

# ISLAND ENERGY TRANSITIONS: PATHWAYS FOR ACCELERATED UPTAKE OF RENEWABLES

**Martinique, June 22-24, 2015**

## **Background**

Islands have been early supporters of renewable energy technologies to reduce the burden of high energy costs through economically viable and promising solutions to their energy challenges. Many have taken great strides towards energy transformation through the roll out of national energy plans, bold renewable energy targets, new partnerships, innovative technical approaches, and significant new investments. At the global level, islands have provided strong political leadership in promoting renewable energy as a key element of sustainable development and a major contribution to efforts on climate change.

In September 2014, the Third International Conference on Small Island Developing States (SIDS) took place in Apia, Samoa. The Conference unanimously adopted the outcome document “SIDS Accelerated Modalities of Action (S.A.M.O.A) Pathway” which contains a strong focus on renewable energy and requests a strategy for deployment of all sources of renewable energy, development of energy roadmaps, and access to mechanisms to increase capital flows for implementation of sustainable energy projects. The S.A.M.O.A. Pathway also urges all stakeholders to join forces in supporting SIDS in development and implementation of their national, regional and interregional sustainable energy plans and strategies.

Consistent with this message and the S.A.M.O.A. Pathway, the SIDS Lighthouses Initiative was launched at the United Nations Secretary General’s Climate Summit. Facilitated by IRENA, the Lighthouses is a joint effort of SIDS, development institutions and other partners. It is a framework for action aimed at maximising the use of indigenous, clean and plentiful renewable energy in a structured, holistic approach that takes into account medium and long-term requirements and impacts, and ensures that the requisite institutional and human capacity is in place. Within the initial 5-year timeframe, the SIDS Lighthouse Initiative focuses on the power sector with the aim to mobilise USD 500 million, deploy 100 MW of new solar photovoltaic power, deploy 20 MW of new wind power, deploy significant quantities of small hydropower and geothermal energy and a number marine technology projects, and ensure that all participating SIDS develop renewable energy roadmaps.

Underpinning this work is the knowledge sharing foundation of the Global Renewable Energy Islands Network (GREIN). GREIN was established by IRENA at the request of islands and other partners to pool knowledge, share best practices and seek innovative solutions for accelerated uptake of clean and cost-effective renewable energy technologies on islands. Stakeholders have identified the most urgent areas for such cooperation to include renewable energy roadmaps, power grid integration, tourism applications, resource assessments, desalination and waste-to-energy systems.

Rapid renewable energy technology cost reductions have opened significant new opportunities, but the renewable energy potentials in islands are yet to be harnessed. With a strong political momentum created by the global focus on climate and new financing instruments coming on-stream, as well as continuous innovation in renewable energy technologies, there are great prospects for accelerated deployment of renewables on islands.

The Martinique Conference on *Island Energy Transitions: Pathways for Accelerated Uptake of Renewables* provided an opportunity to consider concrete options for renewable energy development on islands. Resource, technology, market, financing and other aspects of renewable energy development on islands were reviewed in depth with a view to realising renewable energy projects. The Conference has been a milestone in the implementation of the Lighthouses goals in preparation for the COP21 and beyond.

### Conference Outcome

Under the umbrella of the SIDS Lighthouses Initiative, the conference on Island Energy Transitions provided a global platform for sharing islands' experiences and best practice in deployment of renewable energy technologies.

The conference set forth a *Martinique Action Plan (MAP)* to accelerate the uptake of renewables on islands, demonstrating partners' commitment to the Lighthouses Initiative and allowing them to showcase tangible progress in renewable energy deployment at COP21 in Paris.

### Format and Structure

The first two days of the Conference were dedicated to discussing the practical potential for renewable resource development on islands through real-life examples and reflections on the latest technologies. The third day considered the key elements for linking the technology and resource potentials with financing opportunities. Participants discussed successful business models, financing options and enabling factors to realize renewable energy projects and transform islands energy systems, and provided recommendations on the way forward in preparation for COP 21.

