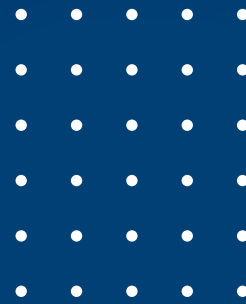


# NDCs

## AND RENEWABLE ENERGY TARGETS IN 2021:

Are we on the right path  
to a climate-safe future?



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The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that serves as the principal platform for co-operation, a centre of excellence, a repository of policy, technology, resource and financial knowledge, and a driver of action on the ground to advance the transformation of the global energy system. IRENA promotes the widespread adoption and sustainable use of all forms of renewable energy, including bioenergy, geothermal, hydropower, ocean, solar and wind energy, in the pursuit of sustainable development, energy access, energy security and low-carbon economic growth and prosperity. [www.irena.org](http://www.irena.org)

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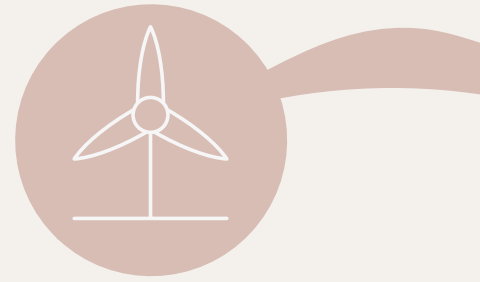
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# Contents

<b>Executive Summary</b>	<b>6</b>
<b>Introduction</b>	<b>9</b>
<b>1. Overview of NDCs as of November 2021</b>	<b>10</b>
1.1. Commitments made by high emitters and G20 members	14
1.2. Climate pledges by least-emitting countries	19
<b>2. Renewable energy components of NDCs</b>	<b>22</b>
2.1. Targets for renewable power in NDCs	24
2.2. Quantification of renewable energy (national) targets beyond NDCs	26
<b>3. Climate finance and NDCs</b>	<b>28</b>
3.1. Investments required for the energy transition	29
3.2. Commitments to redirecting financing from coal	30
3.3. Commitments to global climate finance financing	31
<b>References</b>	<b>41</b>





## Figures

---

<b>Figure 1.</b> NDCs by ambition and share of global emissions	11
<b>Figure 2.</b> Contribution of NDCs and other pledges to limiting global warming	12
<b>Figure 3.</b> Global CO <sub>2</sub> emissions abatement under IRENA's 1.5°C Scenario and required energy transition solutions	13
<b>Figure 4.</b> Sectors covered in updated NDCs	13
<b>Figure 5.</b> Summary of IRENA's NDC enhancement and implementation support to countries	20
<b>Figure 6.</b> The role of renewable energy in the energy transition	24
<b>Figure 7.</b> 2030 Renewable Energy Targets in NDCs	25
<b>Figure 8.</b> Global renewable power installed capacity in 2020 and 2030: Future projections based on targets vs IRENA 1.5C Scenario	27
<b>Figure 9.</b> Total investment by technology in the Planned Energy Scenario (PES) and IRENA's 1.5°C Scenario (2021–2050)	30
<b>Figure 10.</b> International financial flows to developing countries in support of clean and renewable energy, by technology (2019 constant USD billion)	34

## Tables

---

<b>Table 1.</b> Jurisdictions with net zero targets as of November 2021	16
<b>Annex 1.</b> Highest CO <sub>2</sub> emitting countries and regions and level of ambition in NDCs	36

## Boxes

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<b>Box 1.</b> Pledges made by selected members of G20	14
<b>Box 2.</b> Pledges made by selected LDCs and SIDS	18
<b>Box 3.</b> IRENA support for countries in their NDC enhancement and implementation including LDCs and SIDS	20
<b>Box 4.</b> Design elements of renewable energy targets	25
<b>Box 5.</b> South Africa's Just Transition Partnership – COP26	31
<b>Box 6.</b> The Glasgow Financial Alliance for Net Zero (GFANZ)	33
<b>Box 7.</b> SDG indicator 7.A.1 on international public financial flows to developing countries in support of clean and renewable energy	34
<b>Box 8.</b> Examples of renewable energy projects supported by the Green Climate Fund (GCF)	35

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# Abbreviations

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<b>BAU</b>	business-as-usual	<b>MRV</b>	monitoring, reporting and verification
<b>CCUS</b>	carbon capture, utilisation and storage	<b>MtCO<sub>2</sub>e</b>	million tonnes of CO <sub>2</sub> equivalent (emissions)
<b>EV</b>	electric vehicle	<b>MW</b>	Megawatt
<b>CSP</b>	concentrated solar power	<b>NDC</b>	Nationally Determined Contribution
<b>GCF</b>	Green Climate Fund	<b>NZAMI</b>	Net Zero Asset Managers Initiative
<b>GDP</b>	gross domestic product	<b>OECD</b>	Organisation for Economic Cooperation and Development
<b>GEF</b>	Global Environment Facility	<b>RRA</b>	Renewables Readiness Assessment
<b>GFANZ</b>	Glasgow Financial Alliance for Net Zero	<b>SDG</b>	sustainable development goal
<b>GHG</b>	greenhouse gas	<b>SIDS</b>	small island developing states
<b>GtCO<sub>2</sub>e</b>	gigatonnes of CO <sub>2</sub> equivalent (emissions)	<b>TFEC</b>	total final energy consumption
<b>GW</b>	gigawatt	<b>TPEC</b>	total primary energy consumption
<b>GWh</b>	gigawatt hours	<b>TW</b>	terawatt
<b>ICF</b>	International Climate Finance (UK)	<b>UN</b>	United Nations
<b>IEA</b>	International Energy Agency	<b>UNCTAD</b>	United Nations Conference on Trade and Development
<b>IIED</b>	International Institute for Environment and Development	<b>UNDP</b>	United Nations Development Programme
<b>IISD</b>	International Institute for Sustainable Development	<b>UNEP</b>	United Nations Environment Programme
<b>INDC</b>	Intended Nationally Determined Contribution	<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>IPPC</b>	Intergovernmental Panel on Climate Change	<b>WETO</b>	World Energy Transition Outlook (IRENA)
<b>IPPU</b>	industrial processes and product use	<b>WHO</b>	World Health Organization
<b>LDC</b>	least developed country	<b>WRI</b>	World Resources Institute
<b>LULUCF</b>	land use, land use change and forestry		
<b>MDB</b>	multilateral development bank		

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# Executive Summary

**Although ambitions in the Nationally Determined Contributions (NDCs) were raised, more needs to be done to put us on the path to keep the rise in global temperature to below 1.5°C.**

Almost all countries have ratified the Paris Agreement and all Parties have now submitted an NDC. If fully implemented, the original NDCs would have only helped limit global temperature rise to 2.8°C above pre-industrial levels by the end of this century, calling for more ambitious NDCs.

As of mid-November 2021, 91 Parties – accounting for almost 64% of global greenhouse gas (GHG) emissions – had submitted NDCs that are more ambitious than the original ones and 16 Parties – accounting for 3% of global emissions – have expressed their intention to submit an updated NDC.

However, 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.

At the same time, countries are increasingly making net zero commitments by 2050. Together with the new and updated NDCs, current and announced net zero pledges are projected to reduce emissions by approximately 20% by 2030 compared to the business as usual before the first NDCs, with the potential to limit warming to 2.1°C. However, this is still well above the 1.5 °C goal.

Another positive trend is that more than 100 countries are promising to cut emissions of methane by 30% by 2030. These pledges, combined with the NDCs and net zero targets, have been found by the International Energy Agency to be sufficient to hold the rise in global temperatures to 1.8°C by the end of the century.

Recognising the urgency to act, the agreement on a Glasgow Climate Pact requests Parties to revisit and strengthen the 2030 targets in their NDCs by the end of 2022 to align with the aim of keeping the temperature rise to below 1.5°C, taking into account different national circumstances.

Moreover, NDCs have so far been non-binding pledges. As such, the conclusion of the Paris Rulebook outlining the guidelines for how the Paris Agreement is delivered, including a transparency process that holds countries to account as they deliver on their targets, and a framework for countries to exchange carbon credits through the UNFCCC (Article 6), are among crucial positive outcomes of COP26. In addition, the Breakthrough Agenda was endorsed by 42 Parties and it aims to inform policy-making through an assessment of global progress towards breakthroughs in areas including power, road transport, steel and hydrogen.

The ultimate outcome of COP26 will be determined by the extent to which leaders deliver on their promises with real, short-term, accelerated actions.

**The level of ambition in pledges made by the lowest and highest emitters show a sense of urgency among the former and room for more ambition among the latter if the world is to meet climate goals set in the Paris Agreement**

Least developed countries (LDCs) and small island developing states (SIDS) bear a disproportionate cost of climate change-related impacts, despite being home to a small fraction of the world's population and contributing less than a 7% of global GHG emissions. More than 69% of deaths related to climate-related disasters globally were in these two groups of countries, which have also witnessed the displacement of millions of people, loss and damage of physical and natural resources, and worsening inequality.



These countries are increasingly capitalising on renewable energy sources to mitigate their climate-induced vulnerabilities whilst ensuring energy security and sustainable socio-economic growth. Around 32 LDCs and 27 SIDS, representing a total of 55 Parties (4 countries have both an LDC and SIDS status), have submitted new, updated or second NDCs since September 2020, of which more than 35 Parties submitted stronger pledges. About 44 Parties also included renewable energy targets.

G20 members account for roughly 75% of global GHG emissions; 19 submitted new or updated NDCs out of which only 11 have submitted an NDC with pledges that are stronger than their previous NDC. At the same time, several high emitting countries and/or members of G20 have passed or proposed laws around net zero emissions or have placed net zero targets in policy documents. While these are a significant step-up, they will still not be enough to align global temperature rises with the Paris Agreement.

### **What do these commitments mean for renewable energy?**

Renewable energy plays a key role in IRENA's 1.5°C Scenario, which aims for carbon neutrality by 2050, with its share of the world's total primary energy supply growing from 14% in 2018 to 74% in 2050 (requiring an eight-fold increase in annual growth). Naturally, energy efficiency also plays an important role in stabilising primary supply during this period.

Yet the renewable energy targets in NDCs are nowhere near that. As of 15 November 2021, 182 Parties had included renewable energy components in their NDCs, of which only 144 had a quantified target. From these targets, 109 focus on power and 30 explicitly mention heating and cooling or transport. Only 13 Parties have committed to a percentage of renewables in their overall energy mixes.

Although electricity accounts for more than half of final energy consumption in IRENA's 1.5°C Scenario, more efforts will be needed in end uses. This requires specific and quantified targets for

heating and cooling and transport, set for the short term, to reflect the urgency of the transition.

Even in the power sector, of the 109 Parties that have defined targets for renewables in their NDCs, 49 presented them in the form of additions – most in the form of capacity (GW) and two in terms of output (GWh). Although such commitments provide long-term clarity regarding the trajectory of the renewable energy sector, increasing investor confidence and supporting socio-economic benefits, a target in this form does not provide clarity on ambition with regard to climate goals, as it does not account for phasing out fossil-based power the way that targets presented as a share of the electricity mix would.

Naturally, this only applies when considerable shares of the total electricity mix are set. Out of the 60 Parties with targets defined as a share of the power mix, 14 committed to less than 25%, 22 committed to shares between 25% and 59%, 13 committed to shares between 60% and 89%, and 11 Parties committed to shares between 90% to 100%.

Among G20 members and other high emitting countries, seven Parties have set power targets, only two of which are presented as a share of electricity mix, and both are less than 25%.

Meanwhile, most of the countries that have committed to 100% renewables in their electricity mix by or before 2030 are SIDS.

### **How will the commitments be operationalised?**

Targets set in NDCs need to be aligned with national energy plans and renewable energy targets. An IRENA analysis conducted at the end of 2020 shows that in 178 out of the 196 countries analysed (91%), a mismatch exists between renewable energy targets in NDCs and those featuring in national laws and official strategies and plans. This may have improved with the latest round of NDCs communicated around COP26, where many of the NDCs reviewed were heavily linked to national plans and policies, but more efforts are needed to align pledges in NDCs with national energy plans.





By early 2021, 160 countries had active targets for renewable power at the national level, as included in national laws, official strategies and plans. Implementing existing targets could bring an additional 0.9 TW of installed renewable power capacity by 2030, taking global installed renewable power capacity to 3.7 TW). Achieving these targets would meet only one-third of what is required to stay in line with 1.5°C pathway (10.8 TW by 2030 and 27.8 TW by 2050).

Targets are only effective when translated into national laws, policies and measures that are part of a robust long-term policy framework combining various aspects including deployment and enabling policies, including financing.

**Financing the energy transition will require more action from the developed world**

IRENA has estimated that the deployment of energy transition-related technologies required to put the world on the 1.5°C pathway will necessitate USD 131 trillion of aggregate investment between 2021 and 2050. This represents an average annual funding requirement for the energy sector of about USD 4.4 trillion between 2021 and 2050. When it comes to renewable power, which is identified as one of the major avenues for the energy transition, the required annual investment amounts to nearly USD 1 trillion for the 2021–2050 period, more than triple the renewable energy power investment of about USD 300 billion estimated for 2020. Ensuring that the required capital is deployed towards global climate goals and individual NDCs is crucial and one of the main climate challenges facing us today.

A number of financing pledges have been made, and it is projected that the USD 100 billion per year target will be met by 2023. A Climate Finance Delivery Plan launched ahead of COP26 suggests that the target may be exceeded in the years thereafter. In addition, decisions were made to tackle loss and damage, double global adaptation finance by 2025 and develop a 2-year work programme for operationalising the Global Goal.

COP26 saw developments in the financial sector, with announcements on ending select fossil fuel financing and commitments to phase down coal and phase out inefficient fossil fuel subsidies, including from private financial actors.

More needs to be done by developed countries to fulfil their pledges and support developing countries, especially LDCs. This includes the need to maximise the amount and efficiency of public finance via supportive policies, redirecting of public capital from fossil fuels to energy transition related technologies, and greater use of de-risking tools to mobilise private capital. In addition, there is a need for a better tracking of global climate flows (greater co-ordination and transparency in amounts collected and disbursed is needed) in order to ensure its most efficient and equitable use.

**International co-operation is key for a just and inclusive energy transition**

International co-operation will be crucial for achieving a just transition that leaves no one behind. A holistic global policy framework is required to ensure countries commit to such a transition and to strengthening capacities, international finance flows and sufficient co-operation in terms of technical support to developing nations. South Africa's Just Transition Partnership launched at COP26 could serve as a model in this regard.

Climate policies represent a crucial element in global policy framework, as do fiscal policies covering carbon pricing that span emissions across sectors, and public funding is key to successful policy implementation that fosters deployment, creates enabling conditions and ensures a just transition. While access to public financing will be necessary for countries, public investment can be further leveraged to help unlock untapped sources of private investment to aid the climate agenda. This will require strong international co-operation with a view to support the most vulnerable countries.



# Introduction

Since the historic signing of the Paris Climate Change Agreement in 2015, nearly all countries have committed to limiting the increase in the average global temperature to well below 2 degrees Celsius (°C) this century compared to pre-industrial levels, and preferably to 1.5°C, and many are now committing to net zero strategies by mid-century. However, IRENA's analysis for the 2021 World Energy Transitions Outlook (WETO) which depicts a 1.5°C pathway, finds that national energy plans and targets, including the first round of Nationally Determined Contributions (NDCs) under the Paris Agreement, fell far short of this goal and, at best, would only result in a stabilisation of emissions (IRENA, 2021a).

