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Regional cooperation for green growth in Asia

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Contents

Summary

- In the 21st century, after a sustained period of rapid growth, Asia has become the world's largest regional economy. Its economic rise has, however, produced environmentally damaging side effects such as air pollution, sea pollution and significant greenhouse gas (GHG) emissions. The success of global joint efforts for green and sustainable development depends on Asian action to mitigate the adverse effects of its economic growth.
- Despite each country's independent efforts, progress on the Sustainable Development Goals (SDGs) has been uneven across Asia. In particular, the region has struggled to suppress the increase of GHG emissions driven by high economic growth. COVID-19 could slow the trajectory of the shift to a low-carbon economy as governments concentrate on the urgent medical response and economic rescue. The challenge for the region will be finding a way to decouple carbon dependency and other environmental burdens from economic growth.
- Although there is great variation within and across Asia in terms of commitment to climate action, governments are increasingly aware of the risks of climate change. This is pushing them to undertake ambitious climate policies. China's declaration that it aims to be carbon-neutral by 2060, pledges by Japan and South Korea to be carbon-neutral by 2050, and India's renewable deployment goal of 450 gigawatts (GW) of capacity by 2030 are examples of such ambitions. Regional frameworks such as ASEAN, the East Asia Summit framework and the China–South Korea–Japan tripartite cooperation all address the green growth and sustainable development agenda. All statements, however, need to be backed up with detailed action plans and implementation.
- Regional integrated action will achieve far greater impact than individual countries acting alone – for example, through an interconnected electricity transmission line across ASEAN members or region-wide efforts to promote innovation that targets green technology. Strong leadership on this has not yet emerged in the region. With economic integration through initiatives such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership and the Regional Comprehensive Economic Partnership, promotion of innovation in the world's largest market could generate good outcomes.

— The financial community has an influential role to play in green growth and sustainable development. Capital flows are desperately seeking greener and more sustainable projects to finance, spurred by external pressure on environmental, social and governance (ESG) considerations. Despite the COVID-19 crisis, financial markets have some degree of capital flow, particularly through quantitative easing by central banks across the developed economy that could provide favourable funding opportunities for investment projects. Appropriate sourcing of such capital flows to green, sustainable projects could boost their implementation. New regional forums, which involve the financial community from the early stage of conceptualization and design, could support such approaches.

01 Introduction

Asia, the world's largest regional economy, is now facing difficult environmental challenges – particularly the sharp increase of greenhouse gas emissions – that must be addressed in order to maintain sustainable growth.

Asia has experienced dramatic economic growth in the 21st century. In 2001, Asia's share of the global economy in terms of GDP was 26.6 per cent, while North America accounted for 33.8 per cent followed by Europe with 29.5 per cent.[1] By 2019, Asia had grown to become the largest regional economy, with 37.8 per cent of global GDP, followed by North America with 26.5 per cent and Europe with 24.8 per cent.[2] The COVID-19 pandemic has not altered this trajectory: the IMF reports that GDP contracted by 1 per cent in 2020 in the emerging and developing nations of Asia, compared with a contraction of 3.3 per cent in world GDP.[3]

Asia's rapid economic growth coupled with a rising population has, however, adversely affected the environment through air pollution, sea pollution, waste management problems and increased greenhouse gas (GHG) emissions. The International Energy Agency (IEA) reports that carbon dioxide (CO_2) emissions from fuel combustion in Asia increased by 124.2 per cent between 2000 and 2018.[4] As a result, Asia currently accounts for 54.7 per cent of global CO_2 emissions from fuel combustion; far more than North America's 16.4 per cent share and Europe's 15.3 per cent.[5]

Unlike perceptible environmental disruption, such as air pollution or sea pollution, GHG emissions do not have as visible an impact on human health. Nevertheless, unprecedented material and financial damage resulting from climate-related natural disasters in recent years has raised concern over climate change.

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1 United Nations (2019), 'GDP and its breakdown at current prices in US dollars', December 2020, https://unstats.un.org/unsd/snaama/downloads. See Appendix for list of countries included in the UN statistics.
2 Ibid.
3 International Monetary Fund (IMF) (2021), 'World Economic Outlook, April 2021: Managing Divergent Recoveries', April 2021, https://www.imf.org/en/Publications/WEO/Issues/2021/03/23/world-economic-outlook-april-2021. See Appendix for list of countries included in the IMF statistics.
4 International Energy Agency (IEA) (2020), 'CO2 emissions from fuel combustion 2020 – Free highlights (XLS)', https://www.iea.org/subscribe-to-data-services/co2-emissions-statistics.
5 Ibid.

As a result, Asian governments have prioritized climate action, including the green transition and adaptation. In the international arena, Asian countries have expressed their commitment to proactive countermeasures to combat climate change under the Paris Agreement – namely, the international goal to limit global warming to well below 2°C, preferably to 1.5°C, compared to pre-industrial levels. Each country's national commitment to comprehensive climate action and the target for the mitigation of GHG emissions towards 2030 can be seen in the Nationally Determined Contributions (NDCs), which countries are obliged to monitor and submit to the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) every five years.[6]

Asia's emerging economies are struggling to cope with the dilemma of how to balance policies aimed at boosting their economies with their commitments to SDGs.

The 2030 Agenda for Sustainable Development, with its Sustainable Development Goals (SDGs),[7] also set a wide range of key indicators with which to realize sustainable growth. Asian countries have also attempted to align their development strategies with the SDGs.

Although efforts have been made across Asia, the most recent UN report indicates that progress towards the SDGs has been insufficient, and some indicators including GHG emissions even show reverse trends towards 2030.[8] The SDG Index, in Sachs et al.'s *Sustainable Development Report 2020*, tracks country performance on the 17 SDGs (with the worst rating at 0 and the best at 100). It suggests that Asian countries overall are performing poorly on the SDGs. In Asia, Japan has the highest score at 79.2 (17th among 166 countries), followed by South Korea in 20th place, Thailand at 41st, China in 48th, and India in 117th place.[9] Asia's emerging economies are struggling to cope with the dilemma of how to balance policies aimed at boosting their economies with their commitments to SDGs. This difficulty concerns GHG emissions in particular, as these usually increase proportionally with the growth of economic activities and populations.

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6 UNFCCC (2015), 'Paris Agreement', https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf.

7 The Sustainable Development Goals are a universal call to action to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere. The 17 goals were adopted by all UN member states in 2015, as part of the 2030 Agenda for Sustainable Development, which set out a 15-year plan to achieve the goals. For further details see United Nations (n.d.), 'Sustainable Development Goals', https://www.un.org/sustainabledevelopment/development-agenda.

8 United Nations Economic and Social Commission for Asia and Pacific (UNESCAP) (2020), *Asia and the Pacific SDG Progress Report 2020*, Bangkok: United Nations, p. 19, https://www.unescap.org/sites/default/files/publications/ESCAP_Asia_and_the_Pacific_SDG_Progress_Report_2020.pdf.

9 Sachs, J., Schmidt-Traub, G., Kroll, C., Lafortune, G., Fuller, G. and Woelm, F. (2020), *Sustainable Development Report 2020: The Sustainable Development Goals and COVID-19*, Cambridge: Cambridge University Press, pp. 23–28, https://s3.amazonaws.com/sustainabledevelopment.report/2020/2020_sustainable_development_report.pdf.

A common challenge across many countries in Asia is the high dependency on coal for energy (see Table 1). Considering its cost-efficiency, availability and reliability, coal is still regarded as the practical choice to quickly meet a rapid increase in energy demand.

Table 1. Coal-dependency levels for electricity in key Asian nations

Country	Coal dependency in electricity generation	Period
China	67%	Q1, 2020
India	75%	Q1, 2020
Indonesia	59%	2019
Vietnam	43%	2020 (estimate)

Source: IEA (2020), *Global Energy Review 2020: The impacts of the Covid-19 crisis on global energy demand and CO_2 emissions*, April 2020, https://www.iea.org/reports/global-energy-review-2020/electricity#abstract; IEA (2020), 'Electricity generation by source, Indonesia 1990-2019', Electricity Information 2020, https://www.iea.org/countries/indonesia; Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH (n.d.), Vietnam Power Development Plan for the Period 2011–2020, p. 5, http://gizenergy.org.vn/media/app/media/legal%20documents/GIZ_PDP%207%20rev_Mar%202016_Highlights_IS.pdf; for the IEA country page for Indonesia, see https://www.iea.org/countries/indonesia.

