

# Small Island Developing States

## Introduction

*The Global Forum on Sustainable Energy (GFSE) is a neutral multi-stakeholder platform which is facilitating international dialogue on energy for sustainable development by taking into account the special interests and challenges of developing countries. GFSE aims at the establishment of a sustainable world energy system from a social, economic and environmental perspective.*

*GFSE contributes to both international discourse and information dissemination on sustainable energy. The multi-stakeholder platform plays a crucial role in facilitating sustainable energy projects by bringing together donors, investors and project developers. Their interaction creates new opportunities and enhances existing initiatives in the field of sustainable energy.*

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***SIDS tend to confront numerous constraints on the road towards a sustainable development pathway. Their isolated position and the small size of their domestic markets make them dependent on international trade and especially sensitive to external shocks. In addition to these challenges, Small Island Developing States are especially vulnerable to climate change impacts and environmental dangers.***

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The Small Island Developing States (SIDS) can be characterized as a group of countries facing specific environmental, economic and social challenges and vulnerabilities that are linked to their geographical location. SIDS cover three main regions, namely the Caribbean, the Pacific, and the Africa, Indian Ocean, Mediterranean and South China Sea (AIMS). These regions each have their own regional bodies to which the SIDS in that respective geographical region belong to, namely the Caribbean Community (CARICOM), the Pacific Islands Forum (PIF) and the Indian Ocean Commission (IOC). Many of the SIDS are members (or observers) of the Alliance of Small Island States (AOSIS), a coalition of small island and low-lying coastal countries, which functions primarily as an ad hoc body negotiating and advocating for the SIDS at the United Nations (UN). Furthermore, nine of the SIDS (Guinea-Bissau, São Tomé and Príncipe, Comoros, Kiribati, Solomon Islands, Timor-Leste, Tuvalu, Vanuatu, and Haiti) are classified as Least Developed Countries (LDCs)<sup>1</sup> by the United Nations.

SIDS tend to confront numerous constraints on the road towards a sustainable development pathway, including high transport costs – caused by long distances, remote locations and deficient infrastructure conditions – for the import and export of resources, limited natural resources, as well as high energy and infrastructure costs. Their isolated position and the small size of their domestic markets make them dependent on international trade and especially sensitive to external shocks. In addition to these challenges, Small Island Developing States are especially vulnerable to climate change impacts and environmental dangers, such as sea level increases, erosion of coastlines, biodiversity loss, and destruction of coral reefs critical to food security and economic welfare, as well as altered rain patterns and extreme weather events. Many countries are now taking the necessary steps to mainstream climate change and mitigation as well as adaptation measures into their national development framework.

## International Goals and Programmes

During the United Nations Conference on Environment and Development, which took place in Rio de Janeiro, Brazil in 1992, the Small Island Developing States were first recognized as a distinct group of developing countries facing specific challenges.

Under the Programme of Action for the Sustainable Development of Small Island Developing States finalized at the Global Conference held in Barbados in 1994, also known as the Barbados Programme of Action (BPOA), the United Nations has been assisting the SIDS in their sustainable development efforts. This programme was later reviewed and revised to become the Mauritius Strategy for Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States (MSI) in 2005.

During the Fourth UN Conference on the Least Developed Countries (Istanbul, 2011), the Programme of Action for the Least Developed Countries for the Decade 2011-2020, recognizing the importance of LDCs and the enormous potential they hold for global economic growth, welfare and prosperity, was adopted. The Programme also mapped out the international community's strategy for the sustainable development pathways of LDCs with a special focus on developing their productive capacities<sup>2</sup>.

Building on this momentum, the outcome of the Third International Conference on Small Island Developing States – held in Apia, Samoa in the year 2014 –, namely the SAMOA Pathway (SIDS Accelerated Modalities of Action) played a significant role in identifying SIDS' priorities that were then later considered during the development of the 2030 Development Agenda<sup>3</sup>. The participants of the conference recognised the urgency to address the vulnerability of the small islands and find additional solutions to their major challenges<sup>4</sup>.

The United Nations Development Programme (UNDP) helps strengthen the already existing programs in developing and emerging countries by improving awareness and understanding through the provision of training and knowledge products. The South-South Cooperation between Pacific and Caribbean SIDS on Climate Change Adaptation and Disaster Risk Management project is a USD 800,000 three-year project, funded by UNDP's Special Unit for South-South Cooperation and by the UNDP-Japan Partnership Fund. It aims to help SIDS in the Caribbean and Pacific share regional best practices, technologies, and planning tools to improve resilience. Specifically, the project is funding exchanges between practitioners involved in national planning, transfer of technologies and the knowledge of how to use them, and methodologies for building disaster risk reduction into development.

