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The Renewable Energy Policy Debate in the Philippines

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Abstract

The Philippines enacted two legislations to promote RE deployment: the Renewable Energy Act of 2008 and the Biofuels Act of 2006, in recognition of the advantages of the use of renewable energy (RE) as energy source. However, there remain issues and criticisms on the promotion of RE technologies and on the implementation of the RE laws. Both sides of the debate have their justifications for supporting or not supporting the use of RE resources and technologies. The implementation of the RE laws, rules and regulations has also been receiving criticisms. For this paper, data and information on the areas of debate were collected and examined. Findings provide some reference for revisiting the RE laws and regulations to improve their implementation and produce better outcomes for stakeholders.

Keywords: renewable energy, policy debate, Philippine Renewable Energy Act, Philippine Biofuels Act

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1. Background

Like other countries, the Philippines has recognized the impact of high dependence on fossil fuels and exposure to price fluctuations, and the importance of balancing sustainable economic growth with protection of public health, the natural ecosystem and the environment, on matters concerning energy production. These in mind, two important legislations were passed: Republic Act (RA) 9367 or the Biofuels Act of 2006, and RA 9513 or the Renewable Energy Act of 2008. The Biofuels Act aims to reduce the dependence of the county on imported fuels by promoting the development and mandating the use of locally-sourced biofuels. Under this law, entities that conduct activities related to bio-fuels development – such as production, storage, and handling, enjoy incentives such as exemption from specific tax and value added tax, and shall be eligible for financial assistance from government institutions. Complementary to this, the Renewable Energy Act seeks to accelerate the exploration and development of the country's renewable energy resources such as biomass, solar, wind, hydro, geothermal and ocean. One major incentive under this law is the Feed-in-Tariff (FiT) scheme for renewable energy developers.

While laws and policies on the implementation of RE technologies are being executed worldwide in view of the advantages/benefits, there remain issues on the promotion of the renewable resources as source of energy. An inherent quality of RE sources (wind, solar, hydro, geothermal, ocean, biomass, and biofuel) is that they will not run out (replenishable) and have minimal negative impact on the environment (National Association of Regulatory Utility Commissioners (NARUC), 2011). Conventional energy sources (e.g. coal, fossil fuel), on the other hand, can be quickly depleted as natural replenishment/replacement is slow, and its carbon and greenhouse emission levels have received criticisms. However, RE sources can be variable or intermittent – dependent on weather (e.g. rain, wind and sunlight); while conventional energy sources can provide base load power especially for large industries/demand.

Cost-wise, RE technologies are generally capital intensive/require large fixed costs. The Foundation for Economic Freedom (FEF), a public advocacy organization in the Philippines, opined that instead of promoting RE projects that are expensive, it would be ‘prudent’ to rehabilitate and improve existing hydroelectric and geothermal sources, and wait until the cost of the more prominent but more expensive technologies such as solar and wind drops in comparison with conventional energy sources (Fajardo F. , 2011). The Philippines, anyhow, has low carbon foot print and is the second largest producer of geothermal energy. On the other hand, advocates of RE technologies are quick to note that the cost of externalities should also be included in estimating costs of using conventional energy sources, hence comparing costs should be subject to further study/evaluation.

Cost is an important consideration in business/investments and can pose as barriers to entry in the market. In this regard, policies are formulated in an effort to compensate for cost-related barriers by providing incentives and subsidies for RE development in the form of tax credits, special pricing and power purchasing rules, and by lowering transaction costs (Beck & Martinot, 2004). In the Philippines, the RE laws offer different fiscal incentives to attract/encourage investments in RE, such as: income tax holiday, duty free importation of machinery and materials, zero percent VAT, and the Feed-in-Tariff (FiT) scheme. The FiT system is internationally recognized as the most cost-effective measure to ‘achieve higher deployment of RE technologies.’ Under this scheme, RE developers are guaranteed ‘purchase of their power generation at a cost-based price with reasonable rate of return on investments over a long period of time' (Pacudan, 2014). The FEF likens FiT rates to a tax, an amount that would be charged to consumers (Chikiamco, 2012). Apart from being relatively high, especially if compared with rates in other countries (DLA Piper, 2014), the scheme of implementing fixed rates for 20 years received criticism. One view is that advancements in technologies for RE sources will push down costs and prices, explaining the opposition to pegging FiT rates (Chikiamco, 2012).

In the biofuels sector, compliance with the targeted blends in fuel is a concern. One of the goals of the Biofuels Act is to 'develop and utilize indigenous renewable and sustainably-sourced clean energy sources to reduce dependence on imported fuels', but this objective appears to be challenging to accomplish. With the reported lack of capacity of existing sugarcane distilleries, low productivity and high production cost, bioethanol producers have been importing ethanol, mostly from Thailand,[2] to comply with the mandated 10 percent ethanol blend requirement (E10) – prompting an UNCTAD study to conclude that the Philippines would likely remain a net importer of fuel (Olchondra, 2014). Moreover, in biodiesel, the target of 5 percent blend had to be assessed as biofuel suppliers are unable to meet the required demand, as of 2014.

These and other issues in RE utilization and deployment are discussed in this paper. Collecting and analysing data and information on the areas of debate may provide some reference for revisiting the RE law and regulations to improve its implementation and produce better outcomes for stakeholders.

The following are the objectives of the study:

- To profile the renewable energy sector in the Philippines and examine the renewable energy resources, industry structure, market performance, regulatory and policy environment, and economic agents' behavior.
- To analyze trends in the development of the domestic renewable energy sector vis-à-vis global trends.
- To identify and analyze the current debate/s on renewable energy development, market transactions, and policy implementation.
- To find data and information supporting the different sides of the debate/s and formulate conclusions based on such data and information.
- To recommend policy refinements or revisions going forward.

2. Analytical Framework

Environmental impacts of conventional energy sources, limited fossil fuel supply and volatile price of fossil fuel are some of the motivations of many countries in pursuing RE development. In a country like the Philippines which has limited local fossil fuel resources, there is high dependence on imported fuel, exposing the economy and the general public to price fluctuations. The promotion of RE development, through issuing laws and regulations, has become the government's measure to achieve self-sufficiency and energy security (Pacudan, 2014). As in other energy sources, the use of RE has both benefits and costs. The framework for analysis in this study builds on the concepts covering socioeconomic effects and policy mechanisms in promoting RE technology deployment.

[2] Thailand is reported to be consuming more of its own ethanol, hence it is possible that the Philippines would have to start importing from the US or Brazil, leading to higher cost due to transportation. (Olchondra, 2014).

2.1 Socioeconomic effects of Renewable Energy (RE) technology development/ deployment

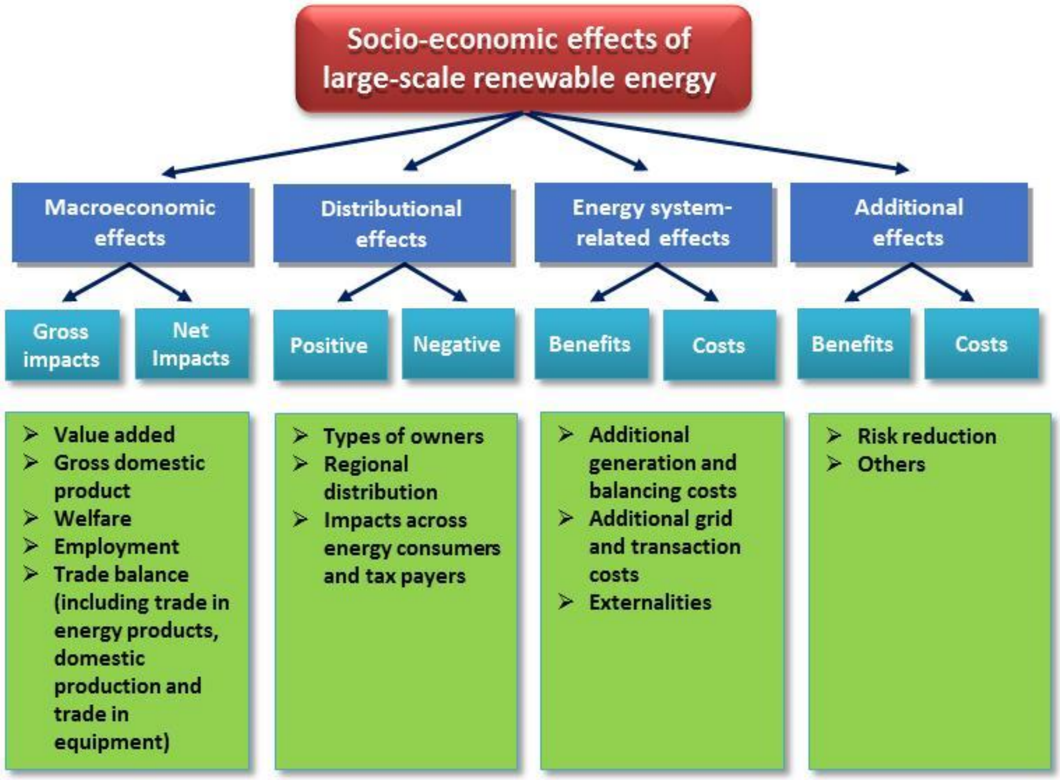
One of the ways to understand renewable energy use is to look at costs and benefits. IRENA & CEM (2014) presented an analytical framework (Figure 1), based on existing literature and on-going research that examined the socio-economic effects of RE implementation/ deployment through different categories: macroeconomic effects, distributional effects, energy system-related effects, and additional effects (e.g. reduced risks). The *macroeconomic effects* include value-added, GDP, welfare, employment, and trade balance-related issues such as trade in energy products and equipment and domestic production. On one hand, these effects can be assessed in terms of gross impact by looking at how the RE sector or RE deployment affects the economy, without considering the possible negative effects on other sectors in the economy (e.g. fossil fuel sector). On the other hand, net impact assessment can also be done to determine whether there are positive or negative effects on the economy as a whole.

Value added of the sector can be assessed at the firm, industry or economy-wide level. Welfare can be viewed through how RE deployment will be able to provide clean alternatives and address issues in different dimensions of well-being such as those related to the environment and health.

Employment may be examined in terms of direct and indirect jobs created in the RE sector. Direct employment are those jobs in the RE sector itself, while indirect employment refers to jobs in supporting industries such as steel or software. There is debate on whether RE deployment leads to net job gains or losses: job creation vis-a-vis the extent wherein possible increases in electricity prices related to renewables could lead to employment losses.

Trade balance may refer to trade in energy products (e.g. fossil fuels) and trade in goods and services related to RE (e.g. solar panels, components, consulting services). Trade in energy products covers trade in final energy (e.g. electricity) in primary energy (e.g. crude oil) or in other natural resources needed to produce energy (e.g. raw uranium ore). For fuel-exporting countries, RE deployment minimizes the domestic use of fuels and maximizes amount exported. On the other hand, for fuel-importing countries, RE deployment can substitute for imported fossil fuels, thereby decreasing imports which may lead to savings. Trade in goods and services include exports and imports of RE technology equipment, such as those for building manufacturing plants/production of RE equipment. Impact on trade balance may be negative or positive, depending on the level of reduction in imports of fossil fuels and increase in importation of RE equipment.

Figure 1: Socio-economic effects of renewable energy



Note: In this framework the widely used concept of "energy security" or "security of supply" is divided between aspects related purely to the trade balance (classified within "macroeconomic effects") and those related to technical geopolitical or financial risks (classified within "additional effects").
Source: Figure 1.1 in IRENA & CEM (2014).

Distributional effects refer to allocation effects (benefits and costs) to different stakeholders within the whole energy sector. IRENA & CEM (2014) describes distributional effects can occur: (i) among stakeholders within the renewable energy sector itself (e.g. among types of owners of renewable energy plants); (ii) within the energy sector as a whole (e.g. between renewable and conventional energy sources and among different types of energy consumers); (iii) throughout the economy at the municipal, sub-national, national, regional or even global level; (iv) between different sets of agents (e.g., households of different income levels, firms, governments); or (v) more generally between different generations (in view of the intergenerational equity debate in the framework of sustainable development). Positive effects are expected for beneficiaries and negative effects for those who are disadvantaged by RE implementation ('bear the corresponding burden').

To name a few, type/ownership structure of RE developers, regional distribution and impact across consumers and tax payers can be assessed under distributional effects. RE technology owners can be private companies, individuals or communities, hence may be assessed on such levels to identify characteristics, issues, structures/models that distinguish one from type to another. Spatial assessment is also found to be valuable as it provides RE deployment patterns, characteristics and impacts analyzed at different geographic levels, e.g. states, regions, provinces, districts, municipalities, cities. Policy making at such subnational levels will benefit from disaggregated analyses. Subnational levels of analysis may also raise public awareness or even inspire public support. There is challenge though on the availability of empirical analyses at these levels due to data availability concerns.

Depending on the national energy policy, some stakeholders in RE deployment benefit and some may bear the burden or the additional costs. Additional costs may be passed to the tax payers or final electricity consumers. For instance, feed in tariff that are implemented in some countries are paid by the final electricity consumers. The challenge is to implement a system of burden sharing that is consistent with the energy policy and acceptable to all stakeholders.