China, the world's biggest consumer of coal, depended on coal-based electricity for around 67 per cent of its average total in the first quarter of 2020 (with its share of renewable energy increasing to 28 per cent in March 2020).[10] This marks a declining trend in coal dependency since 2015, when around 70 per cent of average total electricity needs depended on coal, this figure fell to around 65 per cent in 2019.[11] Critics warn that the approval of new coal power plants in China would risk the global long-term goals of the Paris Agreement.[12]

India is the second largest global consumer of coal. It depended on coal for around 75 per cent of its average total electricity needs in the first quarter of 2020 (with renewable energy increasing to 21 per cent of total electricity in March 2020).[13] Its ambition is to have non-fossil fuel-based energy sources accounting for 40 per cent of its cumulative electricity installed capacity. Its renewable energy capacity goal is 175 gigawatts (GW) by 2022 and 450 GW by 2030 (renewable energy except for large hydropower).[14] Considerable extra effort will be needed to achieve this

10 IEA (2020), *Global Energy Review 2020: The impacts of the Covid-19 crisis on global energy demand and CO2 emissions*, April 2020, https://www.iea.org/reports/global-energy-review-2020/electricity#abstract.
11 IEA (2020), 'Electricity generation by source, People's Republic of China 1990-2019', Electricity Information 2020, https://www.iea.org/countries/china.
12 Rudd, K. (2020), 'China's thirst for coal is economically shortsighted and environmentally reckless', *The Washington Post*, 18 August 2020, https://www.washingtonpost.com/opinions/2020/08/18/chinas-thirst-coal-is-economically-shortsighted-environmentally-reckless.
13 IEA (2020), *Global Energy Review 2020: The impacts of the Covid-19 crisis on global energy demand and CO_2 emissions*.
14 The Climate Action Tracker projects that the new 2030 target could lift the share of renewable energy up to 60 per cent of all national installed capacity of power. Climate Action Tracker (2020), 'India', 22 September 2020, https://climateactiontracker.org/countries/india.

target. The current level of renewable energy capacity is around 93 GW (rising consistently from 15 GW in 2010) and total installed capacity in India was 377 GW, as of January 2021.[15]

Likewise, in Southeast Asia, the share of coal-fired power generation increased from around 20 per cent in 2000 to around 40 per cent in 2018. It is expected to remain at this level over the next two decades, according to the IEA.[16] Indonesia regards coal as its primary source of electricity, and coal accounted for half of installed capacity in 2018. Coal is expected to remain its primary source of energy although the government aims to increase the share of renewable energy

Under the IMF's forecast, emerging and developing Asia is projected to achieve 8.6 per cent growth in 2021, while world growth is projected at 6 per cent.

from 14 per cent in 2018 to 23 per cent by 2025, and to 31 per cent by 2030.[17] Vietnam expects an increase of installed capacity of coal-fired power plants from 42.7 per cent in 2020 to 49.3 per cent in 2025, according to its revised seventh national power development plan.[18] Under the eighth development plan, the rise in coal-based energy in Vietnam is due to be overtaken by efforts to roll out more renewable sources and gas-fired power plants backed by liquefied natural gas-based fuel.

The COVID-19 crisis has sharpened challenges such as coal dependency. The key policy issues are whether governments can develop and implement financial recovery programmes while also meeting their commitments under the Paris Agreement and the SDGs. Although Asia is suffering from a wide range of negative impacts caused by COVID-19, the IMF envisages a quick bounce-back scenario in Asia to high economic growth rates in 2021. Under the IMF's forecast, emerging and developing Asia is projected to achieve 8.6 per cent growth in 2021, while world growth is projected at 6 per cent.[19]

This suggests two things. Firstly, Asia's emerging economies will maintain some level of economic capability that could potentially help to meet the sustainable development agenda. Secondly, it will be imperative that the region meets the challenge of combating rising GHG emissions and the other adverse effects caused by rapid economic growth to ensure more inclusive and sustainable growth. The UN Economic and Social Commission for Asia and the Pacific (UNESCAP) progress report revealed that efforts in the region have been insufficient,

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15 Government of India, Ministry of Power, Central Electricity Authority (2020), *Executive Summary on Power Sector January-2021, and January-2010*, https://cea.nic.in/executive-summary-report/?lang=en.
16 IEA (2019), *South East Asia Energy Outlook 2019*, pp. 32, 67. https://webstore.iea.org/download/direct/2887?fileName=Southeast_Asia_Energy_Outlook_2019.pdf. In the report, Southeast Asia includes the 10 ASEAN member states: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam.
17 National Energy Council (2019), *Indonesia Energy Outlook 2019*, pp. 5–9; 35–37, https://www.esdm.go.id/assets/media/content/content-indonesia-energy-outlook-2019-english-version.pdf.
18 GIZ GmbH (n.d.), *Vietnam Power Development Plan for the Period 2011–2020*, p. 5.
19 IMF (2021), 'World Economic Outlook, April 2021: Managing Divergent Recoveries'.

particularly in terms of curbing growing GHG emissions.[20] The key question is how the region can revitalize and implement approaches to achieve a low-carbon economy through continuous economic growth ('green growth') and sustainable development, particularly in the context of COVID-19.

This research paper examines the forms of regional cooperation that could foster green growth and sustainable development in Asia. It analyses some of the current obstacles faced by Asian countries and assesses existing regional efforts undertaken through various forms of partnership. The paper focuses on the following economies: China, India, the ASEAN5 (Indonesia, Malaysia, the Philippines, Thailand, Vietnam), and other large economies (Japan, South Korea). Given the scale of these economies, their levels of emissions and influence in the region, they should play an important role in changing the direction of regional development.

20 UNESCAP evaluates each of the SDG indicators on the scale of -100 (the biggest regression) to 100 (no significant progress). The indicator of GHG emissions shows a large reverse trend at around -90, nearly the biggest regression. UNESCAP (2020), *Asia and the Pacific SDG Progress Report 2020*, p. 19.

02 Climate change action and awareness in Asia

There is wide variation in how prepared countries are to tackle climate change across Asia, but carbon neutral policies declared by China, Japan and South Korea in 2020 may help drive regional efforts.

Country-level climate commitments and initiatives

Governments' commitments to mitigate GHG emissions are described in the NDCs submitted under the Paris Agreement.[21] As the Paris Agreement adopts a bottom-up approach whereby each government sets its own contribution targets, the NDCs are a means to demonstrate and measure whether governments are serious about tackling climate change.

In Asia, awareness has grown about the risks of climate change, partly in response to the devastating experiences of natural disasters across the region in recent years. According to the Global Climate Risk Index 2020, seven Asian countries (Myanmar, the Philippines, Pakistan, Vietnam, Bangladesh, Thailand and Nepal) are identified

21 The Paris Agreement requires each party to prepare, communicate and maintain successive NDCs that it intends to achieve. Parties pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions. Before signing the Paris Agreement, all parties submitted their Intended Nationally Determined Contribution (INDC). Once a party has formally joined the agreement, the 'Intended' is dropped and the proposed climate actions become an 'NDC'.

among the 10 nations most affected by climate risk from 1999 to 2018.[22] In addition, Japan, the Philippines and India ranked among the five countries most affected in 2018. Japan was hit by extreme weather events in 2018 where rainfall caused damage worth more than $7 billion, and a heatwave led to 138 fatalities and more than 70,000 people requiring hospitalization. The Philippines was hit by the most powerful typhoon recorded worldwide in 2018, affecting more than 250,000 people across the country. India was severely affected the same year by the annual monsoon season lasting from June to September, resulting in damage amounting to $2.8 billion.[23] A 2019 survey conducted in Southeast Asia (in Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam) concluded that governments in the region were becoming more serious about climate change, which was ranked as the biggest concern to national security among other security threats.[24]

According to the Global Climate Risk Index 2020, seven Asian countries are identified among the 10 nations most affected by climate risk from 1999 to 2018.

However, there is great variation regarding how well-equipped countries are to tackle climate change within and across Asia. The NDCs clearly reveal the differences in the stages of social and economic development across the region (see tables 2 and 3).[25]

Table 2. Mitigation targets of China, India, Japan, South Korea

	Mitigation target described in country's NDC
China	To achieve peak CO_2 emissions around 2030 and make best efforts to peak early. To lower CO_2 emissions per unit of GDP by between 60% and 65% by 2030 from the 2005 level. (Carbon-neutral policy (not included in the current NDC): to be carbon-neutral by 2060.)
India	To reduce the emissions intensity of its GDP by between 33% and 35% by 2030 from the 2005 level.
Japan	A 26% reduction CO_2 emissions by fiscal year (FY) 2030, compared to FY2013 (25.4% reduction compared to FY2005). (Carbon-neutral policy (not included in the current NDC): To be carbon-neutral by 2050.)
South Korea	A 24.4% reduction from the total national GHG emissions in 2017 by 2030. (Carbon-neutral policy: To be carbon-neutral by 2050.)

Source: Compiled by the author from individual countries' NDCs, see Appendix for full list.

22 Eckstein, D., Künzel, V., Schäfer, L. and Winges, M. (2019), *Global Climate Risk Index 2020*, Bonn: Germanwatch e.V., p. 9, https://germanwatch.org/sites/germanwatch.org/files/20-2-01e%20Global%20Climate%20Risk%20Index%202020_14.pdf.
23 Ibid. pp. 6–7
24 Green, M. and Searight, A. (2020), *Powers, Norms, and Institutions*: *The Future of the Indo-Pacific from a Southeast Asia Perspective,* Washington, DC: The Center for Strategic and International Studies (CSIS), pp.15–16 https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/20624_Green_PowersNormsandInstitutions_WEB%20FINAL%20UPDATED.pdf.
25 See Appendix for details of each country's NDC (or INDC for the Philippines).