Meanwhile, climate-related impacts are worsening, disproportionately affecting low-income and marginalised population groups. Moreover, while countries have made significant progress related to climate mitigation and adaptation to date, most low-income countries still lack the necessary funding to commit to a fair and equitable energy transition.

Against this backdrop and amid widespread calls for urgent action, the 26th Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC) – COP26 which took place in Glasgow (United Kingdom) in November 2021, represented an important opportunity for countries to step up their climate ambitions. The NDCs updated ahead of and around the time of COP26 – which outline the mitigation and adaptation commitments of each signatory to reduce greenhouse gas (GHG) emissions – indicate the pathway that the world will take as it proceeds towards enhanced climate action and net zero emissions. Among the main outcomes of COP26 was the “Glasgow Climate Pact” requesting Parties to revisit and strengthen the 2030 targets in their NDCs to keep the global temperature rise to below 1.5°C by the end of 2022.

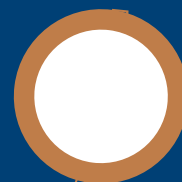
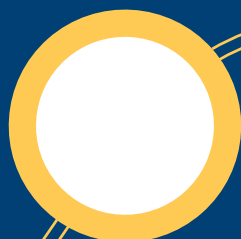
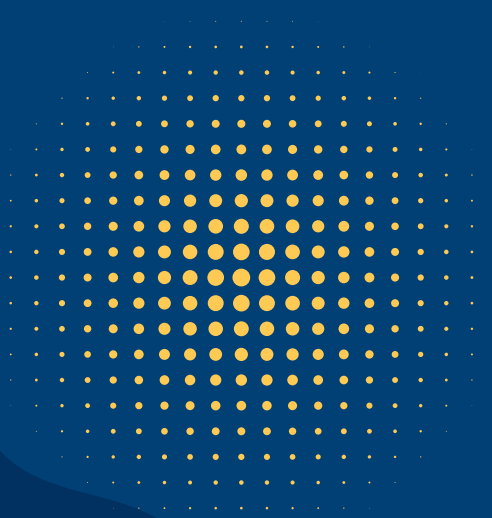
Building on the most recent UNFCCC synthesis report and taking into account the main highlights of COP26, this brief provides an overview of the latest NDC commitments – including the first and second NDC updates made since the ratification of the Paris Agreement – and some of the main agreements made at COP26. As set out in IRENA's WETO, achieving the 1.5°C goal requires a major renewable energy scale-up in all energy uses. Therefore, this brief focuses on the renewable energy component of the NDCs and their related ambitions. The brief also examines the financial commitments made and the extent to which climate financing commitments to developing countries have been met since the signing of the Paris Agreement.

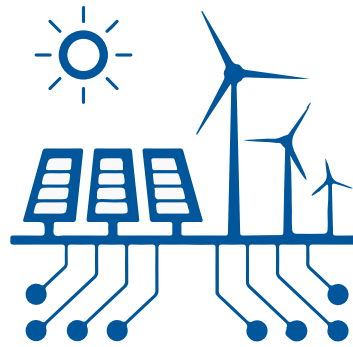




# 1

## Overview of NDCs as of November 2021



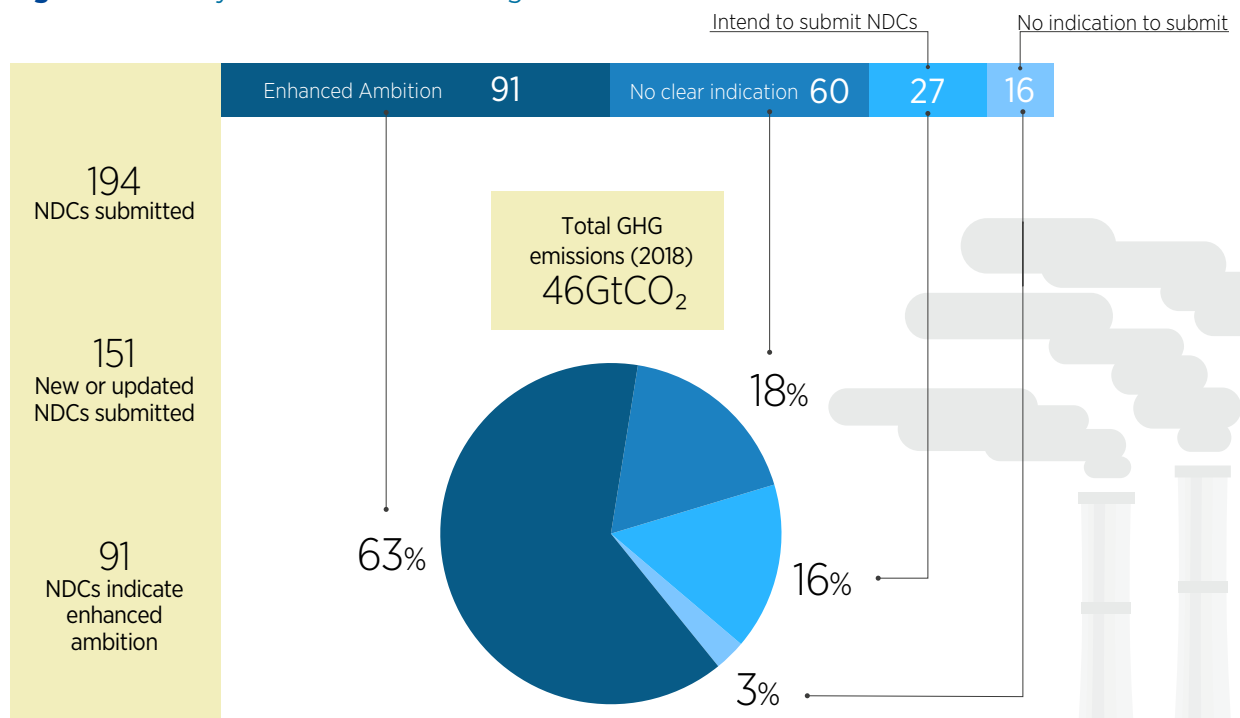


Recognising that ambition needs to grow to get closer to meeting its goal, the Paris Agreement requires NDCs to be revised and submitted to the UNFCCC secretariat every five years – also known as the Agreement’s ratchet mechanism. Additionally, each successive NDC needs to represent a progression compared to its previous version and should reflect the country’s highest possible ambition.

To date, 193 Parties have ratified the Paris Agreement (up from 190 in 2020 with South Sudan, Turkey and Iraq ratifying the Agreement in 2021), and 194 Parties have submitted NDCs<sup>1</sup> (Figure 1).

‘Ratcheting up’ climate ambition is critical: although the initial pledges made in the first round of NDCs were welcome, they were not ambitious enough. If all countries fully implemented their commitments made in the first NDCs, average global temperature is expected to rise by approximately 2.8°C above pre-industrial levels by the end of this century (Climate Action Tracker, 2016). In reality, annual global emissions have been increasing since the Paris Agreement (except in 2020, owing to the pandemic) (Tiseo, 2021), further emphasising the need for more ambitious commitments in updated NDCs.

**Figure 1. NDCs by ambition and share of global emissions**



Source: (Climate Watch, 2021a). Updated as of November 2021

<sup>1</sup> As of November 2021, Eritrea has not ratified the Paris Agreement but has submitted an NDC.

As of 15 November 2021, 151 Parties had submitted new or updated NDCs. Of these, less than half (91 Parties) – collectively representing around 63% of global GHG emissions in 2018 – had enhanced ambitions in their new or updated NDCs relative to their previous target. Of the remaining Parties that submitted new or updated NDCs in 2020 or 2021, 60 Parties – which accounted for a further 17.5% of global emissions in 2018 – submitted NDCs with either the same emission reduction targets, increased emissions compared to their first NDCs, or emissions reduction targets which are not comparable to their initial NDCs (Climate Watch, 2021a).

There were still 27 Parties – which represent 3% of global emissions – that had expressed an intention to submit a new or updated NDC but had yet to do so by mid-November. Lastly, there were 16 Parties – representing the remaining 16% of global emissions in 2018 – that had not yet given any indication regarding their intention to update their NDCs with increased ambition (Climate Watch, 2021a). There are a number of major emitters that have yet to submit a new or updated NDC and although the number of submissions has been increasing, more and stronger targets are needed.

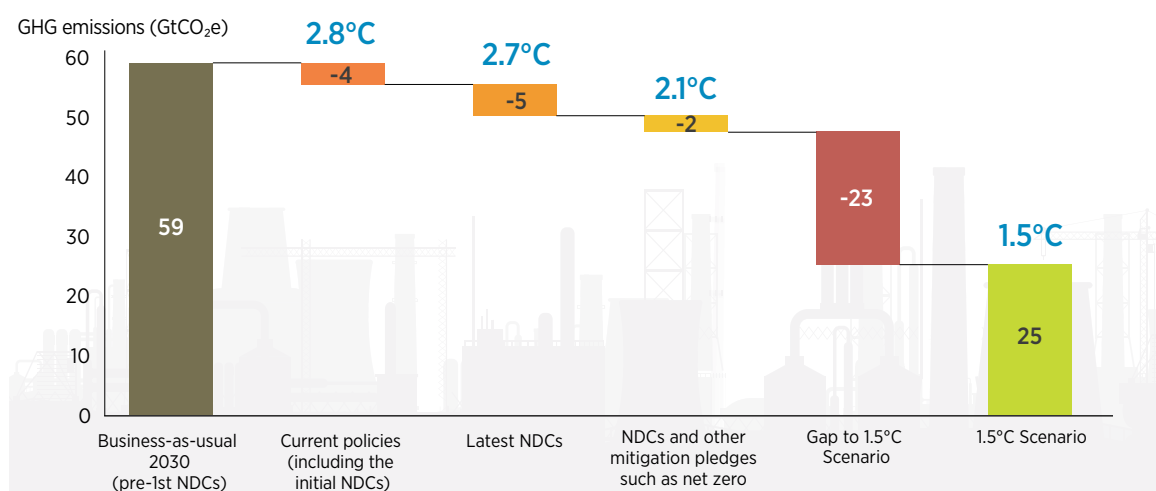
The November 2021 update of the UNFCCC NDC Synthesis report (2021) suggests that almost every country – including those that ramped up their targets – is still falling short of the Paris Agreement target in their NDCs. Even if all countries were to implement their latest NDCs, the total global GHG emission level in 2030 is expected to be 13.7% above

2010 levels (UNFCCC, 2021a; UNFCCC, 2021b), which may result in a temperature rise of 2.7°C by the end of the century (UNEP, 2021). To put this into perspective, before the first round of NDCs were submitted, global GHG emissions in 2030 were projected to be approximately 59 GtCO<sub>2</sub>e. Policies including the first round of NDCs were projected to cut emissions by 3-4 GtCO<sub>2</sub>e and, as of 15 November 2021, the new or updated NDCs and other 2030 pledges are on track to cut emissions by approximately 5 GtCO<sub>2</sub>e (UNEP, 2021; WRI, 2021a). Yet, for a 1.5 °C compatible pathway, global GHG emissions in 2030 need to be approximately 25 GtCO<sub>2</sub>e, about 48% lower than what they would be if NDCs remained at today’s level of ambition.

At the same time, countries are increasingly making net zero commitments by 2050. Together with the new and updated NDCs, current and announced net zero pledges are projected to reduce expected emissions by approximately 20% by 2030 compared to the business as usual before the first NDCs, with the potential to limit warming to 2.1°C (UNEP, 2021). Figure 2 shows the contribution of NDCs and other pledges to limiting global warming.

Furthermore, the International Energy Agency (IEA) has estimated that together with the Global Methane Pledge signed by over 100 countries representing 70% of the global economy, climate pledges made by governments so far, including the NDCs and net zero targets, would be enough to hold the rise in global temperatures to 1.8 °C by

**Figure 2. Contribution of NDCs and other pledges to limiting global warming**

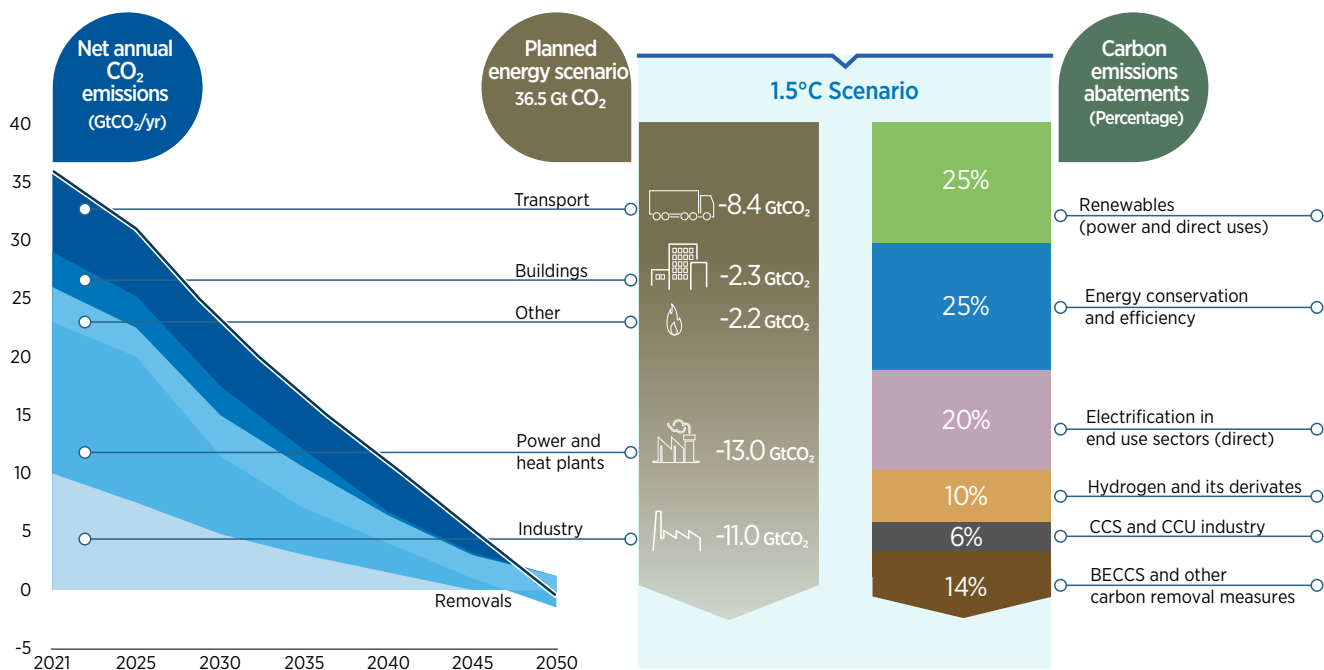


Note: Updated as of 4 November 2021.

Sources: The main data used in this analysis comes from UNEP (2021) except the ‘Pre-1st NDC’ estimate of 59 GtCO<sub>2</sub>e which was sourced from (WRI, 2021a) also based on analysis from UNEP (2021a) and Climate Watch.

Although the data and methodologies tends to vary in some aspects across different sources, the overarching message in all remains consistent.

**Figure 3.** Global CO<sub>2</sub> emissions abatement under IRENA's 1.5°C Scenario and required energy transition solutions



Source: (IRENA, 2021a).

