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# CLIMATE ACTION SUPPORT

## 2024

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## About IRENA

The International Renewable Energy Agency (IRENA) is an intergovernmental organisation that supports countries in their transition to a sustainable energy future and serves as the principal platform for international co-operation, a centre of excellence, and a repository of policy, technology, resource and financial knowledge on renewable energy. 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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# ABBREVIATIONS

<b>ABAS</b>	Antigua and Barbuda Agenda for SIDS	<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>AGN</b>	Africa Group of Negotiators	<b>IRENA</b>	International Renewable Energy Agency
<b>AOSIS</b>	Alliance of Small Island States	<b>LDC</b>	Least Developed Country
<b>APRA</b>	Accelerated Partnership for Renewables in Africa	<b>LHI</b>	Lighthouses Initiative
<b>BECCS</b>	bioenergy with carbon capture and storage	<b>LLDC</b>	Landlocked Developing Country
<b>BTR</b>	biennial transparency report	<b>LT-LEDS</b>	long-term low-emission development strategies
<b>°C</b>	degree Celsius	<b>MJ</b>	megajoule
<b>CAPP</b>	Central African Power Pool	<b>MRV</b>	monitoring, reporting and verification
<b>CCS</b>	carbon capture and storage	<b>MtCO<sub>2</sub>eq</b>	million tonnes of carbon dioxide equivalent
<b>CIP</b>	Climate Investment Platform	<b>MW</b>	megawatt
<b>CO<sub>2</sub></b>	carbon dioxide	<b>MWh</b>	megawatt hour
<b>COP</b>	Conference of the Parties (to the United Nations Framework Convention on Climate Change)	<b>NDC</b>	nationally determined contribution
<b>CSP</b>	concentrating solar power	<b>NECP</b>	National Energy and Climate Plan
<b>EACREEE</b>	East Africa Centre of Excellence for Renewable Energy and Energy Efficiency	<b>PDR</b>	People's Democratic Republic (Lao)
<b>EDGAR</b>	Emissions Database for Global Atmospheric Research	<b>PPP</b>	purchasing power parity
<b>EMDE</b>	emerging market and developing economy	<b>PV</b>	photovoltaic
<b>ETAF</b>	Energy Transition Accelerator Financing	<b>RE</b>	renewable energy
<b>ETF</b>	enhancement transparency framework	<b>RELAC</b>	Renewable Energy for Latin America and the Caribbean Initiative
<b>EU</b>	European Union	<b>RRA</b>	Renewables Readiness Assessment
<b>G7</b>	Group of Seven	<b>SDG</b>	Sustainable Development Goal
<b>G20</b>	Group of Twenty	<b>SIDS</b>	small island developing states
<b>GDP</b>	gross domestic product	<b>tC/ha/yr</b>	tonne carbon/ hectare/ year
<b>GHG</b>	greenhouse gas	<b>TES</b>	total energy supply
<b>GST</b>	Global Stocktake	<b>TFEC</b>	total final energy consumption
<b>GW</b>	gigawatt	<b>TW</b>	terawatt
<b>ICTU</b>	information necessary for clarity, transparency and understanding	<b>TWh</b>	terawatt hours
<b>IITC</b>	IRENA Innovation and Technology Centre	<b>UAE</b>	United Arab Emirates
		<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
		<b>USD</b>	United States dollar
		<b>VRE</b>	variable renewable energy
		<b>Wh/kWp/yr</b>	watt hour per kilowatt peak per year
		<b>W/m<sup>2</sup></b>	watts per square metre

# EXECUTIVE SUMMARY

At the 28<sup>th</sup> Conference of the Parties to the United Nations Framework Convention on Climate Change (COP28) in the United Arab Emirates, the Outcome of the First Global Stocktake (GST) (known as the UAE Consensus) made clear the imperative for the world to advance the energy transition by tripling renewable power capacity and doubling energy efficiency improvement by 2030. This followed the Global Renewable Energy and Energy Efficiency Pledge, organised by COP28 and signed by 130 countries. Important progress was made in 2023, when 473 gigawatts (GW) of global renewable capacity was added (IRENA, 2024a). The capacity additions have been largely driven by solar photovoltaic (PV) because of its falling costs, followed by wind power capacity additions that reached a new record in 2023. Other technologies, like onshore and offshore wind, bioenergy, geothermal, hydropower, and concentrating solar power (CSP), also increased their capacities. Moreover, each region also made progress on the deployment of renewables.

- Africa added around 2.7 GW of new renewable capacity in 2023, reaching more than 62.1 GW of cumulative renewable power capacity. However, only around 43% of African countries showed progress in renewable power between 2022 and 2023. Exploring untapped renewable power potential is important for advancing the energy transition in Africa.
- In 2023, Asia and the Pacific saw a substantial increase in renewable power capacity, with a total addition of 339 GW compared to 2022, bringing the cumulative renewable energy capacity to 2 059 GW (IRENA, 2024a). The global year-on-year increase in renewable power capacity was the largest in East Asia, with the biggest contribution coming from China.
- Europe added around 70 GW of renewable power capacity in 2023, taking advantage of favourable conditions for deploying solar PV, hydropower and wind energy (IRENA, *et al.*, 2024). Europe's total renewable power capacity has reached 785.8 GW in 2023 (IRENA, 2024a).
- The Latin America and Caribbean region has the biggest share of renewables in the electricity mix. The region recorded a rise of around 24 GW in renewable power capacity compared to 2022, with a total of 308.2 GW in 2023 (IRENA, 2024b).
- Small island developing states (SIDS) cumulatively reached 8.7 GW of renewable power capacity in 2023, increasing from 7.8 GW in 2022.<sup>1</sup>

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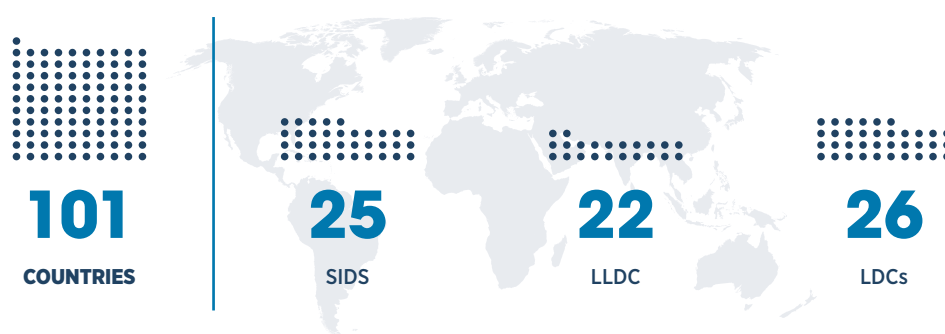
<sup>1</sup> SIDS are a distinct group of 39 States and 18 Associate Members of United Nations regional commissions that face unique social, economic and environmental vulnerabilities.



However, despite the significant progress made in 2023, the pace of renewable power deployment and energy efficiency improvement is insufficient to meet the 2030 global targets for tripling renewables and doubling energy efficiency. The 2030 targets are the crucial milestones for the Paris Agreement’s climate goal of keeping the global average temperature increase to 1.5 degrees Celsius (°C) above pre-industrial levels.

Therefore, it is essential to incorporate the more ambitious energy transition targets into the third generation of Nationally Determined Contributions to the Paris Agreement (NDCs 3.0), due to be submitted in 2025. Although countries have been pledging ambitious climate targets through their updated NDCs, the pathways outlined in these NDCs are insufficient to reach the Paris Agreement goals. Following the first GST, accelerating climate action is imperative to meet the Paris Agreement goals by 2050.

To support this process, the International Renewable Energy Agency (IRENA) has engaged with 101 countries that are Parties to the 2015 Paris Agreement as of 30 September 2024. Through this country engagement, IRENA assists in the enhancement and implementation of NDCs with a focus on the energy sector.



**Notes:** LDC = Least Developed Country; LLDC = Landlocked Developing Country; SIDS = small island developing states

IRENA’s engagement with its Member countries covers a total population of around 5.9 billion people and combined greenhouse gas (GHG) emissions totalling an estimated 31 818 million tonnes of carbon dioxide equivalent (MtCO<sub>2</sub>eq) in 2023 (EDGAR, 2024).

IRENA will continue to support efforts to enhance the scale, accessibility and affordability of climate action through the energy transition. IRENA provides comprehensive quantitative scenarios for climate-compatible energy transformation on global and regional levels through its *World Energy Transitions Outlook*, which may be used to guide national targets. IRENA’s engagements will contribute to achieving the 2030 renewable energy and energy efficiency targets, as well as the 1.5°C goal.



**H.E. Fatumanava-o-Upolu III  
Dr Pa'olelei Luteru**

CHAIR OF ALLIANCE OF SMALL ISLAND  
STATES (AOSIS)

PERMANENT REPRESENTATIVE OF  
SAMOA TO THE UNITED NATIONS,  
SAMOA

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*"The 1.5°C warming limit is not optional but mandatory to secure our future from climate change, especially for island nations and vulnerable communities. Following a memorandum of understanding signed last year at the Bonn Climate Change Conference, the Alliance of Small Island States (AOSIS) and IRENA have deepened the partnership to spearhead the renewable energy transformation, foster innovative co-operation and support the energy transition. Unlocking access to climate finance at scale is crucial for this endeavour. Looking ahead, IRENA's assistance in mobilising resources and providing technical support will be instrumental as a key driver of the energy transition investment, ensuring that our island nations achieve sustainable and resilient energy systems."*

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**MR. EVANS NJEWA**

CHAIR OF LEAST DEVELOPED  
COUNTRIES (LDC)  
GROUP OF CLIMATE CHANGE  
NEGOTIATION

MALAWI

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*"Least Developed Countries (LDCs) are at a critical juncture where the shift to renewable energy and energy efficiency is essential for both overcoming development hurdles and addressing climate change. Renewable energy and energy efficiency provide an opportunity for our nations to leapfrog traditional, polluting technologies and move towards low-emission and sustainable development pathways. This transition has the potential to drive economic growth, enhance energy access and strengthen resilience against climate impacts. Yet, achieving this requires more than just our efforts; it calls for comprehensive international collaboration. With support from IRENA, we will pave the way for a more sustainable and equitable global future."*

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**H.E. ALI MOHAMMED**

CHAIR OF AFRICA GROUP  
OF NEGOTIATORS (AGN)

SPECIAL ENVOY ON CLIMATE CHANGE  
AT THE OFFICE OF THE PRESIDENT  
OF THE REPUBLIC OF KENYA

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*"The energy situation in Africa is deeply concerning. While the rest of the world accelerates its renewable energy deployment, Africa is being left further behind. Despite its immense renewable energy potential and profound energy needs, investments in the continent fell by 47% in 2022-2023, and only received about 2% of global investments in renewable energy over the last two decades. The just transition to resilient, low-carbon development, if not properly designed, could widen the existing developmental gap between Africa and the rest of the world. We call for adequate investment and climate finance mechanisms to enable Africa to effectively combat climate change challenges. Africa's leadership has already set bold goals in the Nairobi Declaration on Climate Change, with a target of at least 300 GW of renewable capacity by 2030. In partnership with IRENA, the Accelerated Partnership for Renewables in Africa (APRA) supported by Denmark, Germany and UAE, aims to fast-track and align renewable energy deployment with broader industrial growth and job creation strategies for green industrialisation through the Africa Green Industrialisation Initiative"*

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# 1 PROGRESS TOWARD TRIPLING RENEWABLE CAPACITY BY 2030

## 1.1 GLOBAL OUTLOOK

Achieving net-zero greenhouse gas (GHG) emissions by mid-century in accordance with the Paris Agreement requires much more ambitious levels of climate action by 2030. The global energy transition is key to climate action; it represents a viable and economically feasible option for climate change mitigation as the world approaches 2030. However, to limit the global average temperature increase to 1.5°C of pre-industrial levels by the end of the 21<sup>st</sup> century, a significant acceleration of renewables deployment is needed, especially across electricity, heat and transport (IRENA, 2023a).

IRENA's 1.5°C Scenario details several essential technological avenues and measures for achieving major emissions reductions in the years leading up to 2050. These include renewable-based power; direct use of renewables; energy intensity improvement;<sup>2</sup> electrification of end-use sectors; the use of clean hydrogen and derivatives; and carbon capture and storage (CCS), bioenergy with carbon capture and storage (BECCS), and other carbon removal technologies. As such, an accelerated renewables deployment up to 2030, combined with the uptake of key energy transition technologies in the years leading to 2050, are both vital to achieve a net-zero carbon world by mid-century.

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<sup>2</sup> IRENA's *World Energy Transitions Outlook* defines energy intensity as total primary energy supply (TPES) divided by GDP; and energy intensity improvement as the compound rate at which energy intensity declines annually at the global level.

At the 28<sup>th</sup> Conference of the Parties to the United Nations Framework Convention on Climate Change (COP28) in 2023, the Parties issued the joint Outcome of the First Global Stocktake (GST) - known as the UAE Consensus.<sup>3</sup> By assessing collective progress towards the goals of the Paris Agreement, the GST has shown that the world is still off track in limiting global warming and that Parties must commit to more ambitious, economy-wide emission reduction targets in the forthcoming round of Nationally Determined Contributions (NDCs).

The UAE Consensus included an unprecedented reference to the energy transition, calling for a transition “... away from all fossil fuels in energy systems, in a just, orderly and equitable manner in this critical decade to enable the world to reach net-zero emissions by 2050” and for all Parties to work towards “tripling renewable energy capacity globally and doubling the global average annual rate of energy efficiency improvements by 2030.”<sup>4</sup>

The Parties also recognised the necessity of setting more ambitious targets in the third round of NDCs (NDCs 3.0) to reduce global greenhouse gas (GHG) emissions by 43% by 2030 compared with 2019 levels. The UAE Consensus also highlighted the need for USD 4.3 trillion in clean energy investment per year to 2030 and, thereafter, USD 5 trillion per year until 2050 to reach net-zero emissions by 2050.<sup>5</sup> The UAE Consensus thus provides a pragmatic framework to transition away from fossil fuels and scale up renewable energy to keep the world on track to achieve the goals of the Paris Agreement. The 2025 NDC update cycle before COP30 provides an opportunity for the Group of Seven (G7) countries, as well as emerging markets and developing economies (EMDEs) and other parties, to translate the UAE Consensus goals into enhanced NDC ambitions.

At COP28, 133 UNFCCC Parties also endorsed the COP28 Presidency's Global Pledge on Renewables and Energy Efficiency - the precursor to the GST call to work together to triple global renewable energy capacity and double global energy efficiency improvements by 2030 (COP28 UAE, 2023). Providing the intellectual framework for these goals, IRENA's *World Energy Transitions Outlook* provides a roadmap to close the energy transition gap and secure a global 1.5°C pathway that includes ramping up installed renewable power capacity from 3 865 gigawatts (GW) in 2023 to 11 174 GW by 2030, adding an average of 1 044 GW each year between 2024 and 2030.

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<sup>3</sup> *The Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC) has annually convened member countries to set ambitions, allocate responsibilities and assess climate measures. The COP21 in 2015 led to the Paris Agreement, which set the overarching goal of keeping the global average temperature increase well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels. The GST Outcome at COP28 in 2023 showed clearly that the years 2024 to 2025 are crucial for global climate governance to facilitate the preparation of enhanced national climate commitments. This will be achieved through the Paris Agreement Parties' NDCs 3.0.*

<sup>4</sup> *CMA5 Decision 8a as part of UAE Consensus [https://unfccc.int/sites/default/files/resource/1\\_CMA.5.pdf](https://unfccc.int/sites/default/files/resource/1_CMA.5.pdf)*

<sup>5</sup> *To achieve climate goals consistent with the 1.5°C target, both the scale-up and strategic re-allocation of investment in energy transition technologies are needed. Aligned with the energy investment package of the UAE Consensus, IRENA's assessment of financing renewables is as follows: although annual investment in energy transition technologies broke USD 1.3 trillion in 2022, the current pace of investment growth is still behind the estimated USD 5 trillion in annual investment required on average. In total, a combined USD 150 trillion in energy transition investment is required to actualise the 1.5°C target by 2050 (IRENA and CPI, 2023).*

Figure 1 Countries that endorsed the COP28 Presidency's Global Renewables and Energy Efficiency Pledge



1 Albania	26 Chile	53 Guatemala	80 Republic of Moldova	107 San Marino
2 Andorra	27 Colombia	54 Guinea	81 Monaco	108 Senegal
3 Angola	28 Comoros	55 Hungary	82 Montenegro	109 Serbia
4 Antigua and Barbuda	29 Costa Rica	56 Iceland	83 Morocco	110 Seychelles
5 Argentina	30 Cote d'Ivoire	57 Ireland	84 Mozambique	111 Sierra Leone
6 Armenia	31 Croatia	58 Italy	85 Namibia	112 Singapore
7 Australia	32 Cuba	59 Jamaica	86 Nauru	113 Slovakia
8 Austria	33 Cyprus	60 Japan	87 The Netherlands	114 Slovenia
9 Azerbaijan	34 Czech Republic	61 Jordan	88 New Zealand	115 Somalia
10 Bahamas	35 Denmark	62 Kenya	89 Nicaragua	116 Spain
11 Bangladesh	36 Djibouti	63 Kiribati	90 Nigeria	117 Sweden
12 Barbados	37 Dominican Republic	64 Kosovo*	91 Niue	118 Switzerland
13 Belgium	38 El Salvador	65 Kyrgyzstan	92 North Macedonia	119 Syria
14 Belize	39 Equatorial Guinea	66 Latvia	93 Norway	120 Tajikistan
15 Benin	40 Estonia	67 Lebanon	94 Oman	121 Thailand
16 Bhutan	41 Eswatini	68 Lesotho	95 Pakistan	122 Togo
17 Bosnia and Herzegovina	42 Ethiopia	69 Liechtenstein	96 Palau	123 Tunisia
18 Brazil	43 European Union	70 Lithuania	97 Panama	124 United Arab Emirates
19 Brunei Darussalam	44 Fiji	71 Luxembourg	98 Papua New Guinea	125 Ukraine
20 Bulgaria	45 Finland	72 Malawi	99 Paraguay	126 United Kingdom
21 Burkina Faso	46 France	73 Malaysia	100 Peru	127 United States
22 Burundi	47 The Gambia	74 Maldives	101 Philippines	128 Uruguay
23 Cabo Verde	48 Georgia	75 Mali	102 Poland	129 Uzbekistan
24 Canada	49 Germany	76 Malta	103 Portugal	130 Vanuatu
25 Chad	50 Ghana	77 Mauritius	104 Republic of Korea	131 Yemen
	51 Greece	78 Mexico	105 Romania	132 Zambia
	52 Grenada	79 Federated States of Micronesia	106 Rwanda	133 Zimbabwe

\* Throughout this publication, this designation is without prejudice to positions on status and in line with the United Nations Security Council Resolution 1244 (1999)

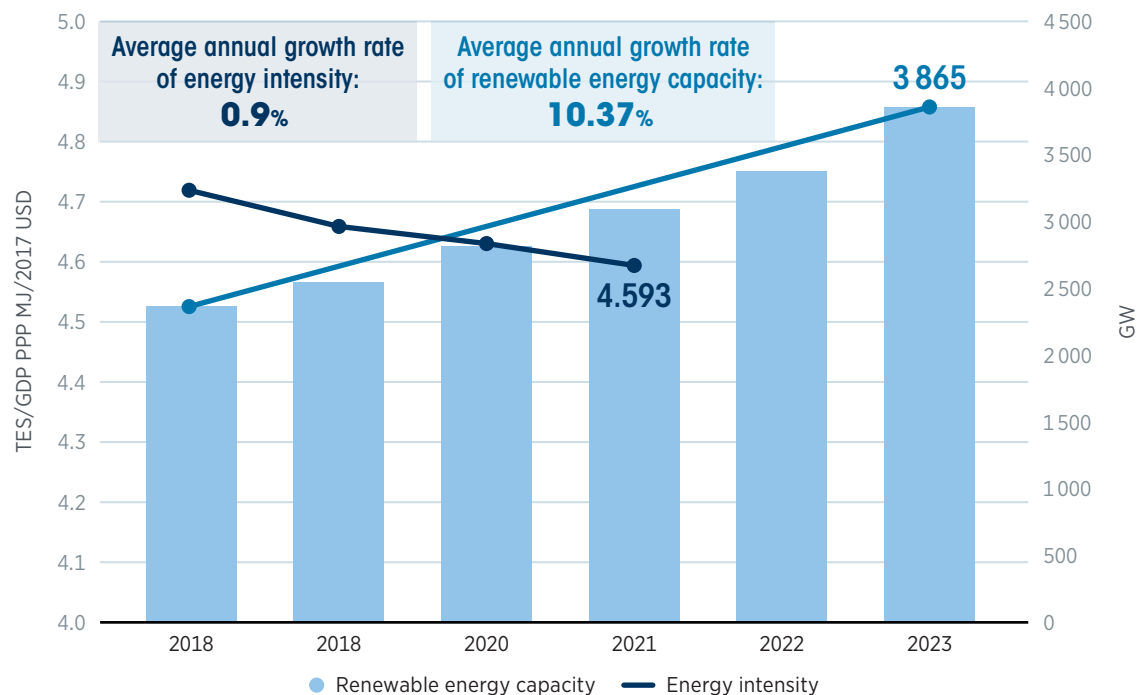
Renewables-based electricity use increased by almost 50% between 2015 and 2021, with renewables-based electricity representing more than 28% of global total electricity consumption (IEA *et al.*, 2024). The increase in renewable power has been largely driven by wind and solar photovoltaic (PV) deployments.

Global renewable capacity additions leapt significantly in 2023, to 473 GW, bringing total cumulative global renewable power capacity to 3865 GW (IRENA, 2024a). This trend is expected to continue through 2024 and 2025, largely driven by rising new solar PV capacity additions due to falling costs.

Capacity additions of global wind power also reached a new record in 2023. However, the deployment of other technologies – such as onshore and offshore wind, hydropower, geothermal, bioenergy and concentrating solar power (CSP) – will also need to ramp up significantly to achieve the 2030 tripling goal. A gap is expected to emerge in 2026 and widen each year until 2030, owing to the linear growth in installed capacity expected for all technologies except solar PV, which is likely to remain exponential (IRENA, 2024c).

If the 14% increase in installed renewable power capacity seen in 2023 were to continue for the remainder of the decade, the shortfall in 2030 would be 1.5 terawatt (TW) - or 13.5% below the tripling goal. Although progress is being made, substantial effort is still required to meet the 11.2 TW target for 2030 (IRENA, 2024c). Concerning energy efficiency, global energy intensity improved from 4.72 total energy supply (TES)/gross domestic product (GDP) in 2018 to 4.59 TES/GDP in 2021, an annual improvement rate of 0.9%; yet no significant improvement has been seen since.

Figure 2 **Global progress: Renewable power and energy efficiency improvement**



Based on: (IRENA, 2024b).

Note: GW = gigawatt; PPP = purchasing power parity; MJ = mega joule; RE = renewable energy.



The urgent actions required include: expanding successful policy programmes and addressing key deployment barriers; and creating enabling environments in countries to encourage renewables deployment, *i.e.* strengthening infrastructure and system operations, policy and regulation, supply chains, skills and capacities, financing and international collaboration. Accelerating the development of critical infrastructure, such as modernising grids, digitalising systems, expanding electricity networks, and enhancing grid flexibility through energy storage and demand-side management, must also accompany sustained rapid renewable capacity growth.

As the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) emphasised, the world remains off track to limit temperature rise to 1.5°C (IPCC, 2023). To stay on course, GHG emissions must be reduced by 43% compared to 2019 levels. Therefore, it is vital to enhance short-term climate ambitions to accelerate the energy transition and meet the Paris Agreement’s long-term climate goals. The accelerated deployment of renewables in the lead-up to 2030 is an essential solution to course-correct emissions pathways towards net-zero emissions in 2050.

At the United Nations Summit of the Future on 22 September 2024 (UN, 2024),<sup>6</sup> key issues of international co-operation were addressed, with an emphasis on the UAE Consensus 2030 energy goals, and underscoring the urgent need for immediate action by countries to tackle both today’s realities and tomorrow’s challenges.

The years from 2024 to 2030 are pivotal in re-orienting the world towards a 1.5°C pathway. The signatory countries of the COP28 Global Pledge are committed to reflecting this global target of tripling renewables in their NDC 3.0 submissions and to taking domestic actions tailored to their different national circumstances. This commitment must be clearly articulated in national policies to drive concrete actions. By translating these goals into practical measures, national frameworks can ensure the effective implementation of renewable energy initiatives.

To ensure a just and inclusive energy transition, it is imperative to foster enabling conditions through practical policies, regulations and measures. Policy makers, therefore, have a pivotal role to play in creating conducive environments and supportive frameworks for the adoption of renewable energy, mobilising the required capital and ensuring universal energy access.

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<sup>6</sup> *Pact for the Future*. [www.un.org/sites/un2.un.org/files/sotf-the-pact-for-the-future.pdf](http://www.un.org/sites/un2.un.org/files/sotf-the-pact-for-the-future.pdf)



## Box 1. IRENA's engagement in the UAE Consensus energy goals: From consultation to monitoring

The COP28 Presidency's Global Renewables and Energy Efficiency Pledge was endorsed by 133 UNFCCC Parties, accounting for more than half of global final energy consumption and around 45% of global GHG emissions. IRENA supported the COP28 Presidency in its engagement with IRENA Members, providing insight and analysis from its 1.5°C Scenario, which forms the basis of the *World Energy Transition Outlook*. The Agency also undertook regional consultations on the Pledge with countries in the Asia-Pacific, Africa, Middle East and North Africa and Latin America regions, as well as with SIDS, in the lead up to COP28.

These consultations contributed to shaping agreement on the energy goals that would later feature in the UAE Consensus, section 28(a) of which called on all Parties to the UNFCCC to contribute to global efforts to triple renewable power and double energy efficiency improvements by 2030 (UNFCCC, 2023).

In early 2024, IRENA was designated the custodian of the UAE Consensus global energy goals by the COP28 Presidency, with the responsibility to track the progress toward the tripling of renewable power capacity doubling of energy efficiency improvements each year to 2030. In addition, in the Climate, Energy and Environment Ministers' Meeting Communiqué of the 2024 G7 chaired by Italy (G7 Italy, 2024), IRENA was tasked with monitoring and reporting progress annually toward global efforts to triple renewable power, building on its existing analyses of global renewable developments. Accordingly, IRENA released the first of its annual tracking reports at Pre-COP meetings in Baku, Azerbaijan in October 2024, entitled *Delivering on the UAE Consensus: Tracking progress toward tripling renewable energy capacity and doubling energy efficiency by 2030* (IRENA, et al. 2024).



## 1.2 TRANSLATING GLOBAL AMBITION INTO NDCS

With the NDC 3.0 submissions due in 2025 before COP30, the Parties to the Paris Agreement have a unique opportunity to define higher levels of mitigation ambition based on the goals of the UAE Consensus. The Parties will also need to update energy targets, as well as GHG emission reduction targets for 2030, based on robust national assessments. It is vital that the anticipated updates reflect the UAE Consensus energy targets.

The key components of NDCs, according to the UNFCCC's information necessary for clarity, transparency and understanding (ICTU) guidance, include quantifiable information on reference points, time frames for implementation, planning processes, assumptions and methodological approaches. In addition, each Party should include its evaluation of the fairness and ambition of its NDC, its scope and its contribution to achieving the Article 2 objective in the Paris Agreement. This section takes stock of the status of the latest NDCs and reflects on good practices of NDC development and implementation as a brief guide for the energy sector component of NDC 3.0 development.

### NDC submissions

Parties to the Paris Agreement are mandated by Article 4 of the agreement to re-submit their NDCs every five years, with Q1 2025 marking the next round of submissions. Among the 168 NDCs submitted so far under the Paris Agreement, a total of 153 new or updated NDCs have been communicated as of 9 September 2024.

According to the NDC Synthesis Report (UNFCCC, 2024), if all of the current NDC targets – including both unconditional and conditional targets – are implemented, GHG emissions will range from 48.3 gigatonnes to 54.7 gigatonnes of carbon dioxide (CO<sub>2</sub>) equivalent in 2030. Global renewable energy capacity must reach almost 11.2 TW by 2030 to meet the tripling target and remain on 1.5°C pathway. However, current NDC commitments only aim for 5.4 TW, representing just half of the required capacity (IRENA *et al.*, 2024).

To achieve NDC mitigation targets and support priority sectors like energy supply, transport, buildings, industry, agriculture and waste, domestic mitigation measures are outlined as key instruments. Most frequently, Parties include commitments related to the energy sector, with 95% highlighting relevant measures. In terms of specific actions, 51% emphasised solar energy, while 36% focused on wind energy, and 30% aimed to enhance energy efficiency in industry, with each selected for their high net emission reduction potential (UNFCCC, 2024).

### NDC 3.0 development

Although the Parties to the Paris Agreement made progress on their level of climate ambition expressed in NDC 1.0 in the second round (NDC 2.0), aggregate global ambition was still lower than what is required to achieve the Paris Agreement goals. For this reason, it is important for countries to further raise their national climate target ambitions leading up to 2030 through the NDC 3.0 process and the implementation of associated commitments. In this respect, while NDCs are nationally defined voluntary targets, they are important indicators of good national practices in relation to the energy transition.

It is important to set consistent NDC targets between overall climate change mitigation commitments across sectors. Quantifying targets, including both overall and sectoral GHG emission reduction targets and non-GHG targets, can drive the implementation of NDCs and become a reference for tracking domestic progress on implementation. For this reason, targets should be set in credible, comprehensive, robust and implementable forms (NDC Partnership, 2024).

- GHG targets: Setting sectoral emission reduction targets in line with an overall emission reduction target is essential to improve consistency between these targets, giving a clear signal to sectoral stakeholders as well as facilitating more transparency in reporting.
- Non-GHG targets: In addition to sectoral emission reduction targets, quantified energy sector targets help clarify overall goals and outcomes for project developers and investors, enabling more efficient planning and monitoring (IRENA, 2022a). For instance, non-GHG energy sector targets may include an electricity mix that displays the intended role of renewables in the power sector, while absolute targets - such as explicit capacity-based targets - can also be set to communicate the planned capacity increase in renewable power.

Another point is that, in line with the UAE Consensus, countries can align their short- to medium-term overall GHG targets in their NDCs with their long-term low-emission development strategies (LT-LEDS) at the energy sector level. As of 30 September 2024, 73 long-term strategies have been submitted by UNFCCC Parties.

Specifying implementation measures for achieving NDC targets is important to actuate targets on the ground. Ensuring consistency between NDC targets and intended implementation measures is essential. Specifying the implementation measures, including investment and/or cost of the measures, the time frame, and the existing and/or forthcoming supportive policies, will help translate NDC commitments into actions. To this end, countries need to define a concrete set of implementation measures and costs, and formulate strategies to finance NDCs and scale up climate finance in an integrated way (UNDP *et al.*, 2020). Moreover, measures will need to be ambitious as well as technologically feasible in the NDC 3.0 time frame.

To meet the UAE Consensus targets, maintaining steady progress on implementation through annual actions up to 2030 is crucial. IRENA has delivered a number of analytical products tracking progress and identifying recommended actions for policy makers, including the World Energy Transitions Outlook brief, *Tracking COP28 outcomes: Tripling renewable power capacity by 2030* (IRENA, 2024f), its report for the Italian G7 Presidency, *Tripling renewable power by 2030: The role of the G7 in turning targets into action* (IRENA, 2024c) and its recent assessment report as custodian agency for tracking the UAE Consensus energy goals, *Delivering on the UAE Consensus: Tracking progress toward tripling renewable energy capacity and doubling energy efficiency by 2030* (IRENA, *et al.* 2024).

**Table 1 Enablers for scaling up renewable power and energy efficiency**

<b>Infrastructure, grids and storage</b>	Existing electricity infrastructure should be expanded and modernised to create a new energy system fit for renewables. There is an urgent need to boost cross-sector infrastructure planning, increase cross-border co-operation and develop regional power grids. Action is also needed to drive grid modernisation and expansion and ensure supply-side flexibility and demand-side management.
<b>Policy and regulation</b>	The role of government is crucial in shaping and guiding the pathway of the energy transition. To create an enabling environment that accelerates energy efficiency and the adoption of renewable power technologies, policies and regulations must focus on phasing down fossil fuel generation and replacing inefficient equipment, shaping power market design to integrate higher shares of renewables, and maximising social and environmental benefits. Specifically, fiscal policies and incentives must be strengthened to overcome potential barriers and bottlenecks and facilitate the shift toward a low-carbon energy landscape.
<b>Supply chains, skills and capacities</b>	Supply chains must be reinforced to ensure the resilient sourcing of critical materials essential for renewable energy technologies, mitigating risks from supply insecurity and price volatility. Concurrently, developing a skilled workforce for the energy transition necessitates expanding the talent pipeline and enhancing the quality of education and training provisions, alongside investing in reskilling and upskilling measures for vulnerable communities and those in fossil fuel industries.
<b>Targeted public and private finance</b>	It is imperative to rapidly mobilise both public and private finance to achieve the tripling of renewable power capacity and the doubling of energy efficiency. This will require an annual average investment in renewable power generation of USD 1300 billion by 2030, compared to USD 486 billion in 2022. To ensure an equitable distribution of these funds, the global financial architecture must be reformed to support the energy transition in the Global South by reducing investment risks and providing access to low-cost financing. The mitigation of currency exchange risks and broader availability of concessional finance and grants must also be prioritised to further facilitate the flow of finance, especially to EMDEs.
<b>International collaboration for a just energy transition</b>	Immediate efforts are essential to facilitate multilateral initiatives promoting knowledge sharing, strengthening human and institutional capacities, and facilitating technology transfer for a just energy transition. International collaboration is needed promptly across governance, climate finance and innovation, fostering North-South and South-South dialogues, and mobilising support from groups like the G7 and Group of Twenty (G20). Meanwhile, it is essential to establish just transition funds in emerging economies to ensure sustainable energy systems and foster equitable global progress.

**Based on:** (COP28 Presidency *et al.*, 2023; IRENA, 2024c, 2024f; IRENA *et al.*, 2024).

NDC development is also an opportunity for elaborating on the adaptation and sustainable development benefits of energy sector climate action. To effectively raise ambition in NDC 3.0, it is essential to establish concrete national renewable energy targets that align with the pledge to triple renewable power capacity at the global level. Such commitments, when quantified and presented with a robust framework, can contribute to sustainable development, adaptation co-benefits, and social progress such as just transitions and equitable mitigation outcomes, along with various other positive outcomes. These targets not only address climate issues but also improve public health by cutting air pollution, lowering agricultural emissions and contaminants, boosting food and water security, and minimising exposure to unprecedented weather events. Increasing renewable energy adoption can also benefit off-grid rural communities by providing clean energy through decentralised systems, leading to greater economic opportunities and improved quality of life.

Building more resilient infrastructure is also an important climate change adaptation effort. Changing climate patterns and extreme weather events, including precipitation patterns, and the frequency of floods and heatwaves, may undermine the sustained operation of physical infrastructure. This in turn becomes an energy security risk and can have significant cascading effects in other sectors and critical activities that are dependent on the power sector. To accommodate climate change-related risks and to cope with changing demand and supply patterns, energy infrastructure must become more resilient, flexible and sustainable. NDCs could include details about intended measures and targets for resilient infrastructure.

As a part of reporting on NDC progress in biennial transparency reports (BTRs), countries will need to assess national circumstances, institutional arrangements, and indicators such as net GHG emissions and removals. Drafting a clear NDC 3.0 will facilitate a better understanding and tracking of NDC implementation through the enhanced transparency framework (ETF). Data collection and the need for sector stakeholders to understand relevant data procedures and requirements present real challenges. Some countries are progressing on this issue by prioritising the development of simplified tools to facilitate data collection for relevant stakeholders. Training of national experts is also important for gathering data and using tools for their energy sector GHG inventories. Such capacity challenges and needs can be highlighted in both NDCs and BTRs (UNDP, 2023a).

Finally, many countries have established a mechanism within their governments to co-ordinate NDC enhancement, implementation and progress-tracking systemically. It is therefore essential to ensure a whole-of-government approach. Mainstreaming NDCs within countries' development strategies and policies can trigger effective implementation and mitigate the risks of NDCs becoming stand-alone commitments. In addition, it is important to continue involving broader stakeholders beyond governments, such as the private sector and civil society organisations, so that each country's NDC represents climate commitments that are aligned with its various stakeholders.

## **Box 2. The Paris Agreement's Enhanced Transparency Framework (ETF)**

The ETF under the Paris Agreement aims to provide a clear understanding of climate change action, including the tracking of progress toward achieving Parties' NDCs. The ETF builds on and refines the countries' measurement, reporting and verification (MRV) arrangements, with flexibility for SIDS and Least Developed Countries (LDCs) that allows for adjustments based on their capacities.

Under the ETF, all parties are mandated to submit BTRs every two years, with the first submission due by 31 December 2024. As a part of reporting tracking the progress of NDCs in BTRs, countries shall assess national circumstances, institutional arrangements, and indicators such as net GHG emissions and removals. Moreover, developed country Parties of the UNFCCC and developing country Parties, except LDCs and SIDS, are required to provide details on their emission projections. Despite this exception for LDCs and SIDS, developing countries are facing capacity challenges in preparing robust BTRs that meet the requirements, including data collection, assessments, estimates and projections, and others, while aligning their reporting with IPCC guidance.

The BTRs will facilitate a better understanding of countries' NDC progress and achievement stages, thereby leading to the collective discussion on periodic GSTs and subsequent NDC submissions. The development of robust BTRs is therefore an important step for countries to reflect on their NDC implementation progress and consider the actions necessary for accelerating climate action.

# 2 IRENA'S CLIMATE ACTION SUPPORT IN 2024

## IMPACT TO DATE

IRENA supports countries' climate action in line with the Paris Agreement and the targets in the UAE Consensus through accelerated energy transition. The support to regions and countries that IRENA provides for facilitating a global energy transition aligned with the 1.5°C Scenario is consistent with its flagship publication, the *World Energy Transitions Outlook*. Moreover, energy transition pathways at the regional level are assessed in other published outlooks,<sup>7</sup> which review the 1.5°C emissions pathway at the regional level, as well as key energy system components and technologies for the transition. Following the assessment of these global and regional 1.5°C scenarios, IRENA provides technical support at the country level to advance climate action through the energy transition. IRENA also engages in consultative activities to strengthen NDC commitments and advance NDC implementation with a focus on energy sector.

As of 30 September 2024, IRENA's climate action support has been delivered to 101 countries via 207 activities to support the commitment of Members that are Party to the 2015 Paris Agreement.<sup>8</sup>



**101**

COUNTRIES



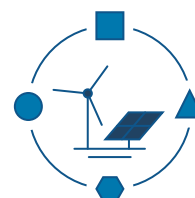
**5.9 billion**

POPULATION



TOTAL GHG  
EMISSION OF

**31.818** tCO<sub>2</sub>eq



**207**

ACTIVITIES

Note: tCO<sub>2</sub>eq = tonnes of carbon dioxide equivalent.

<sup>7</sup> IRENA, (2022b). *Renewable Energy Roadmap for Central America: Towards a Regional Energy Transition*; (IRENA, 2022c). *Renewable Energy Outlook for ASEAN: Towards a Regional Energy Transition*

<sup>8</sup> As of 30 September 2024.

Figure 3 IRENA's engagement with Parties to the Paris Agreement

**101** Countries engaged

**154** Activities completed

**45** Implementation of support

**8** Scoping of support

**Latin America and the Caribbean**

Antigua and Barbuda	Dominica	Panama
Argentina	Dominican Republic	Paraguay
Bahamas	Ecuador	Peru
Belize	El Salvador	Saint Kitts and Nevis
Brazil	Grenada	Saint Lucia
Colombia	Guyana	Saint Vincent and Grenadines
Costa Rica	Honduras	Uruguay
Cuba	Nicaragua	

**Disclaimer:** This map is provided for illustration purposes only. Boundaries and names shown on this map do not imply the expression of any opinion on the part of IRENA concerning the status of any region, country, territory, city or area or of its authorities, or concerning the delimitation of frontiers or boundaries.

**Europe**

Albania	Montenegro
Belarus	North Macedonia
Bosnia and Herzegovina	Serbia
Georgia	Türkiye
Moldova	Ukraine

**Asia and the Pacific**

Bangladesh	Iraq	Mongolia	Philippines
Bhutan	Jordan	Myanmar	Samoa
China	Kazakhstan	Nauru	Saudi Arabia
Fiji	Kyrgyz Republic	Nepal	Solomon Islands
India	Lao People's Democratic Republic	Oman	Tonga
Indonesia	Lebanon	Pakistan	United Arab Emirates
Iran (Islamic Republic of)	Maldives	Palau	Uzbekistan
		Papua New Guinea	Vanuatu

**Africa**

Angola	Egypt	Malawi	Seychelles
Benin	Eswatini	Mali	Sierra Leone
Burkina Faso	Ethiopia	Mauritius	Somalia
Cameroon	Gabon	Mozambique	South Africa
Chad	The Gambia	Namibia	Sudan
Comoros	Ghana	Niger	United Republic of Tanzania
Congo	Kenya	Nigeria	Uganda
Côte d'Ivoire	Lesotho	Rwanda	Zambia
Democratic Republic of Congo	Liberia	São Tomé and Príncipe	Zimbabwe
	Madagascar	Senegal	

IRENA offers this support through various work streams. These include Energy Transition Assessments (ETAs; previously Renewables Readiness Assessments [RRAs]), resource assessments, policy and finance advice, project facilitation, data and statistics, technology, long-term energy planning and power system analysis, among other outputs generated in response to countries' specific needs. IRENA also provides capacity building and deep-dive workshops. These involve government institutions, policy makers and regulators, project developers and financiers, and seek to build institutional capacity to improve policies, energy data and resource assessment, long-term energy planning, qualified project pipelines and financial access, among other improvements (see Table 2).

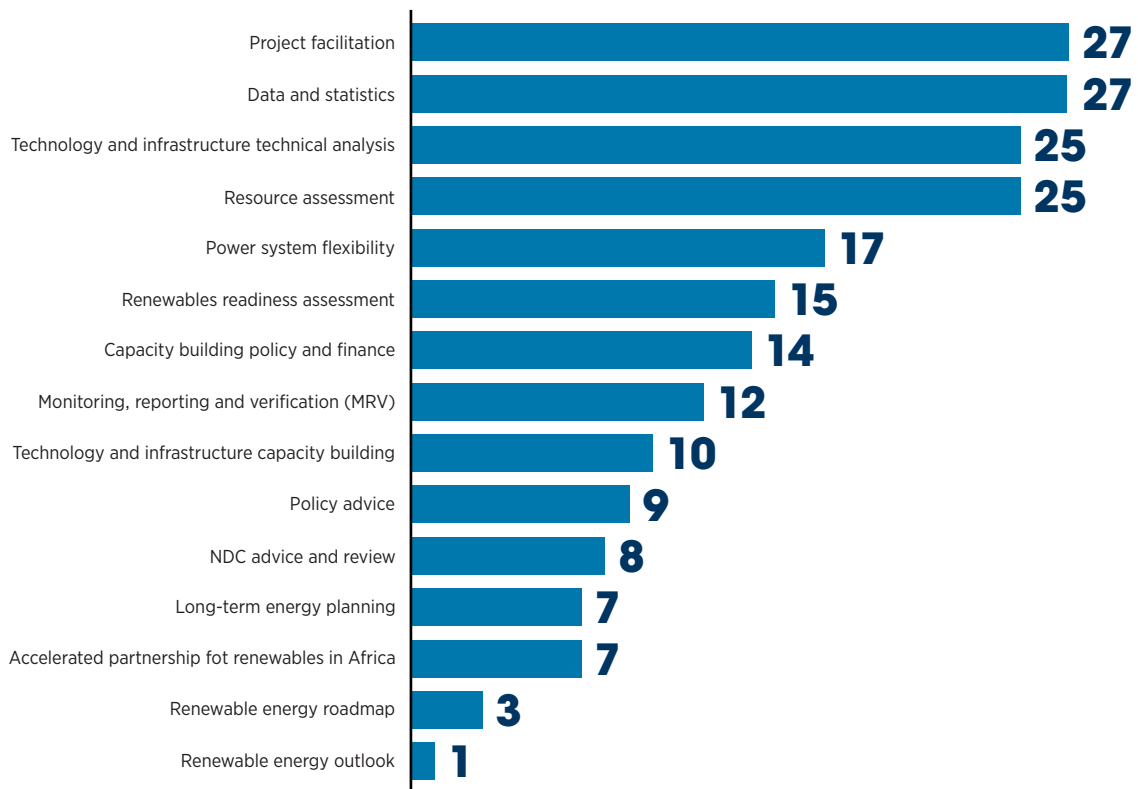
**Table 2 IRENA work packages for country-level climate action support**

<b>Data and statistics</b>	Providing energy data through IRENA's repository of statistics for energy balances, renewable energy capacity and generation, and energy finance and costs.
<b>MRV</b>	Supplying technical assistance and capacity building on energy data collection, analysis, recording and reporting. The support can also cover MRV support on GHG emission reduction through the energy transition.
<b>Resource assessment</b>	Assisting at the country level in assessing a country's renewable energy potential and building its capacities to undertake this analysis, including site assessment, suitability assessment, zoning assessment and use of the web-based SolarCity simulator.
<b>Policy and finance advice</b>	Undertaking technical analysis of the current policies and financial landscape for the energy transition. The support can also offer an analysis of the existing barriers to renewables deployment and provide policy-relevant recommendations.
<b>ETAs</b>	Undertaking comprehensive assessments of the conditions for renewable energy deployment to support decision makers in countries to expand ambitions for renewable deployment (formerly RRAs).
<b>Long-term energy planning</b>	Enhancing long-term renewable energy planning and developing the capacity of countries to undertake their energy planning and modelling as well as peer-to-peer learning through the Global Network on Long-Term Energy Scenarios.
<b>Power system flexibility</b>	Analysing the flexibility in power systems to identify cost-effective and sound solutions for integrating variable renewable energy (VRE). These include demand-side flexibility, energy storage and sector coupling options, such as electric vehicles, power-to-X, etc.
<b>Renewable Energy Roadmap (REmap)</b>	Assessing the potential of renewable energy in the power, cooling, heating and transport sectors to assess the roadmap of possible renewable technology avenues.
<b>Project facilitation services</b>	Facilitating the development of project pipelines aligned with the priorities of governments in collaboration with the financial sector, the private sector and project developers, and assisting in bankability assessments.
<b>Technology and infrastructure technical analysis</b>	Providing technical analysis on the energy sector and renewable technologies, examining mitigation scenarios, alignment with national climate strategies, cost-effectiveness of mitigation options, and transport electrification with renewables. The work package also covers the support of the alignment between NDCs and national energy planning.
<b>Technology and infrastructure capacity building</b>	Supplying technical capacity building programmes on renewable energy technology to facilitate NDC implementation, with a particular focus on performance, cost and planning requirements to implement renewable energy solutions.
<b>Grid assessment and modelling</b>	Assessing grid hosting capacity and distribution at a high level to accommodate VRE integration, build countries' capacity on grid assessment studies and establish a working model of the electricity system.



