



Task Force 7
Infrastructure Investment and Financing

Policy brief

BUILDING A NEW SUSTAINABLE ECONOMY. INVESTING IN INFRASTRUCTURE FOR DISTRIBUTION AND WELL-BEING

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ABSTRACT

Global development and environment talks were disrupted by the COVID-19 crisis, but the year 2021 resonates with renewed ambitions, with infrastructure investments a macroeconomic and geopolitical priority of recovery agendas. Yet, it cannot be about investing trillions in infrastructure for growth as after the 2008 global financial crisis. After over a decade of underfunding of social infrastructure and facing exponentially detrimental environment impacts of infrastructure connectivity, the world is in need of cooperation towards new infrastructure solutions focusing on redistribution and well-being.



CHALLENGE

On the way to editing its “Limits to Growth”, the Club of Rome first reported on its “Quest for Structured Responses to Growing World-wide Complexities and Uncertainties”. Half a century later the enduring COVID-19 pandemic crisis questions the role of think-tanks and of the numerous private advisors of governments and international institutions. Although clear pandemic risk alerts did exist, they were somewhat ignored, and pandemic preparedness has been generally weak (G20, 2017; CSIS, 2019; WHO-GPMB, 2019). This resonates all the more as pre-crisis growth policies and their instruments, including infrastructure investments, have been of little help against the pandemic outbreak. High connectivity among and within regions has favoured the rapid universal dissemination of the virus. In many metro areas around the globe, mass transit ridership has shrunk, leaving investment and management plans in disarray and questioning the future of regional planning and economic geography priorities.

An asymmetric crisis (OECD, 2020), the COVID-19 pandemic has exacerbated inequalities globally between developed and emerging and lower-income countries; as well as locally, with even deeper divides at the metro level (Angel and Blei, 2020). Job losses have been staggering, in particular for those in informal economic sectors – which comprise more than 60 per cent the global workforce according to 2018 estimates from the International Labour Organization (ILO) – and especially in cities of emerging and lower-income countries most exposed to the pandemic. Although cities account for over 80 per cent of the total GDP, no one was really paying attention to the global consequences of local imbalances, until the pandemic outbreak. The crisis has made the situation visible. The next step should be a revision of existing “agglomeration economics” (World-Bank, 2009), which together with an “infrastructure for development” prioritisation (World-Bank, 1994) has contributed to shaping unsustainable urbanisation pathways.

Another major challenge is the fragmentation of natural habitats accelerated by infrastructure development, including the physical and chemical alteration of ecosystems that has led to simultaneous crises in climate change and biodiversity. According to Living Planet Index, for example, representative populations of aquatic species have declined by more than 70 per cent since the 1970s. The pandemic is a stark reminder of just how far humanity is beyond planetary boundaries. An increasingly dense peer-reviewed literature evaluating the sources of zoonotic spillover shows that increasing deforestation, land degradation and fragmentation of habitat are the very same conditions that increase pandemic risks, as human-wildlife interactions increase along deforestation frontiers (Wilkinson et al., 2018; Roe et al., 2020).

In response to the global financial crisis of 2008, the United Nations Environmental Program proposed that the G20 adopt a “Global Green New Deal” to couple stimulus spending with efforts to tackle climate change (UNEP, 2009). Yet the percentage of stimulus spending ultimately earmarked for environmental initiatives fell short (Barbier, 2010; figure 1 in Appendix 2), although the G20 leaders further endorsed the concept of “green growth” at the Los Cabos 2012 Mexico summit (G20, 2012). This echoes an assessment of stimulus plans and packages conducted during the second half of 2020 (Vivid Economics, 2020) and the



independent study by Sir Nicolas Stern, Joseph Stiglitz and colleagues at Oxford showing that a very small proportion of these recovery packages had any positive impact on climate change (Hepburn et al., 2020).

Throughout the past decade, progress in addressing social and environmental issues within a global agenda of economic reforms (Sung, 2012) and recoupling growth with social progress has been sluggish. This goes with a slow, piecemeal focus on urbanisation and multi-level governance, despite the adoption of the G20 action plan on the 2030 Agenda and the creation of the Development Working Group (G20, 2016; Buchoud, 2020 and see Appendix 1). Recently, multiple initiatives within the global infrastructure space have focused on issuing new resilience and sustainability indicators and principles (Kovarik et al., 2019, 2020 and see Appendix 3), without yet achieving substantial systemic change. Carbon emissions continue to rise as humanity sees worsening climate extremes, even with a global pause in economic activity due to the pandemic; and land-use change continues to drive deforestation, degradation and habitat loss in nearly every major biome.

Just as the COVID-19 crisis has broken up existing routines, the journey towards sustainable infrastructure systems and urbanisation similarly needs to change course. In response to the economic recession generated by the COVID-19 crisis, G20 countries alone have pledged over \$11 trillion in support of immediate relief for companies and households (Celasun et al., 2020). This is three times more money than during the 2008 global financial crisis. Two key questions therefore arise at combined global and subnational levels: (i) how infrastructure investments can restore social inclusion and create the conditions for sustainable urbanisation; and (ii) how a better social and environmental balance can be effectively achieved.



PROPOSAL

1. INFRASTRUCTURE FOR DISTRIBUTION

1.1 Redistributing Welfare Opportunities

That “infrastructure is a key driver of economic growth and prosperity” (G-20, 2020) has long been assessed on the global stage and reiterated by G20 Saudi Arabia, following a sturdy tradition since the 2009 Pittsburgh *Framework for Strong, Sustainable and Balanced Growth* and the ensuing G20 Seoul infrastructure plan. Among competing options to recover from the COVID-19 crisis, “*infrastructure for distribution*” is the idea that the overarching purpose and goal of economic infrastructure investments should also be to improve the distribution of income, wealth and opportunities across society and minimise risks of and from health and natural disasters (Cohen, 2021). This approach would be relevant for lower income households and the poor, who have been hit by the COVID-19 pandemic disproportionately (Skinner et al., 2021)¹ as well as to support the middle classes. To tackle the unequal social and geographic distribution of income and many other social and environmental benefits, infrastructure should focus on well-being, which includes knowledge/skills, social capital, security and health (Chevalier Chamas and Stagno, 2020; Miranda and Snower, 2020; Guria, 2021).