### Participants

Participants in the event included, among others:

- Government officials
- Companies and utilities involved in renewable energy deployment
- Banks interested in financing renewable energy investment
- Experts in renewable energy resource assessment
- Development partners

## **PROGRAMME OUTLINE**

### **Monday, June 22, 2015 – PARALLEL WORKSHOPS**

#### **14:00 – 18:00 WORKSHOPS ON ISLAND RENEWABLE RESOURCES**

**Workshop A: Marine Resources and Technologies for Islands**

**Workshop B: Geothermal Resources and Technologies for Islands**

**Workshop C: Wind Resources and Technologies for Islands**

**19:00 – 20:00 Welcome Reception**

### **Tuesday, June 23, 2015 – PLENARY TECHNICAL SESSIONS**

**9:00 – 11:30 Session T-1: INTEGRATING RENEWABLES ON ISLAND POWER GRIDS**

**12:00 – 15:30 Session T-2: BIOMASS- AND WASTE-TO-ENERGY SYSTEMS**

**16:00 – 18:30 Session T-3: RENEWABLE DESALINATION SYSTEMS**

**18:30 – 20:00 REPORTS ON WORKSHOPS AND TECHNICAL SESSIONS**

**20:00 – 22:00 Official Dinner**

### **Wednesday, June 24 – PLENARY POLICY SESSIONS**

**9:00 – 11:00 Session 1: LIGHTING THE WAY FOR RENEWABLES**

**11:30 – 13:00 Session 2: ENABLING FRAMEWORKS FOR RENEWABLE INVESTMENT**

**14:00 – 15:00 Session 3: ENABLING RENEWABLE PROJECT DEVELOPMENT**

**15:30 – 17:00 Session 4: RENEWABLE ENERGY PROJECT PARTNERSHIPS**

**17:00 – 18:00 Session 5: RENEWABLES ON THE ROAD TO PARIS**

## **ANNOTATED AGENDA**

### **Monday, June 22, 2015**

#### **14:00 – 18:00 WORKSHOPS ON ISLAND RENEWABLE RESOURCES**

Many islands have substantial renewable energy resources that could be developed in a cost-effective fashion. Yet few islands have systematically assessed or developed these resources to take full advantage of them. In parallel workshops, participants discussed priorities for developing island wind resources, strategies for assessing and developing island geothermal resources, and prospects for accelerating development of marine resources near islands as technologies mature and costs decline. In each workshop, participants suggested action items to be reported to and recommended by the conference through the Martinique Action Plan.

**19:00 – 21:00 Welcome Reception**

Monday, June 22, 2015 (continued)

## Workshop A: Marine Resources and Technologies for Islands

*Moderator: Jeff Skeer, IRENA Country Support and Partnerships Division*

*Rapporteur: Narasimalu Srikanth, IEA Ocean Energy Systems (OES)*

### 14:00 – 15:30 Marine Energy Overview, OTEC and SWAC

Jeff Skeer, IRENA Country Support and Partnerships Division,

***Status and Prospects of Marine Energy Technologies: Rapid Expansion and Cost Reduction in View***

Narasimalu Srikanth, IEA Implementing Agreement on Ocean Energy Systems

***Global Prospects for Cost-Effective Development of Ocean Energy for Island Electrification***

Jean Dubranna, Center for Observation, Impacts and Energy, Mines ParisTech/ARMINES

***Benefits of Earth Observation Systems for Evaluating Marine Renewable Energy Resources***

Asha Singh, Head, Ocean Governance Unit, Commission for the Organisation of Eastern Caribbean States

***Marine Renewable Potential in the OECS Region***

Yasuyuki Ikegami, Institute of Ocean Energy, Saga University

***OTEC Potential and Activity in the Asia Pacific***

Tristan Urtizberea, Akuo Energy

***OTEC Potential and Projects in Caribbean and Indian Ocean Islands***

Jean-Marie Puran, Sotravac /Urban Cooling, Mauritius

***Sea Water Air Conditioning for Indian Ocean Island Coasts***

### 15:30 – 16:00 Coffee

### 16:00 – 17:00 Wave and Tidal Power

Yann Hervé de Roeck, France Energies Marines

***Marine Energy Resources in the North Atlantic***

Max Carcas, Director, Caelulum

***Wave Energy Technologies: Criteria for Success***

Jean-Christophe Allo, Sabella

***Marine Current Energy for Islands***

### 17:00 – 18:00 Round-Table Discussion of Action Items

Monday, June 22, 2015 (continued)

