



IMPLEMENTING A GREEN RECOVERY IN SOUTHEAST ASIA

MAY 2022

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Notes:

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On the cover: Go blue and green through practice of sustainable fishing, promotion of eco-friendly modes of transport, use of renewable energy, and adoption of the circular approach (reuse, remanufacture, refurbishment, and recycling). Scenic background inspired by the Angkor Wat of Cambodia.

Cover design by Cleone Baradas.

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Foreword

This publication is the third of four reports from a regional study completed in 2021 and funded by the technical assistance of the Asian Development Bank (ADB) on Policy Advice for COVID-19 Economic Recovery in Southeast Asia. The project supports the recovery efforts of Southeast Asian countries to return to their economic performance before the coronavirus disease (COVID-19) pandemic. It also assists countries in preparing for national, regional, or global transformations that may take place post-COVID-19. The focus countries are Cambodia, Indonesia, Myanmar, the Philippines, and Thailand, which tapped ADB's COVID-19 Pandemic Recovery Option facility.* The study produced four reports on the following thematic areas:

1. **Supporting post-COVID-19 economic recovery in Southeast Asia.** After analyzing different sectors, their potential for growth, and the strengths of economies in Southeast Asia, ADB identified five key sectors: tourism, agro-processing, and garments are well-established sectors needing transformation or improvement; while electronics and digital trade are evolving sectors with a high potential for growth. This allows the development of more targeted policies given the constraints to governments' financial and administrative resources.
2. **Strengthening domestic resource mobilization in Southeast Asia.** COVID-19 exacerbated the struggles of some governments to generate tax revenue to meet public expenditure needs. ADB proposes policy actions to expand the tax base, increase tax compliance, and strengthen tax administration to create a healthy fiscal space.
3. **Implementing a green recovery in Southeast Asia.** Green recovery from the pandemic is crucial to ensure an economically and environmentally resilient future for Southeast Asia. Well-designed policy measures can simultaneously achieve socioeconomic and environmental goals.
4. **Harnessing the potential of big data in post-pandemic Southeast Asia.** Digitalization gained more prominence amid COVID-19 and highlighted the value of big data for the effective and efficient delivery of key public services such as health care, social welfare and protection, and education. A range of policy enablers for big data adoption in policy making—from strategic governance to building a data driven culture—were examined.

This publication provides policy makers with a baseline to understand the scope of policy options available in their pursuit of economic recovery. There is still much uncertainty on timing, particularly as the trajectory of the pandemic (i.e., new COVID-19 mutations) remains unclear and countries await the development and distribution of more vaccines. While COVID-19's impact on Southeast Asia has been significant, the report provides hope. The medium-term growth opportunities are strong. Taking advantage of those opportunities, however, will require a significant rethink of current approaches. This series of publications will hopefully inspire governments to think beyond the containment stage and lay the groundwork for opportunities that will ensure a sustainable recovery underpinned by more resilient economies and societies.

The research benefited from the insights and perspectives of government officials, the private sector, the academe, and other key stakeholders and experts working in the region who convened in thematic workshops, roundtable consultations, and focus group discussions. We are grateful for their support and collaboration.

* ADB's stance on Myanmar since 1 February 2021 is outlined in its public statements of 2 February 2021 and 10 March 2021.

The ADB resident mission offices of the focus countries have effectively coordinated all country consultations to inform the study. We look forward to ADB's continued engagement with these countries, in line with its current approaches, to carry out the policy recommendations to support the region's recovery efforts. These recommendations align with the operational directions on fostering regional cooperation and integration under ADB's Strategy 2030. Strengthening regional cooperation is crucial for dealing with future crises more effectively.



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The study is a collaboration between ADB and AlphaBeta (SG) PTE LTD led by Fraser Thompson. Genevieve Lim from AlphaBeta prepared the report. Several ADB staff provided invaluable comments, including: Srinivasan Ancha, Anouj Mehta, Naeeda Crishna Morgado, Toru Kubo, Pradeep Tharakan, Florian Kitt, Antonio Ressano, David Freedman, Kyaw Thu, Teresa Mendoza, Jay Roop, and Kate Hughes.

The team gratefully acknowledges the views and suggestions of government officials, the private sector, the academe, researchers, development partners, and other stakeholders in the region. They generously extended their support and cooperation during the thematic workshops, roundtable consultations, focus group discussions, and related events at the Southeast Asia Development Symposium 2021 conducted as part of the stakeholder engagement undertaken for this project. Special thanks to the ADB resident mission offices in Cambodia, Indonesia, Myanmar, the Philippines, and Thailand for coordinating the participation of in-country stakeholders in the workshops and consultation meetings. Very thoughtful insights were also provided by Cecilia Tam, Drazen Kucan, Sean Kidney, and Joao Alleluia.

Effective 1 February 2021, ADB placed a temporary hold on sovereign project disbursements and new contracts in Myanmar. The bank continues to monitor the situation in the country. All of the background assessments in this study were undertaken before 1 February 2021.

The Knowledge Support Division of ADB's Department of Communications facilitated the publishing of this report.

Abbreviations

| | |
|----------|--|
| ACRF | ASEAN Comprehensive Recovery Framework |
| ADB | Asian Development Bank |
| ASEAN | Association of Southeast Asian Nations |
| CAPEX | capital expenditure |
| COVID-19 | coronavirus disease |
| EPR | Extended Producer Responsibility |
| EU | European Union |
| GDP | gross domestic product |
| GHG | greenhouse gas |
| IEA | International Energy Agency |
| kWh | kilowatt-hour |
| MW | megawatt |
| OECD | Organisation for Economic Co-operation and Development |
| PPP | public-private partnership |
| R&D | research and development |
| SDG | Sustainable Development Goal |
| SME | small and medium-sized enterprise |

Executive Summary

As countries around the world begin to recover from the coronavirus disease (COVID-19) pandemic, policy makers must decide what type of economic recovery they want to promote. Will they choose measures that reinforce existing economic structures, particularly those that have a negative impact on the environment? Or will they see the COVID-19 crisis as an opportunity to rebuild in a way that significantly improves environmental outcomes?

As this report argues, a green recovery from the pandemic is crucial—especially in Southeast Asia—to ensure an economically and environmentally resilient future. Moreover, well-designed policy measures can simultaneously achieve socioeconomic and environmental goals. In fact, without concerted action to address the environmental crises of climate change and biodiversity loss, the region’s long-term growth prospects could be constrained, and extreme weather events and other environmental challenges associated with climate change and biodiversity will continue to impact lives and livelihoods. While recent policy measures in the focus countries of this study are environmentally positive elements (such as investments in green infrastructure), there are also areas of concern (such as fossil fuel subsidies and environmental de-regulation).

A green recovery approach from the COVID-19 pandemic is crucial for Southeast Asia, in particular in the five focus countries of the study: Cambodia, Indonesia, Myanmar, the Philippines, and Thailand. A green recovery (i) will be important for safeguarding against future pandemics due to the growing link between environmental and human health, (ii) will be important for addressing the severe and worsening impacts of climate change and biodiversity loss in the region, (iii) has strong potential to achieve significant economic stimulus, and (iv) is crucial for strengthening the region’s long-term competitiveness.

Support for a green recovery approach is evident in regional strategies such as the Association of Southeast Asian Nations (ASEAN) Comprehensive Recovery Framework (ASEAN Secretariat 2020), which emphasizes environmental sustainability as a key component of the region’s post-pandemic economic recovery process; and the Greater Mekong Subregion’s COVID-19 Response and Recovery Plan 2021–2023, which includes a focus on developing healthy cities. However, there are varying levels of “greenness” observed in recent policy measures at the country level. Green policies implemented so far include green infrastructure finance, a moratorium on new coal-fired power plants, private sector incentives for large-scale renewable energy projects, import duties on crude oil and refined petroleum products, a carbon emissions trading scheme, and investments in solar panels for rural households and utility-scale battery storage for renewable energy. Conversely, policies in Southeast Asia that are likely to have a negative impact on the environment include subsidies that lower the cost of electricity generated from fossil fuels, substantial budget cuts for renewable energy projects, financial support for polluting state-owned enterprises, rollback of some environmental regulations, and expansion of land available for mining activities.

To help governments in Southeast Asia find opportunities for green growth that are most relevant for the region, this report identifies five priority opportunities based on economic potential and number of jobs that can be created, and the extent of environmental damage that can be reversed or addressed by each opportunity. These opportunities include: (i) productive and regenerative agriculture (transforming agricultural landscapes and farming practices to improve yields while enhancing the health of surrounding natural ecosystems); (ii) sustainable urban development and transport models (promoting denser and better-planned urban

developments and public transport systems); (iii) clean energy transition (including the development of renewable energy projects and enhancing the efficiency of energy use across various sectors); (iv) circular economy models (converting by-products and waste-streams across various sectors into valuable end products, while minimizing waste); and (v) healthy and productive oceans (supporting the sustainable management of wild fisheries through ensuring biologically viable fishing levels). If leveraged fully, the five green growth opportunities would require approximately \$172 billion in capital investment and can create 30 million jobs in Southeast Asia by 2030. These growth opportunities also align with almost 60% of the United Nations' Sustainable Development Goal targets.

Some general policy recommendations would include introducing carbon pricing, intensifying research on green technologies, encouraging women entrepreneurs to participate in green business opportunities, and managing biodiversity better through open-data systems. Implementing a green recovery in Southeast Asia requires taking three key steps:

- **Step 1: Build mechanisms that can produce a lasting shift toward ecosystem resilience.** This will involve the development of a more integrated approach toward green growth, working across government agencies to assess trade-offs or possible shared benefits of green policies pursued by different agencies. It will also require a rigorous approach to data collection and target setting; having a consolidated database of information on environmental performance and potential impacts can help policy makers evaluate specific policies and programs and set targets. Government agencies may also require capacity building to have the right skills to execute a green growth agenda.
- **Step 2: Implement targeted policy interventions focused on the five green growth opportunities.** There are policy interventions that governments can implement to achieve each green opportunity.
 - Under “Productive and regenerative agriculture,” policy interventions include helping farmers adopt more efficient micro-irrigation techniques to save water and improve yields, such as sprinkler and drip irrigation systems instead of flood irrigation, especially for high-value crops.
 - Under “Sustainable urban development and transport models,” this includes planning and implementing “car-lite” concepts into urban planning and development to reduce city dwellers’ dependence on cars and encourage them to walk, cycle, or use public transport.
 - Under “Clean energy transition,” measures include policies to reduce coal dependence by acquiring and retiring coal-powered plants, and public–private partnerships to rapidly scale renewable energy.
 - Under “Circular economy models,” measures include establishing extended producer responsibility frameworks for packaging waste, which would give manufacturers and importers significant responsibility for treatment or proper disposal of post-consumer products, and the development of waste management infrastructure to improve plastic waste collection and prevent plastic waste from leaking into the environment.
 - Under “Healthy and productive oceans,” support can be provided for aquaculture innovation programs, which includes financing support for new technologies (e.g., sensor-based systems for shrimp feeding) and technical support (e.g., fish selection and use of alternative feedstocks).
- **Step 3: Identify sustainable sources of financing for green growth opportunities.** Governments must determine at the outset how they will finance these opportunities. Options include collecting green taxation revenue (e.g., carbon taxes); removing “brown” subsidies (e.g., fossil fuel subsidies); mobilizing private sector finance (e.g., green finance facilities and sustainable impact bonds); and leveraging international finance sources (ADB 2020a, 2020b). In particular, Southeast Asian countries can use the ASEAN Catalytic Green Finance Facility to acquire loans and technical assistance for sovereign green infrastructure projects on sustainable transport, clean energy, and resilient water systems.

A green recovery from the COVID-19 crisis is crucial for Southeast Asia and can generate over 30 million jobs in the region by 2030

Four reasons for implementing a green recovery



1. Strong link between the environment and public health – land use change, resulting in contact among wildlife and people, caused the emergence of **>30%** of all new diseases reported since 1960



2. Severe impacts of climate change and biodiversity loss – **2 of the top 5** countries most impacted by climate change are in the region; this environmental crisis could cost Southeast Asian economies **11%** of their combined gross domestic product in the year 2100



3. Significant economic boosts from green stimulus – every \$1 million worth of government spending on renewables creates **5** more jobs than equivalent spending on fossil fuels



4. Vital opportunity to strengthen region's long-term competitiveness – with growing emphasis in foreign direct investment decisions on the environmental footprint of operations, devoting COVID stimulus budgets to improve this can allow economies to enhance their integration in global supply chains

Five green growth opportunities requiring over \$172 billion of capital investment

1.

Productive and regenerative agriculture



2.

Healthy and productive oceans



3.

Sustainable urban development and transport models



4.

Circular economy models



5.

Renewable energy and energy efficiency



Three steps for a green recovery in Southeast Asia

Step 1



Centralize mechanisms to effect permanent transitions toward environmentally resilient pathways

Step 2



Implement targeted policy interventions focused on the five green growth opportunities

Step 3



Identify sustainable sources of financing for policy interventions

SECTION I

Introduction

Governments around the world are in full support of the economic recovery from the coronavirus disease (COVID-19) pandemic. However, a key question is whether current recovery measures reinforce existing “business-as-usual” economic structures that have negative impacts on the environment (through measures such as environmental deregulation), or whether there is an opportunity to “build back better,” wherein measures aim to maximize the shared benefits to the economy, environment, and society. This report argues that there need not be a trade-off between economic and environmental objectives, in Southeast Asia and specifically in the five focus countries of this study: Cambodia, Indonesia, the Philippines, Myanmar, and Thailand. Without concerted action to address the environmental crises of climate change and biodiversity loss, long-term growth prospects in the region could be constrained; extreme weather events and other environmental challenges associated with climate change and biodiversity will continue to impact lives and livelihoods. While recent policy measures in the focus countries are environmentally positive (such as investments in green infrastructure), there are also areas of concern (such as fossil fuel subsidies and environmental deregulation).

Five interrelated green growth opportunities are particularly relevant for Southeast Asia: (i) productive and regenerative agriculture (transforming agricultural landscapes and farming practices to improve yields while enhancing the health of surrounding natural ecosystems); (ii) sustainable urban development and transport models (promoting denser and better-planned urban developments and public transport systems); (iii) clean energy transition (including the development of renewable energy projects and enhancing the efficiency of energy use across various sectors); (iv) circular economy models (converting by-products and waste-streams across various sectors into valuable end products, while minimizing waste); and (v) healthy and productive oceans (supporting the sustainable management of wild fisheries through ensuring biologically viable fishing levels).

The report begins by describing why a green recovery approach from the COVID-19 pandemic is crucial for future economic, environmental, and social resilience of Southeast Asian countries. This approach will be important for safeguarding against future pandemics (due to the strong link between the environment and human health), addressing the severe and worsening impacts of climate change and biodiversity loss, achieving significant economic stimulus, and strengthening the region’s long-term competitiveness. The focus on environmental sustainability, or “greenness,” of recent policy measures undertaken in the five focus countries was then analyzed, including an understanding of current gaps in a green recovery approach. The five green growth opportunities assessed to be relevant for Southeast Asia were then outlined. These growth opportunities are found relevant to almost 60% of the United Nations’ Sustainable Development Goal (SDG) targets, can create 30 million jobs, and would require \$172 billion of capital investment annually by 2030. To implement green recovery in Southeast Asia, three key steps are involved: first, it will be important to centralize mechanisms to effect permanent transitions toward environmentally resilient pathways. Second, governments can implement targeted policy interventions focused on the five green growth opportunities—a set of sample interventions are shared in this report and, although not exhaustive, provide a good starting point. Third, governments will need to identify sustainable sources of financing to ensure the sustained momentum and impact of policies.

SECTION II

Why Southeast Asia Needs a Green Recovery

► The COVID-19 crisis has made it more urgent than ever for Southeast Asian economies to pursue green pathways toward a low-carbon and nature-positive future.

The severity of the COVID-19 crisis has diverted much attention away from the threats of climate change and biodiversity loss, as governments and institutions commit themselves to protecting lives and livelihoods. While it is important to address the immediate economic fallout, a swift return to business as usual will not only be environmentally damaging, but also economically and socially detrimental in the long term. Moreover, to achieve the Paris Agreement's climate target of limiting global warming to 1.5°C, the next 10 years will be critical, as global net human-caused emissions of carbon dioxide will need to fall by about 45% from 2010 levels by 2030.¹ This will require significant transitions in all aspects of society, and it is imperative that governments allocate funds for stimulus measures that could be decisive for this to happen. A green recovery that locks in permanent transitions toward a low-carbon and environmentally resilient future is particularly critical to Southeast Asia for four reasons (Table 1).

First, the COVID-19 pandemic has demonstrated the strong link between the environment and public health. Recent research by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services indicates that almost all pandemics in recent memory are zoonoses or caused by microbes of animal origin which “spill over” due to contact among wildlife, livestock, and people. They include Ebola, dengue fever, severe acute respiratory syndrome or SARS, Middle East respiratory syndrome or MERS, Zika, and COVID-19.² The risk of such spillovers is especially pronounced in tropical areas rich in wildlife diversity, and further compounded by land use change. Driven to some extent by rapid urbanization, land use change is one of the most significant drivers of pandemics globally, and is found to have caused the emergence of more than 30% of all new diseases reported since 1960 (footnote 2). With its location in the biodiversity-rich tropics and an additional 70 million people expected to live in its urban areas between 2015 and 2025,³ the Southeast Asia region is particularly susceptible to future pandemics.

Second, a green recovery approach is necessary to address the severe and worsening impacts of climate and biodiversity crises⁴ on the region. According to the Global Climate Risk Index 2020, two of the top five countries most impacted by climate change globally are in Southeast Asia—Myanmar and the Philippines.⁵ Between 1951 and 2000, the mean temperature in the region increased by 0.1°C to 0.3°C per decade, rainfall declined from

¹ United Nations. Climate Action Fast Facts. <https://www.un.org/en/climatechange/science/key-findings>.

² Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). 2020. *IPBES Workshop on Biodiversity and Pandemics: Workshop Report*. https://ipbes.net/sites/default/files/2020-12/IPBES%20Workshop%20on%20Biodiversity%20and%20Pandemics%20Report_0.pdf.

³ Based on AlphaBeta analysis of statistics on urban population in Southeast Asian economies by the United Nations Population Division. The estimate relates to 10 Southeast Asian nations: Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic (Lao PDR), Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam. Source: United Nations Population Division. <https://population.un.org/wup/>.

⁴ The biodiversity crisis relates to biodiversity loss, which refers to the decline in the number, genetic variability, and variety of biological species.

⁵ The Global Climate Risk Index 2020 analyzes and ranks countries worldwide on the extent to which they have been affected by impacts of weather-related loss events (storms, floods, heatwaves, etc.). GermanWatch. 2020. *Global Climate Risk Index 2020*. https://www.germanwatch.org/sites/germanwatch.org/files/20-2-01e%20Global%20Climate%20Risk%20Index%202020_14.pdf.

Table 1: Why a Green Recovery Approach Is Important

A green recovery approach from the COVID-19 crisis is crucial for four reasons

| Reason | <p style="text-align: center;">1</p> <p>The strong link between the environment and public health means that safeguarding the environment is crucial for enhancing resilience against future pandemics</p>  | <p style="text-align: center;">2</p> <p>To address the severe and worsening impacts of climate change and biodiversity loss in Southeast Asia, and their economic consequences</p>  | <p style="text-align: center;">3</p> <p>Green stimulus policies have been shown to deliver significant economic boosts in past crises</p>  | <p style="text-align: center;">4</p> <p>A green recovery approach presents a vital opportunity to strengthen Southeast Asia's long-term economic competitiveness</p>  |
|----------|---|--|---|---|
| Examples | <ul style="list-style-type: none"> Many deadly pathogens in recent history, including COVID-19, arose as a result of an unhealthy level of contact among wildlife, livestock, and people Land use change (typically driven by urbanization) caused the emergence of more than 30% of all new diseases reported since 1960 | <ul style="list-style-type: none"> Two of the top five countries most impacted by climate change globally are in Southeast Asia (Philippines and Myanmar) Climate change could cost ASEAN economies an estimated 11% loss to their combined GDP in the year 2100 | <ul style="list-style-type: none"> During the Global Financial Crisis 2007/2008, green stimulus packages helped build new and competitive green industries e.g., in Germany and Japan Every \$1 million worth of government spending on renewables creates 5 more jobs than equivalent spending on fossil fuels | <ul style="list-style-type: none"> Increasing emphasis in FDI decisions is being placed on the environmental footprint of operations – devoting COVID stimulus budgets to improve this can allow Southeast Asian economies to improve economic value-add from industries and enhance their integration in global supply chains |

ASEAN = Association of Southeast Asian Nations, COVID-19 = coronavirus disease, FDI = foreign direct investment, GDP = gross domestic product.

Sources: Organisation for Economic Co-operation and Development (OECD); Asian Development Bank; World Economic Forum; Center for German and European Studies; GermanWatch (Global Climate Risk Index 2020); AlphaBeta analysis.

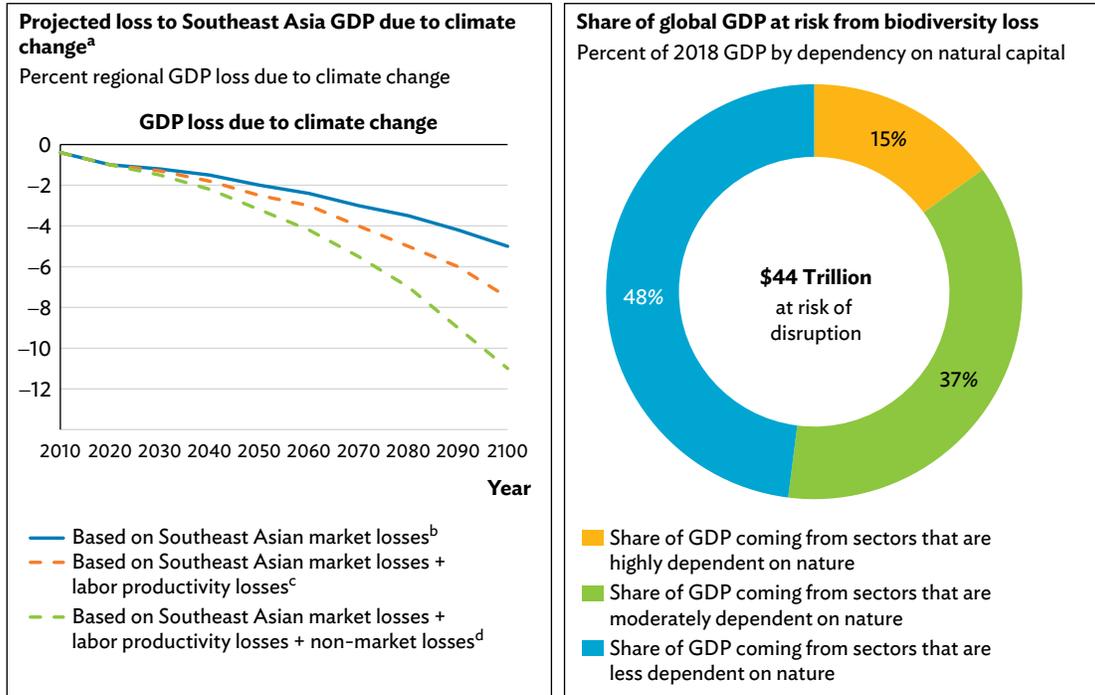
1960 to 2000, and sea levels rose by 1 to 3 millimeters per year.⁶ Heat waves, droughts, floods, and tropical cyclones have also become more intense and frequent (footnote 6). Southeast Asia's biodiversity is also under serious threat; the region lost 14.5% of its forests over 15 years between 2001 and 2016, and some areas, including parts of Indonesia, are projected to lose up to 98% of their forests by 2022.⁷ At the same time, these environmental crises impose severe economic costs. Recent research by the Asian Development Bank (ADB) has shown that the impacts of climate change on agriculture, tourism, energy demand, labor productivity, catastrophic risks, health, and natural ecosystems could collectively result in a loss of 11% in the combined gross domestic product (GDP) of Southeast Asian economies in year 2100 as shown in Figure 1 (footnote 6). Research by the World Economic Forum has also shown that, globally, biodiversity loss could have severe implications for economic output through its impact on business operations, supply chains, and markets.⁸ It has been estimated that, globally, \$44 trillion—or more than half of the world's total GDP—is moderately or highly dependent on nature and its services (Figure 1). A green recovery approach is therefore crucial to build resilience against these environmental crises and their economic consequences.

⁶ Asian Development Bank (ADB). 2015. *Southeast Asia and the Economics of Global Climate Stabilization*. Manila. <https://www.adb.org/sites/default/files/publication/178615/sea-economics-global-climate-stabilization.pdf>.

⁷ A. Hughes. 2017. Understanding the Drivers of Southeast Asian Biodiversity Loss. *Ecosphere*. 8(1). <https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/ecs2.1624>.

⁸ Convention on Biological Diversity. 2010. *Global Biodiversity Outlook 3*. <https://www.cbd.int/doc/publications/gbo/gbo3-final-en.pdf>.

Figure 1: Negative Economic Impacts of Climate Change and Biodiversity Loss



GDP = gross domestic product.

Notes:

^a Modeling was done based on the following Southeast Asian economies: Indonesia, Malaysia, the Philippines, Thailand, and Viet Nam.

^b Refers to direct impact to Southeast Asian markets of sea level rise, changes in energy demand patterns, changes in crop yields, and changes in tourism flows.

^c Refer to the impact of warming temperatures on labor productivity; in particular, as the number of hours during which temperatures exceed thresholds limiting physical labor rise, labor will need to be additionally cooled and/or altered in timing, or where this is not possible, for labor to be reduced, with potential impacts on economic output.

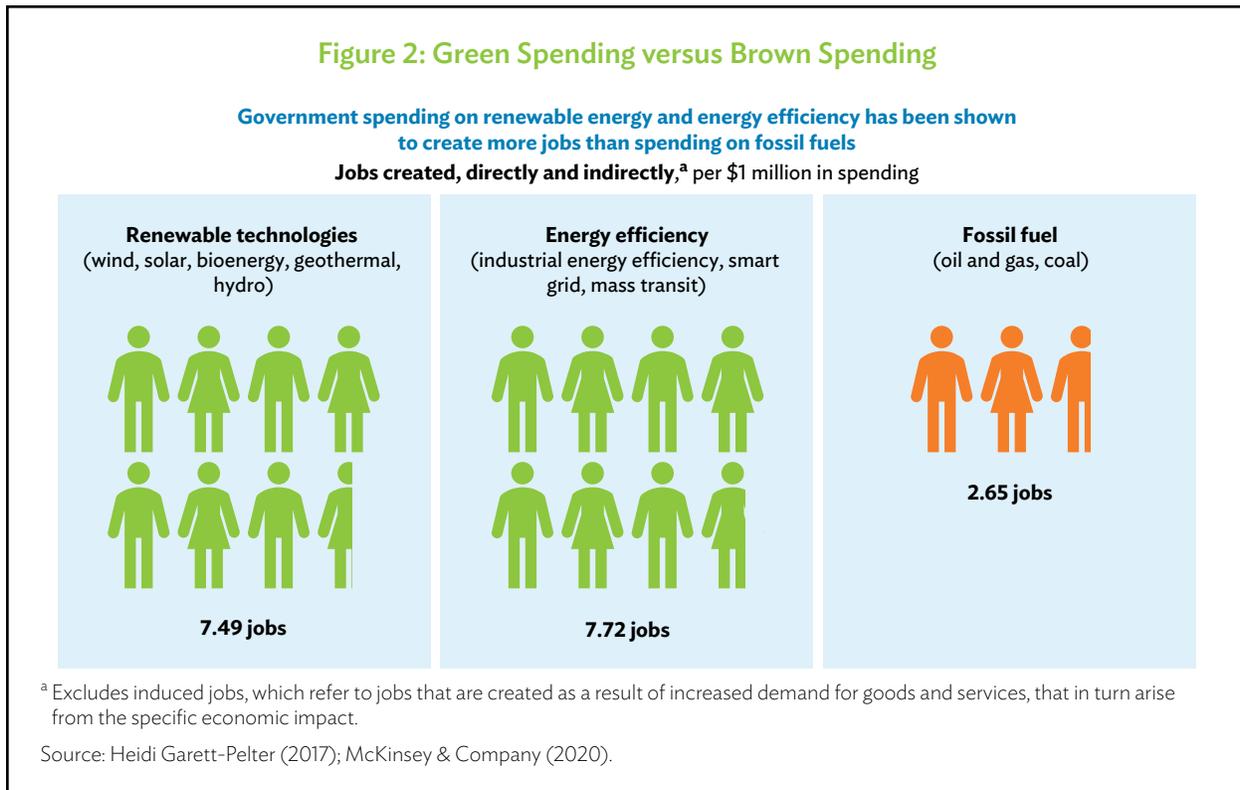
^d Refer to nonmarket impacts which include increased risk of potentially catastrophic events and losses to health and ecosystems.