On the fiscal benefit/burden perspective, there are at tax revenues, subsidies and charges associated with RE deployment. Tax payments come from the individuals/companies that own or implement the RE projects. For cities, regional or other levels of government, local executives find interest in knowing how much the locality will benefit such as from tax revenue that is expected to be generated from setting up and operating RE technology in their area.

Energy system-related effects refer to the additional costs or benefits of RE-based system compared to conventional power generation system. This category includes the direct and indirect benefits and costs of RE deployment, for instance: the additional generation cost, e.g. due to more frequent ramping, hence more frequent maintenance; additional balancing costs, e.g. need for backup capacity; additional grid costs, e.g. to accommodate power generated in a newly developed offshore wind farm; additional transaction costs, e.g. cost of wind forecasting; benefits of reduced energy losses (some may also be classified within the trade balance issues); benefits of reduced negative environmental externalities.

Under this category, additional generation and balancing costs refer to costs related to electricity generation from RE technologies, including installation and operations and maintenance, which occur when electricity generation from RE technologies replace that from conventional sources. A known simplistic method of capturing this is by calculating levelized costs of electricity from the different technologies. Balancing costs, in particular, refer to the need for 'balancing intermittent generation from RE sources in the short run to ensure system stability, and for providing sufficient firm generation capacity in the long run to ensure security of supply in times of peak demand.'

Additional grid and transaction costs refer to costs incurred at the level of distribution or transmission grids related to extension, reinforcement or technologically upgrading of grids associated with RE deployment. Transaction costs refer to RE-induced costs between market participants such as forecasting, contracting, and to policy implementation costs, for instance due to reporting and monitoring obligations.

Externalities can be positive or negative. RE technologies are said to have the potential to avoid negative externalities that would have been acquired in conventional energy sources. Establishing a cap on CO2 emissions and emission trading systems have been used as instruments to capture and internalize externalities such as climate change, for instance in Europe and OECD countries, in an attempt to influence the decisions of companies and consumers.

Additional effects cover all remaining benefits and costs that may be associated with RE deployment and can be classified under more than one category (cross-category). One of the examples is risk reduction. It can refer to mitigation or reduction of possible accidents associated with conventional energy sources (e.g. nuclear accidents, oil spills, etc.); lower technical risks associated with a more decentralized energy system; reduction of geopolitical and financial risks associated with energy dependence in importing countries (covers energy security and trade balance effect).

Technical issues in power distribution networks causing supply disruptions is said to be reduced in RE technologies being less centralized. However, the intermittent nature of power generation by RE sources, and dependence on imported RE technology and expertise also pose risks.

There are financial risks mitigated by using RE technologies whose costs are more predictable as opposed to fossil fuel-based system whose cost/price is volatile. However, in RE technologies, there may be high dependence on imported equipment, components or raw materials used for domestic production; hence posing both financial and geopolitical risks (effect of supply disruptions and price fluctuations).

2.2 Policy instruments in promoting RE development

Different policies have been implemented by governments to promote and support the development of renewable energy, such as the feed-in-tariff (FiT), bidding system, quota system, green certificate trading, and fiscal incentives (e.g. rebates, tax exemptions).

Menanteau, Finon, & Lamy (2003) classified three of these policies into quantity-based scheme: bidding system and green certificate trading; and price-based scheme: feed-in tariff (FiT). Under the bidding system, an amount of renewable energy to be generated is defined by the regulator who then organizes a competition to allocate the amount among renewable energy producers. Selected producers are awarded with long-term contract to supply electricity at the pay-as-bid price. Electric utilities are obliged to purchase the electricity from the selected energy producers. The cost of support/subsidy to producers is covered either by adding in electricity bills through a special levy or cross-subsidizing among all electricity consumers.

Under the quota obligation scheme, also referred to as renewable portfolio standard (RPS) or renewable energy target, the obligation, i.e. to source a minimum percentage of electricity from eligible renewable energy, is imposed on energy producers, suppliers or distribution companies. Following this policy, electricity from renewable energy sources may be produced either by investing in projects, purchasing electricity through long term contracts from specialized RE generators, or by purchasing traded green certificates from other generators (IRENA & CEM, 2014). The implementation of this scheme would also involve penalty for non-compliance to ensure that obligated parties meet the renewable energy purchase obligations. The approach that has been used by some countries to simplify the burden of validating compliance and to enable flexibility in achieving compliance is to incorporate green certificate trading in the quota obligation system or RPS (Linden, et al., 2005; Brick & Visser, 2009). In the Philippines, under the Renewable Energy Act, renewable energy certificates will be issued to electric power industry participants (indicating energy sourced, produced, sold or used), and which may be traded in the renewable energy market in complying with the RPS.

Green certificates, in particular, are issued by renewable electricity generators by selling them in the network at market price or by selling them in the green certificates market. Having a certificate system enables quotas to be allocated in an efficient way, as the mechanism results in equalized marginal production costs among operators and possible entry of specialized producers in the market.

The Feed-in Tariff (FiT) system is considered as the most popular policy instrument (IRENA & CEM, 2014). Under this scheme, eligible RE producers are guaranteed a standard rate or purchasing price for a specific period of time for electricity that they produce. The FiT system operates as a subsidy allocated for renewable electricity producers. The cost of subsidizing producers of the electricity from renewable energy sources is covered by: cross-subsidies among all electricity consumers, or the customers of the utility obliged to buy green electricity, or the taxpayers (Menanteau, Finon, & Lamy, 2003).

Compared with the bidding scheme, the FiT scheme is said to be more efficient (green certificate trading scheme theoretically appears to be most efficient, but has to be proven more in practice (Menanteau, Finon, & Lamy, 2003). International experience confirms that the FiT scheme is the most cost effective measure to deploy renewable energy technologies (Pacudan, 2014). The FiT system is used in countries like the US, Japan and selected ASEAN countries such as Thailand, Malaysia and the Philippines. In the Philippines, the FiT payment is guaranteed for 20 years, with rates differentiated by type of technology. As a guaranteed rate, the FiT is expected to be effective in mitigating market and price volatility risks thereby making renewable energy development attractive and economically and financially feasible for investors to venture into (Guarin, 2013).

Apart from the regulatory policies mentioned above, fiscal incentives are offered by governments to encourage investments in RE development (IRENA & CEM, 2014). These types of incentives take the form of tax exemptions/reductions, subsidies, grants, soft loans, or rebates. Tax exemptions or reductions, for instance in equipment importation, value-added or sales, are said to be effective in encouraging investment especially in countries where tax rates are relatively substantial and where there is high dependency on imported RE equipment and technology. On the other hand, monetary assistance such as capital subsidies and rebates, have been applied to help reduce RE system costs including purchase of equipment for RE projects.

3. Profile of the RE sector in the Philippines

3.1 Regulatory and Policy Environment

The Philippines has two major policies on the renewable energy: the Biofuels Act of 2006 (RA 9367) and the Renewable Energy Act of 2008 (RA 9513). The Biofuels Act aims to reduce dependence on imported fuels by mandating utilization and promoting the development of locally-produced biofuels. It covers regulations on 'production, blending, storage, handling transportation, distribution, use and sale of biofuels, biofuel blends and biofuel feedstock in the country'. In the same vein, the Renewable Energy Act aims to accelerate the exploration and development of renewable energy resources and reduce the country's dependence on fossil fuels to 'minimize exposure to price fluctuations international markets.' The Act provides for fiscal and non-fiscal incentives to promote efficiency and cost-effectiveness of renewable energy systems. The Feed-in Tariff (FiT) scheme is a major feature of this law.

The Department of Energy (DOE) is the lead agency in implementing the provisions in both renewable energy laws and their respective implementing rules and regulations (IRR). Key features of the two laws on renewable energy are presented in Table 1. Key provisions of these laws will be discussed in more detail in the succeeding sections.

Table 1: Key features of laws on renewable energy

Title	Key features
Biofuels Act of 2006 (RA 9367)	▪ Mandatory use of biofuels. All liquid fuels for motors and engines sold in the country shall contain locally-sourced biofuels components, following the mandated proportion or blend. The initial mandated blend is minimum of 2 percent by volume for biodiesel, and 5 percent for bioethanol. ▪ Phasing out of the use of harmful gasoline additives and/or oxygenates. ▪ Fiscal incentives: zero specific tax on local/imported biofuels component per liter of volume; value-added tax rate (VAT) exemption for sale of raw materials used in the production of biofuel (e.g. coconut, jathropa, sugarcane, cassava, corn, sweet sorghum). ▪ Exemption from wastewater charges (under the Clean Water Act) for all water effluents as they are considered 'reuse'. ▪ Financial assistance: Government financial institutions (GFIs) will extend financing with high priority to Filipino citizens or entities (at least 60% Filipino-owned shares) involved in biofuel activities from production to transport, including blending of biofuels with petroleum. ▪ Creation of the National Biofuel Board (NBB). The NBB will monitor the implementation of the National Biofuels Program; provide recommendations to the DOE on matters concerning supply/production and utilization of biofuels and biofuel-blends. ▪ Security of domestic sugar and feedstock supply. The Sugar Regulatory Authority (SRA) will formulate guidelines in ensuring sufficient supply of sugar to meet the domestic demand and stable price of sugar. ▪ Security of domestic biofuels feedstock supply. The Department of Agriculture (DA) will ensure reliable supply of biofuel feedstocks. ▪ Development of a social amelioration and welfare program for workers in the production of biofuels. ▪ One-stop Shop is created for processing applications for feedstock production, biofuels and biofuel blends production and distribution.
Renewable Energy Act of 2008 (RA 9513)	▪ Renewable Portfolio Standards (RPS), which is set by the National Renewable Energy Board (NREB). ▪ Feed-in Tariff (FiT) System- for electricity produced from wind, solar, ocean, run-of-river hydropower and biomass. The Energy Regulatory Commission (ERC), in consultation with NREB, will formulate the FiT rules and set the FiT rates. ▪ Renewable Energy Market (REM), which will be operated under the Wholesale Electricity Spot Market (WESM). A Renewable Energy Registrar will be established by the Philippine Electricity Market Corporation (PEMC) that issue, keep and verify RE certificates used for compliance with the RPS. ▪ Green Energy Option program that provides end-users the option to choose RE resources as their source of energy. ▪ Net Metering agreements with qualified end-users who will be installing the renewable energy system. ▪ Fiscal Incentives: income tax holiday; duty free importation of renewable energy machinery, equipment and materials; special realty tax rates on equipment and machinery; net operating loss carry-over; accelerated depreciation; zero percent VAT; cash incentive of renewable energy developers for missionary electrification; tax exemption of carbon credits; tax credit on domestic capital equipment and services. ▪ Exemption from universal charge for renewable power and electricity generated for the generator's own consumption and/or for free distribution in the off-grid areas. ▪ Fiscal incentives for farmers engaged in plantation of biomass resources. ▪ Fiscal incentive for end-users in renewable energy system hosts communities/LGUs whose monthly electricity consumption does not exceed 100kWh. ▪ Financial assistance: GFIs will provide preferential financial packages for the development, utilization and commercialization of RE projects (with endorsement from DOE). ▪ Creation of the Renewable Energy Management Bureau (REMB) under DOE. The REMB's function include among others: develop, formulate and implement policies, plans and programs to accelerate the development, utilization and commercialization of renewable energy resources and technologies; develop and maintain a database; conduct technical and impact studies; information, education and communication services. ▪ Creation of the National Renewable Energy Board (NREB), assisted by a technical secretariat from the REMB. The NREB is primarily tasked to recommend policies to DOE and monitor the implementation of the Renewable Energy Act. ▪ Renewable Energy Trust Fund to enhance the development and greater utilization of renewable energy.

Source: RA 9367 (2006) and implementing rules and regulations (IRR); RA 9513 (2008) and IRR.

The DOE and its bureaus are not the only government agencies that are working towards the implementation of the RE laws. Other agencies are also involved, such as in terms of technical and procedural (e.g. certification/accreditation) activities. The following lists down key agencies based on the RE law provisions and IRR.

For the Biodiesel Act:

- Department of Finance (DOF) – monitor production and importation of biofuels through Bureau of Internal Revenue (BIR) and Bureau of Customs (BOC).
- Department of Science and Technology (DOST) – coordinate with DFA in identifying and developing viable feedstock for the production of biofuels; develop research and development program for sustainable biofuel production and utilization.
- Department of Agriculture (DA) – develop a national program for the production of crops for use as feedstock supply, that would also guarantee sufficient and reliable supply of feedstock are allocated for biofuel production; undertake biofuel feedstock research and development; coordinate with Philippine Coconut Authority (PCA) and Sugar Regulatory Administration (SRA) to identify and publish potential areas for expansion and production of raw materials as feedstock, and other policies in support of the biofuels program; certifies whether the proposed feedstock may be utilized for biofuel feedstock production.
- Department of Agrarian Reform (DAR) – approves conversion of agricultural lands to biofuel production site.
- Department of Labor and Employment (DOLE) – recommend policies and programs that will enhance social impact of the National Biofuels Program, including promotion of gainful livelihood and employment opportunities and social protection coverage.
- Department of Trade and Industry (DTI) – promote development of alternative fuel technology for vehicles, engines and parts in correspondence with the requirements of the mandated minimum biofuel blends; in coordination with Department of Transportation and Communication (DOTC) and DENR, formulate and implement a national motor vehicle inspection and maintenance program as a measure to reduce emissions from motor vehicles pursuant to the Philippine Clean Air Act of 1999.
- Department of Environment and Natural Resources (DENR) – issues Environment Compliance Certificate (ECC).
- National Commission for Indigenous Peoples (NCIP) – issues Certificate of Precondition (Certificate of Non-Overlap for sites outside ancestral domain; Certificate of Compliance if area is within/overlaps with ancestral domain).
- Philippine Coconut Authority (PCA) – develop and implement policies and programs within the coconut industry in support of the National Biofuels Program, such as: formulate and implement necessary regulatory measures to ensure availability, sufficiency, quality and sustainability of supply of coconut raw materials for the National Biofuels Program, require the accreditation/registration of reputable and credible oil mills that will supply coconut oil (CNO) requirements of coco biodiesel products.
- Tariff Commission – create and classify a tariff line for biofuels and biofuel-blends in consideration of WTO and AFTA agreements.