## Workshop B: Geothermal Resources and Technologies for Islands

**Moderator:** Gurbuz Gonul, Acting Director, Country Support & Partnerships, IRENA

**Rapporteur:** Migara Jaywardana, Senior Energy Specialist, World Bank

### 14:00 – 15:30 Overview of Geothermal Resource Development Tools

Christian Boissavy, European Geothermal Energy Council, AFGP and GEODEEP

**Risk Mitigation Systems for Geothermal Resource Assessment**

Jacques Chouraki, Teranov

**Applying Methods & Tools from the Oil and Gas Industry to Enhance Geothermal Resources**

Adriana Valencia, Infrastructure and Environment Department, Inter-American Development Bank

**Challenges and Opportunities for Geothermal Development in the Caribbean**

Migara Jaywardana, Senior Energy Specialist, World Bank

**Mobilizing Large-Scale Investments for Geothermal Development in Small Island Economies**

Jim Shnell, Ocean Geothermal Energy Foundation

**Harnessing Deep Sea Geothermal Resources for Multiple Islands in the Lesser Antilles**

Sylvain Broglé, Clemessy, **Messages from the Geothermal Meeting in Melbourne**

### 15:30 – 16:00 Coffee

### 16:00 – 17:00 Island Experiences with Geothermal Power

Alastair Brookes, New Zealand Geothermal Office in St Lucia

**Considerations in Geothermal Resource Development for Caribbean Power Grids**

Melissa Defreitas, Energy Office, St Vincent and the Grenadines, **Partnerships for Assessment**

**Drilling and Development of Geothermal Resources in St Vincent and the Grenadines**

Nicolas Pouget, Coordinator, INTERREG IV Geothermal in the Caribbean Project

**Geothermal Development in Guadeloupe**

Naoildine Houmadi, Comoros Geological Bureau, and Douglas Coutts, UN Resident Representative

**Promoting Geothermal Resources in Comoros**

João Carlos Nunes, Scientific Director, Inova Institute, **Geothermal Resource Development and Renewable Energy Strategy in the Azores Islands (Portugal)**

Hervé Traineau, CFG Services, **Geothermal District Cooling in Martinique**

### 17:00 – 18:00 Round-Table Discussion of Action Items

Monday, June 22, 2015 (continued)

### Workshop C: Wind Resources and Technologies for Islands

*Moderator: Daniela Schmidt, Lighthouses Coordinator, IRENA Innovation and Technology Center*

*Rapporteur: Martina Dabo, QiDo Energy Development*

#### 14:00 – 15:30 Overview of Wind Resource Assessment

Henning Wuester, Director, IRENA Knowledge, Policy and Finance Center

*IRENA's Global Atlas as a Point of Departure for Assessing Renewable Energy Resources on Islands*

Matt Filippelli, AWS Truepower

*Guidelines for Detailed Wind Resource Measurements on Islands*

Patrice Vezin, Vergnet,

*Preliminary Assessment of Promising Island Candidates for Detailed Wind Resource Measurement*

#### 15:30 – 16:00 Coffee

#### 16:00 – 17:00 Innovative Wind Resource Assessment for Islands

Martina Dabo, QiDo Energy Development,

*Assessment and Testing of Island Wind Resources without Masts*

Marion Jude, Eoltech

*Wind Measurements on Islands: the Benefits of Using Lidars*

Leijie Chen, Chinese Wind Energy Association

*Assessing Offshore Wind Potential*

#### 17:00 – 18:00 Round-Table Discussion of Action Items

**Tuesday, June 23**

**9:00 – 11:30 Session T-1: RENEWABLE TECHNOLOGY ON ISLAND POWER GRIDS**

As solar energy technologies and other renewable energy technologies are deployed on island power grids, it is vital to ensure that reliable service is maintained and access to energy is expanded. Grid integration studies serve as planning tools to show the substantial share of renewable electricity generation that can already be reached on island power grids and the even higher share that can be reached with the latest technical solutions. This session highlighted the potential for renewable technology that island grid integration studies and experience have revealed.

