Solar public engagement: the prospective study on FELDA community in Malaysia

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Abstract. Malaysia Energy Outlook 2016 has highlighted that Malaysia's electricity generation mix has always been highly dependent on fossil fuels. There is a concern on energy security for Malaysia recently, since the depletion of fossil fuel occurs and its effect increases the price of electricity tariff. Nevertheless, the energy demand continues to increase, which make the non-fossil renewable energy sources is back on demand. Malaysia's highest potential for renewable energy comes from solar energy and the large roofs of rural houses offer potential to contribute solar electricity for the people. Indeed, the engagement of solar energy to the public is very important in allowing this energy to be accepted by the locals. The paper will review the related literature on public engagement for solar energy project. This paper also tries to prospect the potential of implementing solar electricity for a well-known rural organization in Malaysia, known as FELDA.

1. Introduction

The demand of electricity in Malaysia increased at 4% annually [1]. This rapid intensification electricity demand is due to the high economic development rate of Malaysia today [1]. For renewable energy sector, the capacity is expected to reach 2,080MW by 2020, contributing to 7.8% of total installed capacity in Peninsular Malaysia and Sabah. In the Malaysia Eleventh Plan, focus will be on promoting new renewable energy sources. On 2014, total installed capacity for renewable energy capacity is expected to reach 2,080MW by 2020, contributing to 7.8% of total installed capacity in Peninsular Malaysia and Sabah. In the Malaysia Eleventh Plan, focus will be on promoting new renewable energy sources. The total installed capacity for solar photovoltaic is 66% out of 243MW and by the year 2020, the total installed capacity for solar photovoltaic is expected to increase by 9% [1]. The demand of solar energy is growing every year and it signify that the engagement, acceptance and the awareness level towards the development of solar energy is needed in Malaysia, particularly among the people. However, a study has shown that this engagement and awareness are greatly comes from the commercial sector and urban populations only [2].

In Malaysia, rural area has a large scale of people, and it is divided into traditional settlements and government-partnership settlements, such as FELDA community. Even though solar technology is vastly developed in Malaysia, it is still predominantly unfamiliar within the rural communities. A survey in Malaysia [3] with 214 respondents with different background areas in Malaysia. The study shows that the professionals knew about the technology, however, there are gap of knowledge within the domestic populations; especially in terms of its implementation and dissemination at the national level. Most of the rural households are still unfamiliar with the technology. Therefore, this paper tries to explore the potential of introducing solar technology into a large rural community like FELDA.

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Later part of this paper will introduce on the FELDA community and the potential of engaging this technology within the community.

2. The solar public engagement: why it is important?

In realizing a solar energy project for any communities, an engagement is needed. Public engagement and community engagement is a synonymous term [4]. The public engagement involves the variation of public effort to make the institution more consistent to achieve the aspirations, values and needs of the citizens who fund it and work for it [4]. In order for public engagement to be expressive, the public should be involved, interact and have the opportunity to influence the outcome before it is determined and have an opportunity to affect future policy or decisions [5].

Public engagement within solar energy context involves public dialogue, interaction and participation, a two-way communication and collaboration partnership to develop a shared understanding, to design, and to implement the related solar program that meets the users' needs [6]. The flow of information the public engagement needed involved three (3) levels; (i) one way; begin with the information from funder to public (communication), (ii) two-way; public to funder with informal dialogue and information flow back without any discussion (consultation) and (iii) two way exchange; information flow in two direction between funder and public (participant) [7],[8] (see Fig. 1).

