RENEWABLE POWER IN THE PHILIPPINES

Financial flows and barriers to investment

THE AILEG PROJECT

CONTRACT NO.: EEM-I-00-07-00004-00
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ACRONYMS

ADB	Asian Development Bank
AILEG	Analysis and Investment for Low Emission Growth program
BOP	Balance of plant
CAGR	Compound annual growth rate
Capex	Capital Expenditure
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CTF	Clean Technology Fund
DBP	Development Bank of Philippines
DOE	Department of Energy
DSCR	Debt service coverage ratio
EDC	Energy Development Corporation
ERC	Energy Regulatory Commission
FiT	Feed-in-tariff
GBI	Generation-based incentive
GHG	Greenhouse Gas
GPH	Government of the Republic of the Philippines
GW	Gigawatts
IBRD	International Bank for Reconstruction and Development
IFC	International Finance Corporation
JBIC	Japan Bank for International Cooperation
LCOE	Levelized costs of energy
LEDS	Low-emission development strategies
MW	Megawatts
NEA	National Electrification Administration
NGCP	National Grid Corporation of the Philippines
NPC	National Power Corporation
NPC-SPUG	National Power Corporation - Small Power Utilities Group
NREL	National Renewable Energy Laboratory
NREP	National Renewable Energy Plan
PPA	Power Purchase Agreement

PSALM	Power Sector Assets and Liabilities Management Corporation
RE	Renewable energy
REC	Renewable Energy Certificate
RPS	Renewable Portfolio Standard
TDP	Transmission Development Plan
TWh	Terawatt Hour
UNFCCC	United Nation Framework Convention on Climate Change

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During the informal workshop on March 4, 2013, the following AILEG's partners provided observations and feedback: Assistant Secretary Daniel Ariaso, Sr., Director Jess Tamang and Director Mario Marasigan from the Department of Energy, Sandee Recabar and Arnold Grant Belver of Climate Change Commission, Executive Director Francis Saturnino Juan and Sharon Montañer of Energy Regulatory Commission, Chairman Pete Maniego, Jr. of National Renewable Energy Bureau, Marie Christine Danao of National Economic Development Authority, Divina Chingcuanco and Michael Pitlock of Climate Change and Clean Energy Project, Joseph Foltz, Rafael Itchon and Lily Gutierrez of USAID and Heath Bailey of the US Embassy.

We would also like to offer our sincerest gratitude to the participants who attended the Stakeholder Workshop on April 5, 2013 to present the outputs of the *AILEG Report on Renewable Energy in the Philippines–Financial Flows and Barriers for Investment* and to invite stakeholder comments. The thoughtful dialogue and comments of the workshop are incorporated into Section 7 of this report. Participants represented the following stakeholders:

- **Private Sector and NGOs:** Alternergy Philippine Investment Corporation, Bank of the Philippine Islands, Biomass Renewable Energy Alliances, Clark Electric Company, Manila Electric Company, Philippine Association of Small-Scale Hydropower, Philippine Electricity Market Co., Philippine Independent Power Producers Association, Philippine Solar Power Alliance, Philippine Wind Energy, SUNWEST Water & Electric Co., and PASSHydro, Trans-Asia Oil and Energy Development Corp., Trans-Asia Renewable Energy Corporation, The Center for Clean and Renewable Energy Development/RE Coalition, World Wide Fund for Nature, EU-SWITCH Asia Programme;
- **Nationally Attached Agencies and Corporations:** Board of Investments– DOTI, Bureau of Internal Revenue, Joint Congressional Power Commission, Development Bank of the Philippines, Energy Regulatory Commission, Land Bank of the Philippines, League of Municipalities of the Philippines, Mindanao Development Authority, National Economic and Development Authority, National Electrification Administration, National Grid Corporation of the Philippines, National Power Corporation, National Renewable Energy Board, National Transmission Corporation, PNOC Renewables Corporation, Energy Regulatory Commission, Department of Finance, Land Bank of the Philippines;

- **Department of Energy**: Office of the Secretary, REMB, EPPB;
- **Climate Change Commission**; **Academe**: De La Salle University, Mapua Institute of Technology, Polytechnic University of the Philippines, University of the Philippines, Ateneo School of Government;
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EXECUTIVE SUMMARY

The Philippines has a wealth of renewable energy resources, and the Government of the Philippines (GPH) has set up favorable policies for expanding renewable energy development. The Philippines generates almost one-third of its installed electricity capacity from renewable power (mostly hydro and geothermal) but hopes to triple renewable production by expanding into solar power by 2030. Note that solar, here, represents only photovoltaic (PV) technology; wind represents onshore wind, biomass represents incineration technology; and geothermal represents flash technology. To achieve this goal, financial support from the private sector into renewable energy will need to scale up and barriers removed. This report – commissioned for the USAID Analysis and Investment for Low Emissions Growth (AILEG) program – provides an overview of the current status of the renewable energy industry in the Philippines, its renewable finance climate and an analysis of the key barriers preventing wide deployment. Some important facts about renewable energy use in the Philippines include:

- **The Philippines currently has 5.4 gigawatts (GW) of renewable capacity installed, of which 98% is hydro (3.5 GW) and geothermal (1.8 GW).** This represents 28% of the country's total energy mix and the government aims to increase this to 15.3 GW installed or around 39 % by 2030. Hydro, geothermal and wind will drive most of this growth, according to government expectations.
- **At present, renewable projects for electricity generation that are in construction but not operational (pipeline) total 7.6 GW, already 41 % more than the currently installed capacity.** After hydro with 4.1 GW, wind has the biggest pipeline at 1.9 GW followed by geothermal (0.8 GW) and utility-based solar (0.6 GW). This indicates that the future renewable energy mix will likely be somewhat different than the GPH targets; in particular, the prospects for solar energy are very good over the long run.
- **Renewable development is expected to take place across all regions of the country though Luzon will remain dominant**. Luzon currently has 73% of the country's installed power capacity and 80% of the renewable project pipeline. This island will therefore remain dominant although the Visayas and Mindanao will also get renewable development.
- **The country's renewable energy market is expected to consist of many new developers, seeking opportunities for electricity production in the Philippines.** The current pipeline suggests that the future market will see the top 20 players account for 78% of the market. Among the top 20 players, 17 are new to the market.
- **Renewable projects in the Philippines have received at least $1 Billion in funding during 2004-12.** Of this, 58% came from corporate balance sheets and 42% through traditional project finance. Large corporates have been the main source of project equity while development banks have been the main source of project debt though this balance is changing.
- **Clean Development Mechanism (CDM) credits have not substantially driven renewable investments and will not be an important source of private or international finance in the future.** Five renewable energy projects have been issued CDM credits to date ranging from wastewater treatment, biogas, biomass, N2O reduction plant, and energy efficiency improvement since 2006. With a low international carbon price predicted, which may remain as low as EUR 0.4-0.9/tCO2e for at least the next few years, the CDM market is not a large source of financing for expanding renewables in the Philippines.
- **To meet the Government's quite aggressive target of 15.3 GW by 2030 around $25 Billion of debt and equity investment is required, which is over double the amount of investment now going into the current pipeline waiting to be operationalized.**

Local commercial banks are expected to provide at least two thirds of debt for which they would need to allocate 5% of current assets until 2030. International commercial banks and development banks will have to step in to provide the remaining debt, in particular at the initial stages given their existing renewable experience. The equity part will primarily come from domestic corporates as well as private equity funds.

- **Project sponsors and private equity funds require equity returns of 15-20%, while local commercial banks charge around 8-10% interest per annum on project debt.** However, the average deal size for most financiers needs to be larger than $25 Million or around 10 MW. To secure debt it is important to first obtain the feed-in-tariff (FiT) or a power purchase agreement (PPA), as well as a grid connection agreement. As noted in the findings of this study, regulations often allow utilities or energy purchasers to lock-in the FiTs only after construction has begun, which results in potentially viable projects not being able to secure bank loans up front.
- **On average, current renewable energy Feed-in-Tariff (FiT) levels that adjust over time as determined by the GPH energy laws and regulations are for most projects higher than the respective renewable energy levelized costs of energy (LCOE), though they will not make *all* projects economically viable.**[1] The LCOE is defined here as the price of electricity that a project requires to ensure a 15% return for its owners. Biomass and small hydro are in a similar situation.
- **Many renewable energy projects appear to be financially attractive based on a comparison of FiT and LCOE.** The average LCOE of a wind project is $0.14/kWh with a FiT of $0.20/kWh while the solar LCOE is $0.17/kWh with a FiT of $0.23/kWh. The solar and wind FiTs are also 44% and 31% higher than the average wholesale grid power price, respectively.
- **The LCOE of renewables in the Philippines is higher than the global average due to country risks and higher logistics, grid connection and civil engineering costs.** With lower solar module costs already seen in the international market, the solar LCOE is expected to drop from $0.17/kWh to $0.14/kWh within five years, making the technology even more attractive to investors.
- **Average project equity returns offered by the FiTs meet or even exceed investors' expected returns on these projects.** The average returns for wind and solar electric projects are 27% and 23%, respectively, much higher than the expected return range of 15-20% as identified by the BNEF survey of financiers. Those for biomass, geothermal and small hydro projects are 23%, 16% and 16%, respectively. These also exceed or meet the investors' expected return of 12-17%.
- **Yet the existing renewable energy policies that allow the FiT approvals and hence Purchase Power Agreements (PPAs) to be awarded only after plant commissioning ("first commission, first served" approach) undermines the GPH's price incentives.** Delayed implementation of renewable policies (in particular, the FiT system and the time and cost for grid connections) is the main investment barrier, which is a barrier that could be easily remedied. Commercial financing is likely to be available for projects that are financially viable based not on the FiTs but wholesale electricity prices, or to developers with sufficient capital for carrying the construction costs through to commissioning.

[1] The FiT was adopted in 2011, the FiT rates were approved in 2012, and implemented in 2013.

- **The FiT policy implementation is top priority as it is essential in the short-term, while Renewable energy Portfolio Standards (RPS) and net metering are mostly relevant for long-term development of the sector.** Globally, FiTs are linked to 87% of solar PV deployments and 64% of wind projects. And experience of other countries (such as China and India) suggests that even without RPS and net metering programs just having a reasonable FiT policy can drive rapid renewable deployment.
- **A conclusion of the study is that to ensure that pipeline projects are able to obtain financing it is necessary that some components of the FiT policy be clarified.** The priorities include, publication by the GPH of detailed FiT eligibility criteria, how projects will be awarded the FiT and the payment procedures from parastatal and/or private utilities/buyers (energy purchasers).
- **The existing policy of "first-commissioned, first-served" approach discourages the creation of a sustainable renewable energy market and will mainly benefit large project developers with deep pockets or capital availability.** Since this approach requires projects to be commissioned before being certain about the FiT revenues, small developers may be squeezed out as they will not be able to obtain financing. The combination of this approach with the low FiT cap will create further uncertainty and project quality could suffer if developers have to rush to commission.
- **Although the burden and cost of grid connection are very important over the long run, these are not expected to be a problem for the projects in the existing 7.6 GW pipeline.** Some of these projects may be relatively close to transmission lines and some projects may be able to viably extend the lines themselves. Hence, there may not be a major impediment to get the first projects off the ground.
- **Once there is clarity on the FiT process, the Philippines should experience renewable growth rates similar to those of other emerging markets.**

1. BACKGROUND

The Analysis and Investment for Low-Emission Growth (AILEG) Project helps governments, USAID missions, and other stakeholders to integrate climate change economics and investment into low-emission development strategies (LEDS). LEDS accelerate sustainable economic growth and investments while reducing greenhouse gas emissions and building climate resilience. Through AILEG, climate policy- and decision-makers can find cost-effective, sustainable options in climate policy planning, economic modeling, and impact analysis. AILEG provides support to improve climate data collection and dissemination, and identifies green investment options and constraints in clean energy, energy efficiency, and sustainable landscapes. The project is part of the U.S. Government's efforts to pursue and enhance long-term transformative development through sustainable economic growth.

AILEG tailors support to each country's unique capacity, data availability, and technical, analytical, and policy needs. The project helps countries integrate assessment models and tools across a range of interrelated climate economic and investment areas, while responding to heterogeneous demands and data availability. AILEG assists through:

- technical assessments and evaluations
- data improvement and management
- capacity building
- training and knowledge dissemination

The AILEG activities in the Philippines are focused on data assessment and economic analyses in the energy sector. Energy security and the role of indigenous energy sources, especially renewable energy (e.g. biofuels, solar, wind) are major issues. The Philippines has been pro-active in enacting new energy plans and legislation that can help put the country on a low emissions development pathway. In 2011, the Philippines launched its National Renewable Energy Plan (NREP) for 2011-2013 with the aim of increasing its renewable energy (RE) power capacity to as much as 15,300 Megawatts (MW) by 2030 – a trebling of its 2010 capacity of 5,438 MW. The Renewable Energy Act of 2008 provided fiscal and non-fiscal incentives and institutional support for the renewable energy sector: a seven-year exemption from income taxes, followed by a corporate income tax of only 10% (instead of the present 35%); no tax on carbon credits generated from renewable energy sources; a Renewable Portfolio Standard (RPS); and a feed-in tariff. The Philippines Biofuels Act of 2006 includes mandates for the blending of biodiesel and ethanol in all locally distributed diesel and gasoline – at levels of 2% and 10% by volume in 2011. The analyses described in this report focus on quantifying the financial flows, incentives and barriers to investments in renewable energy.

2. RENEWABLE ENERGY MIX

2.1. RENEWABLE ENERGY VERSUS CONVENTIONAL ENERGY

Philippine power generation amounted to 69 TWh in 2011 and 37% of the total was from coal, 30% from natural gas, 28% from renewables, and 5% from oil (Figure 1). Renewable energy in the Philippines includes geothermal, hydro, biomass, wind, solar and ocean energy.

The Philippines' renewable energy generation is estimated to increase from the current 28% to 39% by 2030 if it meets government 2030 installation target of 15.3 GW.

In terms of cumulative installed capacity, renewables led the way with 5.4 GW of capacity or 33% of the total 16 GW installed in 2011 (Figure 2). Coal-fired power capacity followed closely with 4.9 GW, or 30% of the total. Oil-based and natural gas capacities were 3.3 GW and 2.9 GW, accounting for 20% and 17%, respectively.

Both on-grid and off-grid capacity is included in the 16 GW. In the Philippines, off-grid is defined as a micro-grid or isolated grid that is not connected to the main national grids. The main national grids are the Luzon, Visayas and Mindanao grids. The country's off-grid power capacity was negligible compared to its on-grid capacity as of 2011 (section 2.3).

FIGURE 1: POWER GENERATION MIX 2011-30E,TWH

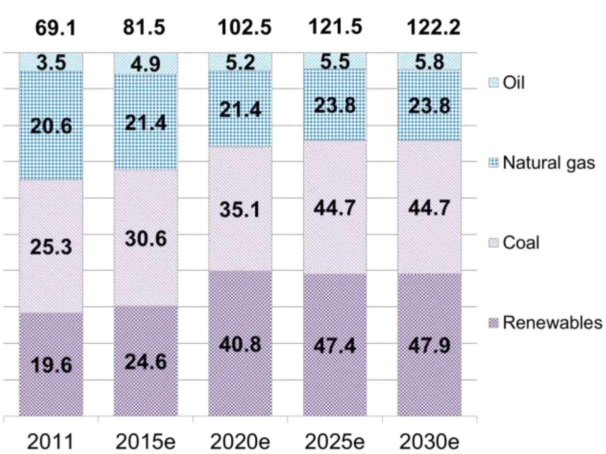
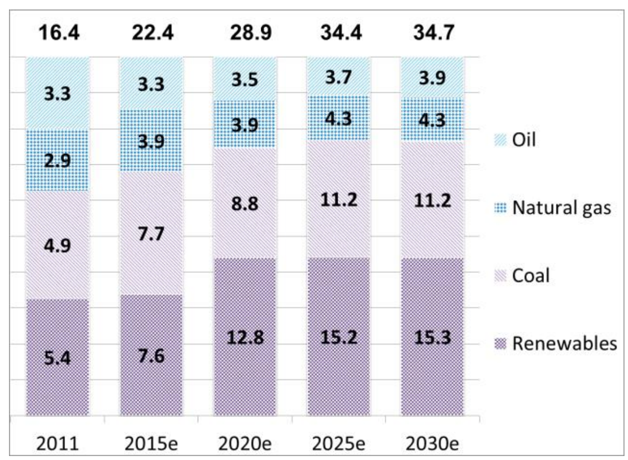


FIGURE 2: CUMULATIVE INSTALLED POWER CAPACITY 2011-30, GW



Source: Department of Energy, Philippines. NPC-SPUG. Compiled by Bloomberg New Energy Finance. Note: Renewables include geothermal, hydro (primarily large hydro >50MW), biomass, wind, and solar. Generation and installed capacity figures include both on-grid and off-grid.

The Luzon grid supplied 72% of the total power generation in the Philippines, 49.8 Terawatt hours (TWh) out of 69.1 TWh in 2011. The Visayas and Mindanao grids supplied the remainder, with 10.5 TWh and 8.8 TWh respectively (15% and 13%). Luzon had the largest amount of renewable energy generation (8.2TWh), although this only accounted for 16% of total power generation. Mindanao mostly relied on renewables, accounting for 65% of power generation (see below and later Figure 8).

FIGURE 3: POWER GENERATION MIX BY GRID, 2011, TWH

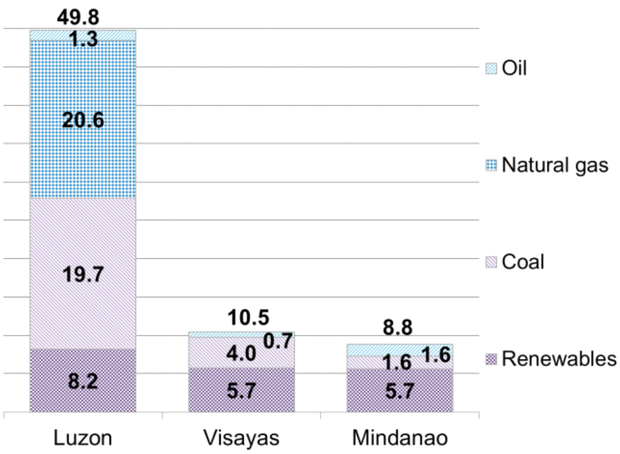
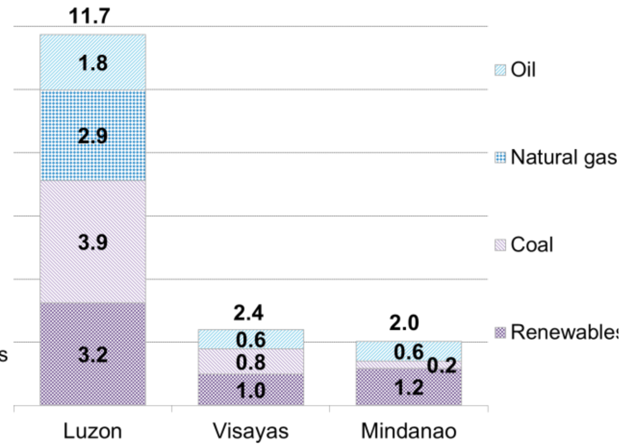


FIGURE 4: CUMULATIVE CAPACITY BY GRID, 2011, GW



Source: Department of Energy, Philippines. Compiled by Bloomberg New Energy Finance. Note: Renewables include geothermal, hydro (primarily large hydro >50MW), biomass, wind, and solar. Off-grid is excluded from installed capacity due to insufficient location details.

Developing and utilizing renewable energy represents a critical component of the Philippines' long-term energy strategy to provide sufficient and clean power for its growing economy. In the National Renewable Energy Plan (NREP) of 2011, the GPH set an ambitious goal of tripling its renewable energy capacity from 5.4 GW in 2011 to 15.3 GW by 2030. This requires 10GW of new capacity to be built during the next 20 years. The country's Department of Energy (DOE) aims to achieve this in phases, with a cumulative 7.5GW installed by 2015, 12.7GW by 2020, 15.2GW by 2025 and 15.3GW by 2030.

The country does not have any targets for conventional power expansion, but the project pipeline for conventional power plants was 8.2 GW in 2011, including 6.5 GW of coal-, 1.5 GW of natural gas-, and 0.2 GW of diesel-fired capacity.

If the Philippines meets its albeit aggressive renewable installation target of 15.3 GW by 2030 and builds the currently planned conventional power plants without further additions, renewable capacity would increase from 33% to 44% of total generating capacity by 2030 (Figure 2).The share of coal would rise from 30% to 32%, whereas the share of oil and natural gas would decrease from 20% to 11% and 17% to 12%, respectively.

