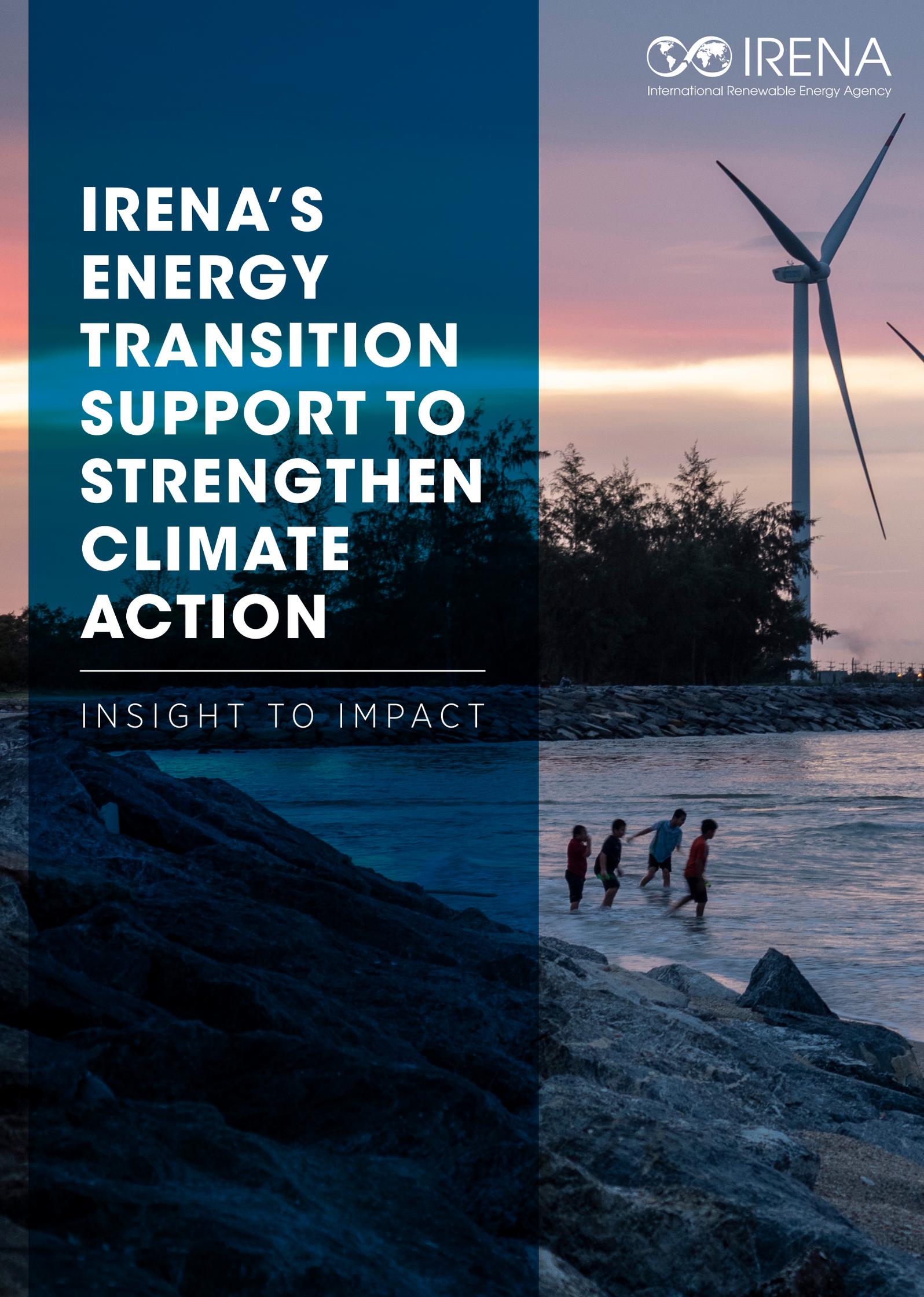


# IRENA'S ENERGY TRANSITION SUPPORT TO STRENGTHEN CLIMATE ACTION

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INSIGHT TO IMPACT



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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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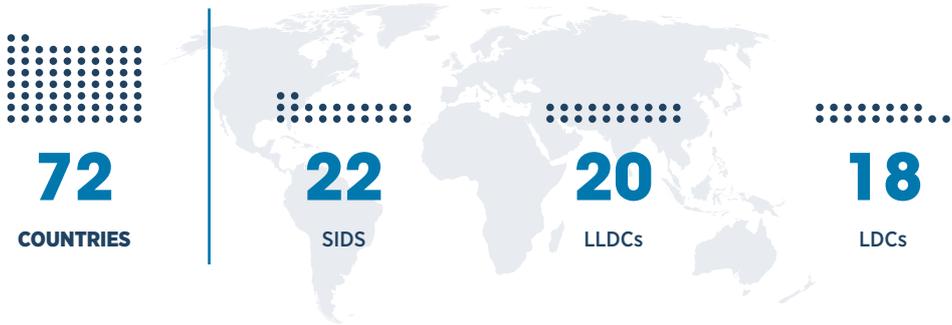
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# ABBREVIATIONS

|                        |   |
|------------------------|---|
| <b>AOSIS</b>           | Alliance of Small Island States                                 |
| <b>AVRIL</b>           | Addressing variable renewables in long-term planning            |
| <b>CAEP</b>            | Climate Action Enhancement Package                              |
| <b>CIP</b>             | Climate Investment Platform                                     |
| <b>CO<sub>2</sub>e</b> | Carbon dioxide equivalent                                       |
| <b>COP26</b>           | Twenty-sixth meeting of the Conference of Parties to the UNFCCC |
| <b>ETF</b>             | Enhanced Transparency Framework                                 |
| <b>EU</b>              | European Union  |
| <b>EU TAF</b>          | European Union's Technical Assistance Facility (EU TAF)         |
| <b>GHG</b>             | Greenhouse gas  |
| <b>GCF</b>             | Green Climate Fund  |
| <b>ICTU</b>            | Information, clarity, transparency and understanding            |
| <b>IRENA</b>           | International Renewable Energy Agency                           |
| <b>LDC</b>             | Least Developed Countries                                       |
| <b>LLDC</b>            | Landlocked Developing Countries                                 |
| <b>LT LEDS</b>         | Long-term, low greenhouse gas emission development strategy     |
| <b>LTS</b>             | Long-term strategy  |
| <b>MRV</b>             | Monitoring, Reporting and Verification                          |
| <b>NDC</b>             | Nationally Determined Contribution                              |
| <b>NDCP</b>            | NDC Partnership   |
| <b>PV</b>              | Photovoltaic  |
| <b>RCC</b>             | Regional Collaboration Centre                                   |
| <b>REmap</b>           | Renewable energy roadmap  |
| <b>REO</b>             | Renewable energy outlook  |
| <b>SIDS</b>            | Small Island Developing States                                  |
| <b>SPLAT</b>           | System planning test  |
| <b>UNDP</b>            | United Nations Development Programme                            |
| <b>UNFCCC</b>          | United Nations Framework Convention on Climate Change           |
| <b>WETO</b>            | World Energy Transition Outlook                                 |

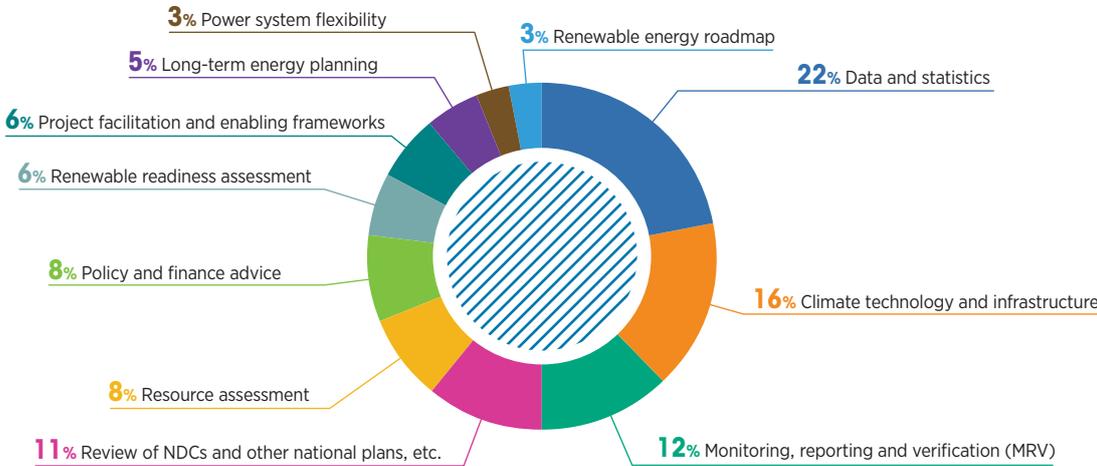
# EXECUTIVE SUMMARY

IRENA has been engaging with 72 Parties of the 2015 Paris Agreement to support their efforts to enhance their climate pledges and implement the existing climate action plan through the energy transition. This engagement covers a total population of around 1.8 billion people with a carbon footprint of 3.2 billion tonnes of carbon dioxide equivalent.



IRENA has a vast body of knowledge and expertise in different facets of the energy transition and, upon request, provides Parties with substantive input for enhancing and implementing their Nationally Determined Contributions (NDCs) towards reducing emissions under the Paris Agreement. IRENA’s dedicated work packages offer a unique opportunity to countries as they update their energy transition targets and implementation plans (Figure 1), and the agency also supports countries in implementing projects on the ground.

Figure 1 **Distribution of IRENA work packages (%)**



IRENA's outreach spans all continents, engaging with Parties from nearly all of the regional groupings of the United Nations Framework Convention on Climate Change (UNFCCC) (Table 1). Based on the needs of Parties, IRENA offers support across all facets of the energy transition driven by renewable energy technologies.

Table 1 **IRENA engagement across different UNFCCC regional groupings**

| UNFCCC regional grouping        | Number of parties engaged | Number of work packages |
|---------------------------------|---------------------------|-------------------------|
| Africa                          | 22                        | 39                      |
| Asia and the Pacific            | 23                        | 38                      |
| Europe (mainly Eastern Europe)  | 6                         | 15                      |
| Latin America and the Caribbean | 21                        | 52                      |
| <b>TOTAL</b>                    | <b>72</b>                 | <b>144</b>              |

IRENA leverages its near-universal membership to engage with Parties to the Paris Agreement and offer support on climate action. This support initiative is strengthened through the agency's institutional partnerships with several other development partners and agencies.



As the lead inter-governmental agency on the energy transition, IRENA will continue to engage with the Parties to the Paris Agreement and support them in implementing their climate action plans through greater deployment of renewables and decarbonisation technologies. IRENA will extend its support to Parties in setting up their long-term strategies (LTS) through analytical work and capacity building. The agency will also support Parties in project facilitation and development through mobilising finance, engaging in matchmaking and enhancing capacity on project development.

***"Climate change is an existential threat and there is a need to take appropriate and timely actions to mitigate and adapt to the impacts of the change... Energy sector remains the most important sector that can be transformed through accelerated adoption of renewable energy. IRENA as a lead intergovernmental agency on energy transition is supporting several G77 member countries achieving mitigation commitments through renewable energy."***

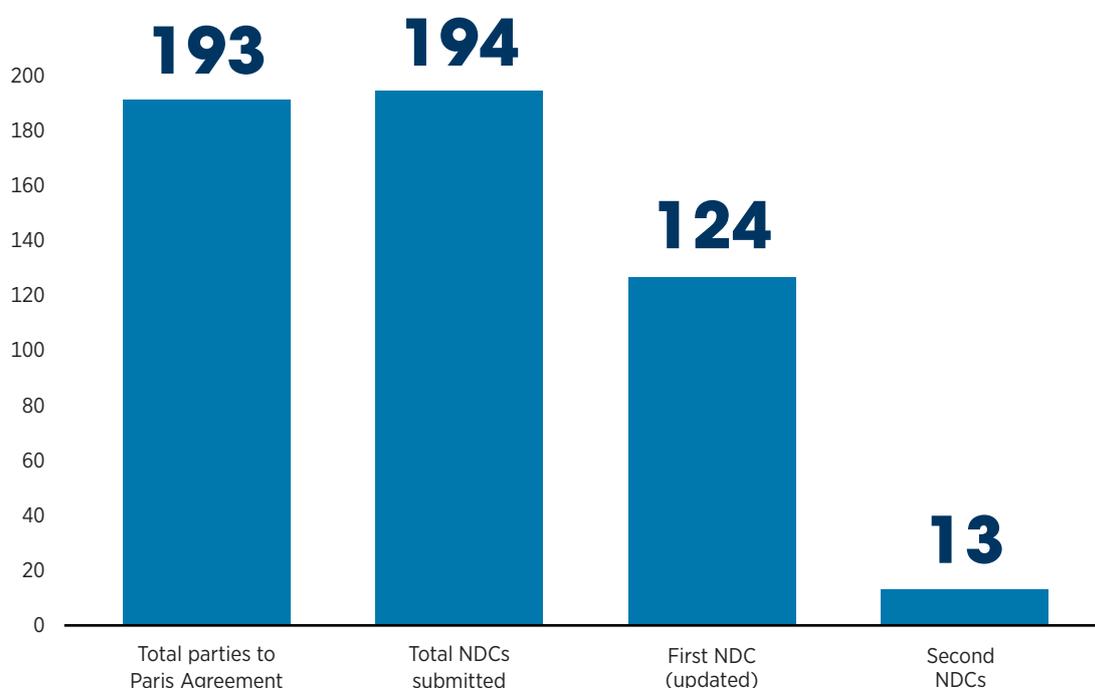
H.E. MR. AHMADOU SEBORY TOURE, REPUBLIC OF GUINEA, PRESIDENT OF G77 & CHINA

# ENERGY TRANSITION AS A KEY DRIVER FOR CLIMATE ACTION

Parties to the Paris Agreement of the United Nations Framework Convention on Climate Change (UNFCCC) are increasingly updating and enhancing their climate pledges towards reducing greenhouse gas emissions to mitigate climate change. The current round of Nationally Determined Contributions (NDCs), updated prior to the 26th Conference of the Parties to the UNFCCC (COP26), will define the pathway that the world will take towards enhanced climate action and net zero emissions.

The analysis of the total 194 NDCs submitted by Parties of the Paris Agreement, including Eritrea and Iraq, shows that 124 new or updated NDCs have been submitted to UNFCCC, as of 02 November 2021<sup>1</sup> (Figure 2).

Figure 2 **Total NDCs submitted to the UNFCCC**



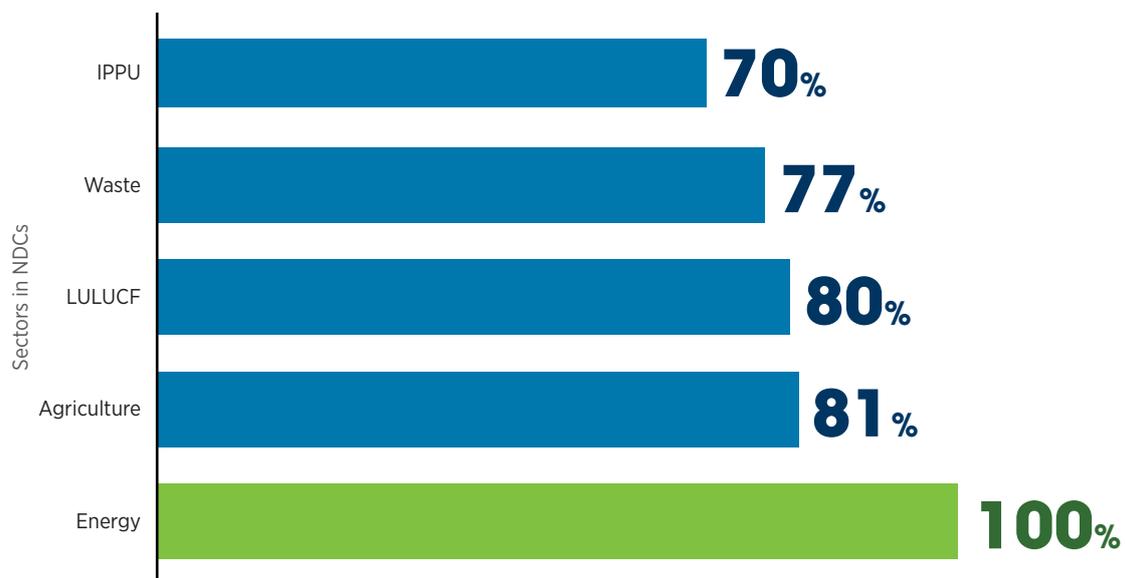
Source: UNFCCC NDC Registry (by 02 November 2021)

<sup>1</sup> UNFCCC NDC Synthesis Report (update), November 2021.

The NDC Synthesis Report released by UNFCCC presents an overview of cumulative climate pledges in the NDCs submitted to UNFCCC. The report projects that if all NDCs are implemented, the total global greenhouse gas emissions in 2030 would range from 50.8 gigatonnes to 56.9 gigatonnes of CO<sub>2</sub> equivalent. This would result in emission levels that are around 59% higher than 1990 levels, 13.7% higher than 2010 levels and 5% higher than 2019 levels<sup>2</sup>. To achieve the Paris Agreement goal of limiting the rise in global mean temperature to 1.5 degrees Celsius, emissions would need to be reduced by around 45% from the 2010 level by 2030, with the aim of reaching net zero emissions by 2050.

Transitioning to a low-carbon energy sector remains key to climate neutrality and to mitigating climate change. The energy sector currently contributes more than two-thirds of total global greenhouse gas emissions, and significant efforts are needed to reduce the sector's carbon footprint and to achieve carbon neutrality by mid-century. Analysis of the latest NDC submissions indicates that all of the NDCs submitted by Parties mention the energy sector as a key area for climate action (Figure 3).

Figure 3 **Sectors in updated NDCs submitted to the UNFCCC**



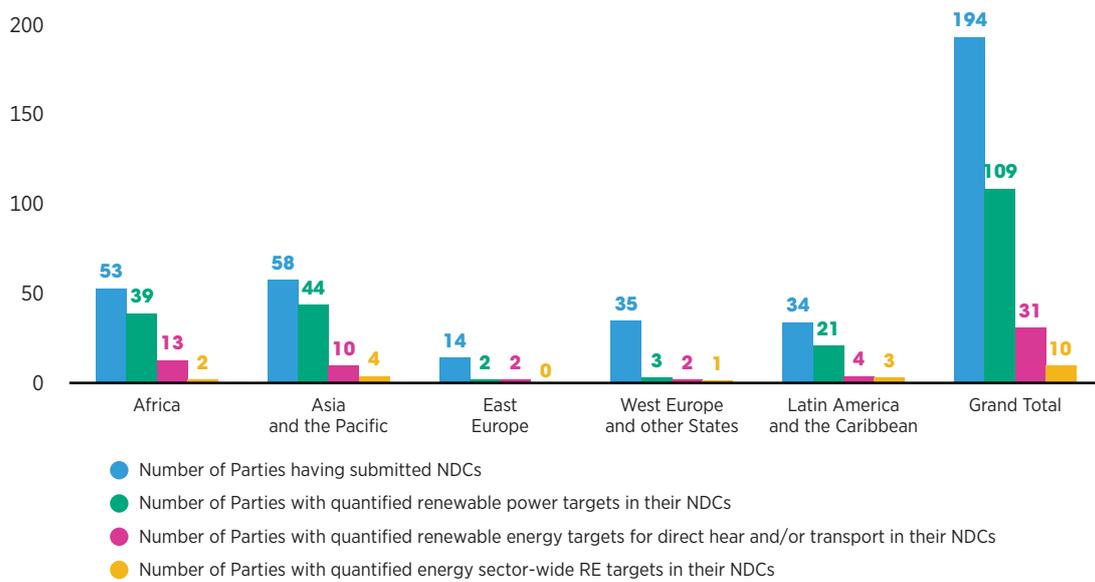
Note: IPPU = Industrial processes and product use; LULUCF = Land use, land-use change and forestry

Source: UNFCCC NDC Synthesis Report, October 2021

Renewable energy remains a key option for achieving energy sector climate goals. IRENA analysis of total submitted NDCs found out that out of total 194 NDCs submitted to UNFCCC, 143 parties mentioned quantified renewable energy targets in their NDCs. This includes 109 NDCs with quantified renewable energy based power targets. Parties have also been considering renewable energy to deploy in end-use sectors. 31 NDCs mentioned quantified renewable energy targets for direct heat and/or transport sector, while 10 parties have energy sector-wide quantified renewable energy targets in their NDCs.

2 UNFCCC NDC Synthesis Report, September 2021

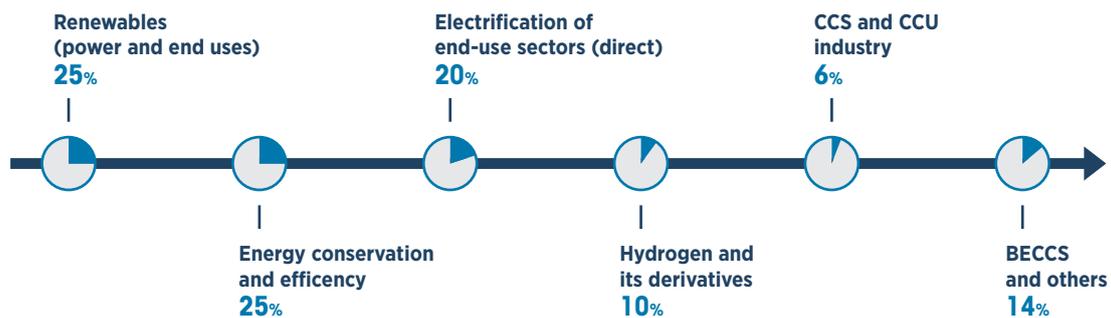
Figure 4 Energy in updated NDCs submitted to the UNFCCC



Source: IRENA analysis (by 28 Oct 2021)

IRENA’s World Energy Transition Outlook (WETO), released in early 2021, presents a clear pathway for the world to ensure energy supply through cleaner and more sustainable energy generation options. The outlook presents technological avenues to achieve climate targets, with a focus on renewables for power and end uses, energy conservation and energy efficiency, the electrification of end-use sectors with renewables, hydrogen and its derivatives, carbon capture and storage, carbon capture and utilisation, and advanced bioenergy (Figure 5).

Figure 5 Emission abatement with a 1.5°C pathway



Note: CCS = carbon capture and storage; CCUS = carbon capture, utilisation and storage; BECCS = bioenergy with carbon capture and storage

Source: IRENA World Energy Transitions Outlook 2021

Responding to requests from IRENA’s membership, and in line with the recommendations made in the WETO, IRENA offers dedicated support to its members that are Parties to the Paris Agreement. This assistance includes helping member countries enhance their ambitions for mitigating emissions in the energy sector – as outlined in the NDCs and in the long-term strategies (LTS) – and supporting implementation of members’ mitigation commitments.

# IRENA'S SUPPORT FOR CLIMATE ACTION: INITIATIVE

IRENA's membership has shown increased interest in engaging with the agency to receive targeted support for climate action to enhance their NDCs and support implementation. The current footprint of IRENA covers all regions of the world, with the agency offering support to member countries in Africa, Asia and the Pacific, Latin America and the Caribbean, and Europe (Figure 6).

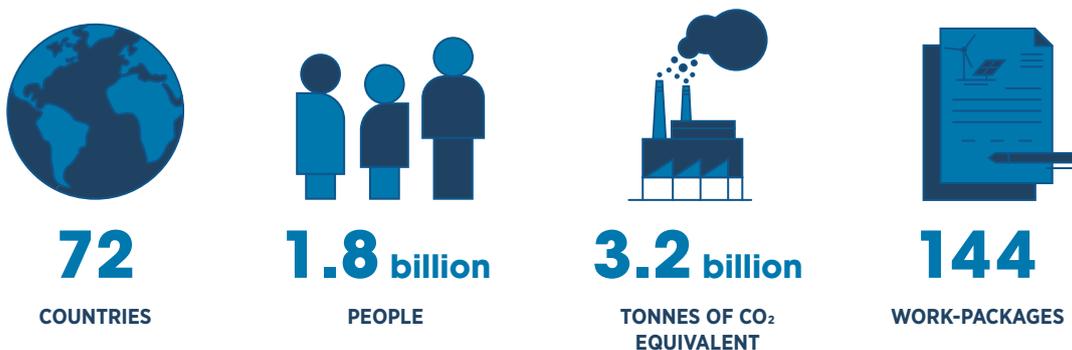
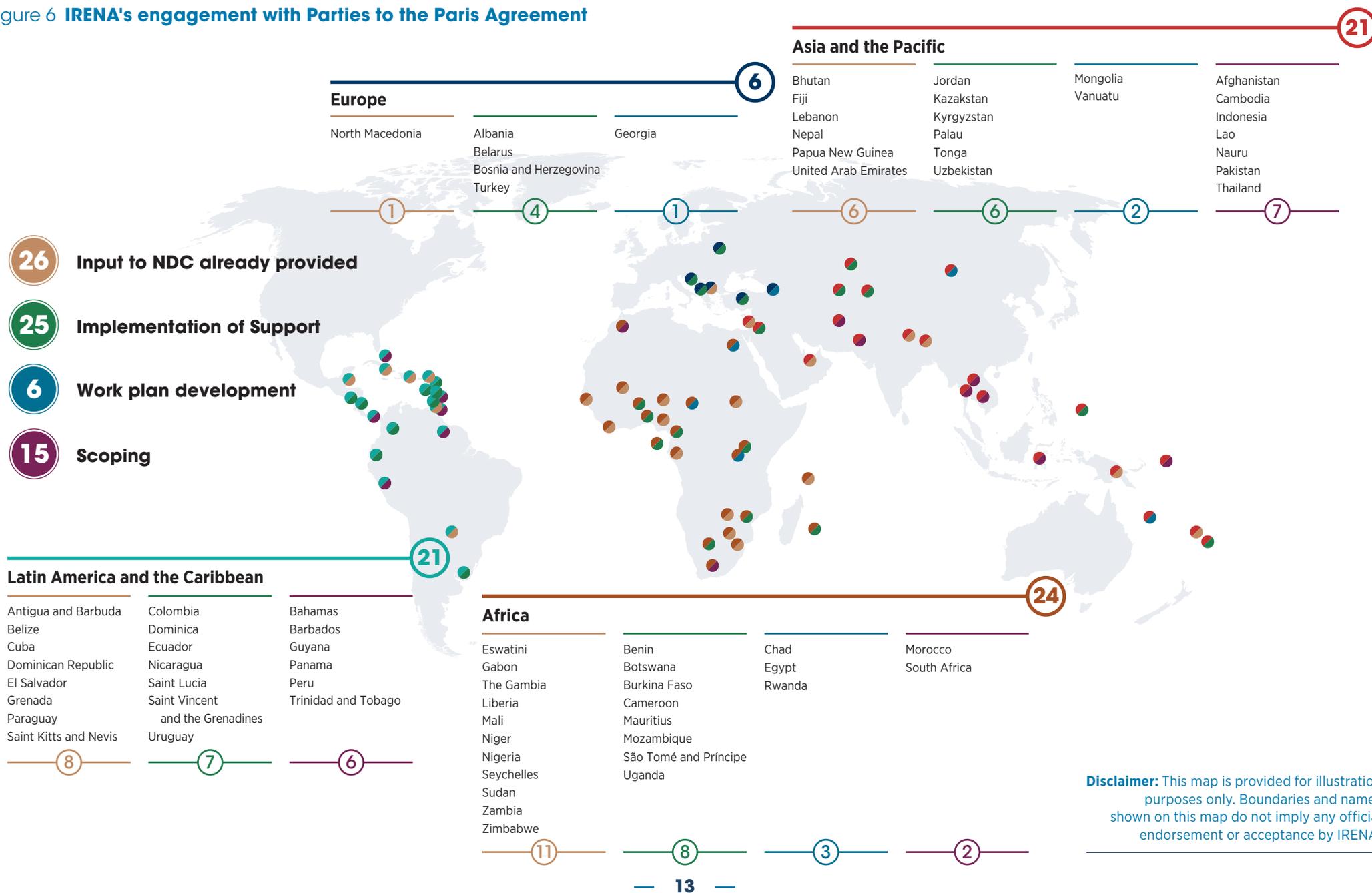


Figure 6 IRENA's engagement with Parties to the Paris Agreement



**Disclaimer:** This map is provided for illustration purposes only. Boundaries and names shown on this map do not imply any official endorsement or acceptance by IRENA.

IRENA's engagement with Parties to the Paris Agreement is based on various work packages that reflect the agency's vast body of knowledge and expertise on different facets of the energy transition (Table 2). These work packages can provide substantive input to NDC enhancement and implementation as well as offering member countries support in updating their renewable energy targets and development.

Table 2 IRENA's main categories of work packages

| Category  | Description   |
|---|---|
| <b>Data and statistics</b>                          | Repository of statistics on renewable energy capacity, generation, energy balances, finance and investments, and costs.   |
| <b>Climate technology and infrastructure</b>        | Assisting countries in developing and implementing mitigation and adaptation measures to enhance NDCs, strengthen NDC implementation plans, and advance LT-LEDS through the assessment of the performance, mitigation potential, associated costs, and adaptation co-benefits of renewable energy technologies and associated infrastructure in the power, transport, buildings and industry sub-sectors.                                 |
| <b>Monitoring, reporting and verification (MRV)</b> | Technical assistance and capacity building on collecting, analysing, recording and reporting detailed and accurate data.  |
| <b>Resource assessment</b>                          | Site assessment, suitability assessment, zoning assessment, SolarCity simulator as well as capacity building to assess the potential of renewable energy.   |
| <b>Policy and finance advice</b>                    | <p>Analysis of the current policy and finance landscape to identify existing barriers to the deployment of renewable energy and policy recommendations to help attract investments in the sector, informing country-level climate action.</p> <p>Support to countries in enhancing their capacity on different topics, including renewable energy targets, policies and regulations, financial instruments and investment frameworks.</p> |
| <b>Renewable readiness assessment</b>               | A tool for carrying out comprehensive evaluations of the conditions for renewable energy deployment in countries that can support decision makers in scaling up renewable energy ambitions.   |
| <b>Long-term energy planning</b>                    | Enhancement of long-term renewable energy planning scenarios and capacity building for energy planning and modelling.   |

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**Power system flexibility**

Assessment of the flexibility of the power system and identification of cost-effective, flexible solutions for greater integration of variable renewable energy – including energy storage, demand-side flexibility and sector coupling options (*i.e.* power-to-hydrogen, power-to-heat and electric vehicles).

