T20 TASK FORCE NOTES

RESILIENT, SUSTAINABLE, AND INCLUSIVE GROWTH THROUGH GREENER INFRASTRUCTURE INVESTMENT AND FINANCING
Summary

This background paper explores potential reform areas on issues related to sustainable investment and financing (SIF) for global economic recovery and sustainable development. Despite significant growth in the past decade, the amount of sustainable investment and financing worldwide still falls short of the scale needed to achieve climate goals and the SDGs. Urgent action is needed to scale up global sustainable investment and financing, along with international cooperation and reforms to reduce financial and institutional barriers to sustainable investing and financing. The G20, which is responsible for more than 80% of global outward FDI, is a respectable platform to lead international cooperation and coordination on these issues.

The G20, with the assistance and support of T20 Task Force 8 in particular, is well positioned to facilitate multilateral efforts encouraging countries to review, recommit, and scale up sustainable investment and financing; enhance the role of multilateral institutions and initiatives to accommodate sustainable investment at scale; integrate environmental, social, and governance (ESG) principles and sustainable investment facilitation in international investment agreements and treaties; ensure equity principles integrated in the carbon market; and continue improving the governance of sustainable investment at a global level. These are the first steps towards facilitating sustainable investment and financing to create resilient, sustainable, and inclusive growth.

“The background paper is prepared by Lili Yan Ing, David Christian, Arti Adji, and Ivana Markus in collaboration with T20 Task Force 8. The paper is mainly based on policy notes of T20—TF8 and materials presented and discussed at workshops and conferences organized by T20-TF8. We thank Hafida Fahmiasari and Ria Fortuna Wijaya for their excellent assistance. Disclaimer: the views expressed here are personal and do not represent any official views of G20 Presidency of Indonesia or G20 member countries.”
1. The needs for a renaissance in the infrastructure development

The world economy is projected to grow by 3.6% in 2022 and 3.7% in 2023, lower than estimated early this year. While the coronavirus disease (COVID-19) seems to be behind us now, the scarring effects on employment, poverty, and education will last forever. The unemployment rate reached 6.3% in 2021, with 33 million more people unemployed worldwide than before the pandemic. Women, youth, and less educated groups of the population have been disproportionately affected. Poverty incidence has also increased, with extreme poverty rising by 0.9% in 34 mostly low-and middle-income countries (LMICs). By the end of 2022, 860 million people could be living in extreme poverty, while simultaneously the world’s poorest countries must repay USD 43 billion in debt this year. Moreover, the rising global tensions and the war in Ukraine and have placed additional pressures on the world economy. The supply shortage will magnify inflationary pressures through increases in the price of energy, food, and metals. The fact that now, countries, particularly low- and middle-income countries, have limited fiscal spaces, the rising geopolitical tensions have widened the inequality and worsened the recovery process.

1.1. Long-standing issues in development: Inequality and Climate Change

The COVID-19 pandemic has left scarring effects that accompany long-standing development issues: inequality and climate change.

Income inequality has increased within and across countries in the past few decades. Between 1995 and 2021, the top 1% of the world’s population (in terms of income) controlled 38% of the wealth, while the bottom 50% captured only 2% (Chancel et al., 2022). As recently as 2016, the top 1% of the world’s population owned half of the global wealth. During 2020–2021, the income of 99% of the global population declined, while the income of the top 10 richest persons doubled (Hardoon, Ayele, and Fuentes-Nieva, 2016; Ahmed et al., 2022).

Equally posing a serious threat to the world economy and human lives, since 1970, CO2 emissions have increased by 90% by 2050. On the current path of emission, temperature could increase by as much as 4.4°C. In the Paris Agreement, 196 countries committed to work together to limit the global temperature rise to below 2°C from pre-industrial levels. The implementation of the Paris Agreement is highly correlated with the achievement of Sustainable Development
Goal (SDG) 13 on Climate Action by 2030. The world is on the verge of hitting a climate tipping point beyond which irreversible environmental damage will be unavoidable. It is estimated that limiting the rise in global temperature to 1.5°C (2°C) would require global greenhouse gas emissions to peak in 2025 and reduce by 43% (a quarter) by 2030. The heat could reduce 2.2% total working hours worldwide, which result in a decrease of USD 2.4 trillion in global GDP by 2030 (IPCC, 2022).

It is estimated that the global unemployment rate has jumped from 5.4% in 2019 to 6.6% in 2020 and 6.2% in 2021 (ILO, 2022). Furthermore, IMF (2021b) estimated that 65 million–75 million additional people were in extreme poverty globally in 2021 compared with pre-pandemic estimates. It is the poor who are worse affected by climate change as they typically are more dependent on environmental capital and climate for their economic activities and more vulnerable to extreme events affecting their economic productivity and health (Dercon, 2014). Considering such sobering circumstances, not only must recovery policies positively influence the environment, but they must also protect the most vulnerable members of the society. IMF (2021a) has pointed to the concurrent nature of both objectives, arguing that environmentally sustainable investment and financing are an important enabler for a resilient and inclusive recovery.

1.2. Is global economic recovery and green economy a trade off?

Global foreign direct investment (FDI)\(^1\) flows halved from USD 1.93 trillion in 2015 to USD 962 billion in 2020 – far below the pre-global financial crisis level of USD 2 trillion in 2007 (Figure 1). The COVID-19 pandemic exacerbated the decline in global FDI flows, which fell by 27% in 2020. However, they bounced back in 2021 to above pre-pandemic levels, growing by 88% to USD 1.8 trillion in 2021 (OECD, 2022). Many countries recorded increases in their investment flows, particularly from or to the United States and China. FDI inflows to G20 countries increased by 67% in 2021. Likewise, FDI outflows from the G20 economies increased by 86% in 2021, nearly twice the 2020 level. The United States was the major source of FDI outflows due to the high level of reinvestment of earnings, followed by Germany, Japan, China, and the United Kingdom.

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\(^1\) Global FDI flows are defined as the average of inward and outward FDI worldwide.
Investor confidence was particularly high in the infrastructure sector, with international project finance deals up in 2021 by 53% in number and 91% in value (UNCTAD, 2022).

However, the least developed countries and developing economies recorded slower FDI growth rates in 2021 than developed economies. Despite the 2021 rebound, the war in Ukraine and inflationary pressures followed by interest rate cuts could hinder FDI flows in 2022 and following years. Following large policy rate cuts to support the recovery path from the pandemic, global financial policies have been tightened to curb inflation – the Federal Open Market Committee raised the policy rate by 25 basis points in March 2022 and intends to raise it further by the end of 2022. Moreover, many countries have limited fiscal space due to high spending and lower tax revenue related to COVID-19 during the pandemic. Various forms of fiscal stimuli delivered during the pandemic have also led to significant increases in the debt burden, with some countries projected to have debt levels of 100% or more of their gross domestic product (GDP) in 2023. Rising borrowing costs will drive interest expenses up and make it more difficult for countries to service their debt (IMF, 2022).

**Figure 1. World FDI Flows, 2005–2021**

![World FDI Flows, 2005–2021](image)

FDI = foreign direct investment.

While FDI remains an important tool for growth and recovery, encouraging higher FDI flows alone is not enough. We need to promote FDI that is aligned with, and geared as closely as possible towards, achieving the global climate targets and SDGs. There is still a lack of common understanding of a certain class of FDI that can help to achieve environmental and climate goals – known as green or climate FDI. In the Glasgow Climate Pact (United Nations, 2021b), the parties agreed to scale up investments in climate change adaptation and mitigation to fulfil the commitments of the Paris Agreement and nationally determined contributions (NDCs) for reducing carbon emissions. The pact urged multilateral development banks (MDBs) and other financial institutions to scale up investment in climate change, including grants and other highly concessional forms of finance. The urgency of the situation calls for a framework for sustainable finance to achieve economic recovery, while upholding the principles of sustainability.

The key is that not only that we need more investments and financing, but we need them to be “sustainable”. Sustainable investment and finance (SIF) include any form of financial assets and services that integrate environmental, social, and governance (ESG) principles into their business or investment decisions for the lasting benefit of both clients and society at large. It is important to note that sustainable development and sustainable investment have been firmly embedded in the G20’s agenda and need to be pushed further this year.

1.3. Sustainable Investment and Financing (SIF) in economic recovery and inclusive growth

Sustainable investment and Finance (SIF) are a key enabler of economic recovery and inclusive growth. For example, a green and resilient infrastructure push that is accompanied by other policy measures to reduce greenhouse gas emissions could boost average GDP by 0.7% between 2021 and 2035 (IMF, 2021a). In the long term, sustainable investment needs to keep growing to reduce and mitigate environmental and economic damage caused by climate change, such as lower productivity due to higher temperatures and more frequent natural disasters. ESG principles, which lie at the heart of sustainable investment, cover a wide range of activities – investing in green, low-carbon, or renewable energy and infrastructure projects with zero or near-zero emissions (environmental aspect); investing in companies that demonstrate social values, such as social inclusion (social aspect); and investing in companies with good governance.
While some countries have chosen a sustainable path in recovering from the pandemic, a broader assessment of fiscal spending reveals that paving a greener path to recovery is not yet the top priority for most countries. During the pandemic, environmental concerns were often detached from economic stimulus and/or investment activities. In terms of financing the sustainable development, low-income (LICs) and lower-middle income countries (LMICs) will continue borrowing and pushing debt levels to further heights while most of them are also facing default risk (Ayadi, 2022). Vulnerable countries, particularly in terms of fiscal space, need to have a more inclusive and green financing framework.

However, the Global Recovery Observatory (2020) reports that the current state of recovery where out of USD 18.2 trillion of total government spending, about USD 3.1 trillion was allocated to recovery spending, with only USD 1 trillion considered green spending. The Organisation for Economic Co-operation and Development (OECD) Green Recovery Database (OECD, 2021) also evaluated countries’ COVID-19 recovery measures and their likely environmental implications. The OECD Green Recovery Database shows that while the USD 336 billion of environmentally positive recovery measures is clearly a significant investment in financing a sustainable recovery, the spending allocated to green measures only represented about 17% of the total recovery spending. The relatively small shares of green spending indicate that current recovery measures are unlikely to have transformational effects at the scale needed to address both the economic and environmental crises.

Furthermore, sustainable or ESG investment and financing mainly involves corporate initiatives on environmental, social, and corporate governance factors. The amount of global ESG investment reached USD 35.3 trillion in 2020, almost 50% higher than the ESG investment in 2016 (Nemoto and Liu, 2022). Sustainable investment has immense potential to support the world’s economic growth in the short and long runs. IMF (2021b) estimated that the net output gains from keeping the global mean temperature increase to 2°C or less will increase sharply after 2050 – reaching up to 13% of GDP by 2100. In the shorter run, sustainable investment also prevents or delays damage to the environment, which in turn improves the productivity and

2 Green measures (or positive measures) are those expected to have a clear positive environmental impact for one or more environmental dimensions, while not having major negative impacts on other environmental dimensions.
output of economies relative to the business-as-usual scenario. Furthermore, greener public infrastructure investment can induce the private sector to adopt new green technologies, such as power grid extensions to support renewable energy or the development of electric vehicles, which will eventually speed up the green transition and sustainable growth (IMF, 2021b).

