EE 446/646 Assignment # 5

(Take home Portion of Final Test – Worth 25%)

Following Assignment # 4, it was determined that the homeowner's yearly electric bill without PV when enrolling in a flat rate of \$0.122/kWh is \$1,582.

1) Recalculate the homeowner's yearly electric bill without PV when enrolling in a TOU rate as shown below. Then make a comparison.

It was also determined that the homeowner's yearly electric bill with PV when enrolling in a flat rate of \$0.122/kWh and a net-metering rate of \$0.09/kWh is \$670.

2) Recalculate the homeowner's yearly electric bill with PV when enrolling in a TOU rate as shown below. Then make a comparison.

While enrolled in TOU rates, the homeowner is considering installing a battery bank, and store the solar energy generated in the morning hours (prior to 14:00) when electricity rates are low (\$0.06/kWh) and utilizing this energy from 14:00 onward during the summer peak months (June-September).

- 3) Determine the new annual electricity bill. For simplicity, assume the battery's round-trip efficiency is 100% and its capacity is sufficiently large to store all the solar energy produced in the morning hours.
- 4) How many years will it take to recover the battery cost of \$2,000 which the homeowner paid in advance. Use a simple calculations by ignoring the discount rate and assuming the utility rates do not change.

Rate Type	Month	Time of Day	Cost(\$/kWh)
Net Metering	All year	All day	-\$0.09
Flat rate	All year	All day	\$0.122
ToU Summer-on-peak	June - Sept	14:00-19:00	\$0.44
ToU Summer-off-peak	June - Sept	20:00-13:00	\$0.06
ToU Rest-of -the-year.	Oct - May	All Day	\$0.05

 Table I: Local Electric Utility Electricity Rates for Single-Family Homes.