



SIDS LIGHTHOUSES INITIATIVE

Progress and way forward

JANUARY 2025

ISLANDS.IRENA.ORG

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Abbreviations

ABAS	Antigua and Barbuda Agenda for SIDS	NDC	Nationally Determined Contribution
ADB	Asian Development Bank	NGO	non-governmental organisation
AIIB	Asian Infrastructure Investment Bank	OECS	Organisation of Eastern Caribbean States
AIS	Atlantic, Indian Ocean and South China Sea	PICTs	Pacific island countries and territories
AOSIS	Alliance of Small Island States	PPP	public-private partnership
COP	Conference of the Parties to the UN Framework Convention on Climate Change	PRETMM	Pacific Regional Energy and Transport Ministers' Meeting
DRE	decentralised renewable energy	PV	photovoltaic
ETA	Energy Transition Assessment	RRA	Renewables Readiness Assessment
EV	electric vehicle	SDG	Sustainable Development Goal
GCF	Green Climate Fund	SIDS	small island developing states
GEF	Global Environment Facility	SPC	South Pacific Commission
GHG	greenhouse gas	UNDP	United Nations Development Programme
GW	gigawatt	UNOHRLLS	United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States
IORA	Indian Ocean Rim Association	VRE	variable renewable energy
IRENA	International Renewable Energy Agency		
LDC	least-developed country		
LHI	Lighthouses Initiative		
MSW	municipal solid waste		
MVI	Multidimensional Vulnerability Index		
MW	megawatt		

Overview of energy transition efforts in SIDS

The ongoing efforts of small island developing states (SIDS)¹ towards bolstering the accessibility, affordability, availability and acceptability of renewable energy, clean and innovative solutions are to be commended regardless of the many challenges. The indelible impacts of climate change, increasingly intense natural disasters, sea-level rise, a constrained resource base, and substantial reliance on fossil fuels (with its burdens of fluctuating costs and geopolitical risks) continue to hinder SIDS' progress towards their climate and renewable energy targets.

SIDS have nevertheless forged ahead, increasing their uptake of renewable energy and energy efficiency interventions. Their abundant renewable energy resources combined with the declining costs of relevant technologies present a distinctive opportunity for these states to expedite the shift of their energy systems from fossil fuels to renewables. Many SIDS have seen this transition result in reduced electricity expenses, expanded energy accessibility, new jobs and greater energy security. Expanding energy accessibility is pivotal for sustainable socio-economic development, since it facilitates access to education and healthcare services while fortifying resilience against natural disasters.

“The realisation of our renewable energy commitments hinges on collaboration with financing institutions, development partners and relevant stakeholders. These partnerships are crucial for providing the financial assistance, technology transfer and capacity-building support that we need”.

Hon. Fiamē Mata’afa, Prime Minister of Samoa, SIDS4, Antigua and Barbuda

Strong partnerships and genuine commitments are essential for SIDS to achieve climate and sustainable development goals. Tailored capacity and financial support will help transform SIDS' ageing infrastructure and help them address high debt profiles. A just, fair and equitable energy transition considers the impacts of climate change and the unique vulnerabilities of island economies, and it ensures that mitigation, adaptation, resilience and development actions are holistic, including gender mainstreaming, so that no one is left behind.



H.E. Surangel Whipps Jr., President of Palau, chairs the SIDS Ministerial: A Just and Equitable Energy Transition Towards a Climate-Resilient Future at COP28

¹ SIDS are a distinct group of 39 states and 18 associate members of the United Nations regional commissions that face unique social, economic and environmental vulnerabilities (www.un.org/ohrlls/content/about-small-island-developing-states).

The complementarity of SIDS' priorities and needs with the 2023 United Nations Climate Change Conference (COP28) cannot be over-emphasised, especially in light of the first “global stocktake” under the Paris Agreement. That indicated insufficient progress across key climate actions, including greenhouse gas (GHG) emission reduction, bolstered resilience, and financial and technological support, especially in vulnerable island economies and least-developed countries (LDCs). In response, countries agreed on measures to accelerate progress by 2030, including a call for governments to expedite the transition from fossil fuels to renewable energy sources like wind and solar power in their upcoming climate commitments.

Building on these efforts, the 2024 United Nations Climate Change Conference (COP29) delivered several critical outcomes for global climate action, with significant implications for SIDS and LDCs. A major milestone was the operationalisation of Articles 6.2 and 6.4 of the Paris Agreement, which enabled carbon credit trading and established a centralised United Nations (UN)-led carbon market. These mechanisms promise new financial flows for developing countries, and support for LDCs to develop the capacity to better access and participate in these markets. Additionally, COP29 set a collective goal to mobilise at least USD 300 billion annually by 2035 from diverse sources, reaffirming the need for developed countries to lead in providing climate finance. Progress was also made on gender and climate action. The Lima Work Programme on Gender and commitments to adopt a new Gender Action Plan were extended at COP29, and the Baku Workplan to elevate Indigenous peoples and local communities in climate decision making was adopted.

However, despite these advancements, the absence of specific allocations for SIDS and LDCs remains a major shortcoming. Proposals for USD 220 billion annually for LDCs and USD 39 billion for SIDS were not addressed, leaving these highly vulnerable countries under-resourced to confront escalating climate challenges. Looking towards the 2025 United Nations Climate Change Conference (COP30) in Brazil, the focus must shift towards ensuring equitable access to climate finance and prioritising the unique needs of SIDS and LDCs. These steps are essential for translating the COP29 outcomes into tangible support for clean energy, resilience and sustainable development in the most climate-affected regions.



Opening session: international conference on SIDS, Antigua and Barbuda, May 2024

“For SIDS, the transition to just and equitable energy isn’t a mere aspiration; it’s a fundamental need for survival... We implore the international community to play a pivotal role in amplifying renewable energy and energy efficiency initiatives within our islands. We need immediate, tangible, concrete actions. The stakes are too high, the time too short to allow anything less”.

H.E. Mr Surangel Whipps Jr., President of Palau, COP28, Dubai

Further, the 4th International Conference on Small Island Developing States, convened in Antigua and Barbuda in May 2024, provided an opportunity to review SIDS’ progress towards sustainable development and charted a path to resilient prosperity guided by the Antigua and Barbuda Agenda for SIDS (ABAS), the programme of action built upon the SIDS Accelerated Modalities of Action (SAMOA) Pathway.

The International Renewable Energy Agency (IRENA), through the SIDS Lighthouses Initiative (LHI), is fully committed to supporting the island economies’ efforts to fulfil their commitments towards the Paris Agreement and Sustainable Development Goals (SDGs).

SIDS leadership on the global energy transition and climate action is to be applauded. Their national leaders continue to be the global voices for action towards a secure and resilient future. Notably, the SIDS LHI has been instrumental in monitoring SIDS’ progress towards having 10 gigawatts (GW) of installed renewable energy capacity by 2030, after the initial LHI targets set to be achieved by 2020 and 2023 were met and exceeded three years ahead of schedule.

In addition to renewable energy, the LHI prioritises the provision of tailored support across 12 priority areas, extending beyond the energy sector, for example, the implementation of Nationally Determined Contributions (NDCs); project development; access to finance; private sector collaboration; capacity building; and the integration of renewables in non-energy sectors such as education, health, food and water security, among others. These efforts aim to foster socio-economic development, gender equality, climate resilience, disaster recovery, and improved data collection and analysis to inform policy making. Moreover, they aim to enhance collaboration and synergy with existing SIDS-focused initiatives on the energy transition.

To effectively monitor the progress and impacts of efforts to accelerate the energy transition in SIDS, IRENA has developed a monitoring and evaluation framework that includes progress indicators and measures of the impacts of energy transition efforts in SIDS. Related consultations have been concluded. Three validation workshops were undertaken: one in Fiji, for the Pacific SIDS; one in Jamaica, for the Caribbean SIDS; and one in the Seychelles, for the Atlantic, Indian Ocean and South China Sea (AIS) SIDS; a web-based validation workshop was undertaken for the development partners. The progress indicators and impact measures for the LHI are earmarked to be launched at the 15th session of the IRENA Assembly.

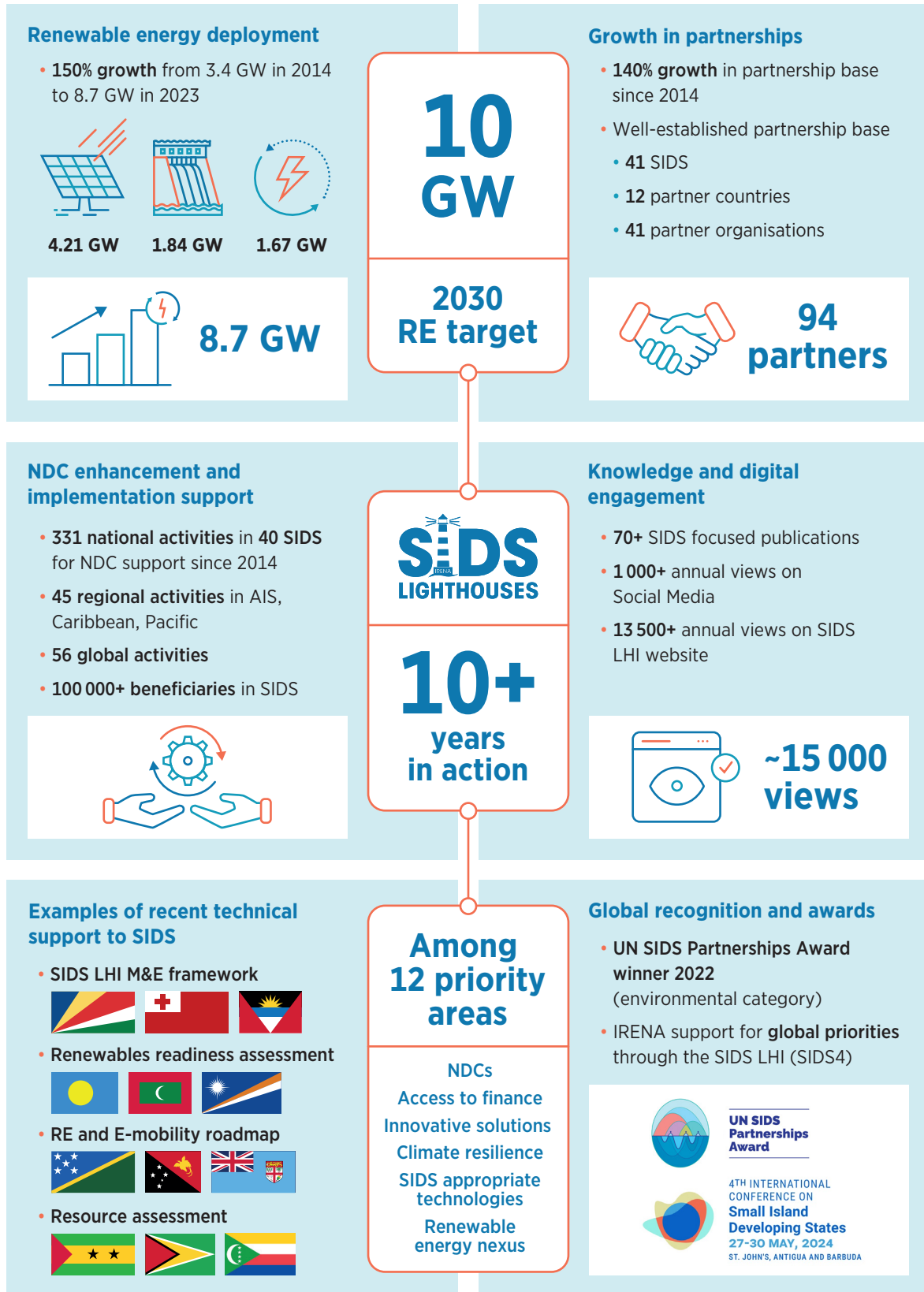
The SIDS programmatic session “Steering the Energy Transformation of Small Island Economies through Partnerships and Innovative, Indigenous Solutions”, held at the 28th IRENA Council on 25 October 2024, showcased the tangible impacts of the SIDS LHI in driving SIDS’ progress and its alignment with the Antigua and Barbuda Agenda for SIDS’ energy transition priorities. The session highlighted SIDS’ progress in renewable energy deployment, as well as the SIDS LHI’s support for the implementation of NDCs, expanded partnerships and increased global recognition. Notable achievements included progress in technical assistance, knowledge sharing and digital engagement. This highlighted the LHI’s contribution to supporting SIDS’ efforts.

SIDS delegations called for targeted support in innovative areas such as off-shore wind, geothermal energy and sargassum-based biofuels to address SIDS’ unique challenges and unlock further potential. The Director-General reaffirmed IRENA’s unwavering commitment to providing tailored assistance, stressing the importance of SIDS’ continued leadership in global energy and climate action as they work towards a resilient and sustainable future.



H.E. Lisa Cummins, Minister of Energy and Business of Barbados, delivers the opening remarks as chair of the SIDS Ministerial, convened at the 14th session of the IRENA Assembly

Figure 1 A snapshot of the impacts of efforts towards the energy transition in SIDS



Source: IRENA, 2024.

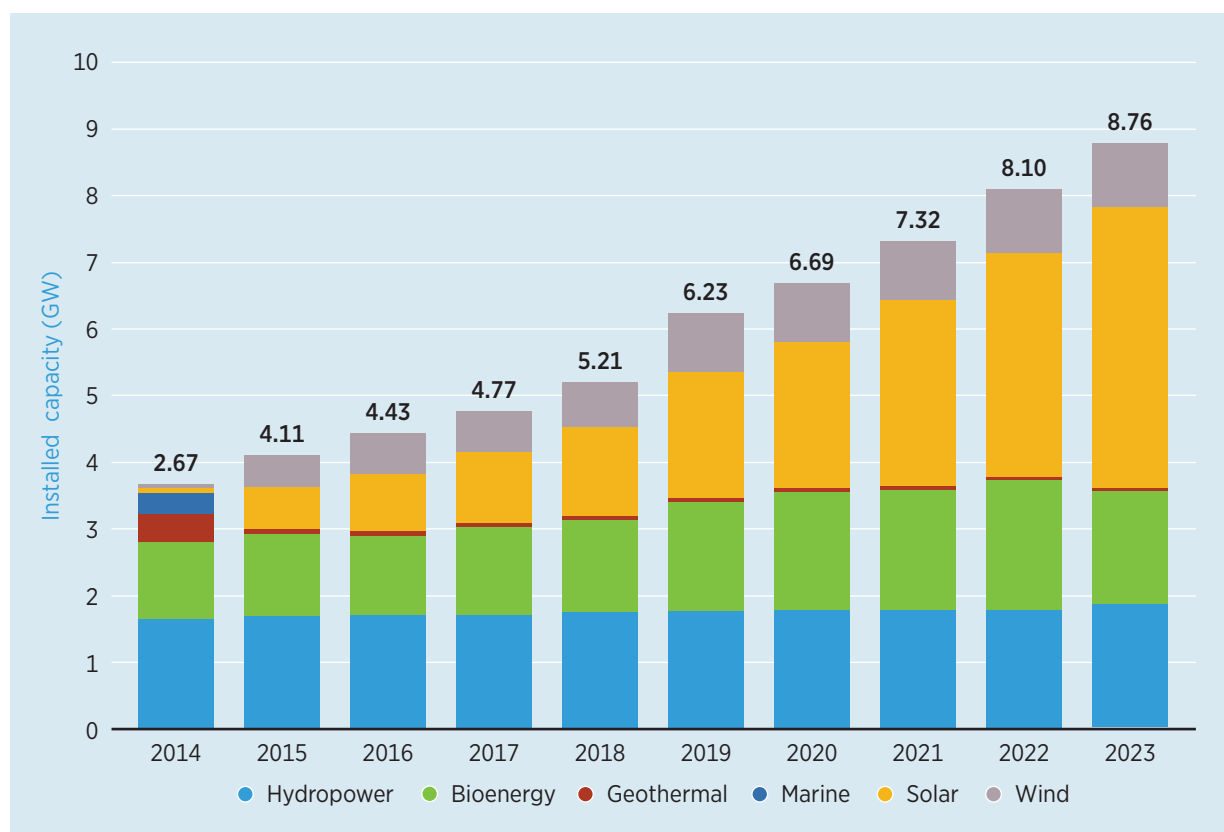
Notes: AIS = Atlantic, Indian Ocean and South China Sea; E-mobility = electric mobility; GW = gigawatt; IRENA = International Renewable Energy Agency; LHI = Lighthouses Initiative; M&E = monitoring and evaluation; NDC = Nationally Determined Contribution; RE = renewable energy; SIDS = small island developing states; UN = United Nations.

Trends of renewable energy deployment in SIDS

Between 2014, when the SIDS LHI was launched, and 2023, total installed renewables-based electricity capacity more than doubled – from 3.67 GW to 8.76 GW – a significant increase. This progressive shift is notable across various renewable energy technologies, especially for solar electricity, whose total installed capacity grew remarkably from 0.1 GW in 2014 to 4.2 GW in 2023. Installed wind electricity capacity doubled from 0.5 GW in 2014 to about 1.0 GW in 2023, and installed bioenergy electricity capacity grew about 50% in the same period, reaching 1.7 GW in 2023 (IRENA, 2023). Figure 1 shows a snapshot of the impacts of the energy transition in SIDS.