Sustainable investment can support economic recovery processes from the point of view of employment. IMF (2020) estimated (Figure 2) that the job multipliers of environmentally sustainable energy subsectors exceed their fossil fuel counterparts. In other words, renewable energy, low-carbon sectors, and the associated services are more labour-intensive than high-carbon industries (based on fossil fuels). Sustainable investment eventually leads to better job creation outcomes, both in the short and long term. It can help countries to tackle inequality issues, particularly in relation to employment opportunities, while supporting the green transition of the economy.

A green transition, including a shift to renewable energy, the manufacturing of electric vehicles, and the construction of energy-efficient buildings, is estimated to create 24 million jobs by 2030, far more than the 6 million that could be lost (United Nations, 2022).
The coverage of SIF could cover among others, but not limited to:

- **Healthcare and support to vulnerable**: Many countries remain heavily dependent on external funding sources to address diseases or public health emergencies. An important part of this is investment in the global health system to achieve universal health coverage. SIF in health systems can protect households from poverty, which directly contributes to inequality reduction and economic recovery (United Nations, 2022).

The COVID-19 pandemic has exposed the lack of preparedness for public health emergencies in many countries, despite the increased support in this area since 2015. Countries need cooperation and investment to bolster their health capacities and systems and thus increase their preparedness for and readiness to deal with future
pandemics, which are likely to occur more frequently. Investment and infrastructure financing in this area could be directed towards laboratories, digital health systems, the health workforce, and community engagement, particularly in developing countries (WHO, 2022). Through better healthcare capacities and capabilities, the world can achieve universal health coverage, which is one of the major targets of the SDGs.

- **Sustainable infrastructure**: The G20 endorsed the G20 Policy Agenda on Infrastructure Maintenance in the G20 Rome Leaders’ Declaration in July 2021. The agenda was propelled by the recognition of the critical role of quality infrastructure investments in the recovery phase. Resilient, properly funded, well maintained, and optimally managed systems are essential to preserve infrastructure assets over their life cycles – minimising loss and disruption, and securing the provision of safe, reliable, and high-quality services. Environmentally sustainable infrastructure improves climate resilience and adaptation to climate change (IMF, 2021a).

The challenges of sustainable infrastructure also come from nature, where various disasters have hit and destroyed infrastructure and human habitats (Gultom et al., 2022). Resilient and adaptive infrastructure is needed to significantly improve the well-being of society. Well-functioning infrastructure creates a transformative impact on the quality of life, as the rate of economic growth depends on whether the infrastructure bottleneck for industrial upgrading and technological innovation is eliminated. For low- and lower middle-income developing countries, it is identified that water and sanitation, energy, electricity, and transport are the major sources of infrastructure bottlenecks, for which greater investments are necessary to prop up economic growth and recovery.

- **Supply chain resilience**: Ensuring the resilience of supply chains, particularly in essential products such as food and essential medical supplies or equipment, is one of the key prerequisites for achieving a sustainable economic recovery. Governments can pursue cross-border cooperation in this area and deploy policies to incentivise greater investment in supply chain resilience, both in the regional and global contexts. For example, supply chain resilience can be supported through wider adoption of digital technologies that improve the functioning of global supply chains, such as blockchain.
Moreover, blockchain can help to trace a particular supply chain from beginning to end; and help producers, distributors, consumers, and policymakers to identify the vulnerabilities or probability of disruption in all tiers of supply chains. It can also increase businesses’ participation in international trade (particularly through digital trade) and incentivise them to adopt digital technologies. Strategic investment in supply chain resilience can also improve countries’ preparedness for future economic shocks or public health emergencies.

- **Digital enablers**: Bridging the digital divide between and within countries requires a significant amount of investment in digital enablers. The G20 has recognised that sustainable investment and financing in quality digital infrastructure can greatly contribute to reducing the digital divide, as well as promoting universal and affordable access to connectivity for all by 2025.³

Digital enablers include digital infrastructure and related technologies – such as electricity, broadband, cloud computing, big data, blockchain, the internet of things, 3D printing, and virtual interaction or production. Investment and financing in digital enablers can enhance the adoption of digital technologies, particularly in developing countries, leading to higher productivity and greater opportunities for individuals and enterprises (including micro, small, and medium-sized enterprises) to participate in economic activities and in turn improve their living standards. As individuals still have less knowledge on public infrastructure, particularly in the remote areas, establishing public infrastructure knowledge and digital infrastructure provision might increase overall connectivity, not only for individuals but also enterprises (including micro, small, and medium-sized enterprises) to participate in the economy (Riefky et al., 2022).

• **Energy transition:** In 2021, global investment and finance in the low-carbon energy transition amounted to USD 755 billion, rising from USD 595 billion in 2020. The single largest sector is renewable energy (USD 366 billion for new projects and small-scale systems), while electric vehicle investment grew the fastest (up to 77%). Accelerating the low-carbon energy transition requires crucial investments in a variety of sectors, such as renewable energy, energy storage (the majority of battery projects), electrified transport, electrified heat, nuclear power, hydrogen, carbon capture and storage projects, and sustainable materials (circular economy).

To be on track for net zero, the world needs to triple the current amount of investment until 2025 to about USD 2 trillion (BloombergNEF, 2022). Advanced economies have increased sustainable finance for clean energy projects. Sustainable debt issuance has risen rapidly, and the mainstreaming of green bonds has been accompanied by new types of securities and performance-based instruments to support more complex energy projects.

• **Waste Management:** Besides energy transition to a greener energy usage, waste management has also been an unprecedented global challenge and highly related to a circular economy model. The World Bank reported that waste production will be 73% higher in 2050 compared to 2020, mostly due to growing populations, urbanization, economic development, and consumption. The world needs appropriate technologies to manage the waste properly in terms of economic, social, and environmental perspectives, which can utilize the development of information and communication technologies to have a sustainable waste management.

Poor waste management not only poses threats to the environment, but also hinders the national and local governments’ goal of a welfare society. The poor waste management might be due to institution failure, such as lack of adequate finances, policies, and law enforcement. Thus, government must take tole in better regulatory instrument for circular economy, such as Integrated Sustainable Waste Management (ISWM). On the financing
side, government can support sustainable waste management projects through improved stakeholder engagement, particularly support from the governments through Viability Gap Fund (VGF) to reduce the investment costs. (Surachman et al., 2022).

1.4. **Sustainable Investment and Finance (SIF) and their challenges**

This section describes a few sustainable finance instruments, as well as the key challenges associated with their adoption. Given the significant degree of adjustments that firms and economies need to make in transitioning to a more sustainable model of production, the financing needs for sustainable investment are huge and require certain types of instruments that take into account the challenges of such activities. Scalable sustainable finance is crucial to provide more investment flows and financing that make a tangible contribution to sustainable development. Sustainable finance instruments typically take the form of the following:

**a. Green financing**

Green financing can be considered as a structured financial activity that contributes to better environmental outcomes and which is aligned with the achievement of the climate goals set by the Paris Agreement. Corporations, municipalities, states, governments, and development banks can issue various forms of green finance instruments. Two of the most important forms of green finance are green bonds and green loans. Green bonds are fixed income instruments whose proceeds are used to finance projects and activities that promote a variety of environmental objectives. They include climate bonds, which target projects and activities involving climate change mitigation and/or adaptation, including infrastructure and renewable energy projects in developing countries. They also include blue bonds, whose proceeds are used to support the cultivation of marine energy and the development of sustainable fisheries. Transition bonds are another important subset of green bonds. They are used to support carbon-intensive activities and industries currently lacking viable greener alternatives in financing the transition to a more decarbonised mode of production with zero or near-zero emissions. The

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4 In a broader sense, green finance is essentially any financial instrument that supports activities and investments leading to a low-carbon and just transition of the global economy, and it therefore extends beyond climate finance (eds. Ing and Rodrik, 2022).
Climate Bonds Initiative (n.d.) reported that the market for green bonds reached USD 517 billion in 2021 and is projected to experience a tenfold increase to USD 5 trillion by 2025.

Green loans are another mechanism for borrowers to finance such activities. Green financing can also take the form of an equity market (e.g., ESG index), which rewards (penalises) companies that successfully (fail to) achieve sustainability or green objectives. For sustainable investment projects in developing countries, development banks or multilateral funds provide governments with access to green finance within an official development assistance framework, with concessional or preferential terms below typical market rates, to offset higher discount factors in developing countries and compensate the higher interest rates developing countries face in capital markets.

b. Social financing

Social financing (i.e., social bonds or loans) refers to fixed-income or loan instruments whose proceeds are used to finance projects or activities aimed at achieving a positive social impact. For example, social financing may come in the form of a COVID-19 response bond for projects aimed at strengthening healthcare infrastructure and alleviating the economic losses stemming from the pandemic. It may also consist of a low-cost housing bond or loan that aims to increase access to affordable housing in a particular region; or other bonds or loans to finance projects that improve labour market access for persons with disability, or any other projects that lead to better access to essential services such as education, health, and financial services. The rationale for introducing social impact bonds (SIBs), that represents innovative financing mechanisms, is to improve the outcome delivery through innovation in social service provision. Governments could also promote blended finance scheme to improve the bankability of a social infrastructure projects. Through blended finance scheme, it would contribute to lowering credit risk and increase private investment flows and financing into the social projects (Bersanetti et al., 2022).
c. Sustainability financing

Sustainability financing refers to any financial instrument (e.g., bond, loan, or equity) whose proceeds are used to finance projects or activities that have a positive environmental or social impact, or both. Essentially, sustainability financing combines the environmental and social objectives of green finance and social finance in a single investment project. For instance, sustainability financing can be used to fund projects that increase access to renewable energy at an affordable price in a particular region. SDG bonds, which sponsor investment projects that advance the attainment of one or more SDGs, are also included in sustainability financing.

d. Sustainability-linked financing

Sustainability-linked financing (SLF) refers to financial instruments (e.g., bond, loan, equity, or revolving credit facility) for which the financial and/or structural characteristics can vary depending on whether the issuer achieves predefined sustainability or ESG objectives (OECD, 2021). SLF differs from green, social, or sustainability financing as it is performance-driven and can be used for general purpose activities that improve companies’ ESG performance without necessarily belonging to a specific project(s). This means that the coupon rate attached to sustainability-linked bonds may depend on the degree of the issuer’s achievement of various sustainability targets. The higher flexibility offered often attracts firms to pursue investments aimed at improving the ESG characteristics of their production and operations using SLF.