As the COVID-19 pandemic continues to unfold and the SARS-CoV-2 virus to mutate, public health is trusting the headlines. Meanwhile, changes are needed in the type and scale of infrastructure projects as inequalities are rising (World Bank, 2020; ILO, 2021). For instance, Asian countries would need to invest an additional 0.5–1 per cent GDP more than what was needed in the pre-pandemic period (Dartanto, 2021) to meet growing needs in social infrastructure. Health, education and housing are examples of infrastructure sectors that have the potential to improve the welfare of all, as was recalled by the chair of the B20 Infrastructure taskforce at a strategic meeting with the G20 Italy Presidency and the D20 club of long-term investors in June 2021.²

As most of these social infrastructures cannot be delivered only at the central level but also at sub-national or local government levels, it reinforces the case for a sustainable urbanisation that is not just green but can endure over the long term and restore pathways to the 2030 Agenda (World Bank, 2021). To restore and build institutional perspectives for collective action, a more polycentric governance of complex economic systems (Polanyi, 1951; Ostrom 2010) might help rebalance infrastructure demand and supply and create new jobs and development opportunities. Successful examples of polycentric governance have been documented in the case of metropolitan policing in Los Angeles (Ostrom and Smith, 1976) and more recently in the planning of mega cities (Liu and Liu, 2018), the management of ports (Monios, 2019), climate change (Jordan et al., 2018) and social-ecological systems (Koonz et al., 2015). As polycentric governance systems go beyond markets and states and involve adaptive interactions among multiple governing bodies operating at several scales, they represent a promising way to support an infrastructure for distribution paradigm change.



This means that a new generation of infrastructure systems designed around decentralisation, flexibility, resilience and health should emerge, providing several (eco)system services, both material and immaterial, at the same time. We recommend that the availability of quantitative data to inspire and develop new models becomes a priority for the UN statistical system, as valuation still remains largely empirical (Crocì, 2021).

In the past, the development of micro-finance has successfully helped increase the incomes of poor and vulnerable communities such as in Bangladesh. In developed countries, rising deficits in social infrastructure have slowed down the recovery from the 2008 financial crisis, all the more as local governments play a critical role in their development and their investment capacities have been severely affected (Allain and Wu, 2021).³ Recent trends in social infrastructure finance have focused on financial innovation and service delivery (Fransen, del Bufalo and Reviglio, 2018). They have rarely been envisioned in a synchronised way with the development and renovation of economic infrastructure (Buchoud, 2018). Building on over a decade of progress in harmonising infrastructure investment prudential measures through the development of infrastructure as an asset class, infrastructure for distribution could maximise the impacts of both green bonds and social bonds (Inderst, 2010; LTIA, 2017; OECD, 2018). The magnitude of the COVID-19 crisis calls for a global leapfrog to upscale the delivery of sustainable infrastructure and review the existing models by rebalancing supply and demand.

1.2 Rebalancing Infrastructure Supply and Demand

In a series of proposals to enhance climate-smart urban infrastructure and reinforce long-term recovery responses to the COVID-19 crisis, the Climate Policy Initiative has highlighted a new trend in multilateral policy-making to address national and local levels of government and international financial institutions all at once (Yang, Negreiros, Smallridge et al., 2021). This goes along with the rising role of sustainability communities of practice that bring together practitioners in the public, private and civil society sectors to exchange knowledge and create and clarify their demands. As the COVID-19 crisis shows, welfare, solidarity and resilience depend on local factors beyond global market trends. The priority of future infrastructure investments, including designated strategic infrastructure, should be to (i) maximise the socio-economic and fiscal spillover effects of infrastructure investments and (ii) promote a recovery “from the bottom-up”, including all users. This goes along with valuing infrastructure “as a process”, focusing on its positive externalities and the development of social capacities rather than just infrastructure “as a product”.⁴

Due to the crisis, workers in the informal economy, especially in expanding urban areas in the Global South, are greatly exposed to enlarging poverty traps (Skinner et al., 2021), an issue which also concerns many in developed economies. By using a labour-intensive process including a focus on how the urban poor (in particular) could meet their own infrastructure needs, projects could generate income for the poor who would use it to meet immediate household needs. Infrastructure for distribution aims at restoring an aggregate demand, through sequences of investment / employment / income generation / consumption. The creation of economic multipliers would occur not just to increase GDP, admittedly a worthy objective, but rather to expedite the distribution of income especially within lower-income communities, which contrasts with many infrastructure investment projects such as large transportation systems. Such projects could also be efficiently developed in rural contexts



in support of nature-based solutions to generate immediate jobs with social, environmental and economic multipliers (WWF, 2020).

An example of infrastructure for distribution might be a programme to improve environmental management to address a range of environmental problems from pollution to maintenance of green space; or catchment reforestation to address landslide risk, as another example. In this case, the infrastructure is people themselves (Simone, 2004), or the nature-based solutions provided. Such “green corps” programmes could provide jobs for millions of unemployed or underemployed people, especially young people with low qualifications, in urban and rural areas and thereby generate incomes for groups that would otherwise fall into durable precariat.⁵ The US Biden administration has proposed exactly such a programme in its draft multi-trillion dollar infrastructure legislation, creating a Civilian Climate Corps in the model of the New Deal-era Civilian Conservation Corps that created millions of jobs for out-of-work Americans during the Great Depression to conserve and restore public lands.⁶

The development of new infrastructure finance models has to involve multiple parties from the very beginning, and the role of a forum such as the G20 can be critical to connect institutional investors – now with an estimated \$80 trillion of assets – with governments, cities and civil society players. This can be critically important for regions undergoing systematic market reforms, such as in Central Asia, with direct and multiple impacts on future water or food production systems, for instance, as well as on the management of cross-border projects.

