Unlocking Rooftop Solar in the Philippines

Energy-Supply Security and Lower Electricity Costs

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Table of Contents

Introduction 2

Main Barriers to Rooftop-Solar Development in the Philippines (& How to Overcome Them)... 4
- Regulatory 4
- Administrative 7
- Financial 8

Investment Potential 8
- Rooftop Solar Market Value 9
- Off-Grid and Island-Grid 9
- Financing for Rooftop Solar: A Variety of Opportunities 10
- Storage Technology 16

Conclusion 16

Introduction

Even with the global rise of affordable renewable energy options and companion storage technology, the Philippines continues to be hobbled by some of the highest electricity prices in the 10-member Association of Southeast Asian Nations (ASEAN).

Rooftop solar—which remains largely undeveloped nationally—has the potential now to lower these high prices while simultaneously enhancing power supply contributing to meeting new generation-capacity requirements.

Yet the Philippines continues to lag global trends toward power-sector modernization, in no small part because of its history and geography: the Philippines consists of more than 7,000 islands that rely for electricity generation largely on imported diesel and coal. This dependency is supported by regulation that perpetuates moral hazard, market distortions, and an uneven playing field. In effect, the current Philippine government has inherited policies that ensure costs and risks associated with outdated models are transferred to Philippine industry and the public.

That said, the government is in a position to change the longstanding status quo, which disproportionally puts fuel-price and foreign-exchange risk[1] on consumers, while utilities and power generators remain insulated from market changes. As a result, power suppliers have no incentive to transition away from coal and diesel or to hedge against price-change and currency risks.

Markets are moving rapidly toward new models, however.

Rapidly-declining costs and technological advances in renewable energy, energy efficiency and distributed storage present an enormous opportunity to replace imported-coal and imported-diesel models with indigenous alternatives. Solar, wind, run-of-river hydro, geothermal, biogas, and storage are competitive, viable domestic options that can be combined to create a cheaper, more diverse and secure energy system.

A recent report by Lazard, a leading global financial advisory and asset management firm, concluded that building new wind and solar farms costs less than running existing coal or nuclear plants. Meantime, the levelized cost of energy for both solar and onshore wind technologies globally has gone down by 6% over the past year, and there is no indication that this deflationary trend will slow anytime soon, as economies of scale and technology advances continue to push prices down.

According to Bloomberg New Energy Finance (BNEF), prices for electricity from onshore wind and solar photovoltaic plants have declined by 18% year on year to US$55/megawatt hour (MWh) and $70/MWh, respectively. Cost deflation is seen broadly now in countries like India, where a progressive regulatory framework allows for lower costs of equipment, construction, financing, and operations and maintenance. India's onshore-wind-produced power is US$39/MWh and its solar-photovoltaic power is $41/MWh, while coal-fired electricity costs $68/MWh and combined cycle imported natural gas is US$93/MWh.

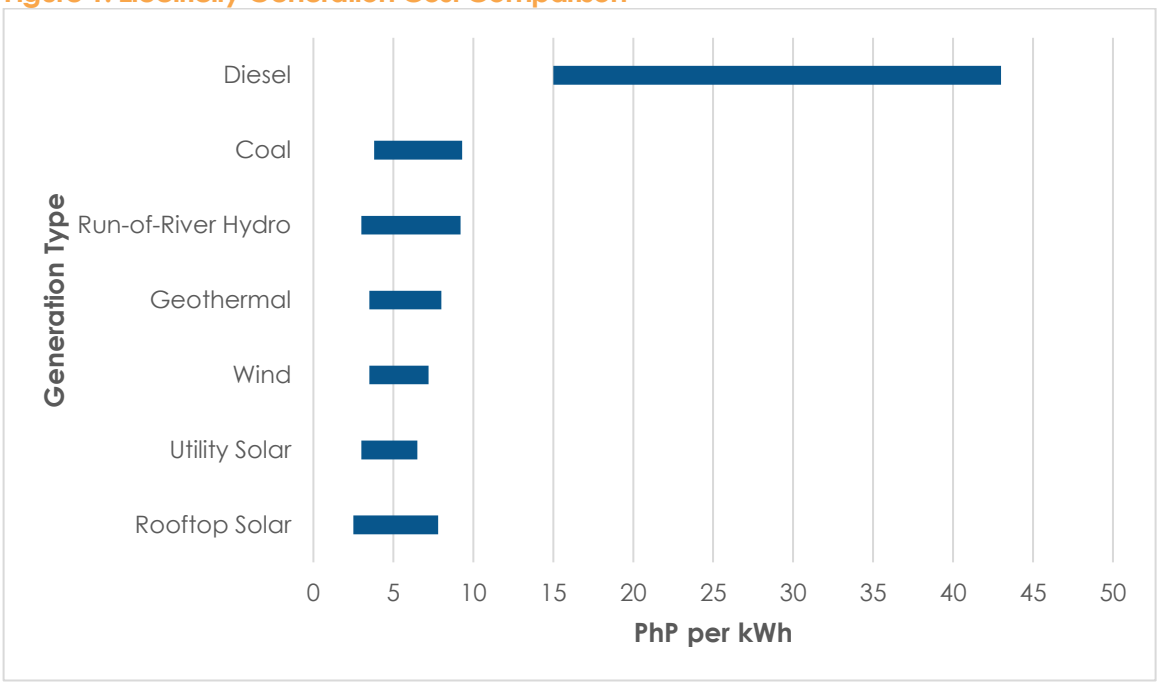
This trend is creeping into the Philippines as well. To cite two examples of recent renewable energy deflation in the Philippines, MANILA Electric Co. (MERALCO) in March of this year received the country's lowest wind electricity-generation bid ever, on a new 150-megawatt

[1] Extreme foreign exchange is capped so extreme swings can be absorbed by consumers and generators together.