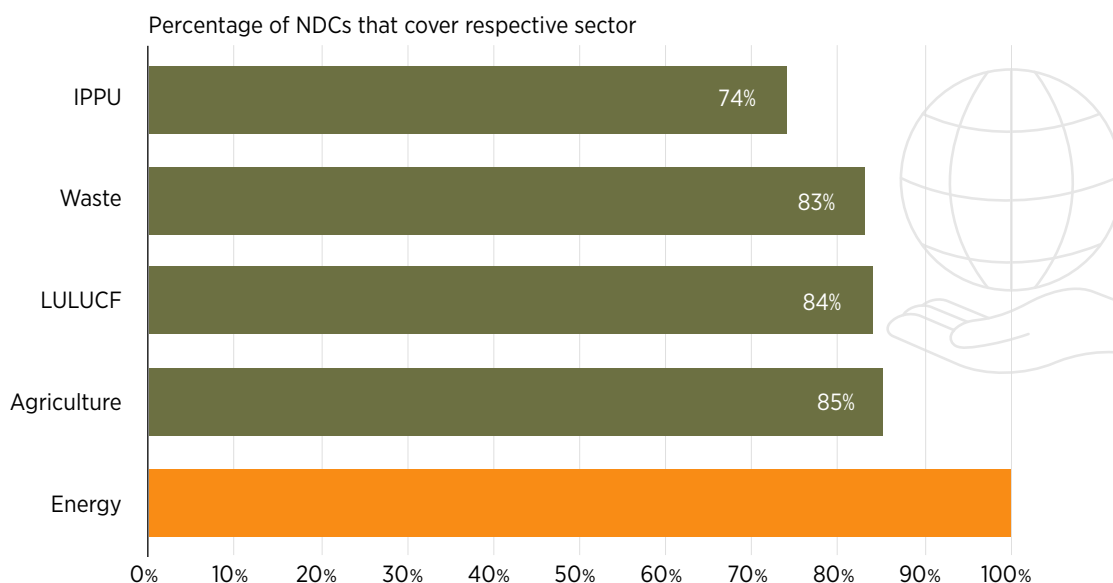
the end of the century (IEA, 2021). However, this still leaves the world short of the goals outlined in the Paris Agreement.

To stay within a global mean temperature rise of 1.5°C, it will be necessary to reduce emissions by about 45% from 2010 levels by 2030, with the aim of reaching net zero emissions by 2050 (IRENA, 2021a). Figure 3 shows the projected trends in global CO<sub>2</sub> emissions under the 1.5°C Scenario, along

with carbon emissions abatement from the energy transition solutions identified in IRENA's WETO.

Decarbonising the energy sector, which contributes almost three quarters of global GHG emissions (UN, 2021b), will play a crucial role in delivering global climate goals. The latest findings from NDC submissions indicate that all 194 NDCs presented include the energy sector in climate action plans (Figure 4).

**Figure 4.** Sectors covered in updated NDCs



Notes: IPPU = Industrial Processes and Product Use; LULUCF = Land Use, Land-Use Change and Forestry  
Source: (UNFCCC, 2021a).



Renewable energy is a key option for reaching climate goals, with more than 160 Parties planning to reduce energy sector emissions through renewable energy-based mitigation action focused on the power sector. A detailed analysis of the renewable energy component of NDCs is presented in Section 2. End uses are covered in about less than one-third of submissions while other crucial areas such as energy efficiency and grid improvement are addressed in about 27% and 24% of submissions respectively (UNFCCC, 2021a). To achieve the energy transition, much more needs to be done to decarbonise heating and cooling uses and transport, as together, these accounted for almost 80% of energy consumption in 2019.

### 1.1. COMMITMENTS MADE BY HIGH EMITTERS AND G20 MEMBERS

#### *Commitments made by high emitters and G20 members in NDCs*

Considering the updates made to the NDCs ahead of, and during COP26, of the top 20 emitters in terms of tonnes of GHG emissions in 2018, 16 Parties submitted revised NDCs.<sup>2</sup> These include several members of the G20 such as Canada,

People's Republic of China (hereby referred to as China), the European Union, the Kingdom of Saudi Arabia (hereby referred to as Saudi Arabia) and the United Kingdom of Great Britain and Northern Ireland (hereby referred to as the United Kingdom). The Russian Federation (hereby referred to as Russia) and Turkey submitted their first NDCs (previously submitting only INDCs) while the United States of America (hereby referred to as the United States) re-joined the Paris Agreement and submitted its first NDC in April 2021. India made a net zero pledge and increased its renewable energy target by 2030,<sup>3</sup> but had yet to update its NDC as of 15 November 2021. By that date, 19 Parties that are members of the G20 had submitted new or updated NDCs, and only 11 G20 members had submitted an NDC with pledges that are stronger than their previous NDC.<sup>4</sup> A substantial gap remains between the emissions reduction pledges that countries have announced, and those needed to limit warming to below 1.5° C in 2030. Annex 1 represents the mitigation commitments of the top 20 emitting countries in terms of tonnes of CO<sub>2</sub> emitted in 2018, including those related to renewable energy and Box 1 presents the pledges made by selected G20 members.

#### BOX 1. PLEDGES MADE BY SELECTED MEMBERS OF G20

**Brazil** updated the target submitted in the previous NDC in 2016 (37% reduction of GHG emissions by 2025) to a 50% reduction by 2030 compared with 2005 levels. The updated NDC does not mention any renewable energy targets, unlike the previous NDC, which included an unconditional target of 45% renewable energy in the primary energy mix by 2030, a target met 12 years earlier than its deadline (Government of Brazil, 2021; IRENA, 2021b), indicating the competitiveness of renewables in Brazil. Carbon neutrality by 2050 has also been pledged (instead of 2060 as stated in the original NDC) in an addendum to the NDC, along with ending illegal deforestation entirely by 2030. This is especially important, since Brazil's emissions increased by 9.5% in 2020 – as opposed to pandemic-induced downward trends in other parts of the world – mainly due to deforestation (Reverdosa, 2021).

**Canada** increased its target to '40-45% below 2005 levels by 2030'. This is a significant increase in ambition compared to the previous 30% target. In addition, the country commits to enable the power sector to achieve net zero by 2050, and to battery and mineral supply chain infrastructure.

The **People's Republic of China (China)** submitted an updated NDC that represents some improvement over its initial targets. The country reaffirmed its commitments to achieving peak CO<sub>2</sub> emissions before 2030 and introduced a new target of achieving carbon neutrality by 2060. Other targets in the updated NDC include: a combined installed wind and solar power capacity of more than 1 200 GW; a non-fossil fuel share in TPEC of around 25%; and a 65% reduction in CO<sub>2</sub> emissions per unit of GDP compared to 2005, all by 2030. China has also pledged to increase forest stock volume by 6 billion m<sup>3</sup> over the 2005 level (WRI, 2021b).

<sup>2</sup> India and Iran had not submitted updated NDCs as of mid-November and Russia and Turkey had submitted their first NDCs.

<sup>3</sup> India's pledges include a 50% share of renewables in the country's electricity mix (with low-emission capacity raised from 450 GW to 500 GW) and a 1 billion tonne reduction in CO<sub>2</sub> emissions by 2030.

<sup>4</sup> Argentina, Canada, European Union, France, Germany, Italy, Japan, Saudi Arabia, South Africa, the United States and the United Kingdom.

The **European Union (EU27)** raised its economy-wide net emissions target from 40% to 55% by 2030 in line with its 'Fit for 55 package'. While the previous EU NDC did not mention any specific renewable energy targets, the updated NDC mentions a 2030 target of at least 32% renewable energy share in TPEC, and a minimum improvement in energy efficiency of 32.5% in TPEC and TPEC compared to a historic baseline

**Indonesia** submitted its updated NDC in 2021 reiterating its target of 29% (unconditional) reduction in GHG emissions and up to 41% (conditional) reduction by 2030 compared to the business-as-usual scenario, from its previous NDC in 2016. The renewable energy target of at least 23% in 2025 and at least 31% in 2050 remains unchanged, while fossil fuels will continue to play an important role in the TPES up to 2050.

**Japan** communicated its updated NDC doubling its emission reduction target from to 46% reduction in its GHG emissions by 2030 compared to 2013 levels (compared to 26% previously). Further efforts will be pursued to achieve a 50% reduction. While no specific renewable energy targets are indicated, the country commits to pursue a possible efforts in all areas including thorough energy efficiency measures, maximum introduction of renewable energy, as well as decarbonisation of public sectors and local communities.

The **Republic of Korea** aims to significantly reduce coal power generation in its updated NDC (including through a ban on the construction of new coal-fired power plants) and to increase its share of renewable energy to 20% by 2030 and 30–35% by 2040 in power and heating, and cooling. Mitigation measures also include the deployment of 3 million electric vehicles (EVs) and 850 000 hydrogen-fuelled vehicles by 2030.

The **Russian Federation (Russia)** submitted its first NDC in 2020, revising its target in the INDC submitted in 2015 of a 70–75% reduction in GHG emissions by 2030 compared to 1990 levels, to a reduction of up to 70%. Although the NDC does not contain any renewable energy targets, it mentions developing renewable energy. This extends to scientific and technical co-operation with other countries in areas including renewables, energy efficiency and nuclear energy.

**South Africa** submitted an updated NDC in September 2021, pledging to maintain 2025 and 2030 annual GHG emissions of 398–510 MtCO<sub>2</sub>e and 350–420 MtCO<sub>2</sub>e, respectively. The new targets correspond to a reduction of 32% in the upper bound for 2030 and 12% in the lower bound. The NDC highlights the important role of the power sector and phasing out coal in achieving these mitigation commitments. It also mentions adaptation measures for a more sustainable economy while ensuring the transition is just for all workers (WRI, 2021c). At COP26, these commitments were followed with the announcement of the 'Just Transition Partnership' – a financing deal that will see South Africa receive USD 8.5 billion to help meet its NDC pledges (see Box 4).

The **United Kingdom**, following its commitment to net zero by 2050, raised the ambition in its updated NDC to an economy-wide reduction in net GHG emissions of at least 68% by 2030 compared to its reference years (1990 and 1995, depending on the GHG). The United Kingdom's emissions in 2018 were down nearly 43% from 1990 levels (the United Kingdom Government, 2020). The NDC refers to the energy white paper which highlights specific policies and measures to honour the NDC and its net zero commitments (the United Kingdom Government, 2020). This includes targets by 2030 to increase offshore wind capacity to 40 GW (compared to 10 GW today); reach 5GW of 'low-carbon' hydrogen production capacity; increase annual installation of electric heat pumps to 600 000 (by 2028); and a ban on the sales of new petrol and diesel vehicles (cars and vans). However, while recognising that significant new commitments have been made, the United Kingdom government's statutory advisory body, the Climate Change Committee, also found gaps in its ambition in key areas (e.g. heat pumps, low-carbon heat networks and CCUS) (Climate Change Committee, 2021).

The **United States** announced a 50–52% emission reduction goal compared to 2005 levels by 2030 in April 2021. Although this reduction goal does not meet the level required to achieve the goal of the Paris Agreement (Climate Action Tracker, 2021a), it is a significant step compared to the previous NDC, which aimed for a 26–28% reduction in comparison to 2005 emissions. Domestic policies are key to meeting these ambitious reduction targets, which will require support at all levels including federal, state, and local, and from all other stakeholders including the private sector.

Source: (Climate Watch, 2021a; UNFCCC, 2021c)



*Commitments made by high emitters and G20 members to net zero*

Several high-emitting countries and G20 members have passed or proposed laws concerning net zero

emissions or have placed net zero targets in policy documents.<sup>5</sup> Within the G20, Canada, the European Union, France, Germany, Japan, the Republic of Korea and the United Kingdom have passed laws

**TABLE 1. JURISDICTIONS WITH NET ZERO TARGETS AS OF NOVEMBER 2021**

	LDCs and SIDS			
Achieved	<ul style="list-style-type: none"> <li>Benin</li> <li>Bhutan</li> <li>Cambodia</li> </ul>	<ul style="list-style-type: none"> <li>Guinea-Bissau</li> <li>Guyana</li> <li>Madagascar</li> </ul>	<ul style="list-style-type: none"> <li>Suriname</li> <li>Liberia</li> </ul>	
In law				
In policy document	<ul style="list-style-type: none"> <li>Antigua and Barbuda</li> <li>Barbados</li> <li>Belize</li> <li>Cuba</li> <li>Democratic Republic of the Congo (the)</li> <li>Djibouti</li> </ul>	<ul style="list-style-type: none"> <li>Dominica</li> <li>Fiji</li> <li>Maldives</li> <li>Marshall Islands</li> <li>Saint Kitts and Nevis</li> <li>Saint Lucia</li> </ul>	<ul style="list-style-type: none"> <li>Singapore</li> </ul>	
Declaration or pledge	<ul style="list-style-type: none"> <li>Bahrain</li> </ul>			
Proposed/ In discussion	<ul style="list-style-type: none"> <li>Afghanistan</li> <li>Angola</li> <li>Bangladesh</li> <li>Burkina Faso</li> <li>Burundi</li> <li>Central African Republic (the)</li> <li>Chad</li> <li>Comoros (the)</li> <li>Dominican republic</li> <li>Eritrea</li> <li>Ethiopia</li> <li>Gambia (the)</li> <li>Grenada</li> </ul>	<ul style="list-style-type: none"> <li>Guinea</li> <li>Haiti</li> <li>Jamaica</li> <li>Kiribati</li> <li>Lao People's Democratic Republic</li> <li>Lesotho</li> <li>Malawi</li> <li>Mali</li> <li>Mauritania</li> <li>Mauritius</li> <li>Mozambique</li> <li>Myanmar</li> <li>Nauru</li> <li>Nepal</li> </ul>	<ul style="list-style-type: none"> <li>Niger (the)</li> <li>Niue</li> <li>Palau</li> <li>Papua New Guinea</li> <li>Rwanda</li> <li>Saint Vincent and the Grenadines</li> <li>Samoa</li> <li>Sao Tome and Principe</li> <li>Senegal</li> <li>Seychelles</li> <li>Sierra Leone</li> <li>Solomon Islands</li> </ul>	<ul style="list-style-type: none"> <li>Somalia</li> <li>South Sudan</li> <li>Sudan (the)</li> <li>United Republic of Tanzania (the)</li> <li>Timor-Leste</li> <li>Togo</li> <li>Tonga</li> <li>Trinidad and Tobago</li> <li>Tuvalu</li> <li>Uganda</li> <li>Vanuatu</li> <li>Yemen</li> <li>Zambia</li> </ul>

Source: Boston Consulting Group based on (Net Zero Tracker, 2021; United Nations, n.d.; United Nations, 2021a; World Bank, 2021)

<sup>5</sup> Net zero emissions occurs when the quantity of human-induced GHG emissions equal the quantity of GHG removed from the atmosphere. This removal can take place through mechanisms such as carbon capture and storage or restoring forests. In order to reach the Paris Agreement's 1.5°C goal, total GHG emissions need to reach net zero by around 2050 (IPCC, 2018).



on net zero. Canada and the Republic of Korea have proposed net zero in legislation, while Brazil, China, Italy, Japan, Turkey, and the United States have included net zero ambitions in policy documents

(Table 1). In addition, Australia, India, Russia, Saudi Arabia, and South Africa have communicated net zero targets in declarations/pledges.