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**Renewable energy roadmap**

REmap assesses renewable energy potential in power, heating, cooling and transport, and studies possible technology pathways and other metrics such as technology, costs, investments and externalities such as air pollution, emissions and economic indicators.

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**Project facilitation services**

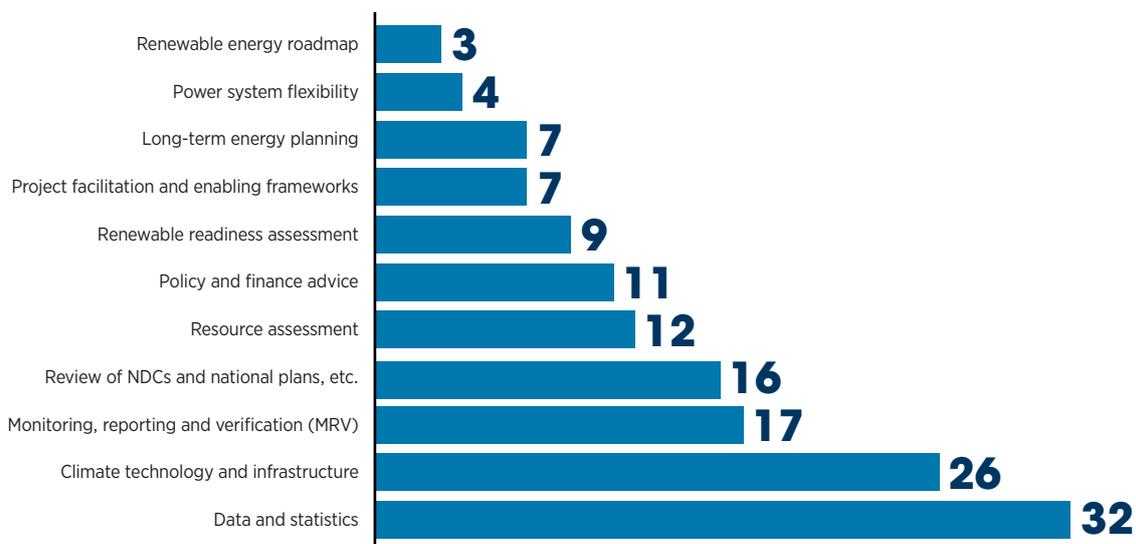
Teaming up with financial institutions, project developers and the private sector to develop solid project pipelines backed by governments, and assisting in bankability and access to finance of projects. The Climate Investment Platform is further supported through a series of Investment forums at the regional level.

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IRENA is currently pursuing 144 work packages to support the needs of Parties to the Paris Agreement in enhancing and implementing their energy transition plans to meet the requirements for climate action (Figure 7).

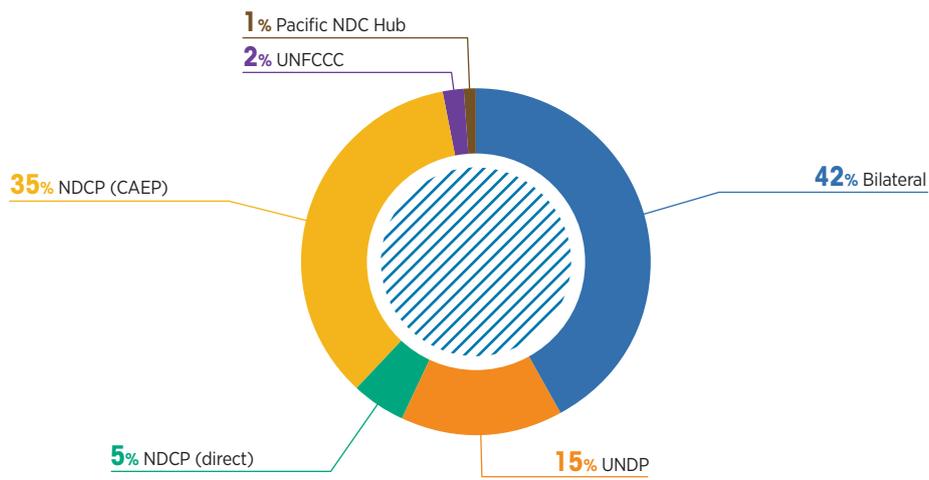
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Figure 7 **Distribution of IRENA’s work packages**



IRENA works directly with its member states and with development partners and agencies to fulfil opportunities to support climate action. In addition to bilateral requests, many requests have been channelled to the agency through its institutional partnerships and engagements with the United Nations Development Programme (UNDP), the NDC Partnership (NDCP, both directly and through the Climate Action Enhancement Package or CAEP), the UNFCCC and the Regional Pacific NDC Hub (Figure 8). IRENA has also been partnering with the European Union’s Technical Assistance Facility for Sustainable Energy (EU TAF) to deliver support to specific countries in the regions of Latin America and the Caribbean and Sub-Saharan Africa.

Figure 8 **Distribution of the sources of IRENA support requests**



IRENA has in place a robust process for developing, managing and implementing support requests from Parties on climate action through the energy transition. A centralised information management system platform is being developed to automate the support process. The platform will be available to IRENA member states and to the partners to facilitate making requests to the agency and monitoring implementation.



# IRENA'S SUPPORT FOR CLIMATE ACTION: IMPACT TO DATE

## AFRICA

22 COUNTRIES, 39 WORK PACKAGES

Africa is experiencing rapid economic expansion leading to increased energy demand, combined with rising expectations for improved resilience and sustainability. Endowed with substantial renewable energy sources, the region has adopted innovative technologies to advance the energy transition and scale up climate action. The existing NDCs support the region in mitigating climate change while aiming to meet the targets of the UN Sustainable Development Goals. IRENA is supporting countries through a range of work packages related to NDC enhancement, NDC implementation and the development of long-term strategies (LTS) (Figure 9).



Figure 9 Distribution of IRENA's work packages in Africa



### Status of IRENA support

IRENA's areas of support in the Africa region cover data and statistics, climate technology and infrastructure, long-term energy planning and resource assessment. Some member countries are also receiving capacity-building and facilitation support to enhance investments.

- In **Nigeria**, IRENA conducted data gap analysis and developed local greenhouse gas emission factors for the energy sector.
- In **Uganda**, IRENA put together a report on the energy balance and prepared a bioenergy survey, which together informed the country's NDC enhancement and development of the long-term strategy.
- In **Eswatini**, a costing analysis was completed on measures to reduce greenhouse gas emissions on the supply and demand sides of the energy sector, using the concept of marginal abatement cost curves.
- In **Mali**, capacity building for long-term energy planning was completed through a hybrid software training and hands-on workshops.
- In **Sudan**, through the CAEP and the NDCP, IRENA has supported the country by developing an energy data audit and by reviewing the data needed for NDC enhancement and for tracking energy-related targets, as well as overall data availability. In addition, the agency held capacity-building workshops on renewable energy auctions and open solar contracts.
- In **The Gambia**, IRENA identified and analysed eight mitigation measures on the demand and supply side of the power sector in terms of their GHG abatement potential and associated costs, which informed the country's second NDC and NDC implementation plan.
- In **Zimbabwe**, IRENA supported the validation of renewable energy mitigation measures proposed for the updated NDC by comparing two independent power system analyses for the country.

## In Focus **The Gambia**

The Gambia submitted its second NDC on 12 September 2021. Climate Action Tracker evaluated the second NDC as part of its Global Update and rated The Gambia as the only country (out of 37 countries, including the European Union) to have overall climate action that is compatible with the 1.5°C target of the Paris Agreement. The Government of The Gambia is committed to retaining and, where possible, enhancing its strong ambition, while strengthening the integration of the identified mitigation measures into national planning processes.

The Gambia's NDC update was supported by a technical analysis of the cost-effectiveness of renewable energy technology options in the country's climate action planning processes. The technical study supported climate policy/decision makers by providing valuable information for the identification, quantification and selection of mitigation measures in the power sector and helped inform the path to cost-effectively achieve mitigation targets. The analysis served as an input to the development of long-term sector plans, while supporting the development of renewable energy mitigation options, fostering energy access and promoting the involvement of the private sector.

The activity was carried out under the Climate Action Enhancement Package (CAEP) of the NDC Partnership and was the result of the ongoing collaboration between the European Commission and IRENA implemented through the EU Technical Assistance Facility for Sustainable Energy funded by the EU.

*"MECCNAR was in charge of the NDC revision process in The Gambia. International partners, including ... IRENA ..., supported the process. The process produced two outputs: The Gambia's Second NDC (NDC2) and an NDC Update Report..."*

(THE GAMBIA'S SECOND NDC, SUBMITTED 12 SEPTEMBER 2021)

## In Focus **Nigeria**

Nigeria submitted its second NDC on 30 July 2021. The Government of Nigeria, Africa's largest economy, has a key role to play in delivering the aims of the Paris Agreement. The updated NDC represents greatly enhanced climate ambition. IRENA supported Nigeria's second NDC through two aspects: 1) developing the energy balance for the year 2018, which provides estimates of energy and serves as a basis for understanding the energy situation, for use in policy monitoring and modelling work, and 2) providing the tools and guidance to advance this monitoring and modelling work through capacity-building workshops.

# ASIA AND THE PACIFIC

## 23 COUNTRIES, 38 WORK PACKAGES

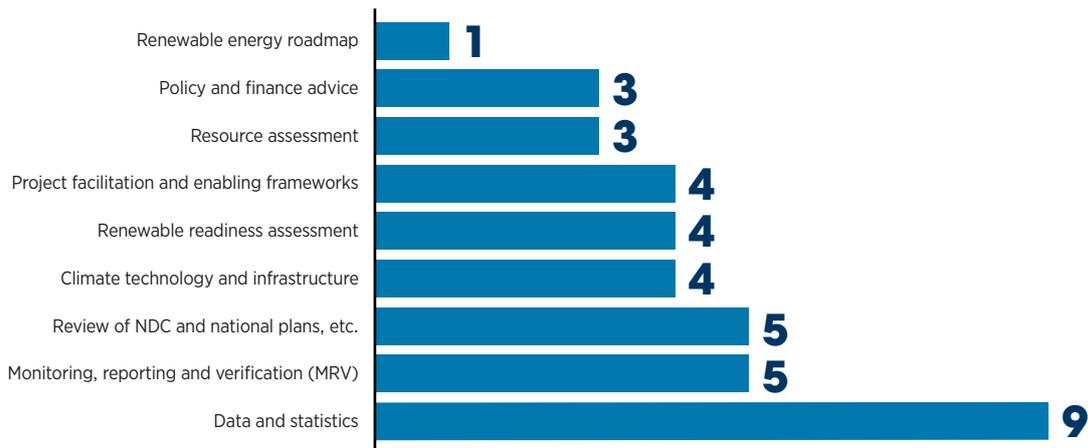
Asia and the Pacific together comprise a large, diverse and dynamic region that is home to around 4.5 billion people. The region contains the world's largest energy economies as well as many smaller, underdeveloped or island economies that are among the most vulnerable to the impacts of climate change. Asia and the Pacific account for more than half of global energy consumption, with 85% of this consumption supplied by fossil fuels.

Still, one-tenth of the region's people lack access to electricity, and many more rely on traditional biomass use for cooking and heating. Demand for energy is rising due to rapid urbanisation and industrialisation, and considerable opportunities exist to avoid the long-term lock-in of high-carbon energy technologies. Along with vast renewable energy potential, the region already possesses significant manufacturing and expertise related to renewables.

Making the transition to a net zero future requires concrete climate actions in the energy sectors that contribute the most to regional emissions. IRENA is actively engaging with countries in Asia and the Pacific to support and strengthen their efforts to mitigate climate change and ensure sustainable development in one of the key regions of the world (Figure 10).



Figure 10 **Distribution of IRENA's work packages in Asia and the Pacific**



### Status of IRENA support

IRENA support to the Asia and the Pacific region covers a diverse set of work packages including helping countries to identify energy data gaps, prepare an energy balance, and enhance their capacity in data collection, refinement, recording and analysis, as well as supporting climate technology and infrastructure development. The data support is supplemented with monitoring, reporting and verification (MRV) support to keep track of renewable energy targets, especially in the power sector.

The support on data is popular in Pacific Island countries such as Papua New Guinea and Tonga as well as in Central Asia where Kazakhstan, Kyrgyzstan and Uzbekistan have sought IRENA support on renewable energy data management and MRV. IRENA work packages also include helping countries enhance and update their renewable energy goals by assessing the potential of renewables through renewables readiness assessment (RRA), REmap and other resource assessment tools. In addition, IRENA has received interest in supporting the development of the LT-LEDS, as part of the Paris Agreement.

- **Bhutan** has used RRA recommendations to set renewable energy goals in its NDCs. Similarly, in **Jordan** and **Kyrgyzstan** the findings from RRA analysis have guided renewable energy ambitions. IRENA is supporting **Palau** in developing a 100% renewable energy roadmap that includes a green hydrogen assessment.
- In **Lebanon**, IRENA completed a renewable energy outlook that has helped the country update its renewable energy ambitions.
- **Mauritius** and **Seychelles** are getting IRENA support through the SolarCity simulator, among other activities that countries in the region are pursuing to assess their rooftop solar resource potentials.
- In **Mongolia** and **Indonesia**, IRENA is engaging to roll out support for enhancing the ambition and implementation of national climate action plans.

## In Focus **Bhutan**

The Kingdom of Bhutan submitted its second NDC on 24 June 2021. Bhutan used the NDC revision process as an opportunity to reflect on energy transition opportunities. Bhutan's RRA, prepared by IRENA, outlined a strategic roadmap for the energy sector and also fed into the NDC revision process, showing how Bhutan could achieve long-term energy security through a diversified and sustainable supply mix.

The RRA findings show that renewable energy technologies, such as solar photovoltaic (PV), wind, bioenergy and small hydropower, could offer opportunities for diversifying the country's energy mix and help address rising energy demand. Distributed renewables can also provide socio-economic benefits, including income through productive uses and improvements in living conditions, while reducing indoor air pollution and deforestation through enhanced access to energy.

*"The Renewable Readiness Report report has been a significant document to structure [Bhutan's] activities in various dimensions. Some of the notable contributions can be observed in the formulation of nationally determined contributions..."*

(LETTER OF APPRECIATION TO IRENA, 17 JUNE 2020)

## In Focus **Papua New Guinea**

The Independent State of Papua New Guinea submitted its second NDC on 16 December 2020. IRENA has assisted Papua New Guinea in revising its NDC targets for the energy sector, in line with the Enhanced Transparency Framework (ETF) of the Paris Agreement and as recognised in the country's enhanced NDC. IRENA is also providing guidance on the country's implementation plan for the energy sector. In addition, IRENA has helped organise meetings of the Energy Sub-Technical Working Committee, gathering stakeholders from across the sector, while reporting on the status of energy statistics and offering recommendations for improvement.

*"Special thanks also go to a number of development partners, including IRENA..., for invaluable support."*

(PAPUA NEW GUINEA'S ENHANCED NDC, 16 DECEMBER 2020)

## In Focus **Kyrgyzstan**

Kyrgyzstan has set an overarching direction for development of the clean energy sector and energy efficiency through the concept of a green economy. IRENA is supporting the country in exploring its renewable resource potential from solar and wind through a renewable readiness assessment (RRA). Kyrgyzstan RRA assesses the suitability of conditions in the country for the development and deployment of renewable energy, along with actions required to improve those conditions. The analysis and findings of the RRA also feed into the NDC revision process to help the country enhance and update its climate actions through energy transition.

IRENA is also strengthening the NDC revision process by enhancing renewable energy targets. The agency's support on resource assessment through suitability maps and zoning for solar PV and wind identifies locations to deploy utility-scale renewable power plants to accelerate energy transition efforts in the country.

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

(KYRGYZSTAN'S UPDATED NDC, SUBMITTED OCTOBER 2021)

## In Focus **Lebanon**

The Republic of Lebanon is committed to meeting the goals of the Paris Agreement, as exemplified by its updated NDC submitted in 2021. In this context, Lebanon has increased its mitigation ambition and transparency. The mitigation targets and ambition were guided by IRENA's *Renewable Energy Outlook: Lebanon*, published in 2020. This study, a collaboration with Lebanon's Ministry of Energy and Water (MEW) and the Lebanese Center for Energy Conservation (LCEC), provides an in-depth assessment of the policy, regulatory, financial and capacity challenges that must be overcome to achieve the targets set for 2030. The NDC update is aligned with economic recovery efforts and provides complementary sustainable solutions to Lebanon's challenges.

*"This NDC represents a progression beyond Lebanon's 2015 NDC ... guided by the IRENA Renewable Energy Outlook: Lebanon..."*

(LEBANON'S NDC UPDATE, 16 MARCH 2021)

## In Focus **Mongolia**

Mongolia was one of the first countries to approach IRENA for assistance in developing a long-term energy perspective consistent with its NDC implementation goals. IRENA's assistance to Mongolia aims to align near- and medium-term actions and targets (as defined in the country's NDC implementation plans for 2030) with an ambitious long-term vision for 2050 that will be incorporated into Mongolia's long-term low emission development strategies (LT-LEDS) in accordance with the Paris Agreement.

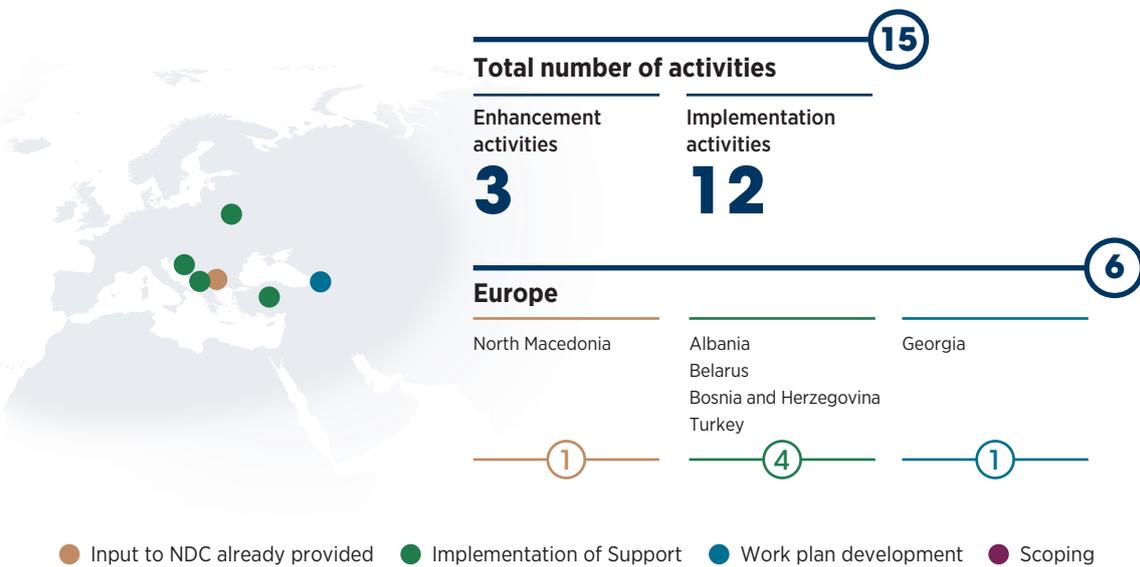
IRENA's analysis will assist authorities in revisiting the use of renewable energy technologies and associated infrastructure in national climate action plans in terms of mitigation potential, associated costs and economic models, and adaptation co-benefits, in order to address climate change in a sustainable and equitable manner and ensure a carbon neutral and sustainable future for Mongolia.

# EUROPE

## 6 COUNTRIES, 15 WORK PACKAGES

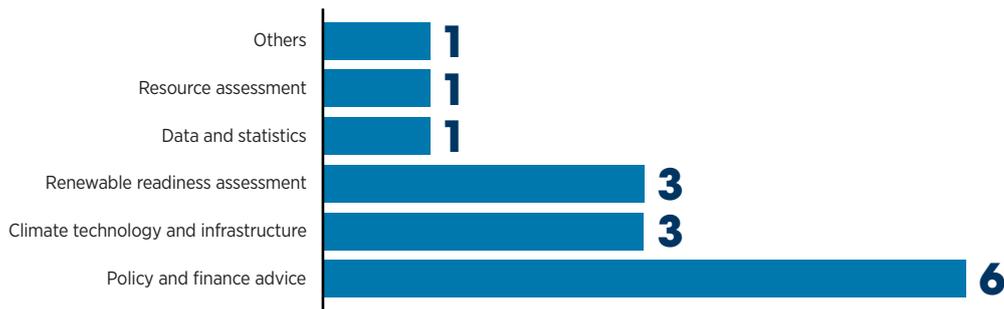
Within Europe, EU member states have already committed to climate neutrality by 2050, and at least 55% GHG reduction by 2030. In the region the non EU countries, particularly in South East Europe also are taking important steps towards a more sustainable energy future, by exploring the options to integrate renewable energy in power and all end-use sectors. Moreover, 06 Western Balkan countries have already expressed their willingness to reduce GHG emissions and pursue climate neutrality.

IRENA is supporting countries in the region through a range of work packages including NDC enhancement and implementation (Figure 11). IRENA is also supporting countries to align their NDC commitments with National Energy and Climate Plans (NECPs).



Lobachad © Shutterstock

Figure 11 **Distribution of IRENA’s work packages in Europe**



### Status of IRENA support

- The areas of support in Europe cover numerous workshops and capacity-building trainings to improve the technical, financial, institutional and regulatory framework for renewables.
- In **Albania**, IRENA is providing support under NDC enhancement and implementation, with activities focused on policy advice and capacity building on the design of renewable energy targets, policies and measures in the heating and cooling sector, maximisation of socio-economic benefits and financial instruments.
- In **Georgia**, the discussed scope of activities for the NDC implementation phase includes assessment of technology options technology options for renewable-energy-based heating systems in residential buildings, assessment of residential building energy efficiency measures and their potential to reduce GHG emissions, as well as support for project development and preparation for potential funding by GCF.
- In **Belarus**, the proposed scope of work aims to support the NDC implementation phase and long-term sectoral plans. It is based on a technical analysis to support the assessment of the potential for reducing greenhouse gas emissions and the cost-effectiveness of existing and future mitigation options for the power and other relevant sectors. There is a particular emphasis on renewable energy and energy efficiency technologies, as well as assisting in the assessment of hydrogen production using renewable energy in Belarus.
- In **Bosnia and Herzegovina**, the scope of activities includes technical assistance in the design and implementation of enhanced mitigation and adaptation measures in climate action plans using renewable energy technologies, as well as support in assessing their mitigation potential, related costs and adaptation co-benefits. The analysis can help to assess and validate renewable energy mitigation measures recommended for the NDC update and ensure that the renewable energy targets to be set in the country’s NECP are consistent with the Paris Agreement, the European Green Deal and the Sofia Declaration on the Western Balkans’ Green Agenda’s climate neutrality targets.
- In **North Macedonia**, a report on de-risking renewable energy investments, focusing on power, heating and cooling was developed to support North Macedonia accelerate the implementation of its enhanced NDC.
- In **Turkey**, IRENA provides support for the development of the SolarCity simulator for the Şahinbey area. For municipal authorities, the simulator supports assessments of different policy incentives – such as generation or capital subsidies – on each city’s rooftop solar PV market.

## In Focus **North Macedonia**

The Republic of North Macedonia submitted its updated NDC on 16 April 2021. The enhanced NDC highlights North Macedonia's commitment to work towards a 2050 climate neutrality target coupled with a target to reduce greenhouse gas emissions 51% by 2030 compared to 1990 levels. IRENA is supporting the country's NDC implementation by providing recommendations for de-risking renewable energy investments. Support has included an overview of the renewable energy finance landscape and investment trends, as well as analysis of available financing sources and the mechanisms of national laws, regulations and strategies.

The recommendations that IRENA has provided to North Macedonia include: creation of an enabling environment for investments in the power sector and in the heating and cooling sectors; introduction of cross-cutting policies to create an enabling environment for the energy transition; provision of government guarantees for renewable energy projects; creation of a dedicated renewable energy fund; consideration of lending options to disburse the renewable fund resources; development of capabilities in the renewable sector, including finance; design and planning for on-lending facilities under a renewable energy fund; design and implementation of risk mitigation instruments; and the importance of communication to raise awareness about opportunities in renewable energy finance.



# LATIN AMERICA AND THE CARIBBEAN

## 21 COUNTRIES, 52 WORK PACKAGES

Latin America hosts some of the most dynamic renewable energy markets in the world, with more than a quarter of the region's primary energy coming from renewables, twice the global average. Power sectors in the region are characterised by a high dependence on hydropower and utilising the complementarity between hydropower and variable renewable energy sources is a key leveraging factor for all renewables in Latin America. Countries are beginning to address diversification efforts in electricity systems and are working to create more enabling policy and regulatory environments to adopt to renewables.

IRENA is supporting countries in the region through a variety of work packages, aimed at integrating renewable energy plans into countries' climate action plans as well as drawing parallels between project execution and the implementation of climate action (Figure 12). These work packages offer an opportunity for countries to enhance and update their NDC targets as well as support their efforts in implementing them.

## Latin American countries are leveraging all renewables, not just hydropower, through enabling policy and regulatory environments allowing diversification of electricity systems

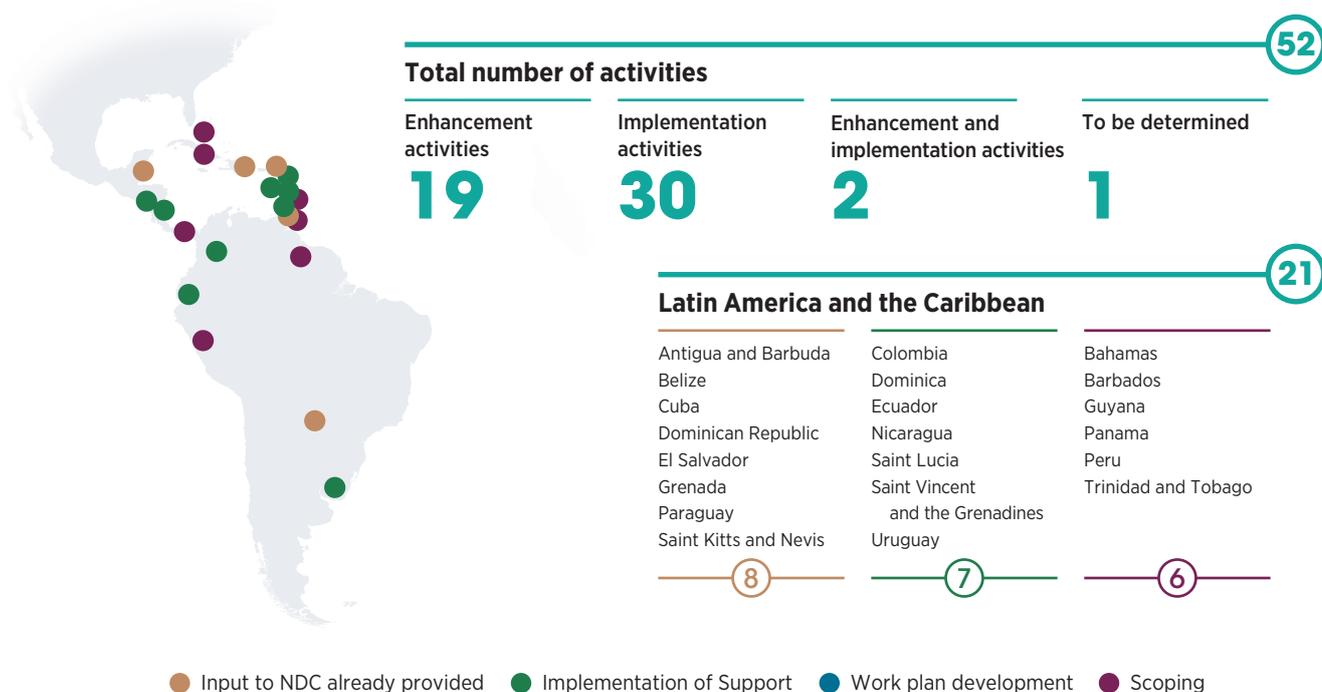
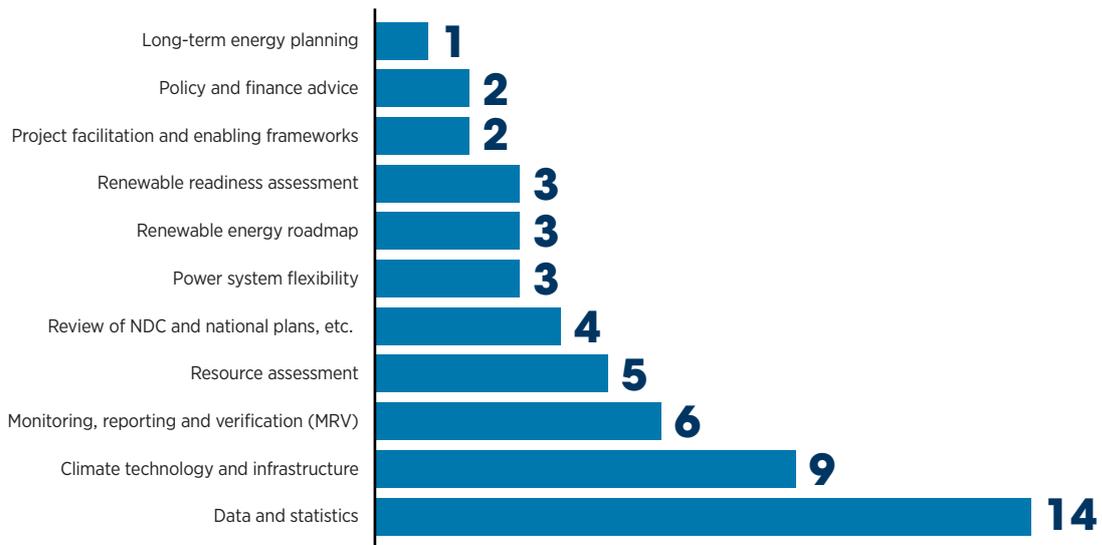


Figure 12 **Distribution of IRENA's work packages in Latin America and the Caribbean**



### Status of IRENA support

IRENA has strong engagement with many countries in Latin America and the Caribbean in supporting their efforts to enhance and update renewable energy targets in their NDCs. The agency's most diverse set of work packages is being delivered to countries in the region, ranging from support on setting up renewable energy targets to climate technology and infrastructure sectoral analysis.