(MW) wind turbine project in the Rizal province, for PhP 3.50 per kilowatt-hour (kWh). Solar is competing similarly, with Meralco having contracted for a PhP 2.99-per kWh, 50-MW capacity plant. A geothermal-generation bid for Php 3.91 for 42- to 53-MW of power has been recorded as well. Coal-fired power generation costs upwards of PhP 3.8-5.5 per kWh, and the true cost of imported diesel-fired power ranges from PhP 15 to PhP 28 per kWh.

By comparison, rooftop solar costs PhP 2.50 per kWh (without financing expenses) to 5.3 per kWh (with financing expenses), utility scale solar power can cost as little as PhP 2.99 per kWh, wind is PhP 3.5 per kWh, geothermal is PhP 3.5-4.5 per kWh and run-of-river hydro costs PhP 3-6.2 per kWh. Development of all of these options, however, are still hampered by costly and unnecessary red tape. Government action to ease existing regulatory burdens and create a can-do mindset would lead to significant cost reductions of these already very competitive alternatives.

Figure 1. Electricity Generation Cost Comparison



Source: IEEFA Report —"Carving out Coal in the Philippines: Stranded Coal Plant Assets and the Energy Transition"; MERALCO; ERC; Solar Philippines; SolarNRG; Energy Development Corporation.

Existing market structures also are slowing the adoption of these cheaper resources. Here too, the Philippine government can make an enormous difference by injecting more diversity—and by doing so increase energy security while reducing costs to consumers.

The economic advantages of rooftop will likely persist with improvement in financing structures and because of systematically lower costs thanks to ever-greater Chinese manufacturing capacity and incoming storage. Significant opportunities exist in distributed residential rooftop solar in urban areas of the Philippines, especially on commercial and industrial (C&I) buildings, opportunities that avoid the complexities and costs of land acquisition for any utility-scale solar electricity generation.

The core driver of demand for solar in the Philippines remains the relatively high current cost of electricity coupled with power shortages caused by underinvestment in power plants. And the Philippines is at a natural advantage for solar development because of its high number of peak sun-hours (4.5-5 hours on an average day).

Net metering, which is an agreement between a qualified end-user (home, business, government agency, school, factory, or hospital) of a distribution utility offers the greatest promise for solar-generation expansion in the Philippines. It requires no storage component, and—given how the Philippines runs short of power during mid-day—it has efficiency advantages that take peak-hour strain off the grid. Moreover, storage costs are coming down, which means that rooftop solar is emerging as an increasingly viable and stable power source for households and industry alike. The Philippines Energy Regulatory Commission (ERC) already recognizes approximately 1,400 customers who together have an aggregate of 10-megawatt peak (MWp) capacity through net-metering.

It is clear that the Philippines has significant potential for solar rooftop and storage applications. An ambitious long-term policy commitment from the government will help catalyze the same sort of rapid implementation that has been seen in other countries—notably China and India—and that can build energy security and reduce reliance on costly imported fuels.

Main Barriers to Rooftop-Solar Development in the Philippines (and How to Overcome Them)

The three public-policy barriers to rooftop-solar expansion can be broken down into three types: Regulatory, administrative, and financial.

Regulatory

Unwieldy Requirements: Distribution Impact Studies and Distribution Asset Studies

Passage of the Renewable Energy Act of 2008 brought enhancement of Distribution Impact Study (DIS) requirements, aimed as assessing the ability of the distribution system to safely and reliably accommodate a proposed interconnection of a generation source and to assess upgrades required to accommodate this new generation source.

In 2008, there was little research on how rooftop solar integration would affect the distribution network, and, as a result, distribution utilities such as MERALCO and VECO requested that all rooftop solar generation complete a DIS to ensure integration issues were addressed (regardless of whether solar project was for own-use or for net-metering).

DIS requirements—because they result in high fees to customers—discourage rooftop solar installations. DIS costs range from PhP 1,700 to PhP 40,000, depending on the distribution utility. Even large installations with self-consumption devices are required to undertake a DIS and sometimes a Distribution Asset Study (DAS), should the distribution utility require it. Such studies can cost more than PhP 70,000.

IEEFA considers DIS and DAS requirements unnecessary cost barriers to solar. Such studies add 10 percent to the cost of a typical household 1-kilowatt (kW) system but create zero value. Moreover, utility company have been known to take over 60 days to respond to DIS approval requests for rooftop-solar installations while collecting applications fees in the interim. This is arguably anti-competition and monopolistic, as the distribution utility is able to slow the development of rooftop solar. A more reasonable construct would have approval decisions occur within a 15-day period.

Many countries have no such requirement. Australia for instance, has 6,000 MW of residential rooftop solar and no such regulatory impediment.

It is important to note here that it can be considered anti-competitive if a distribution utility decides to form its own solar rooftop installation company that tells customers its ability to conduct a DIS quickly and at little or no cost compared to other solar rooftop installation companies. As such, deconstructing the traditional distribution utility structure may be key to reducing current and future conflict of interest issues.