	G20/High emitters <sup>1</sup>	Others
Achieved		<ul style="list-style-type: none"> <li>Gabon</li> </ul>
In law	<ul style="list-style-type: none"> <li>Canada</li> <li>European Union</li> <li>France</li> <li>Germany</li> <li>Japan</li> <li>Republic of Korea</li> <li>United Kingdom of Great Britain and Northern Islands</li> </ul>	<ul style="list-style-type: none"> <li>Denmark</li> <li>Guatemala</li> <li>Hungary</li> <li>Ireland</li> <li>Kingdom of the Netherlands</li> <li>New Zealand</li> <li>Norway</li> <li>Spain</li> <li>Sweden</li> </ul>
In policy document	<ul style="list-style-type: none"> <li>Brazil</li> <li>China</li> <li>Turkey</li> <li>United States of America</li> </ul>	<ul style="list-style-type: none"> <li>Albania</li> <li>Algeria</li> <li>Austria</li> <li>Azerbaijan</li> <li>Belarus</li> <li>Bermuda</li> <li>Chile</li> <li>Costa Rica</li> <li>Croatia</li> <li>Czech Republic</li> <li>Ecuador</li> <li>Egypt</li> <li>Finland</li> <li>Greece</li> <li>Iceland</li> <li>Iraq</li> <li>Italy</li> <li>Jordan</li> <li>Kenya</li> <li>Kyrgyzstan</li> <li>Latvia</li> <li>Lithuania</li> <li>Luxembourg</li> <li>Macedonia, Republic of</li> <li>Malta</li> <li>Moldova, Republic of</li> <li>Monaco</li> <li>Morocco</li> <li>People's Republic of Korea</li> <li>State of Palestine (the)</li> <li>Panama</li> <li>Paraguay</li> <li>Philippines</li> <li>Portugal</li> <li>Qatar</li> <li>San Marino</li> <li>Slovenia</li> <li>Sri Lanka</li> <li>Ukraine</li> <li>Uruguay</li> <li>Uzbekistan</li> <li>Venezuela, (Bolivarian Republic of)</li> </ul>
Declaration or pledge	<ul style="list-style-type: none"> <li>Australia</li> <li>India</li> <li>Russian Federation</li> <li>Saudi Arabia</li> <li>South Africa</li> </ul>	<ul style="list-style-type: none"> <li>Andorra</li> <li>Cameroon</li> <li>Congo (the)</li> <li>Côte d'Ivoire</li> <li>Estonia</li> <li>Eswatini</li> <li>Ghana</li> <li>Israel</li> <li>Kazakhstan</li> <li>Malaysia</li> <li>Nigeria</li> <li>Thailand</li> <li>United Arab Emirates</li> <li>Viet nam</li> <li>Zimbabwe</li> </ul>
Proposed/ In discussion	<ul style="list-style-type: none"> <li>Indonesia</li> <li>Mexico</li> <li>Pakistan</li> </ul>	<ul style="list-style-type: none"> <li>Argentina</li> <li>Armenia</li> <li>The Bahamas</li> <li>Belgium</li> <li>Bulgaria</li> <li>Cape Verde</li> <li>Colombia</li> <li>Cyprus</li> <li>Lebanon</li> <li>Micronesia</li> <li>Namibia</li> <li>Nicaragua</li> <li>Peru</li> <li>Slovakia</li> <li>Switzerland</li> <li>Tunisia</li> <li>Turkmenistan</li> </ul>

1. This includes the top 20 highest GHG emitters based on the World Bank data



In fact, one encouraging trend has been the number of countries committing to long-term net zero targets. As of November 2021, 177 countries (about 90% of all countries) have revealed that they are considering net zero targets. Of these countries, nine have declared that they have achieved net zero emissions, 16 have net zero targets written into law, 59 have mentioned net zero in policy documents, 21 have made a declaration or pledge to reach net zero, and 72 have ongoing discussions regarding net zero targets (Net Zero Tracker, 2021; United Nations, n.d.; United Nations, 2021; World Bank, 2021).

To achieve long-term net zero goals, countries need to make substantial progress over time in advancing energy transition technologies such as renewable energy and energy efficiency, which emphasises the need for stronger 2030 commitments.

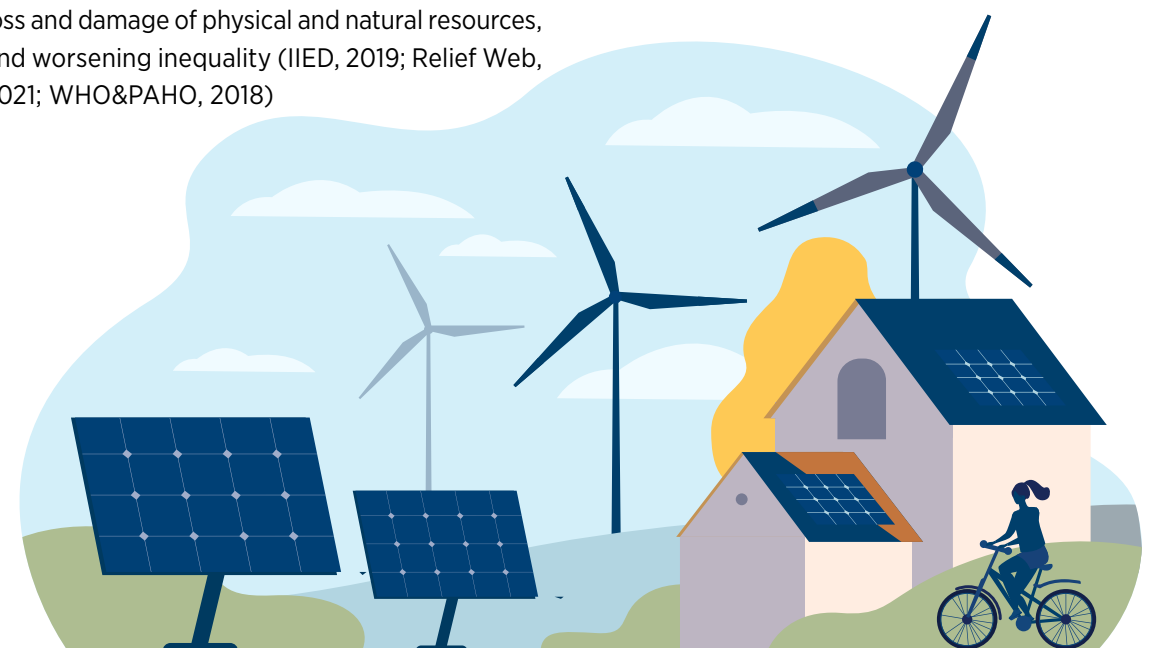
## 1.2. CLIMATE PLEDGES BY LEAST EMITTING COUNTRIES

Least developed countries (LDCs) and small island developing states (SIDS) bear a disproportionate cost of climate change-related impacts, despite being home to a fraction of the world's population and contributing only around 7% of global GHG emissions (UNCTAD, 2017; UNDP, 2021; UNFCCC, 2005). Over the last 50 years, about 69% of deaths due to climate-related disasters globally were in these two groups of countries, which also experienced the displacement of millions of people, loss and damage of physical and natural resources, and worsening inequality (IIED, 2019; Relief Web, 2021; WHO&PAHO, 2018)

In light of these setbacks, these countries are increasingly capitalising on renewable energy sources to mitigate and adapt against their climate-induced vulnerabilities while ensuring energy security and sustainable socio-economic growth. Around 32 LDCs and 27 SIDS, representing a total of 55 parties,<sup>6</sup> have submitted new, updated or second NDCs since September 2020, more than 35 Parties submitted stronger pledges. About 44 Parties also included renewable energy targets (see Section 2).

Several LDCs and SIDS have set emission reduction targets accompanied by ambitious plans to expand renewable energy in their energy or generation mix. Some of them are presented in Box 2.

Several mechanisms are in place to provide countries with the requisite financial (see Section 3 on climate financing) and technical support to enhance NDC implementation. For example, the NDC Partnership – a coalition of over 100 countries and institutions including IRENA, several UN bodies and multilateral development banks (MDBs) – is supporting countries in NDC formulation, implementation, monitoring and/or reporting. In collaboration with the NDC Partnership, UNDP's Climate Promise and through direct country support, IRENA is providing similar support to countries, placing renewable energy at the forefront (Box 3).



<sup>6</sup> Four Parties are categorised as both an LDC and SIDS.

## BOX 2. PLEDGES MADE BY SELECTED LDCS AND SIDS

In 2021, **Barbados** submitted an updated NDC strengthening its conditional emission reduction target from 44% to 70% compared to the business-as-usual scenario. Barbados also included an unconditional target of 37% reduction by 2030 compared to the business-as-usual scenario. To meet its ambitious climate goals, Barbados has set a target for 95% share of renewables in its electricity mix among other measures in transport electrification and energy efficiency improvements.

**Bhutan** submitted its second NDC in 2021, reiterating its target to remain carbon neutral. To support this, several programs and plans were mentioned as part of sectoral Low Emission Development Strategies (LEDS) and National REDD+ Strategy and Action Plan. Renewable energy, energy efficiency and transport electrification play a key role in the LEDS for human settlement; LEDS for industry; and LEDS for surface transport. In addition, the NDC mentions several renewable energy projects as part of its efforts to remain carbon neutral. Bhutan's NDC indicates that target achievement remains conditional on international financing and technical assistance.

In 2020, **Fiji** submitted its updated NDC, reaffirming many of the previous targets, including a 30% reduction of CO<sub>2</sub> emissions from the energy sector compared to the business-as-usual by 2030, out of which a third of the reduction will be achieved unconditionally. The pledge will be supported through a target of 100% renewable energy in grid-connected power. Fiji also added several new adaptation targets, including adopting Climate Smart Agriculture practices, increasing resiliency through improved critical public infrastructure, and relocating highly vulnerable communities.

**Gambia (The)** submitted its second NDC in 2021, setting a target of 49.7% reduction in its emissions compared to the expected 2030 baseline. This is supported through a range of conditional targets in both grid and off-grid renewable energy including expanding its solar water heating facilities to supply 10% of demand by 2030. However, at the same time, the country has taken steps to begin domestic oil extraction to reduce its reliance on oil imports (Climate Action Tracker, 2021b).

**Jamaica** provided an updated NDC in 2020, which increased its 2030 reduction goals from 7.8% unconditional and 10% conditional to 25.4% unconditional and 28.5% conditional reductions depending on international support compared to the business-as-usual scenario. Furthermore, the scope of the NDC was broadened to include land use change and forestry within the targets. In absolute terms, Jamaica's unconditional commitment in its updated NDC has risen by more than 60% compared to the previous NDC.

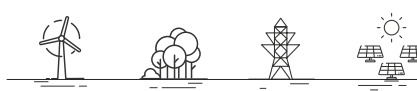
**The Laos People's Democratic Republic** submitted an updated NDC in 2021 pledging to reach an unconditional target of a 60% GHG emissions reduction compared to the baseline scenario by vastly expanding its local hydropower capacity to 13 GW by 2030. Conditional on international support, the country will increase its solar and wind capacity to 1 GW, and biomass to 300 MW. Additional measures include but are not limited to increasing its electric vehicle fleet to 30% of the national vehicles mix, biofuel targets, and energy efficiency improvements.

**Seychelles** submitted an updated NDC in 2021, pledging to reduce economy-wide greenhouse gas (GHG) emissions by 26.4% below business-as-usual (BAU) in 2030. This further includes a commitment to achieve net zero by 2050. The update reiterates the target of expanding renewable electricity from 5% currently to 15% in 2030 using mainly wind and solar PV, and expand energy efficiency.

**Papua New Guinea** has committed to decreasing its GHG emissions by at least 50% before 2030, and becoming carbon-neutral before 2050, by utilising local renewable resources.

Many countries amongst the LDCs, and particularly SIDS, do not possess abundant renewable energy potential, but have still committed to emission reductions and a clean energy transition through feasible avenues. In most cases, this is conditional on international technical and financial assistance.

Source: (Climate Watch, 2021a; UNFCCC, 2021c)

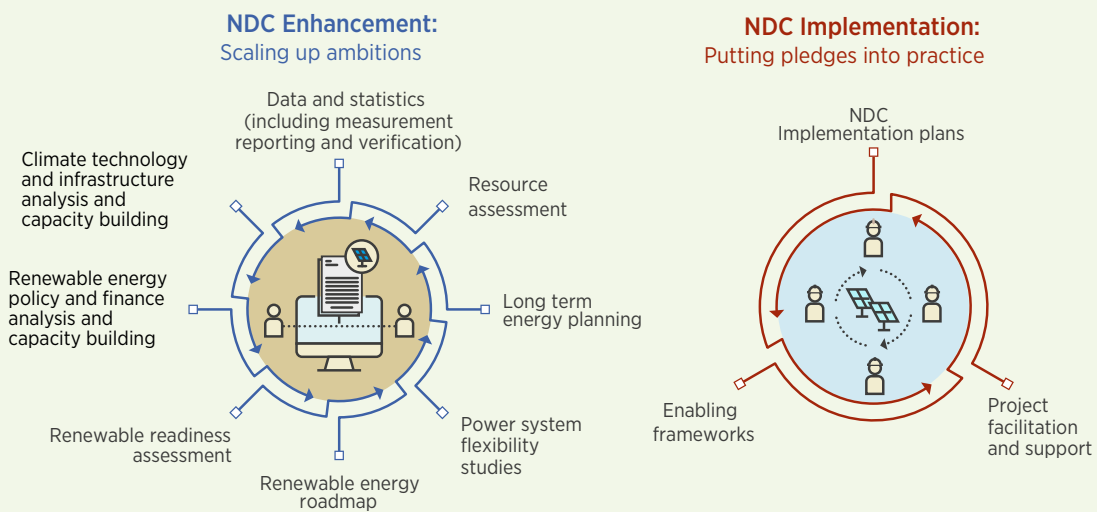


**BOX 3. IRENA SUPPORT FOR COUNTRIES IN THEIR NDC ENHANCEMENT AND IMPLEMENTATION INCLUDING LDCS AND SIDS**

Under the overarching framework of NDCs, IRENA has worked with 72 Parties globally to support NDC enhancement and implementation in preparation for COP26. IRENA is currently delivering 144 activities related to NDC enhancement and implementation (Figure 5), through direct country engagement and in collaboration with partner organisations. Activities include capacity building in renewable energy policy and finance; resource assessments; renewable energy data and statistics; renewables readiness assessments (RRAs); renewable energy roadmaps, climate technology and infrastructure assessment, project facilitation and technical support; and monitoring, reporting and verification (MRV) systems. Of these activities, more than 60 are targeted at Small Island Developing States (SIDS) and Least Developed Countries (LDCs). Examples of activities include the Renewables Readiness Assessment (RRA) study in Bhutan, support in identifying and analysing mitigation measures in Gambia (the), REmap analysis and identification of NDC targets in Belize, and the identification of cost-effective mitigation options for the energy sector in Saint Kitts and Nevis.

