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Energy Procedia 52 (2014) 480 – 486

Energy Procedia

Renewable energy and energy security in the Philippines

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Abstract

This paper focused on the importance of renewable energy to Philippine energy security and sustainability agenda. It examined the status of renewable energy in the Philippines and discussed the opportunities and challenges in the further development and deployment of renewable energy. This research relied on secondary data from the Philippine Department of Energy, ASEAN Centre for Energy, World Bank, and APEC Secretariat. Relevant informative journalistic reports were also consulted. Among the major findings are: (1) renewable energy will account for an increasingly significant share of the Philippine energy mix for power generation in the foreseeable future and (2) fossil fuels, oil in particular, however, will remain the dominant energy source. Whether or not the Philippine government will achieve its renewable energy targets largely depends on how efficient and fast it will be in addressing the related issues. This study builds on the existing knowledge base on Philippine renewable energy.

Keywords: energy policy, energy security, renewable energy, the Philippines

Introduction

Although renewable energy (RE) contributes steadily to global final energy consumption, fossil fuels remain the primary energy source. In 2010, for instance, while RE's share of global final energy consumption was 16.7%, fossil fuels' share was 80.6% [1]. However, oil price volatility, projected depletion of fossil energy resources, and problems of climate change, environmental degradation, and pollution resulting from continued fossil fuel use have driven both developed and developing countries to seek and develop viable alternative energy sources. Renewables, namely, wind, solar, geothermal, and hydro show potential in this regard. In recent years, RE has become an important part of the energy agenda as countries continue to diversify their energy mix to achieve the twin objectives of energy security and sustainability. While RE is promising, much needs to be done to address the challenges and gaps that will pave the way for its further development and deployment.

The Philippines is a case in point. Currently, the share of RE in the country's primary energy supply mix is 40.7% [2]. The Philippine government has set medium- and long-term RE targets and implemented policies that would help promote RE development. These efforts are driven not only by the country's aim of achieving energy security and/or energy self-sufficiency but also by its aims of becoming the global leader in geothermal energy, the biggest user of wind power in Southeast Asia, and the solar manufacturing hub in Southeast Asia. With targets and policies in place, the share of RE is projected to increase in the coming years.

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The Philippines: An Overview

An archipelago of 7,107 islands, the Philippines is one of the 11 countries in the Southeast Asian region. It has a total land area of 298,170 square kilometres and a total population of 94,852,030 [3]. Over the past decade, the Philippines has been experiencing an average growth of 5%. It is noteworthy that the Philippines had a growth rate of 7.6% in 2010, which was the highest the country achieved in 30 years [4].

Table 1: Key indicators, 2011 [5]	
Total land area (sq km)	298,170
Total population (million)	94.85
GDP (current US$, billion)	224.75
GDP growth (annual %)	3.7
GPD per capita (current US$)	2,370

Philippine GDP growth rate, however, declined from 7.6% in 2010 to 3.7% in 2011 (Figure 1). Although the 3.9% drop is significant, other key indicators (Figure 2) show sustained growth.

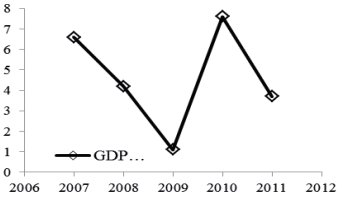

Figure 1: GDP growth (annual %), 2007-2011 [6]

Selection and peer-review under responsibility of the Organizing Committee of 2013 AEDCEE
doi:10.1016/j.egypro.2014.07.101

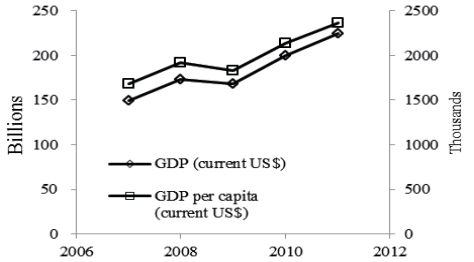

Figure 2: GDP (current US$), GDP per capita (current US$) 2007-2011 [7]

In a recent growth forecast by the World Bank, the Philippines is expected to grow by 6.2% in 2013, making the country one of the fastest growing economies in the Asia-Pacific region [8]. With sustained economic growth, improved living standards, increasing purchasing power, and an annual population growth rate of 2% [9], energy demand in the country is expected to increase in the foreseeable future. As such, the Philippines will continuously be faced with the challenge of energy security.

