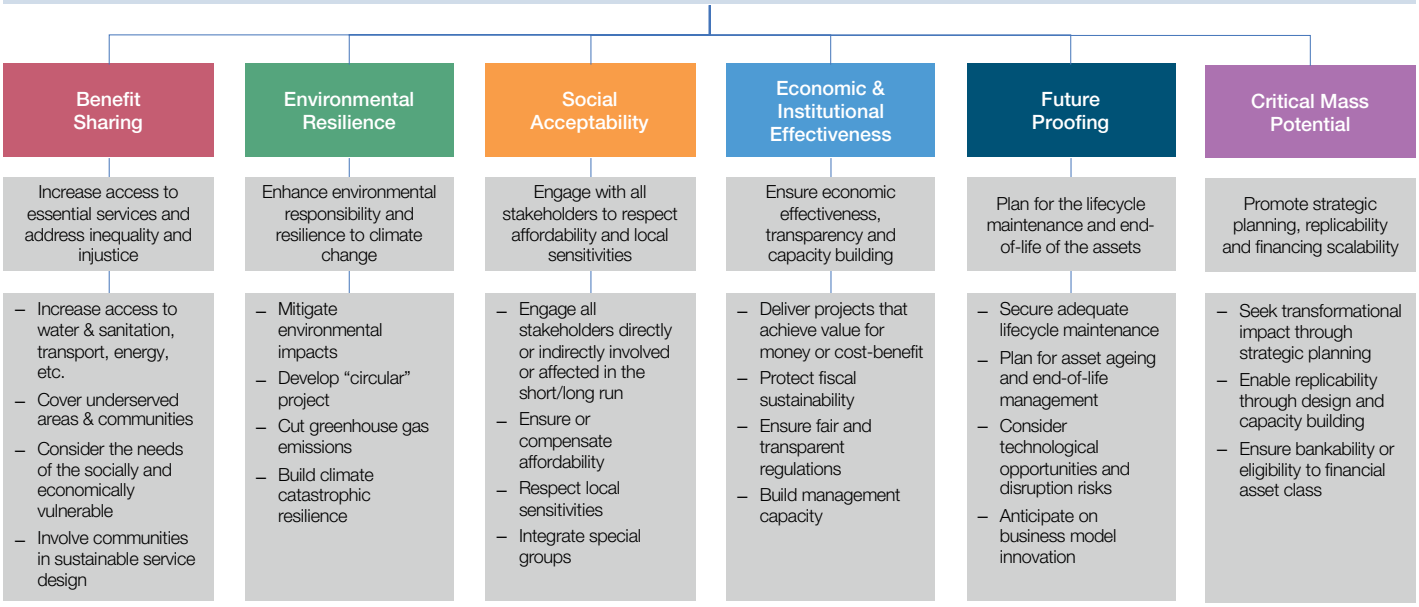
– *Lifecycle sustainability*: Are procedures and funding in place to guarantee the intended design for the asset can be maintained in the future? What are the plans to manage a project's aging, dismantling, and/or replacement?

Using these two standards as guides, the Council solidified a vision for what the sustainable infrastructure of the future would look like: a set of six infrastructure qualities that underpin sustainable, cohesive, resilient and inclusive infrastructure (GFC-6).

These six qualities, which combine and expand on the UN-5 and IDB-4, are:

1. Access and benefit-sharing
2. Environmental and climate resilience
3. Social engagement and acceptability
4. Economic and institutional effectiveness
5. Future-proofing over lifecycle
6. Critical mass potential through replicability

GFC-6 Sustainable Infrastructure Qualities



Source: GFC

The GFC-6 in Practice

The distillation of the Global Future Council on Infrastructure's definition of sustainable infrastructure into the GFC-6 is an important step in supporting the creation of a sustainable infrastructure asset class. To make the GFC-6 useful for decision-makers, frameworks, strategies and tools need to be designed to help implement the various elements. For illustrative purposes, the Council has formulated suggestions and provided one example of how the GFC-6 could be put into practice.