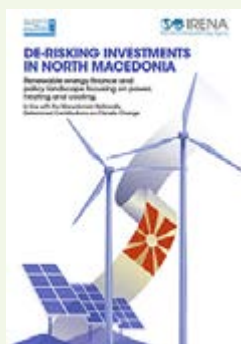
**Figure 5. Summary of IRENA’s NDC enhancement and implementation support to countries**

How IRENA helps parties of the Paris Agreement strengthen their climate pledges:



Sources : (IRENA, 2021c)

**Support in de-risking investments in North Macedonia**



Under the Climate Promise cooperation framework, IRENA and the United Nations Development Programme (UNDP) supported the Republic of North Macedonia in the areas of policy and finance for de-risking renewable energy investments, to support the implementation of the enhanced NDC. An analysis was conducted to identify barriers and associated risks which can hold back private-sector investment in renewable energy, focusing on power and heating and cooling; and recommendations were presented on policy frameworks and financial de-risking instruments to scale up renewable energy investments, taking into account the need for a post-Covid recovery agenda that aims to achieve resilience, development, and equality (IRENA and UNDP, 2021).

### *Support in resource assessment*

IRENA has supported multiple countries including Burkina Faso, Ecuador, Kyrgyzstan and Mozambique in identifying suitable locations for the deployment of renewable energy, including identifying utility-scale wind and solar photovoltaic (PV) plants through almost 40 pre-feasibility site assessments. IRENA additionally supported capacity building activities in Gabon, Mali, and Niger (the) to disseminate renewable energy resource assessment practices for de-risking project development.

The Agency also provided sub-national support at the city-level to Antigua and Barbuda, Mauritius, Saint Lucia, and Seychelles using its SolarCity simulator - an online tool that facilitates rooftop solar PV deployment in urban areas.

### *Support in data and statistics*

IRENA is supporting countries in evidence-based energy policy-making through improved data collection and energy statistics; filling data gaps through surveys and estimations; supporting the calculation of avoided emissions; and providing information in a useful format to track progress and support decision-making.

Through workshops, training sessions and stakeholder engagement sessions, IRENA is facilitating dialogue between country officials from different institutions to support the formulation of country's updated and second NDC communications to the UNFCCC. Out of 27 requests received, 20 were formalised and nine projects have been completed as of Q4 2021. In around ten projects, IRENA helped countries develop and implement MRV systems including energy emissions and mitigation actions based MRV systems. Some of the main activities related to these MRV projects were:

- Methodology review of avoided emissions and emissions inventories.
- Energy statistics capacity building for government institutions.
- Design and implementation of MRV systems for long-term monitoring.
- Needs assessment and energy data audit to review existing data and methods, identify gaps and needs, and data quality assessment. This includes NDC target review; and data collection and analysing for calculating baselines and/or projections.
- Alignment between NDC targets, mitigation actions and national energy policies.
- Recommendations for institutional arrangements.

A few examples include the implementation of avoided emissions MRV in Belize, Ecuador, El Salvador, Niger (the), and Sudan (the). Equally important are building energy balances for Mozambique, Nigeria, and Zambia, as well as energy audits for Belize, Niger (the), Dominica, El Salvador, Grenada, St. Kitts and Nevis, St. Vincent and the Grenadines, Tonga, Uganda, and Uzbekistan. Additionally, online energy statistics trainings were held in Nigeria, Benin, Mozambique, Uganda, and Zambia.

### *Climate technology and infrastructure*

IRENA is assisting at least 31 countries in developing and implementing mitigation and adaptation measures to enhance NDCs, strengthen NDC implementation plans, and advance Long-term Low greenhouse gas Emission Development Strategies (LT-LEDS) through the assessment of the performance, mitigation potential, associated costs, and co-benefits of renewable energy technologies and associated infrastructure in the power, transportation, buildings, and industry subsectors. IRENA supported the adoption of a 100% renewable energy target in the Caribbean, the enhancement of a 1.5°C compatible NDC in Sub-Saharan Africa, and the addition of a new sectoral emissions target in end-uses in Central America through this work package.

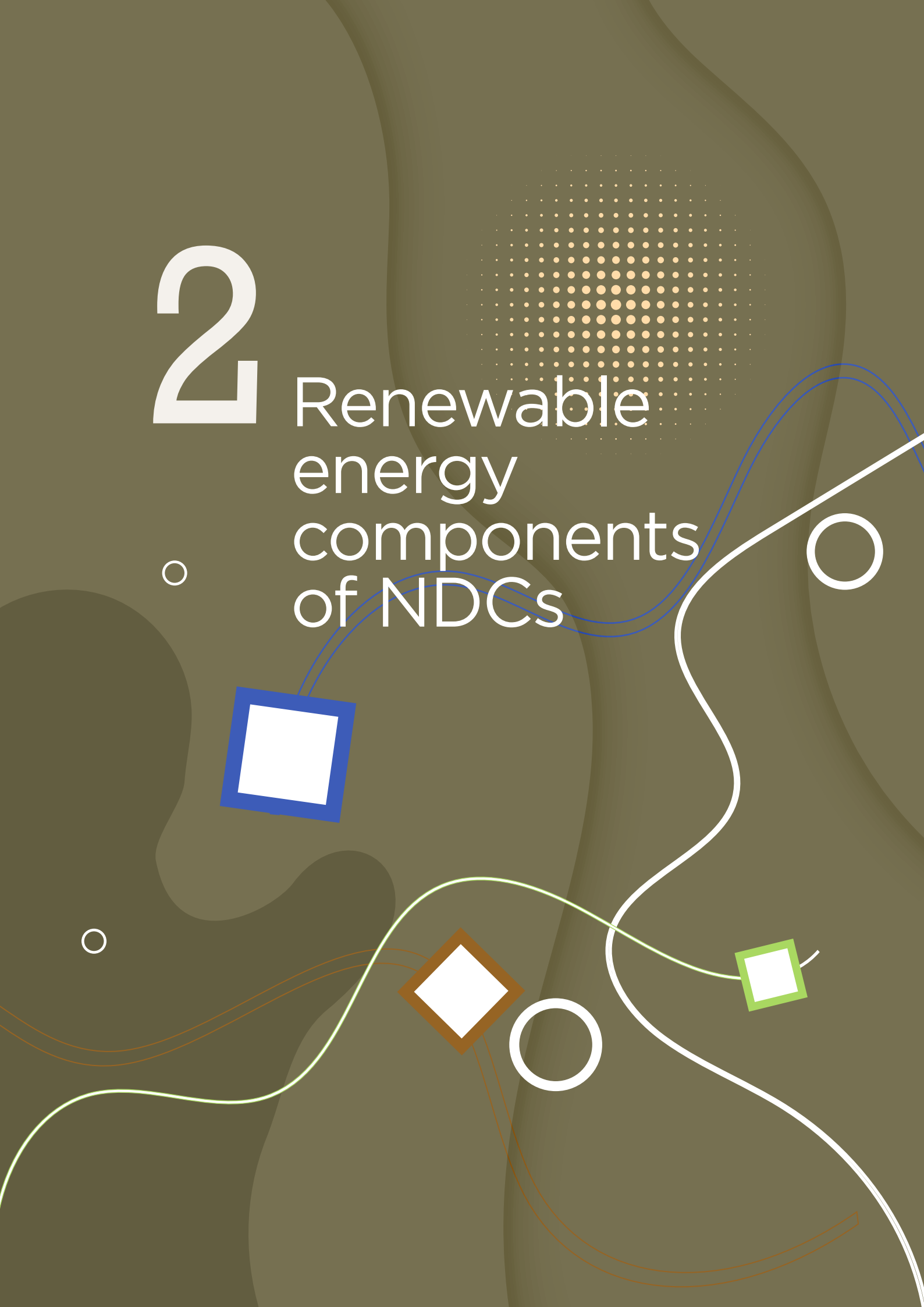
### *Additional NDC support to countries*

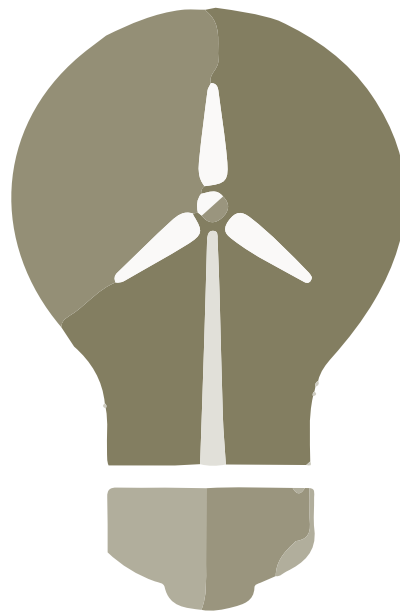
Further details of IRENA's NDC support to countries can be found at (IRENA, 2021d) on IRENA's support to strengthen climate action.



# 2

## Renewable energy components of NDCs





Setting the world on a climate resilient pathway in line with the Paris Agreement depends on a global transformation of the energy system towards clean energy. Significant scaling-up of renewable energy deployment, enhanced energy efficiency, and electrification of end-use sectors such as heating and transport, can together meet 70% of abatement potential (25%, 25% and 20% respectively) (IRENA, 2021a). Given its vital role in achieving global climate goals, this section focuses on the renewable energy components of the NDCs. As of 15 November 2021, 182 Parties had included renewable energy components in their NDCs, of which 144 had a quantified target. From these targets, 109 focus on power and 30 explicitly mention renewables in heating and cooling or transport. Only 13 Parties have committed to a percentage of renewables in their overall energy

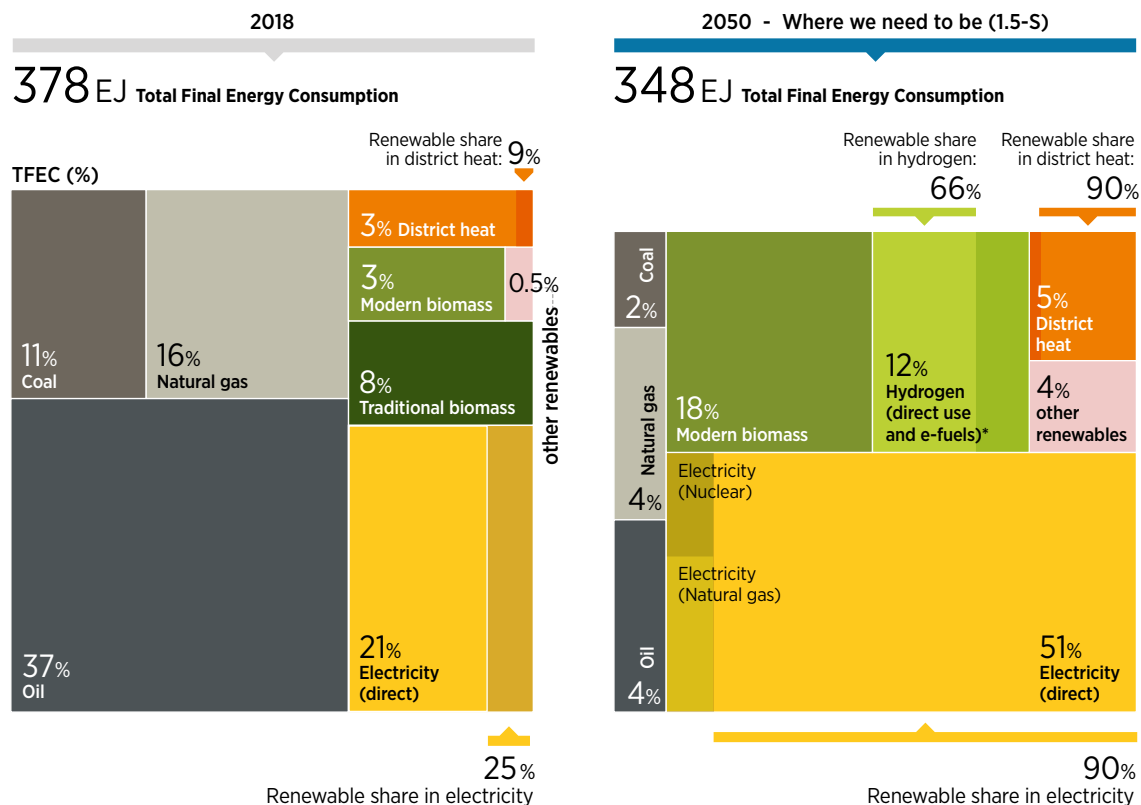
mixes. They include the Bahamas,<sup>7</sup> China, Eswatini, the European Union, Ghana, India,<sup>8</sup> Indonesia, Jamaica, Maldives, Mauritius, Nepal, Pakistan and Paraguay.

Although the direct use of renewables for heating and cooling (e.g. bioenergy, solar thermal or geothermal energy) and transport (e.g. bioenergy) plays a considerable role in the energy transition, the focus on power is also critical. IRENA's 1.5°C Scenario shows that electricity would be the main energy carrier by 2050, with more than a 50% direct share of total final energy consumption – up from 21% in 2018. This means that power additions must be from clean sources, and ambitious renewable targets are required to achieve a share of 90% in the electricity mix by 2050, as per IRENA's 1.5°C Scenario (Figure 6).

<sup>7</sup> Note that targets from the Bahamas are based on earlier NDCs communicated in 2016.

<sup>8</sup> Based on India's COP 26 pledge. An updated NDC is expected to be submitted.

**Figure 6.** The role of renewable energy in the energy transition



Source: (IRENA, 2021a).

## 2.1. TARGETS FOR RENEWABLE POWER IN NDCS

Of the 109 Parties that have defined targets for renewables in the power sector in their NDCs, 49 presented them in the form of additions – mostly in the form of capacity (GW) and a few in terms of output (GWh) (Figure 7). Although commitments to adding renewable power (in terms of capacity or output) deliver many benefits – namely providing long-term clarity regarding the trajectory of the renewable energy sector, increasing investor confidence, and building a local industry with its associated socio-economic benefits – a target in this form does not give clear indication regarding progress towards achieving climate goals.