IRENA has engaged in 207 different work package activities since 2020 to support the Parties to the Paris Agreement in their energy transitions (Figure 4). The distribution of the work packages, aligned to support NDCs, demonstrates the commitment among IRENA Members to climate goals through the energy transition. Project facilitation support, data and statistics, technology and infrastructure technical assistance, and resource assessment are the most frequent work packages provided by IRENA for the countries. Various other assessments, such as ETAs, NDC advice and review, and other evaluations, are also provided for countries to support the NDC process.

Figure 4 **Distribution of IRENA’s climate action support**



As well as working with Member countries, IRENA also co-operates with development agencies and partners to expand opportunities to support climate action powered by renewables. The agency collaborates via multiple institutional partnerships with the UNFCCC and its Regional Collaboration Centres, NDC Partnerships and the United Nations Development Programme (UNDP). IRENA is also expanding its co-operation with other broader partners, including international organisations, philanthropies, not-for-profit organisations and the private sector, to enhance climate action ambitions through the energy transition. Climate finance is also among IRENA’s key engagements through its platforms, such as the Energy Transition Accelerator Financing (ETAF)<sup>9</sup> platform and Climate Investment Platform (CIP),<sup>10</sup> in collaboration with investor partners.

Through these efforts, IRENA, as the custodian agency for the UAE Consensus energy targets, aims to contribute to the tripling of renewable power capacity and doubling of energy efficiency improvement by 2030. At the regional level, each region is making progress towards the global goal, as illustrated in Table 3.

**Table 3 Regional status of renewable power capacity additions and energy efficiency improvements**

Region	RE capacity (MW), 2022	RE capacity (MW), 2023	Capacity addition, 2022-2023	Energy intensity, 2020	Energy intensity, 2021	Rate of improvement - energy intensity, 2020-2021
<b>African countries</b>	59 342	62 066	2 724	5.78	5.77	0.17%
<b>Asia and the Pacific</b>	1 720 189	2 059 301	339 112	5.26	5.30	-0.77%
<b>Latin America and the Caribbean</b>	284 542	308 222	23 680	3.94	3.94	-0.05%
<b>Europe</b>	715 649	785 821	70 172	3.70	3.64	1.65%

**Note:** Renewable energy (RE) capacity data are based on IRENA’s renewable energy statistics (IRENA, 2024b);<sup>11</sup> energy intensity data are sourced from the 2024 SDG 7.3 Energy Efficiency Dataset (ESMAP *et al.*, 2024). The regional classification follows each report’s data category.

The remaining sections of this chapter examine energy transition progress on the regional level and IRENA’s collaboration with countries to advance climate action.

<sup>9</sup> <https://etafplatform.org/>

<sup>10</sup> [www.irena.org/Energy-Transition/Partnerships/CIP](http://www.irena.org/Energy-Transition/Partnerships/CIP)

<sup>11</sup> Renewable energy capacity data follow IRENA’s regional statistics classification. In IRENA’s renewable energy statistics, Asia and the Pacific includes the renewable energy capacity statistics of Asia, Oceania and the Middle East; Latin America and the Caribbean covers South America, Central America and the Caribbean; Africa’s capacity data source is the data from Africa; and Europe’s renewable energy capacity is from Europe (IRENA, 2024b). IRENA’s Regional Trends data dashboard also gives regional trends based on these classifications: [www.irena.org/Data/View-data-by-topic/Capacity-and-Generation/Regional-Trends](http://www.irena.org/Data/View-data-by-topic/Capacity-and-Generation/Regional-Trends) (accessed on 27 September 2024).

## 2.1 AFRICA

Although Africa historically has contributed the least GHG emissions globally, it is one of the regions most affected by negative climate impacts – drought, storms and landslides, among others – caused by GHG emissions. Intensifying climate change impacts are increasing risks for people, their socio-economic livelihood and ecosystems. These risks include insecurity of food supply, poverty, health, water and energy (IPCC, 2022a). Another issue is damage to physical infrastructure caused by climate change impacts.

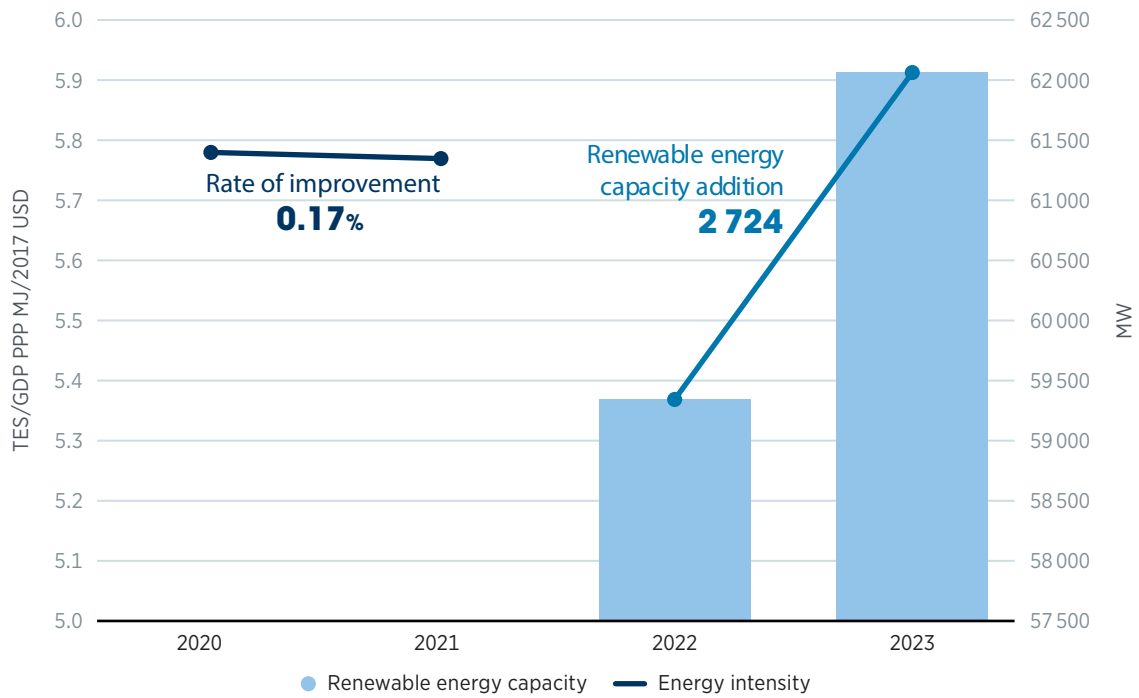
Renewables play an essential role in Africa, fostering economic development and addressing climate concerns. Although the adoption of renewables is increasing in Africa, it is still necessary to explore the untapped potential to accelerate the energy transition and reap the associated socio-economic benefits. In sub-Saharan Africa, renewables constitute more than two-thirds of total final energy consumption (TFEC) due to the widespread uses of traditional biomass as an energy source for cooking and heating. However, modern uses of renewables represent only 10% of TFEC (IEA *et al.*, 2024). Africa's renewable power generation capacity has been steadily increasing, with 2.7 GW added in 2023 (IRENA, 2024d). Africa generated 22.8% of its electricity mix from renewables (205 terawatt hours [TWh]) in 2022, showing a modest growth of 3.5% from 2021 across all sources [IRENA, 2024d]).

- Africa added around 2.7 GW of renewable power capacity in 2023, reaching more than 62.1 GW of cumulative renewable power capacity.
- However, only around 40% of African countries showed progress in renewable power between 2022 and 2023. For instance, large gains were seen in Egypt and Morocco, which expanded their renewable energy capacities by 387 MW and 380 MW, respectively.
- In terms of energy efficiency, northern Africa and sub-Saharan Africa recorded a very small rate of improvement: less than 1% in energy intensity from 2010 to 2021 (IEA *et al.*, 2024). From 2020 to 2021, Africa's rate of energy intensity improvement was less than 0.2%.

With regard to finance, international public financial flows for the energy transition to sub-Saharan Africa showed only a modest 2.5% increase (USD 112.5 million) between 2021 and 2022. Significant investments are therefore needed across countries and urban/rural areas (IRENA, 2024d). IRENA's engagement in Africa is aimed at contributing to countries' responses to climate change through support that advances the region's energy transformation, in line with the global target of tripling renewables and doubling energy efficiency.



Figure 5 **Regional progress in adding renewable power and improving energy efficiency: Africa**



**Note:** Renewable energy capacity data are based on IRENA's renewable energy statistics (IRENA, 2024b); energy intensity data are sourced from the 2024 SDG 7.3 Energy Efficiency Dataset (ESMAP *et al.*, 2024).



74

**Total number of activities**

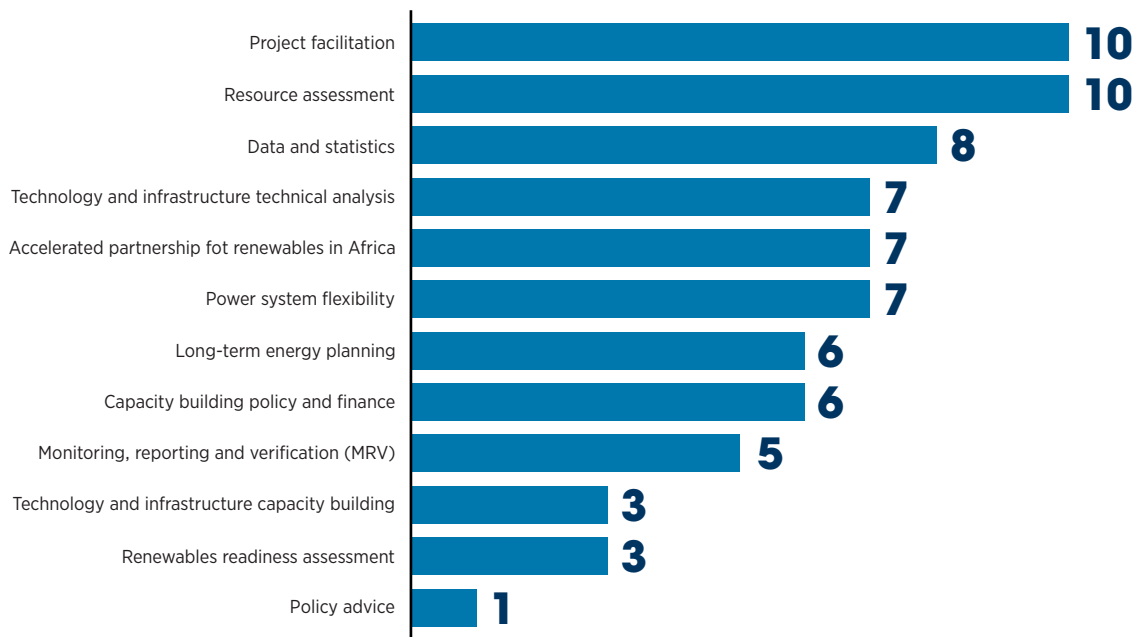
Enhancement activities	Implementation activities	Enhancement and implementation activities
21	43	10

38

**Africa**

Angola	Gabon	Nigeria
Benin	The Gambia	Rwanda
Burkina Faso	Ghana	São Tomé and Príncipe
Cameroon	Kenya	Senegal
Chad	Lesotho	Seychelles
Comoros	Liberia	Sierra Leone
Congo	Madagascar	Somalia
Côte d'Ivoire	Malawi	South Africa
Democratic Republic of Congo	Mali	Sudan
Egypt	Mauritius	United Republic of Tanzania
Eswatini	Mozambique	Uganda
Ethiopia	Namibia	Zambia
	Niger	Zimbabwe

Figure 6 **Distribution of IRENA's climate action support in Africa**



### Progress of IRENA's climate action support in 2024<sup>12</sup>

- IRENA launched the Renewables readiness assessment for **Burkina Faso** in late 2023 (IRENA, 2023b). In collaboration with the Ministry of Energy, Mines and Quarries of Burkina Faso, the RRA reviewed the existing enabling conditions for deploying renewables as well as an assessment of financing renewable energy, including national, regional and international financial schemes. It covered a wide range of topics on renewables, including the deployment of PVs in rural communities. Furthermore, IRENA is currently in discussion with the government and NDC Partnership to provide a capacity-building programme for strengthening solar PV and grid infrastructure skills, which contribute to the country's NDC and long-term low-emission development strategies (LT-LEDS).
- Under the framework of the RRA for **Chad**, IRENA is working on the assessment of renewables and energy transition readiness. This assessment looks into Chad's energy and renewables landscape to provide recommendations for a set of actions to accelerate the deployment of renewables. Consultation meetings and expert workshops have been undertaken with the government in 2024 to tailor the recommendations to Chad's energy transition priorities. In **Somalia**, IRENA is working with the government to assess national energy policy and strategy, resources and technologies, human and institutional capacity, business and financing models, and institutions and markets to analyse the enabling conditions for deploying renewables. Although diesel power generators in the country have four times the capacity of solar and wind power, the country has vast potential to expand renewable power. Since renewables deployment in Somalia requires improvement of the enabling conditions, including policies, institutional frameworks and capacities, recommendations made through the RRA will contribute to the advancement of renewables in Somalia.

<sup>12</sup> Comoros, Seychelles and Mauritius updates are described under the section of Atlantic, Indian Ocean, and South China Sea SIDS are described under the SIA (see Pages 34-35).

- **Ethiopia, Ghana and Lesotho** have been supported through IRENA's energy survey project, which contributed to the enhancement of energy statistics. More specifically, the project will strengthen bioenergy data for more accurate and transparent NDC and Sustainable Development Goal (SDG) monitoring and reporting.
- Assessments of renewable potential are being undertaken in **Angola**, the **Democratic Republic of Congo** and **Cameroon**. While theoretical hydropower potential is being assessed for Cameroon, rooftop solar PV potential is being analysed for Kinshasa, Mbandaka and Kananga in Democratic Republic of Congo by using the SolarCity simulator. Pre-feasibility site assessment is being conducted for Angola. In addition, a zoning assessment was completed for **Mali** (IRENA 2024h).
- Project facilitation and match-making support have been undertaken in **Chad, Gambia, Zambia, Eswatini** and **Cameroon** to assist in building bankable project pipelines of renewable energy. The facilitation of discussions between project developers on the ground and IRENA investor partners is intended to spur investor engagement and mobilise investment for renewable energy projects in these countries. The de-risking arrangement and concessions are important for these countries, linking these countries with investors.
- In collaboration with Eni, a capacity-building programme on biofuel policy and finance was provided for **Ethiopia, Zambia and Egypt** in 2024, replicating the same programme provided for other countries in 2023. Policy makers from the countries were invited to a week-long programme of training sessions on supply and demand trends in biofuels and related legislative frameworks, as well as agribusiness and project development.
- In co-ordination with the NDC Partnership, IRENA is providing technical assistance for **Namibia, Malawi, United Republic of Tanzania** and **South Africa**. For Namibia, technical support is being provided for the development of Namibia's LT-LEDS. In Malawi, NDC 3.0 development support is being provided by assisting in the development of models and scenarios in critical sectors of the country. For the United Republic of Tanzania, IRENA is assessing cost-effective options for climate change mitigation, focusing on energy transition technologies. In South Africa, IRENA collaborates with other partners such as GIZ to provide technical assistance for developing the energy sector component of NDC 3.0 targets, policies and measures.
- The support envisaged, following country consultations, for the Accelerated Partnership for Renewables in Africa (APRA) countries, which include **Ethiopia, Ghana, Kenya, Namibia, Rwanda, Sierra Leone** and **Zimbabwe**, and covers NDC enhancement and implementation to support shaping climate ambitions and translating them into reality (see In Focus 4).
- IRENA and GIZ are supporting **Senegal's** Ministry of Energy, Petroleum and Mines with a capacity-building training programme to enhance public institutions in the energy sector. This also includes the development of a study that analyses the renewable energy policy and financial landscape of Senegal. The programme aligns with the Continental Power System Masterplan and includes support for drafting an electricity sector masterplan document for Senegal's official planning process. Phase 1 will end in 2024, to be followed by Phase 2, which will extend the programme to the energy sector, including transport, buildings and industry.

### Box 3. Regional capacity building on statistics for eastern African countries

IRENA, in co-operation with the East Africa Centre of Excellence for Renewable Energy and Energy Efficiency (EACREEE), hosted a three-day regional training programme in Kampala, Uganda in October 2024. The programme focused on renewable energy statistics with a focus on off-grid renewable energy to address these challenges and improve the availability of reliable information on renewable energy in the East Africa region. Participants were invited from 11 countries: Burundi, Democratic Republic of Congo, Djibouti, Ethiopia, Kenya, Mozambique, Rwanda, Somalia, South Sudan, United Republic of Tanzania and Uganda.

The programme provided training targeted at climate transparency relevant to key statistics topics, such as promoting data transparency and dissemination; construction of energy balances; developing MRV systems for tracking NDCs; methodologies for on-grid/off-grid renewable energy data collection; data validation, estimation and dissemination; and best practices for energy survey design. In addition, participants shared their experiences concerning renewable energy data collection in their respective countries, identifying challenges and good practices.

### Box 4. APRA Investment Forum

Since the launch of the Accelerated Partnership for Renewables in Africa (APRA) in 2023, IRENA has been engaging with the APRA countries (Ethiopia, Ghana, Kenya, Namibia, Rwanda, Sierra Leone and Zimbabwe). With the support of the APRA partner countries, including Denmark, Germany, the UAE and the United States, as well as the supporting partners of the Global Energy Alliance for People and Planet and the Rockefeller Brothers Fund, APRA is working to accelerate the energy transition and green industrialisation through its three intervention pillars, which include the mobilisation of finance, the engagement of the private sector and the provision of technical assistance.

In October 2024, IRENA and the government of Kenya co-hosted the APRA Investment Forum. Attended by governments, financial institutions, project sponsors, development partners and other stakeholders active across the APRA countries from both the public and private spheres, the Investment Forum served as a platform to discuss priorities and investment needs, enabling frameworks, innovative financing instruments, and the development of green industries. The Investment Forum also facilitated match-making between financiers and the sponsors of high-potential projects to advance the financing on these projects, as well as providing a space for project exhibition.

### Box 5. Central African Power Pool

IRENA is supporting the Central African Power Pool (CAPP) with a Regional Model Analysis and Planning Support Programme for Central Africa. This programme aims to improve CAPP member states' long-term energy planning capabilities and is integrated into the African Continental Power Systems Master Plan. The outcome is enhanced energy planning capacity and transparent power sector data for long-term infrastructure development. An associated report is scheduled to be published in 2025.

## 2.2 ASIA AND THE PACIFIC

Asia and the Pacific accounts for the largest portion of global GHG emissions (IPCC, 2022b). Much of these emissions are produced by coal combustion, which makes accelerating the energy transition in the region an urgent imperative for achieving the Paris Agreement goals. The region is a major contributor to - and is severely impacted by - climate change. Six of the worst-affected countries in the world are in Asia and the Pacific. This region suffers from intensifying negative climate impacts, including heatwaves, droughts, floods in monsoon regions and water insecurity in the western Asia region (IPCC, 2022a). The development of climate-resistant infrastructure is increasingly needed for the region's sustainable development.

Asia and the Pacific is experiencing increased energy demand due to rapid urbanisation and industrial growth. This presents significant opportunities to transition away from carbon-based energy solutions. Asia attracted two-thirds of total global energy transition investment in 2022 (IRENA and CPI, 2023). Asia and the Pacific has made progress towards affordable and clean energy, as stipulated in SDG7, and is leading the expansion of renewable power capacity additions to energy systems, contributing to the global goal of tripling renewable capacity.

- Both Asia and the Pacific region's renewable power capacity increased substantially in 2023. The region added a total of 339 GW of renewable power capacity that year, bringing its cumulative renewable energy capacity to 2 059 GW.<sup>13</sup>
- The Pacific SIDS reached 1.27 GW of renewable power capacity in 2023, and Indian Ocean SIDS, including Comoros, Maldives, Mauritius and Seychelles, reached 335 MW (IRENA, 2024b).
- East Asia had the largest global year-on-year increase in renewable power capacity. Approximately 40% of the region's renewable energy capacity is attributed to China, which also has the highest global renewable energy capacity, totalling 1 454 GW (IRENA, 2024b). China alone expanded its renewable energy capacity by around 298 GW in 2023, with solar PV and wind as the main drivers. This dominance is largely due to the increasing competitiveness of solar and wind energy compared to coal and gas power generation, which has been a significant driver of renewable energy development.

The Asian region recorded 3 749 TWh of renewable power generation in 2022, contributing to 26.2% of the electricity mix. This 9.3% increase from 2021 was driven by solar and hydropower, both offsetting declines in wind energy and bioenergy (IRENA, 2024b).

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<sup>13</sup> *Asia and the Pacific electricity capacity statistics are a total of the renewable electricity capacity of Asia, Oceania and the Middle East in IRENA statistics (IRENA, 2024b).*



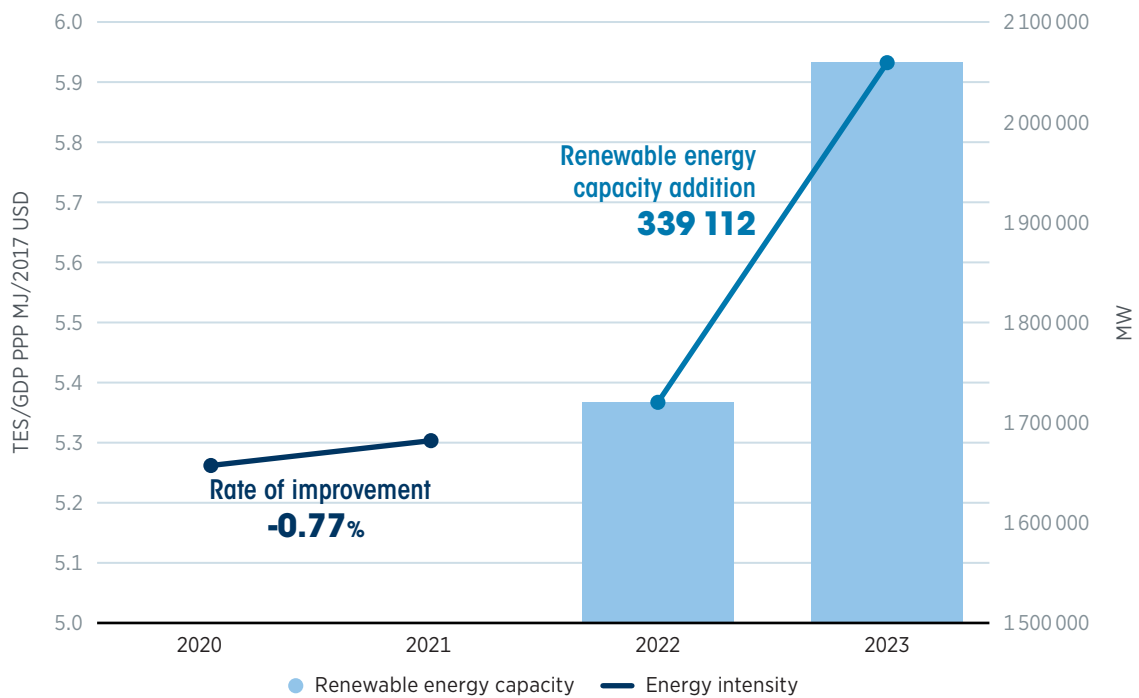
- In 2021, more than four-fifths of global renewable power consumption came from East Asia and Southeast Asia (IEA *et al.*, 2024). On the other hand, the Middle East generated 47 TWh, seeing a 16.9% rise due to new wind energy additions and ongoing solar expansion.
- Despite its rapid growth of renewable power capacity in recent years, the Middle East generated just 3.4% of its electricity from renewables. Meanwhile, Oceania generated 125 TWh, a robust 14.1% increase across energy sources (IRENA, 2024b).

Concerning energy efficiency, the annual improvement rate of energy intensity was close to 2.2% in East Asia and Southeast Asia and 2.0% in Oceania from 2020 to 2021. While South Asia and Central Asia are also above the average global annual rate of energy intensity improvement, the Middle East still needs improvements in energy efficiency. Decarbonising the energy sector in Asia and the Pacific and the Middle East is crucial for reaching global net-zero emissions (ESMAP *et al.*, 2024).

Many countries in the region fall short of their GHG emission reduction targets, a problem that is compounded by the lack of emissions reporting across all sectors. Given the continuous regression in climate action (SDG 13), it is critical to integrate strong climate measures into national policies and bolster resilience to climate impacts (ESCAP, 2024). IRENA aims to accelerate its support to enhance climate strategies and resilient energy solutions, working towards a sustainable, low-carbon energy future by enhancing renewable capacity and improving energy efficiency, in alignment with global climate objectives.



Figure 7 **Regional progress in adding renewable power and improving energy efficiency: Asia and the Pacific**



**Note:** Renewable energy capacity data are based on IRENA's renewable energy statistics (IRENA, 2024b); energy intensity data are sourced from the 2024 SDG 7.3 Energy Efficiency Dataset (ESMAP *et al.*, 2024).

**Total number of activities**

48

Enhancement activities

15

Implementation activities

30

Enhancement and implementation activities

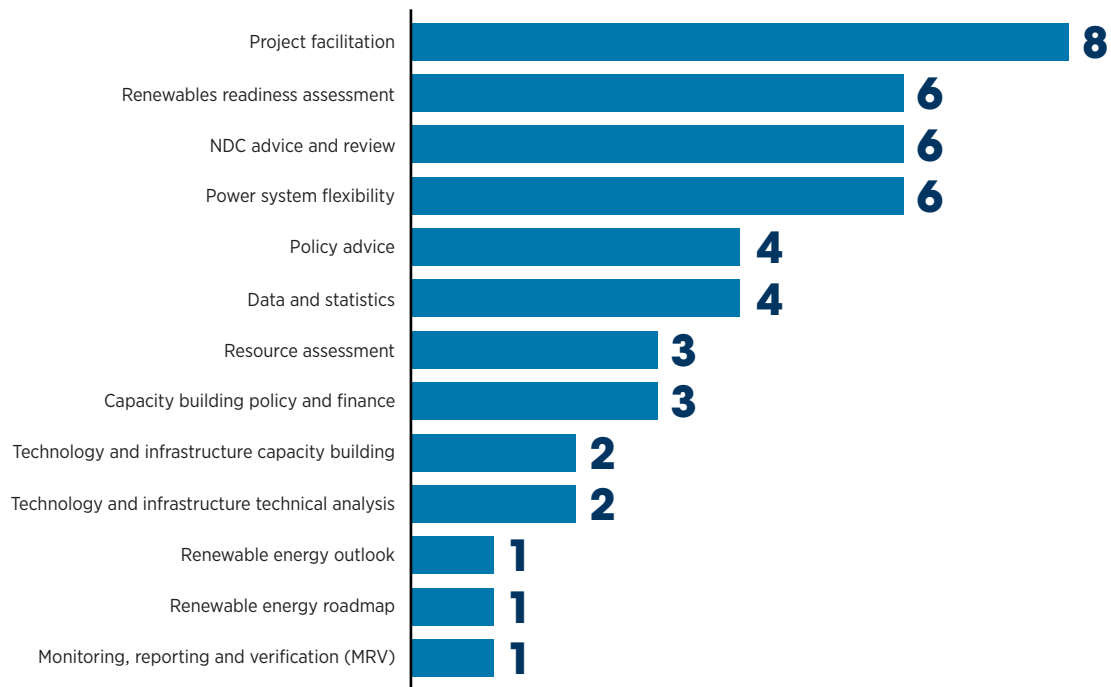
3

**Asia and the Pacific**

30

- |            |                                  |                      |
|------------|----------------------------------|----------------------|
| Bangladesh | Iran (Islamic Republic of)       | Nepal                |
| Bhutan     | Iraq                             | Oman                 |
| China      | Jordan                           | Pakistan             |
| Fiji       | Kazakhstan                       | Palau                |
| India      | Kyrgyz Republic                  | Papua New Guinea     |
| Indonesia  | Lao People's Democratic Republic | Philippines          |
|            | Lebanon                          | Samoa                |
|            | Maldives                         | Saudi Arabia         |
|            | Mongolia                         | Solomon Islands      |
|            | Myanmar                          | Tonga                |
|            | Nauru                            | United Arab Emirates |
|            |                                  | Uzbekistan           |
|            |                                  | Vanuatu              |

Figure 8 **Distribution of IRENA's climate action support in Asia and the Pacific**



### Progress of IRENA's climate action support in 2024

#### Asia

- Project facilitation support has been provided for **Islamic Republic of Iran, Iraq, Nepal, Oman** and **Pakistan** through the ETAF and CIP, which IRENA manages, to help mobilise funds for NDC implementation through partner investors.
- IRENA provided NDC 3.0 recommendation notes for **Indonesia, Pakistan** and **Philippines** to provide 1.5°C emission pathway-aligned energy sector targets, mitigation options and means of implementation, building on the agency's work and outputs in recent years. The objective of the support is to provide input for advancing renewables deployment at the national level to meet the global target of tripling renewables and doubling energy efficiency targets towards 2030.
- IRENA is currently working on Energy Transition Assessments (ETAs) for **Bangladesh** and **Iraq**. ETAs assess the enabling conditions of these countries for deploying renewable energy with the provision of a set of recommended actions. The recommendations support countries' efforts to add renewable power capacity to their energy systems, contributing to the UAE Consensus global goals. The ETAs are undertaken in close co-ordination with the countries' governments to align recommendations with governmental priorities.
- For the **United Arab Emirates**, IRENA provides technical backstopping support for energy and emissions modelling to assist in the development of its NDC 3.0.

## Pacific SIDS

- Through the SIDS Lighthouses Initiative (SIDS LHI), IRENA completed the RRA for the **Solomon Islands** in February 2024 (IRENA, 2024i). IRENA, as the co-ordinator of the SIDS LHI, collaborated with the Ministry of Mines, Energy and Rural Electrification to identify key drivers to expand renewable deployment. The RRA provided recommendations on seven priority strategic areas, including: 1) institutional restructuring of the electricity grid to foster market competition; 2) developing and enforcing renewable energy standards for resilient off-grid renewable energy; 3) creating innovative funding mechanisms; 4) developing markets for electric mobility and innovative solutions for the maritime and aviation sectors; 5) facilitating renewable energy implementation in key sectors such as health, agriculture, food, water, education, tourism, fisheries and forestry; 6) promoting energy efficiency and energy conservation measures; and 7) fostering partnerships and strategic engagements.
- Assessments of renewable potential were also completed for Honiara in the Solomon Islands. The rooftop solar PV potential is analysed through the development of the SolarCity simulator<sup>9</sup> for Honiara, while the theoretical hydropower potential was also assessed at country level. Additionally, IRENA conducted a grid integration study to evaluate the integration of higher shares of renewables. These assessments help policy makers and power sector stakeholders identify suitable measures to deploy increased variable renewables.
- An ETA (formerly RRA) is in development for **Papua New Guinea**.
- For **Tonga**, energy data surveys have been conducted by SIDS LHI as part of the NDC implementation support activity. In addition, collaborating with the NDC Partnership, IRENA contributed to a capacity-building workshop in Tonga focused on climate action, NDC targets and implementation, and the energy transition with renewables.
- Through the SIDS LHI, IRENA provided project development support to the government of **Vanuatu**. In this effort, IRENA has engaged technical assistance (project identification and development) to identify and build a strong pipeline of renewable energy projects. This support aims to help Vanuatu achieve its ambitious goal of transitioning to 100% renewable energy in electricity generation by 2030. It will also improve energy access and resilience and support broader sustainable development objectives.
- Scoping for NDC 3.0 support is being undertaken in **Samoa**.

## Atlantic, Indian Ocean and South China Sea SIDS

- For **Mauritius** and **Comoros**, capacity development workshops related to renewable resource assessment support was provided to demonstrate the capabilities of the SolarCity simulators developed for the cities of Moroni, Mutsamudu Fomboni and Port Louis. The web-based solution assists homeowners, investors and municipalities in evaluating rooftop solar PV installation options by testing various policy instruments, incentive schemes and installation scenarios, helping them identify potential economic savings and social-environmental benefits.

- In **Seychelles**, technical analysis of technology and infrastructure is provided to assess grid stability and the operation of the national power system for integrating higher shares of renewable energy, using software tools and models. The support also aids the decarbonisation planning of the transport sector using similar software tools and models.
- Scoping activities for NDC 3.0 support are underway in **Mauritius** and the **Maldives**.

### Box 6. Pacific SIDS Project Finance Capacity Building Workshop

Building on IRENA's ongoing efforts to support and facilitate renewable energy projects, the Pacific SIDS Project Finance Capacity Building Workshop was held in Fiji on 16-19 January 2024. The workshop aimed to deepen participants' understanding of renewable energy project finance and enhance project feasibility and bankability. The event saw participation from a wide range of sectors, with individuals representing project developers, financial institutions and government entities from seven countries: the Federated States of Micronesia, Fiji, Palau, Samoa, Solomon Islands, Tuvalu and Vanuatu.

The workshop offered both theoretical and practical modules on project finance, featuring a dedicated project pitching day and on-site technical advisory support for projects from four countries, enhancing learning and collaboration. The projects/programmes presented were Vanuatu's National Green Energy Fund aimed at rural electrification, Tuvalu's Clean Energy Loan Project, Samoa's Biofuels from Agricultural Waste, Tuvalu's Renewable Energy Clean Mobility Project, and Fiji's Hydro, Solar and Waste-to-Energy Programme. Despite being in the early stages, these projects received valuable feedback. It was also emphasised that for the presented country programmes, a concerted approach is necessary to address various issues such as regulations, finance, capacity building and policy development, as well as other factors essential for establishing a sustainable renewable energy ecosystem.

Key insights from the workshop included: 1) Pacific islands are at various stages of renewable energy development, with each facing distinct policy, regulatory and financial challenges. 2) There is significant interest in international collaboration, though more capacity is needed to manage these partnerships effectively. 3) Ongoing policy and regulatory issues remain major barriers to advancing renewable energy in the region.

IRENA also encouraged countries to submit their projects to CIP and ETAF once they complete the prerequisite studies, in the interest of improving their investment readiness and seeking project finance facilitation support.



## Box 7. COP29 Investment Forum and regional workshop for Central Asia

The COP29 Energy Transition Investment Forum for Central Asia, a two-day event planned for 15-16 November 2024 in Baku, aims to mobilise finance from public and private sectors to achieve the UAE Consensus, focusing on tripling renewables and accelerating the energy transition in Central Asia. The forum, jointly organised by the COP29 Azerbaijan Presidency, the Ministry of Energy of Azerbaijan and IRENA, will bring together international and regional stakeholders to discuss opportunities and challenges in advancing renewable energy development and mobilising investments in energy transition-related technologies to advance the UAE Consensus achieved at COP28. The event will cover key aspects, such as climate finance, investment needs, enabling frameworks and innovative financing instruments.

Furthermore, IRENA aims to intensify collaboration with the countries in Central Asia in their journey to accelerate a renewables-based energy transition through a regional workshop jointly organised with the Korea Energy Agency and conducted in the context of the COP29 Investment Forum for Central Asia. The workshop will focus on sharing insights, best practices and experiences among key stakeholders in the region regarding key aspects of renewable energy development. It will include effective development policies, investments and supply chains as well as the integration of VRE sources into the power grid and penetration of advanced electricity storage technologies. The event will also facilitate exchanges between interested local and international companies from Central Asia, promoting collaborative approaches and fruitful partnerships for accelerated renewable energy development.



## 2.3 EUROPE

While Europe has continued to advance the decarbonisation of its energy systems, the region has been warming faster than the global average, with negative climate impacts (UN, 2023). IRENA has been actively engaged with Southeast European countries to support the energy transition, where pressing climate impacts, including droughts, heat waves and windstorms are heightening existing climate-driven tensions. The pollution caused by fossil fuel use is also a regional issue, given its effects on people's health and quality of life.

Efforts to enhance the sustainability of energy systems in Europe are ongoing, driven not only by the European Green Deal but also by the commitment of all European countries to triple renewable energy capacity and double energy efficiency by 2030.

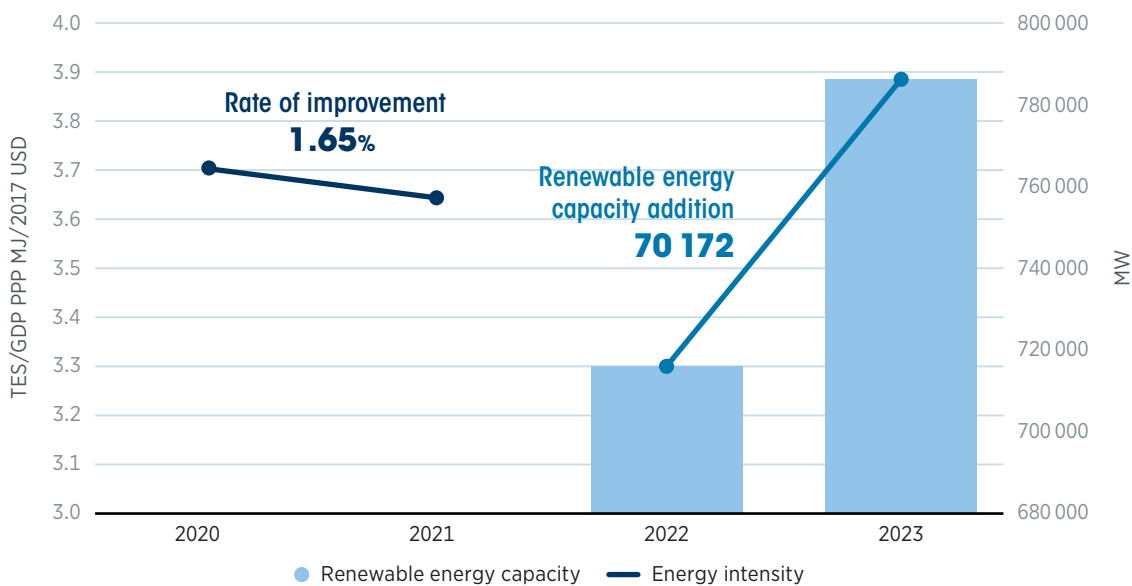
- With an addition of around 70 GW in 2023, Europe's total renewable power capacity has reached 785.8 GW (IRENA, 2024a).
- Germany, Spain and France are the top three countries in the region for renewable energy capacity, with Germany leading at 166.9 GW, followed by Spain with 80.1 GW and France with 69.3 GW. Germany's notable capacity is attributed to a surge in solar power, which saw an addition of 14.1 GW in 2023 – almost twice the previous year's growth (Federal Network Agency of Germany, 2024). This was driven by a rise in private solar installations and an expansion in both ground-mounted and commercial rooftop solar systems.

Europe generated 1462 TWh of electricity from renewable sources in 2022, according to IRENA statistics. Renewable power generation accounted for 40.5% of the electricity mix that year. This renewables total broke down into 35.7% wind energy, 33.3% hydropower, 16.1% solar, 14.0% bioenergy and 0.8% geothermal (IRENA, 2024a). Europe is a major global market for electric cars, and 20% of the renewable energy consumed in the transport sector comes from renewable-based electricity (IEA *et al.*, 2024). Europe also made progress in decarbonising the heating sector, with a 38% growth in heat pump sales in 2022 partially due to energy security concerns, although the growth slowed in 2023 (IEA *et al.*, 2024).

With regard to energy efficiency improvement, Europe experienced a 1.65% reduction in energy intensity from 2020 to 2021 (IEA *et al.*, 2024). Within European countries, Ireland showed the most notable improvements in energy intensity, reaching 9%. This gain was not solely attributable to enhancement in energy efficiency, however; other factors also played a role. In Ireland, structural changes within the economy – particularly a shift towards higher value-added products in the industrial sector – were significant, according to the National Energy Efficiency Action Plan 2009-2020.

Through the European Green Deal, European Union (EU) countries commit to reduce net emissions by at least 55% below 1990 levels by 2030, with Europe’s Green Deal Industrial Plan for the Net-Zero Age providing investment aid and tax breaks for green industries, including renewables and hydrogen. EU countries were required to submit their final updated National Energy and Climate Plans (NECPs) by the end of June 2024 in consideration of the recommendations from the European Commission. NECPs are important planning documents that outline national-level contributions and measures aligned with the European Green Deal, facilitating the EU countries’ delivery of the 2030 energy and climate goals. Of the Energy Community Contracting Parties, eight submitted their draft NECPs to the Energy Community Secretariat, four adopted their NECPs by the end of June 2024, while the rest of the countries are still expected to deliver their plans. As described below, IRENA is supporting Southeast European countries to ensure the alignment of ambition levels between their NECPs and NDCs.

**Figure 9 Regional progress in adding renewable power and improving energy efficiency: Europe**



**Note:** Renewable energy capacity data are based on IRENA’s renewable energy statistics (IRENA, 2024b); energy intensity data are sourced from the 2024 SDG 7.3 Energy Efficiency Dataset (ESMAP *et al.*, 2024).

**24**

**Total number of activities**

Enhancement activities	Implementation activities
<b>8</b>	<b>16</b>

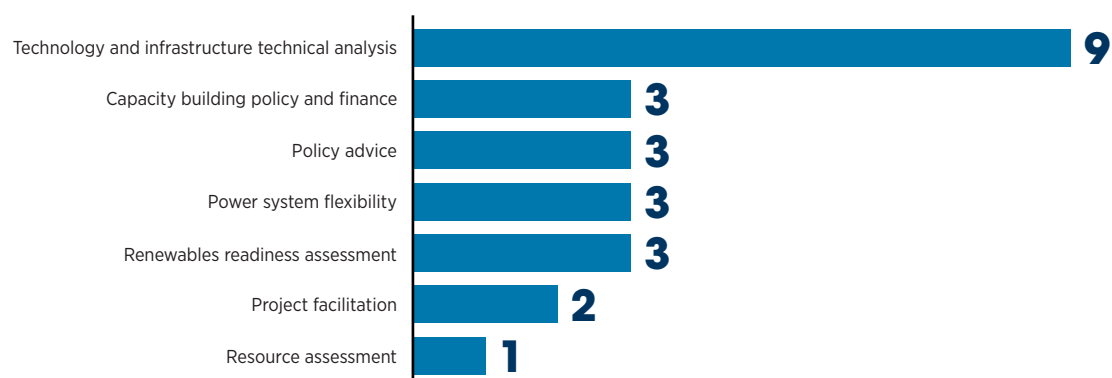
**10**

**Europe**

Albania	Montenegro
Belarus	North Macedonia
Bosnia and Herzegovina	Serbia
Georgia	Türkiye
Moldova	Ukraine



Figure 10 **Distribution of IRENA's climate action support in Europe**



### Progress of IRENA's climate action support in 2024

- For **Bosnia and Herzegovina**, IRENA released an RRA in 2023 (IRENA, 2023c), providing recommendations for ensuring the alignment of renewable energy and GHG emission reduction targets between the NECP and NDC. Building on the outcome of the assessment, the country is proceeding with planning a renewable energy auction, including utility-scale wind and solar in 2024.
- In **Georgia**, in response to the country's request for support, IRENA is undertaking an analytical assessment of the country's readiness for a significant uptake of renewable energy for the energy transition and climate action. In partnership with the Ministry of Economy and Sustainable Development of Georgia, IRENA organised two expert workshops to bring together stakeholders to discuss the opportunities and challenges of deploying renewables in the country. As a result, the final assessment will develop and articulate an action plan for Georgia to achieve the energy transition through a major scale-up and contribution to the global target to triple renewable energy by 2030 as well as other energy system components (electrification, clean hydrogen, energy efficiency, advanced biofuels, *etc.*). The RRA also provides recommendations on the alignment of Georgia's NDC 3.0 with its NECP.
- IRENA is providing assistance for Energy Community Contracting Parties to develop their NDC 3.0 targets in alignment with their countries' NECPs. These Contracting Parties include **Albania, Moldova, Montenegro, North Macedonia, Serbia** and **Ukraine**, in addition to the above-mentioned countries (Bosnia and Herzegovina and Georgia).
- Project facilitation support has been provided for renewable power projects in **Albania, Georgia** and **Ukraine**. IRENA facilitated the match-making between project developers and potential investors in IRENA's platform.

