

Template for Evidence(s) UI GreenMetric Questionnaire

University : Universiti Malaysia Pahang
Country : Malaysia
Web Address : <http://www.ump.edu.my/> and <http://mygreen.ump.edu.my/>

[2] Energy and Climate Change (EC)

[2.5] Renewable Energy Sources in Campus

List of the Renewable Energy Sources in Campus year 2012 – 2022 (September)

No.	Building/Area	Type of Renewable Energy	Year Installed	Capacity, kW	kWh produce year 2021-2022
1	FTKMA & FTKEE	Solar system	2016	21kW	158,166 kWh
2	Solar KP House	Solar system	2018	5kW	5,400 kWh
3	Entrance Guard House	Wind power	2012	22kW	-
4	FKKSA	Biodiesel	2007	30 Litre Biodiesel per 50 Litre cooking oil	-
5	Walkaway (Canseleri to Kafe)	Solar System	2019	2.4kW- off grid	4,380 kWh
6.	Wakf Hut	Solar System	2021	2kW	3,650 kWh
7.	Sea-Lite	Combine heat and power	2022	0.02kW	175.2 kWh
8.	Pico Hydro	Hydro Power	2022	0.015kW	32.85 kWh
9.	FTKMA & FTKEE	Wind Power	2021	250W 250W 800W	9,490 kWh
10.	FTKEE	Solar System	2022	0.5kW	912.5kWh
11.	UMP PEKAN & GAMBANG	Solar Lighting	2017 - 2022	4kW	17,520kWh
				TOTAL	199,726 kWh

[1] SOLAR SYSTEM

LOCATION: FKM

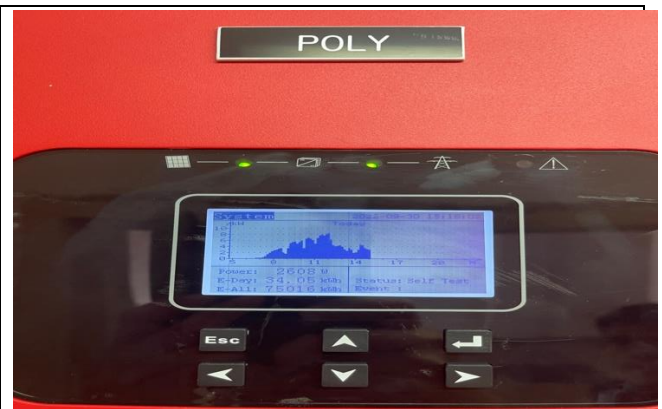
Solar power technology started been introduced in UMP since 2016. The pilot project was installing 20kW solar panels on the top of the walkway to supply electricity to the FTKMA administration blocks & 1kW at FTKEE. The project was the succeed project and the project is also for research purpose in UMP.



20kW Solar Panel installed on the walkaway roof at
FTKMA



1kW Solar Panel installed on the walkaway roof at
FTKEE



UMP Green Office in Maran, Pahang generate 5kWh solar power and its operations depends 100% on solar power.



KP House powered by 5kWh solar power. This house are UMP's Community One Stop Centre where local community get training and classes including religious and academic tutition from UMP staff and students

Walkaway Solar System (Canseleri to Kafe)

This solar system is installed with 8 solar panels (PV). 4 units of the solar PV on each side (A&B) connected in series with total voltage about 149V. The panels A&B connected in Series in the DC Box in solar feeder pillar with total around 300V and connected to the inverter



FTKEE Solar System (Weather / rain / irradiation data collector system)

this tool takes data and sends it directly to the server using iot technology, Solar is used as a continuous energy source 24/7.



Wafq Hut (20nos at UMP Pekan & UMP Gambang)

There are 20 wafqs huts inside UMP Pekan & UMP Gambang equipped with solar systems. This 100W solar produces electricity for lights, phone chargers and there is also a Power Delivery Charger, PD for labtop charging and other electronic devices range 5V - 12V. For phone charging there is 2 options of charging mechanism:

1. Using usb type cable
2. Wireless charging, UMP developed in house.



[2] WIND POWER



In 2012, a project to test sustainable energy was conducted in Malaysia under the purview of MOSTI and SIRIM Berhad. UMP Pekan Campus, due to its strategic location, was selected as one of the test-site for four wind turbines with the power of 2 kW, 4 kW, 5.8 kW and 10 kW. The campus which is situated near coastal area provides the windy condition which enables the turbine to convert the kinetic energy into electrical power efficiently. Total 22kWh. Link: <http://mygreen.ump.edu.my/index.php/iniciative1/93-ump-s-wind-turbine>



2 no of 250W wind turbines at FTKEE



800W wind turbine at FTKMA

In 2020 & 2021, UMP has diversified the study of wind turbines as renewable energy and as a backup supply for the data collection system. At FKM 800W Windturbine has been install and 500W at FTKEE.

[3] BIODIESEL



The Faculty of Chemical & Natural Resources has been producing biodiesel since 2007, based on years of research. On the average, for every two days the faculty collects 50 litres of used cooking oil, to produce 30 litres of pure biodiesel. In one month UMP is therefore capable of producing 450 litres, totaling to 5,400 litres in a year. Taking note that 1litre of biodiesel weighs 0.875kg, the total mass of biodiesel produced by UMP in a year is 4,725 kg. From the test conducted by the Central Lab we found that the calorific content of the biodiesel we produce is 34 MJ/kg. Hence, ideally we are able to generate 160,650 MJ ($= 34 \text{ MJ/kg} \times 4,725\text{kg}$) electricity in a year. Taking note that 3.6 MJ is equivalent to 1 kWh, we are thus able to generate 44,625 kWh ($= 160,650/3.6$) or 44.625 mWh in a year, ideally. Based on our tests, when we use a 10kW generator set to generate electricity fuelled by the biodiesel we produce, this gen-set consumes 2.6 litres of biodiesel for every hour of operation. Hence the 5,400 litres of biodiesel is capable of fuelling for 2,077 hours ($= 5,400/2.6$) which is equivalent to about 86.5 days. **Hence, the actual (useful) amount of electricity we generate is therefore 20,770 kWh ($= 10\text{kW} \times 2077 \text{ hours}$).** From the above test we could also calculate our gen-set thermal efficiency which is 46.5 % ($= 20,770 \text{ kW}/44,625 \text{ kW}$), which is quite normal for most gen-sets. No thermal system or engine in the world can operate at 100% efficiency.

[4] HYDROPOWER

Type : Picohydro

Location : Toilet in Pusat Pembangunan & Pengurusan Harta, UMP Pekan.

This project is the result of the efforts technical teams in this department for the purpose of energy sustainability programmes. Picohydro use as a backup supply for toilet lighting and there is a addition function for phone charging.



[5] COMBINE HEAT & POWER

Type : Sea Lite

Location : Entrance Guard House, UMP Pekan

Sea-Lite is a portable lamp that uses seawater as an electrolyte source. This device is called Sea-Lite referring to the sea that gives light (light or lite). It has a small design, easy to carry and maintain. This device is able to provide light and electricity and is able to last for a long time.

