

## **The Awareness and Perception of Solar Energy in Taman Air Manis, Sabak Bernam**

**Nuramanina Zahraa Abu Mansor<sup>1</sup>, Abdul Zaki Abdul  
Wahid<sup>1\*</sup>, Mariah Awang<sup>1</sup>**

<sup>1</sup>Fakulti Teknologi Kejuruteraan,  
Universiti Tun Hussein Onn Malaysia, Hab Pendidikan Tinggi Pagoh, 84600 Pagoh,  
Johor, MALAYSIA

\*Corresponding Author Designation

DOI: <https://doi.org/10.30880/peat.2023.04.01.095>

Received 15 January 2023; Accepted 12 February 2023; Available online 02 Month 2021

**Abstract:** In this era of globalization, the increase in the adoption of new technologies and new innovations that can bring the country forward from other countries. It is an advantage when the existing power source can be replaced using technology especially the power source used in everyday life. Among the examples of technology that we use more today is solar technology that is increasingly used in residential areas and large buildings around the world. Thus, in this study to analyse the public awareness regarding solar energy Taman Air Manis, Sabak Bernam, Selangor and to identify the public perception towards solar energy. The high cost is one of the factors in inhibiting the use of solar energy among the community especially in the low-income group. The questionnaire is made using a google form and distributed to the residents of Taman Air Manis, Sabak Bernam, Selangor. The analysis was done using the questionnaire form instrument to 247 respondents. The data was analysed using the Statistical Package for Social Sciences (SPSS) version 26. The status of Section C questions gets the status of "Agree" which is 3.57 where the respondent agrees with this survey question related to awareness of solar energy and Section D gets the status of "Neutral" which is 3.30, the majority of respondents neither agree nor disagree with the statement given in the questionnaire. Solar energy can bring more benefits to the public. Solar energy has the least negative impact on the environment of any other energy source and reduces greenhouse gas emissions. Government and experts in this field should conduct campaigns and advertisements on solar in rural areas. This is because they can understand the importance of using solar energy with a better understanding and introduce government programs or initiatives on solar energy to people.

**Keywords:** Solar Energy, Public, Awareness

## 1. Introduction

In this era of globalization, the increase in the adoption of new technologies and new innovations that can bring the country forward from other countries. Modern science and technology have greatly impacted society in many ways, altering not just our way of life but also how we make money. Solar photovoltaic (PV) technology is one of the newest and steadily emerging energy sources, along with other possibilities [1]. Particularly in rural and semi-urban communities, the rooftop solar PV panels have created potential for supplemental income generation through the sale of solar-generated electrical energy to a licensed utility business [1].

One of the problems of environmental pollution that occurs is the emission of greenhouse gases and cause climate change. The main contributors to climate change are the emissions of harmful gases like methane and greenhouse gases [2]. The use of solar can help reduce the significant carbon footprint and prevent the production of greenhouse gases that can affect human health as well as environmental pollution. Several serious diseases, including encephalitis and malaria, spread more quickly because of the increase in temperature [3]. The high cost is one of the factors in inhibiting the use of solar energy among the community especially in the low-income group. The cost of solar installation in a typical home can range from 3kW to 15kW, costing between RM18,900 and RM78,800 [4]. Malaysia is a good manufacturer of solar panels. When compared to 166 MW in 2014, the installed capacity of solar energy has climbed to 1493 MW in 2020, showing that the solar market has expanded greatly because of favorable government policies and activities at various end-user sectors [5].

This study was conducted at Taman Air Manis, Sabak Bernam to analyse the public awareness and public perception regarding solar energy. This study was carried out by making a google form and distributed to experts and residents in Taman Air Manis. The population size in Taman Air Manis is 685 people. Therefore, the sample size selected for the analysis of this study was a total of 247 respondents using sample size calculator by Raosoft. Therefore, this study is more likely to streamline the use of solar panels in the community so that people are exposed to solar use and the use of fossil fuels can be reduced little by little.

