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Directorate General for New and Renewable Energy and Energy Conservation

LCORE Factsheet

Using Solar PV in Indonesia's Tourism Sector

Framework

The objective of "Promotion of Least Cost Renewables in Indonesia" or LCORE-INDO is to promote the application of renewable energy where they show the highest economic viability. One main task of LCORE-INDO is to assess the potential of reducing diesel fuel by solar energy both for on- and off-grid systems to identify economically and technically feasible solutions in close cooperation with the private sector.

LCORE-INDO also strives at enabling the Directorate General for New and Renewable Energy and Energy Conservation (NREEC) in Indonesia to develop practical policies and promote programs for effective support of renewable energy development. The project is executed through studies, pilot projects, capacity building, policy guidelines and monitoring.

The following factsheet provides an overview of how local tourism sector can adopt renewable energy solution that will increase profitability and enhance their eco-friendly credentials.

Background & Motivation

Indonesia has much to offer in the way of tourism; from natural beauty, historical heritage to cultural diversity. With its growing international stature and middle class, Indonesia has recorded the highest growth in the tourism sector among G20 economies. In all, the travel and tourism sector contributed US$74 billion (including indirect and induced contributions) to the nation's economy, making up 9.2 percent of GDP in 2013.

Sustainability has increasingly crept up the tourism agenda, driven by diverse factors such as rising environmental awareness, steadily increasing energy prices, as well as lack of power supply especially in remote areas in Indonesia.

These conditions set an ideal background for using renewable energies in the tourism sector. Increasing price of diesel fuel and electricity tariffs from the state-owned utility PLN make renewable energies such as solar photovoltaic (PV) systems cost-competitive to conventional power supply.

Besides opportunities in the growing eco-tourism sector, Indonesia's current electricity situation reveals a wide range of reasons to invest in renewable energies:

- Subsidised and increasing electricity tariffs
- PLN grid-outages and lack of power supply
- Reliance and high costs for diesel fuel in remote areas

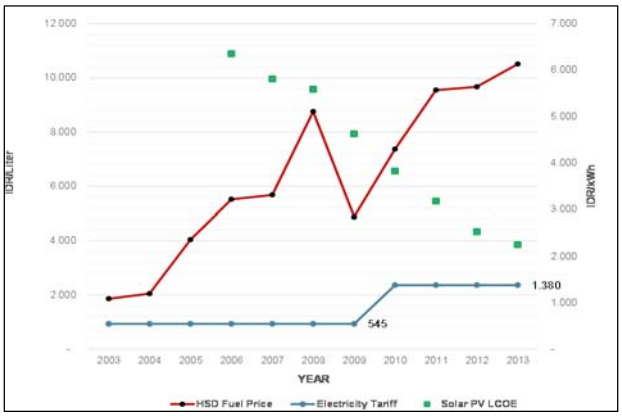

Figure 4: Development of Diesel Fuel and Electricity Prices vs Solar PV Generation Cost

Considering the increasing price of fuel and electricity, solar PV systems become a cost-competitive alternative compared to conventional power generation as shown in Figure 4 above. Additional advantages of zero environmental impact and an enhanced green image make solar PV systems an interesting solution for Indonesia's tourism sector.

Figure 1-3 (left to right): Misool Eco Resort; Raja Ampat; Papua - Sea World Club, Maumere, Flores – PV module

Technical Implementation

Depending on the situations, different technical solutions can be economically promising to cover various types of accomodation ranging from larger hotels to smaller remote tourist resorts in Indonesia.

On-grid system

For bigger hotels **grid-connected Solar PV Systems** in the range of several hundreds of kWp are suitable. These systems are usually realized as green-field or roof-top systems and are directly connected to the power-grid. For a 100 kWp system, the needed surface is i.e. 800 m2. The present and upcoming governmental regulations will allow hotels and tourism resorts to sell the produced solar energy fully to PLN by using Feed-In-Tariffs. Other option is to sell the excess energy to PLN under net-metering regulation.

Off-grid system

For smaller and more remote tourist resorts with no or unstable PLN power supply, **PV-Diesel-Hybrid-Systems** as illustrated in Figure 5 below are economically and technically viable.

These systems provide security of energy supply and reduce reliance on costly diesel-backup generators. During daytime, the required energy is supplied by PV panels and at the same time the batteries are recharged. If the energy supply is not sufficient (i.e. on cloudy days which result in low irradiation), the batteries or a backup diesel generator will provide the remaining required power. During night-time when the PV is not in operation, the resort is supplied by the charged batteries and/or diesel generators.

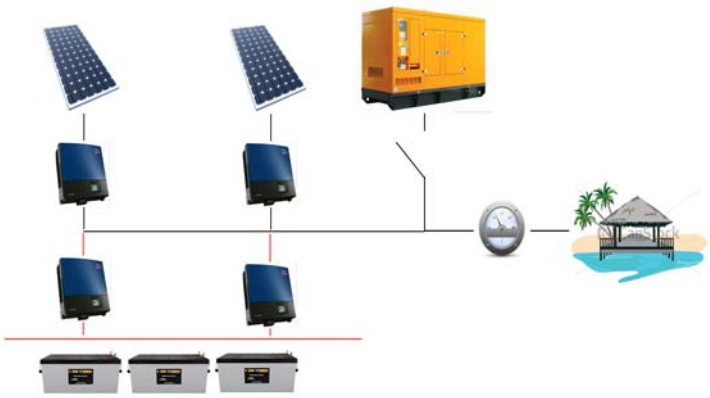

Figure 5: PV-Diesel-Hybrid-System

Especially in remote areas in Indonesia, high diesel-fuel costs result in high operation costs. A well-optimized system consisting of PV-System, battery-bank and an optional diesel-generator can both reduce energy costs significantly and increase energy security. Implementing a PV-Diesel-Hybrid-System is an optimization scenario to establish the cheapest generation costs per kWh based on the given load pattern.

Present conditions already lead to financially feasible systems especially in remote areas with weak or no power supply and therefore high reliance on diesel fuel. Long and frequent grid-outages will allow financial paybacks in the range of several years.

GIZ can support in conducting energy audits for needs assessment, designing a suitable PV system, matchmaking with technology providers and developing investment plan and business models.

Up-Scaling potential

Indonesia is one of Asia's largest countries in terms of physical size but compared to its regional peers, it attracts few tourists. Indonesia's eastern half which has the best potential for PV application due to its high solar irradiation (*4.1 - 5.5 kWh/m2/d),* contains ample untapped places for tourists to discover and is an increasingly attractive holiday destination for both domestic and international travelers.

With the growing demand for the tourism sector to conduct its businesses sustainably and the government targeting tourism growth of over 10% after the implementation of ASEAN's common visa program in end of 2015, this nation of more than 17,000 islands will have many more hotels and resorts that will look into renewable energy to solve their energy issues and bring them closer to their eco ideals.

Project name	LCORE- Promotion of Least Cost Renewables in Indonesia
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