SMEs and start-up businesses are one of the engines of growth and play an important role in job creation and opportunities, particularly for developing countries. However, banks and financial institutions are still reluctant to lend money to SMEs due to the high risks attached (Aktar et al., 2022). Sustainability-linked loans are likely to play a crucial role in helping small and medium-sized enterprises (SMEs) make the transition to low-carbon and more sustainable modes of production. Ensuring higher availability of, and easier access to, sustainability-linked loans for SMEs is a promising area of international cooperation with a potentially high impact, as SMEs still represent most enterprises and sustainable bond or equity instruments are beyond the reach of most SMEs, especially in developing countries with shallow capital markets. Moreover, providing Hometown Crowdfunding or Trust Funds can help SMEs to promote their businesses, as well as start-up businesses, along with provision of quality infrastructure provision (Aktar et al., 2022).
Overall, the market for sustainable finance continues to grow across the world. For example, the amount of ESG bonds issued globally skyrocketed from less than USD 50 billion in 2014 to USD 930 billion in 2021. Despite the massive growth, Moody’s Investors Service (2022) estimated that Green, Social, and Sustainable Bonds only represented 8%–10% of the global bonds issued in 2021, indicating significant room for growth and improvement. According to the latest 2021 data, ESG bond issuance worldwide is dominated by green bonds with a 55% share, followed by social and sustainability bonds at 24% and 22%, respectively. Finally, the ESG bond market is still skewed towards developed countries, which are responsible for 63% of the global distribution. While the gap in the market size of ESG bonds between developed and emerging countries has continued to close since 2014, emerging countries still only accounted for 28% of the ESG bonds issued globally in 2021. The top three issuers of ESG bonds are government-backed entities, financial corporates, and non-financial corporates, which together accounted for 70% of the total ESG bonds issued in 2021 (Climate Bonds Initiative, n.d.). Despite the growing market for sustainable finance over the past decade, several challenges may constrain the pace of their take-up in the medium to long run.

**Challenge 1: Transitional concerns**

From the perspective of issuers, a significant challenge is the perceived greater costs and risks associated with pursuing the green transition and green investment. While green investment and financing tends to have a more positive net present value than traditional investment over the lifetime of the investments, it shifts the costs from the future to the present. It may require significant upfront investment and financing in cleaner technology, as well as asset and employment adjustments. Furthermore, from the issuer’s perspective, financing the green transition with green finance instruments (e.g., green bonds) may incur additional costs and risks on their part due to the need for regular reporting using a different documentation platform, external assessment and review, and other related expenses. As such additional costs have often not translated into demonstrable pricing differentials and benefits of green financing (compared with traditional financing), some companies may be reluctant to make the green transition.
Another commonly raised concern regarding green investment and financing is the potential job losses as firms and economies undergo the green transition. However, the IMF World Economic Outlook (IMF, 2020) showed that environmentally sustainable public investments tend to bring higher multipliers and wider job impacts, especially during times of high uncertainty. Fiscal stimuli that prioritise greener investments not only bring positive impacts to the environment, but also promote employment. Sustainable investment and financing projects benefit the environment and have better job creation outcomes, which helps to reduce inequality. IMF (2020) estimated that a fiscal package consisting of a large, green infrastructure investment and financing stimulus and accompanying mitigation policy measures could create 12 million jobs on average each year over the next 7 years (2021–2027).

**Challenge 2: Lack of clear multilateral governance of sustainable investment**

From an institutional perspective, disjointed multilateral efforts to govern sustainable investment and financing have led to the lack of a robust, comprehensive, globally agreed standard and taxonomy of sustainable activities and, as a result, a lack of common language regarding sustainable investment. This problem is reflected in the proliferation of approaches and guidelines for sustainable investing that govern a wide variety of important issues – such as what constitutes sustainable activities; appropriate ESG criteria; ESG rating methodologies, reporting standards, metrics, and transparency; alignment of the green transition trajectory to the international climate goals in the Paris Agreement (not just national environmental policies or NDCs); and the role of market players. Different countries, regions, and companies may follow different sustainability guidelines, which might diverge from and lack interoperability with one another. Even the European Union – the market leader in ESG bonds – only published a taxonomy for sustainable activities as recently as 2020. In addition, there is a lack of clear guidelines on, and facilitation of, sustainable investment in most international investment agreements and treaties.
As a result of the above, investors and issuers may have different standards to comply with (e.g. stock exchanges, rating providers, industry bodies, and reviewers, some of which may be based in different jurisdictions). This gives rise to confusion and additional compliance costs for companies. In addition, the existence of multiple ESG standards and measurements have led to a lack of comparability in a company’s ESG performance assessment across different rating agencies. This adversely impacts the ability of corporate stock and bond prices to reflect companies’ true ESG performance, which sends mixed signals for companies seeking to improve the sustainability of their operations (Berg et al., 2022). All these issues may ultimately prevent the scaling up of sustainable investment. A more immediate concern, however, is the greater potential for greenwashing arising from such unclear and divergent sets of rules. This involves transactions of investment and financing products that are misleadingly marketed as ‘green’ or ‘sustainable’. Greenwashing is already a common phenomenon that is regularly reported. For example, InfluenceMap, an environment think tank, reported that 71% (55%) of the ESG equity funds (climate-themed funds) it assessed contained portfolios that were not aligned with the Paris goals (InfluenceMap, 2021). Greenwashing is the biggest concern for ESG investors (44%) according to a survey by Quilter (2021). Furthermore, a consumer protection framework against greenwashing is still lacking.

Challenge 3: Sustainable financing gaps

Despite substantial growth in the past decade, ESG investment and financing are still below the massive scale needed to address sustainable development barriers. This challenge is partly because simply not enough financial resources have been allocated to sustainable or green investment and financing – leading to various forms of financing gaps, which are especially pronounced in low-income and developing countries (LIDCs).

At the 15th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP15) in Copenhagen in 2009, developed countries pledged to provide USD 100 billion annually in climate finance by 2020. This pledge has since been extended through 2025, having failed to meet the target for 2020. Furthermore, grants only cover 20% of total climate finance, leading to insufficient resources to address climate adaptation and
resilience, as well as land use systems, especially in low-income countries (Ing and Rodrik, 2022). Furthermore, the most recent Intergovernmental Panel on Climate Change report (IPCC, 2022) suggested that developing countries would need to increase their climate financing by four to eight times their 2019 levels – USD 1.8 trillion–USD 3.4 trillion per year (Ing and Rodrik, 2022). The financing needs for sustainable investment are likely to exceed the initial estimates made at COP15 when the USD 100 billion pledge was made, once all the transition costs are taken into consideration – including, for example, those related to compensation for workers affected by the closure of carbon-intensive activities.

Studies have also identified sizeable financing gaps in sustainable infrastructure investment. The World Bank estimated that emerging market and developing countries require investments of USD 15 trillion–USD 27 trillion per year for infrastructure from 2015 to 2030 to achieve the SDGs and meet the 2°C climate change target (Rozenberg and Fay, 2019). It is estimated that G20 FDI flows and development finance institution flows from MDBs and new development banks to emerging markets and developing countries from 2011 to 2017 for sustainable infrastructure were just over USD 1 trillion – or USD 154.8 billion per year (Bhattacharya et al., 2019). This amount is severely insufficient, as it accounts for just 7.4% of the World Bank’s midrange estimates, and just 2% of the total need estimated by the OECD and New Climate Economy. It is also argued that the existing special drawing rights (SDRs) available for developing countries at MDBs have not been efficiently allocated for development purposes (Ing and Rodrik, 2022).

Global Infrastructure Hub (2018) projects that global infrastructure investment and financing needs would reach USD 94 trillion by 2040 to keep pace with profound economic and demographic changes and to close infrastructure gaps. In addition, to achieve universal household access to drinking water and electricity in line with the SDGs, a further USD 3.5 trillion is needed, widening the gap to about USD 18 trillion, roughly equivalent to a 20% infrastructure investment deficit. Bridging the deficit would require annual infrastructure investment to increase from the current level of 3.0% of global GDP to 3.7% by 2030. For LIDCs, achieving the SDGs would require an estimated 8.5% of GDP in infrastructure investments such as roads, electricity, and water and sanitation by 2030 (Ing and Rodrik, 2022).
2. Past achievements – infrastructure investment and finance in the G20

In 2020, Indonesia’s G20 presidency focuses on three main pillars:

(i) Economic Recovery  
(ii) Digital transformation  
(iii) Sustainable energy transition

By focusing on the three pillars, Indonesia will take the lead on:

(i) Ensuring equitable access to COVID-19 vaccines,  
(ii) Promoting sustainable and inclusive economic dependence through MSMEs participation and digital economy.  
(iii) Maintaining the aspiration to continue to improve our collective capacity in securing the shared prosperity among nations, through:  
   a. Various reform efforts in global taxation,  
   b. Stronger cooperation in fighting corruption,  
   c. Deepening of infrastructure financing,  
   d. Pushing for a more democratic, and representative international cooperation

Referring to the main areas that the G20 need to work on, T20-TF8 aims to set targets in infrastructure investment and financing which will be outlined in the following table. It summarizes past achievements and targets in infrastructure investment and financing in the G20.
### Past achievements and targets – infrastructure investment and finance in G20

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*New issues*

**TASK FORCE NOTES: RESILIENT, SUSTAINABLE, AND INCLUSIVE GROWTH THROUGH GREENER INFRASTRUCTURE INVESTMENT AND FINANCING**
3. Key messages from G20 dialogues on infrastructure

3.1. International cooperation to scale-up SIF: Role of the G20

Considering the urgency of the situation, the role of continuous international cooperation and coordination to deal with these challenges cannot be overstated. The G20 can and should play a leadership role in designing and delivering the necessary reforms to facilitate sustainable investment to take place at a much greater scale. Indonesia’s G20 Presidency has an excellent opportunity to lead the discussions on and push for the following short- and medium- to long-term reforms.

First, the G20 members need to review, recommit, and scale up green finance pledges and allocations. For example, working together with the G20 Sustainable Finance Working Group, they should monitor progress towards the USD 100 billion climate finance pledge and bring any gaps to the G20 leaders’ attention, including in areas such as climate change adaptation. The G20 leaders should consider clarifying each member’s contributions within the pledge and commit credibly to more funding in the future. G20 leaders could consider establishing a specific set of sub-targets within the USD 100 billion pledge for concessional finance by 2025 and encourage dialogue amongst advanced economies to agree on how to raise and allocate concessional climate-related finance and ways of de-risking privately mobilised green finance and investment, including through the use of guarantees. Furthermore, the G20 needs to encourage and facilitate significant increases in the amount and quality of official development assistance (ODA) for supporting sustainable investment and green finance, particularly grants for LIDCs, and to deliver international assistance to people adversely affected by the green transition, taking into account the higher discount factors and interest rates that developing countries face. It is crucial to ensure sustainable investment and financing that increase value added and local employment creation.
In the national level, governments need to improve their National Strategy Coordination Mechanism (NSCM), particularly in providing funds to a strategic long-term goal of the economy and catalyzing inward investment (Braunstein et al., 2022). Better coordination mechanism can help countries to facilitate replication and scale-up green project pipelines. On better quality of public goods provision, the G20 should endorse the Quality Infrastructure Investment (QII) principles where all infrastructure investment should be planned and designed according to emerging standards for nature-positivity and biodiversity-net gain (Autret, 2022). Furthermore, despite there has been much role of MDBs in sustainable investment, National Development Banks (NDBs) also need to play role in such investment. The G20 can foster NDBs collaboration with MDBs to achieve the goal of the scaling up green infrastructure projects, while also improving the internal capacity to give interventions, including legal and regulatory framework nationally (Bersanetti et al., 2022). It is encouraged for the G20 to explore innovative approaches to channel the global savings possible from productive infrastructure projects in developing countries and establish new financing resources and mechanisms to address the risk of infrastructure investment (Hermawan, 2022).

