

# Lighting the Way

## Asian Development Bank's Rooftop Solar Project



## Why Solar?

Solar technology, a low-carbon energy solution, makes sense for much of Asia and the Pacific. With large areas of the region endowed with bountiful solar radiation, many countries—including the Philippines—have the ideal conditions for utilizing solar energy. Solar photovoltaic (PV) systems mounted on rooftops are helping us change how we produce energy and making our world a better place to live (Box 1).

The energy from these systems costs less to produce every day. But it is still more expensive than fossil-fuel-based energy generated from the local electricity utility, without internalizing environmental costs. While cost is important, it must be weighed with other factors. Rooftop solar systems could be particularly beneficial if an urban building owner is experiencing high or volatile energy costs and wants a stable or predictable energy price; is using a lot of peak energy; has clean energy consumption mandates; or wants to reduce dependence on fossil fuels (Box 2).

## Solar Energy Systems

**Help the environment:** Solar energy is environment-friendly and effectively conserves resources, which translates into less pollution and greenhouse gas emissions. Solar energy use fosters a cleaner environment for future generations, and boosts the green economy with new job opportunities.

**Require minimal maintenance:** Without any moving parts, solar PV systems require less maintenance than other energy systems. They only need panel cleaning every couple of days to get maximum efficiency.

**Protect against electricity price spikes:** A solar power system has zero fuel cost in its operation, so it shields against future electricity price hikes due to fluctuations in fossil fuel prices.

### Box 1 Solar Photovoltaic Basics

Solar cells are made of semiconductor materials that convert sunlight into electricity through photovoltaic (PV) effect—a natural physical reaction. The PV systems allow owners to generate some or all of the daily electrical power they demand, reducing the amount of power required from the utility. The majority of large-scale solar PV systems in many countries are grid-tied, which means that the system is directly connected to the power grid. These grid-tied PV systems generate electrical power to supply part of the energy needed during daytime. The amount of electricity generated can be metered under a number of accounting methods. One such method is net metering, which records the net power coming in from the utility and the surplus power flowing out from the solar PV system.

## How the Asian Development Bank Transformed Its Rooftop

As an organization that promotes sustainable development in its projects, the Asian Development Bank (ADB) decided years ago that its own building should be a showcase for sustainability. Since 2007, we have reduced our electricity consumption by at least 4% per year per staff member at ADB headquarters using an efficient heating ventilation and air conditioning (HVAC) system, light emitting diodes (LED), and

other technologies. If we can do it with our nearly 20-year-old building, it is our hope that others may be inspired to green their buildings as well.

ADB decided to install a large rooftop solar system for several reasons. First, we believe in solar energy. If we are asking our developing member countries to adopt this technology under the Asia Solar Energy Initiative, which was launched by President Haruhiko Kuroda at ADB's Annual Meeting in 2010, we should also lead by example and produce solar energy

from ADB headquarters. Second, we want to showcase how commercial buildings in Asia can reduce their carbon footprint and diversify energy supply with renewable energy. Finally, we want to increase the demand for solar PV panels to reduce production costs and accelerate deployment of the technology.

ADB is encouraging like-minded enterprises in Manila and elsewhere in the Philippines to install similar facilities on their rooftops and other available spaces. We envision that these pioneering projects will help the power supply industry use less fossil fuels. With these rooftop facilities, more power will be produced, and the need for transmission capacity will be reduced, since solar power systems would be located at the heart of the building where the energy is needed.

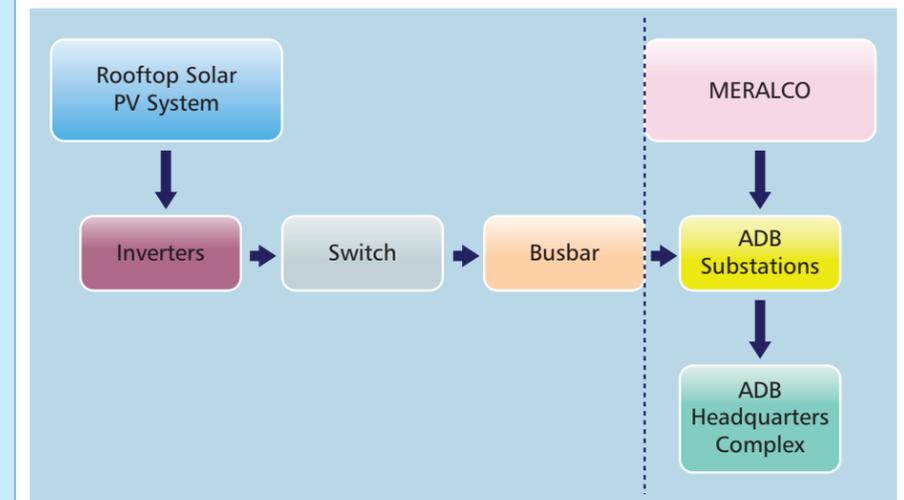
ADB's solar PV system has a capacity of 571 kilowatts. It will generate 613 megawatt-hours of electricity per year, which will supply ADB headquarters in Mandaluyong, supplementing the existing supply from the Manila Electric Company (Meralco) (Figure 1). This is enough to power 245 Metro Manila families using an average of 2,500 kilowatt-hours per year.

## Financing Options

Being a development finance organization, ADB takes great interest in the financing of solar projects. We wanted to make it easy for others to install solar systems. With the declining cost of PV panels and rising demand for clean energy—both locally and globally—investors are finding the solar market very attractive, particularly when combined with incentives (Box 3).

