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Enabling Local Renewable Energy Development: The Case of the Rizal Wind Farm (Philippines)

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ABSTRACT

The findings of the case study prove that active participation through partnership with the private sector in governance is important to pursue local renewable energy (RE) development. Utilizing the Logic Model Framework, the case study assesses the input, activity and the intended results (output, outcome and impact) of the project including the contextual factors and spillover or unintended effects of RE development. The study presents major challenges in developing RE at the local level as experienced by Alternergy, the private sector developer of the Rizal Wind Farm project. The research also shows how Alternergy addresses these problems it encountered, which are mainly on social acceptability, access to finance, technology transfer, and administrative issues. It also includes mitigating measures to counter community impact of the project. Moreover, the Local Government Unit (LGU) support is crucial. A symbiotic relationship among the major actors are present, but it is observed that active private sector participation, local engagement, and local government support are indeed necessary alongside with institutional networks as imperative strategies to enable local RE development. Thus, the case shows the lessons learned and best practices of the private developer and LGUs in the Rizal Wind Farm (Philippines). Asia Pacific countries, private developers, and local governments aspiring to implement RE projects shall benefit from the case experience.

Introduction

Background

Renewable energy (RE) has been recognized worldwide in pursuing sustainable energy development. This is the global trend and one of the sustainable development goals (SDGs) by 2030 on Affordable and Clean Energy (UN SDGs published online). The Philippines, one of the countries in Southeast Asia, has adopted RE since the 1970s. First, the Philippine geothermal energy ranks the country as second largest producer in the world. Second, the Philippine wind energy is first and largest development in Southeast Asia built in 2005 with the development of the NorthWind Bangui Bay Wind Farm, Ilocos Norte, situated in the northern part of the island of Luzon, Philippines. Although there is a landmark law, the Renewable Energy (RE) Act of 2008 that compiled all RE policies and added incentives for the private sector participation, implementation challenges and barriers still beset RE development in the Philippines. The Philippines had the highest RE utilization rate in Asia (Perez 2009). The country is rated higher on incentives and market tax credits by the passage of RE Act of 2008 compared to neighboring countries (Perez 2009). The Philippine RE law implementation is still a governance issue at national and local levels marred with “lack of coordination across jurisdictional levels, a dearth of capacities, and an oligopolistic market structure” (Marquardt 2017). Likewise, substantial efforts are needed in terms of capacity building, coordination, and exchange across jurisdictional levels which are linked to issue on power” (Marquardt 2017:5). Thus, governance is important in the localization of this pursuit of sustainable energy development. Actors, agency institutions, and formal rules play role in achieving RE development in the Philippines.

In fact, there is a paradox in renewable energy development in the Philippines and apparently unique case. The story behind this is that the Philippine electricity sector went through an impressive energy transition. In 2000, more than 40% of the energy demand is covered by renewables with varied policies such as Geothermal law in 1978, Executive Order (E.O.) 462, Series of 1997 (Enabling Private Sector Participation in the Exploration, Development, Utilization and Commercialization of Ocean, Solar and Wind Energy Resources for Power Generation and Other Energy Uses) and Executive Order 262, Series of 2000 that amended the E.O. 462. In 2010, the Philippines has achieved its target of almost 30% RE utilization (Marasigan 2016). Though fossil fuels still contain significantly in Philippines' energy generation mix (Figure 1).