### 1.1 Literature Review

Solar energy is solar radiation that can generate heat, cause chemical reactions, and be converted into electricity for residential and commercial. The sun is a natural nuclear reactor that emits enough photon energy for our planet to generate enough solar energy to meet global energy demands. Because it receives daily power generating capacity in the form of solar energy, the potential of this solar energy is enormous [6]. Photovoltaic cells absorb the sun's energy and convert it to DC electricity, solar inverters convert DC electricity from your solar modules to AC electricity, which is used by most home appliances. Then, electricity flows through your home, powering electronic devices and excess electricity produced by solar panels is fed to the electric grid [7]. Solar panels' most well-known benefit is that they cut the cost of our electricity bills. We will end up buying less power from the grid if generate our own energy from the sun. This helps us to spend less money on energy, resulting in higher savings on power bills [8]. Solar energy systems, overall, are low maintenance. We only need to maintain them clean, which may be accomplished by cleaning them a few times a year. Most reputable solar panel manufacturers provide a warranty of 20 to 25 years [9].

Greenhouse gases are gases in the atmosphere that affect the energy balance of the earth and can create the greenhouse effect. Human actions like burning fossil fuels have increased the quantity of carbon dioxide (CO<sub>2</sub>), methane, and nitrous oxide in our atmosphere, causing a "greenhouse effect" that traps solar energy and raises the earth's temperature. Using solar energy to generate electricity instead of fossil fuels can significantly cut greenhouse gas emissions, particularly carbon dioxide (CO<sub>2</sub>). When fossil fuels are used, greenhouse gases are released, resulting in rising global temperatures and climate change [10]. Climate change has an impact on the air we breathe both indoors and outdoors. The release of

greenhouse gases is air pollution and results in high air temperatures. The health of people can be harmed by high air temperatures. Such circumstances aggravate cardiovascular illnesses and harm respiratory systems. Injury rates rise and some psychological illnesses appear as a result of thermal anomalies. A number of serious diseases, including encephalitis and malaria, spread more quickly as a result of the increase in temperature [3].

Size (kWp)	3	5	6	8	10	12	15
Published Price (RM)	18,900	30,500	36,800	44,100	48,300	57,800	78,800

\*We also cater for system size bigger than 15kW

**Figure 1: Price of solar panel installation in Malaysia**

Based on Figure 1, the cost of a solar panel installation is determined by the size of the installation, the quality of the solar panels, and the scheme or company that provides the solar panel service. The cost of solar installation in a typical home can range from 3kW to 15kW, costing between RM18,900 and RM78,800 [4]. In an effort to pave the way for a more sustainable and green future, the Malaysian government announced in 2018 that by 2025, renewable energy would account for 20% of the country's energy generation mix. Solar energy is one of the key renewable energy sources that the government is focusing on as part of its plan [11]. The Energy and Natural Resources Minister, via a press statement issued by KeTSA on December 29, 2020, introduced the new Net Energy Metering 3.0 programme (NEM 3.0) to provide more opportunities for electricity consumers to install solar PV systems on the roofs of their premises to save on their electricity bill, in response to an overwhelming response from the PV industry and to boost the use of solar energy [12]. Malaysia's Entry Tariff (FiT) System requires Distribution Licensees (DL) to acquire electricity generated from renewable sources (renewable energy) from Feed-in Approval Holders (FIAH) and determine the FiT rate. For a set period, DL will pay for renewable energy supplied to the electrical grid [13].

## 2. Methodology

The data collection method used is a quantitative method in which questionnaires are distributed using Google Forms to the population at the scope of the study to obtain the data. This study makes data collection through a quantitative approach.

### 3.1 Research design

The research design refers to the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring you will effectively address the research problem; it constitutes the blueprint for the collection, measurement, and analysis of data. Surveys are questionnaires (or a series of questions) that are administered to research participants who answer the questions themselves. Since the participants are providing the information, it is referred to as self-report data [14].

### 3.2 Study instruments

The study instrument used in this research is a set of questionnaires to obtain study data. This is because questionnaires are a simple and better way to obtain quantitative information. This method is seen as more efficient in obtaining the cooperation of the respondents in addition to being able to measure the characters present in the variables. The study instrument used in this study is a set of questionnaires that have four sections, namely Section A, Section B, Section C and Section D as found in Table 1 below.

**Table 1: Sections contained in the questionnaire**

Section A	Demographics or background of respondents
Section B	To identify knowledge of respondent regarding solar energy
Section C	To analyse the public awareness regarding solar energy.
Section D	To identify the public perception towards solar energy

### 3.3 Reliability of study instruments

A pilot study was conducted on 20 respondents from the scope of the study. This test estimates the reliability of the questionnaire answers, and the value of this reliability analysis is 0.876, which is greater than 0.7 as set out in Table 2 below. Thus, the reliability value of the questionnaire has an acceptable level of consistency and is continued for research.