Sources: Asian Development Bank; World Economic Forum; AlphaBeta analysis.

Third, green stimulus policies can deliver significant economic benefits. An econometric study of government spending on energy technologies showed that every \$1 million in spending generates 7.49 full-time jobs in renewable infrastructure and 7.72 jobs in energy efficiency, but only 2.65 jobs in fossil fuels (Figure 2).⁹ A study by the Oxford Smith School of Enterprise and the Environment assessing 196 fiscal stimulus policies implemented by the Group of 20 (G20) countries during the Global Financial Crisis of 2007/2008 similarly reflected that green policies yielded strong economic boosts.¹⁰ For instance, economic stimulus in renewable energy development in the United States (US) supported 900,000 full-time jobs on average annually from

⁹ H. Garrett-Peltier. 2017. Green versus brown: Comparing the employment impacts of energy efficiency, renewable energy, and fossil fuels using an input-output model. *Economic Modelling*, Elsevier, Vol. 61(C). pp. 439–447. <https://www.sciencedirect.com/science/article/abs/pii/S026499931630709X>.

¹⁰ C. Hepburn et al. 2020. *Will COVID-19 Fiscal Recovery Packages Accelerate or Retard Progress on Climate Change?* Oxford Smith School of Enterprise and the Environment. <https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf>.



2009 to 2015.¹¹ Green stimulus in the Republic of Korea helped the country recover faster from the economic crisis than expected, and directly created 156,000 new green jobs from 2009 to 2011.¹² In the European Union (EU), each \$1 in green investment was estimated to have boosted GDP by up to \$1.50 across the region.¹³ Investment in clean energy also helped countries build up new and competitive green industries. The People's Republic of China, the US, and Germany became leaders in renewable energy because of these stimulus programs. However, not all green stimulus measures delivered intended economic benefits, but these were a result of regulatory, implementation, and funding failures rather than limitations on the ability of the specific programs to deliver. For example, highly complex projects like high-speed rail or the development of carbon capture and storage technologies tended to proceed more slowly, leading some to be placed on hold.¹⁴ Separately, some governments did not spend all of the committed green stimulus funding. With some of these being isolated green projects without broader strategic frameworks, not all became implemented. The US, for example, eventually spent 89% of its allocated green budget, while Australia spent only 34% (footnote 14).

Fourth, a green recovery approach presents a significant opportunity to strengthen Southeast Asia's long-term economic competitiveness. Policies that motivate green decisions in Southeast Asian businesses can help enhance the overall competitiveness of economies. With increasingly stringent regulations globally on the

¹¹ Obama White House Archives. 2016. *A Retrospective Assessment of Clean Energy Investments in the Recovery Act*. https://obamawhitehouse.archives.gov/sites/default/files/page/files/20160225_cea_final_clean_energy_report.pdf.

¹² Y. Jung. 2015. Is South Korea's Green Job Policy Sustainable? *Center for German and European Studies. Sustainability*. 7(7). pp. 878-8767. <https://doi.org/10.3390/su7078748>.

¹³ European Commission. 2011. *Assessing the Implementation and Impact of Green Elements of Member States' National Recovery Plans*. https://ec.europa.eu/environment/enveco/growth_jobs_social/pdf/studies/green_recovery_plans.pdf.

¹⁴ J. Jaeger. 2020. Lessons from the Great Recession for COVID-19 Green Recovery. World Resources Institute. 24 November. <https://www.wri.org/blog/2020/11/coronavirus-green-stimulus-great-recession-lessons>.

environmental footprint of imported products—for instance, an incoming law by the EU preventing imported products from companies that engage in deforestation—it is critical that Southeast Asian nations establish deforestation-free production and supply chains to stay competitive in the global market.¹⁵ With a growing number of multinational companies making public commitments to move toward renewable energy, foreign direct investment decisions are becoming increasingly influenced by the availability of renewable energy sources and infrastructure. RE100, a global initiative to bring together businesses committed to 100% renewable energy, boasts of a membership of over 280 members whose global operations span across sectors from manufacturing and pharmaceuticals to fashion and technology.¹⁶ One of its members, the technology company Google, achieved 100% renewable energy for their global operations in 2017 and is one of the world’s largest corporate buyers of renewable energy.¹⁷ Devoting COVID-19 stimulus budgets to expanding production and research and development capabilities in these areas can allow Southeast Asian economies to increase value added in their industries, attract greater foreign direct investment flows, and enhance their integration in global supply chains. Viet Nam has made significant strides in this regard, having joined a growing group of countries looking to accelerate renewable energy adoption by businesses—the country launched a pilot program to facilitate the signing of synthetic power purchase agreements¹⁸ between private power buyers and renewable energy producers, targeting contracts of up to 1 gigawatt of between 2020 and 2022.¹⁹

The COVID-19 pandemic presents a unique opportunity for ensuring that the huge amounts of stimulus spending in response to the crisis can help shift economies on sustainable pathways to decarbonization and build resilience while still achieving economic growth. Research by the Organisation for Economic Co-operation and Development (OECD) shows that, globally, countries differ in the extent to which their COVID-19 response strategies encompass greenhouse gas (GHG) emission reductions and the integration of mitigation and wider well-being outcomes.²⁰ It studies three COVID-19 recovery pathways: “Rebound” (the singular pursuit of GDP growth without consideration of climate goals); “Decoupling” (a focus on greener economy); and “Wider Well-Being” (placing climate change at the center of the recovery strategy, and entailing broader social, environmental, and economic well-being). It finds that the third pathway will be crucial to unlocking opportunities for truly transformative change. In Southeast Asia, growing support for this pathway is reflected in regional strategies such as the Association of Southeast Asian Nations (ASEAN) Secretariat’s ASEAN Comprehensive Recovery Framework (ACRF), which emphasizes the need to include environmental sustainability as a key component of the region’s post-pandemic economic recovery process. The Greater Mekong Subregion COVID-19 Response and Recovery Plan 2021–2023 also includes a focus on developing “healthy cities” as part of its overall strategy to enhance resilience against future pandemics.²¹

¹⁵ V. Halleux. 2020. *An EU Legal Framework to Halt and Reverse EU-Driven Global Deforestation*. EU Parliament. 23 October. <https://www.europarl.europa.eu/legislative-train/theme-international-trade-inta/file-eu-driven-global-deforestation>.

¹⁶ RE100. <https://www.there100.org/>.

¹⁷ Since 2010, the company has signed more than 50 long-term contract commitments to buy energy from wind and solar farms around the world, totaling more than 5 gigawatts of new generation capacity. Sources include Google Data Centers. 2019. *Renewable Energy*. <https://www.google.com/about/datacenters/renewable/>; Google Sustainability. *100% Renewable is Just the Beginning*. <https://sustainability.google/progress/projects/announcement-100/>.

¹⁸ A “synthetic power purchase agreement” refers to a contractual agreement with a corporate buyer who does not take the physical delivery of power but instead comprises (i) a long-term financial hedge for the energy produced by a renewable energy project, and (ii) a purchase-and-sale agreement for the associated renewable energy companies. Definition from: Lance et al. 2016. *Corporations Turn to Synthetic PPAs to Reduce Energy Costs, Carbon Footprints*. 28 June. <https://www.skadden.com/insights/publications/2016/06/corporations-turn-to-synthetic-ppas-to-reduce-ener>.

¹⁹ Renewables Now. 2020. *Vietnam Working On Corporate PPA Platform with 1-GW Target*. <https://renewablesnow.com/news/vietnam-working-on-corporate-ppa-platform-with-1-gw-target-686480/>.

²⁰ OECD. 2020. *Addressing the COVID-19 and Climate Crises: Potential Economic Recovery Pathways and Their Implications for Climate Change Mitigation, NDCs and Broader Socio-economic Goals*. https://www.oecd-ilibrary.org/environment/addressing-the-covid-19-and-climate-crises_50abd39c-en.

²¹ ASEAN Secretariat. 2020. *ASEAN Comprehensive Recovery Framework*. <https://asean.org/asean-comprehensive-recovery-framework-and-its-implementation-plan/>; Greater Mekong Subregion. 2020. *Joint Statement from 24th GMS Ministerial Conference*. <https://www.greatermekong.org/joint-statement-24th-gms-ministerial-conference>.

SECTION III

Current Green Policies

► Recent policy responses in the focus countries reflect a mixed response to the environmental challenges faced in Southeast Asia.

An assessment of recent policy measures in the five focus countries reveals that they have been mixed in their environmental focus, or “greenness.” The greenness of a policy measure refers to the extent to which it has a positive environmental focus, i.e., the greener a policy measure is, the greater its potential positive environmental impacts. Positive environmental impacts could include reductions in carbon emissions, GHGs, and air pollution, or enhancing biodiversity and resource efficiency. “Environmentally-positive” policy levers refer to policies that achieve such positive environmental impacts. These impacts could arise as part of the objective of the policy, or come about as a complementary benefit. Conversely, policies with negative environmental focus include those that could potentially result in negative environmental impacts such as increased carbon emissions, GHGs, pollutant levels, and adverse impacts to biodiversity. “Environmentally-negative” policy levers refer to policies that could potentially generate such negative environmental impacts (typically implemented to achieve non-environmental objectives). It should be stressed that this analysis only covers recent policy responses announced since the COVID-19 pandemic began, even though some of these policy measures were being developed before the pandemic and not with a forthcoming pandemic in mind (e.g., Thailand’s issuance of its inaugural B30 billion or \$964 million sustainability bond to finance green infrastructure through a new Mass Rapid Transit line). Table 2 shows 10 policy levers that could be deployed as part of stimulus packages and could have environmental implications.

Table 3 shows an assessment of the greenness of each policy lever, where announced or implemented, across the five focus Southeast Asian countries.

The assessment of the greenness of recent policy responses in the five focus countries reflects the following key findings (Appendix 1 shows the full list of policies that were assessed):

- **Several environmentally positive policies have been implemented, leveraging a diverse range of policy levers.** These policies range from green infrastructure finance to moratoriums on coal power plant development. In August 2020, the Public Debt Management Office of Thailand’s Ministry of Finance’s issued the first sustainability bond in Southeast Asia, raising about B30 billion (\$964 million) to finance green infrastructure (a new Mass Rapid Transit line) as well as social impact projects such as public health measures and job creation in small and medium-sized enterprises (SMEs).²² The Government of the Philippines announced in October 2020 that a moratorium would be placed on the development of new coal-fired power plants, and an accompanying plan to incentivize private sector investment in renewable projects such as large-scale geothermal projects.²³ Though this was a decision in the making prior to the pandemic, it was expedited due to challenges faced as a result of unreliable energy supply from coal plants during the pandemic

²² ADB. 2020. *Green Finance Strategies for Post-COVID-19 Economic Recovery in Southeast Asia*. Manila. <https://www.adb.org/sites/default/files/publication/639141/green-finance-post-covid-19-southeast-asia.pdf>.

²³ C. Farand. 2020. Philippines Declares Moratorium on New Coal Power Plants. *Climate Home News*. 28 October. <https://www.climatechangenews.com/2020/10/28/philippines-declares-moratorium-new-coal-power-plants/#:~:text=The%20Filipino%20government%20will%20no,the%20deployment%20of%20renewable%20energy.&text=A%20pipeline%20of%2012GW%20of,doubled%20the%20country's%20coal%20capacity>.

Table 2: Ten Policy Levers That Can Influence Environmental Outcomes

| # | Policy levers | Description |
|----|---|---|
| 1 | Pricing of externalities | Policies that place a value on the environmental externalities of activities and industries, allowing them to be priced into market decisions (e.g., carbon taxes as positive levers, subsidies for pollution-causing activities as negative levers) |
| 2 | Financial support for green products and services | Direct government financial support in the form of loans and grants for products and services with environmental impacts (e.g., loans for energy-efficient retrofits in construction sector), public funds disbursed to private corporations on the condition that specific environmental actions are taken, and government procurement |
| 3 | Catalyzing private sector financing | Policy levers that catalyze private sector investments in areas with environmental implications (e.g., green financing approaches) |
| 4 | Investments in supporting infrastructure | Direct government investments in projects with specific environmental outcomes (e.g., renewable energy projects, mining activities) |
| 5 | Support for innovation | Policies that support the development of new technologies with implications for the environment (e.g., R&D for electric vehicle deployment) |
| 6 | Addressing non-price market failures | Imposition of environmental standards and regulations (e.g., property rights) in specific industries or activities with environmental impacts, or the reversal of them (deregulation) |
| 7 | Behavioral change policies | Policies to trigger behavioral changes (e.g., “nudge” policies to alter consumer preferences on sustainability, or information and awareness campaigns) |
| 8 | Skills development programs | Skills building programs to build capacity for green projects (e.g., regenerative agricultural techniques) |
| 9 | New collaborations | Fostering of collaborations within industry or between industry and other actors (government, civil society etc.) that influence environmental outcomes |
| 10 | New information systems | Address information asymmetries by alerting businesses to risks, providing information to consumers, and driving transparency in environmental performance |

Sources: Literature review; AlphaBeta analysis.

(versus renewables which are better-suited to meet fluctuating energy needs) (footnote 23). The country also imposed a 10% import duty on crude oil and refined petroleum products; though this was implemented with the aim of augmenting government funds for COVID-19 response, there are considerable environmental benefits to reducing demand for such products which generate substantial carbon and GHG emissions.²⁴ Myanmar’s COVID-19 Economic Relief Plan (CERP) included an expedited international competitive bidding process for 30 solar power projects.²⁵ Although this was initiated prior to the pandemic, it was expedited under the CERP as part of the plan’s focus on growing the country’s renewable energy sector. The Government of Indonesia is working with a local think tank on a \$1 billion plan to install panels with a combined capacity of 1 gigawatt of peak power a year for millions of Indonesia’s poorest households over the next 4 to 5 years.²⁶ It has been estimated that this scheme could generate up to 22,000 jobs from installing the panels, and save the government billions of dollars in electricity subsidies. In Cambodia, the government is working with ADB on financing the country’s first ever utility-scale battery storage to improve energy supply from renewable sources, under the Grid Reinforcement Project approved in 2020.²⁷ The Government of Cambodia

²⁴ Vivid Economics. 2020. *Greenness of Stimulus Index*. <https://www.vivideconomics.com/casestudy/greenness-for-stimulus-index/>.

²⁵ This expedited process involved a short submission time frame of 1 month after the tenders for the solar power plants were issued in May 2020. The tenders are for plants at 30 locations with a combined capacity of 1,060 megawatts, equivalent to the output of a typical nuclear reactor. M. Merdekawati. 2020. ASEAN’s Road to a Green Economic Recovery. *Eco-Business*. 14 September. <https://www.eco-business.com/opinion/aseans-road-to-a-green-economic-recovery/>; A. Gan et al. 2020. Myanmar: The COVID-19 Economic Relief Plan. *Global Compliance News*. 18 May. <https://globalcompliancencews.com/myanmar-the-covid-19-economic-relief-plan-20200504/>.

²⁶ N. Harsono. 2020. Indonesia Working on \$1b Solar-Driven Green Economic Recovery Scheme. *The Jakarta Post*. 19 June. <https://www.thejakartapost.com/news/2020/06/19/indonesia-working-on-1b-solar-driven-green-economic-recovery-scheme.html>.

²⁷ ADB. 2020. *Cambodia: Grid Reinforcement Project*. Manila. <https://www.adb.org/projects/53324-001/main>.

Table 3: Assessment of the Environmental Focus of Recent Policies

The five focus countries' recent policies are mixed in the nature of their focus on the environment

Environmental focus of policy lever:^a ■ Positive ■ Negative ■ Mixed ■ Lever not present or has limited focus on environment

| Policy lever | Impact of policy lever on the environment | | | | |
|---|---|-----------|---------|-------------|----------|
| | Cambodia | Indonesia | Myanmar | Philippines | Thailand |
| Pricing of externalities | | | | | |
| Financial support for green products and services | | | | | |
| Catalyzing private sector financing | | | | | |
| Investments in supporting infrastructure | | | | | |
| Support for innovation | | | | | |
| Environmental standards and safeguards | | | | | |
| Behavioral change policies | | | | | |
| Skills development programs | | | | | |
| New collaborations | | | | | |
| New information systems | | | | | |

^a A specific policy lever is assessed to have a “positive” environmental focus in the country (colored green) if the policies categorized under that lever is assessed to include targets of positive environmental impacts, or if there is evidence that the policies have already resulted in positive environmental impacts. The policy lever is assessed to have a “negative” environmental focus (colored red) if policies categorized under that lever includes a target with a negative environmental impact, or if there is evidence that the policies have already resulted in negative environmental impacts. Where the environmental impacts of policies categorized under the specific lever have evidence of resulting in both positive and negative environmental impacts, the policy lever is assessed as “mixed” (dark blue). Where the policy lever is not present for the specific country, or if it has or is likely to have a limited focus on the environment, the lever will be reflected as white in the table. Note that only policies that were announced since the coronavirus disease (COVID-19) pandemic began have been assessed.

Sources: Vivid Economics; ADB COVID-19 Policy Database; Literature review; AlphaBeta analysis.

is also working on a catalytic financing mechanism for green projects in the country.²⁸ The governments of Cambodia, Indonesia, and the Philippines are also working with ADB on a catalytic financing mechanism under the Green Climate Fund (GCF), which targets to achieve climate-resilient and environmentally sustainable economic recovery from the COVID-19 pandemic in these countries.²⁹

- **However, a number of policies with potentially environmentally negative or mixed impacts have also been observed.** This is most extensive for “pricing of externalities,” in which three of the five focus countries have implemented either negative or mixed policies. In Indonesia, while subsidies for the use of biodiesel fuels have been implemented alongside reductions in the value-added tax and income tax required for various renewable energy projects, the country’s stimulus package has also included subsidies that lower the cost of fossil fuel-generated electricity (footnote 24). Myanmar and Thailand provided state-owned

²⁸ Green Climate Fund. 2019. Readiness Proposal. https://www.greenclimate.fund/sites/default/files/document/readiness-proposals-cambodia-mekong-strategic-partners-strategic-frameworks_1.pdf.

²⁹ ADB. *What is the Green Recovery Program in Southeast Asia?* 31 March. <https://seads.adb.org/news/what-green-recovery-program-southeast-asia> (accessed 10 January 2021).

utilities with direct subsidies on electricity bills; with much of both countries' electricity being fossil fuel-generated, such subsidies indirectly incentivize fossil fuels.³⁰ Fossil fuel remains crucial to meeting the energy demand in both countries, accounting for 72% and 40% of electricity generation in Thailand and Myanmar, respectively.³¹ There is also evidence of environmentally negative levers implemented in Indonesia. For instance, in June 2020, the Ministry of Energy and Mineral Resources' 2020 budget was cut by a third to Rp6.2 trillion (\$430 million) as a result of attempts to fund COVID-19-related measures. This involved a 42% reduction in the budget for renewable energy projects.³² Passed in October 2020, the country's "omnibus" job creation law rolls back a number of environmental regulations, including the removal of a requirement for all regions to maintain a minimum of 30% of their watershed or island area as forest area—which could encourage deforestation.³³ Further, designed to stimulate more value-added production of mined coal and minerals, a mining law announced in May 2020 has expanded the land area available for mining activities, and requires mining companies to increase exploration activities annually—with few provisions to reduce environmental impact (footnote 24).

- **There is scope for further policy levers to deliver environmentally positive outcomes as part of the COVID-19 recovery policy.** Countries have largely focused on rescue packages—referring to emergency measures to protect balance sheets, jobs, and address immediate human welfare concerns (such as welfare payments)—during and following the lockdown phase. While this is appropriate to address urgent socioeconomic needs, there is much scope for further policy levers to be adopted that could encourage a green stimulus. Elsewhere in the Asia and Pacific region, there has been evidence of such policy measures that have already been implemented to encourage short-term growth. For example, the Republic of Korea's "Green New Deal," a centerpiece of its COVID-19 economic recovery strategy, seeks to create over 60,000 new jobs in the development of new low-carbon technologies across various industries.³⁴ The Government of New Zealand also announced it is looking to allocate NZ\$1 billion (\$728 million) worth of stimulus funds to create about 11,000 new "nature jobs" (referring to jobs in environmental work, such as those in biodiversity projects, and as "nature ambassadors").³⁵ As illustrated in Table 3, further policy levers can be leveraged to reap both economically and environmentally positive outcomes. These include catalyzing private sector financing in green infrastructure and projects, addressing non-price market failures through measures like environmental regulations for industry, behavioral change and skills development programs, new collaborations, and new information systems. These also include levers where few countries appear to have developed any environmentally positive policies: catalyzing private sector financing (only Thailand has been active through the sustainability bond issuance), investments in supporting infrastructure (only the Philippines has signaled a positive through its moratorium on coal power projects), and support for innovation (only Indonesia registers a positive outcome through the government's partnership with a local think tank on a rooftop solar panel project).

³⁰ M. Merdekawati. 2020. ASEAN's Road to a Green Economic Recovery. *Eco-Business*. 14 September. <https://www.eco-business.com/opinion/aseans-road-to-a-green-economic-recovery/>; A. Gan et al. 2020. Myanmar: The COVID-19 Economic Relief Plan. *Global Compliance News*. 18 May. <https://globalcompliancencews.com/myanmar-the-covid-19-economic-relief-plan-20200504/>.

³¹ US Energy Information Administration. 2019. *Burma: Electricity*. <https://www.eia.gov/international/data/country/MMR/electricity/electricity-generation>; and US Energy Information Administration. 2019. *Country analysis: Thailand*. <https://www.eia.gov/international/analysis/country/THA>.

³² Reed Smith. 2020. *Indonesian renewable energy sector half-year review*. <https://www.reedsmith.com/en/perspectives/2020/07/indonesian-renewable-energy-sector-half-year-review>.

³³ H. N. Jong. 2020. Indonesia's omnibus law a 'major problem' for environmental protection. *Mongabay*. 4 November. <https://news.mongabay.com/2020/11/indonesia-omnibus-law-global-investor-letter/>.

³⁴ J. Lee and J. Woo. 2020. Green New Deal Policy of South Korea: Policy Innovation for a Sustainability Transition. *MDPI*. <https://www.mdpi.com/2071-1050/12/23/10191/pdf>.

³⁵ E. Roy. 2020. New Zealand Budget: \$1bn for 'Nature Jobs' But Dismay at Lack of Climate Action. *The Guardian*. 14 May. <https://www.theguardian.com/world/2020/may/14/new-zealand-budget-1bn-for-nature-jobs-but-dismay-at-lack-of-climate-action>.

SECTION IV

Five Green Growth Opportunities

► **Five green growth opportunities are of particular importance—not investing in them could result in significant economic and environmental costs.**

The COVID-19 pandemic presents a rare opportunity for economies to hit the “reset” button and build back better—achieving economic recovery while improving environmental and social outcomes. Five green growth opportunities, in particular, hold significant potential for effecting such outcomes in the five focus countries. Box 1 describes the methodology for how these opportunities were selected.

Further details are provided on these green growth opportunities, their importance for the Southeast Asian region, the potential risks of not taking advantage of them, and existing relevant regional and national strategies in the focus countries. (The significant potential these opportunities present for addressing the climate change and biodiversity crises are discussed in Box 2.)

A. Productive and Regenerative Agriculture

Productive and regenerative agriculture entails transforming agricultural landscapes and farming practices to improve yields while enhancing the health of surrounding natural ecosystems. Specific opportunities include using emerging technologies such as big data analytics and the Internet of Things (IoT) to support precision agriculture applications;³⁶ farming practices that reduce GHG emissions such as rotational grazing and the use of high-quality feed to reduce methane levels released from livestock; harnessing biotechnology innovation in areas such as gene editing, selective cropping, and breeding; using bio-pesticides and microbial and organic fertilizers to reduce excess nitrogen and phosphorous in soils and reduce toxic run-off; rotating crops and reducing tillage to replenish soil nutrition; employing micro-irrigation to reduce water usage and run-off; integrating native non-crop vegetation (such as trees or shrubs) within cropland or pastureland to sequester carbon and reduce run-off; using biochar as a soil amendment; and restoring pollinator habitats, forest corridors, and riparian ecosystems surrounding working lands. The development of “climate-smart agriculture” is included as a key focus in the ASEAN Secretariat’s ASEAN Comprehensive Recovery Framework (ACRF).³⁷

Moreover, there are major risks to not taking advantage of this opportunity. The agriculture sector represents the single most important contributor to GDP and employment in the five focus economies. It accounts for 8%, 10%,

³⁶ Precision agriculture applications are possible in the absence of internet connectivity, which is experienced in some rural agricultural regions of Southeast Asian countries. The transfer of precision farming data (e.g., yield monitor data) can be transferred by physical devices such as memory cards. Personal area networks and Bluetooth technologies also allow for data to be wirelessly transferred between farm equipment and computers, and even uploaded onto the cloud. Source: B. Whitacre et al. 2014. How Connected Are Our Farms? *Agricultural & Applied Economics Association*. https://www.choicesmagazine.org/UserFiles/file/cmsarticle_392.pdf.

³⁷ ASEAN Secretariat. 2020. *ASEAN Comprehensive Recovery Framework*. <https://asean.org/asean-comprehensive-recovery-framework-and-its-implementation-plan/>.

Box 1: Identifying Green Growth Opportunities for Southeast Asia

Recent research by the World Economic Forum and AlphaBeta has found that globally, green growth opportunities could be worth over \$10 trillion annually in 2030, and could create 395 million jobs related to enhancing nature and the environment between 2020 and 2030. These opportunities relate to 15 thematic areas, of which five have been prioritized for the focus countries based on their relevance (Figure). The five opportunities were assessed for their relevance to the focus countries based on economic potential, the existing level of environmental damage that could be reversed or addressed, as well as the number of jobs and investment that could be catalyzed through the opportunity. (See Appendix 2 for the full list of green growth opportunities.)

Table: Priority Green Growth Opportunities

The World Economic Forum identified over \$10 trillion of green growth opportunities globally by 2030, five of which are especially relevant to the focus countries

Relevance: ■ Large ■ Moderate ■ Limited Prioritized opportunities

| Green Growth Opportunities ^a | Cambodia | Indonesia | Myanmar | Philippines | Thailand |
|--|----------|-----------|----------|-------------|----------|
| Food, land, and ocean use | | | | | |
| Ecosystem restoration and avoided land and ocean use expansion | Large | Large | Moderate | Large | Moderate |
| Productive and regenerative agriculture | Large | Large | Large | Large | Large |
| Healthy and productive oceans | Large | Large | Large | Large | Large |
| Sustainable management of forests | Limited | Large | Limited | Limited | Limited |
| Planet-compatible consumption | Limited | Limited | Limited | Limited | Large |
| Transparent and sustainable supply chains | Limited | Limited | Limited | Limited | Limited |
| Infrastructure and the built environment | | | | | |
| Sustainable urban development and transport models | Large | Large | Large | Large | Large |
| Nature-positive built environmental design | Moderate | Moderate | Moderate | Moderate | Moderate |
| Planet-compatible urban utilities | Moderate | Moderate | Moderate | Moderate | Moderate |
| Nature as infrastructure | Limited | Limited | Limited | Limited | Limited |
| Nature-positive connecting infrastructure | Moderate | Moderate | Moderate | Moderate | Moderate |
| Energy and extractives | | | | | |
| Circular economy models | Large | Large | Large | Large | Large |
| Nature-positive metals and minerals extraction | Limited | Limited | Limited | Limited | Limited |
| Sustainable materials supply chains | Limited | Limited | Limited | Limited | Limited |
| Clean energy transition | Large | Large | Large | Large | Large |

^a Some of these green growth opportunities have been rephrased from their original wording in the World Economic Forum research for clarity.