1.3 Refining the Quality Infrastructure Investments Indicators

Positive externalities associated with infrastructure spending have long been discussed using various terms such as overflow, ripple effect, etc. In 2019, T20 Japan was instrumental in reformulating a comprehensive overview of infrastructure spillover effects including endorsement of the Quality Infrastructure Investment (QII) principles of the G20.⁷ Along with a contextual approach meant to reinforce infrastructure investment rates of return and thus attract investors (Yoshino, Hendrietty and Lakhia, 2020), the QII approach to infrastructure spillover effects targets a global ambition that fits especially well – but not exclusively – with the Asian context, including Central Asia, South-East Asia and India, the fastest growing and developing region in the world (Yoshino, Heble and Abidhadjaev, 2018). It indeed includes a focus on land management and acquisition, support to MSMEs and the mobilisation of domestic savings to improve the return on investment in infrastructure projects to communities and private investors – a prefiguration that a more systematic infrastructure for distribution approach could build on.

In addition to the recently rejuvenated spillover doctrine, enhancing infrastructure co-benefits – another wording for “hitting two birds with one stone” – comes as an additional priority and a feature of infrastructure for distribution. Co-benefits can carry political weight as an economic concept by emphasising the distribution of multiple benefits to meet user needs from a single project (Chakrabarti et al., 2005; Mayrhofer and Gupta, 2016, see also Appendix 5).⁸ Infrastructure for distribution embodies the design, implementation and governance of infrastructural projects to economically, socially, politically and ecologically integrate the privileged and marginalised communities. It opens up space for a wider and more social understanding of how infrastructure can be used to achieve other objectives. Whereas infra-



structure financing has long predominantly focused on supply, infrastructure for distribution enlarges the conversation towards the demand side, user priorities and needs, focusing on the objective of economic *and* social and environmental progress, to be achieved with the people.

2. INFRASTRUCTURE FOR WELL-BEING

Literature is replete with experiences of model community and cooperative development projects, but creating development pathways within the planetary boundaries and supporting a durable recovery from the COVID-19 pandemic requires a more systemic convergence between social infrastructure investments, social innovation and economic infrastructure investments. Economists' calls from spring 2020 to align economic and environmental objectives in spending packages can serve as a foundation for aligning economic recovery with equitable distribution objectives (White House, 2021). A “return-to-normal” or “building back” economic stimulus would not only be environmentally unsustainable, but also economically inferior to most green recovery schemes (Zachariadis et al., 2021). Green growth and development call for the distribution of benefits of green growth to be shared equitably across the whole social spectrum – and even in a wider perspective including other living species than humans (Wilson, 2019) – to fight the spread of the “inequality virus” (Berkhout et al., 2021).

2.1 Supporting a “One Health” Vision

The COVID-19 crisis has taught us that health does not trickle down from infrastructure, unless explicitly designing investments and institutions to create health equitably (Oni, 2021). Beyond health care, health should therefore become a dimension of future physical, digital and social and environmental infrastructure investments, within a “one health” perspective.

This approach must include efforts to reduce the risk of future pandemics, as many organisations and governments have been advocating since (and prior to) the Ebola epidemic. Major drivers of zoonotic disease spillover risks, from increasing deforestation and livestock-intensive agriculture at deforestation fronts, to the illegal wildlife trade, are directly connected to the sustainable infrastructure agenda. For example, avoiding the development of new roads that increase access into dense forests in priority tropical locations with already high zoonotic spillover, should be as much a part of the “one health” agenda as solutions to increase access to health care in deprived communities. New research and investment in strategic and spatial planning to keep these high biodiversity areas intact and reduce anthropogenic interactions is essential (WWF, 2020).

Effectively integrating environmental criteria into sustainable infrastructure investment requires progressing from voluntary or aspirational targets and principles to mandatory and binding regulatory requirements. G20 policy guidance is essential to facilitate a potential future agreement among MDBs and IFIs on common mandatory lending principles for deforestation-free infrastructure investments, and binding requirements for investments to not just be compatible with land, water and forest conservation, and the protection of biodiversity and healthy ecosystems, but to actively follow regenerative development and nature-positive approaches that rely on nature-based solutions (Nofal, 2021).



Along with a broad environmental perspective, health care is a second dimension of health. It could be improved by reinforcing the distribution of digital infrastructure globally and within countries, as the digital divide and limited accessibility and affordability of digital infrastructure has been made more visible by COVID-19 (Dartanto, 2021). For example, advancing and inducing tele-health services and developing adequate Internet accessibility and affordability could be leveraged with the involvement of the private sector.⁹

2.2 Prioritizing a Sustainability Continuum

The COVID-19 pandemic has dramatically refocused attention on resources, and in particular on the need to feed the growing world population.¹⁰

While investing in infrastructure and developing cities has been widely acknowledged as a way to support prosperity, agriculture and rural environments have regained importance since the pandemic outbreak (Lopes et al., 2020) as risks of food shortage and the return of extreme hunger were exacerbated. This comes alongside recent estimates indicating that agricultural production will need to expand by approximately 70 per cent by 2050 (World Bank, 2020). However, 24 billion tons of fertile soil are lost every year due to erosion, in particular because of unsustainable farming and breeding practices as well as inappropriate agricultural technology (GEF, 2021; FAO, 2021).¹¹ This adds up to an acceleration of land conversion and pollution linked with urbanisation and industry development and related infrastructure, in particular through large-scale or mega-regional corridors, as well as pervasive deforestation such as in the Amazon.¹² If this direction remains unchecked, almost 95 per cent of all agricultural land will be degraded by 2050, thereby posing a serious challenge to food security and further increasing pressure on terrestrial, coastal and ocean ecosystems.