Recommendation: Removal of DIS and DAS fees and requirements whenever a rooftop solar installation creates generation capacity that is less than that required for the typical load of the qualified end-user (home, business, government agency, school, factory, or hospital). Installations that require DIS and DAS fees should be subject to a transparent cost formula so developers, households, and industry can adequately include this cost in their respective cost calculations.

Red Tape Around Rooftop Solar Permitting

Average rooftop-solar permitting time is approximately four months. Fees for local government unit (LGU) permits, also known as municipality permits, range from PhP 500 to PhP 12,000 in addition to costs related to representation and filing time.

Distribution utilities require a Certificate of Electrical Inspection (CEI) or Certificate of Final Electrical Inspection (CFEI), and municipalities can take more than 10 months to issue a CEI or CFEI. These extreme delays may well be caused by a simple lack of understanding of rooftop solar. Municipal permitting processes often include non-electrical requirements and pre-requisites for the CEI or CFEI that include real property tax clearance, occupancy permits zoning permits, and fire permits. Most municipalities do not have a standardized approach, so requirements vary widely and may change per project and per case officer.

Competent technical safeguards and inspection against substandard installations are clearly important. However, the current regulatory framework with its red tape tangle in essence creates fee-extractive barriers and is encouraging guerrilla solar rooftop installation.

Recommendation: Set a limitation on fees charged and standardize requirements and prioritized processing. A national certification program for one-stop permitting through the Energy Regulatory Commission could cover building inspections, electrical inspections, and aforementioned project requirements project. It would also be helpful to have a national accreditation program for solar installers, and an on-line register of warranties tied to bar codes on solar modules to avoid fakes and fly-by-night operators, an issue of concern in Australia and India. Australia and the U.S., through programs sponsored by the Australian Clean Energy Council the Accredited installer initiative and the U.S. NABCEP Solar PV

Installation Professional Certification, for example, serves as models professional-standard enforcement. Such programs ease compliance misunderstandings. In the Philippines, similar initiatives can be done in partnership with the Technical Education and Skills Development Authority (TESDA) through its existing NCII PV installation training program. As it stands now, graduates of the NCII PV installation training program typically seek foreign employment, in the Middle East, Australia, etc., because opportunities are limited in the Philippines.

Resistance to Net Billing Versus Net Metering

According to the Renewable Energy Act of 2008 (RA 9513), "net metering" is when a distribution-grid user has a two-way connection to the grid and is only charged for his or her net electricity consumption and is credited for any net contribution to the grid. RA 9513 stipulates that remuneration for energy that a qualified end-user (home, business, government agency, school, factory, hospital) injects back into the grid is to be credited at full kWh value. Current ERC pricing methodology has not been reviewed or improved since its implementation in 2013 and is based on the amount of electricity injected into the grid. This methodology undervalues solar rooftop generation. One could argue that the reason behind the use of blended rate is so as not to burden consumers who cannot afford to put up their own solar rooftop. The rich who can afford rooftop solar will in effect be subsidized by the poor, as the difference between the blended rate if allowed will be passed on to the consumers. On the other hand, one can also argue that it is a perverse practice that incentivizes qualified end-users to opt out of net metering by not registering installations or by signing up with guerrilla solar rooftop installers with little quality control.

Current practice also imposes an arbitrary limit of 100kWp. At the time the net metering regulation was being crafted, utilities argued that such a limit was justified because they did not fully understand this new means of power generation. Six years on, this is no longer the case. Except in cases of heavy concentrations of solar and an associated constrained or outdated substation, according to research by the German think tank GIZ, solar does not adversely impact the grid. Moreover, VECO, the second largest utility in the Philippines, is allowing electricity injections into the grid in excess of 100-kW, which suggest a model to follow for legislators, the Department of Energy, and the Energy Regulatory Commission. Such a policy change would likely be resisted by utilities like Meralco that may fear that they will be left owning stranded assets as a result of technology changes that in the best interests of the public should be embraced nonetheless.[2]

The value assigned to rooftop solar that goes into the grid is not the main incentive to owners, who benefit primarily by generating electricity for their own use and by capitalizing on cost savings rather than revenue generation. In theory, rooftop solar can be more advantageous to the distribution utility, which acquires electricity at wholesale cost at the point of distribution—without incurring transmission costs, line costs, and missionary fee costs—and can resell it at full retail price, leaving a wider profit spread for the distribution utility. However, if classified as embedded generation, generation expenses should not incur transmission and line costs, leading to savings for the end-customers.

[2] Refer to IEEFA report: "Carving out Coal in the Philippines: Stranded Coal Plant Assets and the Energy Transition"

An additional benefit to the distribution utility is that rooftops solar can help the utility comply with the Renewable Portfolio Standard (RPS) through without having to pay for renewable-energy assets.

As such, it would be prudent for the ERC to review its pricing methodology on utility credits for electricity injected into the grid at blended generation costs, as it is not in compliance with the Renewable Energy Act of 2008.

Net metering should be net billing, which will allow qualified end-users to generate electricity from solar rooftop for their own use and either sell any excess energy to the distribution utility at current wholesale prices or be credited as an avoided cost—while purchasing power at the retail rate of distribution utility.