Table 3. CO_2 emissions mitigation targets of the ASEAN5

	Mitigation target described in country's NDC	
Indonesia	Unconditional	29% reduction from business as usual (BAU) level by 2030.
	Conditional	41% reduction from BAU level by 2030 with additional 12% reduction compared to unconditional target.
Malaysia	Unconditional	To reduce the emissions intensity of GDP by 35% by 2030 from the 2005 level.
	Conditional	45% reduction of emissions intensity of GDP by 2030 with additional 10% reduction compared to unconditional target.
Philippines[26]	Unconditional	–
	Conditional	Approximately 70% reduction from the BAU level by 2030.
Thailand	Unconditional	20% reduction from the BAU level by 2030.
	Conditional	25% reduction from the BAU level by 2030 with additional 5% reduction compared to unconditional target.
Vietnam	Unconditional	9% reduction from the BAU level by 2030.
	Conditional	27% reduction from the BAU level by 2030 with additional 18% reduction compared to unconditional target.

Source: Compiled by the author from individual countries' NDCs, see Appendix for full list.

As Table 3 shows, the ASEAN5 have adopted a two-fold approach to meet their emissions goals through a combination of unconditional and conditional targets. The five countries insist that they can achieve these ambitious targets so long as there is international support, including finance, technology transfer and capacity-building.

China, the largest generator of GHG emissions in the world, intends to achieve peak CO_2 emissions by 2030. But it has also expressed intentions to try to reach the peak earlier and has implemented coal-targeting measures including a coal consumption cap for coal-fired generation capacity. Furthermore, new efficiency standards have forced a number of its old plants to shut down.[27] However, critics remain concerned that China continues to build new coal-fired power plants.[28]

26 Although the Philippines has not submitted its NDC formally, the INDC is regarded as an NDC once the Paris Agreement comes into effect with ratification. In this report, the NDC for the Philippines refers to the INDC submitted to the UNFCCC as the Philippines has already ratified the Paris Agreement.
27 Hart, C., Zhu, J. and Ying, J. (2018), *Mapping China's Climate and Energy Policies*, December 2018, New York: Development Technologies International, pp. 84–90 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/786518/China_Climate_Map_Public_Secured_2019-3-1.pdf.
28 At the EU–China leaders' meeting on 14 September 2020, the EU stressed the importance of a moratorium in China on building coal-fired power plants and on financing their construction abroad, at least as part of a global initiative. See European Commission (2020), 'Joint press release by President Michel, President von der Leyen and Chancellor Merkel', 14 September 2020.

Amid such concern, President Xi Jinping announced during an address to the UN General Assembly on 22 September 2020 that China would aim to become carbon-neutral by 2060.[29] Although there is a need for a more concrete roadmap, the declaration at least demonstrates that the Chinese leadership is mindful of climate action as one of its national agenda priorities. The global community will carefully watch China's next move[30] to see how it incorporates carbon-neutral targets in the country's new five-year plan for the period 2021–25.[31]

Although it is among the world's top 10 highest emitters (see Table 4), Japan is in a position to reduce its GHG emissions in part because of its mature economy and also due to its relatively declining population. In alignment with the global joint action, new Prime Minister Yoshihide Suga in October 2020 declared Japan's ambition to reach carbon neutrality by 2050.[32] In light of their respective declarations, Japan and China could find common ground – both countries recognize their responsibility for global joint collaboration on climate action and have expressed their intention to promote international cooperation.

Table 4. 10 highest emitters of CO_2 from fuel combustion

CO_2 emitter	**2005 (million tonnes of CO_2)**	**2018 (million tonnes of CO_2)**	**% change 2005 to 2018**	**Share of world total CO_2 (%, 2018)**
China	5,448.9	9,570.8	75.6%	28.6%
US	5,703.2	4,921.1	-13.7%	14.7%
European Union 27	3,390.5	2,798.5	-17.5%	8.4%
India	1,075.0	2,307.8	114.7%	6.9%
Russian Federation	1,481.9	1,587.0	7.1%	4.7%
Japan	1,181.5	1,080.7	-8.5%	3.2%
South Korea	457.7	605.8	32.4%	1.8%
Iran	417.8	579.6	38.7%	1.7%
Canada	538.9	565.2	4.9%	1.7%
Indonesia	317.6	542.9	71.0%	1.6%
World total	**27,078.0**	**33,513.3**	**23.8%**	**100.0%**

Source: IEA (2020), 'CO_2 emissions from fuel combustion, 2020'.

29 UN Affairs (2020), '"Enhance solidarity" to fight COVID-19, Chinese President urges, also pledges carbon neutrality by 2060', 22 September 2020, https://news.un.org/en/story/2020/09/1073052.
30 Ursula von der Leyen, the president of the European Commission welcomed China's announcement, but at the same time indicated that 'a lot of work remains to be done' via Twitter: von der Leyen, U. (@vonderleyen) (2020), 'I welcome China's ambition to curb emissions and achieve carbon neutrality by 2060. It's an important step in our global fight against climate change under the #ParisAgreement. We will work with China on this goal. But a lot of work remains to be done', tweet, 23 September 2020, https://twitter.com/vonderleyen.
31 Shi, Y. (2021), 'The 14th Five Year Plan sends mixed message about China's near-term climate trajectory', *China Dialogue*, 8 March 2021, https://chinadialogue.net/en/energy/the-14th-five-year-plan-sends-mixed-message-about-chinas-near-term-climate-trajectory.
32 Prime Minister of Japan and His Cabinet (2020), 'Policy Speech by the Prime Minister to the 203rd Session of the Diet', 28 October 2020, https://japan.kantei.go.jp/99_suga/statement/202010/_00006.html.

South Korea dramatically shifted its position in 2020 from previously showing reluctance to reduce GHG emissions by 2030 to presenting an ambitious reduction policy to achieve its long-term target of carbon neutrality by 2050, which was announced in October 2020 by the South Korean President Moon Jae-in.[33]

Conversely, India has not committed to reducing GHG emissions in the foreseeable future. India intends to reduce the emissions intensity of its GDP; however, it sees difficulty in peaking the level of GHG emissions by 2030.

At the country level across the region, the breakdown of policy actions aimed at achieving these targets includes a move to diversify the energy mix (a shift to renewable energy), promotion of eco-friendly vehicles and other measures to improve energy efficiency. Nevertheless, many of these countries are still expanding economically. A quick shift away from fossil fuels is unrealistic, given the limited range of technologies currently available and the fact that economic activities depend on conventional infrastructure. Although green growth is desirable across all the community, limited financial resources and the higher costs often associated with advanced technologies can also be problematic.

As such, policymakers are struggling to solve the trade-off between economic stimulus policies and a green transition. So far, they are not succeeding, as the progress report by UNESCAP shows.[34] But the carbon-neutral commitments by China, Japan and South Korea may yet change the direction of progress on this, given the scale of impacts of such large emitters. The challenge is how the momentum from these three countries can prevail more widely across the region. As the NDCs of the ASEAN5 indicate, technology transfer, financial resource allocation and capacity-building through international support are key to progress.

Regional initiatives and efforts

In addition to the respective efforts by each government, differing regional networks in Asia have tried to address the concern of climate change and sustainability.

Tripartite Environment Ministers Meeting

One of the long-standing forums on environmental issues is the Tripartite Environment Ministers Meeting (TEMM) where China, Japan and South Korea have held a continued dialogue since 1999. This activity includes knowledge-sharing, joint research or workshops on priority areas such as air pollution, biodiversity, climate change, the circular economy and waste management. TEMM is currently working closely under a five-year joint action plan (2020–24), which stresses that parties should adhere to global and regional agreements such as the SDGs, the Paris Agreement and the G20 consensus, including the Osaka Blue Ocean Vision.

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33 Cha, S. (2020), 'South Korea's Moon targets carbon neutrality by 2050', Reuters, 28 October 2020, https://www.reuters.com/article/us-southkora-environment-greenewdeal-idUSKBN27D1DU.
34 UNESCAP (2020), *Asia and the Pacific SDG Progress Report 2020*.

The action plan stresses that the countries should explore activities with the '3+x'[35] modality to promote sustainable development through multilateral frameworks, including the G20, ASEAN+3[36] and Asia-Pacific Economic Cooperation (APEC).[37] Doing so would show their intention to reach out to much broader global forums to contribute to global joint actions. TEMM has effectively drawn the attention of policymakers to the challenges of controlling air pollution,[38] and dust and sandstorm (DSS) control; these are urgent, cross-border common challenges for the three countries. TEMM has devoted scientific research to DSS prevention and control including a joint research project on long-range transboundary air pollutants in Northeast Asia,[39] and regularly shares DSS monitoring data and assessments. The work also includes technical countermeasures and management approaches to restore vegetation in areas affected by desertification so as to reduce DSS hazard. TEMM is also active in the transboundary movement of e-waste, another urgent problem in the region.