The more the world is urbanising, even as agriculture and rural development are regaining centrality, the more the patterns of urban/rural divides need to be broken. Sustainable farming practices and appropriate agricultural technologies must be used to stop land conversion and environmental degradation, improve productivity, but also reinforce the role of rural environments in addressing global challenges such as carbon capture or biodiversity conservation and nature-based solutions like intact ecosystems that recharge water and reduce downstream flood risks, supporting resilience. This is only possible if agricultural production is socially and economically profitable, which in turn requires processing, product differentiation, branding, marketing and a more open international agro-food trade, in compliance with article 20 of the WTO Agriculture Agreement. In other words, agriculture must be transformed from a primary-sector business into a “primary-cum-secondary-cum-tertiary-sector” sustainable economy.

To eradicate and not just reduce the urban/rural divides, social infrastructure needs to be upgraded to cover international marketing and branding skills, quality assurance, production management and financial management. This requires considerable knowledge input, improved cross-disciplinary training and capacity building, and transparent and fair multi-lateral trade rules. It also requires the development of physical and digital sustainable infrastructure systems including large-scale remote sensing and data management capabilities.



2.3 Implementing New “Biodiversity Economics”

In just a few years, biodiversity issues have moved from expert roundtables to the global headlines. A real paradigm change is happening at a rapid pace (COP14, 2018; OECD, 2019; Das Gupta, 2021). Multiple transnational research and advocacy projects have recently been launched as the UN Convention on Biodiversity (CBD) works to finalise the Post-2020 Global Biodiversity Framework to address the weaknesses of the Aichi targets that so many countries failed to meet by 2020.¹³

Yet, the discrepancy between the ambitions and the delivery of corresponding new investments to address crises in biodiversity loss and climate change is staggering. For instance, whereas infrastructure investment needs account for \$74–94 trillion by 2040, according to recent G20 estimates, environmental priorities still only account for a fraction of this cost (Appendix 5).¹⁴ As debt levels are rising in developed, emerging and lower income countries across the globe due to the COVID-19 crisis, leaving local governments even more exposed (Allain-Dupre and Wu, 2021; Nofal, 2021), a multilateral macro-economic agreement is necessary to prevent debt-servicing from hindering recovery and transformational investments. It is equally urgent to develop harmonised metrics that concretely assess the value generated by ecosystem services in and around cities and larger regions, land/seascapes and watersheds (Crocì, 2021; Kruger et al., 2021; Buchoud and Bernede, 2021; Bartlett, 2020), especially in light of the planned development of hundreds of thousands of new kilometres of roads, railways, bridges and tunnels in the coming decades.

There is no question that business-as-usual infrastructure development contributes to habitat fragmentation and loss of ecosystem services, disturbing species and destroying habitats. However, new paradigms are emerging in linear infrastructure development aimed at maintaining or restoring ecological connectivity. For example, wildlife under- and overpasses to allow for species migration; or green corridors that run alongside infrastructure, can under certain conditions host various habitats and contribute to green infrastructure, as shown in the systematic review of more than 100,000 publications, Cohnecs IT (Jeusset et al., 2016; Villemet et al., 2017; Ouédraogo et al., 2020). This potential has been highlighted since 2016 with the final declaration of the Infrastructure and Ecology Network Europe international conference. But this topic, largely unexplored until quite recently, will be further developed in Europe in upcoming years within the Horizon 2020 BISON project to contribute to the European goal to ensure 7.5 per cent of annual spending is dedicated to biodiversity objectives from 2024 and 10 per cent from 2026 onwards.¹⁵

Influential global actors like MDBs and INGOs, funders like the GEF and GCF, private sector developers and insurers, alongside influential donor countries, are already pushing in this direction, driven by multilateral negotiations at multiple climate and biodiversity forums in 2021, with an essential need for harmonisation across agreements to avoid negative trade-offs between meeting the SDGs and achieving new, stronger goals under both the Paris Agreement and the CBD. Robust and integrated land use planning, often motivated by infrastructure development, plays a critical role in enabling countries to meet stronger goals in both their Nationally Determined Contributions (NDCs) and the increasingly adopted country 30x30 target of 30 per cent land areas under official protection. The zero draft of the CBD Post-2020 Global Biodiversity Framework, for example, calls for “50% of land and sea areas under spatial planning” while country NDCs increasingly include targets for



increasing protected areas and nature-based solutions as part of both adaptation and mitigation targets (Oxford University Nature-based Solutions Policy Platform). Countries need significant capacity investments to make these goals a reality: in data development and integrated modelling and analysis to inform integrated spatial planning; and necessary procurement and other regulatory reforms to both set and implement strategic and spatial priorities for nature-based solutions and infrastructure-driven economic development (Head et al., 2020; Bartlett, 2020).

Along with multilateral development banks, the convergence of infrastructure for distribution and post COVID-19 green growth reinforces the case for regional and national development banks (NDBs) in support of local development in line with biodiversity and climate targets. NDBs are well positioned to play the role of enablers and connectors between various local, national and international stakeholders within a highly complex inter-institutional and multi-level governance setting, where many silos still hamper the translation of ambitious sustainable development goals, climate ambition and biodiversity targets into localised sustainable infrastructure (Smallridge et al., 2013; Griffith-Jones and Attridge, 2020; CCSI, 2021). The above-mentioned call for polycentric governance approaches reflects the challenges that urban infrastructure stakeholders encounter on the ground: indeed, NDBs can develop a critical role in linking local, national and international plans, policies and governance levels while fully acknowledging the polycentric realities of urban infrastructure governance (or, the need for polycentric governance for urban infrastructure governance).