Converting the expected installed capacity to power generation using average capacity factors (Appendix A), the share of renewable energy generation would increase from 28% in 2011 to 39% by 2030 (Figure 2). The share of coal would remain at 37% while natural gas's contribution would drop from 30% to 20%. The share of oil would remain constant at 5%.

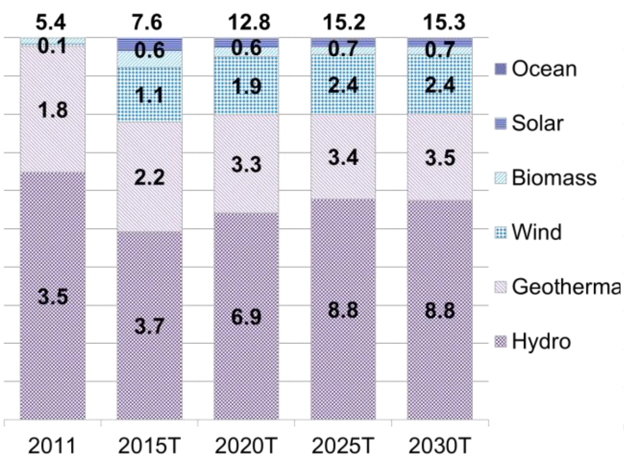
There is no official power capacity target for each grid, but Luzon is likely to add more capacity in absolute terms than the other two areas because of the larger power demand and number and size of projects in the pipeline. About 80% or 6 GW of the total renewable project pipeline of 7.6 GW and 75% or 3.8 GW of the total conventional power pipeline of 5 GW, is for Luzon.

2.2. RENEWABLE ENERGY TECHNOLOGY

The 5.4 GW of national renewable capacity in 2011 was primarily hydro (3.5 GW) and geothermal (1.8 GW). Hydro accounted for 65% and geothermal accounted for 33% (Figure 5). Other renewables only comprised 2% of total renewable capacity; this included five to eight projects totalling 83 MW, one wind project of 33 MW, and one solar project of 1 MW.

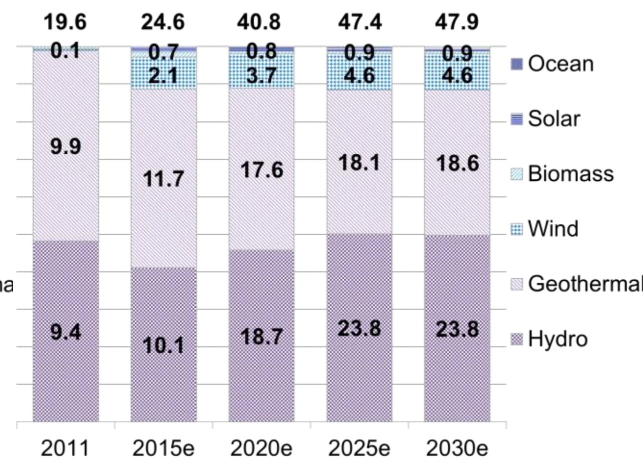
The power generation from hydro and geothermal plants in 2011 was 9.4TWh and 9.9TWh, respectively. Although hydro capacity was almost double the geothermal capacity, the power generation from hydropower was 5% lower than geothermal in 2011due to a lower capacity factor (30.9% versus 63.6%). The power generation from other renewables was 0.2 TWh, just above 1% of total renewable power generation.

FIGURE 5: CUMULATIVE RENEWABLE CAPACITY BY RESOURCE 2011-30T, GW



Source: Department of Energy, Philippines. Compiled by Bloomberg New Energy Finance. Note: Figures for 2015T-30T are DOE targets.

FIGURE 6: RENEWABLE POWER GENERATION BY SECTOR 2011-30E, TWH



Source: Department of Energy, Philippines. Compiled by Bloomberg New Energy Finance. Note: Generation figures for 2015e-30e are estimation.

Luzon had 2.4 GW of hydro capacity and 0.8 GW of geothermal capacity in 2011. The Visayas grid heavily relied on geothermal with 90% of total renewable capacity. All of the country's grid-connected biomass capacity was in the Visayas. Mindanao's renewable capacity was mainly from hydro power. The country's only solar project (1 MW) was on Mindanao.

FIGURE 7: CUMULATIVE RENEWABLE CAPACITY BY GRID, 2011, GW

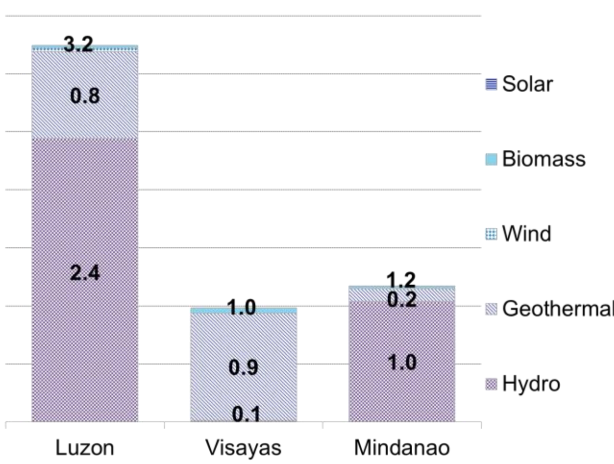
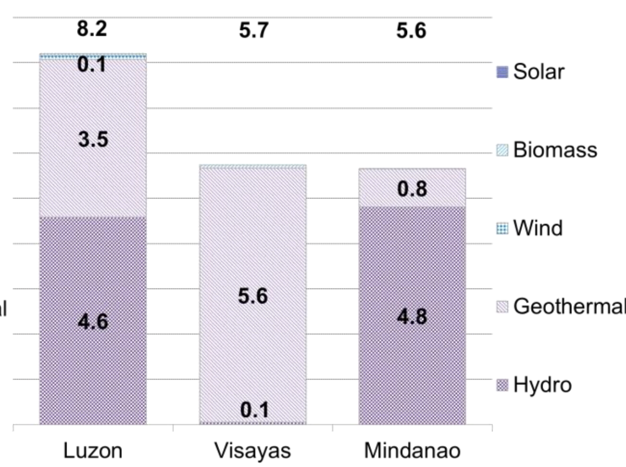


FIGURE 8: RENEWABLE POWER GENERATION BY GRID, 2011, TWH



Source: Department of Energy, Philippines. Compiled by Bloomberg New Energy Finance.

Between 2011 and 2030 GPH aim to add 5.4 GW of hydro, 2.3 GW of wind, and 1.5 GW of geothermal power, as set forth in its NREP of 2011. The targets for solar and biomass power capacity are very modest, with 0.3 GW each by 2030. Ocean power has a target of less than 0.01GW.

The estimated share of hydropower in renewable power generation would increase slightly from 48% to 51% in 2030. Geothermal's contribution to renewable power generation would decrease from 51% to 37% (Figure 6) and wind energy would jump from almost 0.5% to 10%.

The current project pipeline is likely to add more wind capacity on Luzon since this island has the best wind resource in the Philippines and more solar capacity in Mindanao due to higher solar radiation than other parts of the country.

2.3. ON-GRID OR OFF-GRID

The off-grid power capacity was negligible as of 2011. In 2011, the country had 0.3 GW of installed off-grid capacity, 2% of total power capacity (16.4 GW). Off-grid power generation was 0.7% of the total in the Philippines (0.5 GWh out of 69 GWh).

IPPs have become leading power generators through electricity market reform.

The role of renewable energy in the off-grid power market was negligible as well, given the barriers to gaining financing for small-scale projects not connected to a grid of the 0.3 GW off-grid capacity, 98% was diesel capacity and only 2% was renewable capacity (hydro). The current installed renewable energy capacity of 5.4 GW was fully connected to the main national grids.

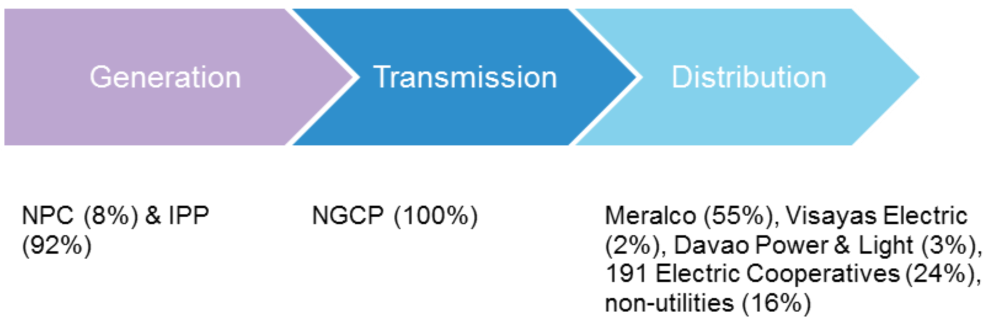
With funding support from the World Bank and the Global Environment Facility, the country is adding renewable energy to its off-grid project pipeline. This includes pipeline projects of 34.4 MW of biomass and a combined 0.65 MW of solar and wind. The Missionary Electrification Development Plan 2012-2016 outlined GPH's plans to improve the conditions prevailing in areas that cannot be served by extension of the national transmission grid in the foreseeable future.

2.4. LEADING MARKET PLAYERS

The Philippines started deregulating its electricity market a decade ago through the Electricity Power Industry Reform Act of 2001 (EPIRA). This law successfully separated operation and ownership of generation, transmission and distribution, and completed the privatization of the power generation sector (Figure 9). . Independent Power Producers (IPPs) generated 92% of total power in 2011, while the National Power Corporation (NPC)'s own generation only accounted for 8 percent.

EPIRA kept transmission and distribution as regulated activities. The state-owned National Grid Corporation of the Philippines (NGCP) is the country's sole electricity transmitter, responsible for both electricity transmission and constructing transmission lines interconnecting the main islands nationwide.

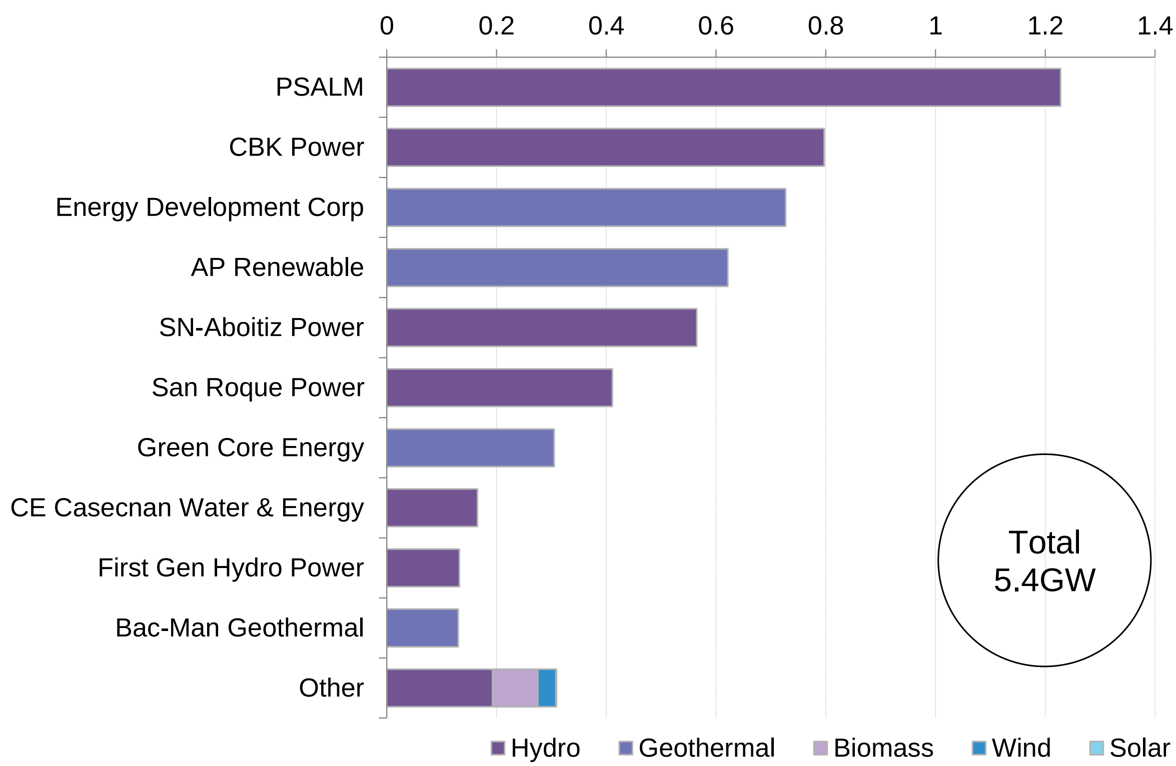
FIGURE 9: ELECTRICITY MARKET STRUCTURE IN THE PHILIPPINES



Source: Bloomberg New Energy Finance. Company reports of Meralco, Visayan, and Davao. National Electrification Administration (NEA). DOE.

Distribution of electricity is performed by numerous private companies and parastatal (NGCP) entities. Manila Electric Company (Meralco) was the largest electricity distributor in the country, with 55% of the national distribution market and 75% of the Luzon market. Visayan Electric (VECO) Company was the largest distributor in the Visayas, and Davao Light the largest on Mindanao. Rural electricity distribution was provided by a few local government-owned utilities and 119 of electric cooperatives through the Rural Electrification Program (NEA, Sep 2012).

FIGURE 10: LEADING RENEWABLE GENERATORS BY INSTALLED CAPACITY, GW



Source: Department of Energy, Philippines. Compiled by Bloomberg New Energy Finance.

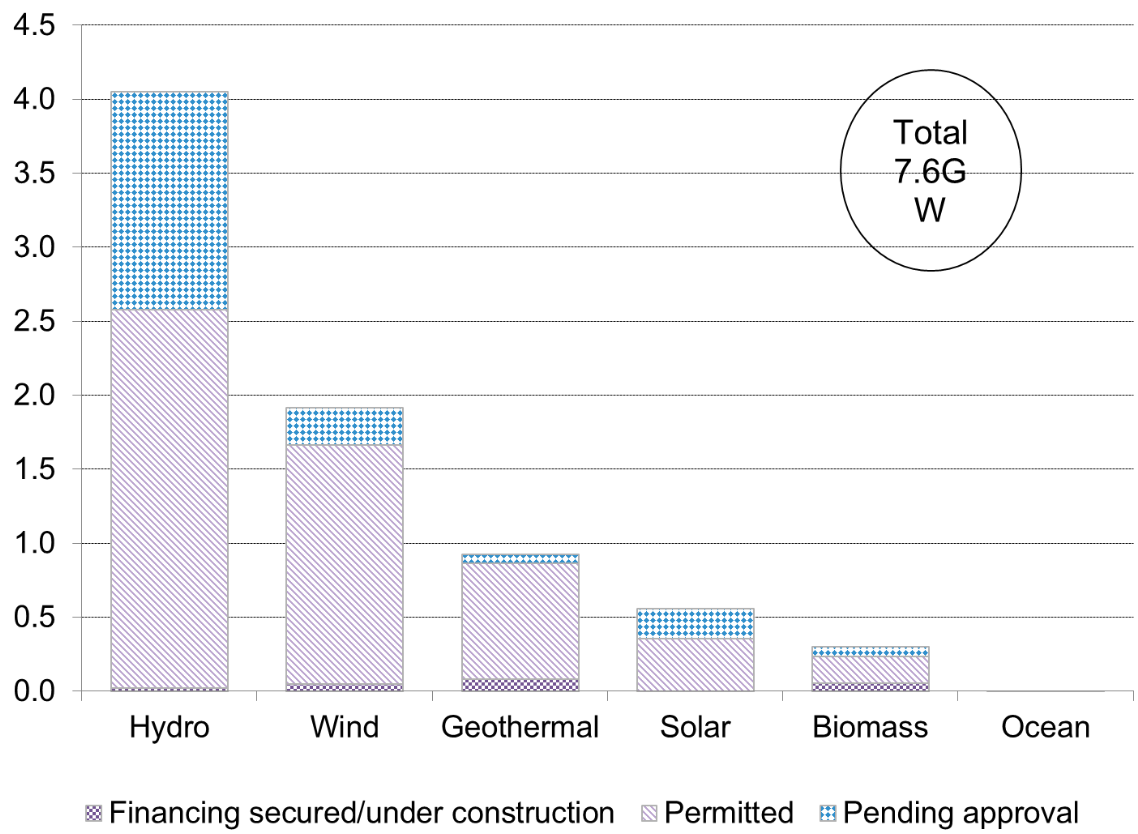
Renewable power generation was dominated by 10 generators, which on aggregate own 95% of the country's total renewable capacity in 2011 (Figure 10).The largest was the national government-run

Power Sector Assets and Liabilities Management Corporation (PSALM) which owned over 1.2 GW of hydro capacity. CBK Power, a joint venture between Electric Power Development and Japanese conglomerate Sumitomo, ranked second with 0.8GW of hydro capacity. Energy Development Corporation (EDC), the Philippines' largest geothermal project developer, was the third largest source of renewable electricity, with 0.7 GW of geothermal capacity. AP Renewables (a subsidiary of the largest private power generator SN-Aboitiz Power) is next, closely followed with 0.6 GW of geothermal capacity. SN-Aboitiz Power is a joint venture between Norwegian hydropower specialist SN Power and Aboitiz and is listed fifth in the ranking as it owns 0.57 GW of hydro capacity.

2.5. RENEWABLE PROJECT PIPELINE

A total of 7.6 GW of renewable electricity projects were in the pipeline as of September 2012, 41% more than currently installed capacity. If the full pipeline were built successfully, 13 GW would be installed by 2030 and the country would be close to meeting its NREP target of 15.3 GW cumulative renewable energy capacity.

FIGURE 11: RENEWABLE PROJECT PIPELINE 2011 BY SECTOR AND STATUS, GW

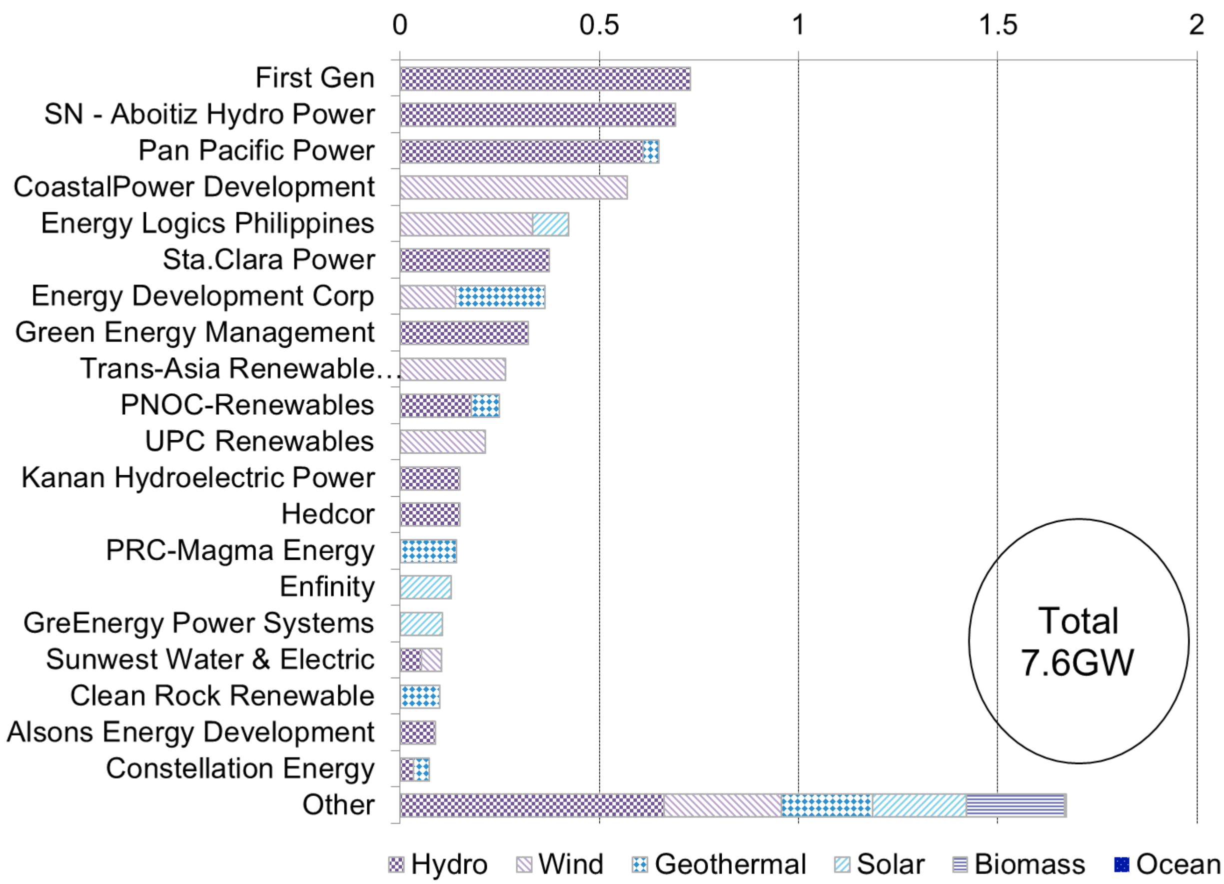


Source: Department of Energy, Philippines. Bloomberg New Energy Finance. Note: As of Sep 2012. 'Permitted' is equivalent to the DOE term 'approved' for renewable service contracts.