ASEAN

The Association of Southeast Asian Nations (ASEAN) is a key regional body with a long history. From its original focus on economic partnership and facilitating trade across member countries, ASEAN's remit has expanded to include challenges common to member countries, including sustainable development. In June 2019, ASEAN adopted the ASEAN Leaders' Vision Statement on Partnership for Sustainability[40] at the 34th ASEAN Summit, which covers a broad range of sustainability issues including the SDGs, national security, cybersecurity and the green economy. As a follow-up, the ASEAN Centre for Sustainable Development Studies and Dialogue was launched in Bangkok, Thailand, in November 2019.[41]

Through these approaches, the regional body is keen to promote and ensure ASEAN centrality in the evolving regional architecture and also seeks to bolster ASEAN-led frameworks such as ASEAN+3 and the East Asia Summit (EAS). In November 2019, the EAS announced its leaders' statement on partnership for sustainability.[42] ASEAN-led outreach to the EAS platform on the green and sustainability agenda is a new development, which aims to engage with the US, India and Russia. It remains to be seen whether ASEAN can lead more action-based initiatives across

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35 '3+x' in this context means three countries (China, Japan and South Korea) working together with other countries or international forums on environmental issues.
36 ASEAN+3 consists of ASEAN member states plus China, Japan and South Korea.
37 Ministry of the Environment, Government of Japan (2019), 'Joint Communique of The 21st Tripartite Environment Ministers Meeting among Japan, Korea and China, 23–24 November 2019, Kitakyushu, Japan', https://www.env.go.jp/press/files/jp/112838.pdf.
38 Kauffmann, C. and Saffirio, C. (2020), *Study of International Regulatory Co-operation (IRC) arrangements for air quality: The cases of the Convention on Long-Range Transboundary Air Pollution, the Canada-United States Air Quality Agreement, and co-operation in North East Asia*, OECD Regulatory Policy Working Paper No. 12, 24 January 2020, pp. 31–33, https://www.oecd-ilibrary.org/docserver/dc34d5e3-en.pdf?expires=1607946282&id=id&accname=guest&checksum=AEEBE31FCA462D822624A303C840D77C.
39 Ministry of the Environment, Government of Japan (2019), 'Summary Report of the 4th State (2013–17) LTP Project', Northeast Asia, https://www.me.go.kr/home/file/readDownloadFile.do?fileId=184686&fileSeq=1.
40 ASEAN (2019), 'ASEAN Leaders' Vision Statement on Partnership for Sustainability', 23 June 2019, https://asean.org/storage/2019/06/1.-ASEAN-Leaders-Vision-Statement_FINAL.pdf.
41 ASEAN (2019), 'Chairman's Press Statement on the Launch of the ASEAN Centre for Sustainable Development Studies and Dialogue (ACSDSD)', 3 November 2019, https://asean.org/storage/2019/11/FINAL-Press-statement-ACSDSD.pdf.
42 EAS (2019), 'East Asia Summit Leaders' Statement on Partnership for Sustainability', 4 November 2019, https://asean.org/storage/2019/11/5.-Finalised-EAS-Statement-on-Sustainability_FINAL.pdf.

the members of the EAS. The challenge for ASEAN is how to develop a more concrete strategy for the region to lead regional sustainable development beyond rhetoric, public statements and agreements.

Regional Comprehensive Economic Partnership

The Regional Comprehensive Economic Partnership (RCEP), a trade partnership signed between ASEAN+3, Australia and New Zealand, could potentially become an influential arena for discussing regional cooperation. However, the decision of India to opt out of the RCEP makes it difficult to assess how this could work in practice.[43] Furthermore, the RCEP has limited provisions on service, investment and standards; no labour provision, no environmental provision and no discipline of state-owned enterprises in competition provisions. As a result, it has been regarded as a lower trade standard framework compared to the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP).[44] Although the RCEP will become the largest trading bloc in the world and an influential body, it is hard to imagine how it could proactively deal with regional common agendas like green growth and sustainable development. Having said that, both the CPTPP and RCEP could move Asia closer to economic integration and an expansion of its free-trade area. In theory, at least, such groupings could make it easier to coordinate joint action beyond national borders.

Belt and Road Initiative

The other influential project in Asia is China's Belt and Road Initiative (BRI). The BRI is part of Beijing's campaign to promote Chinese investment around the world while at the same time better connecting China with Africa and Europe, through a series of maritime and land routes. Given the degree of investment in new infrastructure linked to the BRI, it will have significant climate change implications. One analysis concluded that if the 126 countries involved in the BRI,[45] excluding China, follow the most carbon-intensive growth path observed in history, this could result in a 2.7°C temperature increase above pre-industrial levels, even if the rest of the world adheres to the 2°C path agreed under the Paris Agreement.[46]

At the opening ceremony of the second Belt and Road Forum for International Cooperation on 26 April 2019, Chinese President Xi stated, 'We need to pursue open, green and clean cooperation. The Belt and Road is not an exclusive club. We may launch green infrastructure projects, make green investment and provide green financing.'[47] Nevertheless, there are concerns over the lack of green or sustainable

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43 India pulled out of the RCEP negotiation in 2020, while the other 15 member countries reaffirmed commitment to continue to work with India to address its outstanding issues. Ministry of Foreign Affairs, Japan (2020), 'Joint Statement of the 29th Regional Comprehensive Economic Partnership Trade Negotiating Committee (RCEP TNC) Meeting', https://www.mofa.go.jp/files/100050719.pdf.
44 Reinsch, W. A., Caporal, J. and Murray, L. (2019), 'At last RCEP Deal', Center for Strategic and International Studies, 3 December 2019, https://www.csis.org/analysis/last-rcep-deal#:~:text=A3%3A%20While%20some%20have%20criticized,for%20future%20negotiations%20and%20changes.
45 That is, those countries that signed memorandums of understanding with China as of April 2019.
46 Ma, J. and Zadek, S. (2019), *Decarbonizing the Belt and Road: A Green Finance Roadmap*, September 2019, Tsinghua University Center for Finance and Development, pp. 9–19, https://www.vivideconomics.com/wp-content/uploads/2019/09/Decarbonizing-the-Belt-and-Road-%E2%80%93Final-Report-English.pdf.
47 The Second Belt and Road Forum for International Cooperation (2019), 'Xi Jinping Attends the Opening Ceremony of the Second Belt and Road Forum for International Cooperation (BRF) and Delivers a Keynote Speech', 27 April 2019, http://www.beltandroadforum.org/english/n100/2019/0429/c22-1391.html.

policies and guidelines for the BRI projects. Critics call for the BRI to shift away from funding polluting projects; they are convinced that the BRI includes projects that will increase climate change as well as affect local ecology.[48]

The Green Investment Principles for the BRI, established in 2018, are a set of voluntary principles to promote green finance and green investments along the Belt and Road.[49] Having received official sign-ups from 37 global institutions, mostly large financial institutions, by the end of March 2020, the finance community is expected to take the lead in applying high standards on green investment principles. The Asian Infrastructure Investment Bank's recent change in coal policy, whereby its president expressed the intention to cease financing any project functionally related to coal,[50] is a signal that the finance community might further be able to help change the trajectory.

Japan's approach

Japan has undertaken a project-oriented approach through bilateral cooperation. At the regional level, it has proposed developing a new liquefied natural gas (LNG) supply chain across the Indo-Pacific region to secure a sustainable energy source to meet an increase in electricity demand. Japan has undertaken this approach in collaboration with the US, a big gas supplier, under the Japan–US Energy Partnership (JUSEP),[51] an important collaboration that aligns with the Free and Open Indo-Pacific initiative that both countries are advancing.[52] One concrete example of engagement is the Trilateral Vietnam–US–Japan Commercial LNG Forum held on 2 December 2020.[53] The LNG solution provides a realistic alternative to balance the sustainable supply of electricity and the mitigation of GHG emissions for countries that are heavily dependent on coal. The challenge is the initial cost and time frame required to develop a full package of infrastructure from the LNG-receiving terminal to the pipeline for domestic transfer and gas-fired plant. Furthermore, without a clear replacement plan to move from coal to gas, the gas deployment just increases dependency on a fossil fuel, making it difficult to map out the path to carbon reduction.

If the major regional projects and infrastructure initiatives led by China and Japan can be married to broader regional green growth strategies, these could be a game changer for Asia. However, a great deal of distance remains between current practice and that goal.

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48 Shepherd, C. (2020), 'China's Belt and Road urged to take green route', *Financial Times,* 5 June 2020, https://www.ft.com/content/e00426f4-8ead-11ea-af59-5283fc4c0cb0.
49 Green Investment Principles (n.d.), 'Green Investment Principles for the Belt and Road', http://gipbr.net/index.aspx?m=1.
50 Climate Home News (2020), 'Asian multilateral bank promises to end coal-related financing', 11 September 2020, https://www.climatechangenews.com/2020/09/11/asian-multilateral-bank-promises-end-coal-related-financing.
51 Ministry of Economy, Trade and Industry (2019), '2019 Japan–U.S. Strategic Energy Partnership Statement: Recent Major Developments', https://www.meti.go.jp/policy/external_economy/cooperation/oda/jusep_statement_191104.pdf.
52 The White House (2018), 'U.S.–Japan Joint Statement on Advancing a Free and Open Indo-Pacific Through Energy, Infrastructure and Digital Connectivity Cooperation', 13 November 2018, https://trumpwhitehouse.archives.gov/briefings-statements/u-s-japan-joint-statement-advancing-free-open-indo-pacific-energy-infrastructure-digital-connectivity-cooperation.
53 The joint statement was released on 7 December 2020: U.S. Department of State (2020), 'Joint Statement on United States, Japan and Vietnam Cooperation to Support Vietnam's Energy Transitions Through LNG Utilization', 7 December 2020, https://www.state.gov/joint-statement-on-united-states-japan-and-vietnam-cooperation-to-support-vietnams-energy-transitions-through-lng-utilization.

03 Regional integrated action for green growth

Achieving regional sustainability is a crucial objective and can be achieved through integrated action in areas such as cross-border connectivity, promotion of technology and a circular economy.