## Box 8. Alignment support of NDCs and NECPs

IRENA offers support in aligning Energy Community Contracting Parties' NECPs and NDCs by conducting a comparative study of these documents and verifying results of current assessments and scenario modelling. This support is tailored to the national level to ensure consistency across national plans, focusing mainly on renewable energy and GHG emission reduction targets.

These international climate and energy commitments require different planning, updating and reporting processes. Energy Community Contracting Parties are required to submit their NECPs, which reflect their contributions to the EU's energy and climate targets. Additionally, as Parties of the Paris Agreement, countries must submit their NDCs every five years. The alignment of these different commitments and targets is essential for transparency, providing certainty to stakeholders and tracking purposes. Furthermore, aligning these plans can enable the different processes required for updating and reporting to be simplified and more efficient.

The support offered by IRENA to these countries aims to provide high-level advice and strategic guidance to governments on aligning the targets in these documents, while also taking into consideration countries' long-term plans, such as their LT-LEDS. The recommendations of this assessment serve as input for the preparation of the upcoming update cycles.



## 2.4 LATIN AMERICA AND THE CARIBBEAN

Although Latin America and the Caribbean contribute a relatively small portion of global GHG emissions, the region is facing acute climate impacts and extreme weather events, which have exacerbated social and economic inequalities (IPCC, 2022a; UNDP, 2023b). Climate-resilient development, along with accelerated energy transition technologies, are needed both in the short term and long term for the region's development.

Latin America and the Caribbean have the biggest share of renewables in the electricity mix, compared with other regions globally.

- Latin America and the Caribbean showed a rise of around 24 GW in renewable power capacity in 2023 compared to 2022, with a total of 308.2 GW in 2023 (IRENA, 2024a).<sup>13</sup>
- Caribbean SIDS reached 6.075 GW of renewable power capacity in 2023.
- Brazil is a pioneer of the clean energy transition in Latin America and the Caribbean and globally. In 2023, it achieved the largest capacity addition in the region, accounting for 17.4 GW with expansions primarily in solar, wind and bioenergy. Brazil will continue to play a critical role due to its substantial biomass potential, as biomass production and its use in cement facilities are essential for achieving the necessary emissions reductions (IRENA, 2023a).
- Chile has demonstrated continuous improvement in both renewable energy capacity (2.9 GW) and energy intensity (6% between 2022 and 2023). Such acceleration is attributed to broad-based political support, public-private partnerships and innovative green technologies (World Economic Forum, 2023). In 2022, Chile's government released the country's first energy transition strategy, which set targets for achieving net-zero emissions by 2050 and has contributed to the rapid expansion of solar, wind and geothermal energy throughout the country.

This progress notwithstanding, compared with other regions, the Latin America and the Caribbean region had the lowest compound annual growth rate of renewable power generation capacity per capita over ten years from 2012-2022: the compound annual growth rate in the region is 4.8%, while the world average is 7.7% (IEA *et al.*, 2024). Moreover, Latin America and the Caribbean attracted a limited amount of investment in renewables, with a concentration on a small set of countries such as Brazil and Chile. Renewable investment in the region accounted only for 4% of the total global investment in renewables in 2022 (IRENA *et al.*, 2023).

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<sup>13</sup> *Latin America and the Caribbean electricity capacity statistics are a total of the renewable electricity capacity of South America, Central America and the Caribbean in IRENA statistics (IRENA, 2024b)*

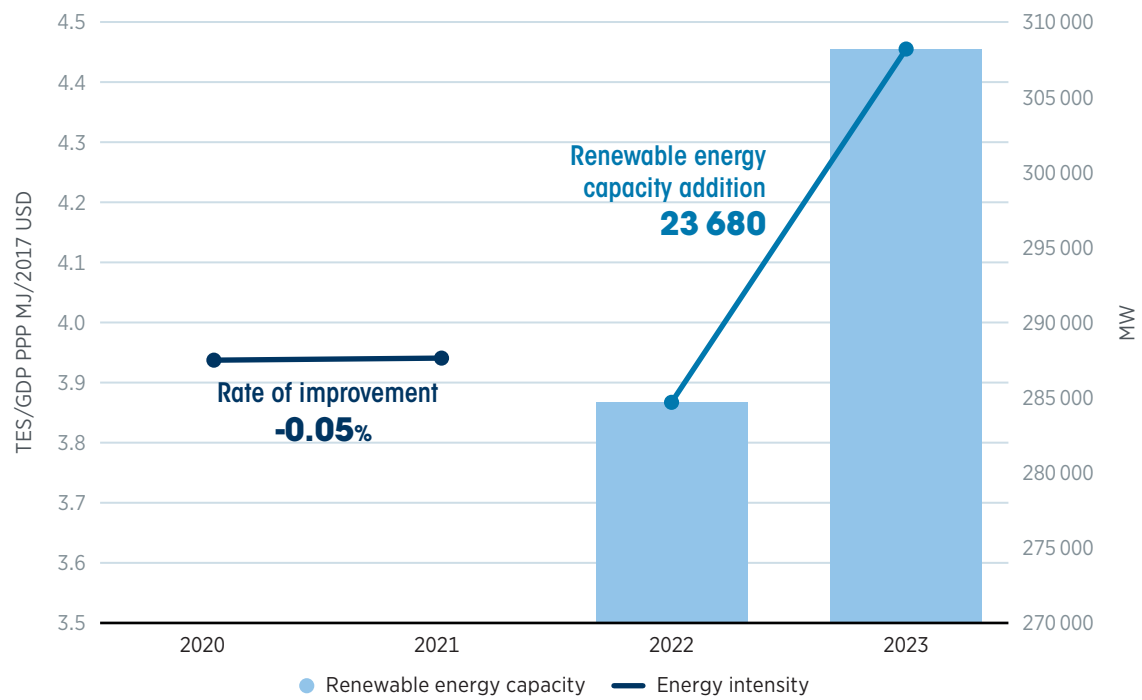
In terms of power generation, South America generated 940 TWh of renewable power in 2022. This was an 11.9% increase from 2021, credited to increases in hydropower and solar energy. Over the same time span, Central America and the Caribbean added 57 TWh of renewable power generation with 1.3% growth (IRENA, 2024b). In terms of the electricity mix, South America recorded 75% of its renewable-based electricity with a predominance of hydropower. Renewable power accounts for 38% of the electricity mix in Central America and the Caribbean (IRENA, 2024b).

For energy efficiency, the annual average rate of improvement in terms of energy intensity is 0.7% from 2010-2021 in the Latin America and the Caribbean region. However, there are significant disparities in energy intensity among Latin American and Caribbean countries. To address this, a co-ordinated effort is needed to improve energy efficiency, including the development of efficient technologies in end-use sectors and the expansion of electrification (COP28 Presidency *et al.*, 2023).

In December 2019, the Renewable Energy for Latin America and the Caribbean Initiative (RELAC) was launched during the United Nations Secretary-General's Climate Action Summit to accelerate the carbon neutrality of electricity systems in the region. The initiative's goal is to achieve at least 73% of installed renewable energy capacity and 80% of the region's total electricity generation from renewable energy by 2030. In line with the region's ambitious objective for accelerating sustainable energy, more than half of the region's countries endorsed the COP28 pledge to triple renewable energy capacity and double energy efficiency. As a supporting agency of RELAC, IRENA aims to help countries assess their current situations and develop energy transition strategies tailored to each country's level of progress.



Figure 11 **Regional progress in adding renewable power and improving energy efficiency: Latin America and the Caribbean**



**Note:** Renewable energy capacity data are based on IRENA's renewable energy statistics (IRENA, 2024b); energy intensity data are sourced from the 2024 SDG 7.3 Energy Efficiency Dataset (ESMAP *et al.*, 2024).



**Total number of activities**

61

Enhancement activities

20

Implementation activities

39

Enhancement and implementation activities

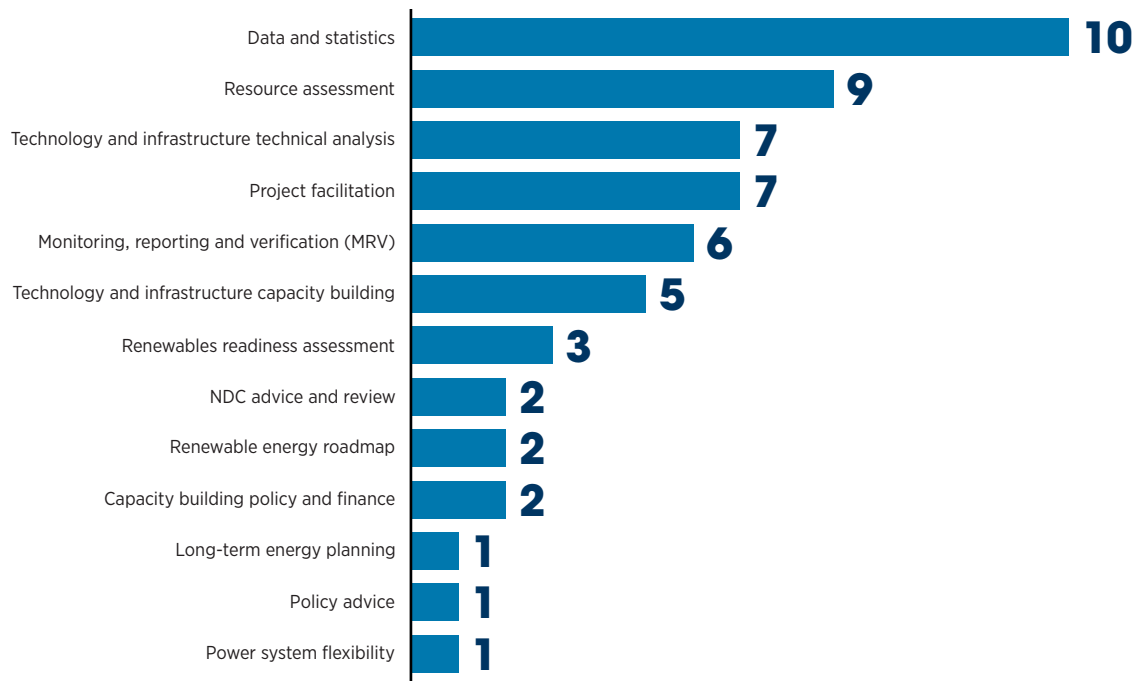
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**Latin America and the Caribbean**

23

Antigua and Barbuda	Dominica	Panama
Argentina	Dominican Republic	Paraguay
Bahamas	Ecuador	Peru
Belize	El Salvador	Saint Kitts and Nevis
Brazil	Grenada	Saint Lucia
Colombia	Guyana	Saint Vincent and Grenadines
Costa Rica	Honduras	Uruguay
Cuba	Nicaragua	

Figure 12 **Distribution of IRENA’s climate action support in Latin America and the Caribbean**



### Progress of IRENA’s climate action support in 2024

#### Latin America

- For **El Salvador**, IRENA assessed the techno-economic renewable potential through a zoning assessment (IRENA, 2024j), while the same assessment is being completed for **Colombia**. The support focussed on the suitability for grid-connected solar and wind projects, analysing areas of the deployment for better planning of renewable projects.
- In collaboration with the NDC Partnership, IRENA is undertaking climate action support in various countries. In **Ecuador**, support is underway to strengthen enablers for NDC implementation, with enhanced transparency. For **El Salvador**, IRENA provides technical assistance for developing vulnerability assessment tools on the electrical infrastructure and capacity-building workshops on the tool.
- Following the completion of the RRA for **Honduras** in 2023 (IRENA, 2023d), the discussion with the government on post-RRA activities is underway to contribute to the country’s goal of attaining 80% renewables in the energy supply by 2038.
- Energy data surveys have been undertaken for **El Salvador**. For **Panama**, IRENA completed the assessment of climate-resilient infrastructure development, particularly for renewable power infrastructure. Changing climate patterns, including extreme heat, may damage energy infrastructure and affect its operation, which becomes a risk for energy security. IRENA provided this assessment for energy infrastructure, including generation, transmission and distribution, taking into consideration different climate events such as extreme heat, rainfall, drought and sea level rise (see Box 10).

- Project facilitation support was undertaken to support match-making for renewable energy projects in **Argentina, Brazil, El Salvador** and **Dominica**.
- In co-ordination with the NDC Partnership, the IITC is providing technical assistance for NDC Partnership activities in **Colombia, El Salvador** and **Peru**. For Colombia, IRENA will assess cost-effective options for climate change mitigation, focusing on energy transition technologies and offshore wind power. In El Salvador, the technical support involves a climate risk assessment of power sector assets and infrastructure. In Peru, the support will assess the alignment between national climate and energy-related strategies and plans.

### Caribbean SIDS

- IRENA through the SIDS LHI has supported countries including **Guyana** (Georgetown) and **Belize** (Belize City, San Ignacio and San Pedro) in accelerating the planning and deployment of rooftop solar PV installations. The SolarCity simulator is a web-based application developed to help households, businesses and municipal authorities evaluate their prospects for generating electricity using rooftop-mounted solar PV, testing several scenarios of installations, and designing policy instruments and incentive schemes.
- Energy data surveys have been undertaken for **Saint Lucia**. While NDCs depict technological and sectoral implementation roadmaps, many countries face challenges in collecting disaggregated baseline data for developing robust data-based roadmaps. IRENA's support was aimed at helping the country implement energy end-use surveys and analysis for policy development to contribute to NDC implementation.

### Box 9. Contributions to the United Nations' 4<sup>th</sup> International Conference on SIDS (SIDS4)

The SIDS LHI, co-ordinated by IRENA, continues to play a vital role in addressing the persisting challenges that SIDS continue to face. These challenges include dependency on fossil fuels, high electricity tariffs, limited access to affordable finance, and limited capacity for energy and modern technology. The SIDS LHI serves as a framework for transforming energy systems with renewables in island countries, fostering co-ordinated support through partnerships.

On the margins of SIDS4, IRENA, in partnership with Antigua and Barbuda and the Alliance of Small Island States (AOSIS) through the SIDS LHI, hosted a high-level session, "Transforming SIDS Economies through Energy Transition and Climate Action towards Prosperity, Resilience and Sustainable Development". The session explored, among other priorities, the financing landscape and available mechanisms for accelerating SIDS' energy transition and climate action.

In line with the Antigua and Barbuda Agenda for SIDS (ABAS) as the outcome of the SIDS4, the SIDS LHI is developing a monitoring mechanism with tailored indicators to track the progress and the impacts of the implementation of the SIDS priority areas. The SIDS indicators will be contributing to the SIDS Centre of Excellence hosted in Antigua and Barbuda. The centre will be a hub for research, capacity building and collaboration to enhance SIDS' socio-economic and environmental resilience.

## Box 10. Climate-resilience energy infrastructure for Panama

In Panama and across Latin America, energy infrastructure was designed and developed under an assumption of climate stability, which anticipated minimal or even no long-term changes in the climate. However, the last decade has seen changes in global weather patterns with significant socio-economic impacts. This has led countries to assess the impact of these changes on existing and planned energy infrastructure. If measures are not implemented for the energy sector to increase the resilience of its assets to climate change, the infrastructure for energy production and transport is likely to be vulnerable to climate events that not only would have high economic and social costs but could cause damage and interruptions to energy generation and distribution operations. For example, rising temperatures could decrease the efficiency of thermal conversion in thermal power plants, impairing their operation. In addition, extreme droughts can decrease water availability, affecting the cooling and operating systems of power plants and causing temporary power outages. Furthermore, hydrological changes and extreme rainfall may affect hydropower production, which constitutes a significant portion of Panama's energy matrix.

Therefore, integrating climate resilience into the design and implementation of energy infrastructure investments would not only help mitigate the impacts of climate change but also complement the cost-effectiveness and quality of services. To support Panama's climate-resilient infrastructure development, IRENA worked on the assessment to identify the climate risks to energy infrastructure in the country and explored adaptation measures aimed at mitigating potential damage and increasing the resilience of energy infrastructure, considering national data and models of the occurrence of extreme climate hazards.

As part of the analytical outputs on hydropower infrastructure, IRENA found that it is crucial to implement measures that increase the availability of water storage in the country's reservoirs and improve the efficiency of power generation through technologies adaptable to reduced turbine flows. It is also essential to integrate climate resilience into the design and planning of the construction of the plants. In addition, for solar PV infrastructure, extreme temperatures may affect electricity generation and transmission. In this context, it is essential to promote the adoption of technologies and materials that are resistant to high temperatures and that optimise for both solar PV generation and power transmission. This implies the use of cooling systems and the implementation of more efficient transmission lines in terms of capacity and thermal resistance. Overall, it is also necessary to integrate climate resilience into energy infrastructure planning, considering the potential impacts of climate change from the earliest stages (IRENA, 2024e).





# 3 AMBITIONS AND DIRECTIONS TOWARDS 2030 AND BEYOND

The urgency of advancing the energy transition and addressing climate change is undeniable, as the climate crisis deepens and its effects become more pronounced. At COP28 and in the First Global Stocktake - the UAE Consensus - a historic agreement was reached to triple renewable energy capacity and double the rate of energy efficiency improvement by 2030. For the realisation of these global ambitions, 2025 will become a critical year for countries to commit to enhanced national climate targets for 2030 and 2035. Countries must integrate these global targets into national frameworks through the NDC 3.0 process, as well as LT-LEDS and other commitments. In particular, NDC 3.0 provides a unique opportunity for the UNFCCC Parties to collectively align global emission trajectories with the Paris Agreement's 1.5°C target.

Countries will need to accelerate the energy transition and climate action for the rest of the five years leading up to 2030. Supportive policy and regulatory frameworks, skills and capacities, and infrastructure development are the keys to deploying energy transition technologies in developing countries as part of NDC implementation. Renewable energy is among the most important and promising opportunities to mitigate climate change in the years up to 2030. Ensuring viable conditions for renewable deployment is therefore essential in the near term. Other, broader energy transition options will become more important between 2030 and 2050. The development of robust regulatory frameworks and capacities can help the further acceleration of the energy transition for the medium term and long term.

Scaling up climate investment enables the deployment of mitigation strategies and the strengthening of adaptive measures. However, investment in renewable energy remains concentrated in a limited number of countries and technologies. As of 2022, 85% of global renewable energy investment was allocated to less than half of the world's population, with Africa receiving only 2% of the investment over the past decade (IRENA, 2023a). To address this disparity and funding gap, prioritising public finance and international co-operation is essential. Public finance, therefore, is needed to de-risk investments, especially for countries and regions that are not yet deemed investable by the private sector.

IRENA will continue to support efforts to enhance the scale, accessibility and affordability of climate action through the energy transition. IRENA is providing comprehensive quantitative scenarios for global- and regional-level climate-compatible energy transformation through its *World Energy Transitions Outlook*, which may guide the setting of national targets. As this report has highlighted, IRENA continues to engage in supporting countries' energy transitions in relation to policies and planning, project facilitation and finance, technology assessment, and innovation. These engagements will contribute to reaching the UAE Consensus 2030 energy targets and realign the world on a net-zero emissions pathway.

# REFERENCES

- COP28 Presidency, et al. (2023)**, *Tripling renewable power and doubling energy efficiency by 2030: Crucial steps toward 1.5°C*, International Renewable Energy Agency, COP28 Presidency and Global Renewables Alliance, Abu Dhabi, [www.irena.org/Publications/2023/Oct/Tripling-renewable-power-and-doubling-energy-efficiency-by-2030](http://www.irena.org/Publications/2023/Oct/Tripling-renewable-power-and-doubling-energy-efficiency-by-2030)
- COP28 UAE (2023)**, “COP28: Global Renewables and Energy Efficiency Pledge”, [www.cop28.com/en/global-renewables-and-energy-efficiency-pledge](http://www.cop28.com/en/global-renewables-and-energy-efficiency-pledge) (accessed 7 May 2024).
- EDGAR (2024)**, “GHG emissions of all world countries: 2024 report”, Emissions Database for Global Atmospheric Research, European Commission,, [https://edgar.jrc.ec.europa.eu/report\\_2024](https://edgar.jrc.ec.europa.eu/report_2024) (accessed 29 September 2024).
- ESCAP (2024)**, “Asia and the Pacific SDG progress report 2024: Showcasing transformative actions”, <https://www.unescap.org/kp/2024/asia-and-pacific-sdg-progress-report-2024> (accessed 28 August 2024).
- ESMAP et al. (2024)**, “SDG 7.3 Energy Efficiency Dataset”, from *Tracking SDG7: The energy progress report 2024*, Energy Sector Management Assistance Program, International Energy Agency, International Renewable Energy Agency, United Nations Statistics Division, the World Bank and World Health Organization, Geneva, <https://trackingsdg7.esmap.org/downloads>
- Federal Network Agency of Germany (2024)**, “Growth in renewable energy in 2023”, [www.bundesnetzagentur.de/SharedDocs/Pressemitteilungen/EN/2024/20240105\\_EEG-Zubau.html](http://www.bundesnetzagentur.de/SharedDocs/Pressemitteilungen/EN/2024/20240105_EEG-Zubau.html) (accessed 28 August 2024).
- G7 Italy (2024)**, “Climate, Energy and Environment Ministers’ Meeting Communiqué”, [www.g7italy.it/wp-content/uploads/G7-Climate-Energy-Environment-Ministerial-Communique\\_Final.pdf](http://www.g7italy.it/wp-content/uploads/G7-Climate-Energy-Environment-Ministerial-Communique_Final.pdf)
- IEA, et al. (2024)**, *Tracking SDG7: The energy progress report 2024*, International Energy Agency, International Renewable Energy Agency, United Nations Statistics Division, the World Bank and World Health Organization, Geneva, [www.irena.org/Publications/2023/Jun/Tracking-SDG7-2023](http://www.irena.org/Publications/2023/Jun/Tracking-SDG7-2023)
- IPCC (2022a)**, *Climate change 2022: Impacts, adaptation and vulnerability summary for policy makers*, Intergovernmental Panel on Climate Change, [https://report.ipcc.ch/ar6wg2/pdf/IPCC\\_AR6\\_WGII\\_SummaryForPolicymakers.pdf](https://report.ipcc.ch/ar6wg2/pdf/IPCC_AR6_WGII_SummaryForPolicymakers.pdf)

- IPCC (2022b)**, *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, IPCC, [doi: 10.1017/9781009157926.001](https://doi.org/10.1017/9781009157926.001)
- IPCC (2023)**, *AR6 synthesis report: Climate change 2023*, Intergovernmental Panel on Climate Change, [www.ipcc.ch/report/ar6/syr/](http://www.ipcc.ch/report/ar6/syr/)
- IRENA (2022a)**, *Renewable energy targets in 2022: A guide to design*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2022/Nov/Renewable-energy-targets-in-2022](http://www.irena.org/Publications/2022/Nov/Renewable-energy-targets-in-2022)
- IRENA (2022b)**, *Renewable energy roadmap for Central America: Towards a regional energy transition*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Mar/IRENA\\_Renewable\\_Roadmap\\_Central\\_America\\_2022.pdf](http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2022/Mar/IRENA_Renewable_Roadmap_Central_America_2022.pdf)
- IRENA (2022c)**, *Renewable energy outlook for ASEAN: Towards a regional energy transition (2nd Edition)*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/publications/2022/Sep/Renewable-Energy-Outlook-for-ASEAN-2nd-edition](http://www.irena.org/publications/2022/Sep/Renewable-Energy-Outlook-for-ASEAN-2nd-edition)
- IRENA (2023a)**, *World energy transitions outlook 2023: 1.5°C pathway*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2023/Jun/World-Energy-Transitions-Outlook-2023](http://www.irena.org/Publications/2023/Jun/World-Energy-Transitions-Outlook-2023)
- IRENA (2023b)**, *Renewables readiness assessment: Burkina Faso*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2023/Dec/Renewables-readiness-assessment-Burkina-Faso](http://www.irena.org/Publications/2023/Dec/Renewables-readiness-assessment-Burkina-Faso)
- IRENA (2023c)**, *Renewables readiness assessment: Bosnia and Herzegovina*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2023/Sep/Renewables-Readiness-Assessment-Bosnia-and-Herzegovina](http://www.irena.org/Publications/2023/Sep/Renewables-Readiness-Assessment-Bosnia-and-Herzegovina)
- IRENA (2023d)**, *Renewables readiness assessment: Honduras*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2023/Nov/Renewables-Readiness-Assessment-Honduras](http://www.irena.org/Publications/2023/Nov/Renewables-Readiness-Assessment-Honduras)
- IRENA (2024a)**, *Renewable capacity statistics 2024*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2024/Mar/Renewable-capacity-statistics-2024](http://www.irena.org/Publications/2024/Mar/Renewable-capacity-statistics-2024)
- IRENA (2024b)**, *Renewable energy statistics 2024*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2024/Jul/Renewable-energy-statistics-2024](http://www.irena.org/Publications/2024/Jul/Renewable-energy-statistics-2024)
- IRENA (2024c)**, *Tripling renewable power by 2030: The role of the G7 in turning targets into action*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2024/Apr/Tripling-renewable-power-by-2030-The-role-of-the-G7-in-turning-targets-into-action](http://www.irena.org/Publications/2024/Apr/Tripling-renewable-power-by-2030-The-role-of-the-G7-in-turning-targets-into-action)

- IRENA (2024d)**, *Sub-Saharan Africa: Policy and finance for renewable energy deployment*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2024/Jul/Sub-Saharan-Africa-Policies-and-finance-for-renewable-energy-deployment](http://www.irena.org/Publications/2024/Jul/Sub-Saharan-Africa-Policies-and-finance-for-renewable-energy-deployment)
- IRENA (2024e)**, *The energy sector of Panama: Climate change adaptation challenges*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2024/Jul/The-energy-sector-of-Panama-Climate-change-adaptation-challenges](http://www.irena.org/Publications/2024/Jul/The-energy-sector-of-Panama-Climate-change-adaptation-challenges)
- IRENA (2024f)**, *Tracking COP28 outcomes: Tripling renewable capacity by 2030*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2024/Mar/Tracking-COP28-outcomes-Tripling-renewable-power-capacity-by-2030](http://www.irena.org/Publications/2024/Mar/Tracking-COP28-outcomes-Tripling-renewable-power-capacity-by-2030)
- IRENA (2024g)** "Statistical Profiles", International Renewable Energy Agency, Abu Dhabi, <https://www.irena.org/Data/Energy-Profiles>
- IRENA (2024h)**, *Investment opportunities for utility-scale solar and wind areas: Mali zoning assessment*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2024/Aug/Investment-opportunities-for-utility-scale-solar-and-wind-areas-Mali](http://www.irena.org/Publications/2024/Aug/Investment-opportunities-for-utility-scale-solar-and-wind-areas-Mali)
- IRENA (2024i)**, *Renewables readiness assessment: Solomon Islands*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2024/Feb/Renewables-readiness-assessment-Solomon-Islands](http://www.irena.org/Publications/2024/Feb/Renewables-readiness-assessment-Solomon-Islands)
- IRENA (2024j)**, *Investment opportunities for utility-scale solar and wind areas: El Salvador zoning assessment*, International Renewable Energy Agency, Abu Dhabi, [www.irena.org/Publications/2024/May/Investment-opportunities-for-utility-scale-solar-and-wind-areas-El-Salvador](http://www.irena.org/Publications/2024/May/Investment-opportunities-for-utility-scale-solar-and-wind-areas-El-Salvador)
- IRENA and CPI (2023)**, *Global landscape of renewable energy finance 2023*, International Renewable Energy Agency and Climate Policy Initiative, Abu Dhabi, [www.irena.org/Publications/2023/Feb/Global-landscape-of-renewable-energy-finance-2023](http://www.irena.org/Publications/2023/Feb/Global-landscape-of-renewable-energy-finance-2023)
- IRENA, et al. (2024)**, *Delivering on the UAE Consensus: Tracking progress toward tripling renewable energy capacity and doubling energy efficiency by 2030*, International Renewable Energy Agency, COP28 Presidency, COP29 Presidency, Global Renewable Alliance, Ministry of Energy of the Republic of Azerbaijan, Government of Brazil, Abu Dhabi, [www.irena.org/Publications/2024/Oct/UAE-Consensus-2030-tripling-renewables-doubling-efficiency](http://www.irena.org/Publications/2024/Oct/UAE-Consensus-2030-tripling-renewables-doubling-efficiency)
- NDC Partnership (2024)**, "NDC 3.0 Navigator", <https://ndcnavigator.org/> (accessed 21 August 2024).
- UN (2023)**, "Europe warming twice as fast as other continents, warns WMO", <https://news.un.org/en/story/2023/06/1137867>
- UN (2024)**, "Pact for the Future", <https://www.un.org/sites/un2.un.org/files/sotf-the-pact-for-the-future.pdf> (accessed 18 October 2024).

**UNDP (2023a)**, *Enhancing climate change transparency: How developing countries are taking action*, United Nations Development Programme, [www.undp.org/sites/g/files/zskgke326/files/2023-12/undp-enhancing-climate-change-transparency.pdf](http://www.undp.org/sites/g/files/zskgke326/files/2023-12/undp-enhancing-climate-change-transparency.pdf) (accessed 21 August 2024).

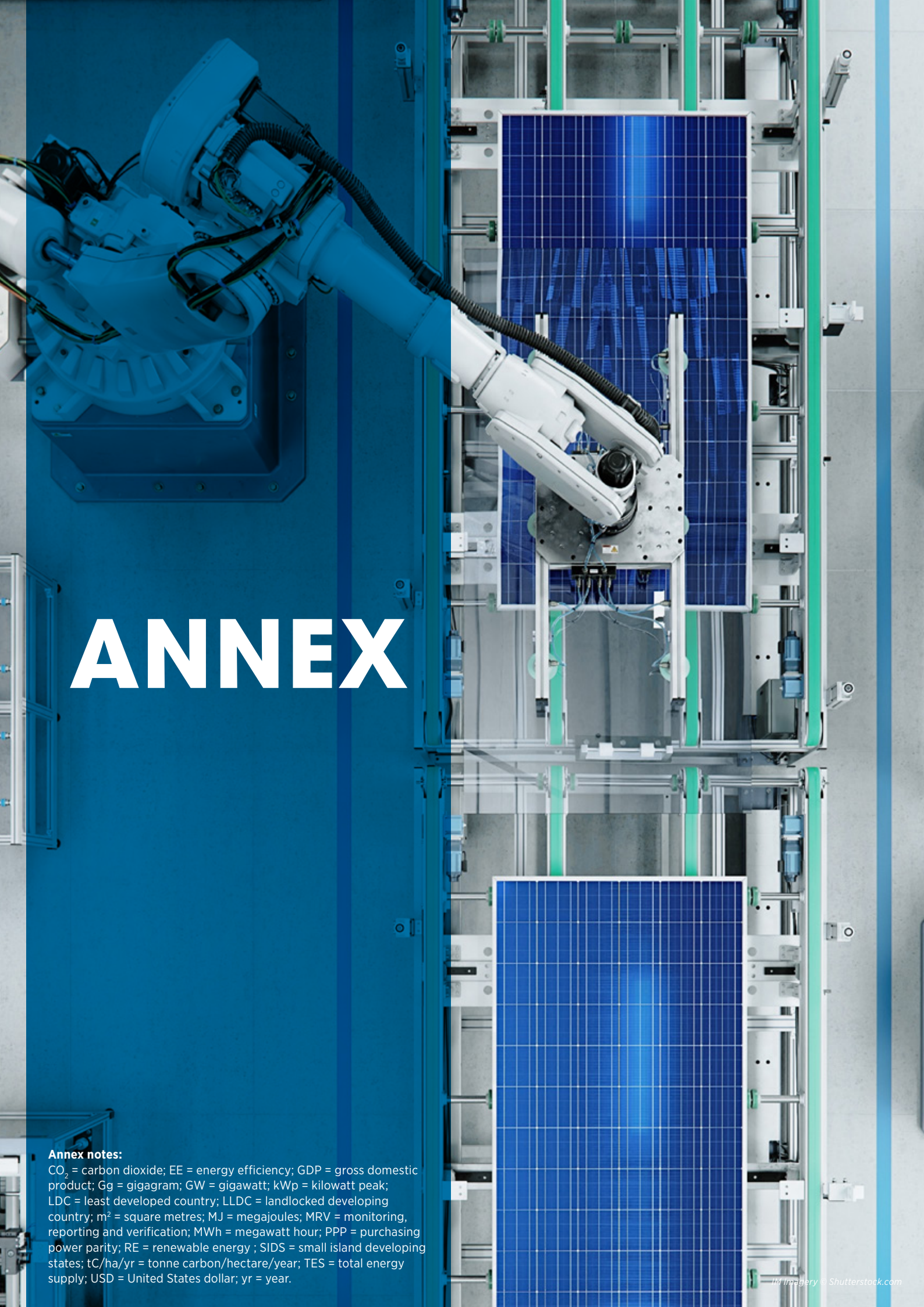
**UNDP (2023b)**, *The challenges of climate mitigation in Latin America and the Caribbean: Some proposals for action*, United Nations Development Programme, [www.undp.org/latin-america/publications/challenges-climate-mitigation-latin-america-and-caribbean-some-proposals-action](http://www.undp.org/latin-america/publications/challenges-climate-mitigation-latin-america-and-caribbean-some-proposals-action)

**UNDP, et al. (2020)**, *Implementing Nationally Determined Contributions (NDCs)*, United Nations Development Programme, United Nations Environment Programme, World Resources Institute, UNEP DTU Partnership Copenhagen, Denmark, <https://tech-action.unepccc.org/wp-content/uploads/2020/03/implementing-ndcs-report.pdf>

**UNFCCC (2023)**, “Outcome of the first global stocktake, revised advance version, No. FCCC/PA/CMA/2023/L.17; Draft decision CMA.5”, United Nations Framework Convention on Climate Change, [https://unfccc.int/sites/default/files/resource/cma2023\\_L17\\_adv.pdf](https://unfccc.int/sites/default/files/resource/cma2023_L17_adv.pdf)

**UNFCCC (2024)**, “Nationally determined contributions under the Paris Agreement: Synthesis report by the secretariat”, <https://unfccc.int/documents/641792> (accessed 28 October 2024).

**World Economic Forum (2023)**, “How Chile is becoming a leader in renewable energy”, [www.weforum.org/agenda/2023/01/how-chile-is-becoming-a-leader-in-renewable-energy/#:~:text=Chile%20has%20set%20an%20ambitious,support%20and%20innovative%20green%20technologies](http://www.weforum.org/agenda/2023/01/how-chile-is-becoming-a-leader-in-renewable-energy/#:~:text=Chile%20has%20set%20an%20ambitious,support%20and%20innovative%20green%20technologies) (accessed 21 August 2024).



# ANNEX

**Annex notes:**

CO<sub>2</sub> = carbon dioxide; EE = energy efficiency; GDP = gross domestic product; Gg = gigagram; GW = gigawatt; kWp = kilowatt peak; LDC = least developed country; LLDC = landlocked developing country; m<sup>2</sup> = square metres; MJ = megajoules; MRV = monitoring, reporting and verification; MWh = megawatt hour; PPP = purchasing power parity; RE = renewable energy ; SIDS = small island developing states; tC/ha/yr = tonne carbon/hectare/year; TES = total energy supply; USD = United States dollar; yr = year.



# ALBANIA

## Membership since

13 August 2010  
**COP28 Pledge of Tripling RE and Doubling EE: Endorsed**

## Population

2 745 972 (2023)<sup>1</sup>

## GDP per capita

USD 8 367.78 (2023)<sup>1</sup>

## Renewable power

2023: 2 657.43 MW  
 (140 MW of capacity added from 2022)

## Energy intensity

2021: 2.27 TES/GDP  
 PPP MJ per 2017 USD  
 (3.29% improvement from 2020)<sup>2</sup>

## Total greenhouse gas emissions

7.67 MtCO<sub>2</sub>eq (2023)<sup>3</sup>

## Renewable energy targets in first NDC<sup>4</sup>

By 2030, 42% renewables in gross final energy consumption. For transport, achieve 10% biofuel consumption in 2020, 10% in 2025 and 10% in 2030, as compared to 3.55% in 2015

## Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (30% area)  
 1.4-1.8 MWh/kWp/yr (69% area)
- **Wind:** <260 W/m<sup>2</sup> (57% area)  
 260-420 W/m<sup>2</sup> (23% area)  
 420-560 W/m<sup>2</sup> (10% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

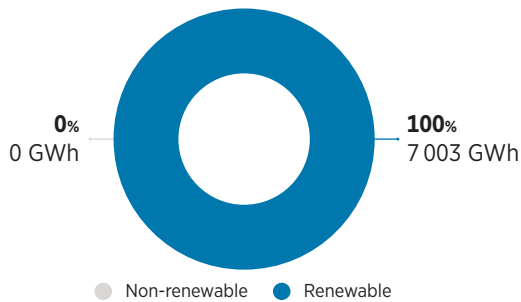
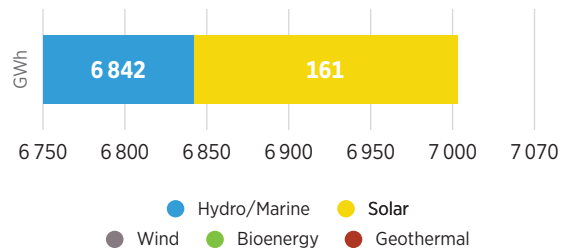


Figure 2 **Renewable generation by technology (GWh)**



<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Albania

### Support completed

1 Comprehensive evaluations of the conditions for renewable energy deployment to identify a set of actions to scale up renewable energy and enhance greenhouse gas mitigation

<b>Work package:</b> Renewables readiness assessment	<b>Source:</b> NDC Partnership
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2 A workshop to provide assistance and capacity building for the design of renewable energy targets and policy frameworks to help define and achieve NDC targets

<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> NDC Partnership
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3 Support for calculation of renewable energy share from heat pumps

<b>Work package:</b> Data and statistics	<b>Source:</b> Data and statistics
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### Support ongoing

4 Support of developing NDC 3.0 target in alignment with the country's NECP

<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of Albania
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<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
14 January 2012 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 2 309.52 (2023) <sup>1</sup>	2021: 3.10 TES/GDP PPP MJ per 2017 USD (-10.71% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
36 684 202 (2023) <sup>1</sup>	2023: 4 090.74 MW (25 MW of capacity added from 2022)	67.70 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

**Unconditional target:**

Installation of 500 MW of biomass plants, 100 MW of mini-hydropower, 700 MW of hydropower stations, 104 MW of large-scale solar power plants, 100 MW of small-scale solar panels, 2 MW of small-scale solar panels in industry and 100 MW of wind farms

**Conditional target:**

Installation of 500 MW of biomass plants, 150 MW of mini-hydropower, 2 050 MW of hydropower stations, 104 MW of large-scale solar power plants, 187 MW of small-scale solar panels, 2 MW of small-scale solar

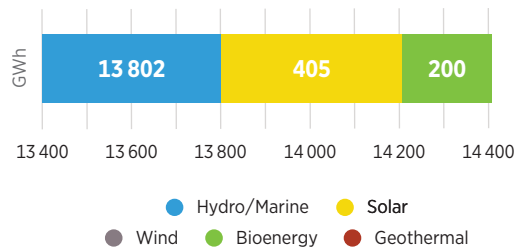
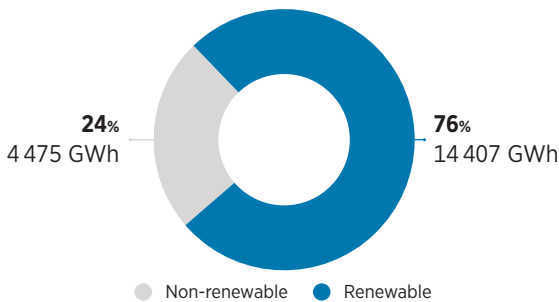
panels in industry, 15 MW of small-scale solar panels (NAMA Program) and 100 MW of wind farms

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (10% area); 1.4-1.6 MWh/kWp/yr (20% area); 1.6-1.8 MWh/kWp/yr (55% area); 1.8-1.9 MWh/kWp/yr (22% area); 1.9-2.0 MWh/kWp/yr (3% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 7.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Angola**

**Support completed**

Bioenergy Eni training	
<b>1</b>	<b>Work package:</b> Capacity building on policy and finance <b>Source:</b> Government of Angola

**Support ongoing**

Pre-feasibility site assessment	
<b>2</b>	<b>Work package:</b> Resource assessment <b>Source:</b> Government of Angola

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# ANTIGUA AND BARBUDA

SIDS

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
10 October 2010 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 21 560.22 (2023) <sup>1</sup>	2021: 4.83 TES/GDP PPP MJ per 2017 USD (3.41% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions<sup>3</sup></b>
94 289 (2023) <sup>1</sup>	2023: 15.58 MW (0.72 MW of capacity added from 2022)	0.39 MtCO <sub>2</sub> eq (2023)

### Renewable energy targets in first updated NDC<sup>4</sup>

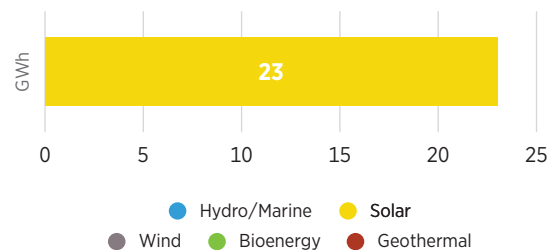
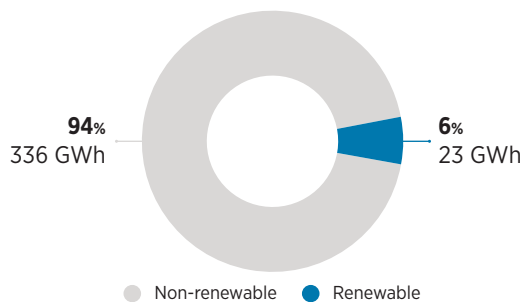
100 MW of renewable generation capacity available to the grid (2030); 86% renewable generation from local resources in the electricity sector (2030); 20 MW of wind energy generation

### Resource potential<sup>5</sup>

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (100% area)
- **Wind:** <260 W/m<sup>2</sup> (73% area)  
260-420 W/m<sup>2</sup> (28% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



### Acknowledgement of IRENA support

*"Special thanks to our implementing partners International Renewable Energy Agency (IRENA)"; also clearly mentions IRENA's Small Island Developing States (SIDS) Lighthouses Initiative as a method of NDC preparation, and cites the renewable energy roadmap work"*

(ANTIGUA AND BARBUDA, FIRST NDC [UPDATED SUBMISSION], 2 SEPTEMBER 2021)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Antigua and Barbuda

### Support completed

Development of a rooftop solar PV city simulator for North Antigua	
<b>1</b>	<b>Work package:</b> Resource assessment
	<b>Source:</b> Government of Antigua and Barbuda
Technical report with references to relevant existing published work that supports the assessment of technical needs of relevant sectors to achieve a just transition of the workforce to greener occupations and more wide-scale adoption of electric mobility	
<b>2</b>	<b>Work package:</b> Technology and infrastructure technical analysis
	<b>Source:</b> NDC Partnership
Technology plan and mitigation analysis to evaluate the early stages of transport sector decarbonisation with electric mobility, including the techno-economic feasibility of electrifying high-use-factor fleets such as public bus transport	
<b>3</b>	<b>Work package:</b> Technology and infrastructure technical analysis
	<b>Source:</b> NDC Partnership

### Support ongoing

A socio-economic analysis of the impact of electric mobility on men, women, and vulnerable groups and communities	
<b>4</b>	<b>Work package:</b> Data and statistics
	<b>Source:</b> Government of Antigua and Barbuda



DiegoMariottini © Shutterstock.com



# ARGENTINA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
15 June 2013 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 13 730.51 (2023) <sup>1</sup>	2021: 3.39 TES/GDP PPP MJ per 2017 USD (1.93% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
46 654 581 (2023) <sup>1</sup>	2023: 15 886.46 MW (702 MW of capacity added from 2022)	365.68 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

Does not indicate quantifiable renewable energy targets

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (46% area)  
1.6-1.8 MWh/kWp/yr (39% area)  
>2.0 MWh/kWp/yr (9% area)
- **Wind:** <260 W/m<sup>2</sup> (55% area)  
260-420 W/m<sup>2</sup> (17% area)  
420-560 W/m<sup>2</sup> (15% area)  
>1 060 W/m<sup>2</sup> (15% area)
- **Biomass:** 3.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

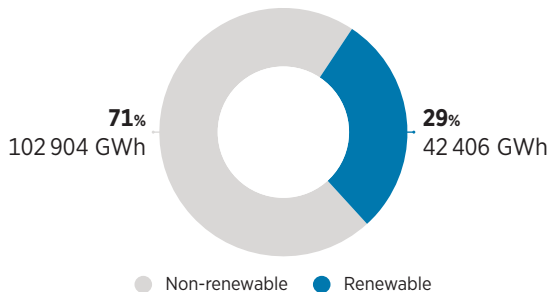
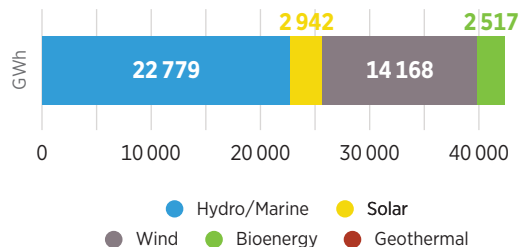


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Argentina

### Support ongoing

Solar City simulator	
<b>1</b> <b>Work package:</b> Resource assessment	<b>Source:</b> Government of Argentina

<sup>1, 2, 3, 4, 5.</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
3 May 2014 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 34 749.64 (2023) <sup>1</sup>	2021: 2.87 TES/GDP PPP MJ per 2017 USD (-4.37% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
412 623 (2023) <sup>1</sup>	2023: 11.53 MW (0.07 MW of capacity added from 2022)	2.05 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in updated first NDC<sup>4</sup>**

Minimum of 30% renewables in the energy mix and 35% and 15% of vehicle purchases to be electric and hybrid by 2030

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (39% area)  
1.6-1.8 MWh/kWp/yr (63% area)
- **Wind:** <260 W/m<sup>2</sup> (80% area)  
260-420 W/m<sup>2</sup> (20% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

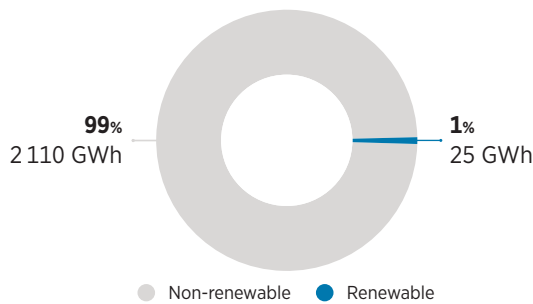
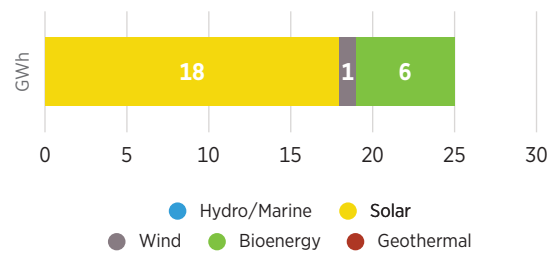


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Bahamas**

**Support completed**

Develop and deliver two technical sessions as part of the virtual training programme for youth, focusing on two of the identified key national priorities: renewable energy and NDC enhancement.			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Technology and infrastructure capacity building</td> <td><b>Source:</b> Government of Bahamas</td> </tr> </table>	<b>Work package:</b> Technology and infrastructure capacity building	<b>Source:</b> Government of Bahamas
<b>Work package:</b> Technology and infrastructure capacity building	<b>Source:</b> Government of Bahamas		
Solar City simulator			
<b>2</b>	<table border="1"> <tr> <td><b>Work package:</b> Resource assessment</td> <td><b>Source:</b> Government of Bahamas</td> </tr> </table>	<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Bahamas
<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Bahamas		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.