Philippine Energy Scenario

The country's total primary energy supply slightly increased from 39.29 million tonnes of oil equivalent (mtoe) in 2010 to 39.40 million tonnes of oil equivalent in 2011. The share of RE was 39.8% and 40.7% in 2010 and 2011 respectively. The country achieved a 1.5% increase in energy self-sufficiency from 2010 to 2011. In terms of primary energy supply mix, oil was the dominant energy source (Figure 3) [10].

It is noteworthy that the Philippines is a net energy importer, particularly of fossil fuels. Most of its crude oil supplies, for instance, are imported from the Middle East, specifically Saudi Arabia, UAE, Qatar, Oman, and Iraq (Table 2) [12]. Although crude oil imports from the Middle East declined from 84.4% in 2009 to 81% in 2010 (Figure 4) [13], the implications for Philippine energy security remain significant.

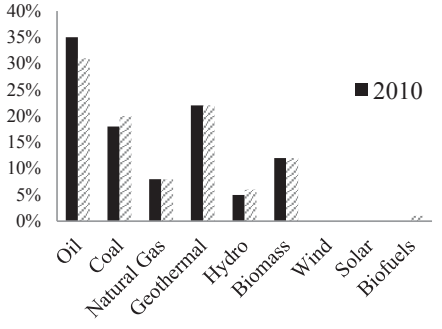

Figure 3: Primary Energy Supply Mix, 2010-2011 [11]

As a net energy importer, the Philippines is inevitably vulnerable to oil supply disruptions, oil price fluctuations, and geopolitical dynamics shaping the energy exporting countries. The continued use of fossil fuels in the country not only highlights the issue of energy security but also the equally important issue of sustainability. Due to global concerns about climate change, environmental degradation, and pollution, there is an imperative for the sustainable use of energy. Thus, energy insecurity and increasing CO_2 emissions are among the major issues affecting the country. Confronted with these challenges, the Philippines seek to harness and utilize viable alternative energy sources.

Table 2: Crude Oil Importations from Middle East (volume in thousand barrels) [14]

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Saudi Arabia	38,235	35,610	41,881	37,165	43,841	45,074	46,872	46,603	22,578	30,359
Kuwait	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iran	19,432	28,859	21,918	25,144	20,004	18,700	1,455	1,915	NA	819
Iraq	NA	NA	NA	396	NA	NA	NA	NA	99	NA
Abu Dhabi	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Qatar	6,637	7,466	4,181	5,563	5,536	2,568	4,374	NA	8,372	4,273
Dubai	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oman	6,328	10,472	NA	NA	NA	NA	NA	NA	1,050	693
United Arab Emirates	15,416	21,853	13,997	525	2,914	7,924	14,655	13,054	10,144	18,088
Yemen	2,611	748	2,407	NA	NA	NA	NA	NA	NA	NA
Total Middle East	**88,659**	**105,008**	**84,384**	**68,793**	**72,295**	**74,266**	**67,356**	**61,572**	**42,243**	**54,232**

Renewable energy and energy security in the Philippines

In its quest for energy security and sustainability, the Philippine government sees tremendous potential in RE. Dependency on imported fossil fuels has become an impetus for the country to implement policies that will help facilitate the further development of RE. Among the laws enacted include the Biofuels Act of 2006 or Republic Act 9367 and the Renewable Energy Act of 2008 or Republic Act 9513 [16]. Considered milestones, these laws seek to

strengthen the RE sector by addressing barriers such as high upfront and technology costs, non-competitiveness, non-viable markets, inaccessible financial packages, and social acceptability. The Biofuels Act of 2006, for instance, provides fiscal incentives and mandates the use of biofuel-blended gasoline and diesel fuels while the Renewable Energy Act of 2008 provides fiscal and non-fiscal incentives to private sector investors and equipment manufacturers and suppliers. Fiscal incentives include, among others, income tax holiday (ITH) and low income tax rate, reduced government