Second, Indonesia’s G20 Presidency should enhance the roles of multilateralism and reforms in the international financial architecture to accommodate sustainable investment and finance at scale. Some of the primary ways of doing so are encouraging MDBs to scale up their contributions to NDCs under the Paris Agreement; and reallocating, on a voluntary basis, surplus SDRs in a way that permits countries to expand fiscal space for NDC implementation. One possibility is to use part of the USD 650 billion SDR allocation for sustainable investment and finance, including providing necessary healthcare and support vulnerable people particularly in LMICs. The newly formed Resilience and Sustainability Trust at the IMF is a step in the right direction, although the size is far from adequate. Governments can also introduce and enhance the PPP Financing Framework to increase the participation of private party. Through this financing framework, government agency and private party can share the risks of the projects, one of the examples of PPP financing framework is PPP bond (Ayadi, 2022) that decouples country and execution/performance risks. G20 can be a place to do knowledge exchange and
provide technical and financial assistance in supporting the PPP framework (Gultom et al., 2022). Furthermore, G20 leaders could consider supporting the existing establishment such as Grameen Bank or Millennium Village Projects, specifically to facilitate sustainable investment and finance in creating local jobs, increasing local value added, and at the same time ensuring their activities are environmentally friendly, and other green sectors/initiatives such as water and waste management.

Third, G20 should also ensure equity principles integrated in the carbon market. The World Bank estimates that the existing national carbon pricing initiatives in 2022 cover only 23% of global greenhouse gas emissions. Therefore, accelerating the decarbonisation of global economies requires further significant development of the global carbon market, which primarily consists of cap-and-trade emission trading system, carbon taxes and carbon offsets. LICs and LMICs contribute on average a smaller share of global CO2 emissions, while at the same time having greater shares of jobs and capital susceptible to green transition and being more vulnerable to climate risks. In addition, the distributional effects of carbon market instruments may also differ substantially between developed and developing countries. Consequently, G20 needs to ensure that equity principles are integrated in the future development of carbon market. For instance, carbon pricing can be set based on the level of economic development of a country. G20 can facilitate the necessary international cooperation in the form of a clear multilateral guideline for carbon pricing and adjustment mechanisms that would facilitate sustainable FDI projects, support a smooth and inclusive green transition, encourage transfers of environmentally sound technologies, while at the same time remaining sensitive to development objectives of both the developed and developing countries and both FDI home and host countries. Uncoordinated, unilateral implementations of carbon pricing policy is unlikely to achieve such an objective. The cooperation may also include possible compensation packages for poorer countries at the multilateral level to counteract the loss in competitiveness and negative distributional effects associated with carbon trading.

Fourth, the G20 should consider establishing a framework to include ESG principles and sustainable investment facilitation. It needs to specifically link climate targets, economic

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5 https://carbonpricingdashboard.worldbank.org/
recovery from crises, and SDGs with investment facilitation efforts. Developing a multilateral framework, guiding principles, and toolkits of sustainable investment facilitation would improve the transparency of investment decisions from host countries and provide an incentive for investors with good sustainability track records to proceed. Some recent initiatives have acknowledged the need for the alignment of investment facilitation with development objectives, such as the WTO’s Joint Statement on Investment Facilitation for Development in December 2021 (WTO, 2021b). The G20 could build on such work and add ESG dimensions to promote and better facilitate sustainable FDI.

Last, there is a need for G20 members to work together systematically to develop a clear, unified, comprehensive taxonomy, standard, and guideline for sustainable activities and investment to improve the governance of sustainable investment and finance at the global level. For instance, the G20 could begin by conducting a stocktake of existing taxonomies and guidelines for sustainable investment and finance (SIF) and review the shared characteristics and points of divergence amongst them. Multilateral initiatives and agreements are also needed to ensure the global comparability and interoperability of the approaches, definitions, scope, metrics, reporting and disclosure standards, and rating methodologies of ESG or sustainable investment. Sustainable investments, particularly in high-quality infrastructure, can boost economic output through increased activity and employment, while also support energy transition and harness the benefits of digitalization (BKF, 2022). Infrastructure development can also improve cross-border cooperation and local and regional competitiveness. Therefore, coordination among G20 member countries could be an important signal to investors and promote robust, innovative, cooperative investment agenda. Sustainable investment and financing are foundation in achieving resilient, sustainable, and inclusive growth.

4. The needs for resilient, inclusive, and green infrastructure

Inclusiveness is an essential ingredient for society’s welfare. Equality of opportunity in terms of access to markets, resources, and just rule of laws are key for inclusiveness. For growth to be inclusive, productivity must be improved, and new employment opportunities must be created. Infrastructure investment is critical for equitable welfare distribution.
Adequacy in infrastructure investment is the foundation to achieve Sustainable Development Goals (SDGs). In the current state, the world is faced by many challenges, such as the pandemic, geopolitical tensions, and climate change which have increased the risk of economic recovery progress. It is imperative for the G20 to give more attention to create better economic development not only to smoothen the economic recovery, but also to achieve SDGs. Policymakers should rely on sustainable and resilient infrastructure in achieving SDGs. Resilient infrastructure provides positive ripple effects during and after crisis. Sustainable infrastructure will increase the efficiency of the economy while also pursue inclusivity and equitable provision of public goods, hence, generates multiplier effects in terms of benefits creation.

Inadequate infrastructure investment, along with growing inequalities and climate and environmental change have exacerbated the economies’ vulnerabilities to shocks such as the COVID-19 pandemic. Underprovided infrastructure yields detrimental impact for the economies to recover sustainably and inclusively amidst global crises. There is an urgent need to provide policies alternatives to address those challenges. In terms of financing, government can utilize several funding schemes and potential investment opportunities, such as PPP, private company participation, international financing, and other alternative financing, to finance the inadequate infrastructure development.

5. Lessons from global examples

The G20 represents a strategic forum in which substantial learning knowledge spillover among its members can occur. It should share the examples and best practices from member countries who are more successful in dealing with the identified critical policy areas associated with developing a greener, more inclusive, and more resilient infrastructure. The following sections offer several policy lessons and recommendations based on current global example.
5.1. Establishing equitable risk allocation in infrastructure

Infrastructure investments have been accorded high priority within the G20. According to Black (2022) and Arthur et al. (2022), in 2019, the Quality Investment Infrastructure (QII) principles were endorsed as a way to raise the level and quality of public and private infrastructure finance around the globe. One of the key aspects in the quality infrastructure refers directly to proper project preparation (ppp) process. A quality process must first commence with an identification of the problem and the goals and objectives of solutions to address that problem. As is often the case, quality infrastructure must involve achieving Sustainable Development Goals (SDG) such as equity and social inclusion. It should also employ a holistic approach on the entire lifetime of the project, taking maintenance, adaptation, and its distributional impacts into account. In this respect, the determination of quality infrastructure and the conceptual validity of a proposed infrastructure project is closely related to the risk allocation among parties who will be involved directly with the project and those who will be impacted – positively or negatively – by the project. The project stakeholders may include politicians, government bureaucrats, private sector companies, consultants and financiers, and representatives of impacted communities. Optimal risk allocation is often overlooked in an infrastructure project wherein ppp is absent, resulting in some parties bearing more risks than they are able to manage. This is especially worse in a post-pandemic era characterized by high debt gridlock, high inflation, and economic recession.

- The G20 should ensure that all members adopt the ppp process in developing the infrastructure projects in their countries. The ppp process should involve quantitative and qualitative assessment of social, economic and environmental benefits and costs of each alternative infrastructure solutions, statutory public consultation through an EIS process, market soundings, and documentation on the reference project case against which to compare bids from the private sector and to determine the ‘value for money’ (e.g. Design and Construct contract that allocates delivery risk between government procurer and delivery company). By including the above steps in a ppp process, risk management and the allocation of risk can commence under the principle that risk is allocated to the party that can best manage risk (IBRD / World Bank, 2017). Countries can then identify these risks, who is best placed to manage them, or if they are to be shared, what is the sharing formula to achieve the optimum equity, social and environment outcomes.
In addition, G20 should also continue to work on the implementation of D20 Guidelines on Maintenance of Infrastructure (including the use of preventive maintenance and predictive maintenance approaches), to create an enabling environment that develops infrastructure as an asset class (related to the transfer of risk and sharing of benefits between lenders and investors and the incorporation of ESG criteria in infrastructure projects), and to diversify financial solutions that are better able to manage or reduce risks associated with various types of infrastructure investment.

5.2. Improving governance in major infrastructure projects

Amidst global challenges and uncertainties, low-income countries (LICs) and lower middle-income countries (LMICs) will continue borrowing and pushing debt levels to further heights, to alleviate the social cost and to jump-start the recovery phase, that is expected to be more inclusive and greener. In the absence of a comprehensive financing infrastructure framework to develop their economies, these countries will not be able to build inclusive, green economic resilience and, hence, continue the payment of the debt stock they have. In 2021, in a paper for the T20 in Italy, we proposed and described an innovative PPP Financing Framework that decouples financial and execution risk, which relies on either domestic or international financial markets to finance infrastructure development, with guarantees from the LMICs and partial guarantees from international financial development institutions with a higher rating, to reduce the cost of financing. This framework described the Ready for Audit Framework (RAF) which, essence, is to monitor the performance of the executing entity by an independent reputable audit firm and to disclose progress to the investors and guarantor(s).

We propose to outline the pillars of the regulatory framework (policy, tools, and institutions) that would regulate a new market for financing infrastructure development with enhanced transparency, liquidity and sustainability. The domestic and international dimensions will be highlighted, introducing the two-tiered regulatory framework (Ayadi, 2022).

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• The G20 should be able to support for a global policy and regulatory framework for PPP infrastructure financing in close cooperation with the international organisations and private sector.
• Establishment of PPP bond that decouples country and execution/performance risks.
• Implementation of digital technologies: increase management efficiency of complex PPP infrastructure projects; monitor the quality of infrastructure and execution of maintenance contracts via dedicated software; and streamline dialogue and consultations between stakeholders: aimed to reduce corruption, execution, and reputational risk, to reduce sovereign risk and to lower risk premium—in lower yield and higher price of bond.

