Asian Journal of Multidisciplinary Studies
Vol. 2, No. 1, (2019)
ISSN 2651-6691 (Print)
ISSN 2651-6705 (Online)

Net Metering Facilities: Renewable Energy Management of Pangasinan Electric Cooperative I

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Abstract - *As peoples on the planet struggle with the harmful effects of climate change, and as they are faced with the challenges of mitigating such global phenomenon, relevant steps at the macro and micro-level can bring significant impact to the environment and to the human race. Climate change brings negative impacts on peoples' lives of people on a global scale.. The Philippine initiative to the advancement of renewable energy is solidified through the enactment of various national laws. Converting solar energy to electrical energy brings environmental and economic benefits which include generating energy that produces no greenhouse gas emissions so air pollution is reduced. This paves the way for the Net-Metering scheme. The Net-Metering is the first non-fiscal incentive mechanism fully implemented under the Renewable Energy (RE) Act of 2008. Electric Cooperatives are non-government organizations which assist the government in the implementation of renewable energy. The Pangasinan Electric Cooperative (PANELCO) I, for instance has its net-metering facility which allows household to convert solar energy to electricity which is then sold by them to distribution utility. PANELCO I is the exclusive franchise holder to operate an electric light and power services in the western part of Pangasinan, was given birth to provide the Filipino people adequate electricity at a reasonable cost.*

This study was aimed at determining the management of renewable energy in terms of the trend in the compensation or incentive received by the customer-respondents for the past three years, and assessed the satisfaction and acceptability of the customers who were availing the net-metering services. This research study also determined the relationship of the profile variables of the customer-respondents on the satisfaction of the services offered by the distribution utility.

Results of the data analysis shows the respondents had a high level of acceptability that the net metering services is one of the best programs of PANELCO I allowing households to maximize their solar panel installation to its highest potential, that it can significantly increase your family savings, ang it can significantly reduce green house gases because with renewable energy the amount of coals and fossils being burned is minimized. No significant relationship was found out between all the selected profile such as sex, age, civil status, educational attainment, work status, type of house profile and number of households with their level of satisfaction to the renewable energy metering facility services of PANELCO I; but, there is a significant relationship between some selected profiles of respondents and their level of acceptability, such as the age and highest educational attainment .

It is recommended that the PANELCO I management may enhance their campaign to advertise and market the benefits of the net metering facility services as one of its best programs of that will allow households to maximize the benefits of solar panel installation to its highest

potential and to use cleaner energy and enhance environmental preservation, while enhancing family savings.

Keywords: ***renewable energy, net metering facility services, PANELCO I, electric cooperatives***

Introduction:

As peoples on the planet struggle with the harmful effects of climate change, and as they are faced with the challenges of mitigating such global phenomenon, relevant steps at the macro and micro-level can bring significant impact to the environment and to the human race. Climate change brings negative impacts on peoples' lives of people on a global scale. Ignoring this will create reversal in development gains for the poorest and most vulnerable people in society, an erosion of biodiversity, increasing difficulties in providing food and shelter, as well as the potential loss of entire countries due to the impacts of climate change [1]. Global warming is a buzz word today. It is used for the observed century-scale rise in the average temperature of the Earth's climatic system and its related effects. Greenhouse gases are what make global warming as certainly claimed by scientists. These gases caused atmospheric heating making weather unpredictable and the dramatically increase in terms of severity and frequency of storms, wildfires, droughts and high temperatures [2].

The burning of fossil fuels released gases released primarily and the tiny particles produced by incomplete burning trap the sun's energy in the atmosphere. Scientists call these gases greenhouse gases because they act like the wrong way reflective glass in our global greenhouse. The tiny particles which are the 'black carbon' attribute their warming effect due to the resulting layer of black particles in the lower atmosphere absorbs heat like a blanket making global temperature hotter during summer and colder during winter. The current warming trend started in the late 18th or beginning of the 19th century when coal first came into common use [3].

A way to mitigate the climate change is targeting its root cause—the greenhouse gases- through the generation and utilization of renewable energy with the management of distribution utilities for electricity. Member-countries adhere to the objective of the United Nations Framework Convention on Climate Change which is to stabilize greenhouse gas concentrations in the atmosphere at an ideal level within a prescribed period with the goal of allowing the ecosystems to adapt naturally to climate change and in the process will ensure ideal food production and enabling economic development in a sustainable way [4]. International Renewable Energy Agency holds that renewable energy, as the most cost-effective way of providing 90% of the required reduction in energy-related carbon dioxide emissions, are the least expensive options in increasing access to electricity, while reducing air pollution and cutting CO2 emissions in the world [5].

