

**IRENA Workshop:**  
*Accelerated Renewable Energy Deployment on Islands with Emphasis on the Pacific Islands*  
26-28 October 2011, Sydney

## Summary

### Introduction

Access to modern energy sources, environmental issues, stimulating economic development and energy security are the current main drivers behind plans to increase renewable energy use in the Pacific Islands Countries (PICs) and territories. The region is unique in that for many PICs, as much as 99% of electricity use is oil-generated, mostly diesel. The high cost of petroleum is therefore a major problem for the PICs. The current median share of fuel imports is nearly 15% of GDP for the region as a whole. Typical electricity costs charged to consumers are in the range of USD 0.3 to USD 0.6/kWh, but can be even higher in remote islands due to the very high transport costs. Roughly 60-75% of all petroleum fuel is used for transport in the Pacific, while the remaining is used for electricity generation and process heat. Electricity growth in the region as a whole is 3-4% per year. Accelerating renewable energy deployment can help to diversify the energy mix of the PICs and territories, improve energy security and reduce fuel import bills. For power generation, it can often do this at the same time as reducing costs and dependency on fossil fuels.

With these issues in mind, IRENA organised a workshop in partnership with the Government of Australia and the World Bank to discuss the challenges and opportunities for accelerating the deployment of renewable energy systems in the Pacific region. A total of 58 representatives and experts from PICs and territories, other small island developing countries, development partners, inter-governmental organisations, industry, and coordination agencies participated. The participants were able to share experiences and knowledge about the state-of-the-art on renewable energy technology deployment in the Pacific region. The meeting identified some of the specific needs and challenges in deploying renewable energy technology and provided input on how IRENA can best contribute to support existing efforts.

There was a general understanding that there are various challenges and opportunities in the deployment of sustainable renewable energy systems in the Pacific region which are dependent on its geographic, economic, and social diversity. There was also a general agreement that any effort IRENA should make must align with existing efforts by the numerous active stakeholders, as well as the national and regional energy frameworks already in place in the region. The workshop provided a firm basis for the future work of IRENA in the region.

The “statement of outcome” of the workshop was agreed during the workshop and delivered in a separate paper.<sup>1</sup> Possible work areas where IRENA can contribute to supporting the region with its renewable deployment plans have been proposed in a separate paper.<sup>2</sup>

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<sup>1</sup> Please see the *Statement of Outcome of the Workshop to the IRENA Council* on the IRENA website ([www.irena.org](http://www.irena.org)).

<sup>2</sup> Please see the *Proposed IRENA Activities for the Pacific Region in 2012* on the IRENA website ([www.irena.org](http://www.irena.org))

## Needs and challenges for renewable energy deployment in the Pacific region:

### 1) Technical

- A lack of baseload renewable energy sources that could reliably provide a high share of renewable energy in the electricity generation mix is a challenge in most of the islands. The specific nature of mini-grids, which are common on the islands, requires expertise in design, operation and maintenance in order to integrate large-scale renewable energy. The development of large-scale, economically viable energy storage and associated control systems are needed in order to substantially reduce fossil fuel use when using solar and wind in order to compensate for the variability of those renewable energy resources.
- Small-scale wind turbines suitable for island conditions are not readily commercially available. Development of the wind resource will require a focus on the supply of suitable small- to medium-scale turbines that are robust, easy to install in remote areas without large construction equipment and resistant to the difficult environmental conditions such as salt corrosion, high ambient temperatures and cyclones.
- There is a need for more technical information and support related to integrating energy storage into renewable energy systems. This must include programmes for the recycling of lead-acid batteries, given that lead can be toxic. New non-toxic batteries could be an alternative (*e.g.* NaS redox flow batteries), but these are still very expensive. Other types of storage should be considered where conditions are appropriate. Maximising battery life should be considered to avoid expensive battery replacement cycles and to keep the number of batteries that must be recycled to a minimum.
- Transport of equipment to most small Pacific Islands is difficult and costly as is access for regular site maintenance, repairs and equipment replacements. To achieve the lowest operating and maintenance cost, installations used for remote electrification need to be very robust and in the case of renewable systems, it can make economic sense to oversize generation and storage systems in order to reduce the frequency of very expensive battery replacements.
- The transport sector is typically the largest user of fossil fuels. Despite this, it is electricity generation that has received the greatest policy interest from governments and donors so far, while the use of renewable energy in island transport systems has received little attention; practical opportunities for renewable energy use need to be investigated.
- Renewable energy standards in the region need to be harmonised. Currently, French, Australia/NZ and United States standards are used in different parts of the Pacific and make accelerating the deployment of renewables more difficult. The South Pacific Regional Environment Programme (SPREP), the Solar Energy Industry Association of the Pacific Islands (SEIAPI), and the Pacific Power Association (PPA) have started to raise awareness about this issue, but there is much more work to be done.
- Considerable renewable energy resource data has been collected in the past. However, the problem is accessing these data for general use and assuring their consistency and accuracy. Renewable energy systems investors in particular want access to good resource data so they can confirm that a proposed installation is capable of repaying the investment. In addition, better data on renewable energy potentials at the site level need to be developed since many renewable energy resources are quite site specific.
- A range of renewable energy technology options applicable to the region were discussed in the workshop, including: hydro, solar, wind, the use of coconut oil blended into diesel fuel and agricultural and forestry waste combustion for its energy recovery. Future renewable solutions further from market maturity include ocean based district cooling, wave energy use and landfill gas collection. Municipal waste-to-energy was mentioned, but it was noted that thus far studies have shown it to be uneconomic