- In **Grenada**, stakeholder consultation on energy-related data collection and management is being conducted along with setting up monitoring and evaluation systems.
- In the **Dominican Republic**, IRENA is supporting revision of the mitigation potential of national greenhouse gas targets, which includes reviewing greenhouse gas inventories, GDP, population growth and national priorities to inform more accurate mitigation targets.
- In **Antigua and Barbuda**, IRENA is conducting a technology plan and mitigation analysis as part of the country's NDC implementation phase and its Sustainable Low-emission Island Mobility project under the Global Programme to Support Countries with the Shift to Electric Mobility, implemented by the Global Environment Facility and the United Nations Environment Programme. The aim is to assess the early stages of transport sector decarbonisation through electric mobility in line with the country's updated NDC targets for transitioning to electric mobility.
- In **Paraguay**, a comprehensive evaluation of the conditions for renewable energy deployment was done through an RRA to identify a set of actions to scale up renewable energy and enhance greenhouse gas mitigation.
- In **Uruguay**, a technical study was completed to evaluate how energy storage systems, electric vehicles and the production of green hydrogen could facilitate the integration of variable renewable energy in the country's energy sector and support the decarbonisation of transport. The study estimated potential emission reductions to facilitate the inclusion of these options in the NDC update.

## In Focus Belize

Belize submitted its updated NDC on 1 September 2019. IRENA supported Belize in specifying NDC energy targets based on international guidelines and on-the-ground data, as well as proposing key progress indicators. IRENA is also supporting the development of a baseline energy scenario and the country's energy transition pathways through REmap analysis. In addition, it is providing insights to the country's long-term decarbonisation strategy.

*"The updated NDC was supported by the NDC Partnership with IRENA, FAO and UNFCCC RCCMRVH."*

(BELIZE'S NDC UPDATE, 1 SEPTEMBER 2021)

## In Focus Ecuador

IRENA is supporting Ecuador on NDC implementation through a range of activities, including automating the calculation of emission factors, which enables the national grid to establish a long-term system for monitoring, reporting and verification (MRV). IRENA is also supporting the enhancement of local capacity through developing a long-term scenario for energy and climate target setting. Through concept note development for the financing of bio-digesters, IRENA has support Ecuador in securing key project finance in support of NDC implementation.

## In Focus El Salvador

The Republic of El Salvador has benefited from a variety of IRENA work packages, including RRA, REmap, energy data, MRV, climate technology and infrastructure, as well as through support on NDC drafting. The country's RRA analysis, launched in December 2020, identifies challenges for renewable energy deployment and outlines key recommendations for overcoming existing barriers, which can then be reflected in the revised NDC. IRENA is also providing a country energy perspective for 2030, assessing the penetration of renewable energy and energy efficiency as part of the REmap Central America goal of facilitating analysis of energy emission reduction targets, sector by sector.

As part of the climate technology and infrastructure work package, IRENA developed a mitigation analysis for El Salvador's agro-industry sub-sector. The analysis demonstrated that, in terms of technical feasibility and greenhouse gas emission abatement, industry sectors have a significant role to play through mitigation options related to industries' power and thermal requirements. The analysis validated the potential, capability and scale of solar technologies for both adaptation and mitigation purposes. The activity was the result of the ongoing collaboration between the European Commission and IRENA implemented through the EU Technical Assistance Facility for Sustainable Energy funded by the EU.

*"IRENA's mitigation analysis has been incorporated into El Salvador's NDC for the energy sector, which will be presented at COP26 this year."*

(LIC. SALVADOR HANDAL, CNE EXECUTIVE SECRETARY, 6 OCTOBER 2021)

## In Focus Grenada

Grenada submitted its second NDC on 1 December 2020. IRENA's support to Grenada in developing renewable energy data and statistics has provided added clarity, transparency and understanding of NDC targets — and was well acknowledged by the government in its second NDC. IRENA's support also includes reviewing NDC content and target structures, conducting an energy audit in the buildings sector, and proposing a strategy to systematise data collection and calculations for transport-related greenhouse gas emissions.

*"The Government of Grenada is appreciative of the support provided by IRENA."*

(GRENADA'S SECOND NDC, 30 NOVEMBER 2020)

## In Focus Saint Kitts and Nevis

The government of Saint Kitts and Nevis received support from IRENA for the NDC revision and enhancement phase. IRENA support led to the adoption of a 100 percent renewable energy target, improvements in electricity transmission and distribution, as well as the introduction of electric vehicles and associated infrastructure. IRENA delivered a technico-economic assessment of cost-effective mitigation options to inform the NDC update with a focus on the power and transport sectors through the use of renewable energy. Up to nine mitigation measures were identified and quantified in co-ordination with national stakeholders. In terms of greenhouse gas emissions abatement, the study supported the quantification of the potential and cost-effectiveness of individual mitigation options, as well as the potentials of scenario aggregation and electrification of the transport sector. IRENA analysis found that the power sector of Saint Kitts and Nevis could be decarbonised by 2030. The analysis allowed for the evaluation of the cost-effectiveness of mitigation options proposed in sectoral action plans, as well as their potential adaptation co-benefits. As a result, effective mitigation measures were prioritised in the country's revised NDC, resulting in a higher level of ambition and a clearer path to meeting national climate goals. The activity was the result of the ongoing collaboration between the European Commission and IRENA implemented through the EU Technical Assistance Facility for Sustainable Energy funded by the EU.

*"The NDC revision process was supported by ... and IRENA in collaboration with the European Commission's support through the EU Technical Assistance Facility (EUTAF) on the technical component for the assessment and modelling of the mitigation actions."*

(SAINT KITTS AND NEVIS' UPDATED NDC, 25 OCTOBER 2021)

# REALISING THE AMBITIONS

IRENA, as the lead inter-governmental agency on the energy transition, has kept climate action at the forefront of its support to member countries. Leveraging its near-universal membership, IRENA continues to work with Parties to the Paris Agreement as well as with partners to implement the updated and enhanced Nationally Determined Contributions (NDCs), in addition to supporting efforts to keep raising climate ambitions.

**NDC implementation** – Implementation of the climate pledges made in the updated and enhanced NDCs remains critical to achieving the goals of the Paris Agreement. IRENA will continue to engage with its membership in implementing and achieving the mitigation actions committed to in the NDCs. The agency is offering its support through different work packages and will also facilitate project developments that can be further materialised to facilitate financing and investment.

**Long-term strategies** – While most of the Parties to the Paris Agreement continue to enhance their NDCs and to raise their climate ambitions, very few of them have set up long-term strategies. Parties are increasingly demanding support from IRENA in identifying economy-wide low-emission pathways to achieve net zero emissions by around mid-century. The agency is offering such support to an initial set of countries.

**Project facilitation and development** – Mobilising investment remains a key to materialising climate action plans in the NDCs. IRENA, along with the United Nations Development Programme and Sustainable Energy for All, in co-operation with the Green Climate Fund, launched a global initiative called the Climate Investment Platform (CIP). The CIP's objective is to mobilise capital to developing countries to accelerate the scale of renewable energy deployment to meet NDC targets and achieve compliance with the UN Sustainable Development Goals. As of the end of the second quarter of 2021, IRENA had selected 33 projects for support. This is equivalent to around 470 megawatts of capacity, which would lead to mobilisation of USD 1.1 billion once the match-making process is completed. The total greenhouse gas emission reduction as result of this support is expected to be 5 million tonnes of CO<sub>2</sub> equivalent once the 33 projects are implemented.

In addition, IRENA plans to continue working with partners and financiers to:

- channel financing for a pipeline of renewable energy projects and support implementing ambitious NDCs to meet the Paris Agreement targets and realise the UN Sustainable Development Goals;
- mobilise financial resources from international financial institutions that provide climate finance, such as development finance institutions; multilateral development banks; global, regional and local banks; and the corporate sector; and
- facilitate the financing matchmaking of near-ready renewable energy projects to support countries in meeting their NDCs.

# ANNEX



# AFGHANISTAN

|                                |                   |   |  |
|--------------------------------|-------------------|---|--|
| <b>Membership since</b>        | <b>LDC / LLDC</b> | <b>GDP per capita</b>                             | <b>Energy-related emissions relative to global</b> |
| 19 August 2016                 |                   | USD 508.80 (2020) <sup>2</sup>                    | 79.58 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>              |                   | <b>TPES</b>                                       |  |
| 38 928 341 (2020) <sup>1</sup> |                   | Total: 142 837 TJ (2018)<br>(Renewable:36 294 TJ) |  |

## Renewable energy targets in latest NDC

### Conditional:

Electricity production from hydro, solar, wind and biomass and development of alternative and renewable energy sources for 25% of the rural population above existing levels (15%).

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (17% area), 1 600-1 800 kWh/kWp/yr (28% area), 1 800-1 900 kWh/kWp/yr (37% area), 1 900-2 000 kWh/kWp/yr (17% area)
- **Wind:** 260 W/m<sup>2</sup> (65% area), 260-420 W/m<sup>2</sup> (18% area), 420-560 W/m<sup>2</sup> (5% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

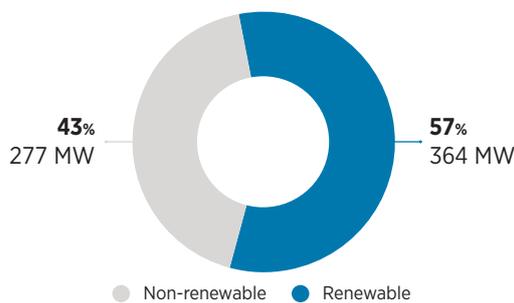
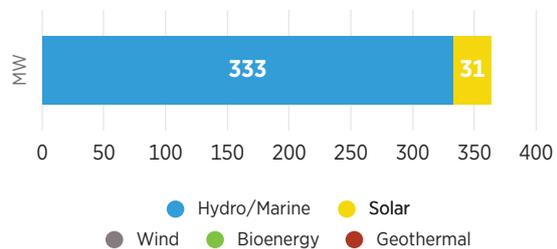


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Afghanistan

### Support is on hold

Activity is on hold

|          |                      |   |
|----------|----------------------|---|
| <b>1</b> | <b>Work package:</b> | <b>Source:</b><br>Government of Afghanistan |
|----------|----------------------|---|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# ALBANIA

|                               |   |  |
|-------------------------------|---|--|
| <b>Membership since</b>       | <b>GDP per capita</b>                             | <b>Energy-related emissions relative to global</b> |
| 13 August 2010                | USD 5 215.27 (2020) <sup>2</sup>                  | 4.61 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>             | <b>TPES</b>                                       |  |
| 2 837 743 (2020) <sup>1</sup> | Total: 78 291 TJ (2018)<br>(Renewable: 26 627 TJ) |  |

## Renewable energy targets in latest NDC

42% of renewable energy in gross final energy consumption by 2030.

## Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (30% area),  
1 400-1 800 kWh/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 installed capacity (MW, %)**

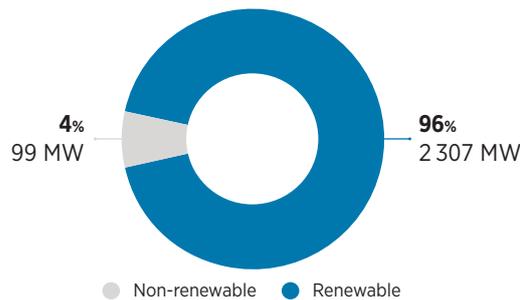
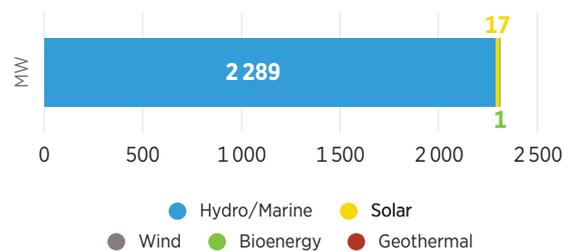


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Albania

### Support in implementation

- 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
- Work package:** Renewables readiness assessment

**Source:** NDC Partnership (CAEP)
  - IRENA will conduct 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

**Work package:** Capacity building on policy and finance

**Source:** NDC Partnership (CAEP)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# ANTIGUA AND BARBUDA

|                            |             |  |  |
|----------------------------|-------------|--|--|
| <b>Membership since</b>    | <b>SIDS</b> | <b>GDP per capita</b>                        | <b>Energy-related emissions relative to global</b> |
| 10 October 2010            |             | USD 14 450 (2020) <sup>2</sup>               | 0.53 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>          |             | <b>TPES</b>                                  |  |
| 97 928 (2020) <sup>1</sup> |             | Total: 7 221 TJ (2018)<br>(Renewable: 47 TJ) |  |

## Renewable energy targets in latest NDC

### Conditional (by 2030):

- 86% renewable energy generation from local resources in the electricity sector; electricity sector targets:
- 100 MW of renewable generation capacity available to the grid;
- 20 MW of wind energy generation;
- 100% renewable generation for all government operations;
- 50 MW of renewable generation capacity owned by farmers who can sell electricity to off-takers;
- 100 MW of renewable generation capacity owned by social investment entities.

## Resource potential

- **Solar PV:** 1 600-1 800 kWh/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 installed capacity (MW, %)**

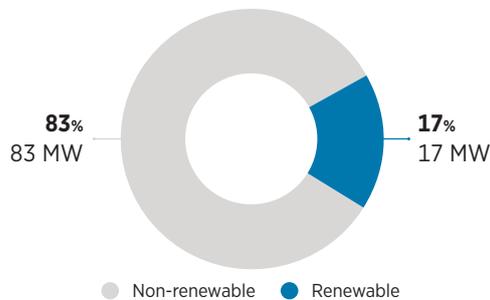
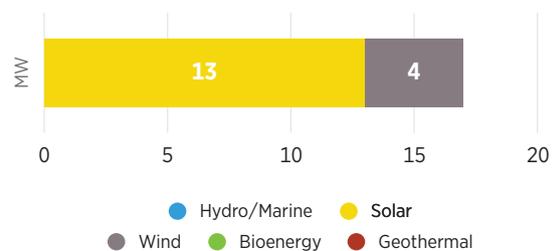


Figure 2 **Renewable generation by technology (MW)**



## Acknowledgement of IRENA support

*"Special thanks to our implementing partners  
International Renewable Energy Agency."*

(ANTIGUA AND BARBUDA'S FIRST NDC UPDATED SUBMISSION, 2 SEPTEMBER 2021)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch

## IRENA climate action engagement in Antigua and Barbuda

### Support in implementation

|  |  |   |   |
|--|--|---|---|
| Develop a rooftop solar PV city simulator for North Antigua  |  |   |   |
| <b>1</b>   | <table border="0"> <tr> <td><b>Work package:</b><br/>Resource assessment</td> <td><b>Source:</b><br/>Government of Antigua and Barbuda</td> </tr> </table>                   | <b>Work package:</b><br>Resource assessment                   | <b>Source:</b><br>Government of Antigua and Barbuda |
| <b>Work package:</b><br>Resource assessment  | <b>Source:</b><br>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 e-mobility                             |  |   |   |
| <b>2</b>   | <table border="0"> <tr> <td><b>Work package:</b><br/>Climate technology and infrastructure</td> <td><b>Source:</b><br/>NDC Partnership (CAEP)</td> </tr> </table>            | <b>Work package:</b><br>Climate technology and infrastructure | <b>Source:</b><br>NDC Partnership (CAEP)            |
| <b>Work package:</b><br>Climate technology and infrastructure  | <b>Source:</b><br>NDC Partnership (CAEP)   |   |   |
| Technology plan and mitigation analysis to evaluate the early stages of transport sector decarbonisation with electric mobility. The analysis will look at the techno-economic feasibility of electrifying high-use-factor fleets, with a focus on public bus transport applications |  |   |   |
| <b>3</b>   | <table border="0"> <tr> <td><b>Work package:</b><br/>Climate technology and infrastructure</td> <td><b>Source:</b><br/>Government of Antigua and Barbuda</td> </tr> </table> | <b>Work package:</b><br>Climate technology and infrastructure | <b>Source:</b><br>Government of Antigua and Barbuda |
| <b>Work package:</b><br>Climate technology and infrastructure  | <b>Source:</b><br>Government of Antigua and Barbuda  |   |   |





# BAHAMAS

|                             |   |  |
|-----------------------------|---|--|
| <b>Membership since</b>     | <b>GDP per capita</b>                         | <b>Energy-related emissions relative to global</b> |
| 3 May 2014                  | USD 28 607.90 (2020) <sup>2</sup>             | 2.32 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>           | <b>TPES</b>                                   |  |
| 393 248 (2020) <sup>1</sup> | Total: 3 900 TJ (2018)<br>(Renewable: 321 TJ) |  |

## Renewable energy targets in latest NDC

**Unconditional (by 2030):**  
30% of electricity from renewables.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (39% land area),  
1 600-1 800 kWh/kWp/yr (63% land area)
- **Wind:** <260 W/m<sup>2</sup> (80% land area),  
260-420 W/m<sup>2</sup> (20% land area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

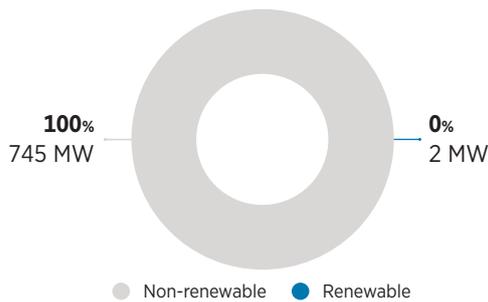
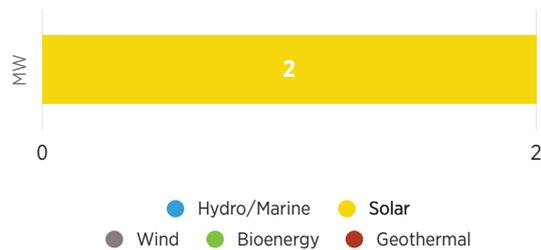


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Bahamas

### Support in implementation

Support is currently under discussion

|          |                      |   |
|----------|----------------------|---|
| <b>1</b> | <b>Work package:</b> | <b>Source:</b><br>Government of Bahamas |
|----------|----------------------|---|

<sup>1,2,3</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch



# BARBADOS

|                             |             |  |  |
|-----------------------------|-------------|--|--|
| <b>Membership since</b>     | <b>SIDS</b> | <b>GDP per capita</b>                          | <b>Energy-related emissions relative to global</b> |
| 25 September 2014           |             | USD 15 191.2 (2020) <sup>2</sup>               | 1.24 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>           |             | <b>TPES</b>                                    |  |
| 287 371 (2020) <sup>1</sup> |             | Total: 16 893 TJ (2018)<br>(Renewable: 742 TJ) |  |

## Renewable energy targets in first updated NDC

### Conditional (by 2030):

95% renewable energy share in the electricity mix  
 100% electric or alternatively-fueled vehicles  
 20% increase in energy efficiency across all sectors as compared to BAU energy from waste (EFW facility 8-15 MW) by 2025.

## Resource potential

- **Solar PV:** 1 600-1 800 kWh/kWp/yr (80% land area), 1 800-1 900 kWh/kWp/year (19% land area)
- **Wind:** <260 W/m<sup>2</sup> (71% area), 260-420 W/m<sup>2</sup> (28% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 Total installed capacity (MW, %)

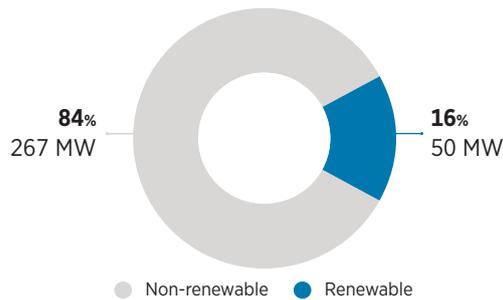
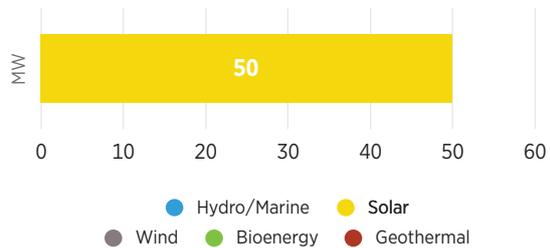


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Barbados

### Support in implementation

Support is currently under discussion

|          |                      |  |
|----------|----------------------|--|
| <b>1</b> | <b>Work package:</b> | <b>Source:</b><br>Government of Barbados |
|----------|----------------------|--|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# BELARUS

|                               |  |  |
|-------------------------------|--|--|
| <b>Membership since</b>       | <b>GDP per capita</b>                                | <b>Energy-related emissions relative to global</b> |
| 27 February 2011              | USD 6 411.22 (2020) <sup>2</sup>                     | 58.45 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>             | <b>TPES</b>  |  |
| 9 398 861 (2020) <sup>1</sup> | Total: 1 139 253 TJ (2018)<br>(Renewable: 66 072 TJ) |  |

## Renewable energy targets in latest NDC

Does not include quantified renewable energy targets.

## Resource potential

- **Solar PV:** 260 kWh/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 installed capacity (MW, %)

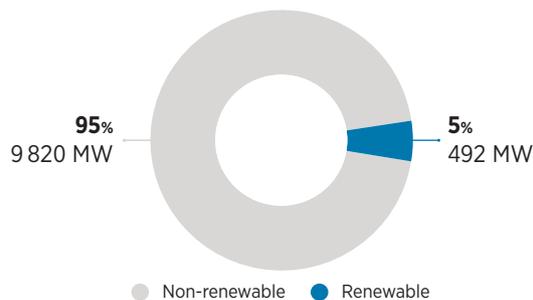
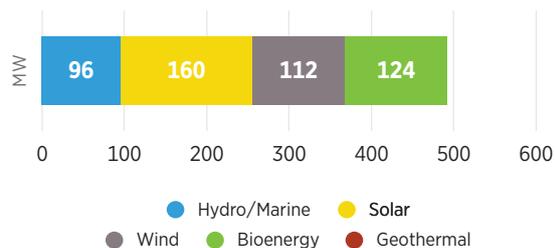


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Belarus

### Support in implementation

Assist in the assessment of GHG emissions reduction potential and cost-effectiveness of existing and future mitigation options for the power, transport and building subsectors, focusing on renewable

#### 1 energy technologies

|   |                        |
|---|------------------------|
| <b>Work package:</b><br>Climate technology and infrastructure | <b>Source:</b><br>UNDP |
|---|------------------------|

Assessment of hydrogen production using renewable energy in Belarus

#### 2

|   |                        |
|---|------------------------|
| <b>Work package:</b><br>Climate technology and infrastructure | <b>Source:</b><br>UNDP |
|---|------------------------|

Building capacity in renewable energy technologies for electricity and end-use applications, including combined heat and power, storage and power-to-molecules

#### 3

|   |                        |
|---|------------------------|
| <b>Work package:</b><br>Climate technology and infrastructure | <b>Source:</b><br>UNDP |
|---|------------------------|

Capacity-building workshop on auction design, a key recommendation from the RRA report

#### 4

|   |   |
|---|---|
| <b>Work package:</b><br>Capacity building on policy and finance | <b>Source:</b><br>Government of Belarus |
|---|---|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# BELIZE

|                             |             |  |  |
|-----------------------------|-------------|--|--|
| <b>Membership since</b>     | <b>SIDS</b> | <b>GDP per capita</b>                            | <b>Energy-related emissions relative to global</b> |
| 27 January 2013             |             | USD 4 435.262 (2020) <sup>2</sup>                | 0.81 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>           |             | <b>TPES</b>                                      |  |
| 397 621 (2020) <sup>1</sup> |             | Total: 15 364 TJ (2018)<br>(Renewable: 6 463 TJ) |  |

### Renewable energy targets in first updated NDC

Achieve 75% gross generation of electricity from renewable energy sources by 2030 through the implementation of hydropower, solar, wind and biomass, including in the tourism sector. 40 MW utility-scale solar by 2025. Implement an interconnection policy and regulatory framework to facilitate distributed renewable power generation by 2022

### Resource potential

- **Solar PV:** 1 400-1 600 W/m<sup>2</sup> kWh/kWp/yr (78% area),  
1 600 - 1 800 W/m<sup>2</sup> kWh/kWp/yr (18% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

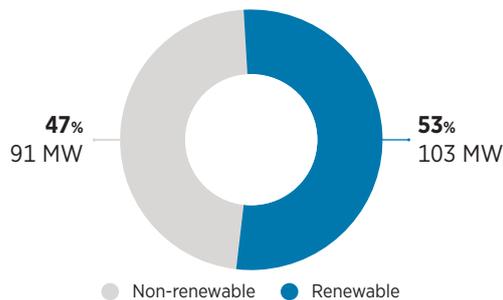
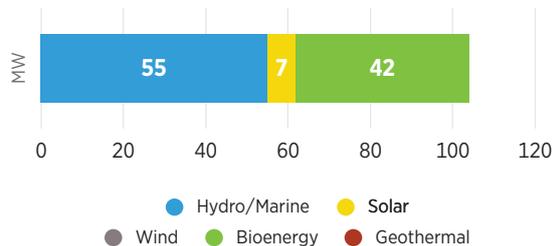


Figure 2 **Renewable generation by technology (MW)**



### Acknowledgement of IRENA support

*“The updated NDC was supported by IRENA. For actions in the energy sector, baseline emissions are estimated in line with the Baseline Energy Scenario in IRENA’s ReMAP modelling framework”.*

*“IRENA is working with the Belizean government to create an energy database to track progress for the NDC targets in the energy sector and mitigation actions”.*

(BELIZE’S FIRST NDC UPDATED SUBMISSION, 1 SEPTEMBER 2021)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch

## IRENA climate action engagement in Belize

### Support completed

1 Technical inputs from REmap to determine the potential to scale up the country’s use of renewable energy, focusing on renewable energy technologies, heating and cooling, and transport technology options

|  |                          |
|--|--------------------------|
| <b>Work package:</b><br>Renewable energy roadmap | <b>Source:</b><br>UNFCCC |
|--|--------------------------|

2 Review and analysis of existing mechanism/ frameworks for the collection and management of all data relevant to development of an MRV system for the energy sector

|   |  |
|---|--|
| <b>Work package:</b><br>Data and statistics | <b>Source:</b><br>NDC Partnership (CAEP) |
|---|--|

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><br>Capacity building on policy and finance | <b>Source:</b><br>NDC Partnership (CAEP) |
|---|--|

### Support in implementation

1 Design 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><br>Monitoring, reporting and verification (MRV) | <b>Source:</b><br>NDC Partnership (CAEP) |
|--|--|





# BENIN

|                                |            |   |  |
|--------------------------------|------------|---|--|
| <b>Membership since</b>        | <b>LDC</b> | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 21 November 2012               |            | USD 1 291.0 (2020) <sup>2</sup>                     | 9.86 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>              |            | <b>TPES</b>   |  |
| 12 123 198 (2020) <sup>1</sup> |            | Total: 218 831 TJ (2018)<br>(Renewable: 113 591 TJ) |  |

## Renewable energy targets in latest NDC

- 147 MW of hydropower
- 128 MW of PV solar farms
- 15 MW of biomass

## Resource Potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (22% area),  
1 400-1 600 kWh/kWp/yr (70% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 2.5 tC/ha/yr

Figure 1 Total installed capacity (MW, %)

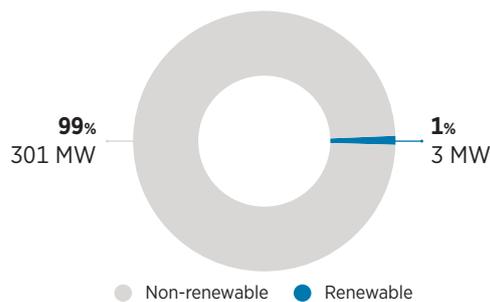
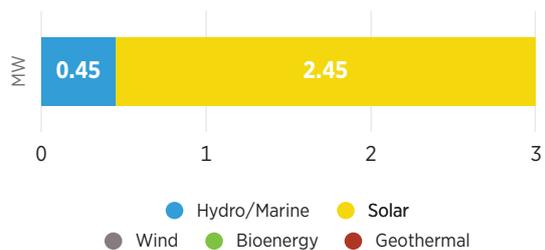


Figure 2 Renewable generation by technology (MW)



## IRENA Climate Action Engagement in Benin

### Support in implementation

Capacity building support on quantification study of GHG emissions from NDC projects by sector

1

**Work Package:**  
Data and statistics

**Partner:**  
NDC Partnership (CAEP)

<sup>1,2,3</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch



# BHUTAN

|                               |                   |   |  |
|-------------------------------|-------------------|---|--|
| <b>Membership since</b>       | <b>LDC / LLDC</b> | <b>GDP per capita</b>                             | <b>Energy-related emissions relative to global</b> |
| 1 June 2016                   |                   | USD 3 122.37 (2020) <sup>2</sup>                  | 1.46 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>             |                   | <b>TPES</b>                                       |  |
| 771 612.0 (2020) <sup>1</sup> |                   | Total: 77 780 TJ (2018)<br>(Renewable: 63 548 TJ) |  |