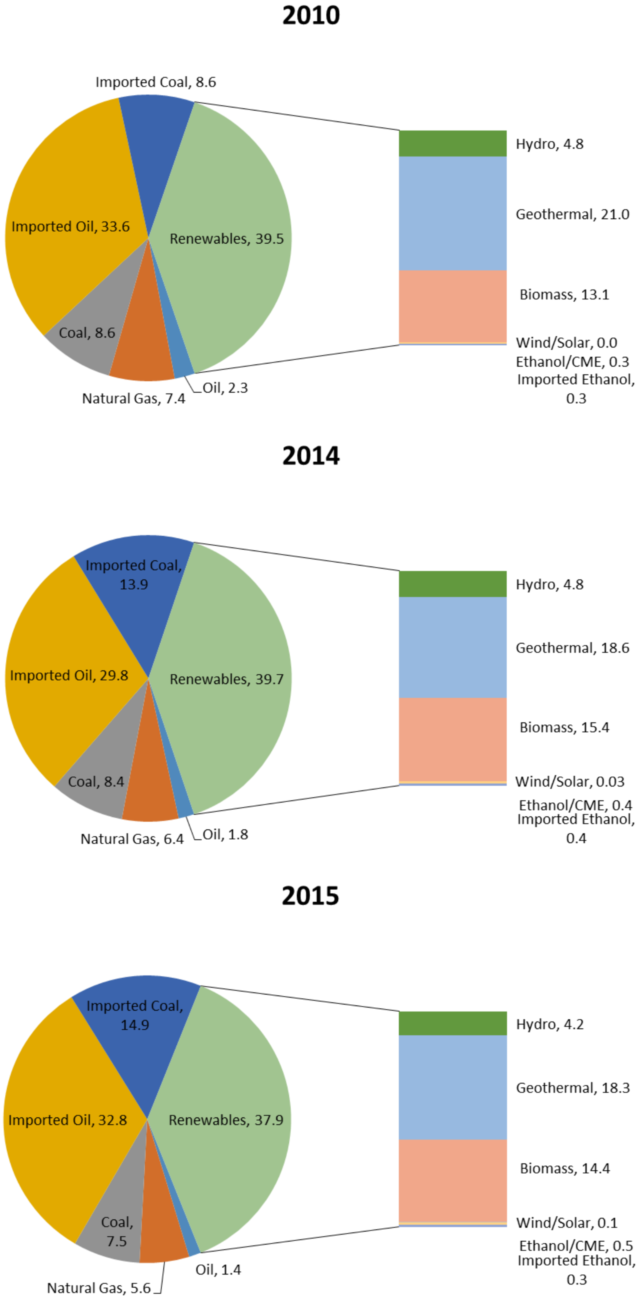
For the Renewable Energy Act:

- Board of Investments (BOI) – register RE developers, manufacturers, fabricators and suppliers of locally produced RE equipment to qualify for availment of fiscal incentives.
- Department of Environment and Natural Resources (DENR) – member of the National Renewable Energy Board (NREB); issues Environment Compliance Certificate (ECC), Forest Land Use Agreement (FLAg)/Special Land Use Agreement (SLUP)for area in public domain.
- Department of Finance (DOF)/Bureau of Customs, Bureau of Internal Revenue – formulate guidelines/mechanisms to implement fiscal-related provisions such as: exemption from duties on RE machinery, equipment and materials; zero percent VAT; tax rebate for purchase of RE components in consultation with Department of Science and Technology (DOST), Department of Trade and Industry (DTI), DOE; member of the National Renewable Energy Board (NREB).
- Department of Trade and Industry (DTI) – member of the National Renewable Energy Board (NREB);
- Department of Agrarian Reform (DAR) – approves conversion of agricultural lands to industrial sites.
- Energy Regulatory Commission (ERC) – formulates the FiT system rules
- National Commission for Indigenous Peoples (NCIP) – issues Certificate of Non-Overlap for sites outside ancestral domain; Free and Prior Informed Consent/Certificate of Precondition if area is within/overlaps with ancestral domain.
- National Transmission Corporation (TRANSCO) – provide necessary mechanisms for physical connection and ensuring safety and reliability of electricity transmission; member of the National Renewable Energy Board (NREB).
- Others: Maritime Industry Authority (MARINA), Bureau of Fisheries and Aquatic Resources (BFAR), Philippine Navy, Philippine Coast Guard, etc. – for necessary clearances.

3.2 Renewable energy sources

3.2.1 Primary energy mix

Figure 2: Philippines Primary Energy Mix, 2010, 2014-2015 (in percent)



Source: Department of Energy

Data in recent years indicate that total RE sources make up over a third of the Philippine's primary energy supply, i.e., sources of energy for electricity, transport, etc. (Figure 2). Renewable sources reached almost 40 percent of total primary energy supply in 2010 and 2014. This level of utilization of RE sources may imply that the Philippines is taking advantage of the indigenous resources available that can be tapped to help meet the country's energy needs.

Under renewables, geothermal energy remains to be the major source of renewable energy in the Philippines, and close to coal as second largest source among all energy sources (oil-based technology ranks top energy source). The high generation of energy from geothermal sources makes the Philippines the second largest producer of geothermal energy globally (DLA Piper, 2014). Meanwhile, biomass and hydropower comes in as second and third largest renewable primary energy source.

3.2.2 RE for electricity generation

For electricity generation, latest data indicate that the RE sources combined produces about a third of the Philippines' electricity supply (33.9% installed capacity, 32.4% dependable capacity). Among all sources, coal-fired generation is the largest source of electricity, producing 34.2 percent in dependable capacity (Table 2, Figures 3 and 4).

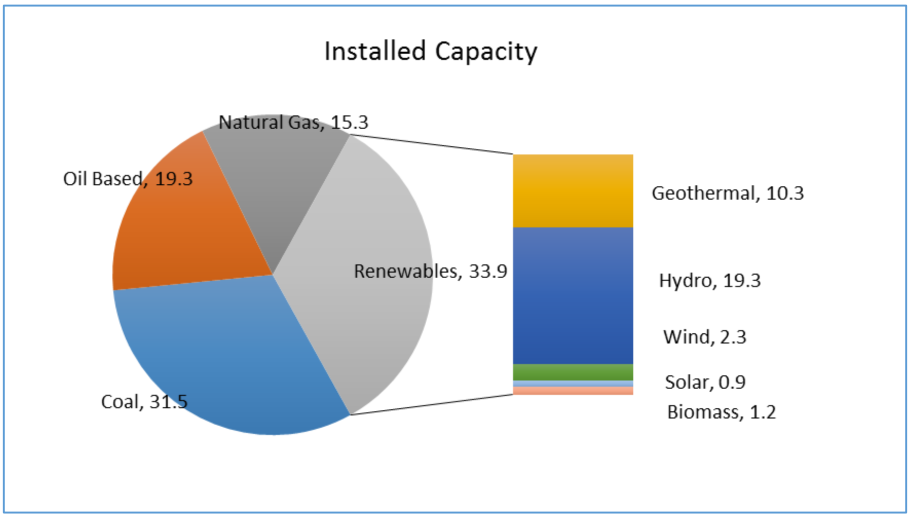
On a per technology basis, hydropower produces the most electricity among the renewable energy sector at 19.3 percent in installed capacity and 18.7 percent in dependable capacity; followed by geothermal power at 10.3 percent in installed capacity and 9.7 percent in dependable capacity. Among all sources, hydropower comes second to coal in electricity generation.

Table 2: Electricity Generation Sources

Fuel Type	**Capacity (MW)**	
	Installed	**Dependable**
Coal	5,893	5,632
Oil Based	3,610	2,734
Natural Gas	2,862	2,759
Geothermal	1,917	1,601
Hydro	3,600	3,073
Wind	427	379
Solar	165	125
Biomass	221	146
TOTAL	**18,695**	**16,451**

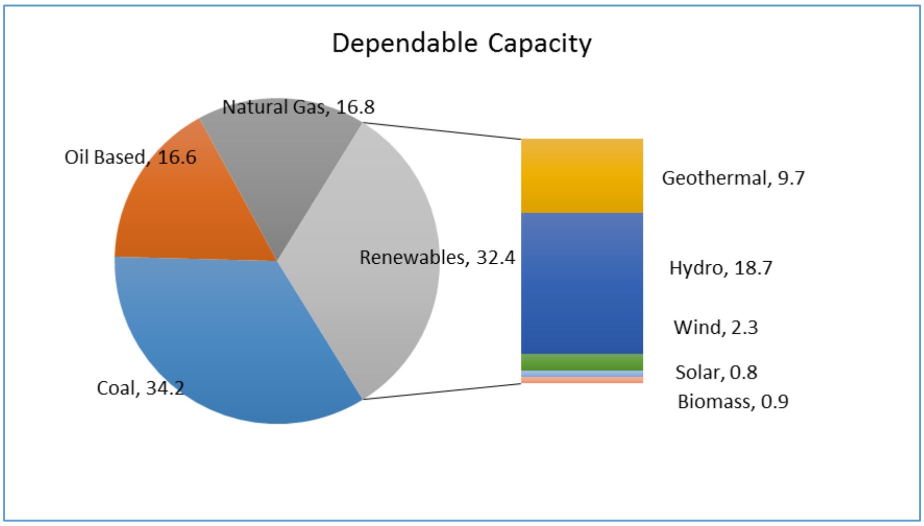
Note: As of December 2015; total no. of plants = 155; excluding off- grid electrification
Source: Department of Energy

Figure 3: Electricity generation by source, Installed capacity (in percent)



Note: As of December 2015; Total no. of plants = 155;
excluding off- grid electrification
Source: Department of Energy

Figure 4: Electricity generation by source, Dependable capacity (in percent)



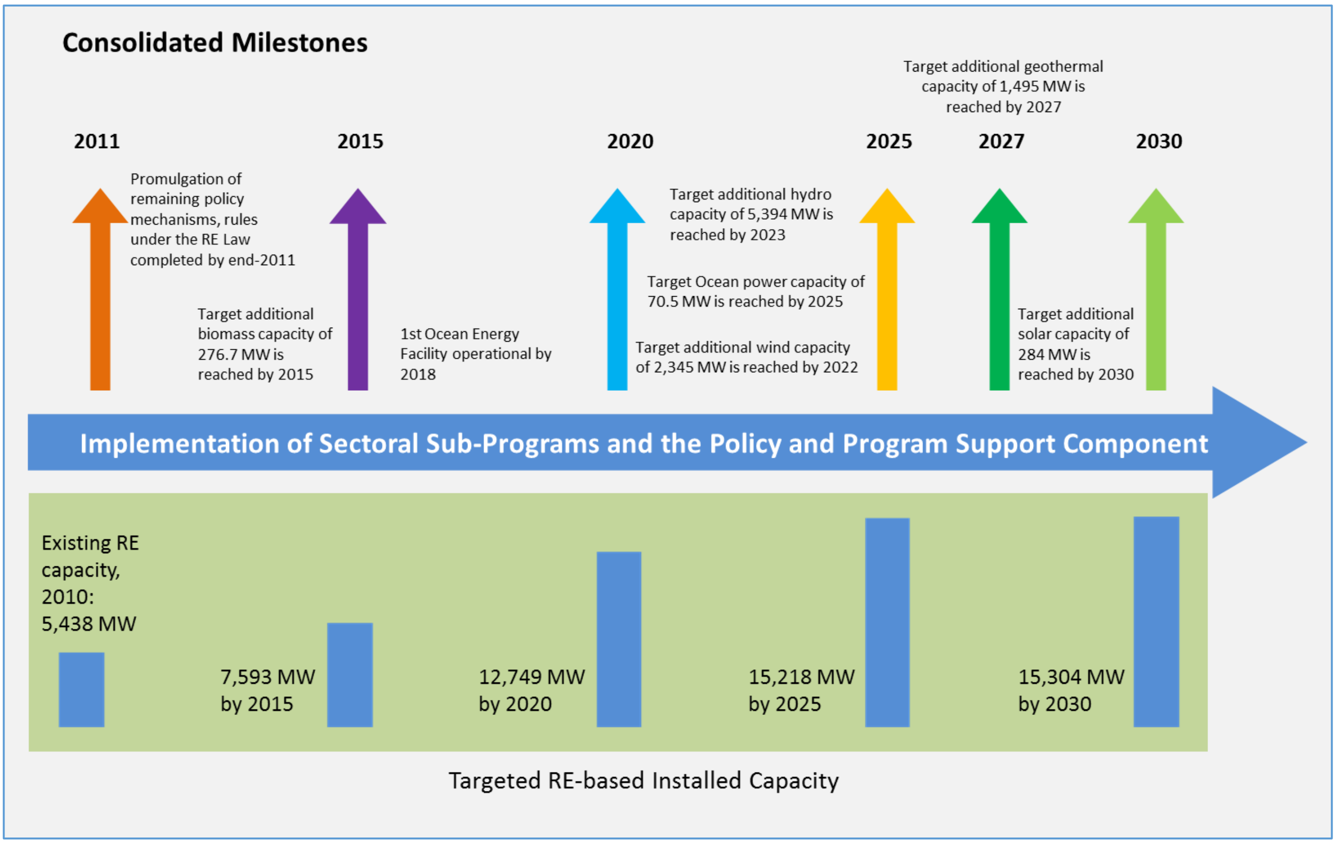
Note: As of December 2015; Total no. of plants = 155;
excluding off- grid electrification
Source: Department of Energy

In power generation, the government has set installation targets and milestones for the country's National Renewable Energy Program (NREP). Milestones were set for specific RE technologies for specific years (Figure 5). The NREP's overall goal is to increase RE-based capacity for power generation to 15,304 MW by 2030 (almost triple of the 2010 capacity level of 5,438 MW), by institutionalizing a comprehensive approach to address the challenges and gaps that would prevent and/or delay wider application of RE technologies in a sustainable manner, and outlining the action plans necessary to facilitate and encourage greater private sector investments in RE development.