for most PIC cities.

- Access to drinking water is an issue in many islands, particularly atolls. Energy is an important component in water delivery, both for pumping and for the production of additional supplies through desalination. Most public water supplies currently rely on imported fuels for these purposes and this is an issue since the security of fuel supply in remote islands is not high. Renewable energy can reduce the cost of water supply and improve the reliability of supply in certain conditions whether it be for pumping existing supplies, or in powering desalination plants.
- Renewable energy deployment must be combined with energy efficiency. At the moment, many of the equipment and appliances being imported and used are low-cost/low-efficiency. It was recognized that the least cost provision of energy services depends on both renewable energy and energy efficiency.

## 2) Capacity Development

- It is clear that private investment will be needed if a high share of renewable energy in the electricity sector is to be achieved. Many countries lack expertise in Public Private Partnerships (PPP) and the policy frameworks required. Therefore, development of templates for “Power Purchase Agreements” (PPA) and “Independent Power Producer” (IPP) contracts suitable for renewable energy projects and which are equitable to utilities, consumers and power producers is essential.
- Experience has shown it can be very difficult to maintain the energy production capacity of projects that have been completed. To be sustainable there is a need to institutionalise education and training, implement appropriate management arrangements, adequately cover operating and maintenance costs as well as including on-demand, site-specific training to ensure that technical capacity is not lost when a trained person leaves the project.
- The inability to retain adequate human resource capacity to operate and maintain energy systems was highlighted as a key problem. This is even more difficult when planning to increase the share of renewables in electricity generation. With a diverse range of conditions and operating environments, a wide range of technical and management skills are needed at individual utilities. This is particularly difficult in the island utilities that operate at very small-scales compared to developed countries.
- A regional capacity building initiative for renewable energy and energy efficiency that is based on existing experiences can and should be developed while working with SEI-API, Pacific Power Association (PPA), University of South Pacific (USP), Secretariat of the Pacific Community (SPC), development partners, and others.
- Multi-stakeholder capacity building programmes that adequately address the needs of consumers, the private sector (installers, importers), utilities and governments are needed. On the job training has been a success but not always practical. Participants strongly expressed the importance of incorporating renewables and efficiency into existing education programmes of universities and other tertiary educational institutions, as well as technical training schools in the region.
- The need to emphasise science and mathematics in secondary schools was also highlighted, to provide basic skills for students to continue their tertiary or technical education in the region.

## 3) Financial

- In the past, funding for renewable energy projects – mainly in the form of grants and soft-loans – usually came from international and/or regional donor organisations and development partners. But workshop participants agreed that grant finance alone is insufficient to achieve a significant share of renewable in the energy mix. Commercial and national development banks in the region need to be encouraged further to participate in the finance of renewable energy systems.

- Investment costs per unit of capacity are much higher in the Pacific than in many developing country markets. This can be attributed to the small size and remoteness of the Pacific markets, the higher technical standards needed in the difficult island environment, and to some extent to the type of financing used (largely donor funded RE projects). The more open the tendering process is for new equipment, the lower the investment costs tend to be per unit of capacity.
- Some renewable energy implementation programmes tend to focus on the initial investment needs and not on ensuring that a long-term, sustainable economic, institutional, and financial model is in place for the project (*e.g.* guaranteeing that project costs will be recovered through electricity revenues and ensuring energy efficiency is combined with RE deployment). Long-term sustainable financial, institutional, training, etc. arrangements for renewable energy will be necessary to accelerate deployment.

#### 4) Institutional

- High level decision-makers in government need to be educated about renewable energy systems and energy efficiency programmes, the synergy that makes them best applied together, their financing, their operation and the ongoing maintenance required to sustain them so that their decisions can be consistent with a sustainable framework for renewables.
- There have been experiences where poor coordination within government departments and among their development partners has led to ineffective and inefficient planning, design and implementation of renewable energy interventions. Successful deployment of projects and programmes requires good coordination at the start and an ongoing coordination mechanism among stakeholders.