## Renewable energy targets in latest NDC

**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

- **Solar PV:** 1 200-1 600 kWh/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 installed capacity (MW, %)**

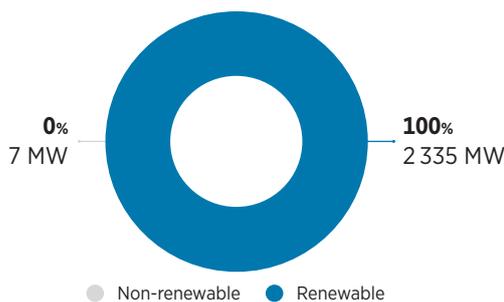
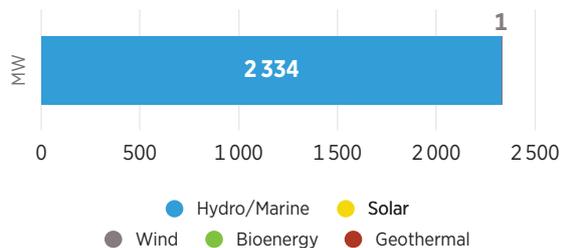


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Bhutan

### 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

|          |   |  |
|----------|---|--|
| <b>1</b> | <b>Work package:</b><br>Renewables readiness assessment | <b>Source:</b><br>Government of Bhutan |
|----------|---|--|

### Acknowledgement of IRENA support

*"The Renewables Readiness Assessment has been developed in cooperation 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</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch



# BOSNIA AND HERZEGOVINA

|                               |  |  |
|-------------------------------|--|--|
| <b>Membership since</b>       | <b>GDP per capita</b>                              | <b>Energy-related emissions relative to global</b> |
| 12 January 2011               | USD 6 031.55 (2020) <sup>2</sup>                   | 23 MtCO <sub>2</sub> e (2018) <sup>3</sup>         |
| <b>Population</b>             | <b>TPES</b>  |  |
| 3 280 815 (2020) <sup>1</sup> | Total: 311 141 TJ (2018)<br>(Renewable: 67 102 TJ) |  |

|   |   |
|---|---|
| <b>Renewable energy targets in latest NDC</b>               | <b>Resource potential</b>   |
| Doesn't include quantified renewable energy targets in NDC. | <ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1 200 kWh/kWp/yr (19% area), 1 200-1 400 kWh/kWp/yr (65% area), 1 400-1 600 kWh/kWp/yr (15% area)</li> <li>• <b>Wind:</b> 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)</li> <li>• <b>Biomass:</b> 5.5 tC/ha/yr</li> </ul> |

Figure 1 Total installed capacity (MW, %)

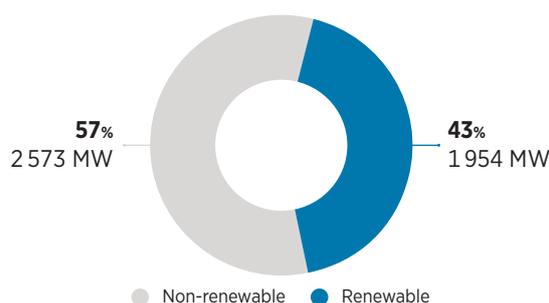
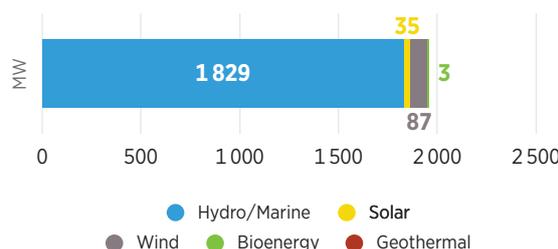


Figure 2 Renewable generation by technology (MW)

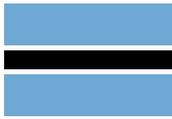


## IRENA climate action engagement in Bosnia and Herzegovina

### Support in implementation

|          |   |  |
|----------|---|--|
|          | RRA report including a chapter on bankability, combined with provisional notes that will serve the finalisation of the national energy and climate plan (NECP)                                    |  |
| <b>1</b> | <b>Work package:</b><br>Renewables readiness assessment   | <b>Source:</b><br>Government of Bosnia and Herzegovina |
|          | Capacity-building workshops on 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>2</b> | <b>Work package:</b><br>Capacity building on policy and finance   | <b>Source:</b><br>Government of Bosnia and Herzegovina |
|          | Technical report with recommendations and actions for revising and aligning the NDC and NECP mitigation options by benchmarking the mitigation assessment completed                               |  |
| <b>3</b> | <b>Work package:</b><br>Climate technology and infrastructure   | <b>Source:</b><br>Government of Bosnia and Herzegovina |

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# BOTSWANA

|                               |             |   |  |
|-------------------------------|-------------|---|--|
| <b>Membership since</b>       | <b>LLDC</b> | <b>GDP per capita</b>                             | <b>Energy-related emissions relative to global</b> |
| 23 June 2016                  |             | USD 6 710.99 (2020) <sup>2</sup>                  | 10.4 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>             |             | <b>TPES</b>                                       |  |
| 2 351 625 (2020) <sup>1</sup> |             | Total: 101 110 TJ (2018)<br>(Renewable: 6 414 TJ) |  |

### Renewable energy targets in latest NDC

Doesn't include quantified renewable energy targets in NDC.

### Resource potential

- **Solar PV:** 1 800-1 900 kWh/kWp/yr (78% area), 1 900-2 000 kWh/kWp/yr (18% area)
- **Wind:** 260 W/m<sup>2</sup> (97% area), 260-420 W/m<sup>2</sup> (5% area)
- **Biomass:** 2.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

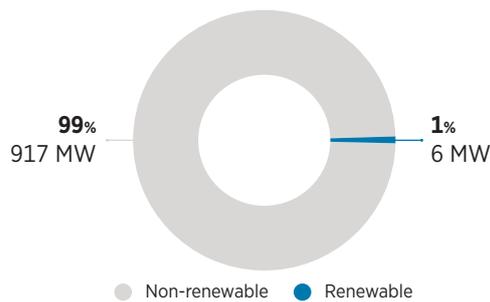
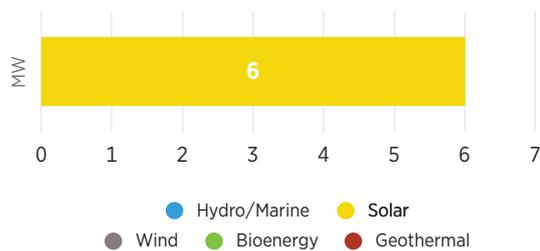


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Botswana

### Support in implementation

Greenhouse gas reporting and energy statistics

1

**Work package:**  
Data and statistics

**Source:**  
Government of Botswana

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# BURKINA FASO

|                                |   |  |
|--------------------------------|---|--|
| <b>Membership since</b>        | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 25 July 2013 <b>LDC / LLDC</b> | USD 830.92 (2020) <sup>2</sup>                      | 5.46 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>              | <b>TPES</b>   |  |
| 20 903 278 (2020) <sup>1</sup> | Total: 192 739 TJ (2018)<br>(Renewable: 131 253 TJ) |  |

## Renewable energy targets in latest NDC

Doesn't include quantified renewable energy targets in NDC.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (22% area), 1 600-1 800 kWh/kWp/yr (87% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

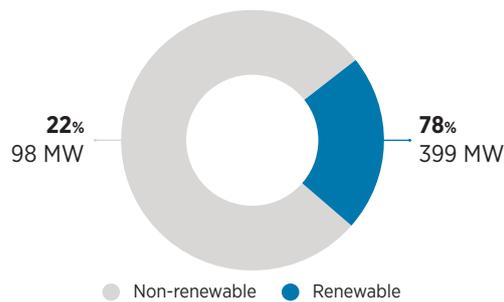
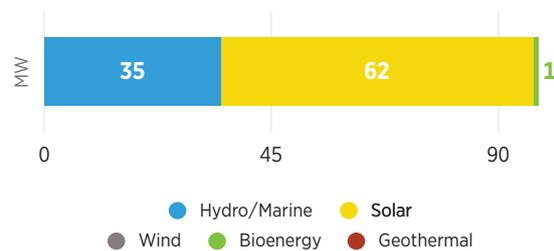


Figure 2 **Renewable generation by technology (MW)**



## 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><br>Resource assessment | <b>Source:</b><br>Government of Burkina Faso |
|----------|---|--|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# CAMBODIA

|                                |            |   |  |
|--------------------------------|------------|---|--|
| <b>State in accession</b>      | <b>LDC</b> | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| <b>Population</b>              |            | USD 1 512.72 (2020) <sup>2</sup>                    | 14.15 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| 16 718 971 (2020) <sup>1</sup> |            | <b>TPES</b>   |  |
|                                |            | Total: 341 556 TJ (2018)<br>(Renewable: 210 807 TJ) |  |

## Renewable energy targets in latest NDC

25% of the renewable energy in the energy mix by 2030 using solar, wind, hydro, biomass

## Resource potential

- **Solar PV:** 1 200-1 400 W/m<sup>2</sup> kWh/kWp/yr (16% area),  
1 400-1 600 W/m<sup>2</sup> kWh/kWp/yr (83% area)
- **Wind:** 260 W/m<sup>2</sup> (98% area),  
260-420 W/m<sup>2</sup> (3% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

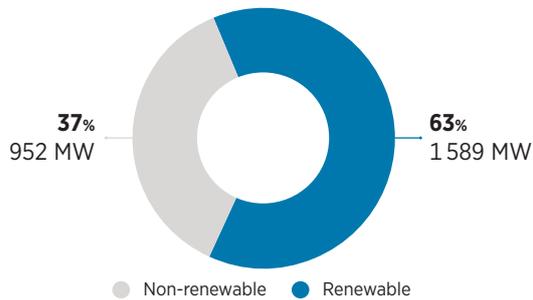
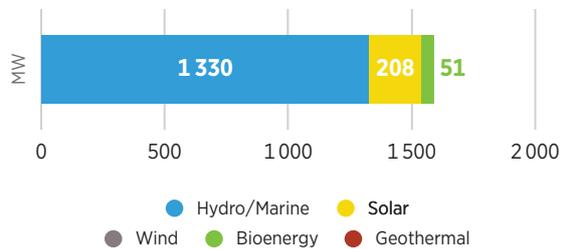


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Cambodia

### Support in Implementation

Support is currently under discussion

|          |                      |                                   |
|----------|----------------------|-----------------------------------|
| <b>1</b> | <b>Work package:</b> | <b>Source:</b><br>NDC Partnership |
|----------|----------------------|-----------------------------------|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# CAMEROON

|                                |   |  |
|--------------------------------|---|--|
| <b>Membership since</b>        | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 29 August 2011                 | USD 1 499.37 (2020) <sup>2</sup>                    | 12.88 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>              | <b>TPES</b>   |  |
| 26 545 864 (2020) <sup>1</sup> | Total: 404 195 TJ (2018)<br>(Renewable: 299 777 TJ) |  |

## Renewable energy targets in latest NDC

Increase the share of renewable energy to 25% in the electricity mix by 2035.

Promote implementation of the Rural Electrification Master Plan by use of mini-smart grids.

## Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (23% area), 1 400-1 600 kWh/kWp/yr (36% area), 1 600-1 800 kWh/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 installed capacity (MW, %)

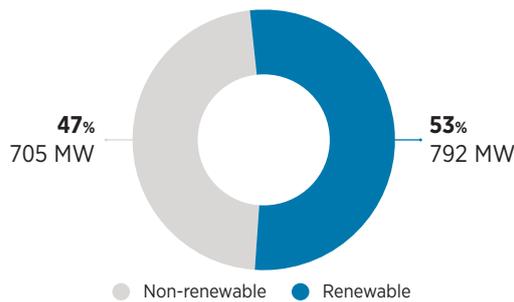
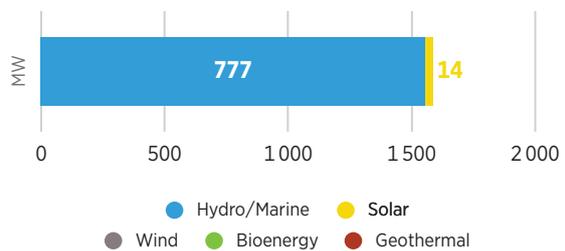


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Cameroon

### Support in implementation

|   |  |   |                                   |
|---|--|---|-----------------------------------|
| Assessment of technology options for power sector mitigation measures |  |   |                                   |
| <b>1</b>  | <table border="1"> <tr> <td><b>Work package:</b><br/>Climate technology and infrastructure</td> <td><b>Source:</b><br/>NDC Partnership</td> </tr> </table> | <b>Work package:</b><br>Climate technology and infrastructure | <b>Source:</b><br>NDC Partnership |
| <b>Work package:</b><br>Climate technology and infrastructure         | <b>Source:</b><br>NDC Partnership  |   |                                   |
| Capacity-building workshops   |  |   |                                   |
| <b>2</b>  | <table border="1"> <tr> <td><b>Work package:</b><br/>Long-term energy planning</td> <td><b>Source:</b><br/>NDC Partnership</td> </tr> </table>             | <b>Work package:</b><br>Long-term energy planning             | <b>Source:</b><br>NDC Partnership |
| <b>Work package:</b><br>Long-term energy planning                     | <b>Source:</b><br>NDC Partnership  |   |                                   |

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# CHAD

|                                |                   |   |  |
|--------------------------------|-------------------|---|--|
| <b>Membership since</b>        | <b>LDC / LLDC</b> | <b>GDP per capita</b>                             | <b>Energy-related emissions relative to global</b> |
| 24 May 2018                    |                   | USD 614.47 (2020) <sup>2</sup>                    | 7.57 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>              |                   | <b>TPES</b>                                       |  |
| 16 425 859 (2020) <sup>1</sup> |                   | Total: 86 105 TJ (2018)<br>(Renewable: 73 684 TJ) |  |

## Renewable energy targets in latest NDC

### Unconditional:

- 2.2 MW of wind

### Conditional:

- 2x15 MW biomass
- 40 MW hydro power - through interconnection with Cameroon
- 240MW solar photovoltaic by 2050
- 400MW solar photovoltaic by 2030
- 60MW solar-diesel hybrid
- 65MW solar photovoltaic with storage
- 100MW wind
- 10 000 digesters on farms

## Resource potential

- **Solar PV:** 1 600-1 800 kWh/kWp/yr (56% area),  
1 800-1 900 kWh/kWp/yr (20% area),  
1 900-2 000 kWh/kWp/yr (22% 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)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 Total installed capacity (MW, %)

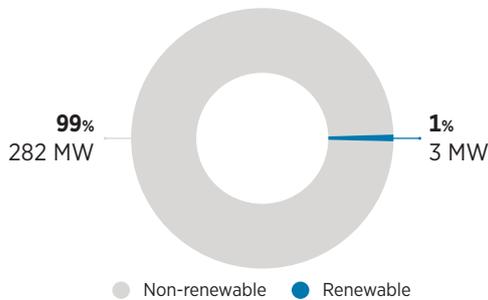
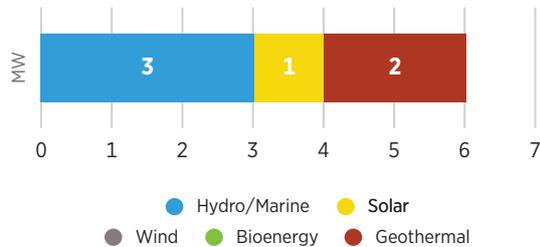


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Chad

### Support in implementation

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

**Work package:**  
Renewables readiness assessment

**Source:**  
Government of Chad

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# COLOMBIA

|                                |   |  |
|--------------------------------|---|--|
| <b>Membership since</b>        | <b>GDP per capita</b>                                 | <b>Energy-related emissions relative to global</b> |
| 7 February 2015                | USD 5 332.77 (2020) <sup>2</sup>                      | 91.75 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>              | <b>TPES</b>   |  |
| 50 882 884 (2020) <sup>1</sup> | Total: 1 610 929 TJ (2018)<br>(Renewable: 404 426 TJ) |  |

## Renewable energy targets in latest NDC

Doesn't mention quantified renewable energy targets in NDC.

## Resource potential

- **Solar PV:** 1 200 kWh/kWp/yr (9% area),  
1 200-1 400 kWh/kWp/yr (45% area),  
1 400 -1 600 kWh/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 installed capacity (MW, %)**

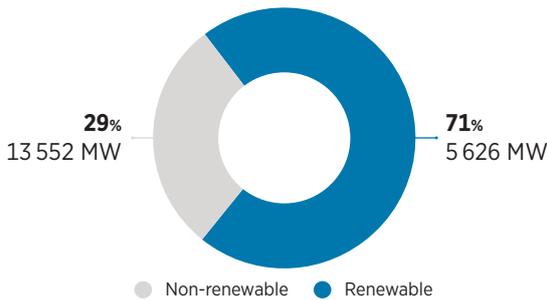
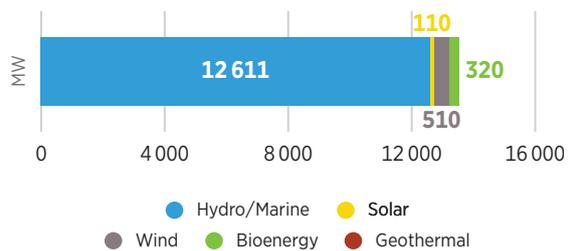


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Colombia

### Support in implementation

Support from IRENA's Suitability Assessment to enable finding highly suitable areas for grid-connected and off-grid solar and wind project planning

1

**Work package:**  
Resource assessment

**Source:**  
Government of Colombia

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# CUBA

|                                |             |  |  |
|--------------------------------|-------------|--|--|
| <b>Membership since</b>        | <b>SIDS</b> | <b>GDP per capita</b>                              | <b>Energy-related emissions relative to global</b> |
| 29 April 2012                  |             | USD 9 099.67 (2019) <sup>2</sup>                   | 26.86 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>              |             | <b>TPES</b>  |  |
| 11 333 484 (2019) <sup>1</sup> |             | Total: 374 870 TJ (2018)<br>(Renewable: 59 115 TJ) |  |

## Renewable energy targets in latest NDC

25% of national electricity generation from renewable energy sources by 2030.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (21% area), 1 600-1 800 kWh/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 installed capacity (MW, %)**

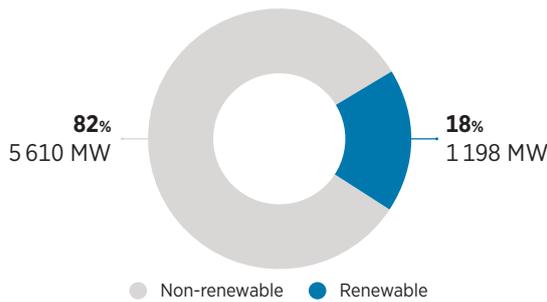
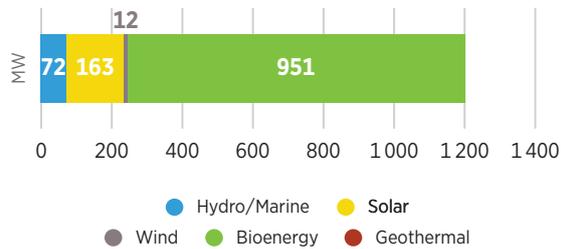


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Cuba

### Support completed

Review and feedback on energy component of NDCs

|          |                                    |                                      |
|----------|------------------------------------|--------------------------------------|
| <b>1</b> | <b>Work package:</b><br>NDC review | <b>Source:</b><br>Government of Cuba |
|----------|------------------------------------|--------------------------------------|

### Support in discussion

Support with financing an efficient lighting programme through IRENA's financing facilities, such as the Climate Investment Platform (CIP)

|          |  |                                      |
|----------|--|--------------------------------------|
| <b>1</b> | <b>Work package:</b><br>Project facilitation | <b>Source:</b><br>Government of Cuba |
|----------|--|--------------------------------------|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# DOMINICA

|                            |             |   |  |
|----------------------------|-------------|---|--|
| <b>Membership since</b>    | <b>SIDS</b> | <b>GDP per capita</b>                         | <b>Energy-related emissions relative to global</b> |
| 8 November 2020            |             | USD 6 526.79 (2020) <sup>2</sup>              | 0.18 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>          |             | <b>TPES</b>                                   |  |
| 71 991 (2020) <sup>1</sup> |             | Total: 2 417 TJ (2018)<br>(Renewable: 142 TJ) |  |

## Renewable energy targets in latest NDC

**Conditional:**  
10.5 MW of geothermal and  
3.4 MW of hybrid mini-grids.

## Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (15% area),  
1 400-1 600 kWh/kWp/yr (20% area),  
1 600-1 800 kWh/kWp/yr (65% area)
- **Wind:** <260 W/m<sup>2</sup> (60% area),  
260-420 W/m<sup>2</sup> (30% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

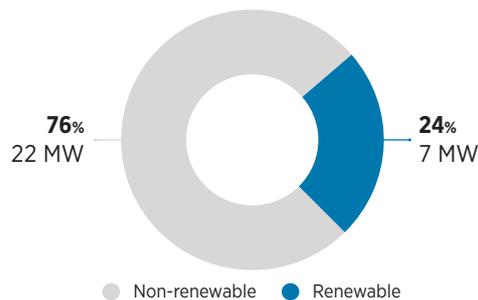
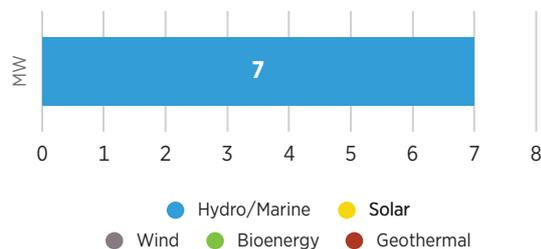


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Dominica

### Support in implementation

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

|  |                        |
|--|------------------------|
| <b>Work package:</b><br>Monitoring, reporting and verification (MRV) | <b>Source:</b><br>UNDP |
|--|------------------------|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# DOMINICAN REPUBLIC

|                                |             |  |  |
|--------------------------------|-------------|--|--|
| <b>Membership since</b>        | <b>SIDS</b> | <b>GDP per capita</b>                              | <b>Energy-related emissions relative to global</b> |
| 9 July 2010                    |             | USD 7 268.20 (2020) <sup>2</sup>                   | 23.91 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>              |             | <b>TPES</b>  |  |
| 10 847 904 (2020) <sup>1</sup> |             | Total: 362 632 TJ (2018)<br>(Renewable: 30 727 TJ) |  |

## Renewable energy targets in latest NDC

### By 2030:

- Installation of 477 MW of wind.
- Installation of 479 MW of solar photovoltaic.
- Installation of 21 MW of power in small and medium-scale hydroelectric plants.
- 100% hybrid and electric vehicles with recharges from renewable sources.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (40% area),  
1 600-1 800 kWh/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 installed capacity (MW, %)**

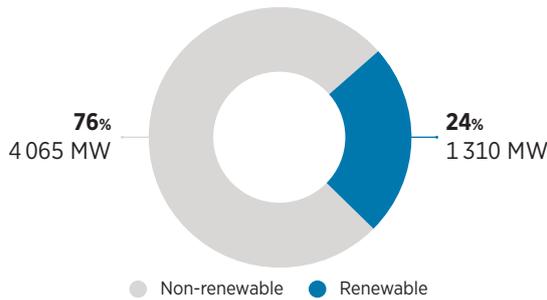
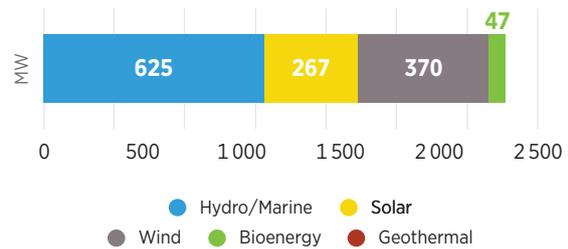


Figure 2 **Renewable generation by technology (MW)**



1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch

## IRENA climate action engagement in Dominican Republic

### Support completed

|   |   |  |
|---|---|--|
| 1 | Technical inputs from the REmap study to scale up renewable heating, cooling and transport technology options |  |
|   | <b>Work package:</b><br>Renewable energy roadmap  | <b>Source:</b><br>Government of the Dominican Republic |

### Support under implementation

|   |   |  |
|---|---|--|
| 1 | 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 vs. required/best practices;   |  |
|   | b. Consolidation of data gaps into implementation solutions;  |  |
|   | c. Implementation proposal for each data gap solution;  |  |
|   | d. Design of a programme for the calculation of local greenhouse gas emission factors for the energy sector, including capacity building with academia  |  |
|   | <b>Work package:</b><br>Data and statistics   | <b>Source:</b><br>NDC Partnership (CAEP) |
| 2 | MRV analysis and implementation support (MRV design and implementation plan), including:  |  |
|   | a. Quality review of current MRVs across energy sub-sectors;  |  |
|   | b. Identifying requirements from MRV stakeholders (emission calculations, reporting structure, etc);  |  |
|   | c. Designing of modified/new MRV systems; and   |  |
|   | d. Implementation plan for MRVs across energy sectors   |  |
|   | <b>Work package:</b><br>Monitoring, reporting and verification (MRV)  | <b>Source:</b><br>NDC Partnership (CAEP) |
| 3 | Capacity building technical module to deploy climate-resilient energy solutions as part of national climate plans   |  |
|   | <b>Work package:</b><br>Climate technology and infrastructure   | <b>Source:</b><br>NDC Partnership (CAEP) |
| 4 | Support with the energy sector climate action implementation plan, including renewable energy options for the power, transport, and industry sectors, outlining cost assessment and benefits of priority action |  |
|   | <b>Work package:</b><br>Climate technology and infrastructure   | <b>Source:</b><br>NDC Partnership        |

### Acknowledgement of IRENA support

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

(DOMINICAN REPUBLIC'S FIRST NDC UPDATED SUBMISSION, 29 DECEMBER 2020)



# ECUADOR

|                                |   |  |
|--------------------------------|---|--|
| <b>Membership since</b>        | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 12 February 2011               | USD 5 600.38 (2020) <sup>2</sup>                    | 38.2 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>              | <b>TPES</b>   |  |
| 17 643 060 (2020) <sup>1</sup> | Total: 610 062 TJ (2018)<br>(Renewable: 113 250 TJ) |  |

## Renewable energy targets in latest NDC

### Conditional (by 2050):

Promote 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

- **Solar PV:** 1 200 kWh/kWp/yr (36% area),  
1 200-1 400 kWh/kWp/yr (47% area),  
1 400-1 600 kWh/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 installed capacity (MW, %)**

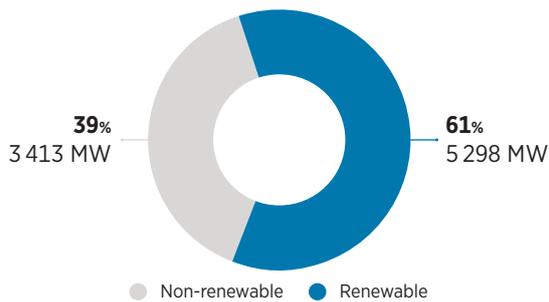
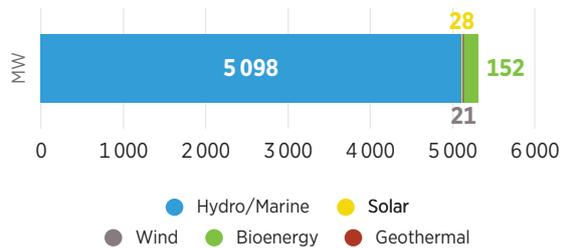


Figure 2 **Renewable generation by technology (MW)**



1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch

## 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><br>Project facilitation  | <b>Source:</b><br>NDC Partnership (CAEP) |
| 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, strengthen the country's capacities for energy planning and contribute to the preparation of roadmaps and long-term sectoral plans |  |
|   | <b>Work package:</b><br>Long-term energy planning   | <b>Source:</b><br>NDC Partnership (CAEP) |
| 3 | A total of seven solar PV and wind sites were assessed through the Global Atlas site appraisal service  |  |
|   | <b>Work package:</b><br>Resource assessment   | <b>Source:</b><br>Government of Ecuador  |

### Support in implementation

|   |   |  |
|---|---|--|
| 1 | Automatisation of the calculations of the emission factors for the national grid to better predict emissions from energy generation   |  |
|   | <b>Work package:</b><br>Data and statistics   | <b>Source:</b><br>NDC Partnership (CAEP) |
| 2 | Support to enhance data, information and methods required to produce robust NDCs and NDC tracking in the Energy and Waste sectors. Analysis of the 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><br>Monitoring, reporting and verification (MRV)  | <b>Source:</b><br>NDC Partnership (CAEP) |



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# EGYPT

|   |   |  |
|---|---|--|
| <b>Membership since</b>                               | <b>GDP per capita</b>   | <b>Energy-related emissions relative to global</b> |
| 11 July 2012  | USD 3 547.87 (2020) <sup>2</sup>  | 239.74 MtCO <sub>2</sub> e (2018) <sup>3</sup>     |
| <b>Population</b>                                     | <b>TPES</b>   |  |
| 102 334 403 (2020) <sup>1</sup>                       | Total: 3 734 509 TJ (2018)<br>(Renewable: 295 871 TJ)   |  |
| <b>Renewable energy targets in latest NDC</b>         | <b>Resource potential</b>   |  |
| Does not include quantified renewable energy targets. | <ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1 800-1 900 kWh/kWp/yr (23% area), 1 900 -2 000 kWh/kWp/yr (65% area)</li> <li>• <b>Wind:</b> 260-420 W/m<sup>2</sup> (57% 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 installed capacity (MW, %)**

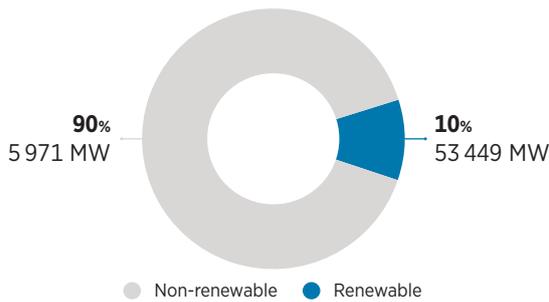
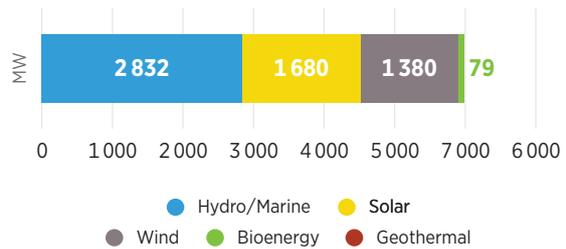


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Egypt

### Support in implementation

Develop MRV system in line with international standard

|          |  |                                       |
|----------|--|---------------------------------------|
| <b>1</b> | <b>Work package:</b><br>Monitoring, reporting and verification (MRV) | <b>Source:</b><br>Government of Egypt |
|----------|--|---------------------------------------|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# EL SALVADOR

|                               |  |  |
|-------------------------------|--|--|
| <b>Membership since</b>       | <b>GDP per capita</b>                              | <b>Energy-related emissions relative to global</b> |
| 21 June 2017                  | USD 3 798.63 (2020) <sup>2</sup>                   | 7.08 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>             | <b>TPES</b>  |  |
| 6 486 201 (2020) <sup>1</sup> | Total: 170 879 TJ (2018)<br>(Renewable: 84 933 TJ) |  |

## Renewable energy targets in latest NDC

Increase renewable energy by 2025 no less than 12% relative to the total electricity generated in 2014.