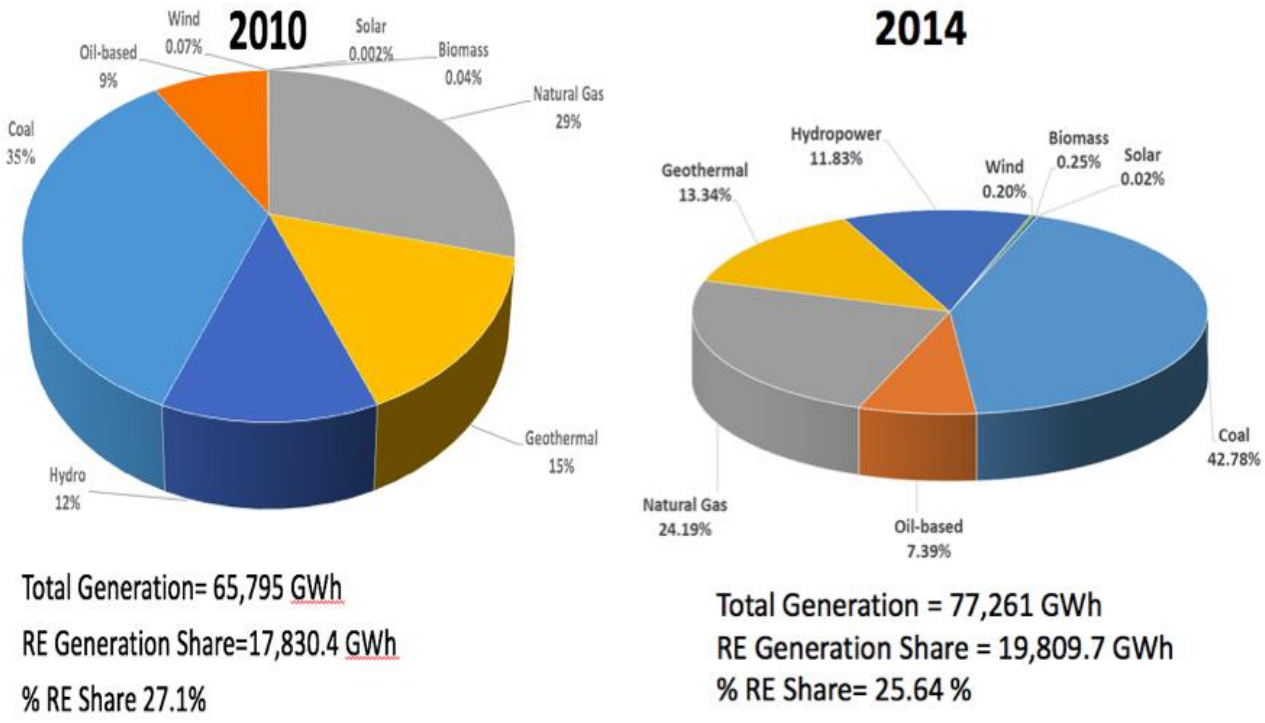

Figure 1: Total Generation Mix (GWh) in 2010 and 2014
Source: Philippine DOE Presentation at 2016 Asian Development Bank (ADB)-Asia Clean Energy Forum (ACEF) Manila

Figure 2: Potential RE Resources in the Philippines (2013) *Source:* Green is gold www.greenpeace.org

Certainly, the Philippine's energy portfolio is quite unique in the region. Locally, the Philippine energy mix already has high capacity utilization of RE in 2011 (WWF 2013). In terms of electricity price, the country has the 2nd highest electricity rates in Asia (2013 and 2018) and 4th highest in the world due to the high cost of importation of fossil fuels. In terms of energy resources, it has few fossil fuel resources and rich alternative energy resources that can be tapped (Figure 2) with a total of 7,404 MW power generation resources for wind power in 1,038 sites in the country (Perez 2009 and NWPDC 2010). Meanwhile, other RE potential resources include: solar which has 4.5 to 5.5 kWh/m2/day in the country; micro and mini hydro has 10,500 MW; geothermal has 3,303 MW; Biomass for development from rice husk power (360 MW), coconut residues (20 MW) and sugarcane (540 MW); and ocean resource with 90,000 tWh/year (Greenpeace 2013 and Perez 2009). Due to this, the Philippines has strong commitment with RE and a goal to triple RE capacity alongside with future planning with coal as base load capacity by 2030 since with the high coal importation in 2011.