With renewable energy, it can bring significant socio-economic benefits in contributing to the global gross domestic product or GDP as production of renewable energy employs about 29 million peoples and generating increase in health welfare by 15% [5]. Of the 17 Sustainable Development Goals, four of these goals can be directly achieved by renewable energy utilization. These are Affordable and Clean Energy (SDG 7), Sustainable Cities and

Communities (SDG 11), Responsible Consumption and Production (SDG 12) and Climate Action (SDG 13) [6].

The Philippine initiative to the advancement of renewable energy is solidified through the enactment of the Republic Act No. 9729 or the Climate Change Act of 2009. It is declared as the State's policy that the right of the people for full protection and right to live in an ecology that is healthful and harmonious to nature [9]. To benefit humankind, the country adopts the ultimate objective of the United Nations Framework Convention on Climate Change, to ensure ideal food production and enabling sustainable economic development [9].

Supportive to the Climate Change Act is the Renewable Energy Act of 2008 or the RA No. 9513. The RE Act stipulates the policy of the State in accelerating the exploration and development of renewable energy resources, to achieve energy self-reliance, through the adoption of sustainable energy development strategies to reduce the country's dependence on fossil fuels and thereby minimize the country's exposure to price fluctuations in the international markets. The RE Act also aims to increase the utilization of renewable energy through the institutionalization and development of national and local capabilities in the use of renewable energy systems, and promoting its efficient and cost-effective commercial application by providing incentives. Part of the State's policy is the encouragement of the development and utilization of renewable energy resources as tools to effectively prevent or reduce harmful emissions and thereby balance the goals of economic growth and development with the protection of health and the environment; and to stablish the necessary infrastructure and mechanism [9].

Converting solar energy to electrical energy brings environmental and economic benefits which include generating energy that produces no greenhouse gas emissions so air pollution is reduced. Dependence of a country on imported fuels can be also reduced. As an alternative source of electrical energy, it can lower world prices on natural gas and coal [9].

Philippines enjoys a sizeable amount of sunshine and the country has the ability to harness the sun's power as its radiation across the country has a potential power generation of 4.5 to 5.5 kWh per square meter per day as claimed by the Department of Energy of the country [8].

This paves the way for the Net-Metering scheme. The Net-Metering is the first non-fiscal incentive mechanism fully implemented under the Renewable Energy (RE) Act of 2008. House owners and commercial establishments can now partly satisfy their electricity demand by themselves by installing solar photovoltaic (PV) panels up to 100 kW [8].

In 2013, the Energy Regulatory Commission adopted ERC Resolution 09, Series of 2013 approving the Rules Enabling the Net-Metering Program for Renewable Energy. The Net-Metering Program is available only to On-Grid distribution systems or distribution utilities connected to the transmission grid. The Renewable Energy Act of 2008 or the R.A. No. 9513 provides that subject to technical considerations and without discrimination and upon request by distribution end-users, distribution utilities shall enter into net-metering agreement with qualified end-users who will be installing the renewable system. The Energy Regulation Commission, in consultation with the National Regulation Energy Board (NREB) and the electric power industry participants, establish net-metering interconnection

standards and pricing methodology and other commercial arrangements necessary to ensure success of the net-metering for renewable energy [8]. Prior to the enactment of the Renewable Energy Act and the Climate Change Act, the Electric Power Industry Reform Act (EPIRA) of 2001 or the R.A. 9136 hereby declares the State's policy to ensure the acceleration of the total electrification of the country, whose supply of electric power is of quality, affordable, reliable and secure. Among other declarations in this law, the promotion of the usage of indigenous and new and renewable energy resources in power generation in order to reduce dependence on imported energy is relevantly noted for this study (Philippine Congress, 2001).

Through the EPIRA, the National Transmission Company (TRANCO) was created to assume the electrical transmission function of the National Power Corporation (NPC) with powers granted by the law. Distribution of electric power to all end-users may be undertaken by private distribution utilities, cooperatives, local government units presently undertaking this function and other duly authorized entities, subject to regulation by the ERC. A distribution utility shall have the obligation to provide distribution services and connections to its system for any end-user within its franchise area consistent with the distribution code. Any entity engaged therein shall provide open and non-discriminatory access to its distribution system to all users [9]. The Philippines Climate Change Act of 2009 provides provisions on the coordination of the National Climate Change Action Plan and the local plans to the nongovernment organizations (NGOs), civic organizations, academe, people's organizations, the private and corporate sectors and other concerned stakeholder groups [9].

