

Green Technology in post-COVID Recovery

Harnessing Green Technology for Inclusive Economic Recovery post-COVID-19

Policy brief

Authors:



Syed Munir Khasru
Chairman, IPAG



Bob Koopman
Research Fellow,
International Trade and
Regional Programme,
Centre for Economic Policy
Research



Jian Xu (Jeffrey)
Education, Education
Practice, Human and Social
Development Sector, Asian
Development Bank (ADB)

Keywords:
green technology, economic growth,
post-COVID19 recovery

Institutions:



The Institute for Policy, Advocacy, and Governance (IPAG) is a government-approved, not-for-profit, independent international think tank focusing on areas such as economic development, regional cooperation and integration, green growth, international relations and strategic affairs, and interfaith harmony and peacebuilding. IPAG engages in research to influence policy and foster change across these critical domains.



The International Trade and Regional Programme at the Centre for Economic Policy Research (CEPR) serves as a collaborative platform for leading economists to share and discuss their latest research in areas concerning cross-border trade, investment, migration, and economic geography. The program is dedicated to advancing theoretical and empirical understanding in these fields, fostering dialogue and exchange of ideas among experts to push the boundaries of economic knowledge.



The Asian Development Bank (ADB) envisions a prosperous, inclusive, resilient, and sustainable Asia and the Pacific. Its mission is to eradicate extreme poverty in the region, which still houses a significant portion of the world's poor. The ADB assists its members and partners by providing loans, technical assistance, grants, and equity investments to promote social and economic development.

ABSTRACT

The COVID-19 pandemic's shift from a health crisis to an economic downturn has prompted a need for green and inclusive recovery strategies, especially among G20 nations. Green technology offers a dual benefit of economic revitalization and environmental sustainability. Global efforts include financial support for green transport, circular economy initiatives, clean energy research, and ecosystem restoration. However, challenges persist in balancing green spending with other priorities and restructuring sectors for lower emissions. This policy brief advocates for G20 action in harnessing green technology to create jobs, foster economic diversification, and achieve sustainable growth in line with international commitments like the Paris Agreement and SDGs.

INTRODUCTION

The COVID-19 pandemic triggered global economic turmoil, prompting massive stimulus spending of US\$14 trillion¹ by the G20 to counteract job losses and supply chain disruptions.^{2,3} The Russia-Ukraine conflict exacerbated inflation and supply chain woes, leading to currency devaluation and income inequality.⁴ While pandemic-induced shutdowns temporarily improved environmental conditions^{5,6} concerns arose over sustainability amidst stimulus measures. Integrating green technology into recovery plans⁷ emerged as a solution, promoting inclusive economic revival and environmental goals alignment. However, recovery efforts have often neglected sustainability as governments faced tensions between stimulus efforts and supply chain disruptions creating unpopular inflation-

»Integrating green technology into recovery plans promotes economic revival and environmental goals.«

ary conditions. But these circumstances highlight the need for a “Building Back Better” approach.⁸ This concept advocates for recovery plans that prioritize reducing emissions, enhancing climate resilience, and conserving biodiversity. Despite G20’s recognition of sustainability importance,⁹ support for unsustainable activities persists, emphasizing the delicate balance between immediate economic recovery and long-term environmental sustainability.¹⁰

THE CHALLENGES OF GREEN RECOVERY

The Asia and Pacific region is on the frontline of climate adversity, hosting six out of the ten nations most devastated by weather-related loss events from 2000 to 2019 (Eckstein et al., 2021). With climate change potentially carving 24% of the region’s GDP by 2100, including staggering losses of 35% in India and 32% in Southeast Asia under a high emissions scenario (ADB, 2023), the urgency for a low-carbon transition is palpable. The region’s GHG emissions share surged from 22% in 1990 to 44% in 2019 (ADB, 2023), underscoring its growing influence on the global climate

equation. This transformation to a green economy demands comprehensive policy frameworks, green finance, and sustainable technology promotion (ADB 2017; OECD, 2023). The shift is set to reshape labor markets, with an estimated 43% of the workforce currently engaged in climate-vulnerable sectors or those transitioning to greener operations (Deloitte, 2023), highlighting the critical role of education systems in equipping the workforce with necessary green skills.