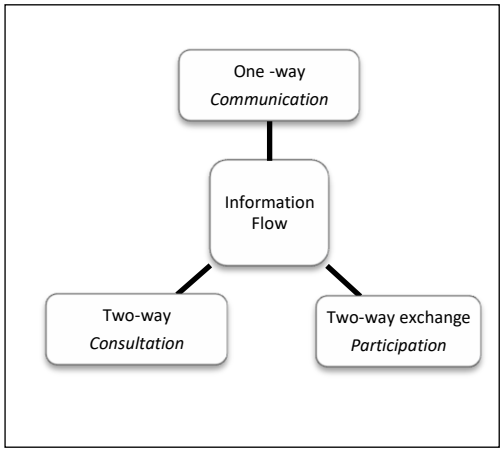


Figure 1. Public engagement Information flow [7] [8]

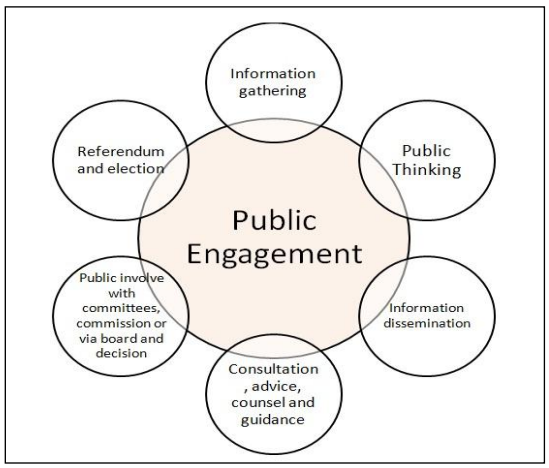


Figure 2. Public engagement approaches [4]

Solar public engagement can develop a public trust and more importantly, it establish the needs of performance feedback from customer perspectives [5]. It also authorizes an action produce from public conversations in order to make a decision or the policy in align with the future perspective. Public engagement assist the people with strategic planning, show the options on solar energy management that a community can handle and at the same time, will resolve the conflict on specific issue occurs in the future which can be used in developing a mutual strategic. However there are several of public engagement approaches (see Fig. 2) [4]. One or more approaches involve in public engagement. Merging the approaches of public engagement can improve the public engagement.

The effective public engagements depend on the ability of the right move engages with the public. The following point are the principle of public engagement [9], which start with listening, engaged to people's leading concerns, reach beyond the "usual condition", deliberation on time-frame issues, provide the information at the right time, help people in every way, expect problems and have resistancy, create various opportunities for deliberation and discussion, react thoughtfully and believe to the public's involvement and build a long-term ability so that it can gain public trust. One report highlighted that principles of public engagement are about involvement of people right, to make a community stronger, to build up their trust and establish a partnership, through accountability, sustainable services and reliable resources [5].

3. Public engagement of other countries

Many researchers engaged the solar energy project to the public on various aspects and criteria. A study done in countries like India, Bangladesh, Nepal and Sri Lanka had involved the public with selected programs linked to dissemination a solar energy program for the people [10]; it involves (i) *innovative financing schemes promotion, (ii) dissemination of solar information, (iii) sizing technical design, finance and service delivery models, (iv) cost of system, monitoring and maintenance, and (v) shares the experience and lessons of solar PV programs through public talks or seminars.* These types of engagement efforts were conducted in India, Bangladesh, Nepal and Sri Lanka which involve the technical, financial, institutional, governance and residential sectors [11].

One of the scholar highlighted that to engaged in a solar energy program, it needs to be managed under the community organizations in order to find significant strategies that suits the community lifestyles. Examples of the strategies are involving the discussions with reliable people in the community, e.g. local clinic and school staff with villagers in order to expose the community with the technology [11]. Public can be persuaded if they trust the people that disseminate the information. In this context, people always put their trust into local medical and education staff [10]. Public buildings in the community is selected to be the hub for solar PVs point so that it can be shared to the locals, namely the community schools, the clinic and the school laboratory. The social-economic data is collected from the local communities and being monitored under a special program by the Government and NGOs [12].

4. The case study – FELDA in Malaysia

Malaysia have two regions: West and East Malaysia and situated in the South East of Asia. It encompasses of 13 states. Total area of Malaysia is 329, 847 km2 [13],[14]. Malaysia which is located in tropical region receives solar radiation every day, with the average irradiance per year of 1643 kWh/m^2 [2]. Typically, roof pitches in Malaysia are angled at 30 °or less, with wide area of roofs that allow PV panels to be arrayed effectively.By using the large roof area, solar irradiance can generate more solar electricity [15].This is a good potential for FELDA houses since a house in FELDA community has an average area of 100 m^2 (see Figure 3 and Figure 4) [16].