Electric Cooperatives are non-government organizations which assist the government in the implementation of renewable energy. The Pangasinan Electric Cooperative (PANELCO) I, for instance has its net-metering facility which allows household to convert solar energy to electricity which is then sold by them to distribution utility. Excess power generated from the solar PV installation will be delivered to the local distribution grid of the electric distribution utility and will be used to offset the end-user's electricity consumption. This way, end-users become "prosumers" or producers and consumers of electricity at the same time. As a result, end-users are able to generate savings on their electricity bill, while protecting themselves from rising prices of electricity. [8] This can be possible with a local electric distribution utility like the Pangasinan Electric Cooperative I or PANELCO I.

PANELCO I is the exclusive franchise holder to operate an electric light and power services in the western part of Pangasinan which includes the City of Alaminos and Municipalities of Agno, Anda, Bani, Bolinao, Burgos, Dasol, Infanta and Mabini. On the 24th of September 1972, the birth of PANELCO I was made possible. Such local electric distribution utility institution, was given birth with the promulgation of the Presidential Decree No. 40 in 1972 which converted private municipal electric systems to electric cooperatives under R.A. 6038 or the Act declaring a National Policy Objective for the Total Electrification of the Philippines on an Area Coverage Service Basis, Providing for the Organization of the National Electrification Administration, the Organization, Promotion and Development

of Electric Cooperatives to Attain the Objective, Prescribing Terms and Conditions for their Operation, the Repeal of R.A. 2717, and for other Purposes. Prior to the institutionalization of electric cooperatives, small utilities were already operating in different towns in the Philippines on a limited basis. RA 6038 was created to address these deficiencies and to provide the Filipino people adequate electricity at a reasonable cost [10]. Today, it supports the Renewable Energy Act of 2008 of the Philippines by way of providing the net-metering facility services.

Net Metering is a policy which permitted the utility-connected household/ industry consumers to offset their consumption through the inputted self-generated electricity surplus in the network and in the process, generating credits that can be used afterwards [14]. For Net Metering Facilities, PANELCO-I, the organization encourages consumers, either at the residential or industrial area to avail of this services. Those who have availed of their net metering facilities are able to sell their excess Watts of electricity stored in their battery which is from the solar energy that are not consumed in daylight. In the process, they are earning. At night time, they can purchase these watts of electricity for their consumption at cheaper costs. Both parties can be better off. At the part of the PANELCO I, they can save fuels or coals in the production of electricity and in the part of the household or industries to produce the electricity that they consume and therefore they can save. In the areas where the PANELCO I provides their services, the net-metering facility was initially installed on 2018 Today, there are 17 households who are registered with the Net-Metering Facility services of the electric distribution facility.

Several management models of renewable energy are proposed to efficiently maximize power production [25], with integration of Smart Grid [21], management and commercialization [22]. To better the management of renewable energy, RE sources are applied [23], consideration of cognitive architectures as building energy management system [19]. The collection of energy technologies with natural resources such as wind, solar, geothermal, where energy is derived from these never-ending sources is called renewable energy [24]. Renewable energy posits numerous advantages, but disadvantages also occur. RE is good for the environment, RE is a renewable resource, a reliable source of energy, it leads to job creation, it stabilizes global energy prices, facilities for RE are require less maintenance and it empowers people in the country side. In a press release by the International Renewable Energy Agency, the RE industry created more than half a million new jobs globally in 2017 [26].

Renewable energy will also bring significant socioeconomic benefits, boosting global gross domestic product (GDP) growth by 1 per cent, employing close to 29 million people and generating a 15 per cent increase in welfare, mainly through health benefits from reduced air pollution [18]. However, RE can be unreliable at time, as the sources are totally depending on the weather to be able to harness any energy. As RE technologies are still new to the market, they still lack the much-needed efficiency and production of RE requires high cost of capital [24]. With Smart Grid integrated to renewable energy, smart transmission and distribution is managed with efficiency and reliability.

As this study focuses on the conversion of solar energy to electrical energy, the net metering mechanism was

scholarly reviewed [20][16]. Its implementation in terms of policies is also added to the subject literature [15]. The most general definition of a Net Metering policy is the permit given to utility-connected consumers to offset their consumption by inputting self-generated electricity surplus into the network and generating credits that can be used afterwards [14]. Allowing electricty users with roof top based PV and wind energy systems to offset part of their conventional electricity requirement is the purpose of net metering. Net metering is intended to encourage private investment in renewable energy resources, stimulate economic growth in the country, contribute to energy security and enhance diversification of Namibia's energy resources [16].