Sources: World Economic Forum and AlphaBeta. 2020. *The Future of Nature and Business*. http://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf; AlphaBeta analysis.

Box 2: The Importance of Green Growth Opportunities for Tackling Climate Change

Taking advantage of the five green growth opportunities is crucial to mitigating climate change and biodiversity loss, and addressing their impacts, in Southeast Asia. Conversely, failing to do so will risk exacerbating the already severe consequences of these environmental crises. Further, climate change and biodiversity loss could also undermine the livelihoods and economic activities associated with these opportunities, reinforcing a negative feedback loop that is detrimental to the environment, economy, and society. Key links between each green growth opportunity and the climate and biodiversity crises are discussed below:

- Productive and regenerative agriculture.** The agriculture sector is both a major contributor of greenhouse gas (GHG) emissions, and one that is greatly impacted by climate change. This sector is one of the largest contributors of GHG emissions, accounting for 18.4% of global emissions.^a At the same time, climate change is already threatening the long-term productivity of this sector in the Southeast Asian region. For instance, improper crop management practices such as soil tilling and monoculture led to land degradation in parts of rural Myanmar. Coupled with rising average temperatures due to climate change, crop yields have fallen, while the costs of land cultivation and the amount of uncultivable land area have increased. Research in the country showed that crop yields in highly degraded land areas were between 3 and 12 times lower than yields in less-degraded areas.^b Mangrove destruction in the Philippines since the 1950s due to agricultural pressures has also imposed significant costs—the equivalent of \$450 million annually in flood damage.^c
- Sustainable urban development and transport models.** Cities are major contributors to climate change. According to UN Habitat, cities consume 78% of the world's energy and produce more than 60% of global GHG emissions; yet they account for less than 2% of the earth's surface.^d At the same time, cities are also most susceptible to the impacts of climate change; 70% of the world's major cities, many of them in Asia, are highly vulnerable to rising temperatures and increasingly severe weather events induced by climate change.^e Due to projected flood-related mortality and economic losses, Jakarta and Manila are among the top 10 cities rated “extreme risk” in terms of the highest economic exposure to climate change in 2023 (footnote e). Developing sustainable urban development and transport models is therefore crucial to addressing climate change, and in turn minimizing its potentially devastating impacts on cities in Southeast Asia.
- Clean energy transitions.** The energy sector plays a critical role in decarbonizing Southeast Asian economies. A recent report by the International Energy Agency indicates that in the last 2 decades, aggregate energy demand in Southeast Asia has increased by more than 80%, with fossil fuel being the most preferred source of energy. As outlined in the main text, the energy industry is the region's largest emitter of GHGs, as compared to other industries.^f A report has found reaching the Paris Agreement's long-term temperature goal of limiting global warming to 1.5 °C will require the region to achieve at least 50% of decarbonized electricity generation by 2030 and 100% by 2050, through deploying a wide range of renewable energy and storage technologies.^g Enhancing energy efficiency across all sectors—for example, through the electrification of end-use sectors like transport, buildings, and manufacturing—will also be an important element of Southeast Asia's climate mitigation pathway in achieving the Paris Agreement target (footnote g).
- Circular economy models.** Climate change and material use are closely linked. Sixty-two percent of global GHG emissions (excluding those from land use and forestry) are released during the extraction, processing, and manufacturing of goods from raw materials, as compared to 38% that is emitted in the delivery and use of these goods.^h Yet, the global use of materials is accelerating, and has more than tripled since 1970 and could double again by 2050 based on current growth trends.ⁱ With the rapid growth of Southeast Asia's middle-class population, which is projected to account for 67% of the regional population by 2030, total consumption is expected to double between 2020 and 2030, with the largest demand growth anticipated in the food and beverage, electronics, and transport industries where a significant amount of physical inputs and materials are processed.^j It is thus crucial that climate change strategies in the region do not overlook the vast potential of the circular economy, and shift industries away from linear “take-make-waste” models toward regenerative systems where resource inputs and waste are minimized and converted into valuable outputs.

continued on next page

Box 2: continued

- **Healthy and productive oceans.** Scientific research shows that overfishing is likely to both reinforce and exacerbate the harmful impacts of climate change on marine biodiversity. The effects of climate change on oceans such as rising seawater temperatures and ocean acidification have adversely impacted marine biodiversity, including coral reef and fish populations, reducing the threshold beyond which overfishing occurs.^k At the same time, overfishing in oceans disrupts marine ecosystems and threaten the survival of many marine species (footnote k). Southeast Asian countries with a high economic dependence on the oceans are particularly vulnerable. It has been found that globally, coral reef damage will hit Southeast Asian economies the most (in terms of the number of individuals whose livelihoods can be disrupted), particularly Indonesia, the Philippines, and Thailand due to their heavy reliance on marine ecosystems and the large populations of smallholder fishermen who thrive on them for livelihood and sustenance.^l

^a Our World in Data. 2020. *Sector by Sector: Where do Global Greenhouse Gas Emissions Come From?* <https://ourworldindata.org/ghg-emissions-by-sector>. Based on 2016 global greenhouse gas emissions data.

^b K. Tun et al. 2015. Assessment of Land Degradation and its Impact on Crop Production in the Dry Zone of Myanmar. *The International Journal of Sustainable Development and World Ecology*. 22 (6). pp. 533–544. <https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.1080%2F13504509.2015.1091046>.

^c The Global Commission on the Economy and Climate. 2018. *The 2018 Report of the Global Commission on the Economy and Climate: Unlocking the inclusive growth story of the 21st century, Section II: Cities*. https://newclimateeconomy.report/2018/wp-content/uploads/sites/6/2018/09/NCE_2018_FULL-REPORT.pdf.

^d United Nations. Undated. *Cities and Pollution*. <https://www.un.org/en/climatechange/climate-solutions/cities-pollution#:~:text=Cities%20are%20major%20contributors%20to,cent%20of%20the%20Earth's%20surface>.

^e V. Maplecroft. 2018. *84% of World's Fastest Growing Cities Face 'Extreme' Climate Change Risks*. 21 November. <https://www.maplecroft.com/insights/analysis/84-of-worlds-fastest-growing-cities-face-extreme-climate-change-risks/>.

^f S. Sandu et al. 2019. *Energy-Related CO2 Emissions Growth in Southeast Asian countries: Trends, Drivers and Policy Implications*. MDPI. <https://www.mdpi.com/1996-1073/12/24/4650/pdf>.

^g Climate Analytics. 2019. *Decarbonising South and South East Asia*. <https://climateanalytics.org/media/decarbonisingasia2019-fullreport-climateanalytics.pdf>.

^h Circle Economy. *The Circularity Gap Report 2020*. <https://www.circularity-gap.world/2020#interactive>.

ⁱ United Nations Climate Change. 2019. *Circular Economy Crucial for Paris Climate Goals*. 22 January. <https://unfccc.int/news/circular-economy-crucial-for-paris-climate-goals#:~:text=A%20circular%20economy%20is%20a,narrowing%20energy%20and%20material%20loops.&text=Climate%20change%20and%20material%20use%20are%20closely%20linked>.

^j World Economic Forum. 2020. *Future of Consumption in Fast-Growth Consumer Markets: ASEAN*. http://www3.weforum.org/docs/WEF_Future_of_Consumption_in_Fast_Growth_Consumer_Markets_ASEAN_2020.pdf.

^k Carbon Brief. 2011. *Climate Change Interacts with Pollution and Overfishing to Make Bigger Problem for Reefs*. 25 February. <https://www.carbonbrief.org/climate-change-interacts-with-pollution-and-overfishing-to-make-bigger-problem-for-reefs>.

^l *Straits Times*. 2016. *Reef Damage Will Hit South-east Asia Most*. 12 November. <https://www.straitstimes.com/world/reef-damage-will-hit-south-east-asia-most>.

13%, 21%, and 23% of the GDP of Thailand, the Philippines, Indonesia, Cambodia, and Myanmar, respectively.³⁸ The sector also accounts for a substantial share of these countries' employment: at 23% (the Philippines), 28% (Indonesia), 31% (Thailand and Cambodia), and 49% (Myanmar) of total national employment.³⁹ Not harnessing greater productivity efficiencies in this sector could thereby result in significant economic opportunity costs.

³⁸ Data extracted from national statistical sources. These include: National Institute of Statistics of Cambodia. <https://www.nis.gov.kh/index.php/km/>; Badan Pusat Statistik (Indonesia). <https://www.bps.go.id/>; Myanmar Statistical Information Service. <http://www.mmsis.gov.mm/>; Philippine Statistics Authority. <https://psa.gov.ph/>; National Statistical Office of Thailand. <http://web.nso.go.th/>.

³⁹ Data extracted from national statistical sources. These include: National Institute of Statistics of Cambodia. <https://www.nis.gov.kh/index.php/km/>; Badan Pusat Statistik (Indonesia). <https://www.bps.go.id/>; Central Statistical Organization (Myanmar). <https://www.csostat.gov.mm/> (accessed 10 January 2021); Philippine Statistics Authority. <https://psa.gov.ph/>; National Statistical Office of Thailand. <http://web.nso.go.th/>.

However, while there has been a growing focus on such efforts in the focus countries, these have taken place at a limited scale. Such efforts in Indonesia, for example, are currently limited to pilot initiatives or stand-alone projects by the private sector. The country received support from the International Food Agriculture Development to develop the world's first pilot project for farmland regeneration; the \$50 million program trains farmers on regenerative and productive agricultural methods.⁴⁰ There were also several private sector initiatives to develop and promote data-driven precision farming techniques, though the reach of these interventions remains limited. Similarly, in Cambodia, while civil society organizations such as the Cambodia Partnership for Sustainable Agriculture are working to promote investments in sustainable farming technologies, there is scope for government support for sustainable practices such as the use of biofertilizers and cover crops.⁴¹

B. Sustainable Urban Development and Transport Models

This opportunity relates to improving the environmental sustainability of cities and transport systems within them, which entails reducing carbon footprint and GHG emissions, while enhancing overall livability.

- Opportunities include improving spatial planning models to promote denser and better-planned urban developments (e.g., transit-oriented developments).
- Developing sustainable public transport systems and last-mile connectivity (e.g., multimodal public transport systems, corridors for active mobility like walking and cycling paths).
- Promoting electric vehicle adoption.
- Supporting the environmental resilience of cities through mechanisms such as restoring natural ecosystems (e.g., urban wetlands and forests) and nature-based solutions (e.g., energy-efficient and green buildings, green roofs).
- Promoting energy-efficient modes and models of private transport such as electric vehicles and ride sharing (or mobility-as-a-service).
- Greening water supply and wastewater management (e.g., enhance energy efficiency in water cleaning and distribution, reducing water loss through smart metering, wastewater treatment plants that use anaerobic digestion to generate energy).

In the context of the COVID-19 pandemic, future urbanization and urban management models could also be innovated to respond to disease outbreaks—and create healthier cities. For instance, Singapore is exploring how to leverage a nodal urban development approach to contain potential COVID-19 clusters by isolating specific neighborhoods or regions that can cater to their residents' needs rather than placing the entire city on lockdown.⁴² This opportunity has been reflected in regional strategies for COVID-19 recovery. For example, the ASEAN Secretariat's ACRF includes a focus on promoting environmentally sustainable transport options as part of the pandemic recovery effort in the region (footnote 37). Given how COVID-19 has demonstrated how quickly high urban population density can lead to widespread transmission, the ASEAN framework includes a proposal to develop a collaborative platform for Southeast Asian cities to exchange best practices to address the pandemic using technological innovations, including ways of operationalizing contract tracing (footnote 37).

⁴⁰ N. Ervian. 2019. Agriculture Ministry to Train 12,000 Millennial Farmers in Bali. *The Jakarta Post*. 13 March. <https://www.thejakartapost.com/news/2019/03/13/agriculture-ministry-to-train-12000-millennial-farmers-in-bali.html>.

⁴¹ Cambodia Partnership for Sustainable Agriculture. <https://cpsa-growasia.org/en/what-we-do/>; S. Chan. 2018. Experts Discuss Sustainable Agriculture. *Khmer Times*. 13 December. <https://www.khmertimeskh.com/558863/experts-discuss-sustainable-agriculture/>.

⁴² Y. Tham. 2020. Self-Sufficient 'Bubbles' and Other Strategies to Curb Future Outbreaks in Singapore. *Straits Times*. 24 June. <https://www.straitstimes.com/politics/self-sufficient-bubbles-and-other-strategies-to-curb-future-outbreaks>.

Pursuing green growth opportunities in this area is important given the large size and continued growth of many Southeast Asian cities, and the harmful environmental implications of unchecked urbanization. For example, it has been estimated that 316 million people will live in cities in Cambodia, Indonesia, Myanmar, the Philippines, and Thailand by 2030, implying an increase of 58 million new urban dwellers between 2020 and 2030. In particular, the combination of sprawling urban development, inadequate road and transport infrastructure, and rising car ownership (prompted by growing incomes) has led to severe traffic congestion challenges and untapped opportunities for more efficient urban developments.⁴³ For instance, traffic congestion costs the city of Jakarta an estimated \$3.5 billion per year in opportunity costs and operational costs,⁴⁴ similarly costing Manila \$3.2 billion⁴⁵ and Bangkok \$360 billion.⁴⁶ However, the lack of financial resources and inability to attract significant private sector investment have deterred significant improvement to urbanization models in Southeast Asia. An ADB report, for example, estimated that in Indonesia, in 2016, investment in transport infrastructure has remained at 3% of GDP, while at least 7% of GDP is required for new investments and capital replacement.⁴⁷

C. Clean Energy Transitions

This opportunity involves the development of renewable energy projects as well as enhancing the efficiency of energy use across various sectors. There are four key thrusts to this opportunity area: facilitating the phase-out and early retirement of coal-fired power plants, scaling up renewables and storage, developing interconnected grids, and saving energy through demand-side energy efficiency measures. Such solutions should allow countries to build resilience against potential energy supply shocks, while staying resilient to the impact of climate change. There could be significant costs of not investing in this opportunity in Southeast Asia, pertaining to the climate, public health, and energy security. The region's energy demand growth is among the fastest in the world—the International Energy Agency (IEA) reports that the region currently registers one of the world's fastest growth in electricity demand at 6% per year, but the renewable energy sector currently meets only around 15% of this demand.⁴⁸ Although this forecast was made before the COVID-19 pandemic, growth in energy demand is unlikely to change in the long term—with energy production in the region being traditionally dominated by fossil fuels, such as coal in Indonesia, Malaysia, and the Philippines; and oil and gas in Singapore, Thailand, and Viet Nam.^{49,50} Thus, the energy sector generates the region's largest GHG emissions.⁵¹ Aside from impacts on the climate, this also has catastrophic effects on public health. In 2018, Southeast Asia recorded a total of 450,000 premature deaths as a result of energy-related air pollution, and this number is expected to reach at least 650,000 by 2040.⁵² Further, the region has insufficient indigenous fossil fuel resources to meet its growing energy demand, and increasing reliance on imported fossil fuel has important energy security implications (footnote 48). Recognizing the importance of

⁴³ S. Situmorang. 2019. Are There Opportunities for the Private Sector in Indonesia's Urban Transportation Development? *The Business Times*. <https://www.businesstimes.com.sg/asean-business/indonesia-accelerating-urban-transportation-development-with-public-private>.

⁴⁴ S. Harmadi. 2015. How does congestion matter for Jakarta's citizens? *Journal of Indonesian Economy and Business*. 30(3). <https://jurnal.ugm.ac.id/jieb/article/view/10312>.

⁴⁵ J. Regidor. 2012. *Revising the costs of traffic congestion in Metro Manila and their implications*. <https://d0ctrine.files.wordpress.com/2012/08/revisiting-costs-of-congestion-jrfregidor-10aug2012.pdf>.

⁴⁶ *Bangkok Post*. 2016. Study: Bangkok traffic jams cost B11bn. 10 September. <https://www.bangkokpost.com/thailand/general/1082948/study-bangkok-traffic-jams-cost-b11bn#:~:text=Traffic%20jams%20in%20Bangkok%20cost,year%2C%20according%20to%20a%20study>.

⁴⁷ ADB. 2017. *Meeting Asia's Infrastructure Needs*. Manila. <https://www.adb.org/sites/default/files/publication/227496/special-report-infrastructure.pdf>.

⁴⁸ International Energy Agency. 2019. *Southeast Asia Energy Outlook 2019*. <https://www.iea.org/reports/southeast-asia-energy-outlook-2019>.

⁴⁹ G. Thompson. 2020. What is the Future of Energy in Asia After COVID-19? *Wood Mackenzie*. 12 May. <https://www.woodmac.com/news/opinion/what-is-the-future-of-energy-in-asia-after-covid-19/>.

⁵⁰ J. Marquardt. 2017. *How Power Shapes Energy Transitions in Southeast Asia: A Complex Governance Challenge*. New York: Routledge.

⁵¹ S. Sandu et al. 2019. Energy-Related CO₂ Emissions Growth in Southeast Asian countries: Trends, Drivers and Policy Implications. *MDPI*. <https://www.mdpi.com/1996-1073/12/24/4650/pdf>.

⁵² A. Odonkor. 2020. Energy Consumption and CO₂ Emission in Southeast Asia. *CGTN*. 9 October. <https://news.cgtn.com/news/2020-10-09/Energy-consumption-and-CO2-emission-in-Southeast-Asia-UqlD84T1Nm/index.html>.

renewable energy to meet future energy demand, Southeast Asian countries have set a target of securing 23% of their primary energy from renewable sources by 2025.⁵³ In addition to renewable energy development, improving the efficiency of current energy use is also an important opportunity that can ease energy security concerns, while keeping energy bills in check. Enhancing energy efficiency is important across all sectors, and particularly in fast-growing sectors like infrastructure and buildings.⁵⁴ ADB has also been providing support to the region's power sector, particularly on cross-border electricity trading and linking transmission networks, to interconnect areas with strong energy demand and those with rich indigenous energy resources, such as hydropower.⁵⁵ There is a strong opportunity to improve the integration of power systems in the region, as well as improve regional trade and cooperation to scale up renewable energy provision and energy efficiency appliances usage in Southeast Asia.⁵⁶ Moreover, procurement prices for renewables in the region have been falling. While these have been traditionally high, the recent piloting of large-scale renewable energy auctions in the region, such as Cambodia's solar park (the first international auction in the region), led to prices falling drastically (footnote 56). A green recovery approach presents potential to upscale renewable projects across the region.

D. Circular Economy Models

The circular economy refers to an economic system of closed loops in which raw materials, components, and products retain their value as much as possible. A report by Circle Economy finds that the global economy today is only 9% “circular”—meaning that just 9% of the 92.8 billion tons of minerals, fossil fuels, metals, and biomass that enter the economy are re-used annually.⁵⁷ There is thus a strong potential to apply circular principles to minimize resource input, waste, emissions, and energy leakage through a set of interventions encompassing long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling. Green growth opportunities in this area include investments and policies that support the processing of waste and by-products into usable and valuable end products across various sectors. Though the circular economy is relatively nascent, several regional strategies have outlined the importance of this approach for COVID-19 recovery efforts in the region. The ASEAN Secretariat's ACRF, for instance, includes a focus on addressing plastic waste and marine plastic debris in the region by supporting the transition to circular economy models (footnote 37). Several Southeast Asian economies have also started to develop national-level strategies. Indonesia is currently developing its national circular economy road map, with the first phase of work focused on understanding the economic, social, and environmental impact of a circular economy in five sectors: plastics, food, construction, e-waste, and textiles. In June 2020, Thailand unveiled its plan to boost the country's “bio-circular green economy,” which entails establishing a law to recycle waste and plastic packaging, promote the productive use of agricultural waste, and broaden awareness of the circular economy.⁵⁸ However, national circular economy plans in the other focus countries have not yet been established. The Philippines currently has several industry-specific initiatives (e.g., food processing, construction) but does not have an integrated circular economy plan; Cambodia currently only has a pilot waste management strategy.⁵⁹ Moreover, these policies and

⁵³ ASEAN Centre for Energy and International Renewable Energy Agency (IRENA). 2016. *Renewable Energy Outlook for ASEAN*. https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2016/IRENA_REmap_ASEAN_2016_report.pdf?la=en&hash=AB911A21CFC4A91616E2374A137B4091AF006829.

⁵⁴ International Energy Agency. 2020. *Southeast Asia Energy Outlook 2019*. <https://www.iea.org/reports/southeast-asia-energy-outlook-2019>.

⁵⁵ ADB. 2016. *ASEAN-ADB Cooperation Toward the ASEAN Community: Advancing Integration and Sustainable Development in Southeast Asia*. Manila. <https://www.adb.org/sites/default/files/publication/182536/asean-adb-cooperation.pdf>.

⁵⁶ P. Tharakan. 2020. Clean energy transition and a sustained recovery in Southeast Asia, Bradford Seminar delivered on 5 October 2020. Princeton University, US. <https://www.youtube.com/watch?v=sFqbg85w1Is>.

⁵⁷ Circle Economy. *The Circularity Gap Report 2020*. <https://www.circularity-gap.world/2020#interactive>.

⁵⁸ *The Nation Thailand*. 2020. Master Plan for Bt6.5-trn Circular Economy Unveiled. 23 June. https://www.nationthailand.com/business/30390088?utm_source=homepage&utm_medium=internal_referral.

⁵⁹ ADB. 2020. *Circular Economy in the Philippines*. Manila. https://www.adb.org/sites/default/files/project-documents/50158/50158-001-tacr-en_0.pdf; *Bangkok Post*. 2019. Cambodia Puts Circular Economy in Motion. 26 May. <https://www.bangkokpost.com/business/1684204/cambodia-puts-circular-economy-in-motion>.

initiatives have a decidedly downstream focus, in which circularity issues have been largely regarded and tackled as waste management issues, not as broader systemic issues of materials design and utilization.⁶⁰

Worsening environmental degradation and supply challenges, coupled with unsustainable waste management practices across a variety of sectors in Southeast Asian economies, render this an important opportunity to pursue. For example, according to one estimate, just six Southeast Asian countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam) generated a total of 243 million tons of waste in 2016.⁶¹ At present, it is estimated that 53% of the waste generated in Southeast Asia is uncollected. Of the waste that is collected, under a quarter is currently recycled. The remainder is either illegally dumped after collection (around 34% of collected waste) or treated and disposed of (around 43% of collected waste) (footnote 61).

E. Healthy and Productive Oceans

This opportunity entails the sustainable management of wild fisheries by ensuring biologically viable fishing levels, while also improving and scaling sustainable mariculture⁶² and aquaculture in water ecosystems to replenish overexploited fish stocks. Developing mariculture and aquaculture requires innovations in disease management; adopting multi-trophic practices;⁶³ and rethinking feed to expand the culture of species that do not depend on wild-caught fish for nutrition, such as bivalves and seaweed.

There are severe economic and environmental risks to not investing in this opportunity. The fishing industry is important in most Southeast Asian economies, but current unsustainable practices are undermining its productivity. For example, this industry accounts for 1.2% of the GDP in the Philippines and 2.8% in Indonesia, but its future productivity is threatened by the magnitude of overfishing challenges in these economies. Data from Indonesia's National Commission on Stock Assessments in 2017 showed that nearly half of the country's wild fish stocks were overfished, depleting its national fish stock and undermining the productivity of its fisheries.⁶⁴ In Thailand, regulatory changes since late-2015 (i.e., the Royal Ordinance on Fisheries 2015; the Marine Fisheries Management Plan 2015–2019; and the National Plan of Action to Prevent, Deter, and Eliminate Illegal, Unreported, and Unregulated Fishing) have reduced unsustainable fishing practices, in general.⁶⁵ However, some species (i.e., Indian mackerel) are still at risk of being overfished (footnote 65).

While these five green growth opportunities have been discussed separately, they are highly interconnected through the flow of common materials and resources between them, as well as the implications that activities under opportunity have for the other opportunities. For instance, productive and regenerative agricultural techniques and technologies can lead to the development of bioenergy sources (enhancing renewable energy development), minimize the leakage of harmful fertilizers to the oceans (safeguarding the health of oceans), and give rise to new circular economy models such as the recycling and utilization of agricultural

⁶⁰ ASEAN Secretariat and European Union. 2020. *Circular Economy and Plastics: A Gap-Analysis in ASEAN Member States*. <https://environment.asean.org/wp-content/uploads/2020/02/Circular-Economy-gap-analysis-final.pdf>.

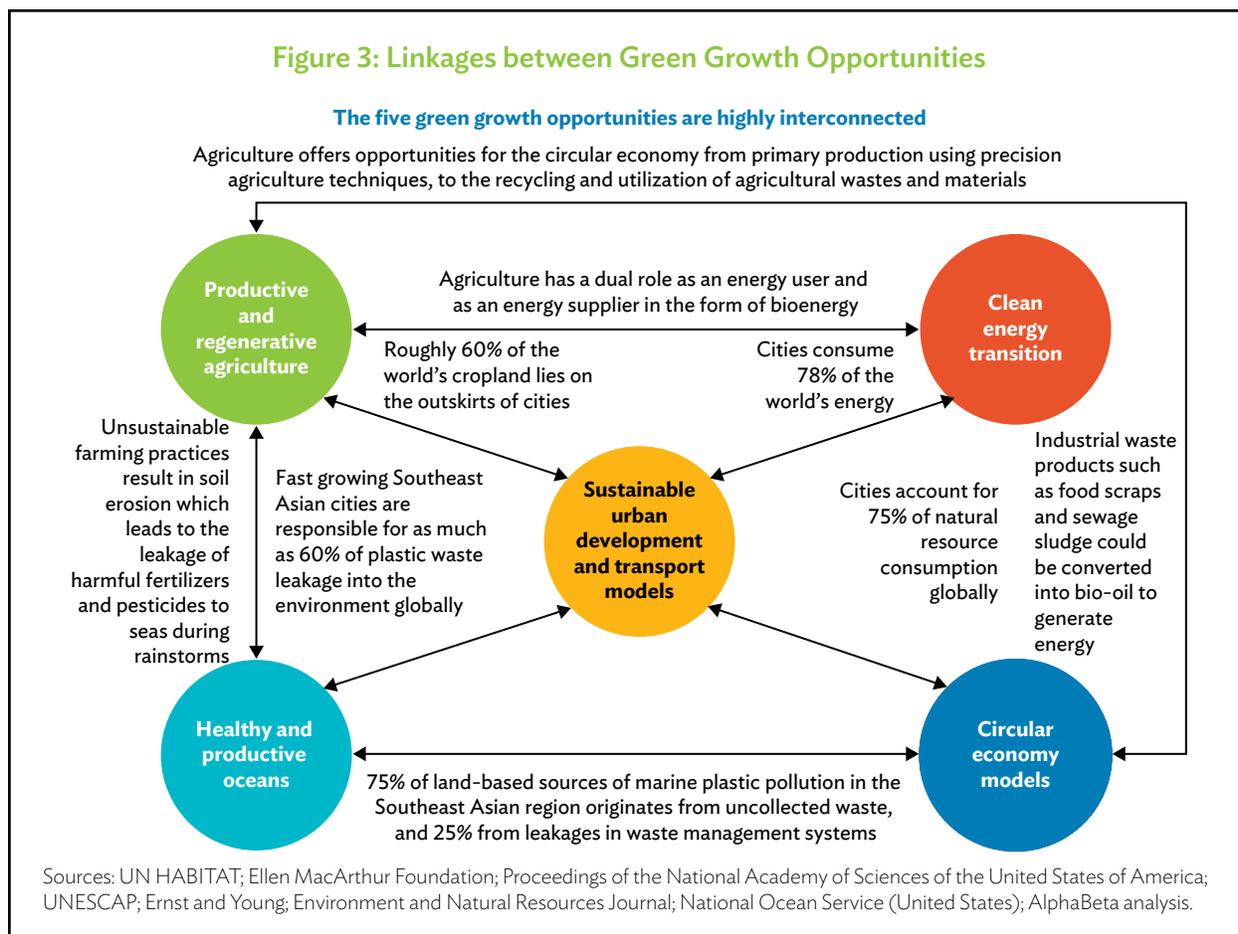
⁶¹ Temasek and AlphaBeta. 2018. *Better Together: Business, Government, Society and our Sustainable Future*. <https://www.ecosperity.sg/en/ideas/better-together-business-government-society-and-our-sustainable-future.html>.