The accelerated deployment of innovative solutions in SIDS underpins their ongoing commitment, in collaboration with partners, towards a just and equitable energy transition – and sustainable development in a climate-resilient future. SIDS have maintained the momentum of their efforts and leveraged evolutions in technology, cost reductions and the support of a wide range of partners. Together, these factors make renewables an affordable and reliable alternative, contributing to energy security and climate resilience.

Figure 2 Total installed renewables-based electricity capacity, by technology, across all SIDS, 2014-2023



Source: IRENA, 2024.

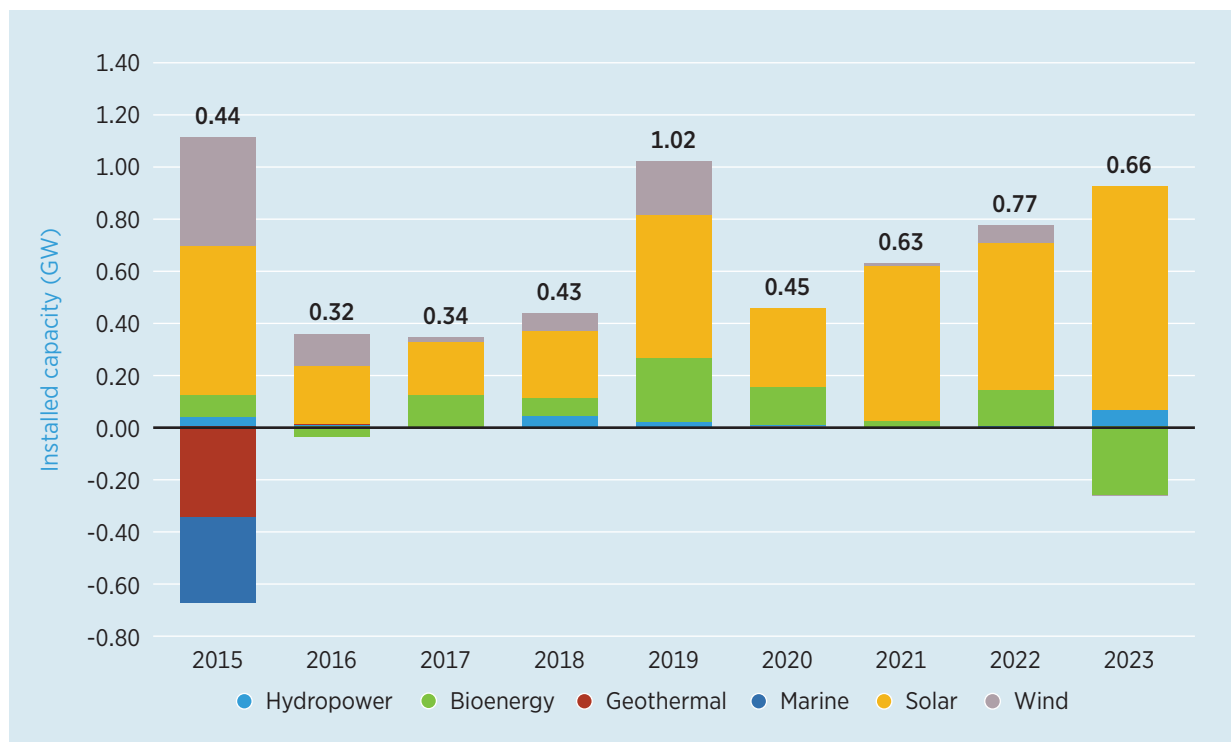
Figure 2 provides an overview of renewables-based electricity capacity installed over the same period. This deployment occurred in a shifting landscape shaped by techno-economic and environmental change.

For solar photovoltaics (PV), additions grew steadily – from a moderate figure of 570 megawatts (MW) in 2015 to a significant rise to 860 MW in 2023 due to declining solar installation costs, increased international funding and the suitability of solar energy to decentralised energy needs. Fluctuations were observed in wind energy; the initial growth of 2015-2017 slowed down, with a notable decrease around 2020 (-10 MW), reflecting logistical challenges (e.g. the difficulty of maintaining wind turbines on isolated islands), a reliance on consistent wind resources and the repercussions of COVID-19. By 2023, wind growth stagnated, with capacity staying at the level observed in 2022.

Bioenergy capacity declined in 2016 but showed variability in the subsequent years. It rebounded starting in 2017, peaking in some years due to regional biofuel initiatives. In 2023, bioenergy suffered a significant decline of -260 MW (IEA, 2024), driven by high feedstock costs and operational inefficiencies that forced the decommissioning of projects. A shift of priorities towards more scalable and low-cost technologies, like solar PV, also played a role.

Hydropower was the most stable energy source, though with natural limitations due to the small island setting. Small-scale increases have occurred sporadically: 70 MW were added in 2023, after a few years of growth almost stagnating. Geothermal and marine energy development declined sharply in 2015 amid financial constraints and a shift in priorities due to the impacts of climate change. Since then, geothermal and marine energy have remained largely underdeveloped in these regions. High upfront costs of feasibility and exploration, complex technical requirements and logistical challenges deter most investments. Figure 3 shows the additional renewable energy electricity capacity installed over 2015-2023.

Figure 3 Installed renewables-based electricity capacity across all SIDS, 2015-2023



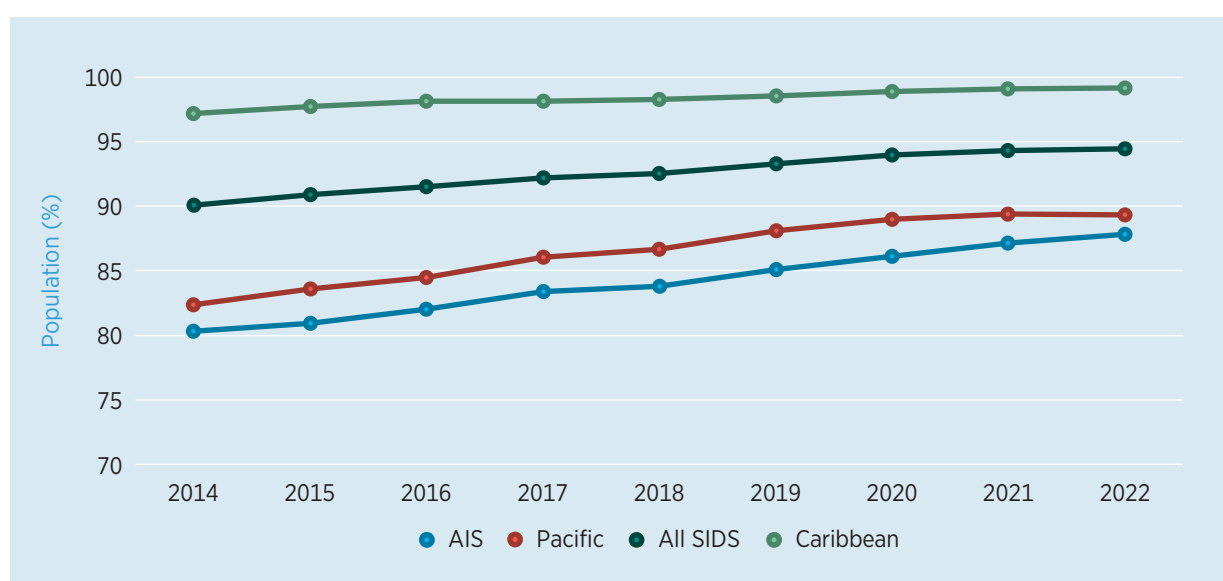
Source: IRENA, 2024.

Overall, these trends put into perspective SIDS' strategic push towards more accessible renewable energy sources like solar while there is a need to overcome logistical, financial and environmental barriers. The push for international support and funding remains fundamental to increase renewable energy adoption in these regions.

SIDS across the three regions of the Pacific, Caribbean, and AIS all made progress in increasing electricity access over 2014-2022; this is a critical factor in driving socio-economic development (Figure 1).

The Caribbean region has consistently had the highest electricity access rates. Access rates remained above 97% throughout 2014-2022, with a gradual increase to 99.19% in 2022, reflecting near-universal access in most Caribbean countries. In the Pacific region, access was substantial, but it grew slowly, starting at 82.35% in 2014 and rising to 89.35% in 2022. Electricity access is the lowest in the AIS region; from 80.30% in 2014, it grew to 87.80% in 2022, reflecting ongoing challenges to universal electricity access.

Figure 4 Electricity access across the three SIDS regions, 2014-2022



Source: Data from World Bank, 2023.

Note: AIS = Atlantic, Indian Ocean and South China Sea; SIDS = small island developing states.

Overall, average electricity access in all SIDS increased from 90.1% in 2014 to 94.4% in 2022. The deployment of renewable energy technologies played a role in closing the access gap in remote communities, acting as stimulus for economic development and helping to bring prosperity to these areas.

However, despite the commendable progress captured in the above figures, disparities within countries are still significant. For example, in the Caribbean, Haiti has access rates below 50%. In the AIS region, Guinea-Bissau reports only 37% access. In the Pacific, Papua New Guinea has only 19% access, due to critical challenges. These examples highlight the need for further investment and targeted strategies to ensure that access is equitably distributed across all SIDS.

About the SIDS Lighthouses Initiative

The SIDS LHI was launched at the UN Climate Summit in 2014, in response to the SIDS' call for action through the SIDS Accelerated Modalities of Action (SAMOA) Pathway, and reaffirmed through the ABAS, the renewed SIDS declaration for resilient prosperity. Acknowledging the actionable commitments of SIDS and development partners, another SIDS Ministerial was convened on the margins of the 2018 UN Assembly to endorse and operationalise the twelve priority areas of the LHI (Box 1). This was followed by specific highlights of SIDS' progress in each priority area.

Box 1. SIDS Lighthouses Initiative: Priority areas

1. Support small island developing states (SIDS) in reviewing and implementing Nationally Determined Contributions and extending technical assistance and capacity building where needed.
2. Expand from assessment and planning to implementing effective, innovative solutions, with continued technical and regulatory advisory services to help SIDS overcome the unique challenges they face.
3. Promote all renewable sources, including geothermal and ocean energy, and step up work to integrate solar photovoltaics and wind power.
4. Support the development of bankable projects, fostering access to finance and closer co-operation with the private sector.
5. Strengthen institutional and human capacity development in all segments of the renewable energy value chain.
6. Expand focus beyond power generation to include transportation and other end-use sectors.
7. Leverage synergies between renewables and energy efficiency.
8. Reinforce links between renewables and non-energy sectors, including agriculture, food, health and water, to foster broad socio-economic development, as well as raise awareness about job creation, gender equality and women's empowerment through renewable energy development.
9. Link renewable energy uptake to climate resilience and more effective disaster recovery.
10. Enhance collection and dissemination of data and statistics, supporting informed decision making and effective monitoring.
11. Reinforce and expand partner engagement, leveraging synergies with existing SIDS initiatives and other IRENA co-ordinated platforms such as the Global Geothermal Alliance, the International Off-Grid Renewable Energy Conference and the Coalition for Action.
12. Increase the development of renewables-based electricity to achieve the target of 10 GW of installed capacity in all SIDS by 2030.

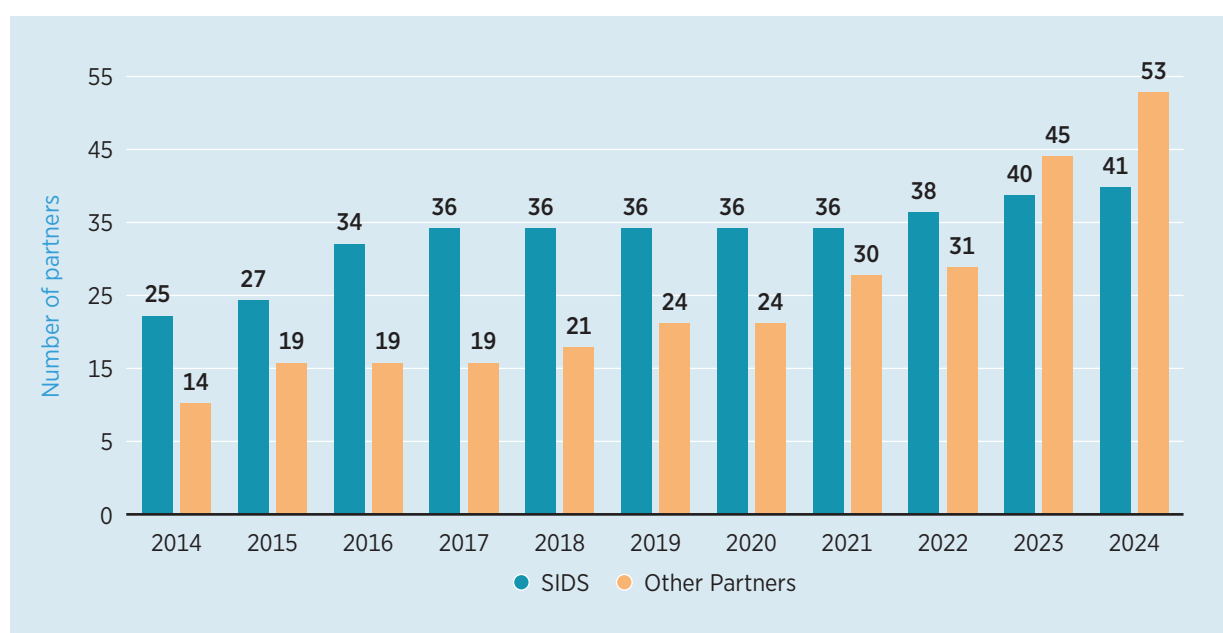
The LHI brings together 41 SIDS from the AIS, Caribbean and Pacific regions, as well as 53 other partners, including developed countries, regional and international organisations, development partners, private companies, research institutes and non-profit organisations. In 2024, Jamaica became a SIDS partner in the LHI, while the Government of Malta, Barefoot College, Green Solutions International SKN, Asian Infrastructure Investment Bank (AIIB), Local2030 Islands Network and Drift Energy joined as development partners. In 2023, Airborne Wind Energy, the Caribbean Development Bank and the Indian Ocean Rim Association (IORA) joined as development partners.

“Building authentic and robust partnerships will be pivotal in translating climate commitments into tangible actions”.

Francesco La Camera, Director-General, IRENA, COP28, Dubai

Since its launch in 2014, the SIDS LHI has consistently attracted growing interest and engagement from different actors, in particular, the private sector and development partners implementing SIDS-focussed initiatives and programmes. Figure 5 illustrates the progressive trajectory of partners joining the LHI. The trajectory demonstrates the growing network of stakeholders committed to advancing climate action and the SDGs through energy transition efforts in SIDS. Figure 6, meanwhile, lists the installed renewable capacity in SIDS who are part of LHI.

Figure 5 SIDS Lighthouses Initiative partners, 2014-2024

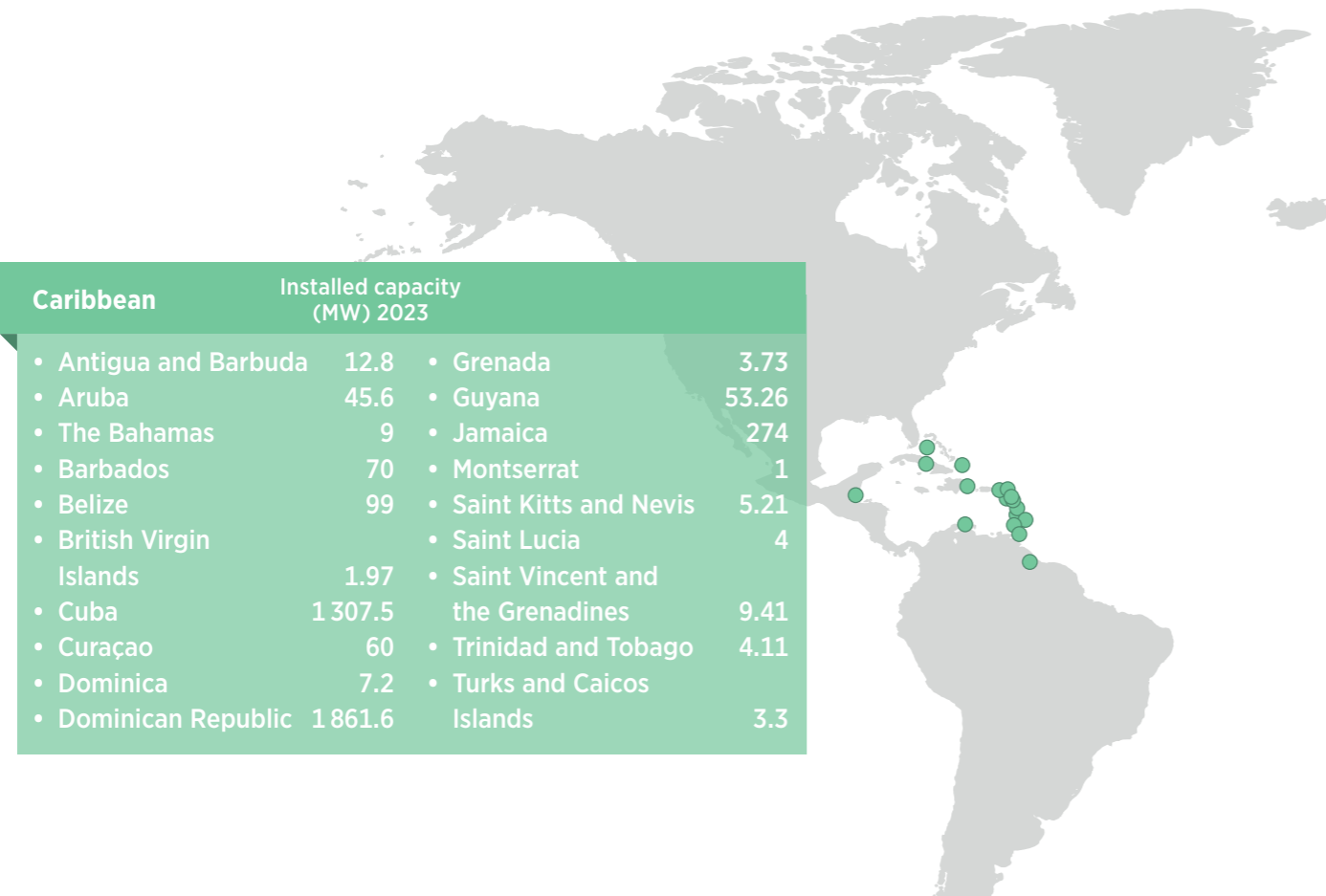


IRENA, as the co-ordinator of the SIDS LHI, provides a platform that actively encourages dialogue at all levels. As such, the LHI operationalises the Alliance of Small Island States (AOSIS) and the IRENA Energy Compact, which prioritises support to islands in making an energy transition towards a 1.5°C world. The LHI operationalises the SIDS Climate Action Summit Package, which seeks to increase ambition towards 100% renewable energy targets in the energy sector.