Cross-border interconnection plans

Regional integrated action is critical to a green transition, with the potential to achieve far greater impact than through independent actions taken by each country. Greater regional efforts would help to establish cross-border power grid connections, which would improve efficiency of power supply and help to secure more sustainable energy supply across the connected region. In terms of a green transition, regional interconnection enables more flexibility over site selection for large-scale wind or solar power plants, positioning these in the best place for energy-sharing with other countries. Some regional efforts are under way but are experiencing various challenges, as these examples show.

The ASEAN Power Grid

One of the more ambitious regional interconnection plans is the ASEAN Power Grid initiative whereby 10 ASEAN member states are aiming to integrate their respective power grids through cross-border transmission lines. The concept, formally adopted by ASEAN in 1997, was developed originally to respond more efficiently to rising energy demand and to encourage further economic growth, based on this enhanced regional infrastructure. Some progress has been seen on the connection between Cambodia, Laos, Thailand and Vietnam, and on that linking Thailand, Malaysia and

Singapore. Yet, the initiative is expected to achieve only 5,000 megawatts (MW) of cross-border electricity transmission capacity out of a planned total of 30,000 MW by the end of 2020.[54] With difficulties in coordination across the region, it is not clear how ASEAN member states plan to incorporate agreed targets into their respective national power development plans.

The IEA assessed the impact of accommodating viable renewable energy into increased cross-border connections and concluded that 'cross-border interconnectors enhance the flexibility of the ASEAN power sector to accommodate an increasing share of renewables, particularly solar and wind. This allows a higher share of viable renewable energy to be integrated into the ASEAN power system in a cost-effective and reliable manner.'[55]

To achieve the most efficient integrated electricity market it is vital to have multilateral electricity trade, where several parties trade electricity across the region when necessary.

Three major challenges lie ahead. The first is to ensure careful coordination to harmonize standards and operational regimes including state aid policies for the sector across the countries. The most difficult area is designing a multilateral electricity trading system, including the pricing mechanism. Most of the existing cross-border interconnections in ASEAN are backed by bilateral long-term power purchase agreements. These can be reached based on negotiation between the limited parties. Nevertheless, to achieve the most efficient integrated electricity market it is vital to have multilateral electricity trade, where several parties trade electricity across the region when necessary (for example, in the case where Malaysia purchases electricity from Vietnam via Cambodia and Thailand). The coordination of multilateral electricity trade is challenging as each country adopts different systems and policies for operation and pricing.[56] Nevertheless, it is essential that ASEAN designs the power grid system taking into account lessons from power trading systems in other regions, such as the EU, but in line with its resources and capabilities.

The second challenge is to ensure that power grid integration supports the future development of renewable energy. Without an integrated policy, the interconnected network might rely on coal-fired power generation, as predicted by the IEA. ASEAN has set a renewable energy target of 23 per cent by 2025 under the ASEAN Plan of Action for Energy Cooperation 2016–2025.[57] The IEA estimates that the

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54 IEA (2019), *Southeast Asia Energy Outlook 2019: Comprehensive review of a region on the rise*, October 2019, p. 141, https://webstore.iea.org/download/direct/2887?fileName=Southeast_Asia_Energy_Outlook_2019.pdf.
55 IEA (2019), *ASEAN Renewable Energy Integration Analysis: Flexibility benefits of cross-border power trade*, October 2019, https://www.iea.org/reports/asean-renewable-energy-integration-analysis.
56 IEA analyses the current challenges in detail and provides proposals for a multilateral electricity trade framework relevant to ASEAN in the following report: IEA (2019), *Establishing Multilateral Power Trade in ASEAN*, 2 September 2019, https://webstore.iea.org/download/direct/2826?fileName=Establishing_Multilateral_Power_Trade_in_ASEAN.pdf.
57 ASEAN Centre for Energy (2020), *ASEAN Plan of Action and Energy Cooperation (APAEC) Phase II: 2021–2025*, 23 November 2020, https://aseanenergy.org/asean-plan-of-action-and-energy-cooperation-apaec-phase-ii-2021-2025.

energy demand increase will be largely supported by fossil fuels and, despite rising in absolute terms, the share of renewable energy will remain flat at around 15 per cent to 2025, well short of the current policy target. This implies the need for extra effort and support from strong leadership, beyond the scope of the current grid integration policy.[58]

The third challenge is to establish how these projects can be financed. Cross-border projects require careful governance structure design, including clarity on ownership of transmission lines or other cross-border legal issues. An example of a successful partnership is the existing cross-border project between Thailand and Laos. The project company, owned by private companies and a Laotian state-owned enterprise, developed a hydropower plant in Laos and a transmission line between the two countries. Most of the generated electricity is exported to Thailand. Long-term power purchase agreements with Thailand's credible state-owned enterprises secure future revenue using a predetermined pricing mechanism. There is also a clear public–private partnership mechanism including an ownership mechanism after the construction. Thanks to these mechanisms and agreements, the project has attracted investments from the private sector as well as project finance from commercial banks and public finance institutions, including the Asian Development Bank (ADB).[59] The advantage of this structure is that both the power plant and transmission line can be simultaneously constructed under the single responsibility of a consortium of commercial companies.

Mobilizing private capital for the ASEAN Power Grid is vital to accelerate energy integration across the member states. The clear and simple structure in the Thai-Laos example was key in winning private capital and in benefiting from the capabilities of commercial companies.

GEIDCO

Beyond ASEAN, the Global Energy Interconnection Development and Cooperation Organization (GEIDCO), an international non-profit organization based in China,[60] promotes the establishment of a global energy interconnection system. It advocates a modern system that is predominantly clean energy, globally interconnected and jointly constructed across a consortium of connected countries. GEIDCO's role is to conduct research and organize seminars and conferences to build support for this agenda. The key technology to enable this cross-border connection in the region will be an ultra-high voltage (UHV) power grid, which would enable efficient distribution of energy across long distances without much energy loss. Similarly to the ASEAN Power Grid, the whole cross-border connection concept would enable optimization of the project site selection and maximize the potential of the green project. However, a big challenge remains regarding how to get multiple players across the world to agree to rely on this multilateral power supply network, particularly in terms of ensuring their national energy security. It will be challenging

58 IEA (2020), *IEA Southeast Asia Energy Outlook 2019*, p. 60.
59 Asian Development Bank (2014), 'ADB Supports Public-Private Hydropower Project in Lao PDR', news release, 21 August 2014, https://www.adb.org/news/adb-supports-public-private-hydropower-project-lao-pdr#:~:text=MANILA%2C%20PHILIPPINES%20%E2%80%93%20The%20Asian%20Development,a%20public%2Dprivate%20partnership%20arrangement.&text=The%20project%20will%20also%20be,Cooperation%20and%20four%20Thai%20banks.
60 GEIDCO (n.d.), 'Overview', https://en.geidco.org.cn/overview/intro.

to build mutual trust across the region, particularly given that the project will likely result in heavier dependency on China. Furthermore, GEIDCO needs to give more details on how the UHV network can improve the efficiency of power distribution to enable deployment of large amounts of renewable energy.

At a smaller scale, the Chinese development of a domestic long-range UHV grid[61] is a good trial to see how UHV transmission could mitigate GHG emissions by improving efficiency and driving investments in renewable energy. GEIDCO's concept includes interconnections between China and ASEAN countries. China–ASEAN power cooperation via cross-border transmission lines aims to harness the hydropower potential across the Mekong region, and then export clean energy to China. This approach, however, needs careful consideration of side effects, including adverse downstream effects on biodiversity and water management along the Mekong river.

New technology and innovation

Innovation is another important factor in realizing green growth. Governments can play a vital role in promoting innovation in priority areas. For example, smart city development should look to incorporate energy efficiency, renewable energy and the circular economy, including waste management concepts, at the planning stage. Governments (either central or local) could incorporate development concerns as a bidding requirement whereby the private sector, particularly advanced technology companies, could compete on how effectively their products or business model can address sustainability issues.

Several challenges exist regarding more dynamic change on the energy supply side. Firstly, there are multiple approaches to improving and greening energy supply chains, many of which need government support to become commercially viable. From the perspective of policymakers, it is difficult to determine which technologies should be supported, given their limited budgets. For example, some companies promote coal-gasification technology[62] or carbon capture, (utilization) and storage (CCS/CCUS) technology,[63] while others are investing in the development of large-scale battery systems.[64] Some governments also support hydrogen supply chains in their approaches to a green transition. Every technology contributes to the reduction of GHG emissions, but innovation can be expensive.