⁶² A specialized branch of aquaculture involving the cultivation of marine organisms for food and other products in the open ocean, an enclosed section of the ocean, or in tanks, ponds or raceways which are filled with seawater.

⁶³ Multi-trophic practices cultivate a variety of ocean-based nutrition such as finfish, shellfish, and marine plants to replicate the food chain in natural ecosystems and diminish pressure on wild fisheries, while reducing the amount of waste generated and the risk of algae bloom.

⁶⁴ J. Thomas. 2019. Indonesia's Fisheries Not Managed Efficiently. *The ASEAN Post*. 11 September. <https://theaseanpost.com/article/indonesias-fisheries-not-managed-efficiently#:~:text=Historical%20and%20ongoing%20overfishing%20has,and%20future%20productivity%20has%20been>.

⁶⁵ P. Noranartragoon. 2019. Maximum Sustainable Yield Assessment in Thailand: A Case of Pelagic Fish in the Andaman Sea. *Indian Ocean Tuna Commission*. <https://www.iotc.org/documents/WPM/10/24>.



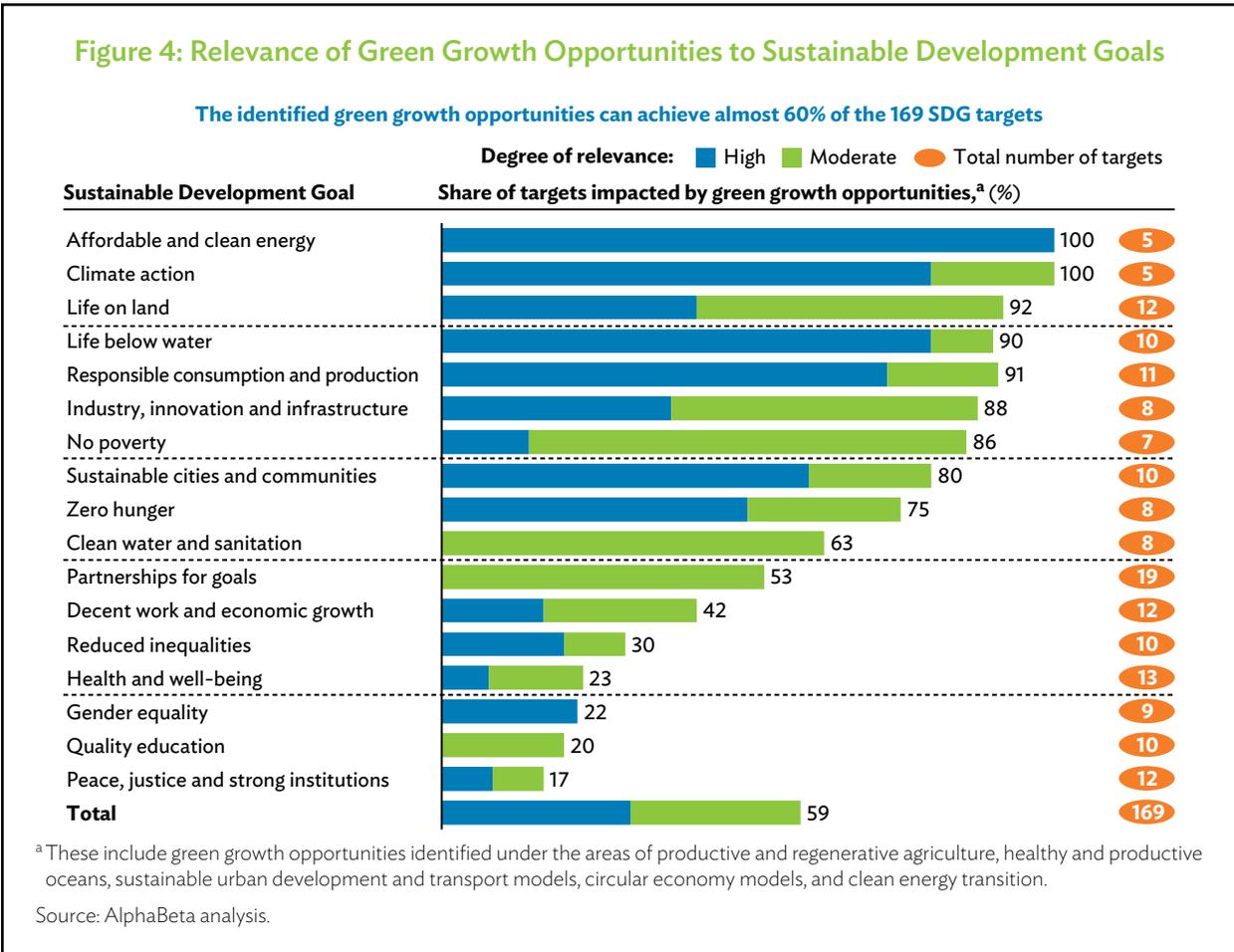
wastes and materials. Figure 3 shows some of the linkages that exist between these opportunities. When developing measures to take advantage of one opportunity, it is, therefore, crucial to consider the implications that it could have for other opportunities, and as far as possible, design strategies that maximize co-benefits across multiple opportunities.

► **These five green growth opportunities can help achieve almost 60% of the UN's Sustainable Development Goal (SDG) targets, create 30 million jobs, and would require \$172 billion of capital investment.**

The green growth opportunities bear strong relevance to the UN SDGs. An analysis of their potential relevance to the full list of 169 targets under the 17 SDGs⁶⁶ reflects that they are somewhat or highly relevant to almost 60% of these targets (Figure 4).

In particular, the SDGs “affordable and clean energy” (e.g., ensuring access to affordable and reliable energy services, and increasing the share of renewable energy in the energy mix); “climate action” (e.g., strengthening

⁶⁶ The 17 Sustainable Development Goals (SDGs) were established under the 2030 Agenda for Sustainable Development, which was adopted by all UN member states in 2015. These SDGs “provide a shared blueprint for peace and prosperity for people and the planet, now and into the future.” Mapped to each of the 17 SDGs are a number of detailed targets. There are a total of 169 targets under the 17 SDGs. Source: United Nations, Department of Economic and Social Affairs. <https://sdgs.un.org/goals>.



resilience to climate-related hazards and disasters); and “life on land” (e.g., restoring degraded land and soil, sustainably using biodiversity systems) have the greatest scope that can be achieved through the five green growth areas, with 90%–100% of their targets being somewhat or highly relevant to these areas. While the SDG “gender equality” appears to demonstrate relatively less (but still significant) relevance as compared to the environment-related SDGs, it is a critical element of the green growth opportunities (Box 3).

The economic development potential linked to these five growth opportunities is also substantial. If leveraged fully, these growth opportunities can create around 30 million jobs in Southeast Asia by 2030 and would require \$172 billion in capital investment (Figure 5; see Appendix 3 for sizing assumptions and methodology).

The estimated economic value and job creation impacts, as well as capital expenditure (CAPEX) requirements for each area of green recovery are discussed below.

- **Productive and regenerative agriculture.** Taking advantage of green growth opportunities in this area in Southeast Asia could create 6.5 million jobs by 2030 and requires an annual CAPEX of \$6.9 billion through to 2030. In particular, expanding the organic food and beverage sector could create up to 2 million jobs across the region as the global demand for nongenetically modified food products increases. Box 4 provides an example with the use of precision agriculture in Indonesia.

Box 3: Addressing Gender Inequality through Green Growth Opportunities

Given the differential access that women in Southeast Asian economies typically face with regard to capacity building, technologies, and financing, the five green growth opportunities carry potential to address gender inequality in the region.

Capacity-building efforts and technology dissemination for **productive and regenerative agriculture** can help address gender inequality in the agriculture sector. Though women and girls make up almost half of the agriculture workforce in Southeast Asian economies, they tend to face a variety of obstacles relative to men in getting access to training, machinery, and new technology.^a Moreover, the challenges they face in accessing land ownership, extension services, and finance impact their ability to implement more productive, cost-efficient, and environmentally sustainable farming techniques such as precision farming.

In relation to **healthy and productive oceans**, there is strong scope for interventions to help address the existing challenges faced by women in the fishing industry. Women tend to be more involved in low-paying roles such as fish processing and harvesting of less valuable fish, compared to men who tend to take on offshore and high-value fishing, fish harvesting, and aquaculture.^b Moreover, women are also rarely given a seat on the local, regional, national, or international bodies that deliberate on the laws governing oceans. It has been argued that the lack of gender diversity in this industry stifles innovation, productivity, and creativity.^c Interventions to ensure that women are provided with adequate education and avenues to deliberate on these issues, and also to participate equally in sustainable and high-value fishing activities, will be an important step forward.

Interventions in the area of **sustainable urban development and transport** have to be guided by a strong understanding of the gender impacts of rapid urbanization in Southeast Asian cities. These include the impacts of rural–urban migration, crime, slum development on city outskirts, poor quality of urban services such as water and sanitation, and transport systems—of which adverse impacts tend to fall disproportionately upon women due to generally lower income-earning opportunities.^d Sustainable urban development plans should ensure that cities are designed with gender neutrality in mind, for instance, that public spaces are safe, brightly lit, and encourage “mutual policing” to deter crime (which tend to have more impact on women).

Finally, in the areas of **circular economy models** and the **clean energy transition**, there is great scope to ensure that women are provided access to livelihoods in the new markets created by both opportunities. A circular economy can generate economic opportunities for women, in particular, in recycling and waste management, while minimizing risks associated with waste picking and manual recycling. Evidence from Indonesia has shown how female employment in waste management enables the creation of circular products and upgrades their socioeconomic position.^e Women in developing countries more often work in jobs with low pay, low security, and limited social mobility. According to the International Labour Organization, the rise of “green jobs” due to the circular economy movement could offer an opportunity to empower women.^f

^a A. Ignaciuk and N. Tun. 2019. *Achieving Agricultural Sustainability Depends on Gender Equality*. International Food Policy Research Institute. 23 October. <https://www.ifpri.org/blog/achieving-agricultural-sustainability-depends-gender-equality>.

^b Food and Agriculture Organization of the United Nations. 2015. *The Role of Women in the Seafood Industry*. <http://www.fao.org/3/a-bc014e.pdf>.

^c L. Liswood. 2019. *Women’s Voices Must be Heard in the Battle to Save the Ocean*. World Economic Forum. 11 January. <https://www.weforum.org/agenda/2019/01/womens-voices-must-be-heard-in-the-battle-to-save-the-ocean/>.

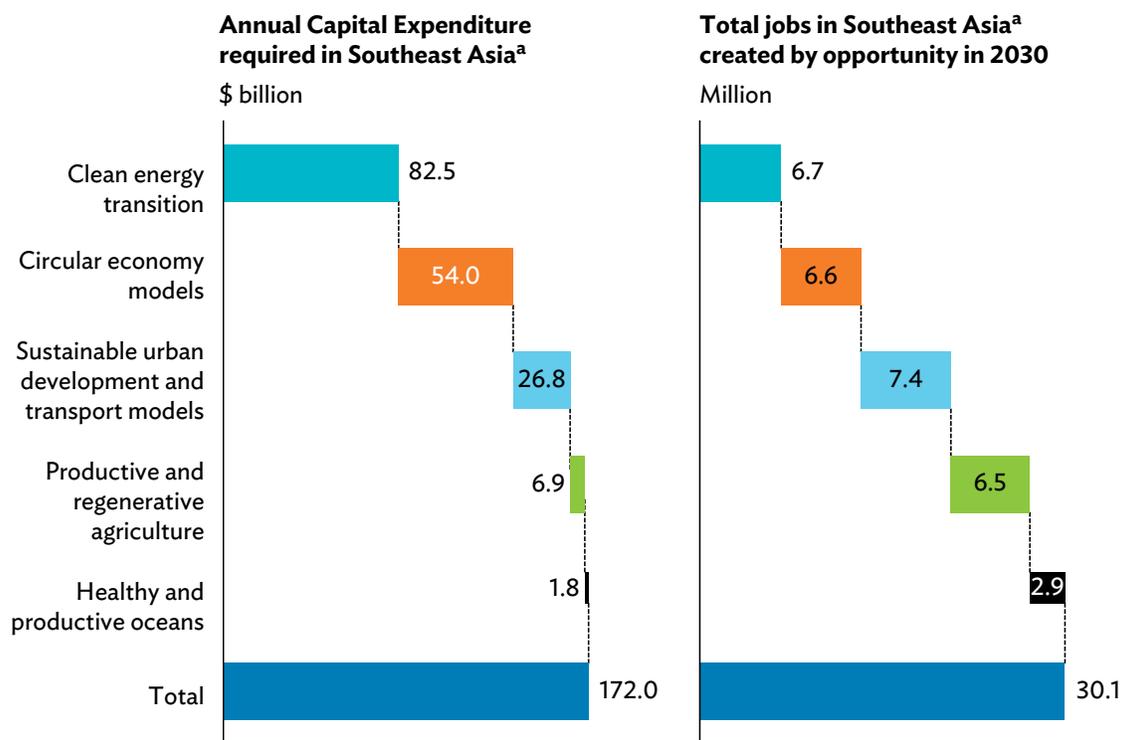
^d United Nations Women Watch. Undated. *Gender Equality and Sustainable Urbanisation*. <https://www.un.org/womenwatch/feature/urban/factsheet.html>.

^e R. Rokis and P. Silaturrahmi. 2018. *Empowering Women in Waste Management Work Setting Through Community Recycling-Upcycling Project: Cases of Malaysia and Indonesia*. <http://irep.iium.edu.my/65337/>.

^f International Labour Organization. 2015. *Gender equality and green jobs*. https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_360572.pdf.

Figure 5: Capital Investment Requirements and Job Creation Impacts of Green Growth Opportunities

Five green growth opportunities, requiring over \$172 billion worth of Capital Expenditure could create 30 million jobs in Southeast Asia by 2030



CAPEX = capital expenditure.

^a The estimate relates to 10 Southeast Asian nations: Brunei Darussalam, Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam.

Sources: World Economic Forum; Literature review; AlphaBeta analysis.

- Sustainable urban development and transport models.** Developing sustainable urban infrastructure, such as bus rapid transit systems and flood management systems, would require \$26.8 billion in annual investments and create 7.4 million jobs by 2030 in Southeast Asia. There are significant benefits associated with these opportunities. For example, ADB estimates that between 2%–5% of GDP is lost in Asian economies due to congestion.⁶⁷ Similarly, Lloyds estimates that around 2.5% of GDP in cities is at risk of loss due to flooding.⁶⁸
- Clean energy transitions.** Green growth opportunities in this area could create 6.7 million jobs in Southeast Asia and would require \$82.5 billion worth of investments annually. The potential for renewables in Southeast Asia is significant and growing: for example, though the contribution of solar photovoltaics (PVs) and wind-to-energy supply remains small in the region, their deployment costs are falling and could be cost-effective to scale. In 2016, record low prices were observed for utility-scale solar PVs and onshore wind—at as low as \$0.03 per kilowatt-hour (kWh) for the lowest-cost project proposals (footnote 53). In addition, as earlier described, renewable

⁶⁷ ADB. *Urban Transport*. <https://www.adb.org/what-we-do/sectors/transport/overview>.

⁶⁸ Lloyds. 2018. *City Risk Index*. <https://assets.lloyds.com/media/727a18b8-34c9-4d4b-b16f-d0b3e7f7fb61/pdf-billions-at-risk-lloyds-city-risk-index-political-risk-v3.pdf>.

Box 4: Precision Agriculture in Indonesia

Although agriculture provides employment to about 41% of Indonesia's workforce, many farmers operate on a subsistence level and farming practices remain low-tech.^a There have been a number of recent private sector initiatives, however, that introduce digital innovations to improve productivity in the sector.

One such initiative is local start-up Habibi Garden's Internet of Things (IoT)-based precision farming platform. The platform deploys a central device that connects to sensors placed in farms that record data on light intensity, humidity, moisture, nutrients, which are then sent to and consolidated in a central cloud platform.^b This information is then processed and used to control on-the-ground devices such as water pumps to supply water to the field when required. Farmers are also able to use the platform to monitor data on their fields.

Another initiative called HARA is a smart-farming solution that helps Indonesian farmers to improve yields by providing data-driven insights into farm and field potential, input and supply management, and proactive mitigation of pests and disease. Developed by local data analytics firm Dattabot in partnership with cloud provider Predix and General Electric, HARA analyzes a combination of historical data, manual feedback, input from sensors, and satellite imagery. It has improved crop yields by an average of 60%, while reducing farming inputs by 50% and crop failure rates by 25%.^c

^a N. Freischlad. 2015. Drones Over the Rice Paddy: Ci-Agriculture Brings Smart Tech to the Field. *Tech In Asia*. 13 May. <https://www.techinasia.com/ci-agriculture-precision-farming-indonesia>.

^b Habibi Garden. <https://www.habibigarden.com/habibigrow.html>.

^c General Electric. Undated. *Dattabot and GE Work to Secure the Future of Agriculture in Indonesia*. https://www.ge.com/digital/sites/default/files/download_assets/Dattabot-GE-Predix-case-study.pdf.

energy investments have been found to be more effective than other types of fiscal spending in boosting jobs, spending, and GDP in the short run.⁶⁹ Two related opportunities in this area of green recovery are grid connectivity and enhancing energy efficiency. Grid interconnectors allow electricity to be transmitted between regional grids, improving economies of scale and helping to balance demand during peak periods. Interconnection is particularly important as the penetration of variable renewable energy increases. Grid connectivity in Southeast Asia is less developed than in Europe, but the opportunity is significant. Research by the Economic Research Institute for ASEAN and East Asia has estimated that there could be net savings to the Southeast Asian power system of up to \$9.1 billion (\$12 billion) by 2035 through an integrated transmission system enabling the growth of renewables. Many of these opportunities could also be pursued bilaterally. Finally, while approaches that expand energy supply and reach are important to ensure that energy needs are met sustainably in the long term, enhancing energy efficiency is an important near-term priority that aims to first reduce the need for energy.⁷⁰ Such reductions may occur by decreasing energy losses in the supply chain for improved performance in the production and delivery of electricity and heat (supply-side energy efficiency). Another approach is improved efficiencies at the point of final energy consumption, for example, when operating tools, products, and machinery, or through green retrofits made to buildings such as the IoT-based sensors that deliver real-time insights into the energy consumption of buildings and smart meters (demand-side energy efficiency). A final area is related to "climate-proofing" energy investments. For example, increases in water temperature are likely to reduce generation efficiency, especially where water availability is also affected; and increases in air temperature will reduce generation efficiency and output as well as increase customers' cooling demands, stressing the capacity of generation and grid networks.⁷¹

⁶⁹ Oxford Smith School of Enterprise and the Environment, University of Oxford. 2020. *Will COVID-19 Fiscal Recovery Packages Accelerate or Retard Progress on Climate Change?* <https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf>.

⁷⁰ Development Asia (An ADB initiative). 2019. *Accelerating Energy Efficiency in Asia*. 29 May. <https://development.asia/summary/accelerating-energy-efficiency-asia>.

⁷¹ ADB. 2013. *Guidelines for Climate Proofing Investment in the Energy Sector*. Manila. <https://www.adb.org/sites/default/files/institutional-document/33896/files/guidelines-climate-proofing-investment-energy-sector.pdf>.

- **Circular economy models.** Green growth opportunities in this area, if fully leveraged, can create a total of 6.6 million jobs and will require \$54 billion worth of annual capital investments by 2030 in Southeast Asia. Indonesia is currently developing its national circular economy road map, with the first phase of work focused on understanding the economic, social, and environmental impact of a circular economy in five sectors: plastics, food, construction, e-waste, and textiles. The initial estimates suggest the opportunity is significant. The circular economy could create 5.1 million net jobs, of which over three-quarters could be for women, and boost GDP in 2030 by 2.7%.⁷² Box 5 shows an example of a private sector circular economy initiative in the country.

Box 5: Private Sector Initiatives in Developing Indonesia's Circular Economy

Magalarva, an Indonesian company, has developed an innovative way to transform food waste into useful products. After its founders visited Jakarta's Bantar Gebang landfill in 2017, they decided to help reduce the amount of organic waste ending up in landfills. Using the black soldier fly and its larvae to accelerate the decomposition process, the Jakarta-based start-up converts food and other organic waste into protein used for animal feed, pet food, and organic fertilizer.

Magalarva currently produces around 50 tons of larvae and 30 tons of organic fertilizer, processing more than 200 tons of organic waste daily, which it sources through partnerships with hotels and food manufacturers such as Shangri-La Hotels and Multi Bintang. It was reported in 2019 that the company secured seed funding of \$500,000 to expand its operation and conduct further research on production efficiency and automation.

Sources: Magalarva. About Magalarva. <https://magalarva.com/about>; *The Jakarta Post*. 2019. Sustainable protein producer Magalarva secures D500k in funding. 22 June. <https://www.thejakartapost.com/youth/2019/06/22/sustainable-protein-producer-magalarva-secures-500k-in-funding.html>.

- **Healthy and productive oceans.** Sustainable management of fish stocks in Southeast Asia could create over 2.9 million jobs while requiring \$1.8 billion in annual investments. Investments in sustainable aquaculture are crucial as the global share of protein consumption from wild fisheries and aquaculture is expected to increase from 7% in 2018 to 11% in 2030.⁷³ The opportunity for sustainable aquaculture in Southeast Asia alone is valued at over \$17.9 billion in 2030.

⁷² BAPPENAS and UNDP. 2021. *The Economic, Social, and Environmental Benefits of a Circular Economy in Indonesia*. Jakarta. Available at: <https://alphabeta.com/wp-content/uploads/2021/03/210127-designed-english-full-report-web.pdf>.

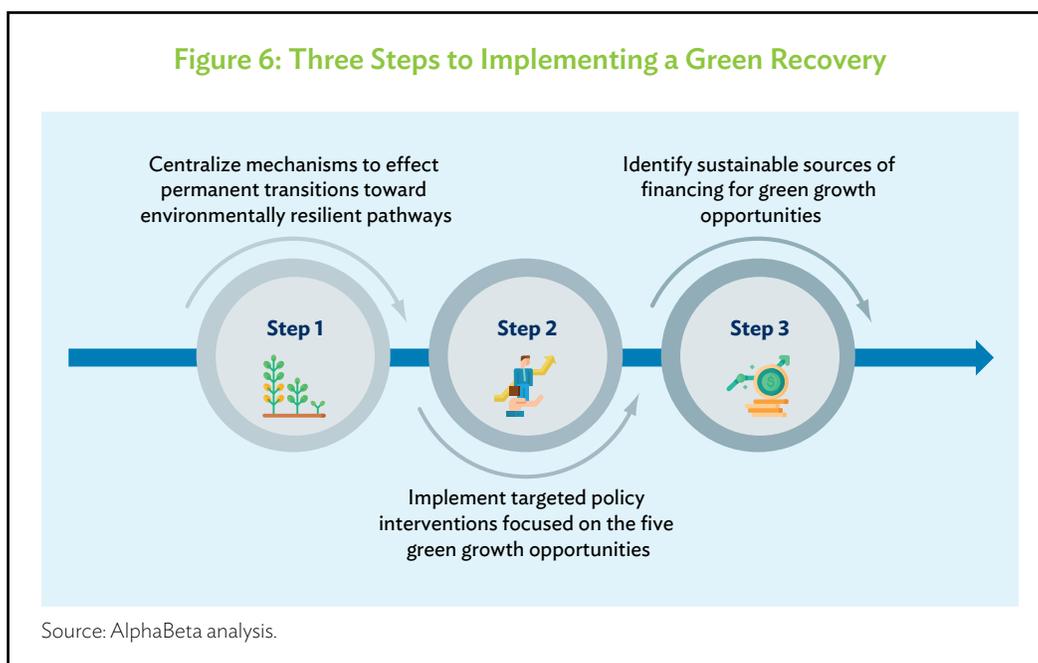
⁷³ Food Innovation Australia Limited and AlphaBeta. 2019. *Protein Market: Size of the Prize Analysis for Australia*. https://alphabeta.com/wp-content/uploads/2021/01/fial_proteinreport_spread_circulation.pdf.

SECTION V

Three Steps for a Green Recovery

► Implementing a green recovery in Southeast Asia requires three key steps.

Three key steps are involved in implementing a green recovery process that shifts Southeast Asian economies permanently to low-carbon and environmentally resilient pathways (Figure 6). First, to ensure the longevity of environmentally positive outcomes, mechanisms including institutional reforms and internal government capacity building will need to be established to ensure that green recovery policies effect transformative and permanent benefits for the environment. Second, governments can implement a series of targeted policy interventions that help achieve the five prioritized green growth opportunities; while these are by no means exhaustive and relate to the five focus countries in varying degrees, they provide a good starting point for anchoring green recovery. Third, leveraging sustainable sources of financing for green growth opportunities is critical. Throughout this process, there is a strong role for international collaboration to support knowledge and capacity building for the implementation of green recovery programs.



Step 1: Centralize mechanisms to effect permanent transitions toward environmentally resilient pathways.

Green considerations will need to be centralized into all COVID-19 recovery measures. COVID-19 recovery packages will need to have specific environmental considerations attached, such as environmental targets (e.g., limits on carbon emissions) and impact assessments (that estimate a policy's potential environmental impacts before deciding if it gets implemented). Concerted effort will need to be made to target recovery financing and support toward the green growth areas identified in this report. Further, to ensure that the green recovery process from the pandemic goes beyond injecting temporary green investments and builds in permanent shift toward environmentally resilient pathways, “green” objectives such as climate mitigation and adaptation and safeguarding against biodiversity loss will need to be mainstreamed into all policies beyond COVID-19 response measures. At the same time, policies that could lead to “brown” or environmentally detrimental outcomes will need to be identified and correspondingly managed. While the notion of discerning the greenness of policies is not entirely new to Southeast Asia, this practice, where implemented, has often focused only on identifying portions of national budgets that go to green projects, in a process known as “green tagging.” Indonesia, for example, has implemented this as part of its journey to achieving the UN SDGs.⁷⁴ In the context of Southeast Asia and the five focus countries, there are four key mechanisms to effect such permanent shifts:

- **Develop core green growth policies that are embedded across broader economic policy which are also translated well into sector policies and plans.** As part of its sustainable development strategy, the German government established a cross-ministry forum on resource efficiency so that individual departments took proper account of trade-offs or potential shared benefits in policies being pursued by different government ministries.⁷⁵ Mexico and the Republic of Korea have also established presidential steering groups to drive more integrated approaches to green growth. These mechanisms must be designed carefully to ensure they help achieve the required coordination across sectors without unduly increasing bureaucratic complexity.
- **Take a green lens in all policy interventions.** A number of principles can help ensure that green growth considerations are incorporated into policy interventions. Some examples are provided in Box 6.
- **Build a rigorous approach to data collection and target setting.** It will be important for countries to establish a consolidated database of relevant information related to environmental performance and potential impacts, from which government officials can draw upon to evaluate specific policies and programs and set targets. Clearly quantified environmental targets form a key component of the COVID-19 green recovery plans observed to date. The European New Deal sets a bloc-wide goal of net zero carbon emissions by 2050 and a 55% cut in emissions by 2030 (as compared with 1990 levels); the Republic of Korea's Green New Deal aims for net zero emissions by 2050.⁷⁶

⁷⁴ D. Rulliadi. 2019. *Climate Budget Tagging and Green Sukuk/Islamic Bond: An Indonesian Experience*. Sherpa's Meeting: Finance Minister Coalition for Climate Action. <https://www.financeministersforclimate.org/sites/cape/files/inline-files/Session%204%20-%20Indonesia%20CBT%20and%20Green%20Bonds.pdf>.

⁷⁵ International Resource Panel. 2011. *Decoupling natural resource use and environmental impacts from economic growth*. <https://www.resourcepanel.org/reports/decoupling-natural-resource-use-and-environmental-impacts-economic-growth>.

⁷⁶ Sources include European Commission. 2020. *Recovery Plan for Europe*. https://ec.europa.eu/info/strategy/recovery-plan-europe_en#the-largest-stimulus-package-ever; World Economic Forum. 2020. *Billions for Sustainable Investments – Germany's Plan for a Green Recovery*. 2 July. <https://www.weforum.org/agenda/2020/07/germany-green-recovery-billions-sustainable-investments/>; J. Lee and J. Woo. 2020. *Green New Deal Policy of South Korea: Policy Innovation for a Sustainability Transition*. MDPI. <https://www.mdpi.com/2071-1050/12/23/10191/pdf>; ADB. 2020. *Green Finance Strategies for Post-COVID-19 Economic Recovery in Southeast Asia*. Manila. <https://www.adb.org/publications/green-finance-post-covid-19-economic-recovery-southeast-asia>.

