Macro environment analysis of ocean renewable energy in the Philippines

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Abstract:
This paper provides a description of the external macro environment that influences the advancement of ocean renewable energy (ORE) in the Philippines. The PESTLE Analysis is employed to identify key factors categorized as political, economic, socio-cultural, technological, legal and environmental factors. The main objective of this study is to assess the country as an investment location for ORE given its abundant resources. This also aims to assist policy makers, technology developers, investors, and other key players in formulating strategies for the development of ocean renewable energy in the Philippines.

Keywords: *renewable energy; ocean energy; macro environment analysis; PESTLE analysis; Philippines*

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1. Introduction

The Philippines is an archipelago of 7,107 islands located in the western Pacific Ocean. To date, the country has an installed capacity of around 16,000 MW but remains to be a net energy importer. While it is highly dependent on the use of non-renewable fossil fuel as energy source, such as oil and coal, a substantial amount has also been generated by energy renewable sources. Geothermal (15%) and hydropower (14%) were major contributors to its total generation in 2011.

However, Asian Development Bank reported that the contribution of renewable energy sources to the country's power supply is expected to shrink to only 14% by 2035, just when indigenous gas and coal reserves will be depleted. This implies that the rate of oil and coal importation will continue to rise to be able to meet growing energy demand of the country for succeeding years. ADB further estimated that oil imports in Asia will triple by 2035. The constant increase of oil price in the world market, the economic risk of high growing fuel dependence on foreign countries, coupled with the pressure of climate change justify the country's pursuit of potential alternative sources of energy.

The Philippines has abundant resource of ocean energy considering it is an archipelago surrounded by vast ocean. Earlier in 2006, the Department of Energy (DOE) identified potential sites for ocean renewable energy (ORE) extraction in the country while the Mindanao State University estimated the country's potential theoretical capacity to be 170,000 MW.

Given this abundant ORE resource, there is a need to assess the country in a macro level and identify factors that influence its potential as an investment location for ORE. This will assist policy makers, technology developers, investors, and other key players in formulating strategies for the ORE development in the Philippines.

2. Material and methods

This study employs PESTLE Analysis to investigate the important factors affecting ORE development in the Philippines. ORE in this study pertains to all types of ocean resources in general. Primary and secondary data are gathered to analyze the key driving forces of ORE in the country following the framework shown in Table 1.

Table 1 Framework of macro environment analysis of ORE in the Philippines

Factors	Description
Political and Legal	Political environment of the Philippines and the attitudes of its political parties or movements; Laws and regulations which have potential impact on ORE development.
Economic	Philippine economic growth rates and projection; energy demand and pricing; energy outlook; economic barriers to ORE development; RE developers' financial incentives.
Socio-cultural	Factors influencing societal acceptance of new energy technologies in the Philippines.
Technological	ORE research and development initiatives in the Philippines.
Environmental	Environmental policy in the Philippines; ORE potential environmental impact.

3. Results and discussion

Findings are presented as follows:

3.1 Political and Legal

Philippine government is taking aggressive steps in pursuit of clean and sustainable energy sources. The passage of Republic Act (RA) no. 9513 otherwise known as The Renewable Energy Act of 2008 is one of the most important milestones that manifest government support to the development of ORE industry in the country. Under this law, five service contracts have been awarded to two private companies for ORE projects with a total potential capacity of 25 MW. The 2012-2030 Philippine Energy Plan and the National Renewable Energy Program (NREP) Consolidated Renewable Energy (RE) Roadmap indicate targets of developing the first ocean energy facility (30 MW) by 2018, and increasing ocean power capacity to 70.5 MW by 2025. ORE investments in the Philippines are made more favorable with the following government regulations:

- RA 6957 Build-Operate-Transfer (BOT) Law of 1990 - Allows participation of private sector as independent power producers (IPPs), foreign or local companies through Public-Private Partnership (PPP) framework.
- RA 9136 The Electric Power Industry Reform Act of 2001 (EPIRA) - Introduces retail competition and open access (RCOA); Sets the 2014 Market Share Limitation (MSL) of IPPs to maximum of 30% of the Installed Generating Capacity (IGC) of a Grid, and/or 25% of the National IGC.
- RA 7718 The Amended BOT Law of 1994 - Allows build-own-and-operate (BOO), build-lease-and-transfer (BLT), rehabilitate-own-and-operate (ROO) and rehabilitate-operate-and-transfer (ROT) schemes
- RA 9513 The Renewable Energy Act of 2008 - Aims to accelerate the development of the country's renewable energy resources by providing fiscal and non-fiscal incentives to private sector investors and equipment manufacturers / suppliers.

The biggest political/legal challenge that hurdles ORE development in the country is the regulatory delay on the implementation of Feed-in Tariffs for ORE projects. It is expected, however, that before the end of 2014, the Energy Regulatory Commission (ERC), will release the FIT rate for ORE.