5.3. Enhancing safeguard policy for infrastructure development (climate, biodiversity, gender, minorities, displaced community)

Autret et al. (2022) assess that international and regional financial and technical institutions have in turn begun to operationalize the QII principles by aligning safeguard systems and investment screening criteria. However, while this is having some impact in screening out unsustainable investments, particularly those most likely to increase carbon emissions, both the impacts on biodiversity and the multiple benefits of nature-based infrastructure solutions (or “natural” infrastructure) continue to be insufficiently considered. This is due to recurrent challenges: insufficient data at the right scale and technical capacity within many countries to provide it and assess risks, and still weak recognition by policy and decision makers of the importance of a paradigm shift toward explicitly planning based on this information. In sum, while some individual projects might be meeting more stringent ESG standards, they are still not part of a larger whole shift in norms that is critical for country commitments and global goals in sustainability. For instance, while mitigating greenhouse gas emissions is gaining attention, biodiversity and ecosystem services remain the least integrated factors. One cited reason for this lag in addressing nature is that available key performance indicators are not readily translated into a quantifiable financial impact, leaving biodiversity to be considered only during the latter due diligence stages of the process (Oliver Wyman and WWF, 2020).
Infrastructure investors rely on environmental impact assessment and other institutional safeguards to try to limit environmental damage, but these measures are applied too late, usually employed on a project-by-project basis. Project-level design also rarely sufficiently considers well-researched forecasts of future infrastructure service needs based on socioeconomic trends or climate scenarios. Furthermore, policymakers are still not realizing the full potential of nature-based infrastructure solutions. While ecosystem services are increasingly valued, their benefits are rarely incorporated into infrastructure sector plans because current cost-benefit analysis standards and practices do not sufficiently consider the true negative costs of built assets or, perhaps even more significantly, the positive benefits of these solutions. These sustainability weaknesses in current infrastructure development practice are resulting in collective action failures and classic “tragedies of the commons” at national and global scales, where the cumulative impact of multiple projects at the landscape scale and entire sectors globally are still driving negative impacts on wildlife, climate, and deforestation and land degradation, regardless of project-level sustainability.

A significant change to this status quo is required to ensure that the estimated USD 90 trillion in anticipated additional infrastructure development investment by 2040 truly contributes to meeting the goals of the United Nations Framework Convention on Climate Change (UNFCCC), Convention on Biodiversity (CBD), and the United Nations Convention to Combat Desertification (UNCCD). In this respect, there are several actions that G20 can pursue to enhance the safeguard systems for current and future infrastructure projects:

- The G20 should require that all countries develop national to subnational land/seascape scale assessments of their natural capital and ecosystem services as the basis guiding future QII; and that they channel funding and technical capacity support to implement these assessments.
- The G20 should endorse, through all future QII guidance, that additional investment in efficiencies and financing of maintenance is both considered prior to investments in new assets and sufficient to addresses new climate-related risks and opportunities to enhance service delivery and create nature-positive outcomes and biodiversity net-gains.
• The G20 should endorse, through all future QII guidance, that investors use cross-disciplinary advances in modelling climate impacts and ecosystems services benefits to capture ecosystem-service, climate and biodiversity costs and benefits more systematically and comprehensively.

• The G20 should endorse through all future QII guidance that all large new scale/high impact infrastructure investments should be planned and designed to meet emerging standards for nature-positivity and biodiversity-net gain.

• The G20 should promote, through all future QII guidance, increased funding and uptake of platforms that break down sector silos and contribute to shared and coordinated approaches amongst infrastructure stakeholders.

5.4. Managing and financing local and social infrastructure development

The COVID-19 health crisis has exposed the chronic under investment in social infrastructure in most developed and emerging countries repositioning the issue of social infrastructure as a core question. According to the Global Infrastructure Hub, over the last decade investment in social infrastructure declined, with primary transactions falling from USD19 billion globally in 2010 to less than USD 3 billion in 2019 (Infrastructure monitor 2020). At the same time, in the post pandemic scenario, governments attach more importance to economic infrastructure, targeting mostly assets in transports, energy and communications with less attention given to social infrastructure which should be at the core of global investment efforts as better social infrastructure led to greater resilience, growth and wellbeing.

Based on Bersanetti et al. (2022), substantial challenges remain before philanthropic actors realize their full potential as financiers of social infrastructure. The investment climate for social infrastructure is affected by many factors, including government regulations, rule of law and property rights, government transparency and accountability. In addition to the policy environment, other factors preventing the flow of impact investing towards social infrastructure assets include a lack of dedicated financial instruments, the bankability of the infrastructure pipeline as well as high costs and high management fees. A shortage of standardized, high-quality data on the impact of social infrastructure could also represent a challenge. Weak data,
for instance, could lead to the misallocation of resources. Investing in developing countries, for many foundations based in OECD countries, adds a layer of challenges including knowledge barriers. In this context, the main burden is on governments to create favourable conditions and devise robust and innovative initiatives to leverage the role of foundations in social infrastructure investment.

From local perspective, one specific challenge is the threat posed by poorly managed waste to the environment in the context of circular economy, which ultimately hinders the national and local governments’ goal of a welfare society. It is difficult to apply appropriate technologies to manage the waste properly in terms of economic, social, and environmental perspectives which eventually leads to an expensive project cost. The application of the circular economy at the local level must inevitably be linked to Integrated Sustainable Waste Management (ISWM). Financing is a critical factor for building ISWM because the initial formulation of the project is largely technology driven. (Surachman et al., 2022).

In response to the earlier discussed challenges, the G20 forum can play a strategic role in promoting the necessary policies and initiatives to reverse the decade-long decline in investment in social infrastructure and to develop a model capable of attracting public and private philanthropy into these investments. There are five main areas that G20 should work on (Bersanetti et al., 2022):

- **G20 to facilitate a clear policy, legal and regulatory regime, and an efficient and independent dispute resolution mechanism to safeguard investors’ rights. This includes four objectives: political and legislative stability; fast administrative procedures; light regulatory and soft bureaucratic constraints and a reliable judicial system.**
- **G20 to support the development of innovative financial instruments and well-designed guarantees for social infrastructure. Social impact bonds (SIBs) represent innovative financing mechanisms where governments enter into agreements with social service providers such as foundations to directly support the delivery of social services.**
- **G20 to implement de-risking mechanisms to make social infrastructure investment more attractive to philanthropic actors. To improve the bankability of a social infrastructure project, governments could promote blended finance scheme (e.g., a mix of grants, subsidies and guarantees) that would ultimately contribute to lowering credit risk and enabling private finance flows into the project.**
• G20 to enable the bundling of projects that could give foundations access to portfolios of smaller size social infrastructure. Bundling has the potential to lower the risk profile for foundations and philanthropic bodies. Unique procurement provided by bundling of similar assets allows to reduce costs and gain significant savings on design and construction phase and on maintenance activities.

• G20 to promote labeling and certification targeting social infrastructure investments. The label certification is useful for all the actors involved: it can increase financing potential, it can be an incentive to design projects with sustainability criteria at their core and it can encourage developers to pursue high environmental, social and resiliency standards at all stages of the infrastructure lifecycle. GRESB is a good example of this endeavor.

6. Developing a national strategy and the role of sovereign wealth fund to support infrastructure

The scale of the global infrastructure investment gap over the next two decades raises the question of where and how governments can access additional finances to deliver the required level of sustainable infrastructure. Infrastructures, such as transportation systems, energy generation structures and networks, water and sanitation facilities, telecommunication services, are a crucial component of socioeconomic development and at the base of people and businesses’ activity. Underinvestment in sustainable infrastructure represents a missed opportunity in terms of progressing toward improved welfare and the achievement of a sustainable and inclusive development (Braunstein et al., 2022). In particular, channeling investments to developing economies is crucial to speed up the reduction of global inequalities and to create new opportunities for inclusive growth at regional and national level, whereas low- and middle-income countries face a recurrent infrastructure-financing gap – with an estimate USD 2.7 trillion in 2019, which the Covid-19 crisis has worsened since (Shamshad et al., 2022).

The G20 has a long history of promoting infrastructural investment plans. For instance, it has facilitated coordination and the sharing of best practices through the creation in 2014 of the Global Infrastructure Hub, which has largely played an advisory role, providing Member States’ governments and international organizations with data, analyses, and knowledge about infrastructural investment needs and financing. Shamshad et al. (2022) argue that what has been lacking from G20 Members is a common and comprehensive approach towards
infrastructural plans: most of the initiatives put forward in the last decade have been established by single countries or by small groups, each with its own set of standards and priorities. (e.g., Belt and Road Initiative, Asian Infrastructure Investment Bank). Only a limited number of initiatives have instead been characterized by an approach based on a larger framework, bringing together different G20 members and other economies.

The sheer number of different infrastructure initiatives launched in recent years already provides a fragmented and complex global picture. Institutional actors and private investors would have a hard time choosing which framework best matches their priorities and objectives. Different countries often have different priorities and, inevitably, each initiative tends to reflect the economic model of its proponents, creating significant divergences between schemes.

In addition, mobilizing private finance is critical for closing the infrastructure gap particularly in low- and middle-income countries. Sovereign Wealth Funds (SWF) – large state-owned investment funds – can play a critical role in incentivising and unlocking private national as well as international finance to enable low carbon infrastructure investment that is aligned with SDGs. For SWF to play such a role of catalyst for blended finance, however, there needs to be a clear articulation of their strategy and its alignment with long term national strategy, which effectively links SWF investment policies to its country’s long term strategic goals. Yet, very few governments, developed and developing, have well-articulated strategies and investment plans for sustainable infrastructure. Sustainable infrastructure and urbanisation need to be placed at the centre of long-term national plans for financial reform and industrial strategy. Understanding that uncoordinated efforts could result in ineffective spending on infrastructure projects, international community, and multilateral fora, such as G20, have long recognised the importance of collective action in funding quality infrastructure needs. Therefore, the G20 has an excellent opportunity to put forward initiatives to align national strategies and enhance the role of SWFs in supporting infrastructure projects.

- First, G20 members can begin by understanding the specific issues related to their own countries. Interdependence within and among these areas requires a new approach to governance that is attuned to targeting global issues such as climate change and domestic infrastructure needs which are unique in how these features combine to create governing structures and challenges, making for different approaches (Braunstein et al., 2022).
• Second, with regard to the role of SWF, the G20 should encourage its members to establish a high-level National Strategy Coordination Mechanism (NCSM) in which the fund’s objectives are mixed with the strategic long-term goals of the economy and catalyzing inward investment. Such a framework not only provides guidance in terms of governance coordination among national entities but also enhancing long term certainty beyond ad-hoc projects or one-off investments within and across nations through collaboration. Coordination Mechanisms among different frameworks in order to facilitate replication and scale up green project pipelines. A focus on national strategies would add significant value to existing policy and technical fora (e.g., the OECD Long-term Investment Project; One Planet Sovereign Wealth Funds Framework; G20 Guiding Principles for Global Investment Policymaking, and the Santiago Principles) to enhance collaboration and smoothen interaction in sustainable and infrastructure investments among countries. The G20 is an ideal forum for initiating a dialogue about the coordination of national infrastructure projects in the context of different national strategic frameworks. This dialogue can take place under the auspices of existing G20 initiatives, such as the Global Infrastructure Hub (Braunstein et al., 2022).