Becoming a SIDS partner in the LHI

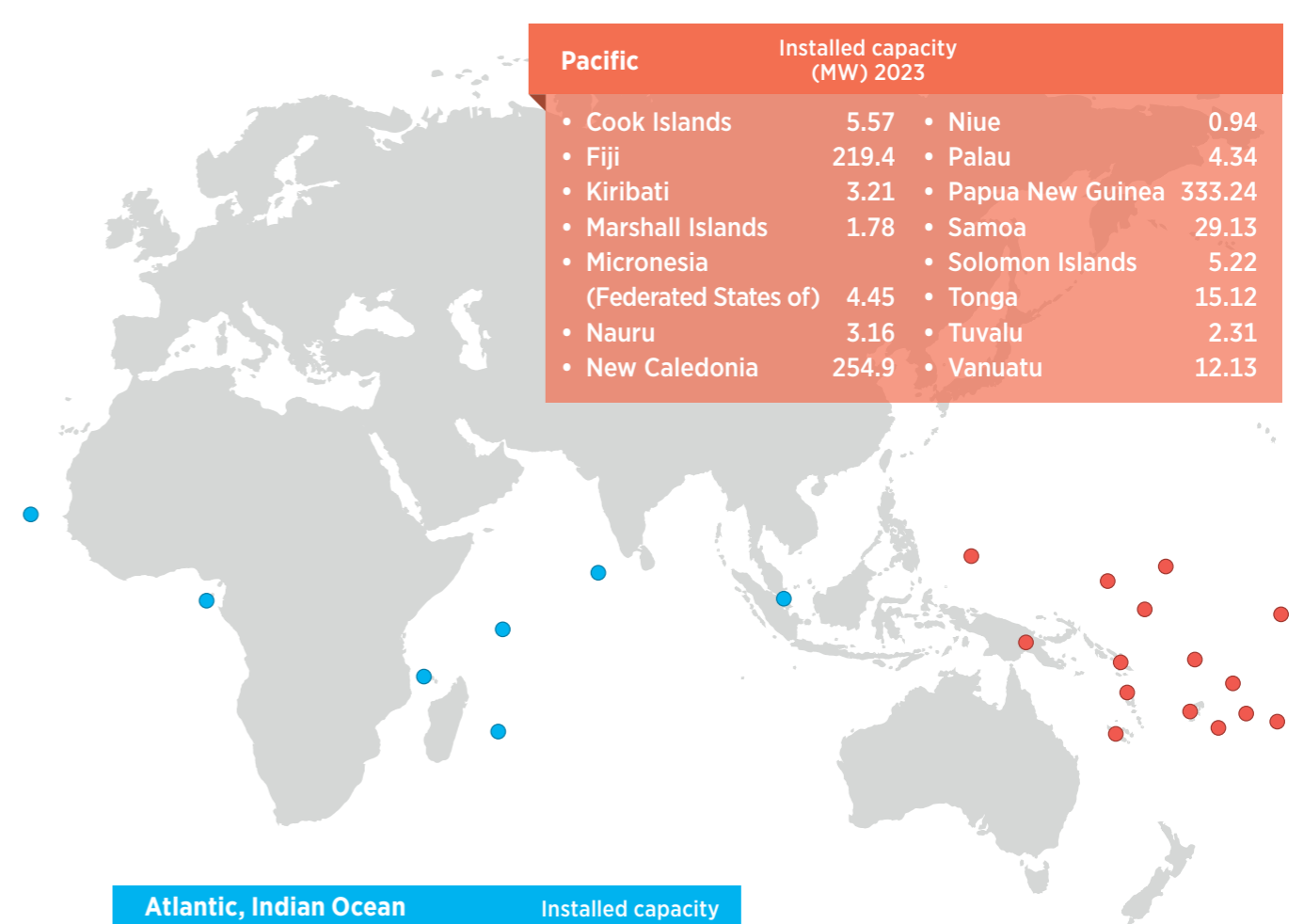
The SIDS LHI provides an all-encompassing and multi-stakeholder platform that brings together various actors – public, private, inter-governmental and non-governmental – to collaborate in further enhancing the SIDS agenda and striving towards a shared vision of expediting energy transformation efforts to reinforce climate resilience and sustainable development. All SIDS and development partners are invited to join the SIDS LHI at no cost. More information is available at <https://islands.irena.org/> or can be obtained by writing to islands@irena.org.

Figure 6 Global Map of SIDS LHI partnership, 2024



Other Partners

• Australia	• Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE)	• European Union	• Pacific Islands Development Forum (PIDF)
• Denmark	• Caribbean Climate-Smart Accelerator (CCSA)	• Greening the Islands	• Pacific Power Association
• France	• Caribbean Community Climate Change Centre (CCCCC)	• Green Solutions International SKN	• RMI
• Germany	• Caribbean Development Bank (CDB)	• Indian Ocean Rim Association (IORA)	• SIDS DOCK
• Italy	• Caribbean Electric Utility Services Corporation (CARILEC)	• IRENA	• Solar Head of State
• Japan	• CARICOM Development Fund (CDF)	• Island Innovation; Indian Ocean Commission	• Sur Futuro Foundation
• the Netherlands	• Cheesecake Energy Limited (CEL)	• Islands and Small States Institute (ISSI) – University of Malta	• Sustainable Energy for All (SEforALL)
• New Zealand	• Clean Energy Solutions Center	• Local2030 Islands Network	• United Nations Development Programme (UNDP)
• Norway	• Clinton Climate Initiative	• Organisation of African, Caribbean and Pacific States (OACPS)	• United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UNOHRLLS)
• Malta	• Drift Energy	• Organisation of Eastern Caribbean States (OECS)	• University of Delaware
• United Arab Emirates	• ENEL	• Pacific Community (formerly the South Pacific Commission [SPC])	• World Bank
• United States			
• Airborne Wind Europe			
• Akuo			
• Alliance of Small Island States (AOSIS)			
• Asian Infrastructure Investment Bank (AIIB)			
• Association of the Overseas Countries and Territories of the European Union			
• Barefoot College			



Atlantic, Indian Ocean and South China Sea (AIS) Installed capacity (MW) 2023

• Cabo Verde	35.39
• Comoros	5.45
• Maldives	37.46
• Mauritius	272.14
• São Tomé and Príncipe	2.12
• Seychelles	24.4
• Singapore	846.22

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

Expanding partnerships and synergies with other SIDS initiatives

Leaders across the SIDS continue to amplify the call for genuine and strong partnerships with all stakeholders to ensure that tailored energy transition solutions are implemented to address the existential vulnerabilities of SIDS' economies. All stakeholders must work together with empathy and a shared vision to mobilise the financial resources needed to accelerate the deployment of innovative and sustainable solutions that will reduce SIDS' reliance on imported fossil fuels. Working in tandem with SIDS-focused initiatives is key to strengthening science, technology, engineering, art and mathematics capacities through research and education and contributes to macro-economic stability. Further, effective and efficient synergies of SIDS-focused initiatives provide a global platform for sharing knowledge and accessing reliable data. It also serves to highlight monitoring and evaluation frameworks for efforts towards the energy transition.

SIDS' energy-secure future possible through IRENA and AOSIS partnership

Since the signing of the groundbreaking partnership between IRENA and the Alliance of Small Island States (AOSIS) on the margins of COP26, it has been increasingly operationalised through the SIDS LHI. At the margins of the International Conference on Small Island Developing States (SIDS4), Antigua and Barbuda, AOSIS and IRENA organised a high-level event that stressed the need for stronger collaborative efforts to mobilise development and climate finance, develop customised technology, ensure support for capacity building and promote knowledge to help SIDS reach the last mile in achieving their climate and sustainable development goals. With the clock ticking, IRENA and AOSIS are committed to achieving the SIDS LHI renewable energy target by 2030.



Antigua and Barbuda, AOSIS and IRENA co-organised a high-level event with opening remarks delivered by the Honourable Fiame Mataafa, Prime Minister of Samoa and Chair of AOSIS

However, recurring and intensifying natural disasters and extreme adverse impacts of climate change suggest a need for billions of dollars to make SIDS more climate resilient and support their efforts to recover from recurring disasters. This also signals a significant shift towards decentralised, innovative, renewables-based solutions to withstand extreme climatic conditions, highlighting a critical need for resilient energy infrastructure.

At COP29, SIDS, through AOSIS, continued to reminding all countries to set more robust and ambitious NDCs towards a 1.5°C future, which is essential for the planet and its people. In the energy sector, SIDS are starting to look to the ocean as an indigenous resource for energy, combined with other innovative energy-efficient and renewables-based solutions. While the fiscal space for SIDS is narrow, innovative financial solutions such as debt-for-climate swaps can be explored to meet their development and climate priorities, besides increased private sector and philanthropic participation in supporting their energy transition efforts.

Alignment of global and regional energy transition priorities in the Pacific

The Pacific Regional Energy Meetings Series 2024, which focused on the theme “Just, Inclusive and Equitable Energy Transition”, included a three-day meeting of senior energy officials, a Waste-to-Energy Symposium and a two-day Pacific Women in Energy Conference, which was convened in Nadi, Fiji, by SPC on 23-27 September 2024. The meeting of senior energy officials was chaired by Papua New Guinea. Participants deliberated on the progress of the implementation of the Framework for Energy Security and Resilience in the Pacific 2021-2030 and stressed the need for close collaboration with development and financing partners to realise regional and national energy transition priorities. The discussions centred on the implementation of robust national energy policies, plans and legislations; capacity development to strengthen skills and knowledge; and a workforce transition to align with emerging renewable energy and energy-efficient solutions, including waste to energy, and ocean and geothermal resources, among other proven renewable energy solutions tailored for the Pacific SIDS. The meeting also underscored the importance of access to clean cooking, efficient electricity and transport services, which significantly enhance energy security, climate resilience and socio-economic benefits (e.g. jobs and gender mainstreaming in the Pacific energy sector).



©Pacific Community (SPC)

Papua New Guinea chairs the Pacific Senior Energy Officials Meeting hosted by the Pacific Community, September 2024

The participants stressed that grid stability is increasingly crucial as energy systems accommodate more renewables, taking into account the energy planning and capacity expansion tools needed to expand micro-grids and solar home systems to communities in remote locations, on islands and off-grid regions.

“Energy security is very important in Island countries. It could become a driver for the energy transition for Pacific islands”.

H.E. Baron Waqa, Secretary General, Pacific Islands Forum Secretariat, COP29, Baku

Box 2. Towards a Resilient Future: Highlights from the 5th Pacific Regional Ministers' Meeting

The Efate Outcome of the 5th Pacific Regional Energy and Transport Ministers' Meeting (PRETMM) highlighted the importance of the timely implementation of the Framework for Energy Security and Resilience in the Pacific 2021-2030 with tailored capacity and investment support for energy transition efforts that will help meet national climate and sustainable development goals. Priority actions include making the Pacific more resilient to recurring and intensifying natural disasters and climate change, energy security, access and affordability, and socio-economic benefits such as jobs and gender mainstreaming. Other aspects include, among others, innovative solutions such as battery storage and clean cooking.

The Efate Outcome also supported the Port Vila call for a just transition towards a fossil-fuel-free Pacific, which is aligned to the 250 Strategy for the Blue Pacific Continent. While the Pacific SIDS releases insignificant greenhouse gas emissions, the Pacific Energy Ministers remain committed to strengthening climate action and resilience to address the existential threats brought by climate change. Decarbonisation of the Pacific's energy and transport sectors, while simultaneously enhancing maritime safety and navigation services, requires increased access to tailored climate finance facilitated through strategic partnerships.



Pacific regional energy and transport ministers and development partners attending the PRETMM held in Port Vila, Vanuatu, in May 2023

Strengthening regional co-operation in the Atlantic, Indian Ocean and South China Sea

IRENA and IORA signed a memorandum of understanding for a joint effort in promoting the increased adoption of the sustainable use of all forms of renewable energy and support the members in their energy transition efforts towards a resilient and prosperous future. The joint effort builds on Nelson Mandela's vision to include the concept of an Indian Ocean Rim for socio-economic co-operation.

Through the SIDS LHI, both organisations will help the IORA SIDS members implement the Conference of Parties outcomes related to infrastructure, policies and skills for tripling renewables and accelerating the energy transition. Joint efforts will be pursued to facilitate information sharing related to emerging sustainable technologies related to ocean energy, battery storage, geothermal energy and green hydrogen. This will be complemented by capacity-building programmes to advance renewables' deployment and women's empowerment and leadership in renewable energy and create, at the national and regional levels, a business climate conducive to financing energy transition efforts.

Strengthening regional co-operation in the Caribbean region

The OECS, a partner of the SIDS LHI and the Global Geothermal Alliance, has teamed up with IRENA to accelerate geothermal energy development in the Eastern Caribbean. This collaboration centres on strengthening stakeholder engagement under the OECS project Geothermal Energy: Capacity Building for Utilization, Investment, and Local Development (GEOBUILD).

A key outcome of this partnership is the development of a Stakeholder Engagement Strategy (SES) for the GEOBUILD. The SES will provide a comprehensive framework to guide the involvement of diverse stakeholders, including government agencies, local communities, private sector entities, technical experts, international organisations and other key partners across five beneficiary member states: Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and the Grenadines. The strategy leverages diverse perspectives and expertise, seeking to promote an inclusive, community-driven approach to geothermal energy development, to advance national as well as regional sustainability goals.

*“What we need is commitment to action by all countries without exception.
We cannot keep postponing action as the most vulnerable
of the world continue to suffer”.*

Hon. Flavien Joubert, Minister of Agriculture, Climate Change and Environment, Seychelles

Strengthening SIDS' engagement through the IRENA permanent representatives

Permanent representatives to IRENA serve as the on-the-ground liaisons between member states and the IRENA Secretariat. They facilitate in-person interactions and communication. While permanent representatives are crucial in maintaining ongoing dialogue with relevant national governments and local stakeholders, particularly in preparation for IRENA's Assembly sessions and Council meetings, they are also engaged on key renewable energy issues and developments, and in hosting the quarterly "Renewables Talk for IRENA Permanent Representatives", which provides a medium for regular interaction with the IRENA Secretariat, including discussions on specific topics and the sharing of national experiences related to priority actions and challenges in renewable energy deployment.



H.E. Gervais Moumou, Seychelles Ambassador to the UAE, and H.E. Cornelius Walegere, Solomon Islands Ambassador to the UAE, present their permanent representative credentials to the Director General of IRENA

Enhancing SIDS' capacity with NDC-targeted support

The first Global Stocktake of the Paris Agreement, which concluded at COP28, revealed that efforts fall short of meeting the Paris Agreement's goals, despite advancements in mitigation, adaptation and support mechanisms. To remain on course, global emissions must be reduced 43% by 2030, 60% by 2035 and achieve net zero by 2050 (UNFCCC, 2023). The Global Stocktake emphasised a need for countries to adopt ambitious, economy-wide emission reduction targets covering all sectors and GHGs. The forthcoming NDCs, due in 2025 – referred to as the NDCs 3.0 – must be more progressive and ambitious than the current submissions. This may be the critical opportunity to align global emission trajectories with the Paris Agreement's 1.5°C goal.

International support is essential for SIDS to meet their enhanced NDCs and fulfil their climate commitments. Co-ordinated partnerships and collaboration will be vital in ensuring that nations, especially those most vulnerable, have the resources and capacity to achieve their climate targets and drive meaningful progress towards a sustainable future.

“We urge that the Loss and Damage Fund should be more targeted to the special challenges confronting Small Island Developing States, because we are the most exposed and most vulnerable”.

Hon. Sitiveni Rabuka, Prime Minister of Fiji, COP28, Dubai

IRENA's 2023-2024 NDC support for SIDS

Upon request, IRENA, through the SIDS LHI, provides its Member States with climate action support through analytical assistance, data and statistical support to help the Member States revise and implement their NDCs under the Paris Agreement. Countries can leverage cost-effectiveness assessments for various mitigation strategies to better identify, prioritise and select the most suitable options; they can thus identify a more efficient path to reach their climate goals. This analysis also contributes to shaping NDCs, supporting implementation plans and developing long-term sectoral strategies. It also fosters the expansion of renewable energy, improves energy access and boosts private sector engagement in climate initiatives.