3. CONCLUSION: RECOVERING TOGETHER

While it took just nine months for the fortunes of the world's top 1,000 billionaires to return to pre-pandemic levels, including 56 new billionaires on the list, the pandemic has pushed an estimate of 88 to 115 million people around the globe into extreme poverty, confirming the risks of a K-shape recovery scenario. While in the mid 1950s the future Nobel Prize in Economics winner W. Arthur Lewis referred to infrastructure, in particular transport networks, communication systems and educational facilities, as prerequisites for growth for developing countries, the foundations of development are changing.

It is not about recovery alone. It is about recovery in a challenging environmental context, where some critical planetary boundaries have already been crossed (i.e., biosphere integrity and biogeochemical flows), leaving a limited margin of manoeuvre in other areas (i.e., land-system change and climate change), where the situation is critical (Steffen, et al., 2015). And, it is about recovering with the civil society and the private sector.

Building sustainable responses to the crisis calls not only for more sustainable sectoral regulations. It also calls for innovative work at the intersections of health, food and agriculture, urbanisation, and ecosystem services. Articulating and developing new regulations and incentives to support sustainable development pathways is necessary, but policy changes will work only if they also address the pre-crisis underlying imbalances of development and wrong infrastructure choices.

Future green growth depends on a more equal and just distribution of the benefits of urbanisation, including and perhaps starting with informal economic sectors. This goes along



with a new management of urban-rural interdependencies, preventing soil degradation and deforestation, improving water management and conservation, and accelerating the transition from high-resource-consuming linear production models to more sustainable circular economy development that explicitly protects and values the multiple and essential benefits of ecosystem services.

The rapid sequencing of the SARS-CoV-2 virus and rapid vaccine development through intense international scientific cooperation show great potentials in scientific and technological innovation and cooperation. Changing industrial, agricultural and urbanisation models require a similar evolution of knowledge and capacity-building management, to deliver the infrastructure of a new sustainable economy.

SUMMARY OF POLICY RECOMMENDATIONS

Infrastructure for Distribution

- In addition to the recently rejuvenated spillover doctrine, enhancing infrastructure co-benefits, another wording for “hitting two birds with one stone”, comes as an additional priority and a feature of infrastructure for distribution.
- To tackle the unequal social and geographic distribution of income and many other social and environmental benefits, infrastructure should focus on well-being, which includes knowledge/skills, social capital, security and health.
- This means that a new generation of infrastructure systems designed around decentralisation, flexibility, resilience and health should emerge, providing several (eco)system services, both material and immaterial, at the same time. We recommend that the availability of quantitative data to inspire and develop new models should become a priority for the UN statistical system, as valuation still remain largely empirical.
- The priority of future infrastructure investments, including designated strategic infrastructure, should be to (i) maximise the socio-economic and fiscal spillover effects of infrastructure investments and (ii) promote a recovery “from the bottom-up”, including all users. This goes along with valuing infrastructure “as a process”, focusing on infrastructure’s positive externalities and the development of social capacities, and not just infrastructure “as a product”.

Sustainable Infrastructure Finance

- The development of new infrastructure finance models has to involve multiple parties from the very beginning, and the role of a forum such as the G20 can be critical to connect institutional investors – now with an estimated \$80 trillion of assets – with governments, cities and civil society players.
- As debt levels are rising in developed, emerging and lower income countries across the globe due to the COVID-19 crisis, leaving local governments even more exposed, a multilateral macro-economic agreement is necessary to prevent debt-servicing from hindering recovery and transformational investments. It is therefore especially urgent



to develop harmonised metrics that concretely assess the value generated by ecosystem services in and around cities and larger regions, land/seascapes and watersheds.

- NDBs can develop a critical role in linking local, national and international plans, policies and governance levels while fully acknowledging the polycentric realities of urban infrastructure governance (or, the need for polycentric governance for urban infrastructure governance).

Enhancing sustainability

- Effectively integrating environmental criteria into sustainable infrastructure investment requires progressing from voluntary or aspirational targets and principles to mandatory and binding regulatory requirements.
- Sustainable farming practices and appropriate agricultural technologies must be used to stop land conversion and environmental degradation, improve productivity, but also reinforce the role of rural environments in addressing global challenges such as carbon capture or biodiversity conservation and nature-based solutions like intact ecosystems that recharge water and reduce downstream flood risks, supporting resilience.
- Countries need significant capacity investments to make enhanced sustainability goals a reality: in data development and integrated modelling and analysis to inform integrated spatial planning; and necessary procurement and other regulatory reforms to both set and implement strategic and spatial priorities for nature-based solutions and infrastructure-driven economic development.

One Health

- Along with a broad environmental perspective, health care is a second dimension of health. It could be improved by reinforcing the distribution of digital infrastructure globally and within countries, as the digital divide and limited accessibility and affordability of digital infrastructure has been made more visible by COVID-19.
- Beyond health care, health should therefore become a dimension of future physical, digital, and social and environmental infrastructure investments, within a “one health” perspective.



APPENDIX

APPENDIX 1. ON THE G-20 AND URBANISATION

Prior to 2021, it is hard to find convincing evidence of the topic of urbanisation within the G20 scope but there are indications of some slow but real progress over the years. Albeit a marginal topic, urbanisation can be identified at the first meeting of the T20 in 2012 featuring “livable cities” in the G20 infrastructure action plan, with an emphasis on mass transit. This was echoed in 2013 by the G20 Saint-Petersburg aiming to “promote development for all”. In 2016, one has to scroll down to an annex of the new “G20 Action Plan on the 2030 Agenda” to find references to cities, and the G20/T20 Germany then bypassed the issue, although it fostered a system-change approach to meet the challenges of an interconnected world. In 2018, the G20 acknowledged the “high-level principles on sustainable habitat through regional planning”, while both the G20 Japan and G20 Saudi Arabia refer to “smart cities”. A designated G20 global smart cities alliance was launched in 2019, but it is in fact a WEF initiative. The well-being of communities was referred to in the G20 Saudi Arabia leaders’ final declaration along with G20 smart mobility practices.

