

## IRENA Workshop Series on Efficient Renewable Energy Integration in the Pacific islands region

### Agenda

Date: 8 – 12 April 2013

Venue: Palau International Coral Reef Centre (PICRC), Koror, Palau (please see **Annex 1** for the details)

Many of the Pacific islands countries and territories are in the process of making the transition to renewable-based energy systems and help islands diversify their energy mix to reduce dependency on fossil fuel. The IRENA Global Renewable Energy Island Network (GREIN) was established for pooling knowledge and exchanging ideas and experiences between islands to accelerate the renewable energy deployment in island countries.

As part of the initiative, with an aim to assist islands to achieve transition to renewable energy for more sustainable and secure energy future, IRENA has been engaged in the Pacific region in various activities. In collaboration with existing regional organizations and key stakeholders in the region, IRENA work activities for the Pacific region since 2012 include: renewable readiness assessments, renewable energy technology assessments that are suitable for the conditions in the region, assessment of grid stability issues, harmonization of standards for renewable installation, development of a sustainable renewable energy market through policy advice, capacity development, assessment of the renewable energy, land use and water resources nexus, and development of a roadmap for the region.

This particular workshop series is the first IRENA technical training workshop in the region that aims to provide practical knowledge and hands-on experiences regarding technical guidelines for PV installation and the assessment of grid stability. Participants will be guided through not only the importance of endorsing the technical guidelines and assessing the grid stability but also with the practical manuals and methodologies for the PV installations and grid assessments. The workshop will also provide an opportunity for participants to exchange their experience and knowledge in the area of renewable energy integration to the electricity grid.

The workshop benefits the support from various partners in the region including the Pacific Power Association (PPA), Sustainable Energy Industry Association of the Pacific Island (SEIAPI), Palau Public Utilities Corporation (PPUC), and Secretariat of the Pacific Community, North Pacific ACP Renewable Energy and Energy Efficiency Project (SPC North-REP).

Note: For the Second Module session on grid stability assessment, participants are asked to bring their own PC for the training (please see **Annex 2** for the details).

#### Partners:

##### SEIAPI



##### SPC North-REP



**NORTHREP**

North Pacific ACP Renewable Energy and Energy Efficiency Project

##### PPA



##### PPUC



**PALAU PUBLIC  
UTILITIES CORPORATION**

## **First Module: Workshop on Harmonised Technical Guidelines for PV Systems in the Pacific Islands**

During the workshop on “Accelerated Renewable Energy Deployment on Islands with Emphasis on the Pacific Islands”, organised by the International Renewable Energy Agency (IRENA) in collaboration with the Government of Australia and the World Bank, in October 2011 in Sydney, the need in the Pacific Islands to harmonise standards was raised and incorporated in the resulting work plan for IRENA in the Pacific. The relevance of this issue in the Pacific Islands is particularly related to the standards for installation and grid interconnection of renewable energy equipment, particularly for PV systems. In this context, harmonisation in standards is of key importance as it facilitates market access and reduces transaction costs. Harmonising standards across different countries requires significant efforts and long time-frames due to the whole process required to revise or develop new standards at international level. One alternative approach to overcome the technical barriers due to non-harmonised standards at regional level is the development and use of technical guidelines that incorporate the main elements from international standards while harmonising technical requirements for the region.

In this context, IRENA in collaboration with Sustainable Energy Industry Association of the Pacific Islands (SEIAPI) and the Pacific Power Association (PPA), will jointly organise an expert meeting and workshop in order to introduce four Technology Guidelines for Solar Photovoltaic Systems (off-grid design; off-grid installation; grid connected design; grid connected installation) in the Pacific region. It is the first in the set of the planned Renewables Technology Guidelines and one which would result in a high impact for the benefit of the energy industry of the Pacific Island States. A task force consisting of IRENA, SEIAPI and PPA officials has been established, with the aim to disseminate and support the implementation of these sound technical guidelines, based on international standards, for grid connected PV systems. This effort is implemented via experts meetings in Pacific Island Countries between the three mentioned organisation and the relevant actors in the country.