Table 1 Summary of IRENA's NDC support for SIDS

No.	Country	NDC support: activity details
1	Antigua and Barbuda	Socio-economic analysis of the impact of e-mobility on communities
2	Belize	Rooftop SolarCity Simulator (Belize City)
		Rooftop SolarCity Simulator (San Ignacio)
		Rooftop SolarCity Simulator (San Pedro)
3	Comoros	Rooftop SolarCity Simulator (Fomboni)
		Rooftop SolarCity Simulator (Moroni)
		Rooftop SolarCity Simulator (Mutsamudu)
4	Cuba	Assessment and the development of a country programme on the deployment of decentralised renewable energy solutions for powering agriculture and food value chains*
5	Dominica	Project facilitation
6	Fiji	Legislative and regulatory gap analysis to facilitate the just inclusive transition for Fiji's energy sector*
7	Guyana	Rooftop SolarCity Simulator (Georgetown)
8	Montserrat	Utility-scale site assessment – onshore wind power
9	Papua New Guinea	Energy transition assessment*
10	São Tomé and Príncipe	Rooftop SolarCity Simulator (São Tomé)
		Rooftop SolarCity Simulator (Príncipe)
		Rooftop SolarCity Simulator (Trindade)
		Rooftop SolarCity Simulator (Bela Vista)
		Assessment for the deployment of renewable energy solutions for healthcare facilities
		Cost-effectiveness analysis for renewable energy technology options
11	Saint Lucia	Strengthening bioenergy data for monitoring SDGs and NDCs
		Energy surveys for NDC implementation roadmaps
12	Seychelles	Grid integration study*
		Techno-economic assessment for e-mobility options*
13	Solomon Islands	Energy transition assessment (formerly renewables readiness assessment)
		Rooftop SolarCity Simulator (Honiara)
		Hydropower potential mapping
		Project identification and pipeline support
14	Tonga	Energy surveys for NDC implementation roadmaps*
		Renewable-energy-related capacity building for youth to tackle climate change
15	Vanuatu	Project identification and pipeline support

* Denotes ongoing activities.

Notes: NDC = Nationally Determined Contribution; SDG = Sustainable Development Goal.

Recognising the critical role of reliable data in driving energy transitions, IRENA, through the SIDS LHI, has prioritised strengthening energy data systems to support reporting for and implementation of the NDCs and the achievement of the SDGs. This support includes improving data quality; surveys to address data gaps; developing robust monitoring, reporting and verification (MRV) systems; and local capacity building to effectively manage and utilise energy data for informed decision making.

IRENA supported Saint Lucia in the development of an improved MRV system, which strengthened Saint Lucia's ability to gather, analyse and archive energy data. In turn, Saint Lucia could effectively implement its NDC and track progress, and also build the capacity of local stakeholders to manage energy statistics critical for NDC reporting and monitoring.

“As we move towards increasing the uptake of renewable energy in SIDS globally, let islands continue to lead the way in our ambitions, let islands continue to convey the urgency and to push for meaningful action”.

H.E. Evelyn C. Wever- Croes, Prime Minister of Aruba

IRENA also provided phased support to Tonga: It began with an end-use energy survey to gather essential data on residential and transport energy consumption. A subsequent audit of government buildings established baseline data on energy efficiency within government buildings and identified opportunities for energy savings and efficiency improvements, consistent with Tonga's energy efficiency master plan. IRENA's support not only provided valuable data but also built the capacity of the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications to conduct energy audits for the first time, in turn strengthening Tonga's ability to monitor and track its progress towards energy efficiency goals.

IRENA also supported Antigua and Barbuda in implementing a Transport Use and Expenditure Survey. The support, focusing on the transport sector, included the collection of baseline data to assess the potential impact of low-carbon, climate-resilient electric mobility solutions on economically vulnerable communities while advancing Antigua and Barbuda's NDC. The survey, which drew on insights from the 2011 Population and Housing Census, established a strong foundation for evidence-based decision making in sustainable transportation. The findings revealed a heavy reliance on fossil-fuel-driven vehicles and significant transportation costs, underscoring the need for supportive policies to enable vulnerable communities to transition to sustainable mobility options.

Cost-effective mitigation options for NDC implementation for São Tomé and Príncipe

IRENA, through the SIDS LHI, conducted the [Assessment of Cost-Effective Mitigation Options for NDC Implementation for São Tomé and Príncipe](#), which seeks to identify and evaluate cost-effective mitigation options to help São Tomé and Príncipe achieve its NDCs. The baseline emissions and various mitigation scenarios, highlighting the potential for significant GHG reductions through the adoption of renewable energy technologies, were analysed in detail, including the marginal abatement costs and the potential for reducing GHGs using cost-effective measures as part of different mitigation options.

Table 2 Estimated investment cost for each mitigation measure (USD, millions) for São Tomé and Príncipe

Reference	Mitigation measure	Description	Estimated investment needs (USD million)
A	Hydropower	15.5 MW of additional hydropower capacity	19.7
B	Solar PV	46.95 MW of utility-scale solar PV capacity	60.9
C	Biomass	4.68 MW of biomass capacity	8.9
D	Reduced T&D losses	Reduction of transmission and distribution losses to 30%	13.5
E	Energy-efficient lighting	Replacement of incandescent light bulbs with LEDs	3.0
Total			106








Notes: LED = light-emitting diode; MW = megawatt; PV = photovoltaic; T&D = transmission and distribution.

The assessment also highlighted mitigation potential in the power sector and for improved cookstoves, including the importance of transitioning to renewable energy sources and improving energy efficiency. It also outlines the investment needs for implementing the identified mitigation options and the impacts of various factors on the cost-effectiveness of these options and the equivalent GHG emissions. Overall, the assessment provided a comprehensive roadmap for São Tomé and Príncipe to achieve its NDC targets by leveraging renewable energy technologies as cost-effective mitigation options.

In 2021, Antigua and Barbuda updated its NDC; it set two targets, to be reached by 2030: (1) 86% renewables share in electricity generation and (2) 100% electric vehicles (EVs) in all new vehicle sales.

IRENA supported Antigua and Barbuda in developing [a technology plan to transition its transport sector to renewables-based electricity](#). The plan included the evaluation of scenarios for road fleet electrification to reduce GHG emissions and support the NDC’s implementation. This technical assistance complemented the Global Environment Facility’s (GEF’s) Sustainable Low-Emission Island Mobility Project, which is helping Antigua and Barbuda switch from internal combustion engine vehicles to EVs. Key findings from Antigua and Barbuda’s technology plan included the needs for charging infrastructure, recommendations for investment, emission forecasts and renewable energy capacity requirements (Figure 7). The plan emphasised benefits to the power sector due to EV deployment, international EV standards, performance monitoring and the next steps for integrating EVs with the Antigua and Barbuda grid.

Figure 7 Key findings of Antigua and Barbuda’s technology plan

Topic	Forecasts
 100% electrification of transport sector	<ul style="list-style-type: none"> It is possible to achieve a 100% EV fleet by 2046. By 2050 Antigua’s vehicle fleet is expected to total 73 693.
 Electricity generation	<ul style="list-style-type: none"> Meeting the energy demand of the EV fleet in 2050 would require 182.4 GWh of renewable electricity to be generated, from solar PV capacity of 89 MW and wind capacity of 19 MW.
 Charging infrastructure	<ul style="list-style-type: none"> The number of EV chargers required is close to 4 000 in 2031 and drops to just over 1 500 in 2050. The required installed capacity of EV chargers peaks at 74 MW in 2041 and decreases to 64 MW in 2050.
 Fuel and electricity	<ul style="list-style-type: none"> In 2050, the annual cost of electricity to power the EV fleet is about USD 47 million. If no EVs were implemented, the annual petrol cost for ICE vehicles in 2050 would be USD 637 million.
 Cost of EVs and chargers	<ul style="list-style-type: none"> In 2050 the total accumulated cost of EVs and EV chargers is estimated at USD 3 568 million and USD 54.2 million, respectively.
 Emissions	<ul style="list-style-type: none"> A 100% EV fleet has associated annual CO₂ emissions of 7 310 tonnes/year, compared to 223 000 tonnes/year without EVs. A 100% EV fleet reduces the emissions of CO₂, PM₁₀, PM_{2.5} and NO_x by -97%, -90%, -95% and -99%, respectively, compared to the equivalent ICE fleet.
 External costs	<ul style="list-style-type: none"> The full electrification of road transport avoids an annual external cost of USD 22.6 million, of which CO₂ accounts for 81.5%.

Notes: CO₂ = carbon dioxide; EV = electric vehicle; GWh = gigawatt hour; ICE = internal combustion engine; MW = megawatt; NO_x = nitrogen oxides; PM = particulate matter; PV = photovoltaic.

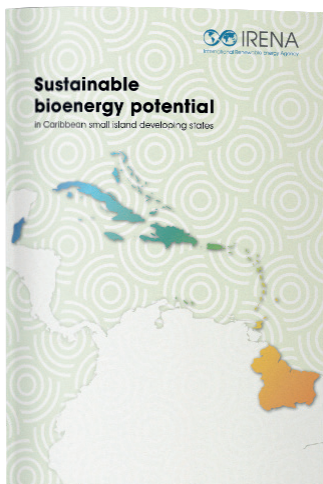
Advancing from planning to action with innovative energy transition solutions

Despite the tremendous renewable energy potential in SIDS, translating that potential into tangible on-the-ground results has proven challenging. In response to this, the SIDS LHI has been intensifying its efforts to enhance renewable energy deployment across SIDS. The focus is on improving access to energy and making it more reliable by diversifying energy sources based on the unique potential of each island state.

Key initiatives under the SIDS LHI include the assessment of sustainable bioenergy potential in the Caribbean region, the findings of the energy transition assessment for the Solomon Island's energy sector, the implementation of the recommendations, and the Pacific decarbonisation efforts with renewables, including innovative solutions such as green hydrogen. Through these targeted efforts, SIDS LHI aims to drive meaningful progress in the energy transition across the region.

Assessment of sustainable bioenergy potential in the Caribbean

Figure 8 Sustainable Bioenergy Potential in Caribbean Small Island Developing States report



IRENA undertook an assessment of bioenergy potential in six Caribbean SIDS: Cuba, the Dominican Republic, Haiti, Jamaica, Trinidad and Tobago, and Guyana. The assessment focussed on the use of local feedstocks like sugarcane, oil palm and municipal solid waste (MSW) to produce biofuels (ethanol, biodiesel) and generate bioelectricity (Figure 8).

Cuba and the Dominican Republic emerged as regional leaders in bioenergy potential. Cuba's vast sugarcane resources can support ethanol production and thermo-electric power generation. It can use sugarcane bagasse and straw to diversify its energy mix and mitigate fuel imports. Similarly, the Dominican Republic benefits from sugarcane and oil palm; oil palm enables the production of biodiesel, which could displace up to 17% of diesel consumption. Solid

biomass from oil palm residues and substantial MSW-based energy potential further increase the Dominican Republic's energy portfolio. Haiti, with notable opportunities in sugarcane ethanol, can address energy access challenges while leveraging moderate MSW energy potential to improve waste management. Jamaica focuses on energy generation from MSW, aligning its waste disposal challenges with clean electricity needs, while Trinidad and Tobago's industrialised economy could integrate bioenergy solutions despite limited agricultural land. Guyana, prioritising forestry preservation, faces restricted sugarcane expansion but can explore small-scale MSW-to-energy projects to support energy diversification and waste management.

Through these country-specific insights, the assessment highlighted how tailored bioenergy strategies can promote sustainability, reduce carbon footprints and enhance energy security across the Caribbean. By addressing resource availability, technological feasibility and environmental concerns, the roadmap offers a practical framework for advancing bioenergy while balancing economic and ecological priorities in the region.

Key outcomes of the Solomon Islands Energy Transition Assessment

The Energy Transition Assessment (ETA) for the Solomon Islands, formerly known as the [Renewables Readiness Assessment \(RRA\)](#), was undertaken in collaboration with the Ministry of Mines, Energy and Rural Electrification and IRENA, through the SIDS LHI. The assessment resulted in the launch of the RRA report in February 2024, which provided a comprehensive roadmap for the Solomon Islands to enhance its energy transition towards achieving its national renewable energy targets and NDC.



The launch of the Solomon Islands RRA report, which also included the rooftop solar analysis for Honiara and the country's hydro potential map

The RRA identified strategic key actions, such as increased investment in renewable energy, which will strengthen energy security. It further emphasises a need to develop and implement supporting policy and regulatory frameworks (e.g. subsidies, tax credits and renewable energy standards) that will encourage private sector participation. The assessment further highlights the potential for job creation in installation, maintenance and research related to renewable energy. Additionally, energy efficiency and conservation measures were highlighted as one of the key areas. Under this, the RRA explored the development of markets for electric mobility and innovative solutions for the maritime and aviation sectors. Key sectors including health, agriculture, food, water, education, tourism, fisheries and forestry were identified as critical areas where efforts to accelerate the energy transition are essential.

The RRA also stresses the significance of fostering partnerships and strategic engagements to support the energy transition, and calls for community and public support, affordable and stable energy prices, and innovative funding mechanisms to support renewable energy projects. Complementing the assessment was the development of the rooftop solar analysis for Honiara and the hydropower potential for the Solomon Islands.

“External support and technical advisory group consisting of current active development partners, mainly IRENA, ADB, World Bank and JICA will be part of the implementation process where they will inform and advise on financing and technical assistance options that may be available to the RRA implementation”.

Daniel Rove, Deputy Secretary, Ministry of Mines, Energy & Rural Electrification, Solomon Islands

Decarbonising Pacific SIDS' economies through green hydrogen

At the 5th Pacific Regional Energy and Transport Ministers' Meeting (PRETMM) in Vanuatu in May 2023, the Pacific Energy Ministers urged IRENA and partners to explore green hydrogen's potential for decarbonising the Blue Pacific and to develop a timebound regional green hydrogen strategy. The University of New South Wales, in co-ordination with Australia's Department of Climate Change, Energy, the Environment and Water, examined the renewable energy resources available in the Pacific island countries and territories (PICTs) and evaluated the potential of green hydrogen to replace fossil fuels in hard-to-electrify sectors. This effort laid the groundwork for understanding green hydrogen's role in regional decarbonisation by assessing the technological readiness and applicability of renewable-based production pathways suitable for the PICTs. It also focused on critical requirements such as energy resources, land availability, infrastructure and feedstocks, while conducting a detailed techno-economic assessment for hydrogen value chains.

The above effort, with SPC support, the University of the South Pacific and IRENA resulted in four reports that highlight the essential role of renewable energy deployment and energy efficiency measures as foundational pillars for a successful energy system transformation. Green hydrogen is identified as a complementary solution with immense potential to decarbonise and optimise transportation across the maritime, aviation and land sectors. Further, the reports offer a comprehensive economic analysis and outline a roadmap for the regional integration and development of a sustainable hydrogen economy tailored to the PICTs' unique needs. Together, these reports highlight the transformative opportunities for green hydrogen to improve sustainability and resilience, particularly in maritime transport, which plays a critical role in the region's socio-economic structure.



Capacity building on the rooftop SolarCity Simulator in Honiara, Solomon Islands

Promote wind, solar, geothermal, ocean energy and other renewable energy sources

SIDS have embraced renewable energy as a cornerstone of their sustainable development and climate action. Accelerating this transition clearly requires actively promoting a comprehensive and balanced energy mix that incorporates a diversity of renewable sources, such as wind, solar, geothermal and ocean energy. However, each of the SIDS has unique strengths and challenges – from resource availability to infrastructure limitations – requiring tailored support in line with their unique characteristics to effectively deploy these energy solutions. Strategic collaboration, targeted investments and a focus on research and development can help SIDS unlock the full potential of renewable energy.

“We need to focus on SIDS-appropriate technology.

Wind and solar are excellent and they have their place and purpose, but we are large ocean states and it would be an injustice if we refuse to make the case for ocean technology (wave or OTEC) and IRENA needs to take up as part of its mandate the development of more SIDS- appropriate technology”.

**Hon. Dr. Vince Henderson, Minister of Foreign Affairs, International Business, Trade and Energy, Dominica,
COP 28 Dubai**

IRENA's work on renewable potential assessment in SIDS

IRENA continues to support SIDS in evaluating their renewable energy potential so that projects can be planned and deployed at various scales.

One key tool is the [SolarCity Simulator](#), an online tool developed by IRENA to estimate rooftop solar PV potential in urban areas. It helps city planners, policy makers and energy experts assess the technical feasibility, costs and environmental benefits of solar PV across city rooftops. IRENA also offers site assessments, as well as cost-effective pre-feasibility analysis for identifying financially viable locations for solar (both on-shore and floating PV, parabolic trough collectors, central receiver systems and linear Fresnel) and wind (on-shore and off-shore) projects.

In 2023-2024, as part of the SIDS LHI, IRENA customised the SolarCity Simulator for specific regions, including Belize (Belize City, San Ignacio and San Pedro), Comoros (Fomboni, Moroni and Mutsamudu), Guyana (Georgetown) and the Solomon Islands (Honiara). These localised analyses provide accurate assessments of solar potential, helping to create tailored strategies for solar PV deployment. This support is vital for reducing reliance on imported fossil fuels and strengthening energy resilience. Following the release of these simulators, IRENA hosted capacity-building workshops on rooftop solar PV potential for Belize, Comoros, Mauritius, Guyana and the Solomon Islands.

