The Commonwealth Sustainable Energy Transition: Pathways and Progress Report

June 2022

The Commonwealth

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Acronyms and Abbreviations

BAU	business as usual
CCFAH	Commonwealth Climate Finance Access Hub
CCS	carbon capture and storage
CHOGM	Commonwealth Heads of Government Meeting
CNG	compressed natural gas
CO_2e	carbon dioxide equivalent emissions
COP26	26th Conference of the Parties to the UNFCCC scheduled for Glasgow, 1–12 November 2021
CSET	Commonwealth Sustainable Energy Transition
CWCs	Commonwealth Countries
EJ	exajoule
ETI	Energy Transition Index
ETS	emissions trading scheme
EU	European Union
EV	electric vehicle
FDI	foreign direct investment
GDP	gross domestic product
GHG	greenhouse gas
HDI	United Nations Human Development Index
HFC	hydrofluorocarbon
IEA	International Energy Agency
IMF	International Monetary Fund
IRENA	International Renewable Energy Association
LDC	less developed country
LED	light-emitting diode
LLDC	Land-locked developing country
LNG	liquefied natural gas

LPG	liquefied petroleum gas
LULUCF	land use, land use change and forestry
MJ	mega joule
MRV	measurement, reporting and verification
MW	megawatt
N/A	not available
NDC	Nationally Determined Contribution
OECD	Organisation for Economic Co-operation and Development
PPP	purchasing price parity
PV	photovoltaic
REDD+	Reducing Emissions from Deforestation and Forest Degradation plus the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries
RISE	Regulatory Indicators for Sustainable Energy
SDG	Sustainable Development Goal
SEforALL	Sustainable Energy for All
SIDS	small island developing state
TFEC	total final energy consumption
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

Executive Summary

Successful implementation of the Paris Agreement and the delivery of the Sustainable Development Goals (SDGs), particularly SDG7 on affordable and clean energy, are intrinsically linked. Key goals of SDG7 include achieving universal access to energy by 2030 and substantially increasing the share of renewable energy globally. The Paris Agreement targets limiting global warming to well below 2°C and preferably to 1.5°C compared to preindustrial levels by 2050 by the decarbonisation of our economies, requiring a transition of our energy sources from non-renewable hydrocarbon-based fuels to non-carbon fuels, which will primarily be renewable energy. This transition will entail major changes in our economies and to our lifestyles and change of this magnitude at the required pace will be challenging, bringing significant disruption, uncertainties and opportunities. Progress is being made towards these goals, but there is a consensus that it is not happening fast enough to meet the targets of SDG7 or the Paris Agreement.

This report focuses on progress towards these goals in Commonwealth countries, with an emphasis on the SDG7 goal indicators and the Nationally Determined Contributions (NDCs) of Commonwealth countries (CWCs) towards meeting the goals of the Paris Agreement. As an update of the Commonwealth's flagship 2019 report, *The Commonwealth Sustainable Energy Transition: Pathways and Progress*, its purposes are to:

- facilitate the sharing of current knowledge, insights, developments and progress on efforts to achieve SDG7 and NDCs by Commonwealth member countries,
- create opportunities for member countries to encourage and support accelerated action towards achievement of SDG7 and climate goals across the Commonwealth, and
- inform government decisions that shape clean energy transition pathways in member countries and support action by governments aimed at achieving SDG7 and commitments under the Paris Agreement.

SDG indicators for Commonwealth countries

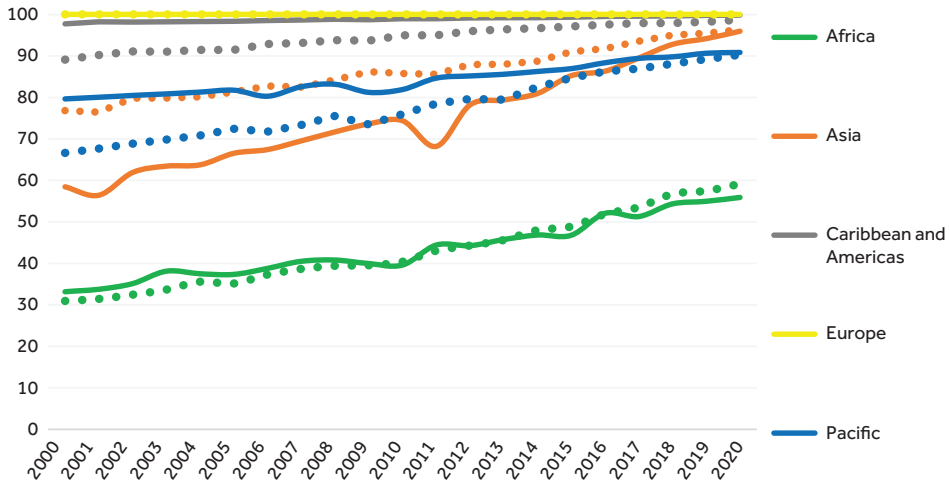
Electrification

The Asian, Caribbean and American, and European regions of the Commonwealth have largely achieved 100 per cent electrification rates (see Figure 1). Africa is the region most in need of increased electrification, followed by the Pacific (especially Papua New Guinea, Solomon Islands and Vanuatu). The percentage of the population with access to electricity continues to increase in the African and Pacific regions in 2020, with an average annual growth rate since 2010 of 4.9 per cent and 2.2 per cent, respectively, if we exclude the countries that are already 100 per cent electrified. African CWCs have the lowest levels of electrification in the Commonwealth at 59.2 per cent in 2020 and have shown the most improvement since 2010, with an average growth rate of 3.5 per cent in electricity access in CWCs in this region.

Clean Cooking

The populations of the European CWCs, as well as Canada, Australia and New Zealand, have universal access to clean cooking (see Figure 2). Caribbean CWCs also have very high access to clean cooking. The rate of access to clean cooking in CWCs with less than 100 per cent access has been growing at 5.5 per cent annually since

Figure 1 SDG 7.1.1 electrification, 2000–20 by region (% of population). Dotted lines denote simple averages of CWCs in the region; solid lines denote averages weighted by population in CWCs in the region.[1]



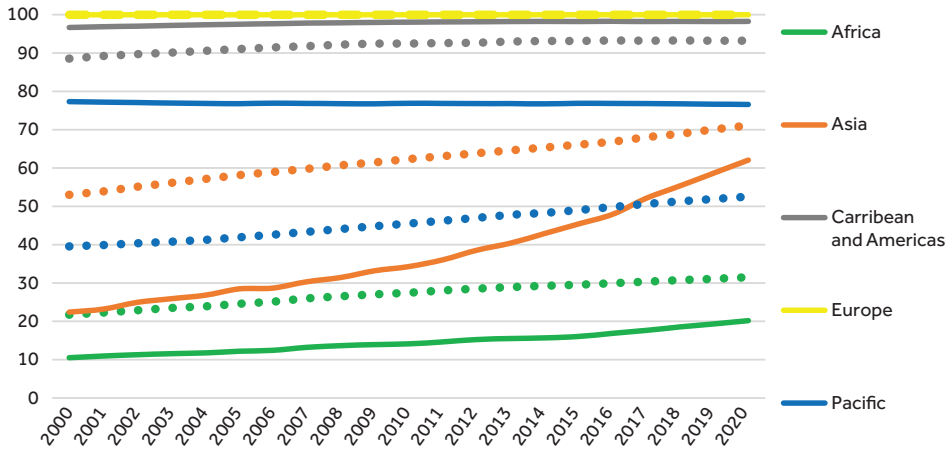
Source: UN Statistics Division SDG Indicators Database.

2010, with Asian CWCs growing at 6.1 per cent and African Commonwealth countries growing at 3.6 per cent. African CWCs have the lowest clean cooking access rate at 20.2 per cent in 2020.

Renewable Energy

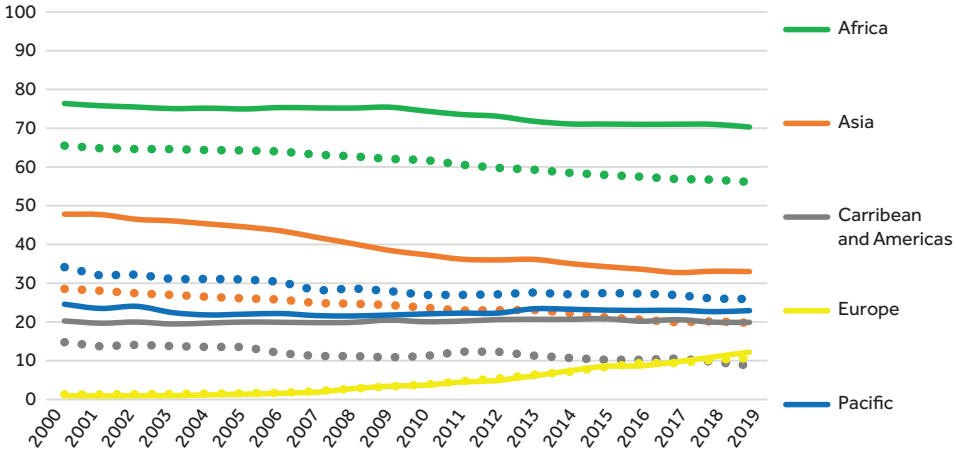
Figure 3 shows that renewable energy's share of total final energy consumption (TFEC) is declining in African and Asian CWCs, is almost flat in Caribbean and American and Pacific CWCs and is increasing in European CWCs. TFEC growth for European CWCs has been negative since 2000, so its growth in renewables represents a larger share of a shrinking pie. It's the opposite in developing CWCs,

Figure 2 SDG 7.1.2 clean cooking access rate, 2000–20 by region (%). Dotted lines denote simple averages of CWCs in the region; solid lines denote averages weighted by population in CWCs in the region.



Source: World Bank, UN Statistics Division SDG Indicators Database.

Figure 3 SDG 7.2.1 renewable energy, 2000–19 by region (% TFEC). Dotted lines denote simple averages of CWCs in the region; solid lines denote averages weighted by population in CWCs in the region.



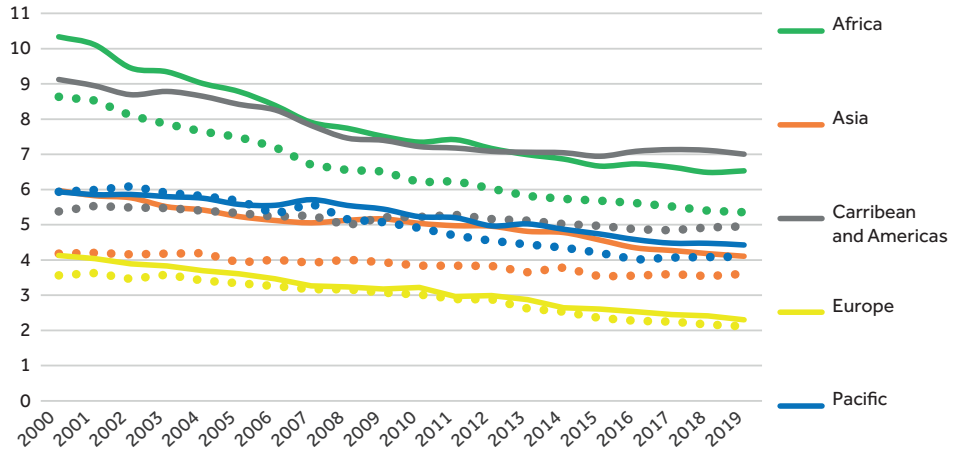
Source: UN Statistics Division SDG Indicators Database.

where renewables are increasing but not as rapidly as total TFEC is growing. In these countries renewables are growing in absolute terms but represent a relatively smaller share of a growing pie. As discussed in this report, the reason the renewables share of TFEC in developing countries is declining is because energy use for cooking comprises a high portion of TFEC in these countries, and the use of renewable biomass for cooking is generally declining in those countries, resulting in more efficient use of energy and often a transition to non-renewable fuels.

Energy Efficiency

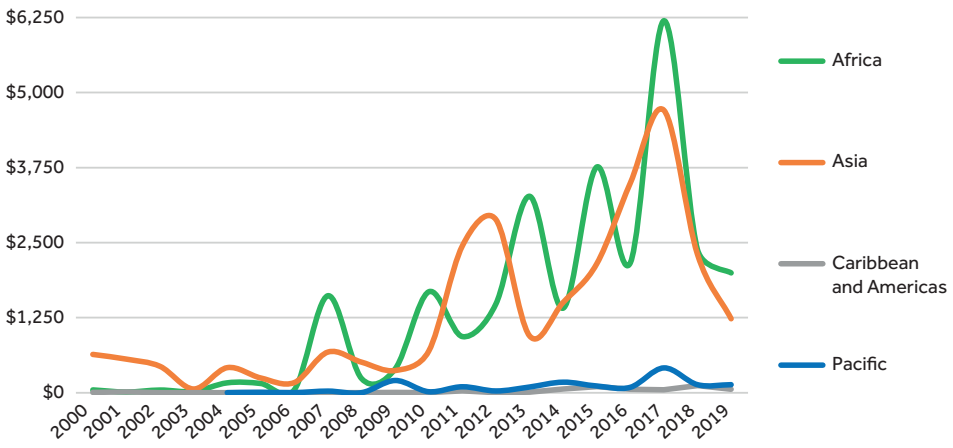
The energy intensity, expressed as units of energy in mega joules (MJ) per unit of US$ gross domestic product (GDP), of CWCs has been declining at an average rate of 1.7 per cent annually since 2010 (see Figure 4). Less energy is required for each unit of production and Commonwealth economies are becoming more energy efficient.

Figure 4 SDG 7.3.1 energy intensity, 2000–19 by region (MJ/US$ GDP). Dotted lines denote simple averages of CWCs in the region; solid lines denote averages weighted by population in CWCs in the region.



Source: UN Statistics Division SDG Indicators Database.

Figure 5 SDG 7.a.1 international financial flows, 2000–19 by region (US$ constant millions)



Source: UN Statistics Division SDG Indicators Database.

Access to Finance

Figure 5 shows that from 2000 to 2019, low-income CWCs have received US$55 billion to support the energy transition. These flows have increased significantly in recent years, although they are also highly cyclical. About 98 per cent has gone to Asian and African CWCs, although the developing countries in the Pacific and Caribbean regions have been larger recipients in per capita terms.

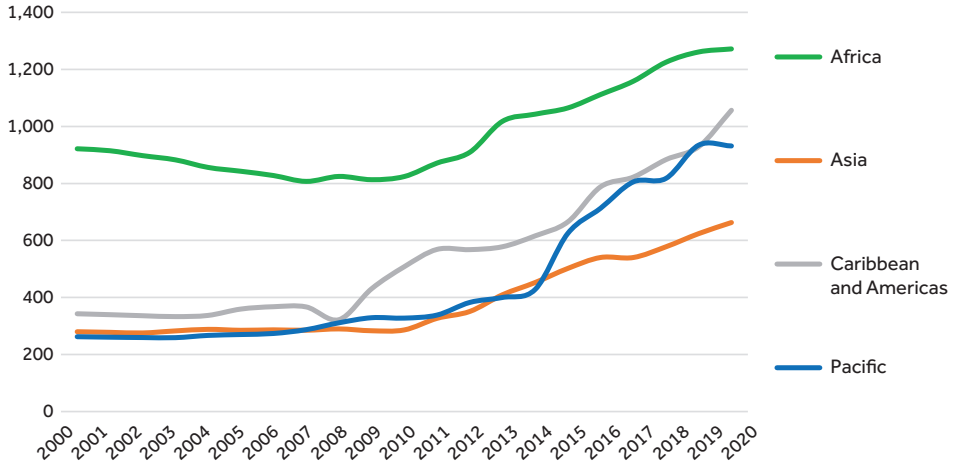
The indicators for SDG 7.b suggested by the UN are:

- investments in energy efficiency as a percentage of GDP, and
- the amount of foreign direct investment (FDI) in financial transfer for infrastructure and technology for sustainable development services.

There are no comprehensive statistics available on energy efficiency investments as a percentage of GDP. The UN publishes a series on installed renewable electricity-generating capacity as its indicator of direct investment in infrastructure for sustainable development, relating to indicator 7.b.1. Figure 6 shows that this capacity has been increasing significantly in recent years. The series is simply described as 'installed renewable electricity-generating capacity' with no indication whether these installed capacities were built with FDI in those countries as expressed in SDG7. Measurable indicators relating to SDG 7.b are not as obvious and direct as, for example, those relating to energy access and renewable energy shares.

Table 1 shows 2018 indicators for key SDG7 targets. Most indicators show improvement over their 2016 levels shown in the 2019 report, with the possible exception of SDG 7.2.1: renewable energy as a percentage of TFEC. The SDG target for renewable energy is for it to increase substantially, with no specific quantifiable target provided. We see that the renewable energy share in African and Asian CWCs has actually declined in recent years. This is partly because hydroelectricity, although it remains the largest renewable energy source in these countries and continues to grow slowly, has seen its share decline significantly in the past decade as electricity from other renewable sources has increased over five times as rapidly as from hydro from 2010 to 2018.[2] This is also a rather ambiguous progress indicator for some of these countries at this stage of development, as many are low energy consumers in per capita terms and have been highly reliant on solid biomass fuel, especially for cooking, which is classified as renewable energy. Like hydro, biomass energy has been

Figure 6 SDG 7.b.1 installed renewable electricity-generating capacity, 2000–20 by region (watts per capita)



Source: UN Statistics Division SDG Indicators Database.

an important energy source in these countries but is growing more slowly than other renewable energy sources. Thus, the lower share of renewable energy sources is likely indicating a transition for energy consumers in these countries to more modern energy sources which may not be renewable but likely results in more efficient energy use in those countries. The reality is that the entire world is lagging in the transition to renewable energy sources. That CWCs appear to show greater strength on this indicator than the world as a whole is probably a reflection of a higher proportion of developing countries in the Commonwealth than in the world generally, rather than superior achievement on this indicator.

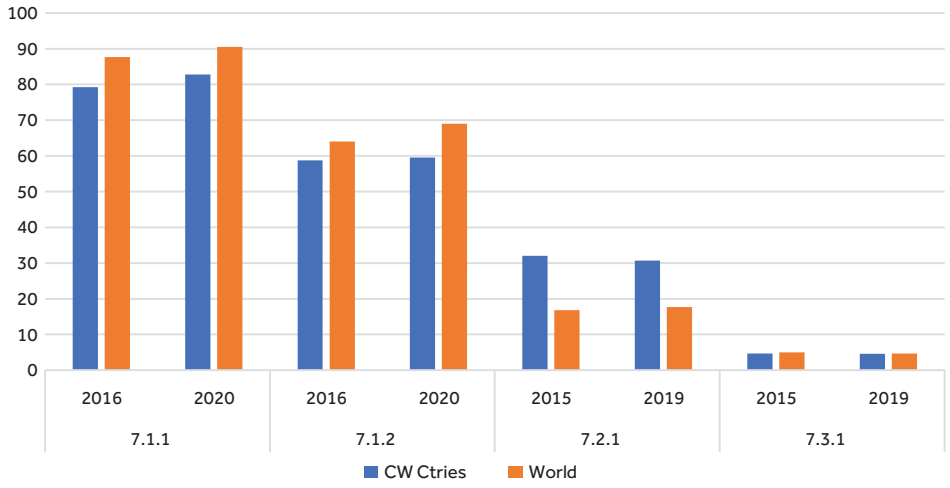
Table 1 summarises SDG7 performance, showing mixed but better performance for all indicators except for the renewable energy share of final energy consumption

Table 1 Latest Commonwealth regions' SDG7 indicators and alignment with NDCs

Commonwealth region	SDG 7.1.1		SDG 7.1.2		SDG 7.2.1		SDG 7.3.1		NDC alignment (%)	
	2016	2020	2016	2020	2015	2019	2015	2019	2018	2020
Africa	51.9	59.2	29.1	31.5	59.5	56.2	6.3	5.4	58	58
Asia	91.8	96.3	60.7	71.1	25.2	19.8	3.6	3.6	60	58
Caribbean & Americas	97.1	98.7	94.5	93.2	10.1	8.8	5.4	5.0	55	51
Europe	100.0	100.0	100.0	100.0	8.0	10.7	2.7	2.1	40	40
Pacific	82.5	90.2	46.6	52.3	23.4	25.9	5.0	4.1	51	51
Commonwealth	79.2	82.8	58.7	60.3	32.1	30.7	4.7	4.6	53	52
World	88.6	90.5	64.0	69.0	16.8	17.7	5.0	4.7	N/A	N/A
Key	Very strong		Strong		Moderate		Weak		Very weak	

Source: 2021 SDG Tracking: The Energy Progress Report; UN SDG Indicators Database 2022. – SDG 7.1.1 – Proportion (%) of population with access to electricity.
– SDG 7.1.2 – Proportion (%) of population with primary reliance on clean fuels and technologies for cooking.
– SDG 7.2.1 – Renewable energy share (%) in the TFEC.
– SDG 7.3.1 – Energy intensity measured in terms of primary energy and GDP (MJ per US$ purchasing price parity (PPP) 2011).
– NDC alignment – Degree of potential alignment between country's climate and sustainable development objectives.

Figure 7 Transition indicators for Commonwealth countries vs the world (%)



Source: UN Statistics Division SDG Indicators Database.

(SDG 7.2.1) with very low shares in Europe and Caribbean and Americas, as well as Asia, although the renewable shares of CWCs in the European and Pacific regions are increasingly slowly. It also shows the alignment of Commonwealth country NDCs with SDG7 targets, expressed as the degree of potential alignment between a country's climate and sustainable development objectives, has not improved since 2018. It may have declined slightly, although we find this a rather subjective measure (see Chapter 6).

Figure 7 shows that CWCs are lagging the world in terms of access to electricity and access to clean cooking. This would be because the Commonwealth has such a high proportion of less developed countries (LDCs). It also shows that CWCs have higher shares of renewable energy than the world has generally, although contrary to SDG7 targets the renewable energy share in CWCs is declining, as discussed in this report. Energy intensities in CWCs are slightly lower than globally and declining slightly.

The World Bank's SDG Tracking did not include SDG 7.a.1 and 7.b.1, so we have included them in Table 2 and Figures 8 and 9. As noted, 7.a.1 is highly cyclical and the measures of both indicators are ambiguous in terms of how closely they relate to SDG7, making these indicators difficult to interpret.

It is clear, and perhaps surprising, that international financial flows to developing countries in support of clean energy and renewable energy have declined by 14 per cent globally since 2015, and by 45 per cent to Commonwealth developing countries. This lack of financial support obviously contributes to slowing the progress of the energy transition in these countries.

Summary comments

The IEA's World Energy Outlook 2021 found that current policy and clean energy investment commitments fall well short of achieving the emissions reductions required to meet the Paris Agreement targets.[3]

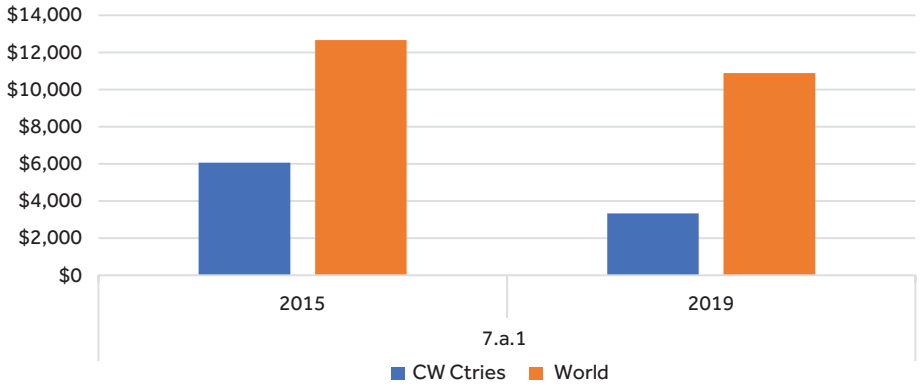
The above summary of the status of SDG7 indicators is presented by region. Some of the findings and observations we can draw from the data presented and analysed in this report are offered below.[4] The data for SDG 7.1.1 show that, in CWCs that had less than 100 per cent access to electricity in 2000, an average of 2.4 per cent

Table 2 Latest Commonwealth regions' SDG7 indicators (7.a.1 and 7.b.1)

Commonwealth region	SDG 7.a.1		SDG 7.b.1	
	2015	2019	2016	2020
Africa	$3,760.3	$1,995.0	58.5	66.9
Asia	$2,146.0	$1,230.8	67.6	82.9
Caribbean & Americas	$100.0	$58.8	65.7	88.1
Europe	N/A	N/A	N/A	N/A
Pacific	$55.6	$66.4	79.2	103.5
Commonwealth	$6,061.5	$3,325.9	65.7	81.7
World	$12,660.8	$10,887.3	171.0	245.7

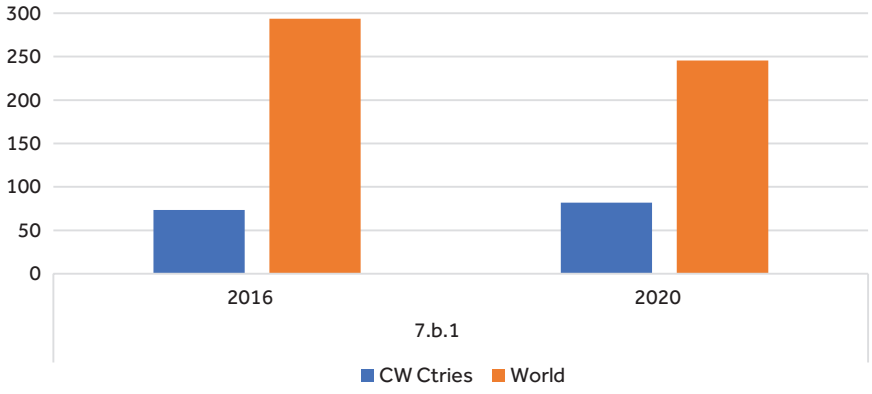
Source: 2021 SDG Tracking: The Energy Progress Report; UN SDG Indicators Database 2022.
SDG 7.a.1 – International financial flows to developing countries in support of clean energy and renewable energy (US$ millions), total.
SDG 7.b.1 – Installed renewable electricity-generating capacity (watts/capita), average.

Figure 8 International financial flows to support energy transition for Commonwealth countries vs the world (US$ millions)



Source: UN Statistics Division SDG Indicators Database.

Figure 9 Installed renewable electricity-generating capacity in Commonwealth countries vs the world (watts per capita)



Source: UN Statistics Division SDG Indicators Database.

of the population have gained access to electricity annually since 2010. The access rate in CWCs which did not have 100 per cent access in 2000 has been improving at 5.7 per cent of the population annually since 2010. The share of renewable energy in TFEC in the Commonwealth has been falling by 0.26 per cent each year since 2010. This decline in the renewable energy share likely reflects a transition from the use of biomass to more efficient modern sources of energy, especially in the high-population regions of Africa and Asia. In Europe (UK, Malta and Cyprus), Canada and Australia, the share of renewable energy in TFEC is increasing. Energy intensity in the Commonwealth, measured in MJ/$ GDP (constant US$), has been declining at an annual rate of 1.4 per cent since 2010, most rapidly in Europe.

It is important to note that while energy efficiency is often included as an integral component of an energy transition strategy and included in many NDCs, it does not happen without incentives. Some efficiencies can occur as a result of consumer education by demonstrating to consumers where energy efficiency measures have zero cost or save dollars. Alternatively, energy efficiency can be induced by subsidies or required by regulations. We suggest the best energy efficiency incentive is higher prices, which provide a signal to consumers to consume less and to technology developers to develop more energy efficient technologies. The energy efficiencies needed to achieve the decarbonising transition will most likely result from higher prices on carbon-based fuels, which can happen by applying a carbon price to these fuels. So far only five CWCs have implemented carbon-pricing mechanisms.

So far, 43 CWCs have submitted updated or second NDCs since 2019. These updates and second NDCs were mostly submitted prior to the Conference of the Parties (COP26) held in Glasgow in November 2021. These updated or second NDCs are the focus of our assessment and review. Our case studies include countries whose NDCs and climate change policies offer novel and innovative approaches that may provide inspiring and stimulating opportunities for other CWCs to learn from, consider and potentially cooperate with each other by sharing ideas and experiences.

We note the NDCs of many developing country members of the Commonwealth are conditional on international sourcing of finance, technology transfer and their capacity for implementation to occur. These conditional NDC components need to be clearly defined so they can be economically analysed and their benefits clearly understood so the necessary financial resources can be successfully obtained from development partners, financial institutions and investors.

1. Introduction

The Commonwealth Sustainable Energy Transition (CSET) agenda builds on the recognition at the 2018 Commonwealth Heads of Government Meeting (CHOGM) of the critical importance of sustainable energy to economic development and the imperative to transition to clean forms of energy in view of Article 4.1 of the Paris Agreement. Member countries were encouraged to cooperate in accelerating the transition to clean forms of energy. Cleaner energies in this context implies energy sources with lower carbon emissions.

The CSET agenda is underpinned by the key pillars which emerged from the CSET Forum launched in June 2019 as a platform for collaboration among Commonwealth member countries in the transition towards sustainable energy systems and supporting acceleration of action towards achievement of the SDGs – in particular SDG7 on access to energy. The pillars which leverage existing programmes of the Commonwealth and anchor implementation of the CSET agenda are:

a. Inclusive Energy Transitions

b. Technology and Innovations in Energy Transitions

c. Enabling Frameworks for Sustainable Energy Transition.

The inaugural CSET Forum launched the flagship publication, *The Commonwealth Sustainable Energy Transition: Pathways and Progress*, in May 2019, which comprehensively described the current status and progress in CWCs regarding achievement of SDG7 and individual NDCs of Commonwealth member countries under the Paris Agreement. It extensively outlined current information on climate change policies and energy transition data as published by recognised and credible international bodies.

This report is an updated edition of the CSET flagship publication and is prepared in advance of the next CHOGM, now scheduled for June 2022. It is a continuation and extension of data collection and analysis that supports the broader ongoing work of the Commonwealth Secretariat in supporting the CSET agenda. The primary purpose of this report is to facilitate the sharing of the most current knowledge, insights, developments and progress on efforts to achieve SDG7 and the NDCs by Commonwealth member countries and thereby create opportunities for member countries to initiate, collaborate in and accelerate actions towards achievement of sustainable energy and climate goals across the Commonwealth.

More specifically, this report:

- updates the data provided in the first edition with the most recent indicators on energy transition progress and addresses data gaps in light of new data availability;
- analyses and assesses the progress of Commonwealth member countries, with particular focus on developing countries, towards achieving SDG7, with primary consideration of Target 7.2;
- updates the review of individual NDCs of Commonwealth member countries under the 2015 Paris Agreement, with focus on those which have been revised and updated since 2019;
- examines interesting components of these NDCs as brief case studies of specific initiatives from some member countries that may motivate and encourage other CWCs to meet their SDG7 and Paris Agreement targets;
- assesses existing trends, challenges, achievements and approaches used in accelerating energy transition in CWCs and across the globe and draws out lessons and recommendations for policy-makers, investors and other key stakeholders; and
- examines the impact of the COVID-19 pandemic on the progress of Commonwealth member countries towards achieving the goals of SDG7 and recommends response measures aligned with their NDCs under the Paris Agreement.

2. Background

This chapter provides a background to the Commonwealth, the CHOGM, the Paris Agreement and SDG7, and outlines some context and challenges for the energy transition.

2.1 The Commonwealth

The Commonwealth is a voluntary association of 54 member countries and home to almost 2.4 billion people. The countries span Africa, Asia, the Caribbean and Americas, Europe and the Pacific and are diverse – they are among the world's largest, smallest, most developed and least developed countries, with 22 member countries having a 2019 population of fewer than one million people, six member countries with GDP per capita less than US$1,000/year and another eight member countries at less than US$2,000/year.

All members subscribe to the Commonwealth's values and principles, as outlined in the Commonwealth Charter (2013),[5] and have an equal voice regardless of size or economic stature.

The 54 Commonwealth countries represent 28 per cent of the 193 members of the United Nations (UN), 30.5 per cent of 2019 global population[6] – growing slightly faster than other countries of the world, so its share of population is slowly increasing – and 17.2 per cent of 2019 global GDP.[7] Also, currently among CWCs:

- 30 CWC members in the World Bank's Small States Forum represent 62 per cent of the 50 members of that forum;
- 13 LDC CWCs represent 28.3 per cent of the 46 countries classified by the UN as an LDC;
- 7 LLDC CWCs represent 22.6 per cent of the 31 countries classified by the UN as an LLDC; and
- 25 SIDS CWCs represent 65.8 per cent of the 38 countries classified by the UN as an SIDS.

2.2 Commonwealth heads of government meeting (CHOGM)

Normally leaders of member countries meet every 2 years for the CHOGM to shape Commonwealth agenda and priorities and discuss issues affecting the Commonwealth and the wider world. At the last CHOGM in 2018 in London, under the theme 'Towards a Common Future', Commonwealth leaders recognised:[8]

- the critical importance of reliable, affordable and sustainable energy to economic development,
- the risks of climate change to many of the Commonwealth's most vulnerable countries and the imperative to transition to clean forms of energy to meet the goals of the 2015 Paris Agreement,
- the opportunities afforded by the untapped potential of renewable energy sources to promote sustainable economic growth,
- the scope for cooperation among member countries to facilitate this transition, COVID and
- the value of sharing best practices for sustainable resource management among CWCs.

The 26th CHOGM meeting was postponed in 2020 and 2021 because of the impact of C-19 and rescheduled to occur in Kigali, Rwanda in June 2022. The theme of the 26th CHOGM is 'Delivering a Common Future: Connecting, Innovating, Transforming'. This theme highlights how the 54 member countries in the Commonwealth family are 'innovating, connecting and transforming' to help achieve some of its biggest goals, like protecting natural resources and boosting trade. It was chosen because Commonwealth countries are connected by deep-rooted networks of friendship and goodwill.