Targets presented as a share of the electricity mix can provide even more clarity on the ambition with regards to climate goals, as they account for phasing out fossil-based power (see Box 4 on IRENA’s framework for the design of renewable energy targets). Naturally, this only applies when considerable shares of the total electricity mix are

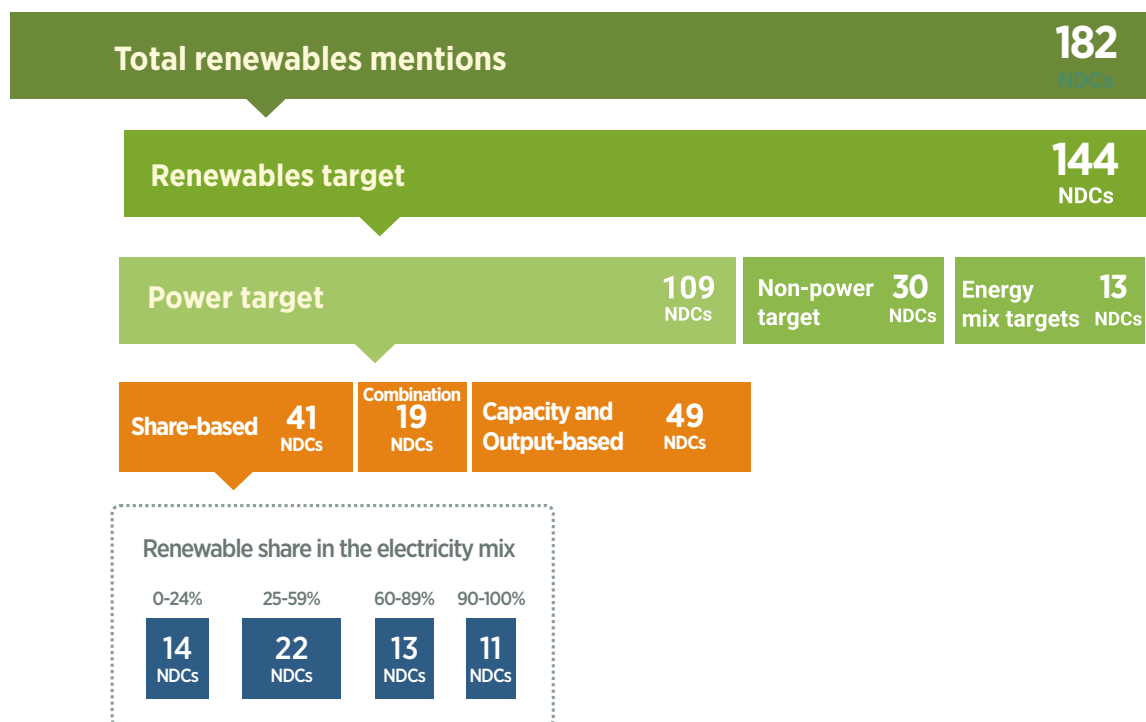
set. Of the 60 Parties with targets defined as a share of the power mix, 14 committed to achieving less than 24% share of renewable energy, 22 committed to shares between 25% and 59%, 13 committed to shares between 60% and 89%, and 11 Parties committed to shares between 90% to 100%.<sup>9</sup>

Most of the countries that have committed to 100% renewables in their electricity mix by or before 2030 are SIDS. Although climate is a major driver for renewables deployment in these countries, increased ambition is also driven by energy security and other socio-economic benefits, which are adversely affected by importing fossil fuels. However, these targets remain conditional on international support in the form of financing, technology transfer, and technical assistance.<sup>10</sup> Among the G20 and other high emitters, seven Parties included power targets, of which only two presented them as a share of electricity mix and those shares were less than 25%.

<sup>9</sup> Note that there are 19 Parties that defined targets in terms of both capacity/output and share of power mix.

<sup>10</sup> Among non-SIDS countries that have also set 100% targets for renewable energy are Costa Rica and New Zealand



**Figure 7.** 2030 Renewable Energy Targets in NDCs**BOX 4. DESIGN ELEMENTS OF RENEWABLE ENERGY TARGETS**

Setting a renewable energy target starts with identifying the overarching policy objectives for the development of renewables in a specific context. Common drivers include achieving climate objectives, addressing energy poverty and increasing access, enhancing energy security, and achieving other socio-economic benefits such as job creation and the development of new industry. The main drivers, together with the specific country context (including the current energy mix and expected energy demand, main sectors in the economy, level of development of the renewable energy sector and existing resource potential) and macro-economic conditions, all impact the choices made regarding target design.

While designing renewable energy targets, choices regarding the following design elements need to be made, taking into consideration the trade-offs that must be considered for every choice:

- The statistical basis for the target refers to whether the target will be set as a percentage of the energy/electricity mix or as an absolute volume to be added. If it is a percentage of the energy mix, a decision needs to be taken regarding whether it will be a share of primary energy supply (TPES) or final energy consumption (TFEC).
- The scope of the target determines its coverage, whether it covers the whole energy sector or focuses on a particular end use, such as power. This design element also covers the technology specificity of the target.
- Other characteristics to consider include whether the target is for a minimum or maximum share or quantity, covers the short or long term, and whether it is aspirational or mandatory.

Finally, decisions regarding the implementation of targets include the methodology of monitoring progress towards their implementation and how often targets are updated.

Using this framework, IRENA supports countries in the design of targets at their request.

Source: (IRENA, Renewable Energy Targets: A Guide to Design, forthcoming 2022).





## 2.2. QUANTIFICATION OF RENEWABLE ENERGY (NATIONAL) TARGETS BEYOND NDCS

Although more than three-quarters of the NDCs presented included increased ambitions for renewable energy, NDCs are still non-binding pledges. As such, translating pledges made in NDCs into action will depend on how well these commitments are integrated into more binding national policies and plans.

IRENA has analysed renewable energy targets in national laws and official strategies released by early 2021 (IRENA, forthcoming 2022) and finds that in a majority of cases, NDC pledges have not yet been mainstreamed into long-term policy and planning. In 178 of the 196 countries analysed (91%), a mismatch exists between renewable energy targets in NDCs and those featuring in national laws, and official strategies and plans. Although this may partly be due to temporal differences in the enactment of national legislation and NDCs,<sup>11</sup> translating pledges in NDCs to binding

legislation can mainstream these pledges into long-term policy and planning. This can help mobilise the required institutional, regulatory and financial infrastructure of countries in pursuit of a low-carbon development strategy.

To put the current ambition outlined in national policies and plans into context with respect to the 1.5C° Scenario, IRENA has quantified national policies and plans in the power sector. By early 2021, 160 countries had active targets for renewable power at the national level, as included in national laws, and official strategies and plans. Implementing existing renewable energy targets could bring an additional 0.9 TW of installed renewable power capacity by 2030 (predominantly solar, wind and hydro), taking the global installed renewable power capacity to 3.7 TW.

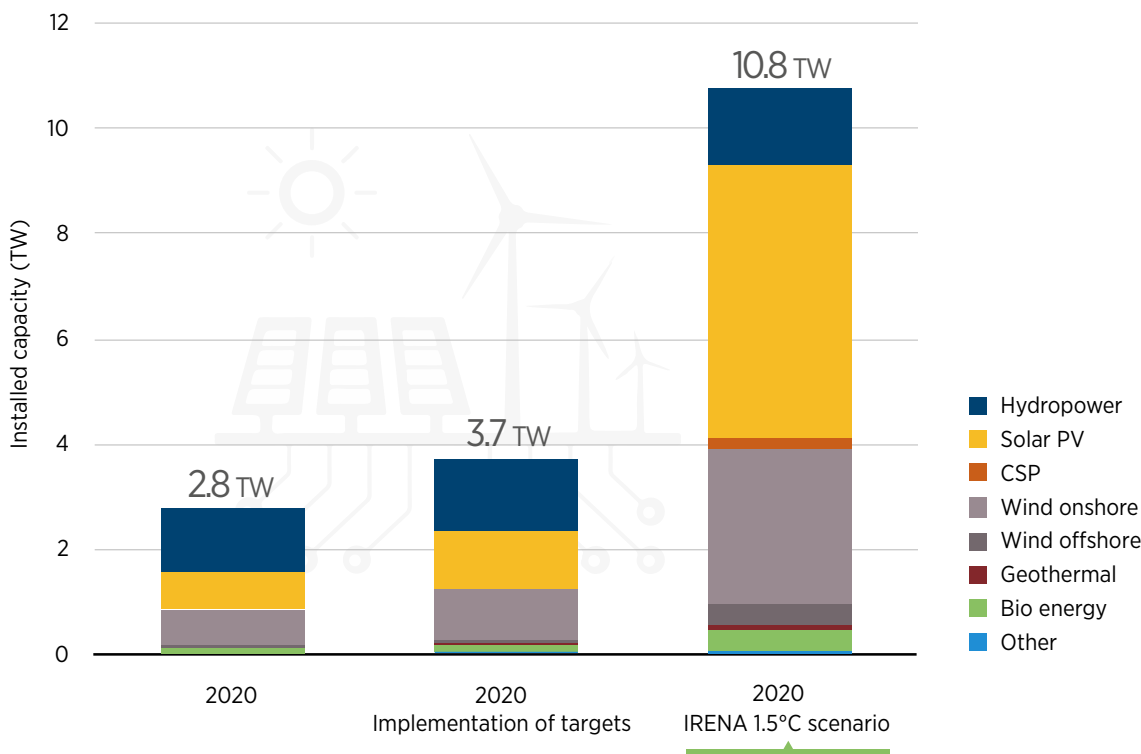
<sup>11</sup> In many cases, the temporal lag exceeds five years.

Achieving these targets would meet only one-third of what is required to stay in line with 1.5°C pathway (10.8 TW by 2030, before growing further to 27.8 TW by 2050) (IRENA, 2021a). Targeted capacity for solar PV and onshore wind would each need to rise five-fold compared to current projections if all targets were to be reached.<sup>12</sup> CSP targets would need to be more than eleven times higher, while those for onshore wind and geothermal would need to more than triple (Figure 8). This would require USD 10.5 trillion in new renewable power investment between 2020 and 2030, not accounting for the investment required to establish the enabling conditions for these projects to take place.

Targets are only effective when translated into policies and measures that are part of a long-term solid policy framework combining various aspects including enabling and deployment policies. IRENA assists countries in the implementation of NDCs through support with policy design, among other areas (Box 3).

Furthermore, power sector targets, while important, need to be accompanied by renewables and/or decarbonisation targets in other end use sectors such as heating, cooling and transport (IRENA, Renewable Energy Targets: A Guide to Design, forthcoming 2022).

**Figure 8.** Global renewable power installed capacity in 2020 and 2030: Future projections based on targets vs IRENA 1.5°C Scenario



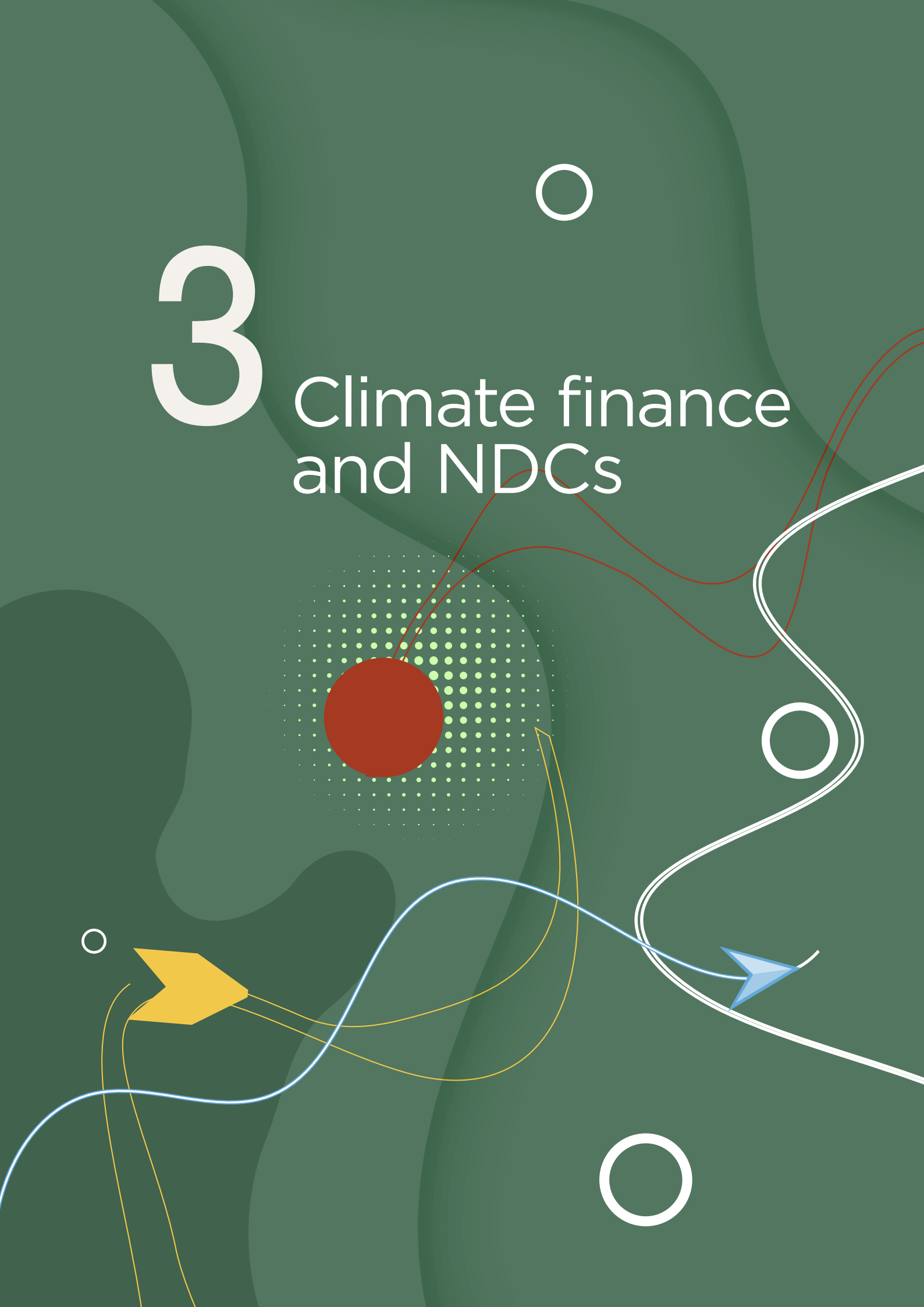
Source: (IRENA, forthcoming 2022), based on (IRENA, 2021a).

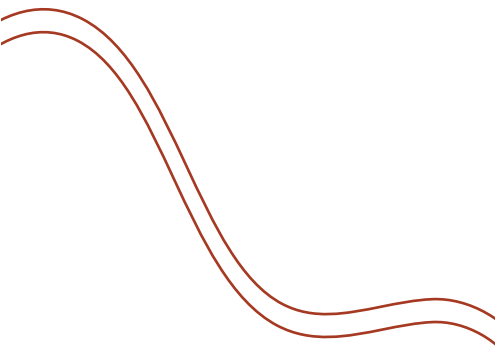
<sup>12</sup> Note that this assumes that targets will not be exceeded.



# 3

## Climate finance and NDCs





Securing a climate-resilient future depends on the ability of the global community to direct global financial capital towards sustainable assets. Climate finance therefore plays a crucial role in achieving NDCs and transforming mitigation and adaptation commitments into actions. The investment needs are substantial and will require a much greater activation of all capital pools – both public and private – as well as a stepped-up redirection of financing from ‘brown’ to ‘green’ technologies, and a stronger emphasis on providing support to those countries that need it.