APPENDIX 2. GREEN INVESTMENTS AND THE G20: FROM ONE CRISIS TO ANOTHER

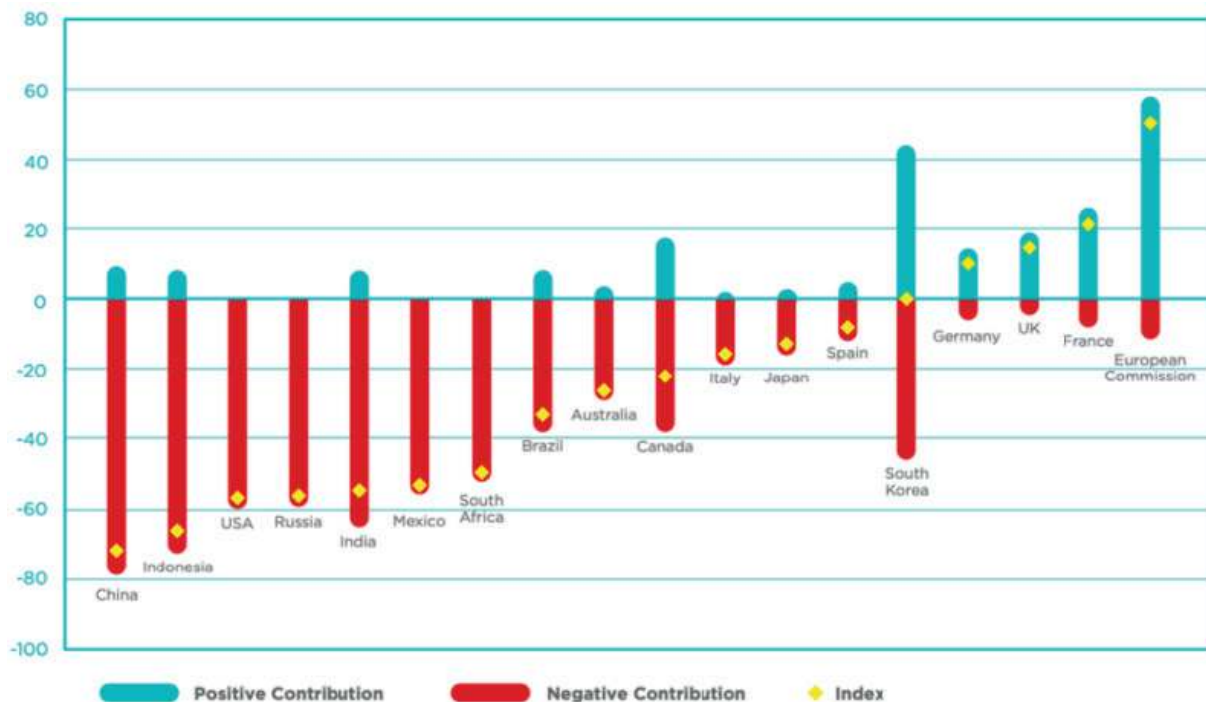


Figure 1 (above): Green Stimulus Index

Source: Vivid Economics (2020)

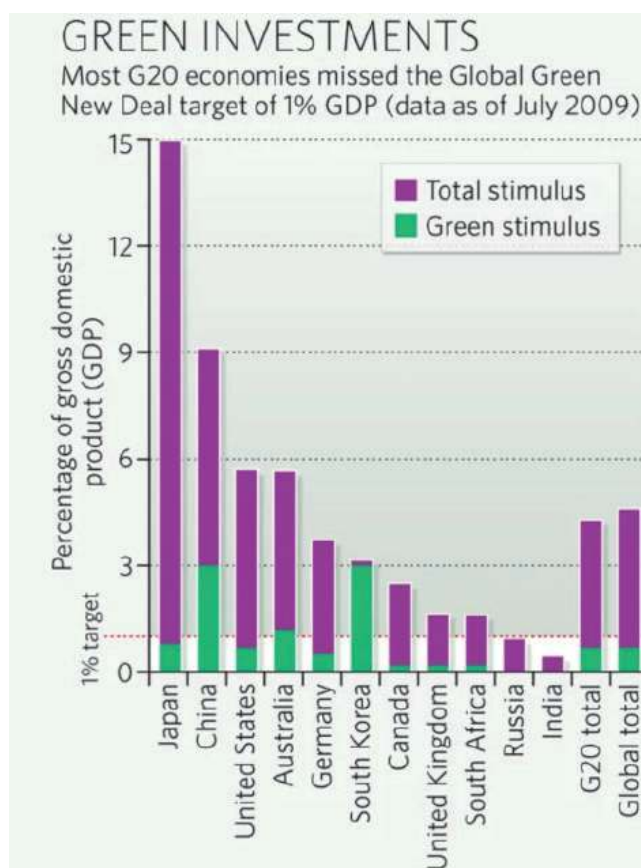


Figure 2 (right): G20 Green Stimulus Following 2008 Economic Crisis

Source: Barbier (2010)

APPENDIX 3.