On an per technology basis, the goals targeted to be achieved by 2030 include: increase geothermal capacity by 75 percent; increase hydropower capacity by 160 percent; deliver additional 277MW biomass power capacities; attain wind power grid parity with the commissioning of 2,345 MW additional capacities; mainstream an additional 284 MW solar power capacities and pursue the achievement of the 1,528 MW aspirational target; develop the first ocean energy facility for the country.

The government also set RE-based capacity installation targets, with details on target capacity additions per RE technology for every five years starting from 2011 leading to the total aimed capacity of 15,304 MW by 2030 (Table 3).

Figure 5: Consolidated RE Roadmap



Source: Adopted from National Renewable Energy Program (NREP), Figure 3, page 26.
Note: The NREP is a live document and will be subject to public consultation. Figures presented may change based on regular updates of the NREP.

Table 3: RE-based capacity installation targets

Sector	Installed Capacity, (MW) as of 2010	Target Capacity Addition by: 2015	2020	2025	2030	Total Capacity Addition (MW) 2011-2030		Total Installed Capacity by 2030
Geothermal	1,966.0	220.0	1,100.0	95.0	80.0	1,495.0		3,461.0
Hydro	3,400.0	341.3	3,161.0	1,891.8	0.0	5,394.1		8,724.1
Biomass	39.0	276.7	0.0	0.0	0.0	276.7		315.7
Wind	33.0	1,048.0	855.0	442.0	0.0	2,345.0		2,378.0
Solar	1.0	269.0	5.0	5.0	5.0	284.0	*/	285.0
Ocean	0.0	0.0	35.5	35.0	0.0	70.5		70.5
Total	5,438.0	2,155.0	5,156.5	2,468.8	85.0	9,865.3		15,304.3

Notes:
Figures may differ with those in tables by location due to rounding off
*/Based on existing RE Service/Operating Contracts awarded and being evaluated by the DOE. The aspirational target of 1,528 MW solar power capacity will still be pursued.
Source: Renewable Energy Plans and Programs 2011-2030, DOE publication

Data suggest that actual installed capacities per RE technology (as of December 2015) did not meet the targeted capacities for 2015, but the figures are rather close except for wind (Table 4). Looking at the awarded RE projects as of March 2016 (Table 5), it appears that there is high potential capacity from 51 wind projects at 1,168.0 MW. Once the wind projects become operational, installed capacity at such level is expected. For the RE sector as a whole, the potential capacity of 13,574.7MW as of March 2016 (based on 682 awarded projects) is approaching the 15,304.3MW targeted installed capacity by 2030, implying that the government would have to ensure the timely launch of the projects to achieve the targets.

Table 4: RE-based capacity targets vs installed capacity as of 2015

RE sector	Installed Capacity (MW), as of 2010 (a)	Target Capacity Addition by 2015 (b)	Target Capacity by 2015 (a+b)	Installed Capacity (MW), as of December 2015
Geothermal	1,966	220	2,186	1,917
Hydro	3,400	341	3,741	3,600
Biomass	39	277	316	221
Wind	33	1,048	1,081	427
Solar	1	269	270	165
Total	*5,438*	*2,155*	*7,593*	*6,330*

Source of data: Department of Energy.

Table 5: Summary of awarded renewable energy projects

Resources	Awarded Projects		Potential Capacity (MW)	
	Grid-Use	Own-Use	Grid-Use	Own-Use
Hydro	411	1	8,853.8	1.5
Ocean Energy	8	-	31.0	-
Geothermal	43	-	750.0	-
Wind	50	1	1,168.0	0.0
Solar	92	12	2,510.8	4.1
Biomass	40	24	249.1	6.4
Sub-Total	644	38	13,562.7	12.0
TOTAL	*682*		*13,574.7*	

Source: Department of Energy
Note: As of March 31, 2016

3.3 Biofuels program

Biofuels in the Philippines refer to bioethanol and biodiesel. Bioethanol is derived from sugarcane, cassava, and sweet potato and blended with gasoline; while biodiesel is derived from coconut oil and is blended with petrodiesel. The biofuels sector is composed of 21 companies with 21 projects and registered annual capacity of 867.02 million liters, as of March 2016 (Table 6).

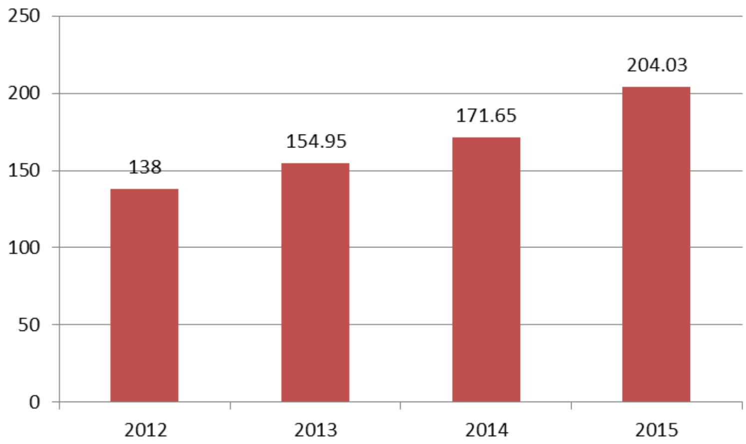
Actual production of biofuels sector has been increasing from 2012 to 2015 (Figures 6 and 7), but the sector does not appear to be producing at the expected level of capacity. Biodiesel production increased at an average annual of rate of 14 percent during this period. On the other hand, bioethanol production increased at an average annual rate of 70 percent. However as of 2015, biodiesel produced was only 35 percent of registered annual capacity of the sector, while bioethanol produced was 59 percent of registered annual capacity of the sector.

Table 6: Biofuels registration/accreditation

Resources	No. of Companies	No. of Projects	Registered annual capacity (million liters)
Bioethanol	10	10	282.12
Biodiesel	11	11	584.90
Total	21	21	867.02

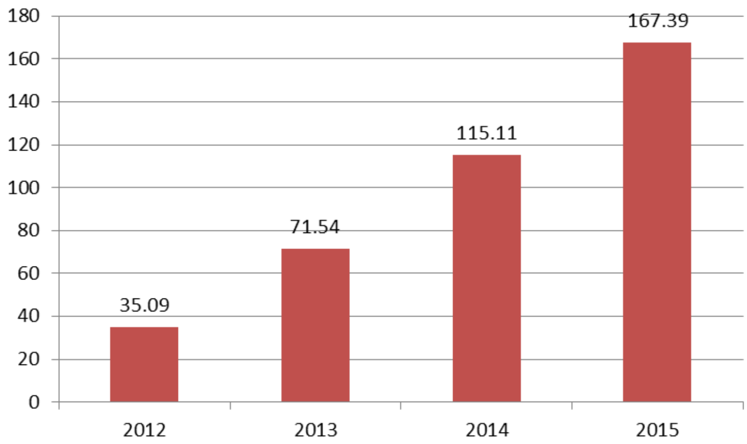
Source: Department of Energy
Note: As of March 31, 2016

Figure 6: Biodiesel local production (in million liters)



Source of data: Department of Energy.

Figure 7: Bioethanol local production (in million liters)



Source of data: Department of Energy.

Conforming to the Biofuels Act provisions, the Philippine Energy Plan (PEP) 2012-2030 released biodiesel and bioethanol measurable targets from 2012 to 2030 (Tables 7 and 8). Based on these targets in the PEP, the biodiesel blend is at 5 percent by volume (B5) by 2015. However, the target blend remains at 2.0 percent (B2) by volume, and increasing it to 5 percent is being reviewed. While, bioethanol target is at 10.0 percent (E10) by volume blended into all gasoline fuel sold and distributed nationwide.

Table 7: Biodiesel measurable targets

Year	Diesel Demand (in million liters)	Biodiesel Blends (Targets)	Supply Requirement/ Fuel Displacement (in million liters)
2012	6,922.85 (5,868.52 KTOE)	2%	138.46 (113.48 KTOE)
2015	7,343.10 (6,224.76 KTOE)	5%	367.15 (300.91 KTOE)
2020	7,923.37 (6,717.66 KTOE)	10%	792.34 (649.38 KTOE)
2025	8,693.73 (7,369.70 KTOE)	20%	1,738.75 (1,425.03 KTOE)
2030	9,030.68 (7,655.34 KTOE)	20%	1,806.14 (1,480.26 KTOE)

Notes: KTOE - kilotonne of oil equivalent;
Total supply requirement of biodiesel is equal to total diesel to be displaced.
Source: Table 74, Philippine Energy Plan (PEP) 2012-2030, page 135.

Table 8: Bioethanol measurable targets

Year	Gasoline Demand (in million liters)	Bioethanol Blends (Targets)	Supply Requirement/ Fuel Displacement (in million liters)
2012	3,730.67 (2,923.02 KTOE)	10%	373.07 (208.64 KTOE)
2015	3,794.72 (2,973.21 KTOE)	10%	379.47 (212.22 KTOE)
2020	4,301.80 (3,370.51 KTOE)	20%	860.36 (481.16 KTOE)
2025	4,682.81 (3,669.04 KTOE)	20%	936.56 (523.77 KTOE)
2030	5,052.26 (3,958.50 KTOE)	20%	1,010.45 (565.10 KTOE)

Notes: KTOE - kilotonne of oil equivalent;
Total supply requirement of bioethanol is equal to total gasoline to be displaced.
Source: Table 75, Philippine Energy Plan (PEP) 2012-2030, page 136.

Data suggests that actual biodiesel production was rather far from the 2015 supply requirement to achieve the targeted blends. Though the local biodiesel production in 2012 achieved the targeted B2 blend, the production in 2015 covered only 3 percent of the supply requirement (Table 9). There was, however, a moratorium on the B5 blend; hence the prevailing blend is still at 2 percent. A study by Alonzo (2016) indicated that increasing the blend from 2 percent to 5 percent would lead to an increase in biodiesel price, hence will incur loss for consumers.

In addition, the upward world price trends in coconut oil and crude oil prices and weak domestic coconut production show signs for postponement of increasing the target blend at least in the short run, according to the author.

For bioethanol, actual local production is relatively far from the supply requirement based on the mandated blend of 10 percent in 2012 and 2015 (Table 10). In 2012, local production was only 0.9 percent of the supply requirement; while in 2015, production increased but covered only 4.4 percent of the supply requirement.

Table 9: Biodiesel measurable targets vs actual production

Year	Diesel Demand (in million liters)	Biodiesel Blends (Targets)	Supply Requirement/ Fuel Displacement (in million liters)	Actual Local Production (in million liters)
2012	6,922.85	2%	138.46	138.00
2015	7,343.10	5%	367.15	204.30
2020	7,923.37	10%	792.34	-
2025	8,693.73	20%	1,738.75	-
2030	9,030.68	20%	1,806.14	-

Note: Total supply requirement of biodiesel is equal to total diesel to be displaced.
Source of data: PEP 2012-2030; Department of Energy.

Table 10: Bioethanol measurable targets vs actual production

Year	Gasoline Demand (in million liters)	Bioethanol Blends (Targets)	Supply Requirement/ Fuel Displacement (in million liters)	Actual Local Production (in million liters)
2012	3730.67	10%	373.07	35.09
2015	3794.72	10%	379.47	167.39
2020	4301.8	20%	860.36	-
2025	4682.81	20%	936.56	-
2030	5052.26	20%	1010.45	-

Note: Total supply requirement of bioethanol is equal to total gasoline to be displaced.
Source of data: PEP 2012-2030; Department of Energy.