**Moderator: Devon Gardner, CARICOM      Rapporteur: Daniela Schmidt, IRENA**

**9:00 – 10:30 Island Experiences with Integrating a Higher Share of Renewable Power**

Elizabeth Press, Deputy Director, IRENA Innovation and Technology Center, ***Grid Integration Studies for Islands: What They Say about the Potential Renewable Share of Electricity Generation***

Greg Decherong, Director, Palau Energy Office

***Grid Integration Study as Predicate for Accelerated Solar Power Investment in Palau***

Tadayuki Ogawa, Japan International Cooperation Agency (JICA)

***Hybrid Island Initiative for Integrating Renewable Energy in Islands of the Asia Pacific***

Simon Gamble, Hydro Tasmania

***Running a Power Grid with One Hundred Percent Renewables on King Island, Australia***

Martin Schroeder, World Bank

***Integrating Variable Renewables in São Tomé, Seychelles and Mauritius***

William Hinds, Chief Energy Conservation Officer, Office of the Prime Minister, Barbados

***Integrating a High Share of Renewable Generation in Barbados***

Michel Durand, EDF Director, SEI (Systèmes énergétiques insulaires) Martinique

***Martinique's Experience with Integrating Renewable Generation on the Grid***

Franck Alshakarchi, CEA – Commissariat à l'Énergie Atomique et aux Énergies Alternatives

***INSOLATIONS Project: Impact of Self-Consumption on Integration of Photovoltaics in Martinique***

Marwane Bejgane, CEO, Énergie de Martinique

***Integrating Renewables on Island Power Grids with Electric Vehicles***

**10:30 – 11:30 Grid Integration Framework & Round Table Discussion of Proposed Actions**

Devon Gardner, Programme Manager, Energy, CARICOM

***Developing a Uniform Grid Integration Framework for CARICOM Countries***

**11:30 – 12:00 Coffee**

Tuesday, June 23, 2015 (continued)

**12:00 – 15:30 Session T-2: BIOMASS-TO-ENERGY & WASTE-TO-ENERGY SYSTEMS**

Islands can produce large quantities of agricultural residues, as well as large quantities of waste which is costly to ship away. Biomass- and waste-to energy systems can give value to the residues and waste by using them to generate electricity. Participants in the session discussed the technical and economic potential for biomass- and waste-to-energy systems on islands.

*Moderator and Rapporteur: Kay Schaubach, German Biomass Research Center*

**12:00 – 13:00 Presentations on Waste-to-Energy Systems for Islands**

Gregg Tomberlin, National Renewable Energy Laboratory (NREL), United States, ***Defining Sustainable and Cost-Effective Waste-to-Energy Technologies for Islands: Haiti as Case Study***

Elisabeth Poncelet, Ademe – French Agency for Environment and Energy Management  
***Waste-to-Energy: Finding the Best Solutions for Each Island***

Olabode Esan, Masdar,  
***Designing Waste-to-Energy Systems at Island Scale***

Andreas Tauer, Renewable Energy and Energy Efficiency Technical Assistance (REETA) Programme, GIZ, ***Regional Waste-to-Energy Collaborative for the Caribbean Community***

Jean-Marie Puran, Sotravic,  
***Conversion of Landfill Gas to Electricity in Mauritius***

Thibaut Loschetter, COO, Atoll Energy  
***Combining Desalination, Power, Heating and Cooling***

Pierre Tauzinat, CEO, Ennesys,  
***Small-Scale Waste-to-Energy and Water Solutions for Islands***

Shiko Hayashi, Institute for Global Environmental Strategies (IGES)  
***Joint Crediting in Palau to Improve Returns on Investment in Waste-to-Energy Systems***

**13:00 – 14:00 Buffet Luncheon**

**14:00 – 14:30 Presentations on Biomass-to-Energy Systems for Islands**

Kay Schaubach, Project Manager, German Biomass Research Center (DBFZ)  
***Bioenergy Assessment for Project Implementation in CARICOM and the Dominican Republic***

Jacques Petry, Chairman and CEO, Albioma, ***Biomass-to-Energy Projects in the Caribbean and Cross-Island Trade to Ensure a Year-Round Supply of Feedstock for Power Production***

**14:30 – 15:30 Round Table Discussion of Proposed Actions**

**15:30 – 16:00 Coffee**

**Tuesday, June 23, 2015 (continued)**

**16:00 – 18:30 Session T-3: RENEWABLE DESALINATION SYSTEMS**

Islands need drinkable water for both residents and visitors. Water is costly to bring in from overseas, making islands a natural market for desalination technologies using indigenous renewable energy resources. In this session, participants discussed the technical and economic potential for renewable desalination systems to meet island fresh water needs.