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61 By June 2019, 9 AC and 10 DC UHV power transmission projects had been built by the State Grid of China, with a total line length of 27,570 km. Updates available at State Grid Corporation of China (n.d.), 'UHV', http://www.sgcc.com.cn/html/sgcc_main_en/col2017112610/column_2017112610_1.shtml. China Southern Power Grid is also implementing a wide range of projects: China Southern Power Grid (2019), 'Ultra-high Voltage Direct Current Projects (UHVDC)', http://eng.csg.cn/Science_Innovation/UHVDC/201512/t20151209_109562.html.
62 Electricity Generating Authority of Thailand (2015), 'EGAT collaborates with NEDO to conduct the research on IGCC technology, converting Mae Moh Mine's lignite to gas to supply future power plants', 22 October 2015, https://www.egat.co.th/en/news-announcement/news-release/egat-collaborates-with-nedo-to-conduct-the-research-on-igcc-technology-converting-mae-moh-mine-s-lignite-to-gas-to-supply-future-power-plants.
63 Asian Development Bank (2015), 'Roadmap for Carbon Capture and Storage Demonstration and Deployment in the People's Republic of China', November 2015, https://www.adb.org/publications/roadmap-carbon-capture-and-storage-demonstration-and-deployment-prc; World Coal Association (2020), 'The Tomakomai CCS Demonstration Project – CCS in the community', 7 February 2020, https://www.worldcoal.org/tomakomai-ccs-demonstration-project-%E2%80%93-ccs-community.
64 Hogan Lovells Lee and Lee (2018), *Energy storage – Changing and charging the future in Asia*, July 2018, https://www.hoganlovells.com/~/media/hogan-lovells/pdf/2018/july_2018_energy-storage-in-asia.pdf.

Secondly, cost sensitivity to electricity tariffs is generally high in developing countries. Some governments in Asia subsidize national electricity companies in order to ensure a supply of low-cost energy in low-income communities. As new technologies are often more costly, it is difficult for electricity companies to adopt them proactively without sign-off from their governments – particularly as, in Asia, such companies are often fully or partially state owned.

With continuous government promotion of renewable energy, one analysis suggests that by 2025 the average LCOE of solar photovoltaics could decrease by 59 per cent, and the LCOE of concentrating solar power could decrease by up to 43 per cent.

However, lessons can be learned from solar and wind power promotion. Government-led incentives have contributed to their market expansion, encouraging take-up of higher purchase prices than conventional energy through a guarantee of long-term fixed prices (known as a feed-in tariff). This market expansion has enabled a dramatic cost reduction coupled with improvements in the efficiency of solar and wind generation.[65] With continuous government promotion of renewable energy, one analysis suggests that by 2025 the average levelized cost of electricity (LCOE) of solar photovoltaics (PV) could decrease by 59 per cent, and the LCOE of concentrating solar power (CSP) could decrease by up to 43 per cent. There could also be decreases in onshore and offshore wind, which could decline by 26 per cent and 35 per cent, respectively.[66] This would enable renewable options to become more competitive than conventional energy and result in further shifts away from government subsidies.

Regionally targeted government efforts could help to nurture innovative technologies by stimulating new market conditions, despite the initial high start-up costs.[67] Strategic promotion of green technology can typically be seen in the EU. The European Commission (EC) established the European CCS project network in 2009 where member states agreed to support up to 12 large-scale CCS demonstration projects.[68] The EC also launched the European Battery Alliance in October 2017[69] and the European Clean Hydrogen Alliance, a network to foster

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65 Chediak, M. and Eckhouse, B. (2019), 'Solar and wind power so cheap they're outgrowing subsidies', Bloomberg, 19 September 2019, https://www.bloomberg.com/news/features/2019-09-19/solar-and-wind-power-so-cheap-they-re-outgrowing-subsidies; Crooks, E. (2016), 'Swason's Law provides green ray of sunshine for PV', *Financial Times,* 17 January 2016, https://www.ft.com/content/d9f9f1b4-a3f0-11e5-873f-68411a84f346.
66 International Renewable Energy Agency (2016), *The Power to Change: Solar and Wind Cost Reduction Potential to 2025*, Bonn: IRENA, pp. 10–19, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2016/IRENA_Power_to_Change_2016.pdf.
67 In the EU, the European Investment Bank (EIB) is running InnovFin programmes whereby the EIB provides finance instruments for demonstration projects and research and innovation projects. See EIB (2020), 'What InnovFin products are available and who can benefit from them?', https://www.eib.org/en/products/blending/innovfin/products/index.htm.
68 CCS network (n.d.), *An introduction to the European Carbon Dioxide Capture and Storage (CCS) Demonstration Project Network,* https://ec.europa.eu/energy/sites/ener/files/documents/ccs_project_network_booklet.pdf.
69 European Commission (n.d.) 'European Battery Alliance', https://ec.europa.eu/growth/industry/policy/european-battery-alliance_en.

development of clean hydrogen between public authorities, industry and civil society, on 8 July 2020.[70] The findings from these private–public partnerships run by the EC will be key to realizing the deployment of new technology-based energy. Regional forums in Asia could take inspiration from EU initiatives to develop and promote new technology in their region.

In 2020, the carbon-neutral declarations by China, Japan and South Korea helped to produce a visible shift in momentum in Asia. Hydrogen has been highlighted as a promising alternative energy option to help achieve the carbon-neutral goals, with active policy promotion in all three countries. Similar moves were seen from ASEAN,[71] in India, and in Japan's cross-border supply chain pilot projects with Australia[72] and with Brunei.[73] Clean hydrogen deployment at scale will require supply chain development at the regional level including development of a hydrogen trade network. The East Asia Summit (EAS) in 2020 also highlighted innovative technology including hydrogen and CCUS.[74]

Regional circular economy

The circular economy is another area where governments can play a critical role. The EAS is intensifying its efforts to conserve the marine environment by developing policies that include an integrated 'land-to-sea' approach, to reduce levels of marine pollution. The EAS regards promotion of resource efficiency including the circular economy, product life cycle management, and the 'reduce, reuse, recycle' (3R) approach as key factors to control the marine environment.[75] The circular economy also contributes to good waste management and to mitigation of GHG emissions through reduced reliance on mass production.

The circular economy in Asia faces new challenges, which require regional solutions. One of these has been regional coordination over plastic waste. In the early 2000s, Japan, South Korea and China each promoted the circular economy. Japan set out the vision of the circular economy in a report, *Creation of a Recycling-Oriented Economic System (Vision of a Recycling Economy)* in 1999 and, in 2000, enacted or revised six laws relating to waste and recycling, including

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70 European Commission (2020), 'A hydrogen strategy for a climate-neutral Europe', 8 July 2020, https://ec.europa.eu/energy/sites/ener/files/hydrogen_strategy.pdf.
71 ASEAN (2020), *ASEAN Plan of Action and Energy Cooperation (APAEC) Phase II: 2021–2025* https://aseanenergy.org/asean-plan-of-action-and-energy-cooperation-apaec-phase-ii-2021-2025.
72 Australian Government Department of Industry, Science, Energy and Resources (n.d.), 'Hydrogen Energy Supply Chain Pilot Project', https://www.industry.gov.au/funding-and-incentives/low-emissions-technologies-for-fossil-fuels/hydrogen-energy-supply-chain-pilot-project.
73 Chiyoda Corporation (n.d.), 'The World's First Global Hydrogen Supply Chain Demonstration Project', https://www.chiyodacorp.com/en/service/spera-hydrogen.
74 Joint ministerial statements of the 14th East Asia Summit Energy Ministers Meeting held on 20 November 2020 highlighted promotion of innovative technology where ministers shared their common understanding of the importance of CCUS and welcomed the cooperation initiative led by Japan and the Economic Research Institute for ASEAN and East Asia to establish the 'Asia CCUS Network'. ASEAN (2020), 'Joint Ministerial Statement of the 14th East Asia Summit Energy Ministers Meeting', 20 November 2020, https://asean.org/storage/JMS-of-the-14th-EAS-EMM-Final-clean.pdf.
75 ASEAN (2020), 'East Asia Summit Leaders' Statement on Partnership for Sustainability', November 2019, https://www.asean2019.go.th/en/news/east-asia-summit-leaders-statement-on-partnership-for-sustainability.

the Basic Law for Promoting the Creation of a Recycling-Oriented Society.[76] South Korea developed its circular economy framework under the Comprehensive National Waste Management Plans and the Fundamental Plan for Resource Circulation.[77] China enacted the Circular Economy Promotion Law in 2008.[78] Notwithstanding this national-level action, plastic waste was managed primarily through a regional supply chain of end-of-life recyclable goods, exported to China. In 2018, China refused to continue accepting these plastics. Malaysia, Thailand, Vietnam, Indonesia and India all imposed similar bans. According to the UN Conference on Trade and Development (UNCTAD), in 2019, the import ban led to a 46 per cent reduction in global trade of plastic waste.[79] The sudden change disrupted the global waste plastic chain and is believed to have caused an increase in illegal waste – just at the time when the problem of marine plastic waste was attracting global attention.[80] As a result of these pressures, waste management and circular economy issues have now become a regional priority for Asia.

City waste management has benefited from regional joint action. Also in response to marine plastic pollution, UNESCAP has partnered with Japan on the Closing the Loop project to make plastic waste management more circular by both reducing the leakage of plastics into the marine environment and increasing the rate of recovery from such leakages. It aims to achieve this through simulations and training across ASEAN cities, as well as through smart technologies to monitor and manage plastic waste and to strengthen waste management systems.[81] As with the power grid, the circular economy, including the 3R approach, works most effectively if designed at the regional level. Follow-up actions should therefore be more focused on discussion about the regional circular economy including recycling networks and waste management cooperation.