Prior to the pandemic, there was already a learning crisis, with many individuals lacking basic literacy and numeracy skills. The COVID-19 pandemic has exacerbated pre-existing inequities in education, hitting low-income and disadvantaged households the hardest. The pandemic has particularly affected vulnerable groups such as girls, children with disabilities, and those living in remote areas or belonging to ethnic minorities and indigenous peoples, increasing their risk of dropping out of school. This has highlighted the urgent need for foundational learning for all and transformative measures to make education systems more adaptive and inclusive.

The post-COVID-19 era offers the chance to harness digital transformation for a sustainable economic rebound. Digital technologies provide innovative solutions to climate challenges and educational reforms, fostering a skilled workforce for a green economy, as seen in the EU’s Climate Pact. Such technologies have proven successful, with Indonesian drones assessing climate risks and apps promoting environmental stewardship.¹¹ AI is central to this transformation, optimizing carbon reduction in construction

with companies like Mortar IO, advancing sustainable agriculture through Agro-Scout, and reducing industrial emissions via Eugenie.ai.¹² These initiatives demonstrate the potential for AI and technology to spearhead a green transition, improving air quality, agriculture, and industry, paving the way for a resilient recovery.

POLICY RECOMMENDATION FOR INCLUSIVE GREEN RECOVERY

1. Structural Changes: Promoting low-emission, sustainable industries and infrastructure.

The transition to green economies requires structural reforms across key sectors like agriculture, energy, transportation, manufacturing, construction, and finance, especially within G20 nations. For agriculture, well-designed and targeted subsidies can support sustainable practices like organic farming. In energy, carbon pricing mechanisms such as carbon taxes can incentivize emission reduction, as seen in the EU ETS.¹³ Transportation sectors can promote electric mobility with incentives for EV adoption and infrastructure development. Manufacturing can adopt circular economy principles to reduce waste, following Japan’s example.¹⁴ Green building standards can be enforced to promote energy-efficient construction, akin to LEED certification in the USA.¹⁵ Finance sectors can invest in green projects through policies like China’s Green Bond Principles.¹⁶ Cross-sectoral policies include investment in clean technology research, education on sustainability, and international cooperation. Carbon pricing mechanisms could help fund these green subsidies and incentive schemes.

2. Fiscal and Monetary Policies: Incentivizing green investments and technologies, reforming subsidies, and implementing carbon pricing.

Fiscal policy recommendations suggest setting up green funds, offering concessional loans and grants and tax incentives for green investments,¹⁷ phasing out fossil fuel subsidies and reinvesting savings into green energy/infrastructure,¹⁸ and implementing carbon pricing mechanisms.¹⁹ Again, these carbon pricing mechanisms can help fund green incentive programs.

Monetary policy recommendations include issuing green bonds, developing sustainable finance frameworks,²⁰ and integrating sustainability criteria into central bank operations.²¹ Cross-cutting recommendations involve international cooperation, transparency in reporting green investments and emissions, and public-private partnerships for low-carbon technology development. Collaboration within the G20 can harmonize standards and prevent carbon leakage while leveraging public-private partnerships to drive green investments.

3. Job Creation and Economic Diversification through Green Technology: Leveraging green tech for new jobs and sectors.

The Green Transition offers numerous opportunities for job creation and economic diversification. Shifting from a fossil fuel-based economy to a renewable energy economy will often require the construction of new energy-generating plants and equipment. Existing renewables in the form of hydro or geothermal will likely need to be expanded and/or their power distributed more widely. Jobs are likely

to be created in Environmental Services aimed at the integration of new technologies and mitigation of climate and environmental disruptions. The World Bank has estimated that as many as 30 million “green” jobs could be created by 2030 in these green technology sectors.²² However, it is also important to keep in mind that many jobs are likely to be lost in fossil fuel-related industries, and it is not always clear that workers from the fossil fuel sectors will be able to transition to the growing sectors. Hence job training and education programs will likely be needed to facilitate labor force adjustments.

4. Enhancing Environmental Sustainability: Strategies to reduce carbon footprints and promote circular economy principles.

The strategies needed to reduce carbon footprints and promote a more circular economy require a significant rethink of traditional energy-intensive economic growth and corporate produce-and-forget approaches. Reducing carbon footprints requires domestic economic and regulatory policies that initially increase costs to citizens and companies, though those increased costs are just capturing the real costs of carbon emissions. Economists typically argue that a “carbon” tax is the most efficient and effective mechanism to ensure a reduction in emissions,

»Green technology is pivotal for sustainable growth post-COVID-19.«

but governments and policymakers often prefer more indirect regulatory approaches with specific quantitative reductions in emissions. For issues like borderless carbon emissions one government’s actions are likely to be ineffective without global cooperation and coordination. Given that developing and least developed countries typically have lower levels of capacity to implement either carbon taxes or regulatory approaches, some differentiation in global commitments is required. Lower-income countries generally emit more carbon per unit of output creating significant equity challenges when it comes to addressing climate change while ensuring economic growth for those who need it the most.