Over half of the project pipeline is hydropower (4 GW), with 2.5 GW permitted and 1.5 GW pending approval (Figure 11). The wind project pipeline totals 1.9 GW with 1.6 GW permitted. The amount of geothermal capacity in the pipeline is relatively modest at 0.8 GW, but almost all of the projects have been approved. The solar project pipeline represents an aggregated 0.6GW and 0.4 GW was permitted. Experience from other countries indicates that solar electric power can grow the fastest. Biomass power plants have only 0.2 GW of additional planned capacity. Ocean power is at a too early stage of technological development to contribute meaningfully to renewable power generation over the period of analysis.

Many new developers are expected to enter the renewable energy market over the next 5 years. The top 10 developers comprised 95% of the market in 2011 and their portfolio was entirely in hydro and geothermal power. Under the current pipeline, the top 20 players will account for 78% of the market and 17 are new to the market (Figure 12).

FIGURE 12: TOP 20 PROJECT DEVELOPERS BY 2012 PIPELINE, GW



Source: Department of Energy, Philippines. Compiled by Bloomberg New Energy Finance.

Existing hydropower developers First Gen and SN-Aboitiz Hydro Power are the two largest producers of renewable power in the pipeline, with a planned capacity of 0.7 GW each. The third developer, Pan Pacific Power, is new and plans to add 0.6 GW of hydro power. Pan Pacific Power is a joint venture between a Philippine developer and a foreign (confidential) partner.

Following the top three players are two wind and solar project developers. Coastal Power, a Philippine project developer, is focused on wind power with 570 MW planned; and Energy Logics Philippines (the wind project development arm of Philippine-based Energy Logics), plans 332 MW of wind projects and 90 MW of solar projects.

Project development has been slow despite these large pipelines. Of the total 7.6 GW, only 0.2 GW had received finance or was under construction at the time of writing. There are 5.5 GW permitted for further development and 2 GW pending approval by the DOE.

To obtain a development permit, a project developer is only required to submit documents that can prove its technical expertise, financial strength and legal status to successfully develop the projects. No project due diligence is required to be completed at the time of applying for a development permit. In principal, a project developer must start development activities within two years from the time a permit was given. Otherwise, the permit will be revoked and the project developer may receive a credit downgrade from the DOE and find it difficult to obtain a project development permit in the future. There is no financial penalty for giving up on a permit.

Project developers have attributed the slow project development pace largely to FiT policy, finance and grid connection barriers. Policymakers, financiers and utilities have blamed the relatively higher costs with buyers needing to pay FiTs versus grid wholesale prices and the intermittent nature of renewable energy as the main reasons for slow development. The following sections will analyze these main barriers to renewable energy development and identify which key issues need to be resolved to continue moving the sector's development forward in the Philippines.

3. FINANCING RENEWABLE ENERGY

3.1. SOURCES OF FINANCING

Expansion of renewable electricity capacity in the Philippines has largely relied on corporate finance. Corporate finance is defined as balance-sheet funding from corporate debt or equity. Based on the publicly disclosed deals in Bloomberg New Energy Finance's database (

Corporate finance has been the main source of financing for renewable projects as most development was done by large companies.

Appendix B: Investment data methodology), 58% of asset financing was raised through corporate finance and 42% from project finance (Figure 13). The existing renewable project developers are mainly large power companies, which are able to obtain corporate loans relatively easily and cheaply. Project finance is a combination of debt and equity specifically structured for a particular project. Project finance differs from a corporate loan secured with general corporate assets. The debt portion of a project finance deal is based solely on project assets and serviced entirely from the project cash flow.

FIGURE 13: RENEWABLE ASSET FINANCE IN THE PHILIPPINES BY SOURCE 2003-12, $M

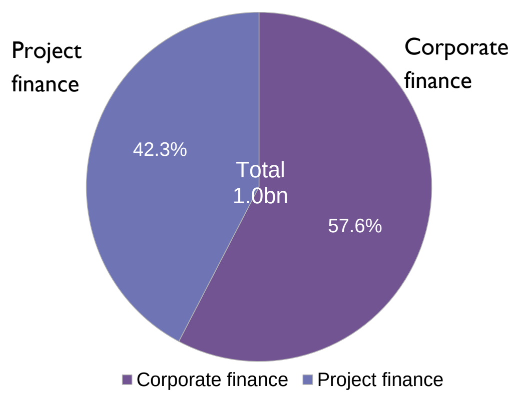
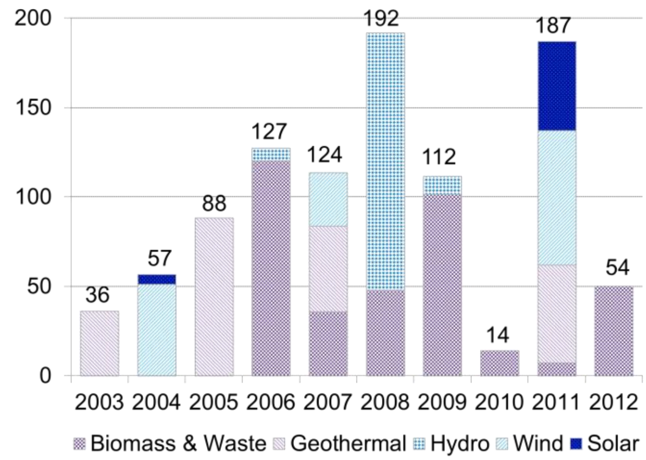


FIGURE 14: RENEWABLE ASSET FINANCE BY RESOURCE IN THE PHILLIPINES BY 2003-12, $M



Source: Bloomberg New Energy Finance. UNFCCC.

Asset finance was focused on geothermal, biomass and small hydro projects in the early years (Figure 14). Very little asset finance was arranged to support wind and solar, apart from a few demonstration projects built in 2005. However, in 2011, the interest in financing solar and wind projects increased as some developers started to finance these projects in anticipation of the proposed FiT policy. More than 60% of the annual asset finance that year went to wind and solar projects. In 2012, financing plummeted once again since no progress was seen in implementation of the FiT policy so developers and financiers could not move their projects forward.

3.2. ROLES OF DIFFERENT FINANCIERS

There is a good mix of financiers in the Philippines openly financing renewable energy projects. Debt finance has come primarily from development banks and local commercial banks, either through corporate loans or project debt for geothermal and large hydro projects. International banks that have gained renewable project financing experience are now entering this growing market looking for opportunities including wind and solar power.

Large corporates have been the main source of project equity and development banks have been the main source of project debt.

The main source of equity in renewable energy projects has come from a handful of large private and state-owned power generation companies. This is changing, though, with new, smaller independent project developers have begun participating in the sector. Apart from developer equity, several private equity funds and social investment funds have been set up over 2012-2013to invest in the sector. In addition, finance is flowing from development banks ($0.015Billion) and local commercial banks ($0.08 Billion) in 2012-2013.

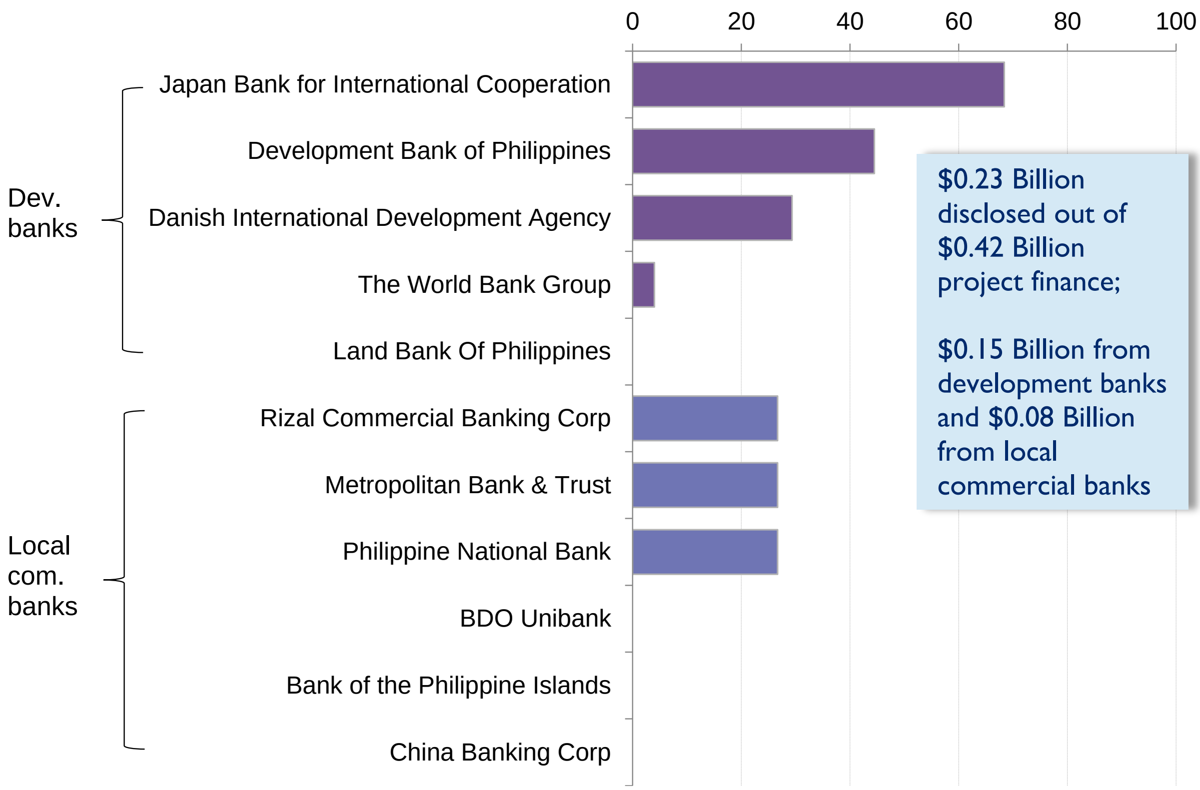
3.2.1. DEBT

Development banks

Development banks provided 65% of the disclosed project debt of the renewable energy projects commissioned during 2003-12 - $0.15 Billion out of $0.23 Billion in project finance (Figure 15). The Japan Bank for International Cooperation (JBIC) was the largest source, lending $68.4 Million to Energy Development Corporation (EDC)'s Northern Negros geothermal project in 2005. The Development Bank of Philippines (DBP) lent a total of $41.2 Million for six projects (two geothermal, two small hydropower and two biomass). The Danish International Development Agency (DANIDA) was the major lender to the Philippines' first wind farm, the 33 MW Northwind Bangui Bay Wind Farm, which was financed in 2004 and commissioned in 2005.

The development banks have diverse interests. JBIC helps Japanese manufacturers grow their sales in Southeast Asia. It has required use of Japanese-made turbines and generators. DBP is a governmental institution with interests in diversifying the country's energy mix and increasing electrification rate and energy security. DANIDA was interested in increasing access to electricity for development while reducing environmental impacts. Renewable energy financing is expected to become more important for development banks as a result of the growing size of the industry, reduced cost of renewable electricity and the possibility of quickly scaling up.

FIGURE 15: LEADING PROJECT FINANCIERS IN THE PHILIPPINES 2003-12, DISCLOSED VALUES ONLY, $MILLION



Source: Bloomberg New Energy Finance. Note: Deal value for Land Bank of Philippines, BDO, Bank of the Philippine Islands, and China Banking Corp is not disclosed. Disclosed debt only. See

Appendix B: Investment data methodology.

In addition to providing direct loans for renewable projects, several development banks are also participating through public sector programs, such as is the Philippines Clean Technology Fund (CTF) managed jointly by the World Bank, the Asian Development Bank (ADB), and other regional development banks (IFC). Development agencies providing loans via the CTF include two World Bank group institutions, International Finance Corporation (IFC), International Bank for Reconstruction and Development (IBRD, and the Development Bank of Philippines (DBP).

As of July 2012, these banks agreed to provide $780 Million to the CTF, for renewable energy lending the over the next decade (

Table 1). This amount would finance 445 MW of projects with average capital expenditures (capex) of $2.5m/MW and a typical 7030 debt-equity ratio. This includes $250 Million each from the, IFC and IBRD. DBP has approved $180 Million of loans for renewable energy, including $20 Million specifically for solar power. The ADB has also committed $80 Million for solar energy in the Philippines.

TABLE 1: POTENTIAL PROJECT LOANS FROM DEVELOPMENT BANKS THROUGH CTF PHILIPPINES, $MILLION

Financing source	Renewable energy	Solar	Total
IFC Loans	250	0	250
IBRD Loans	250	0	250
DBP Loans	180	20	200
ADB Loans	0	80	80
Total	**680**	**100**	**780**

Source: Update as of July 2012 from Clean Technology Fund. Note: IFC=International Finance Corporation, IBRD=International Bank of Reconstruction and Development, DBP=Development Bank of the Philippines, ADB=Asia Development Bank.

Capital expenditure (capex) refers to investments for physical assets, such as equipment and property (land and buildings). In the electricity sector, capex is generally quoted as cost (such as US dollars) per megawatt of installed capacity ($/MW). Here capex mainly includes costs of, for example, solar modules, wind turbines, geothermal and/or hydro turbines and generators, with supporting systems as well as the project development cost (site assessment and acquisition).

Local commercial banks

Local commercial banks have provided 35% of total disclosed debt finance for renewable energy in the Philippines - $0.08 Billion out of $0.23 Billion Figure 15). Local commercial banks have focused on geothermal and hydro technologies. Rizal Commercial Banking Group and Bank of the Philippines Islands arranged the three most recent deals. Rizal provided a combined $27 Million loan for a small hydro project and a geothermal project in 2011. The Bank of the Philippines Islands financed one geothermal project in 2011, but the loan size was not disclosed (Table 2). China Banking Corporation has many local banks situated throughout the Philippines, although its headquarters are located outside the country.

TABLE 2: DEALS BY LOCAL COMMERCIAL BANKS IN THE PHILIPPINES

Banks	Year of last deal	Sector	Deals
Rizal Commercial Banking Group	2011	Small hydro, geothermal	26.7 (2)
Bank of the Philippines Islands	2011	Geothermal	ND (1)
Metropolitan Bank & Trust	2008	Small hydro	26.7 (1)
Philippine National Bank	2008	Small hydro	26.7 (1)
BDO UniBank	2007	Biomass	ND (1)
China Banking Corp	2007	Biomass	ND (1)

Source: Bloomberg New Energy Finance. Note: Numbers in the brackets denote the number of deals. ND=not disclosed.

Although local commercial banks have not been very involved in wind and solar projects so far, they are open to financing these projects. Bloomberg New Energy Finance learnt from interviews with local banks (Appendix C). Local commercial banks are confident that they would become comfortable financing these projects.

International commercial banks

International commercial banks have not yet Philippine financed renewable production in the Philippines because local banks have been financing geothermal and hydro power at a competitive cost. As wind and solar development are set to take off, international banks will see a great business opportunity arise and will draw on their experience in structuring project finance for this sector.

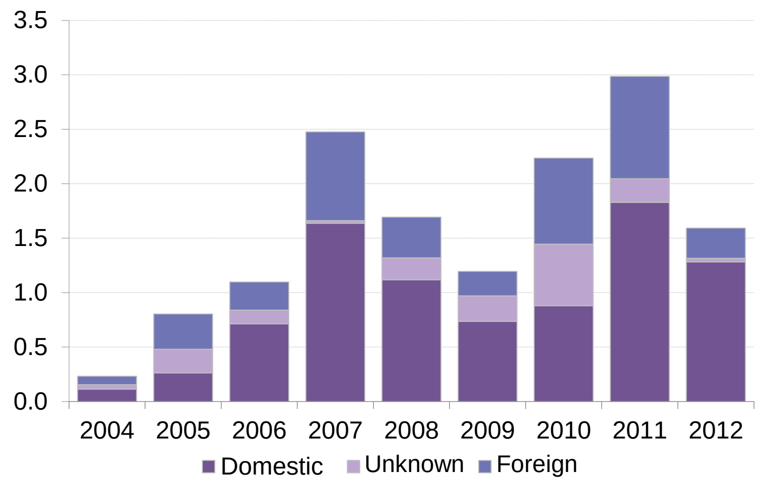
Leading international banks have expressed their interest in leveraging their knowledge of renewable energy for the Philippine market and their willingness to work with local banks in syndicating project loans (Appendix C). Standard Chartered and HSBC already entered it on talks with renewable power developers. The expertise of international banks will be essential at the early stages of the market's development.

Future sources of debt

The large reliance on development bank debt for renewable power in the Philippines is similar to that of other SE Asian countries. However, the global experience is very different. Over two thirds of global asset finance during 2004-12 was domestically driven (Figure 16). This includes both debt and equity provision.

The Philippines is transitioning towards a situation similar to the rest of the developed world where local domestic banks assume a much greater role in financing renewable projects.

FIGURE 16: SOUTHEAST ASIA ASSET FINANCE BY ORIGIN OF INVESTOR, 2004-2012, $BILLION

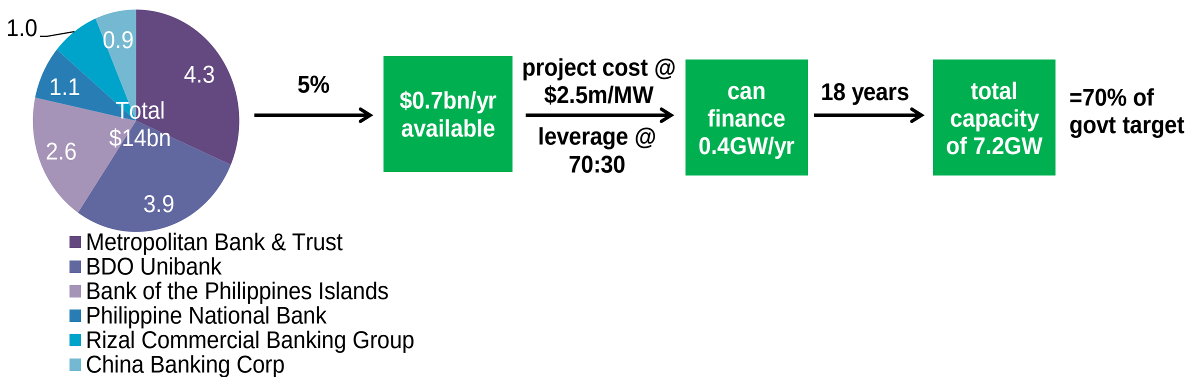


Source: Bloomberg New Energy Finance.

If Philippine banks financed two-thirds of projects in the Philippines, they would have to support close to 7 GW of renewables over the next decades, two-thirds of the 10 GW government target. The remainder would be financed through foreign banks, development banks and other financial institutions.

Figure 17 illustrates that Philippine banks probably have the financial strength to provide debt to these renewable projects. The six leading domestic commercial banks in the Philippines had $14bn of combined cash on their balance sheets at the end of 2012This is based on a debt-equity ratio of 70:30 and an average capital expenditure (capex) of $2.5m/MW.

FIGURE 17: TOTAL CASH AVAILABLE AT MAJOR PHILIPPINE BANKS FOR RENEWABLE ASSET FINANCE



Source: Bloomberg New Energy Finance.

The remaining one-third of financing can be obtained through development banks, foreign banks, and other financial institutions. As the leading development banks have promised to lend $780 Million through the CTF program, an additional $5 billion total would need to be sourced over the next 18 years from other financiers in order to meet the government renewable capacity target.

3.2.2. EQUITY

Large power companies have played a crucial role in providing equity for renewable power projects in the Philippines (Figure 10). In aggregate, they have provided $5 Billion in equity for existing renewable projects. This is based on assumptions on average project cost per MW and project equity ratios (Table 3).

TABLE 3: ASSUMPTIONS FOR HISTORIC PROJECT EQUITY INVESTMENTS

Type	Capex $/W	Equity %
Small hydro	2.5	30%
Geothermal	2.5	50%
Biomass	3	30%
Wind	3	30%
Solar	3	30%

Source: Bloomberg New Energy Finance.

More recently, private equity funds and social investment funds have shown increasing interest in equity in renewable power in other countries. However, pension funds that are active in financing renewable projects in northern Europe have not yet shown interest in financing this sector in the Philippines. To convince pension funds to play in this market, the scale of the market needs to be sufficient and policy incentives need to be in place to reduce the investment risk, including the foreign currency risks.