IRENA adapted the SolarCity Simulator to these SIDS' specific geographical and infrastructural needs with an aim to facilitate sustainable energy transitions that promote climate resilience and economic growth. Additional simulators are under development, with launch scheduled for the Príncipe Island, Bela Vista and Trindade in São Tomé and Príncipe by the end of 2024.

Spotlight on Montserrat's wind power potential

IRENA conducted a pre-feasibility assessment for five potential sites – Saint George's Hills, Centre Hills, Silver Hills, Lookout and Bottomless Ghaut – for utility-scale on-shore wind power projects. The assessment included innovative, cost-effective approaches to identifying financially viable locations (Figure 9).

Figure 9 Montserrat site assessment report for utility-scale wind projects



The methodology for the assessment combined renewable resource data, site-specific features (such as surface roughness, orography and terrain type) and technology-specific information to evaluate these sites' feasibility. It also considered various factors influencing wind turbine performance, for example, vertical wind speed profiles, turbine power curve adjustments for site-specific air density and the effects of the terrain on wind flow. Additionally, potential energy losses due to factors like wake effects, turbine performance, maintenance, grid availability and power curtailment were estimated to determine the net energy output.

The findings included the outcomes of the financial analysis where simulated tariffs and levelised costs are compared with existing tariffs in Montserrat and neighbouring SIDS in the region. Sites deemed viable are those with tariffs comparable to that for existing projects, whereas sites requiring significantly higher tariffs are considered non-viable. The assessment model also accounts for uncertainty and provides adjusted energy production values to support the financial analysis.

Partner update: Trinidad and Tobago's path to green hydrogen and wind power

Trinidad and Tobago is making significant progress towards a sustainable energy future by tapping into its potential for green hydrogen and wind energy. The country is implementing a comprehensive roadmap and forging key partnerships to harness its renewable resources.

Figure 10 Wind Energy Generation in Trinidad & Tobago report



In November 2022, the government unveiled the Roadmap for a Green Hydrogen Economy. It outlined a long-term plan to produce green hydrogen from off-shore wind energy, with a potential 57 GW off-shore capacity. To proceed with this vision, in 2023, the Ministry of Energy and Energy Industries (MEEI) partnered with the European Union to develop a detailed strategy for wind energy (Figure 10). Several high-potential on-shore and off-shore sites were identified for development. Building on this, in November 2024, the MEEI announced the successful deployment of Light Detection and Ranging (LiDAR) devices at key on-shore locations as part of the Wind Resource Assessment Programme. These devices will collect wind data to international standards over the next 12-18 months, marking a crucial first step in the country's wind energy development.

In parallel, the MEEI is prioritising strategic capacity building by offering mentorship and training programmes to cultivate a highly skilled workforce and strengthen institutional expertise. In partnership with IRENA, the MEEI aims to empower its staff with expertise in key areas such as

off-shore wind and green hydrogen, equipping young professionals to drive Trinidad and Tobago's energy transition.

Bankable project development, financial access and private sector engagement

SIDS need to transition to renewable energy and energy efficiency to be climate resilient and achieve energy security. Given their unique challenges, SIDS need bankable projects that are financially viable and tailored to local needs. Innovative financing mechanisms, such as blended finance, green bonds and climate resilience funds, can help unlock new sources of capital, attract private investment and scale up renewable energy projects, while reducing risks and financing costs.

Access to finance is a major barrier for SIDS, which are discouraged especially by the high upfront costs of developing renewable energy infrastructure. Blended finance, for example, combines public and private capital to make projects more attractive to investors. Green bonds allow SIDS to tap global markets for funding, while climate resilience funds provide concessional financing for projects that reduce vulnerability. SIDS can achieve an expedited sustainable energy transition by leveraging these mechanisms and fostering public-private co-operation.

IRENA's project pipeline supports Vanuatu's climate resilience efforts

IRENA, through the SIDS LHI, is helping Vanuatu realise its ambitious goals to transition to 100% renewable energy in electricity generation by 2030. This support – in response to the need for developing a strong pipeline of renewable energy projects in Vanuatu and helping them access finance – seeks to boost energy access and resilience, and support wider sustainable development objectives.

IRENA's technical assistance included the development of a robust pipeline of renewable energy projects that will contribute to Vanuatu's NDC targets and strengthening their capacity in developing bankable proposals. Through this support, the Vanuatu Department of Energy (DOE) has submitted an application to the [Powering Renewable Energy Opportunities Programme](#) for grant funding of EUR 200 000 to undertake feasibility studies and implement findings for the establishment of agro-PV technology, micro-grid systems, and a resilient and energy efficiency community hall in Ipayato Village, Espiritu Santo. Project concepts were also submitted to the GEF Small Grants Programme as well as the Asian Development Bank (ADB) Disaster Resilient Renewable Energy Project to support resilience building in the villages of Namoru, Malao, Narango and Tasiriki. This support has resulted in the Vanuatu DOE securing a USD 5 million ADB grant for feasibility studies and implementation.

Legislative gap analysis to advance Fiji's energy transition efforts

The National Development Plan, which includes a “Transforming Fiji” vision, includes a 20-Year Development Plan (2017-2036), as well as a 5-Year Development Plan (2017-2021), which outlines the country's roadmap for sustainable transformation and aligns with global commitments such as the 2030 Agenda for Sustainable Development and the Paris Agreement. The National Development Plan emphasises a need for multi-sectoral solutions and addressing key issues like climate change, green growth, gender equality and governance for an integrated, sustainable development approach for Fiji's future.



Participants of a stakeholder consultation workshop: legislative gap analysis of Fiji's energy sector, November 2024

However, Fiji's electricity sector is still 45% dependent on fossil fuels, and it needs to do more to fully realise the national renewable energy targets that were reflected in its NDCs, National Energy Policy and the National SDG 7 Roadmap. To this end, IRENA, through the SIDS LHI, undertook a legislative gap analysis to assess the alignment between Fiji's energy vision, goals, and targets and its existing legal and regulatory framework. The analysis identified gaps or inconsistencies within the current legislation that may hinder the effective implementation of energy policies, particularly in the context of renewable energy. The gap analysis included a systematic review of the primary and subsidiary energy laws, to ensure that the legal structure supports Fiji's renewable energy objectives and provides a clear path for a sustainable, resilient energy future for the country through its energy transition efforts. The legislative gap analysis also helped identify areas where new or revised legislation is needed to increase policy coherence and effectiveness, which is earmarked to be completed by the end of 2024.

Pacific SIDS Project Finance Capacity-Building Workshop

The Pacific SIDS Project Finance Workshop was convened in Nadi on 16-19 January 2024 and brought together representatives of seven Pacific Island countries, Fiji, the Federated States of Micronesia, Palau, Samoa, Solomon Islands, Tuvalu and Vanuatu, who were project developers as well as representing government and financial institutions. The workshop included an introduction to IRENA's project facilitation tools, specifically, an introduction to specific features and requirements of the Energy Transition Accelerator Financing (ETAF) platform and the Climate Investment Platform (CIP). Additional participants were trained on practical and theoretical modules on project finance. This training was complemented with project pitching, through which they had an opportunity to present the projects being developed in their respective countries. The participants also received feedback on ways to improve projects' bankability and attractiveness.



Participants of the Pacific SIDS project finance capacity-building workshop, January 2024

The topics covered during the workshop also included contracts; risks; financial structuring; financial model; loan agreement; project appraisal; and the Environmental, Social and Governance framework. These theoretical models were supported by detailed whiteboard sessions on loan life cycle, income statement, balance sheet, various financial ratios and practical Excel modelling to compute the debt-service coverage ratio, net present value, internal rate of return and sensitivity analysis.

Enhance institutional and human capacity across the renewable energy value chain

SIDS continue to face significant challenges, particularly due to a shortage of qualified professionals in the renewable energy sector. In response, the SIDS LHI has been focused on building local capacity at the national and regional levels to support the development of tailored solutions for SIDS. Capacity building, which supports the priorities of the Antigua and Barbuda Agenda for SIDS (ABAS) and the SIDS LHI, is crucial for more robust data governance, improving evidence-based policy making, and greater resilience to climate change and natural disasters. Capacity building also empowers youth through education and skill development, promotes economic participation and supports the growth of sustainable, ocean-based economies by scaling nature-based solutions and improving project feasibility.

Capacity-building programmes have included, but are not limited to project finance, the development of bankable power purchase agreements and projects, energy management and auditing, climate financing flows and resource assessment.

Fostering public-private partnerships to advance the renewable energy agenda in SIDS

IRENA hosted the side event “Fostering Public-Private Partnerships in the Renewable Energy Sector” on 18 September 2024 at the World Utilities Congress, which highlighted innovative collaboration models for advancing renewable energy deployment in SIDS. The event, which attracted over 25 participants, focused on successful public-private partnership (PPP) initiatives that address SIDS’ unique challenges due to geographic isolation, resource limitations and climate vulnerability. It emphasised SIDS’ potential as testbeds for clean energy technologies to support collaboration among the government, utility and private sector to accelerate the energy transition.



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Speakers in the IRENA side event on Fostering Public-Private Partnerships in the Renewable Energy Sector, World Utilities Congress

Discussions highlighted the importance of building robust regulatory frameworks, reducing financing costs and supporting the global adaptation of successful renewable energy models. Key outcomes included commitments from Barbados and Malta to further exploring green hydrogen and resilient infrastructure. The event reinforced the value of PPPs in creating local benefits such as energy security, economic growth and climate resilience, advancing global sustainable development through strategic innovation in SIDS.

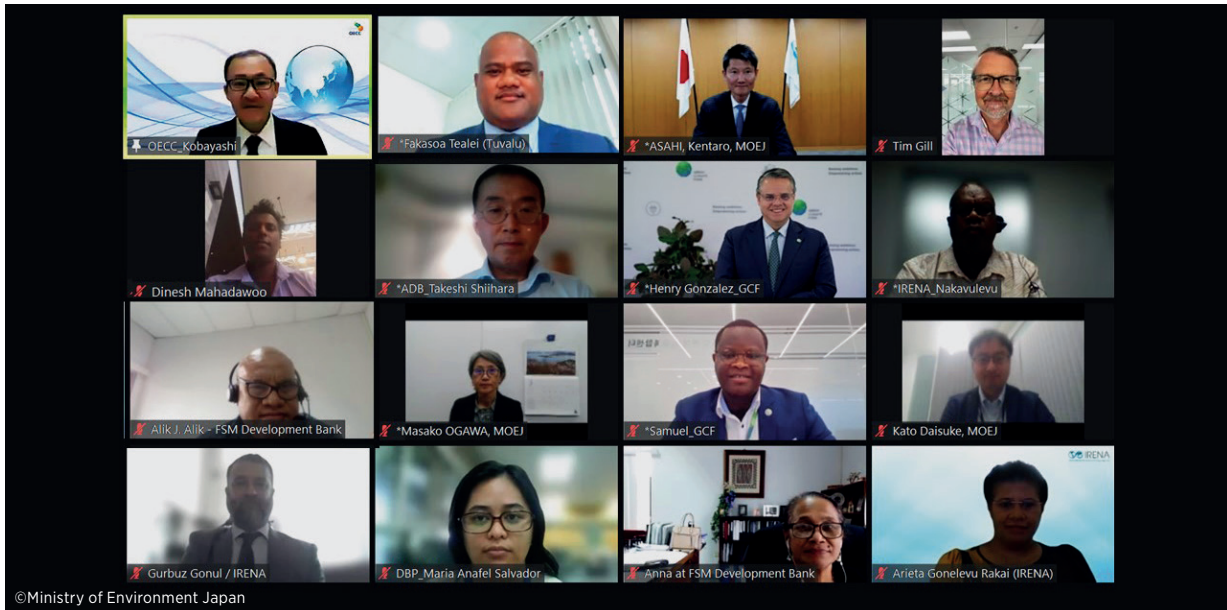
Building on this dialogue, IRENA and the United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UNOHRLLS), under the SIDS LHI, convened an SIDS event titled “Strengthening Public-Private Partnerships for a Green and Resilient Transition in Small Island Developing States” at COP29. The event, held on 14 November 2024, aligned with the priorities outlined in the ABAS, the SIDS LHI and the outcomes of the [2024 SIDS Global Business Network \(SIDS-GBN\) Forum](#). The event brought together representatives from SIDS, regional organisations, the private sector and non-governmental organisations (NGOs) and showcased actionable strategies to accelerate clean energy transitions by unlocking investments, building local capacity and promoting resilience. The event emphasised scalable models and facilitated stakeholder dialogue, underscoring PPPs’ critical role in advancing tailored, sustainable energy solutions and robust climate action for SIDS.



Gürbüz Gönül, Director of Country Engagement and Partnerships, moderates the high-level panel at the SIDS event held on the margins of COP29

Pacific SIDS Decarbonisation Forum: Unveiling success stories in climate action

The SIDS Decarbonisation Forum, co-organised by the Ministry of the Environment of Japan (MOEJ), IRENA and the Green Climate Fund (GCF) and held on 14-15 March 2024, showcased success stories in climate action and fostered collaboration in addressing the unique challenges faced by small island nations. Despite their minimal contribution to GHG emissions, SIDS bear a disproportionate burden of the impacts of climate change.



High-level speakers and presenters at the Pacific SIDS Decarbonisation Forum

In this context, MOEJ and IRENA have been organising workshops since 2015 to promote renewable energy deployment in SIDS and strengthen their capacity to access climate finance. Expanding upon these efforts, the forum showcased climate action in small islands and introduced diverse climate solutions and technology options that can be tailored to the SIDS context. The forum featured sessions on sharing success stories and the challenges towards sustainable and decarbonised SIDS; lessons from decarbonisation efforts with a particular focus on Japan; and discussions on the strategic partnerships, finance and climate actions required for advancing decarbonisation in SIDS. The forum brought together stakeholders from across the world, including representatives of these Japanese islands, the Japan International Cooperation Agency, ADB and GCF, seeking to catalyse collaboration to implement innovative energy transition solutions in the Pacific SIDS.

“The forum was well-organised, featuring contributions from international partners on decarbonisation, showcasing progress in selected SIDS, and concluding with technical partners highlighting on-the-groundwork, benefits, and challenges”.

Mr Andre Siohane, Director General, Ministry of Infrastructure, Niue

Renewable energy project development workshop for Tongan youth

The capacity-building workshop on renewable energy and project proposal development was convened in September 2024 in Nuku'alofa and attracted 50 youth representatives from youth groups, NGOs, churches, universities and the private sector. The workshop focussed on enhancing knowledge and understanding of key climate-action-related issues, such as NDCs and renewable energy, in a SIDS context, as well as raising awareness of local accredited training opportunities on sustainable energy, and of employment and business opportunities on sustainable energy for Tonga's youth.

Further, the workshop contributed to building the capacity of youth in project proposal development as well as strengthening relationships across different sectors (including government, NGOs, private sector and academia), raising awareness of the mandates and offerings of the partners involved, encouraging reflection on and critical evaluation of the challenges facing Tonga's energy sector during the global transition, and empowering and activating youth as agents for change.



Participants of capacity-building workshop on renewable energy and project development

Expand beyond power generation to include transportation and other end-use sectors

SIDS need a holistic energy strategy to meet their ambitious climate targets and build resilient, sustainable economies. While SIDS have made significant progress in transitioning power generation to renewable energy, the transportation sector remains a major contributor to GHG emissions in SIDS, accounting for a substantial share of energy consumption. The transportation sector's high contribution to GHG emissions stems from its heavy reliance on imported fossil fuels to power vehicles, marine vessels and aviation, resulting in high energy costs and exposure to volatile global fuel prices. The challenges are compounded by elevated transportation costs due to the remote geography of SIDS, which impacts both energy imports and the movement of goods and people. SIDS need to address emissions in their transport and other end-use sectors if they have to reduce vulnerabilities, diversify their energy systems and unlock economic opportunities.

Partner update: Launch of the Caribbean Centre of Research, Innovation and Workforce Training

Green Solutions International SKN Incorporated, an SIDS LHI partner, launched the Caribbean Centre of Excellence in Research, Innovation, and Workforce Training on 9 April 2024, in Saint Kitts and Nevis. In collaboration with Clarence Fitzroy Bryant College (CFBC), the Centre is set to position the Caribbean SIDS at the forefront of sustainable innovation and workforce development. Hosted at CFBC premises, the Centre serves as a regional hub for training on solar PV installation and EV maintenance and repair.

An initial “train-the-trainer” program, offered free of charge in its initial phase and funded by the GEF Small Grants Programme, which provided a funding of USD 116 900, offers a solid foundation for local capacity building in PV and EV technologies. The launch of the Centre represents an important step towards a sustainable energy future for the region. The Centre will equip professionals with the knowledge and skills needed to lead in the implementation of renewable energy solutions; in turn it will spur economic growth, increasing environmental protection and improving the overall quality of life in the Caribbean.



Solar PV technicians being trained in solar PV system operation and maintenance in Saint Kitts and Nevis

According to IRENA's analysis, electrification and renewable fuels are essential for decarbonising transport, and renewables are expected to provide over half of all energy by 2050 (IRENA, 2024). Transport sector decarbonisation is essential to mitigate the risks posed by climate change. Achieving low-emission mobility requires not only phasing out internal combustion engine technologies but also restructuring the transport sector.