The two and a half days workshop will bring together key players in the energy industry and governments to present and assure in-depth understanding of the guidelines, as well as to define a plan for the implementation of the guidelines in accordance with the country’s needs. The meeting will also provide the opportunity for a dialogue on other technology aspects that might be of relevance to the country to accelerate the deployment of renewable energy technologies.

The specific objectives of the meeting are:

- Provide stakeholders with an in-depth understanding of the guidelines, how to use them and the on-going work to develop further guidelines
- Present to the relevant government institutions the benefits of endorsing the guidelines in the relevant national regulations
- Define an implementation plan for the guidelines in accordance with the national circumstances
- Obtain feedback from stakeholders on additional technical needs and challenges, including standardisation, that are to be addressed to ensure a sustainable and accelerated deployment of renewables in the country.

## FIRST MODULE: Workshop on Harmonised Technical Guidelines for PV Systems in Pacific Islands

### Day 1: 8<sup>th</sup> April

Time	Session	Presenter
<b>08:30-09:00</b>	<b>Registration</b>	
<b>09:00-9:40</b>	<b>Introduction</b>	
09:00-09:05	Welcome	Government high-level representative
09:05-09:10	Opening of the meeting <ul style="list-style-type: none"> <li>• Objective of the First and Second modules</li> <li>• IRENA GREIN initiative</li> </ul>	Jeffrey Skeer, IRENA
09:10-09:45	Roundtable introduction and discussion <ul style="list-style-type: none"> <li>• Each participant is asked to introduce themselves and share key technical issues and experiences related to design and installation of PV systems connected to the grid in their countries</li> </ul>	All participants (ca. 2 mins each). Moderator: 'Apisake Soakai, IRENA
09:45-09:55	Importance and benefits of adopting harmonised technical guidelines in the region for PV systems	Peter Konings, SEIAPI
09:55-10:10	Benefits for Utilities of endorsing and using the technical guidelines	Andrew Daka, PPA
<b>10:10 – 10:30</b>	<b>Coffee break</b>	
<b>10:30 - 12:00</b>	<b>PV Technical Guidelines – Introduction on technical guidelines for utilities integrating PV into their grids</b>	Geoff Stapleton, SEIAPI
<b>12:00 – 13:00</b>	<b>Lunch</b>	
<b>13:00 – 14:30</b>	<b>PV Technical Guidelines – Session I</b> <b>Grid connected PV – design guidelines</b>	Geoff Stapleton
<b>14:30 – 14:50</b>	<b>Coffee break</b>	
<b>14:50 – 16:30</b>	<b>PV Technical Guidelines – Session II</b> <b>Grid connected PV – design guidelines</b>	Geoff Stapleton

## Day 2: 9<sup>th</sup> April

Time	Session	Presenter
09:00-10:10	PV Technical Guidelines – Session III Grid connected PV – installation guidelines	Geoff Stapleton
10:10 – 10:30	Coffee break	
10:30-12:00	PV Technical Guidelines – Session IV Final of Grid connected PV Off-grid PV – installation & design guidelines	Geoff Stapleton
12:00 – 13:00	Lunch	
13:00 – 14:30	PV Technical Guidelines – Session V Off-grid PV – design guidelines	Peter Konings
14:30 – 14:50	Coffee break	
14:50 - 16:30	PV Technical Guidelines – Session VI Off-grid PV – design and installation guidelines	Peter Konings

## Day 3: 10<sup>th</sup> April (half day)

Time	Session	Presenter
09:00-10:10	PV Technical Guidelines – Session VII Final part of off-grid PV / review	Peter Konings
10:10 – 10:30	Coffee break	
11:00-12:00	Discussion and agreement on the implementation plan for the technical guidelines	<b>Breakout groups session</b> (*The groups can nominate their own moderator and the organisers will provide support to the group. The groups will report to the plenary group)
12:00 – 13:00	Lunch	
13:00	Closure of the First Module	

## **SECOND MODULE: Workshop on Assessment of the Grid Stability for Renewable Energy Integration in the Pacific Islands**