# BANGLADESH

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
25 September 2014 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 2 529.08 (2023) <sup>1</sup>	2021: 1.93 TES/GDP PPP MJ per 2017 USD (-1.61% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
172 954 319 (2023) <sup>1</sup>	2023: 1 005.69 MW (243 MW of capacity added from 2022)	281.38 MtCO <sub>2</sub> eq (2022) <sup>4</sup>

## Renewable energy targets in first updated NDC<sup>5</sup>

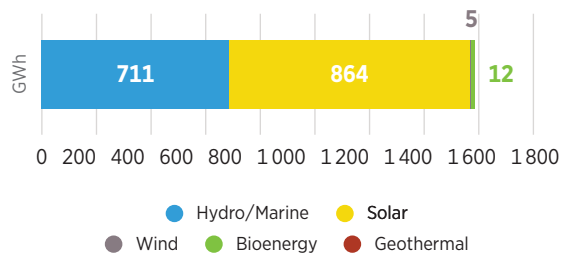
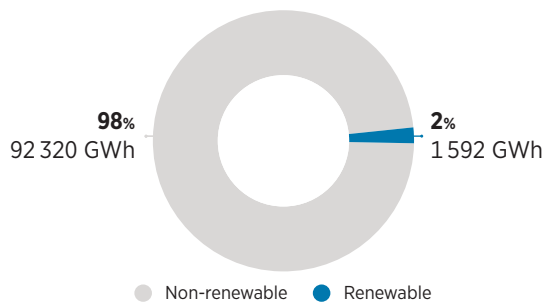
Implementation of renewable energy projects of 4114.3 MW

## Resource potential<sup>6</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (73% area)  
1.4-1.6 MWh/kWp/yr (27% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Bangladesh

### Support ongoing

1 Comprehensive evaluations of the conditions for renewable energy deployment to identify a set of actions to scale up renewables and for climate change mitigation

**Work package:**  
Renewables readiness assessment

**Source:**  
Government of Bangladesh

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# BELARUS

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
27 February 2011 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 7 829.05 (2023) <sup>1</sup>	2021: 6.18 TES/GDP PPP MJ per 2017 USD (-6.23% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
9 178 298 (2023) <sup>1</sup>	2023: 631.90 MW (4 MW of capacity added from 2022)	84.28 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

## Renewable energy targets in first updated NDC<sup>4</sup>

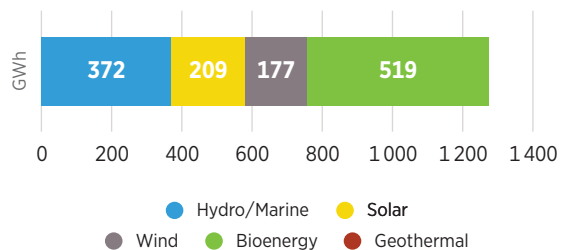
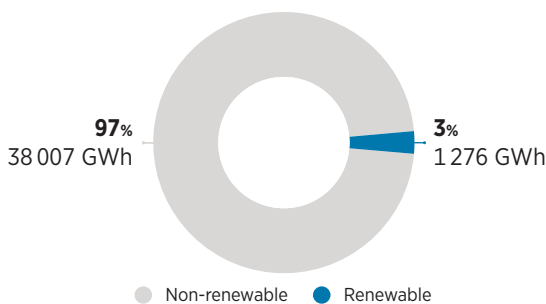
Does not include quantified renewable energy targets

## Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (100% area)
- **Wind:** 260 W/m<sup>2</sup> (97% area)  
260-420 W/m<sup>2</sup> (5% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Belarus

### Support completed

Assessment of the cost effectiveness of mitigation options for the power sector, focusing on renewable energy technologies			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Technology and infrastructure technical analysis</td> <td><b>Source:</b> UNDP</td> </tr> </table>	<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> UNDP
<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> UNDP		
Capacity building workshop on auction design, a key recommendation from the Renewables Readiness Assessment report			
<b>2</b>	<table border="1"> <tr> <td><b>Work package:</b> Capacity building on policy and finance</td> <td><b>Source:</b> Government of Belarus</td> </tr> </table>	<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> Government of Belarus
<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> Government of Belarus		

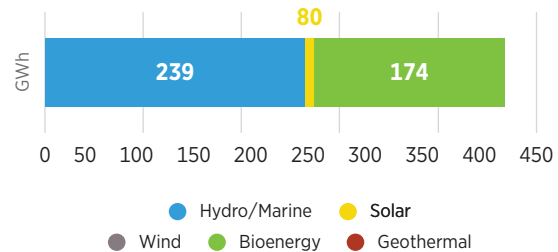
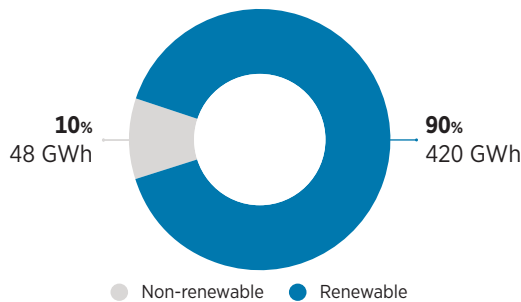
<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita<sup>1</sup></b>	<b>Energy intensity</b>
27 January 2013 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 7 987.59 (2023)	2021: 4.78 TES/GDP PPP MJ per 2017 USD (1.75% improvement from 2020) <sup>2</sup>
<b>Population<sup>1</sup></b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
410 825 (2023)	2023: 99.02 MW (no capacity added from 2022)	0.92 MtCO <sub>2</sub> eq (2023) <sup>3</sup>
<b>Renewable energy targets in first NDC<sup>4</sup></b>	<b>Resource potential<sup>5</sup></b>	
<b>Conditional:</b> Reduce emissions by 2 514 Gg of CO <sub>2</sub> via hydropower 518 Gg of CO <sub>2</sub> via solar PV and 947 Gg of CO <sub>2</sub> via bagasse	<ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1.4-1.6 MWh/kWp/yr (78% area) 1.6-1.8 MWh/kWp/yr (18% area)</li> <li>• <b>Wind:</b> &lt;260 W/m<sup>2</sup> (100% area)</li> <li>• <b>Biomass:</b> 5.5 tC/ha/yr</li> </ul>	

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**Acknowledgement of IRENA support**

*"The updated NDC was supported by IRENA..."*

(BELIZE'S FIRST [UPDATED] NDC SUBMISSION, 1 SEPTEMBER 2021)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



## IRENA climate action engagement in Belize

### Support completed

- 1 Technical inputs from the Renewable Energy Roadmap (REmap) to determine the potential to scale up the use of renewable energy, focusing on renewable technologies and on heating, cooling and transport technology options

<b>Work package:</b> Renewable energy roadmap	<b>Source:</b> UNFCCC
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- 2 Review and analysis of existing mechanisms and frameworks for the collection and management of all data relevant to the development of a monitoring, reporting and verification (MRV) system, including identifying the key public and private sector stakeholders necessary for its design, development and sustainability

<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
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- 3 Recommendations on the policy, legal and institutional frameworks necessary for the development and implementation of the energy sector MRV system, as well as the supporting co-ordination mechanisms, based on international best practices

<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> NDC Partnership
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- 4 Design of an MRV system to support tracking of greenhouse gas emissions, the impact of mitigation and adaptation actions, and climate finance flows that collectively contribute to the pursuit of communicated NDC targets

<b>Work package:</b> Monitoring, reporting and verification (MRV)	<b>Source:</b> NDC Partnership
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<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
21 November 2012 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 1 434.66 (2023) <sup>1</sup>	2021: 4.79 TES/GDP PPP MJ per 2017 USD (17.25% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
13 712 828 (2023) <sup>1</sup>	2023: 28.44 MW (no capacity added from 2022)	16.70 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

#### Renewable energy targets in first updated NDC<sup>4</sup>

By 2030, install 843 MW of renewable capacity in the energy mix

#### Resource Potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (22% area)  
1.4-1.6 MWh/kWp/yr (70% area)  
1.6-1.8 MWh/kWp/yr (9% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 2.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

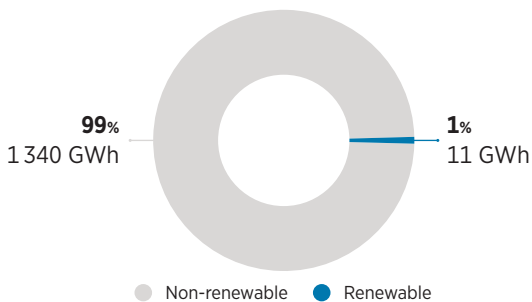
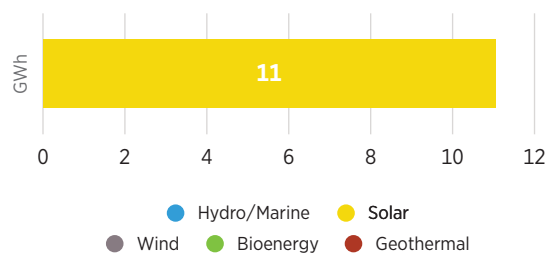


Figure 2 **Renewable generation by technology (GWh)**



## IRENA Climate Action Engagement in Benin

### Support completed

- Capacity building support on a quantification study of greenhouse gas emissions from the NDC projects by sector

1

**Work Package:**  
Data and statistics

**Partner:**  
NDC Partnership

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
1 June 2016 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 3 704.02 (2022) <sup>1</sup>	2021: 9.72 TES/GDP PPP MJ per 2017 USD (-15.02% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
787 424 (2023) <sup>1</sup>	2023: 2 336.28 MW (1 MW of capacity added from 2022)	3.25 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in second NDC<sup>4</sup>**

**Medium-term targets (2020-2028):**

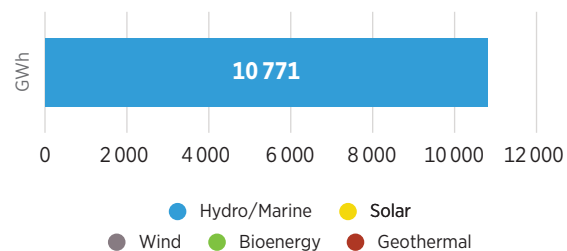
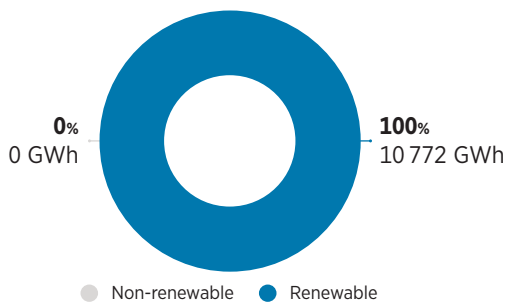
71.11 MW of utility-scale solar and wind energy; alternative renewable energy project to install roof-mounted solar PV on 300 rural households to enable access to clean energy and displace fuelwood consumption

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.2-1.6 MWh/kWp/yr (50% area)
- **Wind:** <260 W/m<sup>2</sup> (99% area)  
420-560 W/m<sup>2</sup> (5% area)
- **Biomass:** 3.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Bhutan**

**Support completed**

1 Comprehensive evaluations of the conditions for renewable energy deployment to identify a set of actions to scale up renewable energy and enhance greenhouse gas mitigation

<b>Work package:</b> Renewables readiness assessment	<b>Source:</b> Government of Bhutan
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**Acknowledgement of IRENA support**

*"The Renewables Readiness Assessment has been developed in co-operation with International Renewable Energy Agency with a view to complement the country's efforts in enabling the wider penetration of various renewable energy technologies..."*

(BHUTAN'S SECOND NDC, 25 JUNE 2021)

<sup>1,2,3,4,5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# BOSNIA AND HERZEGOVINA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
12 January 2011 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 8 426.09 (2023) <sup>1</sup>	2021: 5.89 TES/GDP PPP MJ per 2017 USD (3.55% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
3 210 847 (2023) <sup>1</sup>	2023: 2 116.19 MW (30 MW of capacity added from 2022)	29.40 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

## Renewable energy targets in first NDC<sup>4</sup>

### Conditional (by 2030):

70 MW of biomass co-generation plants  
120 MW of mini-hydropower plants  
175 MW of wind farms and  
4 MW of solar PV modules

## Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (20% area)  
1.2-1.4 MWh/kWp/yr (65% area)  
1.4-1.6 MWh/kWp/yr (15% area)
- **Wind:** <260 W/m<sup>2</sup> (69% area)  
260-420 W/m<sup>2</sup> (17% area)  
420-560 W/m<sup>2</sup> (10% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 Total electricity generation (GWh, %)

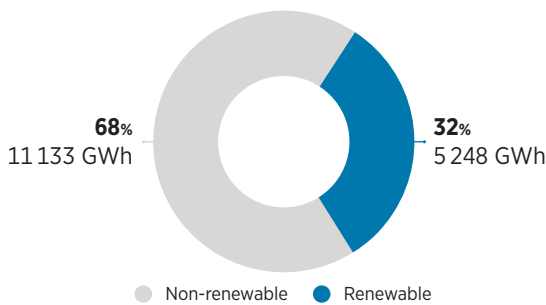
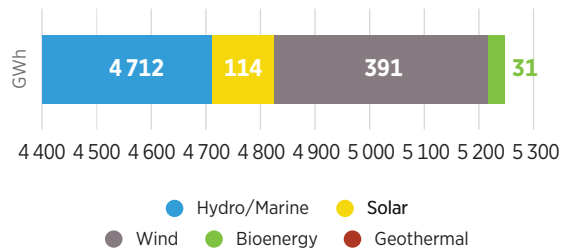


Figure 2 Renewable generation by technology (GWh)



<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Bosnia and Herzegovina

### Support completed

1 Capacity building workshops on the socio-economic benefits of the energy transition, design of policy and measures in the heating and cooling sectors, and financing instruments for renewable energy

<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> Government of Bosnia and Herzegovina
---	--

2 Technical report with recommendations and actions for revising and aligning the NDC and National Energy and Climate Plan (NECP) mitigation options

<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of Bosnia and Herzegovina
--	--

3 Renewables Readiness Assessment (RRA) report including a chapter on bankability, combined with provisional notes that will serve the finalisation of the NECP

<b>Work package:</b> Renewables readiness assessment	<b>Source:</b> Government of Bosnia and Herzegovina
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### Support ongoing

4 Support of developing NDC 3.0 target in alignment with NECP

<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of Bosnia and Herzegovina
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# BRAZIL

<b>State in accession</b> COP28 Pledge of Tripling RE and Doubling EE: Endorsed	<b>GDP per capita</b> USD 10 043.62 (2023) <sup>1</sup>	<b>Energy intensity</b> 2021: 3.96 TES/GDP PPP MJ per 2017 USD (0.80% improvement from 2020) <sup>2</sup>
<b>Population</b> 216 422 446 (2023) <sup>1</sup>	<b>Renewable power</b> 2023: 194 084.66 MW (17 375 MW of capacity added from 2022)	<b>Total greenhouse gas emissions</b> 1300.17 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in updated first NDC<sup>4</sup>

Minimum of 30% renewables in the energy mix and 35% and 15% of vehicle purchases to be electric and hybrid by 2030

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (39% area)  
1.6-1.8 MWh/kWp/yr (63% area)
- **Wind:** <260 W/m<sup>2</sup> (80% area)  
260-420 W/m<sup>2</sup> (20% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 Total electricity generation (GWh, %)

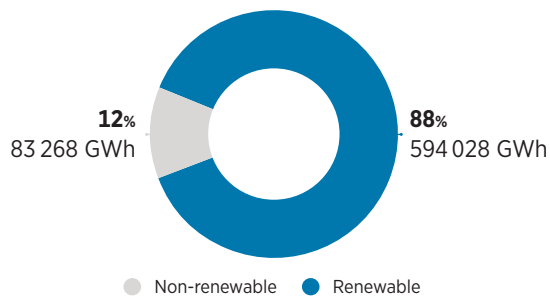
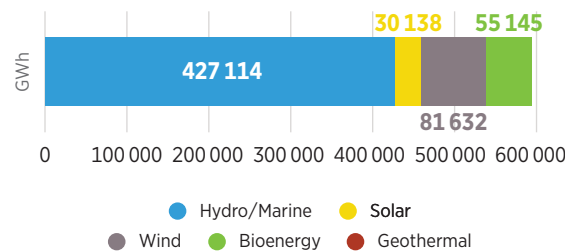


Figure 2 Renewable generation by technology (GWh)



## IRENA climate action engagement in Brazil

### Support completed

Project development support and match making	
<b>1</b> <b>Work package:</b> Project facilitation	<b>Source:</b> Government of Brazil

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.



# BURKINA FASO

LDC/LLDC

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
25 July 2013 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 874.12 (2023) <sup>1</sup>	2021: 5.43 TES/GDP PPP MJ per 2017 USD (1.82% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
23 251 485 (2023) <sup>1</sup>	2023: 214.41 MW (92 MW of capacity added from 2022)	34.46 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

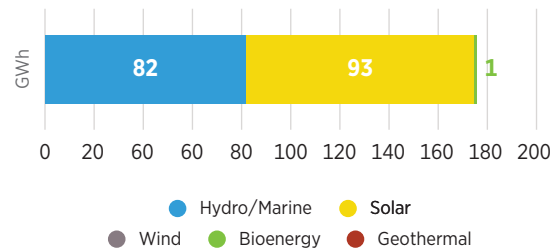
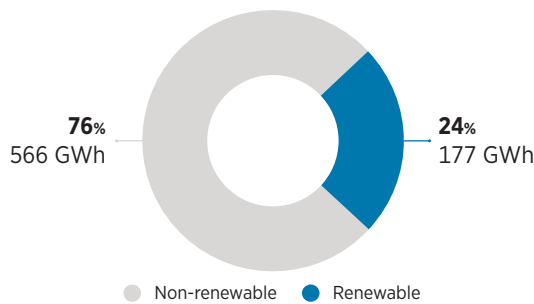
By 2030, 36% renewable energy in total installed capacity, corresponding to 318 MW of renewable installed capacity, including 100 MW of small hydropower, 205 MW of solar and 13 MW of bioenergy

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (22% area)  
1.6-1.8 MWh/kWp/yr (78% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 Total electricity generation (GWh, %)

Figure 2 Renewable generation by technology (GWh)



## IRENA climate action engagement in Burkina Faso

### Support completed

Suitability assessment based on the Global Atlas for Renewable Energy	
<b>1</b>	<b>Work package:</b> Resource assessment <b>Source:</b> Government of Burkina Faso
Preparation of a Renewables Readiness Assessment	
<b>2</b>	<b>Work package:</b> Renewables readiness assessment <b>Source:</b> Government of Burkina Faso

### Support ongoing

Capacity building for strengthening solar PV and grid infrastructure skills	
<b>3</b>	<b>Work package:</b> Technology and infrastructure technical analysis <b>Source:</b> NDC Partnership

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# CAMEROON

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
20 August 2011	USD 1 673.65 (2023) <sup>1</sup>	2021: 4.23 TES/GDP
<b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	<b>Renewable power</b>	PPP MJ per 2017 USD
	2023: 864 MW	(2.98% improvement from 2020) <sup>2</sup>
	(36 MW of capacity added from 2022)	<b>Total greenhouse gas emissions</b>
<b>Population</b>		39.38 MtCO <sub>2</sub> eq (2023) <sup>3</sup>
28 647 293 (2023) <sup>1</sup>		

### Renewable energy targets in first NDC<sup>4</sup>

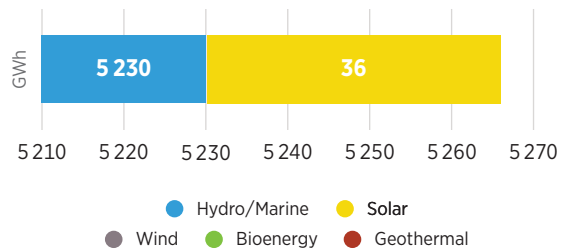
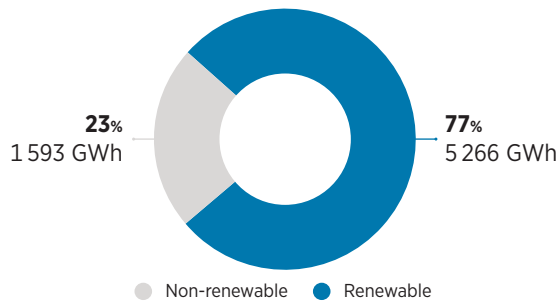
25% renewables in the electricity mix by 2035

### Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (23% area)  
1.4-1.6 MWh/kWp/yr (36% area)  
1.6-1.8 MWh/kWp/yr (37% area)
- **Wind:** 260 W/m<sup>2</sup> (98% area)  
260-420 W/m<sup>2</sup> (2% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 Total electricity generation (GWh, %)

Figure 2 Renewable generation by technology (GWh)



<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



## IRENA climate action engagement in Cameroon

### Support completed

Assessment of technology options for power sector mitigation measures; capacity building for renewables, including dissemination of up-to-date technical information and know-how on renewables;	
<b>1</b>	capacity building on long-term energy planning
<b>Work package:</b>	<b>Source:</b>
Technology and infrastructure capacity building	NDC Partnership
Capacity building workshops	
<b>2</b>	
<b>Work package:</b>	<b>Source:</b>
Long-term energy planning	NDC Partnership
Project development and match making support	
<b>3</b>	
<b>Work package:</b>	<b>Source:</b>
Project facilitation	-

### Support ongoing

Assessment of theoretical hydropower potential	
<b>4</b>	
<b>Work package:</b>	<b>Source:</b>
Resource assessment	Government of Cameroon





<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
24 May 2018 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 719.38 (2023) <sup>1</sup>	2021: 4.34 TES/GDP PPP MJ per 2017 USD (-5.07% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
18 278 568 (2023) <sup>1</sup>	2023: 4.69 MW (no capacity added from 2022)	95.38 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

Does not include quantified renewable energy targets

**Resource potential<sup>5</sup>**

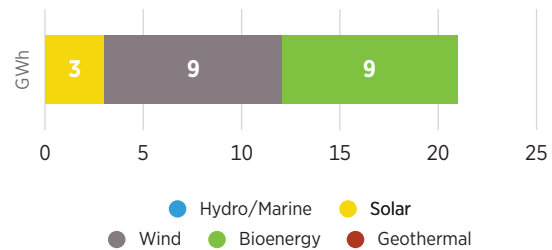
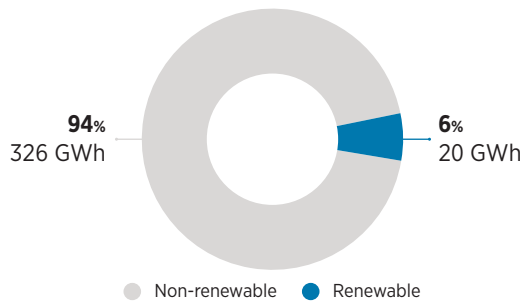
- **Solar PV:** 1.6-1.8 MWh/kWp/yr (56% area)  
1.8-1.9 MWh/kWp/yr (20% area)  
1.9-2.0 MWh/kWp/yr (22% area)  
>2.0 MWh/kWp/yr (5% area)

- **Wind:** <260 W/m<sup>2</sup> (44% area)  
260-420 W/m<sup>2</sup> (30% area)  
420-560 W/m<sup>2</sup> (21% area)  
560-670 W/m<sup>2</sup> (7% area)  
670-820 W/m<sup>2</sup> (5% area)  
>1 060 W/m<sup>2</sup> (2% area)

- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Chad**

**Support ongoing**

Comprehensive evaluations of the conditions for renewable energy deployment to identify a set of actions to scale up renewables and enhance greenhouse gas mitigation			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Renewables readiness assessment</td> <td><b>Source:</b> Government of Chad</td> </tr> </table>	<b>Work package:</b> Renewables readiness assessment	<b>Source:</b> Government of Chad
<b>Work package:</b> Renewables readiness assessment	<b>Source:</b> Government of Chad		
The findings and recommendations of the Renewable Readiness Assessment to elaborate and implement country to scale up renewable energy			
<b>2</b>	<table border="1"> <tr> <td><b>Work package:</b> NDC Note based on RRA findings</td> <td><b>Source:</b> NDC Partnership</td> </tr> </table>	<b>Work package:</b> NDC Note based on RRA findings	<b>Source:</b> NDC Partnership
<b>Work package:</b> NDC Note based on RRA findings	<b>Source:</b> NDC Partnership		
project development and match making support			
<b>3</b>	<table border="1"> <tr> <td><b>Work package:</b> Project facilitation</td> <td><b>Source:</b> -</td> </tr> </table>	<b>Work package:</b> Project facilitation	<b>Source:</b> -
<b>Work package:</b> Project facilitation	<b>Source:</b> -		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.



# CHINA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
2 February 2014 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 12 614.06 (2023) <sup>1</sup>	2021: 6.30 TES/GDP PPP MJ per 2017 USD (1.54% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions<sup>3</sup></b>
1 410 710 000 (2023) <sup>1</sup>	2023: 1 453 701.25 MW (297 575 MW of capacity added from 2022)	15 943.99 MtCO <sub>2</sub> eq (2022)

### Renewable energy targets in first updated NDC<sup>4</sup>

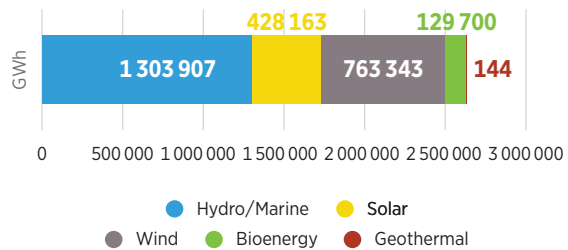
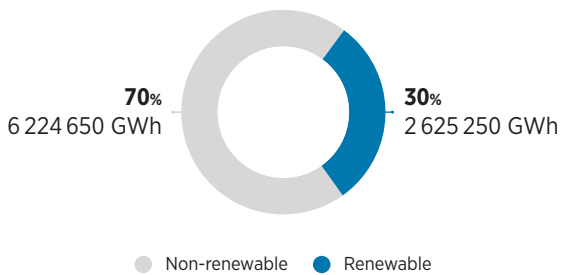
Increase total installed capacity of wind and solar power to over 1.2 billion kW by 2030

### Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (22% area), 1.2-1.4 MWh/kWp/yr (17% area), 1.4-1.6 MWh/kWp/yr (27% area), 1.6-1.8 MWh/kWp/yr (24% area), 1.8-1.9 MWh/kWp/yr (7% area), 1.9-2.0 MWh/kWp/yr (5% area), >2.0 MWh/kWp/yr (6% area)
- **Wind:** <260 W/m<sup>2</sup> (65% area), 260-420 W/m<sup>2</sup> (22% area), 420-560 W/m<sup>2</sup> (8% area), 560-670 W/m<sup>2</sup> (2% area), >1060 W/m<sup>2</sup> (2% area)
- **Biomass:** 2.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in China

### Support ongoing

Activity is currently under discussion

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.



# COLOMBIA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
7 February 2015 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 6 979.73 (2023) <sup>1</sup>	2021: 2.33 TES/GDP PPP MJ per 2017 USD (4.72% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions<sup>3</sup></b>
52 085 168 (2023) <sup>1</sup>	2023: 14 257.88 MW (853 MW of capacity added from 2022)	223.97 MtCO <sub>2</sub> eq (2023)

## Renewable energy targets in first NDC<sup>4</sup>

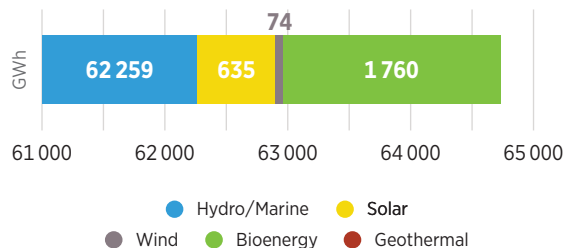
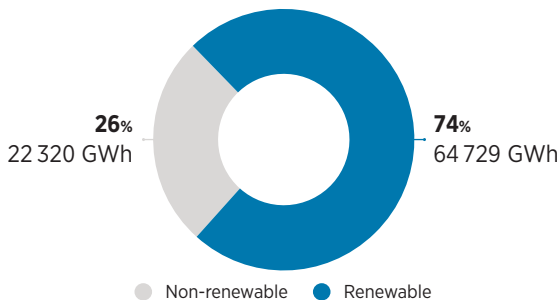
Does not include quantifiable renewable energy targets

## Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (10% area)  
1.2-1.4 MWh/kWp/yr (45% area)  
1.4-1.6 MWh/kWp/yr (45% area)
- **Wind:** <260 W/m<sup>2</sup> (96% area)  
260-420 W/m<sup>2</sup> (3% area)
- **Biomass:** 9.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Colombia

### Support completed

1 Suitability assessment to enable finding highly suitable areas for grid-connected and off-grid solar and wind project planning

<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Colombia
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### Support ongoing

2 Assessment of cost-effective options of climate change mitigation, focusing on energy transition technologies and offshore wind power

<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> NDC Partnership
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
8 November 2015 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 1 587.16 (2023) <sup>1</sup>	2021: 4.27 TES/GDP PPP MJ per 2017 USD (-15.99% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
852 075 (2023) <sup>1</sup>	2023: 5.48 MW (no capacity added from 2022)	0.76 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

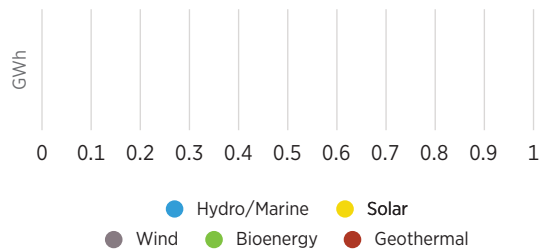
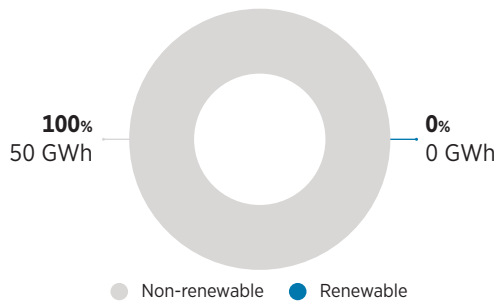
Increase renewable energy (by 2030), including 14 MW of solar and 14 MW of geothermal

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (30% area)  
1.6-1.8 MWh/kWp/yr (70% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 6.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Comoros**

**Support completed**

SolarCity Simulator			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Resource assessment</td> <td><b>Source:</b> Government of Comoros</td> </tr> </table>	<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Comoros
<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Comoros		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# CONGO

<b>State in accession</b> COP28 Pledge of Tripling RE and Doubling EE: No status	<b>GDP per capita</b> USD 2 508.8 (2023) <sup>1</sup>	<b>Energy intensity</b> 2021: 6.72 TES/GDP PPP MJ per 2017 USD (-1.67% improvement from 2020) <sup>2</sup>
<b>Population</b> 6 106 869 (2023) <sup>1</sup>	<b>Renewable power</b> 2023: 226.74 MW (0 MW of capacity added from 2022)	<b>Total greenhouse gas emissions</b> 23.70 MtCO <sub>2</sub> eq (2022) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

Increase renewable electricity generation from 20% in 2020 to 35% in 2030, and 9% energy efficiency distributed among residential, services and industry. Implementation through measures listed in the national strategy action plan; CSP of 100 MW and 300 MW

### Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (7% area)  
1.2-1.4 MWh/kWp/yr (45% area)  
1.4-1.6 MWh/kWp/yr (55% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area),
- **Biomass:** 9.5 tC/ha/yr

Figure 1 Total electricity generation (GWh, %)

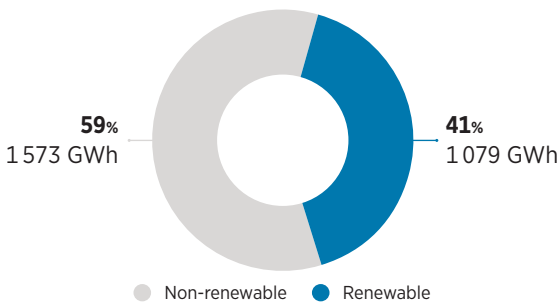
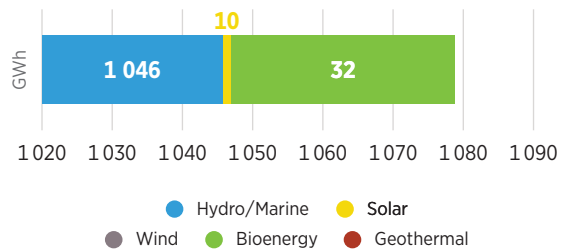


Figure 2 Renewable generation by technology (GWh)



## IRENA climate action engagement in Congo

### Support completed

Bioenergy Eni training			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Capacity building on policy and finance</td> <td><b>Source:</b> Government of Congo</td> </tr> </table>	<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> Government of Congo
<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> Government of Congo		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# COSTA RICA

SIDS

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
18 May 2018 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 16 595.37 (2023) <sup>1</sup>	2021: 1.99 TES/GDP PPP MJ per 2017 USD (2.07% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
5 212 173 (2023) <sup>1</sup>	2023: 3 197.30 MW (59 MW of capacity added from 2022)	16.47 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first updated NDC<sup>4</sup>

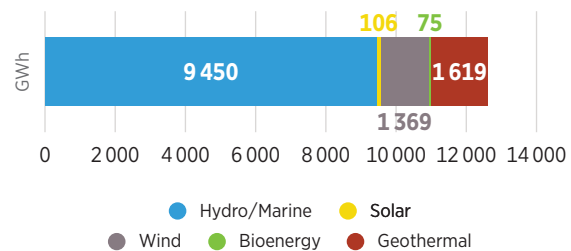
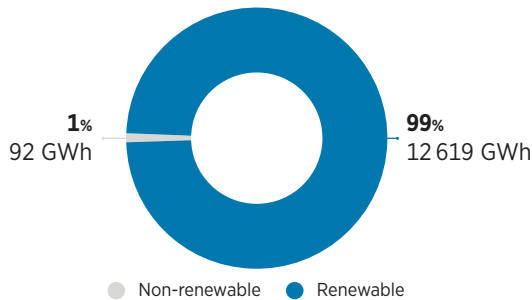
Achieve and maintain 100% renewable electricity generation by 2030

### Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (7% area)  
1.2-1.4 MWh/kWp/yr (40% area)  
1.4-1.6 MWh/kWp/yr (37% area)  
1.6-1.8 MWh/kWp/yr (7% area)
- **Wind:** : <260 W/m<sup>2</sup> (79% area)  
260-420 W/m<sup>2</sup> (7% area)  
420-560 W/m<sup>2</sup> (5% area)  
560-670 W/m<sup>2</sup> (2% area)  
670-820 W/m<sup>2</sup> (2% area)  
820-1 060 W/m<sup>2</sup> (2% area)  
>1 060 W/m<sup>2</sup> (6% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Costa Rica

### Support ongoing

1 Project facilitation support connecting financiers for an electric transport project to install 311 buses, resulting in a reduction of greenhouse gas emissions of 186 300 tCO<sub>2</sub>eq

**Work package:**  
Project facilitation

**Source:**  
Government of Costa Rica

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.

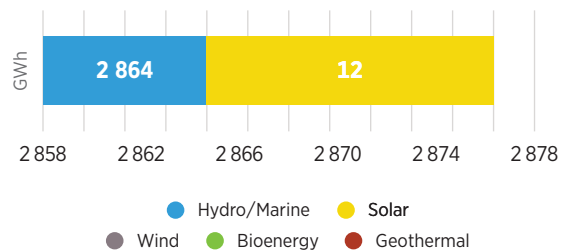
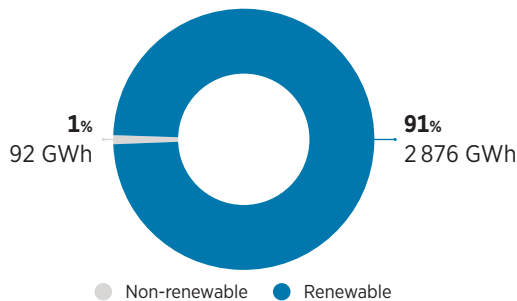


# CÔTE D'IVOIRE

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
16 September 2013 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 2 728.80 (2023) <sup>1</sup>	2021: 3.30 TES/GDP PPP MJ per 2017 USD (0.07% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
28 873 034 (2023) <sup>1</sup>	2023: 925.50 MW (38 MW of capacity added from 2022)	32.18 MtCO <sub>2</sub> eq (2023) <sup>3</sup>
<b>Renewable energy targets in first NDC<sup>4</sup></b>	<b>Resource potential<sup>5</sup></b>	
Increase electricity supply through renewable sources by 2030. <b>Unconditional:</b> 490 MW of solar, 311 MW of biomass, 29 MW of small hydropower and 662 MW of large hydropower  <b>Conditional:</b> 410 or 900 MW of solar 100 MW or 411 MW of biomass	<ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1.2-1.4 kWh/kWp/yr (45% area) 1.4-1.6 kWh/kWp/yr (55% area) 1.6-1.8 kWh/kWp/yr (5% area)</li> <li>• <b>Wind:</b> 260 W/m<sup>2</sup> (100% area)</li> <li>• <b>Biomass:</b> 5.5 tC/ha/yr</li> </ul>	

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Côte d'Ivoire

### Support completed

Project facilitation	
<b>1</b>	<b>Work package:</b> Project facilitation  <b>Source:</b> -

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.





<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
29 April 2012 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 9 499.6 (2020) <sup>1</sup>	2021: 1.35 TES/GDP PPP MJ per 2017 USD (3.12% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
11 194 449 (2023) <sup>1</sup>	2023: 1 383.75 MW (22 MW of capacity added from 2022)	39.40 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

By 2030, up to 24% renewable generation in the electricity matrix

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (21% area)  
1.6-1.8 MWh/kWp/yr (78% area)
- **Wind:** 260 W/m<sup>2</sup> (83% area)  
260-420 W/m<sup>2</sup> (18% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

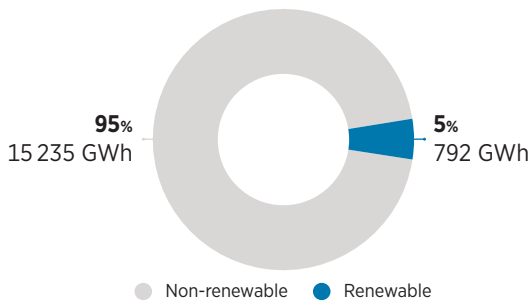
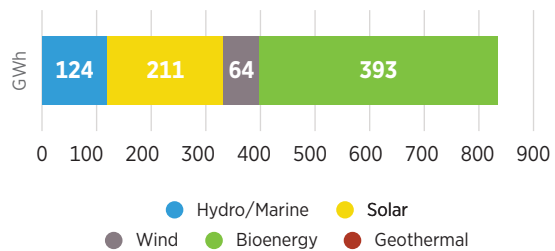


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Cuba**

**Support completed**

Review and feedback on the energy component of the NDC			
<b>1</b>	<table border="0"> <tr> <td><b>Work package:</b> NDC review</td> <td><b>Source:</b> Government of Cuba</td> </tr> </table>	<b>Work package:</b> NDC review	<b>Source:</b> Government of Cuba
<b>Work package:</b> NDC review	<b>Source:</b> Government of Cuba		
Financing for efficient lights programme through IRENA's financing facilities, such as the Climate Investment Platform (CIP)			
<b>2</b>	<table border="0"> <tr> <td><b>Work package:</b> Project facilitation</td> <td><b>Source:</b> Government of Cuba</td> </tr> </table>	<b>Work package:</b> Project facilitation	<b>Source:</b> Government of Cuba
<b>Work package:</b> Project facilitation	<b>Source:</b> Government of Cuba		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.



# DEMOCRATIC REPUBLIC OF THE CONGO

LDC

<b>State in accession</b> COP28 Pledge of Tripling RE and Doubling EE: No status	<b>GDP per capita</b> USD 1 670.80 (2023) <sup>1</sup>	<b>Energy intensity</b> 2021: 12.51 TES/GDP PPP MJ per 2017 USD (4.53% improvement from 2020) <sup>2</sup>
<b>Population</b> 102 262 808 (2023) <sup>1</sup>	<b>Renewable power</b> 2023: 3 200.74 MW (240.00 MW of capacity added from 2022)	<b>Total greenhouse gas emissions</b> 56.11 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

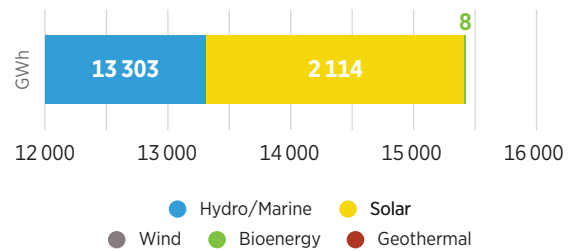
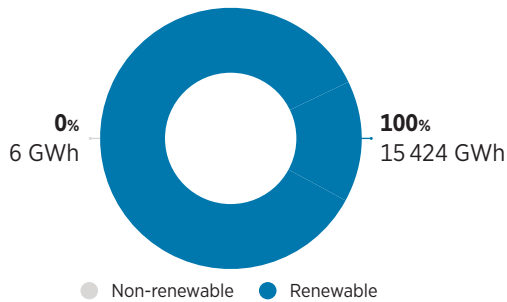
Not specified

### Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (27% area)  
1.4-1.8 MWh/kWp/yr (60% area)  
1.6-1.8 MWh/kWp/yr (13% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 9.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Democratic Republic of the Congo

### Support ongoing

Solar City simulator	
<b>1</b>	<b>Work package:</b> Resource assessment <span style="float: right;"><b>Source:</b> Government of DRC</span>

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
8 November 2020 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 8 953.90 (2023) <sup>1</sup>	2021: 3.03 TES/GDP PPP MJ per 2017 USD (5.19% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
73 040 (2023) <sup>1</sup>	2023: 7.20 MW (no capacity added from 2022)	0.15 MtCO <sub>2</sub> eq (2022) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

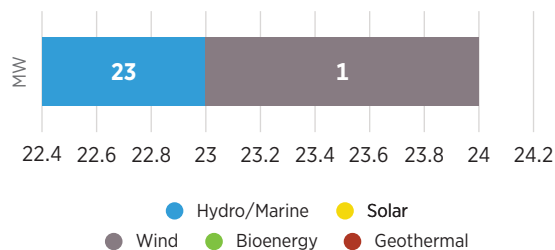
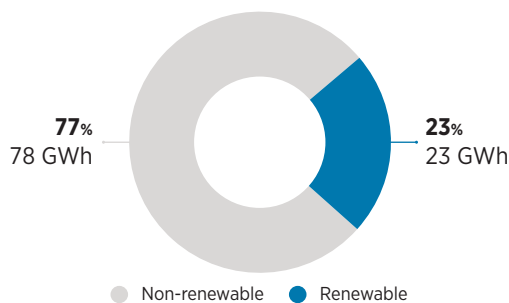
Sustain the current growth rate of renewables and other zero- and low-carbon power generation until 2025 to reach 100% share by 2050 using geothermal, solar, wind and hydropower as well as biofuels, hydrogen and ammonia

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (15% area)  
1.4-1.6 MWh/kWp/yr (20% area)  
1.6-1.8 MWh/kWp/yr (65% area)
- **Wind:** <260 W/m<sup>2</sup> (60% area)  
260-420 W/m<sup>2</sup> (30% area)  
420-560 W/m<sup>2</sup> (7% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Dominica**

**Support completed**

1 Assessment of data gaps for the emission calculation, revision of the methodology for calculating emissions in the energy sector and facilitating intra/inter-institutional co-ordination to establish a functional, long-term system for the monitoring and verification of NDC implementation in the energy sector

<b>Work package:</b> Monitoring, reporting and verification (MRV)	<b>Source:</b> UNDP
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Project development and match making support

<b>2 Work package:</b> Project facilitation	<b>Source:</b> -
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.