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76 Ministry of Economy, Trade and Industry, Japan (2002), *Towards Advancement of a Recycling-Oriented Economic System*, Planning Working Group, February 2002, https://www.meti.go.jp/english/report/downloadfiles/gRO0203re.pdf; Ministry of Economy, Trade and Industry, Japan (2020), *Circular Economy Vision 2020 Compiled*, 22 May 2020, https://www.meti.go.jp/english/press/2020/0522_003.html.
77 OECD (2017), *OECD Environmental Performance Reviews: Korea 2017*, Chapter 4, https://www.oecd-ilibrary.org/sites/9789264268265-11-en/index.html?itemId=/content/component/9789264268265-11-en.
78 Li, W. and Lin, W. (2016), 'Circular Economy Policies in China', in Anbumozhi, V. and Kim, J. (eds) (2016), *Towards a Circular Economy: Corporate Management and Policy Pathways*, ERIA Research Project Report 2014–44, Jakarta: ERIA, pp. 95–111, https://www.eria.org/RPR_FY2014_No.44_Chapter_7.pdf.
79 World Trade Organization (2020), 'Communication on trade in plastics, sustainability and development by the United Nations Conference on Trade and Development (UNCTAD)', 8 June 2020, https://unctad.org/system/files/information-document/wto_unctad_CTE2020_en.pdf.
80 Interpol (2020), 'INTERPOL report alerts to sharp rise in plastic waste crime', 27 August 2020, https://www.interpol.int/en/News-and-Events/News/2020/INTERPOL-report-alerts-to-sharp-rise-in-plastic-waste-crime.
81 UNESCAP (2020), 'New UN initiative to reduce plastic pollution from ASEAN cities', press release, 5 May 2020, https://www.unescap.org/news/new-un-initiative-reduce-plastic-pollution-asean-cities.

04 Green financial networks

The finance sector's strong appetite for green projects will help fill the gap between infrastructure demand and deficiency of investments in Asia, but only if projects are designed to be sustainable and economically viable.

Financial networks will play a critical role in promoting green growth and sustainable development. These networks are increasing their influence on the direction of future energy development in Asia. This is happening for several reasons.

Increased awareness among financial players

Capital flows are increasingly seeking green and sustainable projects. Beyond global market sentiment or reputational management, finance resources including debt capital markets, equity capital markets and pension funds recognize that environmental, social and governance (ESG) factors – or harmony with sustainability – are becoming more important to how businesses are run long-term. This growing consensus, coupled with external pressures from shareholders, has spurred new initiatives and guidelines: Global Reporting Initiative (GRI) Standards; the International Integrated Reporting Framework; the Sustainability Accounting Standards Board (SASB); and the Task Force on Climate-related Financial Disclosures (TCFD) Recommendations Report. Most initiatives have been advanced by non-governmental organizations. The UN partnership programme, the Sustainable Stock Exchanges initiative, is working with stock

exchanges to improve disclosure standards related to sustainability.[82] These developments aim to pressure private companies into incorporating sustainability into their investment decision-making. Even though such standards are at an early development stage and not yet converged into a single consensus, investors' increased attention to ESG reporting is enough for private companies to participate in these initiatives and to take ESG factors more seriously.

Debt capital markets are also promoting green bonds so that investors can be sure that capital will be directly used for green projects. The green bond market has developed rapidly across the world. The total amount of green bonds was recorded at $258.9 billion in 2019, a 51 per cent increase from $171.2 billion in 2018, according to the Climate Bond Initiative.[83] Private sector-led initiatives such as the Climate Bond Initiative[84] and the International Capital Market Association[85] have developed principles and guidelines for green bonds. Asia has developed climate bond markets according to regional guidelines such as the ASEAN Green Bond Standards and the Green Bond Project Endorsed Catalogue of China.

The total amount of green bonds was recorded at $258.9 billion in 2019, a 51 per cent increase from $171.2 billion in 2018, according to the Climate Bond Initiative.

Green bond principles aim to counter scepticism[86] about whether all proceeds are really used to create new projects that help to mitigate climate change in the context of the Paris Agreement. The principles have been developed to align with global norms on what a green project should look like and to eliminate room for 'green washing', whereby green bonds are used to fund projects that are less likely to contribute to the green transition but bond issuers and investors still benefit from the association of being 'green'. For example, in China, the central bank removed coal investments (such as coal-fired plants including clean coal technology) from the draft of its Green Bond Project Endorsed Catalogue (2020 edition), which provides the guidelines for the Chinese domestic green bond market.[87] This removal marks a very important step away from the divergence of green bond principles across capital

82 Korwatanasakul, U. (2020), 'Environmental, Social, and Governance Investment: Concepts, Prospects, and the Policy Landscape', in Nemoto, N. and Morgan, P. J. (eds) (2020), *Environmental, Social, and Governance, Investment: Opportunities and Risks for Asia*, Tokyo: Asian Development Bank Institute, https://www.adb.org/sites/default/files/publication/610771/adbi-environmental-social-governance-investment-opportunities-risks-asia.pdf.
83 Almeida, M. (2020), *Green Bonds Global State of the Market 2019*, Climate Bonds Initiative, July 2020, https://www.climatebonds.net/system/tdf/reports/cbi_sotm_2019_vol1_04d.pdf?file=1&type=node&id=47577&force=0.
84 Climate Bonds Initiative (n.d.), 'About us', https://www.climatebonds.net/about.
85 International Capital Market Association (n.d.), 'About ICMA', https://www.icmagroup.org/About-ICMA.
86 Rajwanshi, Y. (2019), 'Are Green Bonds as good as they sound?', Berkeley Economic Review, 26 November 2019, https://econreview.berkeley.edu/are-green-bonds-as-good-as-they-sound.
87 Gao, B. (2020), 'China's new green bond catalogue could be greener', *China Dialogue*, 9 July 2020, https://chinadialogue.net/en/business/chinas-new-green-bond-catalogue-could-be-greener.

markets, and helps to maintain the legitimacy of global green bond markets, not least given the Chinese market's position as the second largest green bond market in 2019, when it hosted $31.3 billion in green bonds.[88]

Sustainable finance has developed through multi-stakeholder efforts including the United Nations Environment Programme Finance Initiative.[89] Multilateral development banks (MDBs) are the leading funders of green projects. Globally, MDBs have made commitments that their combined global annual climate financing should reach $65 billion by 2025.[90] ADB, for example, has set a target of $80 billion from 2019 to 2030, with at least 75 per cent of ADB's commitment to support climate change and adaptation by 2030.[91] The Asian Infrastructure Investment Bank (AIIB) also intends to increase its share of finance for climate change mitigation in its annual operation to more than 50 per cent by 2025.[92] The efforts of ADB and AIIB include their respective investments or guarantee programmes on green bonds. The definition of 'green' has been carefully reviewed in line with market perceptions. AIIB's intention not to finance any projects that are functionally related to coal, is expected to be reflected in the bank's written energy policy in the near future.[93] Bilateral Development Finance Corporations (DFCs) and commercial banks are also showing more appetite for green or sustainable finance.

Funding Asia's infrastructure

The sheer quantity of infrastructure needed in Asia requires long-term financing. ADB estimates that the countries of developing Asia will need to invest $26 trillion between 2016 and 2030 to maintain its growth momentum, eradicate poverty and respond to climate change.[94] ADB notes that the infrastructure investment gap stands at 2.4 per cent of projected GDP (2016–20) when incorporating climate mitigation and adaptation costs.[95] This implies that the region needs to make extra efforts to attract more long-term investments and financing for its infrastructure projects. Potential finance providers for such long-term investments are pension funds, insurance companies, infrastructure funds, DFCs and MDBs. Some commercial banks have also maintained their appetite for long-term finance despite risks that accompany the need for high levels of capital reserves to potentially absorb future risks. Future infrastructure developments in Asia will be driven by matching key finance providers to existing demand for infrastructure.

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88 Almeida (2020), *Green Bonds Global State of the Market 2019*.
89 UNEP Finance Initiative (n.d.), 'About us', https://www.unepfi.org/about.
90 Bennett, V. (2019), 'MDBs pledge to join forces to raise annual climate finance to $175 bn by 2025', European Bank for Reconstruction and Development, 22 September 2019, https://www.ebrd.com/news/2019/-mdbs-pledge-to-join-forces-to-raise-annual-climate-finance-to-175-bn-by-2025.html.
91 Asian Development Bank (2020), *Green, Social, and Sustainability Bonds for Asia and the Pacific*, https://www.adb.org/sites/default/files/publication/619561/green-social-sustainability-bond-asia-pacific.pdf.
92 Xinhua (2020), 'AIIB to pursue shared development, innovation and inclusiveness: bank president', *China Daily*, 30 July 2020, http://www.chinadaily.com.cn/a/202007/30/WS5f228b49a31083481725d319.html.
93 Climate Home News (2020), 'Asian multilateral bank promises to end coal-related financing'.
94 Without climate change mitigation and adaptation costs, ADB estimates that $22.6 trillion will be needed. Asian Development Bank (2017), *Meeting Asia's Infrastructure Needs*, https://www.adb.org/sites/default/files/publication/227496/special-report-infrastructure.pdf. See Appendix for the countries defined as 'developing Asia' in the ADB report.
95 Ibid.