In other words, the current net-metering policy has excess generation netted one-to-one against consumption over a billing period. In order to ensure fair value, by contrast, net billing would have excess generation credited at an avoided cost rate. For this model to work, it is important that the ERC ensure that distribution utilities do not unfairly price in a net-metering fee. One model to avoid is the one adopted in the southern Philippine city of Cagayan de Oro, where the net metering fee is greater than the value of the exported electricity. One to consider: The Australian grid operator Ausgrid voluntarily offering to subsidise new rooftop solar installations in specific areas of strong load-demand growth, grid congestion and/or capacity constraints, citing the benefit to the grid operator of avoided capital investment.[3]

Recommendation: Review pricing methodology to enable fair pricing via net billing and to prevent a utility from double-charging for distribution and transmission. Distribution utilities should also be able to claim RPS credits for energy bought from net metering.

Administrative

Inadequate Transparency on Load Profile

Both the public and industry should have a right to their load profile (showing how much they consume/demand). Distribution utilities take months in some cases to send such information to their customers. Some require a fee. Access to load profile data should be received within a few weeks and should be free of charge. After all, the data is the customers'. Utilities often leave customers uninformed and in the dark deliberately, a strategy that profits the utility at the expense of the consumer.

Recommendation: An ERC mandate that all distribution utilities give customers access to their load profile data free of charge within a few weeks of receiving such a request.

Resistance to Net Metering Compliance

A number of distribution utilities, specifically electric cooperatives in Bohol, SPUG areas, and some parts in Luzon, that disallowing net metering by simply denying applications for it. But net metering is a legal requirement of RA 9513.

[3] https://reneweconomy.com.au/ausgrid-turns-to-rooftop-solar-to-save-on-network-costs-51647/

Recommendation: ERC and the National Electrification Administration (NEA) hold distribution utilities that are noncompliant with net metering accountable through monetary fines and/or attendance of mandatory training sessions on how to implement net metering.

Financial

Affordability and Accessibility in Leasing Facilities

Solar panel investment is a sizable capital expenditure for commercial and industrial (C&I) end-users with large roof spaces such as hospitals, schools, manufacturing corporations, cold storage facilities, malls, airports, etc.

By changing the solar rooftop financing from a capital-expense model into an operating-expense model, and by matching the expected monthly electricity cost savings with the monthly lease payments, C&I end-users would have the ability to pay for the use of the panels from their normal operations. They could earn back their investments in six to eight years while putting capital in their core business instead, where it would render them the highest return. Such possibilities are creating growing demand for long-term, mid-size leasing solutions to finance rooftop solar for commercial and industrial end-users.

However, providers of leasing solutions are subject to heavy taxation, meaning they must charge a higher cost of capital to maintain profitability. (The providers of leasing solutions—because they are not manufacturers or dealers—must report income as interest income, which can be subjected to a tax rate of up to 30%. In addition, these providers are subject to the usual documentary stamp tax of PhP 0.75 for every PhP 200 of par value, gross receipts tax of 5% or 7%, and the creditable withholding tax of 2% or 20% (if syndicated with other institutions). This high taxation makes leasing facilities quite expensive and inaccessible.

Recommendation: Removing or reducing interest income tax on corporate loans for leasing solutions, removing or reducing documentary stamp tax, and keeping the creditable withholding tax to 2% for syndicated deals for rooftop solar can spur sustainable economic growth. Reduction in electricity costs can reduce fossil fuel import costs, and the resulting increase in corporate profit margins and productivity should increase revenue and profits, which in turn would drive more corporate tax collections that can, in turn, be invested in public infrastructure.

Investment Potential

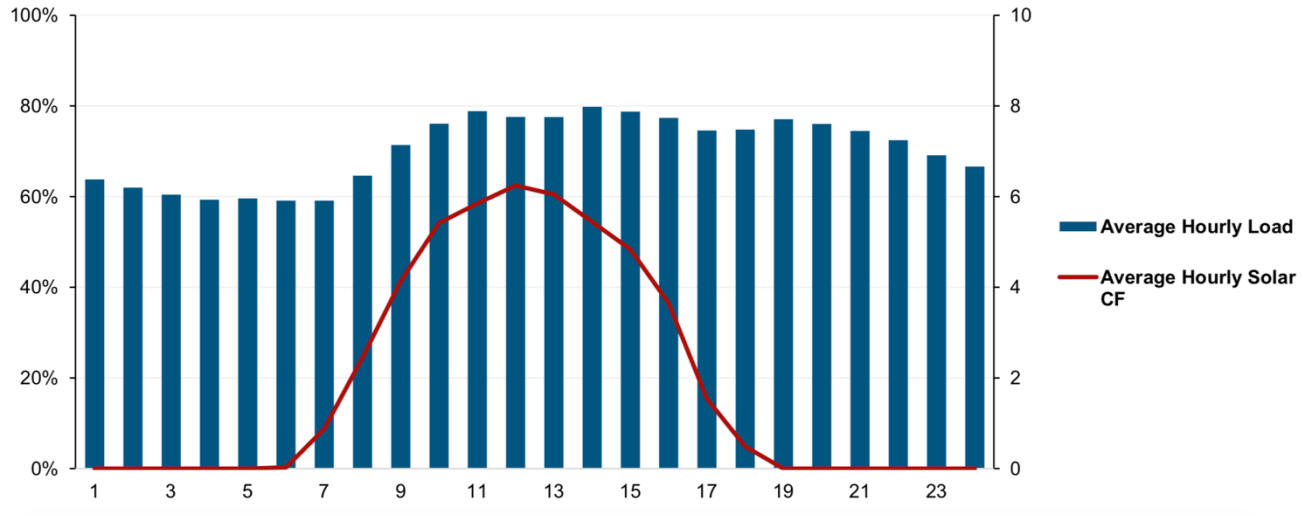
The market for rooftop solar in the Philippines is rich with possibilities. Investors are beginning to recognize the potential and are acting on it now. Off-grid and island-grid applications are especially promising. A wide range of financing mechanisms are emerging as rooftop solar takes root.