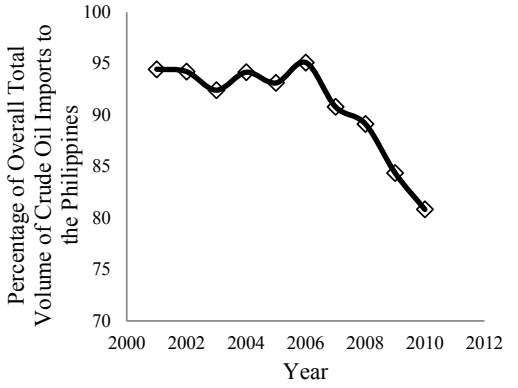

Figure 4: Crude Oil Imports from Middle East 2001-2010 [15]

share, duty-free importation of equipment and value-added tax (VAT)-zero rating, tax credit on domestic capital equipment, special realty tax rate on equipment and machinery, cash incentive for missionary electrification, exemption from universal charge, payment of transmission charges, and tax exemption on carbon credits. Non-fiscal incentives include renewable portfolio standard (RPS) and feed-in-tariff (FIT) [17].

The deployment and development of RE are crucial aspects of the government's strategy to make energy

"available, affordable, and accessible" to the citizens. In an effort to reduce its heavy dependency on imported fuels, the Philippine government has increased the use of renewable energy for power generation and rural electrification. The National Renewable Energy Program (NREP) was launched on 14 June 2011 to serve as "the framework for the accelerated development and advancement of RE resources, and the development of a strategic program to increase its utilization."[18] It provides the overall strategic policy directions in the country's RE industry, sets RE targets, and aims to address issues related to transmission, grid integration for intermittent RE resources, and social and economic impacts [19]. Table 3 below outlines the RE-based on-grid capacity installation targets as stated in the NREP.

On a per technology basis, the NREP seeks to "increase geothermal capacity by 75%, increase hydropower capacity by 160%, deliver additional 277 MW 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, and develop the 1st ocean energy facility for the country." [21]

Table 3: RE-based On-grid Capacity Installation Targets [20]

Sector	Installed Capacity, MW as of 2010	Target Capacity Addition By				Total Capacity Addition, MW 2011-2030	Total Installed Capacity by 2030
		2015	2020	2025	2030		
Geothermal	1,972	220	1,100	95	80	1,495	3,467
Hydro	3,333	343.3	3,161	1,891.8	0	5,396.1	8,729.1
Biomass	30	276.7	0	0	0	2,767	306.7
Wind	33	1,048	855	442	0	2,345	2,378
Solar	1	269	5	5	5	284	285
Ocean	0	0	35.5	35	0	705	70.5
Total	5,369	2,157	5,156.5	24,688	85	9,855.4	15,236.3

Currently, the NREP mainly deals with the addition of RE-based capacity for power generation. The program for non-power applications will be included at a later stage [22]. The NREP, moreover, outlines a RE roadmap as seen in Figure 5. The launching of the 2012-2030 Philippine Energy Plan (PEP) by the Department of Energy (DOE) further highlights the government's efforts towards achieving both energy security and economic development in a sustainable manner. The Plan's policy thrusts are as follows:

- To achieve energy security by increasing the use of RE and the exploration of petroleum and coal;
- To increase energy access;
- To promote low-carbon future by prioritizing energy efficiency and the use of clean, alternative fuels and technologies;
- To "climate proof the energy sector";
- To "develop regional energy plans";
- To encourage investments in the energy sector; and

- To "identify and implement energy sector reforms". [24]

All of these energy-related policy agendas are a result of the demands of a growing economy and an increasing population with improved living standards. As a fast growing economy, the Philippines has become highly energy-intensive.