# DOMINICAN REPUBLIC

SIDS

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
9 July 2010 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 10 716.01 (2023) <sup>1</sup>	2021: 2.11 TES/GDP PPP MJ per 2017 USD (-0.19% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
11 332 972 (2023) <sup>1</sup>	2023: 2 199.70 MW (342 MW of capacity added from 2022)	48.40 MtCO <sub>2</sub> eq (2022) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

Installation of new wind farms, solar PV, and small-scale biomass power generation, and increase in small hydropower plants

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (40% area)  
1.6-1.8 MWh/kWp/yr (57% area)
- **Wind:** <260 W/m<sup>2</sup> (90% area)  
260-420 W/m<sup>2</sup> (10% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

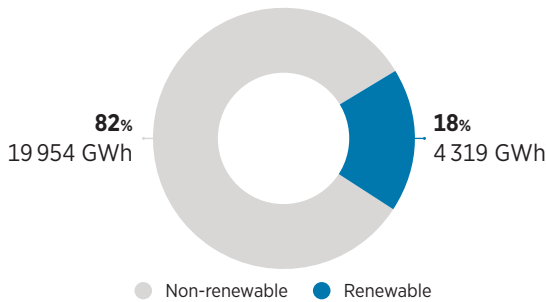
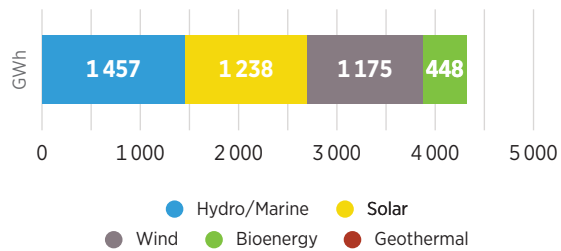


Figure 2 **Renewable generation by technology (GWh)**



### Acknowledgement of IRENA support

*“In the energy sector, the options were identified and evaluated with technical assistance from IRENA...”*

(DOMINICAN REPUBLIC FIRST [UPDATED] NDC SUBMISSION, 29 DECEMBER 2020)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Dominican Republic

### Support completed

1 Technical inputs from the Renewable Energy Roadmap (REmap) study to scale up renewable energy technologies and heating, cooling and transport technology options

<b>Work package:</b> Renewable energy roadmap	<b>Source:</b> Government of the Dominican Republic
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Data gap analysis and development of local greenhouse gas emission factors for the energy sector

- a. Identify data gaps: Comparison between current energy data flows and stakeholders versus required/best practices;
- b. Consolidation of data gaps into implementation solutions;
- 2 c. Implementation proposal for each data gap solution;
- d. Design of a programme for the calculation of local emission factors for the energy sector, including capacity building with academia

<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
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MRV analysis and implementation support (MRV design and implementation plan)

- a. Quality review of current MRV across energy sub-sectors;
- b. Identifying requirements from MRV stakeholders (emission calculations, reporting structure, etc.);
- 3 c. Design of modified/new MRV;
- d. Implementation plan for MRV across energy sectors

<b>Work package:</b> Monitoring, reporting and verification (MRV)	<b>Source:</b> NDC Partnership
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4 Training module focused on solar energy solutions in response to the Dominican Republic's need to further expand capacity to deploy climate-resilient energy solutions, and in alignment with the key technology as part of the country's updated NDC and NDC implementation

<b>Work package:</b> Technology and infrastructure capacity building	<b>Source:</b> NDC Partnership
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# ECUADOR

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
12 February 2011 <b>COP28 Pledge of Tripling RE and Doubling EE No status</b>	USD 6 533.35 (2023) <sup>1</sup>	2021: 3.26 TES/GDP PPP MJ per 2017 USD (-4.39% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
18 190 484 (2023) <sup>1</sup>	2023: 5 447.53 MW (54 MW of capacity added from 2022)	73.60 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

#### Conditional (by 2050):

Promote the use of geothermal and hydropower plants

#### Unconditional (by 2050):

Develop hydropower and non-conventional renewables (such as wind, solar and landfill gas) and power generation from landfill gas

### Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (36% area)  
1.2-1.4 MWh/kWp/yr (47% area)  
1.4-1.6 MWh/kWp/yr (11% area)
- **Wind:** 260 W/m<sup>2</sup> (97% area)  
260-420 W/m<sup>2</sup> (3% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

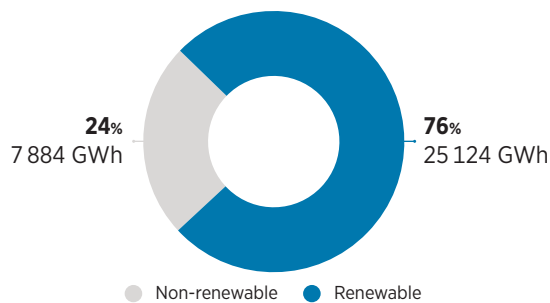
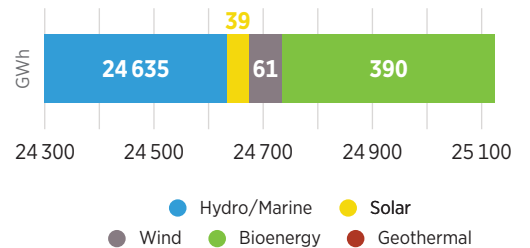


Figure 2 **Renewable generation by technology (GWh)**



<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2019), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Ecuador

### Support completed

1 Support the country in drafting a concept note to access Green Climate Fund finance for implementation of a national biogas programme

<b>Work package:</b> Project facilitation	<b>Source:</b> NDC Partnership
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2 Long-term energy planning capacity building through a mix of online software training and hands-on workshops to support the process of revising the energy component of the NDC, strengthening the country's capacities for energy planning and contributing to the preparation of roadmaps and long-term sectoral plans

<b>Work package:</b> Long-term energy planning	<b>Source:</b> NDC Partnership
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3 Assess a total of seven solar PV and wind sites through the Global Atlas site appraisal service

<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Ecuador
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4 Automatisation of calculations of the emission factors for the national grid to better predict emissions from energy generation

<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
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5 Support to enhance data, information and methods required to produce robust NDCs and NDC tracking in the energy and waste sectors. Analysis of data management and data availability in institutions related to MRV, as well as the tools, methodologies and technological equipment needed for the automatisation of processes that deliver reliable and accurate data for emission reductions

<b>Work package:</b> Monitoring, reporting and verification (MRV)	<b>Source:</b> NDC Partnership
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### Support ongoing

6 Creating an enabling mechanism for the transmission of information with entities responsible for the energy sector to achieve its NDC target

<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
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# EGYPT

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
11 July 2012 COP28 Pledge of Tripling RE and Doubling EE: No status	USD 3 512.58 (2023) <sup>1</sup>	2021: 3.06 TES/GDP PPP MJ per 2017 USD (-3.38% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
112 716 598 (2023) <sup>1</sup>	2023: 6 709.00 MW (388 MW of capacity added from 2022)	335.97 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in second updated NDC<sup>4</sup>

Install additional renewable energy capacities to reach a 42% share in electricity by 2030

### Resource potential<sup>5</sup>

- **Solar PV:** 1.8-1.9 MWh/kWp/yr (23% area)  
1.9-2.0 MWh/kWp/yr (65% area)
- **Wind:** 260-420 W/m<sup>2</sup> (57% area)  
420-560 W/m<sup>2</sup> (10% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 Total electricity generation (GWh, %)

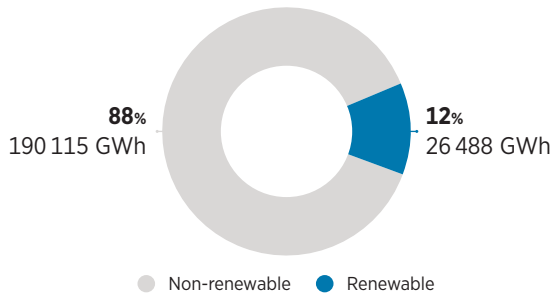
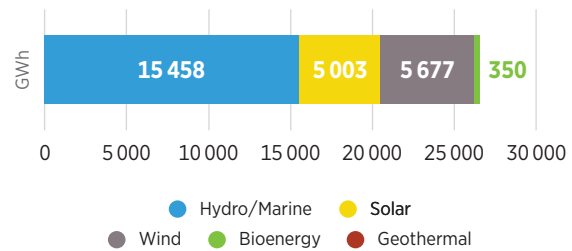


Figure 2 Renewable generation by technology (GWh)



## IRENA climate action engagement in Egypt

### Support completed

Training programme on bioenergy			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Capacity building on policy and finance</td> <td><b>Source:</b> Government of Egypt</td> </tr> </table>	<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> Government of Egypt
<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> Government of Egypt		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.





# EL SALVADOR

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
21 June 2017 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 5 344.21 (2023) <sup>1</sup>	2021: 3.26 TES/GDP PPP MJ per 2017 USD (2.71% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
6 364 943 (2023) <sup>1</sup>	2023: 1 745.20 MW (40 MW of capacity added from 2022)	13.05 MtCO <sub>2</sub> eq (2022) <sup>3</sup>

### Renewable energy targets in first updated NDC<sup>4</sup>

**Solar:** increase renewable energy capacity 50% compared to 2019, to reach 2 222 MW by 2030; generate between 86.1% and 85.7% of electricity from renewable sources by 2030

### Resource potential<sup>5</sup>

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (95% area)
- **Wind:** <260 W/m<sup>2</sup> (73% area)  
260-420 W/m<sup>2</sup> (15% area)  
420-560 W/m<sup>2</sup> (7% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

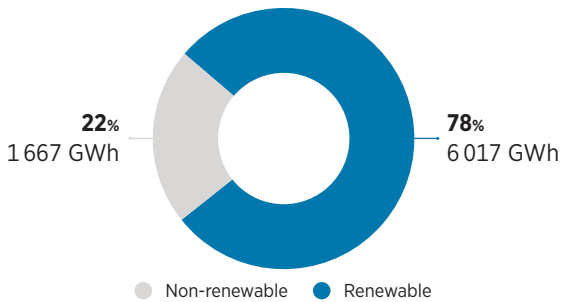
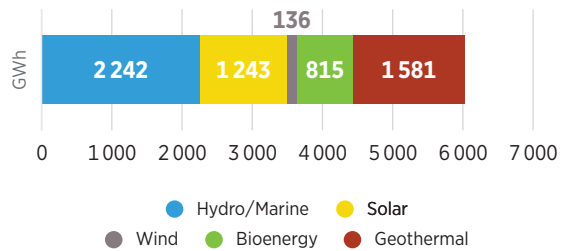


Figure 2 **Renewable generation by technology (GWh)**



<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in El Salvador

### Support completed

	Comprehensive evaluations of the conditions for renewable energy deployment to identify a set of actions to scale up renewable energy and enhance greenhouse gas mitigation	
1	<b>Work package:</b> Renewables readiness assessment	<b>Source:</b> Government of El Salvador
	Support the development of a renewable energy technology plan and mitigation analysis in the agro-industrial sector	
2	<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of El Salvador
	Revision of national greenhouse gas targets' mitigation potential under the best information available. Includes reviewing inventories to ensure that the targets are reasonable and ambitious under the best available information derived from the latest inventories, country GDP, population growth, and national priorities, to inform more accurate mitigation targets under the NDC	
3	<b>Work package:</b> Data and statistics	<b>Source:</b> Government of El Salvador
	MRV analysis and implementation support, ensuring quality review of current MRV systems across energy sub-sectors; identifying requirements from MRV stakeholders (emission calculations, reporting structure, etc.), adjusting and creating new MRV systems, and developing an implementation plan for MRV across energy sectors	
4	<b>Work package:</b> Monitoring, reporting and verification (MRV)	<b>Source:</b> Government of El Salvador
	Guidance in NDC drafting through the identification of best practices and peer-to-peer support with other countries in the region; follow-up on the NDC drafting process, providing reviews and inputs to the energy component	
5	<b>Work package:</b> NDC drafting support	<b>Source:</b> Government of El Salvador
	Energy surveys for NDC implementation roadmaps	
6	<b>Work package:</b> Data and statistics	<b>Source:</b> Government of El Salvador



Elena Berd © Shutterstock.com



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
3 April 2011 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 3 797.30 (2023) <sup>1</sup>	2021: 3.91 TES/GDP PPP MJ per 2017 USD (13.35% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
1 210 882 (2023) <sup>1</sup>	2023: 179.17 MW (no capacity added from 2022)	3.29 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

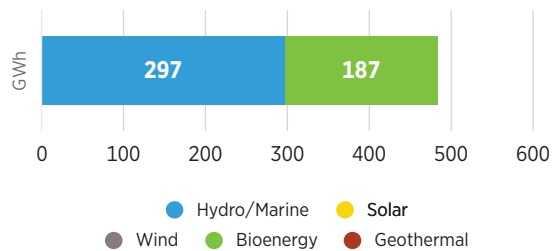
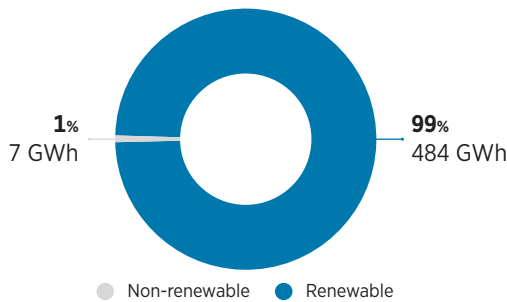
Double the share of renewables in the energy mix (from 16% to 32%) and achieve 10% ethanol blending by 2030

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (68% area)  
1.6-1.8 MWh/kWp/yr (10% area)
- **Wind:** 260 W/m<sup>2</sup> (90% area)  
260-420 W/m<sup>2</sup> (10% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**Acknowledgement of IRENA support**

*“During the course of preparing the NDC, at various stages, contributions to the drafting thereof were made by IRENA...”*

(ESWATINI’S FIRST [UPDATED] NDC SUBMISSION, 9 OCTOBER 2021)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Eswatini

### Support completed

- 1 Technical power sector study to support the identification of cost-effective mitigation options for the energy sector to help country officials prioritise options that can serve as inputs to the NDC for the power and other relevant sectors

<b>Work package:</b> Long-term energy planning	<b>Source:</b> Government of Eswatini
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Project development and match making support

- 2 **Work package:**  
Project facilitation
- Source:**  
-

Energy surveys for NDC implementation roadmaps

- 3 **Work package:**  
Data and statistics
- Source:**  
Government of Eswatini





# ETHIOPIA

LDC/LLDC

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
10 March 2012 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 1 293.78 (2023) <sup>1</sup>	2021: 6.79 TES/GDP PPP MJ per 2017 USD (3.47% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
126 527 060 (2023) <sup>1</sup>	2023: 5 545.07 MW (44 MW of capacity reduced from 2022)	170.03 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

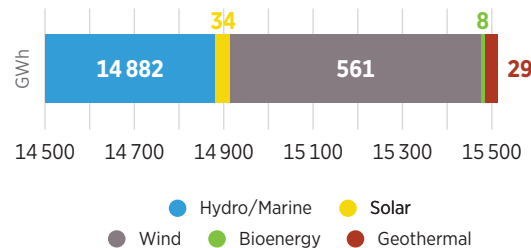
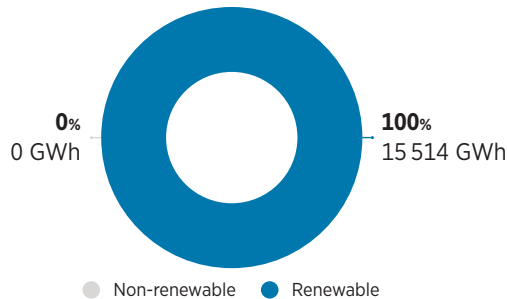
By 2030, install 25 GW of power capacity, including 22 GW of hydropower, 2 GW of wind and 1 GW of geothermal

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (20% area)  
1.6-1.8 MWh/kWp/yr (65% area)  
1.8-1.9 MWh/kWp/yr (18% area)  
1.9-2.0 MWh/kWp/yr (2% area)
- **Wind:** <260 W/m<sup>2</sup> (89% area)  
260-420 W/m<sup>2</sup> (10% area)  
420-560 W/m<sup>2</sup> (2% area)  
670-820 W/m<sup>2</sup> (3% area)
- **Biomass:** 4.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Eswatini

### Support completed

Strengthening bioenergy data for monitoring SDGs and NDCs; energy surveys for NDC implementation roadmaps			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Data and statistics</td> <td><b>Source:</b> Government of Ethiopia</td> </tr> </table>	<b>Work package:</b> Data and statistics	<b>Source:</b> Government of Ethiopia
<b>Work package:</b> Data and statistics	<b>Source:</b> Government of Ethiopia		
Partnership engagement			
<b>2</b>	<table border="1"> <tr> <td><b>Work package:</b> Accelerated Partnership for Renewables in Africa (APRA)</td> <td><b>Source:</b> Government of Ethiopia</td> </tr> </table>	<b>Work package:</b> Accelerated Partnership for Renewables in Africa (APRA)	<b>Source:</b> Government of Ethiopia
<b>Work package:</b> Accelerated Partnership for Renewables in Africa (APRA)	<b>Source:</b> Government of Ethiopia		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
2 December 2010 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 5 868.16 (2023) <sup>1</sup>	2021: 2.27 TES/GDP PPP MJ per 2017 USD (-11.44% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
936 375 (2023) <sup>1</sup>	2023: 225.57 MW (1 MW of capacity added from 2022)	3.40 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

#### Renewable energy targets in first NDC<sup>4</sup>

**Conditional and unconditional (by 2030):**  
100% of electricity from renewables including: hydropower, geothermal, biomass, grid-connected solar and wind; 20% of energy sector CO<sub>2</sub> emissions under a business-as-usual scenario

#### Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (22% area)  
1.2-1.4 MWh/kWp/yr (56% area)  
1.4-1.6 MWh/kWp/yr (17% area)
- **Wind:** <260 W/m<sup>2</sup> (60% area)  
260-420 W/m<sup>2</sup> (37% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

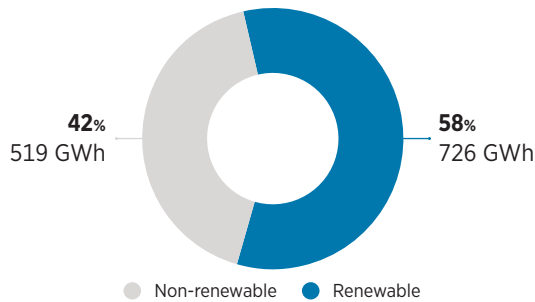
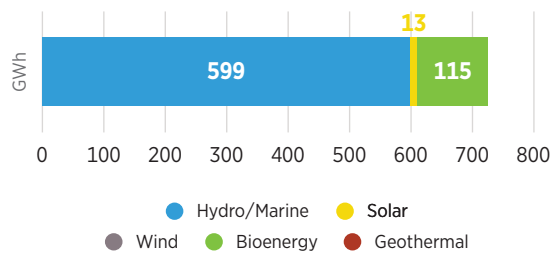


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Fiji

### Support completed

Activity on review of climate change bill		
<b>1</b>	<b>Work package:</b> Data and statistics	<b>Source:</b> Government of Fiji
Identification of data gaps and review of methodology for energy statistics to support the MRV process		
<b>2</b>	<b>Work package:</b> Monitoring, reporting and verification (MRV)	<b>Source:</b> Government of Fiji

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.



# GABON

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
11 June 2015 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 8 420.10 (2023) <sup>1</sup>	2021: 6.47 TES/GDP PPP MJ per 2017 USD (0.71% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
2 436 566 (2023) <sup>1</sup>	2023: 332.28 MW (no capacity added from 2022)	21.40 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

## Renewable energy targets in second NDC<sup>4</sup>

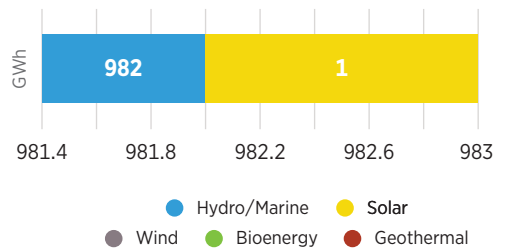
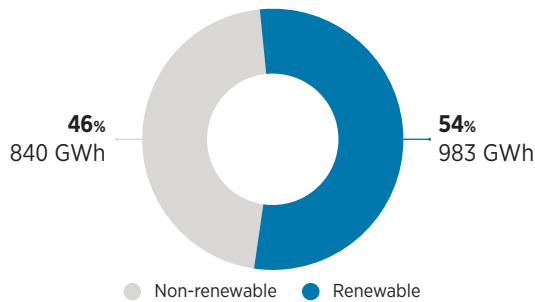
Achieve 80% electricity production from hydropower in 2020, with an additional 1 204 MW of hydropower by 2030

## Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (3% area)  
1.2-1.4 MWh/kWp/yr (93% area)  
1.4-1.6 MWh/kWp/yr (2% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Gabon

### Support completed

1 Long-term energy planning capacity building through a mix of online software training and hands-on workshops to support the energy component of the NDC

**Work package:**  
Long-term energy planning

**Source:**  
NDC Partnership

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
31 March 2011 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 843.77 (2023) <sup>1</sup>	2021: 3.11 TES/GDP PPP MJ per 2017 USD (2.67% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
2 773 168 (2023) <sup>1</sup>	2023: 2.94 MW (no capacity added from 2022)	1.89 MtCO <sub>2</sub> eq (2022) <sup>3</sup>

**Renewable energy targets in second NDC<sup>4</sup>**

By 2030, achieve 38.9% renewable energy capacity, including 50 MW of solar PV and 20 MW of wind

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (100% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

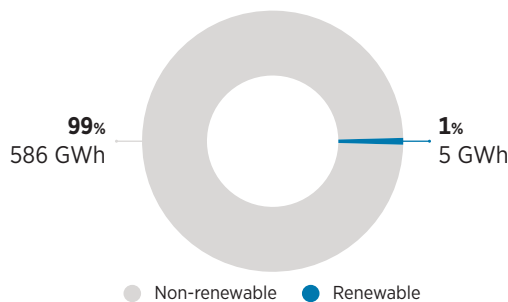
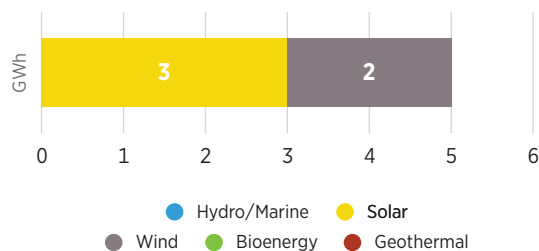


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in The Gambia**

**Support completed**

1 Assessment of the cost effectiveness of mitigation options for the energy sector, to assist the country in prioritising mitigation options supporting the NDC for the power and other relevant sectors

<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> NDC Partnership
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**Acknowledgement of IRENA support**

*"The NDC2 revises and strengthens those mitigation measures and includes additional ones identified through the metabolic analysis and IRENA's work on the power sector. An additional eight mitigation measures were identified through the metabolic analysis, while IRENA defined eight for the power sector through the cost-effectiveness analysis of renewable energy mitigation options (five of which from the NDC1 were strengthened)."*

(THE GAMBIA'S SECOND NDC, 12 SEPTEMBER 2020)

<sup>1,2,3,4,5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.





# GEORGIA

### Membership since

30 June 2010  
**COP28 Pledge of Tripling RE and Doubling EE: Endorsed**

### Population

3 760 365 (2023)<sup>1</sup>

### GDP per capita

USD 8 120.36 (2023)<sup>1</sup>

### Renewable power

2023: 3 524.66 MW  
 (104 MW of capacity added from 2022)

### Energy intensity

2021: 3.86 TES/GDP  
 PPP MJ per 2017 USD  
 (3.12% improvement from 2020)<sup>2</sup>

### Total greenhouse gas emissions

19.05 MtCO<sub>2</sub>eq (2023)<sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

Does not mention renewables or include renewable energy targets

### Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (25% area)  
 1.2-1.4 MWh/kWp/yr (70% area)
- **Wind:** <260 W/m<sup>2</sup> (75% area)  
 260-420 W/m<sup>2</sup> (18% area)  
 420-560 W/m<sup>2</sup> (5% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

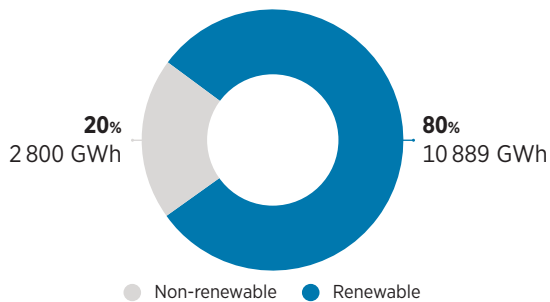
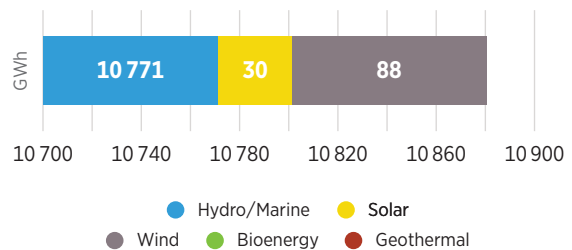


Figure 2 **Renewable generation by technology (GWh)**



<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Georgia

### Support ongoing

Support is currently under discussion		
<b>1</b>	<b>Work package:</b> Renewables readiness assessment	<b>Source:</b> Government of Georgia
Integration of geothermal and other energy solutions in heating and agri-food		
<b>2</b>	<b>Work package:</b> Policy advice	<b>Source:</b> Government of Georgia
Evaluating suitability sites for wind, solar and hydropower		
<b>3</b>	<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Georgia
Technical report with recommendations and actions for revising and aligning the country's NDC and National Energy and Climate Plan (NECP) mitigation options by benchmarking the mitigation component		
<b>4</b>	<b>Work package:</b> Technology and infrastructure capacity building	<b>Source:</b> Government of Georgia
Project development and match making support		
<b>5</b>	<b>Work package:</b> Project facilitation	<b>Source:</b> -



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# GHANA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
6 February 2014 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 2 238.16 (2023) <sup>1</sup>	2021: 2.88 TES/GDP PPP MJ per 2017 USD (2.86% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
34 121 985 (2023) <sup>1</sup>	2023: 1 761.44 MW (no capacity added from 2022)	48.27 MtCO <sub>2</sub> eq (2022) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

**By 2030:**  
 447.5 MW of utility solar  
 200 MW of distributed solar  
 20 MW of stand-alone solar PV  
 25 MW of solar street lighting  
 325 MW of utility-scale wind  
 2 MW of stand-alone wind systems  
 72 MW of utility-scale biomass  
 50.1 MW of utility-scale waste-to-energy  
 150.03 MW of small hydropower plants  
 50 MW of wave power and  
 12 MW of hybrid mini-grids

### Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (37% area)  
1.4-1.6 MWh/kWp/yr (63% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 4.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

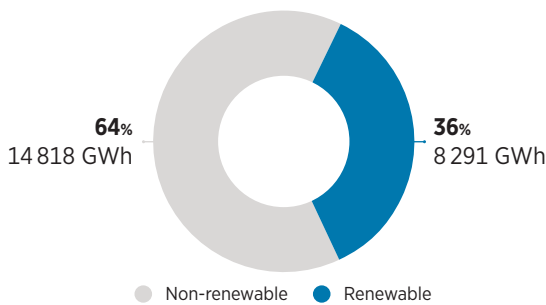
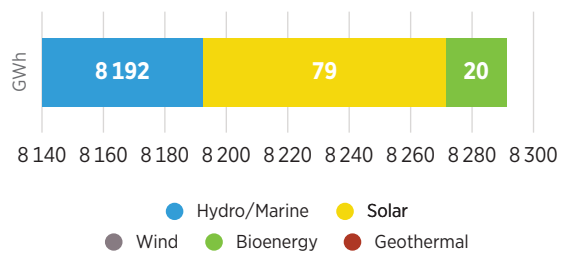


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Ghana

### Support completed

1 Strengthening bioenergy data for monitoring Sustainable Development Goals (SDGs) and NDCs; energy surveys for NDC implementation roadmaps

**Work package:**  
Data and statistics

**Source:**  
Government of Ghana

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
15 July 2011 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 10 463.65 (2023) <sup>1</sup>	2021: 2.78 TES/GDP PPP MJ per 2017 USD (-2.43% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
126 183 (2023) <sup>1</sup>	2023: 3.86 MW (0.13 MW of capacity added from 2022)	0.20 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in second NDC<sup>4</sup>**

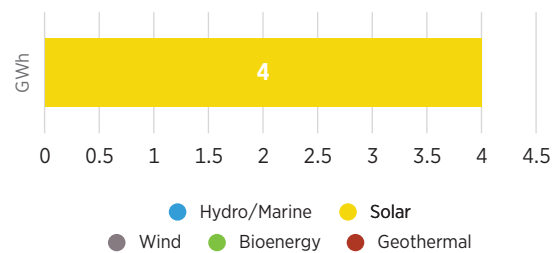
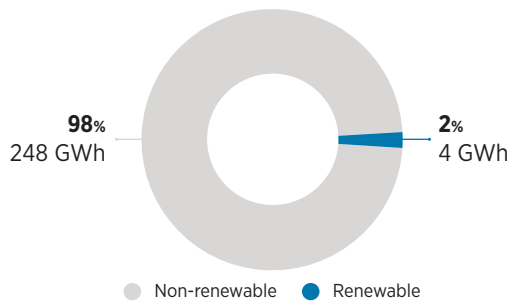
Scale up geothermal electricity as assumed in the first NDC (15 MW); incorporate 15 MW of intermittent renewables for rapid energy transition

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (90% area)
- **Wind:** <260 W/m<sup>2</sup> (48% area)  
260-420 W/m<sup>2</sup> (45% area)  
420-560 W/m<sup>2</sup> (5% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**Acknowledgement of IRENA support**

*"The Government of Grenada is appreciative of the support provided by ... the International Renewable Energy Agency (IRENA)..."*

(GRENADA'S SECOND NDC, 30 NOVEMBER 2020)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Grenada

### Support completed

1	System analysis and maintenance and improvement of energy-related data collection and management for greenhouse gas emission reporting and tracking	
	<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
2	Capacity building on energy management and energy auditing for various sectors, including residential, financial, hotel and government	
	<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> NDC Partnership



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<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
13 February 2014 COP28 Pledge of Tripling RE and Doubling EE: No Status	USD 55 262.50 (2023) <sup>1</sup>	2021: 2.80 TES/GDP PPP MJ per 2017 USD (1.29% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
813 834 (2023) <sup>1</sup>	2023: 53.26 MW (no capacity added from 2022)	8.19 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

<b>Renewable energy targets in first NDC<sup>4</sup></b>	<b>Resource potential<sup>5</sup></b>
100% renewable power supply by 2025	<ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1.2-1.4 MWh/kWp/yr (2% area) 1.4-1.6 MWh/kWp/yr (95% area) 1.6-1.8 MWh/kWp/yr (3% area)</li> <li>• <b>Wind:</b> &lt;260 W/m<sup>2</sup> (100% area)</li> <li>• <b>Biomass:</b> 10.5 tC/ha/yr</li> </ul>

Figure 1 **Total electricity generation (GWh, %)**

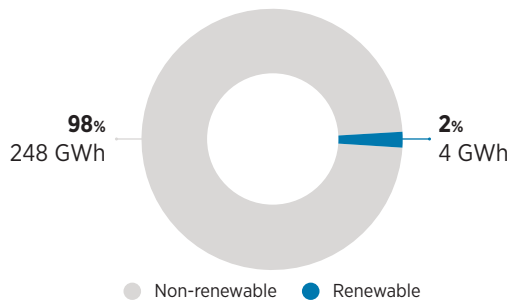
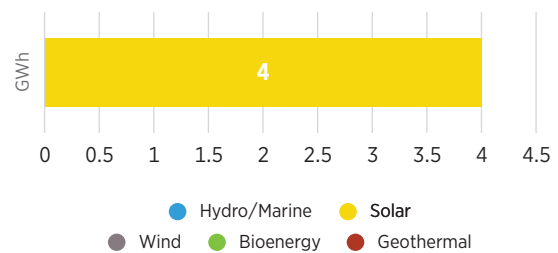


Figure 2 **Renewable generation by technology (GWh)**



### IRENA climate action engagement in Guyana

#### Support completed

Solar City simulator			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Resource assessment</td> <td><b>Source:</b> Government of Guyana</td> </tr> </table>	<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Guyana
<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Guyana		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.



# HONDURAS

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
19 September 2021 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 3 247.23 (2023) <sup>1</sup>	2021: 4.22 TES/GDP PPP MJ per 2017 USD (4.19% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
10 593 798 (2023) <sup>1</sup>	2023: 1 941.20 MW (no capacity added from 2022)	22.92 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

## Renewable energy targets in first NDC<sup>4</sup>

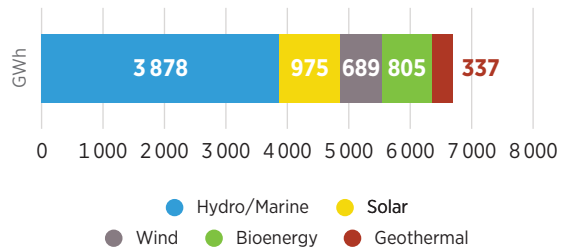
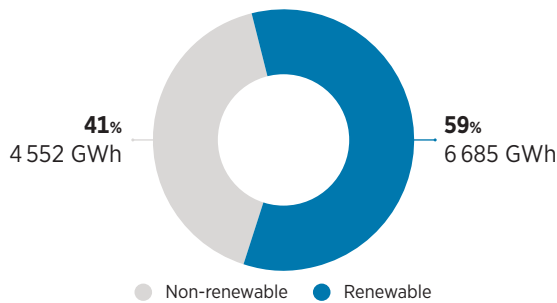
Promotion of renewable energy

## Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (10% area)  
1.4-1.6 MWh/kWp/yr (76% area)  
1.6-1.8 MWh/kWp/yr (22% area)
- **Wind:** <260 W/m<sup>2</sup> (85% area)  
260-420 W/m<sup>2</sup> (10% area)  
420-560 W/m<sup>2</sup> (3% area)  
820-1 060 W/m<sup>2</sup> (3% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Honduras

### Support completed

Preparation of a Renewables Readiness Assessment to review and assess the direction of the country's energy transition, with the aims of developing long-term policies to provide a sustainable, reliable and low-carbon energy supply and of increasing the renewable energy share to 80% by 2038

1

**Work package:**  
Renewables readiness assessment

**Source:**  
Government of Honduras

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# INDIA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
4 May 2010 COP28 Pledge of Tripling RE and Doubling EE: No status	USD 2 484.85 (2023) <sup>1</sup>	2021: 4.21 TES/GDP PPP MJ per 2017 USD (0.96% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
1 428 627 663 (2023) <sup>1</sup>	2023: 175 928.99 MW (12 720 MW of capacity added from 2022)	4 133.55 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in updated first NDC<sup>4</sup>

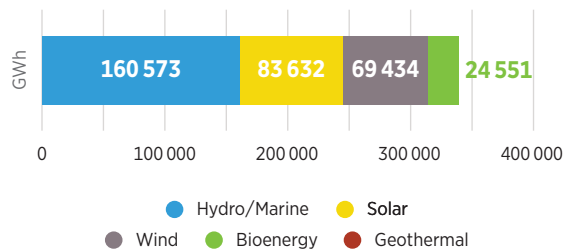
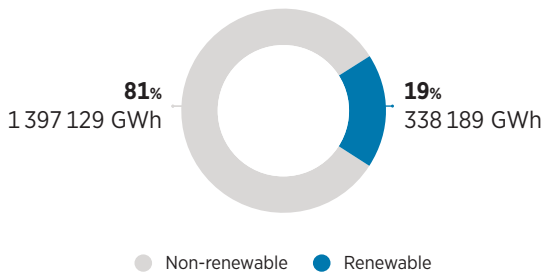
Achieve around 50% cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030

### Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (3% area)  
1.2-1.4 MWh/kWp/yr (10% area)  
1.4-1.6 MWh/kWp/yr (50% area)  
1.6-1.7 MWh/kWp/yr (22% area)  
1.8-1.9 MWh/kWp/yr (7% area)  
1.9-2.0 MWh/kWp/yr (7% area)  
>2.0 MWh/kWp/yr (8% area)
- **Wind:** <260 W/m<sup>2</sup> (95% area)  
260-420 W/m<sup>2</sup> (7% area)  
670-820 W/m (2% area)
- **Biomass:** 3.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in India

### Support completed

Project facilitation	
<b>1</b> <b>Work package:</b> Project facilitation	<b>Source:</b> Government of India

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.





# INDONESIA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
7 September 2014 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 4 940.55 (2023) <sup>1</sup>	2021: 3.04 TES/GDP PPP MJ per 2017 USD (2.42% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
277 534 122 (2023) <sup>1</sup>	2023: 13 113.19 MW (510 MW of capacity added from 2022)	1 200.20 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in enhanced NDC<sup>4</sup>

New and renewable energy (geothermal, hydropower, solar PV, wind turbines, biomass and biofuels) to contribute at least 23% in 2025 and at least 31% in 2050

### Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (60% area)  
1.4-1.6 MWh/kWp/yr (30% area)  
1.6-1.8 MWh/kWp/yr (9% area)
- **Wind:** <260 W/m<sup>2</sup> (98% area)  
260-420 W/m<sup>2</sup> (2% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

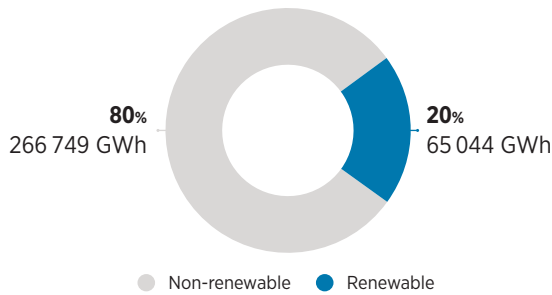
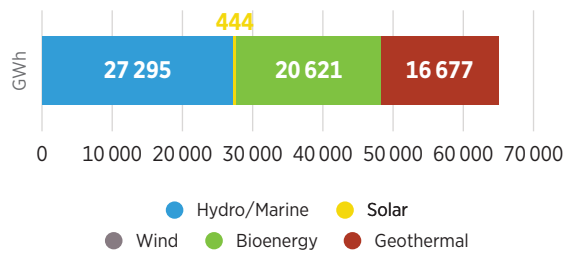


Figure 2 **Renewable generation by technology (GWh)**



<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Indonesia

### Support completed

- 1 At the G20 Investment Forum on Energy Transitions, facilitate support for business matchmaking with investors for nine projects; prepare deep-dive workshops on addressing risks associated with project initiation, development and implementation towards creating strong enabling frameworks to finance energy transition projects

**Work package:**  
Project facilitation

**Source:**  
Government of Indonesia

- 2 Provision of input on the report *Stocktaking of Economic, Social and Environmental Impacts of Sustainable Recovery*, including Impacts on NDC Implementation. The study was mentioned in the G20 Chair's Summary Joint Environment and Climate Ministers' Meeting

**Work package:**  
Policy advice

**Source:**  
NDC Partnership

### Support ongoing

- 3 NDC 3.0 recommendation notes and consultation

**Work package:**  
NDC advice and review

**Source:**  
Government of Indonesia



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# IRAN (ISLAMIC REPUBLIC OF)

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
21 February 2013 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 4 502.55 (2023) <sup>1</sup>	2021: 9.32 TES/GDP PPP MJ per 2017 USD (2.38% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
89 172 767 (2023) <sup>1</sup>	2023: 12 653.34 MW (255 MW of capacity added from 2022)	996.75 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

## Renewable energy targets in NDC<sup>4</sup>

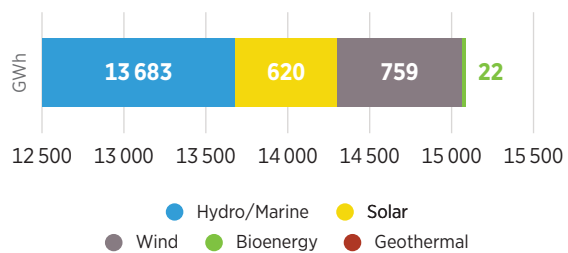
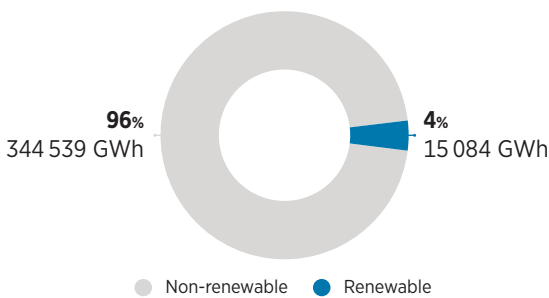
Does not indicate quantifiable renewable energy targets

## Resource potential<sup>5</sup>

- **Solar PV:** 1.2 MWh/kWp/yr (1% area)  
1.2-1.4 MWh/kWp/yr (7% area)  
1.4-1.6 MWh/kWp/yr (8% area)  
1.6-1.8 MWh/kWp/yr (56% area)  
1.8-1.9 MWh/kWp/yr (21% area)  
1.9-2.0 MWh/kWp/yr (10% area)
- **Wind:** <260 W/m<sup>2</sup> (52% area)  
260-420 W/m<sup>2</sup> (30% area)  
420-560 W/m<sup>2</sup> (10% area)  
560-670 W/m<sup>2</sup> (2% area)  
670-820 W/m<sup>2</sup> (2% area)  
820-1 060 W/m<sup>2</sup> (2% area)  
>1 060 W/m<sup>2</sup> (2% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Iran (Islamic Republic of)

### Support completed

Project facilitation	
<b>1</b> <b>Work package:</b> Project facilitation	<b>Source:</b> Government of Iran (Islamic Republic of)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# IRAQ

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
30 December 2012	USD 5 512.48 (2023) <sup>1</sup>	2021: 4.96 TES/GDP
<b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	<b>Renewable power</b>	PPP MJ per 2017 USD
<b>Population</b>	2023: 1 598.92 MW	(2.82% improvement from 2020) <sup>2</sup>
45 504 560 (2023) <sup>1</sup>	(no capacity added from 2022)	<b>Total greenhouse gas emissions</b>
		362.78 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

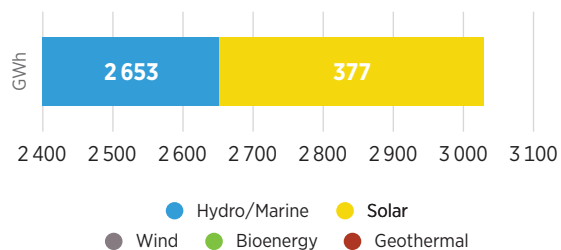
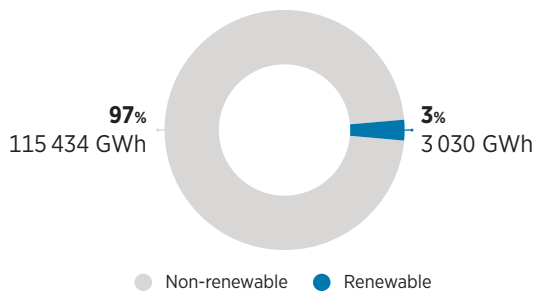
Increase renewables to 30% of the electricity supply by 2030

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (3% area)  
1.6-1.8 MWh/kWp/yr (85% area)
- **Wind:** <260 W/m<sup>2</sup> (20% area)  
260-420 W/m<sup>2</sup> (70% area)  
420-560 W/m (9% area)
- **Biomass:** 4.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Iraq

### Support completed

Project development and match making support					
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b></td> <td><b>Source:</b></td> </tr> <tr> <td>Project facilitation</td> <td>-</td> </tr> </table>	<b>Work package:</b>	<b>Source:</b>	Project facilitation	-
<b>Work package:</b>	<b>Source:</b>				
Project facilitation	-				

### Support ongoing

Comprehensive review and recommendations for renewable energy deployment					
<b>2</b>	<table border="1"> <tr> <td><b>Work package:</b></td> <td><b>Source:</b></td> </tr> <tr> <td>Renewables readiness assessment</td> <td>Government of Iraq</td> </tr> </table>	<b>Work package:</b>	<b>Source:</b>	Renewables readiness assessment	Government of Iraq
<b>Work package:</b>	<b>Source:</b>				
Renewables readiness assessment	Government of Iraq				