Models for financing solar energy systems and reducing the initial costs have evolved in recent years. Three are highlighted:

Figure 1 The Asian Development Bank's Rooftop Solar Power Generation System



ADB = Asian Development Bank, MERALCO = Manila Electric Company, PV = photovoltaic. Source: ADB.

**Direct Investment.** A building owner may choose to fund a rooftop PV system using the owner's own funding or debt financing. In this investment scheme, the owner company would be responsible for all project development decisions and would incur all associated costs.

The more popular models, however, are **Solar Leasing** and **Power Purchase Agreements**. The models complement the more conventional use of cash or equity loan financing for solar

installations. Under third-party financing mechanisms, the owner does not purchase the PV system, but instead enters into an arrangement with a company to make periodic lease payments or electricity payments for the system. These third-party financing mechanisms can be attractive because they can reduce the risk and complexity involved in owning and operating a PV system. And systems owned and operated by third-party providers often perform better because the providers monitor

### Box 2 Advantages of Rooftop Solar Systems

| Construction              |  |
|---------------------------|--|
| Site Access               | Photovoltaic (PV) systems can be operated unattended and require minimum periodic maintenance.                                     |
| Modularity                | They can be designed for easy expansion if power demand may increase.  |
| Operation and Maintenance |  |
| Fuel Supply               | Solar energy is delivered free. Transmitting and distributing conventional energy can be much more expensive than the fuel itself. |
| Maintenance               | PV systems require less maintenance than alternatives.   |
| Peak Generation           | These systems offset the need for electricity during expensive peak demand hours.  |
| Durability                | Most of today's systems are based on a proven technology that has withstood 25 years of operation.                                 |
| Impact                    |  |
| Cost                      | Fuel savings from PV systems typically offset their relatively high initial cost.  |
| Environment               | PV systems create no pollution and have no waste products when operating.  |

### Box 3 Solar Energy Incentives

Even if the cost of solar energy systems is expected to decrease significantly over the next decade, incentives and policies that stimulate demand will be the main driver of solar energy development in the Philippines. These include the following:

#### Tax Incentives

- Income tax holidays
- Duty-free importation
- Special realty tax rates
- Special corporate tax rates
- Zero percent value-added tax rates
- Tax exemption of carbon credits
- Tax credits on domestic capital equipment and services

#### Others

- Net operating loss carry-over
- Accelerated depreciation

their electricity output frequently, and experts perform any necessary maintenance or repair.

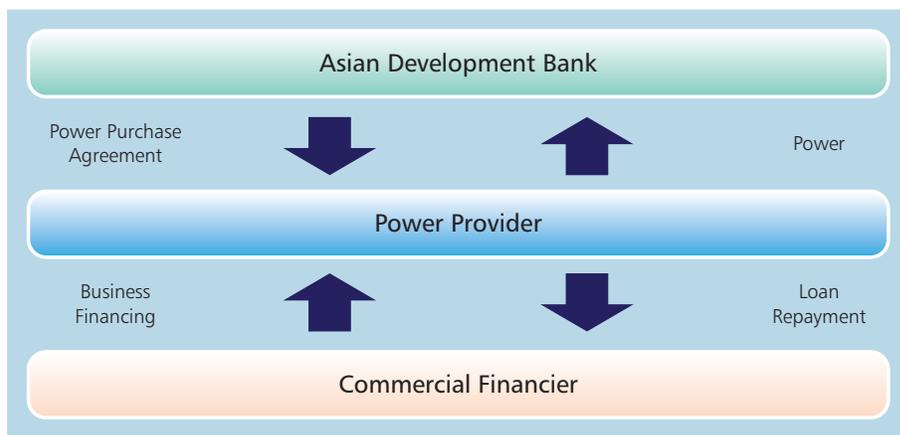
The ADB solar rooftop system uses the power purchase agreement business model (Figure 2). Our intention is to minimize the technology risk by using the build-own-operate transfer scheme. The provider leases the ADB roof space, installs the equipment, and then owns and operates the facility for 15 years.

Here's how it works: A power purchase agreement was prepared with provisions to sell all the generated power to ADB at a final bid price determined through a competitive bidding process. The agreement states that payments will be less when operating efficiencies are lower or the design capacity is overstated. The whole system will be transferred to ADB at the end of the 15-year agreement at no cost.

## Guidebook for Solar Development

ADB is producing a free guidebook that will answer many of the basic questions urban building owners in the Philippines—and elsewhere—may

Figure 2 **The Asian Development Bank's Solar Power Business Model Diagram**



Source: ADB.

have about rooftop solar systems. **Scheduled for release in the third quarter of 2012**, the guidebook covers the basics of solar PV systems, including the types of PV technologies most commonly installed for commercial buildings; things to look for during site assessment; and safety issues for installers. It is intended to serve as a reference for potential project developers (that is, property owners and/or financiers) and contractors who are considering rooftop

solar photovoltaic projects. The guidebook aims to answer many of the questions these people will encounter along the way, including who can install the solar PV systems, considerations before installing a PV system, permits required (and when), and incentives and financing options available for solar PV systems.

It is ADB's hope that this guidebook will inspire many others to transform their rooftops.

Learn more about solar energy incentives in the Philippines on the Department of Energy's web site: [www.doe.gov.ph](http://www.doe.gov.ph)

Produced by  
**Aiming Zhou**, Project Team Leader  
**Carolyn Dedolph-Cabrera**, Principal Operations Communications Specialist  
Sustainable Infrastructure Division  
Regional and Sustainable Development Department

For more information, contact  
[azhou@adb.org](mailto:azhou@adb.org)

Cover photos by Tomas Eric Sales.