3.2 Economic

In terms of Gross Domestic Product (GDP), the country is the 32nd largest economy in the world as of 2012 with an average positive growth rate of 6.6%. Population is at about 106 million and is estimated to increase by 1.84 per year reaching 158 million by 2035. With continuing economic development and population growth, it is expected that energy demand will likely to double in the coming years. By 2030, the projected demand is around 29,000 MW while the estimated installed capacity is only about 26,000 MW. There is an expected power shortage of 3,000 MW in the year 2030 that needs to be addressed.

Retail power prices in the Philippines are said to be among the highest in the Asia-Pacific region. The current electricity price at the Wholesale Electricity Spot Market (WESM) ranges from PhP 4.00 to PhP 8.00 or US$ 0.0890 to US$ 0.1789.

But it is important to note that RE developers have financial incentives under the RE law:

- Seven year income tax holiday.
- Carbon credits generated from renewable energy sources will be free from taxes. A 10% corporate income tax, as against the regular 30%, is also provided once the income tax holiday expires.
- Renewable energy facilities will also be given a 1.5% realty tax cap on original cost of equipment and facilities to produce renewable energy.
- The bill also prioritizes the purchase, grid connection and transmission of electricity generated by companies from renewable energy sources.
- Power generated from renewable energy sources will be value added tax-exempt.

On the other hand, one economic downside of ORE development in the Philippines is its prohibitive cost of investment. Since ORE technologies are at early stage of commercialization, they are relatively more expensive compared to other renewable as presented in Table 2. ORE investors may have to consider a progressive development site (PDS) strategy to mitigate financial risks. A development site may have provision for 100 MW capacity but initial deployment may be up to 10 MW only. Then after de-risking, it may be expanded up to 30 MW in year 2, then up to 50 MW in year 3, and finally up to its full capacity of 100 MW in year 4.

Table 2 Capital cost and feed-in tariff of renewables.

Resources	Estimated Capital Cost (million USD)	FIT (PhP per KWh)	FIT (USD per KWh)
River hydro	1.8	5.90	0.1313
Biomass		6.63	0.1475
Wind	2	8.53	0.1898
Solar	5.3	9.68	0.2154
Ocean	4-12	11.00 (under negotiation)	0.242448 (under negotiation)

3.3 Socio-cultural

Renewable energy projects in the Philippines are supported by majority of stakeholders. Prominent people's movements and organizations, like Greenpeace, Climate Change Commission, etc. commend such initiatives. People are greatly aware of the issues, such as climate change, pollution, power shortage, etc. so they are open to short- and long-term solutions. They also believe that electrification will spur development in the local communities. Various institutions participate in massive campaign promoting renewable energies.

In the case of ORE, it is new to the ears of the public. Potential factors that may influence its societal acceptability are support from the national government down to the local government, endorsement of people's organizations, level of participation of local communities (job creation), level of awareness on its impact to marine life, and benefits offered to the general consumers.

3.4 Technological

The Philippines has taken initiatives and slowly advancing towards the development of its ORE. Most of these efforts are collaboration among government agencies, academes and industry players.

- Previous works:
  - Resource assessment by the Mindanao State University in 1980's to map the country's ocean energy potentials
  - Wave energy study by Fugro OCEANOR of Norway and the Philippine Department of Energy (DOE) in the early 1990's
  - Marine current energy resource assessment by the Department of Science and Technology (DOST), together with the National Power Corporation (NPC), and then with the University of San Carlos (USC) in 1997 and in 2009, respectively.
- On-going projects
  - Tidal current energy integrated resource assessment and spatial planning tool by DOST, University of the Philippines- Diliman (UPD), and DOE, Year 2014-2016 (US$ 445,000)
  - Pre-Front End Engineering Design (Pre-FEED) of Ocean Power Plant by a private company, Year 2014-2015 (US$ 55,000)
- Next projects
  - Ocean energy potential resources assessment by DOE, Year 2015 (US$ 267,000)
  - Tidal current energy turbine development by DOST, UPD, and DOE Year 2016

3.5 Environmental

As ORE is a viable source of clean energy, it will surely mitigate carbon emission of the Philippines. Literatures also claim that ORE has no adverse effects on marine life. However, the Philippines is known for its rich marine resources and an investigation on environmental impact of ORE technologies may be necessary. The problem is that there is no government protocol on environmental impact assessment (EIA) for ORE. There is a need, therefore, to develop rapid assessment methodology for EIA.

4. Conclusion

PESTLE Analysis presents various factors that define Philippines as an investment location for ORE. Political landscape of the country favors investors from the private sector. Economic challenges of ORE development in the Philippines can be addressed by a progressive development site (PDS) strategy to mitigate economic/financial risks. Aggressive information campaign on ORE is the key to ORE projects' societal acceptance and public support. ORE technological efforts in the country are collaborative efforts of government agencies, academes, and industry players. ORE has minimal threat to the environment but further assessment is recommended for Philippine setting.

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