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# JORDAN

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
2 August 2014 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 4 482.09 (2023) <sup>1</sup>	2021: 3.39 TES/GDP PPP MJ per 2017 USD (2.70% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
11 337 052 (2023) <sup>1</sup>	2023: 2 620.54 MW (24 MW of capacity added from 2022)	33.41 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

Increase renewable electricity generation from 20% in 2020 to 35% in 2030, and 9% energy efficiency distributed among residential, services and industry. Implementation through measures listed in the national strategy action plan; CSP of 100 MW and 300 MW

### Resource potential<sup>5</sup>

- **Solar PV:** 1.8-1.9 MWh/kWp/yr (50% area)  
1.9-2.0 MWh/kWp/yr (49% area)
- **Wind:** <260 W/m<sup>2</sup> (62% area)  
260-420 W/m<sup>2</sup> (37% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

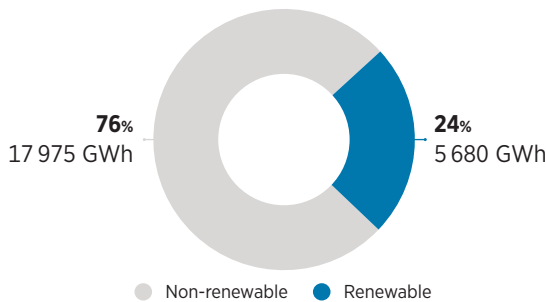
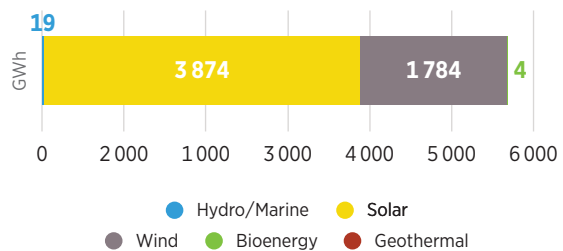


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Jordan

### Support completed

- Comprehensive evaluations of the conditions for renewable energy deployment to identify a set of actions to scale up renewables and enhance greenhouse gas mitigation

<b>1</b>	<b>Work package:</b> Renewables readiness assessment	<b>Source:</b> Government of Jordan
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
5 July 2013 COP28 Pledge of Tripling RE and Doubling EE: No status	USD 13 136.62 (2023) <sup>1</sup>	2021: 5.81 TES/GDP PPP MJ per 2017 USD (0.26% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
19 900 177 (2023) <sup>1</sup>	2023: 5 663.00 MW (594 MW of capacity added from 2022)	320.35 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first updated NDC<sup>4</sup>**

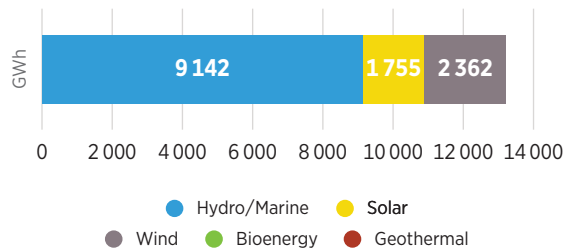
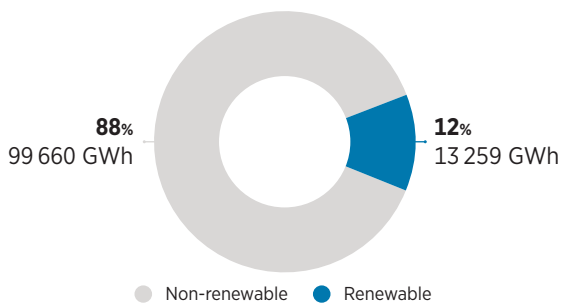
1.5 times increase of the volume of production using renewable energy source by 2030

**Resource potential<sup>5</sup>**

- **Solar PV:** <1.2 MWh/kWp/yr (10% area)  
1.2-1.4 MWh/kWp/yr (59% area)  
1.4-1.6 MWh/kWp/yr (30% area)
- **Wind:** <260 W/m<sup>2</sup> (18% area)  
260-420 W/m<sup>2</sup> (62% area)  
420-560 W/m<sup>2</sup> (17% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Kazakhstan**

**Support completed**

1 End user energy survey to improve and build comprehensive energy balances, annual energy reports and energy commodity accounts. The survey will focus on residential sector energy end use

<b>Work package:</b> Data and statistics	<b>Source:</b> Government of Kazakhstan
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2023), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
22 May 2009 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 1 949.90 (2023) <sup>1</sup>	2021: 4.76 TES/GDP PPP MJ per 2017 USD (4.16% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
55 100 586 (2023) <sup>1</sup>	2023: 2 735.84 MW (76 MW of capacity added from 2022)	107.98 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

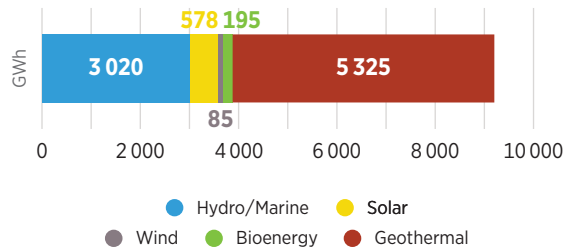
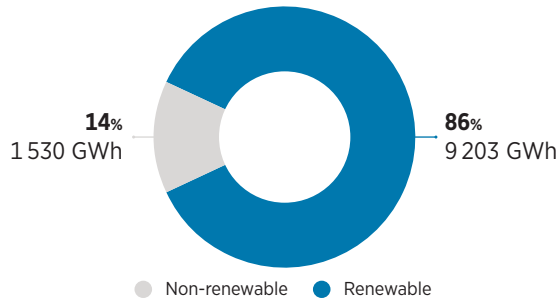
Does not include quantifiable renewable energy targets

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (48% area)  
1.6-1.8 MWh/kWp/yr (50% area)  
1.8-1.9 MWh/kWp/yr (7% area)
- **Wind:** <260 W/m<sup>2</sup> (86% area)  
260-420 W/m<sup>2</sup> (8% area)  
420-560 W/m<sup>2</sup> (2% area)  
820-1 060 W/m<sup>2</sup> (2% area)  
>1 060 W/m<sup>2</sup> (2% area)
- **Biomass:** 3.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Kenya**

**Support ongoing**

Partnership engagement			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Accelerated Partnership for Renewables in Africa</td> <td><b>Source:</b> Government of Kenya</td> </tr> </table>	<b>Work package:</b> Accelerated Partnership for Renewables in Africa	<b>Source:</b> Government of Kenya
<b>Work package:</b> Accelerated Partnership for Renewables in Africa	<b>Source:</b> Government of Kenya		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
14 May 2021 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 1 969.87 (2023) <sup>1</sup>	2021: 5.15 TES/GDP PPP MJ per 2017 USD (-2.29% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
7 100 800 (2023) <sup>1</sup>	2023: 3 209.78 MW (429 MW of capacity added from 2022)	21.70 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first updated NDC<sup>4</sup>**

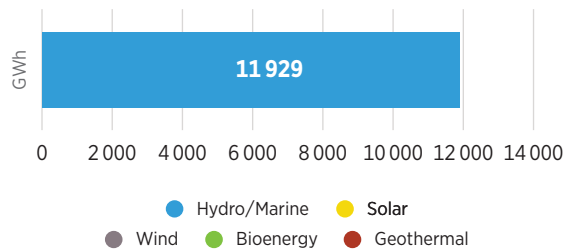
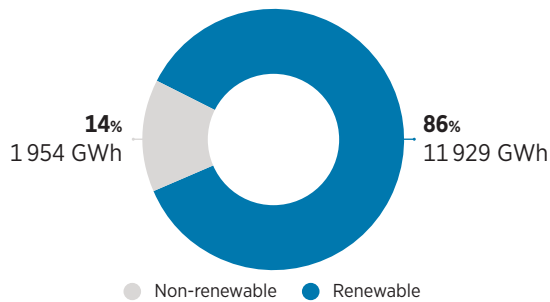
Expanding the use of biogas to reduce 1 311 980 of CO<sub>2</sub>eq by 2030; electricity generation from small hydropower to reduce 2 737 of CO<sub>2</sub>eq by 2030; construction of new hydropower plants to reduce 64 606 of CO<sub>2</sub>eq by 2030; development of geothermal energy (heat pumps) to reduce 38 590 of CO<sub>2</sub>eq by 2030

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (37% area)  
1.4-1.6 MWh/kWp/yr (43% area)  
1.6-1.8 MWh/kWp/yr (10% area)
- **Wind:** <260 W/m<sup>2</sup> (72% area)  
260-420 W/m<sup>2</sup> (15% area)  
420-560 W/m<sup>2</sup> (8% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**Acknowledgement of IRENA support**

*"During the course of preparing the NDC, at various stages, contributions to the drafting thereof were made by IRENA."*

(KYRGYZ REPUBLIC'S FIRST [UPDATED] NDC SUBMISSION, 9 OCTOBER 2021)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



## IRENA climate action engagement in Kyrgyz Republic

### Support completed

Comprehensive assessment of renewable energy sector background to identify a set of actions to scale up renewable energy in the context of the NDC

- |          |  |                        |
|----------|--|------------------------|
| <b>1</b> | <b>Work package:</b><br>NDC Note based on preliminary Renewables readiness assessment (RRA) findings | <b>Source:</b><br>UNDP |
|----------|--|------------------------|

Suitability maps for solar PV and wind with promising zones for development

- |          |   |                        |
|----------|---|------------------------|
| <b>2</b> | <b>Work package:</b><br>Resource assessment | <b>Source:</b><br>UNDP |
|----------|---|------------------------|

As part of the RRA process, technical support on the design of renewable energy targets, presenting the design elements of targets together with the trade-offs of selecting one option over the other

- |          |  |                        |
|----------|--|------------------------|
| <b>3</b> | <b>Work package:</b><br>Capacity building on renewable energy target setting | <b>Source:</b><br>UNDP |
|----------|--|------------------------|



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# LAO PEOPLE'S DEMOCRATIC REPUBLIC

LDC/LLDC

<b>Non-membership</b> COP28 Pledge of Tripling RE and Doubling EE: No status	<b>GDP per capita</b> USD 2 075.40 (2022) <sup>1</sup>	<b>Energy intensity</b> 2021: 4.25 TES/GDP PPP MJ per 2017 USD (2.82% improvement from 2020) <sup>2</sup>
<b>Population</b> 7 633 779 (2023) <sup>1</sup>	<b>Renewable power</b> 2023: 9 922.98 MW (111 MW of capacity added from 2022)	<b>Total greenhouse gas emissions</b> 42.06 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

**Conditional:**  
1 GW of solar and wind and 300 MW of biomass

### Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 kWh/kWp/yr (57% area)  
1.4-1.6 kWh/kWp/yr (35% area)
- **Wind:** <260 W/m<sup>2</sup> (90% area)  
260-420 W/m<sup>2</sup> (9% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

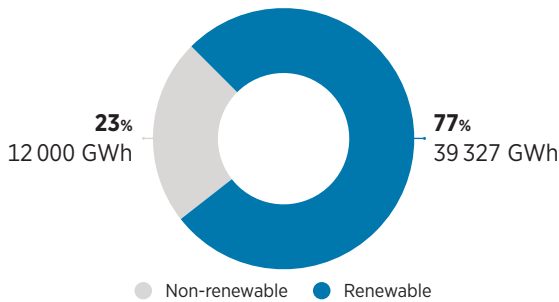
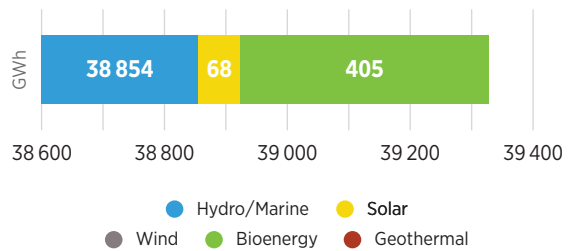


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Lao People's Democratic Republic

### Support ongoing

Technology capacity building programme providing technical information and best practices on solar PV mitigation measures specified in the country's NDC to facilitate NDC implementation,

- 1 with a focus on performance, cost and planning requirements of solar PV solutions

**Work package:**

Technology and infrastructure capacity building

**Source:**

NDC Partnership

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# LEBANON

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
4 November 2017 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 3 350.30 (2021) <sup>1</sup>	2021: 3.55 TES/GDP PPP MJ per 2017 USD (12.48% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
5 353 930 (2023) <sup>1</sup>	2023: 1 296.89 MW (130 MW of capacity added from 2022)	24.67 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

**Unconditional (by 2030):**  
generate 18% of electricity demand and 11% of heat demand (in the buildings sector) from renewable sources

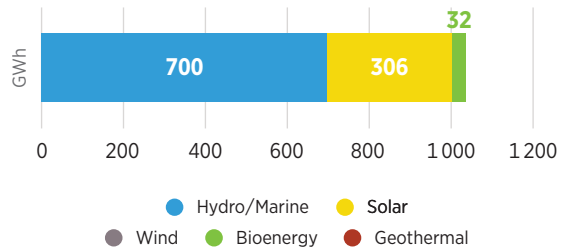
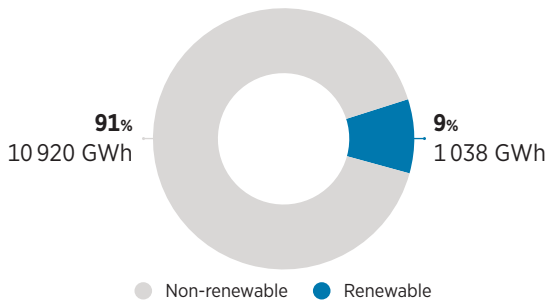
**Conditional (by 2030):**  
generate 30% of electricity demand and 16.5% of heat demand (in the buildings sector) from renewable sources

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (13% area)  
1.6-1.8 MWh/kWp/yr (62% area)  
1.8-1.9 MWh/kWp/yr (25% area)
- **Wind:** <260 W/m<sup>2</sup> (82% area)  
260-420 W/m<sup>2</sup> (13% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



### Acknowledgement of IRENA support

*“Lebanon commits to unconditionally generate 18% of the power demand (i.e. electricity demand) and 11% of its heat demand (in the building sector) from renewable energy sources in 2030, compared to a combined 15% in 2015. Conditionally, Lebanon commits to generate 30% of the power demand (i.e. electricity demand) and 16.5% of its heat demand (in the building sector) from renewable energy sources in 2030, compared to a combined 20% in 2015 (guided by the IRENA Renewable Energy Outlook: Lebanon).”*

(LEBANON’S FIRST [UPDATED] NDC SUBMISSION, 16 MARCH 2021)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Lebanon

### Support completed

- Combination of the two IRENA methodologies, Renewables Readiness Assessment (RRA) and Renewable Energy Roadmap (REmap), to inform decision makers on the potential to scale up renewable energy ambitions

1

**Work package:**  
Renewable energy outlook

**Source:**  
Government of Lebanon

### Support ongoing

- High-level assessment of the grid's hosting capacity and distribution to accommodate integration of variable renewable energy; capacity building to improve the ability of national stakeholders to perform grid assessment studies and to establish a working model of the electricity system through simulation software training

2

**Work package:**  
Technology and infrastructure technical analysis

**Source:**  
Government of Lebanon



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<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
17 September 2014 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 878.01 (2023) <sup>1</sup>	2021: 10.42 TES/GDP PPP MJ per 2017 USD (-27.34% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
2 330 318 (2023) <sup>1</sup>	2023: 102.82 MW (28 MW of capacity added from 2022)	2.60 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

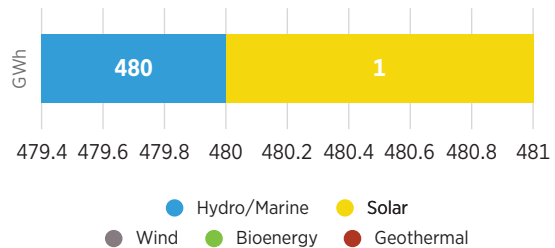
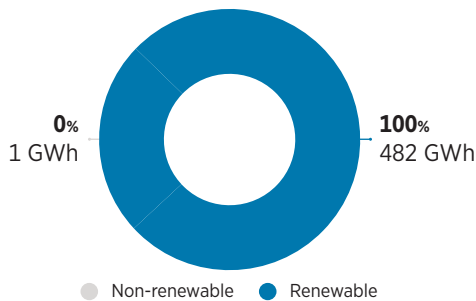
By 2030, additional renewable generation capacity of 200 MW

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (2% area)  
1.6-1.8 MWh/kWp/yr (17% area)  
1.8-1.9 MWh/kWp/yr (78% area)  
1.9-2.0 MWh/kWp/yr (5% area)
- **Wind:** <260 W/m<sup>2</sup> (79% area)  
260-420 W/m<sup>2</sup> (13% area)  
420-560 W/m<sup>2</sup> (9% area)  
560-670 W/m<sup>2</sup> (2% area)  
820-1 060W/m<sup>2</sup> (2% area)
- **Biomass:** 4.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Lesotho**

**Support completed**

1 Strengthening of bioenergy data for monitoring Sustainable Development Goals (SDGs) and NDCs; energy surveys for NDC implementation roadmaps

<b>Work package:</b> Data and statistics	<b>Source:</b> Government of Lesotho
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2018), IRENA (2024g) Statistical Profiles.



<b>State in accession</b> COP28 Pledge of Tripling RE and Doubling EE: No status	<b>GDP per capita</b> USD 799.50 (2023) <sup>1</sup>	<b>Energy intensity</b> 2021: 14.01 TES/GDP PPP MJ per 2017 USD (2.13% improvement from 2020) <sup>2</sup>
<b>Population</b> 5 418 377 (2023) <sup>1</sup>	<b>Renewable power</b> 2023: 95.61 MW (no capacity added from 2022)	<b>Total greenhouse gas emissions</b> 4.53 MtCO <sub>2</sub> eq (2022) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

By 2030, 95% renewable electricity capacity, corresponding to 1011 MW, including, 503 MW of bioenergy, 456 MW of hydropower and 52 MW of solar PV

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (46% area)  
1.4-1.6 MWh/kWp/yr (55% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 7.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

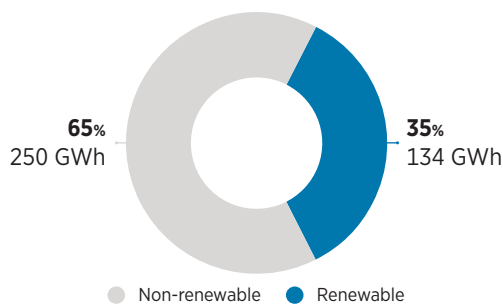
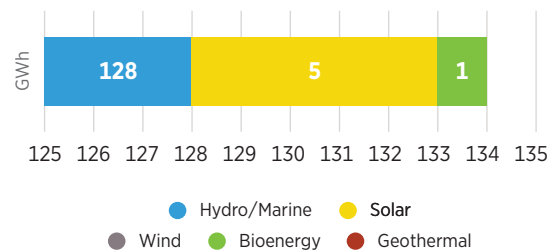


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Liberia**

**Support completed**

Regional capacity building on planning and operation of power grids with higher shares of variable renewable energy

<b>1</b>	<b>Work package:</b> Climate innovation and technology capacity building	<b>Source:</b> NDC Partnership
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**Acknowledgement of IRENA support**

*“The robust process of the NDC revision would not have been possible without the support of the NDC Partnership... supported by: International Renewable Energy Agency...”*

(LIBERIA FIRST [UPDATED] NDC SUBMISSION, 4 AUGUST 2021)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# MADAGASCAR

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
3 May 2014	USD 528.65 (2023) <sup>1</sup>	2021: 9.35 TES/GDP
<b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	<b>Renewable power</b>	PPP MJ per 2017 USD
<b>Population</b>	2023: 251.63 MW	(0.62% improvement from 2020) <sup>2</sup>
30 325 732 (2023) <sup>1</sup>	(1 MW of capacity added from 2022)	<b>Total greenhouse gas emissions</b>
		33.15 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in second NDC<sup>4</sup>

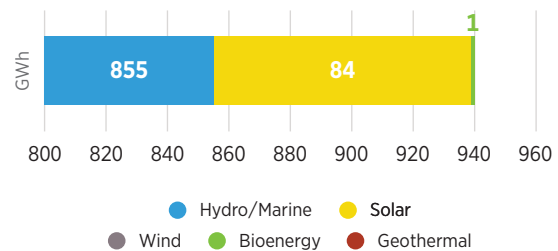
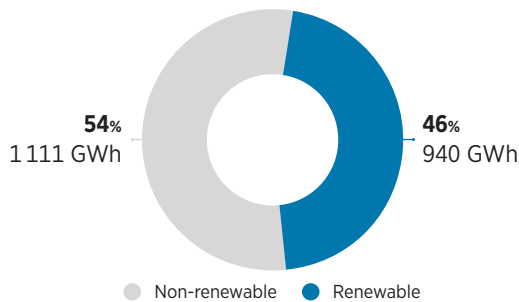
The energy sector will move towards an energy transition with the production mix for electricity and lighting using 80% renewable resources in 2030

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (39% area)  
1.6-1.8 MWh/kWp/yr (63% area)
- **Wind:** <260 W/m<sup>2</sup> (80% area)  
260-420 W/m<sup>2</sup> (20% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 Total electricity generation (GWh, %)

Figure 2 Renewable generation by technology (GWh)



## IRENA climate action engagement in Madagascar

### Support completed

Project development and match making support					
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b></td> <td><b>Source:</b></td> </tr> <tr> <td>Project facilitation</td> <td>-</td> </tr> </table>	<b>Work package:</b>	<b>Source:</b>	Project facilitation	-
<b>Work package:</b>	<b>Source:</b>				
Project facilitation	-				

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2024), IRENA (2024g) Statistical Profiles.



<b>State in accession</b> COP28 Pledge of Tripling RE and Doubling EE: Endorsed	<b>GDP per capita</b> USD 1 867.70 (2023) <sup>1</sup>	<b>Energy intensity</b> 2021: 3.04 TES/GDP PPP MJ per 2017 USD (2.25% improvement from 2020) <sup>2</sup>
<b>Population</b> 20 931 751 (2023) <sup>1</sup>	<b>Renewable power</b> 2023: 591.89 MW (no capacity added from 2022)	<b>Total greenhouse gas emissions</b> 19.71 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

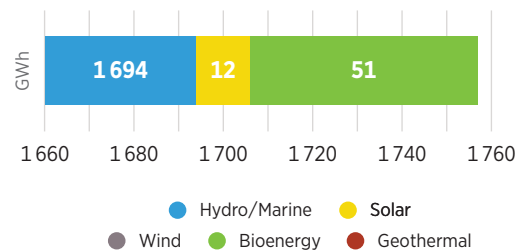
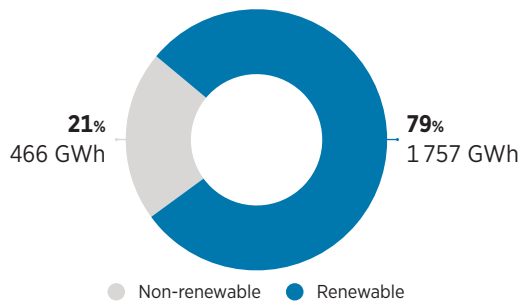
Increased use of renewables

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (61% area)  
1.6-1.8 MWh/kWp/yr (38% area)
- **Wind:** <260 W/m<sup>2</sup> (98% area)  
260-420 W/m<sup>2</sup> (2% area)
- **Biomass:** 6.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Malawi**

**Support ongoing**

NDC 3.0 development support			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Technology and infrastructure technical analysis</td> <td><b>Source:</b> NDC Partnership</td> </tr> </table>	<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> NDC Partnership
<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> NDC Partnership		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.





<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
08 July 2009 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 24 808.70 (2023) <sup>1</sup>	2021: 2.87 TES/GDP PPP MJ per 2017 USD (17.36% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
521 021 (2023) <sup>1</sup>	2023: 38.71 MW (1.25 MW of capacity added from 2022)	3.09 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

15% of renewable energy share in energy mix

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (40% area)  
1.6-1.8 MWh/kWp/yr (60% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 3.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

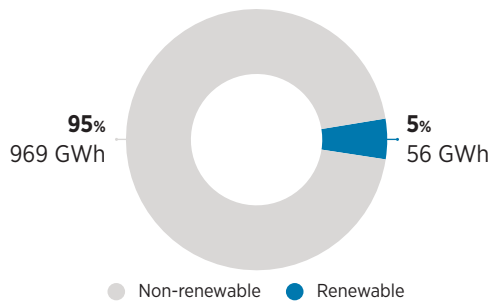
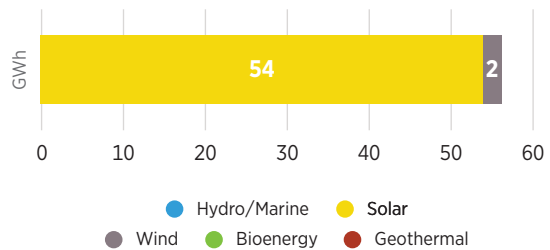


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Maldives**

**Support ongoing**

Support of developing NDC 3.0			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Technology and infrastructure technical analysis</td> <td><b>Source:</b> Government of Maldives</td> </tr> </table>	<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of Maldives
<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of Maldives		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
18 November 2010 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 897.45 (2023) <sup>1</sup>	2021: 6.43 TES/GDP PPP MJ per 2017 USD (0.78% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
23 293 698 (2023) <sup>1</sup>	2023: 592.95 MW (no capacity added from 2022)	45.46 MtCO <sub>2</sub> eq (2022) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

By 2030, 58.3% renewables in total installed electricity capacity, representing 37.1% of the generation mix, including:  
731 MW of medium and large hydropower, 528 MW of solar, 107 MW of small hydropower, 30 MW of bioenergy and 20 MW of wind

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (83% area)  
1.8-1.9 MWh/kWp/yr (18% area)
- **Wind:** <260 W/m<sup>2</sup> (45% area)  
260-420 W/m<sup>2</sup> (50% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

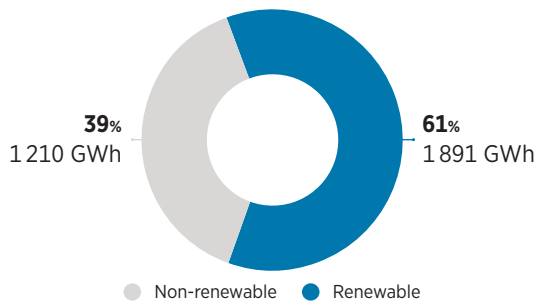
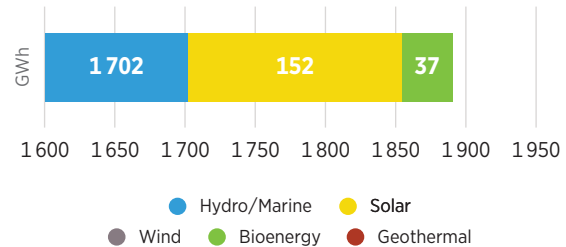


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Mali**

**Support completed**

Support for on-site assessment			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Resource assessment</td> <td><b>Source:</b> Government of Mali</td> </tr> </table>	<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Mali
<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Mali		
Long-term energy planning capacity building through a mix of online software training and hands-on workshops to support the process of revising the energy component of the NDC, strengthening capacities for energy planning and contributing to the preparation of roadmaps and long-term sector plans			
<b>2</b>	<table border="1"> <tr> <td><b>Work package:</b> Long-term energy planning</td> <td><b>Source:</b> NDC Partnership</td> </tr> </table>	<b>Work package:</b> Long-term energy planning	<b>Source:</b> NDC Partnership
<b>Work package:</b> Long-term energy planning	<b>Source:</b> NDC Partnership		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# MAURITIUS

SIDS

## Membership since

24 April 2011  
COP28 Pledge of Tripling RE and Doubling EE: Endorsed

## Population

1 261 041 (2023)<sup>1</sup>

## GDP per capita

USD 11 416.86 (2023)<sup>1</sup>

## Renewable power

2023: 270.13 MW  
(no capacity added from 2022)

## Energy intensity

2021: 2.15 TES/GDP  
PPP MJ per 2017 USD  
(-1.13% improvement from 2020)<sup>2</sup>

## Total greenhouse gas emissions

6.20 MtCO<sub>2</sub>eq (2022)<sup>3</sup>

## Renewable energy targets in first updated NDC<sup>4</sup>

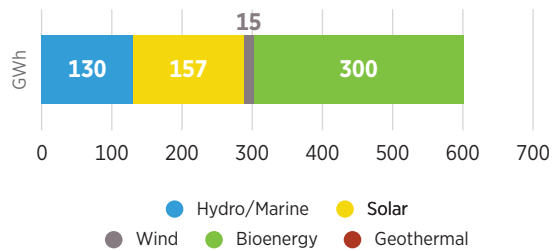
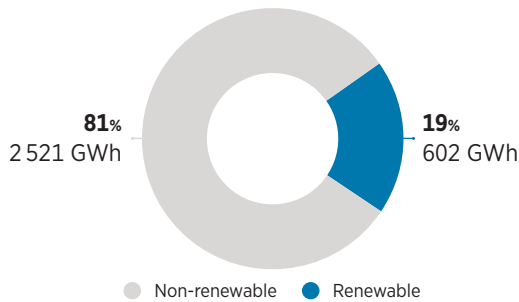
Achieve 35% to 60% renewable energy in the energy mix by 2030

## Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (17% area)  
1.6-1.8 MWh/kWp/yr (76% area)
- **Wind:** <260 W/m<sup>2</sup> (10% area)  
420-560 W/m<sup>2</sup> (80% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 Total electricity generation (GWh, %)

Figure 2 Renewable generation by technology (GWh)



## IRENA climate action engagement in Mauritius

### Support completed

Solar City simulator	
<b>1</b>	<b>Work package:</b> Resource assessment <b>Source:</b> Government of Mauritius

### Support ongoing

NDC 3.0 development support	
<b>2</b>	<b>Work package:</b> Technology and infrastructure technical analysis <b>Source:</b> Government of Mauritius

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# REPUBLIC OF MOLDOVA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
3 August 2011 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 6 650.65 (2023) <sup>1</sup>	2021: 4.92 TES/GDP PPP MJ per 2017 USD (4.64% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
2 486 891 (2023) <sup>1</sup>	2023: 307.91 MW (53 MW of capacity added from 2022)	13.54 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

## Renewable energy targets in first updated NDC<sup>4</sup>

17% of gross final energy consumption from renewable sources by 2020

## Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (25% area)  
1.2-1.4 MWh/kWp/yr (76% area)
- **Wind:** <260 W/m<sup>2</sup> (89% area)  
260-420 W/m<sup>2</sup> (15% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 Total electricity generation (GWh, %)

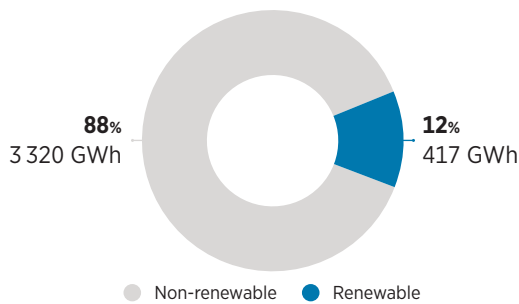
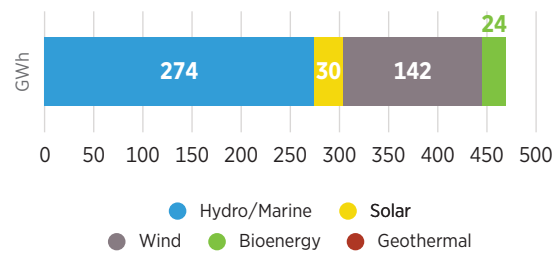


Figure 2 Renewable generation by technology (GWh)



## IRENA climate action engagement in Moldova

### Support ongoing

Strategic planning support for district heating to enhance decarbonisation and heat transition efforts			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Policy advice</td> <td><b>Source:</b> Government of Moldova</td> </tr> </table>	<b>Work package:</b> Policy advice	<b>Source:</b> Government of Moldova
<b>Work package:</b> Policy advice	<b>Source:</b> Government of Moldova		
NDC 3.0 and NECP alignment support			
<b>2</b>	<table border="1"> <tr> <td><b>Work package:</b> Technology and infrastructure technical analysis</td> <td><b>Source:</b> Government of Moldova</td> </tr> </table>	<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of Moldova
<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of Moldova		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.



# MONGOLIAN PEOPLE'S REPUBLIC

LLDC

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
11 April 2010 COP28 Pledge of Tripling RE and Doubling EE: No status	USD 5 764.80 (2023) <sup>1</sup>	2021: 6.96 TES/GDP PPP MJ per 2017 USD (-8.44% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
3 447 157 (2023) <sup>1</sup>	2023: 279.77 MW (no capacity added from 2022)	83.70 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

Use renewable energy sources, including hydro/wind/solar power plants, and heat pumps for heating utilities

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (16% area)  
1.6-1.8 MWh/kWp/yr (56% area)  
1.8-1.9 MWh/kWp/yr (25% area)
- **Wind:** <260 W/m<sup>2</sup> (40% area)  
260-420 W/m<sup>2</sup> (40% area)  
420-560 W/m<sup>2</sup> (18% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

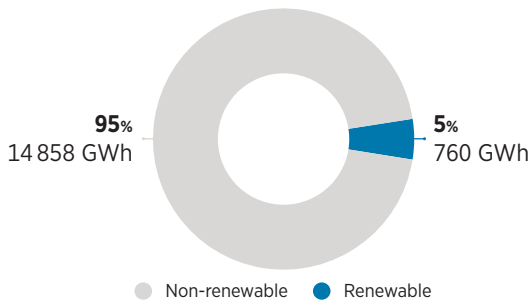
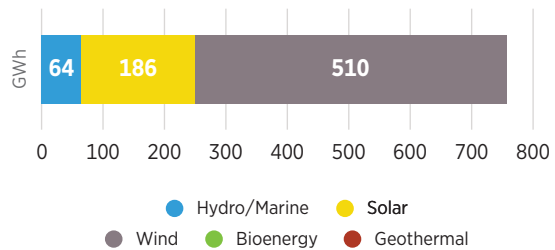


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Mongolia

### Support ongoing

Policy advice on heating and cooling in the buildings sector			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Policy advice</td> <td><b>Source:</b> Government of Mongolia</td> </tr> </table>	<b>Work package:</b> Policy advice	<b>Source:</b> Government of Mongolia
<b>Work package:</b> Policy advice	<b>Source:</b> Government of Mongolia		
Technical capacity building to support costing study of mitigation options in the power sector based on quantitative analysis of energy sector scenarios using software tools and models			
<b>2</b>	<table border="1"> <tr> <td><b>Work package:</b> Technology and infrastructure capacity building</td> <td><b>Source:</b> Government of Mongolia</td> </tr> </table>	<b>Work package:</b> Technology and infrastructure capacity building	<b>Source:</b> Government of Mongolia
<b>Work package:</b> Technology and infrastructure capacity building	<b>Source:</b> Government of Mongolia		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.



# MONTENEGRO

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
03 July 2010 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 31 216.40 (2023) <sup>1</sup>	2021: 3.53 TES/GDP PPP MJ per 2017 USD (6.08% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
616 177 (2023) <sup>1</sup>	2023: 856.52 MW (20 MW of capacity added from 2022)	2.53 MtCO <sub>2</sub> eq (2020) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

New renewable energy power plants, renewable energy use for heating and cooling

### Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (56% area)  
1.4-1.6 MWh/kWp/yr (37% area)
- **Wind:** <260 W/m<sup>2</sup> (58% area)  
260-420 W/m<sup>2</sup> (20% area)  
420-560 W/m<sup>2</sup> (10% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 Total electricity generation (GWh, %)

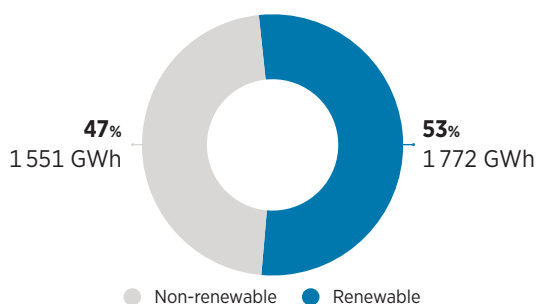
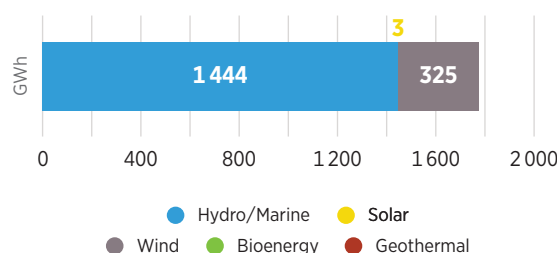


Figure 2 Renewable generation by technology (GWh)



## IRENA climate action engagement in Montenegro

### Support ongoing

Support for the alignment of NDC and NECP

1

**Work package:**

Technology and infrastructure technical analysis

**Source:**

Government of Montenegro

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# MOZAMBIQUE

LDC

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
28 April 2011 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 608.44 (2023) <sup>1</sup>	2021: 11.95 TES/GDP PPP MJ per 2017 USD (-3.87% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
33 897 354 (2023) <sup>1</sup>	2023: 2 350.57 MW (no capacity added from 2022)	33.95 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

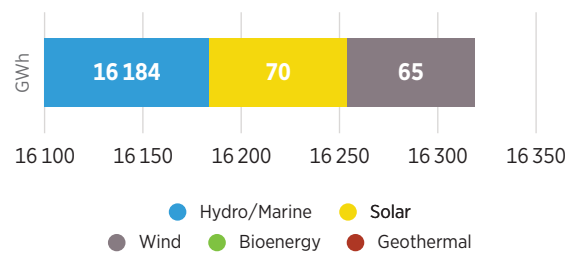
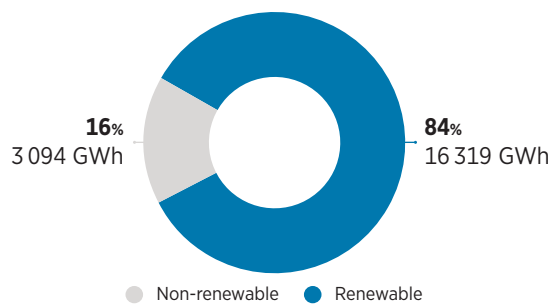
Above 50% renewables in total electricity production, up to and during 2030, including: 3.5 GW of large hydropower, 200 MW of small and mini-hydropower, 150 MW of wind, 50 MW of solar and 50 MW of biomass

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (61% area)  
1.6-1.8 MWh/kWp/yr (39% area)
- **Wind:** <260 W/m<sup>2</sup> (97% area)  
260-420 W/m<sup>2</sup> (1% area)
- **Biomass:** 6.5 tC/ha/yr

Figure 1 Total electricity generation (GWh, %)

Figure 2 Renewable generation by technology (GWh)



## IRENA climate action engagement in Mozambique

### Support completed

Activity to develop and implement a training capacity building package			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Data and statistics</td> <td><b>Source:</b> NDC Partnership</td> </tr> </table>	<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership		
Support for on-site assessment			
<b>2</b>	<table border="1"> <tr> <td><b>Work package:</b> Resource assessment</td> <td><b>Source:</b> Government of Mozambique</td> </tr> </table>	<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Mozambique
<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Mozambique		
Bioenergy Eni training			
<b>3</b>	<table border="1"> <tr> <td><b>Work package:</b> Capacity building on policy and finance</td> <td><b>Source:</b> Government of Mozambique</td> </tr> </table>	<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> Government of Mozambique
<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> Government of Mozambique		

<sup>1,2,3,4,5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# MYANMAR

LDC

<b>Non-membership</b> COP28 Pledge of Tripling RE and Doubling EE: No status	<b>GDP per capita</b> USD 1 187.57 (2023) <sup>1</sup>	<b>Energy intensity</b> 2021: 4.17 TES/GDP PPP MJ per 2017 USD (-18.03% improvement from 2020) <sup>2</sup>
<b>Population</b> 54 577 997 (2023) <sup>1</sup>	<b>Renewable power</b> 2023: 3 509.16 MW (no capacity added from 2022)	<b>Total greenhouse gas emissions</b> 115.08 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

**Conditional (by 2030):**  
new renewable energy target of 2 000 MW  
3 070 MW of renewables (solar and wind)

### Resource potential<sup>5</sup>

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (75% area)
- **Wind:** <260 W/m<sup>2</sup> (98% area)  
260-420 W/m<sup>2</sup> (5% area)
- **Biomass:** 4.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

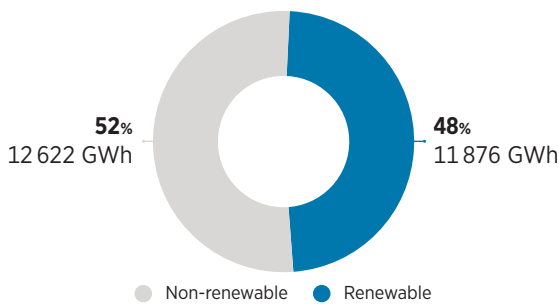
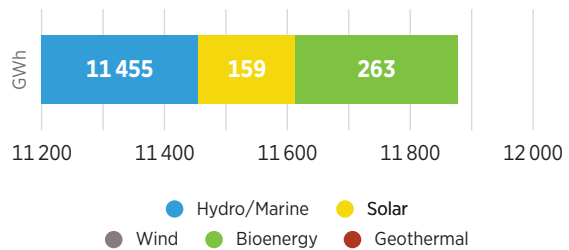


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Myanmar

### Support completed

- 1 Review and provide comments on draft NDC on clean cooking, encouraging the use of improved cookstoves and renewable energy sources to reduce emissions. The first updated NDC (Annex VII: Adaptation projects supplementary information, p. 81) reflects potential socio-economic benefits through improved cookstoves and training in renewable energy technologies as means of adaptation

**Work package:**  
NDC review

**Source:**  
Government of Myanmar

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.





# NAMIBIA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
28 December 2013 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 12 756.50 (2023) <sup>1</sup>	2021: 3.45 TES/GDP PPP MJ per 2017 USD (2.59% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
2 604 172 (2023) <sup>1</sup>	2023: 532.94 MW (no capacity added from 2022)	12.89 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

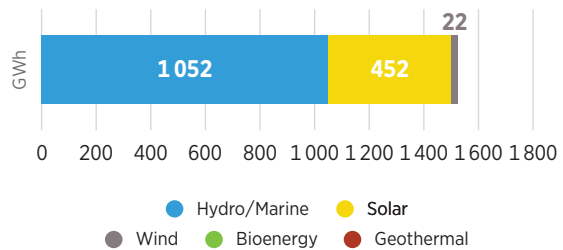
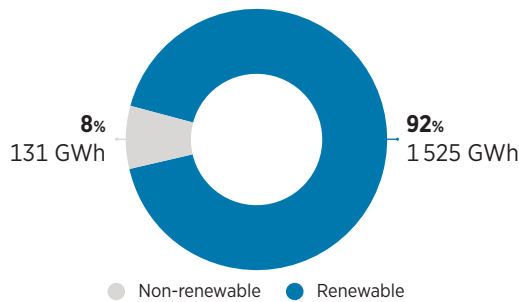
Substitute fossil fuel with renewable energy in existing and new PV pumps (20 000 units)

### Resource potential<sup>5</sup>

- **Solar PV:** 1.8-1.9 MWh/kWp/yr (24% area)  
1.9-2.0 MWh/kWp/yr (52% area)  
>2.0 MWh/kWp/yr (22% area)
- **Wind:** <260 W/m<sup>2</sup> (89% area)  
260-420 W/m<sup>2</sup> (16% area)  
420-560 W/m<sup>2</sup> (2% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Namibia

### Support completed

Partnership engagement			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Accelerated Partnership for Renewables in Africa</td> <td><b>Source:</b> Government of Namibia</td> </tr> </table>	<b>Work package:</b> Accelerated Partnership for Renewables in Africa	<b>Source:</b> Government of Namibia
<b>Work package:</b> Accelerated Partnership for Renewables in Africa	<b>Source:</b> Government of Namibia		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2023), IRENA (2024g) Statistical Profiles.



# NAURU

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
09 September 2010 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 12 060.08 (2023) <sup>1</sup>	2021: 6.94 TES/GDP PPP MJ per 2017 USD (-2.57% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
12 780 (2023) <sup>1</sup>	2023: 3.16 MW (no capacity added from 2022)	0.001 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

Renewable energy comprises half of Nauru's power generation (conditional target)

### Resource potential<sup>5</sup>

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (100% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

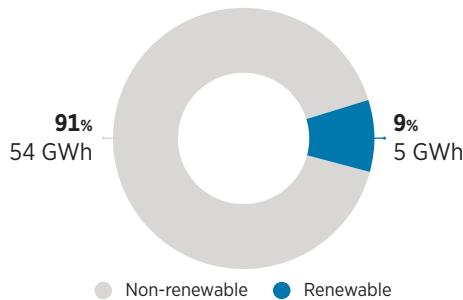
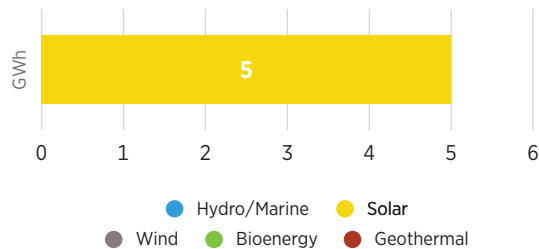


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Nauru

### Support completed

Site assessment for solar potential	
<b>1</b> <b>Work package:</b> Resource assessment	<b>Source:</b> Government of Nauru

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.