An important mechanism in the context of sustainable energy development is the Small Island Developing States (SIDS) Sustainable Energy and Climate Resilience Initiative (SIDS DOCK), which has the goal of helping the Small Island Developing Countries to achieve the following targets: 50% electric power from renewable sources by 2033, a 25% decrease in conventional transportation fuel use, and a 25% increase in energy efficiency (using a 2005 baseline)<sup>5</sup>. The initiative consists of the member states of the Alliance of Small Island States, the Caribbean Community Climate Change Centre (5Cs) and the Secretariat of the Pacific Regional Environment Programme (SPREP), in order to address the impacts of climate change with collective institutional mechanisms<sup>6</sup> change adaptation. SIDS DOCK has four priority areas: (a) assistance in the promotion of a sustainable energy sector through the promotion of energy efficiency and renewable energy development; (b) support the mobilization of financial and technical resources to catalyze clean economic growth; (c) help the SIDS take advantage of resource transfer possibilities by providing the necessary mechanisms; and (d) help the SIDS generate financial resources for the investment in climate change adaptation.<sup>7</sup>

The International Renewable Energy Agency (IRENA) launched the SIDS Lighthouse Initiative at the UN Climate Summit in New York in 2014 to support the renewable energy transformation of the SIDS through the creation of holistic approaches, which pair the necessary policy elements with the most suitable technology<sup>8</sup>. The initiative aims to help SIDS mitigate climate change through partnerships, institutional capacity building, matchmaking between donors and project developers, as well as focused cooperation<sup>9</sup>.

## Impact of Climate Change on SIDS

Though Small Island Developing States contribute to less than one per cent of global GHG emissions, they are especially susceptible to climate change induced vulnerabilities. These threats not only put the achievement of the Sustainable Development Goals at risk, but they also negatively impact future development efforts of the SIDS. Associated sea-level rise threaten the very survival of certain low-lying SIDS, while rising ocean temperatures and acidification damage coral reefs, thereby affecting the subsistence and livelihoods of their citizens. Despite the national and international efforts to counter climate change effects, unsustainable agricultural practices and the lack of integrated approaches to coastal and marine resource management are exacerbating the vulnerabilities of the SIDS. Furthermore, rising ocean temperatures are negatively affecting fisheries, further increasing the gap between supply and demand putting a strain on food security. The economies of SIDS heavily depend on coastal and marine resources; thus, sustainable resource management should be promoted to develop environmentally and ecologically sound policies.

Migration patterns from rural to urban settings put increased pressure on coastal ecosystems. A significant portion of the population of many SIDS live in low elevation coastal zones (LECZ), areas along the coast that are less than 10 meters above sea level<sup>10</sup>. If the sea level continues to rise, these vulnerable coastal communities will need to explore options for relocation. The issue of climate-induced migration brings up many legal questions, such as the international recognition of climate refugees or the loss of state sovereignty<sup>11</sup> and will require strong support from the international community.

SIDS are especially vulnerable to the impact of natural disasters and can face higher than normal economic and social costs. In many cases, the costs of recovery and rehabilitation are also exorbitant. SIDS face major constraints in terms of the quantity and quality of freshwater resources, given that they have scarce surface freshwater aquifers and often rely primarily on groundwater. These constraints are further exacerbated by sea-level rise and flooding, with consequent increased salt-water intrusion into surface and groundwater sources.

Salt-water intrusion in the freshwater aquifers of many SIDS is an increasing phenomenon that will put an additional strain on already decreasing internal freshwater resources. As a result, countries are forced to turn to energy-intensive solutions, such as salt-water desalination. This solution requires a nexus approach in order to guarantee the efficient use of water and energy resources alike.

The strong tourism-dependent economies of the SIDS also suffer from waste management problems especially in the peak tourism period. Waste disposal options, such as landfilling, backyard burning and illegal dumping, are not long-term solutions for countries with high population density and limited land availability. Open dumping sites not only increase health hazards, but also have devastating environmental effects, for example marine ecosystem contamination due to leachates from uncontained sites. Alternative solutions such as recycling, composting or waste-to-energy, the latter which is described in further detail in the following section, should be explored.

