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SUSTAINABLE INFRASTRUCTURE PARTNERSHIP

Policy Brief - November 2021

Sustainable Infrastructure: an essential ingredient for a green recovery

Background

The COVID-19 pandemic has given us a stark reminder that business as usual is not a viable path for a safe planetary future. The pandemic has exposed the fragility of economic, ecological, and social systems, reinforcing the urgent need to repair, rethink, and invest. Cultivating an equitable COVID-19 recovery, along with decent jobs, sustainable health systems, climate resilience, biodiversity protection, and a pollution-free planet would initially appear to be a daunting and costly task for countries at present. However, this confluence of challenges presents a window to fundamentally transform how our societies and economies work.

Sustainable infrastructure[a] is a common, powerful thread that weaves together these critical global priorities. Needs-based investment in strategically planned sustainable infrastructure can invigorate economies, accelerate progress on the 2030 Agenda for Sustainable Development, enhance climate action, increase biodiversity protection, and reduce pollution. The Organisation for Economic Co-operation and Development (OECD) estimates that USD 6.9 trillion per year is needed up to 2050 for investment in infrastructure to meet development goals and create a low carbon, climate resilient future. Sustainable infrastructure is and will remain essential to building robust, inclusive, and green economies.[1,2]

This policy brief introduces how today's dire challenges offer new opportunities, illustrates the connection between sustainable infrastructure and the green recovery, and discusses how the United Nations Environment Programme (UNEP) and its partners can support countries during this new period of possibilities.

Key messages

1. **The COVID-19 pandemic has exposed vast gaps in global health and social infrastructure which must be urgently addressed.**
2. **Investment in infrastructure is a catalyst for economic recovery and job creation, and is necessary for human and economic development.**
3. **Prioritizing the development of infrastructure that is *sustainable and resilient* will help deliver the transformations necessary for our economic, environmental, and social systems.**
4. **Sustainable infrastructure is a critical link between the global climate, biodiversity, and pollution agendas, and the Sustainable Development Goals. Integrated infrastructure planning and investment can be an effective method of achieving multiple sustainable development objectives in a coordinated and efficient manner.**
5. **Rapidly scalable interventions are available to us right now: investment in microgrids, targeted maintenance, and nature-based solutions, for example, can provide important services quickly, while also creating jobs and boosting economic growth.**

a. The Sustainable Infrastructure Partnership has adapted a definition of sustainable infrastructure from the Inter-American Development Bank. According to this adapted definition, sustainable infrastructure systems are those that are planned, designed, constructed, operated and decommissioned in a manner to ensure economic and financial, social, environmental (including climate resilience), and institutional sustainability over the entire infrastructure lifecycle. Sustainable infrastructure can include built infrastructure, natural infrastructure, or hybrid infrastructure that contains elements of both. Adapted from Inter-American Development Bank's What is Sustainable Infrastructure? A Framework to Guide Sustainability Across the Project Cycle, 2018, https://publications.iadb.org/publications/english/document/What_is_Sustainable_Infrastructure__A_Framework_to_Guide_Sustainability_Across_the_Project_Cycle.pdf.

Profound threats, immense opportunities: infrastructure and the pathway to prosperity

The COVID-19 pandemic and its social costs

We are experiencing an unprecedented confluence of global calamities. With over 246 million confirmed cases and over 4.9 million deaths as of 1 November 2021, the COVID-19 pandemic (hereinafter: pandemic) has caused the deepest global recession in 100 years and threatens to push 70-100 million people into poverty.[3,4] While precautionary lockdowns have reduced transmission and saved many lives, they have also led to major reductions in economic activity. And, as governments race to distribute vaccines, the economic fallout continues to grow: estimates range from USD 9-12 trillion in global economic damage between 2020 and 2021.[4,5,6]

The pandemic has exposed and exacerbated inequality, with pronounced differences in development conditions, health systems, and social infrastructure, both between and within countries. Least developed countries tend to have ill-prepared health-care systems, heightened social vulnerabilities, and lack the resources of advanced economies to respond to the economic fallout.[7] Health experts maintain, for example, that frequent handwashing with soap and water can reduce the risk of contracting or spreading COVID-19. Yet the World Health Organization (WHO) estimates that as of 2017, 3 billion people lack basic handwashing facilities at home.[8] The urgent need for investment in inclusive and quality infrastructure, including water and sanitation, could not be clearer, especially given the current investment gap of USD 1.5 trillion in the water sector alone.[9,10] The most developed countries have on average 55 hospital beds, 30 physicians, and 81 nurses for every 10,000 people. This stands in stark contrast to 7 hospital beds, 2.5 physicians, and 6 nurses for every 10,000 people in a least developed country.[11,12] At least 400 million people have no basic health care, and about 3 billion lack any form of social protection.[13]