**Membership since**

14 December 2017

**COP28 Pledge of Tripling RE and Doubling EE: No status**

**Population**

30 896 590 (2023)<sup>1</sup>

**GDP per capita**

USD 1 324.03 (2023)<sup>1</sup>

**Renewable power**

2023: 2 799.05 MW  
(483 MW of capacity added from 2022)

**Energy intensity**

2021: 5.63 TES/GDP  
PPP MJ per 2017 USD  
(2.28% improvement from 2020)<sup>2</sup>

**Total greenhouse gas emissions**

56.83 MtCO<sub>2</sub>eq (2023)<sup>3</sup>

**Renewable energy targets in second NDC<sup>4</sup>**

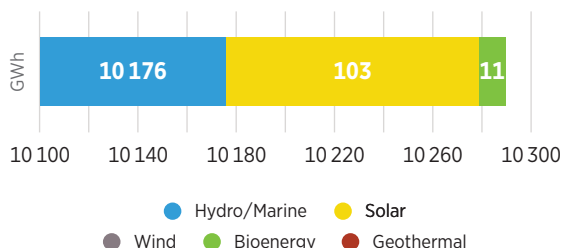
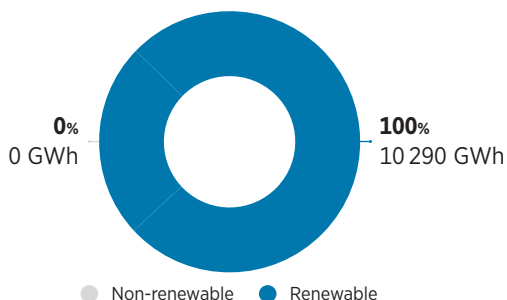
Expand clean energy generation to around 15 000 MW, of which 5-10% will be generated from mini and micro-hydro power, solar, wind and bioenergy. Of this, 5 000 MW is an unconditional target. Ensure that 15% of the total energy demand is supplied from clean sources

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (36% area)  
1.4-1.6 MWh/kWp/yr (41% area)  
1.6-1.8 MWh/kWp/yr (15% area)
- **Wind:** <260 W/m<sup>2</sup> (85% area)  
260-420 W/m<sup>2</sup> (10% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**Acknowledgement of IRENA support**

*“We would like to record our appreciation for the feedback from IRENA on [the] draft NDC...”*

(LETTER RECEIVED FROM GOVERNMENT OF NEPAL, 18 DECEMBER 2020)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Nepal

### Support completed

1 Detailed review of the draft NDC identifying opportunities to increase ambition and provide actionable recommendations to include renewable energy technologies as mitigation options

**Work package:**  
NDC review

**Source:**  
Government of Nepal

Project development and match making support

2 **Work package:**  
Project facilitation

**Source:**  
-



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# NICARAGUA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
23 October 2010 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 2 530.29 (2023) <sup>1</sup>	2021: 4.29 TES/GDP PPP MJ per 2017 USD (5.72% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
7 046 310 (2023) <sup>1</sup>	2023: 750.29 MW (3 MW of capacity added from 2022)	20.63 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

## Renewable energy targets in first NDC<sup>4</sup>

**Conditional (by 2030):**  
up to 65% renewable sources in the energy mix

## Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (23% area)  
1.4-1.6 MWh/kWp/yr (55% area)  
1.6-1.8 MWh/kWp/yr (23% area)
- **Wind:** <260 W/m<sup>2</sup> (79% area),  
260-420 W/m<sup>2</sup> (13% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

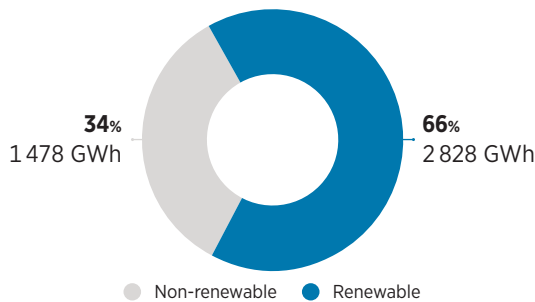
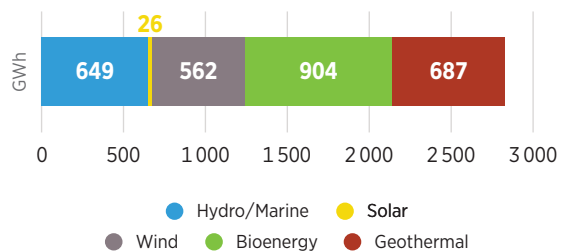


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Nicaragua

### Support completed

1 Technical report with references to relevant existing published work to support the formulation of a strategy to continue expanding the energy matrix using renewable energy

<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> NDC Partnership
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
16 December 2010 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 618.29 (2023) <sup>1</sup>	2021: 5.19 TES/GDP PPP MJ per 2017 USD (-4.55% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
27 202 843 (2023) <sup>1</sup>	2023: 92.04 MW (30 MW of capacity added from 2022)	42.33 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

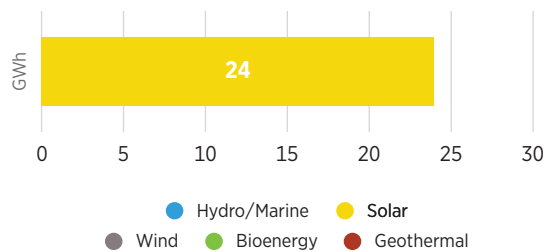
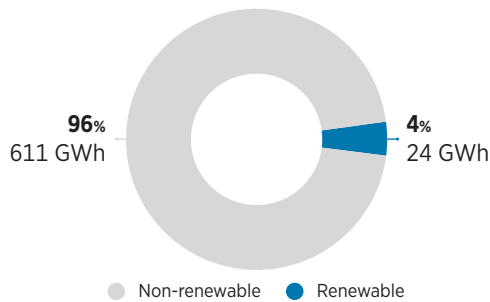
By 2030, 28% renewable installed capacity and 57% renewable electricity generation, corresponding to 280 MW of renewables by 2030, including 130 MW of hydropower, 150 MW of solar PV and 100 MW off-grid

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (42% area)  
1.8-1.9 MWh/kWp/yr (38% area)  
1.9-2.0 MWh/kWp/yr (17% area)
- **Wind:** <260 W/m<sup>2</sup> (50% area),  
260-420 W/m<sup>2</sup> (43% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Niger**

**Support completed**

Long-term energy planning capacity building through a mix of online software training and hands-on workshops to support the process of revising the energy component of the NDC, strengthen capacities for energy planning and contribute to the preparation of roadmaps and long-term sectoral plans

<b>1</b>	<b>Work package:</b> Long-term energy planning	<b>Source:</b> NDC Partnership
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Strengthening the monitoring mechanism for NDC implementation by establishing a sustainable monitoring system, training the stakeholders, defining the indicators, monitoring frequency, and good data collection, analysis and reporting. Development of mini greenhouse gas inventories and projections to inform new NDC targets

<b>2</b>	<b>Work package:</b> Monitoring, reporting and verification (MRV)	<b>Source:</b> NDC Partnership
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# NIGERIA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
30 September 2010 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 1 621.12 (2023) <sup>1</sup>	2021: 6.57 TES/GDP PPP MJ per 2017 USD (1% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
223 804 632 (2023) <sup>1</sup>	2023: 2 983.97 MW (710 MW of capacity added from 2022)	385.11 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

43% installed renewable capacity in final electricity consumption, corresponding to 13 800 MW of renewables, including:  
 5 000 MW of solar PV,  
 4 700 MW of large hydropower,  
 1 200 MW of small hydropower,  
 1 100 MW of bioenergy,  
 1 000 MW of CSP and  
 800 MW of wind

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (37% area)  
1.6-1.8 MWh/kWp/yr (45% area)
- **Wind:** <260 W/m<sup>2</sup> (97% area)  
260-420 W/m<sup>2</sup> (2% area)
- **Biomass:** 2.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

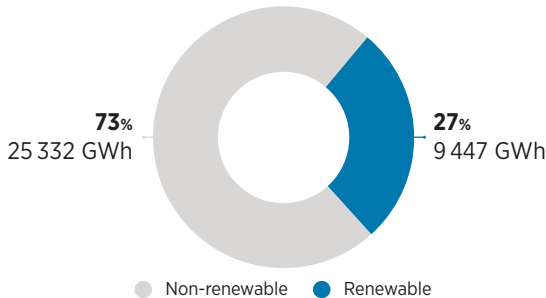
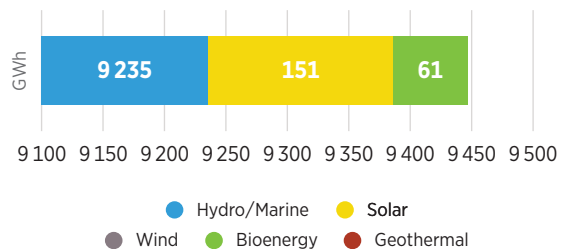


Figure 2 **Renewable generation by technology (GWh)**



### Acknowledgement of IRENA support

*"Nigeria has, with support from ... IRENA, in a coalition of development partners contributing through the NDC Partnership, carried out a significant enhancement program as part of the NDC update."*

(NIGERIA'S FIRST [UPDATED] NDC SUBMISSION, 30 JULY 2021)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Nigeria

### Support ongoing

1 Enhance and establish an energy balance for Nigeria; establish a system to produce balances and MRV reporting for energy; capacity building on data collection and management

<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
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2 Development of four sectoral MRV systems on agriculture, industry, transport, and oil and gas

<b>Work package:</b> Monitoring, reporting and verification (MRV)	<b>Source:</b> NDC Partnership
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3 Training programme on data, scope, methodology and processes for data collection and management for relevant officers of the Department of Climate Change and other line ministries. Development and adoption of appropriate templates for data collection and dissemination

<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
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<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
29 December 2010 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 8 146.47 (2023) <sup>1</sup>	2021: 3.25 TES/GDP PPP MJ per 2017 USD (0.25% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
1 811 980 (2023) <sup>1</sup>	2023: 1 354.32 MW (382 MW of capacity added from 2022)	11.37 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

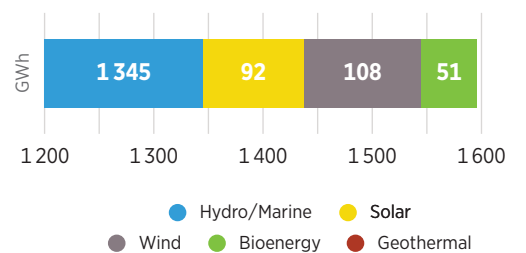
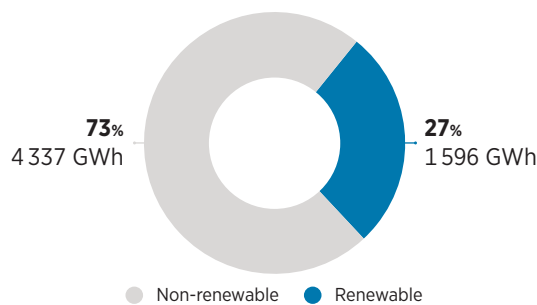
1 033 MW of hydropower,  
180 MW of solar,  
15 MW of biogas,  
15 MW of biogas combined heat and power plants,  
15 MW of geothermal

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (65% area)  
1.4-1.6 MWh/kWp/yr (36% area)
- **Wind:** <260 W/m<sup>2</sup> (85% area)  
260-420 W/m<sup>2</sup> (10% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in North Macedonia**

**Support completed**

IRENA conducted the study “De-risking investments in North Macedonia: Renewable energy finance and policy focusing on power, heating and cooling”

<b>1</b>	<b>Work package:</b> Policy advice	<b>Source:</b> UNDP
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**Support ongoing**

	Input for supporting the alignment of NDC 3.0 and NECP	
<b>2</b>	<b>Work package:</b> NDC advice and review	<b>Source:</b> Government of North Macedonia

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# OMAN

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
5 August 2010 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 23 295.33 (2023) <sup>1</sup>	2021: 7.21 TES/GDP PPP MJ per 2017 USD (-0.51% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
4 644 384 (2023) <sup>1</sup>	2023: 722.09 MW (17 MW of capacity added from 2022)	127.44 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in second NDC<sup>4</sup>

Increase renewable energy consumption to 20% by 2030 and 35-39% by 2040. Between 2021 and 2027, secure at least 2 660 MW from solar PV and wind

### Resource potential<sup>5</sup>

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (10% area)  
1.8-1.9 MWh/kWp/yr (50% area)  
1.9-2.0 MWh/kWp/yr (39% area)  
>2.0 MWh/kWp/yr (9% area)
- **Wind:** <260 W/m<sup>2</sup> (69% area)  
260-420 W/m<sup>2</sup> (23% area)  
420-560 W/m<sup>2</sup> (7% area)  
560-670 W/m<sup>2</sup> (2% area)  
670-820 W/m<sup>2</sup> (2% area)  
>1 060 W/m<sup>2</sup> (2% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

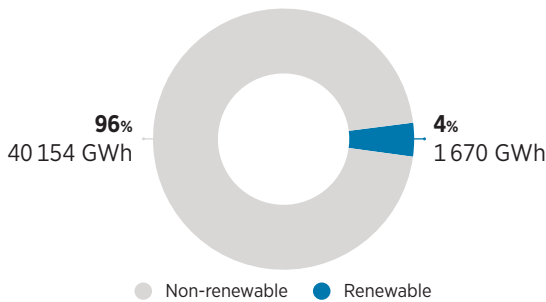
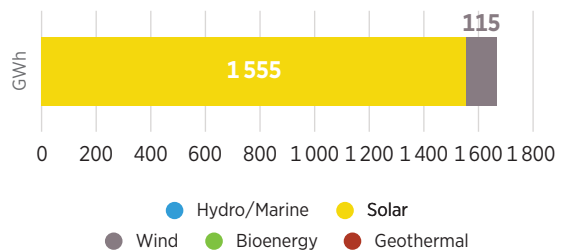


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Oman

### Support completed

Project facilitation	
<b>1</b> <b>Work package:</b> Project facilitation	<b>Source:</b> Government of Oman

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# PAKISTAN

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
23 June 2016 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 1 407.02 (2023) <sup>1</sup>	2021: 4.21 TES/GDP PPP MJ per 2017 USD (-1.06% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
240 485 658 (2023) <sup>1</sup>	2023: 14 156.41 MW (no capacity added from 2022)	532.37 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

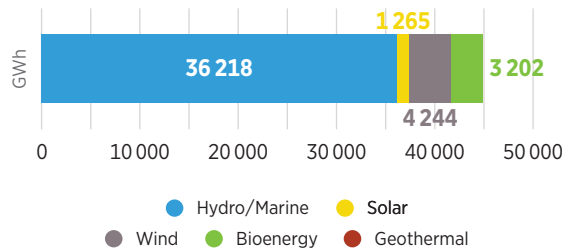
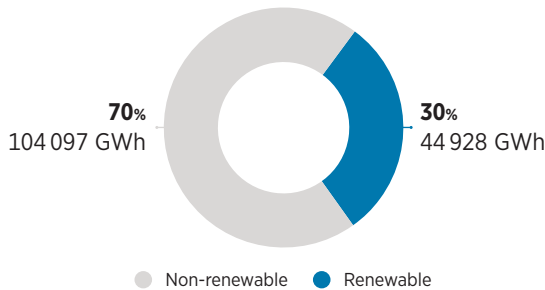
By 2030, generate 60% of all energy from renewable sources, including hydropower

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (30% area)  
1.6-1.8 MWh/kWp/yr (39% area)  
1.8-1.9 MWh/kWp/yr (16% area)  
1.9-2.0 MWh/kWp/yr (10% area)
- **Wind:** <260 W/m<sup>2</sup> (77% area)  
260-420 W/m<sup>2</sup> (16% area)  
420-560 W/m<sup>2</sup> (5% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 Total electricity generation (GWh, %)

Figure 2 Renewable generation by technology (GWh)



## IRENA climate action engagement in Pakistan

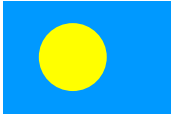
### Support completed

Project development and match making support					
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b></td> <td><b>Source:</b></td> </tr> <tr> <td>Project facilitation</td> <td>-</td> </tr> </table>	<b>Work package:</b>	<b>Source:</b>	Project facilitation	-
<b>Work package:</b>	<b>Source:</b>				
Project facilitation	-				

### Support ongoing

NDC 3.0 recommendation note					
<b>2</b>	<table border="1"> <tr> <td><b>Work package:</b></td> <td><b>Source:</b></td> </tr> <tr> <td>NDC advice and review</td> <td>Government of Pakistan</td> </tr> </table>	<b>Work package:</b>	<b>Source:</b>	NDC advice and review	Government of Pakistan
<b>Work package:</b>	<b>Source:</b>				
NDC advice and review	Government of Pakistan				

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
27 December 2009 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 14 565.33 (2023) <sup>1</sup>	2021: 13.27 TES/GDP PPP MJ per 2017 USD (-15.44% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
18 058 (2023) <sup>1</sup>	2023: 19.62 MW (15 MW of capacity added from 2022)	1.50 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

<b>Rewable energy targets in first NDC<sup>4</sup></b>	<b>Resource potential<sup>5</sup></b>
15 MW of solar and 10 MW of hydropower	<ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1.2-1.4 MWh/kWp/yr (5% area) 1.4-1.6 MWh/kWp/yr (98% area)</li> <li>• <b>Wind:</b> &lt;260 W/m<sup>2</sup> (100% area)</li> <li>• <b>Biomass:</b> 10.5 tC/ha/yr</li> </ul>

Figure 1 **Total electricity generation (GWh, %)**

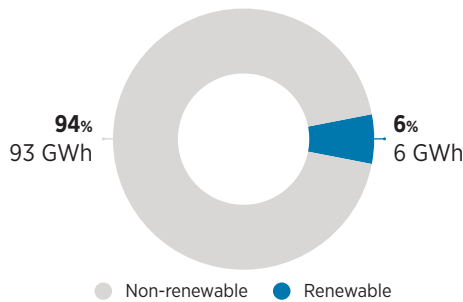
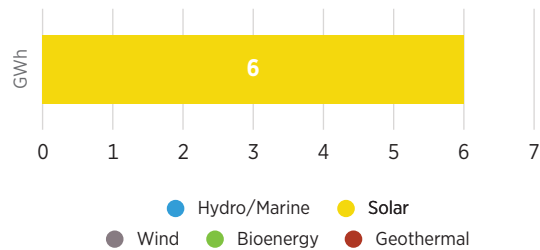


Figure 2 **Renewable generation by technology (GWh)**



### IRENA climate action engagement in Palau

#### Support completed

Support on the green hydrogen roadmap			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Renewable energy roadmap</td> <td><b>Source:</b> Pacific NDC Hub</td> </tr> </table>	<b>Work package:</b> Renewable energy roadmap	<b>Source:</b> Pacific NDC Hub
<b>Work package:</b> Renewable energy roadmap	<b>Source:</b> Pacific NDC Hub		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2016), IRENA (2024g) Statistical Profiles.



# PANAMA

## Membership since

15 January 2012  
**COP28 Pledge of Tripling RE and Doubling EE: Endorsed**

## Population

4 468 087 (2023)<sup>1</sup>

## GDP per capita

USD 18 661.77 (2023)<sup>1</sup>

## Renewable power

2023: 2 818.48 MW  
 (40MW of capacity added from 2022)

## Energy intensity

2021: 1.41 TES/GDP  
 PPP MJ per 2017 USD  
 (2.99% improvement from 2020)<sup>2</sup>

## Total greenhouse gas emissions

21.28 MtCO<sub>2</sub>eq (2023)<sup>3</sup>

## Renewable energy targets in second NDC<sup>4</sup>

Installing at least 1.7 GW of renewable energy capacity by 2030; 20% of energy consumption from non-conventional renewable energy sources

## Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (43% area)  
 1.4-1.6 MWh/kWp/yr (52% area)
- **Wind:** <260 W/m<sup>2</sup> (86% area)  
 260-420 W/m<sup>2</sup> (9% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

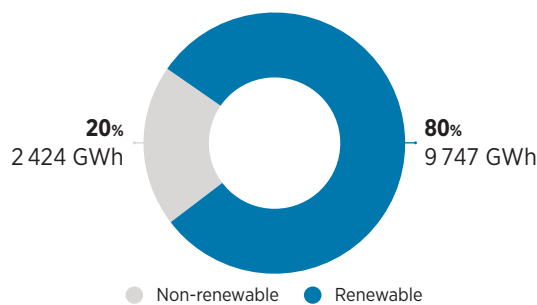
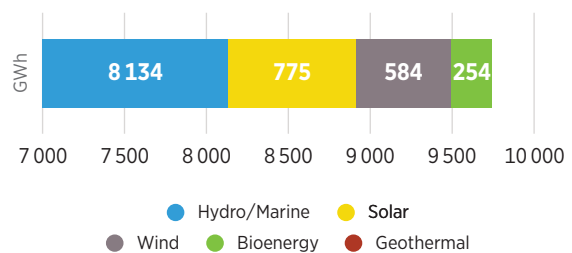


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Panama

### Support completed

Assessment of climate change adaptation in relation to resilient energy infrastructure

**1** **Work package:**  
 Policy advice

**Source:**  
 Government of Panama

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2024), IRENA (2024g) Statistical Profiles.



# PAPUA NEW GUINEA

SIDS

<b>State in accession</b> COP28 Pledge of Tripling RE and Doubling EE: Endorsed	<b>GDP per capita</b> USD 2 994.45 (2023) <sup>1</sup>	<b>Energy intensity</b> 2021: 6.54 TES/GDP PPP MJ per 2017 USD (-2.43% improvement from 2020) <sup>2</sup>
<b>Population</b> 10 329 931 (2023) <sup>1</sup>	<b>Renewable power</b> 2023: 398.84 MW (66 MW of capacity added from 2022)	<b>Total greenhouse gas emissions</b> 9.64 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in second NDC<sup>4</sup>

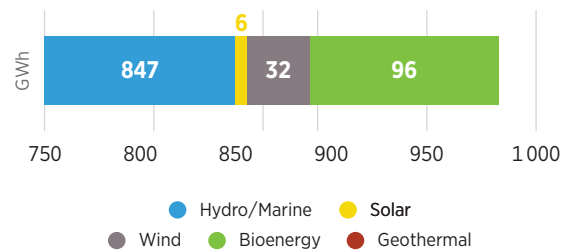
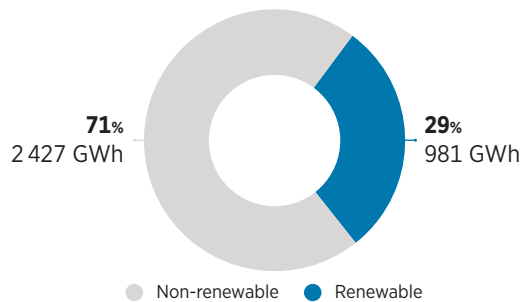
Increase the installed capacity of on-grid renewable electricity generation to 78% by 2030

### Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (16% area)  
1.2-1.4 MWh/kWp/yr (62% area)  
1.4-1.6 MWh/kWp/yr (22% area)
- **Wind:** <260 W/m<sup>2</sup> (89% area),  
260-420 W/m<sup>2</sup> (10% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



### Acknowledgement of IRENA support

*"Special thanks also go to a number of development partners including IRENA for [their] invaluable support."*

(PAPUA NEW GUINEA'S FIRST [UPDATED] NDC SUBMISSION, 16 DECEMBER 2020)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Papua New Guinea

### Support completed

Developing a system to collect reliable country-specific energy data and creating an integrated energy data management system with other sectors for planning and development of the Global Database of

#### 1 National GHG Inventory

**Work package:**  
Data and statistics

**Source:**  
NDC Partnership

### Support ongoing

Analysis of renewable energy landscape and enabling conditions for the deployment

**2 Work package:**  
Renewables readiness assessment

**Source:**  
Government of Papua New Guinea

Review of national guideline of the Article 6.4 under the Paris Agreement

**3 Work package:**  
Policy advice

**Source:**  
Government of Papua New Guinea



Alex Floston © Shutterstock.com



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
2 March 2018 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 6 260.46 (2023) <sup>1</sup>	2021: 3.40 TES/GDP PPP MJ per 2017 USD (-2.26% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
6 861 524 (2023) <sup>1</sup>	2023: 8 852.60 MW (no capacity added from 2022)	41.62 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

Generate and promote alternative energy sources to hydropower in vulnerable communities.

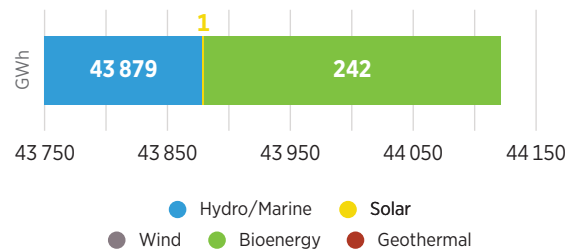
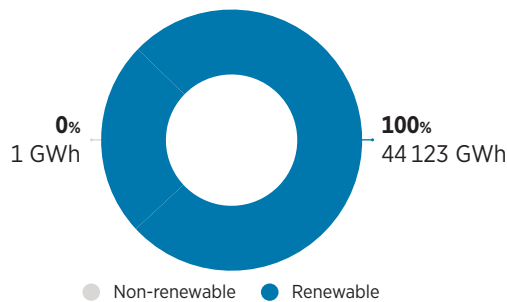
By 2030, promote efficient stoves for vulnerable families in rural areas, especially those most dependent on biomass for cooking; promote distributed generation systems such as solar and wind in areas with limited access to energy sources; promote solar water heaters as a way to use solar thermal energy

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (100% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Paraguay**

**Support completed**

1 Comprehensive evaluation of the conditions for renewable energy deployment to identify a set of actions to scale up renewable energy and enhance green-house gas mitigation

<b>Work package:</b> Renewables readiness assessment	<b>Source:</b> Government of Paraguay
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.





# PERU

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
21 November 2013 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 7 789.87 (2023) <sup>1</sup>	2021: 2.30 TES/GDP PPP MJ per 2017 USD (4.30% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
34 352 719 (2023) <sup>1</sup>	2023: 6 743.95 MW (166 MW of capacity added from 2022)	94.05 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first updated NDC<sup>4</sup>

Does not include quantifiable renewable energy targets

### Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (43% area)  
1.4-1.6 MWh/kWp/yr (23% area)  
1.6-1.8 MWh/kWp/yr (10% area)  
>2.0 MWh/kWp/yr (9% area)
- **Wind:** <260 W/m<sup>2</sup> (97% area)  
260-420 W/m<sup>2</sup> (2% area)  
670-820 W/m<sup>2</sup> (2% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

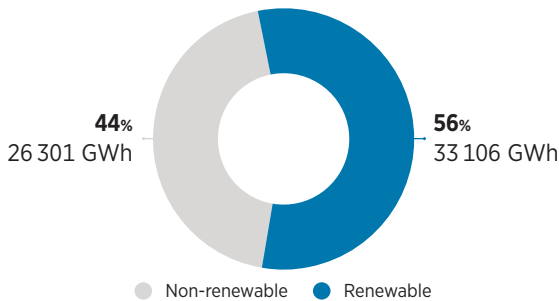
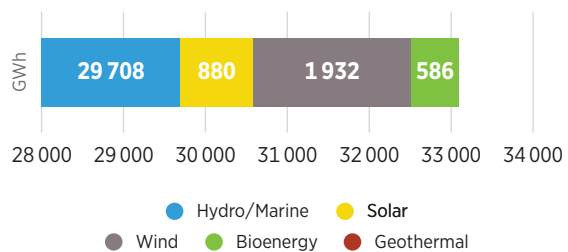


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Peru

### Support ongoing

- 1 Conduct a technical costing study of mitigation options in the power sector based on quantitative analysis of energy sector scenarios using software tools and models

<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of Peru
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.



# PHILIPPINES

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
10 July 2011 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 10 755.50 (2023) <sup>1</sup>	2021: 2.78 TES/GDP PPP MJ per 2017 USD (0.01% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
117 337 368 (2023) <sup>1</sup>	2023: 7 773.98 MW (103 MW of capacity added from 2022)	256.15 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

<b>Renewable energy targets in first NDC<sup>4</sup></b>	<b>Resource potential<sup>5</sup></b>
No quantified target on Renewables	<ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1.2-1.4 MWh/kWp/yr (32% area) 1.4-1.6 MWh/kWp/yr (63% area)</li> <li>• <b>Wind:</b> &lt;260 W/m<sup>2</sup> (60% area) 260-420 W/m<sup>2</sup> (24% area) 420-560 W/m<sup>2</sup> (8% area)</li> <li>• <b>Biomass:</b> 10.5 tC/ha/yr</li> </ul>

Figure 1 Total electricity generation (GWh, %)

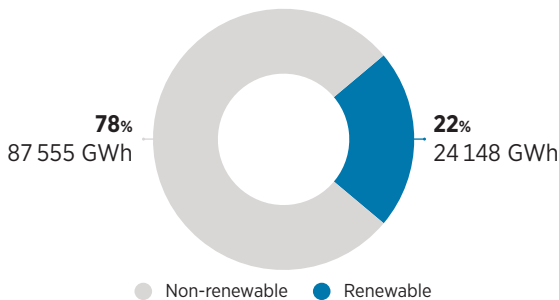
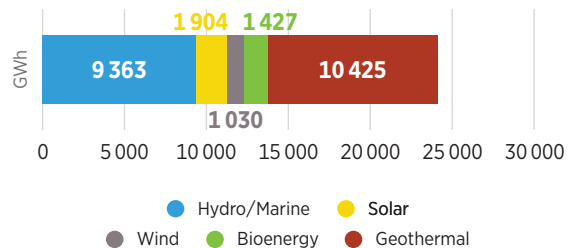


Figure 2 Renewable generation by technology (GWh)



## IRENA climate action engagement in Philippines

### Support ongoing

NDC 3.0 recommendation notes	
<b>1</b> Work package: NDC advice and review	Source: Government of Philippines

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
24 June 2012 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 3 361.10 (2023) <sup>1</sup>	2021: 3.59 TES/GDP PPP MJ per 2017 USD (6.93% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
14 094 683 (2023) <sup>1</sup>	2023: 150.33 MW (no of capacity added from 2022)	7.49 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

Phasing out of diesel gensets for on-site electricity consumption, to be replaced with grid and/or on-site renewable power production

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (13% area)  
1.4-1.8 MWh/kWp/yr (86.4% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

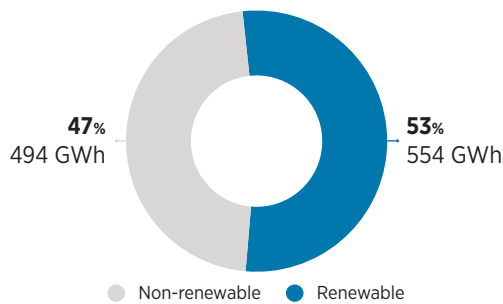
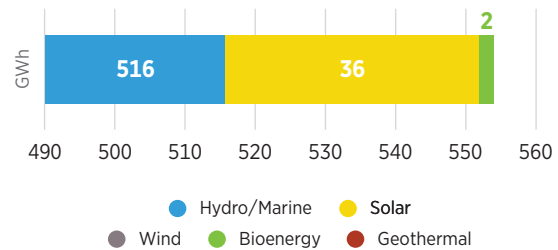


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Rwanda**

**Support ongoing**

Partnership engagement			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Accelerated Partnership for Renewables in Africa</td> <td><b>Source:</b> Government of Rwanda</td> </tr> </table>	<b>Work package:</b> Accelerated Partnership for Renewables in Africa	<b>Source:</b> Government of Rwanda
<b>Work package:</b> Accelerated Partnership for Renewables in Africa	<b>Source:</b> Government of Rwanda		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# SAINT KITTS AND NEVIS

SIDS

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
20 June 2013 COP28 Pledge of Tripling RE and Doubling EE: No status	USD 22 553.31 (2023) <sup>1</sup>	2021: 2.63 TES/GDP PPP MJ per 2017 USD (0.16% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
47 755 (2023) <sup>1</sup>	2023: 5.21 MW (no capacity added from 2022)	0.17 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

#### Conditional (by 2030):

35 MW of geothermal  
7.6 MW of wind  
1.9 MW of solar

### Resource potential<sup>5</sup>

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (100% area)
- **Wind:** <260 W/m<sup>2</sup> (63% area)  
260-420 W/m<sup>2</sup> (25% area)  
420-560 W/m<sup>2</sup> (15% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

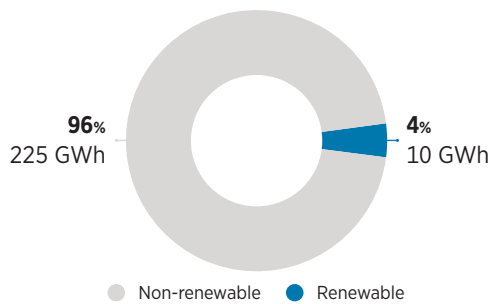
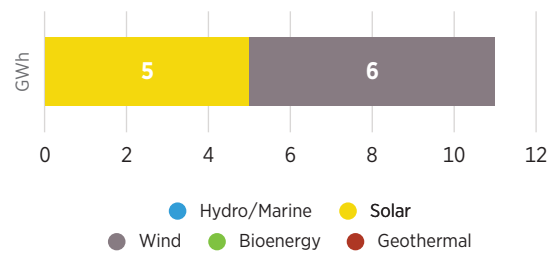


Figure 2 **Renewable generation by technology (GWh)**



<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Saint Kitts and Nevis

### Support completed

- 1 Technical capacity building programme consisting of several workshops on geothermal technology to facilitate NDC implementation, with a focus on performance, cost and planning requirements of geothermal solutions

<b>Work package:</b>	<b>Source:</b>
Technology and infrastructure capacity building	UNFCCC

### Support ongoing

- 2 Implementation of the MRV system in the framework of the NDC revision

<b>Work package:</b>	<b>Source:</b>
Monitoring, reporting and verification (MRV)	UNFCCC

- 3 Assessment for the cost effectiveness of mitigation options for the energy sector to support country officials prioritising mitigation options as the input to the country's NDC on power and other relevant sectors

<b>Work package:</b>	<b>Source:</b>
Technology and infrastructure technical analysis	UNFCCC

SolarCity Simulator

- 4 **Work package:** Resource assessment **Source:** Government of Saint Kitts and Nevis

- 5 Facilitate the rapid dissemination of up-to-date technical information and know-how on renewable technologies and infrastructure. Potential support includes modern renewables for end-use sectors (increasing ambition beyond the power sector), bioenergy, e-mobility, sustainable towns and communities, climate-resilient systems, small-scale renewable energy, decentralised power generation, clean cooking.

<b>Work package:</b>	<b>Source:</b>
Technology and infrastructure capacity building	Government of Saint Kitts and Nevis





**Membership since**

31 March 2016  
COP28 Pledge of Tripling RE and Doubling EE: No status

**Population**

180 251 (2023)<sup>1</sup>

**GDP per capita**

USD 13 980.09 (2023)<sup>1</sup>

**Renewable power**

2023: 4.42 MW  
(no capacity added from 2022)

**Energy intensity**

2021: 3.35 TES/GDP  
PPP MJ per 2017 USD  
(6.62% improvement from 2020)<sup>2</sup>

**Total greenhouse gas emissions**

0.45 MtCO<sub>2</sub>eq (2023)<sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

**Conditional (by 2025 and 2030):**  
35%-50% of electricity from renewables through a mix of geothermal, wind and solar energy

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (16% area)  
1.6-1.8 MWh/kWp/yr (83% area)
- **Wind:** <260 W/m<sup>2</sup> (53% area)  
260-420 W/m<sup>2</sup> (40% area)  
420-560 W/m<sup>2</sup> (8% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

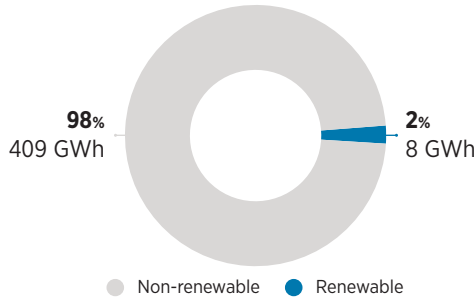
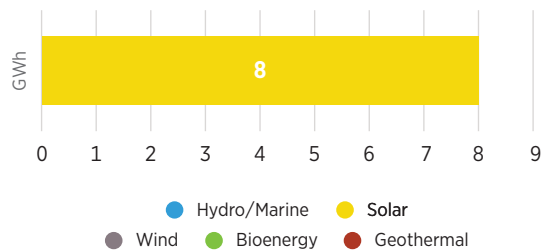


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Saint Lucia**

**Support completed**

Solar City simulator	
<b>1</b>	<p><b>Work package:</b> Resource assessment</p> <p><b>Source:</b> Government of Saint Lucia</p>
Energy surveys for NDC implementation roadmaps	
<b>2</b>	<p><b>Work package:</b> Data and statistics</p> <p><b>Source:</b> Government of Saint Lucia</p>

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# SAINT VINCENT AND THE GRENADINES

SIDS

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
9 November 2012 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 10 279.49 (2023) <sup>1</sup>	2021: 2.46 TES/GDP PPP MJ per 2017 USD (2.24% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
103 698 (2023) <sup>1</sup>	2023: 10.51 MW (1 MW of capacity added from 2022)	0.15 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

**Unconditional:**  
15 MW of geothermal

### Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (5% area)  
1.4-1.6 MWh/kWp/yr (10% area)  
1.6-1.8 MWh/kWp/yr (90% area)
- **Wind:** <260 W/m<sup>2</sup> (32% area)  
260-420 W/m<sup>2</sup> (50% area)  
420-560 W/m<sup>2</sup> (17% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

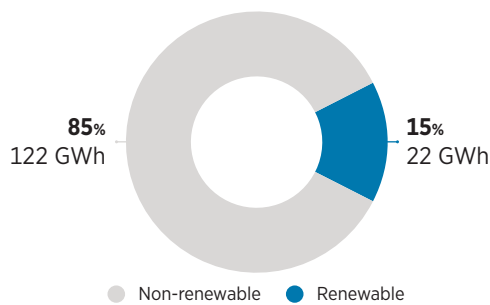
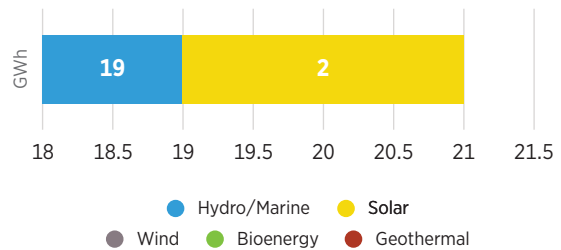


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Saint Vincent and Grenadines

### Support completed

Review the data needed for NDC enhancement and energy-related target tracking and its availability			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Data and statistics</td> <td><b>Source:</b> UNDP</td> </tr> </table>	<b>Work package:</b> Data and statistics	<b>Source:</b> UNDP
<b>Work package:</b> Data and statistics	<b>Source:</b> UNDP		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2016), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
04 August 2010 COP28 Pledge of Tripling RE and Doubling EE: No Status	USD 6 680.60 (2023) <sup>1</sup>	2021: 4.90 TES/GDP PPP MJ per 2017 USD (-8.89% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
225 681 (2023) <sup>1</sup>	2023: 35.23 MW (no capacity added from 2022)	0.65 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

100% of renewable electricity generation by 2025

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (23% area)  
1.6-1.8 MWh/kWp/yr (77% area)
- **Wind:** <260 W/m<sup>2</sup> (88% area)  
260-420 W/m<sup>2</sup> (12% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

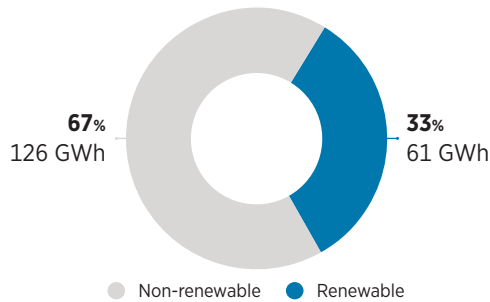
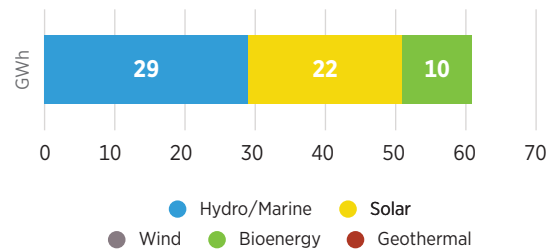


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Samoa**

**Support ongoing**

Support of NDC 3.0	
<b>1</b> <b>Work package:</b> Data and statistics	<b>Source:</b> Government of Samoa

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2016), IRENA (2024g) Statistical Profiles.





# SÃO TOMÉ AND PRÍNCIPE

SIDS/LDC

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
1 November 2014 COP28 Pledge of Tripling RE and Doubling EE: No status	USD 2 601.79 (2023) <sup>1</sup>	2021: 3.97 TES/GDP PPP MJ per 2017 USD (-0.28% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
231 856 (2023) <sup>1</sup>	2023: 1.93 MW (no capacity added from 2022)	0.30 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

## Renewable energy targets in first NDC<sup>4</sup>

**Conditional (by 2030):**  
12 MW of solar and 14 MW of hydropower

## Resource potential<sup>5</sup>

- **Solar PV:** <1.2 MWh/kWp/yr (10% area)  
1.2-1.4 MWh/kWp/yr (70% area)  
1.4-1.6 MWh/kWp/yr (20% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

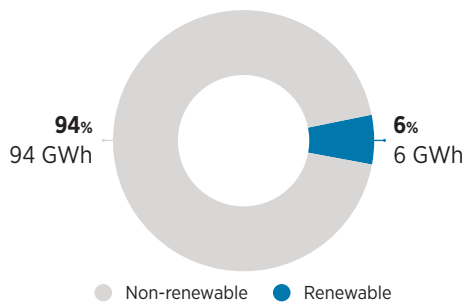
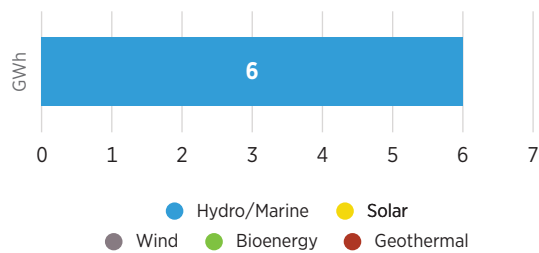


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in São Tomé and Príncipe

### Support completed

SolarCity simulator			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Resource assessment</td> <td><b>Source:</b> UNDP</td> </tr> </table>	<b>Work package:</b> Resource assessment	<b>Source:</b> UNDP
<b>Work package:</b> Resource assessment	<b>Source:</b> UNDP		
Assessment of the cost effectiveness of mitigation options for the energy sector to support country officials prioritising mitigation options that can serve as inputs for the NDC implementation phase for the power and other relevant sectors			
<b>2</b>	<table border="1"> <tr> <td><b>Work package:</b> Technology and infrastructure technical analysis</td> <td><b>Source:</b> UNDP</td> </tr> </table>	<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> UNDP
<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> UNDP		
Assessment of RE for primary healthcare			
<b>3</b>	<table border="1"> <tr> <td><b>Work package:</b> Policy advice</td> <td><b>Source:</b> Government of São Tomé and Príncipe</td> </tr> </table>	<b>Work package:</b> Policy advice	<b>Source:</b> Government of São Tomé and Príncipe
<b>Work package:</b> Policy advice	<b>Source:</b> Government of São Tomé and Príncipe		

<sup>1,2,3,4,5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# SAUDI ARABIA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
29 January 2012 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 28 894.96 (2023) <sup>1</sup>	2021: 5.81 TES/GDP PPP MJ per 2017 USD (2.39% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
36 947 025 (2023) <sup>1</sup>	2023: 2 688.64 MW (1 846 MW of capacity added from 2022)	805.16 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first updated NDC<sup>4</sup>

Acheive 50% renewable energy in the total energy mix by 2030

### Resource potential<sup>5</sup>

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (10% area)  
1.8-1.9 MWh/kWp/yr (95% area)
- **Wind:** <260 W/m<sup>2</sup> (43% area)  
260-420 W/m<sup>2</sup> (55% area)  
420-560 W/m<sup>2</sup> (5% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

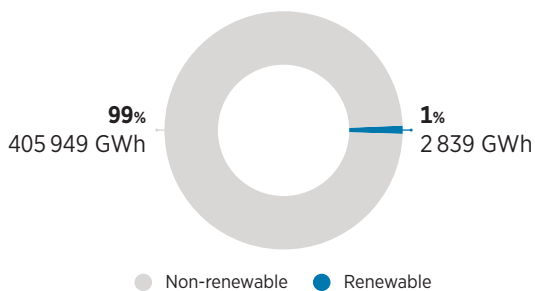
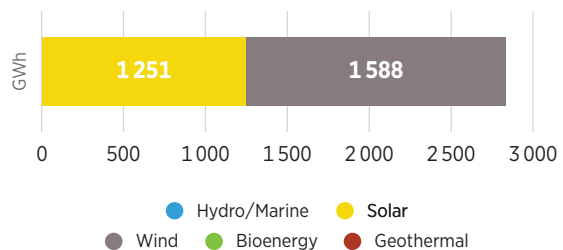


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Saudi Arabia

### Support ongoing

Support is currently under discussion

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
1 April 2012 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 1 745.97 (2023) <sup>1</sup>	2021: 3.58 TES/GDP PPP MJ per 2017 USD (-0.91% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
17 763 163 (2023) <sup>1</sup>	2023: 446.20 MW (no capacity added from 2022)	28.84 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

By 2030, 23% renewables in the electricity generation mix, corresponding to 632 MW, including  
 257 MW of solar  
 225 MW of hydropower  
 150 MW of wind

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (10% area)  
1.6-1.8 MWh/kWp/yr (89% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

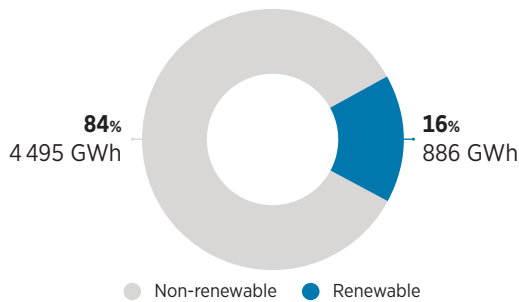
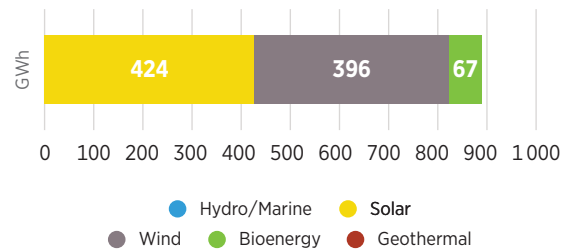


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Senegal**

**Support ongoing**

Capacity building workshops and assessment

<b>1</b>	<b>Work package:</b> Long-term energy planning	<b>Source:</b> Government of Senegal
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2020), IRENA (2024g) Statistical Profiles.