## Resource potential

- **Solar PV:** 1 600-1 800 kWh/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 installed capacity (MW, %)**

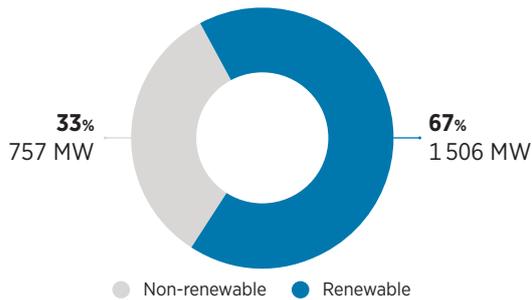
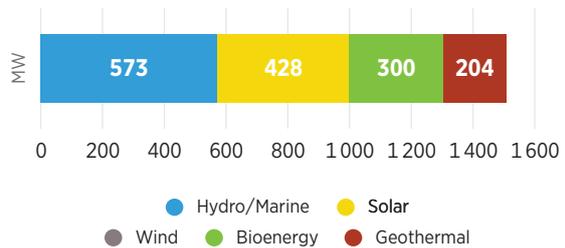


Figure 2 **Renewable generation by technology (MW)**



1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch

## IRENA climate action engagement in El Salvador

### 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><br>Renewables readiness assessment  | <b>Source:</b><br>Government of El Salvador |
| 2 | Technology roadmap for renewable energy applications in the agri-food industry   |   |
|   | <b>Work package:</b><br>Climate technology and infrastructure  | <b>Source:</b><br>Government of El Salvador |
| 3 | Revision of national GHG greenhouse gas targets' mitigation potential under the best information available. Includes reviewing inventories to secure ensure that national GHG targets are reasonable and ambitious under the best available information derived from the latest inventories, country GDP, population growth and national priorities, in order to inform more accurate mitigation targets under the NDC |   |
|   | <b>Work package:</b><br>Data and statistics  | <b>Source:</b><br>Government of El Salvador |
| 4 | 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  |   |
|   | <b>Work package:</b><br>Monitoring, reporting and verification (MRV)   | <b>Source:</b><br>Government of El Salvador |
| 5 | Support country in providing guidance in the NDC drafting, through the identification of best practices and peer-to-peer support with other countries in the region. Following up on country's the NDC drafting process, providing reviews and inputs to the energy component  |   |
|   | <b>Work package:</b><br>NDC drafting support   | <b>Source:</b><br>Government of El Salvador |



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# ESWATINI

|                               |             |   |  |
|-------------------------------|-------------|---|--|
| <b>Membership since</b>       | <b>LLDC</b> | <b>GDP per capita</b>                             | <b>Energy-related emissions relative to global</b> |
| 3 April 2011                  |             | USD 3 415.50 (2020) <sup>2</sup>                  | 1.46 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>             |             | <b>TPES</b>                                       |  |
| 1 160 164 (2020) <sup>1</sup> |             | Total: 43 588 TJ (2018)<br>(Renewable: 29 595 TJ) |  |

### Renewable energy targets in latest NDC

Increase the share of renewable energy to 50% in the electricity mix by 2030 through the adoption of solar, wind, biomass, hydro, and solar water heater technologies

- 55.85 MW solar photovoltaic
- 80 MW hydro-electric
- 95 MW biomass.

### Resource potential

- **Solar PV:** 1 400-1 800 kWh/kWp/yr (68% area),  
1 600-1 800 kWh/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 installed capacity (MW, %)

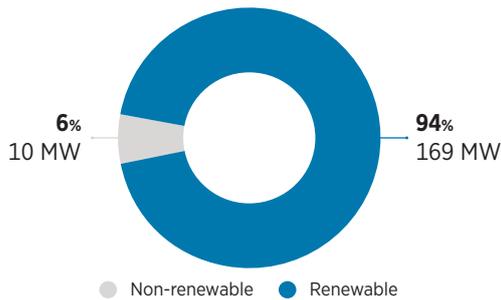
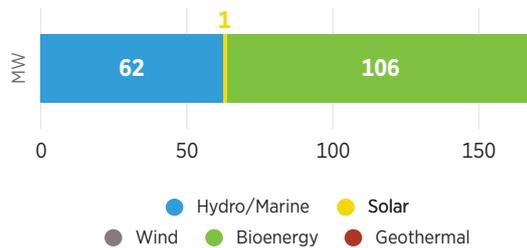


Figure 2 Renewable generation by technology (MW)



## 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 support country officials in prioritising mitigation options that can serve as an input to the NDC for the power and other relevant sectors

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

**Source:**  
Government of Eswatini

### 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 NDC UPDATED SUBMISSION, 9 OCTOBER 2021)

<sup>1,2,3</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch



FIJI

|                             |             |  |  |
|-----------------------------|-------------|--|--|
| <b>Membership since</b>     | <b>SIDS</b> | <b>GDP per capita</b>                            | <b>Energy-related emissions relative to global</b> |
| 2 December 2010             |             | USD 4 881.52 (2020) <sup>2</sup>                 | 58.45 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>           |             | <b>TPES</b>                                      |  |
| 896 444 (2020) <sup>1</sup> |             | Total: 24 998 TJ (2018)<br>(Renewable: 6 440 TJ) |  |

### Renewable energy targets in latest NDC

**Conditional and unconditional (by 2030):**  
100% of electricity from renewables including hydropower, geothermal, biomass, grid-connected solar and wind.

### Resource potential

- **Solar PV:** <260 kWh/kWp/yr (22% area),  
1 200-1 400 kWh/kWp/yr (56% area),  
1 400-1 600 kWh/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 installed capacity (MW, %)**

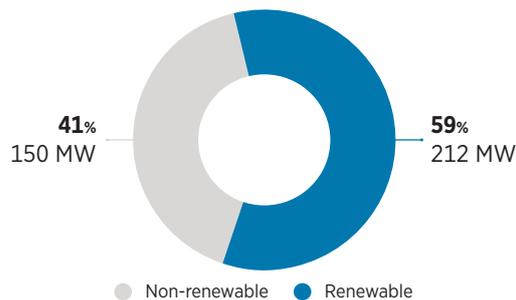
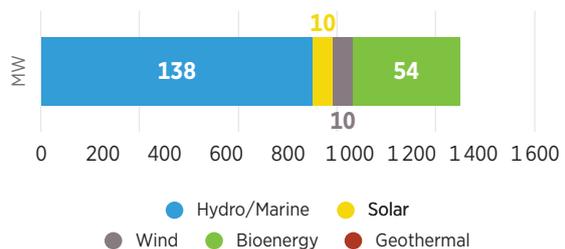


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Fiji

### Support completed

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

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# GABON

## Membership since

11 June 2015

## Population

2 225 728 (2020)<sup>1</sup>

## GDP per capita

USD 7 005.87 (2020)<sup>2</sup>

## TPES

Total: 105 366 TJ (2017)  
(Renewable: 58 972 TJ)

## Energy-related emissions relative to global

4.83 MtCO<sub>2</sub>e (2018)<sup>3</sup>

## Renewable energy targets in latest NDC

80% of hydropower by 2025 (equivalent to a 48% reduction in emissions in electricity sector by 2025).

## Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (93% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

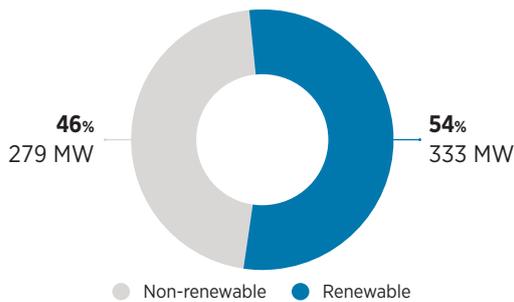
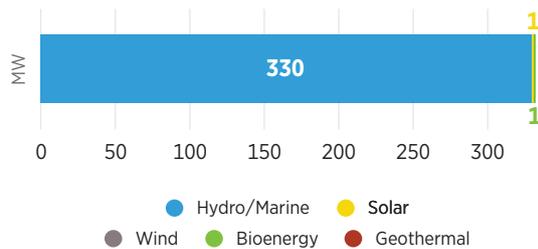


Figure 2 **Renewable generation by technology (MW)**



## 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 Gabon's NDC

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

**Source:**  
NDC Partnership (CAEP)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# THE GAMBIA

|                               |            |  |  |
|-------------------------------|------------|--|--|
| <b>Membership since</b>       | <b>LDC</b> | <b>GDP per capita</b>                            | <b>Energy-related emissions relative to global</b> |
| 31 March 2011                 |            | USD 787.0 (2020) <sup>2</sup>                    | 1 MtCO <sub>2</sub> e (2018) <sup>3</sup>          |
| <b>Population</b>             |            | <b>TPES</b>                                      |  |
| 2 225 728 (2020) <sup>1</sup> |            | Total: 14 485 TJ (2018)<br>(Renewable: 7 002 TJ) |  |

## Renewable energy targets in latest NDC

### Unconditional:

Solar home systems to supply off-grid consumption

### Conditional:

89 MW of utility-scale solar PV capacity.  
3.6 MW of utility-scale wind capacity. Reduction of transmission and distribution losses to 17%.  
Full replacement of diesel mini-grids with solar PV

and battery storage systems. Solar water heating facilities to supply 10% of demand by 2030  
6 MW of solar PV rooftop systems by 2024.

## Resource potential

- **Solar PV:** 1 600-1 800 kWh/kWp/yr (100% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 Total installed capacity (MW, %)

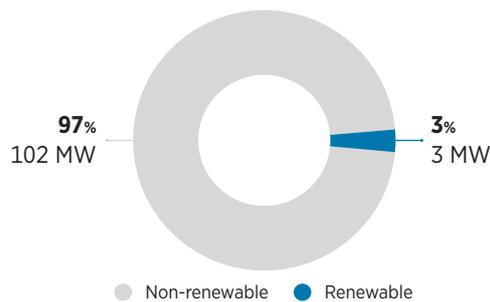
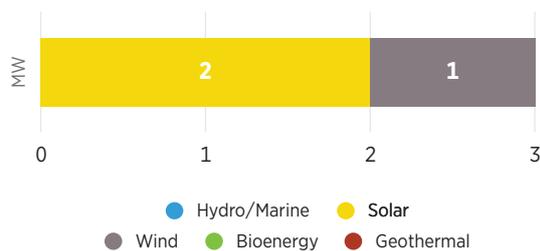


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in The Gambia

### Support completed

Technical power sector study to support the identification of cost-effective mitigation options for the energy sector to support the country in prioritising mitigation options that can serve as an input to the

- 1 NDC for the power and other relevant sectors

**Work package:**  
Climate technology and infrastructure

**Source:**  
NDC Partnership (CAEP)

### 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)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch

### Membership since

8 July 2010

### Population

3 714 000 (2020)<sup>1</sup>

### GDP per capita

USD 4 278.86 (2020)<sup>2</sup>

### TPES

Total: 199 693 TJ (2018)  
(Renewable: 46 529 TJ)

### Energy-related emissions relative to global

9.77 MtCO<sub>2</sub>e (2018)<sup>3</sup>

### Renewable energy targets in latest NDC

Doesn't include quantified renewable energy targets in NDC.

### Resource potential

- **Solar PV:** 1 200 kWh/kWp/yr (25% area),  
1 200-1 400 kWh/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 installed capacity (MW, %)**

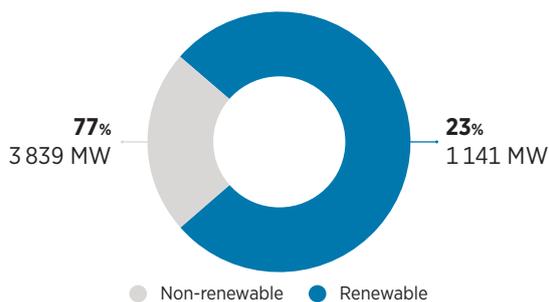
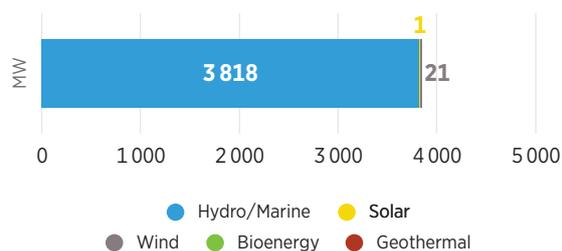


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Georgia

### Support in discussion

Support is currently under discussion

1

Work package:

Source:

NDC Partnership

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# GRENADA

|                             |   |  |
|-----------------------------|---|--|
| <b>Membership since</b>     | <b>GDP per capita</b>                         | <b>Energy-related emissions relative to global</b> |
| 15 July 2011                | USD 9 680.18 (2020) <sup>2</sup>              | 0.3 MtCO <sub>2</sub> e (2018) <sup>3</sup>        |
| <b>Population</b>           | <b>TPES</b>                                   |  |
| 112 519 (2020) <sup>1</sup> | Total: 4 817 TJ (2018)<br>(Renewable: 427 TJ) |  |

### Renewable energy targets in latest NDC

Doesn't include quantified renewable energy target in NDC.

### Resource potential

- **Solar PV:** 1 600-1 800 kWh/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 installed capacity (MW, %)**

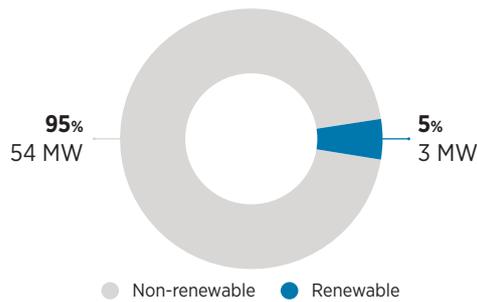
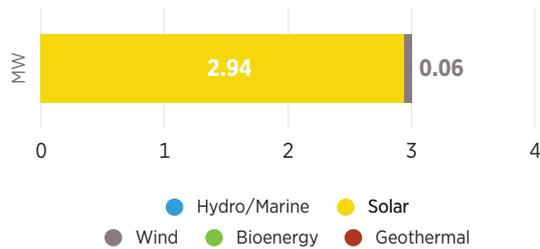


Figure 2 **Renewable generation by technology (MW)**



### Acknowledgement of IRENA support

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

(GRENADA'S SECOND NDC, 30 NOVEMBER 2020)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch

## IRENA climate action engagement in Grenada

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### Support completed

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1 Analyse and maintain the system, and improve energy-related data collection and management for greenhouse gas emission reporting and tracking

|   |  |
|---|--|
| <b>Work package:</b><br>Data and statistics | <b>Source:</b><br>NDC Partnership (CAEP) |
|---|--|

---

### Support in implementation

---

1 Capacity building on energy management and energy audits to improve energy efficiency

|   |  |
|---|--|
| <b>Work package:</b><br>Data and statistics | <b>Source:</b><br>NDC Partnership (CAEP) |
|---|--|

---

2 Technical analysis on power sector development considering a mix of renewables, conventional generation and battery storage to increase low- or zero-carbon fuels

|   |  |
|---|--|
| <b>Work package:</b><br>Climate technology and infrastructure | <b>Source:</b><br>UNDP Climate Promise |
|---|--|

---

3 Supporting assessment on intermittent renewable generation for facilitating renewable generation to achieve NDC renewable target

|   |  |
|---|--|
| <b>Work package:</b><br>Climate technology and infrastructure | <b>Source:</b><br>UNDP Climate Promise |
|---|--|

---



# GUYANA

|                             |             |  |  |
|-----------------------------|-------------|--|--|
| <b>Membership since</b>     | <b>SIDS</b> | <b>GDP per capita</b>                            | <b>Energy-related emissions relative to global</b> |
| 13 February 2014            |             | USD 6 955.93 (2020) <sup>2</sup>                 | 2.54 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>           |             | <b>TPES</b>                                      |  |
| 786 559 (2020) <sup>1</sup> |             | Total: 37 625 TJ (2018)<br>(Renewable: 5 031 TJ) |  |

## Renewable energy targets in latest NDC

**Conditional (by 2025):**  
100% of electricity from renewables,  
165 MW of hydropower.

**Unconditional:**  
26 MW of wind power.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (96% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

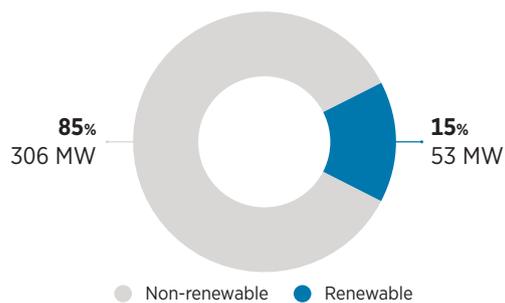
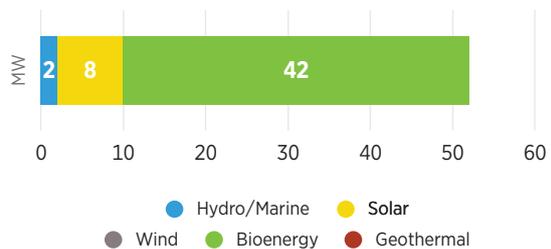


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Guyana

### Support in implementation

Activity is currently under discussion

|          |                      |  |
|----------|----------------------|--|
| <b>1</b> | <b>Work package:</b> | <b>Source:</b><br>Government of Guyana |
|----------|----------------------|--|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# INDONESIA

## Membership since

7 September 2014

## Population

273 523 621 (2020)<sup>1</sup>

## GDP per capita

USD 3 869.58 (2020)<sup>2</sup>

## TPES

Total: 10 466 599 TJ (2018)  
(Renewable: 2 280 387 TJ)

## Energy-related emissions relative to global

598.17 MtCO<sub>2</sub>e (2018)<sup>3</sup>

## Renewable energy targets in latest NDC

Primary energy supply mix with shares of new and renewable energy at least 23% in 2025 and at least 31% in 2050.

Develop renewable power plants including geothermal, hydropower, solar PV, wind turbine, biomass, and biofuel.

## Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (60% area), 1 400-1 600 kWh/kWp/yr (30% area), 1 600-1 800 kWh/kWp/yr (5% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area), 260-420 W/m<sup>2</sup> (2% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 Total installed capacity (MW, %)

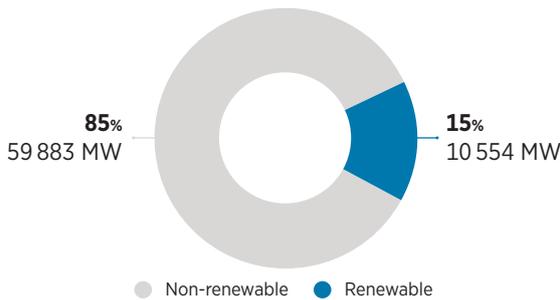
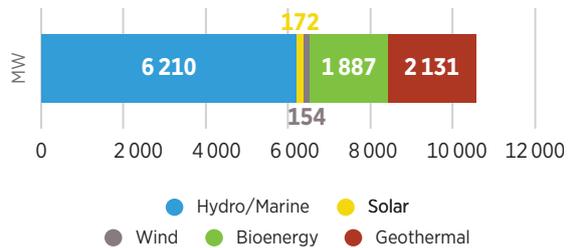


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Indonesia

### Support in implementation

|  |                                    |
|--|------------------------------------|
| Activity is currently under discussion |                                    |
| <b>1</b> Work package:                 | Source:<br>Government of Indonesia |
| Activity is currently under discussion |                                    |
| <b>2</b> Work package:                 | Source:<br>NDCP                    |

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# JORDAN

## Membership since

2 August 2014

## Population

10 203 140 (2020)<sup>1</sup>

## GDP per capita

USD 4 282.76 (2020)<sup>2</sup>

## TPES

Total: 386 955 TJ (2018)  
(Renewable: 14 866 TJ)

## Energy-related emissions relative to global

23.47 MtCO<sub>2</sub>e (2018)<sup>3</sup>

## Renewable energy targets in latest NDC

Increase shares of renewable energy to 35% of electricity generation by 2030

- 185 MW solar photovoltaic
- 100 MW and 300 MW of concentrated solar power.

## Resource potential

- **Solar PV:** 1 800-1 900 kWh/kWp/yr (50% area), 1 900-2 000 kWh/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 installed capacity (MW, %)

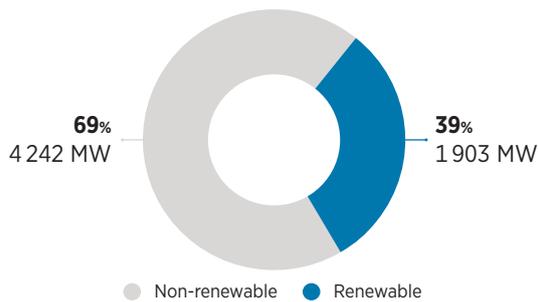
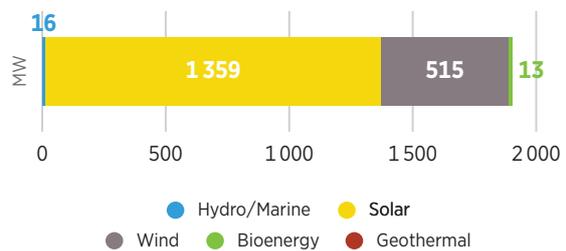


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Jordan

### Support in implementation

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

**Work package:**  
Renewables readiness assessment

**Source:**  
NDC Partnership (CAEP)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# KAZAKHSTAN

## Membership since

5 July 2013

LLDC

## GDP per capita

USD 9 055.74 (2020)<sup>2</sup>

## Energy-related emissions relative to global

238.08 MtCO<sub>2</sub>e (2018)<sup>3</sup>

## Population

18 754 440 (2020)<sup>1</sup>

## TPES

Total: 3 106 466 TJ (2018)  
(Renewable: 43 172 TJ)

## Renewable energy targets in latest NDC

Wind and solar share in total electricity production of 3% by 2020 and 10% by 2030; 50% of electricity generation from alternative sources (renewable and nuclear) by 2050.

## Resource potential

- **Solar PV:** <1 200 kWh/kWp/yr (10% area),  
1 200-1 400 kWh/kWp/yr (59% area),  
1 400-1 600 kWh/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 installed capacity (MW, %)

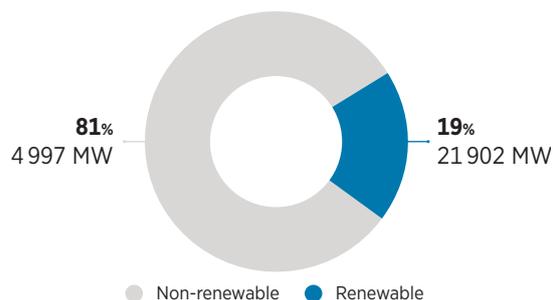
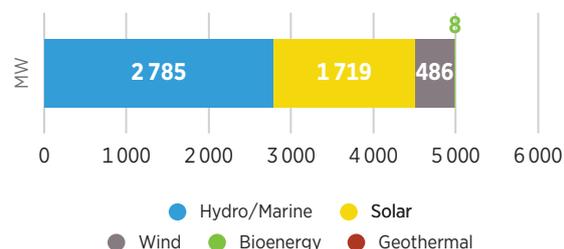


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Kazakhstan

### Support in Implementation

Support on the development the energy data audit report

1

**Work package:**  
Data and statistics

**Source:**  
UNDP

Development of the MRV system through data collection and compilation including capacity building on MRV

2

**Work package:**  
MRV

**Source:**  
UNDP

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# KYRGYZSTAN

|                               |             |  |  |
|-------------------------------|-------------|--|--|
| <b>Membership since</b>       | <b>LLDC</b> | <b>GDP per capita</b>                              | <b>Energy-related emissions relative to global</b> |
| 14 May 2021                   |             | USD 1 173.61 (2020) <sup>2</sup>                   | 11.26 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>             |             | <b>TPES</b>  |  |
| 6 591 600 (2020) <sup>1</sup> |             | Total: 190 130 TJ (2018)<br>(Renewable: 47 509 TJ) |  |

### Renewable energy targets in latest NDC

Doesn't include quantified renewable energy targets in NDC.

### Resource potential

- **Solar PV:** <1 200-1 400 kWh/kWp/yr (37% area),  
1 400-1 600 kWh/kWp/yr (43% area),  
1 600-1 800 kWh/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> (7% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

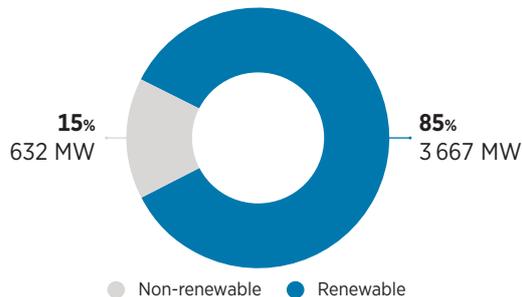
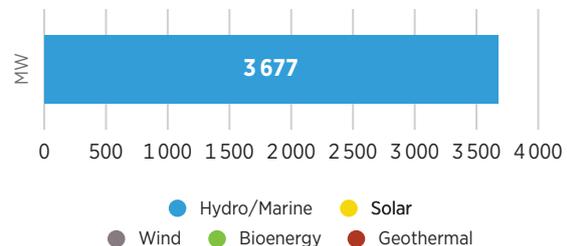


Figure 2 **Renewable generation by technology (MW)**



### Acknowledgement of IRENA support

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

(KYRGYZSTAN'S FIRST NDC UPDATED SUBMISSION, 9 OCTOBER 2021)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch

## IRENA climate action engagement in Kyrgyzstan

### 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

1

|  |                        |
|--|------------------------|
| <b>Work package:</b><br>NDC Note based on preliminary RRA findings | <b>Source:</b><br>UNDP |
|--|------------------------|

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

2

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

### Support in Implementation

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

1

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



JulianBuijzen © Shutterstock



# LAO PEOPLE'S DEMOCRATIC REPUBLIC

|                               |  |  |
|-------------------------------|--|--|
| <b>Membership since</b>       | <b>GDP per capita</b>                              | <b>Energy-related emissions relative to global</b> |
| LDC/LLDC                      | USD 2 630.20 (2020) <sup>2</sup>                   | 18.39 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>             | <b>TPES</b>  |  |
| 7 275 556 (2020) <sup>1</sup> | Total: 228 431 TJ (2018)<br>(Renewable: 29 927 TJ) |  |

## Renewable energy targets in latest NDC

### By 2030:

- 13 GW of hydro-power
- 1 GW of solar photovoltaic and wind
- 300 MW of biomass
- 50 000 energy efficient cook-stoves.

## Resource potential

- **Solar PV:** <1 200-1 400 kWh/kWp/yr (57% area),  
1 400-1 600 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 installed capacity (MW, %)**

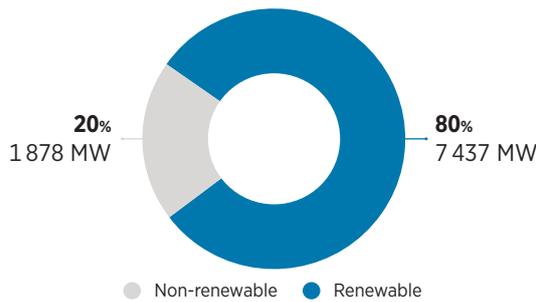
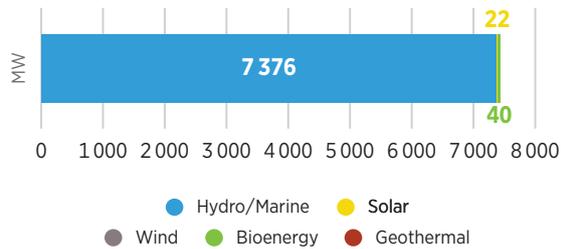


Figure 2 **Renewable generation by technology (MW)**



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

### Support in Implementation

Support is currently under discussion

|          |                      |                                   |
|----------|----------------------|-----------------------------------|
| <b>1</b> | <b>Work package:</b> | <b>Source:</b><br>NDC Partnership |
|----------|----------------------|-----------------------------------|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# LEBANON

|                               |   |  |
|-------------------------------|---|--|
| <b>Membership since</b>       | <b>GDP per capita</b>                             | <b>Energy-related emissions relative to global</b> |
| 4 November 2017               | USD 4 891.0 (2020) <sup>2</sup>                   | 25.48 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>             | <b>TPES</b>                                       |  |
| 6 825 442 (2020) <sup>1</sup> | Total: 368 764 TJ (2018)<br>(Renewable: 9 863 TJ) |  |

## Renewable energy targets in latest NDC

**Unconditional (by 2030):**  
generate 18% of its power demand (i.e. electricity demand) and 11% of its heat demand (in the building sector) from renewable energy sources.