2.3 Paris agreement and NDCs

The Paris Agreement is an international treaty on climate change adopted at Conference of the Parties 21 (COP21) under the United Nations Framework Convention on Climate Change (UNFCCC) in Paris in December 2015. There are now 193 parties to this agreement, including all 54 CWCs. The central goal of the Paris Agreement is to strengthen the global response to the threat of climate change by limiting global warming to

Table 2.1 Commonwealth member countries by region

Africa	Asia	The Caribbean & Americas
Botswana[a, c]	Bangladesh[b]	Antigua and Barbuda[a, d]
Cameroon	Brunei Darussalam[a]	Bahamas, The[a, d]
Eswatini[a]	India	Barbados[a, d]
Gambia, The[a, b]	Malaysia	Belize[a, d]
Ghana	Maldives[a, d]	Canada
Kenya	Pakistan	Dominica[a, d]
Lesotho[a, b, c]	Singapore[d]	Grenada[a, d]
Malawi[b, c]	Sri Lanka	Guyana[a, d]
Mauritius[a, d]	The Pacific	Jamaica[a, d]
Mozambique[b]	Australia	St Lucia[a, d]
Namibia[a]	Fiji[a, d]	St Kitts and Nevis[a, d]
Nigeria	Kiribati[a, b, d]	St Vincent and the Grenadines[a, d]
Rwanda[b, c]	Nauru[a, d]	Trinidad and Tobago[d]
Seychelles[a, d]	New Zealand	Europe
Sierra Leone[b]	Papua New Guinea[d]	Cyprus[a]
South Africa	Samoa[a, d]	Malta[a]
Uganda[b, c]	Solomon Islands[a, b, d]	United Kingdom
Tanzania[b]	Tonga[a, d]	
Zambia[b, c]	Tuvalu[a, b, d]	
	Vanuatu[a, d]	

Source: The Commonwealth Secretariat.
a. Small state – Small States Country List (worldbank.org).
b. LDC – UN list of LDCs | UNCTAD.
c. Land-locked developing country (LLDC) – List of LLDCs (nationsonline.org).
d. Small island developing state (SIDS) – List of SIDS | Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States.

well below 2°C and pursuing efforts to limit the temperature increase to 1.5°C, compared to preindustrial levels.[9]

The agreement requires countries to prepare, communicate and maintain the post-2020 actions they will take to reduce their greenhouse gas (GHG) emissions to reach the goals of the Paris Agreement by means of NDCs. The agreement works on a five-year cycle of increasingly ambitious climate actions to be carried out by countries, so each country must prepare successive NDCs of revised, updated and more ambitious plans.

Monitoring NDCs provides insights into the status and progress of countries in their efforts to achieve the goals of the Paris Agreement. Countries can also obtain useful insights and learnings from the NDCs of other countries regarding potential initiatives and policies that can be pursued for this purpose. An important part of this report will be to review the NDCs of CWCs, focusing on mitigation actions and examining in particular:

- the extent to which these plans meet the agreement goals,
- the revisions and updates made to these plans since the 2019 report was published, and
- interesting initiatives and policies in these NDCs that other CWCs might wish to consider for their own country.

2.4 Energy and SDG7

In 2015, all UN member states adopted 17 SDGs as part of the UN's 2030 Agenda for Sustainable Development. The goals are a universal call to action to end poverty, protect the planet and improve the lives and prospects of everyone,

Table 2.2 SDG7 targets and indicators

Target	Indicator	Description
7.1		By 2030, ensure universal access to affordable, reliable and modern energy services
	7.1.1	Proportion of population with access to electricity
	7.1.2	Proportion of population with primary reliance on clean fuels and technology
7.2		By 2030, substantially increase the share of renewable energy in the global energy mix
	7.2.1	Renewable energy share in the TFEC
7.3		By 2030, double the global rate of improvement in energy efficiency
	7.3.1	Energy intensity measured in terms of primary energy and GDP
7.a		By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil fuel technology, and promote investment in energy infrastructure and clean energy technology
	7.a.1	International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems
7.b		By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular LDCs, SIDS and LLDCs, in accordance with their respective programmes of support
	7.b.1	Investments in energy efficiency as a percentage of GDP and the amount of FDI in financial transfer for infrastructure and technology to sustainable development services

Source: https://sdgs.un.org/goals/goal7.

everywhere. The UN adopted an ambitious target of achieving the goals by 2030, with now less than a decade remaining to meet that target.

The UN's sustainable development agenda includes a separate goal on energy – Sustainable Development Goal 7 (SDG7) – to ensure access to affordable, reliable, sustainable and modern energy. Energy lies at the heart of the Paris Agreement on Climate Change as well as the Agenda for Sustainable Development. SDG7 recognises that a just and inclusive energy transition will create new jobs, advance gender equality and empower people, communities and societies, although the transition pathways will vary based on the individual situations and needs of countries and regions.[10]

The SDG7 targets for 2030 and respective progress indicators are comprehensively set out in Table 2.2.

2.5 A Just and equitable transition to a low-carbon economy

The energy transition will have enormous impact on all dimensions of human life, including on the global economy and local economies, urban planning, natural environments, international relations and individual and collective lifestyles and habits regarding working, housing, heating, cooking and travelling. Some regions will be more affected than others by the move towards an economy based on sustainable, net zero carbon energy sources. Especially since the 1970s, global geopolitics have been disproportionately influenced by the relative endowments of various countries and regions of the world with hydrocarbon resources. Wars have been fought between these nations and over their resources, and many countries have been

cursed rather than blessed by the richness of their hydrocarbon resources. The energy transition will reduce the power and influence, and potentially the wealth, of hydrocarbon-rich countries as more countries become less dependent on hydrocarbon energy sources.

The global energy landscape is experiencing rapid and wide-ranging changes because of the unprecedented growth of renewables, creating new socio-economic opportunities for countries, regions and local communities across the world. Renewable energy sources like solar and wind are much more widely accessible across the globe than fossil fuels, enabling countries to become increasingly energy independent. Renewable energy, because of its smaller scale and generally wide availability, can also lead to a decentralisation of energy development down to the regional and community level within a country.[11]

The preamble to the Paris Agreement references the need to consider 'the imperatives of a just transition of the workforce and the creation of decent work and quality jobs'.[12] The fair distribution of the costs and benefits of energy transition requires policies that enable a just transition. The transition must create alternative opportunities for people and regions whose economies are highly reliant on fossil fuel industries by providing new economic opportunities, education and skills training and adequate social safety systems. Renewable energy will create jobs and revenue in communities throughout the world, and hydrocarbon-based economies must provide support to their industries and citizens as they make the transition. Just as a wide range of skills are needed in the hydrocarbon industries, they will also be needed in renewable energy industries, from planning, procurement, manufacturing, transport, installation and grid connection to operation and maintenance. Government policy and leadership will be important in assisting workers, companies and communities to make the transition. These policies will include workforce development, economic development, infrastructure and environmental remediation and income support programmes.[13]

2.5.1 The Energy transition and economic inequalities among countries

Most countries observe that their emissions are small in a global context, and their mitigation efforts will not make a big difference to the overall success of addressing climate change and meeting the SDG7 and Paris Agreement targets. These observations are generally correct. But climate change is a global problem impacting all countries and all citizens, and all need to be active participants in efforts to achieve these goals and targets. As we see in Table 2.3, lower-income countries face lower emissions reductions, but their low incomes constrain their ability to achieve these reductions. Achieving a just and inclusive energy transition for lower-income countries will require economic assistance from the higher-income countries of the world. Many CWCs will need financial assistance in their efforts.

Six CWCs (Australia, Canada, Cyprus, Malta, New Zealand and the United Kingdom) are members of the European Union (EU) and/or the Organisation for Economic Co-operation and Development (OECD, often referred to as the 'rich countries' club') and can be viewed as higher-income countries. The remaining 48 CWCs are relatively lower income. Countries with higher incomes also have higher spending per capita and higher emissions due to higher energy consumption.

Table 2.3 Emissions per capita, 2020

	Population totals		CO_2 emission totals		Emissions per capita
	Millions	% of Commonwealth	10^9 tonnes	% of Commonwealth	10^9 tonnes/ capita
6 higher-income CWCs	137.60	5.4	1,298.86	25.2	9.44
48 lower income CWCs	2,428.33	94.6	3,855.07	74.8	1.58
Commonwealth total	2,565.93	100	5,153.93	100	2.01
Global total	7,794.80	N/A	34,807.26	N/A	4.47

Source: Population data from UN Statistics; emissions data from Our World in Data.[14]

We see from Table 2.3 that higher-income CWCs, comprising 5.4 per cent of total population in the Commonwealth, have a disproportionate share of carbon emissions, emitting CO_2e at five times the average Commonwealth citizen and over six times the average citizen of the 48 lower-income CWCs. India has the highest share of global emissions at 7.0 per cent (its per capita emissions are only 1.77 million tonnes, but it has 52.3 per cent of the Commonwealth population) followed by Canada at 1.5 per cent, South Africa at 1.3 per cent and Australia at 1.1 per cent – the only CWCs with shares of global emissions greater than 1 per cent. Clearly no country, no economic sector and no individual citizen can successfully solve climate change on its own.

Climate change is a result of the atmosphere being a common property resource: traditionally no one is legally prevented or economically discouraged from emitting carbon into it, and everyone is affected by the adverse effects and negative potential of increasing levels of carbon emitted into the atmosphere. Addressing climate change is a collective action problem, and all must be fully engaged in the effort to address it collectively. Clearly the higher-income countries are bigger emitters and face a much larger challenge in terms of the magnitudes of emissions reductions they must achieve to meet the goals of SDG7 and the Paris Agreement. All six higher-income CWCs are Annex II countries under the Paris Agreement, which means they are to 'take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention'.[15] Lower-income countries also often have lower energy access and will be striving to increase energy access, and consequently energy consumption, as part of their SDG7 goals. Lower-income countries may have the advantage of relying on renewable energy sources to increase energy access, thereby largely leap-frogging the hydrocarbon energy reliance stage which higher-income countries must now transition from.

2.6 The energy transition and current economic conditions

From early 2020, governments throughout the world were more focused on dealing with the immediate effects of COVID-19 and the welfare of their citizens and economies than on addressing climate change. Global economic activity fell by 3.5 per cent in 2020 and was accompanied by a 4 per cent decline in global energy demand, the largest decline since World War II.[16] This decline in energy demand also led to a decline in GHG emissions, as oil demand declined by 9 per cent, coal demand by 4 per cent and gas demand by 2 per cent. Despite the decline in aggregate energy demand, renewable energy consumption grew by 3 per cent in 2020, led by increased electricity generation by solar photovoltaic (PV) technology and wind. The International Energy Agency (IEA) emphasised in its World Energy Outlook 2020 that energy demand declines in 2020 were the result of the impact of

Table 2.4 Real economic growth rates (% change)

Region	2019	2020	2021	2022
World (195 countries)	2.5	−3.5	5.8	3.5
All CWCs	3.4	−5.1	4.6	5.1
African region CWCs	4.1	−3.2	4.8	4.1
Asian region CWCs	4.2	−6.2	8.3	5.3
Pacific region CWCs	3.0	−3.0	0.5	1.8
Caribbean & Americas region CWCs	2.1	−8.4	4.7	9.5
European region CWCs	4.3	−7.5	7.5	3.6
Commonwealth LDCs	5.4	−1.2	3.5	3.3
Commonwealth LLDCs	4.9	−3.3	5.7	3.8
Commonwealth SIDS	2.7	−7.7	4.2	6.1
Commonwealth small states	3.0	−7.1	4.6	5.6

Source: IMF World Economic Outlook and World Economic Databases. [19]

Table 2.5 Global energy demand and emissions, 2020 and 2021 (% change)

	2020	2021	2022
Energy demand	−4.0	4.6	N/A
Crude oil demand	−8.6	6.1	1.9
Natural gas demand	−1.8	4.5	−0.0
Coal demand	−4.4	6.0	1.5
Renewable energy demand	3.0	8.3	N/A
CO_2 emissions	−5.2	5.7	N/A

Source: IEA Global Energy Review 2021 and various IEA commodity-specific forecasts for 2022.[22]

the COVID-19 pandemic on the economy, not any structural changes or deliberate efforts to reduce energy consumption and emissions.

Global CO_2 emissions fell by 5.1 per cent in 2020 due to the impact of COVID-19 on economic activity and energy demand. The 2021 economic recovery was not the sustainable recovery many had hoped for, as emissions rebounded by 6 per cent in 2021 to reach their highest level ever.[17] Oil demand in 2021 was six million barrels below 2019 levels, as transportation demand has not recovered to pre-COVID-19 levels.

Although new variants of COVID-19 continue to appear, the economies of the world have largely returned to normal. There was a strong economic recovery in 2021, driven by government stimulus programmes, pent-up consumer demand and reduced concerns over COVID-19 because of broad vaccination programmes, particularly in advanced economies. The World Economic Outlook 2022, issued by the International Monetary Fund (IMF), estimates global economic growth was 5.8 per cent in 2021 and is projecting global economic growth of 3.5 per cent in 2022. Table 2.4 shows the breakdowns of growth in CWCs.[18]

Russia's invasion of Ukraine in early 2022 has created further turmoil and uncertainty in prospects for economic growth and the energy transition. Russia is a major producer and exporter of oil, gas and coal and the world's third largest producer and exporter of oil, second largest producer and largest exporter of gas and sixth largest producer and third largest exporter of coal.[20] Wood Mackenzie says, 'Russia's invasion of Ukraine is the most significant shock to world energy markets since the 1970s'.[21]

The invasion of Ukraine and energy demand rebound have driven oil, gas, coal and power prices sharply higher. Climate change policies have failed so far to reduce global dependence on fossil fuels but have sometimes restricted investment in these fuels, further constraining supplies and strengthening fossil fuel prices. Given the global reliance on fossil fuels, energy transition policies focusing on reducing fossil fuel demand rather than curtailing supply are likely to be more effective in reducing CO_2 emissions.

Many European countries are highly reliant on imports from Russia, especially of natural gas, and plans are underway to reduce their reliance on Russian energy.[23] Russia and Ukraine are major exporters of agricultural products as well, and shortages arising from the war are contributing to global inflation, with many developing countries being hardest hit. It is difficult to assess the direction of the market in the midst of a crisis. One might expect higher fossil fuel prices to hasten the transition to non-hydrocarbon fuels, but they could also create resentment to climate change policies, thereby slowing the transition.

The impacts of COVID-19 followed by the war in Ukraine have created major uncertainties regarding progress towards achieving the Paris Agreement and SDG7 goals over the next several years. Governments need to remain focused on long-term strategies to address climate change and not be thrown off course by current or potential crises that may happen along the way.

2.7 The energy transition: opportunities and challenges

Given the historic and current dependence of most countries on hydrocarbon energy sources, the pace at which energy transition must occur to meet the targets of SDG7 and the Paris Agreement was always bound to be challenging. Energy is a critically

important sector of the economy and meeting these decarbonisation goals requires a major transition in our energy systems. Structural changes are always disruptive, creating winners and losers. The world's reliance on hydrocarbon fuels has been a major factor in geopolitics – a source of global conflict and a major determinant of the wealth and poverty of many countries and the prosperity of communities, companies and individuals throughout the world. The energy transition will disrupt many aspects of our current political and economic structures. It will also result in stranded hydrocarbon resources and assets, creating losses for their owners, suppliers and employees, and potentially affecting entire communities and regions. The transition will be especially challenging for countries and regions whose economies largely depend on hydrocarbon resource production.

Major investments are needed in new energy system infrastructure, and incremental investment is a welcome stimulus in most economic circumstances and most countries, especially where it supports green, resilient and inclusive economic growth, providing new opportunities for businesses and individuals.

The International Renewable Energy Association (IRENA) has estimated that US$131 trillion of investment in energy transition technologies is needed by 2050 to reach a 1.5°C pathway, including US$24 trillion of planned investments in fossil fuels that will have to be redirected to energy transition technologies.[24] Mobilising the funds to undertake these investments will be especially challenging for many LDCs, LLDCs, SIDS and small states, notwithstanding that both the Paris Agreement and SDG7 include provisions for financial assistance mechanisms for these countries.

IRENA also estimates that every dollar spent on the energy transition would bring a payback of between US$2 and US$5.5 in reduced environmental and health externalities.[25] It also estimates total jobs in the energy sector in transition-related technologies (renewable energy, energy efficiency, power grids and energy flexibility), fossil fuels and nuclear power could reach 122 million by 2050, more than double current total energy employment. New jobs in transition-related technologies and sectors, mostly in renewables, can be expected to outweigh job losses in fossil fuels.

3. NDCs and Energy Policies of Member Countries

The 2015 Paris Agreement establishes a framework for global action on climate change, including mitigation of and adaptation to climate change, the transparent reporting and strengthening of climate policy initiatives and support for developing nations. More specifically, it:

- aims to limit the global average temperature rise in this century to well below 2°C, while pursuing the preferred scenario of limiting temperature rise to 1.5°C;
- provides that each country submit carbon reduction strategies and targets in their NDCs, outlining their commitments for reducing carbon emissions;
- includes a series of mandatory measures for the monitoring, verification and public reporting of progress towards a country's emissions-reduction targets, while accommodating and supporting nations currently lacking the capacity to strengthen their systems;
- includes a plan to provide financial resources to help developing countries mitigate and increase their resilience to climate change.

A key challenge of the Paris Agreement is to ensure the NDCs are sufficient to keep global warming well below 2°C. The strategy for achieving this goal is for countries to publish new NDCs every five years, committing to increasingly larger emissions reductions, that is, a ratcheting escalation of aspirations on a five-year cycle. Countries essentially completed the first round of new NDCs for review and discussion at the COP26 climate summit in Glasgow in November 2021. The focus is now on establishing increasingly ambitious goals and how the associated mitigation policies can be successfully implemented so these goals can be achieved.

All Commonwealth countries are parties to the Paris Agreement, and all have submitted an initial NDC. As of early 2022, 43 CWCs have submitted updated or second NDCs[26] since the initial version of this report was published in 2019, representing substantive change and progress. Note that a very small number of countries have described their NDCs as 'second', and there is no apparent substantive or consistent difference in approach or content whether described as an updated or a second NDC.

3.1 Updated NDC submissions

We have analysed these updated/second NDCs with a focus on how their emissions reduction targets have changed relative to the targets in their initial NDCs. The updated/second NDCs are intended to reflect increased levels of commitments to achieving the Paris Agreement targets, and they have all succeeded in that respect, with a wide range in the extent of increased commitments. In many instances the countries have also increased the sectors of the economy to which their emissions reduction targets apply and the number of GHG gases included in their targets. In terms of progress and accomplishments, see also the tables with country-specific details on SDG7 indicators in Chapter 4.

These emissions reduction targets in updated and second NDCs are summarised and compared against their initial NDCs in Annex V, Tables V.1 to V.5, by Commonwealth region. The information in these NDCs is generally very detailed and extensive, is difficult to summarise succinctly and is not readily comparable between countries. Countries provide very different levels of information and detail on the actions and measures they will adopt to achieve their targets.

The summary tables in Annex V outline each country's emissions reduction targets as well as those in their first NDCs. They include a high-level summary of selected actions and measures outlined in the second/updated NDCs to achieve these mitigation targets. The tables also provide estimated costs to achieve the updated/second NDC mitigation targets, where such estimates are provided in the NDCs. The information on actions and measures is all from the updated/second NDCs. They indicate the nature of actions and measures

various countries are taking to meet their targets and indicate their breadth and diversity. These actions and measures differ between countries based on their circumstances and their targets, and also differ in terms of the degree of information and detail provided by countries in their respective NDCs.

Countries are not consistent in how their reduction targets are calculated; that is, some are compared against estimated 2030 business as usual (BAU) emissions and some against historical levels of emissions. Due to the variety of formats used to state targets, it is not readily evident which countries have more aggressive targets than others. For example, while some emissions reduction targets may appear to be very ambitious, if they are based on a 2030 BAU scenario, emissions in that country may actually be higher in 2030.

The mitigation targets of many smaller and low-income countries are subject to international financial support – including FDI by private investors and financial aid in the form of official development assistance from other countries and international organisations. The reality of this conditionality is that if the international financial support is not forthcoming in the amounts needed by these countries to undertake the mitigation strategies to achieve their conditional targets, their targets will not be met.

A general observation is that not only are countries seeking to increase their efforts to mitigate climate change in their updated/second NDCs, the general quality of the NDCs has noticeably improved in the depth of content as well as the obvious effort that has gone into preparing them.

3.2 NDC overview

The NDC template, though voluntary, provides a common structure and format for how information is presented.[27] Consistency on the targets, quantifiable measures, mitigation and adaptation allows greater ease of understanding and comparison. For future NDCs, hopefully more widespread adoption of the template will facilitate better comparisons among the countries and within countries as subsequent NDCs follow.

As mentioned above, the varying base for targetsis a major impediment to the comparability of different NDCs. Future NDCs having both the volumetric and percentage reductions in GHG emissions will be beneficial for transparency, clarity and comparability.

The impacts of COVID-19 are generally noted in the updated or second NDC submissions as many countries, particularly SIDS, mentioned the impact the pandemic has had on their ability to pursue their targets. These countries, mainly using BAU baselines, are providing reduction targets conditional on external financial support. This highlights the need for SIDS and other developing countries for financial support to help them mitigate climate change.

Many countries are focused on adding renewable energy to their energy mix. We note that many developing countries are already highly reliant on renewable energy, principally in the form of biomass (see figures in Chapter 4 for each region and individual countries). An important qualification is needed regarding whether these biomass energy-consuming countries are managing their forest resources sustainably. A sustainable forest resource should be close to carbon neutral, with carbon emissions and carbon absorption levels roughly in balance. An expanding forest is a carbon sink and will reduce the amount of carbon in the atmosphere. A depleting forest resource results in net carbon emissions, and while it may provide renewable energy, it is not clean energy in terms of its climate change implications.

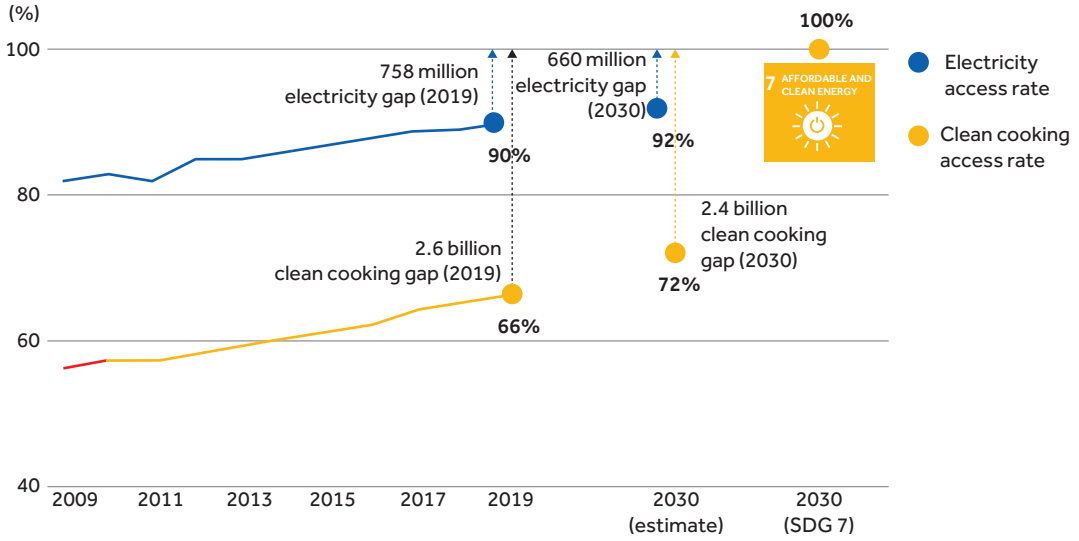
3.3 NDC summary

Most countries raised their emissions reduction targets in their updated/second NDCs, and many are now pledging to reach net zero emissions by 2050. IRENA observes that 'even if all countries implement their latest NDCs, the global GHG emission level in 2030 is expected to be 13.7% above 2010 levels, which could result in a temperature rise of 2.7°C by the end of the century'.[28] This observation is based on a review of all NDCs across the world.

IRENA, in its 2022 World Energy Transitions Outlook, observes that the world is on track to miss the SDG7's 2030 target of universal energy access by a wide margin, as shown in Figure 3.1. The CWCs will likely not fare any better on this indicator.

Table 3.1 attempts to summarise emissions reduction targets, the base year for calculating reductions and unconditional and conditional shares. Not all countries stated an emissions reduction target, some provided absolute targets rather than relative targets and many used different base years.

Figure 3.1 Energy access progress SDG 7.1



Source: IRENA World Energy Transitions Outlook 2022, Slide Deck.[29]

Table 3.1 Mitigation base year, reduction targets, conditionality

Country	Base year	Emissions reductions (%)		Conditionality (%) of 2nd NDC*	
		1st NDC	2nd NDC	Unconditional	Conditional
Antigua and Barbuda	N/A	N/A	N/A	partly	partly
Australia	2005	26–8	30–5	30–5	0.0
The Bahamas	2030 BAU	30.0	N/A[b]	30.0	0
Bangladesh	2030 BAU	15.0	21.8	6.7	15.1
Barbados	2030 BAU	N/A	70.0	35.0	35.0
Belize	N/A	N/A	N/A[a]	partly	partly
Botswana	2010	15.0	N/A[b]	partly	partly
Brunei Darussalam	2015	20.0	N/A[b]	20.0	0.0
Cameroon	2010	32.0	33.0	32.0	0.0
Canada	2005	30.0	40–5	40–5	0.0
Cyprus	1990	40.0	55.0	55.0	0.0
Dominica	2014	N/A	N/A[b]	N/A	partly
Eswatini	N/A	N/A	19.0	5.0	14.0
Fiji	BAU	30.0	30.0	20.0	10.0
The Gambia	BAU	N/A	49.8	2.6	47.2
Ghana	2010	30.0	N/A[a]	partly	partly
Grenada	2010	40.0	40.0	N/A	partly
Guyana	N/A	N/A	N/A[b]	N/A	N/A
India	2005	33–5	N/A[b]	partly	partly
Jamaica	BAU	17.8	28.5	25.4	3.1
Kenya	2030 BAU	30.0	32.0	6.7	25.3

(*Continued*)

Table 3.1 (*Continued*) Mitigation base year, reduction targets, conditionality

Country	Base year	Emissions reductions (%)		Conditionality (%) of 2nd NDC*	
		1st NDC	2nd NDC	Unconditional	Conditional
Kiribati	BAU	61.8	N/A[b]	12.8	49.0
Lesotho	BAU	35.0	N/A[b]	10.0	25.0
Malawi	2040 BAU	N/A	51.0	6.0	45.0
Malaysia	2005	35.0	45.0	45.0	0.0
Maldives	2030 BAU	26.0	100.0	26.0	74.0
Malta	1990	40.0	55.0	55.0	0.0
Mauritius	2030 BAU	30.0	40.0	40.0	0.0
Mozambique	2020	N/A	N/A[a]	N/A	N/A
Namibia	2030 BAU	89.0	91.0	14.0	77.0
Nauru	N/A	N/A	N/A	N/A	N/A
New Zealand	2005	30.0	50.0	30.0	0.0
Nigeria	BAU	45.0	47.0	20.0	27.0
Pakistan	2030 BAU	20.0	50.0	15.0	35.0
Papua New Guinea	N/A	N/A	N/A	N/A	N/A
Rwanda	BAU	N/A	38.0	16.0	22.0
St Lucia	2010	2.0	7.0	N/A	N/A
Samoa	N/A	N/A	26.0	partly	partly
Seychelles	BAU	29.0	26.4	all	0.0
Sierra Leone	BAU	N/A	10.0	N/A	N/A
Singapore	N/A	0.36	36.0	N/A	N/A
Solomon Islands	2030 BAU	50.0	78.0	33.0	45.0
South Africa	N/A	N/A	N/A[a]	N/A	N/A
Sri Lanka	2030 BAU	20.0	14.5	4.0	10.5
St Kitts and Nevis	BAU	35.0	61.0	partly	mostly
St Vincent and the Grenadines	BAU	22.0	N/A[b]	22.0	0.0
Tanzania	2030 BAU	10–20	30–5	partly	partly
Tonga	2006	N/A	13.0	N/A	N/A
Trinidad and Tobago	BAU	15.0	N/A[b]	15.0	0.0
Tuvalu	2010	N/A	N/A	partly	mostly
Uganda	BAU	22.0	N/A	N/A	N/A
United Kingdom	1990	40.0	68.0	68.0	0.0
Vanuatu	BAU	N/A	N/A	partly	mostly
Zambia	2030 BAU	47.0	47.0	25.0	22.0

Source: Authors' analysis of UNFCCC NDC submissions.
*Or first NDC if second NDC not available.
N/A not provided.
N/A[a] absolute reduction provided.
N/A[b] no second NDC provided.

This information is all based on updated/second NDCs, to the extent they are available. Perhaps the most interesting comparison is between emissions reduction targets of the first NDC compared to the updated/second NDC. The summary reveals the incompleteness of data and the challenges of reaching aggregate conclusions based on these data. It also clearly reveals that the emissions reduction targets in the updated/second NDCs are higher than in the first NDCs and how dependent so many countries' NDCs are on external financial assistance.

3.4 Carbon pricing

According to the World Bank's Carbon Pricing Dashboard,[30] 45 nations have carbon pricing initiatives. So far, five CWCs (see Table 3.2) have implemented domestic carbon-pricing mechanisms. These mechanisms can include a carbon tax and/or an emissions trading scheme (ETS, also referred to as cap-and-trade). At least three other CWCs (Brunei Darussalam, Malaysia, Pakistan) are considering developing carbon-pricing initiatives.

3.5 World Bank's RISE 2020: Policy matters

The World Bank's Regulatory Indicators for Sustainable Energy (RISE) 2020 – Sustaining the Momentum[32] is the third edition of a report on a set of indicators to compare the policy and regulatory frameworks of 138 countries to support the achievement of SDG7, including 27 CWCs. A country's overall score is an average of its scores for access to electricity, renewable energy and energy efficiency indicators (clean cooking is only

Table 3.2 Carbon pricing in Commonwealth member countries

Country	Carbon-pricing mechanisms
Canada	**Name**: Pan-Canadian Approach to Pricing Carbon Pollution
	Purpose: jurisdictions can create their own carbon pricing mechanism, subject to meeting the federal benchmark; cap-and-trade systems need emissions reduction target as stringent or more stringent than 30 per cent
	Scope: applies to GHG emissions from all sectors with some exemptions for industry, agriculture and transport sectors to ensure exporting industries are not disadvantaged in global competition; covers 21 types of fuel plus combustible waste burned for producing heat or power
	Year of implementation: 2018
	Current price: federal benchmark C$50/t$CO_2$e (US$40/tCO_2e) in 2022; additional C$15/t annually until C$170/t 2030
New Zealand	**Name**: New Zealand Emissions Trading Scheme
	Sectors included: New Zealand's policy response to climate change includes broadest sectoral coverage of any ETS, directly covering forestry, waste, liquid fossil fuels, stationary energy, industrial processing and synthetic GHGs
	Cap: based on the five-yearly emissions budgets mandated by the 'Zero Carbon Act' and announced over a rolling five-year period with annual updates; allocations auctioned quarterly
	Year of implementation: 2008
	Current price: NZ$37/t$CO_2$e (US$26/tCO_2e)
Singapore	**Name**: Carbon Pricing Act
	Year of implementation: 2019
	Scope: applies to all facilities with annual GHG emissions of 25 ktCO2e or more, with no exemptions. The carbon tax revenue supports initiatives to address climate change
	Price: S$5/t$CO_2$e (US$4/tCO_2e) from 2019 to 2023; pricing will be revisited in 2023

Table 3.2 (*Continued*) Carbon pricing in Commonwealth member countries

Country	Carbon-pricing mechanisms
South Africa	**Name:** Carbon Tax Act
	Year of implementation: 2019
	Price: R120/t (US$7/t) in 2021, increasing annually by inflation plus 2 per cent. To ensure a cost-effective transition, companies could receive tax-free allowances ranging from 60–95 per cent of their emissions, reducing the effective carbon tax rate
United Kingdom	**Name**: UK Emissions Trading Scheme
	Purpose: increase the climate ambition of the UK's carbon pricing policy, while protecting the competitiveness of UK businesses
	Scope: applies to GHG emissions from the power sector, energy-intensive industries and aviation
	Cap: 155.7 $MtCO_2e$ (2021), will decline by 4.2 $MtCO_2e$ each year
	Allocation: auctioning is main method of allocating allowances
	Year of implementation: 2021
	Price: October 2021 auction clearing price of £60/tCO_2e (US$81/$tCO_2e$)

Source: Authors' analysis of UNFCCC NDC submissions, World Bank Carbon Pricing Dashboard[31] and individual country websites.

scored for 55 access-deficit countries). While its benchmarking has recorded a significant increase in sustainable energy policy frameworks that include renewable energy and energy efficiency targets, the gaps indicate that much faster progress is needed.

Not all Commonwealth countries were included in the RISE study, but the 27 CWCs included showed average annual improvements of 6.4 per cent in these indicators from 2017 to 2019. Nigeria, Sierra Leone, Rwanda, Tanzania and Kenya showed the best improvements from 2010 to 2019 in progressing the development of their policy frameworks, in the case of Rwanda and Kenya to the highest level, Nigeria and Tanzania to an intermediate level and Sierra Leone much improved but still at the lowest level. Tanzania and Kenya showed the most improvement from 2017 to 2019. Mozambique and Vanuatu are the countries most in need of support in terms of strengthening energy sector policy (e.g., electricity grid policy, renewable energy regulations, electricity access regulatory framework) (see Table 3.3).