Solar Photovoltaic (PV) system is the most common technology used to perform Net Metering with the grid is the, by which users generate energy while there is sunlight available. Even with the globally rapidly decrease in PV equipment prices and maintenance costs and an increase in generation efficiency, the adoption of DG technologies still encounters many constraints [17]. Mejdalani, et. al. (2018) holds that net metering policy entails many decisions to by undertaken by the regulator or in this case, the distribution utility [15]. There are three ways to utilize the kW earned as surplus: 1) as monetary compensation or the cash back scheme; 2) as write off, which converts from liability into current asset on the balance sheet; and 3) as renovation of roll over period.

For any excess credit at the end of the yearlong billing cycle, such credit is either granted to the utilities or is carried over indefinitely to the customer's next lectricity bill, or any option available is up to the customer to choose from [20]. Generally, net metering involves the use of a meter that can record power flows back into the grid as a credit. Today, most people connected to a net-metered systems are allowed to accumulate credits for excess power generation which is transmitted to the grid from their home power systems on a monthly basis [21]. Different net metering mechanisms are dependent to the requirements of each country or states; this is according to the survey on the current operation of net metering in different countries [20]. In Latin America and the Caribbean, 17 countries have adopted policies to introduce net metering by 2018, with different stages of implementation [15]. Five European countries were using net metering in a very simple form. This form lies on a framework that any amount of energy produced by the eligible renewable energy sources for power generation (RES-E) technology is compensated from the energy consumed by these producers; this results to either less overall electricity bill or to an exception in payment energy taxes [15]. A study in Italy focused on the developing innovative decentralized voltage control approach aimed to allow distribution generation systems active power production maximization and to avoid DGs disconnection due to voltage limit infringements [25]. Such study concluded that the power decentralized control strategy allows a possibility for it to be integrated into a Smart Grid modular structure with further auto-update and optimization capabilities. A proper control strategy is proposed to keep constant the fuel cell power and limit the charge/ discharge batteries current. The implementation of the control strategy was done by means of two hierarchical control algorithm set-up tor the converters and based on the tests conducted, good performances were derived [23].

With net metering system approved in the country, installed capacity had significantly increased in 2013 [27]. Evaluating a 10kW grid-tied photovoltaic system installed at a residential unit in Makati City, Metro Manila, Philippines using system advisory model, the average monthly energy production is 957 kWh of which was directly consumed; while, 541kWh was exported to the grid. An average of 4,764.27 pesos monthly can be saved from the electric bill for using the PV system plus the benefits from the net metering system equal to an average of Php 2,923.08 monthly [27].

The Philippines is an emerging solar photovoltaic market, installing around 1 giga Watts in the span of last 2 years and was spurred by the enactment of supporting policies: feed-in-tariff (FIT) and net-metering [12]. Their study addresses the terms, conditions and effectiveness of these policies reflected as the interannual growth in PV power production with respect to the potential realizable capacity in the country. A Life cycle cost and greenhouse gas (GHG) emission reduction analysis is presented to demonstrate the economic viability and environmental impact of implementing an on-grid residential PV installation in the country – in the context of these policies. Financial results showed that theoretical 100 kW-FIT/1.89 kW-NM PV projects were attractive and would lead to a greenhouse gas emission reduction of 102.9 $tC0_2e$ and 1.9 $tC0_2e$, respectively. The FIT case had a Net Present Value of PHP 4.7 million, a benefit-cost ratio of 4.17, and a simple payback period of 4.1 years. Net-metering had a positive NPV of PHP 27k, a benefit-cost ratio of 1.50, and a simple payback period of 7.8 years. The main profitability drivers were found to be the initial capital cost for FIT and the avoided retail electricity costs for NM [12].

The financial payback of solar photovoltaic systems and analysis of the potential impact of net-metering in Butuan City, Philippines was determined by Dellosa (2015) and found out that there was already a high level of awareness of solar power PV systems among residential and commercial subscribers of the Agusan del Norte Electric Cooperative (ANECO) in Butuan City and that many were willing to invest in solar PV systems [13].

However, majority were not aware of the net–metering scheme. The economic feasibility of investing in solar PV systems for the 1.5 kWp and 5 kWp systems was also determined. Although the computed payback period for these systems were considered long, the computed net present value and internal rate of return were positive indicators that investments in these systems are worthwhile considering the long operating life of the photovoltaic systems. The illustrations of different load output profiles that integrate the solar photovoltaic systems to the actual load of ANECO showed that the base, intermediate and peak demand were significantly reduced during daytime. However, management of the sourcing of energy supplies will be crucial for ANECO especially when large solar photovoltaic systems are integrated in the grid and working at their maximum efficiencies [13]

Net metering generates higher rate of return than net billing and encourages investments on larger systems that could also maximize electricity exports. Since the program implemented under the incentivized self-consumption scheme is supported by distribution utility customers, net metering would result in higher financial burden to ratepayers [18].