• Third, an effective shared facility should provide incentives to bring about as many G20 members to cooperate on the same project, diminishing the attractiveness of competition and raising the appeal of cooperation. G20 can consider establishing a premium mechanism that would benefit shared projects: in a co-financing scenario, where the resources provided by the facility are a share of the total – we envision a situation where the private sector would supply the bulk of the necessary financing – such share should be increased depending on the number of G20 Members cooperating in the same project. An example: financing an infrastructural project backed by one single G20 country would receive only the base share of public financing by the shared facility, with an increasing share for each additional country participating. This would make common projects more appealing to private investors, since they not only would be cheaper but also faster in their pipeline because of the smaller quota of resources to be obtained from markets. Additionally, more participating states would increase the overall quota of public co-financing, significantly diminishing the risk related to the investment. Such a common financing facility should also be provided with de-risking tools and mechanisms that would lower the perceived risks for private investors, ultimately boosting private investments in infrastructure (Shamshad et al., 2022).
Fourth, the G20 can consider a minimum agreed classification of quality and sustainable infrastructural investments to be shared by G20 members, and potentially open to any other country. This classification should function in a similar way to a taxonomy, listing what types of infrastructural investments would be considered sustainable and fully compatible with the G20 Agenda. While members may have different priorities and preferences, G20 should still acknowledge the importance of reaching a common position that would hopefully operationalise the 2019 Osaka Principles. In fact, they are not yet directly translatable in practice and would greatly benefit from a classification rendering them directly applicable to future projects (Shamshad et al., 2022).

Fifth, the G20 can consider adopting spillover tax revenue approach: sharing part of the spillover tax revenues collected by the government with the investors would represent a better option, allowing users to benefit from lower charges and investors to still obtain a high rate of return. A potential optimum would be a 50% share of investors’ return coming directly from charge, with the remaining 50% coming from tax revenues increased by infrastructures (Shamshad et al., 2022).

Furthermore, a successful application of circular economy in the realm of local waste management requires a strategic collaboration and synergy between central and local governments. In particular, the G20 can encourage its members’ central government to pursue the three following actionable recommendations:

- Directing the right regulatory instrument for circular economy manifestation. A circular economy needs an integrated approach, starting from households to higher levels of government, and from upstream to downstream process. The government should supervise stakeholders in the implementation of the regulation as stakeholders tend to be less concerned about the implementation of the circular economy where there are no incentives or penalties for doing so.

- Central governments to take charge of the national strategy through the establishment of supporting regulations, mapping, and strengthening regional capacities, and creating markets, while the local governments to play a role in providing data, implementing public education, and adjusting strategies by taking into account their regional social capital.
o Structuring the project to achieve sustainable financing and low cost of funds. For instance, by applying green budget tagging in their budget mechanism such as green bonds or social impact bonds to support the green project financing, or by establishing a framework of a blended financing scheme to realize ISWM by implementing a pilot project.

7. Promoting innovation and digital transformation in the infrastructure technology

A few transformative technologies have already emerged in the global economy that offer great potential to improve the design, construction, operation and maintenance of infrastructure and buildings. Data is the most important element in this technology-sensitive framework. The ability to collect, organise and use data is a key element in creating a technologically advanced and thriving infrastructure ecosystem. Big data analytics is leveraging new data collection through earth observation, remote sensing, the Internet of Things and new technologies like cloud computing and machine learning. Information technology systems such as digital twins, used in conjunction with distributed ledger technology, can facilitate the collection, sharing and analysis of data, reduce the potential for fraud in projects and improve both time and cost efficiency in infrastructure planning and development (OECD, 2021). By accessing monitoring data using sensors and artificial intelligence techniques, smart infrastructure can develop self-diagnostic cyber-physical systems (CPS) that warn of deteriorating conditions, expected failures and necessary intervention.

Croce et al. (2022) describe that although digital technologies play an important role in offering great potential to improve design, construction, operation, and maintenance of infrastructure and building. However, digital technologies such as big data analytics and data sharing also face some bottlenecks which include among others: (1) Privacy and security (e.g., data protection, vulnerability, system security); (2) Legal and national barriers (e.g., adequate legal frameworks, asset user trust, IP rights, GDPR); (3) Institutional and commercial barriers (e.g., regulatory intervention, commercial sensitivities); (4) Technological constraints (e.g., data standards, resource limitations, interoperability, legacy IT); (5) Cultural barriers (e.g., fragmentation, siloed thinking, lack of understanding of benefits). Ultimately, wider adoption of
digital technologies is hampered by the many actors and jurisdictions involved in infrastructure planning and delivery, lack of national standards and approaches, and lack of interoperability and economies of scale.

To tackle the bottlenecks of big data analytics usage for infrastructure projects, G20 could implement following practices (Croce et al., 2022):

- Creating federated infrastructure data platforms and frameworks that follow a secure and data sovereign governance structure, platform principles, design, and protocols. Open and federated digital platforms that combine the physical with the technological layer of infrastructure represent an opportunity to significantly improve value chain integration of development and delivery for the infrastructure sector. Platform-driven integration could not only advance the symmetry of knowledge among stakeholders, but it can also spur innovation through ecosystem participation, and accelerate the achievement of the broader objectives of decarbonization, resilience, and human-centred infrastructure (Bühler, Jelinek, Nübel et al. 2021). Several sharing of these initiatives already exists both at the national and multinational level. G20 initiatives, such as the InfraTech Stock Take of Use Cases, and the latest supra-governmental initiatives, the Gaia-X federated digital platform, offer important reference.

- Supporting industry-led and government-facilitated data sharing communities that identify appropriate use cases and support collaboration between stakeholders. Supporting data sharing programmes and platforms that centred around the development of use cases represents a key policy measure for implementing safe, decarbonized, and climate-resilient infrastructure. A cross-sector and public-private partnerships is crucial to ensure scientific progress, transfer knowledge, boost innovation, and introduce new business models across-sector and public-private partnerships.

- Utilizing data for intelligent decarbonization and climate resilient urban planning. Advanced urban analytics powered by urban Big Data can play an important role in shaping future urban environment. Big data analytics and ICT-enabled smart solutions could facilitate resilience-building activities through, among other things, improving the capacity to coordinate the activities of different stakeholders and actors involved in resource management, utilizing big data analytics for real-time and proactive urban planning, and ensuring effective and efficient use of the increasingly scarce resources (Chien et al., 2022).
Climate and environmental databases are critical for achieving the sustainable development goals (SDGs) and for efficiently planning and implementing appropriate adaptation measures.

- Project-owner/government-led initiatives will be necessary to overcome regulatory, cultural, and commercial barriers of collaboration and data sharing and improving capacity building. Improving governance systems and coordination mechanisms across different level of governments is of paramount importance. In particular, institutional and legal certainty along with the implementation of regulatory frameworks concerning cybersecurity, privacy, and data sovereignty are considered major success factors for building trust and necessary conditions to overcome data sharing barriers. Aside from the need to formulate the right regulations and policy, improving capacity building and sharing good practices are a common priority to improve the design and implementation of digital enhanced infrastructure.

Furthermore, Riefky et al. (2022) argue that as the pandemic has exacerbated inequalities as it pushes the society to significantly reduces their physical activity; thus, enforcing them to shift their economic activities into the digital platform (Chernoff, Warman, 2020). Considering another socioeconomic dimension of spatial aspect, inequality has prevailed between urban and rural areas even before the pandemic. The provision of an adequate level of infrastructure quality and quantity plays a major role in ensuring the inclusiveness of benefits brought by digitalization, especially in the context of urban-rural disparity. To achieve digital inclusion, G20 should implement the following proposed framework:

- Establishing a well-defined and commonly agreed framework of the inclusive digital economy and addressing digital infrastructure provision as an overall connectivity infrastructure specifically for developing countries.
Another issue is the lack of high-level frameworks with low-level technical reports and assessments. Reports on the assessment of infrastructure accessibility are generally limited to a certain type of infrastructure. However, digital infrastructure provision also depends on the maturity of other basic elements. For instance, Shenglin et al. (2017) note two issues inhibiting the full capture of available digital infrastructure: affordable network services, devices, and applications as well as the lack of digital skills to create or add value. Thus, infrastructures provision (such as digital goods and services and skill distribution) are interrelated to connectivity infrastructures (such as broadband, satellite, and wireless). This systemic view needs to be emphasized in the framework. Despite the need for common framework, it is fundamental that there are distinctions between different stages of economies, as digitalization is fundamentally different between developed and developing countries.

- Establishing public infrastructure of knowledge. The private sector leads digitalization in various aspects, from providing software and devices to operating social media and financial technology platforms. However, they still rely on public support and infrastructure, not only in terms of hard infrastructure but also in soft infrastructures like public education and literacy. Such infrastructure is necessary since private actors might not be capable—or incentivized—to acquire skills and knowledge that unlock the full benefits of digitalization. In both developed and developing countries, better access and better knowledge of usage are pivotal endowments to less widening digital divide as individuals tend to still not well-informed on how digitalization can provide opportunities for income generation.

- The G20 member countries should make a commitment to share financial, technical, and institutional capacity resources in to improve the establishment of public libraries, free internet access hotspots, affordable internet packages, providing access to rural areas, among others so that public access to essential digital services is available. It is also important for G20 member countries to develop more forward-looking digital literacy program that incorporate the characteristics of developed and developing countries that could be adopted as common framework, establishing adequate community-based training and infrastructure knowledge, provide access to education including for marginalized population. In doing so, G20 members can encourage the empowerment of the smallest unit of community or nucleus community level to achieve better utilization of digitalization.
Improvement in institutional capacity. The pace of technological development and the accelerating business cycle imply that governance and regulation tend to be playing catch-up. The network effect and associated economies of scale imply that digitalization rewards agglomeration and concentration in the core, meaning that there is a lack of technical capacity and know-how by related government and private stakeholders at local and regional levels. This is especially the case in developing countries, where state capacity is weaker, talent is more limited, and regional inequality is more prevalent. As digitalization scales up and permeates all levels of society, better understanding by the government, including at local and regional levels, is crucial to ensure that digitalization can support resources for more equal social and economic distribution.

The G20 member countries should encourage the provision and mobilization of technical assistance facilities that focus on specific aspects of concepting, planning, and implementing digitalization agenda. They need to improve horizontal and vertical cooperation between public institutions, considering the interregional and inter-level nature of digital ventures.