3.6 World economic forum energy transition index

The World Economic Forum uses its Energy Transition Index (ETI) to annually gauge the performance and readiness of a country's energy system.[33] The ETI benchmarks countries on their current energy system performance and their readiness for the energy transition. The energy system performance assesses the ability of countries' energy systems to deliver three key priorities: the ability to support economic development and growth, universal access to a secure and reliable energy supply and environmental sustainability across the energy value chain. Measures of a country's enabling environment for energy transition include: a strong political commitment, a flexible regulatory structure, a stable business environment, incentives for investments and innovation, consumer awareness and the adoption of new technologies. A composite ETI score is based on 40 quantitative indicators relating to these factors. Among other things, the World Economic Forum found fuel-importing countries continue to outperform fuel-exporting countries, and the gap between their average scores is increasing.

As in previous years, the World Economic Forum included 115 countries in its 2021 Index, including 24 Commonwealth countries. In aggregate, the scores of CWCs remained unchanged from 2017 to 2021 and showed only modest improvement over 2012 score (see Table 3.4). No CWC scored higher than 72.5 (out of 100), with the United Kingdom having the highest score and South Africa the lowest score of CWCs included in the index. Clearly

there is significant room to improve energy system performance. Some countries, especially in Africa, Asia and the Caribbean, need stronger policies and enabling environments to foster investment and innovation in energy infrastructure for the transition. A full list of renewable energy support policies can be found in Annex III: Commonwealth Renewable Energy Support Policies.

Table 3.3 RISE data 2019, overall score for Commonwealth member countries

Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Δ pa (%)
United Kingdom*	65	69	71	80	86	87	88	90	92	95	4.4
Australia*	70	72	73	74	79	83	86	88	88	90	2.8
Canada*	70	71	72	76	80	81	87	88	89	89	2.6
India	52	53	55	61	64	70	73	79	80	86	5.7
Singapore*	47	53	59	61	67	70	73	74	76	79	6.0
New Zealand*	66	67	68	68	68	69	72	73	74	75	1.4
Malaysia*	48	55	55	57	60	64	70	72	73	73	4.7
Rwanda	12	14	19	26	37	50	57	64	66	71	22.1
South Africa	28	39	44	45	48	49	50	55	57	71	11.0
Kenya	13	16	22	24	26	30	40	51	59	71	20.1
Jamaica*	46	47	47	52	53	57	62	62	66	69	4.8
Sri Lanka*	50	52	55	56	57	61	63	64	64	66	3.0
Ghana	27	29	32	34	34	50	50	51	52	60	9.4
Bangladesh	18	21	20	39	40	44	49	52	55	58	13.8
Nigeria	5	5	7	7	11	16	28	42	52	56	30.1
Uganda	36	36	38	40	41	46	47	50	54	55	4.9
Tanzania	9	10	9	11	15	17	25	27	31	53	21.7
Malawi	15	16	20	20	21	23	25	40	47	53	15.2
Cameroon	18	24	29	29	34	36	45	46	50	52	12.5
Zambia	22	24	25	27	27	31	37	45	47	49	9.5
Maldives*	35	35	35	39	42	45	46	47	47	47	3.3
Pakistan	10	12	11	11	13	22	25	25	29	33	14.6
Papua New Guinea	7	7	7	10	12	22	24	24	24	27	16.6
Sierra Leone	3	5	4	5	7	10	18	21	26	22	24.0
Solomon Islands	8	8	8	9	14	17	18	19	21	21	10.8
Vanuatu	8	8	8	11	12	14	18	19	20	20	11.2
Mozambique	10	11	14	14	14	14	14	17	19	20	7.6

Source: World Bank, Policy Matters: Regulatory Indicators for Sustainable Energy.
Annual percentage change is calculated using compound growth rate formula from 2010.
*Countries not evaluated for Clean Cooking pillar in 2019.

Key to Table 3.3

Growth rates	Very strong >20	Strong 15–20	Moderate 10–15	Weak 5–10	Very weak <5
Levels	Highest 67–100	Middle range 34–66		Lowest 0–33	

Table 3.4 World Economic Forum ETI, Commonwealth countries

Country	2012		2019		2021	
	Score	Ranking	Score	Ranking	Score	Ranking
United Kingdom	70.5	8	72.7	7	72.5	7
New Zealand	72.0	7	70.5	11	71.0	8
Singapore	67.9	15	67.5	19	67.0	21
Canada	67.6	17	68.2	15	66.7	22
Australia	62.5	35	63.1	42	65.0	35
Malaysia	65.0	24	66.0	26	64.0	39
Malta	58.6	51	61.4	46	63.8	41
Cyprus	59.8	48	59.4	53	60.5	51
Ghana	56.3	57	58.4	54	59.1	56
Namibia	55.4	59	58.1	58	58.2	59
Kenya	53.0	73	56.2	73	58.1	61
Sri Lanka	56.5	56	57.2	66	56.7	69
Brunei Darussalam	52.7	74	56.4	72	53.7	82
Trinidad and Tobago	51.8	79	52.5	88	53.5	85
Jamaica	51.7	83	55.3	75	53.1	86
India	48.5	97	53.4	84	52.8	87
Zambia	52.1	78	51.0	93	51.1	95
Bangladesh	46.9	105	49.2	101	50.4	97
Cameroon	49.5	93	50.1	97	50.3	100
Nigeria	46.6	106	48.1	108	50.1	101
Pakistan	45.3	108	48.9	104	48.9	104
Botswana	51.6	86	48.7	106	48.5	105
Mozambique	48.3	100	48.1	110	48.4	107
South Africa	47.4	102	49.4	99	48.0	110
Commonwealth average	55.7	65.0	57.1	67.0	57.1	67.8

Source: World Economic Forum (2021).

4. Summary of Progress under SDG7 by Region

This chapter provides details on the most recent progress indicators available towards achieving the SDG7 targets, with data up to 2020 for Targets 7.1.1, 7.1.2 and 7.b.1 and to 2019 for Targets 7.2.1, 7.3.1 and 7.a.1. See Annex II: SDG7 Comparison Table for a complete country-to-country comparison. The progress for each indicator is presented by region, with details by indicator for each Commonwealth country in that region (Figure 4.1).

A note on data sources

Data for Indicators 7.1.1, 7.2.1, 7.3.1, 7.a.1 and 7.b.1 are from UN Statistics Division Global SDG Indicators Database,[34] with data provided for these indicators complete and updated to 2020 for Indicators 7.1.1, 7.1.2 and 7.b.1 and to 2019 for indicators 7.2.1, 7.3.1 and 7.a.1.

Data for Indicator 7.1.2 was partially obtained from the UN Statistics Division Global SDG Indicators and also partially from the World Bank DataBank.[35] Although both databases were sourced from Global Health Observatory and World Health Organisation, the UN SDG database does not report actual values when the clean cooking access is lower than 5 per cent or higher than 95 per cent. In spite of minor inconsistencies, the more complete and more updated UN SDG database was taken as the primary source, supplemented with World Bank data. For countries with less than 5 per cent or greater than 95 per cent clean cooking access, actual values were based on the World Bank DataBank.

While SDG 7.b.1 cites investments in energy efficiency as a percentage of GDP as an indicator, we were unable to find a comprehensive data source for this indicator.

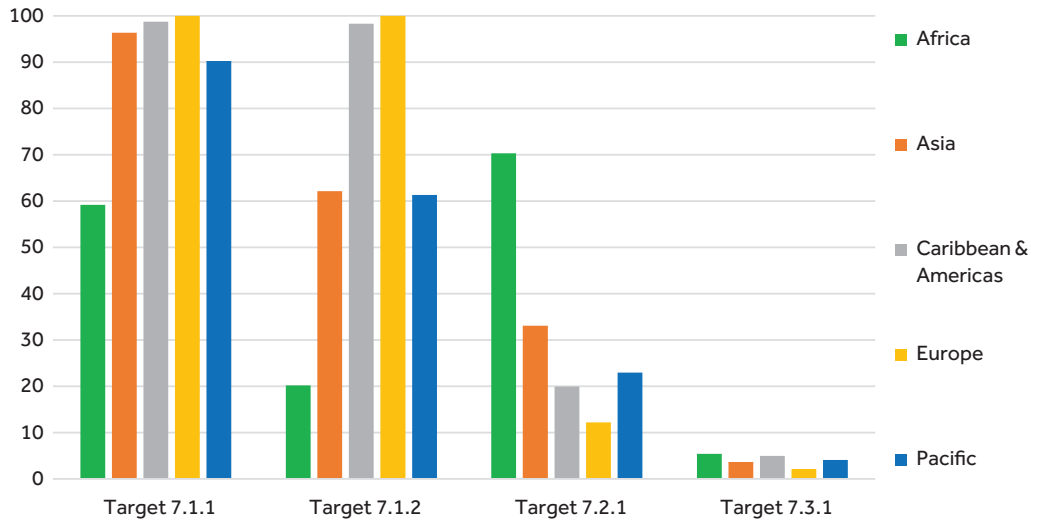
The indicators for each SDG7 target and Commonwealth country are provided below by Commonwealth region, with brief comments on these indicators accompanying the respective charts.

4.1 Africa

4.1.1 Africa: access to electricity

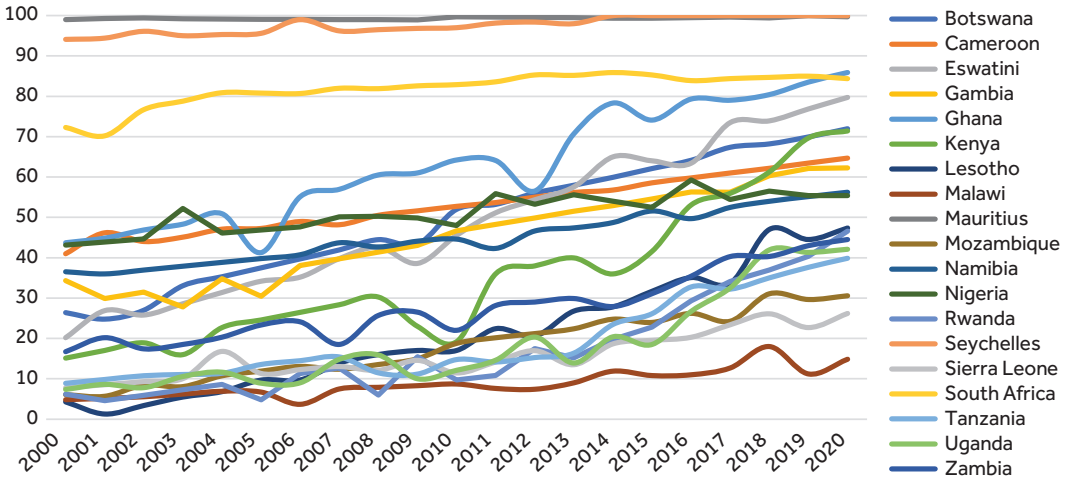
The African SIDS countries of Mauritius and Seychelles are now at 100 per cent electrification. Rwanda, Kenya and Uganda are improving their electrification access rate most rapidly, with annual average increases of 17.0 per cent, 14.0 per cent and 13.3 per cent of the population with access to

Figure 4.1 Current Commonwealth SDG7 status by region



Source: World Bank, UN Statistics Division SDG Indicators Database.

Figure 4.2 SDG 7.1.1 electrification, percentage of population, 2000–20, Africa



Source: UN Statistics Division SDG Indicators Database.

electricity, respectively, since 2010. Those countries with the least access to electrification are Malawi at 14.9 per cent, Sierra Leone at 26.2 per cent and Mozambique at 30.6 per cent of their populations having access to electricity in 2020 (Figure 4.2).

4.1.2 Africa: access to clean cooking

In 2020, 20.2 per cent of the population of Africa's CWCs had access to clean cooking, an increase from 14.1 per cent in 2010 and 10.5 per cent in 2000. Mauritius and the Seychelles have the highest access to clean cooking rates among Africa's CWCs, both at 100 per cent. Nigeria and Rwanda have seen the most rapid increases in clean cooking access since 2010. Gambia, Malawi, Mozambique, Rwanda, Sierra Leone, Tanzania and Uganda all need to address this situation with greater urgency, as their access to clean cooking remains below 5 per cent of the population (Figure 4.3).

4.1.3 Africa: renewable energy shares

African CWCs have the highest shares of renewable energy in their TFEC of all Commonwealth regions. This is fairly common in LDCs with low levels of energy consumption, low electrification rates and low levels of access to clean cooking. The high share of renewable energy occurs because of their high reliance on biofuels, largely solid biomass, for cooking. While the SDG7 goal is to increase the share of renewable energy, we may see renewable energy shares in African countries decline, at least in the short to medium term. As energy access and energy consumption levels increase in these countries, they will likely adopt more modern fuels which may not be renewable energy sources, at least initially. This transition will result in more efficient energy use but also lower renewable energy shares and higher carbon emissions as many modern and cleaner cooking technologies rely on the use of hydrocarbon fuels.

4.1.4 Africa: energy intensities

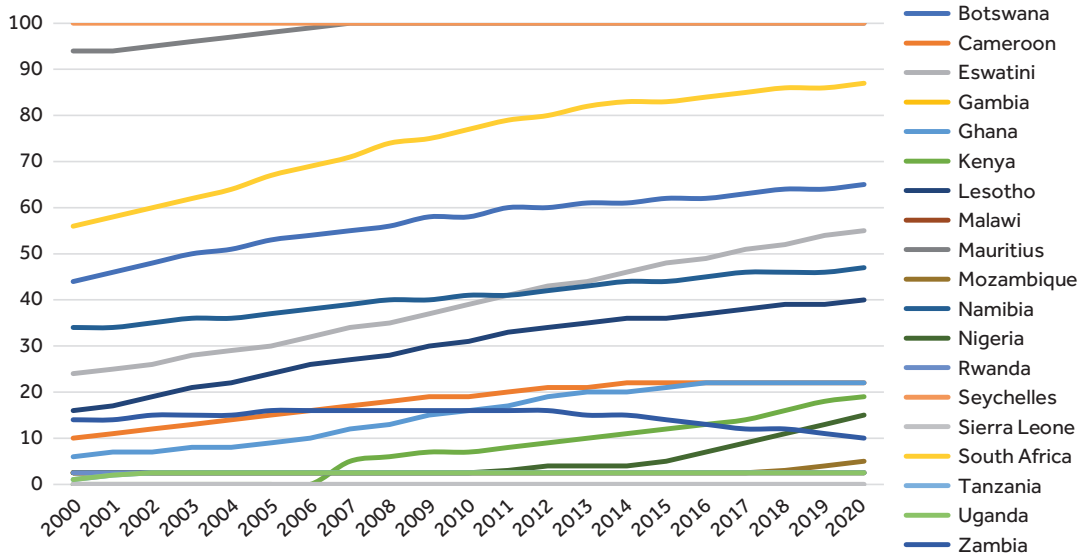
Decreasing energy intensity is generally seen as an indicator of energy efficiency and is a positive indicator of progress towards SDG7 goals. It also occurs as countries undergo structural change in their economies, transitioning from reliance on energy-intensive agriculture and primary production to more sophisticated and extensive processing of materials and greater reliance on service industries. In the case of Africa in particular, it is difficult to distinguish whether decreases in energy intensity are indicative of energy efficiency or are principally driven by structural changes in energy consumption patterns as a result of economic growth and structural transformations of their economies.

The economies of Mozambique and Uganda are the most energy intensive of African CWCs. Mauritius is the least energy intensive.

4.1.5 Africa: international financial flows

International financial flows as shown regarding SDG 7.a.1 include all official loans, grants and equity investments received by countries from foreign governments and multilateral agencies for the purpose of clean energy research and development

Figure 4.3 SDG 7.1.2 clean cooking access rate, 2000–19, Africa (%)



Source: World Bank DataBank, UN Statistics Division SDG Indicators Database.

and renewable energy production. They do not include FDI flows from private investors. The international financial flows into African countries have increased in the past decade, albeit highly cyclically and often highly focused on specific countries.

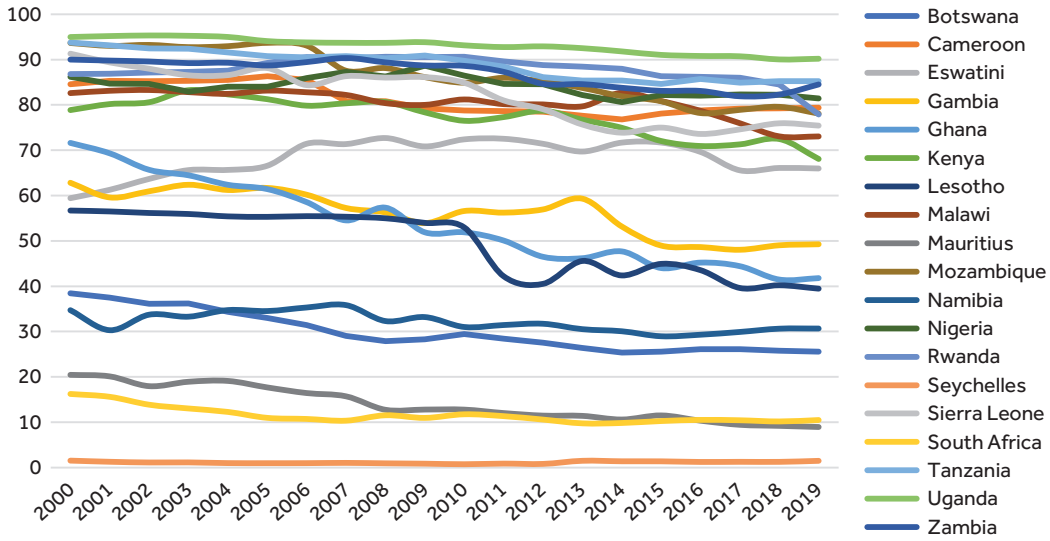
4.1.6 Africa: renewable electricity generating capacities

Installed renewable electricity-generating capacity per capita is highest in Mauritius and Namibia. The most rapid growth in this indicator since 2010 has been in South Africa. The African region currently ranks highest among Commonwealth regions on this indicator, although as we saw regarding Indicator 7.1.1., Africa ranks lowest in access to electricity.

4.1.7 Africa: transition indicators summary

African CWCs have a considerably higher share of renewable energy in total energy consumption than other Commonwealth regions. As seen in Figure 4.4 and in Table 4.1, this share has been

Figure 4.4 SDG 7.2.1 renewable energy, 2000–19, Africa (% TFEC)



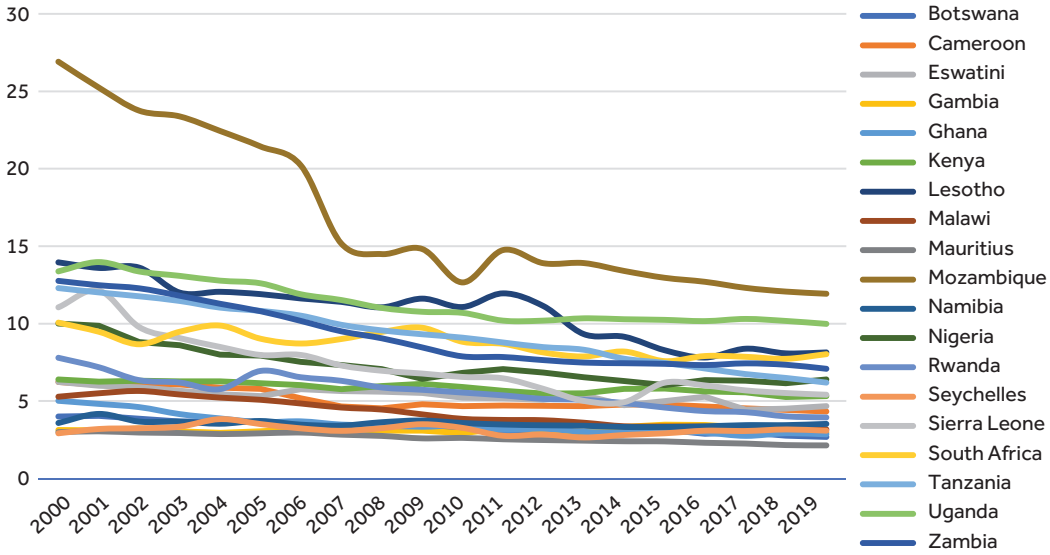
Source: UN Statistics Division SDG Indicators Database.

Table 4.1 SDG7 progress of member countries, Africa

Commonwealth member country	Target 7.1.1 electricity access (%)		Target 7.1.2 clean cooking (%)		Target 7.2.1 renewable energy (% TFEC)		Target 7.3.1 energy intensity (MJ/GDP)		Target 7.a.1 international financial flows (10^6US$)		Target 7.b.1 renewable energy (capacity/capita)	
	2016	2020	2016	2020	2015	2019	2015	2019	2015	2019	2016	2020
Botswana	64.2	72.0	62.0	65.0	25.6	25.6	3.2	2.7			1.5	2.6
Cameroon	59.8	64.7	22.0	22.0	78.1	79.4	4.8	4.3	2.1	7.4	31.0	29.8
Eswatini	63.4	79.7	49.0	55.0	71.7	66.0	5.0	4.7	1.0	6.6	151.7	145.7
Gambia	56.3	62.3	3.3	3.5	49.0	49.2	3.5	3.0		11.9	1.6	1.4
Ghana	79.3	85.9	22.0	22.0	44.0	41.8	3.0	2.9	6.7	3.4	57.2	54.3
Kenya	53.1	71.4	13.4	19.0	72.0	68.1	5.8	5.3	546.2	165.8	32.9	40.7
Lesotho	35.1	47.4	37.0	40.0	44.9	39.5	8.3	8.1	0.0	13.5	36.2	35.1
Malawi	11.0	14.9	2.5	3.5	80.9	73.0	3.4	3.2	63.5	101.6	21.8	21.4
Mauritius	99.5	99.7	100.0	100.0	11.5	8.9	2.4	2.1	9.4	7.3	155.2	198.2
Mozambique	26.2	30.6	3.7	4.1	80.8	78.1	13.0	11.9	9.5	188.5	79.5	74.0
Namibia	49.7	56.3	45.0	47.0	29.0	30.7	3.3	3.5		0.0	162.6	197.3
Nigeria	59.3	55.4	7.0	15.0	82.2	81.4	6.0	6.4	46.5	1,172.6	11.5	10.4
Rwanda	29.4	46.6	0.6	1.0	86.3	77.9	4.6	3.9		1.6	10.1	10.9
Seychelles	100.0	100.0	100.0	100.0	1.4	1.5	2.9	3.1	0.0		83.0	99.5
Sierra Leone	20.3	26.2	1.0	1.2	75.0	75.4	6.2	5.4		0.2	12.4	12.4
South Africa	83.9	84.4	84.0	87.0	10.3	10.5	7.6	8.0	725.6	164.1	82.7	162.5
Uganda	26.7	39.9	2.2	2.5	84.6	85.2	7.5	6.2	37.2	5.7	12.6	11.4
Tanzania	32.8	42.1	0.8	1.0	91.1	90.2	10.2	10.0	521.4	66.5	19.8	25.9
Zambia	35.4	44.5	13.0	10.0	83.1	84.5	7.4	7.1	1,791.2	78.6	148.6	138.2
Average (Total for 7.a.1)	51.9	59.2	29.9	31.5	58.0	56.2	5.7	5.4	3,760.3	1,995.0	58.5	66.9

Source: World Bank, UN Statistics Division SDG Indicators Database.[36]

Figure 4.5 SDG 7.3.1 energy intensity, 2000–19, Africa (MJ/US$ GDP)



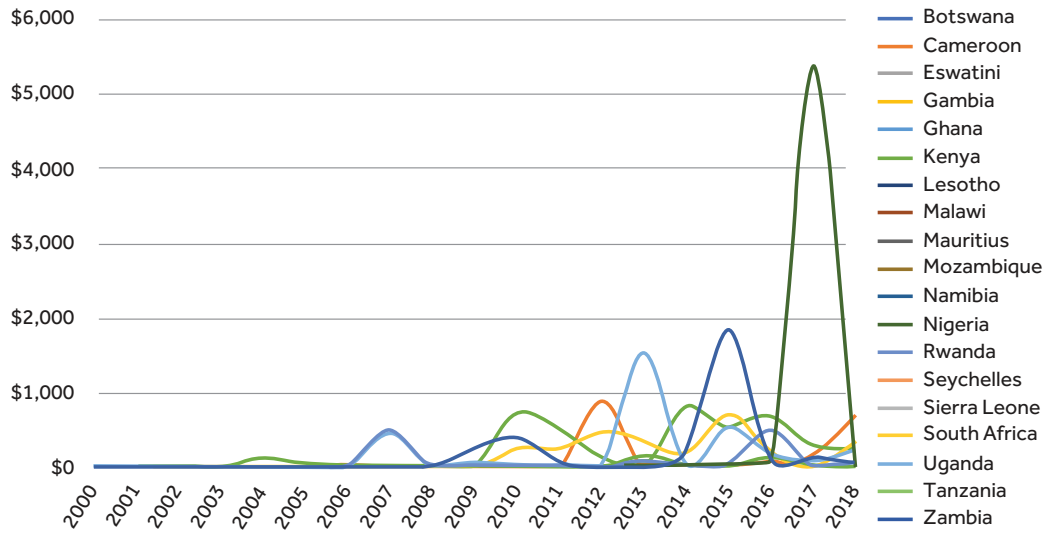
Source: UN Statistics Division SDG Indicators Database.

falling rather than increasing in recent years. As discussed above, the high level of renewable energy in many African countries is largely due to their high use of biomass rather than modern energy sources. The status of biomass as a renewable energy source is contingent on it being harvested sustainably. As that is often not the case, this indicator may not accurately represent the contribution of renewable energy to cleaner energy or low emissions. The use of biomass is falling in most countries as more modern energy sources are used, but if it is not replaced by renewable energy sources, emissions are likely to increase as energy access increases.

Mozambique has had the greatest decrease in energy intensity since 1990, starting from a high rate and slowing to a rate more typical of other member countries in Africa in the most recent decade. As discussed above, it is unclear to what extent these declines in energy efficiency are based on energy efficiency versus shifting energy consumption patterns due to structural economic changes. African CWCs have the highest energy intensity of any of the Commonwealth regions.

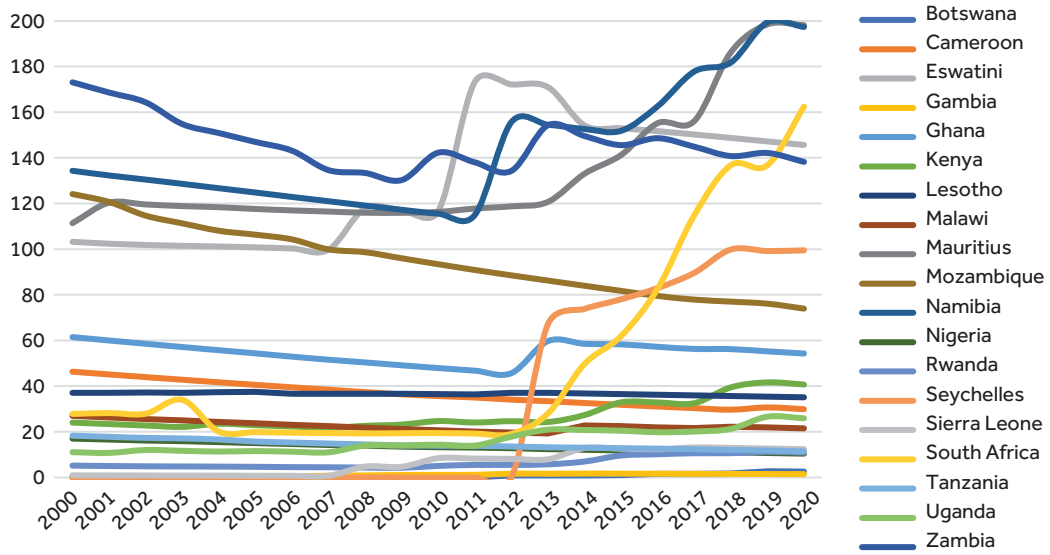
The latest progress for SDG7 for Africa's Commonwealth member countries is provided in Table 4.1.

Figure 4.6 SDG 7.a.1 international financial flows, 2000–18, Africa (US$ constant millions)



Source: UN Statistics Division SDG Indicators Database.

Figure 4.7 SDG 7.b.1 installed renewable electricity-generating capacity, 2000–20, Africa (watts per capita)



Source: UN Statistics Division SDG Indicators Database.

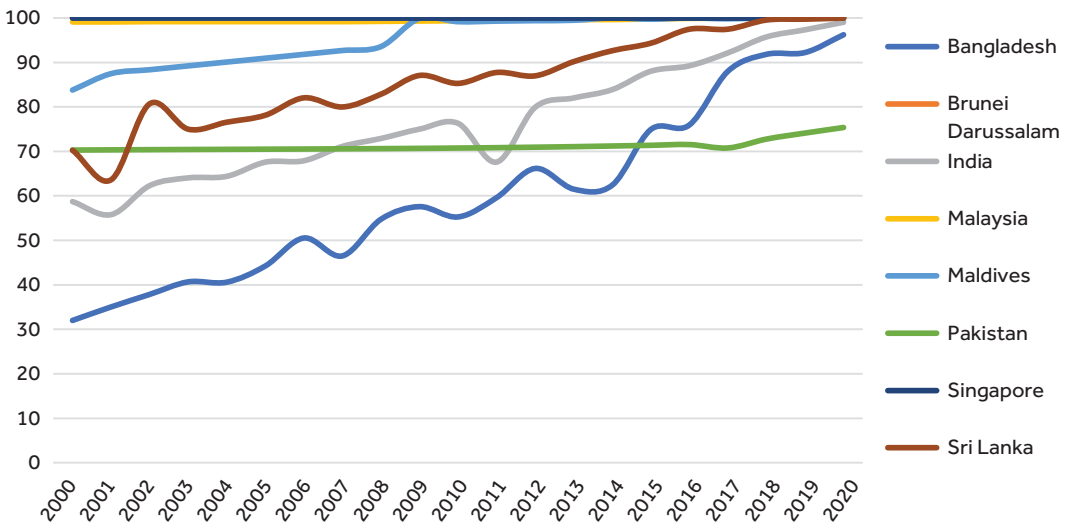
4.2 Asia

The eight CWCs in the Asian region represent 15 per cent of all CWCs and over 70 per cent of the population of all CWCs. The Asian region has also shown the fastest growth in access to electricity and access to clean cooking, reflecting its rapid economic growth that is bringing large shares of its countries' populations out of poverty. Its share of renewable energy is roughly half that of Africa, but it is still relatively high and likely based on similar fuel use factors to that of African CWCs.

4.2.1 Asia: access to electricity

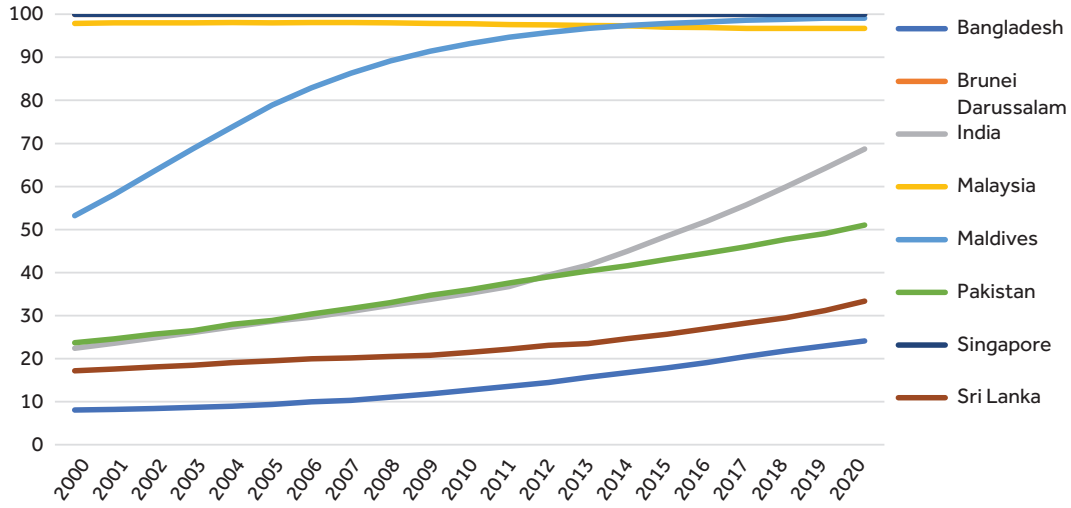
Asian CWCs have made rapid progress in access to electricity, and most are now at 100 per cent access with India and Bangladesh rapidly approaching 100

Figure 4.8 SDG 7.1.1 electrification, 2000–20, Asia (% of population)



Source: UN Statistics Division SDG Indicators Database.

Figure 4.9 SDG 7.1.2 clean cooking access rate, 2000–2020, Asia (%)



Source: World Bank DataBank, UN Statistics Division SDG Indicators Database.

per cent. The notable exception is Pakistan, which appears to have remained stuck at about 70 per cent, with recent progress bringing it to 75 per cent.

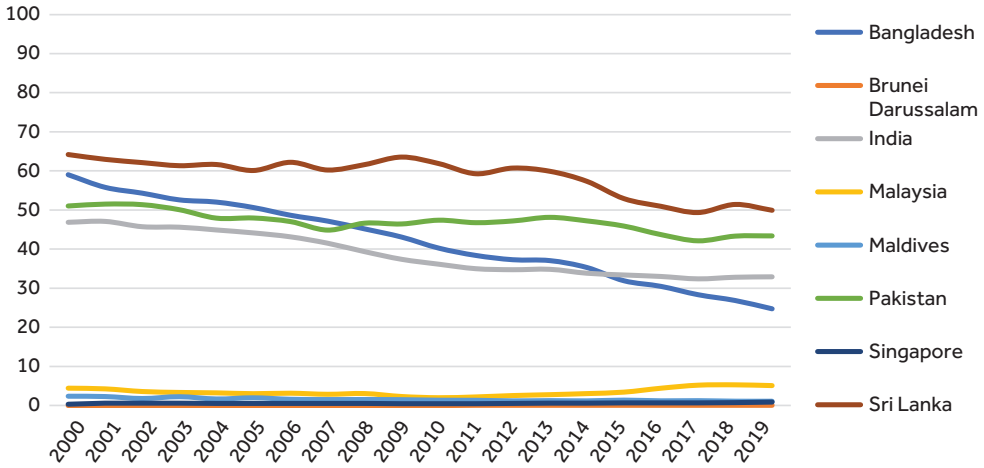
4.2.2 Asia: access to clean cooking

The South-East Asian countries of Singapore, Brunei Darussalam and Malaysia have long had access to clean cooking rates at or close to 100 per cent, more recently joined by the Maldives. India has shown strong growth in recent years but, along with Pakistan, Sri Lanka and Bangladesh, remains well below 100 per cent.