Social inequality also extends to digital infrastructure and to workers. Almost half of the world is not connected to the internet, thwarting distance learning and digital economic pursuits, such as teleworking.[14] The fragile global employment landscape affects billions, particularly less educated workers and groups working in the informal economy. Lower-middle-income countries (LMIC) have seen the largest working-hour losses, with declines in mid-2020 equivalent to 240 million full-time equivalent jobs, or 23% of the LMIC workforce.[15,16,17] Two hundred and seventy million people worldwide are starving – the equivalent of the entire population of Indonesia – further widening the significant USD 2.68 billion funding gap for the World Food Programme.[18,19,20] Gender inequality is also to be noted: the pandemic has had a greater impact on women, as they are more likely to work in the informal sector, have trouble accessing funding, and comprise the majority of health providers worldwide.[21]

Infrastructure drives economic recovery

Some of these inequalities laid bare by the pandemic can be improved through sustainable social infrastructure investments in the health and care industries. Investments that improve the quality of health systems will save lives and avoid trillions in losses while increasing overall employment rates, household savings, and spending.[22,23,24] Women are estimated to take between 60%–70% of the jobs created by investments in the health and care sectors, thereby reducing barriers to their participation in the labour market and rebalancing the gender employment gap.[25,26] Investments in the health and care industries can and should be major components of a green recovery. Stronger health systems are associated with positive economic growth and can help build resilience against future crises, provided that related services, including information and communications technology (ICT), water, electricity, and transportation are also planned and developed sustainably.[27]

While the pandemic casts bleak shadows on health and job opportunities worldwide, all government levels must seize this moment to deliver significant economic and development progress through a green recovery. A green recovery is one that reimagines more equitable and inclusive systems, rather than repeating mistakes of the past. Overall, infrastructure expenditures enhance productivity, contribute to economic growth, and facilitate general investment and economic diversification.[28] Infrastructure is also a common tool for catalyzing economic recovery from recessions and for creating jobs. Increases in infrastructure investment equivalent to 1% of GDP could result in an additional 1.3 million direct and indirect jobs in Brazil, 700,000 in Indonesia, and 1.5 million in the United States of America.[28,29]

Several countries have announced plans to direct significant resources towards stimulating their economies, in order to recover from the pandemic. Over USD 16 trillion in rescue and recovery spending has been committed worldwide, but as of 28 July 2021, only 21% of recovery spending has been allocated to "green" initiatives such as renewable energy, public transportation, building upgrades and energy efficiency, and reforestation (Appendix A).[30, 31, 32] While such allotments are laudable, most planned infrastructure investments reinforce or directly support high carbon industries and forms of agriculture that destroy biodiverse habitats. These infrastructure investments run counter to a green recovery and cannot be classified as sustainable.[33]

Due to the particularly long lifecycle of built infrastructure, unsustainable stimulus approaches, which unfortunately still appear to be the default, risk sustaining the polluting, low-growth sectors of the past. Since the start of the pandemic, the G20 has committed over USD 576 billion to support different types of energy, but over 40% has been directed to fossil fuels.[34,35] These fossil fuel investments are lost opportunities to transition to greener, safer, fairer economies that are more resilient to crises. They illustrate perverse priorities that are out of step with climate reality and the need for immediate, economy-wide decarbonization.

The remaining sections of this policy brief explore the powerful opportunities created by sustainable infrastructure, with a view to mitigating and recovering from major global risks.

Accelerating climate action

Despite the severity of the pandemic, climate change poses an even greater existential threat to life on earth. If CO_2 emissions continue unchecked and unmitigated, global warming could exceed the 1.5°C Paris Agreement goal by as early as 2030.[36] The world is already experiencing significant effects from approximately 1°C of warming: increased hurricane strength, altered rainfall and snowmelt patterns, droughts and erosion, higher wildfire risk, growing food insecurity, and declines in cereal crop production.[37, 38, 39, 40, 41, 42, 43] We are witnessing – and participating in – significant ecological, economic, and human development losses; warming of 1.5°C–2°C (or more) would further amplify human suffering and ecological degradation.