Most of the Small Island Developing States are blessed with a rich diversity of endemic flora and fauna. As a result, the well-being of the islands depends mainly on the preservation of these rich natural resources. Increasing deforestation, air pollution and habitat degradation are threatening the islands' biodiversity. SIDS are already experiencing climate change induced effects such as the loss of mangrove forests due to sea-level rise, reduction in income from tourism due to increases in extreme weather events or economic losses from reduced agricultural yields due to droughts or changes in the growing season<sup>12</sup>. The countries are already working to implement integrated biodiversity strategies for the conservation and sustainable use of terrestrial and marine resources. By raising awareness of the potential effects of climate change, SIDS can promote community and regional support for the conservation of biological diversity by concentrating on educational strategies and technical support<sup>13</sup>. Given the challenges of development to meet basic needs, climate change mitigation and adaptation policies and measures have to be integrated with development goals.

## Energy and SIDS

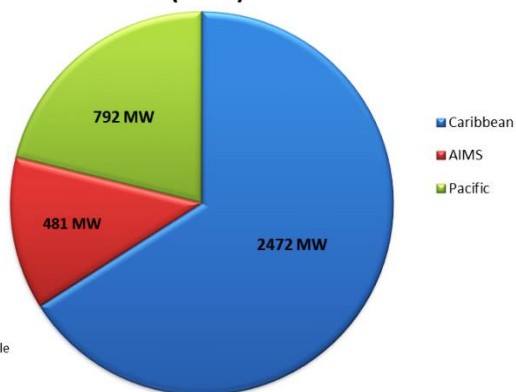
Most of the SIDS already rely heavily on oil and other fossil fuel imports, a fact that will continue to put a heavy burden on the already-strained economies, especially when growing populations and the want for economic growth are taken into consideration. A stronger diversification of the energy sector of the Small Island Developing States is needed in order to reduce fossil fuel import dependence. In order to reduce their dependence on imports, some of the SIDS countries have set voluntary commitments to achieve certain targets, with the help of development partners and the United Nations, of The Barbados Declaration on Achieving Sustainable Energy for All. In the future, renewable energy will play a crucial role in transitioning to a sustainable future and in guaranteeing energy security of the Small Island Developing States, while also contributing to the achievement of the Sustainable Development Goals.

Regional cooperation via centres for renewable energy and energy efficiency, like the Caribbean Centre for Renewable Energy and Energy Efficiency (CCREEE) and the Pacific Centre for Renewable Energy and Energy Efficiency (PCREEE), can help to strengthen efforts undertaken in the SIDS through the exchange of best practices and innovative solutions. Soft barriers for renewable energy and energy efficiency can often be addressed more (cost-)effectively through regional approaches. In this regard, regional centres can help strengthen and complement already existing national activities in knowledge management, awareness raising as well as policy and capacity development.

There exists great potential in the integration of renewable energy sources and the implementation of energy efficiency measures to decrease this economic burden. However, most SIDS have been relatively slow to adopt such practices, mainly due to a lack of appropriate (regulatory, financial and legal) framework conditions - including the absence of policies to promote research and development in new renewable energy technologies and limited local technical capacity for the implementation of RE technologies<sup>14</sup> - or due to reluctance of consumers regarding the high up-front investment costs. Government officials are also often risk-averse when it comes to the adoption of new technologies, especially since well-established technologies often have lower up-front investment costs. Additionally, renewable energy penetration is hindered by the lack of knowledge on existing solutions as well as inadequate financing and investment opportunities due to the limited economies of scale. Ensuring an enabling environment, i.e. stable regulatory structures and the minimisation of bureaucratic hurdles, is crucial to attract foreign direct investment. In order to enable further investment in renewable energy, national governments should set clear renewable energy priorities, which help indicate potential investment opportunities for the private sector. However, such regulations should be complemented through the development of information and advice programmes, which would also aid financiers in deciding whether to invest in a particular project. Furthermore, regulations should make it more profitable for utilities to invest in energy efficiency and renewable energy measures.

The transition to renewable energy would also help Small Island Developing States in times of natural disasters. Currently, most SIDS rely on fossil-fuelled centralized power plants, which face massive disruptions in times of hurricanes or earthquakes. An idea that should be further explored is the combination of micro-grids with renewables, for example in the form of community or rooftop solar installations, which could be connected to form a local grid, thereby reducing the occurrence of widespread power outages. Though the geographic isolation of the SIDS presents numerous disadvantages, it also results in unique potential for renewable energy production. The renewable energy potentials vary widely between the SIDS, but most countries have already adopted strategies for promoting solar, ocean, wave, wind, geothermal, biomass and hydropower technologies.