4.2.3 Asia: renewable energy shares

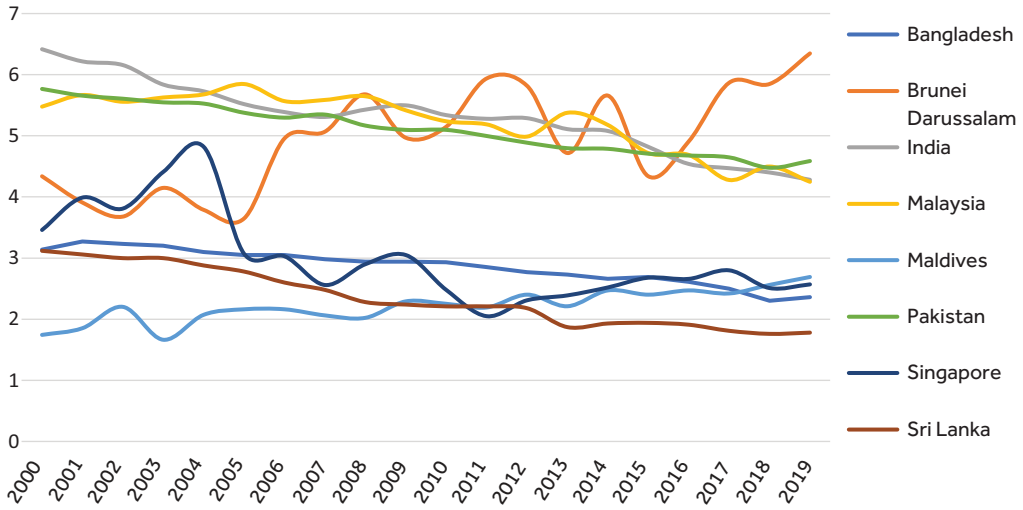
Biomass use in Asia, similar to that of Africa, is slowly decreasing in the transition to more modern forms of energy. Brunei Darussalam, Malaysia and Singapore use virtually no renewable energy, indicating they have a long way to go to reach the SDG7 targets. Brunei Darussalam is a very small country with a wealthy economy based on oil and gas production. Malaysia has a larger share of renewable energy and is the only country showing growth in its share, but as a substantial oil and gas producer it remains highly dependent on these

Figure 4.10 SDG 7.2.1 renewable energy, 2000–20, Asia (% TFEC)



Source: UN Statistics Division SDG Indicators Database.

Figure 4.11 SDG 7.3.1 energy intensity, 2000–19, Asia (MJ/US$ GDP)



Source: UN Statistics Division SDG Indicators Database.

fuels. Singapore is so densely populated it has little space for solar or wind farms. Although Singapore is making increasing use of rooftop solar and offshore floating solar farms, it remains highly reliant on imported hydrocarbon fuels as its principal energy sources.

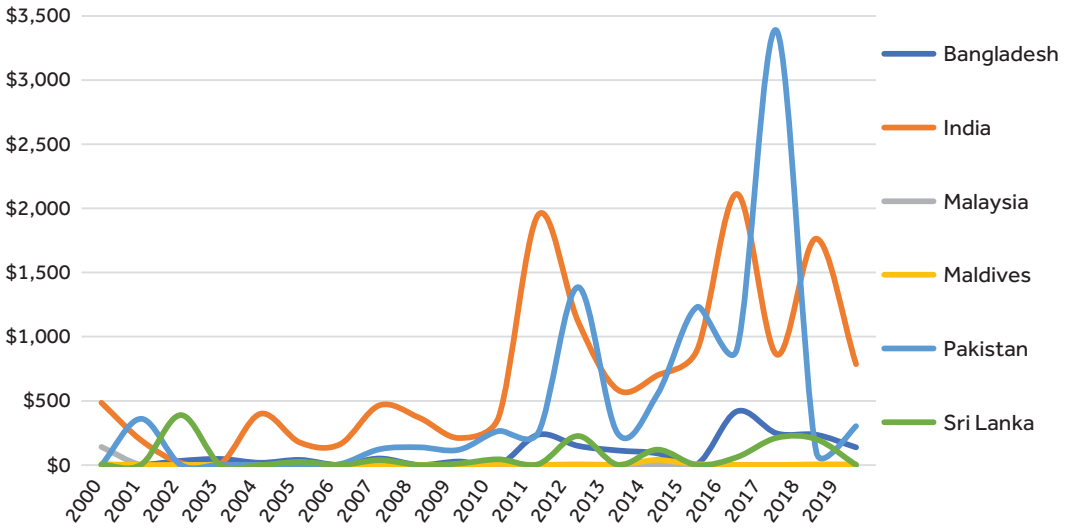
4.2.4 Asia: energy intensities

In aggregate, energy intensity is not decreasing very rapidly in Asia, probably because of energy-intensive industrialisation occurring in many of these countries. India and Pakistan are among the most energy intensive, but their energy intensity is also declining.

4.2.5 Asia: international financial flows

International financial flows to support the energy transition have increased in recent years, and Pakistan has been the largest beneficiary so far, followed by India. While this indicator does not measure the gap in terms of financial needs, we know that many developing countries remain

Figure 4.12 SDG 7.a.1 international financial flows, 2000–19, Asia (US$ constant millions)



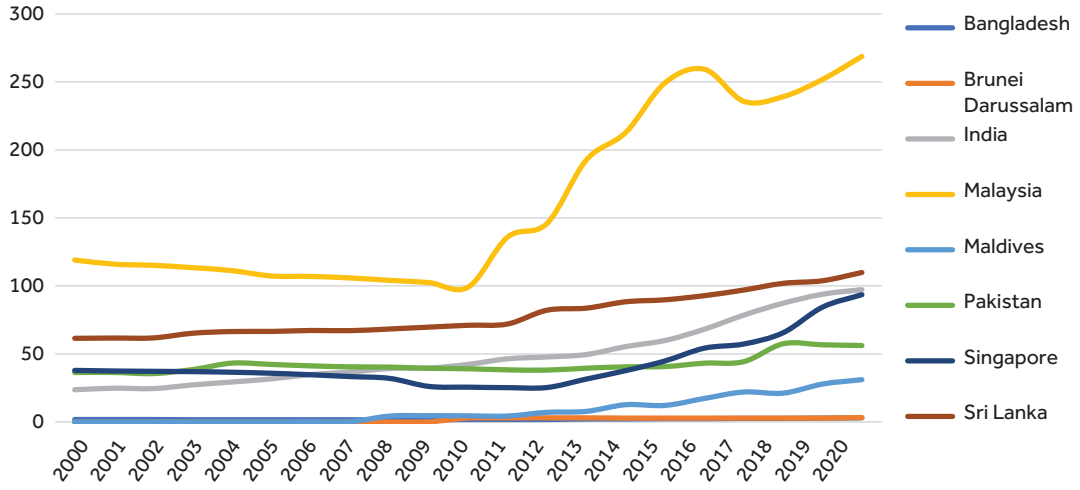
Source: UN Statistics Division SDG Indicators Database.

Table 4.2 SDG7 progress of member countries, Asia

Commonwealth member country	Target 7.1.1 electricity access (%)		Target 7.1.2 clean cooking (%)		Target 7.2.1 renewable energy (% TFEC)		Target 7.3.1 energy intensity (MJ/GDP)		Target 7.a.1 international financial flows (10^6 US$)		Target 7.b.1 renewable energy (capacity/capita)	
	2016	2020	2016	2020	2015	2019	2015	2019	2015	2019	2016	2020
Bangladesh	75.9	96.2	19.0	25.0	31.9	24.8	2.7	2.4	7.7	137.4	2.5	3.1
Brunei Darussalam	100.0	100.0	100.0	100.0	0.0	0.0	4.3	6.4	N/A	N/A	2.9	3.2
India	89.2	99.0	51.0	68.0	33.4	32.9	4.8	4.3	898.8	786.3	68.2	97.3
Malaysia	99.9	100.0	100.0	100.0	3.4	5.1	4.7	4.3	0.2	0.0	259.3	268.8
Maldives	100.0	100.0	95.0	95.0	1.4	1.1	2.4	2.7	6.2	4.0	17.3	31.1
Pakistan	71.6	75.0	43.0	49.0	45.9	43.4	4.7	4.6	1,232.7	302.8	43.2	56.2
Singapore	100.0	100.0	100.0	100.0	0.7	0.8	2.7	2.6	N/A	N/A	54.3	93.6
Sri Lanka	97.5	100.0	27.0	32.0	52.9	49.9	1.9	1.8	0.5	0.2	92.9	109.8
Average (total 7.a.1)	91.8	96.3	66.9	71.1	21.2	19.8	3.5	3.6	2,146.0	1,230.8	67.6	82.9

Source: World Bank, UN Statistics Division SDG Indicators Database.

Figure 4.13 SDG 7.b.1 installed renewable electricity-generating capacity, 2000–20, Asia (watts per capita)



Source: UN Statistics Division SDG Indicators Database.

badly in need of financial support from these and other sources.

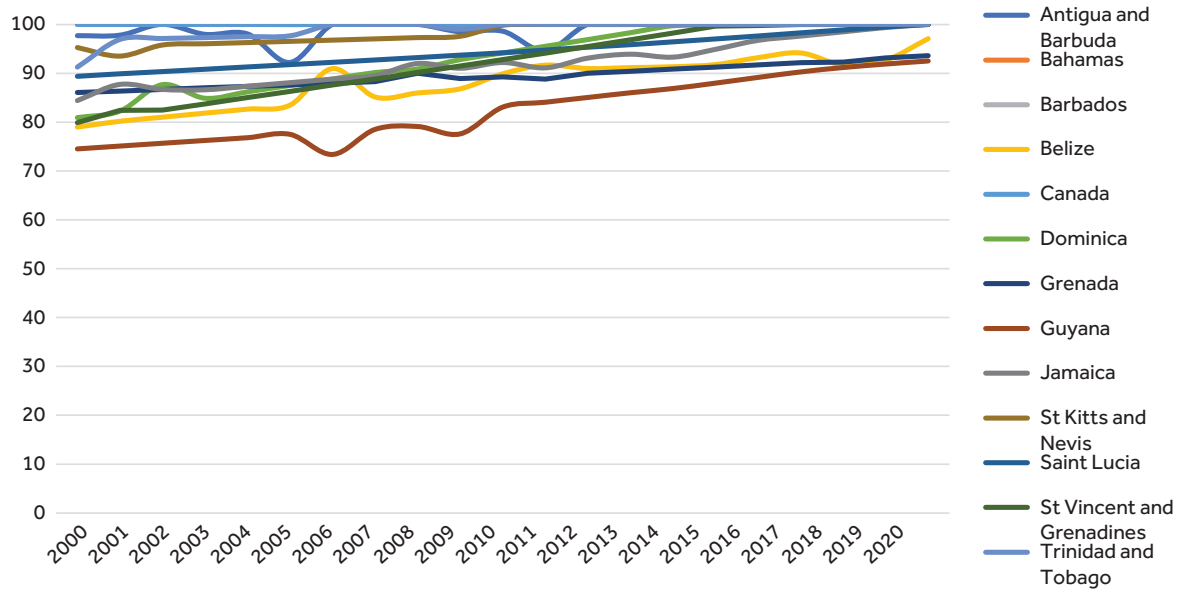
4.2.6 Asia: renewable energy-generating capacity

Malaysia has seen the largest growth in renewable energy-generating capacity per capita in recent years, albeit from a low base. This is interesting as Malaysia is a major petroleum-producing country; but we also note that Malaysia has high hydro potential.[37] Bangladesh and Brunei Darussalam have the lowest levels of this indicator.

4.2.7 Asia: transition indicators summary

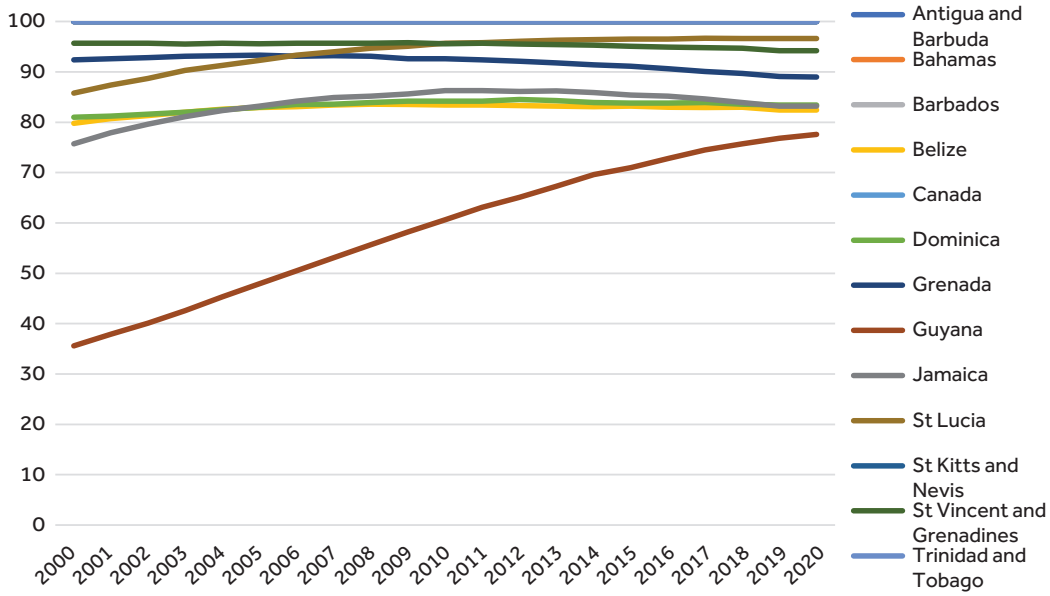
Electricity access is increasing rapidly in Asian CWCs, with all countries having greater than 90 per cent access in 2020 except Pakistan. Clean-cooking access remains low in 2020 for India,

Figure 4.14 SDG 7.1.1 electrification, 2000–20, Caribbean and Americas (% of population)



Source: UN Statistics Division SDG Indicators Database.

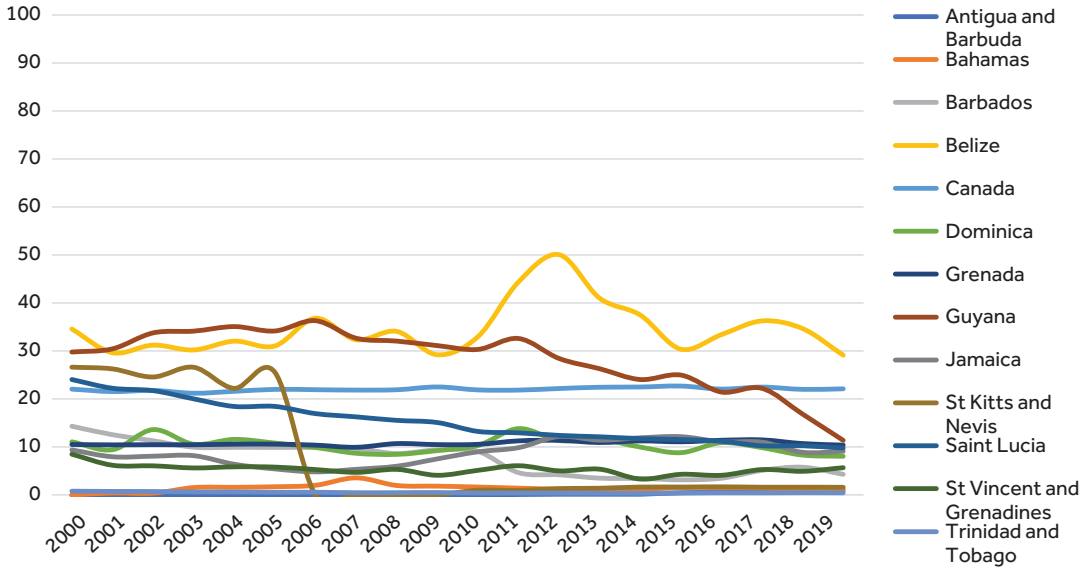
Figure 4.15 SDG 7.1.2 clean-cooking access rate, 2000–20, Caribbean and Americas (%)



Source: World Bank DataBank, UN Statistics Division SDG Indicators Database.

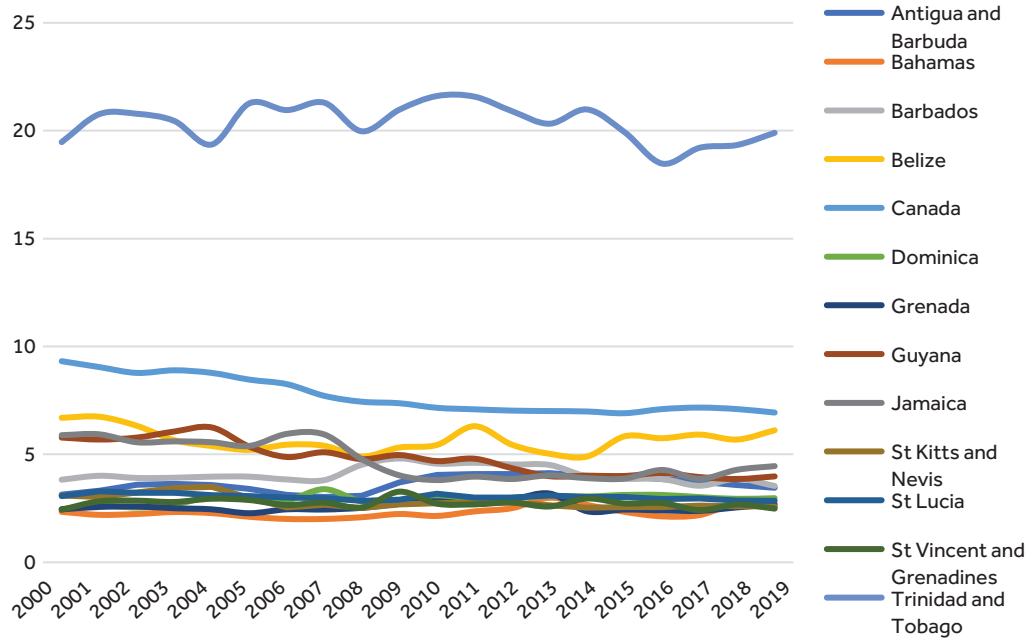
Pakistan, Sri Lanka and Bangladesh, although it is increasing in all of these countries, especially in India in recent years. The Maldives has made the most progress in clean-cooking access and is almost at 100 per cent. The share of renewable energy in Asian countries is declining rather than increasing, like all regions except Europe, and likely for similar reasons to those discussed above regarding African countries. Asian region energy intensity is declining rather slowly. International finance has begun to flow, in a very unevenly distributed way, to Asian countries. Installed renewable energy electricity-generating capacity has increased in the past decade, most markedly in Malaysia.

Figure 4.16 SDG 7.2.1 renewable energy, 2000–19, Caribbean and Americas (% TFEC)



Source: UN Statistics Division SDG Indicators Database.

Figure 4.17 SDG 7.3.1 energy intensity, 2000–19, Caribbean and Americas (MJ/US$ GDP)



Source: UN Statistics Division SDG Indicators Database.

4.3 The caribbean and Americas

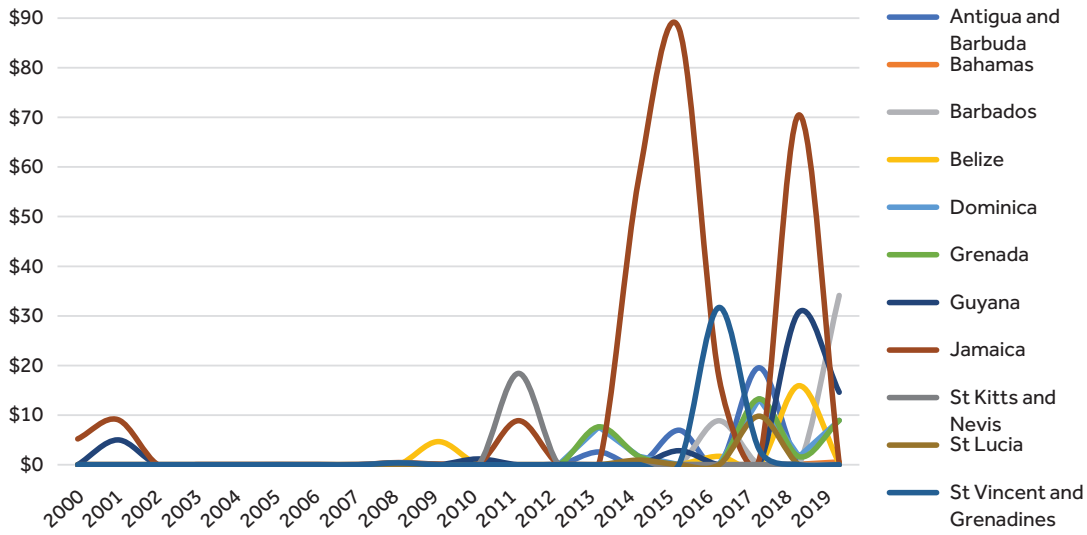
4.3.1 Caribbean and Americas: access to electricity

All CWCs in the Caribbean and Americas have 100 per cent access to electricity, with the exception of Belize, Grenada and Guyana. These countries have over 90 per cent of their population with access to electricity and those access rates are increasing.

4.3.2 Caribbean and Americas: access to clean cooking

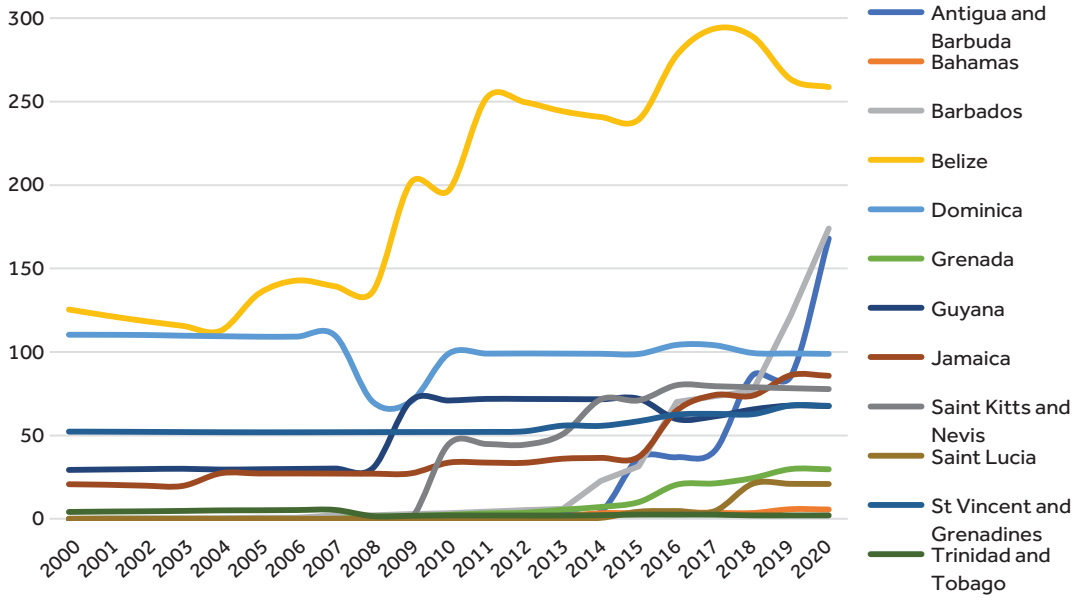
Populations of Caribbean and Americas CWCs all have greater than 80 per cent access to clean cooking, with the exception of Guyana, where the rate of access has been increasing at an annual average rate of 4.1 per cent since 2000, so that gap is rapidly closing. Antigua and Barbuda, The

Figure 4.18 SDG 7.a.1 international financial flows, 2000–19, Caribbean and Americas (US$ constant millions)



Source: UN Statistics Division SDG Indicators Database.

Figure 4.19 SDG 7.b.1 installed renewable electricity-generating capacity, 2000–20, Caribbean and Americas (watts per capita)



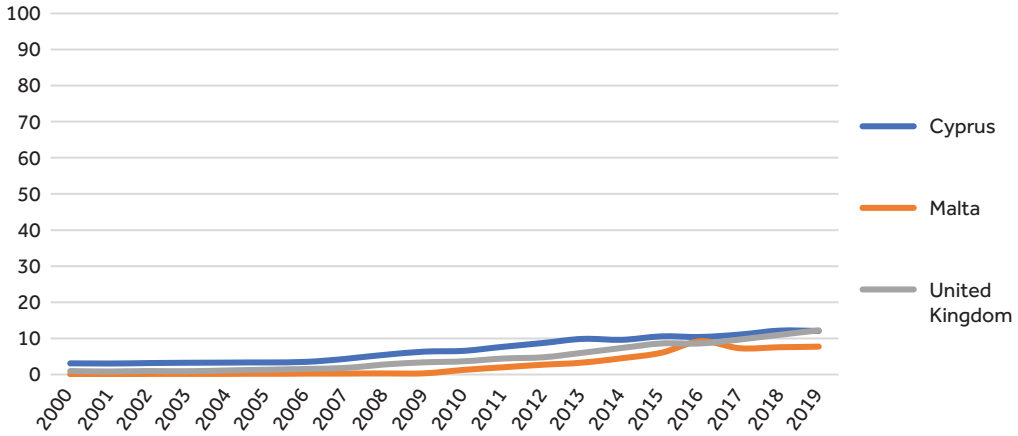
Source: UN Statistics Division SDG Indicators Database.

Table 4.3 SDG7 progress of member countries, Caribbean and Americas

Commonwealth member country	Target 7.1.1 electricity access (%)		Target 7.1.2 clean cooking (%)		Target 7.2.1 renewable energy (% TFEC)		Target 7.3.1 energy intensity (MJ/GDP)		Target 7.a.1 international financial flows (10^6 US$)		Target 7.b.1 renewable energy (capacity/ capita)	
	2016	2020	2016	2020	2015	2019	2015	2019	2015	2019	2016	2020
Antigua and Barbuda	100.0	100.0	100.0	100.0	0.5	0.9	4.0	3.5	7.0		37.0	168.0
The Bahamas	100.0	100.0	100.0	100.0	1.5	1.1	2.3	2.5	0.0	0.6	3.8	5.7
Barbados	100.0	100.0	100.0	100.0	3.2	4.3	3.9	3.5	0.1	34.1	70.0	174.1
Belize	91.8	97.1	83.0	82.4	30.3	29.1	5.8	6.1	0.0	0.3	277.9	258.7
Canada	100.0	100.0	100.0	100.0	22.7	22.1	6.9	6.9	0.0	0.0	104.2	98.8
Dominica	99.8	100.0	83.8	83.4	8.8	8.1	3.1	3.0	0.0	8.9	20.6	29.8
Grenada	91.3	93.6	90.6	89.0	11.1	10.4	2.4	2.7	1.7	0.1	59.8	67.6
Guyana	88.0	92.5	72.8	77.6	25.0	11.4	4.0	4.0	2.9	14.6	64.9	85.7
Jamaica	94.9	100.0	85.2	83.2	12.1	9.1	3.9	4.5	88.0	0.2	80.2	77.8
St Kitts and Nevis	100.0	100.0	96.5	96.6	1.6	1.6	2.6	2.6	0.0	0.0	4.6	20.9
St Lucia	97.0	100.0	100.0	100.0	10.2	8.8	3.0	2.8	0.0	0.0	62.5	67.7
St Vincent and the Grenadines	99.6	100.0	94.9	94.2	4.3	5.7	2.7	2.5	0.0	0.0	2.6	2.2
Trinidad and Tobago	100.0	100.0	100.0	100.0	0.4	0.4	19.9	19.9	0.0	0.0	37.0	168.0
Average (total 7.a.1)	97.1	98.7	92.8	92.8	10.1	10.1	5.0	5.0	99.7	58.8	66.7	88.1

Source: World Bank, UN Statistics Division SDG Indicators Database.

Figure 4.20 SDG 7.2.1 renewable energy, 2000–19, Europe (% TFEC)



Source: UN Statistics Division SDG Indicators Database.

Bahamas, Barbados, Canada, St Kitts and Nevis and Trinidad and Tobago are all at 100 per cent access to clean cooking.

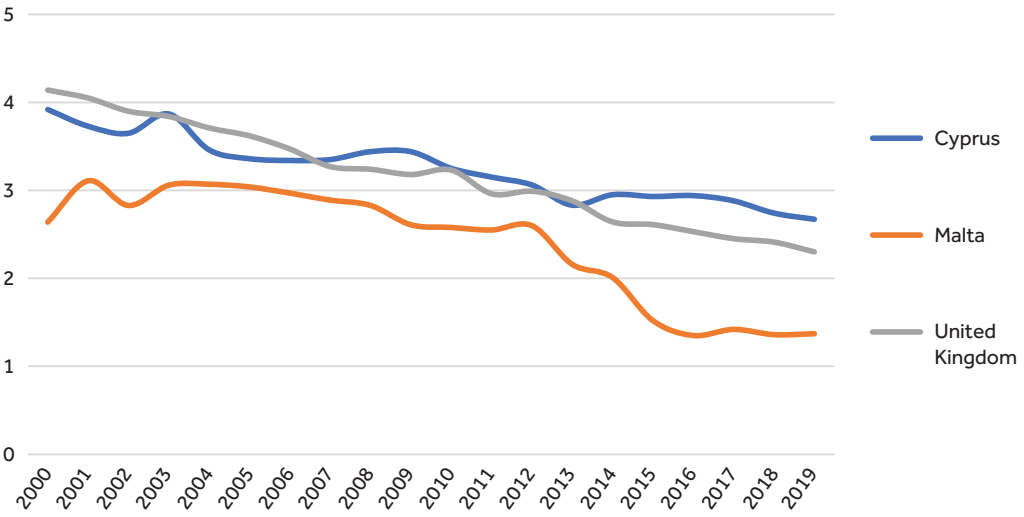
4.3.3 Caribbean and Americas: renewable energy shares

Some CWCs in the Caribbean and Americas have traditionally used biomass as an energy source. That is now declining in countries like Guyana, whose share of renewable energy in its TFEC fell to 11.4 per cent in 2019 and Belize, using biomass and hydropower, has a share of 29.1 per cent in 2019. The sudden drop in renewable energy in 2006 in St Kitts and Nevis is believed to be because of the closure of its sugar industry and the loss of bagasse as an energy source. Canada has consistently had 22 per cent renewable energy in its TFEC, mainly hydropower.

4.3.4 Caribbean and Americas: energy intensities

The Caribbean and Americas region's energy intensity is relatively low and remains quite stable. The outlier in this region is Trinidad and Tobago, a major hydrocarbon-producing nation and one of the larger countries in this region, with an energy intensity more than double that of any other country in the region. This likely reflects its ammonia, methanol, fertiliser and melamine plants and its petroleum refineries, which are

Figure 4.21 SDG 7.3.1 energy intensity, 2000–19, Europe (MJ/US$ GDP)



Source: UN Statistics Division SDG Indicators Database.

Table 4.4 SDG7 progress of member countries, Europe

Commonwealth member country	Target 7.1.1 electricity access (%)		Target 7.1.2 clean cooking (%)		Target 7.2.1 renewable energy (% TFEC)		Target 7.3.1 energy intensity (MJ/US$)		Target 7.a.1 international financial flows (10^6 US$)		Target 7.b.1 renewable energy (capacity/ capita)	
	2016	2020	2016	2020	2015	2019	2015	2019	2015	2019	2016	2020
Cyprus	100.0	100	100.0	100.0	10.5	12.1	2.9	2.7	N/A	N/A	N/A	N/A
Malta	100.0	100	100.0	100.0	6.0	7.7	1.5	1.4	N/A	N/A	N/A	N/A
United Kingdom	100.0	100	100.0	100.0	8.6	12.2	2.6	2.3	N/A	N/A	N/A	N/A
Average (total 7.a.1)	100.0	100.0	100.0	100.0	8.4	10.7	2.4	2.1	N/A	N/A	N/A	N/A

Source: World Bank, UN Statistics Division SDG Indicators Database.

energy-intensive activities. While many Caribbean SIDS have very low and stable energy intensities, those that are higher are generally seeing their intensities decline.

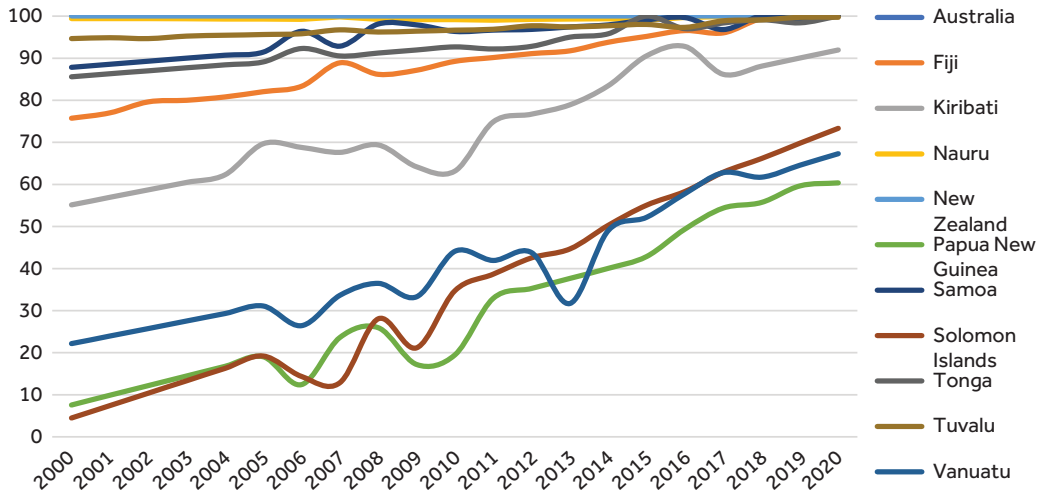
4.3.5 Caribbean and Americas: international financial flows

International financial flows to support green energy projects in the Caribbean and Americas region are low but have been increasing in recent years, as in all Commonwealth regions. These flows are very cyclical, and Jamaica appears to have been the largest recipient to date.