Elements of successful strategies

Any framework or model for developing sustainable infrastructure projects or systems would benefit from enhancing the ability of policymakers, asset owners and asset funders/ investors to make decisions. Key process elements of frameworks and models should include:

- Determining the infrastructure needs of the system or project, including an inventory of the existing infrastructure assets, with relevant stakeholders (e.g. regulators, technical experts, community participants, environmental/social experts, construction/ design firms, lenders/investors)

- Establishing the goals and expected outcomes in conjunction with a pre-determined set of sustainability and resilience drivers that are relevant to the system or project

- Creating a template to analyse the cost, opportunity cost and benefits of incorporating sustainability and resilience conditions and characteristics into the needed infrastructure (e.g. infrastructure cost/benefit curves, or other tools)

- Incorporating the sustainability/resilience goals and design into each stage of the infrastructure asset cycle, particularly in the early stages of strategy and design

Additionally, when creating or using a model or framework, main areas of consideration should be:

- *Environmental considerations* – mitigating effects of natural disasters and climate change, climate resilience, ensuring efficient energy utilization during construction and operation phases, optimizing use of natural resources, optimizing land use, waste minimization/ design optimization

- *Social considerations* – participation of community/beneficiaries, accessibility of the infrastructure to the public, health and safety considerations during construction and operation stages, security consideration during construction and operation, protection of cultural heritage, protection of landscape, historical areas and archaeological sites, risk analysis and disaster mitigation

- *Technical considerations* – site survey, design and site alternatives, multi-disciplinary integrated design considerations from feasibility study stage, meeting functional and aesthetic requirements, integrating design with construction and operation stages, long-term robustness and maintenance optimization, synergies/integration with other infrastructure projects, value engineering, harmony with surrounding environment

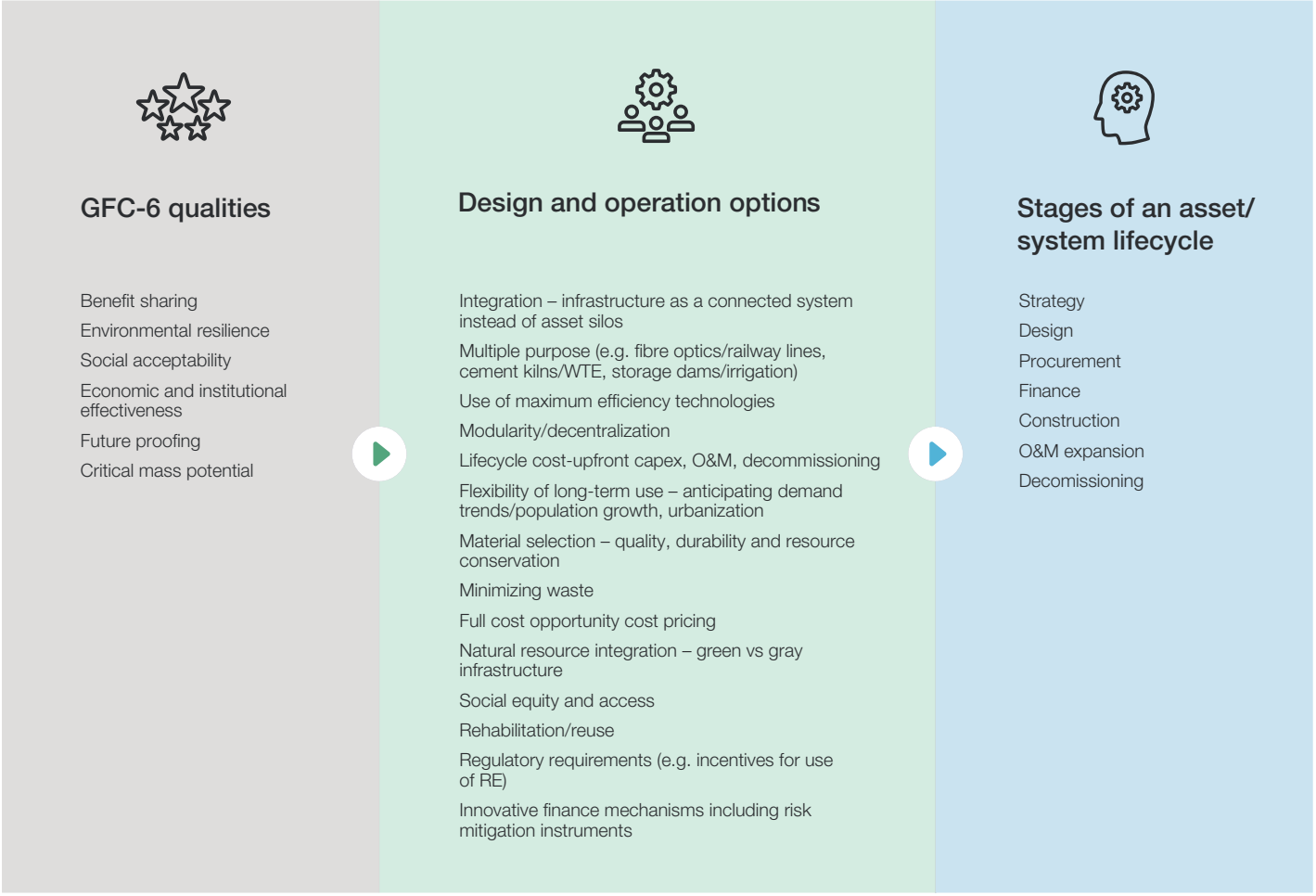
- *Policy and regulations* – regulatory requirements relating to sustainable infrastructure, rating systems, inclusion of sustainable infrastructure requirements in procurement, particularly in publicly tendered projects