Private equity funds

Five private equity funds were currently actively exploring Southeast Asian renewable energy markets, including the Philippines (Table 4).They are expected to provide a total of $1.1 Billion in equity to the renewable energy sector in the region. These funds are likely to be distributed across Southeast Asia for risk mitigation purposes and the quantity that will go directly to the Philippines will depend on the perceived investment risk and opportunities in the country.

Private equity funds are increasingly interested in providing equity for renewable energy projects with a number of funds set up recently.

TABLE 4: EQUITY FUNDS ACTIVE IN SOUTHEAST ASIA'S CLEAN ENERGY SECTOR

Fund manager	Fund name	Type	Sector focus	Target size ($m)	Status
Not disclosed	Not disclosed	Private equity	Solar, Hydro, Wind, Geothermal	500 (with $400m closed as of Nov 2012)	Investing
Armstrong Asset Management	Armstrong South-east Asia Clean Energy Fund	Private equity	Solar, mini-hydro	150	Investing
Plektics	Plektics Asia Infrastructure Fund	Private equity	Renewables& other clean tech	200	Raising
Vigor Capital	Clean Energy Infrastructure Fund Asia	Private equity	Renewables & other clean tech	250	Raising
Bamboo Finance	Bamboo Energy Fund – Solar for All	Social investment	Solar	50	Raising

Source: Bloomberg New Energy Finance.

Social investment funds

Social investment funds active in Southeast Asia are increasingly interested in adding a renewable energy element to their investment portfolios. They concentrate on microfinance for small rural off-grid projects and mainly focus on countries like Myanmar, Cambodia and Vietnam. Bamboo Finance is a European social investment fund interested in the Philippine market; it has a $50 Million equity fund for solar projects (heating, grid, stand-alone systems). The Association for Sustainable and Responsible Investment in Asia (ASRIA) as part of the Global Investor Forum that emerged from the First Global Investor Forum on Climate Change held in Hong Kong in June 2013 also is committed to channelling financing to viable renewable energy projects in the region.

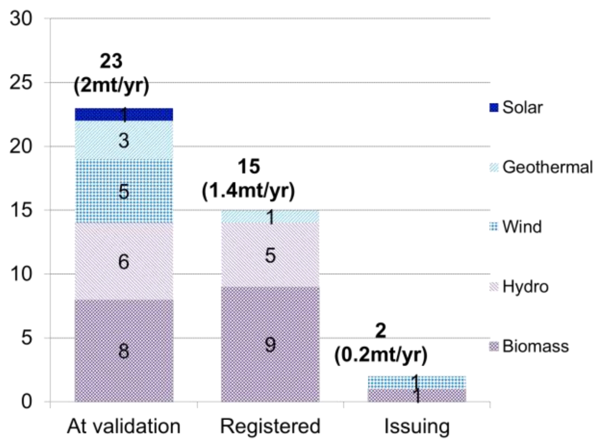
CDM Financing

Clean Development Mechanism (CDM) credits are not a financing method, but offer additional revenues during the project's operation period and have sometimes been structured for pre-payment of the capital costs. Five projects were approved and sales of GHG emissions verified by the CDM from 2006 to the present.

CDM has not proven to be an important source of financing for renewables in the Philippines and will not likely be in the foreseeable future.

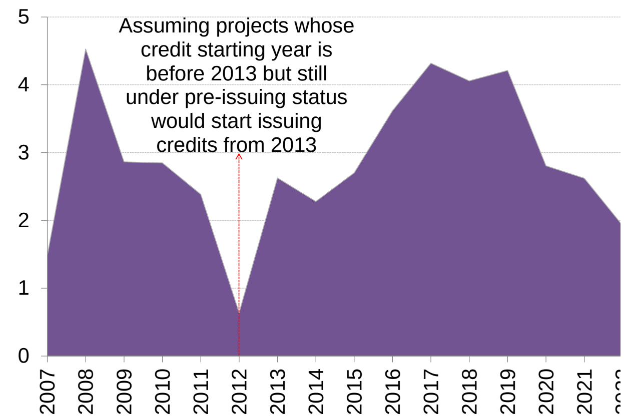
In the Philippines, only two renewable energy projects (Figure 18)—the Quezon-city biogas project and the North Wind Bangui Bay wind project – have received carbon credits for reductions of 57 kt/yr and 119 kt/yr since 2007 and 2008 respectively. The two qualified CDM projects would have received $2-4 Million/yr of revenues before 2012 (Figure 19). The estimated cumulative revenues of $0.8 Million as of 2012 were only 0.1% of total renewable asset financing in that period.

FIGURE 18: # OF CDM PROJECTS BY SECTOR AND STATUS, 2005-12



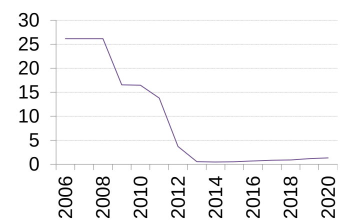
Source: UNFCCC. Compiled by Bloomberg New Energy Finance. Note: Numbers in brackets denote the total amount of carbon emissions reduced every year by the projects.

FIGURE 19: EXPECTED CDM REVENUE, 2007-24E



Source: UNFCCC. Compiled by Bloomberg New Energy Finance. Note: CER value is estimated on expected amount of carbon emission reduction and the average annual CER prices during 2007-24e. CER forward curve is used for prices after 2013.

FIGURE 20: CER PRICES 2006-20E, $/TCO2E



Source: Bloomberg New Energy Finance.

There is nevertheless a large pipeline of 38 CDM projects in the Philippines. As of November 2012, 23 of them were at validation and 15 were registered. However, the pipeline consists of a large chunk of delayed projects. Of the 38 pipeline projects, 26 were supposed to start issuing credits before 2013 but are still at the validation or registration stage. Delayed project development and the long validation process are understood to be the main reasons for few CDM projects issuing credits. Developers also complain about high transaction costs in terms of PDD preparation, validation, and certification, and insufficient local and regional validators.

The total carbon emissions saved every year by these pipeline projects are expected to reach 3.5 MtCO_2e (Figure 18). This would be 20 times the combined carbon emission reductions by the two issuing projects every year. However, if they would finally come online they would probably only receive the same amount of revenues ($2-4 Million/yr) each year as the two issuing projects. This is because the average certified emission reduction (CER) price crashed from $26/t$CO_2$e in 2008 to less than $0.5/t$CO_2$e in January 2013. Moreover, Bloomberg New Energy Finance projects that the future CER price is expected to be somewhere between $0.5/t$CO_2$e and $1.2/t$CO_2$e (EUR 0.4-0.9/t$CO_2$e) over the next few years (Figure 20).

In short, the CDM has failed to contribute to financing renewables in the Philippines in the past and is now losing its function.

3.3. COST OF FINANCING

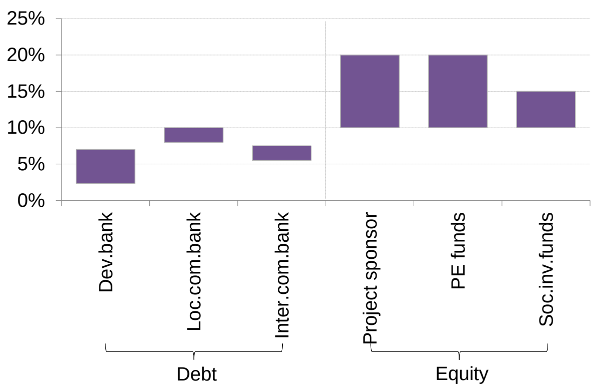
Project sponsors and private equity funds typically require 10-20% of project equity returns, and local commercial banks charge 8-10% of interest rate on project debt.

The cost of debt for renewable power varies by project size, loan duration, and risk guarantees, not by technology. For renewable energy projects in the Philippines, the interest rate charged by local commercial banks in the Philippines is normally

8- 10% per annum. Local commercial banks charge a small premium (50-75 basis points --r 0.50-0.75 percentage points) for projects in Mindanao to reflect higher risks associated with Mindanao's less developed infrastructure, lower electricity prices than in Luzon and Visayas, and greater political instability. Development banks offer lower debt financing rates, which vary from concessional rates of 2-3% per annum to near commercial rates of 6-7% per annum (Figure 21). International commercial banks charge on average 5.5-7.5% per annum.

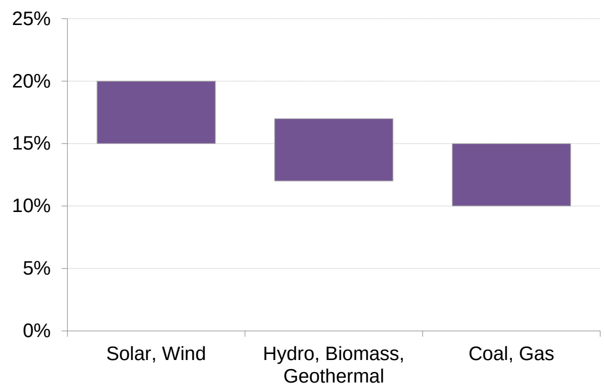
The opportunity cost of equity is the expected rate of return foregone from the alternative use of the funds with the highest return. The cost of equity typically ranges from 10-20% for project sponsors and private equity investors per year (Figure 21). For social investment funds the expected return on capital is t 10-15% per year. This return is normally achieved through the future cash flows of the project and/or sale of the assets.

FIGURE 21: COST OF CAPITAL BY FINANCING SOURCE IN THE PHILIPPINES



Source: Bloomberg New Energy Finance.

FIGURE 22: EXPECTED EQUITY RETURNS ON RENEWABLE VERSUS CONVENTIONAL PROJECTS IN THE PHILIPPINES



Source: Bloomberg New Energy Finance.

The cost of capital is typically 5 percentage points higher for renewable energy projects than conventional coal and gas fired electricity production due to the additional perceived technology risk Expected equity returns on wind and solar projects are 15-20%, about five percentage points higher (Figure 22). Equity investors are often willing to accept a lower return of 12-17% per year on hydro, geothermal, and biomass projects as they use more mature technologies. Biomass projects may require returns at the higher end of this range due to its long-term feedstock supply risk.

3.4. KEY FINANCING CONSIDERATIONS

Financing providers usually consider the factors shown in table 5 h when evaluating a renewable power project's requirement for finance (**Error! Reference source not found.**).

- **Financing size:** Banks generally prefer lending at least $25Million per project due to the transaction costs of making a deal. For loans up to $25-50 Million, banks are generally prepared to lend on their own. For loans over $50 Million, banks often prefer to syndicate the loan with a few other banks. Equity investment offers vary with the funds' size and strategies. Private equity funds are typically interested in investments of $25-75 Million, while social investment funds are interested in the much lower range of $0.25-2.0 Million. See Table 5 below for some general attributes of financing renewable projects.

- **Project return or debt service coverage ratio (DSCR):** Equity investors are interested in potential project equity returns, whereas banks are concerned with the ability of borrowers to repay their loans through a project's future cash flows (the debt service coverage ratio). Private equity funds typically look for 10-20% annualized returns on equity for renewable power projects. Social investment funds have lower requirements for project returns on equity and are generally comfortable with a minimum of 10-15 percent. Both development banks and commercial banks require a DSCR of at least 1.2 under a P90 scenario. A P90 scenario estimates the energy a wind turbine is 90% likely to produce over an average year, given the uncertainties in the measurement, analysis and wind turbine operation.

- **Payback period or loan tenure:** Private equity investors often expect to exit from their investments in 3-5 years, but may accept a slightly longer payback period[2] for geothermal projects due to their longer development process. Social investment funds have y looser requirements on payback period which can be as long as 10 years. Commercial banks currently allow 7-12 years for repayment of loans for renewable energy projects. Development banks are often willing to provide loans for up to 15 years for most renewable power and 30 years for geothermal projects.

Table 5: Key financing considerations

Type of financier	Debt/ equity	Average size of financing ($m)	Project return	DSCR under P90	Payback period (years)	Loan tenure (years)	FiT & PPA	Grid connection
Development banks	Debt	30	NA	1.2-1.3	NA	15-30	Yes	Yes
Commercial banks	Debt	25-50	NA	1.2-1.4	NA	7-12	Yes	Yes
Private equity funds	Equity	25-75	15-20%	NA	3-5	NA	Flexible	Flexible
Social investment funds	Equity	0.25-2.0	10-15%	NA	10	NA	Flexible	Flexible

Source: Bloomberg New Energy Finance. Note: DSCR = debt service coverage ratio

FiT, PPA and grid connection agreements are important for securing project debt but not for raising project equity.

FiT or PPA: A power purchase agreement (PPA) is a contract between a power producer and a purchaser for the sale of the electricity on commercial terms. It typically includes the amount, price, and period of sale for the electricity. A FiT is a policy mechanism offering renewable electricity producers a long-term contracts at a fixed, minimum price (guaranteed by the government). Banks are generally only willing to consider lending to projects with evidence of a FiT or PPA. Equity funds, which can invest in riskier ventures, only require some indication that a project may obtain a FiT or PPA in the near term. Since the FiT is guaranteed by the government for a long period of time (20 years for the Philippines) and tends to be higher than a PPA so it is generally preferred by producers and financiers.

[2] Payback period refers to the period of time required for the return on an investment to "repay" the sum of the original investment (i.e. an investor to recoup their original investment).

- **Grid connection agreement:** Banks may require the existence of a grid connection agreement before they will commit to lending for electric power production. Equity funds may be more flexible about this as they understand their investment is needed at the early stage of project development and a grid connection agreement might not be ready at that time.

Sources of funding place great importance on the quantity and quality of an applicant's project development experience. Local experience is often more highly valued than experience elsewhere. In some cases, banks may waive PPA and grid connection agreement requirements for projects of experienced developers who can demonstrate a strong likelihood of obtaining these in due course.

3.5. CONCLUSIONS

Sufficient debt and equity capital is likely to be available for renewable energy development in the Philippines. Additional debt is available through international commercial banks or development banks. In addition, the private equity funds currently active in Southeast Asia are able to fund 1.5GW of projects. Additional equity can be provided by local power companies.

Sources of financing are ample and domestic commercial banks and international private equity funds will become increasingly involved in financing renewables.

Most local banks in the Philippines have already expressed their willingness to fund renewable energy. Although they charge higher interest rates than international banks, the cost is similar to that of loans for conventional power production in the Philippines.

However, renewable power project development progress has been slow with very few projects financed to date, given primarily the institutional barriers concerning the application and eligibility criteria for projects to receive bankable FiT and PPA approvals. Local banks claimed that they have received few requests to finance renewable energy projects over the past few years. Project developers explained that this was due to a lack of policy clarity, although the macroeconomic environment may also have been a factor. Potential equity investors indicated that policy uncertainty has led them to focus on investments elsewhere in Southeast Asia despite the large potential in the Philippines.

The following sections will examine the current renewable energy policies in the Philippines and assess changes needed to promote rapid expansion of the renewable power production.

4. INVESTMENT INCENTIVES

4.1. INVESTMENT INCENTIVES

The Philippines was the first country in Southeast Asia with a comprehensive legal framework to promote renewable power. In 2008, the Renewable Energy Act authorized a feed-in-tariff (FiT) and other fiscal incentives such as income tax holidays and import duty and VAT exemptions (Table 6). Of these, the FiT was considered to be the most effective incentive because it is supposed to offer a high and stable price to renewable electricity generators. However, implementation of the policy was delayed until July 2012, when the FiTs were finally approved by the Energy Regulatory Commission (ERC). Discussions on other supporting policies are also now back on the government's agenda.

TABLE 6: SNAPSHOT OF THE PHILIPPINES' RENEWABLE ENERGY INCENTIVES

Status	Type of incentives	Description
Current	Tariff	Feed-in-tariff mechanism was promulgated under Renewable Energy Act 2008 in 2008 and the specific FiT rates for wind, solar, biomass and run-of-river hydropower were approved in July 2012.
	Taxation	7 year income tax holiday and 10 % corporate tax rate after income tax holiday (compared to the normal 35%); 10-year import duty free for machinery, equipment and materials; 1.5% realty tax cap on original cost of equipment and facilities to produce renewable energy; 7 year net operating loss carry-over; accelerated depreciation; VAT exemption on the whole process of exploring, developing and selling renewable power; general tax exemption on the sale of carbon credits; tax credit on domestic capital equipment and materials.

Source: Bloomberg New Energy Finance.

4.1.1. FEED-IN TARIFF

FiTs were significantly lowered from the initially proposed levels, but provide incentives for renewable energy development.

The FiT rates approved by the Energy Regulatory Commission (ERC) are substantially lower than originally proposed by the National Renewable Energy Board (NREB). This change was made to reflect reductions in the costs of renewable power technologies in recent years. The final solar FiT was almost halved to \$0.23/kWh, while the wind FiT was reduced by 18% to \$0.20/kWh (Table 7). The FiTs for biomass and small hydro were cut slightly and were set at around \$0.16/kWh and \$0.14/kWh respectively. As the cost of electricity generated by biomass and small-hydro power is much lower than that of solar and wind, their FiTs are also lower.

TABLE 7: APPROVED FIT IN 2012

Sector	Capacity cap (MW)	Approved in 2012		Period
		PHP/kWh	$/kWh	
Solar	50	9.68	0.23	20 years
Wind	200	8.53	0.20	
Biomass	250	6.63	0.158	
Small hydro	250	5.90	0.14	
Marine	10	Pending		

Source: Electricity Regulatory Commission (ERC) of the Philippines. Compiled by Bloomberg New Energy Finance. Note: PHP/USD exchange rate = 41.97 on 31 July 2012. NA=not applicable.

The DOE issued a circular in 2011 to cap the FiT allowance for the first three years (2013-15) to 200 MW for wind, 50 MW for solar, 250 MW for biomass, 250 MW for small-hydro and 10 MW for marine (

Table 7). The capacity cap was adopted in part because GPH expressed concerns about the perceived but not proven impact of intermittent renewable power on the stability of the country's grid. The perceived high incentives and hence potential costs of the FiT scheme may have also contributed to the capacity cap.

The GPH was considering a "first-commissioned, first-served" approach. This approach will provide FiT agreements and approval to the first set of projects that go operational up to the maximum capacity allowed for each type of renewable power.[3] The Philippines is one of the first (and perhaps only) countries to take this approach to FiT approval. In other countries, FiT approval is awarded once a project has obtained the required project permits, finalized its grid connection feasibility study, and obtained lending in principal letters from its financiers. As previously mentioned, by delaying assignment and approval of the FiT to any project, as in the Philippines, puts significant risks on project developers and delays investment given the inability to obtain project financing and PPAs without projected revenue streams.

A FiT schedule over future years will be valid for any project over a 20 year lifetime according to ERC Resolution No.16, series of 2010, but will be retroactively subject to reduction in anticipation of future cost reductions for some renewable energy technologies. In addition, the FiTs will be subject to review and adjustment in 2015 or when the capacity caps set by the DOE are met.

The biggest impediment currently is that the policy has only been approved and has not yet been implemented. The FiT rules issued by the ERC in 2010stipulated the following key implementation mechanisms, which were still pending:

- **FiT eligibility**: How projects will be selected to receive a FiT was not defined, whether this will be on a first-commission-first-serve basis or another process.
- **FiT fund**: A FiT fund will be set up to collect a uniform charge on electricity consumers. This will provide the necessary budget to cover the difference between the FiTs and the currently recoverable generation cost.
- **Centralised FiT payment method**: The National Grid Corporation of the Philippines (NGCP) is obligated to pay FiTs to eligible renewable power plants as the administrator of the FiT fund.

Although these rules were finalised back in 2010 their actual implementation is still pending and need to be completed promptly since the ERC has announced the FiT levels. Once these mechanisms are in place the Philippines will be able to implement the FiT to encourage renewable power production.

4.2. IMPACTS OF NEW FIT

4.2.1. FIT VERSUS WHOLESALE ELECTRICITY PRICE

The average wholesale electricity price in the Philippines on the spot market (WESM) was $0.16/kWh for the 12 months ending November 2012). The wind and solar FiTs are 31-44% higher than the wholesale power price to provide greater incentives for solar and wind development (Figure 23). By contrast, the FiTs for biomass and small hydropower are actually lower than the average wholesale electricity price despite usually being higher than average grid-avoided generation costs. Nevertheless, the long-term price stability offered by the FiTs does provide some incentive to developers compared to selling their electricity directly on the wholesale market rather than into the grid. Geothermal projects are not eligible for the FiT and their economics will have to work with wholesale electricity prices.