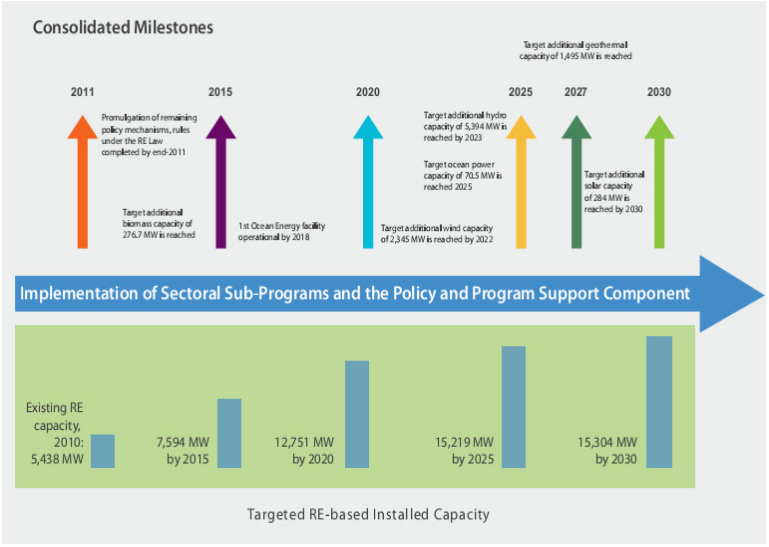

Figure 5 : Renewable Energy Roadmap [23]

Energy consumption has seen and will see a continued growth due to increasing demands in all the industrial, commercial, and residential sectors. As seen in Figure 6 below, the country's energy requirements have been met and will be met mostly by fossil fuels, particularly oil and coal, in the foreseeable future**.**

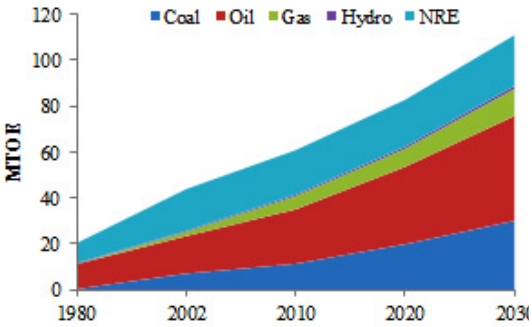

Figure 6: Projected primary energy demand [25]

While fossil fuels meet most of the country's energy requirements, it is not without challenges. The projected increased fossil fuel use will inevitably result in increased CO_2 emissions. Figure 7 below shows the projected CO_2 emissions from fossil fuel combustion.

In the context of climate change and increasing CO_2 emissions, sustainability has become a priority for the Philippine government. RE development is considered a major opportunity in terms of providing sustainable, diverse, and reliable energy sources. As previously discussed, the DOE has launched the 2012-2030 PEP to address the country's energy and sustainability challenges. The specific quantifiable targets set by the PEP include, among others, the following:

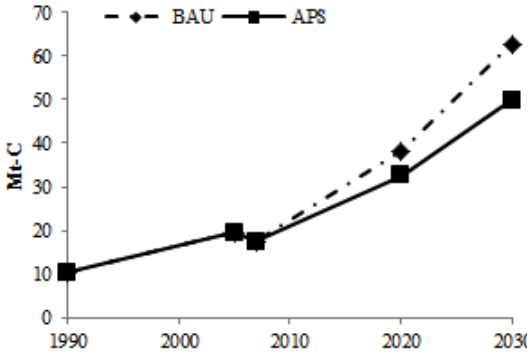

Fig 7: CO_2 emissions from fossil fuel combustion, 1990-2030 [26]

- "Triple RE capacity by 2030;
- 90% household electrification by 2017 and 100% sitio energization by 2015;
- 30% of all public utility vehicles will run on alternative fuels;
- Implement higher biofuels blend; and
- 10% energy savings on the total energy demand." [27]

But while laws have been enacted, policies implemented, and targets set, there remain a number of challenges to RE development in the Philippines.

Challenges to Renewable Energy Development in the Philippines

RE development is faced with a number of regulatory barriers. For instance, while the Renewable Energy Act of 2008 provides for non-fiscal incentives like FIT, it was only in July 2012, almost four years after the enactment of the Renewable Energy Act, that the FIT rates were issued [28]. The rates are as follows: P9.68 a kilowatt-hour for solar; P8.53 a kWh for wind; P6.63 a kWh for biomass; and P5.90 a kWh for hydropower projects. No rate for Ocean Thermal Energy Conversion (OTEC) resource was issued, pending further study and data gathering [29]. Although the issuance of FIT rates by the Energy Regulatory Commission (ERC) [30] was and is regarded as a very significant move towards the promotion and development of RE, it was not without challenges. The approved rates were lower than what the National Renewable Energy Board (NREB) [31] proposed: P17.95 per kWh for solar; P10.37 per kWh for wind; P7 per kWh for biomass; and P6.15 per kWh for run-of-river hydro [32]. As the FIT will be the key determinant of a RE project's economic viability, it remains to be seen how it will impact the RE industry.