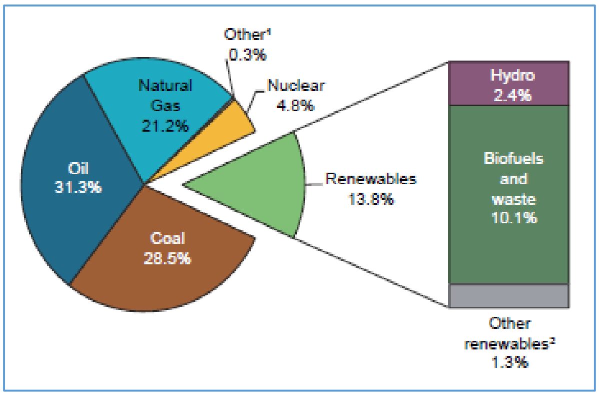
4. Global trends in RE development and use

Statistics indicate that world RE supply has grown from 1990 to 2014, with an average annual rate of 2.2 percent (IEA, 2016). The highest average annual growth rates were recorded in solar PV (46.2%) and wind power (24.3%), and relatively modest growth in geothermal and hydropower (3.1% and 2.5%, respectively).

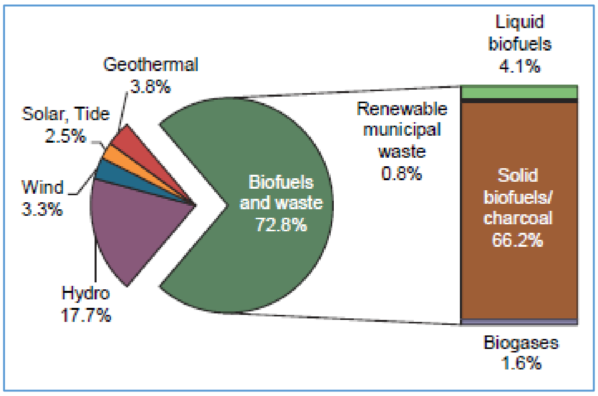
In 2014, RE sources contributed 13.8 percent of the world's total primary energy supply (TPES), a significant portion of which was produced from biofuels and waste (Figure 8-a). Solid biofuels/charcoal were largely used in developing countries for residential heating and cooking, making up 66.2 percent of world RE supply (Figure 8-b). Moreover, among RE sources, hydropower came in second, providing 2.4 percent of TPES and 17.7 percent of RE supply. Meanwhile, liquid biofuels and geothermal power produced smaller shares in world RE supply with less than 5 percent.

Figure 8: Fuel shares in world total primary energy supply, and product shares in world RE supply, 2014

(a) World total primary energy supply (TPES)



(b) World RE supply

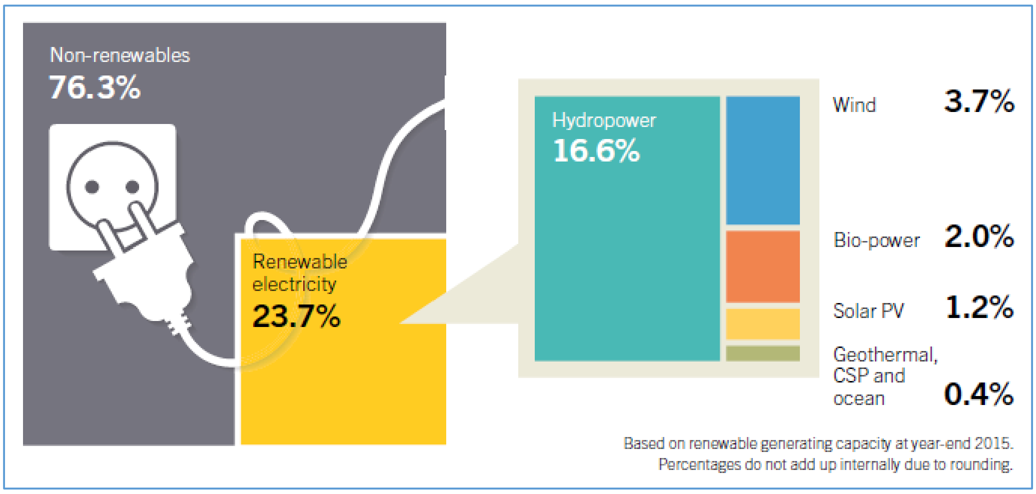


Notes: 1/ Other includes electricity from energy sources not defined above such as non-renewable wastes, peat, oil shale and chemical heat; 2/ Other renewables includes geothermal, wind, solar, tide; Total in graphs might not add up due to rounding.
Source: International Energy Agency (IEA), Key Renewables Trends 2016, Figures 1-2, page 3.

In terms of electricity generating capacity, the RE sector achieved its largest annual increase so far in 2015 (REN21, 2016). Total global capacity increased by almost 9 percent from 2014 (estimated 147 GW of RE capacity added). Wind and solar PV recorded their highest capacity additions in 2015, comprising about 77 percent of new RE installations; while hydropower contributed about 19 percent of additions. The REN21 (2016) report also claimed that 'the world now adds more renewable power capacity annually than it adds (net) capacity from all fossil fuels combined', with an estimated more than 60 percent of net additions to global power generating capacity.

By the end of 2015, the global RE capacity was sufficient to supply an estimated 23.7 percent of global electricity, with hydropower providing about 16.6 percent and the rest of the renewables combined providing 7.3 percent (Figure 9). In end-2014, the share of RE-produced electricity was 22.8 percent (REN21, 2015), suggesting an improvement in RE contribution within a year.

Figure 9: Estimated renewable energy share of global electricity production, end-2015



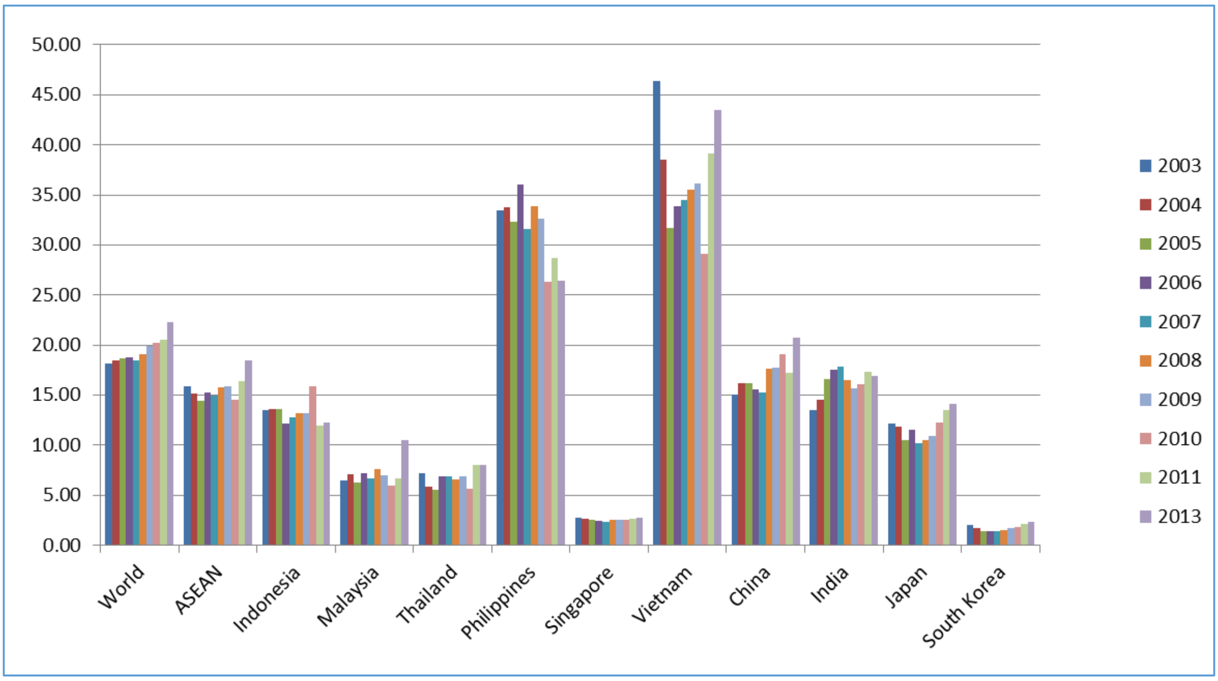
Source: REN21, Renewables 2016 Global Status Report, Figure 3, page 32.

On a regional level, Asia contributed most of the renewable power installations in 2015 (REN21, 2016). China, Japan and India were top countries for solar PV installations. Moreover, China and India were among the top countries for hydro and wind power capacity additions, with China leading the region and the world for hydropower. As for the level of geothermal capacity, Philippines continues to rank second to the US; while Indonesia ranked third in 2015. In Asia in general, countries have become important markets for more than one RE technology.

Share of electricity production from renewables in the region in 2003-2013, particularly for ASEAN, has been generally steady, averaging 15 percent annually (Figure 10). ASEAN average during this period was around 4 percentage points lower than the world average. Its Asian neighbors on the other hand, i.e. China, Korea, Japan and India, showed an increasing trend in share of RE electricity production.

Among Asian countries, Viet Nam and the Philippines had the two highest shares of renewables in electricity production in 2003-2013, with annual average of 36.8 percent and 31.5 percent respectively. While Viet Nam's share is increasing across the years, the Philippines' share is decreasing, though still higher than other countries in the region. South Korea and Singapore posted the lowest shares (annual average of 1.8% and 2.6% respectively), but showed an increasing trend in recent years.

Figure 10: Share of renewables in electricity production, 2003-2013 (in percent)



Note: Includes hydro.
Source of data: Enerdata

In the area of policymaking, there has been a surge in RE support policies in the last decade in response to energy related challenges such as climate change, air pollution, volatile fossil fuel prices and growing demand for electricity from industry (UNEP, 2012). As of 2015, REN21 (2016) reports that at least 173 countries had RE targets and an estimated 146 countries had RE support policies at the national or state/provincial level. Feed-in policy is the most commonly implemented regulatory mechanism to promote RE with 110 countries/states/provinces adopting this policy in 2015. RPS/quota policies follow second with 100 countries implementing. In the same year, 52 countries were found to adopt net metering/net billing policies, and 66 countries had enacted biofuel mandates. Fiscal policies, on the other hand, continue to be an important mechanism in promoting RE deployment and development in many countries. Among the RE policies, tendering[3] (also called auction or public competitive bidding) is currently gaining popularity in developing and emerging countries, as well as in Europe. At the end of 2015, at least 64 countries have adopted tendering schemes and record bids in terms of low price and high volume have been observed.

Countries use a combination of the policies mentioned above in developing their RE sector, with some of them implementing more than one regulatory policy and fiscal incentive. Table 11 presents selected countries and their policies in support of RE. Among the regulatory policies, FiT is most commonly adopted, followed by tendering and RPS/quota scheme. The popularity of FiT schemes is being attributed to their success in promoting RE generation, particularly in Europe (UNEP, 2012). Public investment/loans/grants are also common among

[3] Tendering is a procurement mechanism by which renewable energy supply or capacity is competitively solicited from sellers, who offer bids at the lowest price that they would be willing to accept. Bids may be evaluated on both price and non-price factors (REN21, 2016).

the selection of countries. Public investments support RE development when they finance RE projects that are risky and not financially viable for private investors and where markets are not yet capable of delivering appropriate technical systems for projects, such as grid infrastructure (GIZ, 2012). Moreover, among financial incentives, reduction in taxes and capital subsidies/grants/rebates are most common.

Compared with the selection of developed and developing countries (Table 11), the Philippines (aside from India) appears to be the most ‘generous’ in policymaking for RE, as illustrated by the number of policies it adopted, i.e. all the policies presented in the list. In the Asian region alone, countries have at most three (3) regulatory RE policies in place, while the Philippines offers five of the five policies in the list. It appears, however, that the government may be having some difficulty with execution, as not all of the policies have been implemented – e.g. IRRs for RPS and tradable green certificates are yet to be released.

Table 11: Renewable energy support policies in selected countries

	Regulatory Policies					Fiscal Incentives and Public Financing				
	Feed-in Tariff	Renewable Portfolio Standard/Quota	Net metering	Tradable Renewable Energy Certificates	Tendering/Auction/Public competitive bidding	Capital subsidies, Grants, Rebates	Investment or production tax credits	Reductions in taxes (e.g. sales, energy, CO2, VAT or other taxes)	Energy production payment	Public investment, loans, or grants
Brazil			✓		✓		✓	✓		✓
Chile		✓	✓		✓	✓	✓	✓		✓
United States	✓	✓	✓	✓		✓	✓	✓		✓
United Kingdom	✓	✓		✓		✓		✓	✓	✓
Germany	✓				✓	✓	✓	✓		✓
Italy	✓		✓	✓	✓	✓	✓	✓		✓
China	✓	✓			✓	✓	✓	✓	✓	✓
Japan	✓			✓	✓	✓		✓		✓
South Korea		✓	✓	✓		✓	✓	✓		✓
India	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Indonesia	✓	✓			✓	✓	✓	✓		✓
Malaysia	✓	✓						✓		✓
Philippines	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Singapore			✓		✓					✓
Thailand	✓					✓		✓	✓	✓
Viet Nam	✓			✓		✓	✓	✓		

Source: Adapted from (GIZ, 2012) and (REN21, 2016).