**Table 2: Pilot study reliability analysis**

Reliability Statistics	
Cronbach Alpha	N of Items
0.876	50

## 3. Results and Discussion

In the implementation of the data analysis this study is using the quantitative method of nature. Statistical Program Package for Social Science (SPSS Window version 26.0) and Microsoft Excel is used to analyze and display in a simpler form i.e. a table showing percentage, frequency and mean Table 3 follows the results analyzed.

**Table 3: Respondent Demographics**

		Frequency	Percentage (%)
<b>Gender</b>	Male	98	48.8
	Female	103	51.2
<b>Age</b>	20-29	67	33.3
	30-39	51	25.4
	40-49	46	22.9
	50 and above	37	18.4
<b>Marital status</b>	Single	70	34.8
	Married	131	65.2
	Divorced	0	0
<b>Number of households</b>	1	48	23.9
	2 – 3	67	33.3
	4 – 6	71	35.3
	6 and above	15	7.5
<b>Occupation</b>	Government	47	23.4
	Private	63	31.3
	Freelance	91	45.3
<b>Household income</b>	Less than 2500	75	37.3
	2501 - 4850	68	33.8
	4851 - 10970	52	25.9
	10971 - 15040	5	2.5
	15041 and more	1	0.5
<b>Residence status</b>	Rental house	77	38.3
	Owner house	124	61.7
<b>Does your house use</b>	Yes	6	3.0

<b>solar energy</b>	No	195	97.0
---------------------	----	-----	------

According to Table 3, the most respondents are female (51.2%), those aged 20-29 years (33.3%), married families (65.2%), number of households 4 to 6 people (35.3%), freelance (45.3%), most of the population in around Taman Air Manis has an income of less than RM 2500(37.3%), have own home (61.7%), and did not use solar energy (97%).

**Table 4: To identify knowledge of respondents regarding solar energy**

		Frequency	Percentage (%)
<b>Have you heard about solar energy</b>	Yes	199	99.0
	No	2	1.0
<b>Have you seen solar energy panels</b>	Yes	193	96.0
	No	8	4.0
<b>Do you know about the concept of solar energy</b>	Yes	160	79.6
	No	41	20.4
<b>Do you have technical knowledge about solar energy like cost and capacity</b>	Yes	42	20.9
	No	159	79.1
<b>From where you gather information about solar energy</b>	Internet	194	96.5
	From dealers	18	9.0
	Advertisement	45	22.4
	From neighbors	10	5.0
<b>Do you know about any government scheme promoting solar energy systems such as Net Energy Metering 3.0 programme (NEM3.0)</b>	Yes	13	6.5
	No	132	65.7
	Maybe	56	27.9

Table 4 the most respondents have heard about solar energy (99%), have seen solar energy panels (96%), know about the concept of solar energy (79.6%), did not have technical knowledge about solar energy like cost and capacity (79.1%), internet is one of the source respondents gather information about solar energy (96.5%), and did not know about any government scheme promoting solar energy systems such as Net Energy Metering 3.0 programme (NEM3.0) (65.7%).

**Table 5: The awareness of the respondents regarding solar energy**

	Frequency Score (%)					Mean score	Value
	1	2	3	4	5		
<b>1. Are you interested in using solar energy in your house</b>	1 (0.5)	2 (1.0)	96 (47.8)	80 (39.8)	22 (10.9)	3.60	Agree
<b>2. Solar energy is a green technology</b>	2 (1.0)	2 (1.0)	72 (35.8)	91 (45.3)	34 (16.9)	3.76	Agree
<b>3. Solar energy can reduce global warming</b>	1 (0.5)	2 (1.0)	80 (39.8)	92 (45.8)	26 (12.9)	3.70	Agree
<b>4. Solar PV panel can generate electric current</b>	1 (0.5)	0 (0)	69 (34.3)	101 (50.2)	30 (14.9)	3.79	Agree
<b>5. Solar PV panels can reduce the cost of financing electricity</b>	1 (0.5)	2 (1.0)	128 (63.7)	42 (20.9)	28 (13.9)	3.47	Agree