Box 6: Principles for Designing Green Policy Interventions

For green recovery policies to be truly transformative and long-lasting in their impacts, they need to be carefully designed to deliver non-ambiguous market signals and incentives for greener growth. Drawing upon lessons from both the ongoing coronavirus disease (COVID-19) and previous crises (such as the Global Financial Crisis of 2007–2008), there are four key principles for optimal green policy design:

1. **Ensure that “green” measures are not undermined by “brown” interventions.** While “brown” interventions are necessary for short-term economic relief, conditionality stipulations should be considered to cement countries’ pathways toward green transitions. This has been evident in the COVID-19 crisis. The pandemic’s severe impact on international travel has led to a number of COVID-19 stimulus budgets worldwide being focused on the emissions-intensive airline industry. While such climate-negative policies are unavoidable (particularly given the economic importance of this industry in some countries), they can be designed to have long-term positive climate outcomes by attaching appropriate conditions. For instance, government bailouts of airline companies could be made conditional upon them developing measurable plans to transition toward a net-zero-emissions future (e.g., achieve net zero emissions by 2050, with intermediate targets set at 5- or 10-year intervals).^a In some Organisation for Economic Co-operation and Development (OECD) countries, support for corporate recovery has been linked to taking measures that align with the transition needed to meet Paris Agreement commitments in order to send strong signals to the private sector to support the innovation needed to drive a green economy.^b
2. **Understand how long different policies will take to register their impacts.** Given that it is unclear how long the pandemic will last globally and in the Southeast Asian region, as well as whether the current recession will progress to a deeper depression with possible default cascades,^c it is important to have a good understanding of the impact time frames of different policies and strategize on their implementation to ensure that the required economic boosts are delivered at each stage. Rescue packages—referring to emergency measures to protect balance sheets, jobs, and address immediate human welfare concerns (such as welfare payments)—were appropriate during the lockdown phase despite their limited scope for a green recovery. In the short-term following the lockdowns, fast-acting climate-friendly policies, such as energy-efficient building retrofits, should be implemented to generate jobs and demand in the short term, while improving climate resilience (footnote a). Policies requiring capacity building and skills development, development of new technologies, as well as fundamental shifts in demand patterns of businesses and consumers toward green products and services (e.g., through carbon taxes) could require medium- and long-term time frames to take effect (footnote a). Consideration should also be given to interventions that require certain prerequisites to be effective. For example, Extended Producer Responsibility frameworks for plastics are much more effective if a mandatory reporting mechanism is in place.
3. **Capture complementary benefits where possible.** As illustrated throughout this report, beyond positive macroeconomic and environmental impacts, there are various other benefits associated with the green growth opportunities, such as the improvement of socioeconomic outcomes for women and rural development (analysis of the relevance of five green growth opportunities to the UN’s SDGs is discussed in Section IV). The design of policy measures to anchor these opportunities should be cognizant of such benefits. For instance, in the agriculture sector, smallholder farmer support programs could be leveraged to address current gaps in access to training, machinery, and new technology faced by women and girls, who account for almost half of the sector’s workforce in Southeast Asian economies.^d Low-income household investment programs for green products and grid connectivity plans can increase rural electrification and improve socioeconomic opportunities for rural inhabitants.^e
4. **Ensure transparency in contracts and processes relating to public–private partnerships.** Greater transparency and disclosure in contracts and processes relating to public–private partnerships (PPPs) and large public procurement exercises will help deliver better value for money through improved governance

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Box 6: *continued*

and stimulating competition. A report by the World Bank Group recommends a framework for disclosure in such projects, and the recommended elements include (but not limited to): a clear legislative and/or policy mandate (e.g., provision of a general coverage of contracts entered into by public authorities including ongoing performance information); detailed guidance for the project (e.g., timelines, validation requirements); pre- and post-procurement disclosures (e.g., reasons behind choice of PPP, financial information); and timelines (e.g., project time frames).^f

^a Oxford Smith School of Enterprise and the Environment, University of Oxford. 2020. *Will COVID-19 Fiscal Recovery Packages Accelerate or Retard Progress on Climate Change?* <https://www.smithschool.ox.ac.uk/publications/wpapers/workingpaper20-02.pdf>.

^b OECD. 2020. *COVID-19 and the Low-Carbon Transition: Impacts and Possible Policy Responses*. <http://www.oecd.org/coronavirus/policy-responses/covid-19-and-the-low-carbon-transition-impacts-and-possible-policy-responses-749738fc/>.

^c J. Stiglitz. 2020. *Four Priorities for Pandemic Relief Efforts*. Roosevelt Institute. <https://rooseveltinstitute.org/publications/four-priorities-for-pandemic-relief-efforts/>.

^d A. Ignaciuk and N. Tun. 2019. *Achieving Agricultural Sustainability Depends on Gender Equality*. International Food Policy Research Institute. 23 October. <https://www.ifpri.org/blog/achieving-agricultural-sustainability-depends-gender-equality>.

^e M. Aklin et al. 2018. *Escaping the Energy Poverty Trap*. MIT Press.

^f World Bank Group. 2015. *A Framework for Disclosure in Public-Private Partnerships*. <http://pubdocs.worldbank.org/en/773541448296707678/Disclosure-in-PPPs-Framework.pdf>.

- **Ensure government officials have the right skills to help them execute a green growth agenda.** Capacity building within the government on areas such as proper assessment of socioeconomic and environmental impacts of policies and understanding barriers to green growth opportunities can be achieved through running regular workshops with key policy makers from different ministries, and developing policy handbooks containing such information as well as a step-by-step of how “green” mainstreaming can be conducted as part of the process of all policy development. For example, the ASEAN Secretariat has a capacity-building program helping city-level leaders implement sustainable urbanization projects, which includes workshops and tailored technical support with the goal of developing clear strategic plans for implementing key identified opportunities.⁷⁷

Step 2: Implement targeted policy interventions focused on the five green growth opportunities.

Based on a review of the barriers to capturing the identified green growth opportunities (highlighted earlier) and best practice policy approaches in the region and globally,⁷⁸ a set of example policy interventions that can support the growth of the five selected green growth opportunities in Southeast Asian economies have been identified. While these opportunities are by no means exhaustive and their degree of relevance to each Southeast Asian economy varies (e.g., based on the extent to which it is additive to existing policy in the country, and the scale of the environmental challenge the intervention addresses), they provide a strong starting point for countries in the region to anchor their green recovery approach. There has also been evidence that some of these policies have provided effective stimulus boosts in the past (for other economies), or that they have the potential to do so.

⁷⁷ ASEAN Secretariat. 2019. *ASEAN Sustainable Urbanisation Strategy (ASUS) Socialisation Forum*. <https://asean.org/asean-sustainable-urbanisation-strategy-asus-socialisation-forum/>.

⁷⁸ World Economic Forum and AlphaBeta. 2020. *The Future of Nature and Business*. http://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf.

Figure 7 outlines the policy interventions and how they map to each of the five green growth opportunities. While these are depicted as discretely mapping to the opportunities, some interventions address more than one opportunity—for instance, building energy-efficient retrofits in buildings address both the opportunities of sustainable urban development and energy efficiency. Table 4 provides brief descriptions of each intervention, while their full details (including potential impact and how they relate to existing national policies) are shown in Appendix 4. It is crucial to note that the five focus countries are not starting from zero; some have implemented relevant policies that reflect strong starting points for green recovery measures (Box 7).

Given that SMEs account for over 95% of all enterprises and between 23% (for Brunei Darussalam) and 58% (for Indonesia) of GDP in ASEAN economies, their role in fostering a green recovery should not be underestimated. Across these identified policy levers, support for SMEs to participate in green growth opportunities should be considered from both a supply and demand perspective. On the demand side, it is important that SMEs are made aware of how to unlock these opportunities through awareness campaigns and skills development programs (e.g., informing SMEs on the importance of adopting green technologies). On the supply side, measures like dedicated financial support (e.g., in the form of de-risking instruments and guarantees for SMEs developing green products) and innovation grants should be provided to support the development of green technologies by SMEs.

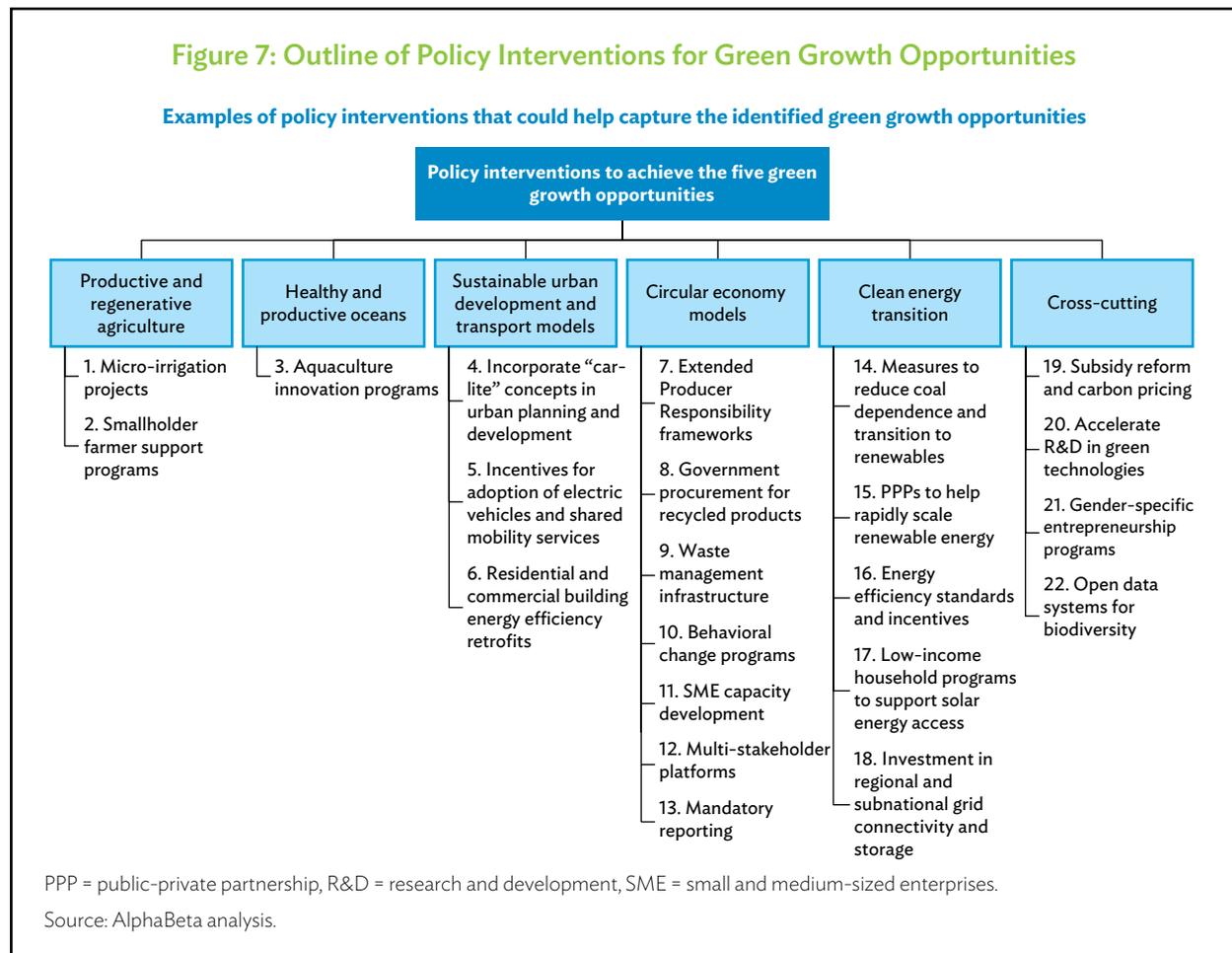


Table 4: Examples of Policy Interventions for Green Growth Opportunities

| No. | Policy Intervention | Description |
|---|--|---|
| Productive and regenerative agriculture | | |
| 1 | Micro-irrigation projects | More efficient irrigation techniques (e.g., sprinkler and drip irrigation systems, instead of flood irrigation), which can save water and improve yields. |
| 2 | Smallholder farmer support programs | Measures that sustainably improve farm yields such as extension services, improved access by farmers to capital to fund the acquisition of necessary equipment, aggregation mechanisms to achieve economies of scale among smallholders, providing subsidies and capacity building for the use of “smart agriculture” technologies, and improving links to markets. |
| Sustainable urban development and transport models | | |
| 3 | Incorporate “car-lite” concepts into urban planning and development | Car-lite urban planning and development entails reducing the dependence of city dwellers on cars through the development of public transport systems and “pedestrianizing” roads. |
| 4 | Incentives for the adoption of electric vehicles and shared mobility services | Besides promoting public transport, private transport can also shift toward lower-carbon pathways through the increased adoption of electric vehicles and shared mobility services. |
| 5 | Residential and commercial building energy efficiency retrofits | Energy-efficient retrofits in buildings help reduce energy consumption and include natural ventilation features, solar shading devices for windows or insulated windows, and smart utility meters. |
| Clean energy transitions | | |
| 6 | Measures to reduce coal dependence and transition to renewables | These include policy measures to acquire and retire coal plants, as well as technical assistance, financing, and financial models to rapidly scale up renewable technology, supporting job creation. |
| 7 | Public-private partnerships (PPPs) to help rapidly scale renewable energy | Development of renewable energy zones structured as PPPs. This could involve the government providing land and transmission access, with the private sector providing power generation capacity based on a long-term power purchase agreement. |
| 8 | Energy efficiency standards and incentives | Enhancing existing energy efficiency standards for products to (i) include more ambitious improvement benchmarks for example Japan’s Top Runner program in which manufacturers are requested to improve the energy efficiency of their products to the top level of the benchmark within a specified period; and (ii) create guidelines for public procurement to buy products and services with certain energy efficiency performance. |
| 9 | Low-income household programs to support solar energy access | Provide support for energy access in remote areas using off-grid solutions such as solar. |
| 10 | Investment in regional and subnational grid connectivity and storage | Grid interconnectors allow electricity to be transmitted between subnational and cross-national grids, improving economies of scale and helping to balance demand during peak periods. Interconnection is particularly important as the penetration of variable renewable energy increases. This could be accompanied by investments in battery storage to further support the integration of renewables into energy grids. |
| Circular economy models | | |
| 11 | Establishing Extended Producer Responsibility (EPR) frameworks for packaging waste | EPR is a policy approach under which producers are given a significant responsibility—financial and/or physical—for the treatment or disposal of post-consumer products. |
| 12 | Government procurement programs for recycled products | Government procurement represents between 5% to 8% of economic output in Southeast Asian economies and could be an important stimulus for encouraging the use of recycled products, such as plastics. ^a |

continued on next page

Table 4: continued

| No. | Policy Intervention | Description |
|--------------------------------------|---|---|
| 13 | Developing waste management infrastructure | Crucial waste management infrastructure is needed to improve plastic waste collection rates and prevent leakage of waste into the environment. This ranges from ensuring sufficient refuse bins at convenient locations; frequent waste collection services (e.g., door-to-door); as well as infrastructure with safety features to isolate waste until they are not harmful to the environment (i.e., sanitary landfills). |
| 14 | Public awareness and behavioral change programs to support a circular economy | These programs will seek to address a lack of understanding of how to properly segregate waste, and of sustainable product alternatives that can be targeted at both mass consumers and businesses. |
| 15 | Support for capacity development of small and medium-sized enterprises (SMEs) on the circular economy | Organize events to increase awareness of SMEs of how waste-streams and by-products in their operations can be converted into valuable end products. Collaboration with large corporations and organize technical learning workshops on topics such as access to finance, communications, and design thinking. |
| 16 | Developing multi-stakeholder platforms for the circular economy | Countries are starting to form platforms to bring together stakeholders from different sectors, nongovernment organizations, academia, and government to align on taking advantage of opportunities in the circular economy, and this can be furthered through platforms organized across countries. |
| 17 | Mandatory reporting on packaging waste | Businesses are required to report annually on the different types and amounts of waste they place on the local market. This brings comprehensive and credible information on the volume of packaging used by each company in the country, without which governments will not be able to fairly distribute the responsibilities and hold specific companies accountable. |
| Healthy and productive oceans | | |
| 18 | Aquaculture innovation programs | This includes financing support for new technologies (e.g., sensor-based systems to feed shrimp on demand) and technical support (e.g., use of alternative feedstocks and fish selection). |
| Cross-cutting | | |
| 19 | Subsidy reform and carbon pricing | Subsidy reform is crucial given that prior to (COVID-19) pandemic in 2018, fossil fuel subsidies in Southeast Asian nations were worth \$35 billion or almost 0.5% of their total combined gross domestic product. ^b |
| 20 | Accelerate research and innovation in green technologies | Governments could work with industry and research organizations to establish a similar focus on these major green growth opportunities to help accelerate innovation in green technologies. |
| 21 | Gender-specific entrepreneurship programs for green opportunities | This involves programs to support women entrepreneurs in green business opportunities. |
| 22 | Building open-data systems for biodiversity | A range of innovations could be supported through the opening of access to existing government data and building new data systems with the private sector, academia, and nongovernment organizations. |

^a J. Gourdon and V. Bastien. 2019. Government Procurement in ASEAN: Issues and How to Move Forward. In L. Y. Ing, R. Peters, and O. Cadot, eds. *Regional Integration and Non-Tariff Measures in ASEAN*. Jakarta: ERIA, pp. 182–221. https://www.eria.org/uploads/media/15.ERIA_Book_2019_Reg.Int_NTM_Chapter_9.pdf.

^b International Energy Agency. 2019. Southeast Asia's dependence on fossil subsidies 'like crack cocaine'. As featured in *Eco-Business*. 5 November. <https://www.eco-business.com/news/southeast-asias-dependence-on-fossil-fuel-subsidies-like-crack-cocaine/?sw-signup=true>.

Box 7: Examples of Green Policies in Southeast Asia

Indonesia: Tackling the plastic pollution crisis through concerted action on plastic waste and developing a national circular economy road map.

Indonesia faces a severe plastic pollution crisis. The nation generates around 6.8 million tons of plastic waste per year, and estimated to grow by 5% annually.^a The amount of plastic waste that ends up in the country's water bodies and neighboring seas is projected to grow by 30% between 2017 and 2025, from 620,000 tons to an estimated 780,000 tons per year (footnote a). Recognizing the urgent need for action, the Government of Indonesia collaborated with the Global Plastic Action Partnership, a multi-stakeholder initiative set up by the World Economic Forum, to launch the National Plastic Action Partnership in 2019. The partnership outlines bold actions and targets such as eliminating plastic use by more than 1 million tons per year by 2025; a goal to redesign all plastic products and packaging for reuse or high-value recycling; doubling plastic waste collection from 39% to more than 80% by 2025 by boosting state-funded and informal or private sector collection systems; doubling the current recycling capacity; and building and expanding controlled waste disposal facilities for the safe management of plastic waste (footnote a).

In addition, the country's Ministry of Planning (BAPPENAS) announced the development of a national circular economy road map, which aims to shift from the linear make-use-dispose model toward the responsible consumption, production, and regeneration of products or materials.^b This road map has a focus on harnessing circular economy opportunities in textiles, food waste, plastic packaging, e-waste, and construction waste. The project is currently in its first phase of work, which focuses on understanding the economic, social, and environmental impact of a circular economy in five sectors: plastics, food, construction, e-waste, and textiles. The country has a goal to mainstream the circular economy into its national development plans, including Indonesia Vision 2045 (footnote b).

The Philippines: Reducing coal dependence and fast-tracking renewables through feed-in tariffs.

Acknowledging the urgent need to improve the affordability, reliability, and environmental sustainability of the country's energy infrastructure, the Philippines has placed a strong focus on policies in a bid to fast-track its transition to renewable energy from coal use. The government's commitment to this goal is reflected by its target to increase renewables' share of energy mix to at least 30% by 2030.^c

A key policy is the Department of Energy's feed-in tariff (FIT), a policy designed to support the development of renewable energy sources by providing a guaranteed, above-market price for producers. Under the FIT program, qualified developers of emerging renewable energy sources are offered a fixed rate per kilowatt-hour (kWh) of their exported electricity to the distribution or transmission network.^d This program has gained reasonable traction, with FIT subscriptions for renewable energy resources significantly increasing from 646.65 megawatts (MW) worth of installations to 806.82 MW since the policy's implementation in 2016 (footnote d). In a significant policy development in October 2020, the government announced a moratorium on the development of new coal-fired power plants, and an accompanying plan to incentivize private sector investment in renewable projects such as large-scale geothermal projects. Though this was a decision in the making prior to the pandemic, it had been expedited by challenges faced with unreliable energy supply from coal plants during the pandemic versus renewables (which are better suited to meet fluctuating energy needs).^e

Cambodia: Rapidly growing solar energy^f

In 2020, 97.4% of the 14,168 villages in Cambodia had a connection to the grid, but the number of households with electricity access stood at just 81.1%.^g In addition, about 18% of the country's total electricity supply was imported fossil fuel energy from Thailand and Viet Nam, with high associated costs of \$0.14 to \$0.17 per kWh. To tackle challenges in energy access, high energy costs, energy insecurity, and high carbon emissions, the Asian Development Bank (ADB)

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Box 7: continued

supported the Government of Cambodia in its national solar development program. This involved the development of renewable energy zones, structured as public–private partnerships. Under this arrangement, the government provides land and transmission access, while the private sector provides power generation capacity based on a long-term power purchase agreement. ADB served as the transaction advisor for the project, providing a sovereign loan blended with climate finance funds to finance the transmission line and substation for the solar park and conducting the project preparation work. Not only has this helped provide energy access and grow solar energy, but it has also delivered low-cost power. An auction for 60 MW of solar photovoltaic capacity conducted by Electricite du Cambodge, Cambodia’s national electricity utility, has led to the lowest bid of \$0.03877 per kWh, nearly a third of what the country was previously paying.^h Phase 2 of the solar park (for 40 MW) is currently being tendered.ⁱ

^a World Economic Forum. 2020. *Radically Reducing Plastic Pollution in Indonesia: A Multistakeholder Action Plan - National Plastic Action Partnership*. https://globalplasticaction.org/wp-content/uploads/NPAP-Indonesia-Multistakeholder-Action-Plan_April-2020.pdf.

^b Government of Indonesia, Kementerian PPN/BAPPENAS. 2018. *Indonesia Direction Towards Achieving Circular Economy*. https://ec.europa.eu/environment/international_issues/cem_presentations/Bappenas%20-%20Circular%20Economy_EIBD2018.pdf.

^c Government of the Philippines, Department of Energy. 2016. *Philippine Energy Plan 2016–2030*. https://www.doe.gov.ph/sites/default/files/pdf/pep/2016-2030_pep.pdf.

^d Government of the Philippines, Department of Energy. 2020. *Strong Support for Philippine Renewable Energy Industry*. <https://www.doe.gov.ph/press-releases/strong-support-philippine-renewable-energy-industry?ckattempt=1>.

^e C. Farand. 2020. Philippines Declares Moratorium on New Coal Power Plants. *Climate Home News*. 28 October. <https://www.climatechangenews.com/2020/10/28/philippines-declares-moratorium-new-coal-power-plants/#:~:text=The%20Filipino%20government%20will%20no,the%20deployment%20of%20renewable%20energy&text=A%20pipeline%20of%2012GW%20of,doubled%20the%20country's%20coal%20capacity>.

^f Climate Investment Funds. 2020. *From carbon to competition: Cambodia’s transition to a clean energy development pathway*. https://www.climateinvestmentfunds.org/sites/cif_enc/files/knowledge-documents/summary_cif_gdi_case_study_cambodia_national_solar_park.pdf.

^g Electricity Authority of Cambodia. 2020. *Salient Features of Power Sector 2020*. <https://eac.gov.kh/site/index?lang=en> (accessed 10 January 2021).

^h ADB. 2019. ADB-Supported Solar Project in Cambodia Achieves Lowest-Ever Tariff in ASEAN. *News Release*. 5 September. <https://www.adb.org/news/adb-supported-solar-project-cambodia-achieves-lowest-ever-tariff-asean>.

ⁱ Prime Road Alternative (Cambodia) Co. Ltd. 2020. *Draft Initial Environmental Examination: Cambodian National Solar Park IPP Project* (prepared for ADB). <https://www.adb.org/sites/default/files/project-documents/52287/52287-001-iee-en.pdf>.

Step 3: Identify sustainable sources of financing for green growth opportunities.

It is critical that governments determine at the outset how to finance these green growth opportunities. There are three key avenues for this:

- i. **Generate domestic public sources of financing.** This can be done through green tax revenues (e.g., carbon taxes) and the removal of “brown” subsidies (such as for fossil fuels). For example, founded in 1992, Thailand’s Energy Conservation Fund, which was established to provide financial support for implementing energy efficiency and renewable energy projects, was funded by a tax on all petroleum sold in the country, and raised approximately \$50 million per year between 1992 and 2002.⁷⁹
- ii. **Mobilize greater private financing.** This will be important considering the increasing burden on public budgets, particularly with COVID-19. This can be through catalytic approaches and increasing access to capital markets. Southeast Asian countries can consider leveraging on the ASEAN Catalytic Green Finance Facility, which provides loans and technical assistance for sovereign green infrastructure projects on sustainable transport, clean energy, and resilient water systems.⁸⁰ At the same time, governments and development institutions can play an important role in transitioning private finance toward green finance. Tools to do this include the provision of sustainable or green finance taxonomy (classifying and defining a list of assets that address climate change and other environmental issues, making it clearer for investors to discern “green” investments); setting out clear criteria for environmental, social, and corporate governance reporting and strategies, as well as measures that reset the financial system in line with long-term climate risks and opportunities (such as fixing biased incentives and inadequate climate risk disclosure and pricing which hinder the allocation of finance to low-emission, resilient infrastructure).⁸¹ In addition, there are a range of good practices that governments can undertake to support the development of green project pipelines.
The OECD set out a series of concrete actions to develop low-carbon project pipelines, which include taking holistic, whole-of-government approaches to infrastructure planning and investment; fostering the development of a diverse set of bankable projects; and establishing strong eligibility criteria to determine which projects should be built and supported.⁸²
- iii. **Leveraging international climate finance.** These include multilateral climate funds (e.g., Green Climate Fund, Global Environmental Facility) and bilateral sources (flows from official or government sources directly to official sources in the recipient country). Box 8 shows some specific green financing mechanisms that can be considered in Southeast Asia.

⁷⁹ Frankfurt School—UNEP Collaborating Centre for Climate & Sustainable Energy Finance. 2012. *Case Study: The Thai Energy Efficiency Revolving Fund*. https://unfccc.int/files/cooperation_and_support/financial_mechanism/standing_committee/application/pdf/fs-unep-thai_eerf_final_2012.pdf.

⁸⁰ ADB. 2020. *ASEAN Catalytic Green Finance Facility*. Manila. <https://www.adb.org/publications/asean-catalytic-green-finance-facility>.

⁸¹ OECD. 2018. *Financing Climate Futures: Rethinking Infrastructure*. <https://www.oecd.org/environment/financing-climate-futures-9789264308114-en.htm>.

⁸² OECD. 2018. *Developing Robust Project Pipelines for Low-Carbon Infrastructure*. <http://www.oecd.org/environment/cc/policy-highlights-developing-robust-project-pipelines-for-low-carbon-infrastructure.pdf>.

Box 8: Green Finance Strategies for Post-COVID-19 Economic Recovery in Southeast Asia

A recent Asian Development Bank (ADB) report *Green Finance Strategies for Post-COVID-19 Economic Recovery in Southeast Asia* showcases seven green finance concepts that Southeast Asian economies can leverage in their post-coronavirus disease (COVID-19) green recovery, categorized under three types of financial innovation: (i) government catalytic funds, (ii) capital market instruments, and (iii) specific thematic concepts.