### ***Background***

With the aim to reduce the high dependency on fossil fuel and achieve a more sustainable and secure energy future in the Pacific region, islands' efforts in making the transition to renewable energy based system have been increasing over the recent years. In the course of transition, the integration of variable renewable energy to the existing grid systems becomes higher where the grid stability issues become apparent. As the shares of variable and intermittent renewable energies increase, stable operation of the grid system may be compromised and additional measures will be needed to stabilise the system. Currently, the majority of island networks in the Pacific region are old with 25 years in average and the power supply is relatively energy inefficient with high system losses. The Pacific Power Association (PPA) has recently conducted an energy loss study for 20 island utilities which observed an average of 12.8% of utility system losses.

The utilities and policymakers in the Pacific region are therefore required to better understand the threshold to which their grids can sustain the penetration of such variable renewable energy without affecting the power quality.

In collaboration with PPA, IRENA is carrying out a study on grid stability to develop a methodology for dynamic modelling using a software tool in order to support islands in the assessment of grid stability of their grids when planning the integration of high share of variable renewable energies. Dynamic modelling assesses the transient effects of frequency and voltage in the system under varying load conditions by renewables which would help identify the levels of renewables integration to grids. This will then raise utilities and policymakers confident in their decision makings and the operation of their grid systems. The first pilot study was conducted for Palau grids where its utility is observing the urgency to assess the grid stability due to an expected integration of a number of PV installations to their grids. In the course of the study, PPA was given a training course on the dynamic modelling using software.

Based on the developed methodology and capacity in PPA, in support of IRENA, PPA will further carry out the grid stability assessment in 2 more islands in the Pacific region which are observing the urgency of high shares of renewables integration. The islands will be selected through the IRENA's Global Renewable Energy Island Network (GREIN). Moreover, PPA will disseminate the methodology and knowledge on the grid stability assessment widely within the Pacific region and beyond.

### ***Objective***

The goal of the workshop is to share the results and experience of the pilot study on the grid stability assessment for Palau and provide an introductory session on the initial methodology of dynamic modelling using software for further applications in the region.

Note: For the Second Module session on grid stability assessment, participants are asked to bring their own PC for the training (please see **Annex 2** for the details).

**Day 1: Afternoon, 10<sup>th</sup> April**

*All the speakers to be confirmed*

<b>Time</b>	<b>Session</b>	<b>Presenter</b>
13:30-13:35	Introduction to the Grid Stability Workshop and IRENA GREIN initiative	Jeffrey Skeer, IRENA
13:35-13:50	IRENA's assessment on grid stability in the Pacific region	Mirei Isaka, IRENA
13:50-14:05	Benefits of the grid stability assessment and the results of the pilot study in Palau	Andrew Daka, PPA
14:05-14:30	Case study of a grid stability assessment in PNG	Kalak Kanawi, PNG Power
14:30-15:00	Roundtable discussion <ul style="list-style-type: none"> <li>• Each participant is asked to share key technical issues and experiences in their countries related to grid stability when integrating renewables</li> </ul>	All Moderator: 'Apisake Soakai
15:00-15:15	Coffee break	
15:15-16:00	Assessment of the dynamic performance of the hybrid system with increasing penetration of PV generation <ul style="list-style-type: none"> <li>• Overview</li> <li>• Role and benefits of dynamic modelling for the assessment of grid stability</li> <li>• System stability: power fluctuations, system reserve, frequency stability</li> <li>• Voltage fluctuations, voltage stability</li> </ul>	Julius Susanto, DiGSILENT
16:00-16:20	Introduction to the dynamic modelling methodology approach (based on the Palau case): Model set up, required input data, data conversion, based on the experience of the Palau study case	Julius Susanto, DiGSILENT
16:20-17:00	Assessment of grid stability for an island system: Results from Palau study case	Julius Susanto, DiGSILENT
17:00	Closure of the day	

