

NUMBER OF RENEWABLE ENERGY SOURCES AND ITS CAPACITY (IN KILO WATT HOUR)

List of the Renewable Energy Sources in Campus year 2012 – 2021 (September)

No.	Building/Area	Type of Renewable Energy	Year Installed	Capacity, kW	kWh produce year 2022-2023	Total
1	FKKSA	Biodiesel	2007	30 Litre Biodiesel per 50 Litre cooking oil	10,150	10,150
2	Sea-Lite (Sea Water Electrolysis)	Hydro Power	2022	0.02kW	262.8	1,116.9
3	Pico Hydro	Hydro Power	2022	0.39kW	854.1	
4	UMP PEKAN & GAMBANG	Solar Lighting	2017 - 2022	4kW	17520	243,399.86
5	UMP GAMBANG	Solar Lighting	2023	100W, 12.8V, 60Ah	3363.84	
6	FTKMA & FTKEE	Solar system	2016	21kW	184396	
7	Solar KP House	Solar system	2018	5kW	5400	
8	Walkaway (Canseleri to Kafe)	Solar System	2019	2.4kW- off grid	4964	
9	Wakf Hut	Solar System	2021	2kW	4928	
10	FTKEE	Solar System	2022	1.5kW	2094.2	
11	FTKEE	Solar System	2019	2.5 kWp	6205	
12	FTKMA	Solar System	2016	1.5 kWp	2094.2	
13	Wakf Hut	Solar System	2023	1.05 kWp	686.78	
14	Electric Fencing	Solar System	2023	0.5 kWp	294.34	
15	Pusat Kompos	Solar System	2019	3.0 kWp	7446	
16	FTKKP	Solar System	2018	10.0 kWp	10150	
17	Entrance Guard House	Wind power	2012	22kW	-	9490
18	FTKMA & FTKEE	Wind Power	2021	250W	9490	
19	FTKMA & FTKEE	Wind Power	2021	250W		
20	FTKMA & FTKEE	Wind Power	2021	800W		
TOTAL					269,318.14	

[1] SOLAR SYSTEM

LOCATION: UMPSA, Pekan.

The UMPSA Renewable Energy Initiative has been in place since 2016. Various efforts have been and continue to be made to promote the growth of renewable energy in the community.

To react to the government's request to attain a carbon-free country by 2050, UMPSA has undertaken initiatives such as solar, wind turbines, mini hydro, pico hydro, biodiesel, and so on.

A 3.58MWp solar system is currently under construction and is scheduled to be finished on October 31, 2023. This installation was made at UMPSA, Pekan, with 75% of the campus's maximum demand electrical supply requirements installed.



FTKMA, UMPSA PEKAN



CTAR, UMPSA PEKAN



CTAR, UMPSA PEKAN

UMPSA PEKAN, 3.58 MWp Solar System



FTKEE, UMPSA PEKAN



LAKE A, UMPSA PEKAN



FTKPM, UMPSA PEKAN



PPPH, UMPSA PEKAN

LOCATION: FTKMA

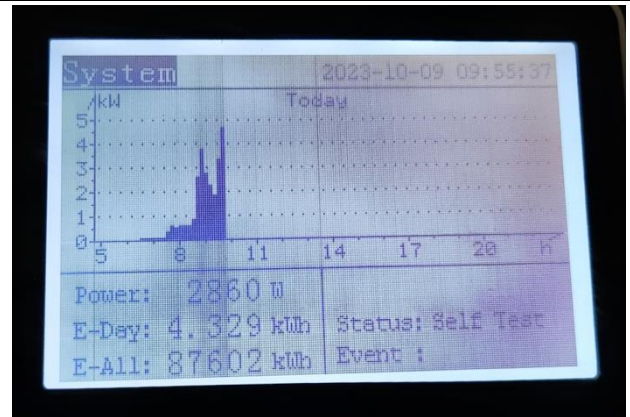
Solar power technology started been introduced in UMPSA since 2016. The pilot project was installing 20kW solar panels on the top of the walkway to supply electricity to the FTKMA administration blocks & 1kW at FTKEE. The project was the succeed project and the project is also for research purpose in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



20kW Solar Panel installed on the walkaway roof at FTKMA



1kW Solar Panel installed on the walkaway roof at FTKEE



UMPSA 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 UMPA's Community One Stop Centre where local community get training and classes including religious and academic tuton from UMPA 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 UMPSA Pekan & UMPSA Gambang)

There are 20 wafqs huts inside UMPSA Pekan & UMPSA 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.



Wafq Hut (7 units handicapped friendly UMPSA)

There are 7 waqfs huts inside UMPSA Pekan are handicapped friendly equipped with solar systems. This 100W solar produces electricity for lights and phone. For phone charging there is 2 options of charging mechanism:

1. Using usb type cable
2. Wireless charging.



[2] WIND POWER



In 2012, a project to test sustainable energy was conducted in Malaysia under the purview of MOSTI and SIRIM Berhad. UMPSA 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](http://mygreen.ump.edu.my/index.php/iniciative1/93-ump-s-wind-turbine)



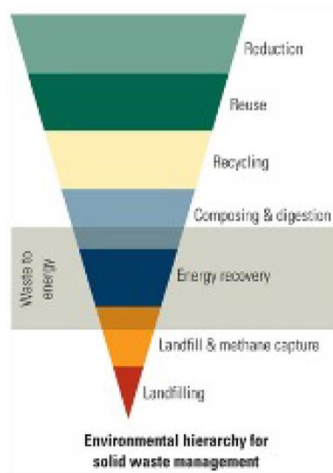
2 no of 250W wind turbines at FTKEE



800W wind turbine at FTKMA

In 2020 & 2021, UMPSA 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



Benefits & Novelty



*Assumption:

- 18.7 metric tonnes production per annum of fuel from waste.
- 8 hrs per day of 330 operating day

	Descriptions	Value
Cost	Capital cost (RM)	150,000.00
	Production cost RM/kg	1.00
	Production cost RM/year	18,744.00
Revenue	Selling price RM/L	2.50
	Gross profit RM/year	66,000.00
	Net profit RM/year	47,256.00
Payback period		3 years
ROI		32%

Waste to Fuel

The Faculty of Chemical & Natural Resources has been producing biodiesel since 2018, based on years of research. On the average, for every two days the faculty collects waste produce pure biodiesel. In one year UMPSA is therefore capable of producing 2,640 liters of fuel from waste. Taking note that 1litre of biodiesel weighs 0.875kg, the total mass of biodiesel produced by UMP in a year is 2,310 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 78,540 MJ (= 34 MJ/kg X 2,310 kg) electricity in a year. Taking note that 3.6 MJ is equivalent to 1 kWh, we are thus able to generate 21,817 kWh (= 78,540 /3.6) or 21.817 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 2,640 litres of biodiesel is capable of fuelling for 1,015 hours (=1,015/2.6) which is equivalent to about 86.5 days. **Hence, the actual (useful) amount of electricity we generate is therefore 10,150 kWh (= 10kW X 1015 hours).** From the above test we could also calculate our gen-set thermal efficiency which is 46.5 % (=10,150 kW/21,817 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, UMPSA 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, UMPSA Pekan

The product have been presented the Malaysia Royal Highness in 2023. 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.