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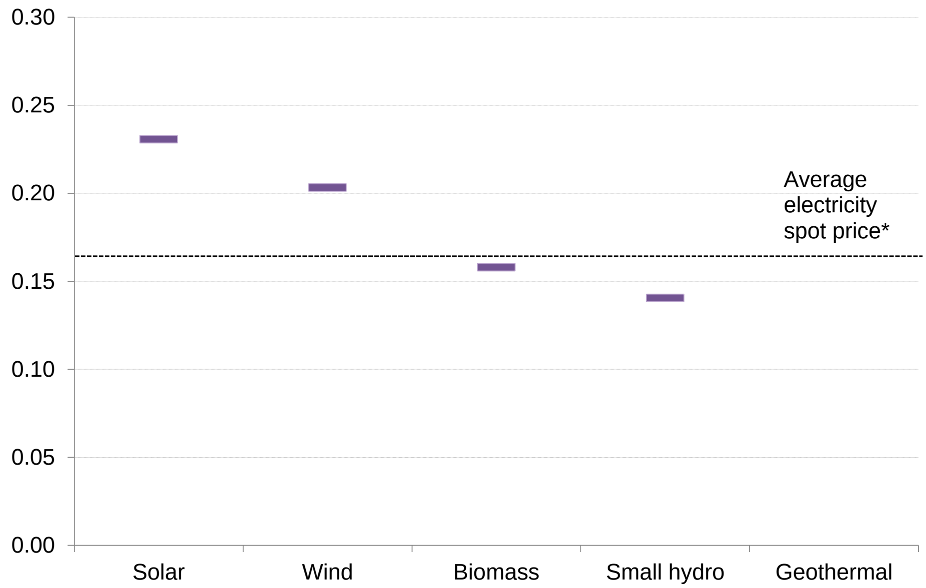
[3] In the Philippines the approach is referred to as first-come-first-served, but for clarification purposes we maintain the first-commission-first-serve terminology.

FIGURE 23: PHILIPPINES RENEWABLE POWER FIT VERSUS AVERAGE WHOLESALE GRID POWER PRICE, $/KWH



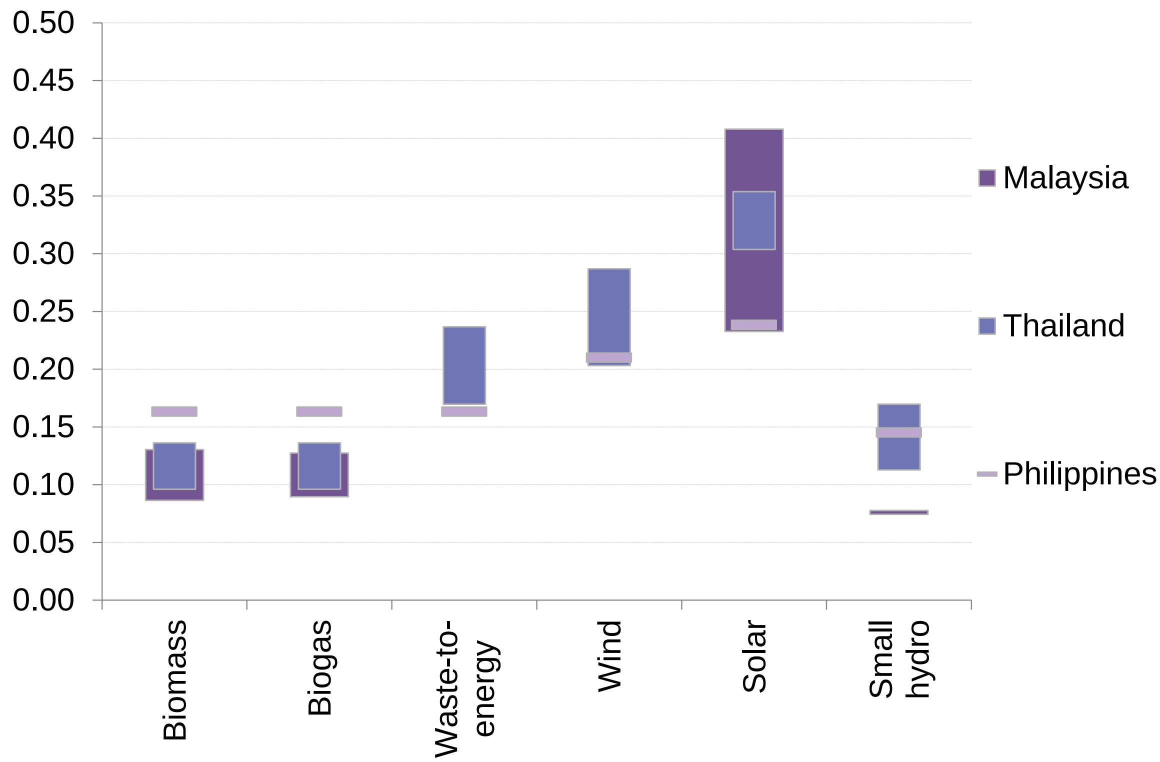
*Source: FiTs from ERC, Philippines; Average electricity price from WESM. Compiled by Bloomberg New Energy Finance. Note: *Trailing 12-month average electricity spot price as of Nov 2012. Geothermal is not eligible for FiT.*

4.2.2. FIT COMPARISON WITH NEIGHBORING COUNTRIES

The Philippine's renewable energy FiT varies by energy type, but not project size or location. This is called a flat FiT., Malaysia and Thailand offer higher FiTs for small-scale renewable energy projects and lower ones for large-scale projects. Thailand also provides higher tariffs for projects located in three southern provinces (Yala, Pattani and Narathivath).[4]

The Philippines' wind and solar FiTs are close to those offered to large-scale wind and solar projects in Malaysia and Thailand (Figure 24). The Philippines' biomass energy FiT is similar to the one offered to large-scale waste-to-energy projects in Thailand, but higher than the FiT for biomass and biogas projects in Malaysia and Thailand. The Philippines' small-hydro FiT is in line with the levels in Thailand (0.11-0.17 $/kWh), but higher than the one in Malaysia (~$0.075 $/kWh) (Figure 24). Any of these differences can be explained by country-specific conditions, other cost assumptions made as well as varying priorities for renewable project development.

FIGURE 24: FIT COMPARISONS FOR THE PHILIPPINES, MALAYSIA, AND THAILAND, 2013($/KWH)



Source: Bloomberg New Energy Finance. Renewable Energy Act 2011 for Malaysia; Energy Development Plan 2010 -2030 for Thailand; ERC of the Philippines. See

Appendix D: Feed-in tariff rates in Southeast Asia

[4] Note that we use the term FiT for Thailand here although technically it has an 'adder' system, which ensures a renewable premium on top of the electricity price.

4.2.3. FIT VERSUS LCOE

The levelized cost of electricity (LCOE) is the price of electricity ($/kWh) that is required for a technology to ensure that the project is financially viable. Whether the project is financially viable depends on investor expectations in an economy and sector. Here, we have assumed a minimum acceptable rate of return (hurdle rate) for the Philippines of a15% internal rate of return (IRR) on equity (

Appendix E: LCOE methodology).

Total project costs include capex (development, equipment, and balance of plant (BOP) costs), financing costs, and operation, maintenance, and replacement costs over the project life less salvage or end of project value. The "balance of plant" (BOP) refers to components such as blowers, compressors and pumps, which are necessary but not primary components. For solar systems, the BOP includes inverters, the ground mounting system, electrical systems, and roads. For wind, BOP costs include foundation works, electrical systems, and roads.

Another factor that is particularly important is the cost of connecting the project to the grid, which must be borne by the renewable power project in the Philippines, unlike many other countries; As a result, the grid connection costs in Table 8 have been incorporated in the LCOE analysis in Table 8 This analysis assumed that biomass, small-hydro and solar projects will be sited near established transmission substations while wind and geothermal projects will typically be further away. We used an average grid construction cost of $0.7m/km, which is the cost for an extended 138-kV line and required transformers. Section 5.2.2 contains a more detailed grid connection cost analysis .Grid connection costs may differ greatly across projects

TABLE 8: ASSUMED GRID CONNECTION COST

Type	Project size (MW)	Grid connection distance (km)	Grid connection cost ($m/MW)
Biomass	15	5	0.23
Small hydro	10	10	0.70
Solar	20	10	0.35
Wind	40	40	0.70
Geothermal	40	30	0.53

Source: Bloomberg New Energy Finance.

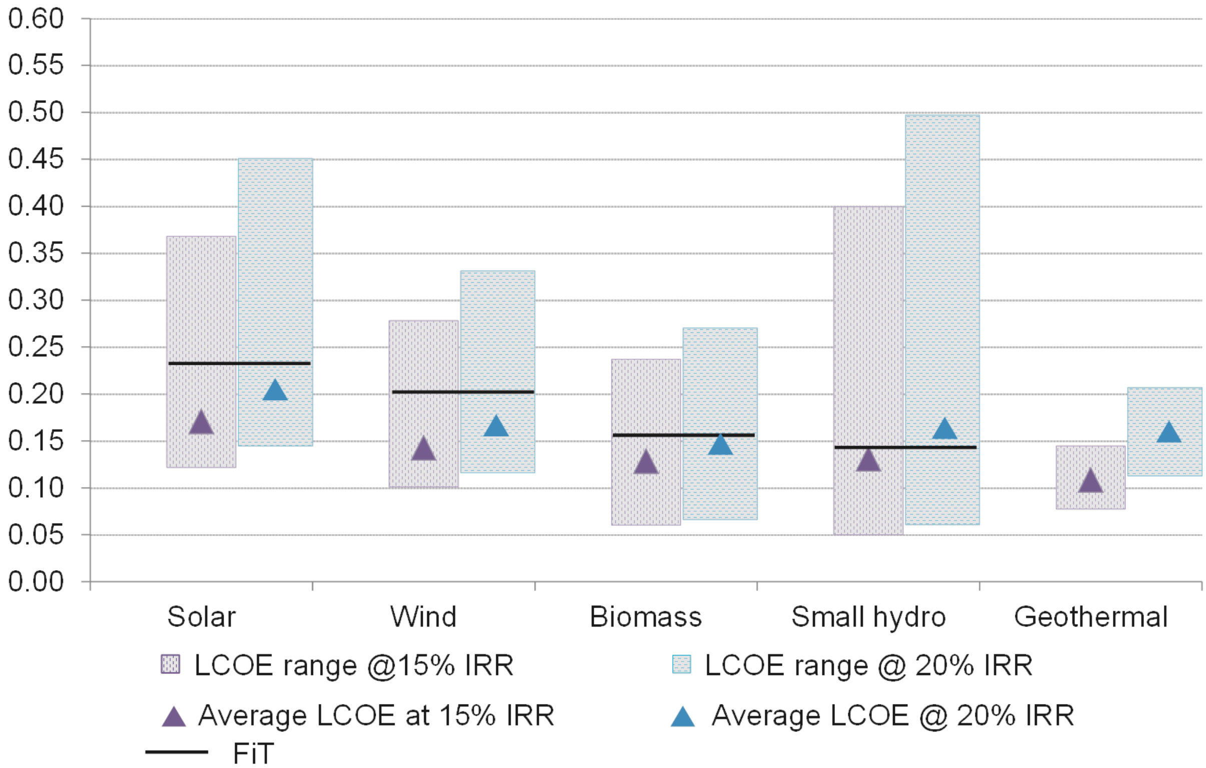
Figure 25 shows the LCOE ranges for the Philippines including low and high scenarios. The average LCOE is the most common cost level that can be found in the country. At an IRR of 15%, the LCOEs of the main renewable power technologies follow:

- Solar: $0.12-37/kWh, with an average of $0.17/kWh
- Wind: $0.10-28/kWh, with an average of $0.14/kWh
- Biomass: $0.06-24/kWh, with an average of $0.13/kWh
- Small hydro: $0.05-40/kWh, with an average of $0.13/kWh
- Geothermal: $0.08-15/kWh, with an average of $0.11/kWh

If the minimum required return on equity is increased from 15% to 20%, the LCOE for biomass increases less than 15% while the solar, wind, small-hydro LCOEs increases 15-20% and the geothermal LCOE rises 45 percent. Except for small-hydro, the FiT level is higher than the LCOE under both hurdle rate scenarios.[5] These are the main technologies being broadly deployed in the world and also the Philippines.

[5] Note that solar, here, represents only photovoltaic (PV) technology; wind represents onshore wind, biomass represents incineration technology; and geothermal represents flash technology.

FIGURE 25: PHILIPPINE 2012 FITS VERSUS LCOE, $/KWH



Source: ERC. Bloomberg New Energy Finance. Note: Geothermal is not eligible for FiT.

4.2.4. LCOE SENSITIVITY ANALYSIS

With lower equipment costs already seen in the international market the solar LCOE would drop to $0.14/kWh.

Since a technology does not have a single LCOE, it is important to understand how the underlying cost components affect the LCOE. In particular, policymakers need to set the right FiTs to reflect any changes in the cost of deploying renewable energy. This is particularly important for solar and wind power projects because they are relatively new technologies that are more likely to have lower equipment costs and capacity factor improvements over time.

System costs

The LCOE for solar PV declines from $0.17/kWh to $0.14/kWh with a 30% reduction in system module and balance of plant costs (figure 26). PV module costs would need to come down from $0.8/W to $0.6/W to achieve this savings. Chinese solar modules are already selling at $0.6/MW, which means the $0.14/kWh solar LCOE should be realized. LCOEs of $0.13/kWh for solar PV have already been achieved in Thailand.

If the total cost of wind turbines fell by 30% (from $1.1/W to $0.8/W), the LCOE would decline from $0.14/kWh to $0.12/kWh. Turbine prices have been stabilizing and although a slight decrease is expected by BNEF analysts in 2013, this analysis does not expect the wind LCOE in the Philippines to drop much further in over the next five years.

Capacity factor

The LCOE for solar PV drops from $0.17/kWh to $0.15/kWh if the capacity factor increases from 18% to 20% (Figure 27). It may however take years for manufacturers to supply solar modules with an efficiency of 20% for $0.8/W. If the wind capacity factor increases from 25% to 30%, the LCOE falls from $0.14/kWh to $0.12/kWh. The Philippines has identified locations for wind projects that can be operated at a 30% capacity factor.

FIGURE 26: SENSITIVITY OF WIND AND SOLAR LCOES TO SYSTEM COST

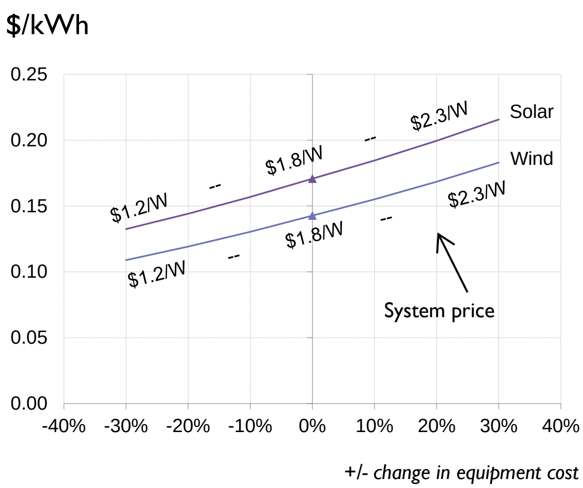
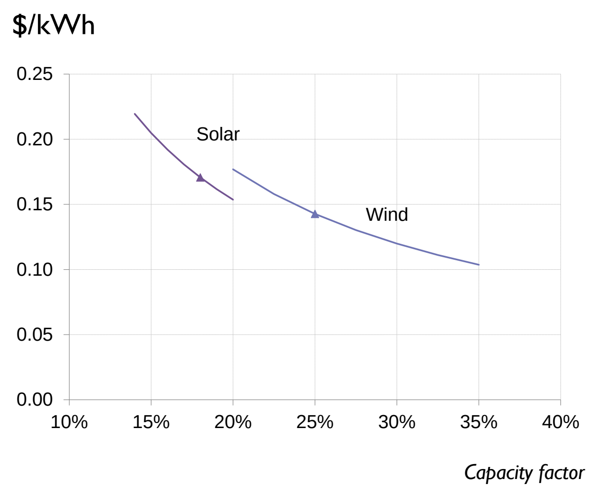


FIGURE 27: SENSITIVITY OF WIND AND SOLAR LCOES TO CAPACITY FACTORS



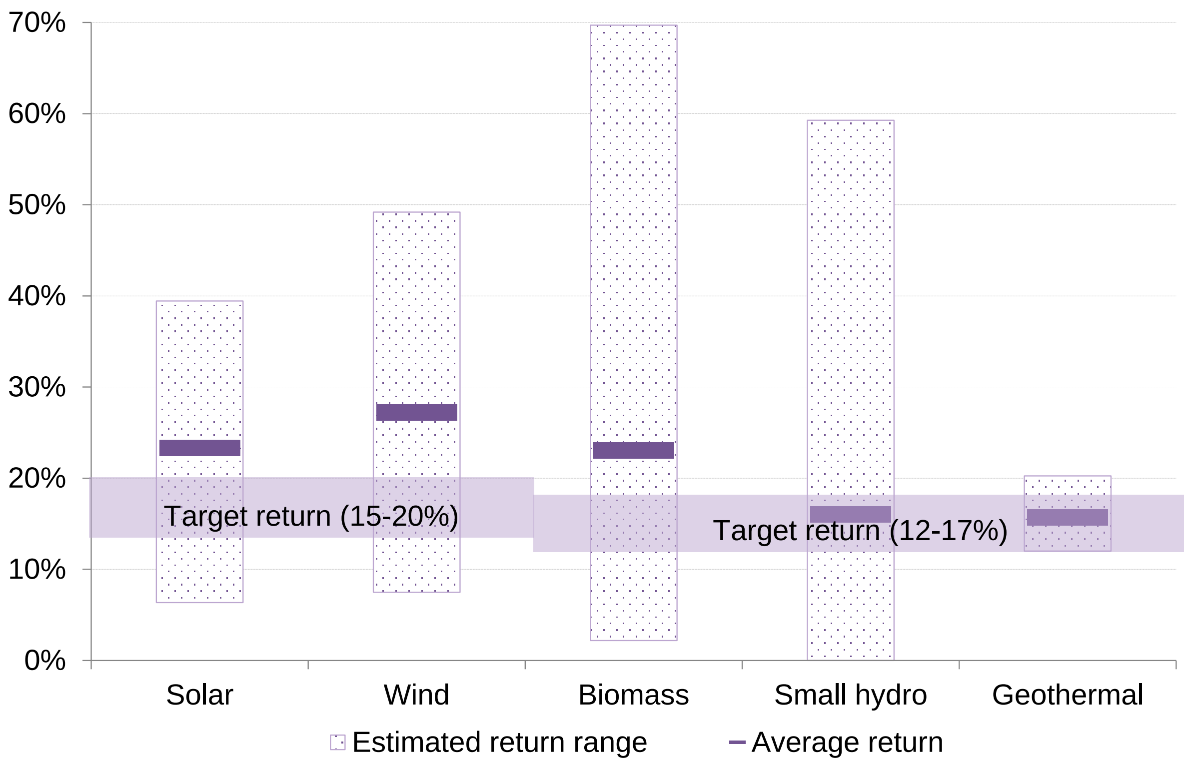
Source: Bloomberg New Energy Finance.

4.2.5. PROJECT RETURNS UNDER FIT PROGRAM

The calculated project equity returns offered by the FiTs meet or exceed investors' target returns on these projects. The average project equity returns are calculated based on average costs and the applicable FiT, assuming that all projects are awarded a FiT. Whereas the LCOE analysis assumed a specific IRR), this calculation assumes the FiT rate as revenue stream ($/kWh) and then calculates the IRR –essentially the process in reverse. The latter analysis shows that maximum values achievable if a project were to be awarded a FiT – which may not be the case for projects unless they can be operationalized prior to reaching the renewable technology cap.

Figure 28 presents the return ranges possible for different renewable technologies assuming that all projects can actually obtain the current FiTs. For geothermal there is no FiT rate so we assumed the average of geothermal PPA prices in 2012 and spot electricity prices at WESM during the 12 months ended November 2012: $0.12/kWh. The average returns for wind and solar power projects are 27% and 23%, respectively, higher than the investors' expected return range of 15-20 percent. Those for biomass, geothermal and small hydro projects are 23%, 16% and 16%, respectively, close to or above the investors' expected returns of 12-17%. It should be noted that rate of return analysis is very project-specific. The illustrative analysis here represents an average return.

FIGURE 28: RANGE OF ESTIMATED RETURNS ON EQUITY FOR RENEWABLE POWER PROJECTS IN THE PHILIPPINES VERSUS MINIMUM RETURNS TARGETED BY INVESTORS



Source: Bloomberg New Energy Finance. Note: estimated return range is the calculated project equity return range based on BNEF's estimated LCOE and the FiT in respective project scenarios except for geothermal an average of geothermal PPA prices in 2012 and spot electricity prices at WESM in 12 months ended Nov2012 is applied. Target return range is collected from BNEF surveys with investors.

