EE 446/646 Assignment # 3

Consider a PV array that consists of 12 AstroHalo 370 Wp PV modules. The electrical characteristics under STC and NOCT of this particular model are shown below. The array is to be placed on the roof portion of a building in Las Vegas, NV, that faces south and it is sloped at 22.5 degrees. Assume the array is free of any shading all year long. Use local TMY3 data to calculate the following:

1) Hourly cell operating temperature.
2) Hourly cell efficiency.
3) Hourly maximum electrical power production.
4) Monthly as well as yearly maximum electrical energy production

ELECTRICAL SPECIFICATIONS					
STC rated output (P_{mpp})*	350 Wp	355 Wp	360 Wp	365 Wp	370 Wp
Rated voltage (V_{mpp}) at STC	38.58 V	38.82 V	39.14 V	39.38 V	39.66 V
Rated current (I_{mpp}) at STC	9.08 A	9.15 A	9.20 A	9.27 A	9.34 A
Open circuit voltage (V_{oc}) at STC	47.01 V	47.31 V	47.62 V	47.82 V	48.13 V
Short circuit current (I_{sc}) at STC	9.53 A	9.60 A	9.66 A	9.75 A	9.82 A
Module efficiency	18.1%	18.4%	18.6%	18.9%	19.1%
Rated output (P_{mpp}) at NOCT	257.8 Wp	261.5 Wp	265.1 Wp	268.8 Wp	272.5 Wp
Rated voltage (V_{mpp}) at NOCT	35.58 V	35.81 V	36.13 V	36.36 V	36.58 V
Rated current (I_{mpp}) at NOCT	7.24 A	7.30 A	7.34 A	7.39 A	7.45 A
Open circuit voltage (V_{oc}) at NOCT	43.59 V	43.87 V	44.15 V	44.34 V	44.62 V
Short circuit current (I_{sc}) at NOCT	7.66 A	7.71 A	7.76 A	7.83 A	7.89 A
Temperature coefficient (P_{mpp})	- 0.376%/°C				
Temperature coefficient (I_{sc})	+0.043%/°C				
Temperature coefficient (V_{oc})	- 0.282%/°C				
Normal operating cell temperature (NOCT)	46±2°C				
Maximum system voltage (IEC/UL)	1000V_{DC} or 1500V_{DC}				
Number of diodes	3				
Junction box IP rating	IP 67				
Maximum series fuse rating	15 A				

Print only the 24-h data of your birthday.

Graph the monthly energy production (in KWh).