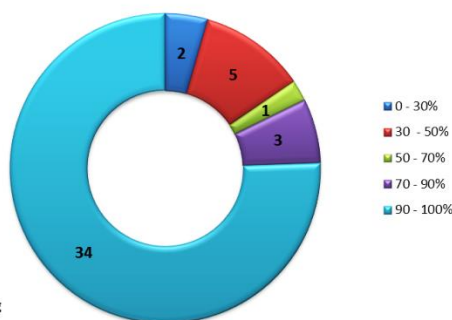
**Total RES Capacity in the SIDS by Region (2016)**



IRENA (2016): Renewable Capacity Statistics 2016

According to the SEforAll Global Tracking Framework (2017), 34 of the analysed SIDS<sup>15</sup> have a rate of electrification between 90-100%, 3 have a rate between 70-90%, 1 between 50 - 70%, 5 between 30 - 50%, and 2 between 0 - 30%.

**Total Electrification in the SIDS (2014)**



SEforAll Global Tracking Framework (GTF) 2017: <http://gtf.esmap.org/downloads>

Waste management is a multifaceted problem that offers solutions both for clean energy and public health. In Haiti, for example, a feasibility study was conducted to look at waste-to-energy options at the Truitier Municipal Dump (TMD) near Port-au-Prince. Haiti experienced a devastating earthquake in 2010, which left millions of people living in temporary settlement camps. The build-up of trash piles and of liquid waste – source of water contamination and the spreading of diseases – put enormous pressure on the government. At the moment, only a little over 30% of the population in Haiti has access to electricity. A waste-to-energy solution could not only tackle waste management problems, but also energy access at the same time. However, many countries shy away from waste-to-energy solutions due to large capacity investments and high operational costs.

SIDS require significant upfront financial capital in order to invest in the development of appropriate renewable energy technologies for commercial production. In this regard, external financial support is crucial to supplement national budgets in shifting to low-carbon development pathways. Despite these challenges, the promotion of renewable energy technologies is high on the agenda of many SIDS: seven of the Pacific Island Countries have declared an ambitious target to generate 100% of their electricity from renewable technologies.

The Cook Islands, Niue and Tuvalu aim to achieve 100% renewable energy by 2020, and Fiji, Vanuatu and Solomon Islands by 2030.<sup>16</sup>

## Renewable Energy and Energy Efficiency Projects in the Small Island Developing States

The following examples of projects aimed to increase renewable energy integration and promote energy efficiency in the Small Island Developing States are only a selection of the numerous measures the countries are undertaking and are by no means an exhaustive collection.

### Antigua and Barbuda

The national government has an objective of reaching 20% of electricity from renewable energy sources by 2018, a target that is especially difficult to reach, since the country is primarily dependent on fossil fuels for electricity generation. The project, *Transformation and Resilience Building of the Water Sector in Antigua and Barbuda*, aims to contribute to this goal, by promoting the generation of renewable electricity from wind turbines and solar PV panels, using batteries for storage when necessary. Part of the electricity will be used for water desalination as well as to provide reliable energy to community clinics and hospitals, especially in times of water stress (i.e. aftermath of drought and storms). The entire project will result in 25 MW of added renewable capacity, while Abu Dhabi Fund for Development (ADFD) funding contributes to 4 MW of this increase. These efforts will not only help meet the national mitigation targets set under the UNFCCC Paris Agreement by reducing GHG emissions by 8,275 tons of CO<sub>2</sub> per year, but will also help diversify the energy mix of the country.<sup>17</sup>

### Barbados<sup>18</sup>

Tourism continues to be a crucial economic driver in the Caribbean. However, economic crises can severely decrease the number of visitors, putting a strain on hotel owners. The use of renewable energy and energy efficiency measures can not only help the environment, but also result in significant economic savings without sacrificing comfort. The hotel is a highly resource-intensive sector that has enormous potential for the use of RES and EE. The *Caribbean Hotel Energy Efficiency Action (CHENACT)* pilot project, implemented in Barbados by the Caribbean Tourism Organization (CTO) and the Caribbean Hotel and Tourism Association (CHTA) between 2011-2017, targeted this very potential and improved the competitiveness of the small- and medium-sized hotels in the Caribbean through more affordable energy solutions (i.e. renewable energy and micro-generation). Over 200 full hotel audits were conducted to assess the exact scope for energy saving opportunities. In addition, the project created energy indices for the hotel sector, which could later be used for benchmarking hotel energy performance.<sup>19</sup>