Note that these returns already incorporate the grid connection cost assumptions (Section 4.2.3). Hence, projects closer to the grid will attract higher returns while those that are further away will have lower returns. For example, high connection cost required for a remote wind site would reduce equity returns such that it could come in line or even below the required threshold for investment.

Potential equity returns at current costs and FiT levels are close to or meet investors' minimum expectations.

Although the average return on biomass projects seems high under the current FiT, the difficulty of securing long-term feedstock has made investors hesitate to invest in the sector. The biomass pipeline is only 284MW at present, the smallest among the others renewables.

4.2.6. OTHER SUPPORTING POLICIES AND MECHANISMS

The FiT is key to renewable electricity development from the supply side. Policies requiring utilities to accept renewable electricity in their distribution networks are also important from the demand side. In addition to authorizing the FiTs, the Renewable Energy Act of 2008 introduced two key supporting policy frameworks for the demand side:

- **Renewable Portfolio Standard (RPS)**: Utilities are required to source a certain percentage of their electricity from renewable energy sources (to be decided by the DOE). This will ensure that project developers can sell the renewable electricity generated. The RPS targets were still under consideration and had not yet been finalized by October 2013 The DOE is also finalizing eligibility criteria.
- **Net metering**: Distribution utilities are obliged to enter into net-metering arrangements with qualified end-users of renewable energy electricity. This means that utilities are obliged to procure any renewable electricity that end-users produce and cannot consume themselves. A net metering rule submitted by NREB is waiting for DOE approval. In addition, the NGCP and distribution utilities are required to give priority to renewable power plants in making connections to the national transmission and distribution grid.

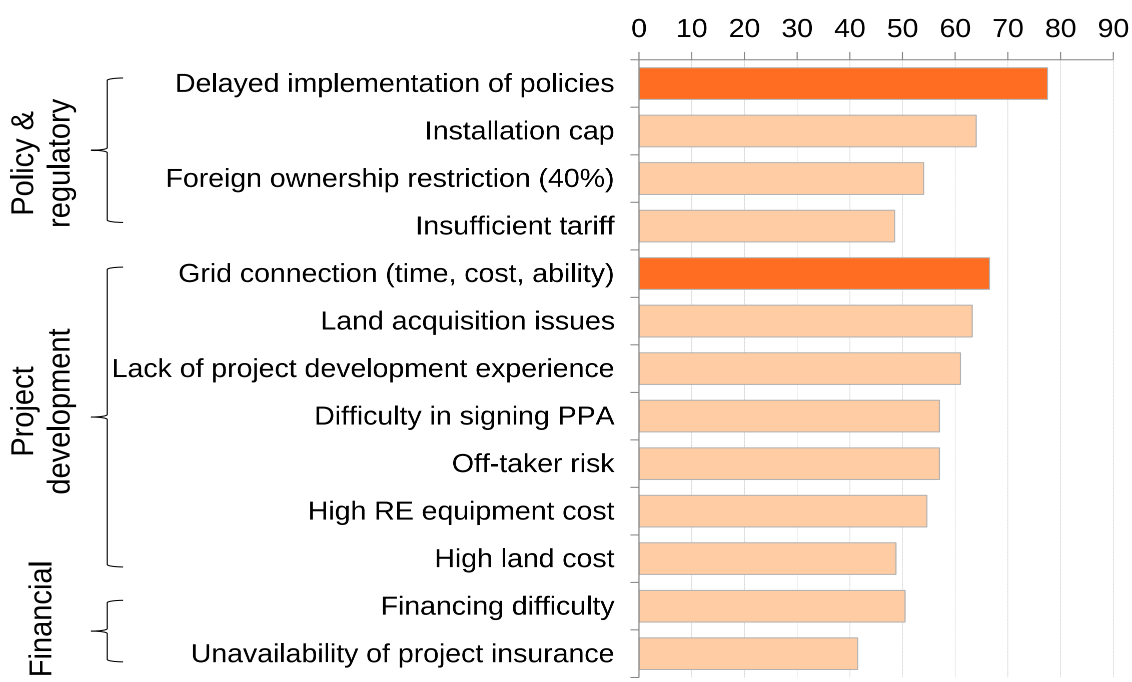
5. INVESTMENT BARRIERS

5.1. OVERVIEW

Bloomberg New Energy Finance surveyed 15 different organizations with one respondent per organization, including leading project developers, banks, equity funds, utilities and policymakers to identify the key barriers to renewable energy investment in the Philippines (Appendix C). The surveys were conducted through telephone interviews, with a sample of one individual per organization. Each organization was asked to rate the key barriers from one to six, with six representing the most important barriers. Interviewees were also free to specify any barriers that were not listed in the questionnaire. Since each of the 15 organizations was weighted equally, the maximum score for each potential barrier was ninety.

Delayed implementation of policies, grid connection issues, the FiT cap, land acquisition problems, and lack of project development experience were the most important constraints identified by the respondents. Financing was regarded as less of a barrier (Figure 29).

FIGURE 29: PERCEIVED RENEWABLE ENERGY (RE) INVESTMENT BARRIERS IN THE PHILIPPINES FROM SURVEY



Source: Bloomberg New Energy Finance.

5.1.1. POLICY & REGULATORY BARRIERS

Delayed implementation of policies

The Philippines has FiTs, a Renewable Portfolio Standard (RPS), and a net-metering program to support the renewable energy sector. However, delayed implementation of these policies resulted in lower incentives for investors to get involved in the country's renewable energy market to date. All interviewees agreed that the implementation of the FiT will be the key to accelerating renewable energy project development.

> ***The lack of policy implementation is the most important reason for slow renewable power development in the Philippines.***

The following implementation issues will need to be resolved before investments in renewable power are likely to be scaled up:

1. **Definition of how projects will be awarded the FiT**, whether this will be on a first-commissioned, first-served basis, an auction or through a selection process based on certain project criteria. This is a very important consideration for developers and financiers because of the low cap on FiTs. The implementation of a first-commission-first-serve approach will lead to uncertainty for investors and will therefore result in a much slower development of the country's renewable market.
2. **The exact FiT application procedure needs to be published.** It is not yet clear which authority handles FiT applications, which steps need to be followed and what documents are required.
3. **The FiT payment method needs to be determined.** The FiT rules from 2010 already specified a centralized FiT payment method with the NGCP as the FiT fund administrator that pays the full FiT to eligible renewable power generators (section 4.1.1). However, discussions were taking place on whether Transco, instead of NGCP, should be the FiT fund keeper as it is the owner of national transmission assets.
4. **Raise or remove the FiT caps.** To encourage greater risks by project developers, increasing the renewable power production caps would provide greater incentives for investors and financiers to go into the renewable power market.

In addition, there is continuing uncertainty as to whether the FiT should be paid in two parts with the conventional power price coming from WESM, and the difference between the conventional power price and the FiT rates coming from the FiT fund. These debates will delay the implementation of the existing rules and may potentially result in formulating new rules and therefore continued uncertainty.

Having a functional RPS and net metering programs would also be useful, but are likely to be f less important than the FiT for kick-starting renewable power investments.

Experience of India and China indicated that these supporting mechanisms were not essential if there was an effective FiT policy, even if the price was a low cap. These countries had successful take-offs of renewable energy sectors without an RPS or net metering over the past 5+ years. Chinas tripled its renewable capacity to 129GW by 2011 following the Renewable Energy Law in 2005, a wind FiT and Golden Sun subsidy provided for solar projects in 2009, and more recently a solar FiT in 2012. India's renewable capacity has risen 50% over the past five years to reach 25 GW since the government instituted generation based incentives, favorable tax benefits, and various states followed with beneficial

FiTs.[6] The most urgent tasks at present are to make clear which projects would qualify for the FiT, how the FiT is applied, who pays for the FiT, and how and when it is paid to the project owner.

The installation cap under the FiT was a key policy barrier identified by the survey respondents. . The current installation cap under the FiT only covers 10% of the current project pipeline and will limit renewable energy development in the immediate term. Developers of the remaining 90% of projects would have to take the risk of investing without the FiT or wait until the cap is lifted. Despite the country's high electricity prices, financing these projects without a FiT or securing good PPAs would be a major challenge.

Foreign investors also raised the 40% foreign ownership restriction on power projects as one of the main barriers. Both foreign financiers and local project developers thought the 40% restriction limited foreign investment.

Another barrier is the many signatures required to obtain approvals at all levels of government: federal, provincial and municipal.

5.1.2. PROJECT DEVELOPMENT BARRIERS

Grid connection

Obtaining a grid connection was the biggest concern among the project development-related barriers because the grid network coverage in the Philippines is limited and the project developers often have to bear the grid connection cost. The current grid system does not cover some remote areas far from demand centers where good renewable energy resource areas may be available. Connecting a project to the nearest transmission or distribution line may require building new corridors and extensive connecting roads, rather than simply extending transmission lines. As a result, grid connection costs will be relatively high and the project construction time may be long (Section 5.2.2).

Unlike in other SE Asian countries where utilities bear grid connection costs, in the Philippines, project developers bear this cost. Although there is a possibility for project developers to sell their gridlines to the NGCP to recoup their initial investment, the upfront investment required for building gridlines increases the project risks. Even the project developers who can afford these additional costs may hesitate due to the additional cash flow pressure.

> ***Limited national grid coverage and connection costs are barriers to project development.***

Land acquisition issues were considered important because renewable energy resources in the Philippines are often located on land used or controlled by indigenous peoples. The process of acquiring those lands is complicated when dealing with numerous local communities and authorities. In addition, security was mentioned as a problem in some areas, such as Mindanao.

Lack of project development experience was also viewed as a key barrier. Solar and wind power are considered new technologies in the Philippines. There have only been a few demonstration solar and wind power projects, which were constructed eight years ago. No local developers have any recent experience in building solar and wind projects. , Development of geothermal projects was dominated by a few large companies such as EDC and Chevron. For the latter corporations, a lack of experienced technicians and management teams has emerged in the recent years as a barrier rapid project development.

[6] State utility boards set the FiTs.

5.1.3. FINANCIAL BARRIERS

Consistent with conclusions reached in Section 3.6, the respondents almost unanimously agreed that financing was only a moderate barrier. Local banks have liquid and strong balance sheets were willing to lend for renewables, despite limited experience and knowledge. International banks saw the Philippines as a growing market and were proactively looking for opportunities.

That said, several local banks have mentioned it would be y easier for conventional power plants to receive financing than renewable power because they were more familiar with these projects. This situation is likely to improve as more renewable power projects are developed and experience increases, as it has in other countries.

Well-known developers did not find it difficult to obtain project finance from banks, but small and unknown developers reported problems. Small projects less than 10MW may struggle to obtain financing as the minimum requirement of $25m would require a project of at least15MW, based on a 70:30 debt-equity ratio. Smaller projects would be better suited for direct balance sheet finance.

5.2. GRID CONNECTION FOR RENEWABLES

This section identifies renewable energy projects that face potential grid connection difficulties and analyzes how much it would cost to build new grid connections. Whether a project would have difficulties connecting to the grid depends on the distance to the nearest transmission connection point and the capacity and voltage of the nearest transmission line Because of the complex interaction between grid capacity and voltage and its ability to absorb intermittent power, the discussion below focuses on the distance between project locations and grid connection points.

5.2.1. GRID NETWORK COVERAGE

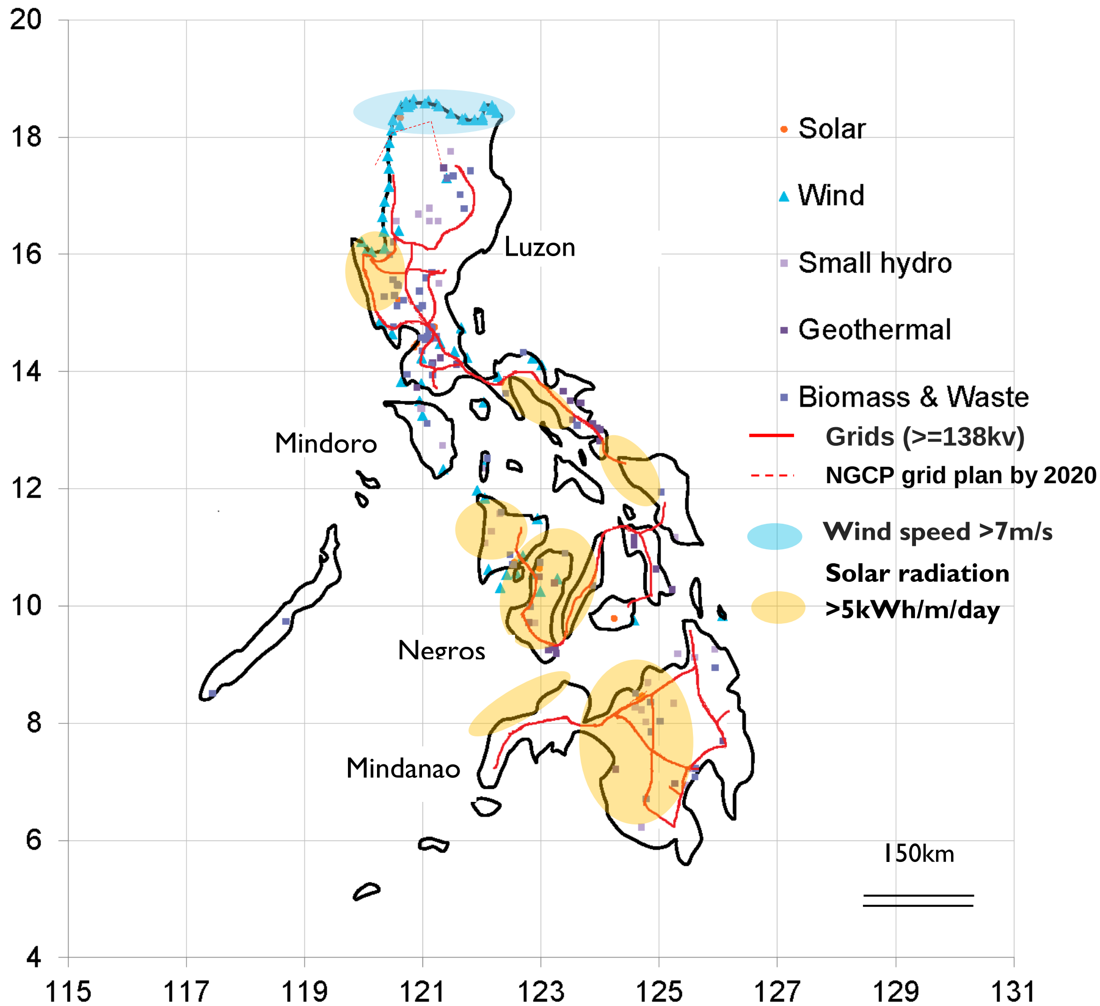
To identify renewable energy projects that could have grid connection difficulties, the locations of renewable power projects in the pipeline (using the Bloomberg New Energy Finance project database) were compared to the national grid system and the renewable energy resource in the country (Figure 30).

There were 200 renewable power projects in the pipeline with a total of 6 GW of capacity. Only the main national transmission lines with voltages of 138-500 kv were shown because low-voltage lines (15 kv, 69 kv and below) are not sufficient to carry the load of intermittent power for renewable power projects. Areas with average wind speeds above 7 meter/second are good for wind farms, Dood solar insolation was defined as at least 5kWh/m/day.

A large number of planned wind projects in north Luzon will face grid connection issues due to the large distance (50-100km) to the nearest transmission substations.

FIGURE 30: RENEWABLE ENERGY PROJECT PIPELINE FOR 2013 ON THE PHILIPPINES' GRID MAP

x-axis Longitude y-axis Latitude



Source: Bloomberg New Energy Finance. TDP 2011. NPC-SPUG of the Philippines. NREL of the US.

The main findings:

- A large number of wind projects located in northern Luzon are over many kilometers from the nearest transmission lines. However, these areas often have the best wind resources. The distance between the pipeline wind projects and the nearest transmission substations was typically 50-100 kilometers. The national grid company NGCP planned to complete the northern transmission loop by extending by extending the transmission line along the coast from the northwest to the northeast, but this is not expected to be finished or useable until 2020.
- A few wind, geothermal and hydro projects located in Mindoro are not within several kilometers of any transmission lines and will have to be connected to the local 69kv-distribution lines.
- Other locations with planned renewable power projects do not seem to have major grid connection problems as the distance to the nearest transmission stations was generally less than 50 kilometers.

5.2.2. GRID CONNECTION COSTS

The limited grid network coverage in northern Luzon will increase financial burdens on developers as they will have to bear the cost of extending the transmission lines. The typical cost of extending a typical 138 kv-line in the Philippines was $0.7 m per kilometer. It would cost $70 Million if a project required a 100 km-extension of the transmission line, the equivalent of the entire cost of a 28 MW renewable energy project or 15% of the cost of a 200 MW project (@ $2.5m/MW). Consequently, this would therefore only be manageable if it the connection costs could be shared by a large number of small or medium-sized projects or one or more large projects.

TABLE 9: KEY COST ASSUMPTIONS

Cost constants	Price
Capex ($m/MW)	2.5
Grid cost ($m/km)	0.7

Source: Bloomberg New Energy Finance.

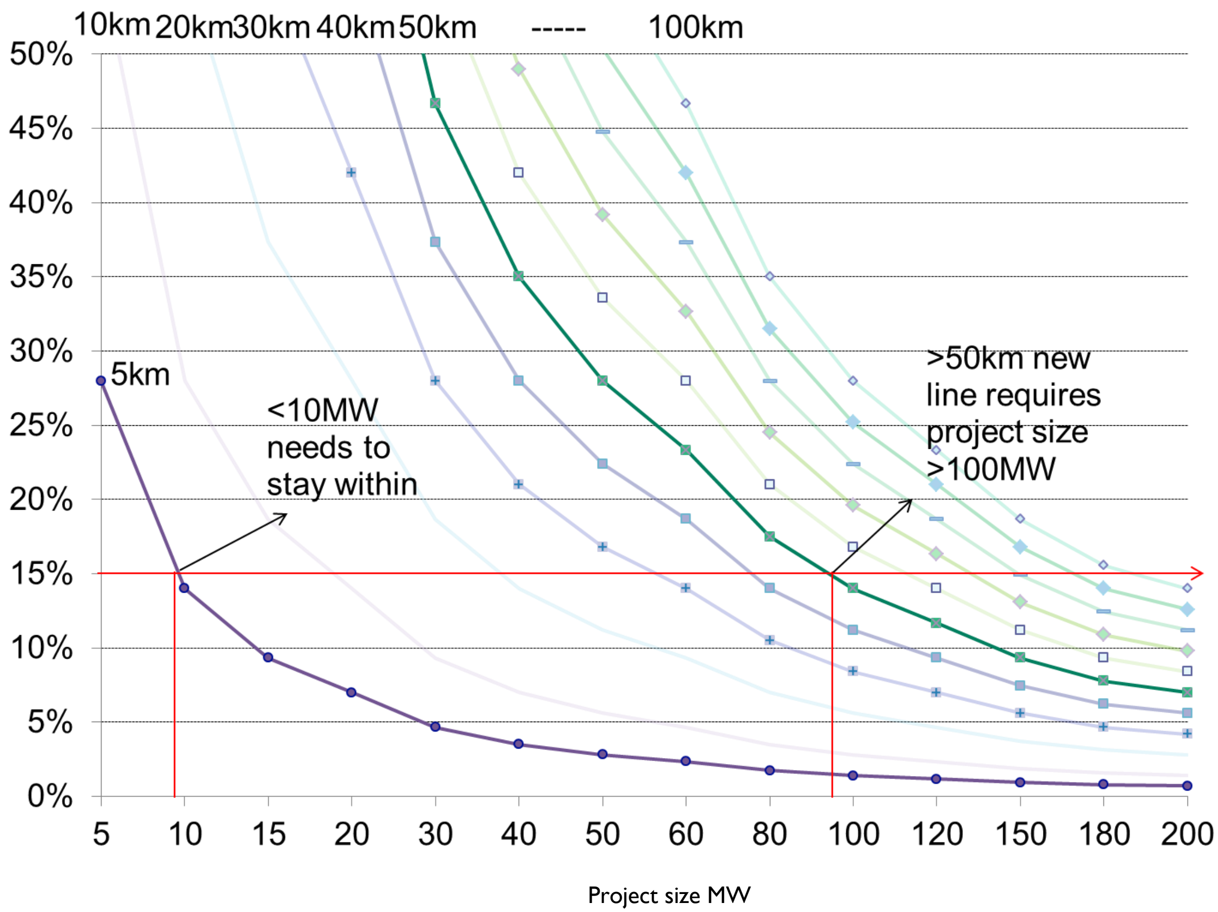
Figure 31 illustrates how the grid connection cost relates to the percentage of total project cost depending on the length of the new transmission line required based on the assumptions in Table 9. We assume the substation capacity is sufficient for the specific network that the project is connecting to, so the grid connection project would only involve an extension of the existing line to the project site. In addition, the cost calculation is simplified to take into account the distance and the average construction cost of a typical 138kv transmission line.