The landmark law, the RE Act of 2008 is first in Southeast Asia with higher incentives and market tax credits compared to neighboring Asian countries but had slow implementation, administrative backlogs and weak institutional capacity to accelerate RE. This is due to initial opposition among energy stakeholders on Feed-in-Tariff (FIT) implementation, a policy mechanism under the Act. RE developers waited for a long time for the passage of FIT and its implementing rules and regulations. The Energy Regulatory Commission (ERC) issued it on 2012 and the Department of Energy (DOE) issued only in 2013 its Guidelines for the Selection Process of RE Projects under FIT System and the Award of Certificate for FIT Eligibility on a first come-first served basis. Due to these delays of Philippine agencies to issue guidelines and other bottlenecks in RE development processes caused investors' uncertainty and presented new risks to RE projects which affected financing RE projects in general (WWF 2013 and ADB TA Completion Report).

With RE Act of 2008 in place, there is still a struggle to implement a supportive legislation to develop RE with domestic clamor for indigenous energy resources. In addition, technology transfer and lack of financial resources are major barriers (Taguibao 2010 and Senate Economic Planning Office 2014) together with challenges on awareness and social acceptance, administrative processes and full implementation of mechanism under the law (Marasigan 2016 ADB Clean Energy Forum). The most crucial is the social acceptability requirement at the local level without which no RE project will take place. This conference paper focuses on how to enable local RE development, lessons learned from the Rizal Wind Farm case and how it surmounted the challenges at the local level RE implementation. Thus, the wind energy project is successfully adopted in Pililla, Rizal.

Scope

The Case of 54 MW Pililla Rizal Wind Farm (Rizal Wind Farm) Philippines

The Rizal Wind Farm is chosen because (1) the Municipality of Pililla envisions to be the alternative energy capital of the Philippines (CLUP 2017-2026); (2) the Municipality has existing energy resource from Malaya Oil Thermal Power Plant (traditional energy) by National Power Corporation (NAPOCOR). This Thermal Plant is now under Power Sector and Asset Liability Management (PSALM), a government-owned and controlled corporation that implements the privatization of government energy assets by virtue of the Electric Power Industry Reform Act (EPIRA) of 2001; (3) The Rizal Wind Farm is the only wind power project that Alternergy prioritized among the 6 wind project sites awarded by the Philippine DOE. The local government unit, the Municipality of Pililla in Rizal eases the business development of RE through their information technology tools on land identification for land acquisition which the private developer had difficulties with other local government units; (4) The Rizal Wind Farm is a challenging case yet successful in overcoming the barriers specifically the financing and technology transfer of wind turbine.

Figure 3: NorthWind Bangui Bay Wind Farm in Ilocos Norte, Philippines
Source: NWPDC 2010

The case is also chosen over the first and largest wind farm in Southeast Asia which was built in 2005 (Figure 3), the Northwind Bangui Wind Farm (Bangui Wind Farm) because of its unique characteristics. The Bangui Wind Farm is along the shoreline and the land requirement in the bay was a lease to Department of Environment and Natural Resources (DENR). Wherein the Rizal Wind Farm is in the mountainous Laguna Lake area and the land requirement had several owners for negotiation (Figure 4). In this arena, the Rizal Wind Farm case is more challenging.

Figure 4: 54 MW Pililla Rizal Wind Farm
Source: Alternergy

The research is very timely and assesses the effects of implementation of RE development in Pililla, Rizal and describes how governance institutions specifically the private company, the local governments and its host communities affect the local adoption of the project. The study shows unique features of the project through the efforts of the private corporation that initiated the project and its practice of local benefits sharing with the host community through its corporate social responsibility. As the case in point, it also shows the effects of RE development and its impacts in an area which serves the greater Metro Manila and nearby consumers in the provinces with big population and higher energy urban demand.