4.3.6 Caribbean and Americas: renewable energy-generating capacities

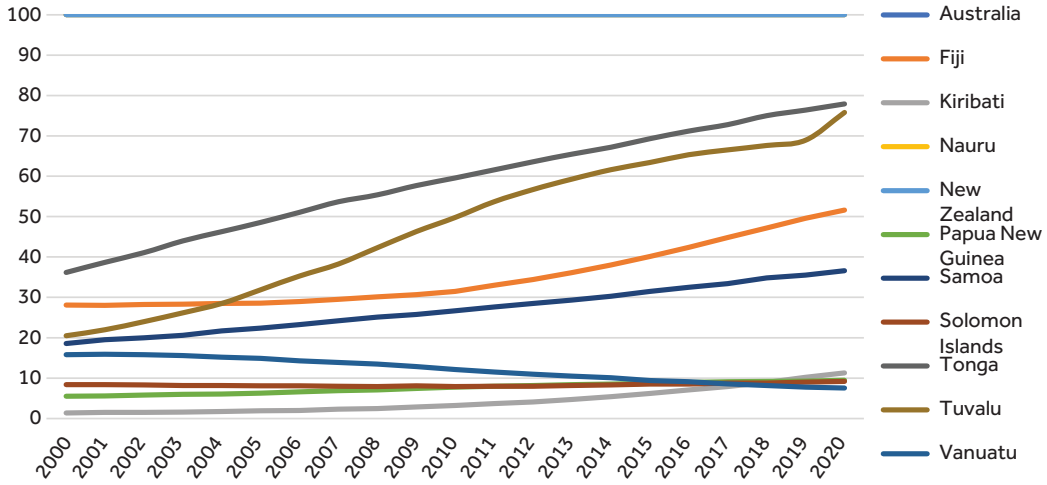
As we saw in Figure 4.16, Belize is the outlier in installed renewable electricity-generating capacity per capita in this region. In recent decades, Belize has seen large increases in electricity generation using hydro and biomass, more than doubling its renewable electricity-generating capacity. Other Caribbean and Americas CWCs have relatively modest renewable electricity-generating capacity and are growing slowly. Barbados and Antigua and Barbuda have seen a recent spike in renewable electricity generation.

Figure 4.22 SDG 7.1.1 electrification, 2000–20, Pacific (% of population)



Source: UN Statistics Division SDG Indicators Database.

Figure 4.23 SDG 7.1.2 clean-cooking access rate, 2000–20, Pacific (%)



Source: World Bank, UN Statistics Division SDG Indicators Database.

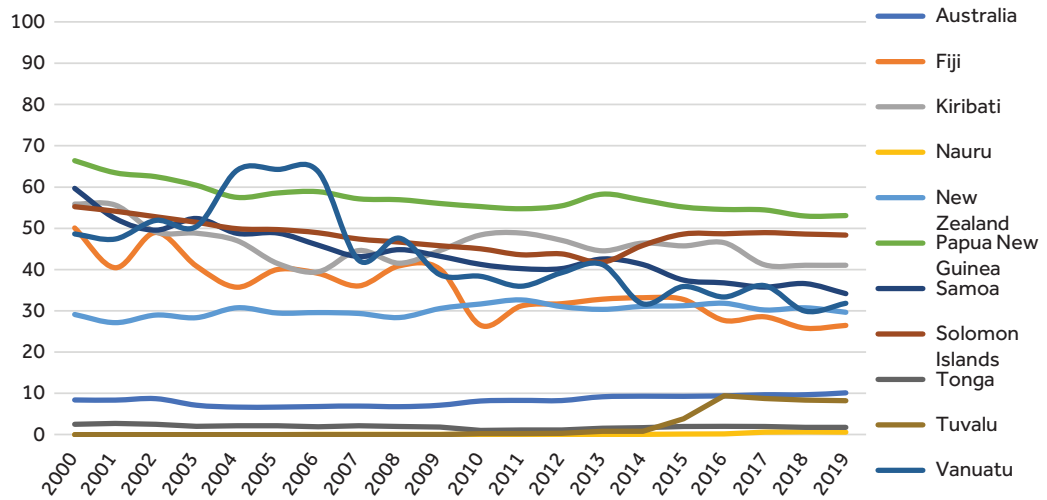
4.3.7 Caribbean and Americas: transition indicators summary

Canada has 100 per cent access rates to electricity and clean cooking, and other Caribbean and Americas region CWCs are not far behind on these indicators. The region's renewable energy share is declining and is now the lowest among the Commonwealth regions. Trinidad and Tobago, another country that is a large producer of carbon-based fuels, has the lowest renewable share. With the exception of Trinidad and Tobago, most CWCs in the region have low energy intensities. The region is seeing very low international support for the energy transition and its installed renewable electricity-generation is relatively flat except for Belize.

4.4 Europe

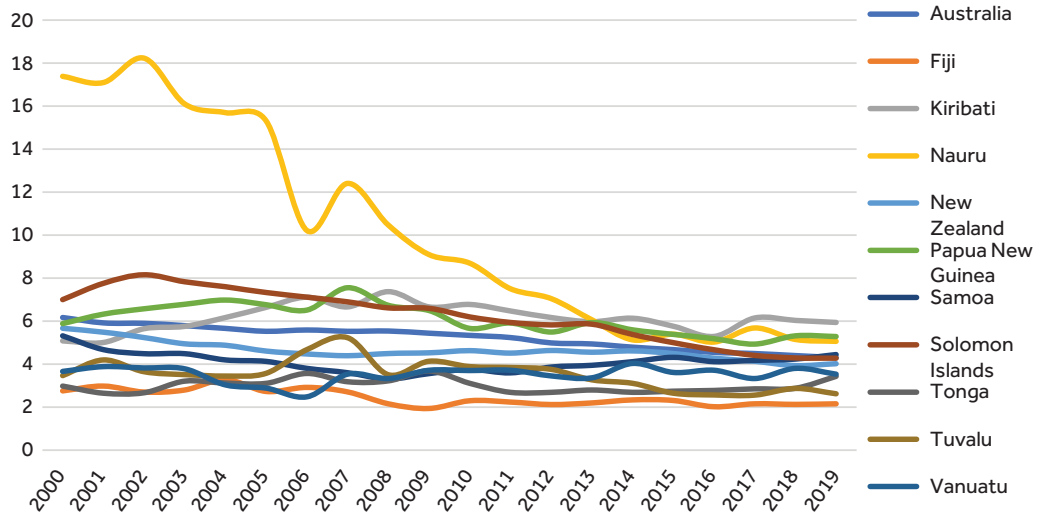
The Commonwealth member countries of Europe are higher-income countries, and all have 100 per cent access to electricity and 100 per cent access to clean cooking, so these targets and indicators are not relevant for this region. They also do not receive international financial flows to support them nor obtain support to expand their energy infrastructure, so there are no indicators for these

Figure 4.24 SDG 7.2.1 renewable energy, 2000–19, Pacific (% TFEC)



Source: UN Statistics Division SDG Indicators Database.

Figure 4.25 SDG 7.3.1 energy intensity, 2000–19, Pacific (MJ/US$ GDP)



Source: UN Statistics Division SDG Indicators Database.

countries for SDG Targets 7.a.1 or 7.b.1. No figures are shown for Europe for these SDG7 indicators.

4.4.1 Europe: renewable energy shares

The greater challenge facing Cyprus, Malta and the United Kingdom is improving their shares of renewable energy, which currently range between 7 and 12 per cent and have grown annually by 7.0 per cent, 22.7 per cent and 14.3 per cent of TFEC, respectively, since 2010 (Figure 4.20).

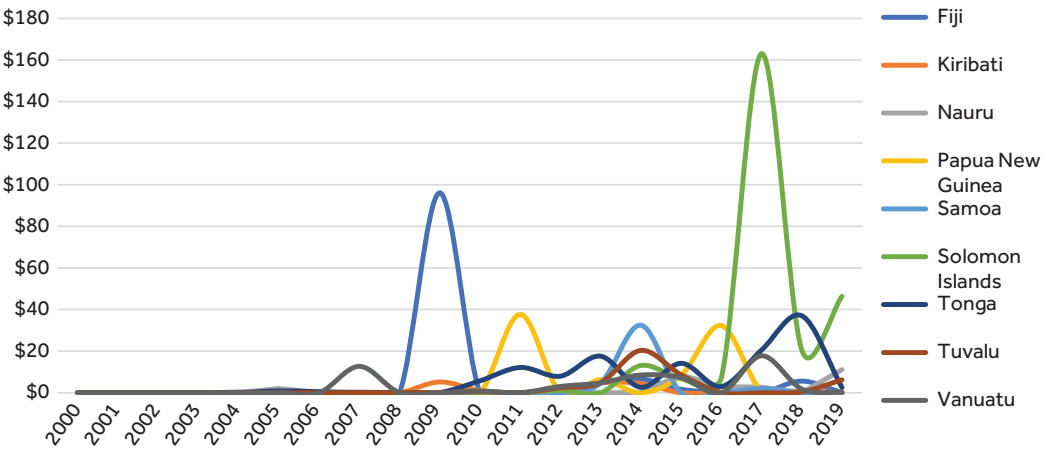
4.4.2 Europe: energy intensities

Energy intensity in Cyprus, Malta and the United Kingdom has declined consistently since 1990.

4.4.3 Europe: transition indicators summary

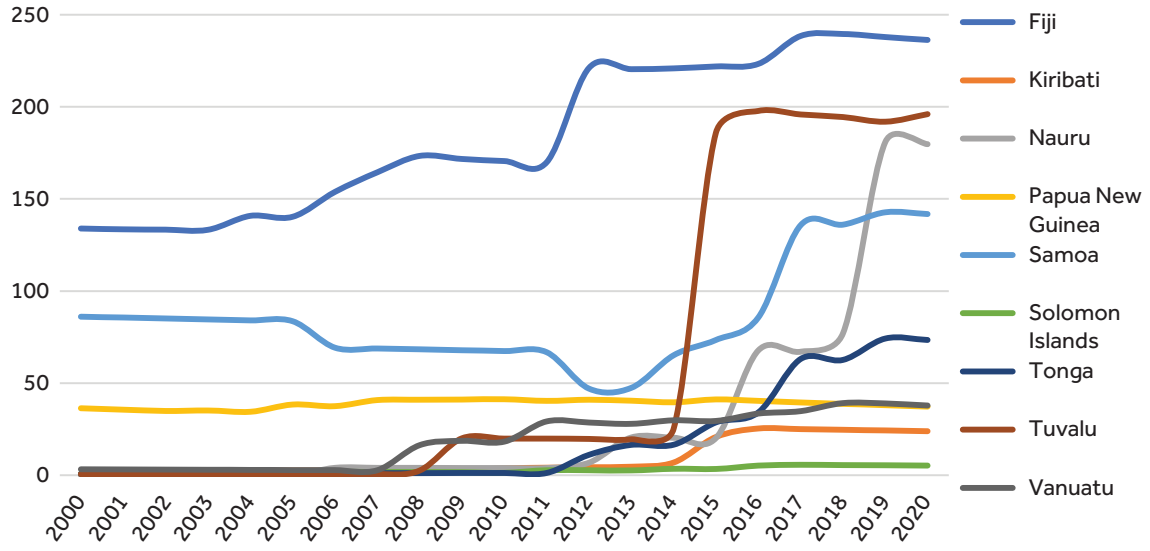
European CWCs are the only region of the Commonwealth with increasing renewable energy shares, but their share remains low and has only recently surpassed that of the Caribbean and Americas region. Their renewable energy shares are increasing but remain a small share of their TFEC, indicating a significantly greater increase is needed to reach a level that will meaningfully reduce their carbon emissions. As the only region exclusively comprising high-income countries, their energy intensities are the lowest among CWCs and are continuing to decline.

Figure 4.26 SDG 7.a.1 international financial flows, 2000–19, Pacific (US$ constant millions)



Source: UN Statistics Division SDG Indicators Database.

Figure 4.27 SDG 7.b.1 installed renewable electricity-generating capacity, 2000–20, Pacific (watts per capita)



Source: UN Statistics Division SDG Indicators Database.

4.5 The pacific

The Pacific CWCs comprise two OECD member countries, Australia and New Zealand, the modestly large Pacific island of Papua New Guinea plus nine smaller Pacific islands or archipelagos.

4.5.1 Pacific: access to electricity

Australia and New Zealand both have 100 per cent access to electricity, and have now been joined by Fiji, Nauru, Tonga and Tuvalu at 100 per cent access. Kiribati now has over 90 per cent access. Although Papua New Guinea, Samoa and Solomon Islands still have less than 100 per cent electricity access, access to electricity is increasing rapidly in those countries.

4.5.2 Pacific: access to clean cooking

Australia, New Zealand and Nauru also have 100 per cent access rates to clean cooking. No other Pacific CWCs have reached that level, but Tonga and Tuvalu access rates are increasing rapidly. Rates in Fiji, Samoa and Kiribati are increasing modestly but remain low. Clean cooking access rates in Vanuatu, Solomon Islands and Papua New Guinea have the lowest clean-cooking access rates at less than 10 per cent in 2020, with their rates flat or declining.

4.5.3 Pacific: renewable energy shares

The share of renewable energy in Pacific region CWCs is modest and generally stable or declining. Papua New Guinea has the highest share of renewable energy at 53 per cent in 2019, with that share declining since 2000, and Solomon Islands now has a 48 per cent share. Nauru and Tonga have virtually no renewable energy at present, and Australia and Tuvalu have only 10 per cent shares.

4.5.4 Pacific: energy intensities

Indicators show that energy intensities in Pacific CWCs are modest and declining slowly. Nauru has seen the most significant decline. By 2019, all Pacific region countries were within the narrow range of 2 per cent to 6 per cent MJ/US$ GDP.

4.5.5 Pacific: international financial flows

International financial flows in support of green energy in developing countries have increased in Pacific region countries. These flows are sporadic and highly cyclical in timing and inadequate for recipient countries to achieve their goals. Solomon Islands appears to be the largest and most recent recipient.

Table 4.5 SDG7 progress of member countries, Pacific

Commonwealth member country	Target 7.1.1 electricity access (%)		Target 7.1.2 clean cooking (%)		Target 7.2.1 renewable energy (% TFEC)		Target 7.3.1 energy intensity (MJ/GDP)		Target 7.a.1 international financial flows (10^6 US$)		Target 7.b.1 renewable energy (capacity/capita)	
	2016	2020	2016	2020	2015	2019	2015	2019	2015	2019	2016	2020
Australia	100.0	100.0	100.0	100.0	9.3	10.1	4.7	4.3	N/A	N/A	N/A	N/A
Fiji	96.6	100.0	42.4	51.6	32.7	26.5	2.3	2.2	1.7	0.1	223.3	236.4
Kiribati	92.8	92.0	7.1	11.3	45.7	41.0	5.8	5.9	0.0	0.0	25.4	24.0
Nauru	99.7	100.0	100.0	100.0	0.1	0.6	5.4	5.1	8.6	11.0	67.8	179.7
New Zealand	100.0	100.0	100.0	100.0	31.2	29.7	4.5	4.0	N/A	N/A	N/A	N/A
Papua New Guinea	49.4	60.4	8.9	9.5	55.2	53.1	5.4	5.3	8.4	0.1	40.3	37.3
Samoa	99.6	100.0	32.5	36.6	37.5	34.2	4.3	4.4	0.0	0.0	85.6	141.8
Solomon Islands	58.3	73.3	8.5	9.2	48.6	48.4	5.0	4.3	6.8	46.4	5.3	5.3
Tonga	97.0	100.0	71.2	77.9	1.9	1.8	2.7	3.4	14.1	2.5	34.0	73.3
Tuvalu	97.3	99.7	65.3	75.8	3.9	8.2	2.6	2.6	8.6	6.2	197.8	196.1
Vanuatu	57.8	67.3	9.1	7.6	35.9	31.9	3.6	3.5	7.3	0.2	33.4	37.8
Average (Total 7.a.1)	86.2	90.2	49.6	52.7	27.5	25.9	4.2	4.1	55.6	66.4	79.2	103.5

Source: World Bank, UN Statistics Division SDG Indicators Database.

Table 4.6 Tracking SDG7-highlighted countries

Measure	Progressing	More progress needed
Electrification	Malawi, Mozambique, Rwanda, Tanzania, Zambia, Uganda	Sierra Leone, Pakistan
Access to electricity (keeping up with population)	Botswana, Kenya, Tanzania, Uganda, Bangladesh, India, Maldives, Pakistan, Sri Lanka,	Nigeria, Malawi
Access to electricity (annualised increase)	Kenya, Papua New Guinea, Kiribati, Solomon Islands, Eswatini, Uganda, Lesotho, Bangladesh, Rwanda	Malawi, Sierra Leone, Mozambique, Rwanda, Tanzania, Zambia
Off-grid access	Rwanda, Fiji, Vanuatu, Uganda, Kenya, Tanzania, Sierra Leone, Cameroon	Bangladesh
Solar lighting	Fiji, Mauritius, Samoa, Uganda, Malawi, India, Sierra Leone	–
Technology and business innovation for electrification	Kenya, Nigeria	–
Financing to fund expansion of electrification	Kenya, Tanzania, Uganda	–
Access to electricity for refugees	–	Rwanda, Tanzania, Cameroon, Bangladesh,
Access to clean cooking	Nigeria, Bangladesh, Pakistan, Ghana, Sri Lanka, Eswatini, Guyana	Mozambique, Kenya, Tanzania, Uganda, Malawi, Rwanda, Sierra Leone, Gambia, Kiribati
Clean-cooking population	–	India, Nigeria, Bangladesh, Pakistan
Policy instruments to fast-track progress of access to clean cooking	India, Nigeria, Bangladesh	–
Promotion of clean fuels	Tanzania, Kenya, Rwanda, Uganda, India, Zambia	–
Renewable energy increase (share of TFEC)	United Kingdom	India, Pakistan, Nigeria
Renewable energy: electricity	Canada, United Kingdom, Nigeria, Pakistan	–
Renewable energy: heat	United Kingdom	–
Energy efficiency	India, United Kingdom	Nigeria, Canada

Source: World Bank et al. (2021).38

4.5.6 Pacific: renewable electricity-generating capacity

Installed renewable electricity-generating capacity per capita has been increasing in most Pacific CWCs, most significantly in Fiji, Tuvalu and Samoa. Solomon Islands is well below other Pacific countries on this indicator, and the international financial inflow it has recently received may help it to raise its renewable electricity-generating capacity.

4.5.7 Pacific: transition indicators summary

Pacific region countries have relatively high electricity access rates, with a wide range of rates among them. Australia, New Zealand, Fiji, Nauru, Tonga and Tuvalu populations now have 100 per cent access to electricity. Most countries are growing steadily, with Kiribati, Tuvalu, Vanuatu and Papua New Guinea having lower access rates but

high growth rates. Most Pacific region countries have fairly stable energy intensities, except Nauru, whose energy intensity has been dropping dramatically. The region is seeing very low financial inflows to support the energy transition, but its per capita installed renewable electricity-generation capacity has shown the highest increase among all regions, and this increase has been led by Fiji, Tuvalu, Samoa and Nauru.

4.6 Highlighted countries from energy progress report 2021

Throughout the tracking of SDG7 indicators by the World Bank, certain indicators stood out with respect to some countries. Of those that stood out, the following measures for CWCs were noted (Table 4.6).

5. Case Studies

The following chapter describes some of the policies and measures being undertaken by a group of selected Commonwealth member countries to facilitate and accelerate their energy transition. We have identified some notable challenges and opportunities facing these selected countries. Each case includes a policy takeaway which briefly describes some innovative climate change policy initiatives that may be of interest to and inspire other CWCs. The policies identified are based on the NDCs as well as other accessible and relevant sources. The focus is on mitigation, not adaptation.[39]

The case studies include the following socio-economic descriptors:

- population, population density, rural populations and GDP per capita are from the UN;[40]
- Human Development Indexes (HDI) are from the UN.[41]

5.1 Africa

5.1.1 Kenya

Challenges: clean-cooking access, electricity access.

Opportunities: urban infrastructure improvements, bike-sharing, geothermal energy.

- Lower middle-income country in Sub-Saharan Africa
- 2019 population of 52,574,000, population density of 92.4 persons/sq km, 73 per cent rural
- 2019 GDP per capita of US$1,817
- 2019 UN HDI rank of 143 and HDI value of 0.601

Kenya's updated NDC in December 2020 aimed to reduce GHG emissions by 32 per cent relative to its 2030 BAU scenario of 143 $MtCO_2e$, with an assessment of milestones in 2025. The total cost of implementing actions in the NDC is estimated at US$62 billion. Kenya is committed to mobilising resources to meet 13 per cent of this cost and will require international support for the remaining 87 per cent. Kenya's initial NDC did not include any domestic contribution.

Kenya's governance of climate change measures is authorised by its Climate Change Act (2016), which requires a National Climate Change Action Plan updated every 5 years. The National Climate Change Council chaired by the president of Kenya is responsible for oversight and coordination, with the Climate Change Directorate as the lead agency for coordinating climate change plans and actions and related measurement, monitoring and reporting. The Act also establishes Climate Change Units at the sectoral level and requires County Integrated Development Plans at the county level.

To achieve its NDC, Kenya will promote and implement the following priority mitigation activities:

- increase renewables in the electricity-generating mix of the national grid;
- enhance energy and resource efficiency across the different sectors;
- make progress towards achieving a tree cover of at least 10 per cent of the land area of Kenya;
- make efforts towards achieving land degradation neutrality;
- scale up Nature Based Solutions for mitigation;
- enhance REDD+ (Reducing Emissions from Deforestation and Forest Degradation) activities;
- adopt lean, efficient and sustainable energy technologies to reduce overreliance on fossil and non-sustainable biomass fuels;
- adopt low-carbon and efficient transportation systems;
- adopt climate smart agriculture with emphasis on efficient livestock management systems;
- adopt sustainable waste management systems;
- harness the mitigation benefits of the sustainable blue economy, including coastal carbon Payment for Ecosystem Services.

From 2016 to 2019, access to electricity in Kenya has increased from 56 per cent to 70 per cent and access to clean cooking increased from 13.4 per

cent to 17 per cent. In the same time frame, Kenya has maintained a high share of renewables and decreased its energy intensity.

Policy takeaway: the COVID-19 pandemic led many Kenyans to avoid transportation by bus, taxicab and carpooling and a shift towards bicycle transportation.[42] This shift to bicycle transportation appears to be an enduring shift, beginning prior to the COVID-19 pandemic and gaining momentum during the pandemic.[43] Kenya's rural areas are seeing a high number of bicycle riders regularly. Kenya's introduction of bicycle sharing in Nairobi in 2017 for university students was positively received.[44] Infrastructure investment in public spaces and monitoring of these public spaces will help the movement to enter urban areas, including through bike sharing, which can reduce CO_2 emissions and help Kenya achieve its NDC. Kenya has started another pilot project by introducing 49 new electric motorcycles into the country. This pilot aims to help policy-makers assess the barriers and uptake of the much-needed technological shift towards electric bikes.[45] These initiatives may also represent precursors for other types of transportation sharing which are widely expected to occur during the energy transition.

5.1.2 Mozambique

Challenges: clean cooking, declining renewable energy shares.

Opportunities: methane recovery from solid waste.

- Low-income LDC in Sub-Saharan Africa
- 2019 population of 30,366,043, population density of 38.6 persons/sq km, 64% rural
- 2019 GDP per capita of US$504
- 2019 UN HDI rank of 181 and HDI value of 0.456

Mozambique has experienced increased extreme climate events such as floods, droughts, tropical cyclones and epidemics in recent decades. Mozambique's national priority is to 'increase resilience in the communities and the national economy including the reduction of climate risks and promote a low-carbon development and the green economy through the integration of adaptation and mitigation in sectorial and local planning'.[46] Mozambique's NDC aims to reduce total emissions by 76.5 $MtCO_2e$ between 2020 to 2030, with 23.0 $MtCO_2e$ by 2024 and 53.4 $MtCO_2e$ from 2025 to 2030. The implementation of further reductions will be subject to financial and technical support from the international community.

Mozambique's climate change policies and programmes include the Mozambique National Climate Change Adaptation and Mitigation Strategy (2013 to 2030), Energy Strategy (2016), Biofuel Policy and Strategy, New and Renewable Energy Development Strategy (2011 to 2025), Conservation and Sustainable Use of the Energy from Biomass Energy Strategy (2014 to 2025), Master Plan for Natural Gas (2014 to 2030), Renewable Energy Feed-in Tariff Regulation, Integrated Urban Solid Waste Management Strategy (2013 to 2015) and the Renewable Energy Atlas for Mozambique.

Following positive initial results, Mozambique has strengthened its institutional structures for a measurement, reporting and verification (MRV) system.[47] Also, Mozambique has introduced electricity tariff structures to make electricity more affordable and accessible to poor segments of its population.[48] Mozambique also introduced a feed-in tariff to incentivise small-scale operators to generate renewable electricity.[49]

From 2016 to 2019, Mozambique's population with access to electricity increased from 24.2 per cent to 30 per cent and its energy intensity decreased from 17.3 MJ/GDP to 11.5 MJ/GDP.

Policy takeaway: Mozambique's strategic action plans to achieve reduced energy emissions include plans to build solid waste landfills with the recovery of methane. This programme promises to transform Mozambique's waste sector, promoting a new circular economy and environmental health, while helping the government deliver on Paris Agreement commitments. The project's ten infrastructure sites across Mozambique will achieve waste management and emissions reduction through material recovery, composting and sanitary landfill with methane recapture. This project has been elevated to a 'Presidential Initiative' and is estimated to be able to process 900 tonnes of waste per month and reduce emissions by 5,000 tCO_2e annually.[50]

5.1.3 Nigeria

Challenges: high reliance of economy on hydrocarbon production, gas flaring and venting.

Opportunities: substituting natural gas for liquid fuels, green bonds.

- Lower-middle-income country in sub-Saharan Africa
- 2019 population of 200,963,603, population density of 220.7 persons/sq km, 49.7 per cent rural
- 2019 GDP per capita of US$2,361
- 2019 UN HDI rank of 161 and HDI value of 0.539

The objective of Nigeria's first NDC is to support economic and social development, grow the economy by 5 per cent per year, improve the standard of living and ensure electricity access for all. Nigeria's emissions reduction unconditional target is 20 per cent from BAU levels by 2030, with a 45 per cent target conditional on international support. Nigeria's updated NDC will emphasise adaptation priorities in the water sector and emissions reduction opportunities from nature-based solutions with an emphasis on forestry.

Nigeria's climate change governance consists of its 2021–25 Economic and Recovery Growth Plan, 'Vision 20:2020', the 2011–15 Transformation Agenda, the Nigeria Climate Change Policy Response and Strategy (2012), National Adaptation Strategy and Plan of Action for Climate Change Nigeria (2011) and the National Agricultural Resilience Framework (2014).

Nigeria's ambitious plans to mitigate its carbon emissions include decentralised renewable energy, substituting natural gas for liquid fuels, improved enforcement of gas-flaring restrictions and the blending of ethanol and biodiesel with gasoline and diesel, respectively. In addition, Nigeria plans to introduce climate-smart agriculture, stop the use of charcoal, benchmark against international best practice for industrial energy usage, adopt green technology, shift from air to high-speed rail transportation, move freight to rail, reform petrol and diesel subsidies, introduce toll roads and introduce better urban transit.

Nigeria has maintained a steady increase in electricity access for its population, its clean-cooking percentage increasing from 4.9 per cent in 2016 to 13 per cent in 2019, and has maintained a high level of renewable energy share in its TFEC.

Policy takeaway: Nigeria became the first country in Africa and the fourth globally to raise funds for environmental projects through its Sovereign Green Bond programme. Projects funded by the bonds must provide clear and quantifiable environmental benefits, while linking with key targets in Nigeria's NDCs.[51] This programme helps fund the programmes Nigeria needs to achieve its NDC commitments and for its climate change management policies to succeed.[52] Both socially responsible investors and mainstream investors that screen for environmental, social and governance factors have exhibited robust demand for green bonds.

5.1.4 Rwanda

Challenges: reliance on biomass for cooking, low electricity access.

Opportunities: lower carbon cement, waste-to-energy, solar energy.

- Low-income LDC country in sub-Saharan Africa
- 2019 population of 12,301,969, population density of 511.8 persons/sq km, 82.8 per cent rural
- 2019 GDP per capita of US$820
- 2019 UN HDI rank of 160 and HDI value of 0.543

Rwanda's NDC aims to reduce emissions unconditionally by 16 per cent relative to 2030 BAU, or by 1.9 $MtCO_2e$. Rwanda may reduce its emissions by an additional 22 per cent relative to 2030 BAU conditional on international support and funding. The combined reduction in GHG emissions compared to 2030 BAU is estimated to be up to 4.6 $MtCO_2e$. Rwanda's NDC estimates mitigation and adaptation measures will require around US$11 billion, with 60 per cent of these funds dependent on conditional measures.

Rwanda's energy sector policies include the Strategic Program for Climate Resilience (2017) and the Rwanda Energy Policy (2015). Both policies highlight measures needed to reduce emissions through a combination of approaches such as regulations, new codes and standards, the introduction of subsidies for renewable energy projects and energy efficiency audits. To achieve its NDC, Rwanda has adopted the LEAP model to analyse economic growth, analysing the relationship between emissions and economic growth and characterising emitting sectors.[53]

Mitigation policies in Rwanda's NDC include:

- substituting pozzolana ash for calcium carbonate in cement, thereby reducing clinker production, associated calcination process CO_2 emissions and imported coal, and also implementing waste heat recovery and increased use of rice husks as fuel;
- extracting and utilising landfill gas for power generation in urban areas and developing waste to energy plants in Kigali and other urban areas through energy recovery options other than landfill gas;
- adopting renewable energy sources such as hydro, biogas and solar (street lighting, off-grid and rooftop, and mini-grids); and
- compost production, improved livestock husbandry, soil and water conservation programmes and other programmes to reduce agricultural emissions.

Rwanda increased its population's access to clean cooking from 29.4 per cent in 2016 to 38 per cent in 2019. In addition, Rwanda has maintained a high renewable energy share in its TFEC and has decreased its energy intensity.

Policy takeaway: Rwanda's new Biomass Energy Strategy is committed to halving the number of households dependent on firewood as a source of energy for cooking. This will be achieved by promoting the use of alternative fuels such as cooking gas and biogas. Two principal objectives are phasing out charcoal use in urban areas and reducing the reliance on firewood. Substantial funding will be made available to address the affordability and awareness gaps as well as many new technological solutions.[54] This initiative will support Rwanda's recently amended NDC target to reduce the percentage of households relying on solid biomass fuel for cooking.

5.1.5 Ghana

Challenges: clean cooking.

Opportunities: solar energy.

- Lower-middle-income in sub-Saharan Africa
- 2019 population of 31,073,000, population density of 133.7 persons/sq km, 43.9 per cent rural
- 2019 GDP per capita of US$2,203
- 2019 UN HDI rank of 138 and HDI value of 0.611

Ghana's unconditional emissions reduction target is 15 per cent by 2030, relative to a BAU scenario of 73.95 $MtCO_2e$. Ghana's conditional emissions reduction target is 45 per cent by 2030. Ghana plans to achieve its targets by prioritising its land use, infrastructure, agriculture, social development, transportation, energy, forest management and waste management sectors. In its enhanced NDC, Ghana will consider new and emerging policies, the inclusion of new technologies, reducing the cost of transition, the need to bring subnational non-state actors on board and investment needs.[55]

Ghana's NDC was prepared through a comprehensive and participatory process with high-level cabinet approval and is based on its 40-year development plan. Ghana has an MRV system to facilitate the successful implementation of its NDC.

To achieve its NDC targets, Ghana plans to:

- scale up renewable energy penetration to 10 per cent by 2030;
- promote clean rural household lighting;
- expand the adoption of market-based cleaner-cooking solutions;
- double energy efficiency improvement to 20 per cent in power plants;
- scale up sustainable mass transportation;
- promote sustainable utilisation of forest resources through REDD+;
- adopt alternative urban solid waste management;
- double energy efficiency improvement to 20 per cent in industrial facilities; and
- participate in the Green Cooling Africa Initiative.

From 2016 to 2019, Ghana's population with access to energy has increased from 79.3 per cent to 84 per cent and its population's access to clean cooking from 21.7 per cent to 23 per cent.

Policy takeaway: the solar energy potential in Ghana is estimated at 35 exajoules (EJ). Ghana is committed to increasing renewable energy generation by up to 10 per cent by 2030 by taking advantage of its solar energy potential. Ghana began constructing the 155 megawatt (MW) Nzema solar energy project in 2016, the largest solar energy project in Africa, which is projected to provide energy to 100,000 households and to

increase the country's electricity generation by 6 per cent.[56] The Ghana Energy Commission has also launched a solar rooftop programme with the intent to provide 200 MW peak load relief through rooftop solar PV systems in residential homes, commercial offices, hospitality industries and small businesses. Beneficiaries would receive a subsidy for installing the appropriate equipment.[57] Ghana's NDC also includes programmes to establish 55 solar mini-grids with average capacity of 100 kW and 200,000 solar home systems in urban and selected non-electrified rural households.