**Day 2: All day, 11<sup>th</sup> April**

<b>Time</b>	<b>Session</b>	<b>Presenter</b>
09:00-10:30	1. Getting started in <i>PowerFactory</i> Hands-on exercise on the use of <i>PowerFactory</i> : Data import, load flow analysis, voltage/reactive power limits	Julius Susanto, DiGSILENT
10:30-10:45	Coffee break	
10:45-12:30	2. Short-circuit analysis	Julius Susanto, DiGSILENT
12.30 – 13.30	Lunch	
13:30-15:30	3. Dynamic Analysis <ul style="list-style-type: none"> <li>• How to run the dynamic analysis</li> </ul>	Julius Susanto, DiGSILENT
15:30 – 15:45	Coffee break	
15:45 – 17:00	4. Stability Assessment <ul style="list-style-type: none"> <li>• Palau case study</li> <li>• Case studies in other islands</li> </ul>	Julius Susanto, DiGSILENT
17:00	Summary and Closure of the day	

### Day 3: Morning, 12<sup>th</sup> April

Time	Session	Presenter
08:30-10:30	(continued from Day 2) 4. Stability assessment (review and exercise) <ul style="list-style-type: none"> <li>• How to interpret the dynamic analysis – how much renewable shares can be integrated into our grids?</li> <li>• Which parameters are the key indicators for the grid stability assessment</li> </ul>	Julius Susanto, DiGSILENT
10:30-10:45	Coffee break	
10:45-12:30	5. Possible recommended technology solutions to maintain grid stability <ul style="list-style-type: none"> <li>• Storage as a solution to the system stability</li> </ul>	Julius Susanto, DiGSILENT
12:30-13:00	Roundtable Discussions <ul style="list-style-type: none"> <li>• Based on the sessions on grid stability, each participant is asked to comment on how the approach may be applicable as one of the means to assess grid stability.</li> <li>• Any further needs and requests may be addressed</li> </ul>	All Moderator: 'Apisake Soakai, Mirei Isaka
13:00	Closure of the Second Module	IRENA

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## Annex 1 Logistics information

*Participants are responsible for arranging their own visas and accommodation.*

Venue: Palau International Coral Reef Centre (PICRC), Koror, Palau

Recommended hotels near the venue:

- West Plaza Malakal
- Cliffside Hotel
- Green Bay Hotel
- New Koror Hotel
- Tree-D Hotel and Apartments
- Palasia Hotel
- Airai Water Paradise Hotel & Spa Babeldaob
- Palau Pacific Resort
- VIP Guest Hotel
- Palau Royal Resort
- Sea Passion Hotel

How to get to the venue:

PICRC is in MEDalii at the Marina - take left at the Palau Supreme Court if you are coming from Airport or Downtown Koror. Every taxi driver and 99% of Palauans would know where PICRC is.

Currency:

USD

Taxi fare from airport from the airport to town:

\$ 20 – \$ 30

Transportation:

\$3.00 from one place to your destination. Multiple stops means another \$2 to \$3 dollars from each stop point to the final destination. Taxis are not metered but rather have fixed rate sheets based on starting and ending points.

Taxi fare from town to PICRC:

\$ 3

For any further questions, please contact Fuana Tmarsel at: 680 775 0112

Map of the venue:



## **Annex 2 Requirements for the Second Module (Grid stability assessment sessions)**

Sessions in the Second Module on Grid stability assessment from 10<sup>th</sup> -12<sup>th</sup> April involves hands-on training of the use of dynamic modelling software (*PowerFactory*). Please bring your own PC with you so that the software can be installed for the training. You will work in a pair during the training.

Please find below the minimum requirements for the *PowerFactory*:

- Intel/AMD CPU with 2.0 GHz or higher
- 1 GB available hard disk space \*
- 0.5-8 GB main memory available for the *PowerFactory* executable
- Supported operating systems are: Windows 2000, XP, Vista, Windows 7 (32 and 64 Bit). For Windows 7, a 32-bit as well as a 64-bit *PowerFactory* version is available. It shall be noted that under Windows 7 (64-bit) also the 32-bit *PowerFactory* executable can be operated. It is not compatible with Mac.

**Important Note:** Please ensure that the system time/date on computers is set correctly as otherwise, the hardlock licenses will not function correctly.