Better utilization of alternative financing instruments. The lack of soft and hard infrastructure in developing countries, especially the gap between urban and rural areas is partly caused by inadequate funding. While annual investment in digital infrastructure has risen, it is estimated that the investment gap could reach USD 512 billion by 2040 for Asia alone (AIIB, 2020). Emerging economies with low-quality infrastructure are facing a bigger shortfall, since they have a large population with low per-capita investment and a decreasing annual growth, signaling an issue in attracting investment. Several financial instruments, such as social impact bonds and designated multilateral credit facilities, may provide solutions to the funding problems. Considering the variety of digitalization programs, an array of potential instruments can be applied to different projects at different stages.
To expand the fiscal capacity, governments can utilize innovative financing instruments, such as social impact bonds or multilateral credit digitalization programs. G20 member countries should escalate their commitment in developing and utilizing innovative financing instruments. Moreover, encouraging private participation is essential, considering that 72% of infrastructure project investment since 2011 comes from the private sector (AIIB, n.d.). Instruments like viability gap funds, sovereign guarantees, and project support may serve as effective tools to leverage public finance by mobilizing greater private finance. Considering its influence, G20 member countries should increase the private participation through various de-risking instruments to spur investment towards digital infrastructure development.

- Establishing a more progressive fiscal instruments to address the vicious cycles of digital divide. Fiscal instrument can relocate resources to sectors with greater capacity or engine to achieve more equitable or inclusive growth. One of the policy options is to establish more progressive fiscal instruments such as tax incentives or subsidy to promote education benefitting disadvantaged groups of societies. Digitalization requires higher education. Intervention in the education sector is very important to address digital inequalities since education is dominant factor explaining the gaps in access and usage both in developed and developing countries.

- Since access to internet represents a primary access for information and resources for education, internet access should be improved, especially for low internet penetration areas and low-income households. Better access to internet for remote areas and lower income brackets will help reducing economic and social gaps among areas and households, especially in developing countries. In addition to physical infrastructure construction, less developed areas and groups also need advancement in soft infrastructure and favorable policies and regulations toward vulnerable groups. Tax incentives for the private sector engaging in internet infrastructure provision will mobilize resource allocation for better access. Essential factors which support the development of digital infrastructure such as government policies and regulation should also be shaped to further enhance inclusive economic growth.
8. Meeting infrastructure challenges of new capital city, urbanization, and urban regeneration

Dash et al. (2022) assess that urban infrastructure planning typically focusing on engineering solutions, e.g., design and beautification than the city’s organic social and economic life. Unplanned urbanization often leads to climate, water and biodiversity crises exacerbating socio-economic vulnerabilities and threatening natural and physical infrastructure. On top of unplanned urbanization, extreme weather events, such as floods, cyclones, and storms, are causing devastating impact in terms of human loss and economic damages. Not having adequate protection to infrastructure could be one of the reasons of destructive impact of extreme weather. The coastal ecosystems and local communities often bear the brunt of urbanization-induced degradation and loss of natural resources. Land reclamation and coastal erosion damages flora, fauna, and water bodies, threatening the wellbeing of local communities, and forcing undesired community relocations. These challenges need to be addressed, especially to countries who plans to build new capital cities or new cities. New cities or expansion of existing cities need to factor these concerns in planning.

Some of those challenges would require a paradigm shift from ‘business as usual’ approach in infrastructure planning and development. Infrastructure planning across sectors like roads, railways, ports, urban utilities, industrial areas, etc., needs to suitably factor in the major drivers of change—rapid urbanization, threat of environmental pollution and climate change, demographic changes, digitalization, among others. Urban infrastructure development, therefore, needs to undergo a well-crafted roadmap including a proper blend of engineering solutions, environmental concerns, dependence on infrastructure supporting cities as centres of economic activity, and societal concerns like inclusivity and disability friendly solutions.

Indonesia’s new capital city could offer some solutions to these challenges and form a basis for further thinking. It is to appreciate that resilient and adaptive infrastructure needs to include systemic thinking, flexibility, and inclusive decision making. Robust safeguards to protect the environment and the affected communities are needed amid the risk of climate change-induced extreme events. The nature of construction of buildings, infrastructure, utilities, etc; resettlement of people; and financing solutions at the federal, sub-national and local levels need to be
effectively dealt with. It would include inclusive urban planning and design in coastal regions as well. To sum up, development of new capital city needs to incorporate five important aspects: density, diversity, design, decarbonization, and digitalization.

A new paradigm of infrastructure planning should envisage cities as “engines” of the economy and incorporate mitigation and adaptation procedures like land management, reducing the disaster risk cycle, confronting extreme weather events, and sustainable territorial development (UN-ECLAC and UN Habitat, 2016). To build a future urban “green” city, government needs to rethink the classic infrastructure project life cycle and incorporate some creative solutions. G20 as a multinational forum could address the issues through some innovative ideas as follow:

- **Development of Smart Infrastructure**

Urban "green" city development needs to consider the extension of the life cycle of the built environment by implementing proper maintenance and retrofitting to sustain it as long as possible:

**Stage-1:** Land acquisition processing should consider the indigenous people and cultural rights with principles of FPIC (Free, Prior and Informed Consent) applied in urban and rural areas. The spatial plan should put environmental factors as the main priority.

**Stage-2:** Planning and financing the adequate residential area, transport and public infrastructure, climate change and disaster resiliency with transparency funding. The planning and design phase should emphasize the need to follow the UN Declaration on Human Environment to achieve urban sustainability. Human dwelling and activities should be planned and rem to circumvent negative impacts and augment social, economic, and environmental benefits (Fu et al., 2017).

**Stage-3:** Civil architecture infrastructure's designer should consider the social awareness, low energy consumption, budget-friendly, and lifecycle of the infrastructure itself.

**Stage-4:** Managing construction process that promotes healthy business conduct, transparent supply chain contract, minimum disruption to local communities, and ensures the structural integrity, disaster risk resilient, and environmentally friendly.
**Stage-5:** Operational, management and maintenance of infrastructure system that mitigates all risks related to environmental pollution, human rights exploitation, misuse of technology, safety, and security risk, and breaching of privacy and data protection.

**Stage-6:** Demolition and redevelopment should incorporate CE principles to take account of the project legacy and end-use phase.

- **Circular Economy Model with Modular Construction**

  Towards a circular lifecycle, it is necessary to adopt the construction methods to support the sustainability goals. Many studies have shown that modular buildings provide better life cycle performances (Kamali and Hewage, 2016), but selecting one construction method should consider the benefits and drawbacks based on the economies of scale and local circumstances. The proven technology that is considered a method for smart, sustainable construction is modular construction technology introduced here (Iacovidou et al., 2021).

- **Promoting Reliance on Renewable Energy**

  Predicting and mapping the suitable renewable energy resources should consider the geospatial information and in/compatibility criteria or potential factors by adopting MCDM (Multi-criteria Decision Making) based assessment and GIS (Geographical Information System) technology.

- **Integrated Coastal Zone Management (ICZM)**

  ICZM projects should be supported with the policy to regulate the climate issue, water purification, coastal erosion control, disturbance regulation, pollination, noise reduction and air purification (De Andres and Barragan, 2017).

- **Urban "Green" Transition**

  The transitioning pathway should support sustainable urbanization, encourage innovation, and ensure sustainable consumption and production. Doing so can be seen as a contribution to achieving the SDGs, especially Goals 9: Industry, Innovation, and Infrastructure, 12: Responsible Consumption and Production, and 13: Climate Action.
Other urban engineering solutions can be leveraged to make infrastructure climate resilient. This includes improved equipment/materials in construction and operations and environmentally optimized road designs using local and marginal materials to reduce the cost of the lifecycle, increase durability, and improve the long-term performance of infrastructure. All new investments into transport, logistics, renewable energy grids, and data and communications infrastructure need to be designed to address adaptation and transition challenges.

- **Financing**

Given the limitations of public sector financing of sustainable and resilient infrastructure, large scale implementation of nature-based solutions (and green/gray infrastructure) and hybrid solutions requires de-risking investments to attract private investment. To do so, mechanisms such as ‘first-loss guarantee’ and ‘off-take agreements’ can be used (IUCN, 2022). Blended finance also offers incentives to private players and can be used to de-risk NBS projects by funding feasibility studies. New and unique blended finance solutions such as the 2018 Seychelles Blue Bond, which used a concessional loan from Global environment facility (GEF) to cover coupon repayments, and a repayment guarantee from the World Bank for part of the principles can be devised.

**8.1. The need to establish a global investment platform for urban development projects**

The adverse impacts brought about by the COVID-19 pandemic involve a substantial urban dimension. Many cities across the world have not been able to fully recover from the fallout of the pandemic, and at the same time continue to face longstanding, pre-pandemic challenges, such as inadequate urban and social infrastructure, limited ICT systems and digital access, and disrupted production networks. Further adding a probable risk of K-shaped recovery to the picture, it is crucial for all urban stakeholders to prevent the income gaps between the rich and poor households from widening. Facilitation of sustainable and resilient urban development projects, therefore, plays a critical to achieving a more equitable economic recovery.
Susantono (2022) argues that it is imperative for G20 leaders to allocate more attention and resources to develop liveable and smarter cities with low carbon emissions. Liveable cities are fundamental for the development of sustainable global supply chain networks and to ensure seamless mobility and delivery of services, both physical and virtual. Access to digital technology plays an important role in creating smart and sustainable cities. The key enablers for smart and sustainable cities are strong policies and institutions, access to technology and digital skills enhancement, innovative financing, and collaboration in planning and coordination. In this respect, the key performance indicators (KPIs) of Indonesia’s new capital city (IKN), a model for sustainable urban development, are in line with all three of the following G20 main pillars:

- **Global health architecture**: It is important for cities to be based on a more robust architecture in responding to future health crises by integrating water, sanitation, and hygiene (WASH) into public health strategy. IKN is targeting 60% recycling of waste generation by 2045 and 100% treatment of wastewater by 2035.

- **Digital transformation**: Governments need to have a systematic plan to develop smart, data-driven, and inclusive cities to improve the quality of urban services for citizens, businesses, and governments. IKN is targeting a very high E-Government Development Index (EGDI) and 100% digital and ICT connectivity for all residents and businesses.

- **Sustainable energy transition**: As cities consume 70% of global energy production, developing sustainable urban energy systems will greatly benefit societies. IKN is targeting 60% energy conservation in buildings and to meet its entire energy needs by renewable energy.