A SHORT PANORAMA OF RECENT CHANGES IN THE GLOBAL INFRASTRUCTURE SPACE

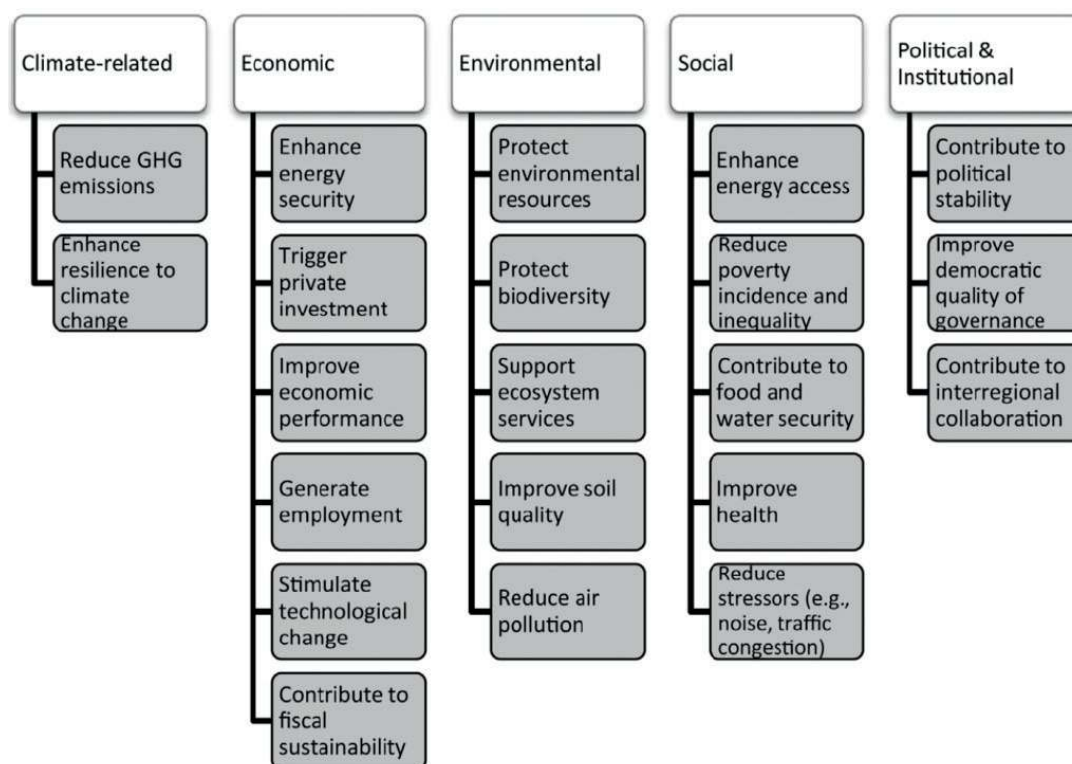
Voluntary and aspirational Quality Infrastructure Investment principles were endorsed by the G20 leaders in 2019 (1). Common sets of aligned sustainable infrastructure indicators were adopted by the Infrastructure Cooperation Platform of Multilateral Development Banks in 2020 (2). Similarly, the multi-stakeholder FAST-Infra was initiated to accelerate the sustainable development transition (3). In 2021, the United Nations Environment Programme (UNEP) released International Good Practice Principles for Sustainable Infrastructure (4). Following the introduction of the Roadmap to Infrastructure as an Asset Class by the G20 Argentina in 2018 (5), in 2020 the G20 Saudi Arabia initiated an InfraTech agenda complemented by a G20/OECD report on the collaboration with institutional investors and asset managers on infrastructure.



APPENDIX 4. A BACKGROUND ON INFRASTRUCTURE INVESTMENTS AND REGIONAL COOPERATION IN CENTRAL ASIA

Central Asia is one of the least economically integrated regions of the world due to, *inter alia*, infrastructure bottlenecks. Infrastructure can vastly improve the lives of communities and societies by providing better connectivity, mobility and business opportunities. Yet, its construction and maintenance requires huge financial resources and the public sector has insufficient capacity to meet the needs of increasingly consumptive economies. This, in turn, is impeding the development of economic cooperation and trade in the region. Central Asian states, like many other countries of the CAREC region, are facing serious challenges on infrastructure financing, according to the CAREC Programme. Central Asia currently spends around 4 per cent of GDP, whereas its projected investment needs until 2030 are 6.8 per cent of GDP and 7.8 per cent of GDP for climate-proof infrastructure. A major role in the financing of Central Asia's infrastructure needs is played by international financing institutions. Since the early 2000s, the CAREC Programme has invested \$34 billion, ADB \$12.5 billion, the World Bank \$7.4 billion, the Islamic Development Bank \$1.4 billion and EBRD \$1.6 billion to support CAREC infrastructure. Most of the infrastructure financing in the CAREC region is currently directed to extractive industries such as oil, gas and mining, while the water sector enjoys only 3–5 per cent of international infrastructure financing.

APPENDIX 5. INFRASTRUCTURE AND ITS CO-BENEFITS, A DEVELOPING STORY



A typical typology of infrastructure co-benefits

Source: Mayrhofer and Gupta (2016)



APPENDIX 6.

LESSONS FROM SYSTEMATIC SCIENTIFIC REVIEWS ON TRANSPORTATION AND BIODIVERSITY IN TEMPERATE CLIMATES

Systematic scientific reviews conducted since 2014 regarding transportation and biodiversity have shown a staggering growth of 15 to 20 per cent in the number of publications every year (ref). Such an exponential interest can compare to the rapid rise in the number of publications related to smart cities after the turn of the millennium. Although this is still far from the number of publications related to climate change and CO₂ emissions, it is a good indication of the growing research interest in sustainable infrastructure. It also illustrates a huge deficit in creating common standards and metrics, and harmonising sets of data and databases. The infrastructure finance gaps have been well illustrated in the context of the implementation of the 2030 Agenda. The infrastructure knowledge and science to decision-making gaps are much more staggering, as more than 370,000 km of new railways and dozens of millions of kilometres of new roads were planned by 2050, before the pandemic outbreak.