Rooftop Solar Market Value

As of March 2018, the Philippine Board of Investments (BOI) had approved eight solar projects through Solar Philippines Commercial Rooftop Projects Inc. worth PhP 85.96 billion, equivalent to US$1.65 billion[4].

With peak solar output overlapping with peak demand[5], as seen in Figure 2, the market value for solar rooftop (without storage) for Luzon is the value within the red line. It's important to note here that the National Grid Corporation of the Philippines (NGCP) announced that the peak demand forecast for 2018 may exceed 2017 figures. In May 2017 alone, the Luzon grid breached its projected peak demand of 9,760 MW by 304 MW to 10,064 MW. A share of this peak demand can be supplied by rooftop solar.

Figure 2. Hourly Solar Generation Profile and Alignment with Luzon Demand (2016)



Source: Lantau Group, 2017.

Off-Grid and Island-Grid Electrification

In addition to providing cost-saving and reliability advantages to commercial, retail and industrial customers, solar rooftop offers the following advantages to off-grid areas and island grids:

1. It can bring electricity immediately to Filipinos who have no access to the centralized grid, a change that would be consistent with the government's electricity-for-all mandate;
2. It would serve to underpin a democratic, easily scalable, distributed energy system;

[4] http://business.inquirer.net/247597/8-solar-projects-worth-p86b-get-boi-perks#ixzz5CC8xfLRE
[5] http://www.lantaugroup.com/files/ppt_pgen17_sr.pdf

3. It would alleviate the effects of massive water usage, pollution, waste-ash disposal problems, and public-health costs that come with thermal power generation;
4. It can be implemented speedily, requiring little more than a day to activate compared to the three years or more required to commission thermal power plants;
5. It has almost zero operational costs once built, as it has no imported fossil fuel costs—no fuel costs of any kind, actually—eliminating the resulting drains on the nation's current account deficit and all the associated exchange rate and inflation pressures;
6. It avoids land-acquisition and resettlement issues.

Financing for Rooftop Solar: A Variety of Opportunities

As overall solar prices continue to decline, installation rates are expected to accelerate.

Benefits of distributed rooftop solar includes the following: democratization of power; it does not take up space beyond what is already available and reduces demand on arable land; there are no AT&C (aggregated technical and commercial) losses; it reduces grid-connection costs and requires neither additional hook-up and transmission-line costs nor additional buffering or load-following beyond what the grid already has.

That said, development of successful business and deployment models are contingent on solar-financing solutions, which are poised expand access to capital and thus accelerate market growth.

The large Philippine bank lenders limit their focus to 1- to 50-MW projects at the moment. This means that it is difficult to find financing[6] for smaller, distributed rooftop solar systems. Nonetheless, current net-metering schemes combined with high electricity prices in the Philippines present a market for residential users and micro, small and medium enterprises (MSMEs). Demand is high already and is growing rapidly for rooftop-solar financing by way of loan and lease mechanisms that are currently not offered by local banks or other financiers.

Solar systems in Filipino households may be owned either by the homeowner through self- or loan-financing or by third-party financing through a lease or power/credit purchase agreement. At the moment, the best readily available option is for homeowners to obtain a home-equity loan, typically with high interest rates (8% to 10.25% for 10 years) backed up by property-title collateral. Such deals can be encumbered by mortgage insurance requirements that allow banks to reduce their risk.

The main issue with home-equity loans is that the minimum loanable value (>PhP 400,000) is often more than the cost of the intended solar technology and installation. This means that borrowers may end up either borrowing too much or not at all. Though personal loans may

6 The Asian Development Bank (ADB) will contribute half of the funds under a USD 1-billion solar rooftop investment program in India. ADB will provide USD 330 million to Punjab National Bank, while the multi-donor Clean Technology Fund (administered by ADB) will add USD 170 million. The Indian commercial bank will lend the funds to various developers and end-users throughout the country for rooftop solar installations. The program will also be supported by a subproject equity investment of USD 300 million and loans totaling USD 200 million from commercial banks and other financiers. In the meantime, the Clean Technology Fund will provide a further USD 5 million for training, to promote market development and raise market awareness. India has set a target to increase its rooftop solar capacity to 40 GW by 2022. A similar program can and should be implemented in the Philippines in order to mobilize policy or control levers. Source: http://renewables.seenews.com/news/adb-to-fund-half-of-usd-1bn-rooftop-solar-programme-in-india-541936

be used for rooftop solar installation, the loan tenors are often too short (<36 months) to adequately because one's electric-bill savings per month is very likely less than monthly principal and interest payments on a 36-month loan. Attractive value propositions match savings per month with principal and interest payments.