***Moderator and Rapporteur: Leon Awerbuch, Director, International Desalination Association***

**16:00 – 17:30 Presentations on Renewable Desalination Systems for Islands**

Joachim Kochikowski, Head of Team, Decentralized Water Treatment: Fraunhofer Institute for Solar Energy Systems (ISES), Germany, ***Technology Options for Renewable Desalination on Islands***

Olabode Esan, Masdar,

***Evaluating Island Renewable Desalination Needs***

Leon Awerbuch, Director, International Desalination Association

***Novel Approaches to Solar Thermal Desalination for Islands***

Gérard Canton, Deputy Managing Director, SIDEM/Veolia

***Waste to Water in the Small island Environment of St. Barthélemy***

Dan Cohee and Euclid Irving, Blue Energy Alliance

***Solar Desalination at a Resort in Anguilla***

Marc Vergnet, Chief Executive Officer, Mascara Nouvelles Technologies, ***Keys to Successful Renewable Desalination Projects on Islands: Unlocking Land, Financing and Permits***

**17:30 – 18:30 Round Table Discussion of Proposed Actions**

**18:30 – 20:00 REPORTS ON WORKSHOPS AND TECHNICAL SESSIONS**

**20:00 Dinner Reception**

## WEDNESDAY, 24 June

### 9:00 – 11:00 Session 1: LIGHTING THE WAY FOR RENEWABLES

Keynote addresses set the scene on the expanding potential for renewable energy options to support sustainable development, and on how islands can light the way to broad strategies for accelerating the deployment of renewable energy around the world.

- Serge Letchimy, President of the Region of Martinique
- Jean Ballendras, National Coordinator for Renewables, France
- Henning Wuester, Director, Knowledge, Policy and Finance Centre, IRENA
- H.E. Oslin Benito Sevinger, Minister of Infrastructure, Spatial Planning and Integration, Aruba
- H.E. Ian Liburd, Minister of Public Infrastructure, Post, Urban Development and Transport, St Kitts and Nevis
- John Morton, Chief of Staff, Overseas Private Investment Corporation, United States
- Devon Gardner, Programme Manager, Energy, Caribbean Community (CARICOM)

### 11:00 – 11:30 Coffee

### 11:30 – 13:00 Session 2: ENABLING FRAMEWORKS FOR RENEWABLES INVESTMENT

Although the costs of renewable energy technologies and infrastructure are declining, the investment requirements can still be prohibitive, especially for SIDS that with high levels of public debt. Many SIDS find it challenging to attract financing for key infrastructure projects due to their small size and remoteness. This session explored options for islands to access the capital they need to achieve their renewable energy ambitions. Through stakeholder experiences and perspectives, it highlighted **financial mechanisms** available for renewable and infrastructure investment, the creation of **enabling policy and regulatory** environments to attract investment, and **risk mitigation tools** to encourage investment.

*Moderator: Henning Wuester, Director, IRENA Knowledge, Policy and Finance Centre*

- Oral Lafleur, Renewable Energy Coordinator, Ministry of Environment and Housing, Bahamas  
***Putting the Policies and Measures in Place to Encourage Renewable Energy Development***
- Jean Andre Chrysostome, Coordinator for Energy, Ministry of Public Works, Transport, Energy and Communications, Haiti  
***Highlights of Haiti's Renewable Energy Investment Plan***
- Jerry Butler, Board of Executive Directors, Inter-American Development Bank  
***Policies for Promoting a Diversified Energy Matrix in the Caribbean***
- Joseph Williams, Sustainable Energy Advisor, Caribbean Development Bank  
***Smart Promotion of Renewable Energy and Energy Efficiency Investments in the Caribbean***
- Stéphane Tromilin, French Development Agency (AFD)  
***Tailoring Financing to Island Settings***
- Mark Lambrides, Senior Energy Specialist, World Bank  
***Financial Mechanisms to Enable Renewable Energy Investment***
- Alex Gellert-Paris, UNFCCC Regional Collaboration Centre  
***Result-Based Carbon Financing for Renewable Energy Projects on Islands***
- ***Questions & Answers***