5. Alignment with International Commitments: Ensuring policies support the Paris Agreement and Sustainable Development Goals (SDGs).

Non-binding agreements such as the Paris Agreement and the SDGs have weak mechanisms to effect change on the part of governments. Domestic politics dominate climate change policy development and international cooperation is viewed as secondary to domestic concerns. This is problematic for a global commons issue like carbon emissions and climate change. Often international agreements, including economic ones with fairly strong enforcement mechanisms such as the WTO and some regional trade agreements, usually do not have specific commitments to help meet the environmental goals. Trade agreements may even include provisions that need clarification or updating to ensure that climate objectives are considered

potentially valid issues for exceptions to agreement rules. Illustrating the need for more international economic cooperation around equitable commitments, the IMF has suggested a series of differentiated yet effective carbon prices depending on a country’s level of development, from \$75 per ton for advanced economies to \$25 per ton for lower-income emerging markets.²³ The WTO has emphasized the role of trade in allowing countries to access at low-cost leading green technologies, that trade can help mitigate the negative effects of climate shocks, and that WTO members could reduce tariffs and trade costs on a group of energy-related environmental goods and boost trade and reducing global emissions.²⁴

6. The Role of Sustainable Finance: Mobilizing private and public funds for green initiatives.

Currently, there is a significant shortfall in the provision of finance for the Green Transition. Wealthy nations have pledged over \$100 billion per year to support developing countries in their transition. Some estimates indicate at least \$1.2-\$1.7 trillion in investment in sustainable infrastructure is required by 2030, which is double the estimated current contributions of \$600-\$800 billion.²⁵ The IEA and IMF estimate that to achieve net zero carbon emissions by 2050, global investment will need to increase an additional 0.6 to 1 percent of global GDP, which amounts to a cumulative \$12-\$20 trillion (IMF, 2021).²⁶ Current high levels of government debt constrains developing and developed countries alike in their ability to fund the transition making it clear that there is a very important role for private investment.

ACTION PLAN

Short-Term Strategies (1-3 Years)

- Assessing greenhouse gas emissions across sectors to establish baselines.
- Implementing carbon pricing mechanisms to encourage emission reductions and help fund green transition incentive programs.
- Incentivizing electric vehicle (EV) adoption through subsidies and tax rebates.
- Promoting circular economy principles in manufacturing, encouraging product design for reuse and recycling.
- Providing subsidies for organic farming and water-efficient irrigation techniques.
- Enforcing green building standards for new constructions.
- Developing frameworks for green bonds and sustainable investments in finance.
- Increasing funding for clean technology research and creating innovation hubs.
- Implementing education programs on sustainability.
- Engaging in international collaborations to share best practices and build capacity.

The short-term plans are low-hanging fruits since many of the G20 countries are already engaged in these activities. While others can learn from them, effective knowledge-sharing and collaboration can address these actions in the short run.

Long-Term Strategies (3+ Years)

- Increasing investments in renewable energy sources and phasing out high-emission power plants.
- Setting targets for EV penetration and investing in public transportation electrification.

- Implementing efficiency and environmental standards in manufacturing.
- Educating farmers on sustainable practices and investing in sustainable agricultural technologies.
- Create job training and assistance programs to facilitate the worker transition from working with fossil fuel-intensive technologies to green technologies.
- Providing incentives for sustainability certifications and retrofitting existing buildings.
- Encouraging the adoption of sustainable investment criteria and directing funds towards green technologies.
- Adjusting strategies based on performance data and stakeholder feedback for continuous improvement.
- Aligning central bank operations with sustainability goals, incorporating green fiscal and monetary policies.
- Investing in skills development training for workers transitioning from fossil-fuel industries.
- Implementing regulations for mandatory disclosure of environmental impacts and sustainability practices.

CONCLUSION

In the face of the COVID-19 pandemic and subsequent global challenges, the G20's commitment to a sustainable and inclusive economic recovery is paramount. By integrating green technology and prioritizing environmental sustainability, these nations can navigate the dual crises of economic downturn and climate change. The proposed action plan offers a balanced mix of short-term initiatives and long-term strategies aimed at reducing emissions, promoting green jobs, and fostering economic diversification. Effec-

tive implementation, coupled with international cooperation, is key to realizing these goals. Ultimately, this approach not only addresses immediate recovery needs but also sets a foundation for a resilient and green future.