Profile of Alternergy, the Private Sector Developer

Alternergy is a Filipino and Dutch owned company. The stockholders are Hangin ng Amihan Holdings, Inc. (Filipino) Pililla AVPC Corporation (Filipino) and Energon Philippine Holdings Inc. (Dutch). Alternergy is a power company on renewable energy in emerging countries. Alternergy Power Holding Corporation (APHC), a holding corporation of all the Alternergy companies, develops wind power projects. The Alternergy Wind One Corporation (Alternergy) under APHC, is in charge of the Pililla Wind Farm Project. The company generates electricity through renewable sources of energy in Singapore and the Philippines. The vision of the company is to be the leading renewable power company in the Philippines and its mission is to develop RE power with at least 200 MW generating capacity from RE resources. The Alternergy Project, the 54 MW Pililla Rizal Wind Farm is a joint venture with Vena Energy (EQUIS) which received IFC Sustainable Energy Finance Award, first non-recourse project financing for a Feed-in-Tariff project in the Philippines, and holds a partnership with Rizal provincial and local governments. It also serves as tourist destination that peaks at 130,000 visitors per week. This project is the first Luzon-based wind farm outside the province of Ilocos Norte where the first and largest wind farm in Southeast Asia was built in the Philippines, the Bangui Wind Farms.

The Project Location and Wind Farm Site

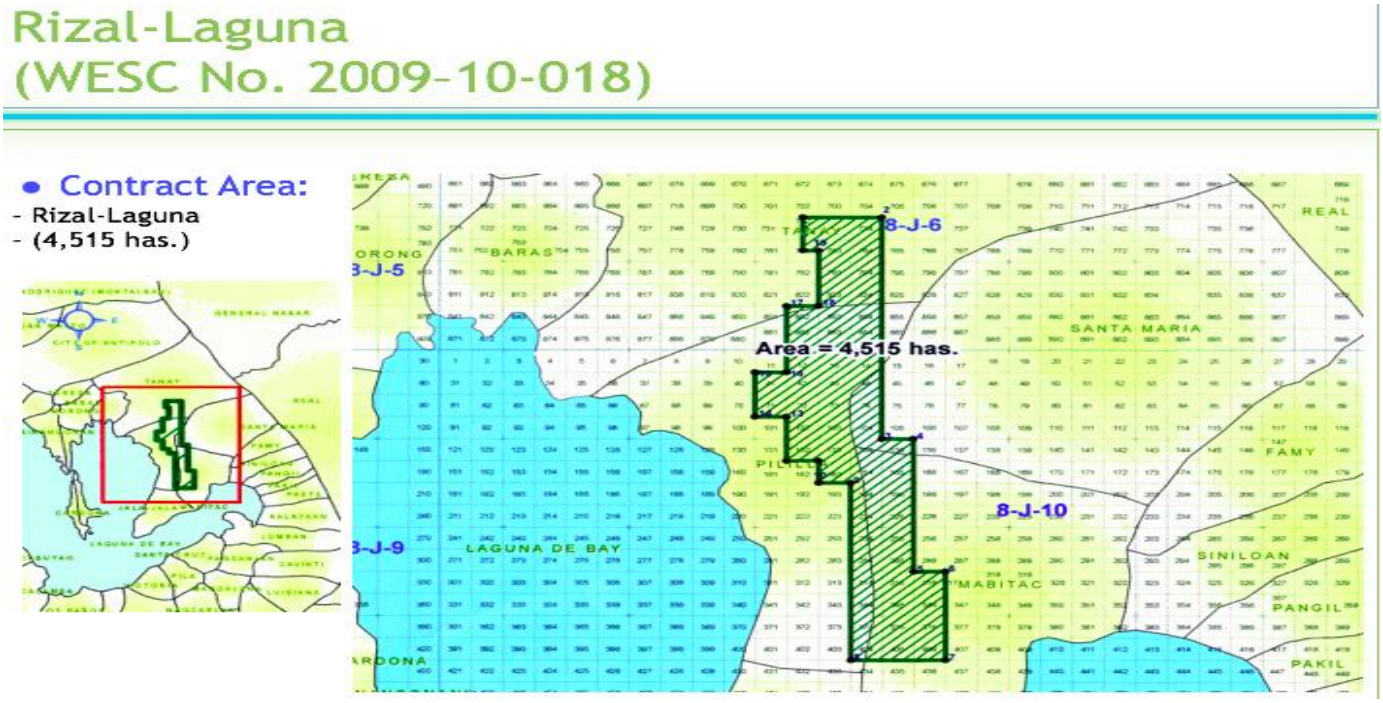

Figure 4: The Alternergy Wind Farm Project Approved by Department of Energy
Source: Alternergy Wind Farm Presentation, 2015