By and large, it is quite evident that the Philippine financial sector for rooftop solar is underdeveloped compared to other countries in the region. Banks and non-banking institutions alike would do well to develop a better understand of the value of energy efficiency initiatives to households, businesses, and industry—and how to properly price risk. Indeed, the Philippine financial sector is in dire need of innovation on this front.

Below is a conservative overview of a typical net-metering household case:

- Area required per kilowatt is 6 square meters
- Area available is 30 square meters with a power generation potential of 4 kWh per square meter per day
- Total project cost is estimated at PhP 428, 571 (PhP 107,143 per kW)
- 70% of the cost can be debt-funded: PhP 300,000
- PhP 6,000 of savings per month (PhP 72,000 per year and PhP 720,000 over 10 years)

Current financing gaps that include the glaring lack of loans for net-metering installation programs for households make it clear that Philippine banks and non-banks are not prepared to finance new customer demands and innovation investment needed to drive the transition to a low-emission economy and democratization of power generation.

That said, the problem is not necessarily the fault of the banking industry. Philippine banks are facing new regulations and in fact are trying to diversify in a difficult environment. Further, they have no history of appropriately evaluating risk for energy efficiency programs such as net metering, a circumstance that only contributes to the lack of loan product availability. But lenders can incorporate energy savings into their underwriting processes, creating the new and properly priced tools that can open up more financing for net metering and in turn give the energy efficiency market much needed encouragement. In other words, lenders can have a clear long-term policy framework that shifts the risk-reward balance in financing in a way that will support low-carbon investment.

Working in parallel with lenders, other financing institutions can come in to de-risk such projects through insurance and warranty products such as energy savings value warranty insurance to provide some level of revenue security.

Regardless, the goal—and the opportunity—is to make clean energy efficiency solutions more affordable. Financing innovations can help fuel the exponential growth of the solar market in the Philippines.

Institutions with the ability to offer financing now include a large full-service solar developer, government financial institutions, the government-owned Home Development Mutual Fund, banks, credit cooperatives, utilities, leasing companies, insurers or reinsurers, venture philanthropists, and crowd-funding platforms.

Pag-IBIG (a government-owned Home Development Mutual Fund), and government institutions such as the Development Bank of the Philippines and the Land Bank of the Philippines are in a position to become preferred providers of either unsecured or secured

financing (including by providing securitization-packaging liquidity and access to green bond funds) to deliver low-interest funding to offset investment costs associated with household net-metering initiatives. As banks look to grow their business around the new energy economy and to reduce the carbon footprint in their portfolios, they can also encourage borrowers and depositors to participate in net-metering financing programs.

Unsecured and secured net-metering loans can spread the cost of the installation over time and can be priced according to the value of energy savings. The loan-to-value ratio on such loans can be 85% or less, subject to borrower credit risk. Rooftop solar systems can and should be included in structure insurance to further de-risk. And letting a utility to effectively factor leasing options into electricity rates would allow capital costs to be borne by the utility, leveraging its borrowing capacity and credit rating—effectively securitizing installation costs. Such a policy could open up access for firms like Meralco to tap into the rapidly growing global green bond market.

Another option: Third-party ownership. Such arrangements typically include either an explicit lease arrangement or a power purchase agreement. In a lease arrangement, the homeowner pays a pre-determined amount to the institution that owns the installation. The homeowner can consume all the energy produced and/or sell excess supply to the grid via net metering. In a power purchase agreement, the homeowner pays a pre-determined cost per kWh to the institution that owns installation[7]. The institution can sell the excess energy not consumed by the homeowner to the grid. It is important to note here that property title law can be modernized so that solar leases are tied to property titles, allowing change of ownership and continuity of the power purchase agreement.

The growing interest in and presence of green bonds in within global fixed income markets is driven by a number of factors that include greater commercial viability of low-carbon technologies like solar panels, greater institutional investor interest in climate-friendly themes, and the fact that bond issuers can provide upfront and long-term financing terms for upgrading infrastructure. Solar-backed securities, which are bundles of net-metering loans, can bring economies of scale and aggregation that, in turn, reduces transaction costs and grows the overall financing capacity of the market. Bonds can be structured and designed in a way that takes into account different tranches of risk and return, allowing institutional investors choices to best suit their need. Though the Philippine bond market is not as developed as those in some neighboring countries, public and private multilateral development banks such as the World Bank, the International Finance Corporation, the Asian Development Bank, and the Asian Infrastructure Investment Bank, are equipped to step in and facilitate the process by providing low-carbon refinancing guarantees.

Further de-risking to attract a wider range of investors could include an equity- or first-loss cushion to reduce risk in some tranches, and/or bond insurance to increase the credit rating of the entire security.

Similarly, a second-hand solar panel guarantee program could be created to support the purchase of old solar panels subject to depreciation and appraisal. Such a program could resell solar panels to households or to corporations looking to donate panels to off-grid areas as part of their respective corporate social responsibility initiatives. A national online solar

[7] Some utilities might challenge the PPA for rooftop as an infringement of their franchise right to sale distribution of electricity in their specific area. As a result, it is likely that that households and businesses engage in operating lease agreements, instead of PPAs.

panel registry system with a panel-barcode system could reduce theft and use of non-warranty suppliers.