(i) Government Catalytic Funds

- **National green finance catalytic facilities.** This refers to national or local green funds or facilities that de-risk green projects to attract private sector financing. This de-risking element is particularly relevant in a COVID-19 environment, where perceptions of risks to bankability have emerged as a key constraint on private capital flows. Such funds or facilities can be in the form of direct investment (e.g., equity or capital expenditure or CAPEX support that covers up a certain percentage of the total project cost); operations and management support to cover the riskiest periods of the project (e.g., the initial 7 years of the project); credit enhancements or guarantees (e.g., covering year 5 to 10 of operations up to a certain percentage of the repayment shortfall); and other innovative instruments such as convertible debt.
- **Debt-for-nature swap funds.** These relate to agreements to reduce or cancel the level of debt servicing by a developing country, in exchange for a commitment to utilize the debt payment for investments in conservation or nature projects. Debt-for-nature swap can be used to attract fresh investment; this would entail governments creating a ring-fenced fund or vehicle to attract global private sector investors into the fund, with the cost of debt and equity returns expected by investors reduced through backing guarantee funds that could be provided by multilateral development agencies like ADB.

(ii) Capital Market Instruments

- **COVID-19 recovery transition bonds.** To build momentum in the capital markets given the COVID-19 context, these are green bonds that are tailored and structured to the needs of the time period impacted by COVID-19 and supported by government and multilateral development bank funds providing risk assurance. They will have a strong focus on recovery with a goal to “build back better.”
- **Sustainable impact bonds.** COVID-19 bonds could be issued by state-owned enterprises, local governments, or sovereigns and aligned with social or sustainability impact funds. These would aim to finance only projects that have a positive impact on the climate (based on a recognized green framework such as that of the ASEAN Catalytic Green Facility or Climate Bond Initiative), and on a sector impacted by the pandemic.
- **Green securitization.** Securitization is a well-established practice in global debt capital markets and relates to the process of converting assets into securities, which are then financed through capital markets via the issuance of an asset-backed security^a bond or note. Green securitization relates to the (re)financing of green, blue, or any other environment-related assets.

(iii) Specific Thematic Concepts

- **“Blue” financing and credits.** This concept refers to “blue finance” or “blue capital” to support ocean health projects in coastal areas. “Blue credits,” in which governments provide predetermined annual payments to a “blue economy” project, can also be created to address low revenue streams from projects supporting ocean conservation efforts. This is particularly crucial given the current challenges associated with blue finance and the lack of blue economy projects. A survey by Credit Suisse and Responsible Investor covering 34 countries analyzed factors such as interest, barriers, and opportunities in the blue economy and listed the lack of investment-grade projects, internal expertise, and visibility as key barriers to mainstreaming blue finance.^b In developing Asia, many blue economy projects are constrained by low tariff and revenue levels due to affordability considerations, or are pure cost projects with no revenue streams at all.

ASEAN = Association of Southeast Asian Nations.

^a An asset-backed security is collateralized or secured by classes of assets and typically an income stream from those assets, thereby reducing the risk to the bond holder.

^b Responsible Investor and Credit Suisse. 2020. *Investors and the Blue Economy. Ocean Risk or Opportunity? Is the Blue Economy Investible?* <https://www.esg-data.com/blue-economy>.

Source: ADB. 2020. *Green Finance Strategies for Post-COVID-19 Economic Recovery in Southeast Asia: Greening Recoveries for Planet and People*. Manila. <https://www.adb.org/sites/default/files/publication/639141/green-finance-post-covid-19-southeast-asia.pdf>.

SECTION VI

Conclusion

A green recovery from the pandemic is crucial to ensure an economically and environmentally resilient future in Southeast Asia. Without concerted action to address the environmental crises of climate change and biodiversity loss, not only would the region's long-term growth prospects be constrained, extreme weather events and other environmental challenges will continue to impact lives and livelihoods.

Achieving a green recovery is also well aligned with ADB's Strategy 2030. It will contribute to several operational priorities of ADB's strategy. A key priority is that of **tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability**. The policy opportunities outlined in the report bear strong relevance to the sub-agendas laid out under this priority. These include scaling up support to address climate change and disaster risks, and accelerate low GHG emissions development, which are supported by the recommendations on the five green growth opportunities, mainstreaming green objectives into policy making, and promoting sustainable financing options for green projects. Other operational priorities that a green recovery approach relates to include **making cities more livable** (particularly in relation to the report's emphasis on promoting sustainable urban development and transport models), **strengthening governance and institutional capacity** (the report emphasizes the importance of building internal capacity in governments to systematically evaluate the "greenness" of all policies), and **fostering regional cooperation and integration** (the report advocates promoting knowledge transfer on green recovery measures in the region).

The report highlights three steps that governments in Southeast Asia can take to implement a green recovery over the next 3 to 5 years: (i) centralizing mechanisms to effect permanent transitions toward environmentally resilient pathways, (ii) implementing targeted policy interventions focused on the five green growth opportunities, and (iii) identifying sustainable sources of financing for green growth opportunities. An immediate action that governments can consider would be to target COVID-19 economic stimulus and recovery funds at the policy interventions highlighted in the report to unlock the five green growth opportunities.

In particular, it would be critical to consider policies that promote the reduction in environmentally harmful activities. An example of such a policy would be to phase out coal production in countries where this has not been fully implemented. It would also be important to look into building a consolidated database of relevant information related to environmental performance and potential impacts, from which government officials can draw upon to evaluate specific policies and programs, and to set targets to guide future policy decisions with a strong green lens. In the context of the ongoing COVID-19 crisis, it would also be important for governments to start building momentum for private sector green financing in capital markets, for instance, through the issuance of COVID-19 recovery transition bonds or green bonds that are tailored and structured to the needs of the period impacted by COVID-19, and supported by government and multilateral development bank funds providing risk assurance.

As countries transition from response to recovery, it will be critical to leverage opportunities for a greener and more sustainable future.

Appendixes

APPENDIX 1

Assessing the “Greenness” of Policy Responses in Focus Countries

Table A1 lists recent policy responses analyzed for their “greenness” (i.e., the extent to which they potentially reap positive environmental impact), for each lever and country. This was used to assess the greenness of policy responses across focus countries (Table 3 in Section III). This analysis only covers recent policy responses (i.e., those announced since the coronavirus disease [COVID-19] pandemic began) that have registered or could register environmental impacts.

Table A1: Greenness of Policy Responses in Focus Countries

| Country | Recent Policy Announcements with Environmental Impact |
|---|--|
| Pricing of externalities | |
| Cambodia | None noted. |
| Indonesia | <ul style="list-style-type: none"> Subsidies for use of biodiesel fuels, and reduced value-added tax (VAT) and income tax for various renewable energy projects^a Tax incentives for fossil fuel-generated electricity and the price of industrial gas^b |
| Myanmar | <ul style="list-style-type: none"> Direct subsidies to state-owned utilities through heavy discounts on electricity bills, which were largely fossil fuel-generated^c |
| Philippines | <ul style="list-style-type: none"> A 10% import duty on crude oil and refined petroleum products to augment government funds to address COVID-19 (footnote a) |
| Thailand | <ul style="list-style-type: none"> Direct subsidies to state-owned utilities through heavy discounts on electricity bills, which are largely fossil fuel-generated (footnote c) |
| Financial support for green products or services versus alternatives | |
| Cambodia | None noted. |
| Indonesia | Reduction in the Ministry of Energy and Mineral Resources’ budget by a third to Rp6.2 trillion (\$430 million) to fund COVID-19 measures, which led to a 42% cut in renewables spending ^d |
| Myanmar | <ul style="list-style-type: none"> Fast-tracked international competitive bidding process for 30 solar power projects under the COVID-19 Economic Relief Plan. This expedited process involved a short submission time frame of 1 month after the tenders for the solar power plants were issued in May 2020. The tenders are for plants at 30 locations with a combined capacity of 1,060 megawatts, equivalent to the output of a typical nuclear reactor (footnote c). |
| Philippines | None noted. |
| Thailand | None noted. |

continued on next page

Table A1: *continued*

| Country | Recent Policy Announcements with Environmental Impact |
|---|---|
| Catalyzing private sector financing | |
| Cambodia | <ul style="list-style-type: none"> The Government of Cambodia is working with the Asian Development Bank (ADB) on a catalytic financing mechanism under the Green Climate Fund (GCF), targeted at achieving climate-resilient and environmentally sustainable economic recovery from the COVID-19 pandemic.^e |
| Indonesia | <ul style="list-style-type: none"> The Government of Indonesia is working with ADB on a catalytic financing mechanism under the GCF, targeted at achieving climate-resilient and environmentally sustainable economic recovery from the COVID-19 pandemic (footnote e). |
| Myanmar | None noted. |
| Philippines | <ul style="list-style-type: none"> The Government of the Philippines is working with ADB on a catalytic financing mechanism under the GCF, targeted at achieving climate-resilient and environmentally sustainable economic recovery from the COVID-19 pandemic (footnote e). |
| Thailand | <ul style="list-style-type: none"> Inaugural B30 billion (\$964 million) sustainability bond to finance green infrastructure through a new mass rapid transit line.^f |
| Investments in supporting infrastructure | |
| Cambodia | <ul style="list-style-type: none"> The government is working with ADB on financing the country's first ever utility-scale battery storage to improve energy supply from renewable sources, under the Grid Reinforcement Project approved in 2020.^g |
| Indonesia | None noted. |
| Myanmar | None noted. |
| Philippines | <ul style="list-style-type: none"> A moratorium placed on the development of new coal-fired power plants, and an accompanying plan to incentivize private sector investment in renewable projects such as large-scale geothermal projects.^h |
| Thailand | None noted. |
| Support for innovation | |
| Cambodia | None noted. |
| Indonesia | <ul style="list-style-type: none"> Solar Archipelago (Surya Nusantara) plan, a collaboration between the Government of Indonesia and local think tank Institute for Essential Services Reform to install \$1 billion worth of solar panels on rooftops of low-income households. The scheme is estimated to generate up to 22,000 jobs from installing the panels.ⁱ |
| Myanmar | None noted. |
| Philippines | None noted. |
| Thailand | None noted. |
| Environmental standards and safeguards | |
| Cambodia | None noted. |
| Indonesia | <ul style="list-style-type: none"> "Omnibus" job creation law rolls back a number of environmental regulations, e.g., the removal of a requirement for all regions to maintain a minimum of 30% of their watershed and/or island area as forest area (which could encourage greater deforestation).^j |
| Myanmar | None noted. |
| Philippines | None noted. |
| Thailand | None noted. |

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Table A1: continued

| Country | Recent Policy Announcements with Environmental Impact |
|------------------------------------|---|
| Behavioral change policies | None noted for all countries |
| Skills development programs | None noted for all countries |
| New collaborations | None noted for all countries |
| New information systems | None noted for all countries |

^a Vivid Economics. 2020. *Greenness of Stimulus Index*. <https://www.vivideconomics.com/casestudy/greenness-for-stimulus-index/>.

^b M. Merdekawati. 2020. ASEAN's Road to a Green Economic Recovery. *Eco-Business*. 14 September. <https://www.eco-business.com/opinion/aseans-road-to-a-green-economic-recovery/>.

^c M. Merdekawati. 2020. ASEAN's Road to a Green Economic Recovery. *Eco-Business*. 14 September. <https://www.eco-business.com/opinion/aseans-road-to-a-green-economic-recovery/>; A. Gan et al. 2020. Myanmar: The COVID-19 Economic Relief Plan. *Global Compliance News*. 18 May. <https://globalcompliancencews.com/myanmar-the-covid-19-economic-relief-plan-20200504/>.

^d Vivid Economics. 2020. *Greenness of Stimulus Index*. <https://www.vivideconomics.com/casestudy/greenness-for-stimulus-index/>; M. Merdekawati. 2020. ASEAN's Road to A Green Economic Recovery. *Eco-Business*. 14 September. <https://www.eco-business.com/opinion/aseans-road-to-a-green-economic-recovery/>.

^e Asian Development Bank (ADB). *What is the Green Recovery Program in Southeast Asia?* 31 March. <https://seads.adb.org/news/what-green-recovery-program-southeast-asia>. Accessed January 10, 2021.

^f ADB. 2020. ADB Supports Thailand's Green, Social, and Sustainability Bonds for COVID-19 Recovery. *News Release*. 24 September. <https://www.adb.org/news/adb-supports-thailand-green-social-and-sustainability-bonds-covid-19-recovery>.

^g ADB. 2020. *Cambodia: Grid Reinforcement Project*. <https://www.adb.org/projects/53324-001/main>.

^h C. Farand. 2020. Philippines Declares Moratorium on New Coal Power Plants. *Climate Home News*. 28 October. <https://www.climatechangenews.com/2020/10/28/philippines-declares-moratorium-new-coal-power-plants/#:~:text=The%20Filipino%20government%20will%20no,the%20deployment%20of%20renewable%20energy.&text=A%20pipeline%20of%2012GW%20of,doubled%20the%20country's%20coal%20capacity>.

ⁱ N. Harsono. 2020. Indonesia Working on \$1b Solar-Driven Green Economic Recovery Scheme. *The Jakarta Post*. 19 June. <https://www.thejakartapost.com/news/2020/06/19/indonesia-working-on-1b-solar-driven-green-economic-recovery-scheme.html>.

^j H. N. Jong. 2020. Indonesia's omnibus law a 'major problem' for environmental protection. *Mongabay*. 4 November. <https://news.mongabay.com/2020/11/indonesia-omnibus-law-global-investor-letter/>.

Source: Compiled by the Asian Development Bank.

APPENDIX 2**Definitions of Green Growth Opportunities****Table A2: Definitions of Green Growth Opportunities**

| Opportunity | Definition |
|--|--|
| Food, land, and ocean use | |
| Ecosystem restoration and avoided land and ocean use expansion | Stabilize and reduce the carbon footprint of agriculture and fishing on ecosystems, while restoring degraded ecosystems to their natural state |
| Productive and regenerative agriculture | Transform agricultural landscapes and farming practices to improve yields, while enhancing the health of surrounding natural ecosystems |
| Healthy and productive oceans | Sustainable management of wild fisheries through ensuring biologically viable fishing levels, while also improving and scaling sustainable mariculture ^a and aquaculture in water ecosystems to replenish overexploited fish stocks |
| Sustainable management of forests | Techniques such as reduced-impact logging, improved harvest planning, and precision forestry allow forests to flourish, while meeting the world's resource needs |
| Planet-compatible consumption | Promote a shift away from the overconsumption of resource-intensive foods (which helps improve health outcomes) and from wasteful "fast fashion" |
| Transparent and sustainable supply chains | Integrate transparency, traceability, and increased collaboration into supply chains to improve sustainable sourcing; eliminate illegality; reduce food and material loss; improve safety and quality; and ensure that consumers, regulators, and investors are able to make informed decisions that, in turn, reinforce responsible production |
| Infrastructure and the built environment | |
| Sustainable urban development and transport models | Improve the environmental sustainability of cities and the transport systems within them, which entails reducing carbon footprint and greenhouse gas (GHG) emissions while enhancing overall livability |
| Nature-positive environmental design | Innovative planning, design, and construction of infrastructure and buildings that leverage natural resources for heating, cooling, and lighting through elements such as streetscapes, roofs, walls, and "rain gardens," which boost natural ecosystem health, reduce GHG emissions, generate cost savings, and promote the well-being of people. |
| Planet-compatible urban utilities | Smarter and cleaner utilities that provide cleaner air, safer water, more efficient sanitation, modern energy, comprehensive waste and recycling services, and waste-to-energy plants (e.g., generation of energy from sludge) |
| Nature as infrastructure | Protect and restore natural ecosystems such as floodplains, wetlands, and forests, which often involves working with rural communities, including indigenous peoples who are the guardians of large natural areas |
| Nature-positive infrastructure | Transport links within and between urban areas that leverage natural resources, for instance, subterranean infrastructure or the use of eco-bridges and new forms of transportation that reduce the need for physical assets can enable long-range infrastructure projects |

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Table A2: continued

| Opportunity | Definition |
|---|---|
| Energy and extractives | |
| Circular economy models | An economic system of closed loops in which raw materials, components, and products retain their value as much as possible |
| Nature-positive extraction of metals and minerals | Non-invasive exploration techniques include the sustainable management of extraction sites, more efficient extraction techniques to minimize environmental impact, and the extensive remediation of ecosystems and communities once extraction is complete |
| Sustainable materials supply chains | Conservation initiatives, mineral governance frameworks, new technologies, and corporate commitments that help to integrate transparency and traceability into supply chains to help combat the threat of illegal and often environmentally harmful extraction activities |
| Clean energy transition | Develop renewable energy project and enhance the efficiency of energy use across various sectors |

^a A specialized branch of aquaculture involving the cultivation of marine organisms for food and other products in the open ocean, an enclosed section of the ocean, or in tanks, ponds, or raceways which are filled with seawater.

Sources: World Economic Forum and AlphaBeta. 2020. *The Future of Nature and Business*. http://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf; AlphaBeta analysis.

APPENDIX 3

Methodology for Sizing Jobs and Investment Potential by Opportunity

Opportunity 1: Productive and Regenerative Agriculture

| Description | Sizing Assumptions | Sources |
|---|---|---------------------------|
| Productive and regenerative agriculture (annualized CAPEX: \$6.9 billion, 6.4 million total jobs created by 2030) | | |
| Market opportunity related to transforming agriculture landscapes and farming practices for both food and non-food agriculture. | Global CAPEX and total jobs created by 2030 from transitioning toward productive and regenerative agricultural practices were taken from a study in the WEF's <i>The Future of Nature and Business</i> report that measured the following opportunities: organic food and beverages, technology in large-scale farms, bio-innovation, technology in small-scale farms, micro-irrigation, livestock intensification, sustainable inputs, and agro-forestry. ^a | WEF (2020) |
| | The estimated CAPEX in Southeast Asia was scaled based on the share of arable land in the region to the amount of arable land available globally (around 5%). ^b The number of jobs created was estimated using labor factor productivity data from the WEF report. Data for Timor-Leste not available. | FAO (2020) and WEF (2020) |

CAPEX = capital expenditure, FAO = Food and Agriculture Organization, WEF = World Economic Forum.

^a World Economic Forum and AlphaBeta. 2020. *The Future of Nature and Business*. http://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf.

^b FAOSTAT. Land Use. <http://www.fao.org/faostat/en/#data/RL/visualize>.

Opportunity 2: Healthy and Productive Oceans

| Description | Sizing Assumptions | Sources |
|--|---|----------------------------------|
| Wild fisheries management (annualized CAPEX: \$1.3 billion, 0.8 million jobs created by 2030) | | |
| Reduction of losses in wild fisheries by 2030 through sustainable fishing | Global CAPEX and jobs created from adopting wild fisheries management were taken from the WEF's <i>The Future of Nature and Business</i> report. ^a | WEF (2020) |
| | The CAPEX needed in Southeast Asia was scaled based on the region's estimated share in fish production in 2030 (15.6% of global production). ^b The number of jobs created in Southeast Asia was estimated using labor factor productivity data from the WEF report. Data for Timor-Leste not available. | World Bank (2013) and WEF (2020) |
| Sustainable aquaculture (annualized CAPEX: \$0.5 billion, 2.1 million jobs created by 2030) | | |
| Market opportunity from increased demand for aquaculture products from sustainable farming in 2030 | Global CAPEX and jobs created from transitioning toward sustainable aquaculture were taken from the WEF's <i>The Future of Nature and Business</i> report (footnote a) | WEF (2020) |
| | The CAPEX needed in Southeast Asia was scaled based on the estimated share of fish production in the region in 2030 (15.6% of global production) (footnote b). The number of jobs created in Southeast Asia was estimated using labor factor productivity data from the WEF report. Data for Timor-Leste not available. | World Bank (2013) and WEF (2020) |

CAPEX = capital expenditure, WEF = World Economic Forum.

^a World Economic Forum and AlphaBeta. 2020. *The Future of Nature and Business*. http://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf.

^b World Bank. 2013. *Fish to 2030: Prospects for Fisheries and Aquaculture*. <https://openknowledge.worldbank.org/handle/10986/17579>.

Opportunity 3: Sustainable Urban Development and Transport Models

| Description | Sizing Assumptions | Sources |
|--|--|---|
| Reducing congestion (annualized CAPEX: \$0.14 billion, 3.7 million jobs created by 2030) | | |
| Market opportunity from introducing processes to reduce road congestion (e.g., public transport, traffic management) | <p>ADB estimates that road congestion costs Asian economies 2%–5% of GDP annually due to lost time and higher transport costs.^a</p> <p>The estimated business opportunity for Southeast Asia was calculated based on the estimated value of the region's GDP in 2030 using IMF estimates.^b The resulting CAPEX and number of jobs created in Southeast Asia were estimated using data from the WEF's <i>The Future of Nature and Business</i> report. Data for Timor-Leste not available.</p> | <p>ADB</p> <p>IMF (2020) and WEF (2020)</p> |
| Development of flood management systems (annual CAPEX: \$26.4 billion, 3.7 million jobs created by 2030) | | |
| Market opportunity from introducing infrastructure and technologies to prevent flooding | <p>Lloyds' City Risk Index estimates that flooding could cost up to 2.56% of a city's GDP in the following 10 Southeast Asian cities: Manila, Jakarta, Singapore, Bangkok, Surabaya, Kuala Lumpur, Ho Chi Minh, Hao, Bandung, and Medan.^c</p> <p>The value at risk from floods in the 10 cities in 2030 was calculated based on 2018 GDP (\$1.27 trillion) and the assumption that the GDP of these cities would grow at an average of 6.9% annually.^d The resulting CAPEX and number of jobs created in Southeast Asia were estimated using data from the WEF report. Data for Timor-Leste not available.</p> | <p>Lloyds (2018)</p> <p>Lloyds (2018), ASEAN Secretariat (2018), and WEF (2020)</p> |

ADB = Asian Development Bank, ASEAN = Association of Southeast Asian Nations, CAPEX = capital expenditure, GDP = gross domestic product, IMF = International Monetary Fund, WEF = World Economic Forum.

^a ADB. *Urban Transport*. <https://www.adb.org/what-we-do/sectors/transport/overview>.

^b IMF. *World Economic Outlook 2020*. <https://www.imf.org/en/Publications/WEO/Issues/2020/09/30/world-economic-outlook-october-2020>.

^c Lloyds. 2018. *City Risk Index*. <https://assets.lloyds.com/media/727a18b8-34c9-4d4b-b16f-d0b3e7f7fb61/pdf-billions-at-risk-lloyds-city-risk-index-political-risk-v3.pdf>.

^d ASEAN Secretariat. 2019. *ASEAN Sustainable Urbanisation Strategy*. https://asean.org/?static_post=asean-sustainable-urbanisation-strategy.

Opportunity 4: Circular Economy Models for Materials

| Description | Sizing Assumptions | Sources |
|--|--|---|
| Circular economic benefits (annualized CAPEX: \$54 billion, 6.6 million jobs created by 2030) | | |
| Market opportunity to promote a circular economy in Southeast Asia | <p>A report by UNDP and AlphaBeta estimates that the economic value brought by investment in a circular economy in Indonesia (in food and beverage, textiles, construction, wholesale and retail, and electrical and electronic equipment) amounts to \$42 billion and will create over 4.4 million jobs by 2030. An estimated \$21.7 billion is needed yearly to realize this opportunity.</p> <p>The estimated CAPEX required in Southeast Asia was calculated based on the estimated share of Indonesia's GDP in 2030 to the region's GDP in 2030 (40%). (footnote 5) The resulting number of jobs created in Southeast Asia was estimated using data from the WEF's <i>The Future of Nature and Business</i> report. Data for Timor-Leste not available.</p> | <p>BAPPENAS and UNDP (2021)</p> <p>IMF (2020), WEF (2020)</p> |

BAPPENAS = Kementerian Perencanaan Pembangunan Nasional Republik Indonesia or Ministry of National Development Planning, CAPEX = capital expenditure, GDP = gross domestic product, IMF = International Monetary Fund, UNDP = United Nations Development Programme, WEF = World Economic Forum.

Opportunity 5: Clean Energy Transition

| Description | Sizing Assumptions | Sources |
|---|---|------------|
| Renewable expansion (annualized CAPEX: \$40 billion, 3.2 million jobs created by 2030) | | |
| Market opportunity from the expansion of renewable power across Southeast Asia | The IEA estimates that up to \$40 billion will be required to transition Southeast Asia to a sustainable development scenario, where renewables will be deployed to reduce carbon dioxide emissions. ^a | IEA (2019) |
| | The resulting number of jobs created in Southeast Asia was estimated using data from the WEF's <i>The Future of Nature and Business</i> report. Data for Timor-Leste not available. | WEF (2020) |
| Grid connectivity and transmission (annualized CAPEX: \$1.5 billion, 0.2 million jobs created by 2030) | | |
| Market opportunity from enhancing grid connectivity and transmission in Southeast Asia | The IEA estimates that expanding the cross-border electricity interconnection infrastructure in Southeast Asia is expected to cost an additional \$1 billion to \$2 billion in investments annually, but will support greater shares of variable renewable energy across the region. ^b | IEA (2019) |
| | The resulting number of jobs created in Southeast Asia was estimated using data from the WEF's <i>The Future of Nature and Business</i> report. Data for Timor-Leste not available. | WEF (2020) |
| Energy efficiency (annualized CAPEX: \$41 billion, 3.3 million jobs created by 2030) | | |
| Market opportunity from enhancing energy efficiency in the grid | The IEA estimates that it would take around \$41 billion annually to decrease the energy intensity (i.e., the ratio of primary energy supply to GDP) by an annual average of 3.3% to be consistent with a sustainable development scenario (footnote a). | IEA (2019) |
| | The resulting number of jobs created in Southeast Asia was estimated using data from the WEF's <i>The Future of Nature and Business</i> . Data for Timor-Leste not available. | WEF (2020) |

CAPEX = capital expenditure, GDP = gross domestic product, IEA = International Energy Agency, IMF = International Monetary Fund, WEF = World Economic Forum.

^a International Energy Agency 2019. *Southeast Asia Energy Outlook*. https://webstore.iea.org/download/direct/2887?filename=southeast_asia_energy_outlook_2019.pdf.

^b International Energy Agency 2019. *ASEAN Renewable Energy Integration Analysis*. https://webstore.iea.org/download/direct/2889?fileName=ASEAN_Renewable_Energy_Integration_Analysis.pdf.

APPENDIX 4

Details of Proposed Policy Recommendations

This section contains an explanation of the sample policy levers identified for achieving each of the identified five green growth opportunities. This includes further detail on each identified policy intervention, examples of successful implementation in other countries, how they relate to existing national policies and programs in the five focus countries, and a suggested approach to their implementation.

- Productive and regenerative agriculture.** Nearly the full set of policy levers could be leveraged to capture this opportunity. Key ones include subsidies and financial support for relevant products and services (e.g., biofertilizers); addressing non-price market failures (e.g., prohibiting the use of harmful fertilizers); and capacity building or skills development approaches (e.g., training farmers on regenerative or precision farming techniques).
- Much of these efforts will need to be targeted particularly at smallholder farmers who dominate a large share of the industry in the five focus countries (e.g., they account for 93% of all farmers in Indonesia).¹ A recent study by the Asian Development Bank (ADB) reflected that the rapid dissemination of precision farming technologies in Indonesia will involve significant government efforts to improve the digital skills of smallholder farmers, and stronger public-private partnership to promote awareness and adoption in major farming communities.² Credible governance mechanisms to manage the potential unintended consequences of biotechnology innovation, such as biodiversity reduction, are also needed.³ Moreover, it will be crucial to rethink how government supports this sector. For example, governments around the world have provided approximately \$600 billion per year in public subsidies and market price support for farmers, but only 5% of this funding supports conservation and climate-friendly objectives, while the majority (70% are pure income support measures) may spur the overuse of fertilizers and natural resources, among other negative effects.⁴ Redirecting agricultural subsidies to incentivize practices that boost productivity while addressing climate goals would be critical to divert economies on to green recovery pathways. Such subsidies could include farm financial aid disbursed based on the protection of forests and native flora within farming communities, and funding to reduce the use of chemical-based fertilizers and pesticides (footnote 4). Specific recommendations include:
 - Micro-irrigation projects.** Adoption of more efficient irrigation techniques (sprinkler and drip irrigation systems, instead of flood irrigation) can both save water and improve yields. Helping with the adoption of such approaches could be usefully integrated into the ADB's planned irrigation projects in Cambodia, Indonesia, and the Philippines. The use of sprinklers can improve yields by 5%–20% and reduce the water required by 15%. Drip irrigation is even more effective and has been demonstrated to improve yields by 15%–30%, while reducing the amount of water required by 20%–60%.⁵ There are some barriers

¹ Food and Agriculture Organization of the United Nations (FAO). 2018. *Small Family Farms Country Factsheet*. <http://www.fao.org/3/i8881en/i8881EN.pdf>.