#### 5) Legislative, regulatory and policy

- Over the last few years, many PICs have established very ambitious short- and mid-term targets for renewable energy deployment of between 50% and 100% of the electricity supply in the next 10 to 20 years. In addition, almost all PICs have developed and approved a national energy policy and/or an action plan that generally includes an important role for both renewables and energy efficiency. However, despite PICs governments surge of interest in diversifying their countries energy mix, current policies are often not integrated into national planning including economic and budget allocation. This ‘missing link’ adversely affects implementation of the existing national energy action plans.
- There was a general consensus that there should be more private involvement to accelerate renewable energy deployment in the region. Participants have highlighted that private renewable energy project developers are starting to show interest in the Pacific market, but little experience exists with Power Purchase Agreements (PPAs) and setting of appropriate tariff formulas. Some renewable energy targets are not backed by comprehensive implementation plans. Countries need to develop clear and attainable plans that credibly outline their strategy to achieve the targets adopted. A credible and strong government commitment is necessary to support renewable energy development and energy efficiency measures and attract further private sector investment.

#### **IRENA’s possible areas of contribution (based on the *Statement of Outcome of the Workshop to the IRENA Council*):**

- IRENA should design its activities to align with the national and regional energy frameworks in the Pacific region that have emerged over the past decade and take a leading role in working closely with the key players who are supporting activities across the region, including all key development partners

represented in the *Pacific Energy Development Partners Working Group* in the “Energizing the Pacific” initiative.

- IRENA should take advantage of the existing expertise in regional organisations and programmes, as well as locally-engaged private sector experts and industries when engaging in activities in the Pacific region. IRENA should also seek to build upon the past lessons learned in the region, and help tailor to the Pacific those activities that have already been proven to work elsewhere.
- IRENA can develop technical advice on renewable energy technology implementation tailored to the Pacific region and each PIC. As one of the solutions to assure the practicality of integrating large amount of renewable energy to grids, it was noted that it is necessary to identify affordable, reliable energy storage technologies as well as ensuring that all components have the technical characteristics to withstand island conditions and require limited technical skills for adequate maintenance.
- IRENA can provide advice and support to help the private sector, particularly local entrepreneurs, develop viable business models as well as expand the energy market management capacity of utilities including advice on suitable frameworks to promote IPPs and PPAs.
- IRENA can serve as a “one-stop-shop” for the region by collecting and sharing information on the renewable energy technologies used for the projects being implemented in the Pacific region and those elsewhere in the world that are applicable to the Pacific. IRENA should identify best practices (including enterprise driven solutions) for renewable energy deployment programmes as identified in the Pacific and elsewhere in the world, and showcase examples. IRENA should complement this by fostering the exchange of experiences and expertise within the Pacific region and other countries and regions that have similar problems.
- Regarding capacity building, IRENA can closely coordinate with existing institutions in the region such as USP and SPC, and help innovate concepts that involve both the public and the private sector. It will be important to institutionalise the training capacity of different education providers and develop standardized curriculum and certification schemes, thereby assisting the capacity of the PICs to renew and retain their expertise in the region. IRENA can support the development of tailor made programmes, based on its international experience.
- IRENA can support regular and systematic training activities (including vocational programmes) focusing on the energy sector, which help build and maintain capacity in the region. This training could be modeled on the proposed Pacific Renewable Energy Training Initiative (PRETI) approach, which develops existing educational institutions within the region as “centres of excellence” for renewable energy technologies. PRETI has been endorsed by PIC energy departments and the region as a whole.
- IRENA can support and partner with ongoing efforts in assessing the renewable energy potential of the region and assessing the renewable energy readiness<sup>3</sup> of the PICs. IRENA can thus help identify the largest resource potentials and their location, allowing the determination of the best technology to install.
- IRENA recognizes that the transport sector represents a significant share of the energy balance of most Pacific countries. Large efficiency gains can be achieved in this area while in the longer-term, renewable energy can play an ever increasing role in transport energy which should benefit terms of trade, help encourage innovation, help improve health, and increase youth employment.
- IRENA also recognises that addressing the losses and poor efficiency of energy production and consumption is a priority, and that for the near term, the cost of delivering energy services depends as much on this as on using renewable energy.

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<sup>3</sup> IRENA’s renewable energy readiness assessments aim to identify the elements necessary to devise an effective policy framework to support renewable energy market development.

- IRENA can support the implementation of the PICs' national renewable energy policies and action plans. Advice can be provided on how PICs governments can best create a regulatory framework that attracts appropriate private investors to improve the required investment in renewable energy.