Pre-crisis calculations showed that less than €50 billion was spent globally on environment-related priorities, out of which a much smaller part concerned biodiversity and nature-based solutions in the global infrastructure space, as compared with over \$2 trillion in infrastructure investments globally (GiHub). As an illustration in the context of a large-scale regional infrastructure project, the total cost of the Grand Paris Express new metro system under construction in the Paris region is €38 billion, or roughly €150 million/km, to be compared with a total of €400 million for the regional biodiversity plan 2020–2030 including, among numerous other topics, the development of green and blue infrastructure. Similarly, while literature on ecosystem services has grown in recent years, its application to urban contexts is still very limited (Croci, 2021). While the calls to develop “public” or “common” goods (ref) have gained a lot of visibility, they can barely be substantiated by existing literature.

APPENDIX 7.

BUILDING THE FUTURE OF LINEAR INFRASTRUCTURE

In Europe, the BISON project was launched at the turn of 2020–21 as a major multiyear research and policy initiative on biodiversity and infrastructure systems, looking for infrastructure to provide new opportunities to develop innovative solutions (e.g., technological, organisational, managerial and methodological) that can simultaneously benefit mobility, trade and energy policy targets, alongside biodiversity. New regulations with higher biodiversity standards can be expected, in the wake of the negotiation of a new global framework for biodiversity within the Convention on Biological Diversity, by:

- Identifying future research and innovation needs, following a multimodal approach by integrating sector-specific knowledge and extending existing research results to different types of infrastructure.



- Developing a Strategic Research and Deployment Agenda which can be deployed at multiple scales, within the EU research framework programme, or by other regional, national or local programmes, in order to improve the knowledge base on infrastructure and biodiversity.
- Making linear infrastructure more high performing and reliable.
- Supporting countries to fulfil their international commitments.

Source: BISON, *Biodiversity and Infrastructure Synergies and Opportunities for European Transport Networks*, <https://bison-transport.eu/>; https://www.europarl.europa.eu/pdfs/news/expert/2020/11/press_release/20201106IPR91014/20201106IPR91014_en.pdf



NOTES

¹ An example of infrastructure for distribution has occurred recently in Buenos Aires where a slum community of 30,000 people, Villa 20, with prior participatory experience in slum upgrading was able to keep COVID-19 cases and mortality below levels in other neighborhoods. Infrastructure investment in water supply, sanitation, electricity, coupled with housing improvements, has been designed and implemented through a process in which residents have made the decisions about design, location and who is to benefit. A 2019 survey showed that 80 per cent of the population approved of the process and the outcomes. The COVID-19 crisis has not proven to be so disastrous for this community because it was able to strengthen its social capital.

² *2021 G20 Infrastructure Investors Dialogue: Financing Sustainable Infrastructure for the Recovery*, G20 Italy Presidency, OECD, D20.

³ In the European Union alone, the minimum infrastructure gap in social infrastructure investment is estimated at EUR 100–150 bn p.a. and represents a total gap of over EUR 1.5 tn in 2018–2030 (Fransen et al., 2018). Social infrastructure is a subset of the infrastructure sector that can be broadly defined as long-term physical assets in the social sectors (in this report these are sectors related to education and lifelong learning, health and long-term care, and affordable, accessible energy-efficient housing) that enable goods and services to be provided (Fransen, del Bufalo and Reviglio, 2018).

⁴ For example, Labonne and Chase (2011) found that the use of community-driven development approaches in planning infrastructure projects in the Philippines resulted in increased social capital and political participation in the municipalities studied, demonstrating the possibility to consider not only the end infrastructural product, but the process – including planning, implementation and maintenance – as potential opportunities for added social benefit.

⁵ The Aral Sea Region as a zone of environmental innovation technologies and the large-scale programme for replanting the former Aral Sea bed in Central Asia provides a relevant use case of such orientations, across multilateral support and national and regional engagement.

⁶ *Fact Sheet: The American Jobs Plan*, March 2021, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan/>.

⁷ *Quality Infrastructure Investment (QII) Principles*, Japanese Ministry of Foreign Affairs, June 2019, https://www.mof.go.jp/english/international_policy/convention/g20/annex6_1.pdf.

⁸ Urban sustainability science has largely adopted the language of co-benefits to describe additional social, economic and health benefits of projects such as nature-based solutions (Crocì, Luchetta, 2021, in press).

⁹ For instance, in Indonesia only 47.7 per cent of the population has access to the Internet, with relatively low broadband and mobile Internet speed, while countries such as South Korea, China and Singapore have almost universal coverage and high-speed broadband and mobile Internet.



¹⁰ The world population could expand to 10 billion by 2050, according to United Nations estimates from 2019.

¹¹ At a press conference presenting the conclusions of the G20 Saudi Arabia Environment Working Group in October 2020, the Deputy Minister of Saudi Arabia compared the world's total annual GDP of \$75 trillion with the annual value of all ecosystem services estimated at \$130 trillion. He referred to the cost of land degradation as \$6–11 trillion in annual lost revenue.

¹² In France alone, the total surface occupied by infrastructure facilities is larger than that of all regional natural reserves (*parcs naturels régionaux*) combined.

¹³ A new ISO/TC 331 standard on Biodiversity is about to be launched (<https://www.iso.org/committee/8030847.html>), the International Union of Railways has engaged in *rEvERsE*, a project assessing the impacts of railways on wildlife, the IUCN has set up a dedicated pavilion on Infrastructure and Biodiversity for their quadrennial congress, the European Commission has launched a multistakeholder research project on infrastructure and biodiversity in 2021, aiming at defining future norms and guidelines for EU policies (BISON project), etc.

¹⁴ As an illustration, whereas the new metropolitan automatic metro system in the Paris Region is an investment of over €38 billion with a total cost of €150 million / km, the total of the Regional 2020–2030 biodiversity plan including the development of nature-based solutions and green and blue infrastructure is only €400 million, which equates to barely 2.5 km of the future infrastructure.

¹⁵ See Appendix 7.



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