IRENA is supporting SIDS in developing the Technology and Grid Plan for Road Transport Electrification with Renewables. The analysis aims to help SIDS governments transition to sustainable and reliable energy systems by integrating variable renewable energy (VRE) and electric mobility. The analysis contributes towards a sustainable and cost-effective transition by identifying opportunities for improvement and addressing the existing challenges to integrating high VRE shares into the power grid and electrifying the transport sector. The analysis focussed on SIDS' specific needs and priorities, and alignment with national climate action plans, including NDCs and/or long-term low-emission development strategies, highlighting the most cost-efficient investment options for the effective electrification of road transport mobility while maintaining grid stability and reliability. This initiative, designed to help SIDS develop a sustainable transportation infrastructure for the future, promotes the utilisation of renewable energy sources to power road vehicles. Support for Antigua and Barbuda is completed and currently ongoing for the Seychelles.



Leverage synergies between renewables and energy efficiency

Combining renewable energy and energy efficiency offers a powerful pathway to accelerating energy transition efforts in SIDS. Renewable energy technologies provide clean and sustainable power, while energy efficiency and conservation measures, including upgrading energy-efficient appliances and lighting (e.g. light-emitting diode systems), retrofitting buildings with better insulation and energy management systems, deploying advanced cooling technologies suited for tropical climates, and optimising grid infrastructure for reduced transmission and distribution losses, optimise energy use and reduce the overall demand. Integrating demand-side management strategies, such as load shifting and smart metering, makes systems even more effective. SIDS can lower energy costs, reduce GHG emissions and become more resilient to external shocks by coupling renewables with such targeted energy efficiency interventions, which will contribute to a sustainable and low-carbon future.

Partner update: Micronesia (Federated States of) Public Sector Buildings Energy Efficiency (MPSBEE) Project

The “Micronesia Public Sector Buildings Energy Efficiency (MPSBEE)” project, supported by GEF and implemented from 2020 to 2023, significantly increased energy efficiency in public sector buildings across four semi-autonomous states of the Federated States of Micronesia – Chuuk, Kosrae, Pohnpei and Yap. Under the project, energy policies were developed, energy-saving technologies like solar hybrid air conditioners were implemented and a building energy audit system was established. The project thus led to notable GHG reductions and promoted sustainable practices. Key lessons from this experience include the importance of decentralised and inclusive governance, systematic knowledge transfer and strategic stakeholder partnerships to boost efficiency and enhance outcomes, and an emphasis on the meaningful engagement of women and leveraging civil society advocacy.

Renewable energy links with non-energy sectors driving socio-economics and empowerment

In SIDS, renewable energy offers transformative potential for not only energy security but also driving development in critical non-energy sectors such as agriculture, food security, health and water management. Integrating renewable energy solutions into these areas can enable SIDS to address their unique challenges, including resource scarcity, high energy costs and vulnerability to climate change. For instance, solar-powered desalination systems can boost access to clean water, while renewable-energy-driven cold storage can reduce food spoilage and enhance food security. Reliable renewable energy can improve health outcomes by powering essential services in remote clinics. Moreover, the renewable energy sector can create significant opportunities for job creation and entrepreneurship in SIDS, empower women and promote gender equality. By reinforcing these inter-connections, SIDS can leverage renewable energy to build resilience, promote socio-economic development, and achieve a more sustainable and inclusive future.

From Malta to SIDS: Offshore renewable energy and sustainable water solutions for blue economies

At COP29, on 18 November 2024, Malta and IRENA, through the SIDS LHI, co-organised an impactful side event: “Efficient Water Management and Offshore Renewables – A Green Opportunity for Island Blue Economies”. Malta showcased its progress in efficient water management and deep-sea off-shore renewable energy generation; it shared best practices; lessons learnt; and challenges related to jurisdiction, environmental concerns and other critical issues. The lessons provided valuable takeaways for SIDS. They offer pathways for these economies to replicate and scale these innovative approaches domestically. The event also advocated for a policy framework based on the water-energy-food nexus. The panel fostered a comprehensive dialogue on sustainable solutions, featuring energy directors and ministers from SIDS, and key representatives from the private sector and financial institutions.



Keynote speakers and panellists in the IRENA-Malta-SIDS LHI side event at COP29

Electrification with renewables: Improving healthcare delivery in São Tomé and Príncipe

Access to reliable energy is essential for delivering quality healthcare services, powering critical equipment (e.g. incubators) and lighting. In SIDS, which face heightened vulnerability to climate impacts and often contend with unreliable and costly energy supplies, access to reliable energy is essential for supporting basic diagnostics and administrative functions. Decentralised renewable energy (DRE) emerges as a vital solution to democratise essential social services, including healthcare, in such geographies.

São Tomé and Príncipe's health sector is highly prone to prolonged power outages. The country's health facilities are all grid connected, but power supply is highly unreliable. Backup systems exist but are inadequate. Only the main healthcare facilities receive power backup from diesel generators, and even those backup options are rendered unreliable by critical shortages of diesel.

The energy and healthcare challenges have spurred the government's interest in creating an environment for investments in the energy sector in general and in the renewable energy sector specifically, particularly in critical sectors such as healthcare. Interventions in this sector will enable the country to better face the rising impact of climatic disasters and progress towards sustainable growth.

IRENA, the United Nations Development Programme (UNDP) and SELCO Foundation, through the SIDS LHI, conducted a comprehensive country assessment that analysed the current energy-health infrastructure, developed technical designs, estimated costs for renewables-based power interventions, and explored options for operation and maintenance models. It also made recommendations on energy-efficient appliances and built environments. Of the estimated USD 11.25 million required for implementation, the assessment has helped the Government of São Tomé and Príncipe secure commitments totalling USD 4.25 million from the World Bank and private sector corporate social responsibility contributions. These commitments cover more than one-third of the funding needed to electrify the entire network.



Participants of the validation workshop, São Tomé and Príncipe, October 2023

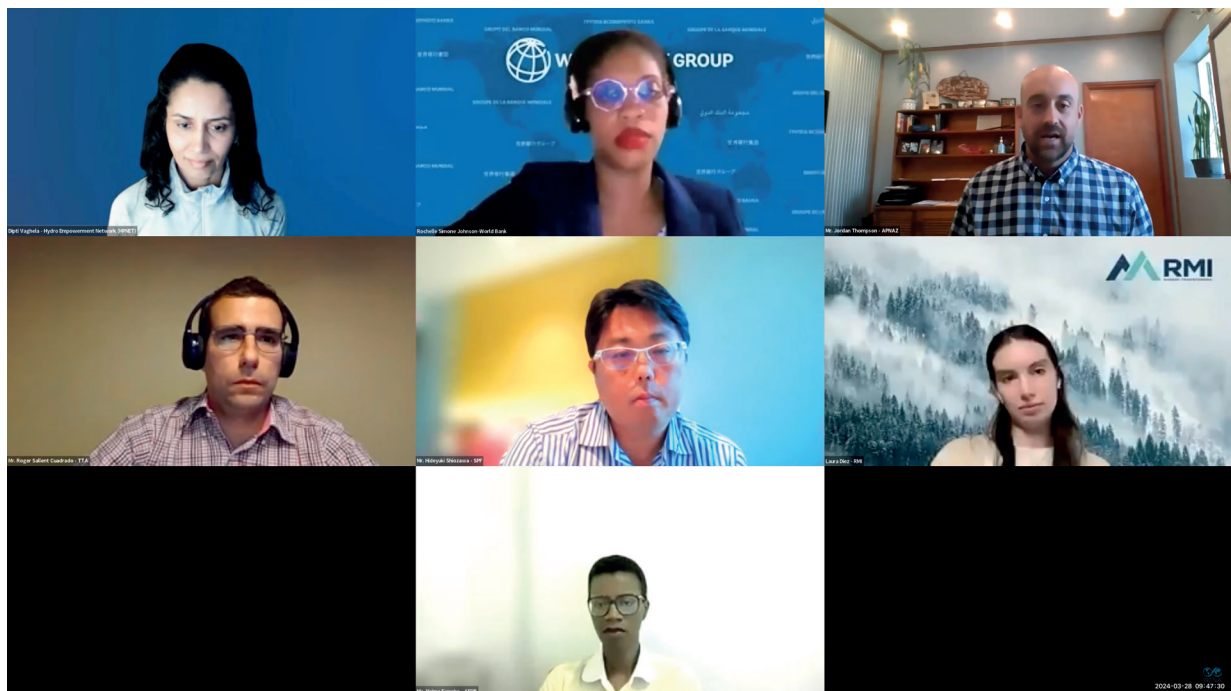
Assessment of the deployment of DRE solutions for powering agriculture and food value chains in Cuba

IRENA is undertaking an assessment supporting the deployment of DRE solutions in Cuba's agriculture and food value chains. The assessment's primary objective is to identify gaps and provide recommendations for tailored techno-commercially viable DRE solutions to power selected agricultural value chains or zones. This includes designing renewable energy systems, estimating costs, calculating payback periods and addressing challenges related to deploying DRE, including the operation and maintenance of processing machinery. The assessment will also recommend optimal efficiency measures and propose suitable business models where relevant.

This initiative aligns with Cuba's national priorities to boost climate resilience and strengthen the country's adaptation to climate change through sustainable food production and renewable energy development. It seeks to provide the Government of Cuba and development partners with critical insights to plan and implement strategies for powering irrigation, production, storage and agro-processing systems with DRE. Additionally, it is expected to support co-operatives, promote local entrepreneurship and attract investments through the country programme.

Socio-economic impact of renewable energy transition in SIDS

As part of IRENA's knowledge sharing efforts through the SIDS LHI, a virtual launch of the "Small Island Developing States at a Crossroads" series was undertaken. This series includes "The Socioeconomics of Transitioning to Renewables", which focuses on SIDS contexts that are predominantly electrified and reliant on imported fossil fuels, and "Towards Equitable Energy Access in Least-Electrified Countries", which examines SIDS with significant unelectrified populations and the opportunity to leapfrog to renewables-based energy access.



Panelists of the "Small Island Developing States (SIDS): Navigating the Energy Transition Crossroads" webinar March 2024

The launch event began with an overview of key updates and key findings from the reports, and an overview of the SIDS LHI. This was followed by a panel discussion with representation from SIDS, development partners and key stakeholders. The representatives provided insights on the progress, challenges, mechanisms and potential benefits of the energy transition in SIDS.

The panel, moderated by the Hydro Empowerment Network (HPNET), began with insights from Nazarene Mission Services, highlighting 50 years of providing healthcare and medical education in remote Papua New Guinea using mini hydropower. These efforts have improved maternal care; empowered women in healthcare; localised renewable energy use; fostered equal partnerships with indigenous communities; promoted ecological stewardship; and reduced substance abuse, domestic violence, healthcare costs and overall hardship in the region.

Trama TecnoAmbiental outlined the challenges and opportunities for Pacific SIDS in the energy transition. It emphasised high energy import costs as a driver of renewables adoption, the critical role of experienced local actors in addressing logistical complexities and the need for holistic early planning to link electricity supply with socio-economic benefits. The Sasakawa Peace Foundation stressed the importance of regional co-operation for equitable transitions and the importance of prioritising universal access to electricity for communication, education and safety. It also emphasised the importance of community-level capacity building and quality standards. The Rocky Mountain Institute and Women in Renewable Energy Network (WIRE) showcased workforce development strategies for Caribbean SIDS, including mentorships, externships and workshops to build women leaders in renewable energy.

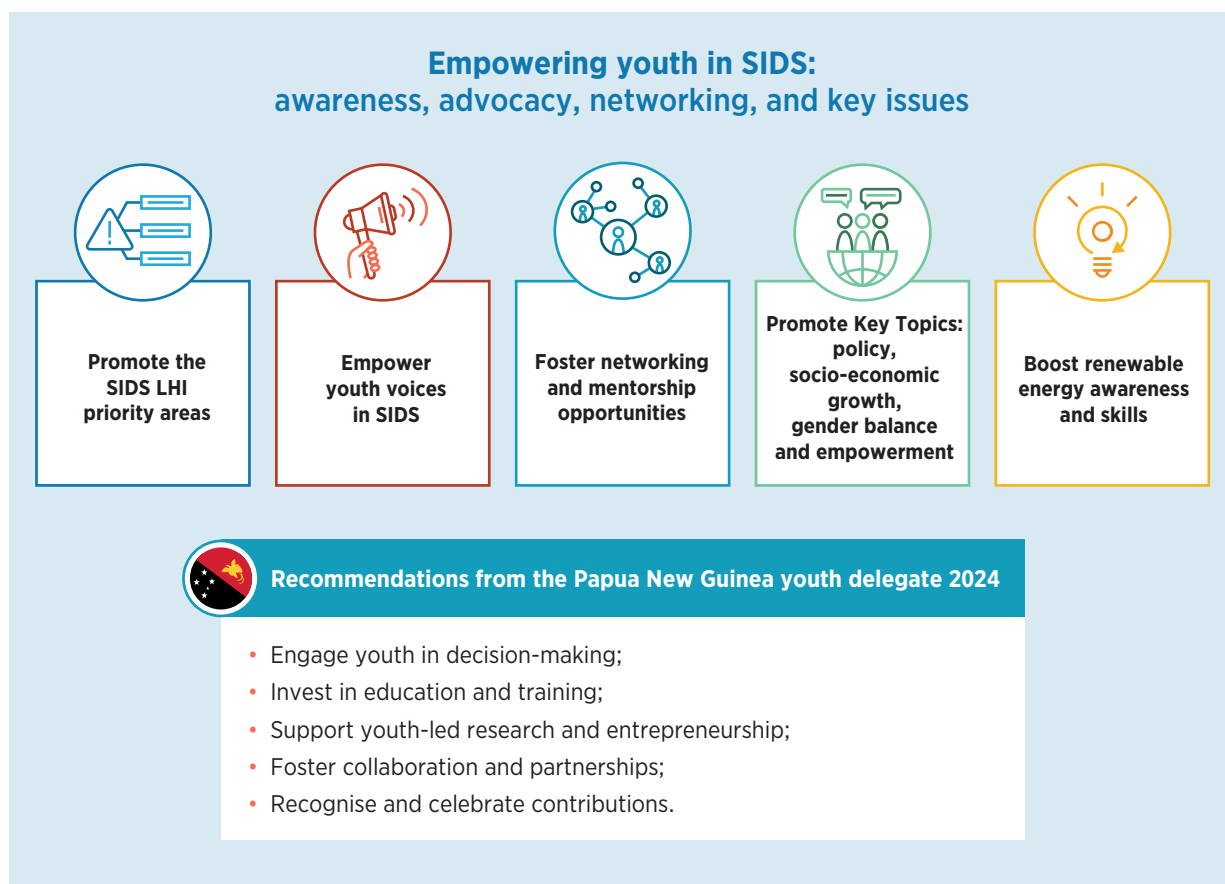
The World Bank highlighted WIRE's role in raising awareness of the energy transition's opportunities for young women. It shared its efforts in risk mitigation for clean energy projects, for example, geothermal development in the Caribbean. The African Development Bank Group's Lusophone Compact showcased tailored financing solutions for Portuguese-speaking SIDS, including wind farm expansion and EV support in Cabo Verde, regulatory reforms in São Tomé and Príncipe, and a focus on women-and- youth-led small and medium enterprises in energy-intensive sectors like agriculture and tourism. The session concluded by underscoring a need for international co-operation to promote inclusive, multi-actor capacity building for a sustained energy transition in SIDS.

SIDS Youth *Campions*² Strategy for the energy transition

The SIDS LHI has been engaging university students since 2020 via a platform provided through the IRENA@GROWTH programme for students to learn about the SIDS energy transition efforts. In 2024, this initiative continued its impactful outreach. It provided participants with an overview of the energy transition challenges faced by island economies. On 13 August 2024, at Khalifa University, youth participants were informed about the stark realities of the impacts of climate change on SIDS. Issues such as geographic isolation, limited domestic markets, vulnerability to climate change and resource constraints were highlighted.

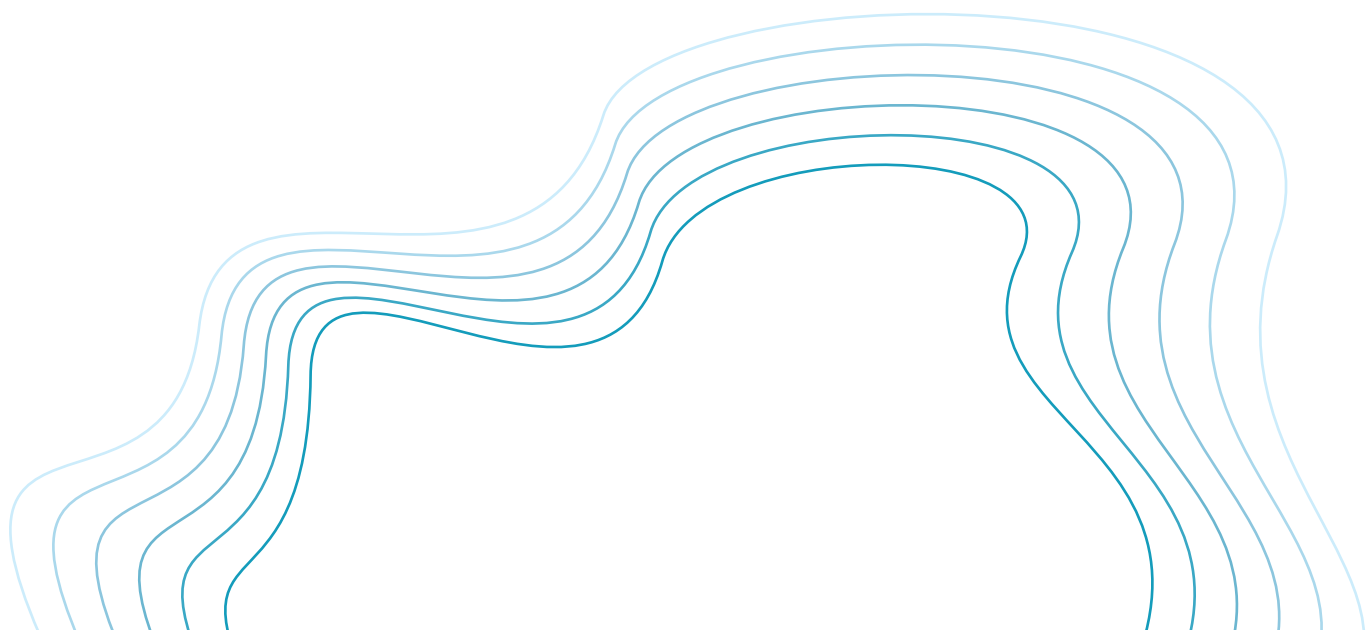
² *Campions* - means *Champions* in Creole, Cabo Verde's local language.