**Conditional (by 2030):**  
generate 30% of its power demand (i.e. electricity demand) and 16.5% of its heat demand (in the building sector) from renewable energy sources.

## Resource potential

- **Solar PV:** <1 600-1 800 kWh/kWp/yr (62% area)
- **Wind:** 260 W/m<sup>2</sup> (82% area), 260-420 W/m<sup>2</sup> (10% area)
- **Biomass:** 0.5 tC/ha/yr

Figure 1 Total installed capacity (MW, %)

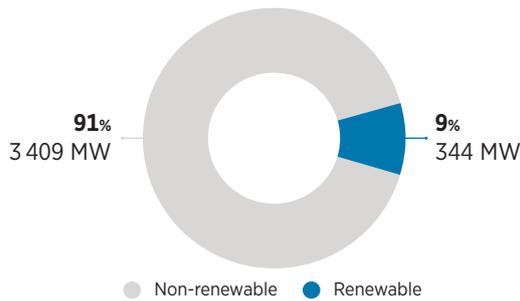
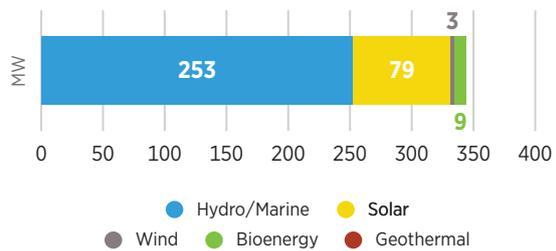


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Lebanon

### Support completed

Combination of the two IRENA methodologies – Renewable Readiness Assessment (RRA) and Renewable Energy Roadmap (REmap) – to inform decision makers on the potential to scale up

#### 1 renewable energy ambitions

**Work package:**  
Renewable energy outlook

**Source:**  
Government of Lebanon

### 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 NDC, UPDATED SUBMISSION, 16 MARCH 2021)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# LIBERIA

|                               |            |   |  |
|-------------------------------|------------|---|--|
| <b>State in accession</b>     | <b>LDC</b> | <b>GDP per capita</b>                             | <b>Energy-related emissions relative to global</b> |
| <b>Population</b>             |            | USD 583.27 (2020) <sup>2</sup>                    | 8.19 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| 5 057 677 (2020) <sup>1</sup> |            | <b>TPES</b>                                       |  |
|                               |            | Total: 98 113 TJ (2018)<br>(Renewable: 84 181 TJ) |  |

## Renewable energy targets in latest NDC

### By 2030:

- Develop off-grid small hydropower plants with 20 MW capacity
- medium HPP with an output of 40 GWh/year and with 50% base load minimum for rural electrification and connected to the grid
- 10 MW of solar photovoltaic plants.

## Resource potential

- **Solar PV:** <1 200-1 400 kWh/kWp/yr (46% area), 1 400-1 600 kWh/kWp/yr (55% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 7.5 tC/ha/yr

Figure 1 Total installed capacity (MW, %)

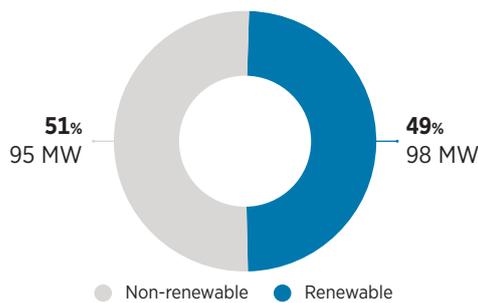
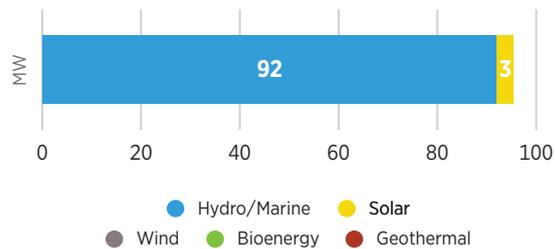


Figure 2 Renewable generation by technology (MW)



## 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><br>Climate innovation and technology capacity building | <b>Source:</b><br>NDC Partnership (CAEP) |
|----------|---|--|

## 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'S FIRST NDC, UPDATED SUBMISSION, 4 AUGUST 2021)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# MALI

|                                    |   |  |
|------------------------------------|---|--|
| <b>Membership since</b>            | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 18 November 2010 <b>LDC / LLDC</b> | <b>USD 858.91 (2020)<sup>2</sup></b>                |  |
| <b>Population</b>                  | <b>TPES</b>   | <b>7.89 MtCO<sub>2</sub>e (2018)<sup>3</sup></b>   |
| 20 250 834 (2020) <sup>1</sup>     | Total: 209 454 TJ (2018)<br>(Renewable: 162 182 TJ) |  |

## Renewable energy targets in latest NDC

**By 2030:**  
100 MW of large-scale renewable energy projects.

## Resource potential

- **Solar PV:** <1 600-1 800 kWh/kWp/yr (83% area),  
1 800-1 900 kWh/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 installed capacity (MW, %)**

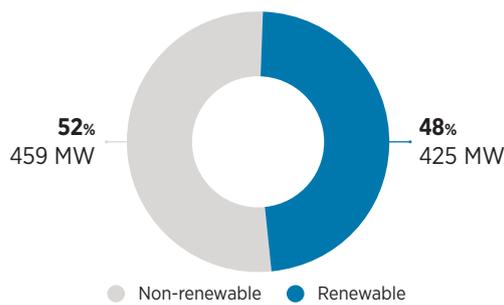
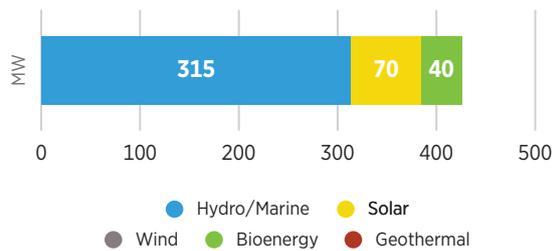


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Mali

### Support in Implementation

|   |  |   |  |
|---|--|---|--|
| Support on site assessment                        |  |   |  |
| <b>1</b>  | <table border="1"> <tr> <td><b>Work package:</b><br/>Resource assessment</td> <td><b>Source:</b><br/>Government of Mali</td> </tr> </table>  | <b>Work package:</b><br>Resource assessment       | <b>Source:</b><br>Government of Mali     |
| <b>Work package:</b><br>Resource assessment       | <b>Source:</b><br>Government of Mali   |   |  |
| <b>2</b>  | <p>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 Mali's NDC, strengthen Mali's capacities for energy planning and contribute to the preparation of roadmaps and long-term sectoral plans</p> <table border="1"> <tr> <td><b>Work package:</b><br/>Long-term energy planning</td> <td><b>Source:</b><br/>NDC Partnership (CAEP)</td> </tr> </table> | <b>Work package:</b><br>Long-term energy planning | <b>Source:</b><br>NDC Partnership (CAEP) |
| <b>Work package:</b><br>Long-term energy planning | <b>Source:</b><br>NDC Partnership (CAEP)   |   |  |

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# MAURITIUS

|                                 |  |  |
|---------------------------------|--|--|
| <b>Membership since</b>         | <b>GDP per capita</b>                            | <b>Energy-related emissions relative to global</b> |
| 24 April 2011 <b>SIDS / LDC</b> | USD 8 622.67 (2020) <sup>2</sup>                 | 4.19 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>               | <b>TPES</b>                                      |  |
| 1 265 740 (2020) <sup>1</sup>   | Total: 68 851 TJ (2018)<br>(Renewable: 9 791 TJ) |  |

## Renewable energy targets in latest NDC

### Unconditional and conditional (by 2030 or before):

- production of 60% of energy needs from green sources
- the total phasing out of use of coal and the development of the biomass framework;

## Resource potential

- **Solar PV:** <1 400-1600 kWh/kWp/yr (17% area),  
1 600-1 800 kWh/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 installed capacity (MW, %)**

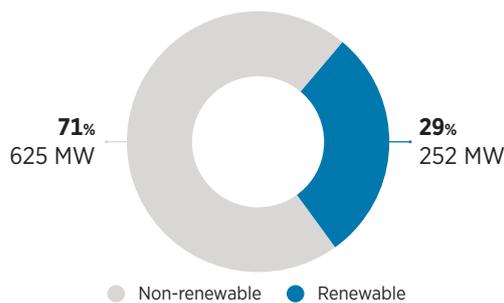
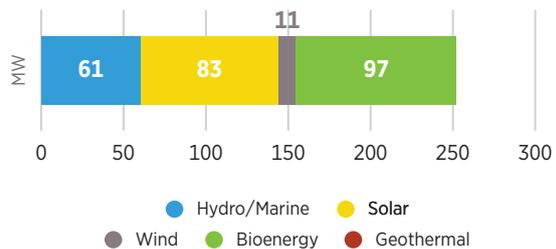


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Mauritius

### Support in Implementation

SolarCity simulator

1

**Work package:**  
Resource assessment

**Source:**  
Government of Mauritius

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# MONGOLIA

|                               |             |   |  |
|-------------------------------|-------------|---|--|
| <b>Membership since</b>       | <b>LLDC</b> | <b>GDP per capita</b>                             | <b>Energy-related emissions relative to global</b> |
| 11 April 2010                 |             | USD 4 007.30 (2020) <sup>2</sup>                  | 23.04 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>             |             | <b>TPES</b>                                       |  |
| 3 278 292 (2020) <sup>1</sup> |             | Total: 543 806 TJ (2018)<br>(Renewable: 8 300 TJ) |  |

## Renewable energy targets in latest NDC

20% renewable energy generation capacity by 2023 and 30% by 2030.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (16% area), 1 600-1 800 kWh/kWp/yr (56% area), 1 800-1 900 kWh/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 installed capacity (MW, %)

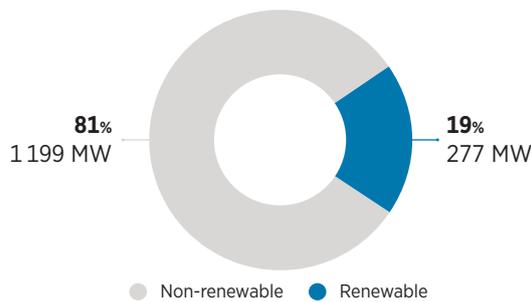
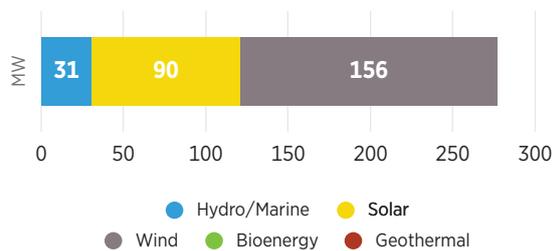


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Mongolia

### Support in Implementation

|          |   |  |
|----------|---|--|
|          | Policy advice on heating and cooling in the buildings sector                              |  |
| <b>1</b> | <b>Work package:</b><br>Policy advice   | <b>Source:</b><br>Government of Mongolia |
|          | Technical assistance for Mongolia's long-term low emission development strategy (LT-LEDS) |  |
| <b>2</b> | <b>Work package:</b><br>Development of long-term low emission development strategy        | <b>Source:</b><br>Government of Mongolia |
|          | Integrated approach for capacity building on mitigation and adaptation co-benefits        |  |
| <b>3</b> | <b>Work package:</b><br>Climate innovation and technology capacity building               | <b>Source:</b><br>Government of Mongolia |
|          | Activity is currently under discussion  |  |
| <b>4</b> | <b>Work package:</b><br>Project facilitation  | <b>Source:</b><br>Government of Mongolia |

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# MOROCCO

|                                |   |  |
|--------------------------------|---|--|
| <b>Membership since</b>        | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 24 December 2015               | USD 3 009.25 (2020) <sup>2</sup>                    | 65.84 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>              | <b>TPES</b>   |  |
| 36 910 558 (2020) <sup>1</sup> | Total: 876 953 TJ (2018)<br>(Renewable: 100 618 TJ) |  |

## Renewable energy targets in latest NDC

Achieve 52% of the installed electrical power from sources renewable, of which 20% in solar energy, 20% in wind energy and 12% in hydropower by 2030.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (3% area),  
1 600-1 800 kWh/kWp/yr (32% area),  
1 800-1 900 kWh/kWp/yr (57% area),  
1 900-2 000 kWh/kWp/yr (10% area)
- **Wind:** <260 W/m<sup>2</sup> (45% area),  
260-420 W/m<sup>2</sup> (37% area),  
420-560 W/m<sup>2</sup> (10% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

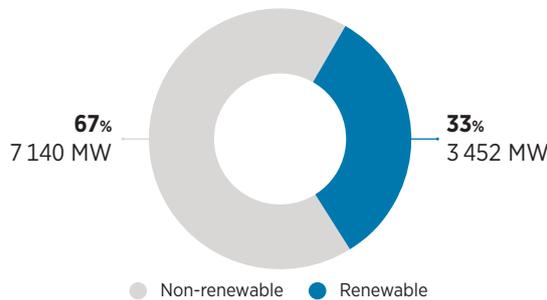
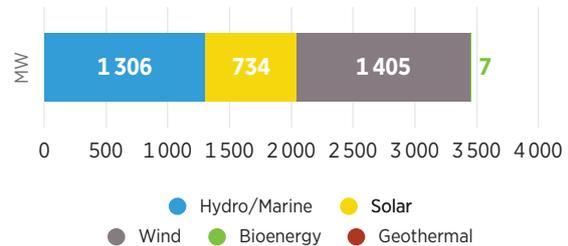


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Morocco

### Support in Implementation

Activity is currently under discussion

|          |                      |   |
|----------|----------------------|---|
| <b>1</b> | <b>Work package:</b> | <b>Source:</b><br>Government of Morocco |
|----------|----------------------|---|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# MOZAMBIQUE

|                                |            |   |  |
|--------------------------------|------------|---|--|
| <b>Membership since</b>        | <b>LDC</b> | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 28 April 2011                  |            | USD 448.60 (2020) <sup>2</sup>                      | 11.36 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>              |            | <b>TPES</b>   |  |
| 31 255 435 (2020) <sup>1</sup> |            | Total: 446 795 TJ (2018)<br>(Renewable: 349 981 TJ) |  |

## Renewable energy targets in latest NDC

Doesn't include quantified renewable energy targets in NDC.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (61% area), 1 600-1v800 kWh/kWp/yr (39% area)
- **Wind:** 260 W/m<sup>2</sup> (99% area), 260-420 W/m<sup>2</sup> (1% area)
- **Biomass:** 6.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

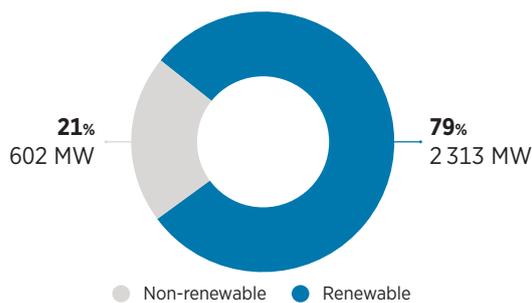
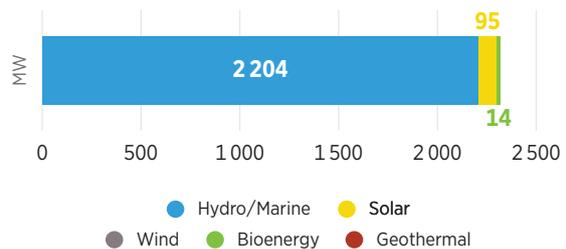


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Mozambique

### Support completed

Activity to develop and implement a training capacity-building package

|          |   |  |
|----------|---|--|
| <b>1</b> | <b>Work package:</b><br>Data and statistics | <b>Source:</b><br>NDC Partnership (CAEP) |
|----------|---|--|

Support on site assessment

|          |   |  |
|----------|---|--|
| <b>2</b> | <b>Work package:</b><br>Data and statistics | <b>Source:</b><br>Government of Mozambique |
|----------|---|--|

### Support in implementation

Conduct a study on a renewable energy off-grid regulatory framework and business models and carry out a capacity-building workshop on best practices in legal frameworks for licensing or concession for mini/micro-grids and different business models

|          |   |  |
|----------|---|--|
| <b>1</b> | <b>Work package:</b><br>Capacity building on policy and finance | <b>Source:</b><br>Government of Mozambique |
|----------|---|--|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# NAURU

## Membership since

9 September 2010

SIDS

## GDP per capita

USD 10 983.2 (2020)<sup>2</sup>

## Energy-related emissions relative to global

0.07 MtCO<sub>2</sub>e (2018)<sup>3</sup>

## Population

10 764 (2020)<sup>1</sup>

## TPES

Total: 751 TJ (2018)  
(Renewable: 5 TJ)

## Renewable energy targets in latest NDC

**Achieve 50% Renewable Energy Capacity (by 2050):** 6MW Solar PV with 5MW/2.5MW battery capacity and conduct technical assessment of non-solar (*i.e.* ocean thermal energy conversion and waste-to-energy) and low-carbon transport options.

## Resource potential

- **Solar PV:** 1 600-1 800 kWh/kWp/yr (100% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

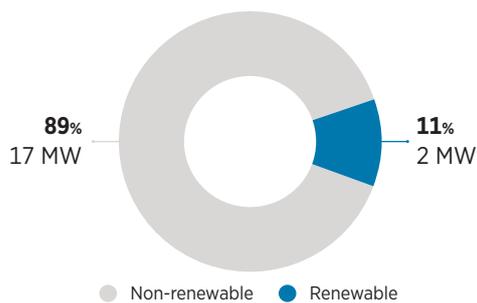
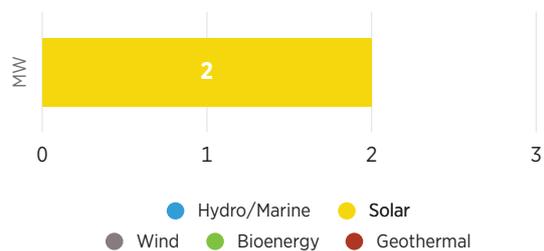


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Nauru

### Support in implementation

Support is currently under discussion

1 **Work package:**

**Source:**  
Pacific NDC Hub

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# NEPAL

## Membership since

14 December 2017 **LDC / LLDC**

## GDP per capita

USD 1 155.14 (2020)<sup>2</sup>

## Energy-related emissions relative to global

23.61 MtCO<sub>2</sub>e (2018)<sup>3</sup>

## Population

29 136 808 (2020)<sup>1</sup>

## TPES

Total: 595 722 TJ (2018)  
(Renewable: 458 542 TJ)

## Renewable energy targets in latest NDC

### Conditional and unconditional by 2030:

- By 2030, ensure 15% of the total energy demand is supplied from clean energy sources.
- By 2030, expand clean energy generation from approximately 1 400 MW to 15 000 MW, of which 5-10 % will be generated from mini and micro-hydro power, solar, wind and bio-energy. Of this, 5 000 MW is an unconditional target.

- By 2030, install an additional 200,000 household biogas plants and 500 large scale biogas plants institutional/industrial/ municipal/community).

### Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (36% area), 1 400-1 600 kWh/kWp/yr (41% area), 1 600-1 800 (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 installed capacity (MW, %)**

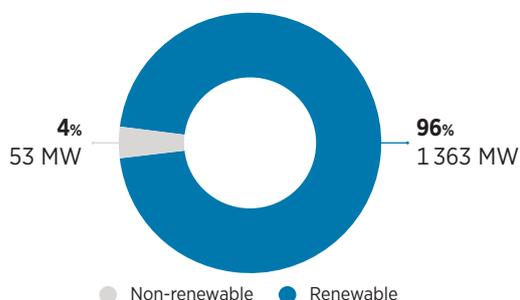
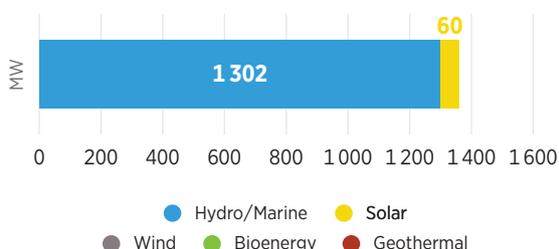


Figure 2 **Renewable generation by technology (MW)**



## 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

### Acknowledgement of IRENA support

*"We would like to record our appreciation for the feedback from IRENA on draft NDC received in a short notice ...."*

(LETTER RECEIVED FROM GOVERNMENT OF NEPAL, 18 DECEMBER 2020)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# NICARAGUA

## Membership since

23 October 2010

## Population

6 624 554 (2020)<sup>1</sup>

## GDP per capita

USD 1 905.25 (2020)<sup>2</sup>

## TPES

Total: 165 427 TJ (2018)  
(Renewable: 95 434 TJ)

## Energy-related emissions relative to global

5.98 MtCO<sub>2</sub>e (2018)<sup>3</sup>

## Renewable energy targets in latest NDC

Increase the electricity generation in renewable energy to 60 percent by 2030 adopting solar, wind and biomass.

## Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (23% area),  
1 400-1 600 kWh/kWp/yr (55% area),  
1 600-1 800 kWh/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 installed capacity (MW, %)

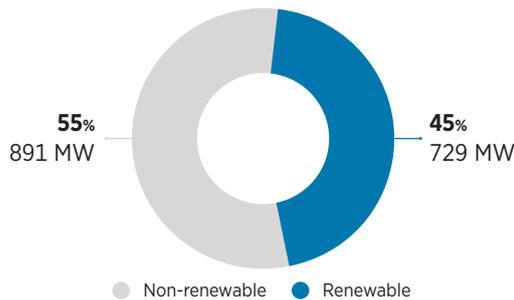
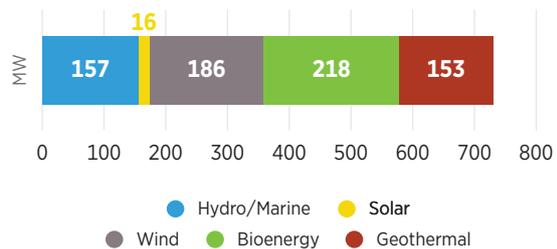


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Nicaragua

### Support completed

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

1

#### Work package:

Climate technology and infrastructure

#### Source:

NDC Partnership (CAEP)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



|                                    |   |  |
|------------------------------------|---|--|
| <b>Membership since</b>            | <b>GDP per capita</b>                             | <b>Energy-related emissions relative to global</b> |
| 16 December 2010 <b>LDC / LLDC</b> | <b>USD 565.1 (2020)<sup>2</sup></b>               |  |
| <b>Population</b>                  | <b>TPES</b>                                       | <b>7.25 MtCO<sub>2</sub>e (2018)<sup>3</sup></b>   |
| 24 206 636 (2020) <sup>1</sup>     | Total: 95 696 TJ (2018)<br>(Renewable: 67 410 TJ) |  |

|  |  |
|--|--|
| <b>Renewable energy targets in latest NDC</b>  | <b>Resource potential</b>  |
| <b>Conditional (by 2030):</b> <ul style="list-style-type: none"> <li>• 130 MW of hydro,</li> <li>• 20 MW of wind,</li> <li>• 30% renewable share in primary energy.</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1 600-1 800 kWh/kWp/yr (42% area),<br/>1 800-1 900 kWh/kWp/yr (48% area)</li> <li>• <b>Wind:</b> 260 W/m<sup>2</sup> (50% area),<br/>260-420 W/m<sup>2</sup> (43% area)</li> <li>• <b>Biomass:</b> 0.5 tC/ha/yr</li> </ul> |

Figure 1 **Total installed capacity (MW, %)**

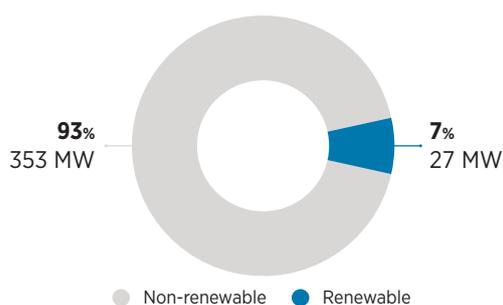
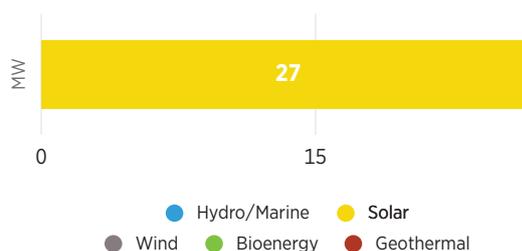


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Niger

### Support completed

- 1 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 the country's capacities for energy planning and contribute to the preparation of roadmaps and long-term sectoral plans

|   |  |
|---|--|
| <b>Work package:</b><br>Long-term energy planning | <b>Source:</b><br>NDC Partnership (CAEP) |
|---|--|

### Support in implementation

- 1 Strengthen the monitoring mechanism for NDC implementation by establishing a sustainable monitoring system, training stakeholders, defining the indicators, and establishing monitoring frequency and good data collection, analysis and reporting. Develop mini-greenhouse gas inventories and projections to inform new NDC targets

|  |  |
|--|--|
| <b>Work package:</b><br>Monitoring, reporting and verification (MRV) | <b>Source:</b><br>NDC Partnership (CAEP) |
|--|--|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch

# NIGERIA

|                                |   |  |
|--------------------------------|---|--|
| <b>Membership since</b>        | <b>GDP per capita</b>                                   | <b>Energy-related emissions relative to global</b> |
| 30 September 2010              | USD 565.06 (2020) <sup>2</sup>                          | 197.18 MtCO <sub>2</sub> e (2018) <sup>3</sup>     |
| <b>Population</b>              | <b>TPES</b>   |  |
| 24 206 636 (2020) <sup>1</sup> | Total: 6 592 429 TJ (2018)<br>(Renewable: 4 954 442 TJ) |  |

## Renewable energy targets in latest NDC

- 30% of on-grid electricity from renewables (12 GW additional large hydro, 3.5GW small hydro, 6.5 GW solar PV, 3.2 GW wind)
- 13 GW off-grid renewable energy (i.e. minigrid 5.3 GW, SHS and street lights 2.7 GW, self generation 5 GW)
- 13% of population using 7.3million improved cookstoves by 2030.

## Resource potential

- **Solar PV:** 1 400 - 1 600 kWh/kWp/yr (37% area),  
1 600 - 1 800 kWh/kWp/yr (45% area)
- **Wind:** 260 W/m<sup>2</sup> (50% area),  
260-420 W/m<sup>2</sup> (43% area)
- **Biomass:** 2.5 tC/ha/yr

Figure 1 Total installed capacity (MW, %)

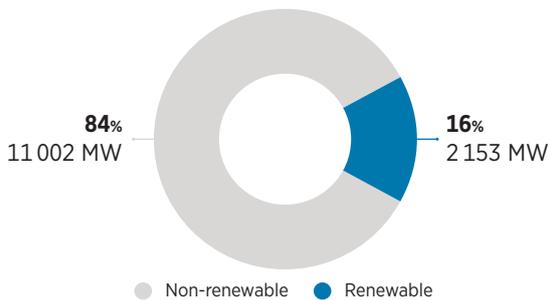
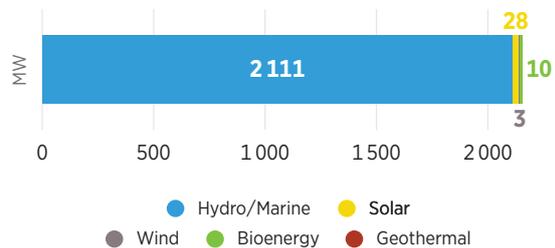


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Nigeria

### Support in implementation

|   |  |  |  |
|---|--|--|--|
| 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>1</b>  | <table border="1"> <tr> <td><b>Work package:</b><br/>Data and statistics</td> <td><b>Source:</b><br/>NDC Partnership (CAEP)</td> </tr> </table>                          | <b>Work package:</b><br>Data and statistics                          | <b>Source:</b><br>NDC Partnership (CAEP) |
| <b>Work package:</b><br>Data and statistics   | <b>Source:</b><br>NDC Partnership (CAEP)   |  |  |
| Development of four-sector MRV on agriculture, industry, transport, and oil and gas   |  |  |  |
| <b>2</b>  | <table border="1"> <tr> <td><b>Work package:</b><br/>Monitoring, reporting and verification (MRV)</td> <td><b>Source:</b><br/>NDC Partnership (CAEP)</td> </tr> </table> | <b>Work package:</b><br>Monitoring, reporting and verification (MRV) | <b>Source:</b><br>NDC Partnership (CAEP) |
| <b>Work package:</b><br>Monitoring, reporting and verification (MRV)  | <b>Source:</b><br>NDC Partnership (CAEP)   |  |  |

### 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 NDC UPDATED SUBMISSION, 30 JULY 2021)

<sup>1,2,3</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch



# NORTH MACEDONIA

|                               |             |  |  |
|-------------------------------|-------------|--|--|
| <b>Membership since</b>       | <b>LLDC</b> | <b>GDP per capita</b>                              | <b>Energy-related emissions relative to global</b> |
| 29 December 2010              |             | USD 5 888.0 (2020) <sup>2</sup>                    | 7.39 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>             |             | <b>TPES</b>  |  |
| 2 083 380 (2020) <sup>1</sup> |             | Total: 109 538 TJ (2018)<br>(Renewable: 19 182 TJ) |  |

## Renewable energy targets in latest NDC

### Renewable Energy Sources (RES):

- 38% share in gross final energy consumption
- 66% share in gross electricity production
- 45% share in gross final energy consumption for heating and cooling
- 10% in final energy consumption in transport.

## Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (65% area),  
1 400-1 600 kWh/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 installed capacity (MW, %)**

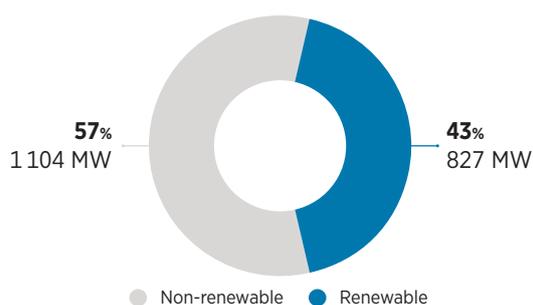
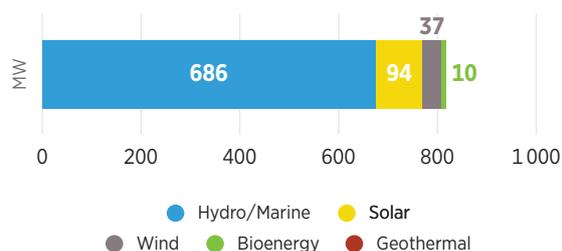


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in North Macedonia

### Support completed

Conducting the study “De-risking investments in North Macedonia: Renewable energy finance and policy focusing on power, heating and cooling”

1

**Work package:**  
Policy advice

**Source:**  
UNDP

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# PAKISTAN

## Membership since

23 June 2016

## Population

220 892 331 (2020)<sup>1</sup>

## GDP per capita

USD 1 193.73 (2020)<sup>2</sup>

## TPES

Total: 4 578 364 TJ (2018)  
(Renewable: 1 097 879 TJ)

## Energy-related emissions relative to global

210.75 MtCO<sub>2</sub>e (2018)<sup>3</sup>

## Renewable energy targets in latest NDC

- 60% of total electricity generation from renewable energy by 2030
- 30% electric vehicles by 2030.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (30% area),  
1 600-1 800 kWh/kWp/yr (39% area),  
1 800-1 900 kWh/kWp/yr (16% area),  
1 900-2 000 kWh/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 installed capacity (MW, %)

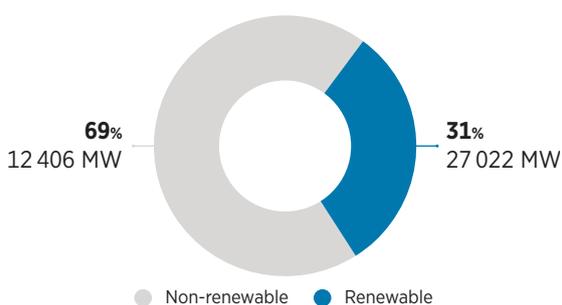
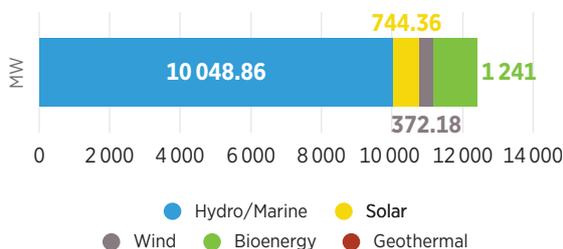


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Pakistan

### Support in implementation

Support is currently under discussion

1

Work package:

Source:

Government of Pakistan

<sup>1,2,3</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch



# PALAU

|                            |             |   |  |
|----------------------------|-------------|---|--|
| <b>Membership since</b>    | <b>SIDS</b> | <b>GDP per capita</b>                       | <b>Energy-related emissions relative to global</b> |
| 27 December 2009           |             | USD 14 907.8 (2020) <sup>2</sup>            | 0.29 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>          |             | <b>TPES</b>                                 |  |
| 18 001 (2020) <sup>1</sup> |             | Total: 2 971 TJ (2018)<br>(Renewable: 8 TJ) |  |

|   |   |
|---|---|
| <b>Renewable energy targets in latest NDC</b> | <b>Resource potential</b>   |
| 15 MW of solar and 10 MW of hydro.            | <ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1 400-1 600 kWh/kWp/yr (95% area)</li> <li>• <b>Wind:</b> 260 W/m<sup>2</sup> (100% area)</li> <li>• <b>Biomass:</b> 10.5 tC/ha/yr</li> </ul> |

Figure 1 **Total installed capacity (MW, %)**

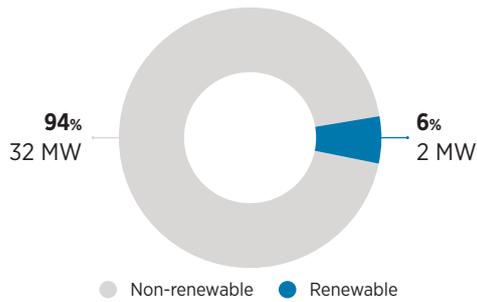
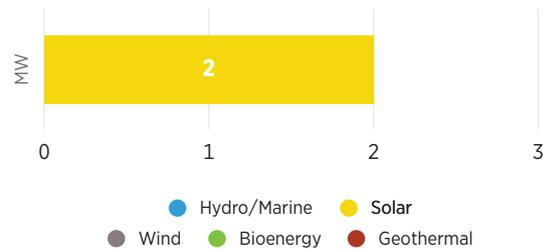


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Palau

### Support in implementation

Support on the green hydrogen roadmap

|          |  |                                   |
|----------|--|-----------------------------------|
| <b>1</b> | <b>Work package:</b><br>Power system flexibility | <b>Source:</b><br>Pacific NDC Hub |
|----------|--|-----------------------------------|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



|                               |  |  |
|-------------------------------|--|--|
| <b>Membership since</b>       | <b>GDP per capita</b>                              | <b>Energy-related emissions relative to global</b> |
| 15 January 2012               | USD 12 269.04 (2020) <sup>2</sup>                  | 9.94 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>             | <b>TPES</b>  |  |
| 4 314 768 (2020) <sup>1</sup> | Total: 173 806 TJ (2018)<br>(Renewable: 33 996 TJ) |  |

|   |   |
|---|---|
| <b>Renewable energy targets in latest NDC</b>                               | <b>Resource potential</b>   |
| 15% of Non-Conventional Renewable Energy Generation in Electricity by 2030. | <ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1 200-1 400 kWh/kWp/yr (43% area), 1 400-1 600 kWh/kWp/yr (52% area)</li> <li>• <b>Wind:</b> 260 W/m<sup>2</sup> (86% area), 260-420 W/m<sup>2</sup> (9% area)</li> <li>• <b>Biomass:</b> 8.5 tC/ha/yr</li> </ul> |

Figure 1 **Total installed capacity (MW, %)**

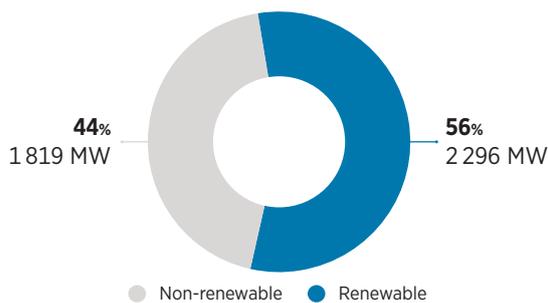
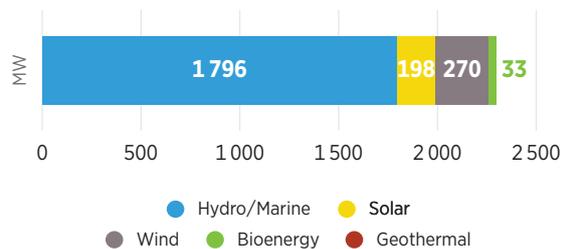


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Panama

### Support in implementation

Support is currently under discussion

|          |                      |  |
|----------|----------------------|--|
| <b>1</b> | <b>Work package:</b> | <b>Source:</b><br>Government of Panama |
|----------|----------------------|--|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# PAPUA NEW GUINEA

|                               |             |  |  |
|-------------------------------|-------------|--|--|
| <b>State in accession</b>     | <b>SIDS</b> | <b>GDP per capita</b>                              | <b>Energy-related emissions relative to global</b> |
| <b>Population</b>             |             | USD 2 636.80 (2020) <sup>2</sup>                   | 13.31 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| 8 947 027 (2020) <sup>1</sup> |             | <b>TPES</b>  |  |
|                               |             | Total: 165 688 TJ (2018)<br>(Renewable: 74 293 TJ) |  |

## Renewable energy targets in latest NDC

Increase the installed capacity of on-grid renewable electricity generation from 30% in 2015 to 78% in 2030.

## Resource potential

- **Solar PV:** 1 200 kWh/kWp/yr (16% area),  
1 200-1 400 kWh/kWp/yr (62% area),  
1 400-1 600 kWh/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 installed capacity (MW, %)**

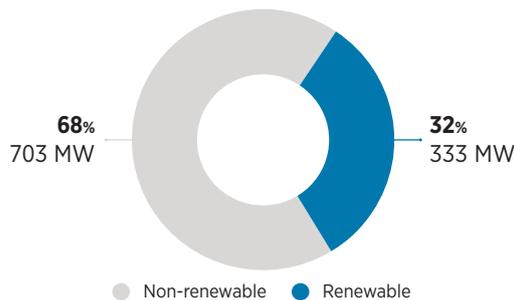
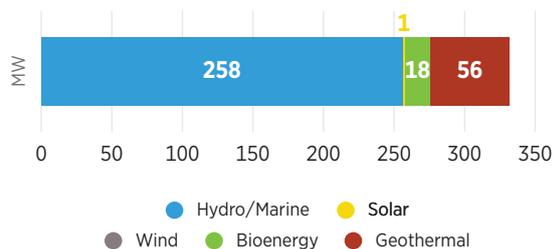


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Papua New Guinea

### Support completed

- 1 Provide support to develop a system of collecting reliable country-specific energy data and develop an integrated energy data management system with other sectors for planning and the Global Database of National Greenhouse Gas Inventory (GHGI) development

**Work package:**  
Data and statistics

**Source:**  
NDC Partnership (CAEP)

### Acknowledgement of IRENA support

*"Special thanks also go to a number of development partners including IRENA for invaluable support."*

(PAPUA NEW GUINEA'S FIRST NDC UPDATED SUBMISSION, 16 DECEMBER 2020)

<sup>1,2,3</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch



# PARAGUAY

|                               |             |   |  |
|-------------------------------|-------------|---|--|
| <b>Membership since</b>       | <b>LLDC</b> | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 2 March 2018                  |             | USD 4 949.74 (2020) <sup>2</sup>                    | 9.46 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>             |             | <b>TPES</b>   |  |
| 7 132 530 (2020) <sup>1</sup> |             | Total: 272 102 TJ (2018)<br>(Renewable: 155 366 TJ) |  |

## Renewable energy targets in latest NDC

Doesn't include quantified renewable energy targets in NDC.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (100% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 5.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

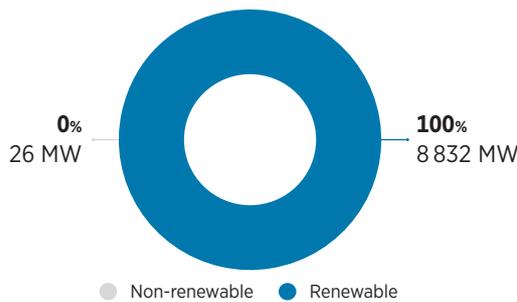
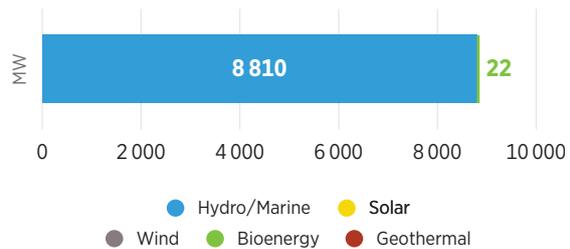


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Paraguay

### Support completed

Comprehensive evaluation 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><br>Renewables readiness assessment | <b>Source:</b><br>Government of Paraguay |
|---|--|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



**Membership since**

21 November 2013

**Population**

32 971 846 (2020)<sup>1</sup>

**GDP per capita**

USD 6 126.87 (2020)<sup>2</sup>

**TPES**

Total: 1 002 961 TJ (2018)  
(Renewable: 226 724 TJ)

**Energy-related emissions relative to global**

53.49 MtCO<sub>2</sub>e (2018)<sup>3</sup>

**Renewable energy targets in latest NDC**

Doesn't include quantified renewable energy targets in NDC.

**Resource potential**

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (43% area), 1 400-1 600 kWh/kWp/yr (23% area), 1 600-1 800 kWh/kWp/yr (10% area), 2 000 kWh/kWp/yr (9%)
- **Wind:** 260 W/m<sup>2</sup> (97% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

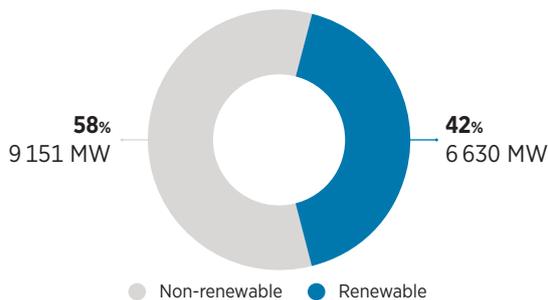
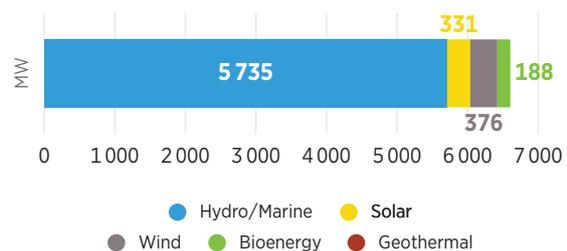


Figure 2 **Renewable generation by technology (MW)**



**IRENA climate action engagement in Peru**

**Support in implementation**

Support is currently under discussion

1

**Work package:**

**Source:**

NDC Partnership (CAEP)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# RWANDA

|                                |                   |  |  |
|--------------------------------|-------------------|--|--|
| <b>Membership since</b>        | <b>LDC / LLDC</b> | <b>GDP per capita</b>                              | <b>Energy-related emissions relative to global</b> |
| 24 June 2012                   |                   | USD 797.85 (2020) <sup>2</sup>                     | 2.07 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>              |                   | <b>TPES</b>  |  |
| 12 952 209 (2020) <sup>1</sup> |                   | Total: 101 207 TJ (2018)<br>(Renewable: 86 364 TJ) |  |

## Renewable energy targets in latest NDC

### Unconditional:

Development of 56.75 MW large hydro capacity (capacity > 5 MW), 24.5 MW small and mini hydro projects (capacity <5MW) and 75 MW regional projects by 2030.

### Conditional:

Solar mini-grids- 68 MWp of solar mini-grids to be installed in off-grid rural areas by 2030.

Displacement of traditional biomass fuels, diesel and kerosene for domestic energy use.

## Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (13% area), 1 400-1 600 kWh/kWp/yr (85% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 Total installed capacity (MW, %)

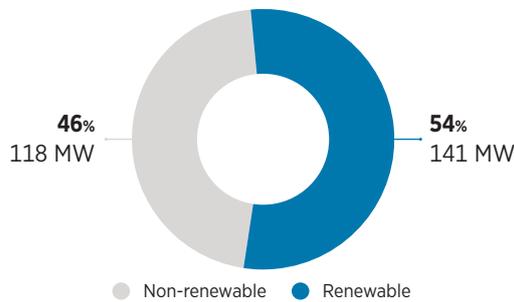
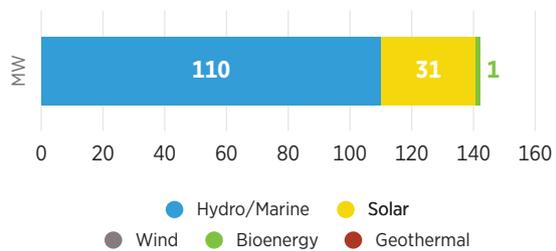


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Rwanda

### Support in implementation

Develop a project pipeline to implement the NDC

1

**Work package:**  
Project facilitation

**Source:**  
NDC Partnership (CAEP)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# SAINT KITTS AND NEVIS

|                            |             |  |  |
|----------------------------|-------------|--|--|
| <b>Membership since</b>    | <b>SIDS</b> | <b>GDP per capita</b>                        | <b>Energy-related emissions relative to global</b> |
| 20 June 2013               |             | USD 17 435.92 (2020) <sup>2</sup>            | 0.27 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>          |             | <b>TPES</b>                                  |  |
| 53 192 (2020) <sup>1</sup> |             | Total: 3 520 TJ (2018)<br>(Renewable: 38 TJ) |  |

## Renewable energy targets in latest NDC

### By 2030:

35 MW of solar photovoltaic; Transition to 100% renewable energy in power generation (of which, 35 MW is unconditional) and electrification of 2% of the total vehicle fleet; 6.6 MW of wind. 25 MW of geothermal (10 MW in Nevis and 15 MW in St. Kitts); Two solar photovoltaic plants of 0.75 MW each to supply two desalination plants 5% reduction in the power demand by introducing solar water heaters.

## Resource potential

- **Solar PV:** 1 600-1 800 kWh/kWp/yr (100% area)
- **Wind:** 260 W/m<sup>2</sup> (63% area),  
260-420 W/m<sup>2</sup> (25% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 Total installed capacity (MW, %)

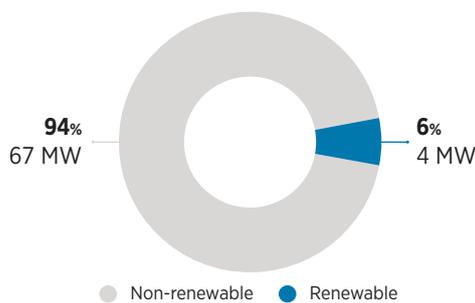
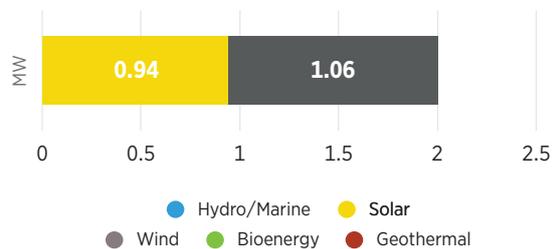


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Saint Kitts and Nevis

### Support completed

Technical power sector study to support the identification of cost-effective mitigation options for the energy sector to support country officials in prioritising mitigation options to serve as an input to the

- 1 NDC for the power and other relevant sectors

|   |                          |
|---|--------------------------|
| <b>Work package:</b><br>Climate technology and infrastructure | <b>Source:</b><br>UNFCCC |
|---|--------------------------|

*“For the 2020 revision cycle, the participatory process with technical support from IRENA led to the development of an assessment of the cost-effectiveness of mitigation options for the power and transport sectors”*

(SAINT KITTS AND NEVIS FIRST NDC UPDATED SUBMISSION, 25 OCTOBER 2021).

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# SAINT LUCIA

|                             |   |  |
|-----------------------------|---|--|
| <b>Membership since</b>     | <b>GDP per capita</b>                         | <b>Energy-related emissions relative to global</b> |
| 31 March 2016               | USD 9 276.11 (2020) <sup>2</sup>              | 0.39 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>           | <b>TPES</b>                                   |  |
| 183 629 (2020) <sup>1</sup> | Total: 7 944 TJ (2018)<br>(Renewable: 628 TJ) |  |

## Renewable energy targets in latest NDC

**Conditional (by 2025 and 2030):**  
35% - 50% renewable electricity through a mix of geothermal, wind and solar.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (16% area),  
1 600-1 800 kWh/kWp/yr (83% area)
- **Wind:** 260 W/m<sup>2</sup> (53% area),  
260-420 W/m<sup>2</sup> (40% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

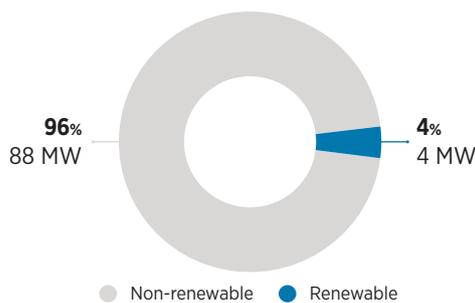
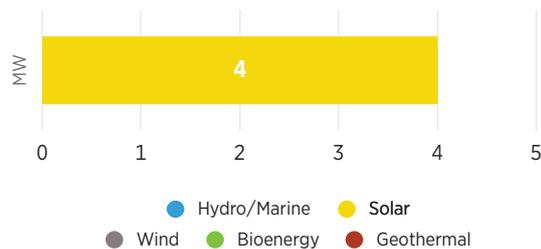


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Saint Lucia

### Support in implementation

Activity on the SolarCity simulator

|          |   |   |
|----------|---|---|
| <b>1</b> | <b>Work package:</b><br>Resource assessment | <b>Source:</b><br>Government of Saint Lucia |
|----------|---|---|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# SAINT VINCENT AND THE GRENADINES

|                             |             |   |  |
|-----------------------------|-------------|---|--|
| <b>Membership since</b>     | <b>SIDS</b> | <b>GDP per capita</b>                         | <b>Energy-related emissions relative to global</b> |
| 9 November 2012             |             | USD 7 297.91 (2020) <sup>2</sup>              | 0.28 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>           |             | <b>TPES</b>                                   |  |
| 110 947 (2020) <sup>1</sup> |             | Total: 3 665 TJ (2018)<br>(Renewable: 160 TJ) |  |

## Renewable energy targets in latest NDC

**Unconditional:**  
15 MW of geothermal.

## Resource potential

- **Solar PV:** 1 600-1 800 kWh/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> (10% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

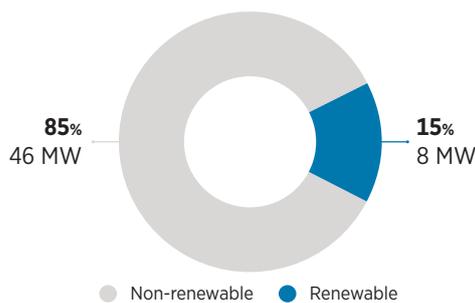
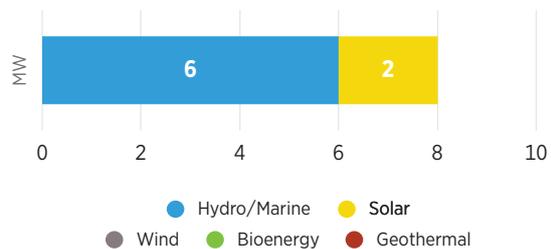


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Saint Vincent and the Grenadines

### Support in implementation

Review the data needed for NDC enhancement and the tracking of energy-related targets, as well as the data availability

1

**Work package:**  
Data and statistics

**Source:**  
UNDP

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# SÃO TOMÉ AND PRÍNCIPE

|                                    |   |  |
|------------------------------------|---|--|
| <b>Membership since</b>            | <b>GDP per capita</b>                           | <b>Energy-related emissions relative to global</b> |
| 1 November 2014 <b>SIDS / LDC</b>  | <b>USD 2 157.84</b> (2020) <sup>2</sup>         | 0.16 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>                  | <b>TPES</b>                                     |  |
| <b>219 161</b> (2020) <sup>1</sup> | Total: 2 945 TJ (2018)<br>(Renewable: 1 061 TJ) |  |

## Renewable energy targets in latest NDC

**By 2030:**  
Increase in the use of renewable energy sources up to 49 MW, mainly from solar (32.4 MW), hydroelectric (14 MW) and biomass (2.5 MW).

## Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (70% area),  
1 400-1 600 kWh/kWp/yr (20% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 1.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

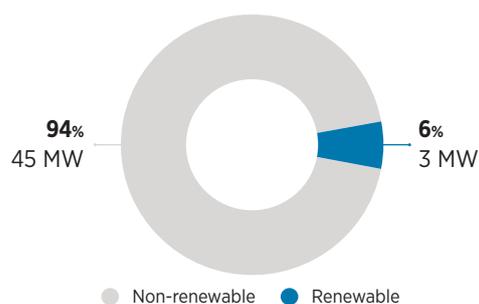
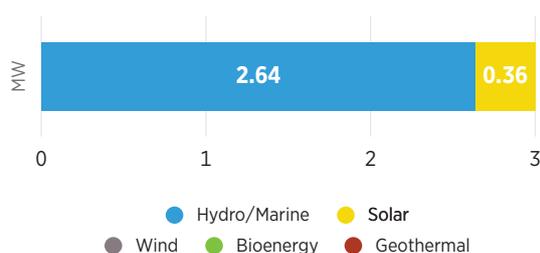


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in São Tomé and Príncipe

### Support in implementation

|          |   |                        |
|----------|---|------------------------|
|          | Training for long-term planning and scenario modelling to enhance skills and increase the group of technicians to lead the process  |                        |
| <b>1</b> | <b>Work package:</b><br>Long-term energy planning   | <b>Source:</b><br>UNDP |
|          | NDC implementation within the mitigation scope, especially renewable energy technical aspects                                       |                        |
| <b>2</b> | <b>Work package:</b><br>Climate technology and infrastructure   | <b>Source:</b><br>UNDP |
|          | Assessment of renewable energy for primary health care  |                        |
| <b>3</b> | <b>Work package:</b><br>Long-term energy planning   | <b>Source:</b><br>UNDP |
|          | Assist on quantification of costing of the proposed measures that will be identified by the partners under the NDC updated proposal |                        |
| <b>4</b> | <b>Work package:</b><br>Costing   | <b>Source:</b><br>UNDP |

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# SEYCHELLES

|                            |             |  |  |
|----------------------------|-------------|--|--|
| <b>Membership since</b>    | <b>SIDS</b> | <b>GDP per capita</b>                        | <b>Energy-related emissions relative to global</b> |
| 2 June 2011                |             | USD 11 425.09 (2020) <sup>2</sup>            | 0.62 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>          |             | <b>TPES</b>                                  |  |
| 98 462 (2020) <sup>1</sup> |             | Total: 7 766 TJ (2018)<br>(Renewable: 73 TJ) |  |

|  |  |
|--|--|
| <b>Renewable energy targets in latest NDC</b>              | <b>Resource potential</b>  |
| By 2030:<br>15% of power generation from renewable energy. | <ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1 600-1 800 kWh/kWp/yr (100% area)</li> <li>• <b>Wind:</b> 260 W/m<sup>2</sup> (53% area),<br/>260-420 W/m<sup>2</sup> (46% area)</li> <li>• <b>Biomass:</b> 6.5 tC/ha/yr</li> </ul> |

Figure 1 Total installed capacity (MW, %)

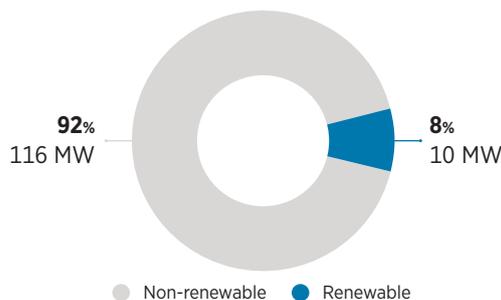
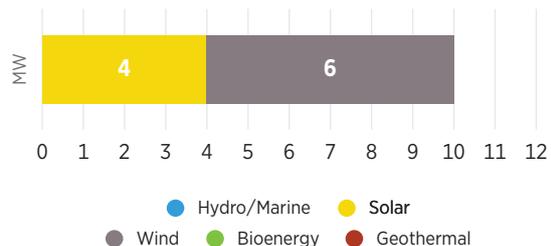


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Seychelles

### Support in implementation

|  |   |  |  |
|--|---|--|--|
| Activity support on the SolarCity simulator                                      |   |  |  |
| <b>1</b>   | <table border="1"> <tr> <td><b>Work package:</b><br/>Resource assessment</td> <td><b>Source:</b><br/>Government of Seychelles</td> </tr> </table> | <b>Work package:</b><br>Resource assessment  | <b>Source:</b><br>Government of Seychelles |
| <b>Work package:</b><br>Resource assessment                                      | <b>Source:</b><br>Government of Seychelles  |  |  |
| Capacity building on climate investment and financial flows in the energy sector |   |  |  |
| <b>2</b>   | <table border="1"> <tr> <td><b>Work package:</b><br/>Project facilitation</td> <td><b>Source:</b><br/>NDC Partnership (CAEP)</td> </tr> </table>  | <b>Work package:</b><br>Project facilitation | <b>Source:</b><br>NDC Partnership (CAEP)   |
| <b>Work package:</b><br>Project facilitation                                     | <b>Source:</b><br>NDC Partnership (CAEP)  |  |  |

### 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 NDC UPDATED SUBMISSION, 30 JULY 2021)

<sup>1,2,3</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch



# SOUTH AFRICA

|                                |   |  |
|--------------------------------|---|--|
| <b>Membership since</b>        | <b>GDP per capita</b>                                 | <b>Energy-related emissions relative to global</b> |
| 30 December 2010               | USD 5 090.71 (2020) <sup>2</sup>                      | 436.1 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>              | <b>TPES</b>   |  |
| 59 308 690 (2020) <sup>1</sup> | Total: 5 899 878 TJ (2018)<br>(Renewable: 370 204 TJ) |  |

## Renewable energy targets in latest NDC

Doesn't include quantified renewable energy targets in NDC.