Built infrastructure, particularly transportation, buildings, industry, and electricity production, has directly contributed to the climate crisis, accounting for 79%[44] of global greenhouse gas (GHG) emissions (Appendix B).[45, 46, b] The carbon intensive sectors that have dominated much of the world's energy infrastructure are profoundly destructive and, increasingly, economically problematic.[47] Nonetheless, this disturbing trend does not have to continue. Investment in energy efficiency and renewables generates five times more jobs per USD 1 million spent than investment in fossil fuels (Appendix C).[48,49] With USD 31 trillion needed in energy investment up to 2040, directing those funds towards energy efficiency and building retrofits, smart grids, and renewable energy supply and storage will be consequential for the planet, jobseekers, and investors.[50,51] Transforming energy systems could boost global GDP by USD 98 trillion by 2050, delivering 2.4% more GDP growth than current plans; augmenting investments in renewable energy alone would create 42 million jobs.[52]

In addition to renewable energy and decarbonization efforts, nature-based solutions[c] present numerous opportunities for sustainable infrastructure systems to mitigate climate change and increase climate resilience. Protecting and restoring wetland habitat is one of the most compelling nature-based solutions. Wetlands are dynamic examples of natural infrastructure providing multiple environmental, economic, and social benefits. They are efficient at storing carbon and other GHGs, holding between 20% and 30% of the earth's soil carbon while only occupying between 5% and 8% of the planet's surface.[53] Disturbing, filling, or destroying a wetland not only eliminates that particular carbon sink, but also releases the carbon stored beneath.[54] Wetlands protect coastal communities from storm surges and flooding as they absorb wave energy and floodwaters, and strengthen local climate resilience. The presence of coastal wetlands helped avoid over USD 625 million in damages from Hurricane Sandy in the Northeastern United States in 2012.[55]

b. Food systems are expected to contribute to half of the world's GHG emissions by GHG emissions by 2050, per the International Monetary Fund (IMF) and Intergovernmental Panel on Climate Change (IPCC), https://blogs.imf.org/2020/07/14/why-sustainable-food-systems-are-needed-in-a-post-covid-world/.

c. **Nature-based solutions** are actions that protect, manage and restore ecosystems in ways that address societal challenges effectively and adaptively, in order to provide both human well-being and biodiversity benefits. They are used to achieve numerous and often simultaneous goals, such as mitigating climate change, reducing disaster risk, enhancing food and water security, and promoting healthy communities and economies. Adapted from IUCN's definition: https://www.iucn.org/theme/nature-based-solutions.

Beyond wetlands, other proven nature-based solutions include green roofs to help keep cities cool, permeable pavements to promote safer drainage and reduce flooding, and soil and forest conservation to protect water supplies and quality. These are three critical services provided by ecosystems which are helping regions to adapt to more unpredictable and dangerous climate conditions. In the future, designing and installing climate resilient infrastructure should be a priority; approaches that combine both green (nature-based) and grey (traditional) infrastructure have been proven to enhance performance, strengthen resilience, decrease risk, and reduce costs.[56,57,58]

Investing in nature and biodiversity

Another costly crisis stems from the widespread loss of biodiversity and ecosystem services that nature provides. Land use change is the largest and most direct stressor on ecosystems: from 1980 to 2000, the world lost tropical forest equivalent to the size of Bolivia, and urban areas have doubled since 1992.[59] Oil and gas exploration and development degrades habitats and disrupts wildlife migration.[60] Chemicals used in oil drilling and hydraulic fracturing often spill into aquifers and surface waters.[61,62] Coal mines discharge acidic water laced with arsenic, copper, and lead that can make streams as acidic as vinegar.[63] There is a direct correlation between road construction and deforestation, with almost 95% of all deforestation in the Amazon occurring within 6 km of roads, or 1 km of rivers. The pavement, road, and built infrastructure deployed worldwide exerts immense pressure on surrounding forests and agricultural lands.[64,65] Urban run-off from impervious surfaces increases the thermal and chemical pollution of water bodies and aquatic habitats.[66]

Protecting biodiversity makes economic sense. More than half of global GDP depends on biodiversity and ecosystem services.[67] Healthy ecosystems provide us with countless benefits: crop pollination, water filtration, medicinal compounds, climate regulation and carbon sequestration, flood protection, erosion control, food, and fuel.[68] Nevertheless, global trends are deeply worrying, as natural ecosystems have declined by almost half, and one in five countries is at risk of ecosystem collapse due to biodiversity decline.[69,70] Quite simply, if business as usual continues, life on this planet will be unrecognizable.