– *Design/project management* – involvement of contractors, suppliers at design stage, selection of appropriate project delivery design, inclusion of sustainability-related clauses in contract documents, quality control procedures to include community concerns

– *Materials selection* – low energy/water use materials, technologically advanced materials, durable and long-term materials, locally sourced materials, material reuse

– *Economic considerations* – cost/benefit analysis, asset lifecycle analysis, cost optimization, bankability

The chart below illustrates a possible roadmap from the GFC-6 to potential design and operation options taking the above into account, which would then be implemented in all stages of the infrastructure system or asset lifecycle:



From process to project

A final step in the process would be creating a decision-mapping framework to allow policy-makers, asset owners and asset funders to make the correct decisions towards sustainable infrastructure models. In the illustrative example below, a logical framework (logframe) matrix – a popular tool among public sector decision-makers – has been created to display an example focused on water infrastructure. Logframes are created by defining goals, visualizing big-picture outcomes and drilling down by identifying technical outputs in very practical terms.

Sustainable infrastructure roadmap (water supply system example)

	Project summary	Indicators	Means of verification	Risks/assumptions
Goal	Improve livelihoods and public health in rural areas surrounding city X in country Y by connecting households to water supply system	Reduced occurrence of water borne diseases in the area	Reports from local hospitals and dispensaries, baseline vs two years opportunities	Assumes complete and accurate reporting by medical services Risk of under-usage of safe drinking water due to affordability constraints
Outcomes	Raise number of households connected to water supply system to near-universal coverage	90% of households connected to and using water supply system	Completion reports on connection installations Active usage of safe water by households despite cost involved	Risk of cost overrun in marginal/more remote areas Stakeholders engagement in support of project cost/benefit
Outputs	Quality drinking water consumed by households	Quality standards of treated water Volumes pumped to and paid for by households	Ongoing performance reporting of water treatment plant Technical and commercial collection rate	Risk of vicious circle in case of low collection rates triggering under performance of operator and downgraded service quality
Activities	Develop bankable feasibility study Engage stakeholders on project objectives and cost/benefit Review and manage affordability Efficient and cost-effective procurement Report transparently to communities on ongoing performance	Acceptable cost/benefit of the project within affordability constraints Project delivered on time and on budget with no indication of corruption Continuous public reporting on agreed set of performance and benefit indicators	Cost/benefit analysis Affordability analysis Implementation of sound and transparent procurement Independent review of performance with stakeholder involvement	Assumes availability of robust data allowing meaningful analysis Assumes presence and interest of quality contractors responsive to procurement process Risk of disconnect between stakeholders' expectations, perceived benefits and service price

Conclusion

The Global Future Council on Infrastructure's Six Qualities for Sustainable Infrastructure represent a bold statement in service of creating a more sustainable world. Bold as they may be, however, with deliberate decision-making and proactive effort, they can guide the way towards the development of more sustainable infrastructure.

Nevertheless, the work here is not finished. The road to incorporating the GFC-6 is meant to be open-source, with no one framework or tool deemed the proper course of action. By presenting the GFC-6 as a set of qualities to be achieved in a diverse set of versatile ways, the Council hopes that it has contributed in a lasting way to the creation of a sustainable infrastructure asset class. With the right frameworks, models, tools and guiding examples, we can all build a world where sustainable infrastructure is simply known as infrastructure.

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