5. Implementation of policies and emerging issues

5.1 General policy direction on encouraging more renewable energy development

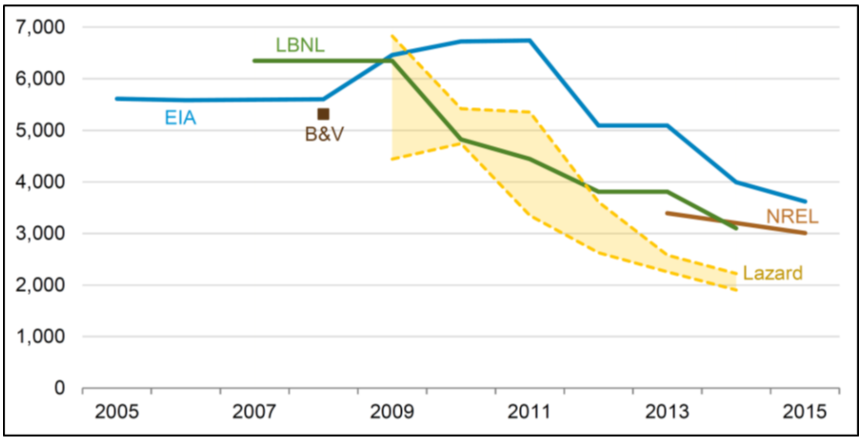
The RE laws in the Philippines offer incentives and other policies to encourage investments in RE projects and reach its targets for RE deployment. The government issued implementing rules and regulations (IRRs) to support these policies. However, while the government is taking steps to ensure that the sector is moving towards its goals, there have been issues raised regarding the government's decision to promote RE and its implementation of the RE laws.

Reduction of cost-related barriers. Like other countries, the Philippines offers financial incentives, e.g. tax holidays and duty free importation of machinery, to attract RE investment and development. It is one means of reducing cost-related barriers to entry in the market. RE technologies are generally capital intensive – developing an RE project and setting up the plant and the whole RE system requires large fixed costs.

A public advocacy organization in the Philippines, the Foundation for Economic Freedom (FEF), was apprehensive about the government's promotion especially of the expensive RE technologies when the RE law was enacted. The said organization suggested that it would be better to rehabilitate and improve existing hydroelectric and geothermal sources, and wait until the cost of the more prominent but more expensive technologies such as solar and wind drops in comparison with conventional energy sources (Fajardo F. , 2011).

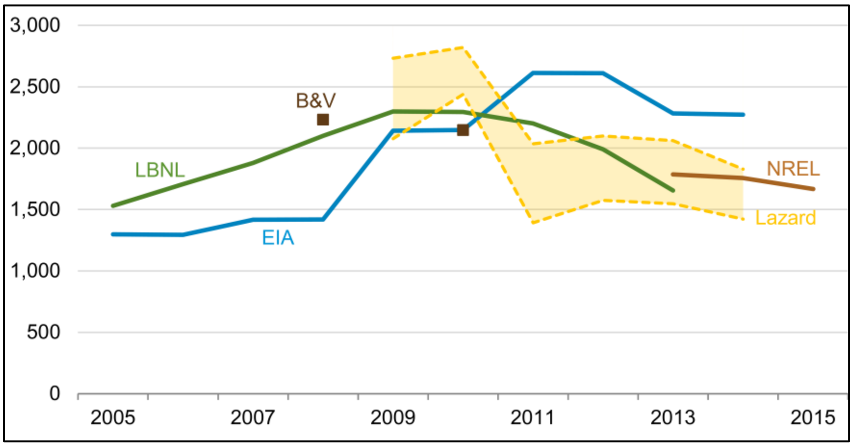
Data indicate that costs related to RE development have reduced in the last five years. This trend is attributed to advances in technology, expansion into new markets with better resources, improvements in financing conditions, and secure regulatory framework (REN21, 2016). Solar PV and wind technologies, in particular, experienced decline in costs. For solar PV technologies, annual capital costs estimated by different organizations indicated a decline in trend from 2010 to 2015 (Figure 11). For wind technologies, the estimated annual capital costs indicated an increasing trend from 2005 to 2009/2010, and subsequently, a slow declining trend towards 2015 (Figure 12). REN21 (2016) reported that in 2015, some of the countries in Latin America, North Africa, US and Asia Pacific found wind power to be the most cost-effective option for new grid-based power. In addition, record-low winning bids in solar PV and wind power auctions in India and some countries in Latin America and Middle East were also observed.

Figure 11: Annual estimated capital costs for solar PV technologies from various agencies, 2005-2015 (in 2014$ per kilowatt)



Note: EIA, Annual Energy Outlook (2003-2015); LBNL, Tracking the Sun 2014; LBNL, Utility-Scale Solar (2013-2014); Black & Veatch (B&V), Cost and Performance Data for Power Generation Technologies; NREL, Annual Technology Baseline 2014; Lazard, Levelized Cost of Energy (version 3-8). Source: Adapted from US Energy Information Administration, 2016

Figure 12: Annual estimated capital costs for wind technologies from various agencies, 2005-2015 (in 2014$ per kilowatt)



Note: EIA, Annual Energy Outlook (2003-2015); LBNL, Tracking the Sun 2014; LBNL, Utility-Scale Solar (2013-2014); Black & Veatch (B&V), Cost and Performance Data for Power Generation Technologies; NREL, Annual Technology Baseline 2014; Lazard, Levelized Cost of Energy (version 3-8). Source: Adapted from US Energy Information Administration, 2016

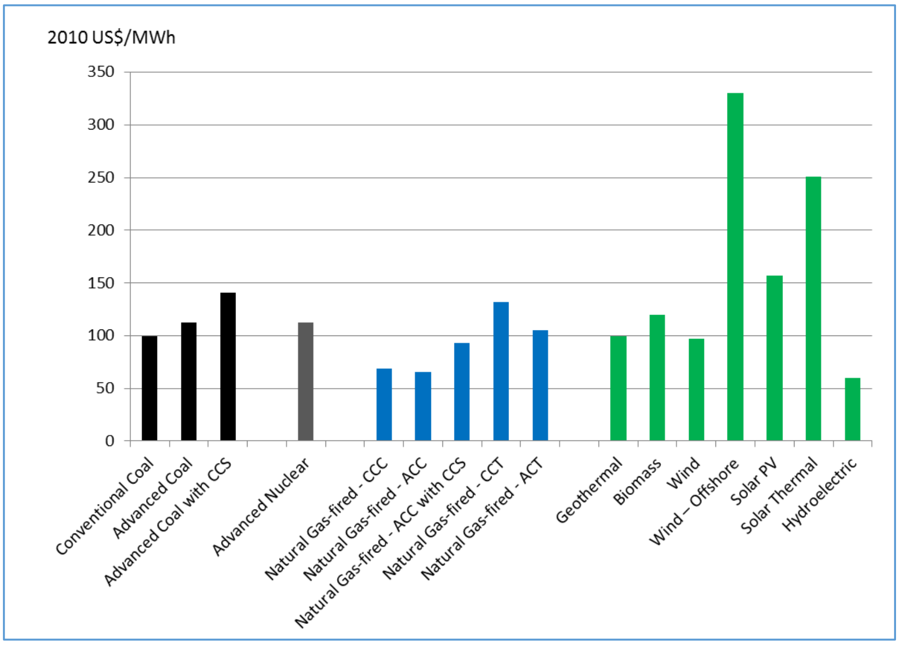
Hydro, geothermal, and some biomass power sources have also been observed to be competitive with fossil fuels (REN21, 2016). This can be seen when comparing US average levelized costs of electricity (LCOE)[4] across different RE technologies (Figures 13 and 14).

[4] Levelized cost of electricity (LCOE) is often cited as a convenient summary measure of the overall competiveness of different generating technologies. It represents the per-kilowatt-hour cost (in real dollars) of

The data also indicate that solar PV and wind LCOE are also becoming comparable with conventional energy resources. This supports the report by REN21 (2016) stating that solar PV and wind can be cost-competitive with new fossil capacities (even if externalities are unaccounted for), but with good resources and sound regulatory framework.

Across years, comparing particularly 2010 and 2013 (Figures 13 and 14), there have been cost improvements in RE technologies. Data indicate that their LCOE in 2013 USD/MWh was lower than the value in 2010 USD/MWh, with the substantial drop coming from geothermal, solar PV and wind offshore.[5] It is important to note, however, that a number of factors such as regulatory framework and market design are crucial in attaining cost competitiveness of RE technologies (REN21, 2016).

Figure 13: US average levelized costs of electricity by technology, 2010 USD/MWh

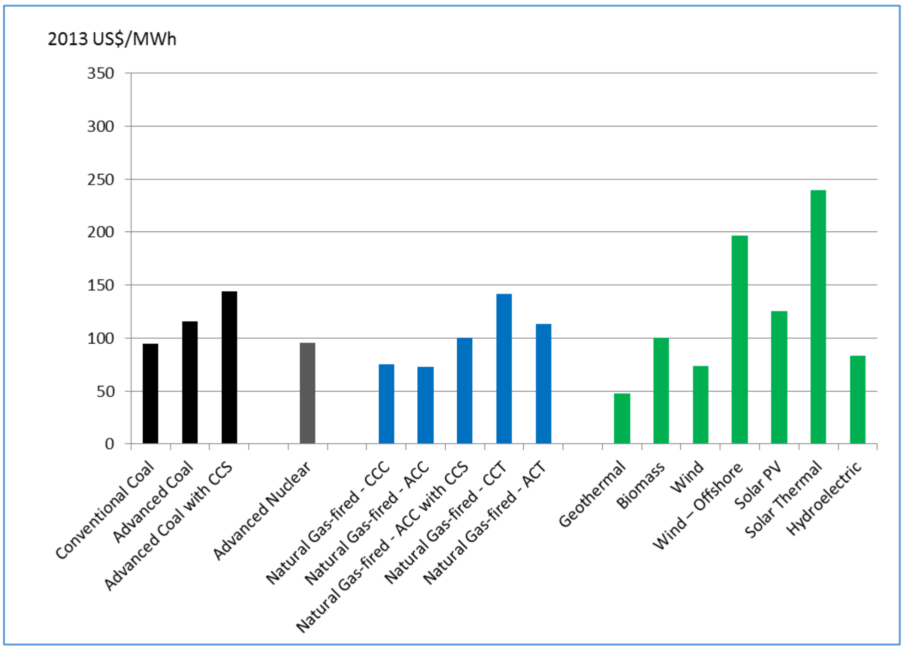


Notes: For plants entering service in 2017.
CCS – carbon control and sequestration; CCC – conventional combined cycle; ACC – advanced combined cycle; CCT – conventional combustion turbine; ACT – advanced combustion turbine.
Source: Annual Energy Outlook 2012, US Energy Information Administration (EIA).

building and operating a generating plant over an assumed financial life and duty cycle. Key inputs to calculating LCOE include capital costs, fuel costs, fixed and variable operations and maintenance (O&M) costs, financing costs, and an assumed utilization rate for each plant type (U.S. Energy Information Administration, Annual Energy Outlook 2015).

[5] Wind offshore refers to wind farms constructed off the coast or continental shelf.

Figure 14: US average levelized costs of electricity by technology, 2013 USD/MWh



Note: For plants entering service in 2020.
CCS – carbon control and sequestration; CCC – conventional combined cycle; ACC – advanced combined cycle; CCT – conventional combustion turbine; ACT – advanced combustion turbine.
Source: Annual Energy Outlook 2015, U.S. Energy Information Administration.

Implementation of government procedures for RE project development. The government established procedural systems to have an efficient and orderly way of implementing the RE policies. Administrative procedures involve securing approvals and permits for RE projects. Figure 15 and Box 1 presents a summary of the stages of RE project development. Each stage involves a series of approvals, certifications and permits from applicable government agencies.

The different steps involved in RE development suggest that the procedure can take a while to accomplish. The lengthy permitting process has been identified as one of the obstacles to RE deployment (National Association of Regulatory Utility Commissioners (NARUC), 2011). In the Philippines, the permitting process, on average, can take 1 to 3 years.[6] Obtaining an RESC, one of the major steps in the project preparation stage, can take 1 year. A hydropower company shared that the permitting process can take up to 3 years, and for a wind company, 1 to 2 years. Permitting for geothermal projects can take 1 year. While, for solar, the process takes relatively shorter – one company's 50MW solar project took about 3 to 4 months of permitting time. Construction-wise, average time is 1 to 2 years for RE technologies except for solar which can take relatively shorter time – 4 to 6 months based on experience by a 50MW project. In sum, RE development up to the construction of a power plant can take 4 to 5 years to complete.

[6] Based on interviews with wind, solar, run-of-river hydro and geothermal project developers.

Figure 15: Summary of stages of RE project development

Source: Adapted from (GIZ, 2014), page 17.