Moreover, while infrastructure has played a role in biodiversity decline, investments in sustainable infrastructure can serve as a course-correcting tool that can transform our relationship with the natural world. In the next 30 years, enough new roads will have been paved to circle the globe 600 times.[71] Firstly, not all of those roads may be necessary—repairing existing roads in combination with other transport solutions could solve the same problems.[72] If new roads are needed, what if they were built strategically to improve water drainage, and enhance, instead of reduce, ecosystem connectivity?[73]

Nature-based solutions, including habitat restoration, reforestation, coastal protection, and invasive species removal, create jobs at over 10 times the rate of fossil fuel sectors.[74] New Zealand has already incorporated these important solutions into its COVID-19 recovery plan: the Department of Conservation has launched a NZD 1.1 billion programme to restore wetlands, control invasive species, re-establish biodiversity, and enhance recreational facilities on public lands, thereby creating 11,000 jobs.[75] Colombia plans to rebuild its economy sustainably and has created two key programmes: a National Restoration Strategy that will plant 180 million trees and generate 50,000 jobs, and a payments programme for environmental services, preserving 160,000 hectares and generating income for 13,000 families.[76]

Protecting biodiversity and natural habitats is also key to avoiding another pandemic, as 75% of emerging infectious diseases in humans originate in other animals; the closer we encroach on natural habitat, the higher our risk.[77] We are in a unique and empowered position of having both the evidence and awareness to understand in real time that deep, fundamental changes are necessary. Planning and implementing infrastructure sustainably, with the right tools, frameworks, and safeguards, can help achieve numerous benefits for economies, health, the climate, and biodiversity. Examples of regulatory frameworks include national "no net loss" policies and mitigation hierarchies that mandate the avoidance and minimization of environmental impacts from infrastructure.[78,79,80] Such regulations encourage planners to explore alternatives that can be far more sustainable than original designs.[79]

Cutting pollution

Pollution in all its forms harms our economies, our health, and impacts every corner of the planet. Air pollution is the deadliest form and accounts for over 7 million premature deaths every year, with global welfare costs

of USD 5 trillion.[81, 82, 83] The major contributing causes are nitrous and sulphur oxides from power plants, soot and compounds from indoor cooking stoves, and emissions from fossil fuel based transportation. Pollution also affects land and water: pesticides flow from farms to waterways, excess fertilizers create toxic algal blooms, killing fish; per- and Polyfluoroalkyl substances (PFAS, and also known as "forever chemicals") from industrial and consumer products accumulate in water and our bodies; and heavy metals like mercury from mining poison waterways.[84, 85, 86] Every year, we produce plastic waste equal to the combined weight of every living human, a large portion of which is discarded into rivers and oceans.[87]

Investing in sustainable infrastructure is key to reducing pollution. Pollution remains pervasive, deadly, and costly, but sustainable infrastructure presents a number of viable mitigation opportunities. Modest increases in clean energy investment could prevent over three million premature deaths from air pollution by reducing both particulate and carbon dioxide emissions simultaneously.[88] Bioswales and other nature-based solutions reduce nutrient pollution from agricultural run-off in various watersheds.[89] Expanding and improving wastewater treatment protects human health and reduces toxic algal blooms.[90] Safely managing mining operations through more reliable water pumping systems and resilient tailings storage structures can avoid catastrophic discharges into the water table.[91] Tackling plastic pollution requires upstream reductions in plastic production, but also downstream waste management that embraces circular economy principles to re-use, repurpose, and recycle.[92] These varied, strategic, and circular approaches are possible and practical, and showcase the bold innovation and upstream planning that the UNEP-hosted Sustainable Infrastructure Partnership (SIP) supports (see Box 1, below).

Box 1: Strategies, tools, and demonstrations: the road map to sustainable infrastructure deployment

The Sustainable Infrastructure Partnership (SIP) has produced a foundational paper: Integrated Approaches to Sustainable Infrastructure, which describes infrastructure's centrality to the delivery of the Sustainable Development Goals and outlines ways to advance integrated approaches globally. SIP also coordinates the implementation of Resolution 4/5: Sustainable Infrastructure, adopted by Member States at the United Nations Environment Assembly in 2019. To fulfill the mandate of Resolution 4/5, SIP convened an Expert Working Group to develop International Good Practice Principles for Sustainable Infrastructure that outlines principles for integrated, systems-level approaches to sustainable infrastructure. An associated case study report illustrates the ten Good Practice Principles by documenting sustainable infrastructure in action, including landscape-scale planning in Mongolia, green buildings in Singapore, solar and health infrastructure in Zimbabwe, and several other examples of proactive, integrated planning, public consultation, and service delivery. SIP released ten Principles for Recovery in June 2020 emphasizing resilience, planning, digital infrastructure, and nature considerations. Finally, SIP is working with the German Corporation for International Cooperation (GIZ) to expand the Sustainable Infrastructure Tool Navigator, an extensive resource depository that helps government and private sector planners, designers, and funders to develop and integrate sustainability into infrastructure systems and specific projects.