Projects smaller than 10MW will need to be within 5km from the nearest transmission substation; projects 50-100km from the nearest transmission substation will need to be larger than 100MW.

The project developers interviewed we are generally comfortable with grid connection costs below 15% of total project costs as long as the returns on equity returns were still within the targeted range. For a wind project, a 10-15% increase in e capital costs in the Philippines would reduce the returns on equity return by three to five percentage points. A typical wind project with returns on equity of 27% would be able to absorb these costs, but would the returns on equity would fall to 22-24% which is still higher than the minimum targeted returns for wind power.

FIGURE 31: RELATION BETWEEN GRID COST AND PROJECT SIZE BY LENGTH OF NEW TRANSMISSION LINE

Grid connection costs as a percent of total project costs



Source: Bloomberg New Energy Finance.

Figure 31 used the 15% increase in capital costs from grid connection as a threshold for decision making:

- Projects smaller than 10MW will need to be within 5km of the nearest transmission station. The current project pipeline includes 170 projects below 10 MW, for a total of 0.7 GW (10% of the renewable power pipeline). The pipeline contained 149 small hydro projects with a combined capacity of 0.65GW that would have grid connection problems if they are situated far from transmission lines.
- For projects between 15 and30 MW, the locations would be within 10-20 km of the nearest transmission substation.
- In northern Luzon, developers that need to extend the transmission line by 50 km or more would have to scale up a project to over 100 MW or share grid connections across a portfolio of geographically concentrated projects of if they.

6. SOLUTIONS AND OUTLOOK

6.1. RECOMMENDED SOLUTIONS

The Philippines has ambitious long-term targets for renewable energy installations aimed at increasing renewables by 10 GW to 15.3 GW installed by 2030. Developers have already shown substantial potential interest, as evidenced by the large project pipeline of 7.6 GW. However, many projects have been stalled by policy and regulatory issues. A major barrier is the process of awarding FiTs and grid connection costs. The FiTs adopted in 2012 were above the average renewable power production cost levels and would be expected to give investors who have access to them an adequate rate of return. However, the investments are being held back by a binding cap (maximum allowable power generation by type of technology) on the FiTs. Financing is likely to be available for projects that are financially viable and can have access to the FiT under the cap. The main perceived barriers holding back growth in renewables were the delayed implementation of the FiT policy and the cost of grid connections. The FiT policy is by far the most important barrier. Grid connection costs are locally important and will become more constraining over time as more attractive sites are taken up first.

6.1.1. FIT POLICY IMPLEMENTATION

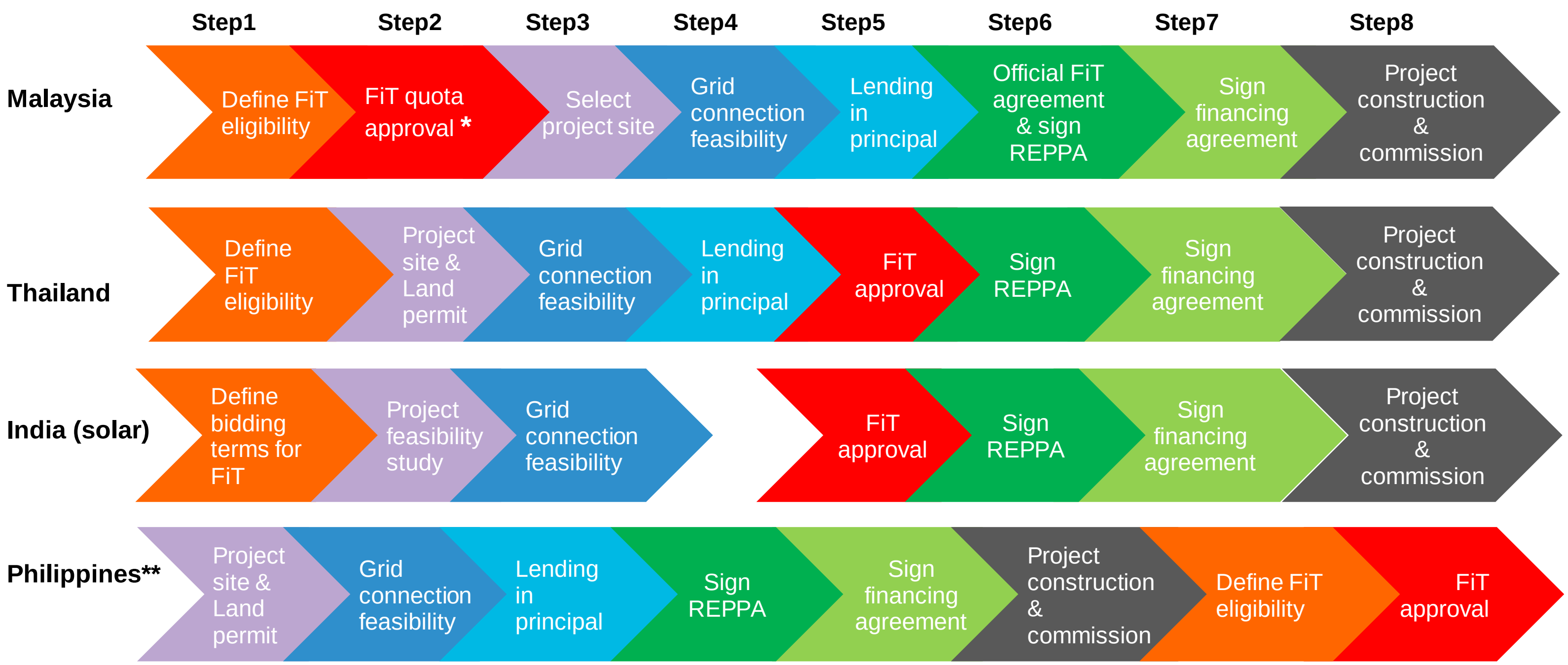
Lack of clarity on the FiT process has been identified as the top reason why renewable power development has not taken off in the Philippines:

The FiT policy implementation is top priority. The experience of China and India suggests that a FiT can drive rapid renewable deployment even without RPS and net metering programmes. The major study solutions include:

1. **Defining the eligibility of a project for the FiT needs to be the first step of the application process.** Figure 32 illustrates the process for determining eligibility for a FiT or similar incentive in Malaysia, Thailand India, and the Philippines. The first step in the process is to decide which projects qualify and whether they fall within the set ceiling.

   Thailand only approves FiTs after eligible developers have chosen a project site, conducted grid connection feasibility study and received a lend-in-principle offer from debt financiers (step 4). India follows a similar process as Thailand, but does not require a lend-in-principle offer for FiT approval. Malaysia approves a FiT as the initial step in the process. If the question of FiT eligibility is left to a later stage in the process (as in Thailand and India,) uncertainty is created for project developers and financiers. Time and costs would have to be spent on project site selection, grid impact study and securing finance without knowing whether a project would actually qualify for an incentive. Many developers and financiers would not take this risk.

FIGURE 32: OVERVIEW ON FIT IMPLEMENTATION STEPS IN ASIAN COUNTRIES



*Source: Bloomberg New Energy Finance. Note: *Malaysia approves FiT quota allocation through its online system based on first-come-first-serve basis. **the FiT implementation steps in the Philippines are due to final approval from the DOE. REPPA=renewable energy power purchase agreement. In India to obtain FiT approval does not require lending in principal offer.*

2. **FiT eligibility criteria need to be defined at the onset with as much detail as possible to ensure that Philippine Government targets for development of renewable power can be met**. Eligibility criteria have not been determined yet, but could include location preference, spreading access across different developers, project size, experience of the developer, domestic content requirement, time period to achieve financial close, bond payments to ensure project completion, and time to commissioning. Which criteria are chosen depends on the government's objectives for creating incentives and desired safeguards to ensure project completion. Malaysia and Thailand established a preference for smaller projects by offering them a higher FiT. Thailand restricted FiT eligibility for solar projects at 10MW. India's FiT policies are set at the state rather than national level and often set a maximum time for financial closure and bond postings to increase the likelihood of project completion.

> ***Defining the eligibility criteria for FiT approval and ensuring its evaluation early in the process will be key to unlocking investment.***

3. **The FiT application process needs to be specified. The proposed first-commissioned, first-served approach will not be beneficial for developing renewable power.**

   Under a first-commissioned, first-served approach, many project developers will note risk wasting time and money on project site selection, grid impact studies and securing finance without knowing whether a project would ultimately qualify for a FiT. Furthermore, banks will not lend unless they are confident about the project's expected revenues.

   The more common first-come, first-served approach (as contrasted with first commissioned) is a simpler option that has been used by Malaysia, Thailand, India, and China. It allocated FiTs at the application stage, not following the commissioning stage. Successful use of the first-come, first-served approach requires setting good criteria for selecting projects based on their quality. First-come, first-served will also require a sophisticated, publicly accessible data system to ensure the application process is fair, secure, transparent and efficient. Some Indian states, such as have used a reverse bidding process. As a result, these Indian states have been able to reduce the cost of projects although there have been some challenges in ensuring a high rate of completion of the selected projects. These challenges have however since been largely resolved. China used a FiT that is not bound by capacity caps.

4. **The payment procedure and timeline for the FiT needs to be published.** Experience in China and India has shown that it may take years before FiT payments are made to projects. In the interim, the costs and risks are borne by the investors. Consequently, it is important for developers to know the counterparty that will pay the FiT with certainty and the timeline and frequency of future payments. The Philippines' 2010 Fit policy stipulated a separate FiT fund to collect surcharges from consumers and proposed the NGCP as the counterparty. Subsequent policy discussions have proposed an alternative counterparty, named Transco, who would be managing the fund but this proposal has only created additional uncertainty.

> ***A joint effort between the NGCP and financial institutions is needed to provide financial solutions to reduce the grid connection cost barrier.***

6.1.2. GRID CONNECTION

Although the costs of obtaining grid connections are important over the long run, this is not expected to be a problem for many of the projects in the existing pipeline. Some of these projects may be close enough to existing or planned transmission lines. Nevertheless, the ability to connect to the grid needs to be assured and cost can be reduced through the following actions:

1. **Renewable power projects need priority grid access.** The FiT rule requires the NGCP and distribution utilities to give priority to renewable power for connections to the national transmission and distribution grid. However, this favourable language is generally insufficient unless accompanied by compliance targets and penalties and/or incentives for utilities. Utility incentives would either require direct government funding or higher charges for customers and consequently approval in the rate-setting process.
2. **The Government can designate specific renewable development zones in high potential areas where it will fund grid connections through the NGCP.** In many other developing countries, grid connections are normally offered by national transmission companies subsidized by the government or financed by multilateral development banks.
3. **The NGCP can grant developers grid development licenses for projects that have carried out a grid impact study or meet specified criteria.**
4. **Development banks can work with local commercial banks to provide loan financing for the grid connection costs** of projects that have been granted grid development licenses.

6.1.3. FINANCING FOR RENEWABLE POWER

The availability of financing is not a major barrier for financially viable projects. However, financial viability may require clarity in the FiT process. Nevertheless, some developers have recommended that more demonstration projects be developed in the Philippines by a syndicate of multilateral, local and international banks to accelerate the development of the sector by building a proven track record that will make local banks more comfortable with the unfamiliar risks of new technologies.

6.2. RENEWABLE POWER OUTLOOK

At present, policy incentives are essential for renewable power development in the Philippines as they are still not fully competitive with conventional power. However, the policy incentives and processes are still uncertain.

Experiences in other countries have shown that policy incentives have been very effective in stimulating renewable power development. Figure 33 shows the growth rates in renewable capacity in India, China, and Thailand. India and China have had more supportive renewable energy incentives than Thailand, which contributed to higher average annual growth rates in renewable power capacity (21% in China, 16% in India, and 9% in Thailand Other factors such as domestic manufacturing of renewable energy equipment, overall economic growth rates and electricity demand and supply may also explain some of these different growth rates

Project development could accelerate if key investment barriers are removed.

Also, past growth paths of other countries may not be directly comparable to what could occur in the Philippines in the future. , Nevertheless, one of the lessons from the other countries was that renewable power commercialization only occurred once there was clarity on the level and duration of the policy incentives as well as regulatory processes. Assuming the assumptions in Table 10 and if the Philippines can achieve an 18 annual average growth rate in renewable power capacity, it could add 1.5GW in 2012-15 and 8GW in 2015-20 to reach a total of 15GW by 2020. This would enable the country to achieve

TABLE 10: DEVELOPMENT TIMELINE ASSUMPTIONS

Project type	Total dev. years	Const. years
Wind	3	1
Solar	2	1
Small hydro	2	1
Large hydro	6	2
Geothermal	6	2
Biomass	3	1

Source: Bloomberg New Energy Finance. Note: Total development time includes construction period and project preparation period.

its 2030 renewable capacity target almost ten years early. Wind and solar would grow the fastest under this scenario, adding 3.8GW and 2.9GW, respectively by 2020.

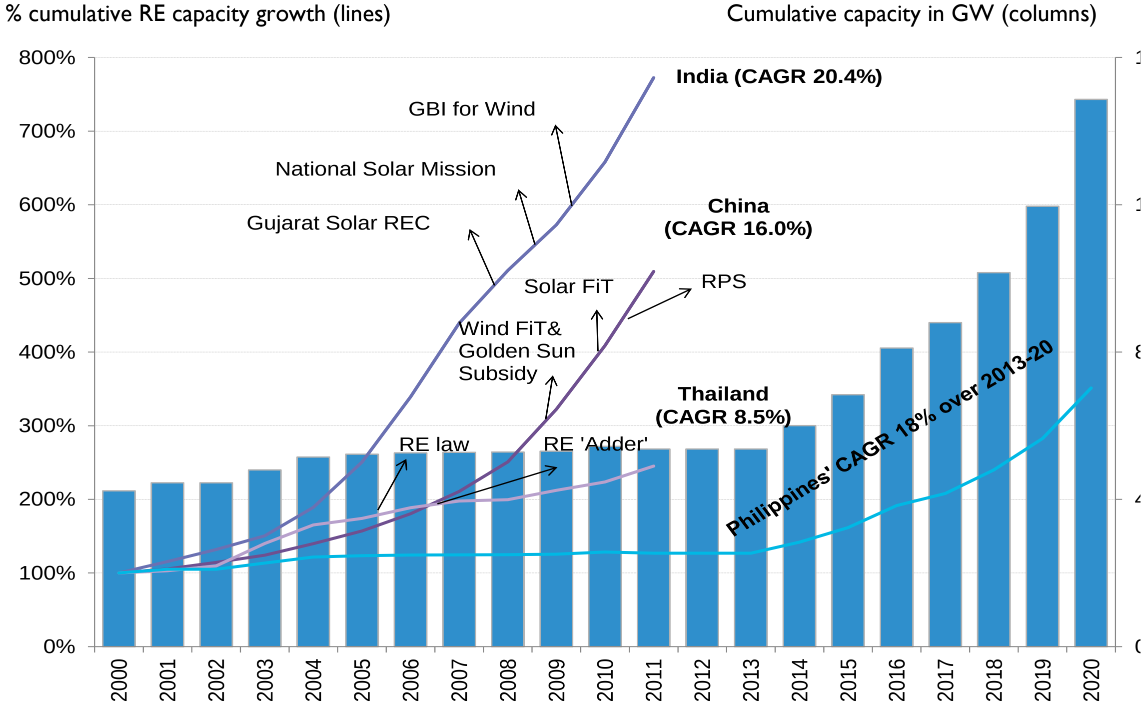
This development would require $24bn of investment during 2013-20 based on an average project cost of $2.5m/MW – close to the $25bn required to meet the government's 2030 target. This would be a large challenge for the investment community because the annual project investment would need to increase from the current $0.1bn to $2-3bn in coming few years and to $4-5bn in the later years towards 2020.

Wind, solar, small hydro and biomass power projects require capex investments at least one year before projects are commissioned while large hydro and geothermal investments need to be made at least two years before project completion and often much longer due to land acquisition issues.

This scenario would only hold, however, if the FiT capacity cap were removed or if most development occurred without FiTs. Considering typical construction periods and the FiT installation cap (

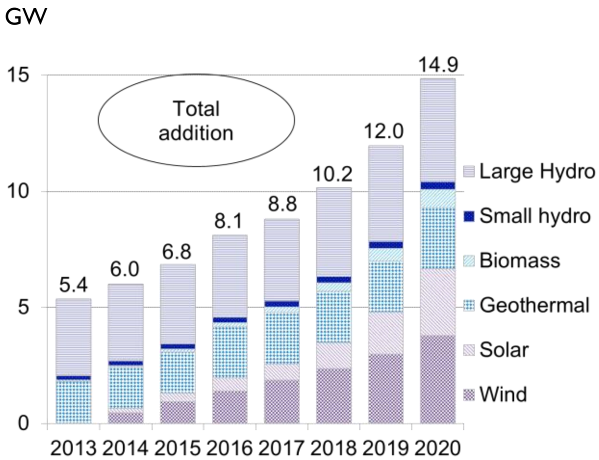
Table 7), the country may only be able to add 0.8GW of new capacity by 2015 rather than the 1.5GW illustrated in the potential growth scenario.

FIGURE 33: RENEWABLE POWER DEPLOYMENT PATHS: CHINA, INDIA, THAILAND, PHILIPPINES*



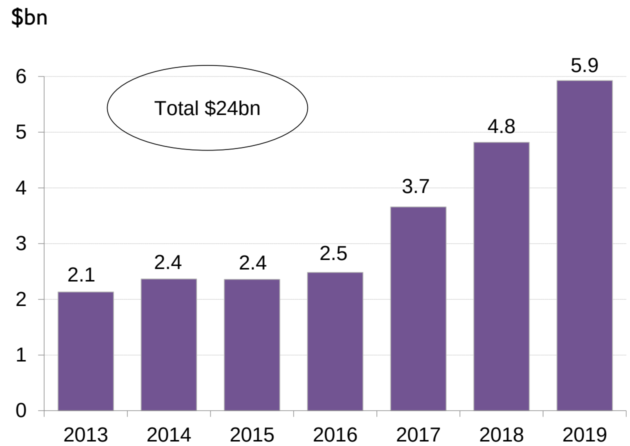
*Source: Bloomberg New Energy Finance. Note: * based on an assumption that there would be little investment barriers. RE= renewable energy. CAGR=compound annual growth rate. GBI=generation-based incentive. REC=renewable energy certificate. RPS=renewable portfolio standard. Note: The CAGR for the Philippines is based on the government set rate, not a hurdle rate from BNEF.*

FIGURE 34: POTENTIAL RENEWABLE CAPACITY BY SECTOR 2013-20



Source: Bloomberg New Energy Finance.

FIGURE 35: REQUIRED INVESTMENT BY YEAR TO GENERATE THE POTENTIAL RENEWABLE GROWTH



Source: Bloomberg New Energy Finance.

7. APPENDICES

APPENDIX A: ENERGY MIX FORECAST METHODOLOGY

The capacity-to-generation conversion was conducted based on the formula: power generation = respective generation figures. A period modification was made to oil-based power generation excluding 1991-2004 when the country faced severe restrictions in petroleum supplies, limiting electricity production. For ocean power, the theoretical global average capacity factor was used since operating plants did not exist.

TABLE A-1: KEY DATA FOR 'CAPACITY-TO-GENERATION' CONVERSION 2015-30E

Type of power	2015e (MW)	2020e (MW)	2025e (MW)	2030e (MW)	Capacity factor
Coal	7,666	8,798	11,200	11,200	45.6% (1991-2011)
Natural gas	3,861	3,861	4,306	4,306	63.2% (1998-2011)
Oil	3,294	3,294	3,487	3,487	17.0% (2005-2011)
Hydro	3,832	6,993	8,885	8,885	30.9% (1991-2011)
Geothermal	2,003	3,103	3198	3,278	61.2% (1991-2011)
Wind	1,081	1,936	2,378	2,378	22.0% (2005-2011)
Biomass	359	359	359	359	11.9% (2009-2011)
Solar	270	275	280	285	15.0% (2005-2011)
Ocean	0	36	71	71	35.0% (global avg)

Source: Bloomberg New Energy Finance. Note: Capacity figures are cumulative.

APPENDIX B: INVESTMENT DATA METHODOLOGY

Bloomberg New Energy tracks investment flow data available in the public domain with a team of over 200 analysts and researchers globally. Some investment deals may have disclosed value while some may not be in the public domain. For deals without a disclosed value, BNEF assigns an estimated value based on its knowledge of the total project cost. In Section 2.1the investment trend analysis was conducted on the investment deal value which includes both publicly disclosed value and BNEF's estimated value where applicable. However, Figure 15 only included deals with disclosed debt value.