5.2 Asia

5.2.1 Maldives

Challenges: rising sea levels, reliance on non-renewables.

Opportunities: energy efficiency, solar energy, marine energy.

- Upper-middle-income SIDS country in South Asia
- 2019 population of 530,957, population density of 1,769.8 persons/sq km, 60.2 per cent rural
- 2019 GDP per capita of US$10,626 USD
- 2019 UN HDI rank of 95, HDI value of 0.74

Maldives' average elevation of 1.5 metres above sea level and its highest natural elevation of only 5.1 metres makes it the world's lowest-lying country and especially vulnerable to climate change. Maldives plans to reduce its GHG emissions by 26 per cent from its 2030 BAU scenario of 3,284.92 CO_2e under its updated NDC. If sufficient international support and assistance is received, it will strive to achieve net-zero by 2030.

Maldives' climate change governance structure consists of its Ministry of Environment and the Climate Smart Resilient Island Initiative.

Actions to achieve Maldives' NDC target include:

- increasing the share of renewable energy in energy production to 15 per cent;
- increasing the efficiency of generators and upgrading the grid to minimise grid loss;
- turning waste into energy at two plants;
- establishing vehicles/vessels emissions standards, efficient transportation management system, promoting hybrid vehicles; and
- increasing use of liquefied natural gas (LNG) as a replacement for diesel.

Maldives has an electricity access rate of 100 per cent and access to clean cooking rate of 95 per cent. Maldives' renewable energy share is around 1 per cent.

Policy takeaway: Maldives recognises the opportunity for marine energy to be an integral part of its energy mix and anticipates that, with further research, marine energy will be introduced. Its NDC notes 'ocean currents and waves surrounding the islands can be considered as potential renewable energy sources for the Maldives and other SIDS'. However, the technologies to harness them are still at pilot stages globally and commercially unavailable. An archipelago of 1,200 islands with limited energy options, Maldives has an obvious interest in a potential domestic energy source like marine energy. A private energy technology developer has been testing a novel technology based on ocean temperature variations called ocean thermal energy conversion and is engaged in conducting further studies and piloting this technology in Maldives.[58] Maldives has also been involved in testing a new marine energy technology based on wave energy called Wave Energy Converter Units, with the aim of supplying sustainable energy and reducing carbon emissions.[59]

5.2.2 Pakistan

Challenges: reliance on hydrocarbon energy.

Opportunities: hydro energy, off-grid access, clean cooking.

- Lower-middle-income country in South Asia
- 2019 population of 216,565,300, population density of 280.9 persons/sq km, 63.3 per cent rural
- 2019 GDP per capita of US$1,187
- 2019 UN HDI rank of 154 and HDI value of 0.557

Pakistan's NDC is rooted in the country's plan, 'Vision 2025', which outlines Pakistan's intentions to reduce its 2030 GHG emissions by up to 20 per cent. Pakistan expects this goal can be achieved subject to the availability of international support of approximately US$40 billion.

Pakistan's National Climate Change and National Disaster Risk Reduction Policies of 2012 provides a comprehensive framework for policy goals and

actions to address climate change. The Ministry of Climate Change works with subnational governments, other federal authorities, research institutions, universities and private sector organisations to address and coordinate climate change concerns.

Pakistan plans to meet its NDC by increasing its grid efficiency to reduce grid losses, developing hydropower, rationalising use of fertilisers, improving soil carbon management, abolishing import duties on solar equipment, upgrading technology and raising awareness of climate change issues.

Pakistan's plans to combat climate change are primarily nature-based. It aims to plant ten billion trees in the next 3 years and has pledged to source 60 per cent of its energy from renewables by 2030. Pakistan is implementing an electric vehicle (EV) policy which aims to have 30 per cent of all vehicles in the country running on electricity by 2030.[60]

From 2016 to 2019, Pakistan has increased its population's access to clean cooking from 43.3 per cent to 49 per cent. Pakistan has also maintained a steady share of renewables in its TFEC while investing in projects to ensure that share increases.

Policy takeaway: Pakistan is highly dependent on its abundant coal resource for electricity generation; however, it has cancelled two coal projects and replaced them with hydroelectricity;[61] 2,600 MW of energy to be produced by burning coal have been replaced with hydroelectric power.[62] In addition, Pakistan has improved its population's access to clean cooking by installing biogas plants as a cooking fuel source. Pakistan has installed 3,000 biogas plants and the Karachi Electricity Supply Company has a target of 1,500 MW of biogas by 2030 [63] to increase clean-cooking access and energy generation.[64]

5.2.3 Singapore

Challenges: reliance on non-renewable energy.

Opportunities: solar energy, EVs.

- High-income SIDS country in East Asia and Pacific
- 2019 population of 5,804,300, population density of 8,291.9 persons/sq km, 0 per cent rural population
- 2019 GDP per capita of US$64,103
- 2019 UN HDI rank of 11 and HDI value of 0.938

Singapore's updated NDC targets an emissions ceiling of 65 $MtCO_2e$ by 2030, a 36 per cent reduction in Singapore's energy intensity since 2005. Singapore's NDC covers energy, industrial processes and product use, agriculture, LULUCF and waste.

Singapore has reduced its GHG emissions by switching early from fuel oil to natural gas – the cleanest form of fossil fuels – for power generation. In 2019, 95 per cent of Singapore's energy was generated from natural gas compared to 18 per cent in 2000. Singapore has imposed a vehicle quota system to cap vehicle growth and a zero-growth rate for cars and motorcycles, aiming to phase out internal combustion engine vehicles by 2040. Singapore has also pushed solar deployment and anticipates that it will achieve a 350 megawatt-peak (MWp) in 2020 and at least 2 gigawatt-peak (GWp) by 2030. In 2019, Singapore introduced the first carbon tax in South-East Asia, applying to 80 per cent of Singapore's carbon emissions.

Singapore's climate strategies are reflected in the Singapore Climate Action Plan: Take Action Today for a Sustainable Future (2016)[65] to achieve its initial NDC and Charting Singapore's Low-Carbon and Climate Resilient Future (2020)[66] for its enhanced NDC.

Of Singapore's population, 100 per cent has access to electricity and clean cooking, while its share of renewable energy in its TFEC remains less than 1 per cent.

Policy takeaway: Singapore has implemented a number of ambitious schemes and targets for vehicles to create a greener transportation system. Its Vehicular Emissions Scheme uses vehicle registration fee rebates and surcharges to incentivise the purchase of EVs. The Singapore Green Plan 2030 includes the following key targets relating to vehicular emissions:

- new registrations of diesel cars and taxis to cease from 2025;
- 8 EV-Ready Towns with chargers at carparks in all Housing and Development Board towns by 2025;
- all new car and taxi registrations to be of cleaner-energy models from 2030; and
- 60,000 charging points nationwide, including 40,000 in public car parks and 20,000 in private premises by 2030.[67]

5.3 The Caribbean and Americas

5.3.1 Canada

Challenges: dependency of economy on hydrocarbon resource industries.

Opportunities: energy efficiency, carbon capture and storage (CCS), carbon pricing.

- High-income country in North America
- 2019 population of 37,411,038, population density of 4.1 persons/sq km, 18.6 per cent rural
- 2019 GDP per capita of US$46,550
- 2019 UN HDI rank of 16 and HDI value of 0.929

Canada's 2017 NDC target was to reduce its GHG emissions by 30 per cent below 2005 levels by 2030. Canada recently increased its target to reduce its GHG emissions by 40–45 per cent below 2005 levels by 2030 and has indicated this target will be included in its second NDC.[68]

Notwithstanding regional diversity in climate change policies because of its federal nature, Canada has built a strong climate change governance system. The Pan-Canadian Framework on Clean Growth and Climate Change is a comprehensive plan to reduce emissions across all sectors of the economy, accelerate clean economic growth and build resilience to the impacts of climate change.

A principal policy tool for Canada is aggressive carbon pricing, which is scheduled to reach C$170/tonne by 2030. This major component of Canada's climate change policy is intended to discourage consumption of hydrocarbon fuels as well as making consumption of and investment in renewable fuels more attractive. The carbon price may take different forms in different provinces, subject to meeting a national standard. It also offers a reprieve for low-income Canadians and for energy-intensive export industries.

Canada has some CCS projects currently in existence, and CCS figures prominently in the climate change policies of its hydrocarbon-producing provinces. Abundant natural gas resources will permit blue hydrogen production with CCS. The rapidly increasing carbon price will serve to make CCS increasingly economically viable and attractive.

Canada's federal government invested C$53.6 billion for green recovery from the COVID-19 pandemic, creating jobs and a cleaner future. It is also funding a Net-Zero Accelerator to incentivise Canadians to develop and adopt net-zero technologies. The recently enacted Canadian Net-Zero Emissions Accountability Act legislates emissions reductions accountability to address climate change by setting legal requirements on the current government and future governments to plan, report and course correct on the path to net-zero emissions by or before 2050.

Policy takeaway: Canada's carbon price establishes a carbon price floor that is to aggressively rise over the next decade and gives provinces the leeway to develop their own systems, subject to meeting the national floor price.[69] This allows provinces to use cap-and-trade systems to mitigate emissions and create comparable carbon prices. Canada will return carbon-pricing revenues to households in the form of a rebate to low-income households or through investments in green energy projects.

5.3.2 Jamaica

Challenges: reliance on carbon-intensive energy sources.

Opportunities: solar energy, wind energy, biogas.

- Upper-middle-income SIDS country in the Caribbean
- 2019 population of 2,948,277, population density of 272.2 persons/sq km, 44.3 per cent rural
- 2019 GDP per capita of US$5,369
- 2019 UN HDI rank of 101 and HDI value of 0.734

Jamaica's updated NDC is based on its Vision 2030 for economic development, reflecting the three dimensions of sustainable development: social, economic and environmental. Jamaica's target is to reduce 2030 BAU emissions of 7.2 $MtCO_2e$ by 1.8 $MtCO_2e$ (25.0 per cent) without international support or 2.0 $MtCO_2e$ (27.8 per cent) conditional upon international support. These are more ambitious reduction targets than its initial NDC which were 1.1 $MtCO_2e$ (15.2 per cent) and 1.5 $MtCO_2e$ (20.8 per cent), respectively. These include emissions reductions from land use changes in agriculture and forestry, with forestry accounting for more than half of Jamaica's land use. It also includes emissions reductions in electricity generation and energy end-use.

Jamaica's institutional arrangements on energy are guided by its National Energy Policy, which is expected to be relevant beyond 2030. Jamaica has integrated its Vision 2030 into its energy emissions reduction frameworks as well as its goals of realising its energy resource potential through developing renewables, establishing agencies as models in energy conservation and steadily moving towards a green economy.[70]

Jamaica's access to electricity is 99 per cent, its access to clean cooking dropped from 90.5 per cent in 2016 to 83 per cent in 2019 and its renewable energy share of TFEC dropped from 16.8 per cent to 8.7 per cent.

Policy takeaway: Jamaica's NDC includes a range of pilot projects to explore biodiesel from cooking oil, the production of biogas using animal waste and increasing the use of biodigesters. Jamaica is currently working with a conservation partner on harnessing organic waste to produce biogas and fertiliser to address the challenges of increasing renewable energy and reducing emissions by recycling and diverting tremendous quantities of organic waste from landfills to produce clean energy.[71]

5.3.3 Belize

Challenges: domestic technology capacity.

Opportunities: renewable energy, mangroves for carbon capture.

- Upper-middle-income SIDS country in the Caribbean
- 2019 population of 390,353, population density of 17.1 persons/sq km, 54.3 per cent rural
- 2019 GDP per capita of US$4,815
- 2019 UN HDI rank of 110 and HDI value of 0.716

Belize aims to decrease GHG emissions from fuel wood combustion by 27 per cent to 66 per cent, depending on the sector, and to reach 85 per cent renewable energy share of TFEC by 2030 by increased use of hydropower, solar, wind and biomass energy sources, as well as reduction of transmission and distribution losses. An adequate legislative and policy-enabling environment exists but addressing each sector significantly contributing to Belize's GHG emissions will need international financial support.

Belize's policy frameworks to address emissions reductions include Horizon 2030 – a national development framework – the National Energy Policy Framework, the Sustainable Energy Action Plan for 2014–2033, the National Climate Resilience Investment Plan for 2013 and the National Climate Change Policy.

To achieve its NDC targets, Belize is focusing on sustainable forest management, reduced fuel wood consumption, mangrove restoration for CCS, expanded hydropower and solar energy and fuel efficiency in the transport sector.

Belize has been making progress on SDG7. Its population's access to electricity is close to 100 per cent and it is steadily increasing its clean-cooking access and its renewable energy share of TFEC.

Policy takeaway: Belize has identified mangrove forest restoration as an important mitigation action, providing a net carbon sink to absorb carbon emissions. The expected cumulative emissions are estimated to be up to 379,000 tCO_2e between 2015 and 2030. The properties of Belize's mangroves make them ideal for climate policies by increasing carbon storage in their soils by more than five times per area, with carbon remaining there for centuries. With this policy, Belize is restoring large areas of healthy mangrove forests to build resilience to climate change.[72] In addition to mitigating emissions through CCS, mangroves support food security and livelihoods, help stabilise coastlines and help buffer coastal communities from the impacts of storms.

5.4 The Pacific

5.4.1 Fiji

Challenges: forest degradation and deforestation.

Opportunities: sustainable forests.

- Upper-middle-income SIDS country in the Pacific
- 2019 population of 889,955, population density of 48.7 persons/sq km, 43.8 per cent rural
- 2019 GDP per capita of US$6,185
- 2019 UN HDI rank of 93 and HDI value of 0.743

Fiji's NDC targets a 30 per cent reduction in GHG emissions from the 2013 base by 2030, with 10 per cent unconditional, using available resources in the country, and 20 per cent conditional on international support.

Fiji's climate change governance structure consists of the Climate Change and International Cooperation Division of the Ministry of Economy and is guided by the National Climate Change Policy, with government agencies, non-governmental organisations, regional and international agencies and development partners working in collaboration. Fiji's governance structure also consists of the Low Emission Development Strategy Steering Committee, comprising senior government officials from relevant ministries and public utilities.

To achieve its NDC, Fiji intends to:

- reach close to 100 per cent grid-connected renewable energy power generation by 2030 to reduce CO_2 emissions by 20 per cent;
- reduce CO_2 emissions by 10 per cent through energy efficiency improvements;
- reduce maritime shipping emissions by 40 per cent;
- promote sustainable practices in crop management, livestock and sugar cane farming and fisheries;
- improve infrastructure maintenance;
- conserve biodiversity, including carbon sequestration potential; and
- plant 30 million trees by 2035.

Of Fiji's population, 100 per cent now has access to electricity, and its population with access to clean cooking has increased from 39.6 per cent to 50 per cent.

Policy takeaway: Fiji's Low Emission Development Strategy[73] states that Fiji is able to achieve net zero emissions as a result of its REDD+ programme of extensive afforestation measures, reduced deforestation and increased use of sustainable forest plantations in the 'agriculture, forestry and other land use' sector. Fiji's Ministry of Forestry has launched the 2020: 4 Million Trees in 4 Years initiative[74] and the 30 Million Trees in 15 Years initiative.[75] Fiji has opened up nurseries to supply seedlings for project catchment areas so that trees can be continuously planted. Of the four million trees to be planted in 4 years, 2.6 million have already been planted, resulting in sustainable forest management and significant carbon sequestration.

5.4.2 Kiribati

Challenges: reliance on hydrocarbon fuels, access to clean cooking.

Opportunities: solar PV mini-grids.

- Lower-middle-income SIDS country in the Pacific
- 2019 population of 119,000, population density of 145.2 persons/sq km, 45.9 per cent rural
- 2019 GDP per capita of US$1,657
- 2019 UN HDI rank of 134, HDI value of 0.63

Kiribati's unconditional NDC target is reducing its GHG emissions by 13.7 per cent by 2025 and 12.8 per cent by 2030 from 2020 emission levels. Kiribati's conditional NDC target is a reduction in GHG emissions of 48.8 per cent by 2025 and 49 per cent by 2030, potentially leading to a total emissions reduction of 61.8 per cent by 2030.

Kiribati's climate change governance structure consists of the Kiribati National Energy Policy, Kiribati Integrated Environment Policy and Kiribati Joint Implementation Plan on Climate Change and Disaster Risk Management (2014).

Kiribati's vision is to have 'available, accessible, reliable, affordable, clean, and sustainable energy options for the enhancement of economic growth and improvement of livelihoods in Kiribati'.[76] Kiribati plans to achieve its NDC by reducing fossil fuel imports through increasing its renewable energy along with energy efficiency improvements on both the demand and supply. It expects to replace more than one- third of fossil fuels for electricity and transport by 2025. Kiribati acknowledges that meeting its mitigation targets will require a combination of capacity building, technology transfer and financial support in the form of grants.

Since 2016, Kiribati has been progressing towards meeting its SDG targets. Its population with access to electricity has increased from 84.9 per cent to 100 per cent and clean cooking from 5.5 per cent to 10 per cent. Kiribati has increased its renewable energy from 4.3 per cent to 41.1 per cent of TFEC.

Policy takeaway: Kiribati is promoting the use of renewables by setting up the Kiribati Solar Energy Company, which provides solar lighting on rural islands and markets solar appliances and on-grid

solar PV on urban islands and establishing a fund to provide partial funding for equipment associated with PV mini-grids.[77] Solar PV mini-grids with battery storage will be designed and demonstrated for boosting energy access and the deployment of renewable energy. Kiribati is heavily focused on implementing solar mini-grids; its NDC includes ten activities for solar energy.

5.4.3 Vanuatu

Challenges: electrification, marine transport.

Opportunities: domestic inputs for biofuel (coconut).

- Lower-middle-income SIDS country in the Pacific
- 2019 population of 307,000, population density of 24.6 persons/sq km, 74.7 per cent rural
- 2019 GDP per capita of US$3,023
- 2019 UN HDI rank of 140 and HDI value of 0.609

Vanuatu is an archipelago of roughly 80 islands with differing emissions targets for different areas and sectors. Vanuatu's GHG emissions reductions are dependent on international support – financial and technical – being available.

Vanuatu's climate policy is led by the Department of Climate Change under the guidance of the Ministry of Climate Change, Meteorology, Geo-Hazards, Energy, Environment and Disaster Management with engagement of all ministries and departments of Vanuatu. Consultations are carried out with the private sector, including utility companies, energy sector vendors, development partners and non-governmental organisations.

By 2030, Vanuatu plans to achieve:

- transition to 100 per cent grid-connected renewables;
- improve transport energy efficiency by 10 per cent;
- increase biomass end-use by 14 per cent;
- change 10 per cent of public buses to e-buses;
- change 10 per cent of government fleet to e-cars; and
- build three new waste to energy plants, one new composting plant and 1,000 public and communal toilet facilities, including biotoilets.

From 2016 to 2019, Vanuatu has increased its population's access to electricity from 57.8 per cent to 64 per cent and has slightly decreased its energy intensity.

Policy takeaway: Vanuatu has been actively implementing renewable energy projects for electricity generation, including solar, wind, hydro, geothermal and coconut oil for biofuel.[78] Vanuatu's Coconut for Fuel Strategy is an essential contributor to achieving the NDC target and is the first step to be carried out.[79] Vanuatu is using domestically sourced coconut oil and transforming it into a fuel for electricity generation, replacing diesel in existing generators. This home-grown renewable resource has the advantage over variable renewable energy sources because it can be stored.[80]

5.5 Europe

5.5.1 United Kingdom

Challenges: renewable energy share.

Opportunities: offshore wind, carbon taxation.

- High-income country in Europe
- 2019 population of 67,886,000, population density of 279.1 persons/sq km, 16.6 per cent rural
- 2019 GDP per capita of US$41,855
- 2019 UN HDI rank of 13 and HDI value of 0.932

The UK is targeting to reduce its GHG emissions by at least 68 per cent by 2030, compared to 1990 levels. The sectors primarily affected are energy (including transport), industrial processes and product use, agriculture and land use, land use change and forestry (LULUCF) and waste.

The UK's climate change governance is under the Department for Business, Energy and Industrial Strategy which oversees climate and energy policy. The UK Climate Change Act (2008) provides a framework for the UK to achieve its climate change goals of reducing GHG emissions and building capacity to adapt and strengthen resilience to

climate risks. The Act established the Climate Change Committee as an independent, statutory body to advise the UK and devolved governments on emissions targets, report to Parliament on progress in reducing GHG emissions and prepare for and adapt to the impacts of climate change. Scotland, Wales and Northern Ireland have control over certain policy areas to deliver emissions reductions. The UK employs a range of institutional structures – at national, subnational and local level – to enable economy-wide emissions mitigation, as well as numerous policies and measures to underpin delivery.

The UK renewable electricity generation increased from 2.6 per cent of total electricity in 2000 to 41.0 per cent in 2020, with the 2020 total comprising 28.4 per cent from wind and solar, 12.6 per cent from other renewables and 2.2 per cent from hydropower.[81] In November 2020, the UK set out its 'Ten Point Plan' to address clean energy, buildings, technologies and transport with £12 billion to be invested.[82]

The UK has 100 per cent access to electricity and clean cooking and is modestly increasing its renewable energy share in its TFEC and decreasing its energy intensity.

Policy takeaway: the UK's investments in its renewable energy sector have made it the global leader in offshore wind generation. The cost of offshore wind energy has fallen by 50 per cent compared to 2015 levels; the UK has capitalised on this reduction and now generates half its renewable electricity through offshore wind. Its investments in offshore wind have resulted in it becoming the backbone of the UK's renewable energy sector, with ambitious plans for this transformative sector to generate tens of thousands of jobs.[83]

6. NDC Alignment with SDG7

SDG7 comprises five targets relating to:

7.1 Energy access

7.2 Renewable energy

7.3 Energy efficiency

7a Cooperation and investment

7b Infrastructure and technology

This chapter examines the alignment of each Commonwealth country's NDC with these SDG7 targets. Data were extracted from Climate Watch,[84] which analysed the countries' alignment to SDG7 by utilising information provided in the NDCs. The Climate Watch database is not dated, so the differences between 2022 and 2019 are either because of updates of revisions to NDCs or due to subjective interpretation by Climate Watch or by us.

The alignment assessments are also adjusted to exclude:

- Indicator 7.1 for countries which have 100 per cent electricity and clean cooking access
- Indicators 7.a and 7.b which are not applicable to developed countries.

Alignments for those indicators are not relevant and showing them as unaligned as in the 2019 version of this document may mislead. Indicators currently at 100 per cent are shown as N/A as there is no need for targets or mitigation strategies for these indicators. Also, these indicators are not included in the alignment percentage for the respective country, so these results differ somewhat from those in the 2019 version of this document.

6.1 Africa

Earlier analysis has shown that African CWCs in aggregate have the lowest energy access, both for electricity and clean cooking, and the highest energy intensities. This indicates the challenges they face in meeting the SDG7 and their climate change targets under the Paris Agreement. They have the highest share of renewable energy, which is positive but perhaps more reflective of the structures of their energy sectors and levels of development than indicative of progress towards the desired targets. The 95 per cent and 89 per cent alignments shown for Targets 7.2 and 7.3 in 2021 (Table 6.1) are positive and promising. The strength of alignment indicates commitment to achieving the goals associated with these indicators, although there remains a long way to go to achieve them.

Target 7.1 does not necessarily result in lower emissions, so it is not surprising to see lower alignment with this SDG7 target in their NDCs. Targets 7.a and 7.b relate to international support, which are areas African CWCs may have to rely on very strongly to reach their targets. These are also areas largely outside of their control, so perhaps that is why they are not given the same level of focus in the NDCs. International cooperation and investment, though minimally aligned, are imperative for African CWCs, as most of their strategies for achieving their targets are conditional on international financial support. While Target 7.a may be least mentioned in their NDCs, its presence may be stronger than shown by implication of the degree of conditionality in their NDCs. The published data for the Target 7.a.1 indicator measureofficial development assistance and all loans, grants and equity investments received by developing countries from foreign governments, multilateral agencies and development finance institutions.[85] They do not include investments by private investors, which will likely have to be the principal source of investments of the magnitude required, although they too are insufficient to date.

Rwanda is the only country with 100 per cent alignment in 2021, whereas Botswana and Mozambique have 0 per cent alignment (the former may be a result of missing data on Climate Watch).

6.2 Asia

Asian CWCs have 100 per cent alignment of their NDCs with SGD7 targets for 7.2 and 7.3 (Table 6.2). The alignment of energy access grew to 50 per cent, noting that four of the eight countries have 100 per cent access to electricity and most others are approaching 100 per cent clean-cooking access. The lagging country, Pakistan, does not have alignment on Target 7.1, and seeking that alignment would be a step in the right direction. The alignment of NDCs in Asia with Targets 7.a and 7.b

Table 6.1 NDC and SDG7 alignment of member countries, Africa

Commonwealth member country	7.1		7.2		7.3		7.a		7.b		Total (%)	
	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
Botswana											0	0
Cameroon	✓	✓	✓	✓	✓	✓			✓	✓	80	80
Eswatini	✓	✓	✓	✓	✓	✓					60	60
Gambia			✓	✓	✓	✓			✓	✓	60	60
Ghana	✓	✓	✓	✓	✓	✓					60	60
Kenya			✓	✓	✓	✓			✓	✓	60	60
Lesotho	✓	✓	✓	✓	✓	✓		✓	✓	✓	80	80
Malawi			✓	✓	✓	✓					40	40
Mauritius	✓	✓	✓	✓					✓	✓	60	60
Mozambique											0	0
Namibia			✓	✓	✓	✓					40	40
Nigeria	✓	✓	✓	✓	✓	✓			✓	✓	80	80
Rwanda	✓	✓	✓	✓	✓	✓		✓		✓	60	100
Seychelles	✓	✓	✓	✓	✓	✓			✓	✓	80	80
Sierra Leone	✓	✓	✓	✓	✓	✓					**60**	60
South Africa			✓	✓	✓	✓	✓	✓			60	60
Tanzania		✓	✓	✓	✓	✓	✓				60	60
Uganda	✓	✓	✓	✓	✓	✓			✓	✓	80	80
Zambia	✓	✓	✓	✓	✓	✓			✓	✓	80	80
Total (%)	58	63	95	95	89	89	11	16	47	53	60	63
Key		Very strong		Strong		Moderate		Weak		Very weak		

Source: Climate Watch NDC-SDG Linkages; authors' estimates.

Table 6.2 NDC and SDG7 alignment of member countries, Asia

Commonwealth member country	7.1		7.2		7.3		7.a		7.b		Total (%)	
	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
Bangladesh		✓	✓	✓	✓	✓			✓	✓	80	80
Brunei Darussalam	N/A	N/A	✓	✓	✓	✓					50	50
India	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	100	100
Malaysia	N/A	N/A	✓	✓	✓	✓					50	50
Maldives	N/A		N/A	✓	N/A	✓	N/A		N/A	✓	N/A	40
Pakistan			✓	✓	✓	✓					40	40
Singapore	N/A	N/A	✓	✓	✓	✓			✓	✓	80	80
Sri Lanka		N/A	✓	✓	✓	✓			✓	✓	60	75
Total (%)	25	50	100	100	100	100	14	13	57	63	66	64
Key		Very strong		Strong		Moderate		Weak		Very weak		

Source: Climate Watch NDC-SDG Linkages; authors' estimates.

are similar to those of Africa, and most Asian CWCs are also highly reliant on international support to achieve their SDG7 targets.

India is the only country to be fully aligned for all indicators. The average alignment in 2021 is slightly lower than in 2019 because 2021 includes Maldives as a new Commonwealth country with lower-than-average alignment.

6.3 The Caribbean and Americas

The NDCs of CWCs of the Caribbean and Americas region have 100 per cent alignment in 2021 with SDG7 Targets 7.2 and 7.3 (Table 6.3). Caribbean countries are generally highly dependent on petroleum products and currently have relatively low renewable energy shares. Their apparent focus on renewable energy is a welcome initiative. Most already have high access to electricity and clean cooking; not surprisingly, it has relatively low emphasis on Target 7.1. These countries will need international support to achieve their targets, which implies that greater alignment on Targets 7.a and 7.b would be desirable, but again that alignment may not be within their control.

Canada and Jamaica are the only countries in this region with 100 per cent alignment on relevant indicators.

6.4 Europe

The European CWCs have 100 per cent alignment on Targets 7.2 and 7.3, which are the areas they need to focus on to achieve the SDG7 and Paris Agreement targets. They already have 100 per cent access to energy and do not qualify for international assistance, so alignment on those targets is not relevant to these countries. European CWCs have 100 per cent alignment for the indicators relevant to them.

6.5 The Pacific

The NDCs of the CWCs of the Pacific have strong alignment with SDG7 Targets 7.2 and 7.3. Fiji, Papua New Guinea and Tuvalu's NDCs align with 7.a and

Table 6.3 NDC and SDG7 alignment of member countries, Caribbean and Americas

Commonwealth member country	7.1		7.2		7.3		7.a		7.b		Total (%)	
	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
Antigua and Barbuda	N/A	N/A	✓		✓						50	0
The Bahamas	N/A	N/A	✓	✓	✓	✓					50	50
Barbados	N/A	N/A	✓	✓		✓					25	50
Belize	✓	✓	✓	✓	✓	✓					60	60
Canada	N/A	N/A	✓	✓	✓	✓	N/A	N/A	N/A	N/A	100	10
Dominica	N/A	N/A	✓	✓	✓	✓					50	50
Grenada			✓	✓	✓	✓					40	40
Guyana	✓	✓	✓	✓	✓						60	60
Jamaica	N/A	N/A	✓	✓	✓	✓	✓	✓	✓	✓	100	100
St Kitts and Nevis	N/A	N/A	✓	✓	✓	✓			✓	✓	50	50
St Lucia	N/A	N/A	✓	✓	✓	✓			✓	✓	50	50
St Vincent and the Grenadines	N/A	N/A	✓	✓	✓	✓					50	50
Trinidad and Tobago	N/A	N/A	✓	✓	✓	✓					50	50
Total (%)	66	66	100	100	85	100	8	8	25	25	56	55
Key		Very strong		Strong		Moderate		Weak		Very weak		

Source: Climate Watch NDC-SDG Linkages; authors' estimates.

Table 6.4 NDC and SDG7 alignment of member countries, Europe

Commonwealth member country	7.1		7.2		7.3		7.a		7.b		Total (%)	
	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
Cyprus	N/A	N/A	✓	✓	✓	✓	N/A	N/A	N/A	N/A	100	100
Malta	N/A	N/A	✓	✓	✓	✓	N/A	N/A	N/A	N/A	100	100
United Kingdom	N/A	N/A	✓	✓	✓	✓	N/A	N/A	N/A	N/A	100	100
Total (%)			100	100	100	100					100	100
Key		Very strong		Strong		Moderate		Weak		Very weak		

Source: Climate Watch NDC-SDG Linkages; authors' estimates.

7.b with respect to cooperation and infrastructure; hence these countries have strong overall NDC SDG7 alignments (Table 6.5).

6.6 Alignment Issues Overview

Most Commonwealth regions and countries show good alignment of their NDCs with SDG7 Targets 7.2 and 7.3. This is not surprising as these are the targets where SDG7 itself is closely aligned with the Paris Agreement. The alignment of SDG7 Target 7.1 was lower, partly because energy access is not an explicit goal of the Paris Agreement, and therefore no obvious reason for it to appear in an NDC. Also, many CWCs already have 100 per cent or high access to electricity and clean cooking, so there is no need for them to align. A big gap exists regarding NDC alignment with SDG7 Targets 7.a and 7.b. Successful achievement of these targets is not within the control of the country submitting the NDC. Also, we believe alignments may be overstated in this analysis to the extent that many mitigation actions by developing countries are conditional on international financial support. This is a common feature of many developing country NDCs, and to date that support has not been forthcoming to the extent needed to meet the actions expressed on the NDCs.

Table 6.5 NDC and SDG7 alignment of member countries, Pacific

Commonwealth member country	7.1		7.2		7.3		7.a		7.b		Total (%)	
	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021	2019	2021
Australia	N/A	N/A	✓	✓	✓	✓	N/A	N/A	N/A	N/A	100	100
Fiji	N/A	N/A	✓	✓	✓	✓	✓	✓	✓	✓	100	100
Kiribati	✓	✓	✓	✓	✓	✓					60	60
Nauru	N/A	N/A	✓	✓	✓	✓					50	50
New Zealand	N/A	N/A	✓	✓	✓	✓	N/A	N/A	N/A	N/A	100	100
Papua New Guinea			✓	✓	✓	✓	✓	✓	✓	✓	40	80
Samoa	N/A	N/A	✓	✓							25	25
Solomon Islands			✓	✓	✓	✓					40	40
Tonga	N/A	N/A	✓	✓	✓	✓					80	80
Tuvalu	N/A	N/A	✓	✓	✓	✓	✓	✓	✓	✓	100	100
Vanuatu	✓	✓	✓	✓	✓	✓					60	60
Total (%)	33	33	100	100	91	91	18	27	18	27	68	71
Key		Very strong		Strong		Moderate		Weak		Very weak		

Source: Climate Watch NDC-SDG Linkages; authors' estimates.

7. Initiatives to Support Progress

Ambitious policy actions are needed to meet the goals of SDG7 and the Paris Agreement. The urgency of acting and getting the right policies in place has been reinforced by the recently published *Sixth Assessment Report* by the Intergovernmental Panel on Climate Change (IPCC).[86] Pathways that can be followed to achieve the Paris Agreement targets are set out by the IEA in its *Net Zero by 2050: A Roadmap for the Global Energy Sector*.[87] Generally, all countries of the world, including CWCs, have a long way to go to get on the pathways necessary to achieving these targets. The SDG goals are under a very tight deadline of reaching their goals by 2030, and also based on the IPCC report substantive progress is needed by 2030 if the world is to meet the Paris Agreement targets. High hopes and expectations for COP26 in Glasgow in November 2021 to accelerate progress towards the Paris Agreement goals were not fully realised.