Moving forward, together

As the world continues to wrestle with the multiple crises of the pandemic and economic recession, a terrifying and warming climate, widespread biodiversity loss, high pollution levels, and profound development needs, Member States will feel increased pressure to achieve more results with limited resources. Less available global capital necessitates both needs-based approaches and innovative solutions for financing infrastructure . Fostering investment in sustainable infrastructure as part of recovery packages can help economies quickly recover from the devastating impacts of the pandemic while improving human development, addressing the climate crisis, and reducing adverse effects on the environment. No matter whether specific country needs focus more on health (hospitals, clinics, and triage facilities), social matters (safety nets and employment programmes), or economic matters (energy, transportation, disaster resilience and digital technology), a green recovery can be achieved through the intentional and integrated planning and implementation of sustainable infrastructure that safeguards the shared futures of nature, climate, and people. SIP remains fully committed to cultivating essential partnerships, exploring financing pathways, building capacity, and delivering technical assistance to support Member States with their plans and activities aiming to build a better world.

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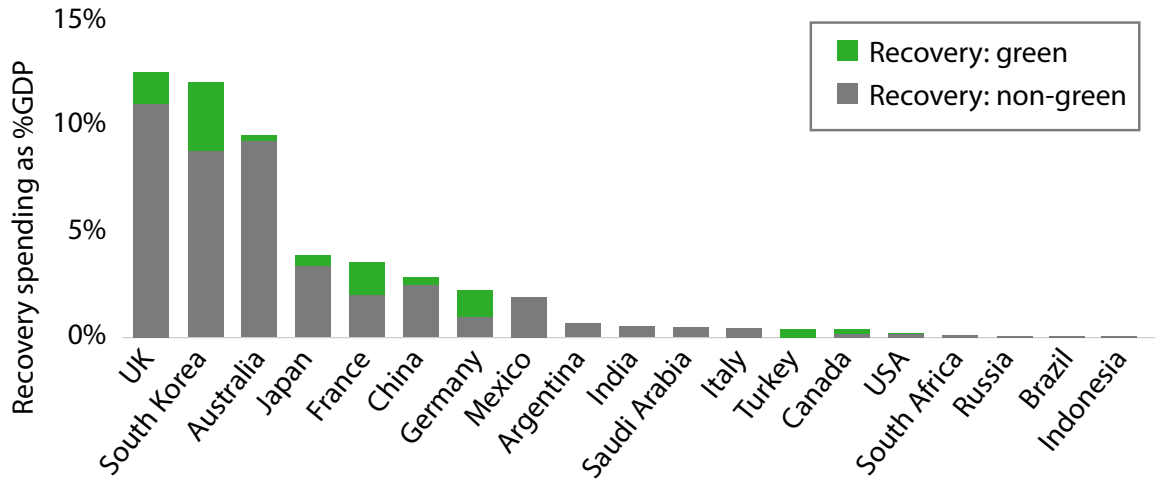
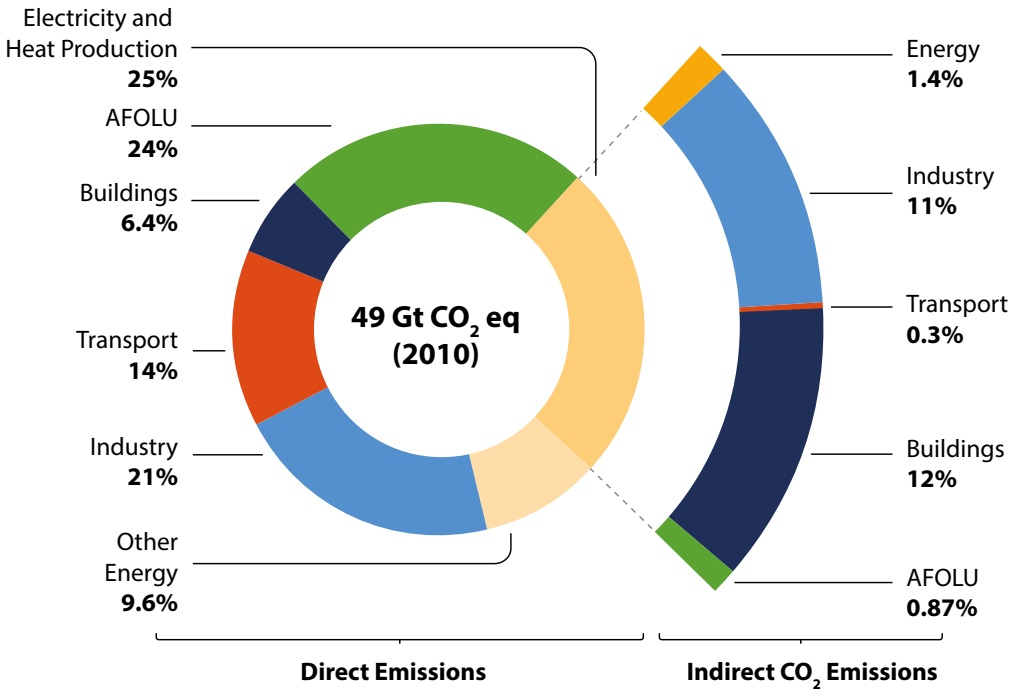
Appendix