Figure 5: The Wind Farm Site, the Researcher and Guests from Philippine Department of Energy
Source: Photo from the Author

The service contract is awarded in December 2008 which is not yet covered by RE Act of 2008 but by an Executive Order No. 262 of 2000 on Ocean, Solar and Wind Development, which is the same Executive Order applied by NorthWind Bangui Wind Farm. From the approved service contract, the 54 MW Pililla Rizal Wind Farm project site started its operation in 2015. It is situated in Sitios Mahabang Sapa and Bugarin in Barangay Halayhayin, Pililla, Rizal, Philippines. The Local Government Units (LGUs) that covered the project are Rizal Provincial Government, Municipal Government of Pililla and Barangay Halayhayin.

Methodology

This paper analyzes the government data, publications, and relevant literature. Utilizing the Logic Model Framework, the case study assesses the inputs, activities and the intended results (output, outcome and impact) of the project including the contextual factors and spillover or unintended effects of RE development. The Logic Model is used as it serves as a theory-based evaluation tool in dissemination of results (Rogers and Weiss 2007). As an evaluation of a renewable energy project, the logic model is apt as it is widely adopted in the policy and program domain and used by researchers, practitioners and funders in many countries (Hatry 1996, Penna and Philips 2004 and W.K. Kellogg Foundation 2004). Further, according to Herranz 2010 that in public governance as public managers are expected to facilitate networks and collaboration of multiple government agencies, non-profit organization and for profit firms, the Logic Model is one way to address the problem on analyzing the relations of variable processes and outcomes of these institutions, specifically the critical interactions necessary to achieve more attainable outcomes with emphasis on stakeholder interaction or in this case the governance institutions in RE development.

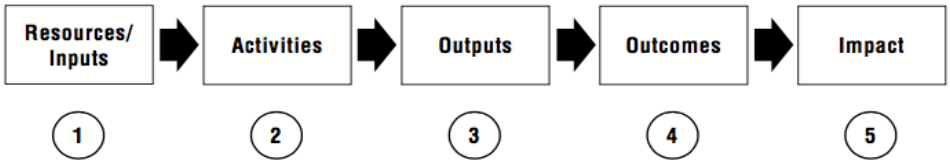

Figure 6: The Basic Logic Model *Source*: W.K. Kellogg Foundation 2004

It is applicable in planning implementation and evaluation as performance measurement of an organization, program or project by specifying the activities and outputs that are expected to produce outcomes. The achievement of the objectives and outcomes will then produce long-term effects which are the impact. Thus, the research aims to recommend and illustrate the lessons learned, best practices, and key success factors on local RE implementation.

Results

Studies and researches on RE development record the value of good governance through partnership with private sector. Most significant is the government support to RE developers to pursue the RE project in the area aside from the challenges the project must overcome from its inception up to operation, in particular at the local level. As observed, the most crucial stage before the commissioning of the project are the local social acceptability requirement, public consultation and LGU's endorsement. These determine the success or failure of RE project without which no project will take place. These are required by Philippine Renewable Energy Act of 2008 and its Implementing Rules and Regulation, Department of Environment and Natural Resources (DENR) Environment Impact Assessment and under the Philippine Local Government Code of 1991. The Philippines follows presidential system of government who is both the head of the state and head of government from national level and local chief executives at the local level. With this context, the private sector participation of Alternergy helps developed RE in the transformation of a property (public and private) into the delivery of electricity services. The Rizal Wind Farm harnesses the wind power in Rizal and translates into electricity that caters to 66,000 households in Metro Manila (WWF brochure) and other services to the host communities.

Inputs

The **inputs** are the enabling protective factors or resources which includes the funding from local banks, Asian Development Bank (ADB) Technical Assistance, EQUIS Funds and the shareholders of the company, the organization itself, Alternergy and its experienced management and public consultation team, its partners and network in government such as the Philippine DOE and DENR, the local government units (LGUs); while the **limiting risk factors** or **barriers** includes the attitudes (initial negative perception and conflicts on land acquisition encountered), initial financial problems and wind turbine technology transfer and policy implementation delays under the RE Act of 2008. The Alternergy Wnd Farm Project is later converted to RE Act in 2013.