### 13:00 – 14:00 Luncheon

### WEDNESDAY, 24 June (continued)

#### 14:00 – 15:00 Session 3: RENEWABLE PROJECT DEVELOPMENT

As renewable energy and climate financing instruments come on stream, developing **bankable projects** will be of increasing importance. Based on consideration of technical and policy requirements, participants discussed **business models** that have proven successful in island settings. Participants showcased best practice in project development and different tools for strengthening the capacity of project developers.

*Moderator: Kristian Petrick, IEA Renewable Energy Technology Deployment*

- Patrice Vezin, Vergnet  
**Keys to Success for Deployment of Renewable Power on Islands**
- Emmanuel Brochard, Vice President for Business Development, DCNS Energies **NEMO (New Energy for Martinique and Overseas) Project: Business Prospects for OTEC in the Caribbean**
- Michael Henson, Aligned Energy  
**Building a Sustainable Biomass Business in Papua New Guinea**
- Kristian Petrick, IEA Implementing Agreement on Renewable Energy Technology Deployment  
**Preparing the Ground for Island Prosumers**
- Hugo Chandler, Director, New Resource Partners  
**Finding Bankable Renewable Energy Projects on Islands**
- Loreto Duffy-Mayers, Regional Programme Manager, CHENACT (Caribbean Hotel and Tourist Association) **Renewable Energy Business Solutions for Caribbean Hotels**

#### 15:00 – 15:30 Coffee

#### 15:30 – 17:00 Session 4: RENEWABLE ENERGY PROJECT PARTNERSHIPS

Participants considered common actions to advance island energy transition, with a view to creating **a pipeline of bankable renewable energy projects** for investment in islands. Regional partnerships such as the EU/New Zealand Pacific Forum and the US-led Caribbean Energy Security initiative, were highlighted as examples of initiatives that can have quick impacts and **enable private investment**. Further, participants considered how renewable energy projects proposed by regional partnerships, SIDS DOCK, or individual islands can be matched with existing sources of public and private financing.

*Moderator: Elizabeth Press, Deputy Director, IRENA Innovation and Technology Center*

- Devon Gardner, Programme Manager, Energy, Caribbean Community (CARICOM)  
**Caribbean Sustainable Energy Roadmap and Strategy**
- Vera Rodenhoff, Head of International Affairs Division for Environment and Energy, Federal Ministry of the Environment, Nature Conservation, Building and Nuclear Safety, Germany  
**Innovative Cooperation for Renewable Energy Deployment: The International Climate Initiative**
- Dan Birns, Senior Energy Officer, U.S. Department of State  
**The Caribbean Energy Security Initiative: Partnering for Renewable Energy Development**
- Leslie Labruto, Clinton Foundation  
**Tripartite Partnership of the Clinton Climate Initiative, Rocky Mountain Institute and Carbon War Room with SIDS Island Lighthouses**
- Gurbuz Gonul, Acting Director of Country Support and Partnerships, IRENA  
**The Global Geothermal Alliance - Forming a Global Partnership for Geothermal Energy**
- Paul van Aalst and Valerie Dorel, ITC Consulting  
**Investor Matchmaking for Renewable Energy Businesses in the Caribbean**

#### 17:00 – 18:00 Session 5: RENEWABLES ON THE ROAD TO PARIS

In the concluding session, participants will consider priority action areas, ways to maximize opportunities, and the potential for new partnerships and approaches to accelerating action on renewable energy projects to be showcased in Paris. They will define the key action items emerging from the Conference and identify milestones to facilitate advancement of these projects in preparation for the COP21 and beyond.

*Moderator: Hugh Sealy, Lead Negotiator, Association of Small Island States (AOSIS)*