Objectives of the Study

This study aims to assess the satisfaction and acceptability of the customers who are availing the net-metering services. This research study shall also seek to know the profile of respondents and determine the relationship of the profile variables of the customer-respondents on the satisfaction of the services offered by the distribution utility.

Materials and Methods

This study used the descriptive research design. The information provided by the respondents was included in the qualitative aspect. Their level of satisfaction to the services provided by PANELCO I pertaining to the metering facility and the respondents' acceptability on the renewable energy and metering facility were described qualitatively. The significant relationship between the selected profile variables of the respondents and their satisfaction and acceptability level was described qualitatively.

The locale of the study was in the Western Pangasinan to where the services of PANELCO I is provided to. The included municipalities and city in this region of the province are Bolinao, Anda, Bani, City of Alaminos, Sual, Dasol, Mabini and Infanta. Seventeen clients who have solar panel installations served as the sources of data. Total enumeration was sampling technique to be used.

Various statistical tools were used to provide answers to the statements of the problem. For the problem number 1, frequency and percentages were used to summarize and describe the profile of the respondents. For problems three and four, Mean, Grand Mean and Overall Grand Mean were used to provide information on the level of satisfaction of respondents to the services provided by PANELCO I which pertains to the renewable metering facility and their level of acceptability to such renewable facility installation. Percentages and frequency counts were still used in the presentation of data, in order to maintain the completeness of information.

Below are the tables showing the rating, scale range and descriptive meaning of the level of satisfaction and level of acceptability.

Table 1
Range, Mean Scale and Descriptive Equivalent for the level of satisfaction of respondents

Range	Mean Scale		Descriptive Equivalent
4	3.26-4.00	–	Highly Satisfied
3	2.11-3.25	–	Satisfied
2	1.76-2.50	–	Slightly Satisfied

Table 2
Range, Mean Scale and Descriptive Equivalent for the level of acceptability of respondents

Range	Mean Scale		Descriptive Equivalent
4	3.26 4.00	–	Highly Acceptable
3	2.11 3.25	–	Acceptable

2	1.76 2.50	–	Slightly Acceptable
1	1.00 1.75	–	Not Acceptable

For the fifth and sixth problems which aimed to determine the relationship between the profile of the respondents and their level of satisfaction to the services offered by

PANELCO I and their acceptability on the installation of solar panels and availing of the metering facility, the Pearson Chi-square test of independence was used. The profile civil status was re-classified to either single or married; the highest educational attainment was re-classified to either college graduate and high school graduate, the type of employment was re-classified to either government or private; and the nature of employment was re-classified to either employed or not employed. For the statements pertaining to level of satisfaction or acceptability, these were re-classified from 4 scales into 2, in order for the statistical tool Pearson Chi-square test to work. A rating of 3 or 4 was re-classified as 'satisfied/ acceptable' and the rating of 1 or 2, as 'not satisfied/ not acceptable'.

1	1.00 - 1.75	–	Not Satisfied

Results and Discussions

Most of the respondents were males (87.5%), belonged to the age group of 61 years and above (43.75%), were married (87.5), have graduated college (68.8%) as their highest educational attainment, were currently working (46.2%), had their work status as job order (60%), temporary (20%) , had worked or 11-20 years (54.6%), with their family income, ranging from 31,001 to 50,000 pesos. Most of the respondents have a bungalow type of house with 1-2 number of households.

The earliest installation was in 2017 or more than two years ago. Most of the respondents have 6-10 solar panels, and one has 85 to 90 solar panels installed at his residence. The estimated average cost of installation was 100,000 pesos to 300,000 pesos and had converted/earned 100 KW to 200 KW of electric power from the solar energy. The two of the respondents spent more than a million pesos for their installation of solar panels and had converted and earned 1000 to 3000 KW of electrical power from the sun. The respondents had credited or sold more than what they purchased from the PANELCO I. Average monthly maintenance cost is relatively low ranging from nothing to 12,000 pesos.

It can be noted that the average cost for the installation is 100,001 pesos to 300,000 pesos. Such amount is high relative to the average savings of a Filipino family which is 52,000.00 (Philippine Statistics Authority). As renewable energy technologies are still new to the market, renewable energy requires high cost of capital (Damodhar, 2017). Such finding agrees that facilities for renewable energy require less maintenance (Damodhar, 2017).