Activities

These inputs contribute to the **activities** which include the processes, techniques and tools, technology used, and actions made. Table 1 shows the Key Activities from Pre-development, Development, and Operation Stage of the project.

Table 1: Key Activities of the Private Developer, Alternergy

Stages	Key Activities
I. Pre-development Stage	• Courtesy Meetings with Local Officials • Public Consultation • Information Campaign • LGU Endorsement • Needs Assessment for Corporate Social Responsibility (CSR)
II. Development Stage	• Wind Turbine Transport • Negotiation with Affected Household/Citizen • Land Acquisition (Sale or Lease) • Hiring of Construction Workers
III. Operation	• Community programs • Governance arrangements and local partnership

Source: Alternergy and Municipality of Pililla

It can be observed that the key activities involve formal and informal activities. The strategy is involving all stakeholders from all the stages up to the operation of the Rizal Wind Farm. Consultations and discussion are conducted from feasibility and wind assessment phase before construction and during operation and implementation of CSR programs (e.g., livelihood, education and advocacy on environment protection) to develop a sense of ownership with the project in the province. Public participation methods used form trust and partnership among local officials which are transmitted to the local citizenry. In fact, the provincial governor expressed an all-out support for the Project, which is pivotal in proceeding at the local level aside from the formal requirements and

notice to proceed. The research validates that the role of LGU is necessary to facilitate RE development not only the existence of formal incentives but also the informal support due to the nature of actors and institutions that can either help succeed or opposed RE implementation in a given LGU. In fact, LGUs are vital drivers to enable conducive local environment. Thus, this is the most crucial stage before the commissioning of the project--the local social acceptability, public consultation, and LGU endorsement which are required by Philippine laws and guidelines.

Outputs

The **outputs** of the implementation of the RE development in Rizal province are the creation of partnerships and building of networks. In particular, the consultations among the stakeholders utilized participatory methods apt for the affected host community. The developer also met and explained RE concepts and principles to the citizens through the Information, Education and Communication (IEC) campaigns conducted not only to the affected citizens of Pililla Municipality but also to the general public as well. For the initial conflicts or problems encountered, the company sought assistance with the LGU through issuance of local instruments such as local ordinance, resolutions, and inclusion of RE in local development plans of the LGUs. The role of governance institutions and interactions are also illustrated at this stage of the project. The company also produces the baseline profile of the community for CSR interventions during the needs assessment phase of the public consultations. In these experiences, there are arrangements and partnerships formed from the initial stage of the project before the commissioning. In addition, regarding the land acquisition stage, mutually beneficial agreements were made with corresponding compensation given by Alternergy to the affected areas in Pililla where the wind farms were built. Moreover, to address the employment of Pililla citizens, they were hired as construction workers based on local policies.

In particular, Alternergy encountered challenges and barriers from the start of its application. This includes the legal, technical, financial, and administrative problems in every stage of the project. An example of this administrative problem which is inherent in the processing of an RE project is the limitation of the allowable period for every phase of the project to complete. The developer also experienced financing issues when the initial financier backed-out. This stage is the highlight of the accomplishment of the private developer as pioneering local RE project in terms of surmounting the challenges faced on financial aspect. In September 2009, based on the ADB Technical Assistance (TA) Completion Report, the funding source came from the following shareholders: (i) Eurus Energy Japan Corporation (subsidiary of Tokyo Electric Power and Toyota Tsuscho Corp. with equity commitment of US$50 Million in Alternergy; (ii) Korea East-West Power Co. (subsidiary of Korea Electric Power) with initial equity commitment of US$50 Million; and (iii) Alternergy Viento Partners Corporation founded by Mr. Vince Perez, Alternergy CEO. Eurus Energy withdrew from the project because of TEPCO's disaster in Japan as a result of the 2011 tsunami. A private equity fund specializing in RE stepped in.