Box 1. Brief description of the stages of RE project development[7]
(Discussion here refers to Figure 15)

At the first stage, project preparation, the RE developer determines a suitable location for an RE project. Collection of data and information, desk studies, site surveys conducted by the developer. At this stage, the developer must apply for a RE service contract (RESC)[8] at the DOE to be able to acquire exclusive rights to explore and perform a feasibility study on the identified location of the RE project.

The pre-development stage (Phase 2) involves preliminary assessment and feasibility study until the financial closing of the RE project. The RESC is used in this stage and is valid for a maximum of 2 years. This stage also involves securing of permits and licenses from different agencies/authorities. The following are examples of the key requirements:[9]

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[7] This section draws heavily from Fajardo, et.al. (2014). A thorough discussion of the different phases in RE project development can be found in the said report.
[8] The RE service contract (RESC) is a service agreement between the Philippine Government through the DOE and RE developer, allowing exploration, development or utilization of renewable energy resources and actual operation of RE systems/facilities converting RE resources into useful energy forms, e.g., electricity.
[9] Fajardo, et.al. (2014) and GIZ (2014) offer guide on other requirements.

---Certificate from the National Commission in Indigenous People (NCIP) is required to ensure that the interests of indigenous people (IP) are protected. There are two types of certificates issued by the NCIP to an RE developer: Certificate of Non-overlap (attests that the location of the RE project does not overlap with or affect ant ancestral domain) and the Certification Precondition (attests to the grant of Free and Prior Informed Consent (FPIC) by the concerned IP community). RE developers must secure the certificate that is applicable to the circumstances of their project.
---Order of Conversion from DAR must be obtained if the project site is not classified as industrial land; and depending on the location, additional clearance may be required by agencies such as the Forest Management Bureau (FMB) and the Laguna Lake Development Authority (LLDA).
---Environmental Certificate from the DENR to confirm that the project will not cause negative environmental impact to the extent considered as unacceptable. Certificate required differ depending on project size: Certificate of Non-coverage (CNC) for projects smaller than 5 MW; Environmental Compliance Certificate (ECC) with initial environmental checklist for 5-100 MW projects; ECC with an Environmental Impact Statement (EIS) for projects with installed capacity above 100MW.
---Permit to Operate from the DENR to confirm that the power plant does not emit air pollution above the set limit (as per the Philippine Clean Air Act of 1999 / Republic Act 8749).
---Resolution of support from the host LGU (municipality/city) to ensure acceptance by the community (resolution from the host barangay is obtained first); some RE developers, though not required, also obtain resolution of support from the province to ensure support from this level.

In addition, the RE developer should have secured and mobilized financial support. A financial closure should be reached in order to begin physical construction and equipment procurement. Once financial closure is reached, the RE developer can apply for the Confirmation of Commerciality (COC) from the DOE. The COC indicates that a project has successfully completed the pre-development stage. It converts the RESC to the development stage. Moreover, the RE developer should also approach power utilities to obtain the licenses and agreement needed to connect and use their networks (do the initial steps for the Grid Connection Permit [GCP]; obtain necessary documents from TRANSCO).

The development/commercial stage involves the development, production or utilization of RE resources, including the physical construction and installation of relevant facilities up to the completion of commissioning of the power plant. The RESC used in this stage is valid at a maximum of five years. Building and electrical installation permits should be secured from the LGU as well. When the power plant construction reaches 80 percent and ready for commissioning (inspection is conducted by the DOE), the RE developer may apply for a Confirmation of Electromechanical Completion at the DOE. This confirmation becomes the basis for the ERC’s issuance of the Certificate of Compliance (CoC) (GIZ, 2014). The CoC gives permission to the RE developer to operate the power plant facility for generating electricity.

The fourth stage, registration and connection, still requires some permits and certifications, before commercial operations of the power plant may begin. If an RE project will avail of the FiT, a certificate of FiT endorsement (COE) should be obtained from the DOE. If under a power supply arrangement, the RE project should get approval from the ERC (power purchase agreement). And with a CoC issued, the RE project/power plant is allowed to generate electricity (Electricity Production License).

A number of factors can lead to lengthy permitting process. The cases below are based on experience of RE developers (wind, solar, hydro, geothermal, biomass):[10]

- Numerous permits and signatures required

Box 1 enumerated key permitting requirements, but there are other documents/permits such as those related to business registration, those required by local governments, e.g. building and wiring, and those required before applying for other permits or certifications (pre-requisites). One company shared that it applied for 66 permits for a geothermal project, around 70 permits for a wind project.

Permits require signatures from concerned government officials – it could be from the barangay, municipal/city, provincial, regional, department (central office) level, depending on the requirement. A solar and biomass company estimated that overall permitting may have required around 500 signatures. A hydropower company claimed that one project took around 1,300 signatures before they could begin construction – this includes signatures from the IP communities. It was also noted that some signatures would require other persons to affix their initials.

Numerous permits and signatures can already lengthen the permitting process, according to the companies interviewed. It can be further prolonged by cases with pre-requisite permits wherein delay in one permit would cascade to other permits and would cause delay in the overall project. Affixing initials of additional personnel also lengthens the process further. Connected to this case is the bureaucratic manner that documents are signed by, for instance, the Department Secretary. The documents would pass through different bureaus/divisions before it reaches the Secretary for signature, including when the said head of agency has inquiries or clarifications. The companies interviewed are on in suggesting that streamlining of the system, including reduction of signatures and bureaucratic procedures, can help speed up the process.

- Varying interpretation of rules

One of the problems identified by interviewed RE companies is the varying interpretations of the implementing rules and regulations – among offices (local, regional) of the same line agencies, and also across different agencies. They said that interpretation of the rules can be very subjective, dependent on the interpretation of the regional heads/officers. One RE company shared that the permitting process at the NCIP, for instance, in the northern regions differs from the process practiced in the southern regions.

Under this circumstance, there is uncertainty as to whether different interpretations will be given which will then require re-filing of documents, thereby cause delay in the process (one company experienced around 2 days of delay). One RE company added that the changes or rotations of directors and officers in the middle of the permitting process increases the probability of receiving different interpretations of the rules.

- Change of guidelines/policies upon assumption of new head/officer

The RE companies interviewed also shared that there is tendency for the permitting guidelines to change, especially when a new administration/head assumes office (national,

[10] Four RE companies were interviewed.

department or local levels). Developers have experienced being confronted with changes in policy in the middle of complying with requirements. One company related this experience while applying for water permit.

Another company recounted a case wherein new applications were stopped during transition to a new agency head and new guidelines were released after 6 months of taking office. The new guidelines entailed new requirements, hence lengthening the permitting process.

One guideline raised was the permitting process in projects located in ancestral domain. The past guidelines stated that an RE project developer should secure permission from the barangays where the project is located, e.g. if the project is located in two barangays, coordination will be done with these two barangay. In the new guidelines, securing of permission depends on the ancestral domain title. If the ancestral domain includes barangays other than the location of the RE project, the developer should also coordinate with them. In this case, instead of coordinating with just the barangays affected by the RE project, the developer will have to talk to all the barangays covered by the ancestral domain title.

- 'First come, first served' policy

To be eligible for the FiT scheme, one of the steps is to secure the certificate of endorsement (COE) for FiT eligibility. However, only a limited number of RE developers can be issued with COE (Fajardo, et.al, 2014). The government sets installation targets per RE technology, and COEs will only be issued until the target is fully subscribed.[11]

The COE is issued on a first-come-first-serve basis. When the installation target is fully subscribed, RE developers can no longer apply for a COE, hence they cannot be eligible to avail of the FiT scheme (after issuance of the COE, the ERC gives the final approval for FIT enrolment).

The issue for RE companies is that the key requirement for COE puts them under high risk. The guidelines indicate that COE can be obtained only after the construction of the power plant reaches 80 percent and the plant has confirmed 100 percent electromechanical completion. In such case, there is no guarantee that a developer will be eligible to avail of the FiT rate even if the RE facility has already been constructed. Developers compete with each other in qualifying for the COE until the installation target is reached. The guidelines also indicate alternative options for developers to sell their electricity should the installation targets already be reached: enter into a bilateral agreement with a distribution utility (DU) or any off-taker; export the power generated directly to the WESM, subject to the FiT guidelines on 'must dispatch'. But while there are alternative schemes, FiT would be the better incentive as of the moment because this scheme guarantees payment for generated power at price set by the government.

This policy may have been implemented to get rid of speculators and invite only the 'serious' developers who will be able to construct and operate RE projects. But, according to one RE company, the policy poses a barrier especially to the relatively small companies with genuine interest to develop RE projects but are concerned about the uncertainty of FiT eligibility even after construction of power plants. The suggestion given by RE companies interviewed is to

[11] Installation target: Run-of-hydro – 250MW; Biomass – 250MW; Solar – 500MW (from 50MW before April 2014); Wind – 400MW (from 200MW); Ocean – 10MW.

have clear and strictly implemented requirements, and have FiT eligibility determined before the development stage and not after completion of power plant construction (electro-mechanical completion).

The fourth stage in RE project development (as shown in Figure 15), particularly grid connection, is also a lengthy process, based on the experience of one RE company. It will take about 15 to 17 months from the application for (including waiting/processing time) and actual conduct of a Grid Impact Study, conduct of a facility study, up to the application for grid connection to the ERC.

5.2 Net metering for on-site RE generation

Net metering was the first RE policy instrument that was fully implemented in the Philippines (GIZ, 2013). It is a consumer-based RE incentive scheme wherein electric power generated by an end-user from an on-site RE generating facility and delivered to the local distribution grid may be used to offset electric energy provided by the DU to the end-user.[12] It allows residential and commercial customers who generate their own electricity from eligible RE resources (e.g. solar energy system) to feed electricity they do not use back into the grid. In essence, customers are only billed for their "net" energy consumption. The system involves electricity meters that record the electricity consumed and provided by the end-user (GIZ, 2012). The actual electricity bill reflects what is left after deducting the electricity generated from electricity consumed. An example of on-site generating facility is a house or office building with solar PV system that can be connected to the grid.

The rules enabling the Net Metering Program for RE lay out a few criteria to qualify for the program.[13] The program is applicable for installation of less than or equal to 100kW, and the on-site RE system to be installed should be appropriate for distributed generation. RE technologies such as wind, solar, biomass or biogas or other RE systems capable of being installed within the qualified end-user’s premises are eligible to participate in the program. The end-user (natural or juridical) should also be in good credit standing in their payment of electricity bills to the distribution utility (DU). Finally, the RE system should comply with the interconnection standards, grid and distribution codes, and other commercial arrangements that will be set by the government.

Two entities that participate in the net metering program are the Asian Development Bank (ADB) Manila headquarters and University of Asia and the Pacific (UA&P). In 2012, ADB launched a rooftop solar power facility with 2,040 PV panels that will generate 613 MWh of electricity per year to run a portion of the office’s air conditioning, lighting and computer systems.[14] In 2014, responding to the DOE’s call for energy conservation and efficiency (via a solar power program in cooperation with Metro Manila schools), UA&P installed a 300 kW solar PV system to supply power to the university’s parking and sports building. The building’s rooftop holds 1,200 pieces of high-efficiency 250 solar panels that can provide the building’s 60kW requirement.[15] The facility helped reduce energy cost, saving the university around PHP

[12] Renewable Energy Act of 2008 (RA 9513).
[13] Rules Enabling the Net Metering Program for Renewable Energy, Energy Regulatory Commission, 2013.
[14] http://www.adb.org/news/adb-opens-hq-solar-power-project-setting-clean-energy-example.
[15] Iris C. Gonzales, Feb 21, 2015philstar.com.

4 million in heat insulation, and ensure uninterruptible power supply for its services.[16] Like the ADB, utilization of the RE technology also meant less carbon footprint.

Manila Electric Co. (Meralco) reported that the net metering program is growingly attracting participants. As of May 2016, it has 392 participating customers, from having its first customer in 2013.[17] Meralco suggests that factors such as the price of electricity and the declining cost of solar PV systems may have prompted more customers to install RE systems and avail of the net metering program.

5.3 Feed-in tariff policy

The Feed-in tariff (FiT) is a scheme that involves the obligation on the part of electric power industry participants to source electricity from RE generation at a guaranteed fixed price applicable for a period of time – for the Philippines it is 20 years. This policy aims to accelerate the development of emerging RE technologies, particularly for wind, solar, ocean, run-of-river hydropower and biomass, through a fixed tariff mechanism. The IRR for the FiT scheme states that FiT eligible RE plants shall enjoy priority connection to the transmission or distribution system, and be given priority to inject generated power into the network that they are connected with and paid corresponding FiTs (all subject to compliance with standards and rules set by the government).

The FiT scheme is one of the most commonly implemented RE policy instruments by countries that encourage RE technologies. Table 12 presents FiT rates issued by selected counties in East Asia. The data indicate that the Philippine FiT rates appear relatively higher by regional standards, second to Japan. While the FiT rates have been adjusted in 2016, with new installation targets: Solar – 8.69 (from 50MW to 500MW); Wind – 7.40 (200MW to 400MW), the rates in the Philippines are still quite high relative to other countries in the region.

