Cal Poly Pomona Solar

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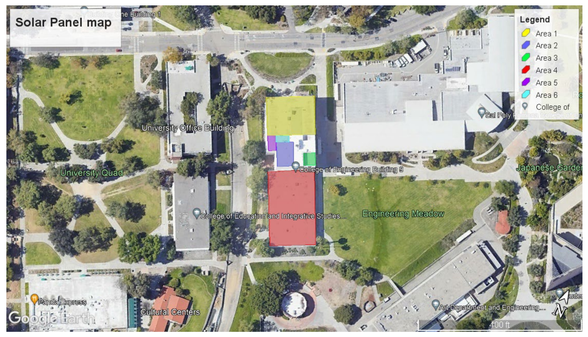
Background

In order to mitigate the damage to the environment, it is in the best interest of the school to use electricity generated from renewable resources.

One possible method would be to install solar panels to the roofs of campus buildings and use solar energy to power the building.

This study is to determine if solar panels were to be installed on the roof of building 9 in Cal Poly Pomona, would it be able to power the building.

Trina Model Number	**TSM-380DE14A(II)**
STC Rating	380.0 Watts
PTC Rating	353.6
Open Circuit Voltage (Voc)	48.8 Volts
Short Circuit Current (Isc)	9.94 Amps
Frame Color	Silver Anodized Aluminum Alloy
Origin	China
Power Tolerance	-0 / +5W
Module Efficiency	19.5%
Area	14.53 ft²
Weight	49.6 lbs.
Length	77.2 in.
Width	39.1 in.
Height	1.57 in.



Area #	Area (m^2)	# of Panels	Area of composing the Solar Panels (m^2)
1	996	697	940.87
2	219	153	206.53
3	76.5	48	64.79
4	1,854	1372	1852.04
5	67	45	60.74
6	44.7	28	37.80
Sum	3257.2	2343	3162.77

Constraints

The Solar Panels must use only the roof of the building they are powering.

They must at least meet 30% of the buildings overall demand. This includes variances in sun hours as a result of the changing of the seasons.

Results

average	results
Size of Solar Panel (m^2)	3162.77464
Multiplied by 1,000	3162774.64
efficiency of the panel (percentage as decimal)	0.195
Sun Hours (per Day)	5.62
Solar Panel Output Per day (kWh)	3466.08473
Solar Panel Output Per Month (kWh)	103982.542
Power Consumption Per day (KWh)	5958314.54
Average efficiency of Panel (Dec)	0.2
High Efficiency	0.4
% of power offset	0.05817%

summer	results
Size of Solar Panel (m^2)	3162.77464
Multiplied by 1,000	3162774.64
efficiency of the panel (percentage as decimal)	0.195
Sun Hours (per Day)	6.14
Solar Panel Output Per day (kWh)	3786.79008
Solar Panel Output Per Month (kWh)	113603.702
Power Consumption Per day (KWh)	5958314.54
Average efficiency of Panel (Dec)	0.2
High Efficiency	0.4
% of power offset	0.06355%

winter	results
Size of Solar Panel (m^2)	3162.77464
Multiplied by 1,000	3162774.64
efficiency of the panel (percentage as decimal)	0.195
Sun Hours (per Day)	5.03
Solar Panel Output Per day (kWh)	3102.20751
Solar Panel Output Per Month (kWh)	93066.2253
Power Consumption Per day (KWh)	5958314.54
Average efficiency of Panel (Dec)	0.2
High Efficiency	0.4
% of power offset	0.05207%

Analysis

The Solar Panels were unable to meet the demand of the building.

Less than 1% of the total demand of the building was met. It would take years for the panels to make any return.

The power that the solar panels provide at any time of the year, is a small fraction of the demand.

Adjustments

There are three possible ways to solve this issue, increase the number of panels, increase the efficiency of solar panels, or decrease the demand for electricity.

Increasing the number of panels is not possible as there is no available roof space for more panels.

There is plenty of research being done to increase solar panel efficiency, but it is not in the best interest of Cal Poly Pomona to spend resources on this.

The easiest solution would be to lower the demand of electricity required by the building to function.

*Below are the theoretical Numbers needed to achieve 30% individually

Adjustments to achieve 30%	Number
# of Panels	4027694
efficiency	100%
Sun Hours	1412.91632

Conclusion

Until there is progress, when it comes to efficiency of solar panels or the demand for electricity in building nine decreases, attaching solar panels to the building would be pointless from an economical standpoint.

It would be more efficient to receive renewable energy from a larger source, such as a wind or solar farm, as they are designed to harvest more energy.