## Resource potential

- **Solar PV:** 1 600-1 800 kWh/kWp/yr (25% area), 1 900-2 000 kWh/kWp/yr (30% area)
- **Wind:** 260 W/m<sup>2</sup> (65% area), 260-420 W/m<sup>2</sup> (18% area)
- **Biomass:** 4.5 tC/ha/yr

Figure 1 Total installed capacity (MW, %)

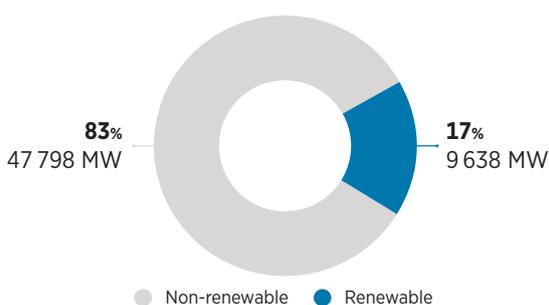
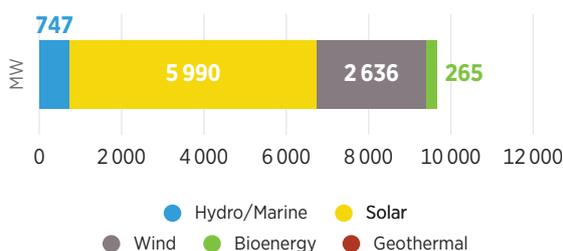


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in South Africa

### Support completed

Technical inputs from the FlexTool programme to assess the adequacy and flexibility of a more ambitious power expansion plan

|          |  |  |
|----------|--|--|
| <b>1</b> | <b>Work package:</b><br>Power system flexibility | <b>Source:</b><br>Government of the Republic of South Africa |
|----------|--|--|

### Support in implementation

Support with mini-grid regulations

|          |                                       |  |
|----------|---------------------------------------|--|
| <b>1</b> | <b>Work package:</b><br>Policy advice | <b>Source:</b><br>Government of the Republic of South Africa |
|----------|---------------------------------------|--|

<sup>1,2,3</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch



# SUDAN

|                                |            |   |  |
|--------------------------------|------------|---|--|
| <b>Membership since</b>        | <b>LDC</b> | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 18 June 2011                   |            | USD 595.46 (2020) <sup>2</sup>                      | 27.8 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>              |            | <b>TPES</b>   |  |
| 43 849 269 (2020) <sup>1</sup> |            | Total: 530 537 TJ (2018)<br>(Renewable: 245 888 TJ) |  |

## Renewable energy targets in latest NDC

### By 2030:

- 2140MW of utility scale solar and wind
- 796MW of standalone or mini-grid
- 36 894GWh of hydro generation

## Resource potential

- **Solar PV:** 1 600-1 800 kWh/kWp/yr (36% area),  
1 800-1 900 kWh/kWp/yr (40% area),  
1 900-2 000 kWh/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 installed capacity (MW, %)

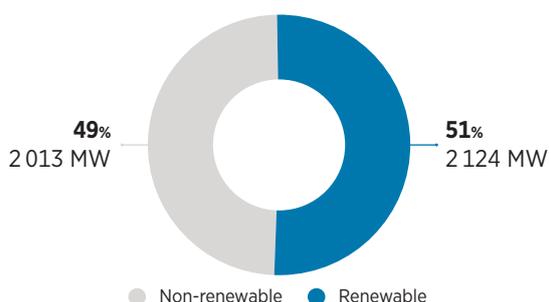
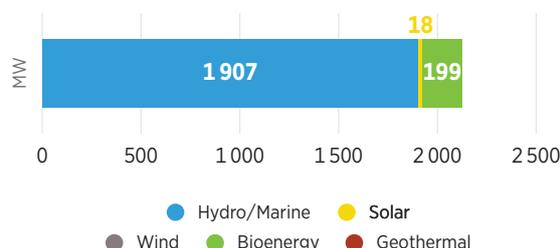


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Sudan

### Support in implementation

Enhancement of ambition and other requirements for a good NDC specific to Sudan circumstances, particularly work on country- and region-specific data. Sectoral institutions also need to build their

- 1 capacity to generate the data and information required for NDC work

#### Work package:

Data and statistics

#### Source:

NDC Partnership (CAEP)

IRENA provided capacity building and support on the design of auctions following its framework that classifies design elements according to auction demand (e.g., product, technology and volume auctioned). IRENA also provided capacity building support on Open Solar Contracts (OSCs) to empower the Government of Sudan with the practice skills to use IRENA's OSCs in the procurement of affordable solar power

- 2

#### Work package:

Capacity building on policy and finance

#### Source:

NDC Partnership (CAEP)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# THAILAND

## Membership since

30 April 2016

## GDP per capita

USD 7 189.04 (2020)<sup>2</sup>

## Energy-related emissions relative to global

263.51 MtCO<sub>2</sub>e (2018)<sup>3</sup>

## Population

69 799 978 (2020)<sup>1</sup>

## TPES

Total: 5 682 839 TJ (2018)  
(Renewable: 1 147 931 TJ)

## Renewable energy targets in latest NDC

Doesn't include quantified renewable energy targets in NDC.

## Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (20% area),  
1 400-1 600 kWh/kWp/yr (80% area)
- **Wind:** 260 W/m<sup>2</sup> (96% area),  
260-420 W/m<sup>2</sup> (2% area)
- **Biomass:** 6.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

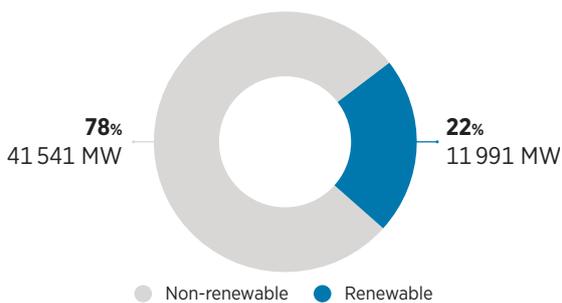
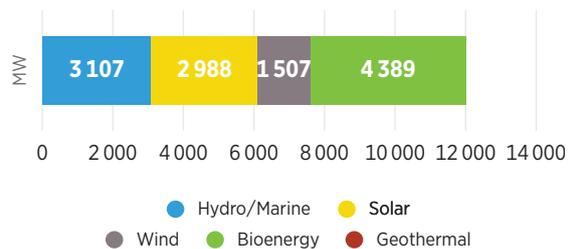


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Thailand

### Support in implementation

Support is under discussion

1

**Work package:**

**Source:**

Government of Thailand

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch

|                             |  |  |
|-----------------------------|--|--|
| <b>Membership since</b>     | <b>GDP per capita</b>                        | <b>Energy-related emissions relative to global</b> |
| 6 March 2010                | USD 4 903.0 (2020) <sup>2</sup>              | 0.2 MtCO <sub>2</sub> e (2018) <sup>3</sup>        |
| <b>Population</b>           | <b>TPES</b>                                  |  |
| 104 497 (2020) <sup>1</sup> | Total: 1 954 TJ (2018)<br>(Renewable: 50 TJ) |  |

### Renewable energy targets in the enhanced or second NDC

Transition to 70% renewable electricity by 2030.

### Resource potential

- **Solar PV:** 1 400-1 600 kWh/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 installed capacity (MW, %)**

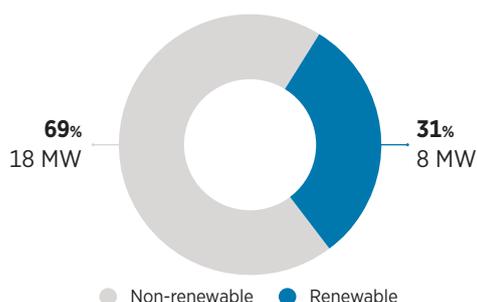
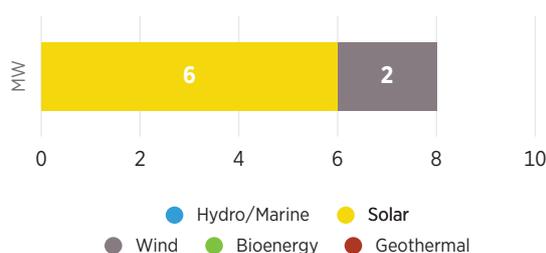


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Tonga

### Support completed

Provide capacity-building trainings on forestry inventory, greenhouse gas inventory system set-up and ICTU. Support 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

- 1 waste. Strengthen and add sectoral greenhouse gas reduction targets and sectoral non-greenhouse gas targets. Align NDC targets with the country's long-term strategies (LT-LEDS)

**Work package:**  
Data and statistics

**Source:**  
NDC Partnership (CAEP)

### Support in implementation

Integrate MRV system to Tonga's Joint National Action Plan

- 1 **Work package:**  
Monitoring, reporting and verification (MRV)

**Source:**  
NDC Partnership (CAEP)

<sup>1,2,3</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch



# TRINIDAD AND TOBAGO

|                               |   |  |
|-------------------------------|---|--|
| <b>Membership since</b>       | <b>GDP per capita</b>                           | <b>Energy-related emissions relative to global</b> |
| 15 February 2014              | USD 15 384.03 (2020) <sup>2</sup>               | 17.59 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>             | <b>TPES</b>                                     |  |
| 1 399 491 (2020) <sup>1</sup> | Total: 715 362 TJ (2018)<br>(Renewable: 296 TJ) |  |

## Renewable energy targets in latest NDC

Doesn't include quantified renewable energy targets in NDC.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (10% area), 1 600-1 800 kWh/kWp/yr (92% area)
- **Wind:** 260 W/m<sup>2</sup> (95% area), 260-420 W/m<sup>2</sup> (8% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

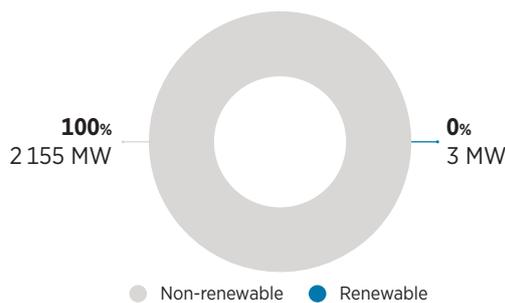
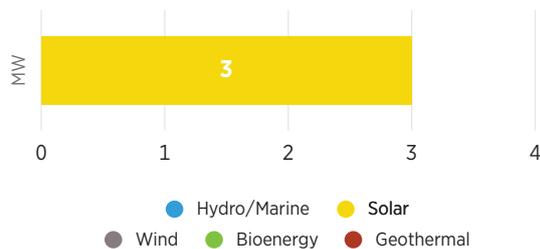


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Trinidad and Tobago

### Support in implementation

|   |  |   |   |
|---|--|---|---|
| Assessment for the cost effectiveness of mitigation options for the power and transport sectors |  |   |   |
| <b>1</b>  | <table border="1"> <tr> <td><b>Work package:</b><br/>Climate technology and infrastructure</td> <td><b>Source:</b><br/>Government of Trinidad and Tobago</td> </tr> </table> | <b>Work package:</b><br>Climate technology and infrastructure | <b>Source:</b><br>Government of Trinidad and Tobago |
| <b>Work package:</b><br>Climate technology and infrastructure                                   | <b>Source:</b><br>Government of Trinidad and Tobago  |   |   |
| Support is currently under discussion   |  |   |   |
| <b>2</b>  | <table border="1"> <tr> <td><b>Work package:</b></td> <td><b>Source:</b><br/>Government of Trinidad and Tobago</td> </tr> </table>   | <b>Work package:</b>  | <b>Source:</b><br>Government of Trinidad and Tobago |
| <b>Work package:</b>  | <b>Source:</b><br>Government of Trinidad and Tobago  |   |   |

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# TURKEY

## Membership since

1 April 2012

## Population

84 339 067 (2020)<sup>1</sup>

## GDP per capita

USD 8 538.16 (2020)<sup>2</sup>

## TPES

Total: 6 081 863 TJ (2018)  
(Renewable: 852 391 TJ)

## Energy-related emissions relative to global

388.32 MtCO<sub>2</sub>e (2018)<sup>3</sup>

## Renewable energy targets in latest NDC

### Conditional (by 2030):

10 GW of solar and 16 GW of wind.

## Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (17% area),  
1 400-1 600 kWh/kWp/yr (45% area),  
1 600-1 800 kWh/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 installed capacity (MW, %)

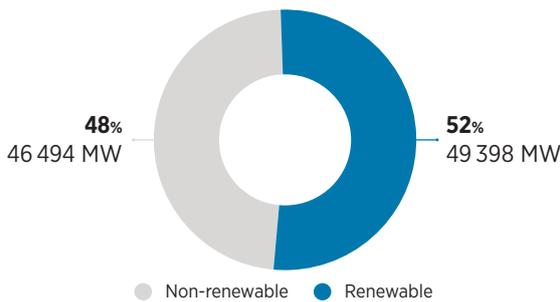
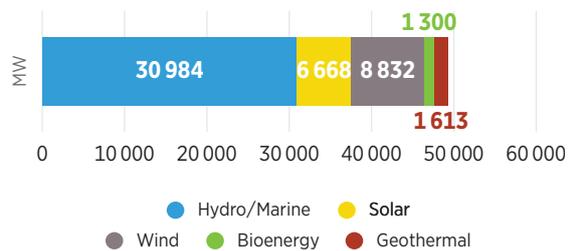


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Turkey

### Support in implementation

Support on SolarCity simulator

1

#### Work package:

Resource assessment

#### Source:

Government of Turkey

<sup>1,2,3</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch



# UGANDA

|                                |                   |   |  |
|--------------------------------|-------------------|---|--|
| <b>Membership since</b>        | <b>LDC / LLDC</b> | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 17 May 2012                    |                   | USD 817.03 (2020) <sup>2</sup>                      | 22.43 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>              |                   | <b>TPES</b>   |  |
| 45 741 000 (2020) <sup>1</sup> |                   | Total: 917 208 TJ (2018)<br>(Renewable: 844 120 TJ) |  |

## Renewable energy targets in latest NDC

**Conditional (by 2030):**  
2 471 MW of hydro, solar, biomass and geothermal.

**Unconditional (by 2030):**  
30% of USD 5.4 billion investment.

## Resource potential

- **Solar PV:** 1 400-1 600 kWh/kWp/yr (47% area),  
1 600-1 800 kWh/kWp/yr (52% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 8.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

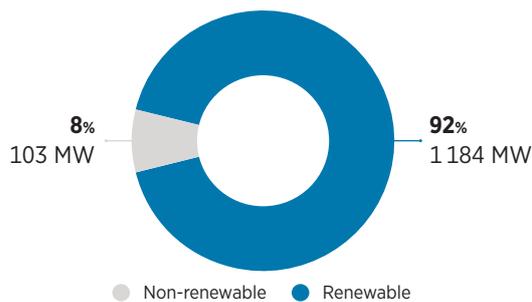
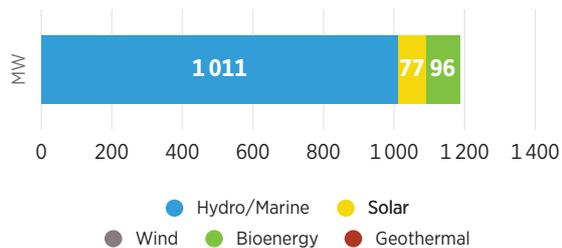


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Uganda

### Support in implementation

- 1 Support 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

**Work package:**  
Data and statistics

**Source:**  
NDC Partnership (CAEP)

<sup>1,2,3</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch



# UNITED ARAB EMIRATES

|                               |  |  |
|-------------------------------|--|--|
| <b>Membership since</b>       | <b>GDP per capita</b>                                | <b>Energy related emissions relative to global</b> |
| 18 July 2009                  | USD 43 103.3 (2020) <sup>2</sup>                     | 232.37 MtCO <sub>2</sub> e (2018) <sup>3</sup>     |
| <b>Population</b>             | <b>TPES</b>  |  |
| 9 770 526 (2020) <sup>1</sup> | Total: 2 658 279 TJ (2018)<br>(Renewable: 17 059 TJ) |  |

## Renewable energy targets in latest NDC

- 50% share of clean energy (renewables and nuclear) in the installed power capacity mix by 2050.
- 14 GW of solar photovoltaic by 2030 and 125 MW of solar PV installed.
- Develop 250 MW of hydropower project.

## Resource potential

- **Solar PV:** 1 800-1 900 W/m<sup>2</sup> kWh/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 installed capacity (MW, %)

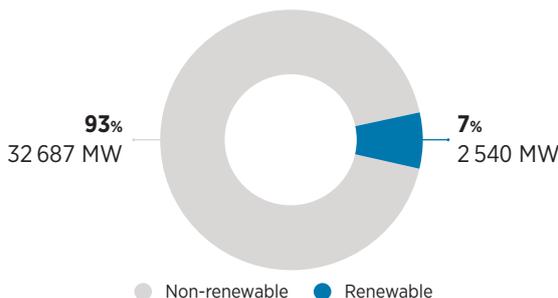
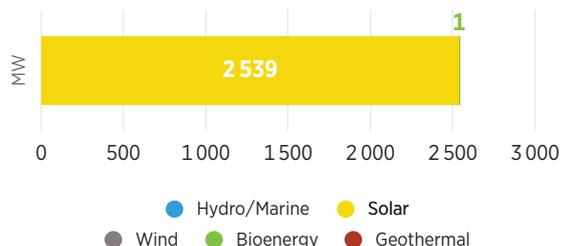


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in United Arab Emirates

### Support in implementation

Support is under discussion

|                        |   |
|------------------------|---|
| <b>1</b> Work package: | Source:<br>Government of United Arab Emirates |
|------------------------|---|

### 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)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch

|                               |   |  |
|-------------------------------|---|--|
| <b>Membership since</b>       | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 28 August 2011                | USD 15 438.41 (2020) <sup>2</sup>                   | 6.54 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>             | <b>TPES</b>   |  |
| 3 473 727 (2020) <sup>1</sup> | Total: 228 875 TJ (2018)<br>(Renewable: 138 223 TJ) |  |

|   |   |
|---|---|
| <b>Renewable energy targets in latest NDC</b>   | <b>Resource Potential</b>   |
| <b>Conditional (by 2025):</b><br>10 MW of hydro.  | <ul style="list-style-type: none"> <li>• <b>Solar PV:</b> 1 400-1 600 kWh/kWp/yr (100% area)</li> <li>• <b>Wind:</b> 260 W/m<sup>2</sup> (97% area),<br/>260-420 W/m<sup>2</sup> (5% area)</li> <li>• <b>Biomass:</b> 8.5 tC/ha/yr</li> </ul> |
| <b>Unconditional (by 2025):</b><br>1 450 MW of wind, 220 MW of solar and 410 MW of bioenergy. |   |

Figure 1 **Total installed capacity (MW, %)**

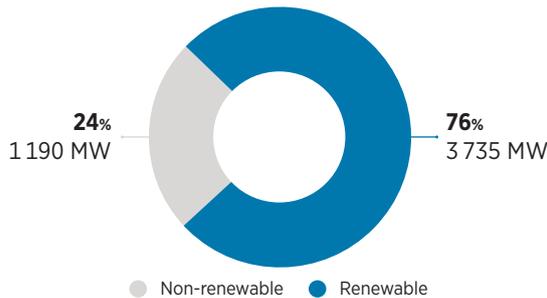
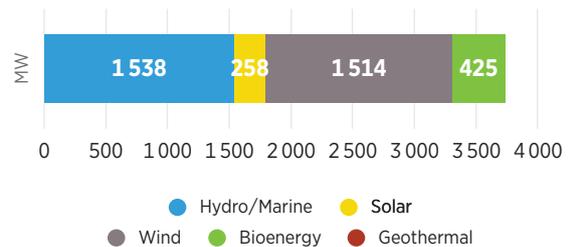


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Uruguay

### Support completed

1 Technical inputs from the FlexTtool programme to assess the adequacy and flexibility of a more ambitious power expansion plan

|  |   |
|--|---|
| <b>Work package:</b><br>Power system flexibility | <b>Source:</b><br>Government of the Republic of Uruguay |
|--|---|

### Support in implementation

1 Summary of references to relevant existing published work that can support the assessment of technical needs, with a focus on bioenergy and hydrogen, as part of the process of enhancing Uruguay's NDC

|   |   |
|---|---|
| <b>Work package:</b><br>Climate technology and infrastructure | <b>Source:</b><br>Government of the Republic of Uruguay |
|---|---|

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# UZBEKISTAN

|                                |             |  |  |
|--------------------------------|-------------|--|--|
| <b>Membership since</b>        | <b>LLDC</b> | <b>GDP per capita</b>                                | <b>Energy-related emissions relative to global</b> |
| 24 August 2017                 |             | USD 1 685.76 (2020) <sup>2</sup>                     | 185.79 MtCO <sub>2</sub> e (2018) <sup>3</sup>     |
| <b>Population</b>              |             | <b>TPES</b>  |  |
| 34 232 050 (2020) <sup>1</sup> |             | Total: 1 946 125 TJ (2018)<br>(Renewable: 23 673 TJ) |  |

## Renewable energy targets in latest NDC

Increasing the share of renewable energy in power generation to 25%, through construction of solar, wind and small hydropower plants.

## Resource potential

- **Solar PV:** 1 200-1 400 kWh/kWp/yr (10% area), 1 400-1 600 kWh/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 installed capacity (MW, %)

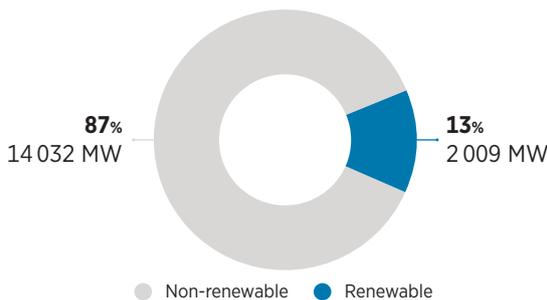
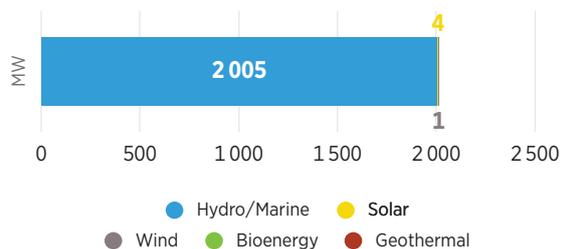


Figure 2 Renewable generation by technology (MW)



## IRENA climate action engagement in Uzbekistan

### Support in implementation

|  |   |   |                        |
|--|---|---|------------------------|
| Support on the development the energy data audit report              |   |   |                        |
| <b>1</b>   | <table border="1"> <tr> <td><b>Work package:</b><br/>Data and statistics</td> <td><b>Source:</b><br/>UNDP</td> </tr> </table> | <b>Work package:</b><br>Data and statistics | <b>Source:</b><br>UNDP |
| <b>Work package:</b><br>Data and statistics                          | <b>Source:</b><br>UNDP  |   |                        |
| Support on the development of MRV including capacity building on MRV |   |   |                        |
| <b>2</b>   | <table border="1"> <tr> <td><b>Work package:</b><br/>MRV</td> <td><b>Source:</b><br/>UNDP</td> </tr> </table>                 | <b>Work package:</b><br>MRV                 | <b>Source:</b><br>UNDP |
| <b>Work package:</b><br>MRV  | <b>Source:</b><br>UNDP  |   |                        |

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# VANUATU

|                             |             |   |  |
|-----------------------------|-------------|---|--|
| <b>Membership since</b>     | <b>SIDS</b> | <b>GDP per capita</b>                         | <b>Energy-related emissions relative to global</b> |
| 1 March 2013                |             | USD 2 782.98 (2020) <sup>2</sup>              | 0.22 MtCO <sub>2</sub> e (2018) <sup>3</sup>       |
| <b>Population</b>           |             | <b>TPES</b>                                   |  |
| 307 150 (2020) <sup>1</sup> |             | Total: 3 472 TJ (2018)<br>(Renewable: 934 TJ) |  |

## Renewable energy targets in enhanced or second NDC

### By 2030:

- Generation: transitioning to close to 100% renewable energy in the electricity generation sector.
- 100% electricity access by households in off-grid areas;
- 100% electricity access by public institutions (on- and off-grid);
- 14% improve biomass end use (improved cook stoves and drying) efficiency;
- 65% renewable electricity use by rural tourism bungalows.
- installation of 1000 numbers of biogas plants for commercial and residential use.

## Resource potential

- **Solar PV:** 1 200 kWh/kWp/yr (10% area),  
1 200-1 400 kWh/kWp/yr (47% area),  
1 400-1 600 kWh/kWp/yr (42% area)
- **Wind:** 260 W/m<sup>2</sup> (76% area),  
260-420 W/m<sup>2</sup> (18% area)
- **Biomass:** 10.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

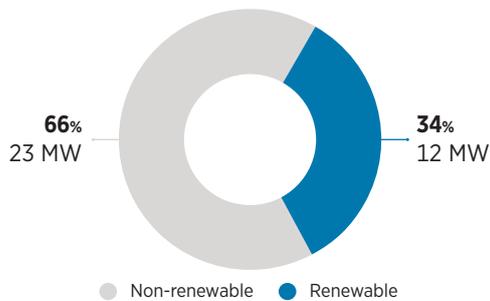
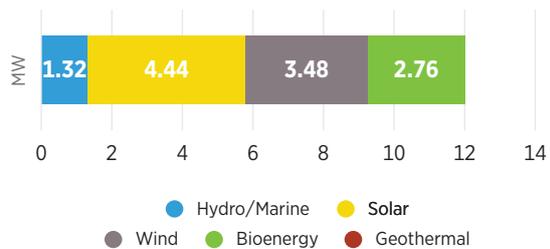


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Vanuatu

### Support in discussion

|                               |                                  |
|-------------------------------|----------------------------------|
| TBD                           |                                  |
| <b>1</b> Work package:<br>TBD | Source:<br>Government of Vanuatu |

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# ZAMBIA

|                                |                   |   |  |
|--------------------------------|-------------------|---|--|
| <b>Membership since</b>        | <b>LDC / LLDC</b> | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 22 June 2013                   |                   | USD 5 090.91 (2020) <sup>2</sup>                    | 10.98 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>              |                   | <b>TPES</b>   |  |
| 59 308 690 (2020) <sup>1</sup> |                   | Total: 517 575 TJ (2018)<br>(Renewable: 435 940 TJ) |  |

## Renewable energy targets in latest NDC

Doesn't include quantified renewable energy targets in NDC.

## Resource potential

- **Solar PV:** 1 600-1 800 kWh/kWp/yr (95% area)
- **Wind:** 260 W/m<sup>2</sup> (100% area)
- **Biomass:** 2.5 tC/ha/yr

Figure 1 **Total installed capacity (MW, %)**

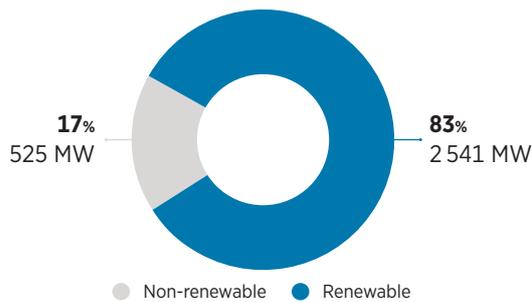
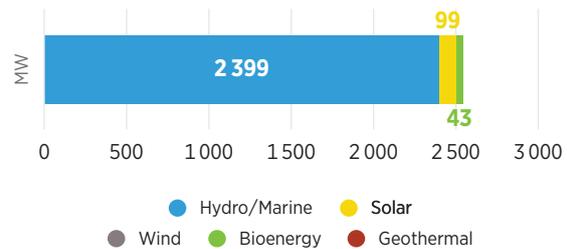


Figure 2 **Renewable generation by technology (MW)**



## 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. Integrate the NDC MRV system to the Central

- 1 Statistics Office for national reporting and communication of projections

**Work package:**  
MRV

**Source:**  
NDC Partnership (CAEP)

### Support in implementation

Build capacity of data providers and establish data sharing platforms for quality assurance

- 1 **Work package:**  
Data and statistics

**Source:**  
NDC Partnership (CAEP)

1,2,3 World Bank national accounts data; OECD National Accounts data files; Climate Watch



# ZIMBABWE

|                                |             |   |  |
|--------------------------------|-------------|---|--|
| <b>Membership since</b>        | <b>LLDC</b> | <b>GDP per capita</b>                               | <b>Energy-related emissions relative to global</b> |
| 17 September 2014              |             | USD 1 128.21 (2020) <sup>2</sup>                    | 15.79 MtCO <sub>2</sub> e (2018) <sup>3</sup>      |
| <b>Population</b>              |             | <b>TPES</b>   |  |
| 14 862 927 (2020) <sup>1</sup> |             | Total: 499 548 TJ (2018)<br>(Renewable: 361 178 TJ) |  |

## Renewable energy targets in latest NDC

### Conditional (by 2025):

300 MW of solar photovoltaic.

### Conditional (by 2024):

41 MW biogas capacity; Additional 2.098 MW of capacity by 2028.

## Resource potential

- **Solar PV:** 1 600-1 800 kWh/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 installed capacity (MW, %)**

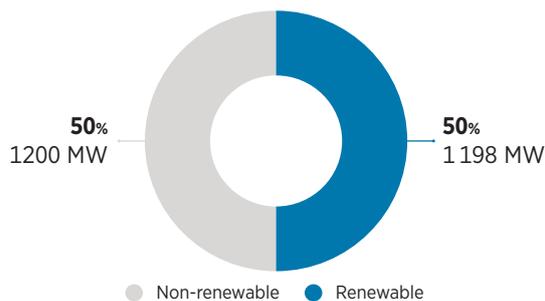
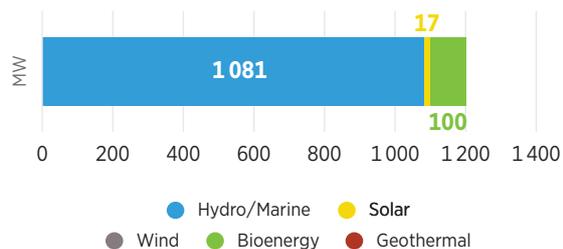


Figure 2 **Renewable generation by technology (MW)**



## IRENA climate action engagement in Zimbabwe

### Support completed

Technical report that references the existing published works and provides support to the definition of baseline, targets and mitigation measures in the energy sector, providing input to the country's MRV

#### 1 framework

**Work package:**  
Climate technology and infrastructure

**Source:**  
NDC Partnership

### Acknowledgement of IRENA support

*"Zimbabwe's Revised NDC Report was developed under the auspices of the ... International Renewable Energy Agency. The Government of Zimbabwe would like to thank these organisations for their support in delivering Zimbabwe's revised Nationally Determined Contribution."*

(ZIMBABWE'S FIRST NDC UPDATED SUBMISSION, 24 SEPTEMBER 2021)

<sup>1,2,3</sup> World Bank national accounts data; OECD National Accounts data files; Climate Watch