Figure 3. FELDA community; The first generation house [16].



Figure 4. FELDA community; The second generation house [16]

FELDA; known as The Federal Land Development Authority is the settlement areas that has been established by the Malaysian Government with the objective to establish the resettlement of rural poor into newly developed areas and to provide smallholder farms for growing crops, which basically is rubber trees and palm oil trees [16],[17]. Each FELDA settlement is supplied with electricity and water and community buildings (A mosque, a school, a public clinic and a public hall).
In Malaysia, 11 provinces of FELDA situated at Negeri Sembilan, Johor, Kelantan, Pahang, Perak, Terengganu, Kedah and Sabah (see Figure 5). The provinces has its own settlements. 317 FELDA settlements with almost 10,000 houses throughout Malaysia [16] (see Table 1), which indicates the community-based approach is considered significant to disseminate the solar technology and can be chosen as the key mechanism for public engagement for rural households in Malaysia.

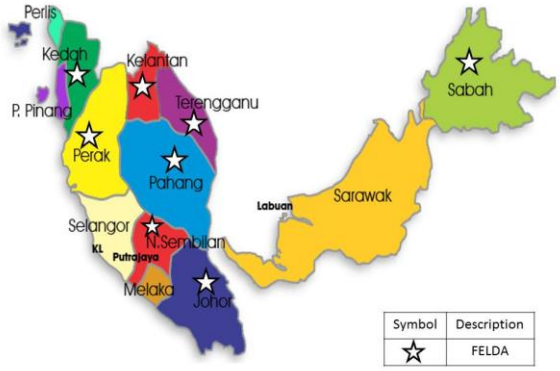


Figure 5. FELDA Malaysia

Table 1: Provinces and settlements of FELDA [16]

No	Province	No of Settlements
1	Johor Bahru	42
2	Segamat	36
3	AlorSetar	13
4	Jengka	37
5	Kuantan	42
6	Mempaga	36
7	Trolak	21
8	Raja Alias	49
9	Terengganu	21
10	GuaMusang	11
11	Sahabat	9
	Total	317

For this paper, certain generic criteria of houses have been considered based on typical common features of the roof shapes. Shadings are not an issue since typically the house yard is wide and trees are located far from the house. The electricity generated is based on the assumption that the roof is using a 2kWp PV panels. For economic purposes, only half of the roofs are covered with PV panels. Based on a simple calculation, the PV area of 50m^2 can provides about twice as much electricity as the household demand over 24 hours [17]. This is because, rural houses only used limited demand of electricity, e.g. for lighting, watching television and cooking purposes.

Considering that for each 2 kWP PV panels will produce a 10 kW solar production/daily (based on calculation from a typical solar energy calculator), the total solar production for a month is predicted at 300kW. Since the electricity consumption for FELDA houses will only be between 100-150 kW per month [17], there are 50% surpluses of solar energy production which can be used for Malaysia. This indicates that FELDA community has a large potential in implementing solar energy project.

The Calculation:
Average households electricity consumption/monthly
– 150 kW
Monthly solar production (from 2 kWp panel)
– 300 kW
Surplus of energy = 300 – 150 = 150 kW (50% surplus)
No. of FELDA Houses = 10,000 houses x 150 kW
= 1500000 kW
Therefore, 1500000 kW of electricity can be produced if all houses in FELDA are been installed with PV panels. This shows a huge potential on deploying a solar energy project for the community. This is a main reason why it is significant to have public engagement for the FELDA community in order to make the people aware and able to give full commitment.

5. Conclusion

Proactive attitude, effective promotion, good dissemination of information, informal or formal discussion and dialog from all the public and stakeholder needed to be produced in order to the benefit the solar energy industry and engaged the people with the technology. Without strategic steps, the engagement from the people is impossible and it is hard to disseminate this technology to the people.

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