For the level of satisfaction of the respondents on the renewable energy management of PANELCO I in its net-metering facility services, an overall grand mean of 3.49 indicates the high satisfaction of respondents on the renewable energy

management through net metering facility services of PANELCO I. They were highly satisfied with the assistance provided by PANELCO I management from the processing of application, issuance of permits, inspection and installation services, and with the assistance provided to them in the generation and selling of renewable energy they earned. The respondents were also highly satisfied with the customer support provided to them by PANELCO I personnel who were respectful, emphatic, and timely. Monitoring is regularly conducted by PANELCO I personnel to ensure the safety of the users of the net metering facility services with a grand mean of 3.50. It can be further gleaned from table 1, that the respondents had a high level of acceptability on the services provided by PANELCO I in the installation of renewable energy through net metering facility as indicated by the grand mean of 3.42.

Table 1
Level of Satisfaction of the Respondents on the Renewable Energy Management of PANELCO I in Net Metering Facility Services

Services Provided by PANELCO I	Frequency & Percentage				Mean	Descriptive Meaning
	4	3	2	1		
A. Assistance provided by PANELCO I Mgt. to applicants						
1. Processing of the Net-Metering application (in the beginning).	8 61.5 %	5 38.5 %	0	0	3.32	Highly Satisfied
2. Issuance of building/ electric permit in the evaluation process of the application for the net metering facility services.	8 61.5 %	4 30.8 %	1 7.7 %	0	3.54	Highly Satisfied
3. The inspection of the Service Entrance and installation services provided by the PANELCO I in connecting my solar panels to the metering facility with a two uni-directional meters.	9 69.2 %	1 7.7 %	2 13.3 %	1 7.7 %	3.38	Highly Satisfied
4. The instructions given by PANELCO I are specific, clear and doable in the Energization phase of the application process.	9 69.2 %	2 15.4 %	1 7.7 %	1 7.7 %	3.46	Highly Satisfied
5. The assistance provided by the PANELCO I in the generation of KW of electricity is dependable.	9 69.2 %	3 23.1 %	1 7.7 %	0	3.62	Highly Satisfied
6. The assistance provided by the PANELCO I in selling of KW of electricity is dependable.	8 61.5 %	3 23.1 %	1 7.7 %	1 7.7 %	3.38	Highly Satisfied
7. The assistance provided by the PANELCO I in purchasing of KW of electricity is dependable.	8 61.5 %	2 13.3 %	1 7.7 %	1 7.7 %	3.42	Highly Satisfied
Grand Mean					**3.49**	**Highly Satisfied**

1.0 – 1.75 Not Satisfied
1.76 – 2.50 Slightly Satisfied
2.51 – 3.25 Satisfied
3.26 - 4.00 Highly Satisfied

The satisfaction level of the respondents in the study was measured in terms of their received services from the PANELCO I in: 1) their application process for the net-metering facility services as divided to four phases—filing, evaluation, inspection and energization.

For the assistance provided by the management, a grand mean of 3.49 indicates the high satisfaction level of the respondents. Respondents were highly satisfied with the assistance provided by PANELCO I management during their application with the said renewable energy services from processing of the net metering application, to issuance of permit, inspection of the site, in the generation of clean energy, and in utilizing and supplying the energy earned for consumption.

Respondents were also highly satisfied with the instructions given by PANELCO I are specific, clear and doable in the Energization phase of the application process. The assistance provided by the PANELCO I in the generation of KW of electricity highly accepted as dependable. The assistance provided by the PANELCO I in selling and purchasing of KWh of electricity was also rated highly acceptable in terms of dependability by the respondents.

PANELCO I is adopting a management model of renewable energy to efficiently maximize power production as mentioned by Calderaro, 2013 which provides satisfaction to the clients. The management also uses smart grid management and commercialization which is in consonance with the study of Raythatha, et. al.

Asian Journal of Multidisciplinary Studies
Vol. 2, No. 1, (2019)
ISSN 2651-6691 (Print)
ISSN 2651-6705 (Online)

Table 2
Level of Satisfaction of the Respondents on the Renewable Energy Mgt. of PANELCO I in Net Metering Facility Services in terms of Customer Support

Services Provided by PANELCO I	Frequency & Percentage				Mean	Descriptive Meaning
	4	3	2	1		
B. Consumer Support						
8. The PANELCO I personnel are respectful and they show emphaty and care to your concern.	9 69.2 %	2 15.4 %	2 15.4 %	0	3.54	Highly Satisfied
9. Safety pertaining to the metering facility is ensured by the PANELCO I personnel and so, you feel safe and secured.	4 69.2 %	3 23.1 %	2 15.4 %	0	3.54	Highly Satisfied
10. Monitoring is regularly conducted by PANELCO I personnel, and so you feel an assurance that everything is well.	7 53.8 %	5 38.5 %	1 7.7 %	0	3.46	Highly Satisfied
11. The PANELCO I personnel observance to timeliness is notable.	7 53.8 %	5 38.5 %	1 7.7 %	0	3.46	Highly Satisfied
Grand Mean					**3.50**	**Highly Satisfied**