A natural policy question, then, is how to tap global financial resources to fund our cities (or new capital cities) and urban development projects in a sustainable manner. In this context, we propose the establishment of Global Investment Platform for Sustainable Urban Infrastructure as a forum by which the relevant G20 engagement groups, working groups, and initiatives can pool their resources and work together to effectively addressing urban challenges related to equitable development, climate change mitigation and adaptation, creative financing, commitment, innovation collaboration, and inclusiveness.
9. Future orientation and mainstreaming the ecosystem of the PPP scheme in infrastructure projects

Gultom et al. (2022) explain that one of the main challenges facing infrastructure development is the increasing threats from natural disasters and climate change. It creates greater demand for more resilient infrastructures, particularly in disaster-prone countries. While the damage from vulnerable infrastructure could result in enormous economic costs and human lives, providing resilient infrastructure serves otherwise. Resilient infrastructures offer social benefits, ranging from saving human lives against natural hazards and climate change to achieving a better and more equitable life quality. Furthermore, resiliency can be utilized as a signal to attract more investment by putting the standards intact. However, investment in infrastructure often faces substantial budget constraints, specifically the increasing expectations for the role of private participation to fill the public funding gaps.

Public-Private Partnership (PPP) scheme is regularly offered as a potential solution for this growing problem. PPP scheme offers an efficiency gain not only for governments but also leverage private sector’s knowledge and experience in such project. Moreover, under the PPP scheme, stakeholders, specifically the governments (i.e. the national and local government), also need to strengthen capacity building and provide the right incentives, either to the public and/or private sector, to increase their sustainability. Further strengthening capacity building may start with mainstreaming the ecosystem of the PPP scheme in infrastructure projects, which in return will succour the investment from the private sector. In order to magnify and prioritize the PPP scheme, governments shall establish a government policy which endorse the use of PPP scheme in the development of any infrastructure project. In addition, the national and local governments may also be incentivized for ensuring the use of PPP scheme in a infrastructure development on their respective level. This may be done through building a firm regulatory framework which regulates the use of PPP scheme and ease the process of investment by the private sector.
Despite its huge potential, the contribution of PPP financing in infrastructure development is still low. Typically, PPP contributes less than 1% of gross domestic product, while public finance greatly varies from 2% to 10% of a country’s gross domestic product (Zen, 2018). Private participation in infrastructure development is still lacking in many countries. For example, out of the USD 425 billion of infrastructure development projects in Indonesia, private participation only accounts for 21 per cent, while many private entities are in fact state-owned enterprises (SOEs) (APEC Policy Support Unit, 2019). Instead, investing in the resilience of infrastructures in developing countries is estimated to bring a net benefit of USD 4.2 trillion over the lifetime of new infrastructures or USD 4 for each dollar invested (Evans et al., 2020).

Contributing to the relatively minimal role of PPP in infrastructure development are a number of critical challenges. One of them relates to synchronization challenge that may span across various government agencies involved in the infrastructure planning process. Such a lack of commitment and inconsistency between government agencies as stakeholders could also occur in other inter-regional infrastructure sectors such as water supply systems, electricity transmission, and fibre optic networks. Another may also come from knowledge and resource gaps, especially between national and local governments (LGs). Finally, the challenge also comes from a misperception that adding resiliency dimensions to infrastructure projects means additional costs that would seemingly reduce the project’s net returns.

- In light of the aforementioned challenges on PPP, the G20 should be a leading platform for effective knowledge exchange among the members with more successful experiences in harmonizing and inclusive inter-governmental coordination in order to better synchronize the infrastructure planning amongst various public agencies and institutions. The supports can utilize the existing platforms and international institutions working on PPP capacity building. Improving the coordination and synchronization across the public sector stakeholders may require the project committee to have representatives from relevant Local Governments (LGs) and a mechanism to request LGs’ active participation. Public consultation, knowledge exchange, and partnerships are examples of various instruments to enhance local participation. These efforts aim to close the knowledge gaps and harmonize the development objectives among the stakeholders.
• Second, G20 member countries also need to provide technical and financial assistance to support PPP development preparations for developing countries. Promoting the merit-based incentives mechanism contributes to local economic development and incorporates incentives for PPP institutions to finalize PPP projects. It is also important for G20 member countries to develop a framework for and standardization of PPP contracts to ensure the completeness and quality of PPP contracts and governance.

• Third, in order to promote the development of resilient infrastructure, the G20 should (1) continue and prioritize further the development of better-designed infrastructure resilience metrics that considers differences in country’s characteristics through the use of the PPP scheme; (2) encourage continuous multi-stakeholder coordination and participation involving government, private sectors, community, and civil society to improve the resilience aspects of infrastructure that adapts to the change of dynamic in the population; (3) strengthen the sharing and mobilization of resource to improve financial, technical, and institutional capacity towards middle- and low-income countries; and (4) incorporate resilience measures into the existing standards and requirements for infrastructure development by coordinating with relevant international development institutions.

10. **Messages for India’s G20 Presidency in 2023**

This policy note illustrates the sheer magnitude of issues and challenges around ensuring the development of sustainable and resilient infrastructure at a global scale. While promising national, regional, and multilateral initiatives have been offered as potential solutions, many of them are still at a nascent stage and require substantial further development. This is undoubtedly a multi-year global endeavor which the next G20 Presidency of India can build on. We highly encourage the Government of India to consider integrating the following policy areas in its preparation for G20 Presidency in 2023 and subsequent T20 India engagement group works, as well as ensuring discussions with regard to infrastructure sector:

• **Mitigating the risks of a global decline in subnational investment capacities.** We need to keep providing the necessary support and momentum for the establishment of Global Investment Platform for Sustainable Urban Infrastructure, which is to be developed on a voluntary basis with other G20 engagement groups, along with G20 working groups and initiatives addressing climate, infrastructure, energy, and sustainable finance.
• **Promoting a better framework for resilient and sustainable infrastructure financing** by i) improving project preparation, imposing equitable risk allocation, establishing alternative financing mechanisms, promoting stronger collaboration and capacity building to support local ecosystem development and diffuse innovation; ii) taking into account the needs for project de-risking mechanism and framework through blended finance and sustainable infrastructure investment and financing (SIIF) to ensure viability for private sector-financed infrastructure operation and to obtain quality infrastructure highlighted in the previous G20 policy agenda.

• Recognizing advantages of a multi-level approach to ESG, to mainstream sustainable infrastructure investments, across multiple financial models. Sustainable infrastructure investments are especially critical to meet a growing and huge demand in affordable housing, urban regeneration, mobility, IT systems and manage energy and resources, including waste and water. Proposals should be made by the proposed **Global Investment Platform for Sustainable Urban Infrastructure (GIPSUI)** and implemented in the round of G20 presidencies of Indonesia, India, Brazil, and to be followed by South Africa.

• **Promoting smartization and meaningful digitalization** in society and government through collaboration to achieve SDGs, for instance, by initiating smartization through digital collaboration projects among various G20 stakeholders.

• **Improving project preparation and alternative financing mechanisms and policy frameworks** to promote local ecosystem development and diffuse innovation. G20 members should assist developing countries to ensure a better access to the internet and better internet literacy that will generate higher productivity for the lowest income brackets and narrow the digital divide.

• **Creating safer online space for women, children and the vulnerable.** G20 members should establish public infrastructure of knowledge that targets individuals’ technology use and the messages delivered. Civil society organizations in G20 member countries should be empowered to provide advocacy and accountability to protect vulnerable groups.

• **Facilitating better access and better internet literacy** since they are pivotal to narrowing the digital divide. Better access to the internet will generate higher productivity for the lowest income brackets.
• Establishing public infrastructure of knowledge that targets individuals’ technology use and the messages delivered. Less educated groups may also become victims of fake news and fake information, which in turn, increases their vulnerability. Civil society organizations can serve as platforms that provide advocacy and accountability to protect vulnerable groups. G20 members should encourage civil society organisations to provide advocacy on internet usage to minimise its adverse impacts.

Think20 process has also taught us the importance of governance during the development of communique and policy recommendations. Task Force in infrastructure investment and financing remains a relevant G20 dialogue, and even more important when tighter fiscal policies are witnessed elsewhere in both developing and developed G20 countries. Discussions and debates need to be continued and further enhanced to encourage G20 leaders adopting policy recommendations developed using T20 rigorous framework. There are three (2) important governance strategies for Think20 G20 India Presidency to be considered.

• Effective management structure for advocating policies to G20 Finance Track and Sherpa Track. The nomination of international co-chairs should reflect a diversity in the infrastructure policy area expertise, regional representation, gender-balanced and academic background. It combined university-based academics, policy think-tank researchers, and non-government policy advocates. Then continuity of T20 was reflected by the nomination of past Lead Co-Chair of Task Force on infrastructure as an honorary member of co-chairs for TF8 T20 Indonesia. Some past active co-chairs were also requested to join 2022 TF8 T20 Indonesia. It is suggested that 2023 T20 India will adopt same approach to ensure the continuity of infrastructure policy dialogues. In 2022 T20, Task Force 8: Infrastructure investment and financing, introduced new structure in the task force management. In addition to the existing co-chairs and coordinators, TF8 established a group of thematic coordinators or TC. The thematic coordinators consisted of a gender balanced national experts and community of practice as well as industry leaders. The choice of TC members ensured the policy areas proposed by the G20 Presidency are well-reflected and relevant. TC members are expected to bridge the task force with other engagement groups, such as B20 and U20, and to connect the task force with its government partners, notably IWG Infrastructure Working Group of the Finance Track and
• **Keeping track of the T20 communique and policy recommendations.** Since the beginning of TF8 T20 Indonesia works, there are enormous demand from past and new co-chairs to have a continuity of policy advocacy. So far within T20 framework, there is no mechanism to allow and keep track of the communique and policy recommendations. This has been a major issue of every T20 process. Without a permanent global T20 secretariat or organization that institutionalize all the documentations during policy development processes, it is difficult to retrieve and to portray the dynamics of policy discourse. Organizations such as GSI Global Solution Initiative has been useful for G7 and T7 policy debates and discussion platform. G20 and T20 could also benefit from GSI experiences in managing knowledge collected during T20 process. T20 2022 recommendation on the establishment of a Global Research Forum will probably serve as a seed for more institutionalized knowledge management practice of policy advocacy.

• **Developing a framework for a more structured and inclusive approach in formulating policy recommendations.** Knowledge developed during TF8 T20 process came from (1) policy briefs, (2) co-chairs and thematic coordinators’ tacit knowledge, (3) policy dialogues with experts and specialists of the infrastructure fields, through a series of task forces’ own and collaborative webinars, seminars, and workshops, and (4) knowledge partners. It is advised that T20 India structures and prioritizes the knowledge developed during T20 process to effectively delivered the policy recommendations to G20. The partnership between T20 and other G20 engagement groups are also important to successfully endorse and push the recommendations to the finance track and Sherpa track. It is also critical to continue conversations with the past T20 management, especially with the related task force lead co-chair, deputy co-chair and coordinator on infrastructure. Managing the relationship with G7 and T7 is also equally important to address global issues more effectively. In the case of T20 Indonesia, managing T20-T7 relation is vital to ensure a well-balanced view on climate change agenda, mitigation strategy for covid-19 pandemic and post covid-19 development policy, and geopolitical conflicts.
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