An important and valuable initiative of the Commonwealth to support energy transition progress is the CSET agenda (Annex IV briefly describes the CSET agenda). The CSET agenda emerged as a key outcome of a pan-Commonwealth Sustainable Energy Forum held in 2019. The second forum under the CSET agenda was held in early May 2021 on the theme, 'Accelerating Action for Inclusive Energy Transitions'. This forum was anchored around technical papers on the three key pillars of the CSET agenda:[88]

1. Inclusive Energy Transition
2. Technology and Innovation in Sustainable Energy Transition
3. Enabling Frameworks for Energy Transition

The discussions of these technical papers at the forum provided an opportunity for member countries to share knowledge and explore opportunities for collaboration in accelerating sustainable energy transition policies and technologies across the Commonwealth.

The resources to support and accelerate progress in the achievement of SDG7 and commitments under the NDCs exist within the Commonwealth. Greater utilisation and adoption of these resources is needed for CWCs to achieve their targets.

Broader ranges of measures for addressing climate change are discussed in this chapter.

7.1 Policies and measures

Meeting the targets of SDG7 and the Paris Agreement needs government engagement and leadership. Most economic decisions and structures globally regarding use of resources rely on markets to set prices and guide investment decisions. Market discipline can provide good results when the market works, and the energy systems in place today – which have served us well in many respects – are mostly based on market-based decisions. Climate change is among the most urgent issues facing the world today and this issue arises because the atmosphere is a resource that is not subject to market discipline. No one owns the atmosphere, making it a common property resource, which means everyone can use it and no one has responsibility to manage it.

The unmitigated release of carbon emissions into the atmosphere from the reliance of our energy system on hydrocarbon fuels is now resulting in warming of the planet and presenting an existential threat to life as we know it. The inability of markets to guide environmentally acceptable energy system development decisions means governments must step in to provide the needed leadership and discipline to guide these decisions.

The resources and technologies needed for the sustainable energy transition to succeed are becoming increasingly economically viable and attractive, and these advances are largely the result of government leadership and policy support in the past. The urgency of actions needed means there is an ongoing need for government leadership and initiative. The NDCs described above are examples of policies and measures initiated by governments

to meet the targets of the Paris Agreement; but the current plans and policies, in aggregate, are not sufficient to meet these targets.

The market is often referred to as the 'invisible hand' guiding resource allocation decisions. Where the market does not work, the government is required to step in with the 'visible hand' of regulation and use its authority to incentivise or mandate the needed actions. The visible hand can take a number of forms.

7.1.1 Carbon pricing

Putting a price on carbon is adapting a market mechanism by government to achieve a policy goal. Carbon emissions and their effects on climate are negative externalities that arise from producing and consuming carbon-based fuels. An effective market would result in compensation by those who impose negative externalities to those who bear the burden of the negative externality; in this case, all global citizens share the burden as all are affected by the climate. Because the market does not put a price on carbon emissions to compensate for the negative externality, governments must step in to establish a carbon price which applies to carbon-based fuels. A carbon price is a government policy that emulates the market in order to correct for a market failure. A price on carbon provides a signal to consumers by increasing the price of carbon fuels commensurate with their carbon content. The higher price will discourage consumption of higher carbon fuels and encourage consumers to find cost-effective ways to reduce their emissions, including by switching to non-carbon fuels which become relatively cheaper. The carbon price signals to suppliers that the attractiveness of other energy sources has been enhanced, and also signals to technology developers to search for new technologies that rely less on carbon fuels.

There are alternative ways of imposing a carbon price. A carbon tax is generally expressed as $/tonne of the carbon emissions content of a quantity of fuel. The effect of a carbon tax on the fuel price is transparent and predictable, but its effect on reducing emissions is uncertain. An alternative carbon-pricing method is an ETS, also called cap-and-trade, which sets a limit on emissions for an economy or sector by granting or selling emissions credits to firms in the economy or a sector. The number of credits cap the total emissions level, and firms can buy or sell credits with other firms depending on their needs and alternatives, thereby setting a price on carbon. Both systems encourage consumers and firms to find alternative energy sources that produce less or contain less carbon. To increase the incentive to reduce emissions, the carbon tax needs to increase over time and the emissions credits need to decrease over time.

A carbon price corrects a market flaw. However, because it is imposed and administered by a government, it has the appearance of a tax, and is sometimes referred to as a Pigou tax in honour of the economist who was an early advocate for its use as a correction for a negative externality. To make it more politically palatable, carbon price revenues can be used in a number of different ways. A carbon price is often criticised as regressive, with a higher burden on low-income populations for whom energy usually represents a larger share of their budget. But there are ways this can be remedied. A portion of the carbon price revenues can be dedicated to providing income support for low-income populations, either by lowering personal income tax rates for low-income taxpayers or providing direct cash transfers to these persons. Its revenues can also be used to offset a range of other taxes to make it revenue neutral. A portion of the revenues can also be used to subsidise renewable energies and enhance a country's energy transition policies. All these ways of recycling carbon tax revenues have been adopted to varying degrees in various jurisdictions.

As we noted in Chapter 3, only five CWCs currently have carbon prices; another three have announced their intentions to implement a carbon price. We would strongly encourage CWCs to include carbon pricing as part of their NDC or climate change policy. Not only do few CWCs have carbon prices, but many also subsidise the production and/or consumption of carbon fuels.[89] Establishing a carbon price and eliminating subsidies on carbon fuels would provide significant revenues for governments to initiate sustainable energy transition actions.

7.1.2 Direct regulation

Carbon pricing is a regulatory instrument of government as it needs a legislative basis to authorise its implementation. Carbon-pricing policy directly uses market incentives for its implementation, so is generally viewed differently from other forms of regulation. Governments can

appeal to and encourage citizens to achieve the sustainable energy transition through responsible behaviour. While behavioural change is needed, its policies must ultimately include regulatory requirements as moral suasion will likely not be sufficient. A traditional definition of regulation is the imposition of rules and controls by governments which are designed to direct, restrict or change the economic behaviour of individuals and businesses and which are supported by penalties for non-compliance.[90]

While policy frameworks, policy statements and plans are important and valuable, they are simply the first step in a process that must ultimately be made binding through a framework of laws and regulations. The legal framework can set standards designed for energy efficiency, such as building codes, automobile fuel efficiency standards and appliance standards. They can extend to banning coal-fired electricity generation (as has been done in the UK[91] and Canada[92]), oil and gas exploration and development activities (New Zealand has banned new offshore oil and gas exploration,[93] which is where most of its reserves and production are located[94]) or internal combustion engines (India has announced the 'ambition' that by 2030 all vehicles sold in India be electric-powered;[95] the UK may ban new internal combustion engine vehicle sales by 2030;[96] Canada recently announced that by 2035 all new cars and light trucks sold must be zero emission[97]). Effective regulations must be accompanied by appropriate monitoring, enforcement and accountability systems.

Countries can have ambitious targets to meet the SDGs and their commitments under the Paris Agreement, but without being supported by appropriate regulatory authority and frameworks they are unlikely to succeed. Many organisations and countries tout energy efficiency as a key component of their climate change policy, but without being part of a broader regulatory framework there is little likelihood for energy efficiency to be an effective stand-alone policy tool.

7.1.3 Fiscal incentives

Governments generally play a large and important role in the economy, and their fiscal policies are important tools in stimulating and directing economic activities. This 'power of the purse' can influence the pace and direction of transition in a country's energy system. The tax system can implement a carbon price and also be used to offer incentives to energy transition investments, such as investment tax credits or accelerated write-offs. These have often been, and continue to be, used as incentives for fossil fuel investments and can also be used as energy transition incentives. Government expenditures can provide grants and subsidies for desired activities, such as installing solar PV systems, adding insulation to homes and buildings and purchasing EVs. Government can also invest in infrastructure to facilitate the energy transition, such as public transit, EV recharging stations and converting its own vehicle fleet to EVs.

Tax incentives and public expenditures do not come free and will compete with traditional government priorities of building schools, hospitals and roads; this is especially challenging in developing countries that are already fiscally constrained. The revenues from carbon pricing and eliminating carbon fuel subsidies can provide funds for these activities. The good news is that many energy transition technologies are now at or near economic viability. Market prices may be all the incentive needed, with little or no need for government intervention. The costs of solar and wind energy, battery electricity storage and EVs have fallen dramatically in recent decades and will continue to fall as those technologies continue to improve.

7.2 Technology and innovation

The rapid decrease in costs of solar and wind energy technologies over the past decade has resulted in them becoming the most economically attractive sources of energy in most countries of the world. The innovation has been highly successful, and the technologies are now available and economically viable with further continuous improvement anticipated. Adopting solar and wind for expanding a country's electricity-generating capacity are valuable steps and will greatly facilitate progress towards achieving the targets of SDG7 and the Paris Agreement. Apart from reducing emissions, stand-alone solar and wind energy allow remote populations access to electricity without needing access to the grid. These technologies can contribute to SDG Targets 7.1 and 7.2.

One energy source that has not been exploited in most CWCs is offshore wind. The Commonwealth has 25 SIDS members and most of its remaining members are coastal countries. Therefore, the lack of offshore wind energy is not because they lack

offshore access. Each of these countries should examine its potential for developing offshore wind energy, which could become an increasingly important source of renewable energy in many countries. The United Kingdom is a global leader in offshore wind, and its success in developing and utilising this resource can provide valuable lessons and insights to other CWCs on how to effectively utilise it.

Marine energy is obtained from the natural movements of oceans in tides and waves. It is not an established technology yet, and more innovation is required. Given the reliance of many SIDS CWCs on imports of carbon-based fuels, marine energy has high potential to benefit them and other coastal countries. Pilot projects as well as continuing research are underway in Canada's Bay of Fundy, which has a high marine energy potential for marine energy.[98] The UK also hosts the European Marine Energy Centre in Scotland, which is working on wave and tidal energy technologies.[99] The Commonwealth could provide a valuable forum for bringing its SIDS members together with researchers in Canada and Scotland to become informed about and potentially participate in this research, facilitate technology transfer and accelerate this technology development effort.

Another technology that is becoming more viable, and increasingly adopted in a number of jurisdictions, is batteries. Batteries store energy rather than produce it but are a valuable complement to variable renewable energy sources like solar and wind. Natural gas, the cleanest hydrocarbon fuel, has been a widely touted backup energy source for variable renewable energies; it does nevertheless produce carbon emissions. Batteries may now be poised to become the most economical backup source, serving as a peak energy source and with the added advantage of making off-grid electricity generation more reliable.[100] Batteries would allow many CWCs to transition more completely to clean energy technologies and help them to achieve their emissions reduction targets.

7.3 Bilateral and multilateral cooperation

Commonwealth member countries are working together bilaterally and multilaterally in various technical cooperation initiatives to source finance, transfer technology and build capacity to overcome barriers. They participate in the Commonwealth Sustainable Energy Forum, which meets biennially to encourage collaboration among Commonwealth member countries to accelerate action in the transition to sustainable energy systems, achieve the SDGs and implement their NDCs.

The NDC partnership allows members to better leverage and share their resources and expertise to implement their NDCs.[101] Membership has grown to over 100 members including 42 Commonwealth member countries; 16 of the 19 African Commonwealth member countries, four of the eight Asian Commonwealth member countries, 10 of the 13 Caribbean and Americas Commonwealth member countries, the United Kingdom independently, and Cyprus and Malta as part of the EU, and 8 of the 11 Pacific Commonwealth member countries.

The close relationship between CWCs countries in many aspects, including trade relationships, could allow it to become an ideal setting for a climate club. The concept of a climate club originated with Professor William Nordhaus at Yale University as an incentive-based structure for countries to pursue their climate change policies and applying pressure on countries that lag in implementing climate change policies.[102] Members would agree to adopt harmonised emissions reduction strategies (e.g. an agreed uniform price on carbon) and appropriate incentives, including border charges applied to carbon emissions of imports from countries underperforming in relation to the agreed standards. The benefit of belonging to the club would be the low tariffs and open borders on trade between members. In addition to being a catalyst among its members for increased trade and strengthened environmental policies, the climate club could invite non-CWCs to join the club to increase their trade with CWCs and broaden the scope of efforts to encourage accelerated energy transition and greater climate change amelioration in more countries. Establishing a climate club could provide CWCs with the potential to 'leap-frog' other nations in decarbonising their economies.

7.4 Renewable energy and climate finance

The IEA's roadmap to get to Net Zero by 2050[103] estimates that:

- US$90 billion of public funds will be required to complete a portfolio of demonstration projects by 2030, of which US$25 billion has been allocated to date;
- US$40 billion will be required annually for the next decade to reach 100 per cent access to electricity and clean cooking; and
- reaching net zero emissions will increase annual global energy investment from just over US$2 trillion on average over the last 5 years to almost US$5 trillion by 2030 and US$4.5 trillion by 2050.

Wood Mackenzie estimates that limiting global warming to 1.5°C would cost a minimum of US$50 trillion.[104] IRENA estimates the energy transition will need investments of US$60 trillion by 2030 and US$110 trillion by 2050.[105] All these sources indicate the investment needed for NDCs and SDG7 implementation is massive and clearly exceeds the capacity of public sector resources.

IRENA[106] reports that modest growth in renewable investment occurred in 2019, but still only one-third of what is needed to be on a path to meet the Paris Agreement targets. It noted that investment dropped by 34 per cent in the first half of 2020 with the onset of COVID-19. Investment in solar PV and onshore wind technologies represented over 75 per cent of renewable energy investments in recent years. Between 2013 and 2018, 86 per cent of renewable energy investments were by private sector investors. The 14 per cent of public-financed investments came mainly via development finance institutions. Regions dominated by developing and emerging economies remained consistently underrepresented, attracting only 15 per cent of the global total during this period. Decreasing costs, resulting from improvements in technology and the adaptation of procurement mechanisms to changing market conditions, have ramped up investment and capacity additions.

IRENA's recommended actions to mobilise additional investment for renewable energy are:

- setting ambitious renewable energy targets consistent with long-term national energy strategies to send a strong signal to investors and help attract additional capital;
- focusing limited public resources on attracting private capital through capacity building, support for pilot projects and new investment instruments such as green bonds, blended finance initiatives and tailored innovative financial instruments designed to replicate and scale up financing from the private sector;
- mobilising a greater share of institutional capital in renewables by
  - policy and regulatory solutions to support the overall growth and integration of renewables,
  - capital market solutions such as use of investment vehicles including project bonds, project funds and green bonds,
  - greater use of risk mitigation instruments, standardisation of processes and contractual agreements, aggregation of assets and blended finance transactions among providers of public capital and institutional investors, and
  - internal capacity building within institutional investors in the areas of financial and legal structuring, as well as in climate change impacts, regulations and renewable sector progress;
- promoting greater use of green bonds to attract institutional investors in the renewable energy sector and channel considerable additional private capital;
- enhancing the participation of non-energy-producing corporations by
  - setting up transparent systems for the certifying and tracking of renewable energy attributes,
  - allowing third-party sales between companies and independent power producers, and
  - creating incentives for utilities to provide green procurement options for companies (e.g. green labels and green tariffs); and
- scaling up financing for off-grid renewables which are key to ensuring universal energy access and just and inclusive economic development.

The Commonwealth has its own programme to assist small and vulnerable member countries to access finances for climate-related projects.[107] The Commonwealth Climate Finance Access Hub

(CCFAH) helps these countries unlock the available climate finance. While climate finance may be available to developing countries through a number of international initiatives, most of these countries have limited capacity to access these funds. The CCFAH provides support in:

- developing grant proposals and project pipelines;
- building human and institutional capacity;
- providing technical advisory services; and
- facilitating cross-Commonwealth cooperation and sharing of experiences and expertise by Commonwealth national climate finance advisers, who are deployed and embedded in relevant government ministry departments.

In addition to the general manager based in Mauritius, CCFAH currently has climate finance advisers deployed in 11 countries. As of March 2021, CCFAH has mobilised US$43.8 million finance for approved projects in six countries and currently has US$762.2 million in the pipeline for climate finance in 11 countries.

Much of the mitigation and emissions reduction strategies in the NDCs of CWCs are conditional on obtaining international support and assistance. The Commonwealth Secretariat has recently observed that financial resources to address climate change are becoming increasingly available. For effective deployment and maximum impact, this additional climate finance needs to be integrated into national policy, planning and budgetary systems. The Commonwealth Secretariat advocates that this be achieved through a comprehensive Climate Change Financing Framework, a process designed and promoted by the United Nations Development Programme (UNDP) to align national climate policy frameworks with budget processes and to integrate climate finance into existing public economic and financial management systems.[108]

8. Conclusions and the Way Forward

The World Bank's '*RISE 2020: Regulatory Indicators for Sustainable Energy: Sustaining the Momentum*' notes: 'Globally, steady progress was made on sustainable energy policy in 2017–2019, but the pace was slower than in the past.'[109] In particular, renewable energy shares and energy efficiency slowed, whereas electricity access and clean-cooking growth rates were maintained. It notes the countries that made the most substantial progress were concentrated in sub-Saharan Africa. However, it also notes a higher rate of growth than experienced from 2017 to 2019 will be required to meet the SDG7 goals by 2030. More aggressive policies are needed. These observations are all consistent with what is seen in this report in examining the transitions indicators for CWCs.

Sustainable Energy for All's (SEforALL) 2020 analysis of SDG7 progress[110] concludes the world is not on track to achieve SDG7 by 2030. SEforALL's poignant observations regarding SDG7 status in 2020 are:

- 'This is our reset moment. We can recover better' – the pandemic offers an opportunity for a green recovery.
- 'Electricity access is growing, but not for everyone' – progress on electrification is being made, especially in Asia; but Africa is stagnant.
- 'We can no longer ignore the crisis: a lack of clean cooking' – over a third of the world's population are unable to cook cleanly and safely; gains are being made in Asia, but in Africa the number of people gaining access to clean cooking is overwhelmed by population growth.
- 'The renewable energy opportunity is still to be fully realized' – renewable energy is growing but only at a moderate pace.
- 'Energy inefficiency is costing us' – progress is slow, and the rate of improvement is declining.

If the SDG7 and Paris Agreement targets are to be met, and a transition made to a carbon-neutral world by 2050, a more engaged commitment and more accelerated actions are needed.

The CHOGM scheduled for Kigali, Rwanda in June 2022 will give member countries the opportunity to:

- collectively assess progress towards these targets and identify priority areas where urgent action by members could accelerate progress towards achieving sustainable energy systems and combatting climate change;
- ensure that the energy transition to a low-carbon economy is happening in a just way (with equity, equality, fairness and justice);
- share experiences and identify best practices on country and regional progress in attaining the target indicators for SDG7 and its interlinkage with other SDGs, and discuss potential areas for cooperation among countries;
- review trends in CWCs for energy access, renewable energy and energy efficiency;
- explore the role of various partner organisations in the implementation of national and regional agendas; and
- discuss how challenges can be overcome, opportunities seized and optimal low-carbon pathways established for each member country.

The needed actions identified in the 2019 version of this report remain relevant and valid and are repeated below. In managing the energy transition, recognising that Commonwealth member countries have varying circumstances and that the following actions may not be practicable in all environments and countries, there is broad and general need for:

- strong political will and leadership that drives ambitious and long-term thinking and strategy;
- strong, stable and just energy and climate policy and legal frameworks, with carbon pricing and targets, to provide investment certainty and manage long-horizon risks that may not be priced efficiently by the markets;

- electrification with renewables, the elimination/reduction of fossil fuel subsidies and increasing the share of renewables in the energy mix;
- NDCs with investment pipelines of costed actions (and estimates of net employment creation) so development partners, financial institutions and investors can more easily assess the opportunities and provide finance, technology transfer and capacity assistance;
- increased access to large sources of finance and investment (grants, concessional loans, guarantees, green/climate bonds, etc.), technology transfer and capacity for cleaner energy investment;
- aligning energy policy and investments in energy efficiency and cleaner energy technologies that utilise best practice engineering and environmental and ethical standards with the SDG targets and Paris Agreement 1.5°C NDCs;
- bilateral and multilateral cooperation that shares experiences, transfers technology and capacity and improves partnerships (e.g. South–South cooperation, the Commonwealth's CCFAH);
- greater alignment in planning, managing and monitoring, reporting and verification of the SDGs and NDCs to the 1.5°C climate change target and sustainable development agendas in Commonwealth member countries (especially Africa, the Caribbean and Americas, and the Pacific) to ensure integration of the NDCs and SDGs into a single national budgeting and planning process, and to ensure more efficient use of resources, avoid overlap and duplication and achieve greater progress.

Endnotes

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Appendix A: CHOGM 2018 Communiqué

Parts of the CHOGM 2018 communiqué 'Towards a Common Future' relating to energy (and climate change) included:

'19. ... Heads emphasised that improved access to reliable and affordable energy will create an enabling investment environment for successful industrialisation.'

'24. Heads expressed grave concern that without urgent action to mitigate climate change, reduce vulnerability and increase resilience, the impacts of climate change could push an additional 100 million people into poverty by 2030. Heads recognised that temperature and sea level rise and other adverse impacts of climate change are a significant reality and risk to many of the Commonwealth's most vulnerable member countries. They renewed their commitment under the Paris Agreement to keep the increase in global average temperature to well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels. Heads welcomed the ratification by all member countries of the Paris Agreement and encouraged member countries that have not yet done so to consider ratifying and implementing the Kigali Amendment to the Montreal Protocol and the Doha Amendment for parties to the Kyoto Protocol. Heads record the commitments made to the Green Climate Fund and encourage member countries to fulfil them.'

'25. Recalling the 2015 Commonwealth Leaders' Statement on Climate Action, Heads expressed their resolve to build on this work, and collectively agreed to engage with the Fiji and Poland-led Talanoa Dialogue. They expressed their determination that the Paris Agreement work programme be completed at COP24. They expressed their support for the global approach led by the International Civil Aviation Organisation and International Maritime Organisation in addressing greenhouse gas emissions from international aviation and shipping respectively, consistent with the goals of the Paris Agreement. They agreed that mechanisms need to be established to promote enhanced participation, particularly of young people, in climate policy implementation frameworks at all levels, including the Paris Agreement.'

'26. Heads expressed support for a range of innovative financing solutions, both public and private, and including disaster risk insurance, to enhance adaptive capacity and boost resilience, noting the importance of the Commonwealth Climate Finance Access Hub, among others, in supporting member countries.'

'30. Heads committed to work together for the prudent and sustainable use of energy and natural resources and recognised the critical importance of sustainable energy to economic development. They agreed to share best practice in effectively developing, governing and managing natural resources on the basis of sustainability, equity, transparency, good governance and wealth creation, including via the Commonwealth Secretariat's ongoing programme of technical assistance on natural resource management.'

'31. Recognising the imperative to transition to clean forms of energy in view of Article 4.1 of the Paris Agreement and the untapped potential of solar, wind, and other renewable energy sources to promote sustainable economic growth, Heads encouraged co-operation among member countries, and partnerships with relevant organisations, including the International Solar Alliance of 121 solar resource rich countries...'.[111]

Appendix B: SDG7 Comparison Table

Commonwealth member country	Target 7.1.1 electricity access (%)		Target 7.1.2 clean cooking (%)		Target 7.2.1 renewable energy (%TFEC)		Target 7.3.1 energy intensity (MJ/US$)		Target 7.a.1 international financial flows (10^6 US$)		Target 7.b.1 renewable energy (capacity/capita)	
	2016	2020	2016	2020	2015	2019	2015	2019	2015	2019	2016	2020
Antigua and Barbuda	100	100	>95	>95	0	1	4	3			74	336
Australia	100	100	>95	>95	9	10	5	4				
The Bahamas	100	100	>95	>95	2	1	2	3		18	8	11
Bangladesh	76	96	19	25	32	25	3	2	2	13	5	6
Barbados	100	100	>95	>95	3	4	4	4	3	0	140	348
Belize	93	97	83	82	30	29	6	6		24	556	517
Botswana	64	72	62	65	26	26	3	3	13	7	3	5
Brunei Darussalam	100	100	>95	>95	0	0	4	6	3	0	6	6
Cameroon	60	65	22	22	78	79	5	4	6	29	62	60
Canada	100	100	>95	>95	23	22	7	7	1,798	1,573		
Cyprus	100	100	>95	>95	11	12	3	3	176	0		
Dominica	100	100	89	89	9	8	3	3	1,092	332	208	198
Eswatini	63	80	49	55	72	66	5	5			303	291
Fiji	97	100	42	51	33	26	2	2	0	27	447	473
The Gambia	56	62	<5	<5	49	49	3	3	127	203	3	3
Ghana	79	86	22	22	44	42	3	3	0	0	114	109
Grenada	92	94	91	89	11	10	2	3	12	8	41	60
Guyana	89	93	75	81	25	11	4	4			120	135
India	89	99	51	68	33	33	5	4	19	15	136	195
Jamaica	97	100	85	83	12	9	4	4	19	377	130	171
Kenya	53	71	13	19	72	68	6	5		0	66	81
Kiribati	93	92	6	10	46	41	6	6	17	22	51	48
Lesotho	35	47	37	40	45	39	8	8			72	70
Malawi	11	15	<5	<5	81	73	3	3	93	2,345	44	43

Commonwealth member country	Target 7.1.1 electricity access (%)		Target 7.1.2 clean cooking (%)		Target 7.2.1 renewable energy (%TFEC)		Target 7.3.1 energy intensity (MJ/US$)		Target 7.a.1 international financial flows (10^6 US$)		Target 7.b.1 renewable energy (capacity/capita)	
	2016	2020	2016	2020	2015	2019	2015	2019	2015	2019	2016	2020
Malaysia	100	100	>95	>95	3	5	5	4	2,465	606	519	538
Maldives	100	100	>95	>95	1	1	2	3	17	0	35	62
Malta	100	100	>95	>95	6	8	2	1		3		
Mauritius	99	100	>95	>95	11	9	2	2			310	396
Mozambique	26	31	<5	5	81	78	13	12	0		159	148
Namibia	50	56	45	47	29	31	3	4			325	395
Nauru	100	100	>95	>95	0	1	5	5	0		136	359
New Zealand	100	100	>95	>95	31	30	4	4	0			
Nigeria	59	55	7	15	82	81	6	6		0	23	21
Pakistan	72	75	43	49	46	43	5	5			86	112
Papua New Guinea	49	60	9	9	55	53	5	5	14	93	81	75
Rwanda	29	47	<5	<5	86	78	5	4	1,451	328	20	22
St Kitts and Nevis	100	100	>95	>95	2	2	3	3	1	0	160	156
St Lucia	98	100	>95	94	12	10	3	3	74	11	9	42
St Vincent and the Grenadines	100	100	>95	94	4	6	3	2	28	5	125	135
Samoa	100	100	32	36	37	34	4	4			171	284
Seychelles	100	100	>95	>95	1	1	3	3	17	12	166	199
Sierra Leone	20	26	<5	<5	75	75	6	5	1,043	133	25	25
Singapore	100	100	>95	>95	1	1	3	3			109	187
Solomon Islands	58	73	9	9	49	48	5	4	15	0	11	11
South Africa	84	84	84	87	10	11	8	8	3,582	157	165	325
Sri Lanka	98	100	27	32	53	50	2	2			186	220
Tanzania	33	40	<5	<5	85	85	7	6			40	52
Tonga	97	100	75	84	2	2	3	3		18	68	147

Commonwealth member country	Target 7.1.1 electricity access (%)		Target 7.1.2 clean cooking (%)		Target 7.2.1 renewable energy (%TFEC)		Target 7.3.1 energy intensity (MJ/US$)		Target 7.a.1 international financial flows (10^6 US$)		Target 7.b.1 renewable energy (capacity/capita)	
	2016	2020	2016	2020	2015	2019	2015	2019	2015	2019	2016	2020
Trinidad and Tobago	100	100	>95	>95	0	0	20	20	2	13	5	4
Tuvalu	97	100	66	71	4	8	3	3	3	0	396	392
Uganda	27	42	<5	<5	91	90	10	10		24	25	23
United Kingdom	100	100	>95	>95	9	12	3	2	13	7		
Vanuatu	58	67	9	8	36	32	4	4	3	0	67	76
Zambia	35	45	13	10	83	85	7	7	6	29	297	276
Average (total 7.a.1)	78.5	82.8	58.6	60.3	32.1	30.7	4.7	4.6	12.123	6,702	131.4	163.5

Source: UN Statistics Division SDG Indicators Database.

Appendix C. Commonwealth Renewable Energy Support Policies

COUNTRY	Renewable energy targets	Renewable energy in NDC	REGULATORY POLICIES							FISCAL INCENTIVES AND PUBLIC FINANCING			
			Feed-in tariff/premium payment	Electric utility quota/obligation / Renewable portfolio standard	Net metering/billing	Biofuel blend, renewable transport obligation/mandate	Heat obligation/mandate	Tradable Renewable Electricity Certificate	Tendering	Reductions in sales, energy, CO_2, VAT or other taxes	Investment or production tax credits	Energy production payment	Public investment, loans, grants, capital subsidies or rebates
Africa													
Botswana	**P**	**O**				**N**			**O,O***	**O**			**O**
Cameroon	**P**	**O**								**O**			
Eswatini	**P**	**O**							**O**				
The Gambia	**E, P**	**O**							**O**	**O**			
Ghana	**P**	**O**	**O**	**O**	**O**	**O**		**O**	**O**	**O**			**O**
Kenya	**E, P, HC**	**O**	**O**		**O**				**O**	**O**		**O**	**O**
Lesotho	**P**	○			○				○	N	○	○	○
Malawi	**E, P, HC**	**O**				**O**	**O**		**O**	**O**			**O**
Mauritius	**P**	**O**			**O**				**O**	**O**			**O**[2]
Mozambique	**P, HC, T**	**O**				**O**			**O***	**O**			**O**

COUNTRY	Renewable energy targets	Renewable energy in NDC	REGULATORY POLICIES							FISCAL INCENTIVES AND PUBLIC FINANCING			
			Feed-in tariff/premium payment	Electric utility quota/obligation /Renewable portfolio standard	Net metering/billing	Biofuel blend, renewable transport obligation/mandate	Heat obligation/mandate	Tradable Renewable Electricity Certificate	Tendering	Reductions in sales, energy, CO_2, VAT or other taxes	Investment or production tax credits	Energy production payment	Public investment, loans, grants, capital subsidies or rebates
Namibia	**P**	**O**					**O**						
Nigeria	**P(N)**	**O**	**O**	**O**					**O**	**O**			**O**
Rwanda	**E**	**O**	**O**						**O**	**O**	**O**		**O**
Seychelles	**E, P**	**O**			**O**				**O**	**O**	**O**		**O**
Sierra Leone	**P, HC**	**O**											
South Africa	**P**	**O**		**O**		**O**	**O**		**O**	**O**			**O**[2]
Tanzania	**E, P**	**O**	**O**		**O**				**O**	**O**		**O**	**O**
Uganda	**p**	**O**	**O**						**O**	**R***			**O**
Zambia		**O**			**N**	**O**			**O,O***	**O**			**O**
Asia													
Bangladesh	**E, P(N)**	**O**							**O**	**O**			**O,N**
Brunei Darussalam	**E**	**O**											
India	**E, P, P*, HC, T**	**O**	**O***	**O**	**O*,N**	**O**		**O**	**O,O*, o***	**O**	**O**	**O, O***	**O**[2], **N**[3]
Malaysia	**P, HC(O), T(O)**	**O**	**O**	**O**	**R**	**O**			**O**	**O**			**O**
Maldives	**E, P(O)**	**O**	**O**						**O**				
Pakistan	**E, P(N)**	**O**	**O**		**O**			**P**		**P**			**P**

Singapore	**P(O)**	**O**			**O**				**O**				**O**
Sri Lanka	**P(N), T(O)**	**O**	**O**	**O**	**O**	**O**			**O**	**O**		**O**	**O**
Caribbean & Americas													
Antigua & Barbuda	**E, P**	**O**											
Bahamas	**E, P**	**O**											
Barbados[1]	**E, P**	**O**			**O**					**O**			**O**
Belize	**P**	**O**							**O**				
Canada	**P***	**O**	**O***	**O***	**O***	**O, O* R***		**R**	**O***	**O**[2],**R**	**O**[2]		**O, R**[2,3]**, N***[7]
Dominica		**O**											
Grenada	**P**	**O**			**O**					**O**			
Guyana	**P**	**O**								**O**			
Jamaica	**P**	**O**			**O**	**O**			**O,O***	**O**	**O**		
St Kitts and Nevis		**O**											
St Lucia	**P**	**O**			**O**					**O**			
St Vincent and Grenadines[1]	**P(O)**	**O**			**O**								
Trinidad and Tobago	**P**	**O**								**O**	**O**		
Europe													
Cyprus	**E, P(O), HC(O), T**	**O**	**O**		**O**	**R**			**O**	**O**			**O**[2]
Malta	**E, P(O), HC(O), T**	**O**	**O**		**O**	**R**			**O**	**O**			**O**[2]
United Kingdom	**E(O), P(N), P*(O), T(N), HC(O)**	**O**	**O***	**O**		**R**	**O**[5]	**O**	**O,O***	**O**		**O**	**O**[2],**R**[3]**, N,N***
Pacific													
Australia	**P, P*, N, T***	**O**	**O***	**O**	**O***	**O***	**O**	**O**	**O, O***				**O,R**[2]**, R***

COUNTRY	Renewable energy targets	Renewable energy in NDC	REGULATORY POLICIES							FISCAL INCENTIVES AND PUBLIC FINANCING			
			Feed-in tariff/premium payment	Electric utility quota/obligation /Renewable portfolio standard	Net metering/billing	Biofuel blend, renewable transport obligation/mandate	Heat obligation/mandate	Tradable Renewable Electricity Certificate	Tendering	Reductions in sales, energy, CO_2, VAT or other taxes	Investment or production tax credits	Energy production payment	Public investment, loans, grants, capital subsidies or rebates
Fiji	**E, P**	**O**								**O**	**O**		
Kiribati	**E, P**	**O**											
Nauru		**O**											
New Zealand	**P**	**O**			**O***	**O**				**R**			**O**
Papua New Guinea	**E, P**	**O**											
Samoa	**E**	**O**											
Solomon Islands	**E, P**	**O**											
Tonga	**P**	**O**							**O**				
Tuvalu	**E, P(O)**	**O**											
Vanuatu	**E, P**	**O**	**O**							**O**			

Targets	Policies	
E Energy (final or primary)	**N** New (one or more policies of this type)	**O** Existing national policy or tender framework (could include sub-national)
P **Power**	**N*** New sub-national	**O*** Existing sub-national policy or tender framework (but no national)
HC **Heating or cooling**	**R** Revised (from previously existing	**o** National tender held in 2020
T **Transport**	**R*** Revised sub-national	**o*** Sub-national tender held in 2020
*** Indicates sub-national target**	**(O)** Removed	
(R) **Revised**		
(N) **New**		
(**O**) **Removed or came to term**		
+ Renewable energy not included in NDC		

[1] Certain Caribbean countries have adopted hybrid net metering and feed-in policies whereby residential consumers can offset power while commercial consumers are obligated to feed 100 per cent of the power generated into the grid. These policies are defined as net metering for the purposes of the Global Status Report.
[2] Includes renewable heating and/or cooling technologies.
[3] Includes aviation, maritime or rail transport.
[4] Heat feed-in policies (tariffs and premiums).
[5] Fossil fuel heating ban.
Source: Reproduced from the REN21 Renewables 2021 Global Status Report (Table 6)[112]

Appendix D: The Commonwealth Sustainable Energy Transition Agenda

The CSET agenda is a platform for collaborative action among member countries to accelerate energy transition to low-carbon energy systems and achieve SDG7.