Figure 11 Objectives of the SIDS Youth *Campions* Strategy



Note: LHI = Lighthouses Initiative; SIDS = small island developing states.

Students who participated in the IRENA@GROWTH 2024 programme recognised an urgent need for youth involvement in addressing these challenges. This exchange underscored the younger generation’s potential pivotal role in driving sustainable solutions, fostering collaboration and advocating for innovations that can help overcome the unique challenges faced by island nations in their energy transition. To this end, IRENA developed an Energy Transition SIDS Youth *Campions* Strategy, which highlights how SIDS youth can actively contribute to their countries’ climate and sustainable development targets while aligning with global objectives through the existing IRENA youth programmes (Figure 11).



Renewable energy deployment for climate resilience and effective disaster recovery

Though SIDS contribute minimally to global emissions, they are disproportionately affected by climate change. They experience rising sea levels, extreme weather events and reduced agricultural productivity. At COP28 in Dubai, United Arab Emirates, the operationalisation of the Loss and Damage Fund marked a significant milestone. Vital support was provided to climate-vulnerable communities, including SIDS. This fund, the result of years of negotiations, boosts resilience, improves disaster recovery and links renewable energy uptake to both climate resilience and effective recovery.

The Loss and Damage Fund enables countries to direct resources towards rebuilding after the impacts of climatic events. The Fund includes commitments from nations like the United Arab Emirates, Germany and the United Kingdom to help SIDS strengthen their resilience. Integrating renewable energy solutions can help SIDS recover from disasters faster while relying less on costly fossil fuels, in turn promoting long-term sustainability. This approach aligns renewable energy with climate adaptation and disaster recovery strategies, helping to reduce vulnerabilities and foster a climate-resilient future.

Partner update: Vanuatu seeks climate justice for SIDS

An important development on loss and damage was initiated by Vanuatu's Special Envoy for Climate Change and Environment, Honourable Ralph Regenvanu, who sought an advisory opinion from the International Court of Justice (ICJ) to hold accountable major developed states whose industrialisation has been responsible for the majority of cumulative anthropogenic GHG emissions.

Climate justice is not an issue exclusive to SIDS but holds particular urgency due to the existential threats posed by climate change. While efforts to prevent future harm are critical, the global focus on mitigation often overshadows questions of accountability for past loss and damage. These include addressing the climate-impact-linked human rights violations and legal obligations that have already occurred.

In 2023, Vanuatu experienced the devastating impacts of cyclones Judy and Kevin, which struck within a week of each other and affected nearly 200 000 people. These disasters underscore the disproportionate vulnerability of SIDS, and the capacity and financial constraints they face in addressing such crises. Yet, they also present a unique opportunity to rally global solidarity behind this crucial cause.

The outcome of the ICJ proceedings could mark a transformative step in redefining global accountability for climate action. By prioritising justice and equity, it paves the way for a more inclusive and effective response to the climate crisis, ensuring that the burdens of responsibility are borne by those who have contributed most to the problem.

SIDS Energy Transition: Navigating a Green Hydrogen Future

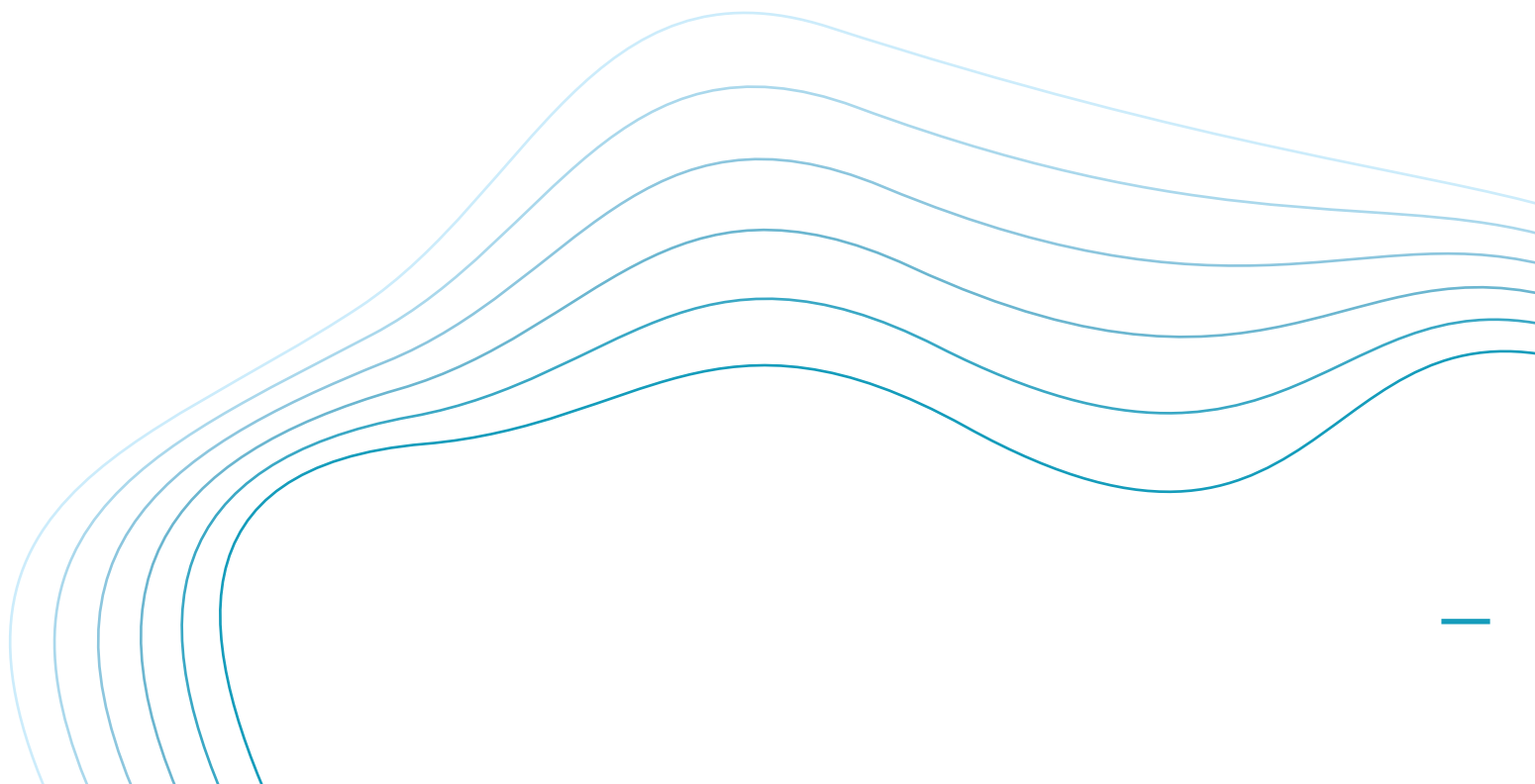
On 6 December 2023, at COP28 in Dubai, United Arab Emirates, the Seychelles Pavilion served as a vibrant venue for discussions on “SIDS Energy Transition: Navigating a Green Hydrogen Future”. The purpose of this event, co-hosted by IRENA and the Government of Seychelles through the SIDS LHI, was to explore green hydrogen’s transformative potential in advancing a sustainable and low-carbon energy future for SIDS.

The session convened a diverse group of experts, stakeholders and policy makers to address the opportunities and challenges associated with the adoption of green hydrogen. The event facilitated knowledge sharing and fostered collaboration, and highlighted green hydrogen’s potentially pivotal role in accelerating SIDS’ advancement of the energy transition.

The event highlighted SIDS and the private sector’s shared commitment to adopting innovative green hydrogen solutions, addressing unique challenges and promoting resilience and equity. By emphasising collaboration and practical strategies, the event showcased SIDS’ leadership in advancing sustainable energy transitions and shaping a greener global climate agenda.

Small islands leading the way towards 100% renewables

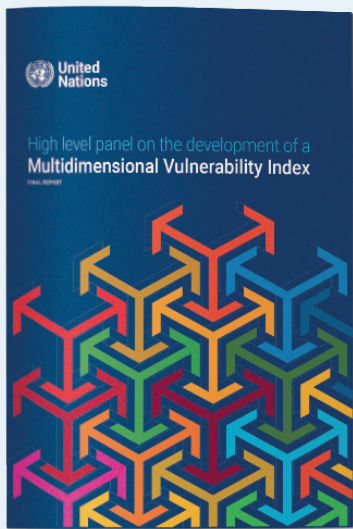
SIDS are key testbeds for transitioning to decarbonised energy systems, starting with clean electricity generation, which can decarbonise sectors like water and transportation. However, achieving 100% renewable energy requires robust power grids, storage and legislative frameworks. The event, co-organised by the Greening the Islands Foundation and United Nations Department of Economic and Social Affairs, showcased IRENA’s SIDS LHI. It highlighted renewable energy trends and how renewables empower island communities to accelerate energy transitions and stimulate local economies.



Partner update: The role of multidimensional vulnerability indices in unlocking climate finance and support for SIDS

The journey towards establishing a Multidimensional Vulnerability Index (MVI) began in 1992 at the United Nations Conference on Environment and Development, where the first call for a globally accepted vulnerability assessment was made. Numerous appeals for the creation of an MVI emerged over the years, in recognition of the unique challenges faced by SIDS. This ongoing dialogue culminated in a significant milestone on 13 August 2024, when the United Nations General Assembly adopted [a resolution](#) on the Multidimensional Vulnerability Index.

Figure 12 High-level panel on the development of the SIDS Multi-dimensional Vulnerability Index (MVI)



The purpose of the [MVI](#) is to effectively capture the unique external vulnerabilities and resilience challenges faced by SIDS and other developing countries. That many SIDS exhibit higher levels of vulnerability than income indicates that current measures, including gross national income per capita, do not accurately capture the adverse effects of climate change. An assessment that captures the inherent geographical and structural characteristics hindering sustainable development in SIDS is needed. The MVI is, therefore, intended to complement existing metrics by providing a comprehensive framework that considers economic, environmental and social vulnerabilities. This approach, which can redefine eligibility for financing sustainable development in SIDS, is expected to provide a clearer understanding of resilience gaps, in turn facilitating targeted resource allocation and informed policy decisions (Figure 12).

This is especially relevant to the SIDS LHI, which has developed progress indicators and impact measures to monitor SIDS' progress in the energy transition across 12 priority areas including linking renewable energy uptake to climate resilience and more effective disaster recovery. As the co-ordinator of the SIDS LHI, IRENA is committed to aligning monitoring and evaluation frameworks that can greatly enhance support mechanisms, ensuring that SIDS receive tailored and timely support to effectively address the challenges posed by climate change and disaster risks.

Data collection and dissemination supporting informed decision making and effective monitoring

Informed decision making and effective monitoring of development progress require collecting and disseminating accurate data and statistics. The unique challenges facing SIDS make reliable data essential for creating targeted policies and strategies to address immediate needs and long-term sustainability. Enhancing SIDS' capacity to gather, analyse and share data can help them make more informed choices, improve governance, track progress and ensure efficient resource allocation to address the most pressing issues. This will strengthen the foundations of sound policy making but also enables SIDS to better engage with development partners.

The SIDS LHI aims to assess implementation progress across 12 priority areas, consistent with the goal of informed decision making and effective monitoring through improved data collection and dissemination. This effort will report on the progress and impacts in SIDS, and improve the ability to monitor progress, identify gaps and identify areas where development partners can provide additional support to SIDS' energy transition.

Monitoring and evaluation framework for the SIDS Lighthouses Initiative

IRENA, through the SIDS LHI, has developed a comprehensive set of progress indicators and impact measures across the 12 priority areas of the SIDS LHI and to align with the Antigua and Barbuda Agenda for SIDS (ABAS) monitoring framework. This development was an iterative process informed by regional consultation workshops across the three SIDS regions – the Pacific (September 2023); Caribbean (February 2024); and Atlantic, Indian Ocean and South China Sea (AIS) (March 2024) – and with SIDS LHI partners (July 2024). The workshops brought together representatives from government ministries, development partners, financial institutions and other key stakeholders to incorporate national and regional perspectives. The consultations fostered consensus on the importance of reporting on key metrics while identifying challenges and opportunities for operationalising the indicators.



Participants in the Caribbean consultation workshop, Jamaica, 2024



Participants in the AIS consultation workshop, Seychelles, 2024

To test the indicators and refine their application, three case studies were conducted in Antigua and Barbuda, Seychelles and Tonga. These studies uncovered capacity gaps, institutional constraints and valuable insights for improving clarity for indicators and data management practices. The findings also highlighted areas for targeted support to strengthen institutional and technical capacities.

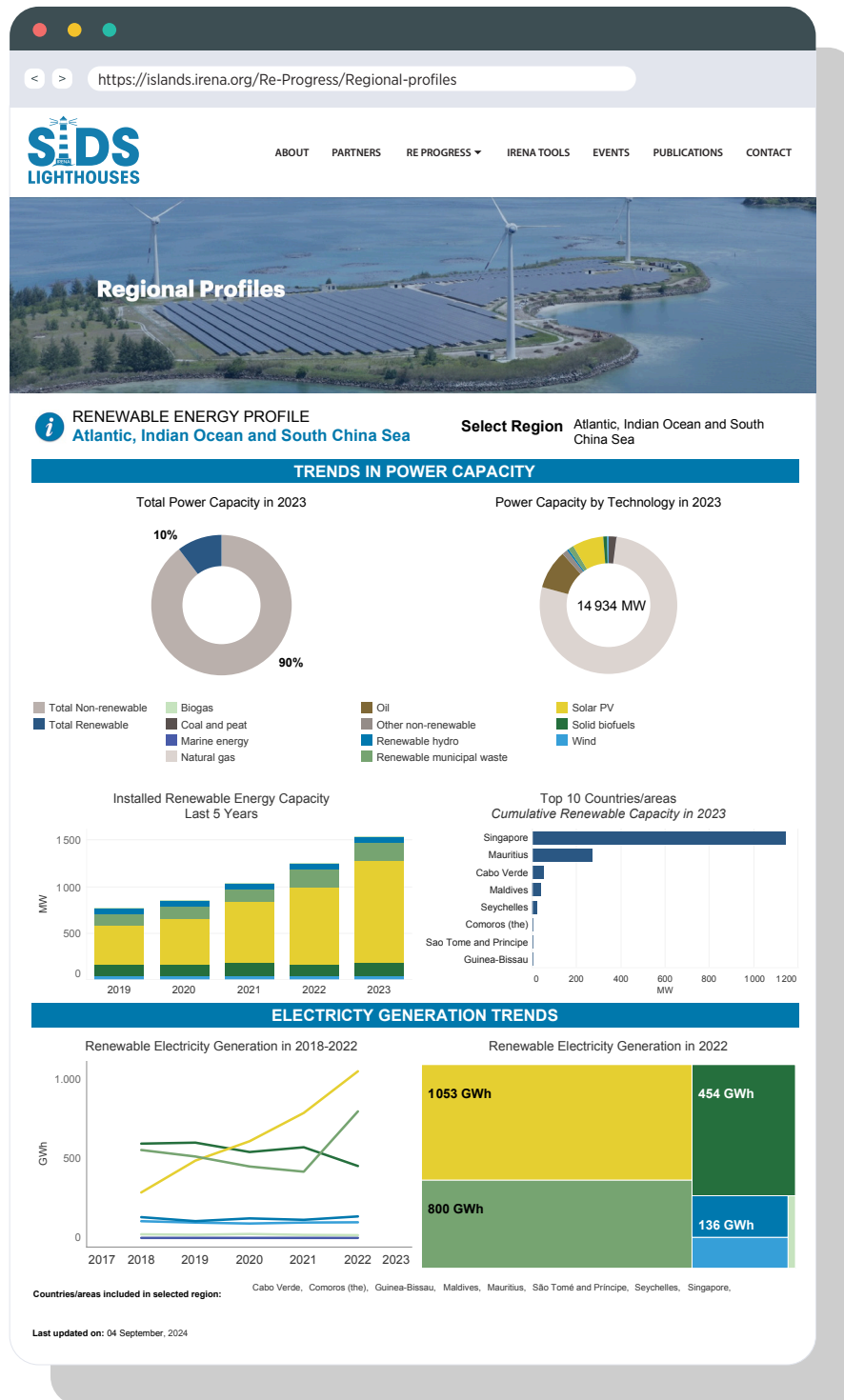
The finalised set of indicators will be rolled out in an initial phase in 2025. The indicators will provide a robust tool to track energy transition priorities under the ABAS framework. This initiative represents a significant step forward in enabling SIDS to measure progress, address challenges and accelerate their path towards sustainable and resilient energy systems.