² ADB. 2019. *Policies to Support Investment Requirements of Indonesia's Food and Agriculture Development During 2020–2045*. Manila. <https://www.adb.org/sites/default/files/publication/534336/indonesia-food-agri-development-2020-2045.pdf>.

³ D. Cumming et al. 2020. The Unintended Consequences of Biotechnology Innovation Adoption. *Industry and Innovation*. <https://doi.org/10.1080/13662716.2020.1731431>.

⁴ World Bank Group. 2020. *Revising Public Agricultural Support to Mitigate Climate Change*. Washington, DC. <https://openknowledge.worldbank.org/handle/10986/33677>.

⁵ McKinsey Global Institute. 2011. *Resource Revolution: Meeting the world's energy, materials, food, and water needs*. https://www.mckinsey.com/-/media/McKinsey/Business%20Functions/Sustainability/Our%20Insights/Resource%20revolution/MGI_Resource_revolution_full_report.ashx.

to overcome, including the initial capital investment, limited understanding by farmers of the benefits, and a lack of an incentive structure for change due to subsidized water. A potential approach could be to develop a pilot program with a group of farmers with an integrated financing and capacity support project to demonstrate the impact, and then seek to broaden this based on the initial results. Such a program was successfully implemented at scale in Ramthal, India, where a 2,150-kilometer pipeline was built to provide 6,000 farmers with over 12,300 acres of land with a stable water supply.⁶ Not only has this system allowed farmers to eliminate water usage on fields, the technology involved has also enabled the purification of the heavily polluted water in the local river. Moreover, farmers will be empowered to take over the management of the system after the first 5 years of the project's completion. Such a program could potentially be implemented as part of ADB's current and planned projects in the focus countries, which include projects to help modernize and improve the climate and disaster resilience of irrigation systems in Cambodia and Myanmar, improve rural productivity in the Philippines, foster participatory development in irrigation management in Indonesia, and incorporate climate change adaptation in Thailand's agriculture sector. This recommendation is closely aligned with broad national strategies to boost the productivity of the agriculture sector in Cambodia and Myanmar. For example, Cambodia's Master Plan for Crop Production in Cambodia to 2030 aims to introduce on-farm investments, like irrigation systems, for several crops, including vegetables, mung bean, and rice, to 80% of farms by 2030.⁷

- **Smallholder farmer support programs.** There are large gaps in smallholder farmer productivity. For example, smallholder Indonesian palm oil producers account for one-third of production and achieve yields that are approximately 50% lower than on large plantations.⁸ Academic evidence shows there is the net potential to double current yields, more than on large-scale farms (footnote 5). The range of levers for achieving this yield improvement includes extension services, improved access to capital (to fund the acquisition of necessary equipment), aggregation mechanisms (to achieve economies of scale among smallholders), and better links to markets. A meta-study of smallholder extension services⁹ found a median rate of return of 58%, and available case study evidence demonstrates the large potential impact on total factor productivity (through more capital per worker, better utilization of fertilizers, and improved farming practices), as well as labor and capital increases.¹⁰ One of the important channels is through reducing the cost of inputs (e.g., fertilizers) by more efficient or targeted application approaches. It is important to ensure that these productivity interventions do not undermine existing ecologically resilient farming techniques that may already be implemented in smallholder farms, or bring about any adverse impacts on the environment. Regenerative agriculture techniques that enhance biodiversity, enrich soils, and improve watersheds and ecosystem services, while also boosting long-term productivity and yields, such as crop rotation, planting cover crops, reducing tillage, and matching soil nutrient supply to demand, should form a key focus of such programs.¹¹ Smallholder improvement projects could potentially be implemented into

⁶ V. Kumar. 2018. Karnataka gets Asia's largest drip irrigation project with Israeli tech". *The Hindu Business Line*. 30 January. <https://www.thehindubusinessline.com/economy/agri-business/karnataka-gets-asias-largest-drip-irrigation-project-with-israeli-tech/article22592938.ece>.

⁷ Government of Cambodia, Ministry of Agriculture Forestry and Fisheries. 2016. *Development of Master Plan for Crop Production in Cambodia by 2030*. <http://extwprlegs1.fao.org/docs/pdf/cam173300.pdf>.

⁸ DFID. 2011. Elsom, D. Indonesia Country Appraisal: Opportunities for UK support to Forestry and Climate Change (unpublished consultancy report).

⁹ Extension services refer to agricultural advisory services rendered to smallholder farmers to improve their knowledge of agronomic techniques and skills to improve their productivity, food security, and livelihoods.

¹⁰ J. Alston et al. 2000. *A Meta-Analysis of Rates of Return to Agricultural R&D: Ex Pede Herculem?* International Food Policy Research Institute. <https://www.ifpri.org/publication/meta-analysis-rates-return-agricultural-r-d>.

¹¹ Food and Agriculture Organization of the United Nations. Undated. *NSP – Sustainable Agricultural Practices*. <http://www.fao.org/agriculture/crops/thematic-sitemap/theme/spi/soil-biodiversity/agriculture-and-soil-biodiversity/sustainable-agricultural-practices/en/>; Union of Concerned Scientists. 2017. *What is Sustainable Agriculture?* 10 April. <https://www.ucsusa.org/resources/what-sustainable-agriculture>.

many ADB current and planned projects in the focus countries, including agro-industry development in Cambodia and the Philippines, the Climate Change Adaptation in Agriculture for Enhanced Recovery and Sustainability of Communities in Thailand, and the Village Development Program Project in Indonesia.¹² Supporting smallholder farmers is a priority for most countries. For example, the Master Plan for Crop Production in Cambodia to 2030 includes integrating smallholder farmers into global value chains and domestic urban markets through contract farming.¹³ In the Philippines, the Department of Trade and Industry has identified supporting smallholder farmers with access to agricultural inputs and technical knowledge as a strategic approach to promoting the growth of the country's agribusiness sector.¹⁴

- **Sustainable urban development and transport models.** Harnessing this opportunity will require the rethinking of existing policies such as current development intensity restrictions and land zoning guidelines in spatial and land-use master planning, as well as policy to limit urban sprawl and incentivize transit-oriented developments (to address non-price market failures). Investment in supporting infrastructure such as public transport systems is also crucial to encourage denser urban developments. Given the capital-intensive nature of such projects, catalyzing private sector financing will also be important, as evidenced by the recent successful issuance of a sustainability bond to finance a new mass rapid transit line in Thailand.¹⁵ Finally, subsidies such as on fees for public transport “nudge” policies to encourage switching from private to public modes of transport, and policy levers that support innovation (e.g., research and development [R&D] grants to identify new ways of clustering typically non-compatible land uses) could also be deployed here. Specific recommendations include:
 - **Incorporate “car-lite” concepts into urban planning and development.** Globally, road transport accounts for about 12% of global GHG emissions.¹⁶ In addition, air pollution caused by light-duty passenger vehicles contributes to the significant deterioration of the urban environment and its livability. “Car-lite” urban planning and development entails reducing the dependence of city dwellers on cars and shifting them to more environment-friendly modes of transport, including public transport, as well as “active mobility” modes like walking and cycling. These cities tend to generate less carbon emissions and are conducive to healthier lifestyles. Car-lite concepts in urban planning include developing more public transport options including mass rapid transit, bus rapid transit, and public bus systems, and ensuring they are integrated with one another.¹⁷ This entails expanding the range of service providers through public tenders, and ensuring that various transport modes converge with one another through upfront planning of multimodal public transport nodes, and developments with high foot traffic such as office and retail uses around them (the concept is referred to as transit-oriented development). As cities evolve from being car-centric to car-lite, there could also be new approaches to vehicle parking spaces and rethinking regulation around them (Box A1).

¹² ADB. 2020. *Climate Change Adaptation in Agriculture for Enhanced Recovery and Sustainability of Highlands: Technical Assistance Report*. Manila. <https://www.adb.org/projects/documents/tha-53099-001-tar>.

¹³ Government of Cambodia, Ministry of Agriculture Forestry and Fisheries. 2016. *Development of Master Plan for Crop Production in Cambodia by 2030*. <http://extwprlegs1.fao.org/docs/pdf/cam173300.pdf>.

¹⁴ Government of the Philippines, Department of Trade and Industry. *Securing the Future of Philippine Industries: Agribusiness*. <http://industry.gov.ph/category/agribusiness/>.

¹⁵ ADB. 2020. *Green Finance Strategies for Post-COVID-19 Economic Recovery in Southeast Asia*. Manila. <https://www.adb.org/sites/default/files/publication/639141/green-finance-post-covid-19-southeast-asia.pdf>.

¹⁶ Our World in Data. 2020. *Sector by Sector: Where do Global Greenhouse Gas Emissions Come From?* <https://ourworldindata.org/ghg-emissions-by-sector>. Based on 2016 global greenhouse gas emissions data.

¹⁷ Centre for Liveable Cities Singapore and Urban Land Institute Asia Pacific. 2016. *Creating Liveable Cities Through Car-Lite Urban Mobility*. <https://www.clc.gov.sg/docs/default-source/books/carlite-urban-mobility-finalreport.pdf>.

Box A1: Rethinking Approaches to Parking Regulation

As urban mobility and travel patterns evolve from being car-centric to more public transport-focused, land used for car parking can be freed up for other more valuable uses.^a Not only does land have a high opportunity cost in dense cities, but government-subsidized parking is a regressive use of taxpayers' resources. Implementing electronic parking meters to improve revenue collection^b and a heavy crackdown on illegal parking can help.^c

However, there are still many gaps within the current parking regulatory environment in the focus countries, particularly related to the on-street parking problems prevalent in urban areas. Some practices from other nations that the focus countries could consider adopting include rethinking minimum parking requirements for buildings, which enable less parking space to be built. For example, minimum parking requirements in Jakarta are five times higher than in Singapore for central business district office buildings.^d In Manila, they are over six times higher, and in Bangkok, they are over eight times higher, than in Singapore.

To free up land in cities for other uses as well as encourage car-lite development, a few alternative approaches to parking can be considered. One is ensuring that parking space is not exempt from the allowable floor area of building developments to incentivize developers to provide efficient use of available parking space (footnote d). Another is to implement a “proof-of-parking” rule, which essentially requires motorists to prove they have access to parking space when they register vehicles. Along with a ban on overnight street parking, this measure has helped to dampen vehicle ownership in Japan.^e Abolishing price controls on parking is another measure that Indonesia could adopt. Currently, on-street parking in Jakarta costs around Rp5,000 (\$0.37) per hour,^f compared to \$0.85 per hour in Singapore^g or \$1 per hour in the United States.^h Removing price controls could allow city governments to collect more revenue, but more importantly, it would allow market forces to dictate the parking rates which in turn would help control demand and supply. These parking reforms could be crucial enablers to support ADB urban and multimodal transport projects in each of the five focus countries. Developing new approaches to urban planning with a focus on environmental management and sustainability is part of Cambodia's National Environment Strategy and Action Plan, 2016–2023.ⁱ In Indonesia, traffic demand management measures that reduce pollution emissions (e.g., parking management) have been embedded as a guiding principle for transport-related National Urban Development Projects in cities.^j

^a C. Ratti. 2020. *Car-parking Space: The Next Great Urban Frontier*. World Economic Forum. 10 December. <https://www.weforum.org/agenda/2020/12/urban-mobility-car-parking-space/>.

^b *The Jakarta Post*. 2015. Electronic parking meters increase Jakarta's revenue. 10 August. <https://www.thejakartapost.com/news/2015/08/10/electronic-parking-meters-increase-jakarta-s-revenue.html>.

^c *The Jakarta Post*. 2014. Parking problems revealed on first day of heavy fines. 9 September. <https://www.thejakartapost.com/news/2014/09/09/parking-problems-revealed-first-day-heavy-fines.html>.

^d Asian Development Bank. 2011. *Parking policy in Asian countries*. Manila. <https://www.adb.org/publications/parking-policy-asian-cities>.

^e Reinventing Parking. 2014. *Japan's proof-of-parking rule has an essential twin policy*. [https://www.reinventingparking.org/2014/06/japans-proof-of-parking-rule-has.html#:~:text=To%20register%20a%20car%2C%20or,sho%22\)%20from%20local%20police](https://www.reinventingparking.org/2014/06/japans-proof-of-parking-rule-has.html#:~:text=To%20register%20a%20car%2C%20or,sho%22)%20from%20local%20police).

^f *Coconuts Jakarta*. 2016. Jakarta Government may double car parking fee to RP 10,000 an hour. 26 August. <http://jakarta.coconuts.co/2016/08/26/jakarta-government-may-double-car-parking-fee-rp-10000-hour>.

^g *Straits Times*. 2016. Parking fee hike after big jump in running costs. 5 July. <http://www.straitstimes.com/singapore/parking-fee-hike-after-big-jump-in-running-costs>.

^h A. Auchincloss et al. 2015. *Public Parking Fees and Fines: A Survey of U.S. Cities*. <http://pwm.sagepub.com/content/20/1/49.full.pdf>.

ⁱ Government of Cambodia. 2017. *National Environment Strategy and Action Plan, 2016–2023 (NESAP)* https://policy.asiapacificenergy.org/sites/default/files/National%20Environment%20Strategy%20and%20Action%20Plan_NESAP_2016-2023.pdf.

^j Government of Indonesia, Ministry of Public Works and Housing. 2019. *The National Urban and Development Project: Environmental and Social Management Framework*. [https://bpiw.pu.go.id/uploads/Environmental%20and%20Social%20Management%20Framework%20\(English\).pdf](https://bpiw.pu.go.id/uploads/Environmental%20and%20Social%20Management%20Framework%20(English).pdf).

- Incentives for the adoption of electric vehicles and shared mobility services.** Besides promoting public transport, private transport can also shift toward lower-carbon pathways through the increased adoption of electric vehicles and shared mobility services. Because of their lower emissions over their lifetime than conventional vehicles, electric vehicles are an important part of meeting global climate change goals and feature prominently in mitigation pathways to limit global warming to below 2°C, in line with the Paris Agreement’s targets.¹⁸ Common policies to incentivize electric vehicle use include subsidies and tax rebates on vehicle registration fees. Singapore, for example, has an “Electric Vehicle Early Adoption Incentive,” where those who buy fully electric cars and taxis will receive a rebate of up to 45% of the vehicle registration fees, capped at S\$20,000 (approximately \$15,000).¹⁹ A key criticism of such policies, however, is that the electricity used to power the charging of electric vehicles is still fossil fuel-generated in some countries.²⁰ It is therefore important that electric vehicle adoption policies are paired with broader strategies to decarbonize electricity generation. Moreover, it is important to note that as battery prices fall and vehicle manufacturers start including bigger batteries with higher mileage, the climate benefits of electric vehicles will increase (footnote 20). Shared mobility services are also found to offer significant environmental benefits. A study by the Organisation for Economic Co-operation and Development (OECD) for 247 cities in 29 OECD economies shows that by reducing the number of cars on roads, it can potentially eliminate on average 6.3% of passenger transport emissions. This is likely to be even higher in the rapidly urbanizing cities in middle-income Southeast Asian countries, given their higher rates of traffic congestion. Policies to incentivize the development and adoption of shared mobility services could include subsidies to ride-sharing companies; clear regulations for the deployment of such services (to reduce the costs); and incentives offered to developers and property owners that include shared mobility in their development plans (e.g., car-sharing and bike-sharing kiosks, pick-up and drop-off points for ride sharing and consolidation of passengers, reducing the number of vehicle parking).²¹
- Residential and commercial building energy efficiency retrofits.** Fostering energy efficiency through retrofitting existing buildings can help generate local jobs quickly, while decreasing the operational and maintenance costs of buildings in the long run. It has been found that buildings with such retrofits can be up to 70% more efficient than conventional commercial buildings.²² In the context of the economic crisis, jobs in the production of these retrofits and their installation can also be generated fairly quickly in the short term, with scope for displaced labor from pandemic-affected industries requiring complementary skills (in construction and manufacturing industries) being shifted over, with limited time required for skill development.
- Clean energy transitions.** Taking advantage of opportunities in this area requires a range of policy levers, including support for R&D of renewables; redirecting subsidies away from fossil fuel industries to renewable technologies; and establishing clear regulatory frameworks, particularly in areas such as cross-border energy grid connectivity. Although the pandemic is expected to reduce global solar and energy storage installations by 20% in 2020 as compared to past projections, a strong case is being made for stimulus packages to prioritize

¹⁸ J. Mercure et al. 2018. Integrated Assessment Modelling As a Positive Science: Private Passenger Road Transport Policies to Meet a Climate Target Well Below 2 Degrees Celsius. *Climatic Change*. 151. 109–129 (2018). <https://link.springer.com/article/10.1007/s10584-018-2262-7>.

¹⁹ Z. Abdullah. 2020. Incentives Likely to Encourage Electric Vehicle Adoption in Singapore, But Questions Remain, Say Analysts. *Channel News Asia*. <https://www.channelnewsasia.com/news/singapore/electric-vehicles-ev-budget2020-reaction-singapore-12450184#:~:text=Among%20them%20is%20the%20EV,%2C%20capped%20at%20S%2420%2C000>.

²⁰ Z. Hausfather. 2019. Factcheck: How Electric Vehicles Help to Tackle Climate Change. *Carbon Brief*. 13 May. <https://www.carbonbrief.org/factcheck-how-electric-vehicles-help-to-tackle-climate-change>.

²¹ American Planning Association. Undated. *Planning for Shared Mobility: Executive Summary*. <https://planning-org-uploaded-media.s3.amazonaws.com/document/PAS-Report-583-Executive-Summary-rev.pdf>.

²² H. Phoumin and I. Leong. 2020. Building Energy Efficiency to Employ ASEAN People. *The ASEAN Post*. 1 August. <https://theaseanpost.com/article/building-energy-efficiency-employ-asean-people>; Centre for Liveable Cities Singapore and Urban Land Institute Asia Pacific. 2016. *Creating Liveable Cities Through Car-Lite Urban Mobility*. <https://www.clc.gov.sg/docs/default-source/books/carlite-urban-mobility-finalreport.pdf>.

renewable energy investments because global studies have demonstrated they are able to provide returns of between three and eight times the original investment, and the transition to renewable energy has the potential to generate 100 million new jobs globally by 2050.²³ Specific recommendations include:

- **Measures to reduce coal dependence and transition to renewable energy.** Recent research by the World Economic Forum (WEF) has found that globally, emissions from existing coal-fired power plants alone will exceed the maximum allowable emissions from all sources to keep warming within 1.5°C.²⁴ Measures that reduce economies' dependence on coal (referred to by the WEF as "coal retirement mechanisms") will help to create more jobs while also improving public and environmental health (footnote 24). These measures include policies to acquire and retire coal plants, as well as technical assistance to rapidly scale up renewable technology (footnote 24). There are promising examples in this area. For example, Viet Nam is considering reducing its total coal-fired capacity and building new wind and solar power plants (footnote 24). However, the challenges in countries such as Australia in tackling coal production show that this is a particularly difficult area, given the risks of alienating local communities that are dependent on coal production. Developing clear plans for how to create new jobs in those communities (ideally directly linked to renewable energy development) or to provide social assistance to older workers who are unable to transition to other jobs will be crucial. Germany's phase-out of coal mining provides a useful example, including focusing on attracting new industries, and retraining and early retirement support to help miners above a certain age.²⁵
- **Public-private partnerships to help rapidly scale renewable energy.** This involves the development of renewable energy zones, which are structured as public-private partnerships (PPPs). The government provides the land and transmission access, while the private sector provides power generation capacity based on a long-term power purchase agreement. For example, in Cambodia, ADB supported a renewable energy zone in which the auction for 60 megawatts of solar photovoltaic capacity conducted by Electricite du Cambodge, Cambodia's national electricity utility, has led to the lowest bid of \$0.03877 per kilowatt-hour.²⁶ ADB served as the transaction advisor for the project, providing a sovereign loan blended with climate finance funds to finance the transmission line and substation for the solar park and conducting the project preparation work.²⁷
- **Low-income household programs to support solar energy access.** The focus countries could consider sustainability investment programs that could help scale renewable energy access in rural regions while supporting low-income households, particularly those most-affected by the coronavirus disease (COVID-19). Indonesia is currently working on rolling out solar panel installations for low-income households. Such a program has also been implemented in Cambodia, where limited grid connectivity has rendered off-grid solutions— primarily the installation of solar panels—necessary in rural areas.²⁸ There is also growing support for such schemes in the Philippines, which has been engaged in such projects since 2016 with a range of development agencies. For example, more than 40,000 poor families without electricity in remote areas of the country would have access to solar energy under the

²³ International Renewable Energy Agency. 2020. *Global Renewables Outlook: Energy Transformation 2050*. <https://www.irena.org/publications/2020/Apr/Global-Renewables-Outlook-2020>.

²⁴ D. Kanak. 2020. *How to Replace Coal Power with Renewables in Developing Countries*. World Economic Forum. 29 May. <https://www.weforum.org/agenda/2020/05/how-to-replace-coal-and-accelerate-the-energy-transition-in-developing-countries/#:~:text=The%20%27coal%20retirement%20mechanism%27%20described,the%20trajectory%20of%20carbon%20emissions>.

²⁵ P. Oei, H. Brauers, and P. Herpich. 2020. Lessons from Germany's hard coal mining phase-out: policies and transition from 1950 to 2018, *Climate Policy*. 20(8). pp. 963–979. <https://www.tandfonline.com/doi/full/10.1080/14693062.2019.1688636>.

²⁶ ADB. 2019. ADB-Supported Solar Project in Cambodia Achieves Lowest-Ever Tariff in ASEAN. *News Release*. 5 September. <https://www.adb.org/news/adb-supported-solar-project-cambodia-achieves-lowest-ever-tariff-asean>.

²⁷ Climate Investment Funds. 2020. *From carbon to competition: Cambodia's transition to a clean energy development pathway*. https://www.climateinvestmentfunds.org/sites/cif_enc/files/knowledge-documents/summary_cif_gdi_case_study_cambodia_national_solar_park.pdf.

²⁸ H. Phoumin. 2017. Solar Power for Poor Rural Households in ASEAN: Lessons from Cambodia. *Sun-Connect*. 23 June. <https://www.sun-connect-news.org/de/articles/business/details/solar-power-for-poor-rural-households-in-asean-lessons-from-cambodia/>.

Access to Sustainable Energy Project grant agreement signed by the LGU Guarantee Corporation and the World Bank.²⁹

- **Energy efficiency standards and incentives.** This involves enhancing existing energy efficiency standards for products to (i) include more ambitious improvement benchmarks for example Japan's Top Runner program in which manufacturers are requested to improve the energy efficiency of their products to the top level of the benchmark within a specified period (footnote 5), and (ii) create guidelines for public procurement to buy products and services with certain energy efficiency performance. While some countries such as Thailand have green public procurement plans,³⁰ and others like Indonesia are considering these,³¹ there is opportunity to strengthen these and put in place practical guidelines to help government officials understand how to incorporate these requirements into their solicitations to the private sector. For example, in the United States (US), the Energy-Efficient Product Procurement program provides guidance to agencies with regard to federal sustainable acquisition requirements related to energy and water consumption.³² In the Asia and Pacific region, India has also had large public programs in the past for compact fluorescent lamps (or CFLs, to replace incandescent lamps that are less energy-efficient), and is now doing the same with energy-efficient pumps, fans, and electric vehicles.³³ There have been such initiatives in focus countries but to limited effect due to poor governance. For example, Indonesia ran large CFL procurement programs in the past, but experienced mixed results due to the lack of enforcement of policy and supporting tools to implement green public purchasing.³⁴ There is therefore an opportunity for such public procurement programs to scale up through the post-COVID-19 green recovery approach. It is also critical that policy measures should ensure strong regulatory and enforcement frameworks to allow for sustained impact. There is also scope for harmonizing regional standards and processes for the use of energy-efficient appliances.
- **Investment in regional and subnational grid connectivity and storage.** At a broad level, regional grid connectivity and power trade can lead to cost savings and increased deployment of renewable energy, which also reduces dependence on imported fuels like natural gas and coal. Grid interconnectors allow electricity to be transmitted between subnational and cross-national grids, improving economies of scale and helping to balance demand during peak periods. Interconnection is particularly important as the penetration of variable renewable energy increases. Construction of new interconnectors is capital-intensive, however, and it is often difficult to agree how the costs of interconnectors should be distributed between grids, and the private and public sectors. Governments could explore investments to support this grid connectivity, supported by establishing complementary regulatory and pricing regimes to facilitate energy market integration.³⁵ Establishing grid connectivity also exhibits strong links with existing national strategies.

²⁹ The World Bank. 2020. Turning on the Lights for 450,000 People in Rural Myanmar. *Press Release*. 8 July. <https://www.worldbank.org/en/news/press-release/2020/07/08/turning-on-the-lights-for-450000-people-in-rural-myanmar>; The World Bank. 2016. Philippines: Poor Families in Remote Areas to Benefit from Renewable Energy Grants. *Press release*. 23 August. <https://www.worldbank.org/en/news/press-release/2016/08/23/philippines-poor-families-in-remote-areas-to-benefit-from-renewable-energy-grants>.

³⁰ J. Suksod. 2015. Green Public Procurement in Thailand. Presentation at the International Symposium "Current status of Green Public Procurement and Ecolabeling in the World." Pollution Control Department. https://www.env.go.jp/policy/hozen/green/kokusai_platform/2015_symposium/03Thailand.pdf.

³¹ United Nations Environment Program. 2017. *Asia Pacific Green Public Procurement Partnership Project*. <https://www.unenvironment.org/events/workshop/asia-pacific-green-public-procurement-partnership-project>.

³² US Department of Energy. 2017. *Contracting for Efficiency: A Best Practices Guide for Energy-Efficient Product Procurement*. https://eta-publications.lbl.gov/sites/default/files/femp_best_practices_guide_for_procurement.pdf.

³³ Government of India, Ministry of Finance, Department of Expenditure. 2013. *Procurement of Energy Efficient Electrical Appliances*. <https://doe.gov.in/order-circular/procurement-energy-efficient-electrical-appliances>.

³⁴ Asia-Pacific Economic Cooperation. 2013. *Green Public Procurement in the Asia Pacific Region: Challenges and Opportunities for Green Growth and Trade*. <https://www.apec.org/Publications/2013/06/Green-Public-Procurement-in-the-Asia-Pacific-Region-Challenges-and-Opportunities-for-Green-Growth-an>.

³⁵ International Energy Agency. 2019. *Establishing multilateral power trade in ASEAN*. <https://www.iea.org/reports/establishing-multilateral-power-trade-in-asean>.

For example, under Thailand’s 12th National Economic and Social Development Plan (2017–2021), the government plans to promote energy conservation by developing smart grid technology across power generation, transmission, distribution, or consumption, to increase the commercial viability and subsequent adoption of these technologies.³⁶ In the Philippines, the Department of Energy is working on introducing the mandatory utilization of renewable energy in on-grid systems in the country.³⁷ This would complement the government’s recent initiative to develop a smart grid system for the wholesale and retail electricity market.³⁸ This should be accompanied by investments in energy storage. Currently, almost all of the world’s storage capacity is in pumped hydropower. However, battery and other storage technologies are developing quickly, and are expected to become cost competitive with hydropower on the same level by 2030.³⁹

- **Circular economy models.** A range of public policies are needed to support a circular economy, ranging from consumer and business education, through creating markets for offtake of recycled products (e.g., through Extended Producer Responsibility [EPR] schemes). Municipal and city governments can also encourage private sector participation in circular economy models by investing in accessible and efficient end-of-life product collection programs and infrastructure, and regulating how products can be disposed of in landfills. A coordinated effort from governments and industries is needed to accelerate research and development on more efficient collection, recycling, and remanufacturing techniques; train the workforce on circularity models; and provide consumer education and enhanced awareness about materials recycling. Regional cooperation is necessary to harmonize standards, labels, and trade policy in materials use, recovery, and disposal; and to establish clear product labeling standards to encourage transparency for consumers. These efforts, when carried out in major trade blocs, can have significant spillover effects. Specific recommendations include:
 - **Establishing extended producer responsibility frameworks for packaging.** EPR is a policy approach under which producers are given a significant responsibility—financial and/or physical—for the treatment or disposal of post-consumer products.⁴⁰ More than 70 countries now have EPR frameworks for packaging materials (including 10 in the Asia and Pacific region).⁴¹ In Southeast Asia, countries are starting to consider implementing EPR initiatives (such as road maps and pilots) to address the pertinent issue of packaging waste. For instance, Indonesia has developed an EPR road map as part of its push toward circular economy implementation.⁴² The European Union Commission (with Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH, or GIZ, as the implementing partner) has also established a donor support program to develop an EPR policy in Thailand, among other plastic waste policy levers.⁴³ The focus countries could consider working with industry stakeholders to develop voluntary efforts that would then serve as pilots to transition to a mandatory EPR framework. Such approaches are beginning to emerge in Thailand (through

³⁶ Office of the National Economic and Social Development Board. 2016. *12th National Socio-Economic Development Plan (2017–2021)*. <https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/THAILAND%29%20The%20Twelfth%20National%20Economic%20and%20Social%20Development%20Plan%20%282017-2021%29.pdf>.