REFERENCES

- ADB. (2022). Digital Technologies for Climate Action, Disaster Resilience, and Environmental Sustainability. ASIAN DEVELOPMENT BANK.
- AK, K. (2023, September 28). Sustainability in a nutshell (weekly update September 28, 2023). LinkedIn. <https://www.linkedin.com/pulse/sustainability-nutshell-weekly-update-september-28-2023-kamal-ak/>
- Asian Infrastructure Investment Bank (AIIB). (n.d.). Addressing the climate finance shortfall: The role of multilateral development banks, institutional investors and insurers. AIIB. <https://www.aiib.org/en/news-events/media-center/blog/2023/Addressing-the-Climate-Finance-Shortfall-The-Role-of-Multilateral-Development-Banks-Institutional-Investors-and-Insurers.html>
- Bank of England. (n.d.). Greening Our Corporate Bond Purchase Scheme (CBPS). <https://www.bankofengland.co.uk/markets/greening-the-corporate-bond-purchase-scheme>
- Building back better: A sustainable, resilient recovery after COVID-19. OECD. (n.d.-a). <https://oecd.org/coronavirus/policy-responses/building-back-better-a-sustainable-resilient-recovery-after-covid-19-52b869f5/>
- DICKELLA GAMARALALAGE, P. J. (n.d.). Building a sound material cycle society: Learning from Japan. Institute for Global Environmental Strategies. <https://www.iges.or.jp/en/pub/building-sound-material-cycle-society-learning-japan/en>
- Eckstein, D., Künzel, V., & Schäfer, L. (2021). Global climate risk index 2021 who suffers most extreme weather events? weather-related loss events in 2019 and 2000-2019. Germanwatch Nord-Süd Initiative e.V.
- European Commission. (n.d.-a). EU Emissions Trading System (EU ETS). https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en
- European Commission. (n.d.-b). EU taxonomy for Sustainable Activities. EC Finance. https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en
- International Capital Market Association (ICMA). (2022). Analysis of China's Green Bond Principles. International Capital Market Association. <https://www.icmagroup.org/assets/Analysis-of-Chinas-Green-Bond-Principles.pdf>
- The International Institute for Sustainable Development (IISD). (2016). Indonesia Uses Savings from Fossil Fuel Subsidy Reform to Finance Development. Retrieved from <https://www.iisd.org/articles/press-release/indonesia-uses-savings-fossil-fuel-subsidy-reform-finance-development>.
- International Monetary Fund (IMF). (2021). World Economic Outlook, Chapter 3, 60. <https://doi.org/10.5089/9781513577524.081>
- Making the Green Recovery Work for Jobs, income, and growth. OECD. (n.d.-b). <https://oecd.org/coronavirus/policy-responses/making-the-green-recovery-work-for-jobs-income-and-growth-a505f3e7/>
- Martin, F. M., Sánchez, J. M., & Wilkinson, O. (2023). The economic impact of COVID-19 around the world. Review, 105(2). <https://doi.org/10.20955/r.105.74-88>
- McKinsey & Company. (2020, May 27). How a post-pandemic stimulus can both create jobs and help the climate. McKinsey & Company. <https://www.mckinsey.com/capabilities/sustainability/our-insights/how-a-post-pandemic-stimulus-can-both-create-jobs-and-help-the-climate>
- Nahm, J. M., Miller, S. M., & Urpelainen, J. (2022). G20's US\$ 14 trillion economic stimulus reneges on emissions pledges. Nature, 603(7899), 28-31. <https://doi.org/10.1038/d41586-022-00540-6>
- Parry, I. (2021, September 2). Five things to know about carbon pricing. IMF. <https://www.imf.org/en/Publications/fandd/issues/2021/09/five-things-to-know-about-carbon-pricing-parry>
- Russell, K., Karaian, J., & Rennison, J. (2022). The extremely strong dollar is weighing down the world. The Economic Times. <https://economictimes.indiatimes.com/small-biz/trade/exports/insights/the-extremely-strong-dollar-is-weighing-down-the-world/articleshow/92946409.cms>
- Taylan, O., Alkabaa, A. S., & Yılmaz, M. T. (2022). Impact of COVID-19 on G20 countries: Analysis of economic recession using data mining approaches. Financial Innovation, 8(1). <https://doi.org/10.1186/s40854-022-00385-y>
- U.S. Environmental Protection Agency. (2023). Summary of Inflation Reduction Act provisions related to renewable energy. EPA. <https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy>
- U.S. Green Building Council. (n.d.). LEED rating system. LEED rating system | U.S. Green Building Council. <https://www.usgbc.org/leed>