Alternergy funded the project from the technical assistance of ADB, local bank loans and equity from EQUIS Funds of Singapore. Based on the Report, the ADB TA is approved in July 2010 and signed on September 2010 amounting to US$630,000 from the Asian Clean Energy Fund under the Clean Energy Financing Partnership Facility. The TA was provided by APHC as the executing agency. APHC is to finance the first phase of the preparatory work for the construction of the three potential wind farm projects in Luzon producing site-specific feasibility studies for each proposed locations to determine the viability for commercial operations of wind power projects (ADB TA Completion Report published online). For the Pililla project, Alternergy spent US$145 million for the 54 MW wind farm which was completed in June 2015. In fact, the ADB technical consultants were present during this phase of the project which included environmental and social review during the public consultations in the community. This phase also includes the need for land conversion and consideration of environmentally protected areas, transport or wind turbine, and other necessary permits and clearances, among others. The common resolution mechanisms are through resolutions or ordinance by the developer, government agencies with affected LGUs. Table 2 summarized the challenges and barriers with mechanisms used.

Table 2: Local RE Development Challenges and Resolution Mechanisms

Challenges and Barriers	Mechanisms Used
Initial investor backed out, costly logistics and civil works	Private investors, ADB technical assistance and local bank loans
Difficult feasibility study, wind assessment and technical limitations	The project site is near the national grid. RE developer involved the LGUs and local officials from the pre-development stage until its operation

Challenges and Barriers	Mechanisms Used
Community Perception (initial hesitance with something "new" and unawareness on RE)	Meetings and briefing with the local officials and consultations with affected community/households by the RE developer
Difficult Transfer of Wind Turbine to Pililla, Rizal (with mountainous, long archaic roads)	Cost-efficient to transport from Manila via land to Laguna area to Rizal
Initial problem on site location and land acquisition with private landowners	Assisted by the LGU's information technology tools on land mapping and on negotiating with landowners

Outcomes

It can be observed that the same strategies and mechanisms are used by the developer in surmounting the challenges through collaboration with the host LGUs. The private sector developed a symbiotic and collaborative partnership that enabled local RE development in Rizal. While the **outcomes** include the delivery of public services through the CSR programs and additionally the actual accomplishment through the host community benefit from the contribution on electricity sales through the Energy Regulation (ER) 1-94 (Benefits to Host Community) policy allocated to the LGUs.

Impact

The **impact** of the RE development in Rizal includes the socio-economic, environmental and institutional results. The **social results** increased the livelihood options for the community. Alternergy supported the Kamayin Handicraft Community-based Organization that produced bamboo made souvenirs. Likewise, the Pililla Municipality services improved the following: (i) tourism through the establishment of visitor's center as tourism information desk on wind farms; (ii) solid waste management program and donated for two Materials Recovery Facilities (MRFs) and segregated trash bins in the Municipality; (iii) greening program through material donations and staff voluntary participation in tree and bamboo planting to control soil erosion in wind farms and fresh water pollution in the Laguna de Bay area; (iv) education through youth participation in local events developed the local talents and skills. The tourist events are also an attraction; (vi) construction of community learning center, material donations for sports activities, youth talent contests and school activities; and (vii) healthcare through community healthcare support through IEC or healthcare kits. The beneficiaries were prioritized in the preschool and who were women and girls, women-headed households, and families with special needs under the Alternergy CSR Programs that brought about the initial needs assessment during the public consultation and EIA results. Moreover, under the ER 1-94, renewable plants contribute to one centavo per kilowatt hour on electricity generation sales. This can be tapped by LGUs (for livelihood and reforestation fund) or through the utility distributor (for electrification fund). Alternergy remitted since 2015 when it started its operation. According to DOE, this fund of Alternergy is still collected and hopefully to increase through the years as it will operate and will serve as an additional to the current fund from ER 1-94 that may be tapped by the LGUs in Rizal particularly the Pililla Municipality. The **economic results** include increased employment opportunities for the Pililla working population, increased income of the LGUs from taxes and business permits, and increased economic movement through the offshoot tourism industry. The **environmental results** led to the increased LGU advocacy on renewable energy and the continuing environmental compliance of Alternergy. The wind farm is not required to undergo a full-blown EIA as non-environmentally critical project under DENR. The EIA indicated consistency with land use as agricultural use. The company is required to limit land clearing and promote restoration of damaged or destroyed vegetation (e.g. tree planting) and soil erosion will have protection measures by construction during dry season. The preventive measures will have regular inspection of slope protection in erosion. Due to improper solid waste disposal, there can be soil or land contamination and will be mitigated by having ecological solid waste management plan, implementing 3R, provide receptacles/bins for solid waste and coordinate with municipal/city waste collectors. The **institutional results** increased governance mechanisms through policy measures and actions taken in support of the Wind Farms. In terms of governance, partnership with LGUs is the key to manage the social, economic, and environmental impacts of RE development in Rizal. Meanwhile, it has a compliance-driven community participation in the legislation process and monitoring of the project given the context that at the local level many people are still not fully aware of the benefits or impact of developing alternative energy in the countryside. This is based on focus-group discussions and field interviews conducted with some NGOs/POs in the barangay, they were not aware of the project during the public consultation stage and until it is now in operation. This arise because even though the Philippines adopted local autonomy through the Philippine Local Government Code of 1991, the prevailing political