# SERBIA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
06 March 2010 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 27 401.80 (2023) <sup>1</sup>	2021: 4.97 TES/GDP PPP MJ per 2017 USD (5.33% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
6 618 026 (2023) <sup>1</sup>	2023: 3 181.30 MW (114 MW of capacity added from 2022)	46.32 MtCO <sub>2</sub> eq (2020) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

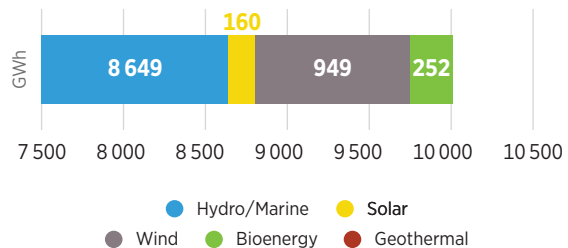
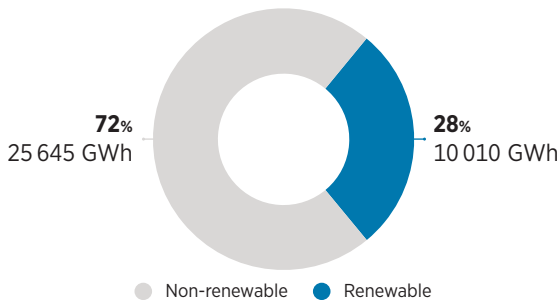
Not specified

### Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (94% area)
- **Wind:** <260 W/m<sup>2</sup> (82% area)  
260-420 W/m<sup>2</sup> (14% area)  
420-560 W/m<sup>2</sup> (2% area)  
560-670 W/m<sup>2</sup> (2% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Serbia

### Support ongoing

Support of developing NDC 3.0 target in alignment with the country's NECP

<b>1</b>	<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of Serbia
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
2 June 2011 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 17 879.24 (2023) <sup>1</sup>	2021: 2.85 TES/GDP PPP MJ per 2017 USD (-0.11% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
119 773 (2023) <sup>1</sup>	2023: 20.22 MW (no capacity added from 2022)	1.34 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

<b>Renewable energy targets in first NDC<sup>4</sup></b>	<b>Resource potential<sup>5</sup></b>
<b>Conditional (by 2030):</b> 15.8 MW of solar	<ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1.6-1.8 MWh/kWp/yr (100% area)</li> <li>• <b>Wind:</b> &lt;260 W/m<sup>2</sup> (53% area) 260-420 W/m<sup>2</sup> (46% area)</li> <li>• <b>Biomass:</b> 6.5 tC/ha/yr</li> </ul>
<b>Unconditional (by 2030):</b> 90 MW of solar	

Figure 1 **Total electricity generation (GWh, %)**

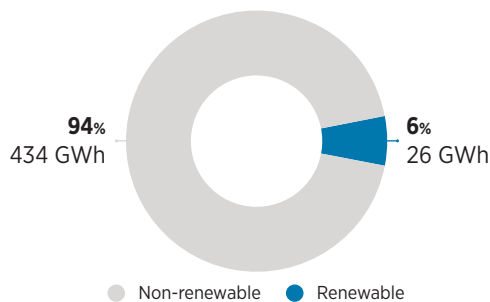
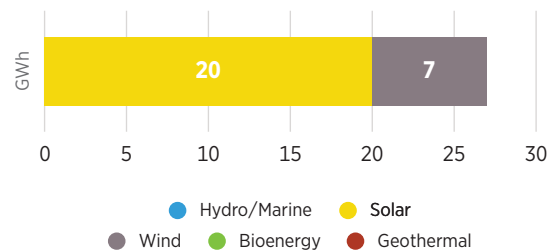


Figure 2 **Renewable generation by technology (GWh)**



**Acknowledgement of IRENA support**

*"The supporting partners assisting Seychelles technically and financially to raise our ambitions by updating mitigation and adaptation targets and broadening the scope of our NDCs to cover a greater part of the economy, are... IRENA..."*

(SEYCHELLES' FIRST [UPDATED] NDC SUBMISSION, 30 JULY 2021)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Seychelles

### Support completed

SolarCity simulator		
<b>1</b>	<b>Work package:</b> Resource assessment	<b>Source:</b> Government of Seychelles
Capacity building on climate investment and financial flows in the energy sector		
<b>2</b>	<b>Work package:</b> Project facilitation	<b>Source:</b> NDC Partnership

### Support ongoing

Development of a technology infrastructure plan to support the decarbonisation of the transport sector using software tools and models		
<b>3</b>	<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> NDC Partnership
Analysis of the grid stability and operation of the national power system for the integration of higher shares of renewable energy using software tools and models		
<b>4</b>	<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> NDC Partnership





<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
25 March 2011 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 433.37 (2023) <sup>1</sup>	2021: 5.49 TES/GDP PPP MJ per 2017 USD (-1.06% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
8 791 092 (2023) <sup>1</sup>	2023: 104.10 MW (no capacity added from 2022)	6.94 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first updated NDC<sup>4</sup>**

Improve energy efficiency and increase access to grid connections by 42% in 2025; increase off-grid mini-grid systems by 27% and solar stand-alone systems by 10% by 2030.

**Resource potential<sup>5</sup>**

- **Solar PV:** <1.2 MWh/kWp/yr (7% area)  
1.2-1.4 MWh/kWp/yr (78% area)  
1.4-1.6 MWh/kWp/yr (16% area)
- **Wind:** <260 W/m<sup>2</sup> (98% area)  
260-420 W/m<sup>2</sup> (5% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

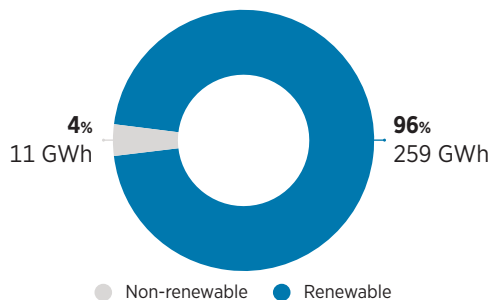
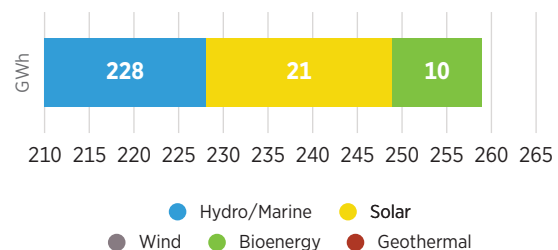


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Sierra Leone**

**Support completed**

Project development and match making support			
<b>1</b>	<table border="1"> <tr> <td><b>Work package:</b> Project facilitation</td> <td><b>Source:</b> Government of Sierra Leone</td> </tr> </table>	<b>Work package:</b> Project facilitation	<b>Source:</b> Government of Sierra Leone
<b>Work package:</b> Project facilitation	<b>Source:</b> Government of Sierra Leone		

**Support ongoing**

Partnership engagement			
<b>2</b>	<table border="1"> <tr> <td><b>Work package:</b> Accelerated Partnership for Renewables in Africa</td> <td><b>Source:</b> Government of Sierra Leone</td> </tr> </table>	<b>Work package:</b> Accelerated Partnership for Renewables in Africa	<b>Source:</b> Government of Sierra Leone
<b>Work package:</b> Accelerated Partnership for Renewables in Africa	<b>Source:</b> Government of Sierra Leone		

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
4 August 2013 COP28 Pledge of Tripling RE and Doubling EE: No status	USD 2 203.18 (2023) <sup>1</sup>	2021: 5.07 TES/GDP PPP MJ per 2017 USD (0.18% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
740 424 (2023) <sup>1</sup>	2023: 5.58 MW (0.36 MW of capacity added from 2022)	0.72 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

**Unconditional (by 2030):**

84 MW of hydropower and 1 250 MW of biodigesters

**Conditional (by 2030):**

Reduce 15 316 Gg of CO<sub>2</sub>eq via hydropower and 179 Gg of CO<sub>2</sub>eq via solar

**Resource potential<sup>5</sup>**

- **Solar PV:** <1.2 MWh/kWp/yr (7% area)  
1.2-1.4 MWh/kWp/yr (78% area)  
1.4-1.6 MWh/kWp/yr (16% area)
- **Wind:** <260 W/m<sup>2</sup> (98% area)  
260-420 W/m<sup>2</sup> (5% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

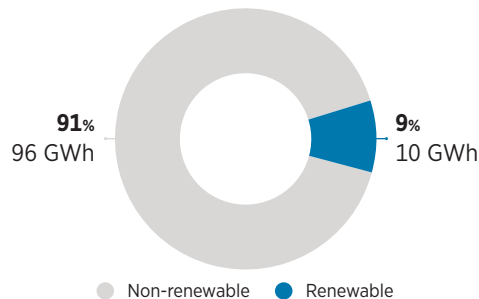
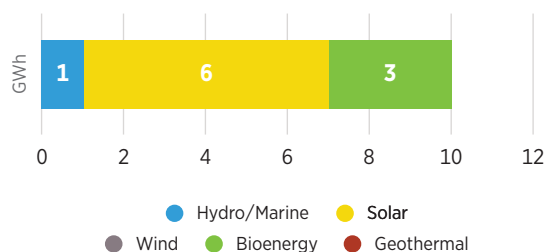


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Solomon Islands**

**Support completed**

SolarCity Simulator	
<b>1</b>	<b>Work package:</b> Resource assessment <b>Source:</b> Government of Solomon Islands
High-level assessment of grid hosting capacity and distribution to accommodate variable renewable energy integration and build the country's capacity for grid assessment studies; establishment of a working model of the electricity system through simulation software training	
<b>2</b>	<b>Work package:</b> Technology and infrastructure technical analysis <b>Source:</b> Government of Solomon Islands
Readiness assessment of the energy sector	
<b>3</b>	<b>Work package:</b> Renewables readiness assessment <b>Source:</b> Government of Solomon Islands

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.





<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
18 June 2011 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 643.75 (2023) <sup>1</sup>	2021: 6.57 TES/GDP PPP MJ per 2017 USD (0.57% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
18 143 378 (2023) <sup>1</sup>	2023: 54.09 MW (4 MW of capacity added from 2022)	32.50 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

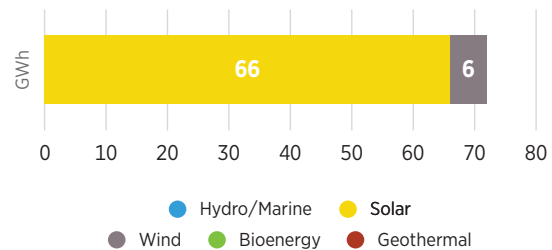
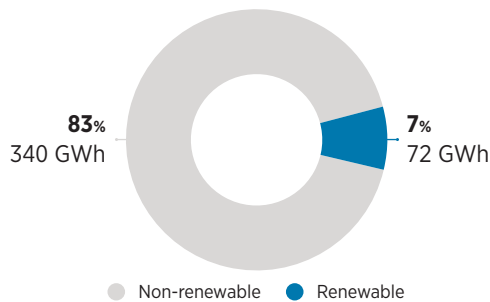
Does not include quantifiable renewable energy targets

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (36% area)  
1.8-1.9 MWh/kWp/yr (40% area)  
1.9-2.0 MWh/kWp/yr (23% area)
- **Wind:** <260 W/m<sup>2</sup> (48% area)  
260-420 W/m<sup>2</sup> (38% area)  
420-560 W/m<sup>2</sup> (10% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Somalia**

**Support ongoing**

<sup>1</sup> The Renewables Readiness Assessment (RRA) explores five main themes: national energy policy and strategy; institutions and markets; resources and technologies; business and financing models; and human and institutional capacity needed to scale up renewables. Through the RRA multi-stakeholder engagement process, the support intends to improve the enabling conditions for deploying renewables

<b>Work package:</b> Renewables readiness assessment	<b>Source:</b> Government of Somalia
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# SOUTH AFRICA

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
30 December 2010 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 6 253.16 (2023) <sup>1</sup>	2021: 6.57 TES/GDP PPP MJ per 2017 USD (4.88% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
60 414 495 (2023) <sup>1</sup>	2023: 10 622.57 MW (117 MW of capacity added from 2022)	522.12 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

By 2030, produce 39.7% of electricity from renewable sources, including:  
 17 742 MW of wind  
 8 288 MW of solar  
 4 600 MW of hydropower  
 600 MW of CSP

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (17% area)  
 1.6-1.8 MWh/kWp/yr (25% area)  
 1.8-1.9 MWh/kWp/yr (29% area)  
 1.9-2.0 MWh/kWp/yr (32% area)  
 >2.0 MWh/kWp/yr (3% area)
- **Wind:** <260 W/m<sup>2</sup> (67% area)  
 260-420 W/m<sup>2</sup> (18% area)
- **Biomass:** 4.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

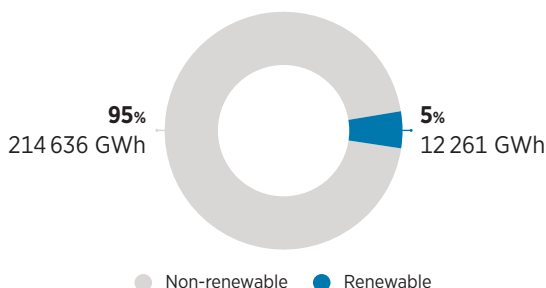
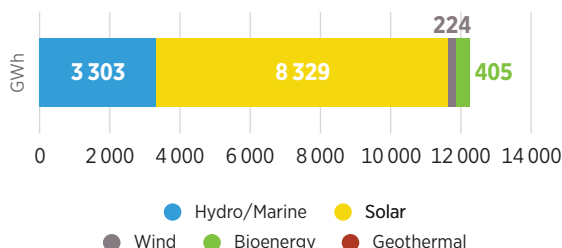


Figure 2 **Renewable generation by technology (GWh)**



### Acknowledgement of IRENA support

*"We are also very grateful to the support and advice provided by IRENA in the use of their FlexTool in the technical analysis below."*

(TECHNICAL ANALYSIS TO SUPPORT THE UPDATE OF SOUTH AFRICA'S FIRST NDC'S MITIGATION TARGET RANGES, APRIL 2021)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in South Africa

### Support completed

1 Technical inputs from the FlexTool programme to assess the adequacy and flexibility of a more ambitious power expansion plan

**Work package:**  
Power system flexibility

**Source:**  
Government of South Africa

### Support ongoing

NDC 3.0 development support

2 **Work package:**  
Technology and infrastructure technical analysis

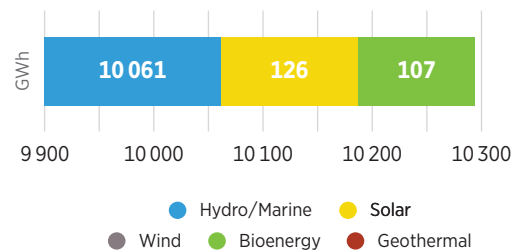
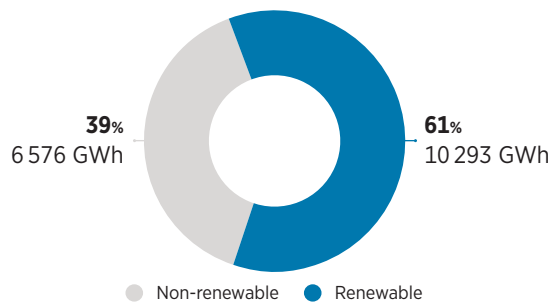
**Source:**  
Government of South Africa



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
18 June 2011 COP28 Pledge of Tripling RE and Doubling EE: No status	USD 2 272.49 (2023) <sup>1</sup>	2021: 4.83 TES/GDP PPP MJ per 2017 USD (-4.73% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
48 109 006 (2023) <sup>1</sup>	2023: 1 870.86 MW (no capacity added from 2022)	138.74 MtCO <sub>2</sub> eq (2023) <sup>3</sup>
<b>Renewable energy targets in first NDC<sup>4</sup></b>	<b>Resource potential<sup>5</sup></b>	
Utility-scale grid-connected solar and wind power plants; mini-grids for the residential, agricultural and industrial sectors; hydropower plant rehabilitation; energy-efficient appliances in the residential sector	<ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1.6-1.8 MWh/kWp/yr (36% area) 1.8-1.9 MWh/kWp/yr (40% area) 1.9-2.0 MWh/kWp/yr (23% area)</li> <li>• <b>Wind:</b> &lt;260 W/m<sup>2</sup> (48% area); 260-420 W/m<sup>2</sup> (38% area); 420-560 W/m<sup>2</sup> (10% area)</li> <li>• <b>Biomass:</b> 0.5 tC/ha/yr</li> </ul>	

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Sudan

### Support completed

- Enhancement of ambition and other requirements for a good NDC specific to Sudan's circumstances; much more work is required, particularly country- and regional-specific data. Capacity building of the sector's institutions is needed to generate the data and information required for NDC work

<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
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- Capacity building support on the design of auctions following a framework that classifies design elements according to auction demand (e.g. product, technology and volume auctioned). Capacity building support on Open Solar Contracts to empower the government with the practical skills to use these contracts in the procurement of affordable solar power

<b>Work package:</b> Capacity building on policy and finance	<b>Source:</b> NDC Partnership
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### Support ongoing

Support is currently under discussion

<sup>1,2,3,4,5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.



# UNITED REPUBLIC OF TANZANIA

LDC

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
28 August 2024 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 3 972.60 (2023) <sup>1</sup>	2021: 6.38 TES/GDP PPP MJ per 2017 USD (1.00% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
67 438 106 (2023) <sup>1</sup>	2023: 686.73 MW (no capacity added from 2022)	89.82 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

By 2030, 42% renewables in gross final energy consumption. For transport, achieve 10% biofuel consumption in 2020, 10% in 2025 and 10% in 2030, as compared to 3.55% in 2015

### Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (44% area)  
1.6-1.8 MWh/kWp/yr (51% area)  
1.8-1.9 MWh/kWp/yr (4% area)
- **Wind:** <260 W/m<sup>2</sup> (96% area)  
260-420 W/m<sup>2</sup> (4% area)
- **Biomass:** 6.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

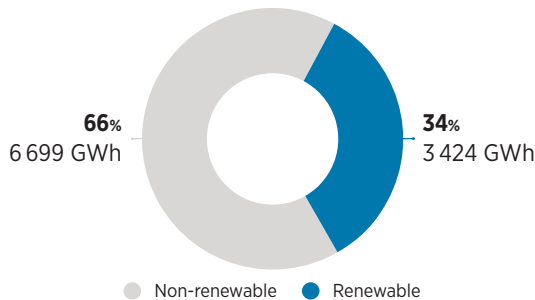
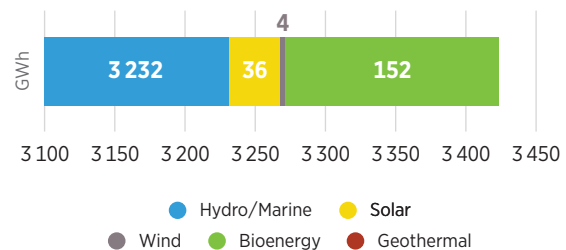


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Tanzania

### Support ongoing

Support of developing NDC 3.0 target in alignment with the country's NECP

<b>1</b>	<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of Albania
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
6 March 2010 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 4 681.68 (2022) <sup>1</sup>	2021: 4.65 TES/GDP PPP MJ per 2017 USD (-3.80% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
107 773 (2023) <sup>1</sup>	2023: 16.50 MW (1 MW of capacity added from 2022)	0.34 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in the enhanced or second NDC<sup>4</sup>**

By 2030, achieve a 3% (16 Gg) reduction in greenhouse gas emissions from the energy sector and 70% renewable electricity through solar, wind and battery storage

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (100% area)
- **Wind:** <260 W/m<sup>2</sup> (10% area)  
260-420 W/m<sup>2</sup> (80% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

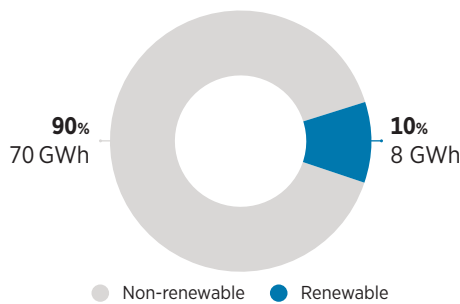
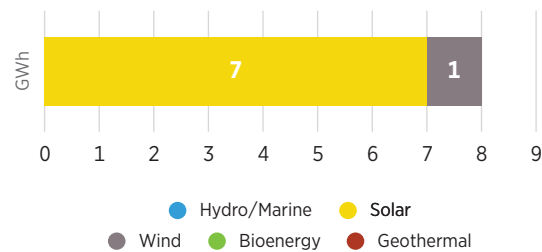


Figure 2 **Renewable generation by technology (GWh)**



<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Tonga

### Support completed

1 Capacity building trainings on forestry inventory, greenhouse gas inventory system set-up and the information necessary for clarity, transparency and understanding. Support for data collection and collation to inform the defining of the adaptation goal and target and refining of sub-sector emission reduction targets for agriculture, energy, transport and waste. Strengthening and adding sectoral greenhouse gas reduction targets and sectoral non-greenhouse gas targets. Aligning NDC targets with the country's long-term strategies (LTS)

<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
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2 Support for data collection and collation to inform the defining of the adaptation target/goal and refining of sub-sector emission reduction targets for agriculture, energy, transport and waste

<b>Work package:</b> Data and statistics	<b>Source:</b> Government of Tonga
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3 Strengthening and adding sectoral greenhouse gas reduction targets and sectoral non-greenhouse gas targets. Aligning NDC targets with Tonga's LT-LEDS

<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
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4 Energy surveys for NDC implementation roadmaps

<b>Work package:</b> Data and statistics	<b>Source:</b> Government of Tonga
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# TÜRKIYE

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
1 April 2012 <b>COP28 Pledge of Tripling RE and Doubling EE: No status</b>	USD 12 985.75 (2023) <sup>1</sup>	2021: 2.48 TES/GDP PPP MJ per 2017 USD (2.63% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
85 326 000 (2023) <sup>1</sup>	2023: 58 461.69 MW (2 516 MW of capacity added from 2022)	606.43 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first updated NDC<sup>4</sup>

Increase renewable energy sources in primary energy consumption to 20.4% by 2030. By 2030, achieve around 33 GW of solar-installed power capacity, 18 GW of wind installed power capacity and 35 GW of hydropower installed capacity

### Resource potential<sup>5</sup>

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (17% area)  
1.4-1.6 MWh/kWp/yr (45% area)  
1.6-1.8 MWh/kWp/yr (37% area)
- **Wind:** <260 W/m<sup>2</sup> (82% area)  
260-420 W/m<sup>2</sup> (10% area)
- **Biomass:** 3.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

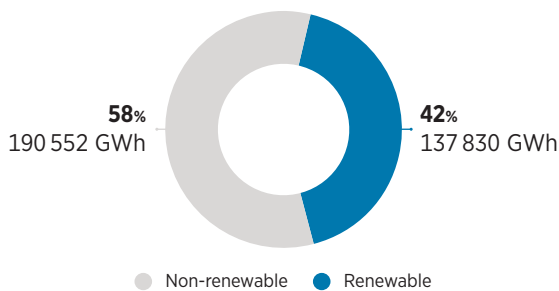
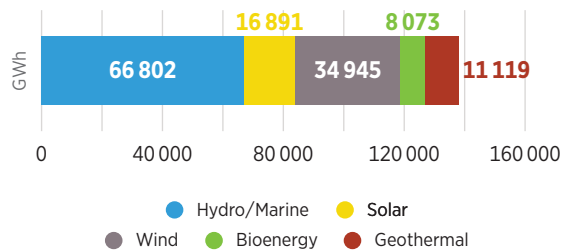


Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Türkiye

### Support ongoing

Solar City simulator	
<b>1</b>	<p><b>Work package:</b> Resource assessment</p> <p><b>Source:</b> Government of Türkiye</p>
Overview of Türkiye's finance and policy landscape and the barriers affecting solar PV and solar thermal investments at the municipal level	
<b>2</b>	<p><b>Work package:</b> Resource assessment</p> <p><b>Source:</b> Government of Türkiye</p>

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.





<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
17 May 2012 COP28 Pledge of Tripling RE and Doubling EE: No status	USD 1 014.21 (2023) <sup>1</sup>	2021: 10.20 TES/GDP PPP MJ per 2017 USD (4.91% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
48 582 334 (2023) <sup>1</sup>	2023: 1 223.70 MW (0.16 MW of capacity added from 2022)	53.37 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

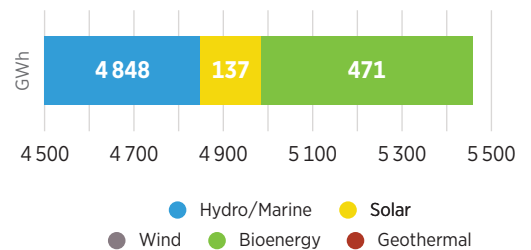
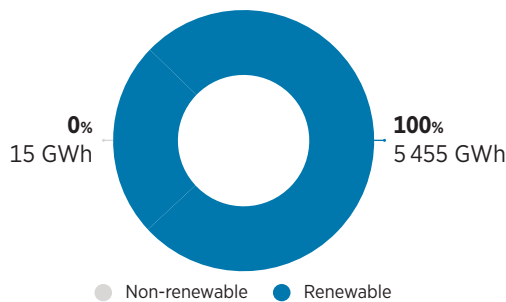
By 2030, promote use of renewable energy sources and energy-efficient technologies to reach 4 200 MW, aligning with the third National Development Plan

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (47% area)  
1.6-1.8 MWh/kWp/yr (52% area)
- **Wind:** <260 W/m<sup>2</sup> (100% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Uganda**

**Support ongoing**

- 1 Data collection and collation to inform the defining of the adaptation target/goal and refining of sub-sector emission reduction targets for agriculture, energy, transport and waste. Includes: conduct energy data audit, analyse results, identify gaps and prepare activities to bridge the gaps; train NDC stakeholders in the analysis of energy statistics, including their use for appraising and setting targets; support NDC stakeholders in the identification, appraisal and refinement of energy-related targets, including contribution to and/or peer review of the revised NDC

<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
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**Acknowledgement of IRENA support**

*“On behalf of the Ministry of Water and Environment, I wish to take this opportunity to thank all the partners and stakeholders involved in the NDC update process for their technical and financial support. These include ... the International Renewable Energy Agency (IRENA).”*

(UGANDA’S FIRST [UPDATED] NDC SUBMISSION, 12 SEPTEMBER 2022)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.



# UKRAINE

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
24 February 2018 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 5 181.36 (2023) <sup>1</sup>	2021: 6.89 TES/GDP PPP MJ per 2017 USD (1.29% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
37 000 000 (2023) <sup>1</sup>	2023: 14 612.20 MW (309 MW of capacity reduced from 2022)	216.09 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

## Renewable energy targets in first NDC<sup>4</sup>

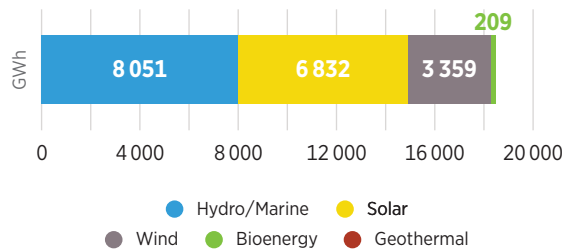
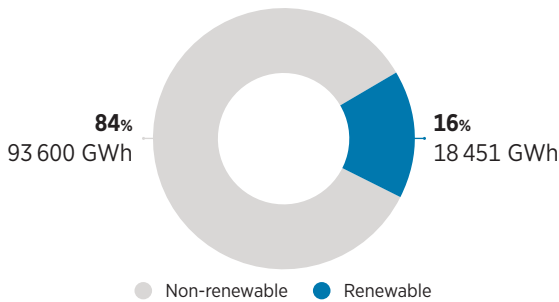
Does not include quantifiable renewable energy targets

## Resource potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (17% area)  
1.6-1.8 MWh/kWp/yr (76% area)
- **Wind:** <260 W/m<sup>2</sup> (10% area)  
420-560 W/m<sup>2</sup> (80% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Ukraine

### Support completed

Project development and match making support

<b>1</b>	<b>Work package:</b> Project facilitation	<b>Source:</b> -
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### Support ongoing

Support of alignment of NDC and NECP

<b>2</b>	<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of Ukraine
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



# UNITED ARAB EMIRATES

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
18 July 2009 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 52 976.81 (2023) <sup>1</sup>	2021: 5.48 TES/GDP PPP MJ per 2017 USD (-3.63% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
9 516 871 (2023) <sup>1</sup>	2023: 6 052.50 MW (2 455 MW of capacity added from 2022)	267.82 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

## Renewable energy targets in NDC 3.0<sup>4</sup>

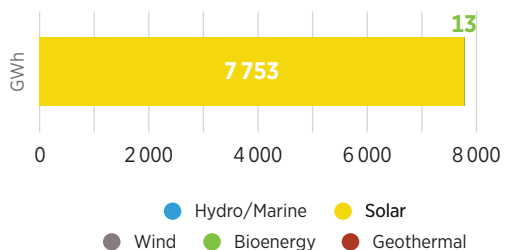
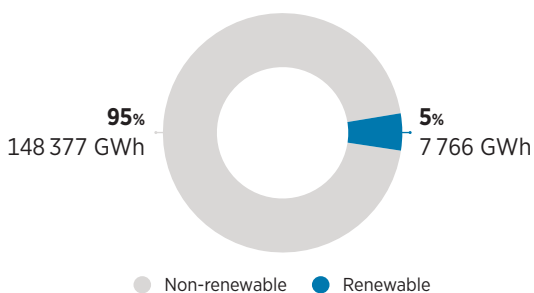
More than 50% reduction in emissions from the power and water sector by 2035 relative to 2019 levels; More efficient grid emissions coefficient than 0.243 tCO<sub>2</sub>eq/MWh.

## Resource potential<sup>5</sup>

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (10% area)  
1.8-1.9 MWh/kWp/yr (95% area)
- **Wind:** <260 W/m<sup>2</sup> (80% area)  
260-420 W/m<sup>2</sup> (18% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in United Arab Emirates

### Support ongoing

Technical backstopping for NDC and transparency report development

<b>1</b>	<b>Work package:</b> NDC advice and review	<b>Source:</b> Government of UAE
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### Acknowledgement of IRENA support

*"In furthering bilateral and multilateral collaboration on technology development and deployment, the UAE has championed infrastructure and energy projects. These efforts have been pursued through formal channels including, but not limited to, the UAE-Pacific Partnership Facility for Pacific island countries, the UAE-Caribbean Renewable Energy Fund, and the joint project facility by IRENA and Abu Dhabi Fund for Development that supports renewable energy projects in developing countries."*

(UNITED ARAB EMIRATES' SECOND NDC, 29 DECEMBER 2020)

<sup>1,2,3,4,5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2024), IRENA (2024g) Statistical Profiles.



# REPUBLIC OF URUGUAY

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
28 August 2011 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 22 564.53 (2023) <sup>1</sup>	2021: 2.94 TES/GDP PPP MJ per 2017 USD (-1.93% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
3 423 108 (2023) <sup>1</sup>	2023: 4 088.56 MW (330 MW of capacity added from 2022)	41.63 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

## Renewable energy targets in second NDC<sup>4</sup>

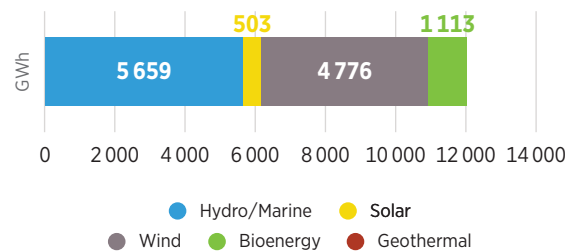
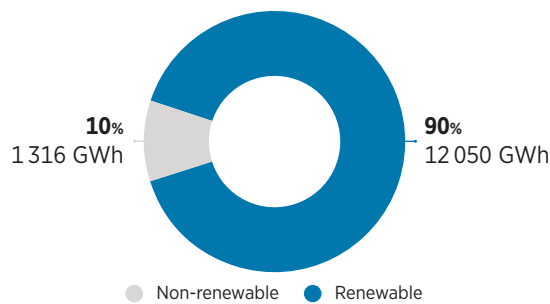
Achieve renewable energy shares of 58% of the global primary energy mix and 94% of electricity generation by 2020

## Resource Potential<sup>5</sup>

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (100% area)
- **Wind:** <260 W/m<sup>2</sup> (97% area)  
260-420 W/m<sup>2</sup> (5% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



## IRENA climate action engagement in Uruguay

### Support completed

- Technical inputs from the FlexTool programme to assess the adequacy and flexibility of a more ambitious power expansion plan

<b>Work package:</b> Power system flexibility	<b>Source:</b> NDC Partnership
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- Technical report with references to relevant existing published work that supports biomass gasification for production of hydrogen and methanol

<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> NDC Partnership
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
24 August 2017 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 2 496.11 (2023) <sup>1</sup>	2021: 7.55 TES/GDP PPP MJ per 2017 USD (-1.07% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
36 412 350 (2023) <sup>1</sup>	2023: 2 668.45 MW (190 MW of capacity added from 2022)	214.53 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

Increase renewables to 25% of total power generation; install a total capacity of 10 GW, including 5 GW of solar, 3 GW of wind and 1.9 GW of hydropower plants

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.2-1.4 MWh/kWp/yr (10% area)  
1.4-1.6 MWh/kWp/yr (90% area)
- **Wind:** <260 W/m<sup>2</sup> (25% area)  
260-420 W/m<sup>2</sup> (58% area)  
420-560 W/m<sup>2</sup> (15% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

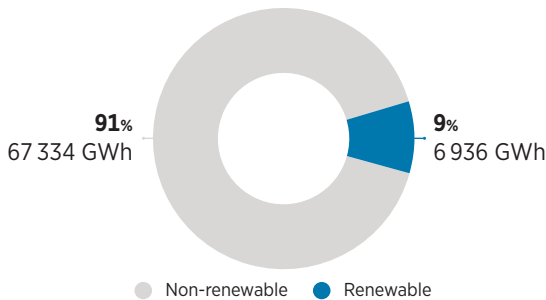
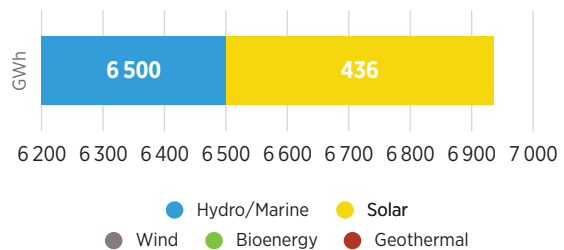


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Uzbekistan**

**Support completed**

Solar City simulator	
<b>1</b>	<b>Work package:</b> Resource assessment <b>Source:</b> UNDP
Support for development of bankable projects	
<b>2</b>	<b>Work package:</b> Project facilitation <b>Source:</b> Government of Uzbekistan

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
1 March 2013 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 3 367.09 (2023) <sup>1</sup>	2021: 5.17 TES/GDP PPP MJ per 2017 USD (-4.15% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
334 506 (2023) <sup>1</sup>	2023: 12.47 MW (0.41 MW of capacity added from 2022)	0.67 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in updated first NDC<sup>4</sup>**

Transition to near-100% renewable electricity generation; grid-connected targets for renewable generation of 11.69% by 2010, 50% by 2025 and 100% by 2030; and other targets

**Resource potential<sup>5</sup>**

- **Solar PV:** <1.2 MWh/kWp/yr (10% area)  
1.2-1.4 MWh/kWp/yr (47% area)  
1.4-1.6 MWh/kWp/yr (42% area)
- **Wind:** <260 W/m<sup>2</sup> (76% area)  
260-420 W/m<sup>2</sup> (18% area)  
420-560 W/m<sup>2</sup> (5% area)  
670-820 W/m<sup>2</sup> (2% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

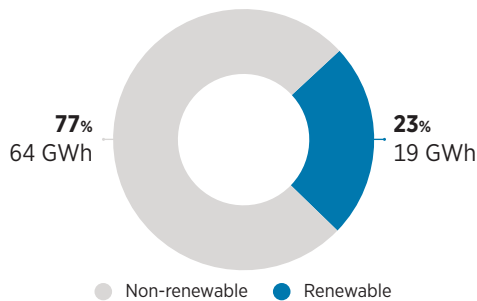
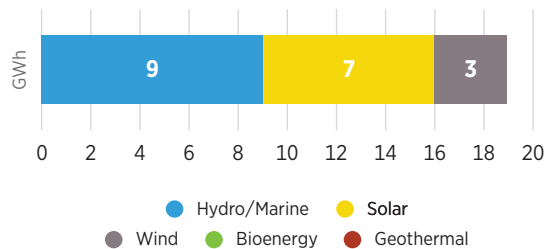


Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Vanuatu**

**Support ongoing**

1 Technical grid assessment of the stability of the grid to provide a path to reduce power generation's reliance on fossil fuels

<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> Government of Vanuatu
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<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2022), IRENA (2024g) Statistical Profiles.



# REPUBLIC OF ZAMBIA

LDC/LLDC

<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
22 June 2013 COP28 Pledge of Tripling RE and Doubling EE: Endorsed	USD 1 369.13 (2023) <sup>1</sup>	2021: 7.82 TES/GDP PPP MJ per 2017 USD (0.75% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
20 569 737 (2023) <sup>1</sup>	2023: 3 332.12 MW (35 MW of capacity added from 2022)	30.48 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

### Renewable energy targets in first NDC<sup>4</sup>

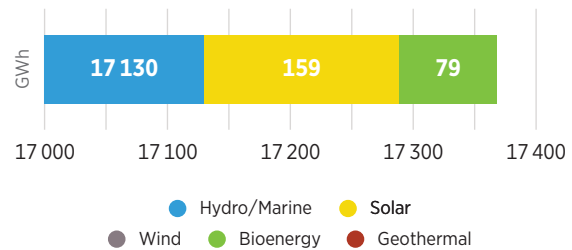
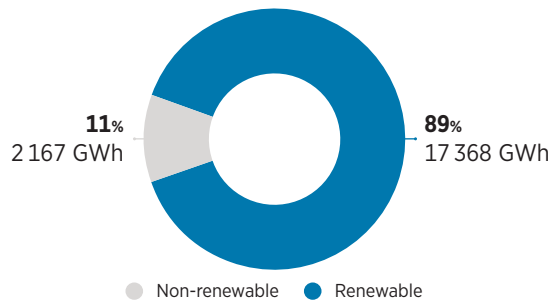
By 2030, achieve 30% renewables in the electricity generation mix (excluding large hydropower)

### Resource potential<sup>5</sup>

- **Solar PV:** 1.6-1.8 MWh/kWp/yr (95% area)  
1.8-1.9 MWh/kWp/yr (8% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 2.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.

## IRENA climate action engagement in Zambia

### Support completed

Strengthen MRV system data collection, greenhouse gas projections analysis, and alignment of target with respective sector policies, strategies and plans. Integration of the NDC MRV system with the Central Statistics Office for national reporting and communication of projections

1

<b>Work package:</b> Monitoring, reporting and verification (MRV)	<b>Source:</b> NDC Partnership
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Integrate the NDC MRV system with the Central Statistics Office for national reporting and communication of projections

2

<b>Work package:</b> Monitoring, reporting and verification (MRV)	<b>Source:</b> NDC Partnership
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Capacity building to data providers and establishment of data sharing platforms for quality assurance

3

<b>Work package:</b> Data and statistics	<b>Source:</b> NDC Partnership
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Project development and match making support

4

<b>Work package:</b> Project facilitation	<b>Source:</b> -
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Capacity building of bioenergy

5

<b>Work package:</b> Capacity building of policy and finance	<b>Source:</b> Government of Zambia
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<b>Membership since</b>	<b>GDP per capita</b>	<b>Energy intensity</b>
17 September 2014 <b>COP28 Pledge of Tripling RE and Doubling EE: Endorsed</b>	USD 1 592.42 (2023) <sup>1</sup>	2021: 14.77 TES/GDP PPP MJ per 2017 USD (1.83% improvement from 2020) <sup>2</sup>
<b>Population</b>	<b>Renewable power</b>	<b>Total greenhouse gas emissions</b>
16 665 409 (2023) <sup>1</sup>	2023: 1 220.96 MW (no capacity added from 2022)	31.02 MtCO <sub>2</sub> eq (2023) <sup>3</sup>

**Renewable energy targets in first NDC<sup>4</sup>**

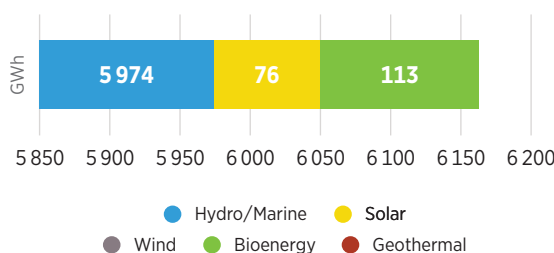
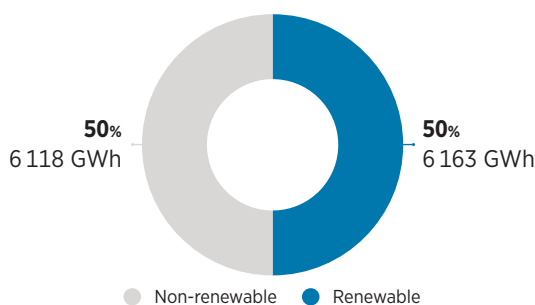
Increase electricity demand 16.5% by 2025 and 26.5% by 2030, corresponding to 2 100 MW of renewable energy capacity, including: 1 575 MW of solar, 275 MW of bioenergy, 150 MW of small hydropower, 100 MW of wind, 8 000 biodigesters and 288 institutional biodigesters

**Resource potential<sup>5</sup>**

- **Solar PV:** 1.4-1.6 MWh/kWp/yr (3% area)  
1.6-1.8 MWh/kWp/yr (75% area)  
1.8-1.9 MWh/kWp/yr (25% area)
- **Wind:** <260 W/m<sup>2</sup> (98% area)  
260-420 W/m<sup>2</sup> (3% area)
- **Biomass:** 2.5 tC/ha/yr

Figure 1 **Total electricity generation (GWh, %)**

Figure 2 **Renewable generation by technology (GWh)**



**IRENA climate action engagement in Zimbabwe**

**Support completed**

Technical report referencing existing published works and providing support to the comparative analysis of energy scenarios to inform the country’s NDC enhancement process

1

<b>Work package:</b> Technology and infrastructure technical analysis	<b>Source:</b> NDC Partnership
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**Acknowledgement of IRENA support**

*“Zimbabwe’s Revised NDC Report was developed under the auspices of the ... International Renewable Energy Agency (IRENA). The Government of Zimbabwe (GOZ) would like to thank these organisations for their support in delivering Zimbabwe’s revised Nationally Determined Contribution (NDC).”*

(ZIMBABWE’S FIRST [UPDATED] NDC SUBMISSION, 24 SEPTEMBER 2021)

<sup>1, 2, 3, 4, 5</sup> World Bank national account data, ESMAP (2024) SDG 7.3 Energy Efficiency Dataset, Emissions Database for Global Atmospheric Research, Nationally Determined Contribution (2021), IRENA (2024g) Statistical Profiles.



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