World Bank Group. (2023, March 30). WDR 2022 Chapter 1. Introduction. World Bank. <https://www.worldbank.org/en/publication/wdr2022/brief/chapter-1-introduction-the-economic-impacts-of-the-covid-19-crisis>

World Bank. (n.d.). What is a green job?: The Development Podcast Limited Series: A world free of poverty on a livable planet. <https://www.worldbank.org/en/news/podcast/2024/02/08/what-is-a-green-job-development-podcast>

- ¹ https://www.researchgate.net/publication/358982530_G20's_US14-trillion_economic_stimulus_reneges_on_emissions_pledges
- ² https://economictimes.indiatimes.com/small-biz/trade/exports/insights/the-extremely-strong-dollar-is-weighing-down-the-world/articleshow/92946409.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cpp
- ³ <https://ces.ulab.edu.bd/sites/default/files/Mitigating-the-Dollar-Crisis-Policy-Recommendations-for-the-Near-and-Long-Term.pdf>
- ⁴ <https://www.worldbank.org/en/publication/wdr2022/brief/chapter-1-introduction-the-economic-impacts-of-the-covid-19-crisis>
- ⁵ <https://www.oecd.org/coronavirus/policy-responses/building-back-better-a-sustainable-resilient-recovery-after-covid-19-52b869f5/>
- ⁶ <https://research.stlouisfed.org/publications/review/2023/03/09/the-economic-impact-of-covid-19-around-the-world>
- ⁷ <https://www.mckinsey.com/capabilities/sustainability/our-insights/how-a-post-pandemic-stimulus-can-both-create-jobs-and-help-the-climate>
- ⁸ <https://oecd.org/coronavirus/policy-responses/making-the-green-recovery-work-for-jobs-income-and-growth-a505f3e7/>
- ⁹ <https://jfin-swufe.springeropen.com/articles/10.1186/s40854-022-00385-y>
- ¹⁰ <https://www.oecd.org/coronavirus/policy-responses/building-back-better-a-sustainable-resilient-recovery-after-covid-19-52b869f5/>
- ¹¹ <https://www.adb.org/sites/default/files/publication/700396/digital-technologies-climate-action.pdf>
- ¹² <https://www.linkedin.com/pulse/sustainability-nutshell-weekly-update-september-28-2023-kamal-ak/>
- ¹³ https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en
- ¹⁴ <https://www.iges.or.jp/en/pub/building-sound-material-cycle-society-learning-japan/en>
- ¹⁵ <https://www.usgbc.org/leed>
- ¹⁶ <https://www.icmagroup.org/assets/Analysis-of-Chinas-Green-Bond-Principles.pdf>
- ¹⁷ <https://www.epa.gov/green-power-markets/summary-inflation-reduction-act-provisions-related-renewable-energy#:~:text=Investment%20Tax%20Credit%20and%20Production%20Tax%20Credit,-The%20Investment%20Tax&text=These%20credits%20are%20available%20to,or%20PTC%2C%20but%20not%20both.>
- ¹⁸ <https://www.iisd.org/articles/press-release/indonesia-uses-savings-fossil-fuel-subsidy-reform-finance-development>
- ¹⁹ https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en
- ²⁰ https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en
- ²¹ <https://www.bankofengland.co.uk/markets/greening-the-corporate-bond-purchase-scheme>
- ²² [What Is a Green Job? | The Development Podcast Limited Series: A World Free of Poverty on a Livable Planet \(worldbank.org\)](https://www.worldbank.org)
- ²³ [Five Things to Know about Carbon Pricing \(imf.org\)](https://www.imf.org)
- ²⁴ [WTO | World Trade Report 2022 Climate change and international trade](https://www.wto.org)
- ²⁵ [Addressing the Climate Finance Shortfall: The Role of Multilateral Development Banks, Institutional Investors and Insurers \(aiib.org\) and Financing a global climate plan | UNCTAD](https://www.iiab.org)
- ²⁶ [IMF, World Economic Outlook, October 2021, Ch. 3, p.60.](https://www.imf.org)