<b>bills</b>								
<b>6. The use of solar PV panels does not give any bad health or side effect to humans.</b>	2 (1.0)	2 (1.0)	144 (71.6)	38 (18.9)	15 (7.5)	3.31	Neutral	
<b>7. Malaysia is suitable for the generation of electric energy from sunlight.</b>	1 (0.5)	1 (0.5)	138 (68.7)	37 (18.4)	24 (11.9)	3.41	Agree	
<b>8. I support the use of solar PV panels in residential areas</b>	1 (0.5)	1 (0.5)	78 (38.8)	92 (45.8)	29 (14.4)	3.73	Agree	
<b>9. I will encourage relatives and friends to install solar panels on their roofs</b>	1 (0.5)	1 (0.5)	132 (65.7)	45 (22.4)	22 (10.9)	3.43	Agree	
<b>10. I will educate children and families in the use of environmentally friendly technology</b>	3 (1.5)	0 (0)	127 (63.2)	43 (21.4)	28 (13.9)	3.48	Agree	
<b>Total average</b>						3.57	Agree	

The findings Table 5 from this study can be formulated that the overall status of the Section C question gets "Agree" which is 3.57 and proves that the majority of respondents agree with the statement given in the questionnaire. The total mean score obtained in Table 5 is 3.57 and is in the mean score range in the Likert scale of 3.41-4.20. So, this suggests that the respondent agrees with the statement of the questionnaire in Section C above. It is also possible to know that the respondent is aware of solar energy.

**Table 6: Summary of public awareness analysis of solar energy**

	Mean Score	Value
Solar PV panel can generate electric current	3.79	Agree
The use of solar PV panels does not give any bad health or side effect to humans	3.31	Neutral

Based on Table 6, the highest mean score 3.79 which is solar PV panel can generate electric current, and the lowest mean score 3.31 which is the use of solar PV panels does not give any bad health or side effect to humans.

**Table 7: The perception of consumers towards solar energy**

	Frequency Score (%)					Mean score	Value
	1	2	3	4	5		
<b>1. Solar energy helps in the fight against climate change and the greenhouse effect</b>	1 (0.5)	1 (0.5)	115 (57.2)	62 (30.8)	21 (10.4)	3.50	Agree
<b>2. Solar energy can save home electricity</b>	1 (0.5)	1 (0.5)	129 (64.2)	38 (18.9)	32 (15.9)	3.49	Agree
<b>3. Solar energy requires high capital costs</b>	1 (0.5)	9 (4.5)	34 (16.9)	131 (65.2)	25 (12.4)	3.84	Agree
<b>4. Solar energy requires maintenance</b>	1 (0.5)	4 (2.0)	146 (72.6)	35 (17.4)	15 (7.5)	3.29	Neutral

5. The roof of the house does not have enough space for solar panel	5 (2.5)	25 (12.4)	137 (68.2)	26 (12.9)	8 (4.0)	3.03	Neutral
6. Not getting enough sunlight to use solar energy	5 (2.5)	14 (7.0)	148 (73.6)	31 (15.4)	3 (1.5)	3.06	Neutral
7. Solar energy cannot operate at night because there is no sun	6 (3.0)	11 (5.5)	118 (58.7)	54 (26.9)	12 (6.0)	3.27	Neutral
8. Solar products are easily available in the market	3 (1.5)	6 (3.0)	156 (77.6)	28 (13.9)	8 (4.0)	3.16	Neutral
9. I am lack of necessary information on solar energy	5 (2.5)	4 (2.0)	152 (75.6)	33 (16.4)	7 (3.5)	3.16	Neutral
10. Through solar energy, I can generate my own electricity and sell the surplus to TNB	2 (1.0)	8 (4.0)	150 (74.6)	23 (11.4)	18 (9.0)	3.23	Neutral
11. I am prefer to use solar energy over fossil fuels (coal, oil, natural gas) in generating electricity	1 (0.5)	6 (3.0)	147 (73.1)	31 (15.4)	16 (8.0)	3.27	Neutral
<b>Total average</b>						<b>3.30</b>	<b>Neutral</b>

The findings from Table 7 this study can be formulated that the overall status of the Section D question gets "Neutral" which is 3.30 and proves that the majority of respondents neither agree nor disagree with the statement given in the questionnaire. The total mean score obtained in Table 7 is 3.30 and is in the mean score range in the Likert scale of 2.61 – 3.40. So, this suggests that the respondent neither objects nor agree with the statement of the questionnaire in Section D above. It is also possible to identify the respondent's perception towards solar energy.