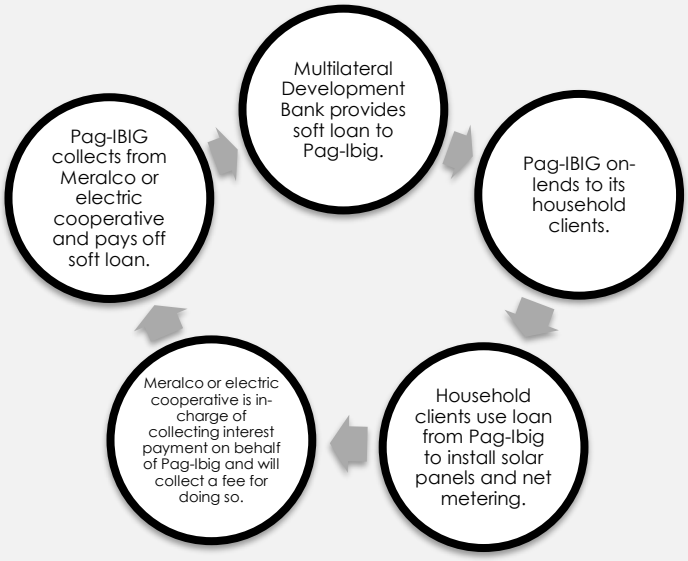
Crowd-funding net-metering loan platforms offer yet another way to finance the rooftop solar market, bringing project investing to the masses. Sponsor websites and implementing partners can take a 1% or more fee for project management.

Financiers of all stripes would do well to recognize that the renewable energy business, above all, is a technology business. Solar PV prices have fallen by 80% since 2008. Technology-driven pricing changes at a faster rate than do commodity prices, which is a key input of oil, coal, and gas power generation. This means oil, coal, and gas financial models do not work for renewable energy. Advances in solar technology, similar to those in information technology, drive older models to outlive their usability, and in most cases, it is more economical to replace a solar panel and to write off the asset before fully depreciating it. Because renewable energy is classified as a technology, leasing solutions can manage obsolescence and provide the requisite agility to scale or embrace a more efficient technology, which in turn improves business performance. In short, financial institutions can be more innovative in finding effective ways to address the risks associated with the solar technology lifecycle.

Menu of Financing Tools for Net Metering

Financing Tool	Implementing Institution	Information
Unsecured or secured loan for installation	1) A large full-serviced solar developer 2) Government financial institution 3) Government-owned Home Development Mutual Fund 4) Bank (private and public) 5) Credit cooperative 6) Utility 7) Leasing company 8) Venture philanthropy	Household will eventually own the installation. The loan facility will spread the cost of the installation over time, with the loan repayment value structured based on energy savings from kilowatt-hours produced. LTV can be 85% or less subject to the credit risk of the borrower.
Lease, including installation.	1) A large full-serviced solar developer 2) Government financial institution 3) Government-owned Home Development Mutual Fund 4) Bank (private and public) 5) Credit cooperative 6) Utility 7) Leasing company 8) Venture philanthropy	Third-party ownership via lease arrangement or power purchase agreement with homeowner. In a lease arrangement, the homeowner makes a pre-determined payment to the institution that owns the installation. The homeowner can consume all the energy it produces and/or sell excess supply to the grid. In a power purchase agreement, the homeowner pays a pre-determined cost per kWh to the institution that owns the installation. The institution can sell the excess energy not consumed by the homeowner to the grid.
Solar installations to be included in house's infrastructure insurance	1) Insurer or reinsurer 2) Bank	Solar installations are part of the house structure and should therefore be covered by home infrastructure insurance.
Energy savings value warranty insurance	1) Insurer or reinsurer 2) Bank	De-risking tool to guarantee up to 100% of energy savings value.
Solar-Backed Securities (Green Bonds)	1) Government financial institution 2) Government-owned Home Development Mutual Fund 3) Bank (private and public)	If institutions are able to bundle loans with steady cash flows and reasonable credit risks, the solar-backed security can be listed.
Low-carbon refinancing guarantees	1) Government financial institution 2) Bank (private and public) 3) Insurer or reinsurer	De-risking tool to provide liquidity to solar-backed securities.
Secondary solar panel guarantee facility	1) Government financial institution 2) Government-owned Home Development Mutual Fund 3) Bank (private and public)	The program can allow for resale of solar panels to other households or to corporations looking to donate panels to off-grid areas as part of their respective corporate social responsibility initiatives. The pricing of second-hand solar panels is subject to depreciation and appraisal.

Box 1. Micro-Project Financing Facility



Aligning incentives among different interests in housing and electricity markets will help propel growth in the net-metering market. The two key players are Pag-IBIG or a credit cooperative and Meralco or an electric cooperative.

Pag-IBIG Fund

The Home Development Mutual Fund, better known as the Pag-IBIG Fund, is the Philippines' main national savings program. It operates under the auspices of the Housing and Urban Development Coordinating Council and its mission is to promote and provide affordable financing of shelter to Filipinos. The agency concurrently manages savings program for both private and government workers. In 2016 Pag-IBIG membership totaled 15.9 million, with 11.5 million members in the Philippines and the remainder Filipino nationals remitting from abroad. Pag-IBIG's latest annual financial data, as of August 2016, shows the agency with a total assets under administration of 1.358 trillion pesos, with 408.4 billion pesos, or over a third of the total coming from proceeds from retail housing/wholesale home-lending collections. Offering two modes for home lending, wholesale involves the extension of a credit line to home developers for their customers; program financing amounts to 2.8 billion pesos. Retail home lending, comprising the bulk of Pag-IBIG transactions, includes over 1.16 million loan agreements supporting the construction of 1.09 million housing units. Local members have taken out the bulk of the financing, with 401 billion peso, while foreign-based members have remitted 92.4 billion pesos. Philippines-based members account for 979,000 of Pag-IBIG loans; foreign-based members account for 111,000.