1.0 – 1.75 Not Satisfied
1.76 – 2.50 Slightly Satisfied
2.51 – 3.25 Satisfied
3.26 - 4.00 Highly Satisfied

For the customer support provided to the respondents by PANELCO I personnel to the respondents, a grand mean of 3.50 also indicates their high level of satisfaction. The respondents agreed a highly acceptable rating that the service provided from PANELCO I were respectful, emphatic, and timely. The respondents were also highly satisfied with the PANELCO I personnel's act of ensuring safety so the clients feel safe and secured. The respondents were highly satisfied with the regular monitoring activities conducted by PANELCO I personnel to ensure the safety of the users of the net metering facility services.

Because of the net metering facility services, the clients who have availed of it somehow are enabled to secure sustainable source of clean energy, and this is supportive to the United Nations Framework Convention on Climate Change, though in a micro-level. However, micro, if collectively done, it can create impact in the community or in the economy.

Table 3
Level of Acceptability on PANELCO I's Installation of Renewable Energy through Net Metering Facility

Acceptability of the net metering services for solar energy	Level of Acceptability				Mean	Descriptive Meaning
	4	3	2	1		
Usefulness						
1. The net metering services is one of the best programs of PANELCO I that will allow you to maximize your solar panel installation to its highest potential.	9 69.2 %	1 7.7%	3 23.1 %	0	3.46	Highly Acceptable
2. Availing of the net-metering services from PANELCO I can significantly increase your family savings.	9 69.2 %	2 15.4 %	2 15.4 %	0	3.54	Highly Acceptable
3. The net metering services can significantly reduce green house gases because with renewable energy, the amount of coals and fossils being burned is minimized.	8 61.5 %	4 30.8 %	1 7.7%	0	3.54	Highly Acceptable
Grand Mean					**3.51**	**Highly Acceptable**
B. Ease of Use of Operation						
4. Operating the generation and exporting of electricity with the installed solar PV comes with ease.	6 50%	3 25%	3 25%	0	3.25	Acceptable
5. The PANELCO I personnel are very accommodating on the process of availing net-metering services.	8 61.5 %	2 15.4 %	3 23.1 %	0	3.38	Highly Acceptable
6. The generation of electric energy from Photovoltaic (PV) system is easy to operate.	8 61.5 %	3 23.1 %	2 15.4 %	0	3.46	Highly Acceptable
7. Selling/ Crediting of your excess KWh earned to PANELCO I is easy.	7 53.8 %	2 15.4 %	3 23.1 %	1 7.7 %	3.15	Acceptable
8. Buying of your needed KW from PANELCO I is easy as well.	7 53.8 %	3 23.	2 15.4 %	1 7.7 %	3.23	Acceptable
Grand Mean					**3.29**	**Highly Acceptable**
C. Attitude towards customer support services						
9. Customer support given by PANELCO I pertaining to metering facility is reliable.	6 46.2 %	3 23.1 %	4 30.8 %	0	3.15	Acceptable
10. PANELCO personnel are dependable at all times	7 53.8 %	4 30.8 %	2 15.4 %	0	3.38	Highly Acceptable
11. Safety is ensured by the PANELCO I to operations pertaining to the metering facility.	9 69.2 %	2 15.4 %	2 15.4 %	0	3.54	Highly Acceptable
Grand Mean					**3.36**	**Highly Acceptable**
D. Intention to Use Sustainably						
12. I shall use renewable energy for the next 5 years.	9 69.2 %	3 23.1 %	1 7.7%	0	3.62	Highly Acceptable
13. I shall use renewable energy for the next 10 years.	9 69.2 %	3 23.1 %	1 7.7%	0	3.62	Highly Acceptable
14. I would recomment my friends or relatives to install their solar panels and avail of the metering facility services of PANELCO I.	9 69.2 %	3 23.1 %	1 7.7%	0	3.62	Highly Acceptable
Grand Mean					**3.62**	**Highly Acceptable**
Overall Grand Mean					**3.45**	**Highly Acceptable**

1.0 – 1.75 Not Acceptable
1.76 – 2.50 Slightly Acceptable
2.51 – 3.25 Acceptable
3.26 - 4.00 Highly Acceptable

the net metering services is one of the best programs of PANELCO I that will allow you to maximize your solar panel installation to its highest potential, that it can significantly increase your family savings, ang it can significantly reduce green house gases because with renewable energy the amount of coals and fossils being burned is minimized.