APPENDIX C: ORGANIZATIONS INCLUDED IN THE SURVEY

Organization name	Type of organization	Foreign/Domestic
ADB	Development Bank	Foreign
Banco De Oro	Commercial Bank	Domestic
Conergy	Project developer	Foreign
DOE of the Philippines	Government	Domestic
EDC	Project developer	Domestic
Enfinity	Project developer	Foreign
IFC	Development Bank	Foreign
LandBank	Development Bank	Domestic
NCGP	Utility (private company)	Domestic
Not disclosed	Private equity fund	Foreign
Rizal Commercial Banking Corp.	Commercial Bank	Domestic
SN Power	Project developer	Foreign
Standard Chartered	Commercial Bank	Foreign
Trans-Asia	Project developer	Domestic
UPC Renewables	Project developer	Foreign
Vigor Capital	Private equity fund	Foreign

Source: Bloomberg New Energy Finance.

APPENDIX D: FEED-IN TARIFF RATES IN SOUTHEAST ASIA

TABLE D-1: RENEWABLE ENERGY SUBSIDIES ('ADDERS') IN THAILAND

Sector	Capacity (MW)	Standard Subsidy		Period (year)	Special Subsidy*	
		THB/kWh	$/kWh		THB/kWh	$/kWh
Biomass	<=1MW	0.5	0.02	7	1.5	0.05
	>1MW	0.3	0.01	7	1.3	0.04
Biogas	<=1MW	0.5	0.02	7	1.5	0.05
	>1MW	0.3	0.01	7	1.3	0.04
WTE	AD & b LFG	2.5	0.08	7	3.5	0.12
	Thermal process	3.5	0.12	7	4.5	0.15
Wind	<=50kw	4.5	0.15	10	6.0	0.20
	>50kw	3.5	0.12	10	5.0	0.17
Small hydro	50kw-=200kw	0.8	0.03	7	1.8	0.06
	<50kw	1.5	0.05	7	2.5	0.08
Solar	VSPP capped at 10MW; SPP capped at 90MW	8	0.22	10	9.5	0.27

*Source: Bloomberg New Energy Finance. Energy Development Plan 2011-2030. Note: *special subsidy for facilities in 3 southern provinces (Yala, Pattani and Narathivath) or diesel-generation replacement on PEA system. Exchange rate THB/USD=29.87 on 15 February 2013. NA=not applicable.*

TABLE 11: 2013 RENEWABLE ENERGY FEED-IN-TARIFFS IN MALAYSIA

Sector	Capacity (MW)	Standard FiT		Degression rate	Period (year)	Bonus FiT		Bonus FiT requirement	Degression rate
		MYN/kWh	$/kWh			MYN/kWh	$/kWh		
Biogas	<=4MW	0.32	0.10	0.5%	16	0.08	0.02	landfill/sewage gas as fuel	1.8%
	4MW<X<=10MW	0.30	0.10			0.02	0.01	gas engine tech with electricity efficiency of > 40%	0.5%
	10MW<X<=30MW	0.28	0.09			0.01	0.00	locally manufactured/ assembled gas engine tech	0.5%
Biomass	<=10MW	0.31	0.10	0.5%	16	0.10	0.03	municipal solid waste as fuel	1.8%
	10MW<X<=20MW	0.29	0.09			0.02	0.01	gasification tech	0.5%

Sector	Capacity (MW)	Standard FiT		Degression rate	Period (year)	Bonus FiT		Bonus FiT requirement	Degression rate
		MYN/kWh	$/kWh			MYN/kWh	$/kWh		
	20MW<X<=30MW	0.27	0.09			0.01	0.003	steam-based electricity generation with overall efficiency of >14% OR use of locally manufactured / assembled gasification tech	0.5%
Small hydro	<=10MW	0.24	0.08	0%	21	N/A			
	10MW<X<=30MW	0.23	0.07						
Solar (capped at 5MW for a single project)	<=4kw	1.04	0.34	8%	21	0.2201	0.07	installation in buildings or building structures	8%
	4kw<X<=24kw	1.02	0.33			0.2116	0.07	building materials	
	24kw<X<=72kw	1.00	0.32			0.0254	0.01	locally manufactured / assembled solar PV modules	
	72kw<X<=1MW	0.96	0.31			0.0085	0.003	local manufactured or assembled solar inverters	
	1MW<X<=10MW	0.80	0.26						
	10MW<X<=30MW	0.72	0.23						

Source: Bloomberg New Energy Finance. Renewable Energy Act 2011.Note: Exchange rate MYR/USD=3.09 on 15 February 2013. NA=not applicable.

APPENDIX E: LCOE METHODOLOGY

LCOE modeling was done to create sector benchmarks with real-world applicability. The LCOE estimates are comparable to the power purchase agreements currently being signed for typical projects in the sector.

The LCOE model was based on a pro-forma project financing schedule for project inputs. It captured the impact of the timing of cash flows, development and construction costs, multiple stages of financing, and interest and tax implications of long-term debt instruments and depreciation. The outputs of the model included sponsor equity cash flows, enabling calculation of the internal rates of return on equity. For each scenario, the model identifies the long-term off-take price required to hit the developer's required equity hurdle rate.

The mid-scenario used a15% equity IRR for each technology. One potential criticism of this method is that risks and therefore minimum required returns on equity return vary by technology. Technology risks were reflected in the market assumptions on the cost and availability of debt (e.g., the minimal gear currently available for geothermal drilling and the almost complete lack of debt financing for ocean power). The sector risk was incorporated in the LCOEs as reduced returns to equity. The use of a single IRR may have understated the LCOEs for the riskier technologies, but avoided the problem of lack of investor comparables for the less common technologies.

TABLE E-1. LOW, MID AND HIGH SCENARIOS IN THE LCOE ANALYSIS FOR THE PHILIPPINES

Technology	Capacity factor	Development ($m/MW)	BOP ($m/MW)	Equipment ($m/MW)	Fixed O&M ($m/MW)	Cost of debt	Loan Tenor (yr)
Wind (high)	20%	0.03	1.06	1.64	0.05	10%	8
Wind (mid)	25%	0.03	0.70	1.08	0.03	8%	12
Wind (low)	30%	0.03	1.06	0.67	0.03	6%	15
Solar (high)	14%	0.09	0.82	2.08	0.06	10%	8
Solar (mid)	18%	0.07	0.63	1.15	0.04	8%	12
Solar (low)	20%	0.07	0.45	1.15	0.03	6%	15
Biomass(high)	67%	0.37	0.62	4.49	0.13	10%	8
Biomass (mid)	72%	0.25	0.41	2.96	0.08	8%	12
Biomass(low)	77%	0.07	0.41	0.83	0.08	6%	15
Small hydro (high)	23%	0.52	1.45	3.41	0.09	10%	8
Small hydro (mid)	35%	0.28	0.77	1.82	0.02	8%	12
Small hydro (low)	50%	0.14	0.77	0.91	0.02	6%	15
Geothermal (high)	50%	1.70	1.2	NA	0.02	10%	15
Geothermal (mid)	60%	1.57	1.2	NA	0.02	8%	15
Geothermal (low)	75%	1.37	1.2	NA	0.02	6%	15

Source: Bloomberg New Energy Finance. Note: NA=not available. 'Solar' represents only PV technology, 'wind' represents onshore wind, 'biomass' represents incineration technology, and 'geothermal' represents flash technology.

TABLE E-2. PERCENTAGE OF GRID CONNECTION COSTS AS A PERCENT OF TOTAL PROJECT COST

Size (MW)	Project cost ($m)	Length of grid to be built (km)										
		5	10	20	30	40	50	60	70	80	90	100
5	$13	28%	56%	112%	168%	224%	280%	336%	392%	448%	504%	560%
10	$25	14%	28%	56%	84%	112%	140%	168%	196%	224%	252%	280%
15	$38	9%	19%	37%	56%	75%	93%	112%	131%	149%	168%	187%
20	$50	7%	14%	28%	42%	56%	70%	84%	98%	112%	126%	140%
30	$75	5%	9%	19%	28%	37%	47%	56%	65%	75%	84%	93%
40	$100	4%	7%	14%	21%	28%	35%	42%	49%	56%	63%	70%
50	$125	3%	6%	11%	17%	22%	28%	34%	39%	45%	50%	56%
60	$150	2%	5%	9%	14%	19%	23%	28%	33%	37%	42%	47%
80	$200	2%	4%	7%	11%	14%	18%	21%	25%	28%	32%	35%
100	$250	1%	3%	6%	8%	11%	14%	17%	20%	22%	25%	28%
120	$300	1%	2%	5%	7%	9%	12%	14%	16%	19%	21%	23%
150	$375	1%	2%	4%	6%	7%	9%	11%	13%	15%	17%	19%
180	$450	1%	2%	3%	5%	6%	8%	9%	11%	12%	14%	16%
200	$500	1%	1%	3%	4%	6%	7%	8%	10%	11%	13%	14%

Source: Bloomberg New Energy Finance.

APPENDIX F: LCOE COMPARISON WITH OTHER COUNTRIES

This section compares the LCOEs of solar, wind, biomass and small-hydro in the Philippines to those in Thailand, Malaysia, and the global market as represented by the EU and US. To ensure like-for-like comparison we have *excluded* grid connection costs and the Philippines LCOE numbers are therefore lower here than in the other sections of this report.

Figure F-1 illustrates that the average solar LCOE in the Philippines is higher than in Malaysia, Thailand and the global average. This is mostly due to the assumption of a higher hurdle rate of 15% for the Philippines due to perceptions of greater country risk and technology risk. In addition, the BOP costs are higher in the Philippines: $0.6m/MW for solar, more than the global average of $0.4m/MW because of higher logistic and civil engineering costs due to the country's geographic characteristics, less developed infrastructure and a shortage of experienced engineers.

The LCOE for wind is lower than those in Thailand and Malaysia, although higher than the global average. Thailand and Malaysia are slightly more expensive because of less favorable wind conditions. A lower capacity factor (25%) was assumed than the global average (30%) due to lower average wind speeds. In addition, the BOP costs for wind ($0.7m/MW) were above the global average ($0.6m/MW). Most sites with high wind speed are in remote areas, which may not have access to roads. The additional cost of building new roads increases the total BOP cost.

FIGURE F-1: SOLAR LCOE COMPARISONS BETWEEN THE PHILIPPINES AND OTHERS, $/KWH

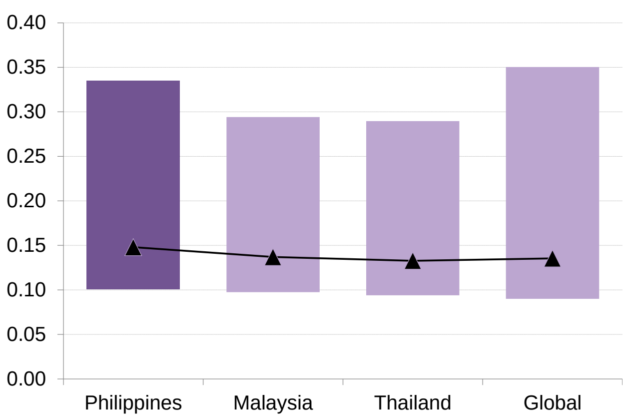
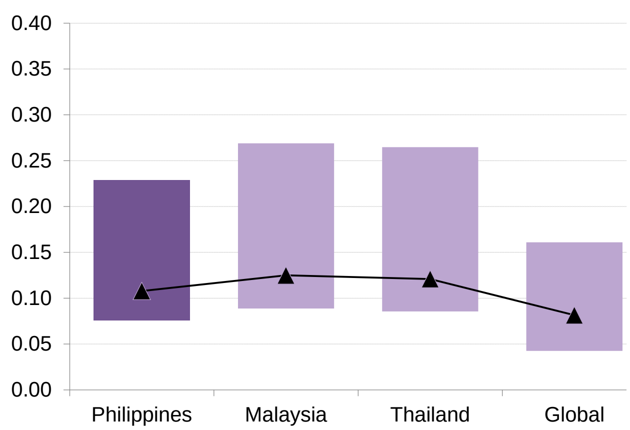


FIGURE F-2: WIND LCOE COMPARISONS BETWEEN THE PHILIPPINES AND OTHERS, $/KWH



Source: Bloomberg New Energy Finance. Note: denotes the LCOE level in BNEF's average LCOE scenario.

FIGURE F-3: BIOMASS LCOE COMPARISONS BETWEEN THE PHILIPPINES AND OTHERS, $/KWH

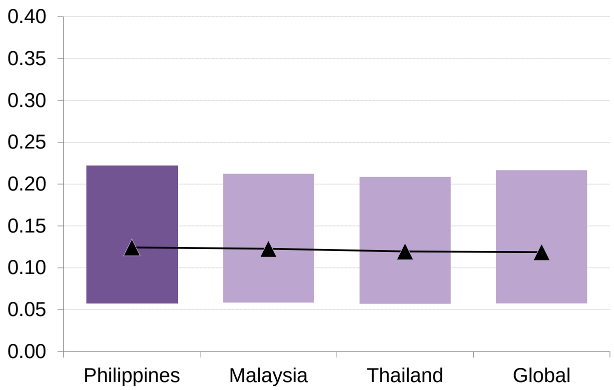
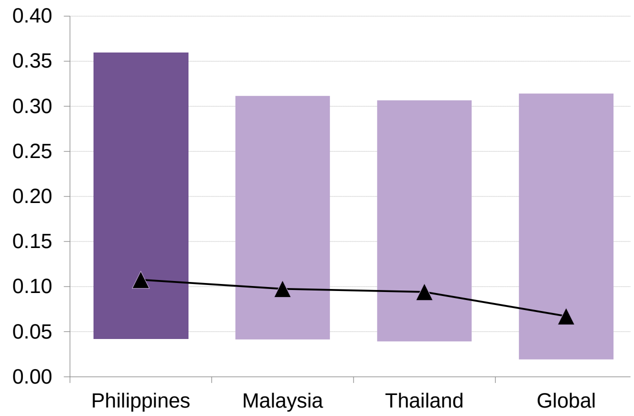


FIGURE F-4: SMALL-HYDRO LCOE COMPARISONS BETWEEN THE PHILIPPINES AND OTHERS, $/KWH

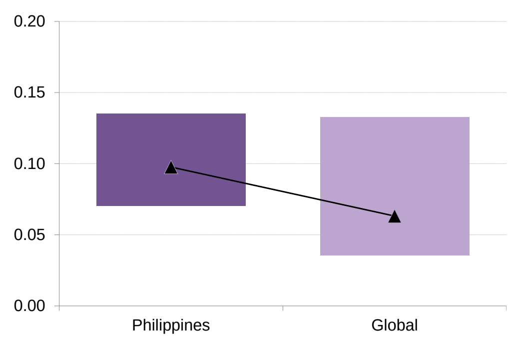


Source: Bloomberg New Energy Finance. Note: denotes the LCOE level in BNEF's average LCOE scenario.

The LCOE for biomass power in the Philippines was similar to neighboring countries and the global average. For biomass, the range in LCOE estimates is more relevant than the average because the cost and availability of feed stocks differ widely.

The average LCOEs for small-hydro and geothermal were higher in the Philippines than the global average due to lower capacity factors. Power generation statistics in the Philippines during 1991-2011 show the average generation output from hydro and geothermal plants is only 35% and 60% of nominal output respectively.[7] The 35% historic capacity factor for small hydro and 60% for geothermal was used rather than the respective 50% and 73% factors in the global analysis. Thailand and Malaysia have about the same hydro capacity factor as the Philippines. The LCOE for geothermal power was not calculated for Thailand and Malaysia since they have no commissioned geothermal projects and lack significant geothermal resources.

FIGURE F-5: GEOTHERMAL LCOE COMPARISONS BETWEEN THE PHILIPPINES AND OTHERS, $/KWH



Source: Bloomberg New Energy Finance. Note: denotes the LCOE level in BNEF's average LCOE scenario.

Table F-1 summarizes the average scenario details for the Philippines, Thailand, Malaysia, and the global average. Global equipment costs were used for the Philippines, Thai and Malay markets because these goods are competitively traded on international markets. The order size determined the equipment prices, rather than location. Interviews with leading market players in these markets confirmed that purchase prices for renewable power equipment were in line with the global costs. Current global average equipment costs were $1.1m/MW for solar power, is $1.1m/MW for wind, $3.0m/MW biomass incineration, and $1.8m/MW for small-scale hydropower. .

[7] BNEF. Internal documents.

TABLE F-1: AVERAGE LCOE COST STRUCTURE, $/MW

Philippines	Dev. Cost	Equip. Cost	BOP cost	Debt cost	Loan tenor (Y)	Inflation rate	Tax rate	Capacity factor
Solar	0.07	1.1	0.6	8%	12	5%	0% (1-7 years); 10% (following years)	18%
Wind	0.03	1.1	0.7					25%
Biomass	0.25	3.0	0.4					72%
Small hydro	0.28	1.8	0.8					35%
Geothermal	1.60	1.2			15			60%

Global	Dev. Cost	Equip. Cost	BOP cost	Debt cost	Loan tenor (Y)	Inflation rate	Tax rate	Capacity factor
Solar	0.07	1.1	0.4	6%	10	2%	35%	17%
Wind	0.03	1.1	0.6		12			30%
Biomass	0.25	3.0	0.37		12			77%
Small hydro	0.28	1.8	0.7		13			50%
Geothermal	1.60	1.1			15			73%

Malaysia	Dev. Cost	Equip. Cost	BOP cost	Debt cost	Loan tenor (Y)	Inflation rate	Tax rate	Capacity factor
Solar	0.07	1.1	0.6	6.5%	12	2.5%	0% (1-10year); 25% (following years0	18%
Wind	0.03	1.1	0.7					20%
Biomass	0.25	3.0	0.4					72%
Small hydro	0.28	1.8	0.7					35%

Thailand	Dev. Cost	Equip. Cost	BOP cost	Debt cost	Loan tenor (Y)	Inflation rate	Tax rate	Capacity factor
Solar	0.07	1.1	0.6	6%	12	2.9%	0% (1-8years); 15% (following years)	18%
Wind	0.03	1.1	0.7					20%
Biomass	0.25	3.0	0.4					72%
Small hydro	0.28	1.8	0.7					35%

Source: Bloomberg New Energy Finance. Note: BOP = balance of plant

The average interest rate on debt from local commercial banks in the Philippines for 2013 was around 8% (Figure 21), higher than the international rate of 6% and the rates in Thailand and Malaysia. A typical loan tenor is 12 years (15 years for geothermal), in line with the two neighbors and the global average. Finally, we use a 15% hurdle rate for the equity component in the Philippines and 10% for the global, Thailand and Malaysia estimates. The higher, minimum required return in the Philippines reflects higher country risk for foreign investors, and the higher technology risk perceived by local investors.

Project contingency fees were excluded from the analysis. Some investors may set contingency fees as high as 10% of the total project cost when dealing with inexperienced project developers. Including contingency fees would increase the LCOEs and decrease returns on equity.

APPENDIX G: WORKSHOP COMMENTS

On April 5, 2013 a workshop was held in Makati City, the Philippines, to discuss the outputs of the AILEG Report on Renewable Energy in the Philippines – Financial Flows and Barriers for Investment and to invite stakeholder comments. The main messages from the workshop:

- **Remove policy uncertainty by clarifying and implementing the FiT law.** There are many remaining questions regarding FiT eligibility that need to be solved and consistency between agencies was a concern. Implementation could be fast tracked by an executive order or law declaring RE as a national priority. Increased communication among government agencies would ensure consistency.
- **The 'first-commissioned, first-served' approach favors large companies with solid balance sheets.** There was general agreement among many of the participants that the approach would not serve the smaller developers in the market. Alternatives to this approach have been successfully been applied in other countries or the allocation targets (Fit cap) could be eliminated.
- **Reduce layers of bureaucracy.** There are too many different processes that project owners need to go through at various levels of government that are holding back development. For example, in Mindanao it can take several years to obtain approval to build a project because of the need for many signatories; 700MW is waiting to be built. This could be solved by appointing a RE officer at the provincial level or by creating a one-stop-shop for application and approval.
- **Create more awareness about RE and ensure capacity building.** It Local government units (LGUs) and other relevant agencies should be educated on renewable energy since many of the approvals take place at a local level and further knowledge would facilitate this process.
- **Take into account other costs.** The country's VAT and the cost of capital make renewables more expensive than in other SE Asian countries. One option suggested was for manufacturers to locate to the Philippines, but it is questionable that manufacturers would ever do so because of the difficulty competing with low Chinese manufacturing costs.
- **Simplify renewable energy loan approval for banks.** Design a checklist or manual that banks can use to qualify RE project loans.[8] This would simplify and accelerate loan approvals although this may not make a large difference if the first-commissioned, first-served approach is adopted.

[8] The AILEG project has prepared a clean energy lending toolkit.

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