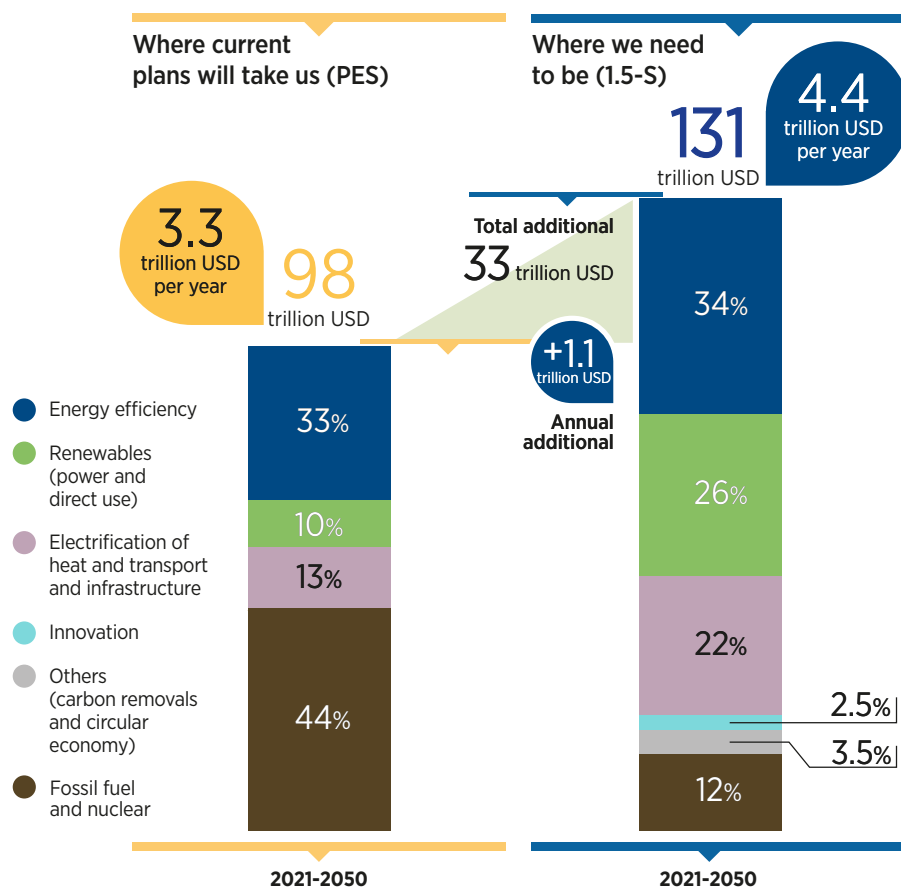
### **3.1. INVESTMENTS REQUIRED FOR THE ENERGY TRANSITION**

IRENA has estimated that the deployment of energy transition-related technologies required to put the world on the 1.5°C pathway necessitates USD 131 trillion of aggregate investment between 2021 and 2050. This represents an average annual funding requirement for the energy sector of about USD 4.4 trillion between 2021 and 2050 (Figure 9)

(IRENA, 2021a). When it comes to renewable power, which is identified as one of the major avenues for achieving the energy transition, the required annual investment amounts to nearly USD 1 trillion for the 2021–2050 period (IRENA, 2021a), more than triple the renewable energy power investment of the USD 300 billion estimated for 2020. The investments presented in Figure 9 represent the needs for installing the technology and exclude the investments required to create an enabling environment for the transition (e.g. capacity building and the implementation of structural change and just transition policies).

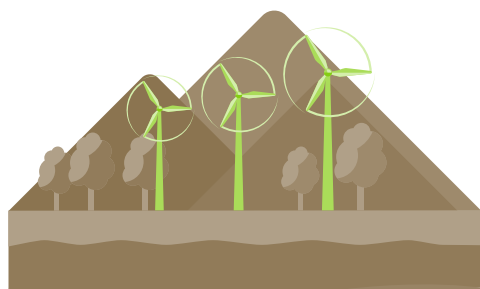
Realising the climate-safe scenario will depend on securing significant funding for energy transition technologies (i.e. renewables, energy efficiency, electrification of heat and transport). This requires drastic cuts and/or repurposing of current investments in fossil fuels over the coming years and decades, with oil and coal investments expected to decline the fastest, followed by natural gas. Over the 2020–2050 period, cumulative

**Figure 9.** Total investment by technology in the Planned Energy Scenario (PES) and IRENA's 1.5°C Scenario (2021-2050)



Source: IRENA (2021a).

investments of more than USD 24 trillion must be redirected from fossil fuels towards energy transition technologies. Countries would be well advised to begin this capital reallocation rapidly, as delaying action would cause fossil fuel stranded assets to nearly double, from an estimated USD 3.3 trillion to an alarming USD 6.5 trillion by 2050. In addition, support is needed to ensure a just transition, including the reallocation and creation of new jobs and services (IRENA, 2021a). Box 5 discusses the Just Transition Partnership for the transition from coal in South Africa.



### 3.2. COMMITMENTS TO REDIRECTING FINANCING FROM COAL

At COP26, 39 signatories including several countries and MDBs signed the statement on Aligning International Public Finance With the Clean Energy Transition and committed to 'ending direct public support for the international unabated fossil fuel energy sector<sup>13</sup> by the end of 2022, except in limited and clearly defined circumstances that are consistent with a 1.5°C warming limit and the goals of the Paris Agreement' (Conference of Parties 26, 2021b). This complements the agreement by representatives from nearly 200 Parties agreed to phase down unabated coal (UNFCCC, 2021d). However, major public investors in the fossil fuel sector were missing from this statement.

In addition, ten major MDBs have issued a Joint Climate Statement at COP26 outlining their activities to date to align their financial flows with the Paris Agreement, although the statement was

<sup>13</sup> This is defined as fossil fuel energy without pollution control measures such as carbon capture and storage.

short of concrete financing targets or deadlines (Conference of Parties 26, 2021c). Among the initiatives launched at COP26 however, was also the the Energy Transition Mechanism by the Asian Development Bank (ADB) which will phase out 30 GW of coal power in Southeast Asia (ADB, 2021).

Private financiers are also increasingly joining coalitions aiming to scale up capital required for the transition to a climate safe economy, as can be seen in the launch of the Glasgow Financial Alliance for Net Zero (GFANZ) (Box 6) with a rapidly growing membership that includes over 450 firms from 45 countries (Glasgow Financial Alliance for Net Zero, 2021).

Prior to COP26, several countries – some of which are key providers of development assistance such as Denmark, France, Germany, Japan, Republic of Korea, Sweden, and the United Kingdom – had pledged to halt financing of coal power plants; the latest of these is China’s pledge concerning its overseas funding to coal. This is important, as over 70% of all coal plants built globally today rely on funding from China (BNEF, 2021a; 2021b).

### 3.3. COMMITMENTS TO GLOBAL CLIMATE FINANCE

Recognising the urgent need for a drastic scale-up of financing for sustainable assets including renewable energy, the Paris Agreement called upon signatories to make “finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development”. The Agreement also called on developed countries to take the lead in mobilising climate finance in a “progression beyond previous efforts”, from a wide variety of sources, noting the significant role of public capital. Furthermore, recognising different capacities of countries to raise the required financial capital, the Agreement called on developed countries to provide financial assistance to developing country Parties (UN, 2015). To facilitate the provision of this assistance, a financial mechanism was put in place, the operation of which was partly entrusted to the Global Environment Facility (GEF) and the Green Climate Fund (GCF) (UNFCCC, 2021e).

The global climate finance architecture, however, extends well beyond the Paris Agreement entities and occurs through multilateral, bilateral, regional

#### BOX 5. SOUTH AFRICA’S JUST TRANSITION PARTNERSHIP – COP26

The World Leaders’ Summit at COP26 saw the launch of South Africa’s Just Transition Partnership – a collective effort by the European Union, France, Germany, the United Kingdom and the United States to support the decarbonisation of the energy sector in South Africa, which relies on coal for more than 70% of its energy needs and is currently the 16th highest emitter of greenhouse gases globally.

The first phase of financing will mobilise a commitment of USD 8.5 billion through various mechanisms such as grants and concessional loans, as well as risk mitigation instruments, with a view to crowd-in the private sector. This could help mitigate about 1-1.5 Gt of emissions over the next 20 years while enabling a just and inclusive transition away from coal. This deal follows South Africa’s ambitious NDC pledge of maintaining 2025 and 2030 annual greenhouse gas emissions between 398–510 MtCO<sub>2</sub>e and 350–420 MtCO<sub>2</sub>e, respectively, which will depend extensively on increasing renewable energy while simultaneously phasing out coal in the power sector.

This first-of-its-kind deal for a just transition financing could serve as a model for climate action, inviting closer international co-operation through greater financial and technical support channelled to developing nations.

Recognising the need to embed equity and justice into the energy transition, IRENA established the Just and Inclusive Energy Transitions’ collaborative framework to promote multi-stakeholder dialogue and foster international collaboration directed towards just and inclusive energy transitions. The collaborative framework is headed by the United States and South Africa.

Sources: (Conference of Parties 26, 2021a; European Commission, 2021; UNFCCC, 2021d)



and national climate change channels. Multilateral channels include entities such as GCF and GEF, as well the Climate Investment Funds (CIFs) administered by the World Bank, and multilateral development banks. Bilateral climate flows mostly come through development agencies and bilateral climate funds (such as Germany's International Klimaschutz initiative [climate protection initiative, IKI] or the UK's International Climate Finance [ICF]). Regional and national channels include a variety of funds such as Africa Risk Capacity (ARC), Brazil's Amazon Fund, and the Indonesian Climate Change Trust Fund, to name a few (Climate Funds Update, 2021; Independent Expert Group on Climate Finance, 2020). Owing to its large and decentralised scope, climate finance flows are difficult to estimate and monitor – this is also due to the fact that there is no universal agreement on the definition of 'climate finance' nor are there consistent accounting rules to track such flows (Independent Expert Group on Climate Finance, 2020).

In terms of financial commitments made linked to the global climate negotiations at COP15 in Copenhagen in 2009, developed countries agreed to mobilise USD 100 billion per year by 2020 for climate mitigation and adaptation in developing countries. This goal that was formalised at COP16 in Cancun and reiterated at COP21, where the Parties also agreed to set a new floor prior to the forthcoming COP in 2025 (UNFCCC, 2021e). Estimates of the amounts actually channelled to developing countries as part of this goal vary, as determining the amount of financing that has been mobilised is not straight forward, nor is deciding whether such capital flows represent a "progression beyond previous efforts" (as required by the Paris Agreement).



A number of financing pledges were made at COP26, and it is projected that the USD 100 billion per year target will be met by 2023 (Government of Canada & Government of Germany, 2021). A Climate Finance Delivery Plan launched ahead of COP26 suggests that the target may be exceeded in the years thereafter. However, this timeframe may change as more details on pledged amounts are revealed. In addition, as mentioned earlier, about 10 MDBs including the ADB, the African Development Bank (AfDB), the Inter-American Development Bank (IADB), the European Bank for Reconstruction and Development (EBRD), and the World Bank signed the MDB Joint Climate Statement, which reaffirmed their continued support as per their individual mandates – although no specific targets were pledged (Conference of Parties 26, 2021c)

Furthermore, a coalition of 450 global financial services entities (e.g. asset managers, banks and insurers) holding 40% of the global financial asset base – some USD 130 trillion – committed to align their portfolios with the goals outlined in the Paris Agreement under the Glasgow Financial Alliance for Net Zero (GFANZ) (UNFCCC, 2021d) (Box 6).

In terms of the composition of the public climate finance flows from developed countries to developing countries, mitigation accounts for a dominant (two-thirds) share compared to adaptation. This is driven by two sectors in particular – energy and transportation – which together accounted for half of such capital flows in 2019. The other half went into agriculture, forestry and fishing, water and sanitation, and other sector. The majority of these capital flows came in form of public loans (56% of 2019 financing), followed by public grants (21% of public financing), while other forms of support – including risk mitigation instruments, for example – represent a small portion of the overall total (3% in 2019). Nonetheless, such instruments have proven to be very efficient at mobilising private investments.

In terms of the regional allocation of public climate finance from developed countries, Asia is the main beneficiary, accounting for 43% of flows on average over the 2016–2019 period, substantially ahead of Africa (26%) and the Americas (17%). LDCs, as a group, increased their share of this type of



**BOX 6. THE GLASGOW FINANCIAL ALLIANCE FOR NET ZERO (GFANZ)**

The Glasgow Financial Alliance for Net Zero (GFANZ) is a growing coalition of 450 global financial services entities holding 40% of the global financial asset base – some USD 130 trillion. Launched in April 2021, its members commit to achieving net zero by 2050 and contributing their share of 50% emission reductions by 2030. Members are required to report progress and financed emissions annually while ‘ratcheting up’ their ambition every five years. However, while the number of signatories and asset base under the GFANZ has grown substantially, there are still some questions around the current framework of the alliance.

By some accounts, the current targets announced under the alliance may be seen as not ambitious enough. For example, only 43 members of the Net Zero Asset Managers Initiative (NZAMI) – a subset of GFANZ comprising asset managers (e.g. BlackRock, Vanguard, and Allianz) with equity holdings of USD 57 trillion – have announced 2030 targets to reduce their carbon footprints so far.

Even the targets to align 90% assets under management with net zero could fail to make any actual impact. This is because emissions tend to be concentrated within a small sub-set of assets (in the sample studied, about 85% of the overall portfolio emissions were captured within just 10% of the assets under management). Setting 100% targets could correct for this but only 13 out of the 43 targets are 100%, while the remaining are below 80%, with some being less than 1%.

Although the GFANZ has made extensive progress in creating mechanisms to track progress and increase ambition over time, this highlights the enormous gap between pledges and their impact on real-world emissions.

Source:(BNEF, 2021c; Glasgow Financial Alliance for Net Zero, 2021; Reclaim Finance, 2021; Universal Owner, 2021)

climate finance from USD 6 billion in 2016 (10% of the total) to USD 15.4 billion in 2019 (19% of the total), while the share for SIDS remained below 2% in the 2016–2019 period (OECD, 2021).

For renewable energy in particular, IRENA’s analysis (summarised in Box 7) also shows that while public financing to developing countries has grown in the recent past, it is still too little, not flowing sufficiently to the countries most in need; and furthermore, could be made more efficient with less reliance on traditional instruments such as loans and grants, and increased availability of risk mitigation solutions.

Focusing on the climate finance collected and disbursed by the operating entities of the Paris Agreement financial mechanism, and in particular the Green Climate Fund (GCF), one can see similar climate finance challenges are discussed throughout this section – namely the lack of global ambition and timely action. As the largest global fund dedicated to fighting climate change and one that is expected to become the primary channel for international public climate finance, GCF was established in 2010 but only became

fully operational in 2015 when it approved its first project funding (GCF, 2021a).

Given that the GCF is meant to play a central role in the developed world’s promise to mobilise USD 100 billion of climate finance per year, the fund has experienced a rocky start in its capital raising rounds. Its initial capital mobilisation was meant to raise USD 10.3 billion but ultimately only USD 7.1 billion was available due to exchange rate fluctuations and the United States’ failure to contribute USD 2 billion out of its USD 3 billion pledge (as the country announced its intention to exit the Paris Agreement in 2017). The fund completed its first replenishment by November 2020, which resulted in USD 9.9 billion worth of pledges (Climate Funds Update, 2021). To date, GCF has approved 190 projects worth USD 10 billion in funding commitments and USD 2 billion has been disbursed (GCF, 2021a). Energy generation and access account for almost USD 3 billion, and other sectors include an energy component such as health, livelihoods, transport and buildings. Box 8 describes select renewable energy projects approved by the Fund.