## Cabo Verde

The Government of Cabo Verde is working to expand the use of wind resources to reduce fossil fuel imports, such as oil imports. *Cabeólica*, the largest wind project and largest Public Private Partnership (PPP) in Sub-Saharan Africa, has constructed 30 wind turbines across the four islands of Cabo Verde (Boa Vista, São Vicente, Sal and Santiago) and has established the first PPP that transmits commercial scale wind power. Currently, the installed wind capacity is 25.5 MW, which is 25% of Cape Verde's electricity demand. The ground-breaking project won the Best Renewable Energy Project of the Year at the Africa Energy Awards and the Ashden Award for Small Island Developing States.<sup>20</sup>

## Fiji

Through a joint venture partnership between Tropik Woods Industries Limited, GS Power, GIMCO and the Korean Development Bank (KDB), a 10 MW biomass-fired power plant is currently under construction in Nadroga, Fiji. Presently, Fiji only sells high quality chips, while other by-products (ex. bark waste) are discarded. This project will make use of the waste products that are otherwise thrown away in the agricultural and forestry sectors of the country. Through this renewable energy project, biomass chips will be exported to other countries.<sup>21</sup>

## Mauritius

Mauritius has set a very ambitious goal to generate 35 percent of its energy mix from renewable sources by 2025 and to expand its renewable generation base. The *Garden Island Microgrid Project* by Carnegie Clean Energy, funded by the Mauritian Ministry of Finance and Economic Development and the Australian Government, is developing a renewable energy micro-grid, which is operated by wave and solar energy and functions as a storage system as well. The main aim of the project is to provide a viable commercial model for islands and other remote communities.<sup>22</sup>

## Seychelles

The expansion of renewable energy resources has become an essential part of the long-term development agenda in Seychelles. In order to increase fuel security, the island set targets for the share of renewables at 5 percent by 2020 and 15 percent by 2030. The Energy Sector Management Assistance Program, support by the SIDS DOCK Support Program, helped the island strengthen its regulatory framework to allow centralized and distributed renewable generation<sup>23</sup>. As part of the *Technical Assistance to Support Expanded Private Participation in Renewable Energy Supply to the Grid* project, technical requirements (grid codes) were developed for connecting renewable energy systems into the grid. Furthermore, a model for Generic Power Purchase Agreement was designed and the feed-in tariff system for wind, solar photovoltaic, biomass, hydro and waste-to-energy power sources was created, in order to increase financial attractiveness for financiers.<sup>24</sup>

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*Soft barriers for renewable energy and energy efficiency can often be addressed more (cost-)effectively through regional approaches. In this regard, regional centres can help strengthen and complement already existing national activities in knowledge management, awareness raising as well as policy and capacity development.*

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## Eastern Caribbean Region

The *Caribbean Energy Efficiency Lighting Project (CEELP)*, implemented by the United Nations Development Programme (UNDP), aimed to catalyse the transition to low carbon economies and sustainable energy sectors. The project helped the participating countries remove policy, capacity and investment barriers to energy-efficient lighting. In the implementation phase, pilot projects took place in order identify the existing barriers in the Eastern Caribbean Region, including the inadequacy of policy and regulations, limited technical capacity, information and awareness and a lack of public and private funding. During the project duration, stakeholders revised – and in some cases – created new energy performance standards for indoor and outdoor lighting. A review was conducted to assess the perception of international actors with existing laws, incentives and regulations in the partner countries.