MERALCO

MERALCO is the largest electric distribution company in the Philippines, serving 111 municipalities, including Metro Manila. It has been in operation for 113 years. Its geographic reach covers 9,337 km2 of industrial, commercial, and population centers. Meralco serves almost 5.8 million customers. As of June 3, 2018, it had a market capitalization of PhP 377.35 billion (US$ 7.19billion).

Meralco's micro-project financing facility will include either Pag-IBIG or a credit cooperative and Meralco or an electric cooperative as its main proponents. Pag-IBIG or a credit cooperative may not currently have funds to scale up an unsecured or secured net-metering loan facility for households, but it may be able to source a soft loan from a multilateral development bank such as the Asian Development Bank, the Asian Infrastructure Investment Bank, or the World Bank. Pag-IBIG or a credit cooperative can then on-lend to clients for solar-panel installation and net-metering packages. Pag-IBIG's or a credit cooperative's ability to collect interest payments and principal payments could be greatly improved by a partnership with Meralco or an electric cooperative, which could then include interest and principal payments on household electricity bills. Household, in effect, would be paying for solar installations with their energy savings and will eventually own the system after interest and principal has been paid in full. The loan facility would spread the cost of the installation over time and should be priced according to the value of energy savings. In other words, the loan repayment value would be structured based on energy savings from kilowatt-hours produced. LTV can be 85% or below subject to the credit risk of the borrower. Meralco or an electric cooperative would be able to collect a transaction fee and would then send interest and principal payments to Pag-IBIG or a credit cooperative. This would reduce the risk of late or non-payment for Pag-IBIG or a credit cooperative: if a household fails to pay, Meralco or the pertinent electric cooperative could turn off their electricity, and Pag-IBIG or a credit cooperative could then use returns to pay off the soft loan from the multilateral development bank.

Storage Technology

It is important to note, finally, that financing facilities like those described above can also be utilized for solar-power storage, which is an exceptionally fast-growing sector of the global electricity-generation economy.

Storage-technology possibilities abound, especially in lithium-ion battery systems. Imagine how a rooftop solar installation on a shopping mall that generates power from 7 a.m. to 10 a.m.—before the mall opens—is lost if it is not stored, becoming a sunk cost. A strong case to can be made for investment in storage, which allows otherwise lost energy to be harnessed.

Storage technology can also serve as new growth opportunities for utility companies like MERALCO and VECO. For example, in the UK, a local network operator partnered-up with a domestic battery supplier to run the UK's first 'home-to-grid' service. UK Power Networks and Powervault will install 40 8kWh batteries in north London that will be controlled by the network operator to provide power at times of peak demand. The batteries will all be installed at homes with solar PV and the system can benefit from time-of-use pricing. This new business model gives utilities better control and oversight over the charging and discharging of small battery systems.[8] A business venture of this nature makes sense in countries with high electricity prices like the Philippines.

Conclusion

Rooftop solar in the Philippines can contribute significantly to enhancing national electricity supply while facilitating and creating financing for a growing share of new generation capacity requirements and lowering electricity costs.

Commercial and industrial end-users with large roof spaces, such as hospitals, schools, manufacturing corporations, cold-storage facilities, malls, airports, etc. can lower baseload electricity costs in the long run via rooftop solar, while off-grid areas can utilize rooftop solar for affordable electrification.

However, a combination of cumbersome existing regulation, outdated administrative practices, and a lack of affordable and accessible financing are hindering the broad adoption of rooftop solar. The Philippine government can help break this logjam by adopting policies that inject more diversity—and more energy security—into the electricity system while helping lower consumer costs by enabling the uptake of cheaper, cleaner options such as rooftop solar.

Indeed, "behind-the-meter" generation by way of rooftop solar can replace or complement existing generation by introducing significant inherent grid efficiencies. It can help alleviate constraints on land availability, projected underinvestment in grid upgrade and capacity expansion in the coming decade, and the likelihood that extreme weather events will become more frequent. Moreover, every kilowatt of installed rooftop solar means a reduction in the need for imported coal and diesel power. This phenomenon alone could

[8] https://us9.campaign-archive.com/?u=a336c39e55a6260d59adbffb0&id=b2cb751119

save the Philippines up to US$2.2 billion annually in its current account deficits as well as US$200 million per year in diesel subsidies.

The high cost of power is a recurring theme in the Philippines and a major impediment to sustained, strong economic growth. That said, the country's retail, commercial, and industrial sectors are expected to accelerate their uptake of rooftop installations in the face of rising grid electricity prices combined with continual improvements in the commercial viability of battery storage and access to affordable financing structures.

Given the projected doubling of electricity demand in the Philippines over the next 10 years or so, distributed rooftop solar stands to play an increasingly material role in the country's electricity-sector transformation.

However, the development of cost-effective net metering government policies, an easing of approval processes, and access to affordable financing remain crucial to rooftop solar deployment. The rapid development of ever-lower-cost, behind-the-meter integrated lithium-ion battery storage systems will help accelerate this deployment.

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Important Information