The final rules and regulations concerning the FIT system are yet to be implemented. Other mechanisms, as provided in the Renewable Energy Act, namely RPS, net metering, RE market, green energy options, interconnection with the grid, priority dispatch, and RE trust fund are needed to be put in place to further attract investors. Putting all these mechanisms in place is not an easy undertaking. According to the director of the Philippine DOE's Renewable Energy Management Bureau Mario Marasigan, these mechanisms can only be put in place in the next two years [33].

Another issue concerning the RE industry is the need for developing local technologies. According to Commissioner and Vice Chairperson of Philippine Climate Change Commission (CCC) Mary Ann Lucille Sering, the costs of RE will remain high if the country continues to depend on imported technology. Moreover, she argued that it is imperative for the DOE to work closely with the CCC as the enactment of the Renewable Energy Act was done without factoring in climate change. For instance, a significant reduction of rainfall particularly in Mindanao in specific months is expected by 2020. This projection will surely have an impact on the hydropower supply in that region and as such, it is important to conduct vulnerability assessment while pushing for RE use at the same time [34]. Other issues include lack of public awareness of the benefits of the RE projects (socio-environmental concerns) and absence of commercially viable market for RE systems [35].

Conclusion

The Philippines' sustained economic growth, coupled with growing population with improved living standards, is the main driver for the increase in domestic energy demand. As the demand for energy is projected to increase in the coming years, the challenges of energy security and sustainability become more pressing not only because the country relies heavily on imported energy (oil in particular) but also because it has limited energy resources. However, in addressing energy security and sustainability challenges, harnessing and utilizing renewables can be a viable alternative given that the Philippines has significant, mostly untapped RE sources. The tremendous potential of RE in terms of minimizing the country's heavy dependency on imported fossil fuels has driven the government to push for the further development of its RE sector. The government has enacted laws namely the Biofuels Act and Renewable Energy Act, which will attract and encourage investors to invest in the RE sector, and which will in turn pave the way for the expansion of the sector. Through these laws, the government is increasing the use of RE for power generation and rural electrification. In connection with the enactment of the Renewable Energy Act of 2008, the NREP was launched on 14 June 2011 as the overarching framework for the further development and increased deployment of RE sources.

It is noteworthy, however, that the country's energy requirements in the foreseeable future will be met mostly by fossil fuels, oil and coal in particular. While policies are important in accelerating the development and advancement of RE and have been implemented by government officials, there have been gaps between the implementation of policies and putting in place the related mechanisms. For instance, the FIT rates provided by the Renewable Energy Act were only issued four years after the enactment of the said law. The FIT is considered to be a guarantee to potential investors of a stable pricing mechanism and a key determinant of the economic viability of RE projects. However, the FIT rates were significantly lower than expected and were received by investors with less enthusiasm. The final implementing rules and regulations of the FIT system as well as other mechanisms, namely, RPS, net metering, RE market, green energy options, interconnection with the grid, priority dispatch, and RE trust fund have yet to be put in place.

There is also an imperative for the Philippine government to develop and tap into local technologies. At current rates, RE is more expensive than other sources like coal and oil. The high costs are related to the dependency on imported RE technologies. These costs will remain high vis-à-vis the country's increasing reliance on imported technology. However, the RE industry expects the costs to go down in the coming years, following the setting of FIT rates. There is also a need for RE policies to complement climate change policies as climate change-related phenomena will have an impact on the RE resources. The lack of public awareness of the socioeconomic and environmental benefits of the RE projects is also an important issue that needs to be addressed. What the Philippine government can do is to enhance its information, education, and communication campaign to encourage greater citizens' participation. The Philippines being a democratic country should engage her citizens in

political decisions which impact and/or can impact the lives of the general public.

In the final analysis, it remains to be seen whether or not the government can achieve its RE targets. These targets might seem ambitious considering a wide range of issues that need to be addressed. Given that the Philippines is the world's second largest producer of geothermal power, there is a relatively good prospect of achieving its RE targets. But whether or not these installation targets can be realized by their designated dates largely depends on how proactive, fast, and most importantly, efficient the government will be in properly addressing the related issues and in implementing the necessary mechanisms.

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