Additionally, the project offered recommendations for the gradual introduction of the missing regulations into the Eastern Caribbean region. Efforts were also undertaken to build-up local capacity through training sessions and to expand public outreach on the benefits of energy-efficient lighting. For example, the Knowledge Road Show, which took place in Dominica and Saint Lucia, displayed energy-efficient lighting technologies to a various stakeholders to raise awareness about the topic. In addition, the project tackled financial barriers by working with public authorities to identify methods to leverage further financing. Furthermore, the project also succeeded in introducing recycling services for the safe disposal of lamps. The SIDS DOCK target (energy efficiency increase by at least 25%) and the SEforAll objective (doubling the rate of improvement in energy efficiency) were aligned with the project objectives. The private sector was also involved in the technical capacity building (i.e. participation in training sessions for lighting companies) and technology transfer part of the project.<sup>25</sup>

## A Look to the Future

The Small Island Developing States constitute a unique group of countries with diverse cultures, natural resources and biodiversity. Unfortunately, their very existence is threatened by the increasing risks brought on by climate change. SIDS already have to confront rising sea levels, increasing global temperatures and food security risks due to these planetary changes. Despite recent targeted actions, many Small Island Developing States continue to face numerous barriers on their sustainable development pathway. In particular, SIDS face high public debt levels, which already constrain their ability to invest in infrastructure development as well as in climate change mitigation and adaptation measures. Climate change-induced disasters put a further strain on already limited resources. SIDS will require technical and financial support from the international community in order to move further towards resource efficiency, clean technology and carbon neutrality. At the same time, SIDS can introduce fiscal and regulatory reforms to help attract international financiers to increase investments.

Energy efficiency and renewable energy sources can not only stimulate growth through the creation of new employment opportunities, but they can also lead to health and environmental benefits. Small Island Developing States suffer enormously under high costs of energy, further constraining already limited national budgets. Utilizing the renewable energy potential in SIDS - such as solar, wind, biomass, tidal and geothermal - would help relieve the burden of high energy costs, while also reducing greenhouse gas emissions. Targeted actions to implement energy efficiency measures and to roll-out renewable energy technologies could not only contribute to sustainable development, but could also transition the islands into energy exporters in the long-term. Renewable energy solutions can especially contribute to increasing energy access in rural regions, where alternative solutions may prove unfeasible. Small Island Developing States should therefore take further steps to raise awareness and understanding of renewable energy technologies and the benefits of energy efficiency measures.

Regional cooperation has enormous importance in promoting climate change mitigation and adaptation, as well as energy efficiency and renewable energy as it can facilitate the adoption of policies on national levels. In addition, it can help maximise impact by up-scaling already existing national initiatives, while also avoiding duplication of efforts. Through the introduction of regional standards, for example, efforts can be made to build up a local market for energy-efficient equipment or renewable energy technologies, which also foster the development of local value chains. Stronger regional cooperation together with the recently established regional sustainable energy centres in the Caribbean (CCREEE) and the Pacific (PCREEE) would help to develop strategies to tackle issues across multiple countries, while facilitating knowledge exchange.

CCREEE in particular will focus on projects with regional impact or projects with potential for scale-up on a regional level in order to create a regional RE and EE market. Furthermore, CCREEE aims to tackle the interface between decentralized renewable energy and energy efficiency technologies and the agricultural sector as well the energy-water-food nexus. In addition, waste-to-energy solutions, small and medium-scale hydropower projects, and geothermal projects will be promoted.

PCREEE, on the other hand, will place a strong focus on the private sector and industry to enhance the productivity of key industries, including agriculture, tourism, and fishery, to create job opportunities. The Pacific Centre will also promote sustainable energy entrepreneurship and nexus-approaches (ex. combination of sustainable energy initiatives with value chain development). Cooperation and cross-learning between these regional centres for renewable energy and energy efficiency can aid in identifying successful approaches and avoiding pitfalls when designing and implementing policies and measures.

### Useful Links

Global Network of Regional Sustainable Energy Centres  
<https://www.unido.org/our-focus/safeguarding-environment/clean-energy-access-productive-use/climate-policies-and-networks/global-network-regional-sustainable-energy-centres>

SIDS DOCK  
<http://sidsdock.org/>

Alliance of Small Island States (AOSIS)  
<http://aosis.org/>

Global Renewable Energy Islands Network (GREIN):  
<https://sustainabledevelopment.un.org/partnership/?p=8011>

Created by IRENA, this platform allows islands to pool knowledge and share best practices

SIDS Lighthouse Initiative Quickscan  
<http://irena.org/quickscan/>

This tool monitors the readiness of the SIDS to deploy renewable energy in the power sector with the help of an interactive chart. The tool identifies seven factors in order to deploy renewable energy successfully, such as an institutional framework, technical knowledge, planning of renewable energy projects, affordability of financial resources, key processes of maintenance and system operation, a strong local capacity and the cooperation in the form of financial, non-technical and technical and political knowledge transfer.

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