**BOX 7. SDG INDICATOR 7.A.1 ON INTERNATIONAL PUBLIC FINANCIAL FLOWS TO DEVELOPING COUNTRIES IN SUPPORT OF CLEAN AND RENEWABLE ENERGY**

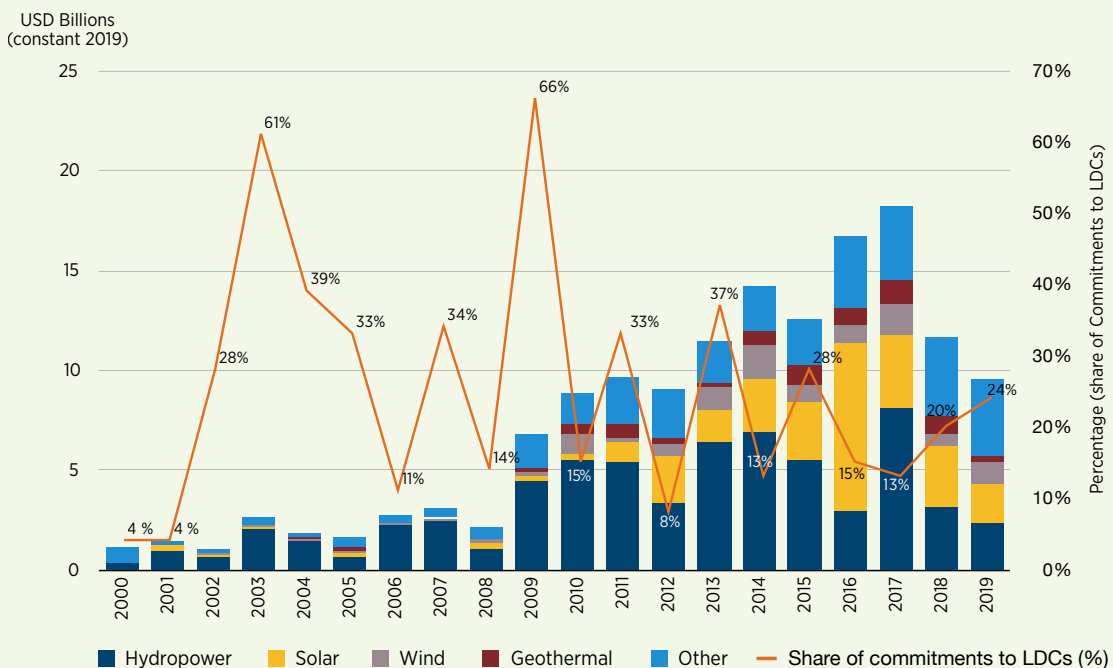
As one of the custodian agencies of Sustainable Development Goal (SDG) 7 on energy, IRENA collects and analyses data on SDG 7.A (Increasing international collaboration in support of clean and renewable energy) and, in particular, indicator 7.A.1 on international public financial flows to developing countries in support of clean and renewable energy. IRENA’s analysis shows that we are not currently on track to meet the goals set out in this target and far more support is needed for the most disadvantaged countries.

Over the 2000–2019 period, more than USD 175 billion of public capital was channelled towards developing countries in support of renewable energy. In 2019, these flows reached USD 11.4 billion (Figure 10). While the long-term trend is positive, annual or cumulative amounts are not sufficient to help put the world on a climate-safe pathway. Furthermore, annual fluctuations are significant, mostly reflecting the fluctuating nature of annual commitments and, in particular, a few large outlier projects. Most importantly, however, those countries most in need of new financing – LDCs – are not receiving sufficient support, drawing in an average of 21% of public flows over the 2010–2019 period.

In terms of the technologies financed, hydropower has traditionally drawn in a majority of public financing (reaching a high of 81% of total financing in 2007), but solar and wind have grown their share significantly, reflecting the level of maturity that such sectors have reached and the striking price drops seen over the past decade. In 2019, hydro attracted about 25% of capital, closely followed by wind at about 12% and solar power at 20%.

The most commonly used financial instruments were concessional loans (representing 79% of the total in 2019 but with an average share of 90% in the overall 2000–2019 period) followed by grants, representing 14% of the 2019 total and an average 7% share over 2000–2019. While the provision of risk mitigation instruments such as guarantees has grown recently, their overall share is still minimal (2% of the 2019 total). Given that such instruments are particularly effective in mobilising private capital, and in light of the increased market uncertainty seen in the past few years, their greater provision will be crucial to reduce real or perceived risks in renewable projects and improve the effectiveness of public interventions.

**Figure 10. International financial flows to developing countries in support of clean and renewable energy, by technology (2019 constant USD billion)**



Source: (IRENA and OECD, 2021).

As noted above, global climate finance flows are larger in size than the capital flows that occur solely through public channels or flow through the Paris Agreement Financial Mechanism entities. Estimates of total global climate flows – both public and private – coming from all countries were in the range of USD 608–622 billion for 2019, representing a 6–8% increase from the USD 574 billion in 2017/18, which, in turn, was 24% higher than the USD 464 billion average from 2015/16 (CPI, 2020). Even when viewed through this wider lens, however, it is clear that while

global climate finance has been increasing, it still falls short of the investment needed to put the world on a climate-safe pathway. Most of these capital flows stem from private sources and are directed to renewable energy (59% of the 2017/18 total), followed by low-carbon transport. The majority of climate financing occurs in East Asia and the Pacific, while three-quarters of climate investment stays in the same country from which the capital was sourced – highlighting the crucial need to reduce investment risks for global financiers.

### **BOX 8. EXAMPLES OF RENEWABLE ENERGY PROJECTS SUPPORTED BY THE GREEN CLIMATE FUND (GCF)**

#### *Participation in the Energy Access Relief Facility (Sub-Saharan Africa):*

The Energy Access Relief Fund (EARF) of USD 80 million offers financial support to companies in Africa (and Asia) working on providing clean energy access, that now face bankruptcy from the COVID-19 fallout. Short-term loans provided by the EARF aim to keep these companies financially solvent. The Green Climate Fund (GCF) is the largest contributor to EARF (with a USD 30 million investment), focusing on supporting mitigation in nine sub-Saharan countries facing acute challenges in tackling climate change.

#### *Fiji Agrophotovoltaic Project in Ovalau:*

In order to reduce Fiji's reliance on hydropower, the electricity output of which is becoming increasingly volatile owing to irregular annual rainfall, this project aims to develop a 4 MW solar PV power generation system that will boost local agricultural production, and to combine it with a 5 MW battery storage system. The total project value is USD 10 million, including GCF's loan of USD 3.9 million and a USD 1.1 million grant. The project was approved in August 2020.

#### *Espejo de Tarapacá (Chile):*

This project aims to combat renewable energy's intermittency challenge by combining a 561 MW PV solar plant with a 300 MW pumped storage hydropower plant using the Pacific Ocean as its lower reservoir. GCF's anchor equity investment of USD 60 million is expected to attract USD 1 billion of additional investments from private sector debt and equity investors. The project was approved in July 2019.

#### *Afghanistan Rural Energy Market Transformation Initiative*

With the goal to kick-start a renewable energy market in rural communities in Afghanistan, this project aims to set up three solar mini-grids with a long-term objective to develop more such mini-grids in Afghanistan, and with a focus on both public and private financing. The total project value is USD 21.4 million, including a USD 17.2 million grant from GCF. The project was approved in August 2020.






#### *Green Growth Equity Fund (India)*




This climate-focused fund aims to invest in multiple low-carbon energy and climate solutions, including renewable energy, energy efficiency technologies, low carbon transport, resource conservation, and both water and waste management. The total project value is USD 945 million, of which GCF's equity amounts to USD 132.5 million, with the remainder being supplied in the form of a grant of USD 4.5 million. The programme was approved in March 2021.

Source: (GCF, 2021b).







**ANNEX 1.** Highest CO<sub>2</sub> emitting countries and regions and level of ambition in NDCs




Country/ region	Total GHG emissions (kt of CO <sub>2</sub> equivalent)	Emissions target	Renewable energy target	Enhancement details from previous NDC to latest NDC
<b>China</b> 	12 355 240	Achieve peak carbon dioxide emissions before 2030; Lower CO <sub>2</sub> emissions per unit of GDP by more than 65% from the 2005 level	Increase the share of non-fossil fuels in primary energy consumption to around 25%	Increased emission reduction targets from 60–65% to over 65%; increased target for share of non-fossil fuel sources in primary RE consumption from 20 to 25%
<b>United States</b> 	6 023 620	Economy-wide target of reducing net GHG emissions by 50–52% below 2005 levels in 2030	No specific renewable energy targets but does mention domestic policies and incentives that have advanced renewable energy	Almost doubled emission reduction targets (from 26–28% below 2005 levels in 2025 in the previous NDC submitted prior to re-joining Paris Agreement)
<b>European Union</b> 	3 567 090	Net domestic reduction of at least 55% in GHG emissions by 2030 compared to 1990 levels	2030 target of at least 32% renewable energy share in final energy consumption	Increased emissions reduction target from 40% to 55%; introduced a specific renewable energy target for 2030
<b>India</b> 	3 374 990	COP 26 pledge: 1 billion tonne reduction in CO <sub>2</sub> emissions by 2030	COP 26 pledge: 50% share of renewables in the country's energy mix (with low-emission capacity raised from 450 GW to 500 GW)	Expected to significantly raise ambition in the forthcoming NDC update
<b>Russian Federation</b> 	2 543 400	To reduce GHG emissions by 2030 by 'up to 70%' relative to the 1990 level	Limited mention of renewables	Russia decreased its GHG reduction target from 'up to 75%' to 'up to 70%' compared to 1990 levels from its INDC.

Country/ region	Total GHG emissions (kt of CO <sub>2</sub> equivalent)	Emissions target	Renewable energy target	Enhancement details from previous NDC to latest NDC
<b>Japan</b> 	1186 770	Reduce greenhouse gas emissions by 46% in 2030 compared to 2013 levels	All possible efforts in all areas including thorough energy efficiency measures, maximum introduction of renewable energy, as well as decarbonisation of public sectors and local communities	Increased emission target from 26% in the first NDC
<b>Brazil</b> 	1032 640	To reduce its emissions in 2030 by 43% compared with 2005 (updated to 50% at COP26)	No target; renewable energy mentioned but only in the context of previous targets	Pledged carbon neutrality by 2050 instead of 2060 (in the original NDC); <sup>1</sup> slightly raised emission target at COP26 pledge
<b>Indonesia</b> 	969 580	Unconditional: 29% reduction in GHG emissions against BAU scenario by 2030; conditional: 41% reduction by 2030, subject to availability of international support for finance, technology transfer and development, and capacity building	Refers to the National Energy Policy target of new and renewable energy share in TPES of at least 23% in 2025 and at least 31% in 2050. Presents two scenarios: a. Unconditional mitigation 19.6% of power generation will come from renewables by 2030; b. Conditional mitigation scenario: 132.74 TWh produced by renewable energy (equivalent to 21.65 GW capacity)	No change in targets or mitigation scenarios.

<sup>1</sup> Financing needs as per Brazil's updated NDC are: at least USD 10 billion per year. This estimate may be revised based on an updated COP 26 pledge



Country/ region	Total GHG emissions (kt of CO <sub>2</sub> equivalent)	Emissions target	Renewable energy target	Enhancement details from previous NDC to latest NDC
<b>Islamic Republic of Iran</b> 	828 280	Unconditional mitigation of its GHGs emission in 2030 by 4% compared to the BAU scenario. Conditional mitigation target is at 8% (based on INDC)		No NDC submitted
<b>Germany</b> 	806 090	NDC submitted as part of the EU		
<b>Canada</b> 	724 930	Reduce GHG emissions in 2030 by at least 40–45% below 2005 levels (406.5 MtCO <sub>2</sub> e – 443.4 MtCO <sub>2</sub> e)	Advance additional measures, including working with partners to enable Canada's electricity generation to achieve net-zero by 2050; several power and non-power targets (multiple designs) at state level	Cut emissions by at least 40–45% below 2005 levels by 2030, up from the previous target of 30% (incl. LULUCF).
<b>Republic of Korea</b> 	718 880	24.4% reduction from total national GHG emissions in 2017 (709.1 MtCO <sub>2</sub> e) by 2030; COP26 update: 40% reduction from 2018 levels	Increase the share of renewable energy to 20% by 2030 and 30–35% by 2040	Updated NDC contains specific targets for renewable energy shares, EVs and hydrogen-fuelled vehicles, and mitigation measures for power and heating

Country/ region	Total GHG emissions (kt of CO <sub>2</sub> equivalent)	Emissions target	Renewable energy target	Enhancement details from previous NDC to latest NDC
<b>Mexico</b> 	679 880	Reduce unconditionally 25% of GHGs and short-lived climate pollutants emissions (below BAU) for the year 2030; conditional: 40% reduction	No quantitative targets but mentions measures to increase the share of renewables in the electricity mix	Weakened emission-reduction target; 2030 emissions under the new pledge will be higher than the initial NDC due to increase in the BAU projection by 1.8% and no change in the emission reduction target. 2030 emissions under the new pledge will be higher than the initial NDC due to increase in the BAU projection by 1.8% and no change in the emission reduction target
<b>Saudi Arabia</b> 	638 120	Reduce, avoid and remove GHG emissions of 278 MtCO <sub>2</sub> e <sub>q</sub> annually by 2030 (base year = 2019)	Mentioned specific urban projects running on 100% renewable energy including NEOM; one of the world's largest green hydrogen facilities <sup>2</sup>	Increased absolute emission target by more than double
<b>Australia</b> 	615 380	Reduce emissions by 26–28% below 2005 levels by 2030	Cost reduction targets for renewable electricity generation (solar, clean hydrogen)	No increase in 2030 target ambition. Recently indicated at COP26 that 2030 target is fixed. (Ministers for the Department of Industry, Science, Energy and Resources, 2021)

<sup>2</sup> The plant will be powered by over 4 GW of RE from solar and wind. By 2025, it is expected to produce 650 tons per day of green hydrogen by electrolysis and 1.2 million tons per year of green ammonia.



Country/ region	Total GHG emissions (kt of CO <sub>2</sub> equivalent)	Emissions target	Renewable energy target	Enhancement details from previous NDC to latest NDC
<b>South Africa</b> 	513 440	Annual GHG emissions to range from 398 MtCO <sub>2e</sub> to 510 MtCO <sub>2e</sub> between 2021 and 2025; annual GHG emissions to range from 350 MtCO <sub>2e</sub> to 420 MtCO <sub>2e</sub> between 2026 and 2030	No specific targets but mentioned expanding its energy mix to include more renewable energy technologies	Raised ambition; acceptable range for annual emissions lowered (i.e. 32% reduction in the upper bound for 2030 emissions and 12% reduction for the lower bound) <sup>3</sup>
<b>Turkey</b> 	502 520	Up to 21 % reduction in GHG emissions from BAU level by 2030	Conditional: increasing solar and wind power installed capacity to reach 10 GW and 16 GW, respectively, by 2030, and tapping full hydroelectric potential	Previously submitted an INDC. Reaffirmed the same targets with no increase in ambition. (Climate Action Tracker, 2021c)
<b>United Kingdom of Great Britain and Northern Ireland</b> 	452 080	Reduce economy-wide greenhouse gas emissions by at least 68% by 2030, compared to 1990 levels	Specific measures and policies mentioned in energy white paper	Increased emission target compared to previous NDC (as part of EU)
<b>Pakistan</b> 	431 220	50% reduction of Pakistan's projected emissions by 2030 15% conditional 35% conditional <sup>4</sup>	60% share in energy mix (including hydropower) by 2030. From 2020, new coal power plants are subject to a moratorium, and no generation of power through imported coal shall be allowed.	Raised ambition: Increased emissions target from a conditional 20% target in the previous NDC to a hybrid 50% target. Also included a specific renewable energy target and mentioned plans to limit coal
<b>France</b> 	423 350	NDC submitted as part of the EU		

<sup>3</sup> Financing needs amount to USD 60–64 billion in the electricity sector. Shifting away from coal will require support in the form of transition finance, and associated technology and capacity-building.

<sup>4</sup> Subject to provision of international grant finance that would require USD 101 billion just for energy transition.



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