A. Green, neutral, and dirty recovery spending announced by the G20 countries, as a percentage of 2019 GDP



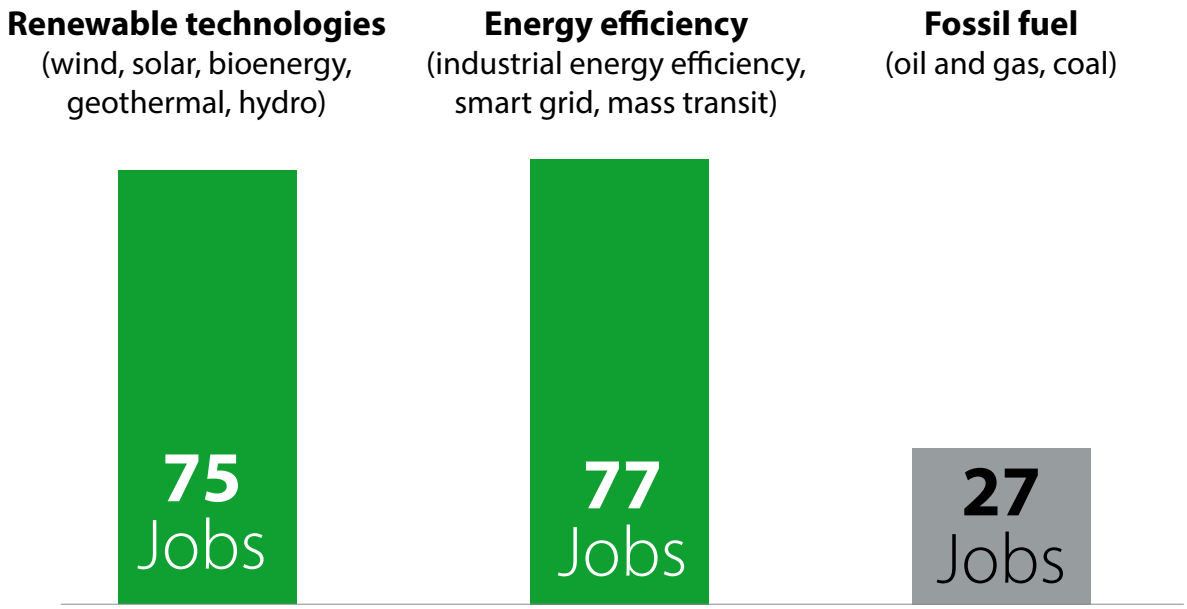
Source: UNEP, Global Recovery Observatory, https://wedocs.unep.org/bitstream/handle/20.500.11822/35282/AWBBB_ES.pdf

B. Total anthropogenic greenhouse gas emissions (GtCO2eq/yr) by economic sectors



https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_summary-for-policymakers.pdf

C. Jobs created, directly and indirectly, per $10 million in spending



Source: https://www.mckinsey.com/business-functions/sustainability/our-insights/how-a-post-pandemic-stimulus-can-both-create-jobs-and-help-the-climate and https://www.sciencedirect.com/science/article/pii/S026499931630709X.

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