It builds on the recognition by heads of government at CHOGM 2018 of the critical importance of sustainable energy to economic development and the imperative to transition to cleaner forms of energy. This imperative is heightened in the light of commitments made by Commonwealth governments under the Paris Agreement and more generally pursuant to the global climate agenda.

The CSET agenda emerged from the agreed outcomes of the inaugural pan-Commonwealth Sustainable Energy Forum held in London in June 2019 and it is anchored on three key pillars:

a. Inclusive transitions – advocating and building consensus on equitable and inclusive measures for energy transitions that recognise and address in a meaningful way the impact on economies, communities and industries and advance a transition that leaves no one behind.

b. Technology and innovation – propagating advances in clean energy technology and innovation, leveraging synergies and fostering strong partnerships between the public and private sector.

c. Enabling frameworks – supporting the development of enabling frameworks including policy, laws, regulations, standards, governance institutions and implementation tools for accelerating energy transitions.

The CSET agenda's activities are delivered through four strategies:

- research and studies,
- action groups,
- forums and roundtables, and
- technical assistance.

Member countries are encouraged to step forward to lead action groups under the three pillars to drive collaborative actions among Commonwealth member countries towards accelerating energy transitions and achieving the SDG7. Two action groups are planned for launch at the CHOGM 2022. An action group on Energy Literacy and another one on Geothermal.

A second Commonwealth Sustainable Energy Forum was held by webinar in May 2021 on the theme 'Accelerating Action for Inclusive Energy Transitions'. This forum was anchored around technical papers on the three key pillars of the CSET agenda. It also provided an opportunity for member countries to share knowledge and explore opportunities for collaboration in accelerating inclusive sustainable energy transition across the Commonwealth. It also sought to inspire member countries with new possibilities and perspectives to accelerate implementation of their NDCs under the Paris Agreement and their strategies for achievement of SDG7.

The Commonwealth Secretariat has also published a series of children's books that present the concepts of sustainable and inclusive energy in a digestible and engaging format and encourage young readers to find out how they can be part of the change in the way the world produces and uses energy. Targeted at readers aged 7–12 years old, the books are available for distribution in Commonwealth member countries.

The Commonwealth Secretariat under the CSET agenda and SEforALL has developed a Toolkit for producing business cases for the clean energy investment for power sector in SIDSs. Already, Seychelles and Barbados have developed their

business cases using the Toolkit and showcased them at investment roundtables jointly organised by the Commonwealth Secretariat and SEforALL.

Collaborative partnerships with development partners have been developed under the CSET agenda with the International Solar Alliance, Bloomberg NEF, the International Hydropower Association and Ashden to help member countries advance their SDG7 and climate change goals.

Appendix E: NDC Targets and Selected Actions

Table E1. Updated NDCs, African Commonwealth countries

Country	First NDC targets	Second/updated NDC targets	Selected actions and measures	Mitigation costs
Botswana	Reduce emissions by 15% by 2030, against 2010 base year	Not provided		
Cameroon	32% reduction compared to 2010 by 2035 (conditional)	12% unconditional GHGemissions reduction target and additional 23% conditional reduction of BAUby 2030	Increase non-hydro renewable electricity to 25%; landfills all major cities with at least 70% methane capture; establish regional composting units with capacity 50–100 tons/ day; protect 3,299,000 ha of forest; establish 600 MW hydroelectric power plants; install 400 MW solar power plants; install 50,000 solar street lights in localities with limited or no grid access; substitute 5% of fossil fuel vehicles by EVs by 2030; install 20 million compact fluorescent bulbs and 20 million light-emitting diode (LED) bulbs; reduce industrial energy consumption by 15%; substitute 10% of wood by biogas in large farms, rural farms and households; distribute 500,000 improved cookstoves	US$25.78 billion
Eswatini	0.97 $MtCO_2e$ reduction from 2010 level, conditional on appropriate financial, technical assistance and capacity-building support	GHG emissions reduction of 5% by 2030 compared to baseline scenario; 14% reduction with external financing (1.04 $MtCO_2e$) reduction in 2030 compared to baseline scenario	Increasing renewable energy share of electricity mix to 50% by 2030 relative to 2010 levels through adoption of solar, wind, biomass, hydro and solar water heater technologies; 100% access to clean modern energy for cooking at household level by 2030; 50% uptake of energy efficient biomass stoves for cooking by 2030; introducing 10% ethanol blend in petrol by 2030; increasing composting, capturing 30% of organic waste generated by 2030; introducing landfill gas recovery in solid waste disposal sites; freeze hydrofluorocarbon (HFC) production and use in 2024; reducing land degradation through restoration including planting ten million trees and improving livelihoods through better livestock management	Estimated total cost of implementing NDC is US$950 million to US$1.5 billion

(Continued)

Table E1. Updated NDCs, African Commonwealth countries (*Continued*)

Country	First NDC targets	Second/updated NDC targets	Selected actions and measures	Mitigation costs
The Gambia	Targets did not include all emission sources	Unconditional GHG emissions reduction from 2030 BAU of 2.6%, conditional reduction of 47.2%; aspires to reach net zero emissions by 2050	NDC1 identified ten mitigation options; NDC2 revises and strengthens those and 13 additional mitigation measures; replacing diesel mini-grids with solar and wind mini-grids and solar-powered street lights; developing energy efficiency measures; incentivising energy-saving LEDs; expanding off-grid solar home systems; capturing biogas from waste and landfills; implementing climate smart agriculture and improving livestock productivity; expanding deployment of fuel-efficient biomass stoves	Not provided
Ghana	Unconditionally reduce GHG emissions by 15% (11.1 $MtCO_2e$) relative to 2030 BAU; additional 30% reduction conditional on external support	Emissions reductions of 64 $MtCO_2e$ from 2030 BAU; unconditional measures reduce 24.6 $MtCO_2e$ emissions; conditional measures reduce 39.4 $MtCO_2e$ emissions	Actions include 34 mitigation policy measures; expansion of intercity and intracity transportation modes; promotion of energy efficiency in homes, industry and commerce; low carbon electricity generation; expanded adoption of cleaner cooking solutions; promote sustainable charcoal production; promote clean rural households' lighting	US$9.3–US$15.5 billion for mitigation and adaptation to 2030; US$3.9 billion for unconditional, US$5.4 billion for conditional
Kenya	30% reduction from 2030 BAU, fully conditional on international support	32% reduction of 2030 BAU emissions (143 $MtCO_2e$)	Increase renewables in electricity generation mix of the national grid; enhance energy and resource efficiency; progress towards a tree cover of at least 10% of land area of Kenya; enhance REDD+ activities; clean, efficient and sustainable energy technologies to reduce overreliance on fossil and non-sustainable biomass fuels; low-carbon and efficient transportation systems; climate smart agriculture with emphasis on efficient livestock management systems; sustainable waste management systems	US$17.7 billion for mitigation to 2030, 21% from domestic sources, 79% from international sources

Lesotho	Reduce GHG emissions by 10% of 2030 BAU; by 35% with international support	Not provided		
Malawi		Emissions reduction of 51% (17.7 $MtCO_2e$) from 2040 BAU; 6% unconditional, additional 45% conditional on international support and funding	Displacement of GHG emissions from coal-fired, diesel and heavy fuel oil generation; installation of small solar systems for domestic heating and lanterns; grid-connected large-scale solar PV and wind power; efficient charcoal production; install high-efficiency super-ultracritical coal plant; deployment of carbon capture to subcritical coal power stations; modal shifts – private to passenger transport and road to rail; increasing ethanol blending with gasoline and biodiesel with diesel as transportation fuels; improved charcoal cookstoves; use of efficient barns for tobacco curing; conservation tillage within commercial crop farming; increased use of rice husk ash in blended cement; landfill gas utilisation; installation of waste-to-energy incinerators; wastewater treatment and reuse; improved rice-management practices and livestock husbandry; afforestation	US$11.55 billion from 2020 to 2030, 31.3% from domestic and 68.7% from international sources
Mauritius	Reduce emissions by 30% relative to 2030 BAU	Reduce emissions by 40% relative to 2030 BAU	60% of energy needs from green sources by 2030; phasing out use of coal by 2030; increasing energy efficiency by 10% based on 2019; extension of the light rail network to modernise and upscale the public transport system by 2022; phasing out of subsidies and incentives for diesel buses and increase subsidy for EVs; divert 70% of waste from the landfill by 2030 through composting plants, sorting units, biogas plants and waste-to-energy plants; employing anaerobic digestion; banning of non-inverter air-conditioners in 2024; 10% emissions reduction of HFCs by 2030 compared to BAU; setting up of biogas pilot units; adopting smart agricultural practices including natural farming systems and agro-forestry; promotion of efficient irrigation techniques; massive planting of trees	US$2 billion

(Continued)

Table E1. Updated NDCs, African Commonwealth countries (*Continued*)

Country	First NDC targets	Second/updated NDC targets	Selected actions and measures	Mitigation costs
Mozambique		Reduce emissions by about 40 $MtCO_2e$ between 2020 and 2025 from BAU	Installing 50,000 photovoltaic or wind turbine lighting systems and 5,000 solar PV systems for pumping water for domestic, community or public use; replacing 2.5 million incandescent lamps with efficient lamps; importing 150 compressed natural gas (CNG) buses, converting 1,000 cars to CNG; applying and expanding agricultural production techniques to conserve and protect soil, such as direct planting; installing solid waste recycling industries	US$7.586 billion
Namibia	Reduce 89% of BAU emissions by 2029	Reduce 91% of BAU emissions by 2030, 14% under limited domestic and international support and 77% with substantial international support	Renewable energy feed-in tariff will allow 170 MW of PV; 45 MW solar rooftop systems; 40 MW wind power generation; 40 MW biomass energy plant; 600 MW hydropower generation; 40,000 solar water heaters; passenger vehicle fuel efficiency standards in 80% of total vehicles; 10,000 EVs; replace 23% clinker in cement production; switch air conditioning and refrigeration to propane; reduce deforestation rate by 75% and reforest 20,000 ha per year; transform 70% municipal solid waste to electricity and compost; methane net zero emissions by 2050 (achieve 75% of the target by 2030)	US$3.61 billion by 2030; US$0.36 billion for unconditional and US$3.25 for conditional measures
Nigeria	Unconditionally reduce emissions by 20% below 2030 BAU levels, 45% reduction conditional on international support	Unconditionally reduce emissions by 20% below 2030 BAU levels, 47% reduction conditional on international support	Eliminate kerosene lighting by 2030; 10,000 additional buses by 2030 and expansion of bus rapid transit in Lagos; 50% reduction in burning of crop residues by 2030; 25% of trucks and buses using CNG by 2030; eliminate diesel and gasoline electricity generation by 2030; eliminate gas flaring by 2030 and 60% reduction in fugitive methane emissions by 2031; 25+ million households convert to liquefied petroleum gas (LPG) for cooking and 7+ million improved cookstoves; reduced fuelwood harvest and extensive forest restoration; air conditioning minimum standards and labelling	US$177 billion

Rwanda	Quantitative targets established for different sectors, but no aggregate target provided	Unconditional reduction in GHG emissions of 16% relative to 2030 BAU (1.9 million tCO_2e); additional conditional reduction in GHG emissions of 22% relative to 2030 BAU (2.7 million tCO_2e) based on international support and funding	Agriculture accounts for 49% of mitigation potential; soil conservation measures – terracing, conservation tillage, multi-cropping and crop rotation – account for half of sector's mitigation potential, and remainder from reduced enteric fermentation emissions from livestock, including new species to replace local herds and improved husbandry, use of windrow composting; within energy use, large- and small-scale new generation hydropower represents the largest share of GHG potential, followed by use of solar energy for water heating, pumping for agricultural irrigation and off-grid electricity; EVs and vehicle fuel economy standards also significant; within waste, measures include landfill gas recovery (LGR) and direct waste-to-energy plants	Estimated cost of US$2.10 billion for conditional mitigation measures and additional US$3.67 billion for unconditional mitigation measures
Seychelles	Reduce GHG emissions by 21.4% (122.5 $ktCO_2e$) in 2025 and 29.0% (188 $ktCO_2e$) in 2030 relative to baseline emissions	Reduce GHG emissions by 26.4% (293.8 $ktCO_2e$) compared to 2030 BAU; commitment to achieve a net-zero emissions economy by 2050	Electricity target is 15% renewables in 2030; implement early action to reduce HFCs and introduce climate-friendly alternatives; minimum energy performance standards and labels introduced to increase the energy efficiency of appliances; adopt building codes for low-carbon, low-tech, passive, bioclimatic, self-reliant construction techniques; electrify vehicles fleet with priority for public transportation, collective, high-passenger load, duty and commercial vehicles; methane collection from landfills	US$331.5 million
Sierra Leone	Maintain emission levels relatively low (close to the world average of 7.58 $MtCO_2e$) by 2035 or neutral by 2050	Reduce GHG emissions by 10% by 2030 as compared to BAU, with an intermediary target of 5% by 2025; reduce GHG emissions by 25% in 2050 with the inclusion of additional sectors and gases; committed to enhance its mitigation efforts with financial support	Unconditional measures include planting five million trees over next five years, promoting transition to off-grid renewable energy systems, setting quality standards for energy efficiency, increasing access to environmentally sound waste management infrastructure, testing vehicle emissions, improving road infrastructure; conditional measures include feed-in tariff for renewable energy technologies, phasing out fossil fuel subsidies, converting to no-tillage agricultural practices, reducing methane emissions from wastewater and providing a nutrient-rich digestate that can be used as a fertiliser, incineration facilities to reduce methane emissions from landfill sites, investment in reuse and recycling technology, e-mobility and mass transport initiatives, new REDD+ and blue carbon initiatives	Not provided

(Continued)

Table E1. Updated NDCs, African Commonwealth countries (*Continued*)

Country	First NDC targets	Second/updated NDC targets	Selected actions and measures	Mitigation costs
South Africa	2030 annual emissions will range between 398 and 614 $MtCO_2e$	2025 annual GHG emissions will range from 398 to 510 $MtCO_2e$ and 2030 annual GHG emissions will range from 350 to 420 $MtCO_2e$	Key to increased level of mitigation is electricity sector and shift from coal; invest in energy efficiency, a range of green transport measures including EVs and hybrid vehicles, mode shifting and the enhanced provision of safe and affordable public transport; long and deep transformations (e.g. producing green steel) require international cooperation and support	Not provided
Tanzania	GHG emissions reduction between 10% and 20% by 2030 relative to BAU	GHG emissions reduction between 30% and 35% by 2030 relative to BAU	Promoting clean technologies for power generation using renewable sources such as geothermal, wind, hydro, solar and bioenergy; promoting climate smart rural electrification, including development of micro and mini-grid renewable generation; reducing consumption of charcoal by affordable alternative energy sources; promoting low-emission transport systems through deployment of mass rapid transport system and investments in rail, maritime and road infrastructures; promote forest landscape restoration; promoting waste management practices that reuse, reduce and recycle	Total budget of US$19,232.17 million for mitigation and adaptation
Uganda	Estimated potential of policies and measures could result in 22% reduction of GHG emissions in 2030 compared to BAU	Prior emissions reduction estimate could be almost doubled; updated estimate will be submitted when approval process is completed	Not provided	Not provided

Zambia	Reducing GHG emissions by 25% (20,000 Gg CO_2e) under BAU 2030 against 2010; or by 47% (38,000 Gg CO_2e) with substantial international support	Reducing GHG emissions by 25% (20,000 Gg CO_2e) under BAU 2030 against 2015; or by 47% (38,000 Gg CO_2e) with substantial international support	Mitigation actions focused on three programmes: (1) sustainable forest management; (2) sustainable agriculture; and (3) renewable energy and energy efficiency.	Not provided

Source: Authors' analysis of UNFCCC NDC submissions.

Table E2. Updated NDCs, Asian Commonwealth countries

Country	First NDC targets	Second/updated NDC targets	Selected actions and measures	Mitigation costs
Bangladesh	Unconditional 5% (12 $MtCO_2e$) reduction from BAU by 2030 in the power, transport and industry sectors plus 10% (24 $MtCO_2e$) conditional on international support	Unconditional 6.7% (27.56 $MtCO_2e$) reduction from BAU by 2030 in the power, transport and industry sectors plus 15.12% (61.9 $MtCO_2e$) conditional on international support	Unconditional mitigation actions by 2030; renewable energy projects of 911.8 MW; new 3,208 MW combined cycle gas power plant; installation of prepaid meters; reduce road congestion (5% improvement in fuel efficiency) by widening roads, add non-motorized transit and bicycle lanes, congestion charging; modal shift from road to rail, modern rolling stock and signalling systems, electrification of rail system, dual track construction; enhanced use of solar energy; ban fixed-chimney kilns, encourage advanced technology and non-fired brick use; enhanced use of energy efficient appliances; waste-to-energy plant	US$32.26 billion for unconditional mitigation measures to 3,030; US$143.73 billion for conditional mitigation measures
Brunei Darussalam	Reduce GHG emissions by 20% relative to 2030 BAU	Not provided		
India	Reduce emissions intensity of its GDP by 33–35%, over 2005 levels by 2030	Not provided		
Malaysia	35% reduction in carbon intensity by 2030 compared to 2005 level	Unconditionally reduce economy-wide carbon intensity by 45% in 2030 compared to 2005 level	Will apply to following sectors: energy, industrial processes and product use, waste, agriculture LULUCF, including forest land, cropland, grassland, wetland, settlement	Not provided
Maldives	Unconditional 10% reduction of 2030 BAU emissions; up to 24% reduction conditional on availability of financial resources, technology transfer and capacity building	Conditional 26% reduction of 2030 BAU emissions; will strive to achieve net zero by 2030, with adequate international support and assistance	Increase renewable energy to 15% of electricity generation with storage and grid stabilisation; increase efficiency of generators and upgrading the grid to minimise grid loss; implement standard labelling programme and improve building standards for energy efficiency; waste-to-energy for grid connection and electricity production; establish vehicle/vessels emissions standard and efficient transport management system; promote hybrid vehicles; replace diesel power with LNG	Not provided

Pakistan	Reduce up to 20% of 2030 projected GHG emissions, subject to availability of international grants	50% reduction of projected emissions by 2030; 15% from the country's own resources and 35% subject to provision of international grant finance	Shift to 60% renewable energy and 30% EVs of new vehicle sales by 2030; moratorium on new coal power plants and ban on imported coal; afforestation with 10 Billion Tree Tsunami Program; ban burning of rice stubble, solid waste and other hazardous materials; encourage animal waste to methane for fuel for rural household and urban transportation projects; national guidelines for green bonds to encourage innovative financing mechanisms; explore options for domestic carbon pricing instruments to manage large-scale emitting installations and transport sector	US$101 billion
Singapore	Reduce emissions intensity by 36% from 2005 levels by 2030, and stabilise emissions with the aim of peaking around 2030	Reduce emissions intensity by 36% from 2005 levels by 2030, and stabilise emissions with peak emissions of 65 $MtCO_2e$ around 2030	Absence of subsidies incentivises judicious energy use and embracing energy efficient technologies; strong pollution control laws encourage switch to cleaner fuel sources such as natural gas; continued investment in research, development and demonstration of solar PV to reduce cost, improve efficiency and enable innovative modes of deployment such as floating, offshore and building-integrated PV; carbon tax, first in South-East Asia, applies to 80% of Singapore's carbon emissions; make public and shared transport and active mobility the preferred mode of travel and phase out internal combustion engine vehicles; mandated minimum energy performance standards and Super Low Energy Buildings Programme	Not provided
Sri Lanka	Reduce the GHG emissions against 2030 BAU by 20% in energy sector (4% unconditional and 16% conditional) and by 10% in other sectors (transport, industry, forests and waste) by 3% unconditional and 7% conditional; achieve carbon neutrality by 2060	Unconditionally reduce GHG emissions by 4% of BAU from 2021 to 2030; conditionally reduce GHG emissions by 10.5% of BAU from 2021 to 2030; achieve 70% renewable energy in electricity generation by 2030; achieve carbon neutrality by 2050	Investment in renewable energy by supportive policy instruments such as feed-in tariffs, net metering and net accounting; energy efficiency incentivised by high energy rates and time-of-use billing and supported through financial incentives to replace incandescent lighting with LEDs; substantially increase waste-to-energy investments and waste composting measures; switch from road to rail transport with inland container depots, expand and electrify rail lines, promote transporting petroleum products by pipeline	Not provided

Source: Authors' analysis of UNFCCC NDC submissions.

Table E3. Updated NDCs, Pacific Commonwealth countries

Country	First NDC targets	Second/updated NDC targets	Selected actions and measures	Mitigation costs
Australia	Reduce 2005 GHG emissions by 26–28% by 2030	Reduce 2005 GHG emissions by 30–35% by 2030; net zero emissions target by 2050	Technology Investment Roadmap priority is to reduce costs of a range of technologies to bring them to commercial parity, driving emissions reductions and supporting economic growth; 7 low-emissions economic stretch goals – clean hydrogen production under $2/kg; ultra low-cost solar electricity generation at $15/MWh; electricity from storage for under $100/MWh; low-emissions steel production under $700/t; low-emissions aluminium production under $2,200/t; CCS under $20/t of CO_2; soil carbon measurement under $3/ha/year	Invest at least US$14 billion in low-emissions technologies by 2030; over US$57 billion of total public and private investment
Fiji	Reduce BAU energy sector emissions by 30% by 2030; 10% unconditionally and 20% conditionally	Reaffirm 2030 target; commitment to achieve net zero GHG emissions by 2050	Introduced single-use plastic ban; 100% renewable energy power generation for the gridby 2030; adopt sustainable agricultural practices in crop management, livestock and sugar cane farming; upgrade, repair and relocate existing critical public infrastructure; plant 30 million trees by 2035	US$2.97 billion between 2017 and 2030
Kiribati	Reduce emissions by 13.7% by 2025 and 12.8% by 2030 compared to BAU; with international assistance, reduce a further 48.8% by 2025 and 49% by 2030 compared BAU	Not provided		
Nauru	No target provided	No target provided	Increase renewable energy, principally solar, to 50% of power generation from current 3%; achieve 30% energy savings through increased energy efficiency, including energy audits, appliance labelling, energy standard programme and education; construct new organic waste recovery and composting facility; potential use of groundwater to reduce energy use for water desalination	US$5 million unconditional and US$50 million conditional (from first NDC)

New Zealand	Reduce GHG emissions by 30% below 2005 levels by 2030	Reduce GHG emissions by 50% below gross 2005 levels by 2030; a domestic emissions reduction target for GHGs other than biogenic methane to reach net zero by 2050	Clean Car Discount to incentivise cleaner vehicles, higher registration charge on high-emitting vehicles; continued development of geothermal and wind electricity generation; battery project to address hydro dependence and dry year risk; LULUCF approach will create incentives for the establishment of new forests	Not provided
Papua New Guinea	100% renewable electricity by 2030, contingent on funding being available	Energy sector is largest emitting sector; due to data uncertainties, Papua New Guinea has not included GHG energy sector targets; increasing grid capacity of renewable energy from 30% in 2015 to 78% in 2030, conditional on international support	Reducing annual emissions from deforestation and forest degradation by 10,000 Gg CO_2e by 2030 comparing to 2015, by 25% reduction in area of annual deforestation and degradation and increases in areas of forest planted; energy efficiencies by improved performance of air conditioning and refrigeration systems and in industrial energy efficiency audits and retrofits	Not provided
Samoa	Focused solely on electricity, with 100% renewable energy target for electricity generation by 2025	Reduce GHG emissions by 26% in 2030 compared to 2007 levels (91 Gg CO_2e)	100% renewable electricity generation by 2025; shore-side electricity supply for maritime vessels; electrification of vehicles, shared bicycles, e-bikes and e-scooters; implement a programme to support energy efficient appliances; implement landfill gas capturing technologies; improved manure management and fertiliser use; reforestation, forest restoration and promoting agroforestry	NDC targets will require large proportions of Samoa's fiscal budget and public service capacity; also requires external financial support, capacity building, and technology investment
Solomon Islands	Reduce emissions by 12% below 2015 level by 2025 and 30% below 2015 level by 2030 compared to BAU	Reduce emissions by 14% below 2015 by 2025 and 33% below 2015 by 2030; with international assistance, a further 27% reduction by 2025 and 45% by 2030 compared to BAU; with appropriate international assistance, can achieve net zero emissions by 2050	Increase renewable electricity to 100% by 2050 through use of solar PV and hydropower generation; improve energy efficiency and conservation by regulating imports of electrical appliances by 2035; reduce emissions from deforestation and degradation (REDD+), implement sustainable logging policy	Not provided

(Continued)

Table E3. Updated NDCs, Pacific Commonwealth countries (*Continued*)

Country	First NDC targets	Second/updated NDC targets	Selected actions and measures	Mitigation costs
Tonga	No aggregate target specified	13% reductions in GHG emissions by 2030 compared to 2006	Generate 50% of electricity from renewable sources by 2020, 70% by 2030, 100% by 2035; reduce line losses to 9% by 2020; mandatory vehicle standards and/or incentives through tax, fees and import tariffs; adopt minimum energy performance standards; plant 1 million trees by 2023	Not provided
Tuvalu	Reduce GHG emissions from electricity generation by 100% by 2025; reduce GHG emissions from entire energy sector by 60% below 2010 levels by 2025	Not provided		
Vanuatu	30% reduction in GHG emissions by 2030 relative to BAU, conditional	Aggregate target not provided	By 2030, replace fossil fuels with coconut oil, transitioning close to 100% renewable energy in the electricity generation; by 2030, e-buses for public transportation (10% of total); EVs (10% of government fleet); 1,000 e-bikes/e-rickshaws; 20% biodiesel blending in diesel; mileage and emission standards for vehicles; 14% improvement in biomass cook stoves and drying efficiency; install 1,000 biogas plants for commercial and residential use; REDD+ programme to improve sustainable forest management practices; waste-to-energy plants	Not provided

Source: Authors' analysis of UNFCCC NDC submissions.

Table E4. Updated NDCs, Caribbean and Americas Commonwealth countries

Country	First NDC targets	Second/updated NDC targets	Selected actions and measures	Mitigation costs
Antigua and Barbuda	Policies and actions (states consistency with 1.5°C)	Mitigation targets – 86% renewable electricity generation by 2030; 100% new vehicle sales EVs by 2030; potential emissions reductions in waste sector by 2025 and in AFOLU sector by 2030	NDC Implementation Plan, to be finalised in 2021, will be a roadmap for the country to achieve its NDC targets	Cost of US$1–1.7 billion to 2030, subject to international support for technology transfer, capacity building and financial resources
The Bahamas	Reduce GHG emissions by 30% compared to 2030 BAU	Not provided		
Barbados	44% reduction compared to BAU by 2030 or absolute reduction of 23% compared to 2008; interim 37% reduction compared to BAU by 2025 or absolute reduction of 21% compared to 2008	Aspires to achieve fossil fuel-free economy and reduce GHG emissions as close to zero as possible by 2030; 20% reduction relative to BAU emissions in 2025 without international support; 35% reduction in 2025 with international support; 35% reduction relative to BAU emissions in 2030 without international support; 70% reduction in 2030 with international support	Barbados' updated conditional mitigation contribution for 2030 – 95% renewable energy in the electricity mix; 100% EV or alternative-fuelled vehicles in the passenger fleet; 20% increase in energy efficiency across all sectors compared to BAU; 29% decrease in industrial, commercial and residential fuel consumption as compared to BAU; 20% decrease in waste emissions	Not provided
Belize	Policies and actions (states consistency with 1.5°C)	Reduce GHG emissions by 5,647 $ktCO_2e$ by 2030	Reduce GHG land use change emissions; enhance carbon sink capacity of mangrove and seagrass ecosystems through increased protection and restoration; reduce power sector emissions through system efficiency and increased renewable energy sources; reduce conventional transportation fuel use and increase efficiency per passenger/km and tonne/km; reduce livestock methane emissions and emissions due to agricultural land use change; improve waste management processes	Estimated to cost US$1.39 billion to 2030, with estimated funding gap of US$1.24 billion

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Table E4. Updated NDCs, Caribbean and Americas Commonwealth countries (*Continued*)

Country	First NDC targets	Second/updated NDC targets	Selected actions and measures	Mitigation costs
Canada	30% reduction compared to 2005 by 2030 (mentions 1.5°C and 2°C)	Reduce emissions by 40–5% below 2005 levels by 2030 and to net zero by 2050	Create a C$2.6 billion initiative with grants up to C$5,000, and invest C$4.4 billion in deep home retrofits through interest-free loans up to C$40,000; require all new light-duty vehicle and passenger trucks sold in Canada to be zero emissions by 2035; annually increase the benchmark carbon price by $15/t starting in 2023, rising to $170/t in 2030; invest over $3 billion over 10 years to plant 2 billion trees	Over US$25 billions by Government of Canada, plus additional from provinces
Dominica	Reduce GHG emissions below 2014 levels (164.5 Ggs est) 17.9% by 2020; 39.2% by 2025; and 44.7% by 2030	Not provided		
Grenada	Reduction by 30% of 2010 emissions by 2025, with an indicative reduction of 40% of 2010 by 2030	40% reduction in GHG emissions below 2010 level by 2030,focusing on energy, agriculture, water and industry	Geothermal is main strategy for reducing emissions, still in exploratory phase; transportation sector strategies include introduction of gasoline taxes, biofuel blends and fuel efficiency standards; NDC Partnership Plan madeto support NDC targets	Cost of NDC mitigation measures through 2030 is between US$984.9 and US$1,054.5 million
Guyana	No aggregate target provided; increase renewable energy share by 100% by 2025	Not provided		
Jamaica	Unconditional reduction by 7.8% (1.1 $MtCO_2e$) from BAU 2030, additional 10% conditional	25.4% unconditional reduction (1.9 $MtCO_2e$) and 28.5% conditional reduction (1.3 $MtCO_2e$) against 2030 BAU	Use water efficient agricultural methods, improve food storage systems and diversify food production techniques; introduced single-use plastic ban in 2019; pilot projects for biodiesel from cooking oil, production of biogas using animal waste and increased use of biodigesters	Not provided

St Lucia	GHG reduction of 2% by 2030 against 2010 base year	GHG reduction of 7% by 2030 against 2010 base year	Covers electricity generation and transportation; working on a long-term strategy to decarbonise the economy	US$368 million
St Kitts and Nevis	Emissions reduction of 22% by 2025 and 35% by 2030 against BAU	Emissions reduction of 61% by 2030 against 2010 base year, conditional on adequate resources including climate finance and capacity building support	Switch to 100% renewable electricity (solar, wind and geothermal); increase the share of EVs in vehicle fleet to at least 2%; improve transmission and distribution lines to reduce losses; introduce solar water heaters	US$637 million
St Vincent and Grenadines	Reduce GHG emissions by 22% compared to BAU by 2025	Not provided		
Trinidad and Tobago	Reduce emissions from power generation, transportation and industrial sectors by 15% by 2030 against BAU	Not provided		

Source: Authors' analysis of UNFCCC NDC submissions.

Table E5. Updated NDCs, European Commonwealth countries

Country	First NDC targets	Second/updated NDC targets	Selected actions and measures	Mitigation costs
Cyprus and Malta	Reduce 1990 emissions by minimum 40% by 2030 (combined as part of the EU's NDC)	Net domestic reduction of at least 55% in GHG emissions by 2030	EU ETS to reduce the emissions allowance per sector; set binding GHG targets not covered in EU ETS to member states; binding commitment for each member state to ensure land use emissions are compensated by equivalent removal of CO_2 from the atmosphere; reduce vehicle CO_2 emissions ~35%/km by 2030; more stringent binding targets regarding waste and recycling; reduction in fossil fuel power plants	Partial costs mentioned
United Kingdom	Reduce 1990 emissions by minimum 40% by 2030 (combined as part of the EU's NDC)	Reduce GHG emissions by at least 68% by 2030, compared to 1990 levels	UK's 10-point plan for a green revolution includes advancing offshore wind, growing low-carbon hydrogen, new and advanced nuclear power, zero emissions vehicles, green public transport, green jets and ships, greener buildings, carbon capture utilization and storage	Not provided

Source: Authors' analysis of UNFCCC NDC submissions.