Similar to the observation of Darghout, 2011 about net metering services, the PANELCO I clients find it highly acceptable to offset their consumption by inputting self-generated electricity surplus into the network of the distribution utility and generating credits that they can used afterwards.

The PANELCO personnel were also highly accepted as very accommodating on the process of availing net-metering services. This high level of acceptance is in sync with the satisfaction of the respondents on the customer support provided by the PANELCO I personnel as mentioned in table 7.b.

The respondents highly accepted that the generation of electric energy from Photovoltaic (PV) system is easy to operate and they highly accepted the idea of using it for the next 5 to 10 years and shall recommend the installation and availing of such net metering services to their friends and relatives.

Similar to Butuan City, Philippines, where many are willing to invest in solar photovoltaic systems, there is an ideal financial payback of net metering [28]. Also, people are becoming more aware of the indirect benefits of net metering services, to health, since the system reduced air pollution brought by burning fuels to generate electricity. Net metering facility provides an alternative which diversify resources in Western Pangasinan and contributing to energy security just like in Nigeria [16].

Mejdalani, et. al. (2018) holds that net metering policy entails many decisions to by undertaken by the regulator or in this case, the distribution utility the PANELCO I who started offering such facility services to households in Western Pangasinan. Started in 2017, the first household to availed of the service which incentivize the prosumers. The clients have ways to utilize the kWh earned as surplus: 1) as monetary compensation or the cash back scheme; and 2) as write off, which converts from liability into current asset on the balance sheet.

For the significant relationship between the level of satisfaction to the renewable energy metering facility services of PANELCO I there is no significant relationship between all the selected profile such as sex, age, civil status, educational attainment, work status, type of house profile and number of households with their level of satisfaction to the renewable energy metering facility services of PANELCO I. This means that the level of satisfaction of respondents is not affected by any of their profile.

With the significant relationship between the profile of respondents and their level of acceptability, the age of the respondents has a significant relationship with their level of acceptability to the renewable energy metering facility services of PANELCO I on the net metering services which can significantly reduce green house gases as indicated by the $X^2 = 4.286$ and $p = .038$. Older respondents tend to believe more that the net metering services as way or harnessing the power of solar energy and a form of renewable energy minimized the amount of coals and fossils being burned. Also, the highest educational attainment of the respondents has a significant relationship particularly on 'Availing of the net-metering services from PANELCO I can significantly increase your family savings' as indicated by $X^2 = 13.289$ and $p = .010$; as well as the indicator 'Selling/ Crediting of your excess KWh earned to PANELCO I is easy' as indicated by $X^2 = 13.743$ and $p = .033$. Respondents who were College Graduate tends to accept more that family savings can be more achieved with the renewable energy usage using net metering services of

PANELCO I than those belonging to lower educational attainment. Same applies to the ease they were experiencing in selling/ crediting excess KWh of power earned to PANELCO I.

Other profile variables of the respondents such as sex , civil status, work status, type of house and household size have no significant relationship with their level of acceptability to the renewable energy metering facility services of PANELCO I. Other indicators have p-values of higher than .05, with various Chi-square values which led to the decision of accepting the null hypothesis.

Recommendations

The following are suggestions and recommendations which are anchored on the findings of the study: (1) The PANELCO I may enhance their campain to advertise and market the benefits of the net metering facility services as one of its best programs of that will allow households to maximize the benefits of solar panel installation to its highest potential and to use cleaner energy and enhance environmental preservation, while enhancing family savings; (2) The PANELCO I administration received a 'highly satisfaction' rating to all indicators of satisfaction level from the net metering facility services users. The management has to continue its efficient and effective management in providing assistance to applicants and clients, and keep a very good customer service to them; (3) Enhance the services of PANELCO I to improve the selling/ crediting of excess KWH earned by clients, to improve the knowledge of clients on buying their needed KWh electric energy to make the net metering facility services more reliable. This can be done by providing seminar and distributing IEC material to the clients; (4) Since there is no significant relationship between all the selected profile such as sex, age, civil status, educational attainment, work status, type of house profile and number of households with their level of satisfaction to the renewable energy metering facility services of PANELCO I, the management has to continue their good services to their clients and would-be clients; and (5) Activities to improve the acceptability level of younger respondents on the benefits of net metering services as way or harnessing the power of solar energy and a form of renewable energy minimized the amount of coals and fossils being burned should be conducted. Information, education materials (IEC) may be developed by PANELCO I for information dissemination activities to enhance the understanding of the clients and would-be clients on increasing family savings brought by the net metering services. A more elaborative discussion among the clients and would be clients is suggested to make them more informed on the selling/ crediting of their excess KWh earned.

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