There are some criticisms on this move by the government to implement FiT rates. The FEF likens FiT rates to a tax that will be added to the consumers' electricity bills to encourage use of new RE technologies. Moreover, compared to conventional energy sources that depend on coal/diesel prices that are dictated by the international market, FiT rates are pegged for the next 20 years, regardless of changes in prices/costs of new RE technologies.

Table 12: Feed-in Tariff rates in selected East Asian countries

	Hydropower	Wind	Solar	Biomass
China				
RMB/kWh	0.29 to 0.45	0.51 to 0.61	1 to 1.15	0.65
USD/kWH	0.05 to 0.07	0.08 to 0.10	0.16 to 0.19	0. 11
Indonesia				
IDR/kWh	656	Yet to be introduced	2,918 to 3,502	940 to 1700
USD/kWH	0.06	Yet to be introduced	0.25 to 0.30	0.08 to 0.15
Japan				

[16] Lenie Lectura, February 22, 2015. UA&P installs solar-power facility. www.businessmirror.com.ph.
[17] Rooftop installations by its customers have an average capacity of four (4) kW. Danessa Rivera, June 25, 2016. More Meralco customers shift to net metering. http://www.philstar.com/business/2016/06/25/1596294/more-meralco-customers-shift-net-metering.

JPY/kWh	25.92 to 36.72	23.76 to 59.4	30 to 37	14.04 to 42.12
USD/kWH	0.25 to 0.36	0.23 to 0.58	0.29 to 0.36	0.14 to 0.41
Malaysia				
MYR/kWh	0.00	Yet to be introduced	0.00 to 3.46	4.05
USD/kWH	0.00	Yet to be introduced	0.00 to 1.09	1.27
Mongolia				
MNT/kWh	64.69 to 143.75	115 to 215.63	215.63 to 431.25	Yet to be introduced
USD/kWH	0.03 to 0.08	0.06 to 0.11	0.11 to 0.23	Yet to be introduced
Philippines				
PHP/kWh	5.9	8.53	9.68	6.63
USD/kWH	0.14	0.20	0.22	0.15
Thailand				
THB/kWh	0.8 to 1.5	3.5 to 4.5	6.5	0.3 to 0.5
USD/kWH	0.03 to 0.05	0.11 to 0.14	0.20	0.01 to 0.02
Viet Nam				
VND/kWh	Yet to be introduced	1, 614	Yet to be introduced	Yet to be introduced
USD/kWH	Yet to be introduced	0.08	Yet to be introduced	Yet to be introduced

Note: Data as of 15 August 2014.
Source: (Piper, 2013), page 108.

5.4 Priority dispatch policy

Part of the FiT scheme is the priority dispatch policy, wherein eligible RE resources are given priority in the purchase and injection to the grid. The FiT guidelines provides for priority connection to the grid for electricity generated from RE resources and priority purchase, transmission of, and payment for such electricity by the grid system operators. The framework for the implementation of must dispatch and priority dispatch of RE resources have been formulated and disseminated as a DOE Department Circular.[18]

Implementation of this policy implies two scenarios: (1) As price takers, RE resources may displace expensive conventional energy resources, which may possibly result in lower electricity prices, especially during peak period, and also assuming that there are no changes in the behavior of trading participants. (2) During off-peak hours, electricity may increase due to the thinning of demand for which the generators would compete. With a thin market for competition, there could be temptation to exercise market power via collusion.

The two scenarios above refer to the merit order effect, which according to a PEMC study, can affect the energy costs of end-users. The PEMC study (De La Vina, 2015) simulated and compares energy costs under scenarios with and without intermittent RE resource in the grid (particularly, comparing cost of energy purchased from the WESM with or without the FiT-eligible generating plants). In their study, the difference between these costs corresponds to an estimate of the financial impact to the end-user. For instance, if the cost of energy purchased from the WESM is lower with the FiT-eligible generating plants than without them, then the

[18] DOE Department Circular No. 2015-03-0001, "Promulgating the framework for the Implementation of Must Dispatch and Priority Dispatch of RE Resources in the Whole Electricity Spot Market (WESM)".

difference in costs is considered as the benefit of the integration of the RE resources to the grid (and vice versa). One of the methodologies in the study is the simulation/analysis of WESM payments of end-users from November2014 to October 2015) under two scenarios: (1) 337 MW wind capacity and (2) combined 337 MW wind and 500 solar capacities are available. Results of the analysis indicate that in Luzon, the large private distribution utility would be paying 4.9 centavos per kWh less than it what it would have paid if there was no scenario 1, and 9.5 centavos per kWh less than what it would have paid if there was no scenario 2. For the rest of Luzon and Visayas, WESM payments would be 12.5 centavos per kWh less than would have been paid without scenario 1, and 24.7 centavos per kWh less than would have paid without scenario 2. As for Mindano, no impact from the merit effect is identified as WESM is not implemented in the region.[19]

In sum, the PEMC study findings (which refer to the period of November 2014 to October 2015) indicate that integrating FiT-eligible generating plants (wind and solar technologies were used in the analysis) resulted in lower overall energy costs; in particular, a reduction in average rate in the WESM (at 11.65 centavos per kWh or P8.29 billion), thereby translating to an avoided cost by consumers (5.67 centavos per kWh or P4.04 billion).[20]

5.5 Policies in RE Act of 2008 which are yet to be implemented

5.5.1 Renewable portfolio standards (RPS)

The Renewable Portfolio Standards (RPS) places an obligation on power industry participants such as generators, DUs, or suppliers serving on-grid areas to source or produce a specified fraction of their electricity from eligible RE resources.[21] Under the Renewable Energy Act of 2008, the NREB will set the minimum percentage of generation from eligible RE resources based on different parameters: sustainability of the RE resources; available capacity of the relevant grids; available RE resource within the specific grid; and other relevant parameters.

The RE law's IRR also indicated that the DOE, upon recommendation of the NREB, will formulate (and publish) the RPS rules which should include: the type of RE resources, and identification and certification of RE generating facilities which will be required to comply with the RPS obligations; yearly minimum RPS requirements once RPS rules are established; annual minimum incremental percentage of electricity sold by each RPS-mandated electricity industry participant which is required to be sourced from eligible RE resources, and which should not be less than one percent of its annual energy demand over the next ten (10) years; technical feasibility and stability of the transmission and/or distribution grid systems; means of compliance by RPS-mandated electricity industry participants of the minimum percentage set by the government to meet the RPS obligations including direct generation from eligible RE resources, contracting the energy sourced from eligible RE resources, or trading in the Renewable Energy Market (REM); and other rules that may be deemed necessary to promote RE industry development.[22]

[19] End-user impact depends on spot exposure of the end users.
[20] Lenie Lectura, RE plants kept power rates steady at WESM, PEMC says, January 19, 2016, www.businessmirror.com.ph.
[21] Renewable Energy Act of 2008 (RA 9513) implementing rules and regulations (IRR). DOE Department Circular No. DC2009-05-0008. May 25, 2009.
[22] Renewable Energy Act of 2008 (RA 9513) implementing rules and regulations (IRR). DOE Department Circular No. DC2009-05-0008. May 25, 2009.

The RE law's IRR states that the RPS rules should be formulated and disseminated within six months of its (IRR) effectivity. The IRR took effect sometime in June 2014. Two years later, in June 2016, the draft RPS rules and guidelines was issued by the DOE.[23]

5.5.2 Green Energy Option

The Green Energy Option is a mechanism to provide end-users the option to choose RE resources as their source of energy.[24] The DOE, in consultation with the NREB, will establish the program and formulate the IRR. The ERC, on the other hand, will issue the necessary regulatory framework following the objectives of the program. Moreover, relevant parties such as TRANSCO, its concessionaire, distribution utilities and PEMC are mandated to provide the mechanisms for the physical connection and commercial arrangements in support of the program. Meanwhile, for end-users who will enroll under the program, the IRR states that they will be provided with information through their monthly electric bill on how much of their energy consumption and generation charge is provided by RE facilities.

5.5.3 Renewable Energy Market

The IRR of the Renewable Energy Act defines Renewable Energy Market (REM) as the market (to be set up as a sub-market of the WESM) where the trading of the RE certificates equivalent to an amount of power generated from RE resources is made; essentially, to expedite compliance with the establishment of the RPS. The REM will be established by the DOE. The PEMC, under the supervision of the DOE, will establish and operate the RE Registrar and will issue, keep and verify RE Certificates corresponding to energy generated from the eligible RE facilities. These RE certificates will be credited in compliance with any obligation under the RPS.

5.5.3 Incentives that have not yet been implemented

The renewable energy laws offer fiscal incentives such as income tax holiday, special corporate tax, duty free importation of machinery, equipment and materials, zero percent VAT and others. An RE company interviewed shared that they benefit from these incentives. These schemes can attract investors to shift to renewable energy technology. However, it was suggested that the government improve on the implementation, particularly, on the zero VAT. Though it is clear which energy projects can avail of the incentive, the concerned implementing agencies has not yet issued rules and guidelines, hence, RE companies faced delay in VAT recovery.

5.6 Compliance with Biofuels Act of 2006

As discussed above, when comparing targets and actual production, the biofuels industry appears to have failed in reaching its targets. In this regard, the government has started a review of the targeted blends.

According to reports, there is lack of capacity of existing sugarcane distilleries, low productivity and high production costs (Olchondra, 2014). For coconut production, typhoons,

[23] Danessa Rivera, DOE issues draft rules on RPS, June 24, 2016, http://www.philstar.com/business/2016/06/24/1595976/doe-issues-draft-rules-rps.

[24] Renewable Energy Act of 2008 (RA 9513) implementing rules and regulations (IRR). DOE Department Circular No. DC2009-05-0008. May 25, 2009.

recent infestations in coconut producing areas were some of the reasons cited as causes of declining production and productivity of feedstock supply for the production of biofuels.

An UNCTAD study also found that bioethanol producers have been importing ethanol, mostly from Thailand[25] to comply with the mandated 10 percent ethanol blend requirement (E10), which then implies that the Philippines would likely remain a net importer of fuel. Moreover, in biodiesel, the target of 5 percent blend had to be assessed as biofuel suppliers are unable to meet the required demand, as of 2014.

6. Conclusion and Recommendations for Policy

Both sides of the debate on Renewable Energy deployment have their justifications for supporting or not supporting the use of RE resources. Those that endorse RE technologies speak of how RE resources are replenishable and have minimum impact on the environment. Externalities, unlike conventional energy sources, are minimized as there is no fossil fuel used to produce energy. In relation to this, use of RE resources pushes down the cost of electricity as only operation and maintenance costs are involved, and fuel, whose prices are volatile, is not needed. In addition, advocates argue that there is a growing demand for electricity from the industry as well as households – why not use RE resources which are already available in the country.

On the other hand, criticisms on RE resources include variability of supply and the high cost of developing RE technologies. RE supply can be variable or intermittent, while conventional energy sources can provide base load power especially for large demand. Meanwhile, promoting capital intensive RE technologies would require policies such as incentives and subsidies to compensate for high costs. One of the incentives is the FiT rate, which the FEF likens to a tax, an amount that would be passed on to consumers. In view of these arguments, the FEF had suggested that the existing RE resources – hydroelectric and geothermal, should be rehabilitated and improved instead of promoting expensive RE projects.

The renewable energy laws have been enacted, but this does not mean that the debate has ended. The same criticisms remained and more were raised as the laws are being implemented. What can be done is to improve on the implementation of these laws as a way of responding to and addressing the people's current and potential concerns and criticisms. The following are some suggestions:

- RE technologies have been criticized for being expensive. Data presented above indicate that the cost of RE technologies is declining and becoming competitive with conventional energy sources. With the developments in terms of costs, the government should consider reviewing the incentive schemes offered to RE players. For instance, a review of the FiT rates and validity period.
- The RE law achieved its objective of accelerating the exploration and development of RE resources, with the many investments in RE projects and attainment of the installation targets. Given the increasing interest of investors in the industry, it would

[25] Thailand is reported to be consuming more of its own ethanol, hence it is possible that the Philippines would have to start importing from the US or Brazil, leading to higher cost due to transportation. (Olchondra, 2014).

be important to review the ‘doing business’ procedures. RE companies that were interviewed who experienced the lengthy and troublesome permitting process suggested that bureaucratic reform is needed, e.g. streamlining of procedures, establishment of a one-stop shop.

- One provision of the RE law, the ‘first come first served policy’ in awarding FiT eligibility, currently requires 100% mechanical completion of RE plants. This criteria implies that RE companies that have already injected a lot of investment cannot be assured of eligibility for the FiT scheme, even if the RE project is still within the installation target. A review of the policy would be useful. One criteria that can be considered would be completion of development stage requirements, but as a safeguard, there should be a specific timeline for 100% completion of the project.
- The priority dispatch policy, as discussed above, may have positive and negative impacts on consumer electricity prices, hence there should be continued monitoring of the impact of this policy on the electricity market.
- The Biofuels Act aims to reduce dependence on imported fuels by mandating utilization and promoting the development of locally-produced. It seems these objectives have not been met as the biofuels targets have been missed as indicated in the data. The biofuels program implementation should be reviewed and realistic targets be formulated.

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