culture is that LGUs follow the traditional hierarchical structure of instruction on programs and policies. Thus, the municipal and barangay LGUs did not still have local independence. In terms on environment impact relative to institutional dimension, the preventive or mitigating measures are integrated in local policies and resolutions following the DENR environment impact assessment.

Spillover Effects

There are also costs or benefits of activities that "spill over" onto third parties or non-participant/not directly involved. Thus, the term spillover effects or externalities. Spillover effects were the unintended effects from the logic model. This can be either positive or negative effects. Thus, externalities were uncalculated costs and benefits of exchange equation, accruing to exchange actors or to others (Mundt and Houston, 2010 and Callahan, 2001). Further, studies of externalities and their disposition offered rich opportunities for understanding transactions, relationships, networks, market systems, communities, and micro/macro systems. The spillover effects are offshoot tourism industry, increase in collection of business license fees and the land valuation had increased.

Contextual Factors

The contextual factors are the influences that may affect the outcomes (Belaid and Ridde, 2015). These were all elements at the local level that had influence in the implementation of RE development. These factors can be found in the individual level, organizational level and interaction across levels (e.g. relations of the private company to DOE, LGU or host community). In particular, the stakeholders who have authority and knowledge in the industry are interviewed and consulted by the researcher namely, Mr. Vincent Perez of Alternergy and his team; the Department of Energy, specifically Renewable Energy Management Bureau (REMB), Electric Power Industry Management Bureau (EPIMB) and Power Compliance Dvision; Planning and Development Offices of the Provincial Government and Municipal Government of Pililla, the local chief executive and local officials of Barangay Halayhayin, Kamayin Handicraft Organization. Using referral sampling method, the affected Pililla citizens either in public consultation, land acquisition, employment during construction and beneficiary of Alternergy CSR programs are also interviewed. These stakeholders' interaction with each other shed light on the necessity of the factors to enable local RE development. The contextual factors include the presence of facilitative leadership, institutional and local partnership and engagement and LGU support of the project. These factors are the key to success in the adoption of RE project at the local level.

Conclusion

Lessons Learned, Best Practices, and Key Success Factors

This paper illustrates the best practice on how the private developer surmounted the challenges through the local government support of the project and how local endorsement is crucial for RE development and adoption at the LGUs in the country. This leads to succinct understanding on the potential economic benefits of the project in the province while the local citizens trusted the authenticity of the project as "new" with local officials accompanying the private developer. The Rizal Wind Farm case is also a pioneer on local financing RE project in the Philippines with its partnerships with local banks and ADB on financing and successful technology transfer. Thereby, the key success factors are local engagement and local government support, active private sector participation and institutionalization of national policy and policy integration at the local level that can serve as a model for replication for RE projects not only in the Philippines but also in Asia Pacific countries moving towards our clean and green energy future to achieve global sustainable development goals.

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WWF Brochure on Pililla Wind Farm

Annex

The Logic Model Research Framework

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