Regional and country energy profiles

IRENA compiles key statistics on renewable energy capacity, power generation and energy balances from member countries using its Renewable Energy Statistics questionnaire. These data, released annually in March for capacity and July for generation and energy balances, aids analysts, policy makers and the public with informed decision making. IRENA's statistics unit also provides training to strengthen member countries' data collection and reporting activities. IRENA's cost dashboards offer global statistics on renewable energy trends, including levelised cost of energy, auction values and solar/wind technology costs. IRENA also produces regional and country energy profiles for its members, which also include SIDS.

The profile presented in Figure 13 for the AIS region highlights a significant need for a transition to low-carbon and renewable energy systems. As of 2023, Mauritius emerged as the regional leader in renewable energy deployment; renewables' share of the energy mix is the lowest in Guinea-Bissau. This disparity underscores the importance of targeted support and investment to accelerate renewable energy adoption and foster energy accessibility across the region.

Figure 13 Regional profile for the Atlantic, Indian Ocean and South China Sea (AIS) SIDS



Notes: GWh = gigawatt hour; MW = megawatt; PV = photovoltaic.

Solar energy has emerged as the most widely harnessed renewable energy source in the AIS region, demonstrating remarkable growth over the past five years. This progression underscores the region’s vast solar potential and its commitment to expanding clean energy solutions. Further, the use of renewable municipal waste for electricity production has gained traction in the AIS region, making its renewable energy mix more diverse.

Figure 14 Energy profile for Jamaica



IRENA's country profiles provide detailed insights into the renewable energy landscape of its member states. These profiles include key data on renewable energy capacity, generation, policies and investments, and offer a comprehensive overview to guide decision making. The profiles present tailored information on energy resources, infrastructure and progress towards national goals, which aids investors and stakeholders in accelerating the energy transition. The profiles also highlight challenges and opportunities, fostering collaboration for sustainable development.

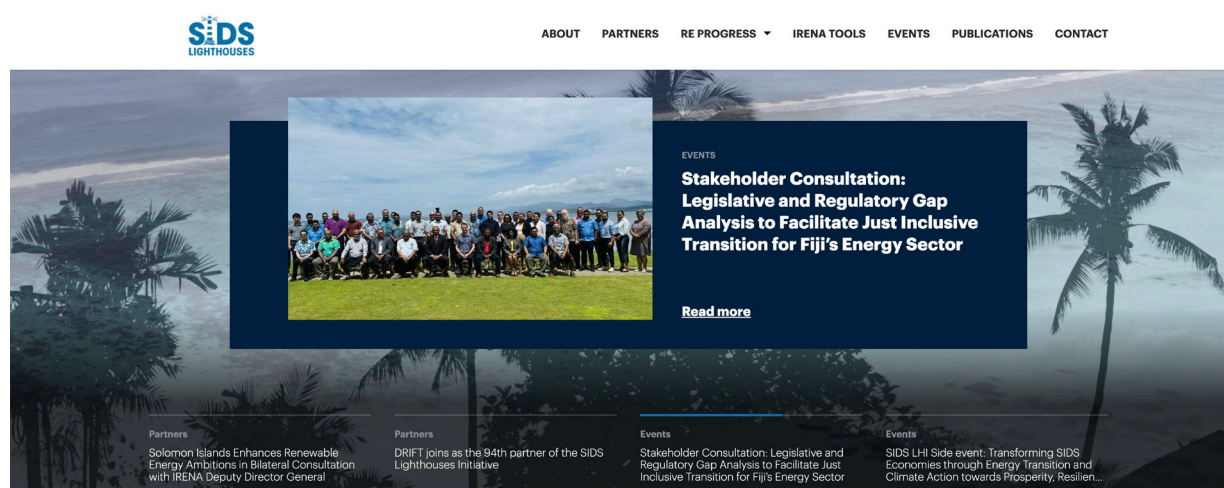
The country profile for Jamaica highlights its proactive approach to renewable energy development and climate resilience. Jamaica set a target of achieving 20% renewables in the energy supply mix by 2030, as illustrated in Figure 14, and has made notable strides in integrating solar, wind and mini-hydro into its energy mix. Policies and initiatives to attract investments in clean energy projects, including utility-scale solar farms and wind parks, have also been implemented. Additionally, Jamaica is leveraging its natural resources to explore bioenergy and waste-to-energy solutions, to make its renewable energy portfolio even more diverse. While it faces challenges, for example, in financing and infrastructure upgrades, Jamaica remains a leader in the Caribbean, setting an example for other island nations in their pursuit of a sustainable energy transition.

The SIDS LHI knowledge sharing platform

The SIDS LHI knowledge sharing platform plays an essential role in connecting SIDS with global partners to amplify awareness of their energy transitions and climate action efforts.

The platform is a one-stop shop for energy transition efforts being pursued by the LHI partners in SIDS. It consists of the [SIDS LHI website](#) and a [LinkedIn page](#), which is complemented by a [Facebook page](#). The [SIDS LHI](#) website features analytical tools and services, technical assistance and advice, capacity-building activities, videos showcasing the human impacts of renewable energy across the three SIDS, high-level and technical events, and other relevant information that can be accessed and used by students, policy makers, the private sector, development partners, financing institutions and other stakeholders that are committed to making a difference in SIDS (Figure 15).

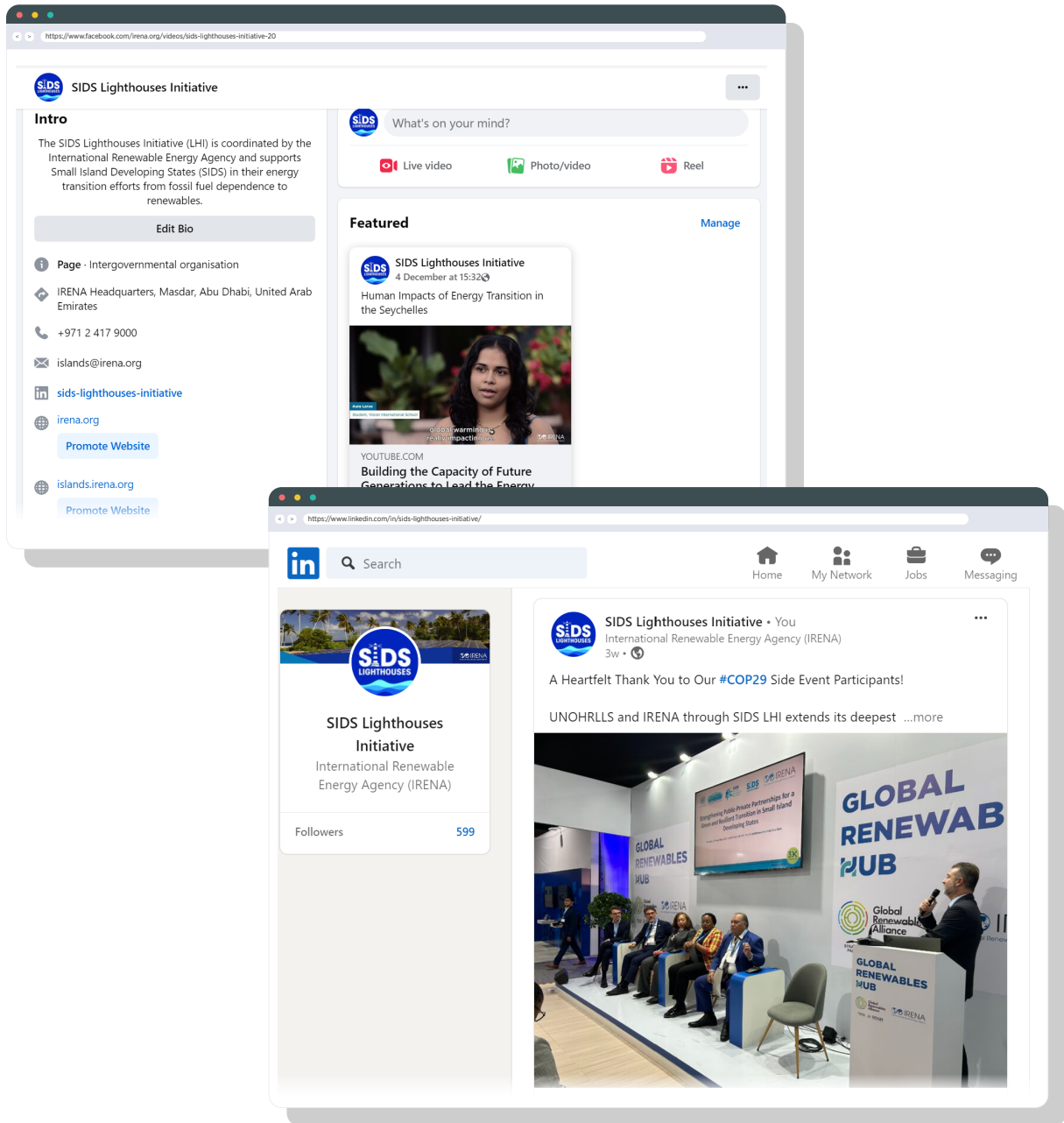
Figure 15 SIDS LHI knowledge-sharing platform



Over the past year, these platforms have seen significant engagement – over 4 700 users and 13 500 page views – demonstrating active interest in tools, country profiles and publications.

SIDS regional and country profiles on renewables, examples of which are shown in Figures 13 and 14, respectively, provide an overview of key indicators, renewable energy developments and recent initiatives. The videos and articles highlight the best practices and human impacts of renewables in individual homes, education centres and health facilities, and renewables' important role in strengthening food and water security in SIDS.

Figure 16 SIDS LHI social media platforms



With an expanding digital presence across social media platforms, the SIDS LHI continues to inspire and inform global audiences by providing a platform for sharing success stories and driving conversations around sustainable energy and climate resilience in SIDS and island economies alike (Figure 16).

IRENA provides comprehensive support to islands transitioning to renewable energy with a range of tools and services. These include technical analysis for grid integration and site appraisal services to assess financial viability, collaborative frameworks, renewables' readiness assessments, quick scans and renewable energy roadmaps, and grid integration studies. The Global Atlas offers a free online resource assessment tool. Open Solar Contracts streamline project development, and IRENA publishes detailed data and statistics on renewable energy.

Collaborative frameworks

Collaborative frameworks serve as dynamic multistakeholder platforms. They promote engagement among public, private, inter-governmental and non-governmental actors to co-ordinate support and drive collective actions for the global energy transition. IRENA has collaborative frameworks on fundamental themes such as hydropower, green hydrogen, geopolitics and off-shore renewables/oceans. These frameworks strengthen dialogue on high shares of renewables in energy systems, and a just and inclusive energy transition. The frameworks are crucial as effective tools for facilitating dialogue, encouraging peer-to-peer collaboration and facilitating the exchange of knowledge among different stakeholders.

Energy Transition Assessment

An Energy Transition Assessment (ETA) is a comprehensive tool for evaluating a country context with respect to the development and deployment of renewable energy sources. It not only identifies the existing conditions but also outlines specific actions needed to improve and optimise the renewable energy landscape. ETAs are in progress for several island nations, including **Papua New Guinea**, while completed ETAs are available for **Antigua and Barbuda, Fiji, Grenada, Kiribati, the Republic of the Marshall Islands, the Solomon Islands and Vanuatu**.

Sector assessments

IRENA uses sector assessments as a tool to address the widespread lack of proper medical facilities, hampered by the inadequate accessibility and affordability of energy. An assessment of this type is also used to support countries facing severe challenges in accessing clean water and with a deficient water supply infrastructure. Another important aspect of this tool relates to the execution of energy-efficiency- and audit-related assessments for the improvement of the economic sector so that deficient water supply infrastructures can be addressed. IRENA offers a set of assessments in this regard. An on-going sector assessment is in progress for **Cuba**. Completed assessments are available for **São Tomé and Príncipe**.

Quickscans

Quickscan is a comprehensive questionnaire covering seven crucial factors essential for the successful deployment of renewable energy in SIDS. The tool helps evaluate the readiness of the power sector for renewable energy deployment; it identifies areas requiring immediate attention. Quickscan has proved invaluable to SIDS governments and development partners; it guides them in prioritising actions that will expedite the deployment of renewable energy initiatives.

Quickscan has been developed for ten islands: **Antigua and Barbuda, Barbados, Belize, Curaçao, Fiji, Grenada, Saint Kitts and Nevis, São Tomé and Príncipe, Seychelles** and **Tuvalu**.

Grid integration studies

Grid studies are vital in planning the power sector's transformation. The outcomes of these studies enable the assessment of costs and other essential considerations for implementing a versatile power system that can accommodate the intended VRE shares. Particularly on islands, grid studies improve the alignment between long-term, policy-driven targets for integrating renewable energy and their practical implementation within power systems. This alignment enables policy makers to more precisely plan the resources necessary to achieve the envisioned objectives. These studies also empower power utilities to identify the most suitable technical measures for integrating the planned VRE shares, all while ensuring the system remains stability and reliable.

Renewable energy solutions, which offer distinct advantages (e.g. economies of scale and simpler networks) can be more rapidly adopted by islands than larger regions, positioning the former as innovators in renewable energy. Islands can in turn showcase pioneering solutions for global application. Completed grid studies are available for **Palau, Antigua and Barbuda, Cook Islands** and **Samoa**.

Global Atlas

IRENA's Global Atlas for Renewable Energy is a free online resource assessment tool. It contains maps on solar, wind, ocean and bioenergy resources and facilitates a first screening of sites and areas for renewable energy investment opportunities.

Global Atlas
FOR RENEWABLE ENERGY

SolarCity Simulator

IRENA created the SolarCity Simulator, a web-based tool, to assess electricity generation potential using rooftop solar PV systems. The simulator, developed as part of the Global Atlas for Renewable Energy, aids households, businesses and municipal authorities in evaluating savings, financing models and policy incentives, and combines data on buildings footprints and solar irradiation. For those interested, IRENA offers collaboration to develop and promote custom SolarCity Simulators.

SOLARCITY
SIMULATOR

Bioenergy Simulator

The Bioenergy simulator is a user-friendly web-based application to help policy makers, practitioners and business developers estimate potential bioenergy and plan bioenergy development considering combinations of area, biomass resource, technology and end use. The simulator seeks to raise awareness on modern bioenergy production options to help meet global climate goals; decarbonise the world's energy system; and ensure access to affordable, reliable and sustainable energy for all. It is important to note that this knowledge is provided without assessing financial viability, socio-economic feasibility and environmental impacts.

BIOENERGY
SIMULATOR

Prefeasibility site assessment

IRENA's prefeasibility site assessment simulates the financial viability of a wind or solar (PV, parabolic trough collector, central receiver system and linear Fresnel) project at a given site. The wind or solar resource potential at the specific site and the potential costs, financing and revenue associated with it are assessed. The appraisal generates scenarios of financial performance based on the confidence determined in the resource data or the power purchase agreement model. The assessment uses hourly high-resolution wind and solar time-series datasets within an IRENA custom-built model, and it can be applied to any location in the world. The tool has been extended to include off-shore wind and floating solar.

Climate Investment Platform and investment forums

The Climate Investment Platform (CIP) is a collaborative initiative by IRENA, UNDP and Sustainable Energy for All (SEforALL), in partnership with the Green Climate Fund (GCF). Its objective is to increase capital mobilisation and influence investment in renewable energy in developing countries. The CIP operates as a demand-driven platform. It provides member countries with tailored technical assistance for developing and scaling up renewable energy technologies. Project proponents registered on the platform receive support for technical assistance and project facilitation to achieve commercial feasibility readiness; this enables financing matchmaking with registered financial institutions.



Energy Transition Accelerator Financing (ETAF) Platform

The Energy Transition Accelerator Financing (ETAF) Platform, managed by IRENA, is a climate finance initiative that seeks to accelerate the global energy transition in developing economies by mobilising capital for renewable energy projects.



The platform, which has commitments of USD 1.25 billion from six institutions, targets the development of 1.5 GW of renewable energy capacity by 2030, with further pledges expected at COP28. ETAF collaborates with partners like the Abu Dhabi Fund for Development, Asian Infrastructure Investment Bank (AIIB) and Masdar, and it leverages expertise in concessional financing, risk management and project development to unlock capital and technologies; in turn, it promotes flexible and sustainable energy transitions in developing countries.

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For more information, visit the [SIDS Lighthouses website](#), [LinkedIn page](#) or contact islands@irena.org.

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About IRENA

The International Renewable Energy Agency (IRENA) serves as the principal platform for international co-operation, a centre of excellence, a repository of policy, technology, resource and financial knowledge, and a driver of action on the ground to advance the transformation of the global energy system. An intergovernmental organisation established in 2011, 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

About the SIDS Lighthouses Initiative

The SIDS Lighthouses initiative (LHI) is a partnership framework for action to support Small Island Developing States in their energy transition efforts from fossil fuel dependence to renewables. The Initiative brings together partners, including SIDS, developed countries, regional and international organisations, development and multilateral agencies, private companies, research institutes and non-profit organisations that support the development and implementation of the SIDS national, regional and inter-regional and global sustainable energy strategies. IRENA is the coordinator and facilitator of the Initiative. islands.irena.org