³⁷ Government of the Philippines, Department of Energy. *Philippines Renewable Energy Policy Updates*. <https://www.egnret.ewg.apec.org/sites/default/files/geektic/files/%5BPhilippines%5D%20RE%20Law%20Policy%20Updates.pdf>.

³⁸ Government of the Philippines, Department of Energy. 2020. *Providing A National Smart Grid Policy Framework for the Philippine Electric Power Industry and Roadmap for Distribution Utilities*. <https://www.doe.gov.ph/sites/default/files/pdf/issuances/dc2020-02-0003.pdf>.

³⁹ Business and Sustainable Development Commission (BSDC). 2017. *Better Business Better World*. <http://businesscommission.org/news/release-sustainable-business-can-unlock-at-least-us-12-trillion-in-new-market-value-and-repair-economic-system>.

⁴⁰ OECD. 2019. *Extended Producer Responsibility*. <https://www.oecd.org/env/tools-evaluation/extendedproducerresponsibility.htm>.

⁴¹ This is based on AlphaBeta’s analysis of EPR packaging frameworks.

⁴² United Nations Industrial Development Organization (UNIDO). 2018. *From Waste Reduction Toward Circular Economy Implementation in Indonesia*. Available at: https://www.unido.org/sites/default/files/files/2018-10/Laksmi%20Dhewanthi%20%28Indonesia%29%20CE%20in%20Indonesia_Laksmi_02102018.pdf.

⁴³ WWF. 2019. *Legal Framework Study of Extended Producer Responsibility*. https://d2ouvy59p0dg6k.cloudfront.net/downloads/2019____wwf____epr_legal_framework_analysis_vf.pdf.

the Thailand Public–Private Partnership for Plastic and Waste Management, or PPP Plastic);⁴⁴ and in Indonesia through the Packaging and Recycling Alliance for Indonesia Sustainable Environment. Cambodia’s National Environment Strategy and Action Plan, 2016–2023 aims to promote a circular economy by developing EPR schemes and incentives for local authorities to increase reuse and recycling of waste.⁴⁵

- **Government procurement programs for recycled products.** Government procurement represents between 5% to 8% of economic output in the member countries of the Association of Southeast Asian Nations (ASEAN) and could be an important stimulus for encouraging the use of recycled products, such as plastics.⁴⁶ Governments can review their procurement operations to encourage the use of recycled materials. The European Commission is currently working on integrating recycled content into its Green Public Procurement criteria. While some countries such as Thailand have green public procurement plans (footnote 30); others like Indonesia are considering these;⁴⁷ and Cambodia in particular aims to promote sustainable and inclusive waste management principles by mainstreaming environmental sustainability, natural resource management, and climate change consideration into the state budgeting process.⁴⁸ There is therefore an opportunity to extend the coverage of these procurement strategies to products such as recycled products (which are not explicitly included in any current programs).
- **Waste management infrastructure.** Crucial waste management infrastructure is needed to improve plastic waste collection rates and prevent leakage of waste into the environment. This ranges from ensuring sufficient refuse bins at convenient locations, frequent waste collection services (e.g., door-to-door), as well as infrastructure with safety features to isolate waste until they are not harmful to the environment (i.e., sanitary landfills). Without this basic infrastructure, policy measures such as public awareness campaigns and enforcement will not be effective. In Indonesia, the city of Depok has invested in 400 “waste banks” and differentiated collection trucks for different types of waste materials to improve collection and recycling rates.⁴⁹ Through these initiatives and other supporting enforcement mechanisms (e.g., fines), the city has managed to achieve almost 100% waste segregation rates and diverted about 72% of household food and packaging waste from landfills (footnote 49). Waste management is also an emerging segment of national government strategies. In particular, Cambodia aims to improve waste management by introducing financial mechanisms (e.g., landfill fees and incineration fees) that could be used to improve waste management processes and infrastructure at a local level.⁵⁰ Also, Thailand’s 12th National Economic and Social Development Plan (2017–2021) links waste management outcomes to the success of its tourism sector, and has an ambitious goal of enhancing waste management infrastructure such that 75% of waste generated by communities is properly treated or reused.⁵¹

⁴⁴ Thailand Environment Institute. 2021. *Role of Public Private Partnership for Sustainable Plastic and Waste Management (PPP Plastics) for Solving the Plastic Waste Problem in Thailand*. http://www.tei.or.th/file/library/2021-Brochure_PPP-Plastics-ENG_60.pdf.

⁴⁵ Royal Government of Cambodia. 2017. *National Environment Strategy and Action Plan, 2016–2023 (NESAP)*. https://policy.asiapacificenergy.org/sites/default/files/National%20Environment%20Strategy%20and%20Action%20Plan_NESAP_2016-2023.pdf.

⁴⁶ J. Gourdon and V. Bastien. 2019. Government Procurement in ASEAN: Issues and How to Move Forward. In L. Y. Ing, R. Peters, and O. Cadot, eds. *Regional Integration and Non-Tariff Measures in ASEAN*. Jakarta: ERIA, pp.182–221. https://www.eria.org/uploads/media/15.ERIA_Book_2019_Reg.Int_NTM_Chapter_9.pdf.

⁴⁷ United Nations Environment Program (UNEP). 2017. Asia Pacific Green Public Procurement Partnership Project. <https://www.unenvironment.org/events/workshop/asia-pacific-green-public-procurement-partnership-project>.

⁴⁸ Royal Government of Cambodia. 2017. *National Environment Strategy and Action Plan, 2016–2023 (NESAP)*. https://policy.asiapacificenergy.org/sites/default/files/National%20Environment%20Strategy%20and%20Action%20Plan_NESAP_2016-2023.pdf.

⁴⁹ P. Miquelis and A. Subramaniam. 2017. Depok: The front line in Indonesia’s fight against waste. *The Jakarta Post*. 21 August. <http://www.thejakartapost.com/life/2017/08/21/depok-the-front-line-in-indonesias-fight-against-waste.html>.

⁵⁰ Royal Government of Cambodia. 2017. *National Environment Strategy and Action Plan, 2016–2023 (NESAP)*. https://policy.asiapacificenergy.org/sites/default/files/National%20Environment%20Strategy%20and%20Action%20Plan_NESAP_2016-2023.pdf.

⁵¹ Office of the National Economic and Social Development Board. 2016. *12th National Socio-Economic Development Plan (2017–2021)*. <https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-database/THAILAND%29%20The%20Twelfth%20National%20Economic%20and%20Social%20Development%20Plan%20%282017-2021%29.pdf>.

- **Behavioral change programs to support a circular economy.** A recent review of the readiness of Southeast Asian countries to develop a circular economy for plastics identified several gaps, including around consumer and business behavior.⁵² Issues noted include a lack of understanding of how to properly segregate waste and likewise a lack of understanding of sustainable product alternatives among businesses (footnote 52). To address this, governments could consider developing behavioral change programs. For example, the Government of Indonesia has already developed a behavioral change communications strategy “playbook,” which aims to inform communications strategies relating to specific behaviors to address plastic pollution in Indonesia.⁵³ Similar approaches could be considered in other countries and extended to other areas such as food waste. These approaches can also be tied to existing national strategies in the focus countries.
- **Support for small and medium-sized enterprise capacity development on the circular economy.** In the United Kingdom, the London Waste and Recycling Board created the “Advance London” program to support local small and medium-sized enterprises (SMEs) in exploring new circular economy markets, revenue streams, and business models. The program includes organizing events to promote collaboration between SMEs and corporations; and technical learning workshops on topics, such as access to finance, communications, and design thinking. The program helped one in three SMEs engaged in the program to secure capital within 18 months of first receiving advice.⁵⁴ Such SME capacity-building efforts can build upon existing policies in the focus countries. In particular, in Thailand, the government is incentivizing companies to adopt sustainable plastic practices by providing tax deductions of up to 1.25 times for expenses if companies purchase biodegradable plastics instead of nonbiodegradable ones.⁵⁵ This initiative would increase the demand and production of more sustainable materials across the country.
- **Developing multi-stakeholder platforms for the circular economy.** Countries are starting to form platforms to bring together stakeholders from different sectors, nongovernment organizations (NGOs), academia, and government to align on taking advantage of opportunities in the circular economy. Indonesia’s Ministry of Planning (BAPPENAS) has announced the development of a national circular economy road map, with a focus on textiles, food waste, plastic packaging, e-waste, and construction waste. In addition, the Indonesia National Plastic Action Partnership was launched in March 2019, to accelerate action on plastic waste with over 150 member organizations.⁵⁶ Thailand’s Public-Private Partnership for Plastic and Waste Management (PPP Plastic) is a public-private platform that is working toward promoting circularity in the country and has an ambitious goal of reducing marine plastic debris by 50% by 2017 (footnote 44).
- **Mandatory reporting on packaging waste.** Comparing different sources of waste, packaging is one of the highest contributors to plastic waste and marine debris.⁵⁷ Without comprehensive and credible information on the volume of packaging used by each company in the country, the governments will not be able to fairly distribute the responsibilities and hold specific companies accountable. Under a mandatory reporting

⁵² European Union and ASEAN Secretariat. 2019. *Circular economy and plastics: A gap analysis in ASEAN Member States*. <https://www.iges.or.jp/en/pub/ce-plastics/en>.

⁵³ World Bank and GA. *Better Managing Plastic Waste Could Combat Marine Pollution and Unlock Billions of Dollars for a Circular Economy: Southeast Asia*. <https://www.worldbank.org/en/news/press-release/2021/03/21/better-managing-plastic-waste-could-combat-marine-pollution-and-unlock-billions-of-dollars-for-a-circular-economy-southe>.

⁵⁴ Ellen MacArthur Foundation. 2019. *Advance London Circular Economy SME Business Support Programme*. https://www.ellenmacarthurfoundation.org/assets/downloads/London_-_Case-Study_Mar19.pdf.

⁵⁵ BioPlastic News. 2019. *Thai Government Gives Tax Deduction for Using Bioplastics Packaging*. <https://bioplasticsnews.com/2019/06/09/thai-government-gives-tax-deduction-for-using-bioplastics-packaging/>.

⁵⁶ Information obtained from: <https://globalplasticaction.org/countries/indonesia/>.

⁵⁷ Geyer et al. 2017. Production, use, and fate of all plastics ever made. *Science Advances*. 3(7). <https://advances.sciencemag.org/content/3/7/e1700782>; Our World in Data. 2018. Plastic Pollution. <https://ourworldindata.org/plastic-pollution#which-sectors-produce-the-most-plastic>.

framework, businesses are required to report annually on the different types and amounts of waste they place on the local market. International analysis reveals 45 countries with mandatory packaging reporting frameworks and 13% of them are in Asia and the Pacific.⁵⁸ Singapore has recently introduced a mandatory packaging reporting framework, which is effective from 2020, and other Southeast Asian countries are likewise considering it, although no formal policies have been implemented.⁵⁹ Coordination across ASEAN member states is crucial as there is a risk of confusion and added costs for businesses if each member state adopts different reporting requirements. For instance, given the significant share of intra-ASEAN trade (representing more than 20% of total trade in the region), companies operating across multiple markets in Southeast Asia may face significant reporting costs.⁶⁰

- **Healthy and productive oceans.** Policies to support this opportunity could include comprehensive area-based management approaches for wild fisheries such as marine protected areas, stronger illegal fishing detection and enforcement mechanisms (to address non-price market failures); solutions to end harmful subsidies for exploitative fishing practices (pricing of externalities); promotion of sustainable aquaculture techniques (support for innovation); and information systems that facilitate the implementation of science-based quotas (new information systems) to reduce the pressure on wild fish stocks. Some of these solutions will take on a transboundary perspective, particularly in relation to the issue of fishing subsidies granted to large fishing companies in other countries that incentivize overfishing in international waters. Such subsidies have received pushback from emerging economies, including the Philippines and Indonesia, as they impact fish populations in their coastal communities.⁶¹ Specific recommendations include:
 - **Aquaculture innovation programs.** Aquaculture represents a substantial share of total fish production in the focus countries, between 16% (in Cambodia) to 54% (in the Philippines).⁶² However, for ocean and freshwater aquaculture to offer a sustainable solution to wild-catch fisheries, it needs to overcome some productivity and environmental limitations. These challenges include the need to improve disease management, limit antibiotic usage, favor native species harvesting, scale sustainable feeds that do not compete for land or wild-caught fish, and improve the condition of production sites to avoid pollution. As part of ADB's Action Plan for Healthy Oceans and Sustainable Blue Economies, a pilot program could be launched to support aquaculture producers to develop sustainable operations. This would include financing support for new technologies (e.g., sensor-based systems to feed shrimp on demand) and technical support (e.g., use of alternative feedstocks and fish selection).

Nonetheless, some Southeast Asian countries are making headway in realizing these opportunities. For example, in 2017, the Philippine government forged a partnership with Environmental Defense Fund, a global NGO, to leverage data analytics for sustainable fishing (Box A2). The Indonesian Maritime Information Center was

⁵⁸ AlphaBeta. 2020. *Presentation on mandatory reporting frameworks*, Workshop II of the Southeast Asian regional Action Plan on Marine Debris, Singapore.

⁵⁹ Government of Singapore, Ministry of the Environment and Water Resources and National Environment Agency. 2019. *Factsheet on Mandatory Packaging Reporting*. <https://www.nea.gov.sg/docs/default-source/media-files/news-releases-docs/cos-2019/cos-2019-media-factsheet---mandatory-packaging-reporting.pdf>.

⁶⁰ ASEAN Secretariat. 2018. *ASEAN Statistical Highlights 2018*. <https://www.aseanstats.org/wp-content/uploads/2018/10/ASEAN-Statistical-Highlights-2018.pdf>.

⁶¹ *The Jakarta Post*. 2017. Indonesia Wants WTO to Regulate Subsidies for Large Fishing Firms. 29 November. <https://www.thejakartapost.com/news/2017/11/29/indonesia-wants-wto-to-regulate-subsidies-for-large-fishing-firms.html>; J. Lim. 2019. PHL Proposes Scheme to Cap Fisheries Subsidies. *Business World*. <https://www.bworldonline.com/phl-proposes-scheme-to-cap-fisheries-subsidies/>.

⁶² The share of aquaculture in total fish production by country are: 16% (Cambodia), 20% (Indonesia), 34% (Myanmar), 35% (Thailand), and 54% (Philippines). Food and Agriculture Organization of the United Nations. *National Aquaculture Sector Overview (NASO)*. <http://www.fao.org/fishery/collection/naso/en>; T. Yenpoeng. 2020. *Fisheries country profile: Thailand*. Southeast Asian Fisheries Development Center. <http://www.seafdec.org/fisheries-country-profile-thailand/#:~:text=By%20sub%2Dsector%2C%20the%20largest,inland%20capture%20fisheries%20at%208%25>.

Box A2: Sustainable Reforms to Commercial Fisheries in the Philippines

The Philippines is ranked 11th globally in annual marine capture production, and the country has about 2 million small-scale fisheries that depend on nearshore waters for their daily sustenance and livelihoods.^a However, some 70% of the country's fish populations are overfished.^b This has been attributed to the limited use of data on fish stocks to inform decisions on fishing activities. To address this challenge, the country's Bureau of Fisheries and Aquatic Resources is working with Environmental Defense Fund, a global nongovernment organization, to develop a framework to leverage data analytics to transform data on fish stocks into information that can be used for more sustainable management of fisheries (footnote b). Under this framework, fishery managers are given access to a digital tool called Framework for Integrated Stock and Habitat Evaluation, which provides data on fishing levels, allowing for policies that permit fish populations to regenerate, while also allowing for sustainable harvests. Working toward a national target of establishing sustainable reforms for major commercial fisheries by 2022, the project is currently at the capacity-building stage, wherein fishery managers are being trained on the use of the platform as well as on sustainable fishing principles.

^a Food and Agricultural Organization of the United Nations (FAO). 2020. *The State of World Fisheries and Aquaculture*. <http://www.fao.org/3/ca9229en/ca9229en.pdf>.

^b Environmental Defense Fund. 2017. *EDF to Partner with Philippine Bureau of Fisheries to Implement Fishing Reforms*. 6 October. <https://www.edf.org/media/edf-partner-philippine-bureau-fisheries-implement-fishing-reforms>.

also launched in July 2020 to enhance surveillance efforts against illegal fishing, which has both contributed to overfishing and estimated to cost the country \$4 billion a year in lost revenue.⁶³ Thailand's National Policy for Marine Fisheries Management (2015–2019) was successful at reducing the fishing capacity in the Gulf of Thailand and the Andaman Sea by 10%–40%.⁶⁴

There are also some crosscutting recommendations that could support all of these opportunities. These include:

- **Subsidy reform and carbon pricing.** Subsidy reform is crucial given that prior to the COVID-19 pandemic in 2018, fossil fuel subsidies in Southeast Asian nations were worth \$35 billion or almost 0.5% of their total combined GDP.⁶⁵ The political challenge of reforming subsidies and introducing new forms of pricing for externalities such as carbon emissions should not be underestimated. However, experience can offer some useful lessons. In particular, shifting the tax base from labor to resources (while maintaining a level total tax burden) can alleviate concerns about the competitiveness among businesses and create strong support among stakeholders by potentially boosting employment. Germany, for example, introduced an ecological tax reform in 1999 that effectively increased the cost of energy use by raising taxes on transport fuels, electricity, and heating fuels. However, the reform simultaneously cut the cost of labor by reducing social security contributions. According to the German Institute for Economic Research, the reforms created up to 250,000 additional jobs in Germany in the first 4 years after its adoption.⁶⁶ Denmark similarly offset increases in energy taxes by cuts to payroll and income taxes, ensuring that the total tax burden stayed the same.⁶⁷ These reforms helped drive an 80% improvement in energy efficiency in Denmark between

⁶³ J. John. 2020. Indonesia's New Intelligence Hub Wields Data in the War on Illegal Fishing. *Mongabay*, 29 September. <https://news.mongabay.com/2020/09/indonesias-new-intelligence-hub-wields-data-in-the-war-on-illegal-fishing/>; *The ASEAN Post*. 2018. The Threat of Overfishing. <https://theaseanpost.com/article/threat-overfishing>.

⁶⁴ Government of Thailand, Ministry of Agriculture and Cooperatives. 2015. *A National Policy for Marine Fisheries Management 2015–2019*. <http://extwprlegs1.fao.org/docs/pdf/tha165156.pdf>.

⁶⁵ International Energy Agency. 2019. Southeast Asia's dependence on fossil subsidies 'like crack cocaine'. As featured in *Eco-Business*. <https://www.eco-business.com/news/southeast-asias-dependence-on-fossil-fuel-subsidies-like-crack-cocaine/?sw-signup=true>.

⁶⁶ E. Von Weizsäcker et al. 2009. *Factor five: Transforming the global economy through 80% improvements in resource productivity*. London: Earthscan.

⁶⁷ OECD. 2001. *Environmentally related taxes in OECD countries: Issues and strategies*.

1979 and 2010 and generated significant growth in employment. In Southeast Asia, Thailand's Climate Change Master Plan 2015–2050 intends to use taxes on carbon emissions and an emission trading market as policy tools to reduce GHG emissions to 20.8% in 2030, below business-as-usual levels.⁶⁸ Similarly, Indonesia implemented subsidy reforms in 2015 to remove fuel subsidies for gasoline and diesel, saving the government Rp211 trillion (\$15.6 billion), or 10% of all government expenditure.⁶⁹

- **Accelerate research and innovation in green technologies.** There is an opportunity for governments in the focus countries to work with industry and research organizations to establish a similar focus on these major green growth opportunities to help accelerate innovation in green technologies. A key example is the Republic of Korea's Green New Deal—a centerpiece of its COVID-19 economic recovery strategy. This entails an investment of ₩7.6 trillion (\$7 billion) between 2020 and 2025 to create 63,000 jobs in businesses and research organizations to develop new low-carbon technologies across various industry sectors.⁷⁰ Thailand's Climate Change Master Plan 2015–2050 has identified increasing research in adaptation and risk management for water, agriculture, and energy sectors as areas to develop an enabling environment for climate change management (footnote 68). Beyond the environmental benefits, green technologies have great potential to enhance economic productivity and reduce costs. The Global Green Growth Institute estimated that incorporating green technologies to enhance circularity in four industries in Cambodia (garments, food and beverage processing, electronics manufacturing, and brick manufacturing) can reduce production costs through enhanced resource efficiencies. This could translate into increased GDP contributions between 14.7% (for brick manufacturing) and 35.5% (for electronics), and create 512,000 additional jobs.⁷¹
- **Gender-specific entrepreneurship programs for green opportunities.** Globally, women-owned firms represent 20%–40% of all registered SMEs. Yet, women's potential contributions to SME green enterprises and climate investments have largely been overlooked.⁷² Targeted support from governments, development agencies, and investors is critical to allow women to contribute to and benefit from new economic opportunities created from the shift to greener development models. According to the World Bank, previous programs targeting women entrepreneurs related to green growth opportunities have yielded suboptimal results for two key reasons: inability to target the right firms and failure to consider specific challenges and needs faced by women in business.⁷³ To ensure that resources are well utilized and programs yield better outcomes, one approach is to identify and target “growth-oriented” entrepreneurs. Research for Indonesia has shown that among 20 million to 30 million women entrepreneurs, 15% can be classified as growth-oriented who are likely to expand their businesses and hire female employees (footnote 73). Women entrepreneurs also tend to face a range of unique barriers that programs targeting them should address. For instance, female entrepreneurs in Indonesia report that limited access to assets

⁶⁸ Government of Thailand, Ministry of Natural Resources and Environment. 2015. *Climate Change Master Plan 2015–2050*. https://climate.onep.go.th/wp-content/uploads/2019/07/CCMP_english.pdf.

⁶⁹ International Institute for Sustainable Development. 2016. *Indonesia Uses Savings from Fossil Fuel Subsidy Reform to Finance Development*. [https://www.iisd.org/articles/indonesia-uses-savings-fossil-fuel-subsidy-reform-finance-development#:~:text=Major%20Investments%20in%20Social%20Protection,billion\)%20to%20fossil%20fuel%20subsidies](https://www.iisd.org/articles/indonesia-uses-savings-fossil-fuel-subsidy-reform-finance-development#:~:text=Major%20Investments%20in%20Social%20Protection,billion)%20to%20fossil%20fuel%20subsidies).

⁷⁰ J. Lee and J. Woo. 2020. Green New Deal Policy of South Korea: Policy Innovation for a Sustainability Transition. *MDPI*. <https://www.mdpi.com/2071-1050/12/23/10191/pdf>.

⁷¹ Global Green Growth Institute. 2018. *The Economic, Social and Environmental Impacts of Greening the Industrial Sector in Cambodia*. <https://gggi.org/press-release/gggi-report-finds-clean-tech-can-deliver-green-growth-in-cambodia/>.

⁷² United Nations Development Program. 2015. *Women's Green Business Initiative*. https://www.undp.org/content/undp/en/home/librarypage/environment-energy/climate_change/gender/womens-green-business-initiative.html#:~:text=The%20Women's%20Green%20Business%20Initiative,poor%20women%20and%20men%20equitably.

⁷³ World Bank. 2016. *Women entrepreneurs in Indonesia*. <https://openknowledge.worldbank.org/bitstream/handle/10986/24751/WomenEntrepreneurshipSharedProsperity.pdf?sequence=1&isAllowed=y>.

impacts their ability to secure loans, and that only 21% of women have assets registered under their name (footnote 73). Another common barrier faced by women entrepreneurs is limited access to business networks as compared to men, which limit their opportunities to learn from the experience of others, develop useful business contacts, and gain market information. One study showed that women business owners in Malaysia, the Philippines, and Thailand who interact with business associations are 24% more likely to report plans to increase the size of their businesses within 3 years, but more than one-third of women business owners in those countries never interact with these associations at all (compared with 26% of men who never do).⁷⁴ Possible approaches to tackle these barriers include tailoring credit products, helping financial institutions enter the lending market for women, stimulating the insurance market for women-owned businesses, and establishing women-in-business networking platforms. The United Nations Development Programme's Women's Green Business Initiative is a positive example of a program that addresses existing structural barriers to women's economic advancement and facilitates equal opportunities for women to participate in the green economy (footnote 72). Some countries in Southeast Asia have begun acknowledging the significant role of women entrepreneurs in supporting climate adaptation.

- **Building open data systems for biodiversity.** A range of innovations could be supported through the opening of access to existing government data and building new data systems with the private sector, academia, and NGOs. For example, in Indonesia, Global Fishing Watch, an alliance of SkyTruth, Oceana, and Google Earth Outreach, is collaborating with the Ministry of Marine Affairs and Fisheries to better manage Indonesia's fisheries.⁷⁵ It uses GPS-equipped vessels, big data analysis, machine learning, cloud computing, and visualization techniques to spot illegal fishing activities (footnote 75). Another online platform, Global Forest Watch, uses satellites and algorithms to track tree cover loss, offering the public near real-time information about where and how forest cover is changing globally.⁷⁶ However, there has been limited development of data governance and sharing platforms related to biodiversity issues to date. Indonesia, the Philippines, and Thailand have introduced centralized open data platforms that collate data from various government agencies, including data related to biodiversity and sustainability (e.g., mangrove biodiversity, deforestation rates, soil sample data, and scale of illegal logging).⁷⁷ These platforms could be further built upon to allow for more types of data to be collected and shared securely and organizations to use the data to help address biodiversity challenges. To distinguish between "low-hanging fruits" that governments can capture in the near-term versus policies that require longer time frames to implement and take effect, the policy recommendations were further analyzed in terms of their implementation time frame. This takes into account multiple factors including potential for short-term impact; implementation time frame; and whether they are considered politically feasible (i.e., exhibit strong links to current government strategies).

⁷⁴ The Asia Foundation. 2013. *Access to Trade and Growth of Women's SMEs in APEC Developing Economies: Evaluating Business Environments in Malaysia—Philippines—Thailand*. Singapore: Asia Pacific Economic Cooperation (APEC) Secretariat. https://www.apec.org/-/media/APEC/Publications/2013/2/Access-to-Trade-and-Growth-of-Womens-SMEs-in-APEC-Developing-Economies/2013_PPWE_Access-Trade-Growth-Women-SMEs.pdf.

⁷⁵ Global Fishing Watch. Indonesia Vessel Monitoring System (VMS). <https://globalfishingwatch.org/programs/indonesia-vms/>.

⁷⁶ Global Forest Watch. <https://www.globalforestwatch.org/about/>.

⁷⁷ Open Government Data of Thailand. <https://data.go.th/en/>; Satu Data Indonesia. <https://data.go.id/>; and Freedom of Information Philippines. <https://www.foi.gov.ph/>.

Implementing a Green Recovery in Southeast Asia

This report explains why Southeast Asian countries need to design pandemic recovery policies that hit both ambitious socioeconomic and environmental goals. The third in a four-part series, the report considers the impact of COVID-19 on Cambodia, Indonesia, Myanmar, the Philippines, and Thailand to show how a green recovery can help safeguard against future health crises. Analyzing areas including agriculture, cities, and oceans, the report lays out policy measures designed to identify, create, and finance green growth opportunities. It shows how COVID-19 has presented countries with a chance to hit the reset button and build a socially, economically, and environmentally resilient future.

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ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 68 members—49 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