COVID-19 effects

The COVID-19 crisis has had a severe impact across the region, affecting national economies and budgets that have been reallocated towards urgent medical infrastructure needs or short-term economic stimulus packages. However, the finance sector, including debt and equity capital markets, appears to be functioning as normal, unlike what happened during the global financial crisis. The pandemic has adversely affected economic activity, particularly consumption, due to lockdowns and travel restrictions, which first hit the economy and capital markets around March 2020. Swift action from governments with economic rescue packages alongside global joint monetary policy efforts have helped to restore confidence in Asia, based on expectations of a fast recovery and revitalized equity and financial markets.[96] Quantitative easing by respective central banks created abundant liquidity that is now available for projects in need of financing while monetary policy led to interest rate cuts.[97]

COVID-19 has temporarily overshadowed the green transition and sustainable development across Asia due to the change in policy priorities. According to Global Energy Monitor and the Centre for Research on Energy and Clean Air, during the first six months of 2020 China approved 17 GW of new coal-fired capacity for construction, which is more than the permitted allowance for 2018 and 2019 combined (12 GW).[98] Experts interpret this move as a decision driven by fears of an economic downturn.[99]

Given the growing power of the finance community across the world, it is increasingly important to have regional forums and bodies that enable policymakers, state-owned enterprises and the finance community to discuss green project developments. These forums and bodies could discuss realistic transitions to a low-carbon economy and practical options, including desirable incentives, to mobilize private capital for green and sustainable projects, and could generate long-term strategies to introduce new technologies into markets. They should include major economies in Asia such as ASEAN+3 and India to discuss cross-border projects. More project-oriented initiatives across the region would help to create a new green trajectory.

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96 The equity market shows a quick bounce back after the sharp drop around March 2020. MSCI (n.d.), 'MSCI AC Asia Index', https://www.msci.com/documents/10199/a63c9809-ca71-4752-923a-31695a29b9d7.
97 Cavallino, P. and De Fiore, D. F. (2020), 'Central banks' response to Covid-19 in advanced economies', *BIS Bulletin* No. 21, 5 June 2020, https://www.bis.org/publ/bisbull21.pdf.
98 CREA (2020), 'A New Coal Boom in China', June 2020, https://energyandcleanair.org/wp/wp-content/uploads/2020/06/A-New-Coal-Boom-in-China.pdf.
99 Hale, T. and Hook, L. (2020), 'China expands coal plant capacity to boost post-virus economy', *Financial Times*, 25 June 2020, https://www.ft.com/content/cdcd8a02-81b5-48f1-a4a5-60a93a6ffa1e.

05 Conclusion

Green growth and sustainable development in Asia can be accelerated through regional integrated action. Existing forums involving the financial community are well placed to develop new green business opportunities.

As Asian economies have grown, the impact on the environment has increased, not only within the region but globally. Although efforts have been made across the region, progress towards achieving the SDGs remains slow. Some of the SDGs can be accomplished through economic growth, but climate-related SDGs are becoming more difficult to achieve due to the impacts of such economic activity. Governments in Asia take climate change seriously due to damage from natural disasters and thus prioritize climate action. Yet, it is difficult to decouple economic growth and population increases from rising GHG emissions. In order to separate economic growth from environmental challenges, the following regional integrated efforts could be pursued:

- An acceleration of the ASEAN Power Grid integration coupled with efforts to increase regional renewable energy deployment. Even though there are already a variety of support mechanisms via the US–Japan partnership, the IEA and China in the context of future grid linkage, ASEAN should take a strong lead in implementing its plan through the harmonization of its member states.
- Region-wide innovation initiatives that nurture promising technology to overcome current technological constraints. Two dimensions should be considered. One is energy storage technology to enable the roll-out of more viable renewable energy, such as large-scale battery use or clean hydrogen. The other is technology like CCS to dramatically cut carbon emissions from conventional fossil fuels. If successful, these initiatives could create new business fields in green technology across the region. Some progress has been seen in the East Asia Summit discussion on a CCS network or on building awareness of the importance of innovation. Action needs to accelerate. There is a space for every economy to take the lead in this regional initiative as long as that economy has advanced technology.

— The creation of a regional circular economy. This would solve plastic waste problems triggered by the Chinese import ban on waste plastic and would contribute to mitigating GHG emissions. An expanded UN–Japan partnership or TEMM could be a good framework to lead the regional circular economy based on the experiences of each country.

— The increased participation of the financial community in regional forums to discuss green and sustainable policies. With an increase of capital flows seeking green or sustainable investment as well as stable financial circumstances in spite of COVID-19, it makes sense for policymakers to involve the financial community from the policy development stage to incorporate their requirements with actual project development policy. This early-stage coordination with the financial community would also contribute to mobilizing capital flows, even for innovative projects. The financial community should play a pivotal role in advising about project structures including on public–private partnership frameworks, risk awareness on new technology or other useful information for policymakers to develop green growth policy.

Green growth and sustainable development are undoubtedly two of the top priority areas for the Asian regional agenda. Regional integrated action can create a win-win situation across Asia by providing new sustainable business opportunities. Despite the difficult challenges that the region faces, integrated action can make a difference and should be encouraged at all levels.

Appendix

Asia is defined as including different groupings of countries depending on the organization that has compiled the data. See below for relevant publications cited in this paper:

- **United Nations** (2019), 'GDP and its breakdown at current prices in US dollars': in these statistics Asia includes Kazakhstan; Kyrgyzstan; Tajikistan; Turkmenistan; Uzbekistan; China; North Korea; Japan; Mongolia; South Korea; Brunei; Cambodia; Indonesia; Laos; Malaysia; Myanmar; the Philippines; Singapore; Thailand; Timor-Leste; Vietnam; Afghanistan; Bangladesh; Bhutan; India; Iran; Maldives; Nepal; Pakistan; Sri Lanka; Armenia; Azerbaijan; Bahrain; Cyprus; Georgia; Iraq; Israel; Jordan; Kuwait; Lebanon; Oman; Qatar; Saudi Arabia; Palestine; Syria; Turkey; United Arab Emirates; and Yemen.
- **International Monetary Fund** (2021), 'World Economic Outlook, April 2021 : Managing Divergent Recoveries': in these statistics, 'emerging and developing' Asia includes Bangladesh; Bhutan; Brunei; Cambodia; China; Fiji; India; Indonesia; Kiribati; Laos; Malaysia; Maldives; Marshall Islands; Micronesia; Mongolia; Myanmar; Nauru; Nepal; Palau; Papua New Guinea; the Philippines; Samoa; Solomon Islands; Sri Lanka; Thailand; Timor-Leste; Tonga; Tuvalu; Vanuatu; Vietnam.
- **International Energy Agency** (2020), 'CO_2 emissions from fuel combustion 2020': in these statistics, Asia includes Afghanistan; Armenia; Azerbaijan; Bahrain; Bangladesh; Bhutan; Brunei; Cambodia; Cyprus; Georgia; China; India; Indonesia; Iran; Iraq; Israel; Japan; Jordan; North Korea; South Korea; Kazakhstan; Kuwait; Kyrgyzstan; Laos; Lebanon; Malaysia; Maldives; Mongolia; Myanmar; Nepal; Oman; Pakistan; the Philippines; Qatar; Saudi Arabia; Singapore; Sri Lanka; Syria; Tajikistan; Taiwan; Thailand; Timor-Leste; Turkey; Turkmenistan; the United Arab Emirates; Uzbekistan; Vietnam; and Yemen.
- **Asian Development Bank** (2017), *Meeting Asia's Infrastructure Needs:* in this report, 'developing Asia' includes Armenia; Brunei; Azerbaijan; Cambodia; Georgia; Indonesia; Kazakhstan; Laos; Kyrgyzstan; Malaysia; Tajikistan; Myanmar; Turkmenistan; the Philippines; Uzbekistan; Singapore; Thailand; Vietnam; China; Cook Islands; South Korea; Fiji; Mongolia; Kiribati; Taiwan; Marshall Islands; Micronesia; Nauru; Afghanistan; Palau; Bangladesh; Papua New Guinea; Bhutan; Samoa; India; Solomon Islands; Maldives; Timor-Leste; Nepal; Tonga; Pakistan; Tuvalu; Sri Lanka; Vanuatu.

Nationally Determined Contributions

Details of each country's NDC (or INDC for the Philippines) are available via the following UNFCCC links:

China

https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/China%20First/China%27s%20First%20NDC%20Submission.pdf.

India

https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/India%20First/INDIA%20INDC%20TO%20UNFCCC.pdf.

Japan

https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Japan%20First/SUBMISSION%20OF%20JAPAN%27S%20NATIONALLY%20DETERMINED%20CONTRIBUTION%20(NDC).PDF.

South Korea

https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Republic%20of%20Korea%20First/201230_ROK's%20Update%20of%20its%20First%20NDC_editorial%20change.pdf.

Indonesia

https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Indonesia%20First/First%20NDC%20Indonesia_submitted%20to%20UNFCCC%20Set_November%20%202016.pdf.

Malaysia

https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Malaysia%20First/INDC%20Malaysia%20Final%2027%20November%202015%20Revised%20Final%20UNFCCC.pdf.

Philippines

https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Philippines/1/Philippines%20-%20Final%20INDC%20submission.pdf.

Thailand

https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Thailand%20First/Thailand%20Updated%20NDC.pdf.

Vietnam

https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Viet%20Nam%20First/Viet%20Nam_NDC_2020_Eng.pdf.

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Cover image: Aerial view of solar panels installed on a reservoir at a fishery-solar hybrid photovoltaic power station, Anhui Province, China, 25 March 2021.

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