**Table 8: Summary of public perception analysis of solar energy**

	<b>Mean Score</b>	<b>Value</b>
Solar energy requires high capital costs	3.84	Agree
The roof of the house does not have enough space for solar panel	3.03	Neutral

Based on Table 8, the highest mean score 3.84 which is solar energy requires high capital costs, and the lowest mean score 3.03 which is the roof of the house does not have enough space for solar panel

#### 4. Conclusion

Overall, this study was conducted to analyse the public's awareness of solar energy and identify the public's perception of solar energy in residential buildings. Based on data collection through questionnaires, data analysis, this study has answered the research questions and fulfilled the objectives of this research. The status of Section C questions gets the status of "Agree" which is 3.57 and Section D gets the status of "Neutral" which is 3.30 where the respondent agrees with this survey question related to awareness of solar energy while most respondents neither agree nor disagree with the statement given in the questionnaire. The recommendations that have been identified earlier are expected to help future studies. The analysis of the data showed that the population agreed and aware of solar energy. Respondents also were satisfied with the perception of solar energy that asked in the questionnaire.

## Acknowledgement

The authors would like to thank the Faculty of Engineering Technology, Universiti Tun Hussein Onn Malaysia for its support.

## References

- [1] [1] Malik, S. A., & Ayop, A. R. (2020). Solar energy technology: Knowledge, awareness, and acceptance of B40 households in one district of Malaysia towards government initiatives. *Technology in Society*, 63, 101416. <https://doi.org/10.1016/j.techsoc.2020.101416>
- [2] Ravi, J., Qing, Y. X., Sahil, M., Fadhline, N. A., Yi Ying, N. C., Handayani, D., & Mantoro, T. (2020). Identification of Greenhouse Gases Emission Thorough Exploration of The Emission from Different Sectors. 2020 6th International Conference on Computing Engineering and Design (ICCED). <https://doi.org/10.1109/icced51276.2020.9415811>
- [3] Mikhaylov, A., Moiseev, N., Aleshin, K., & Burkhardt, T. (2020). Global climate change and greenhouse effect. *Entrepreneurship and Sustainability Issues*, 7(4), 2897–2913. [https://doi.org/10.9770/jesi.2020.7.4\(21](https://doi.org/10.9770/jesi.2020.7.4(21)
- [4] GSPARX. (2020). Residential Package. <https://www.gsparx.com.my/residential-package.html>
- [5] Soonmin, H., & Taghavi, M. (2022). Solar Energy Development: Study Cases in Iran and Malaysia. *International Journal of Engineering Trends and Technology*, 70(8), 408–422. <https://doi.org/10.14445/22315381/ijett-v70i8p242>
- [6] Turgeon, A., & Morse, E. (2022, July 28). Solar Energy | National Geographic Society. <https://education.nationalgeographic.org/resource/solar-energy/>
- [7] Richardson, L. (2022, November 29). What is the history of solar energy and when were solar panels invented? EnergySage Blog. <https://news.energysage.com/the-history-and-invention-of-solar-panel-technology>
- [8] Luke, L. (2022, August 26). 16 Advantages & 10 Disadvantages Of Solar Panels In 2022. Lightning Energy. <https://lightning-energy.com.au/comparative-guide-advantages-disadvantages-of-solar-panels/>
- [9] Vourvoulias, A. (2022, October 7). Advantages & Disadvantages of Solar Energy. GreenMatch. <https://www.greenmatch.co.uk/blog/2014/08/5-advantages-and-5-disadvantages-of-solar-energy>
- [10] Matasci, S. (2019, January 2). Health & Environmental Benefits of Solar Energy. EnergySage Blog. <https://news.energysage.com/health-environmental-benefits-of-solar-energy/>
- [11] Fozi, F. A. M. (2021, March 15). Legal Updates On The Solar Energy Industry In Malaysia. Renewables - Malaysia. <https://www.mondaq.com/renewables/1046920/legal-updates-on-the-solar-energy-industry-in-malaysia>
- [12] Razak, I. (2021, July 2). Net Energy Metering (NEM) 3.0: Lower your electricity bills with solar energy. <https://www.iproperty.com.my/guides/net-energy-metering-nem-3-0-in-malaysia-67227>
- [13] Sustainable Energy Development Authority (SEDA) Malaysia. (2019). FiT – Renewable Energy Malaysia. <https://www.seda.gov.my/reportal/fit/>
- [14] DeLecce, T. (2021, December 9). Survey Study: Definition & Design. <https://study.com/academy/lesson/survey-study-definition-design-quiz.html>