ECE 333 Green Electric Energy

Fall 2017
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Room 4052 ECEB

Homework 5

The solutions will be released on Friday, November 10, 2017

Quiz Date: Tuesday, November 14, 2017 during class

The quiz is based on the following material: Lecture 10, Lecture 11, Chapter 7 (Sections 7.8 and 7.9) and Appendix A from the textbook, and the problems in Homework 5.

Problem 1:

Better windows for a building adds $3/ft^2$ of window but saves $0.55/ft^2$ in the reduced heating, cooling and lighting costs with a discount rate of 12 %.

    a. What is the NPV of the better windows over a 30-year period with no escalation in the value of the annual savings?

    b. What is the IRR with no escalation rate?

    c. What is the NPV if the savings escalate at 7 % per year due to fueling savings?

    d. What is the IRR with the escalation rate?

Problem 2:

A 30 kW PV system on a building reduces the peak demand by 25 kW and reduces the annual electricity demand by 60,000 kWh/yr. The PV systems cost $135,000 to install, has no annual maintenance costs, and have an expected lifetime of 30 years. The utility rate structure charges $0.07/kWh$ and $9/kW$ per month on demand.

    a. What annual savings in utility bills will the PVs deliver?

    b. What is the IRR on the investment with no escalation in utility rate?

    c. What is the IRR on the investment if the annual savings on utility bills increases 6% per year?

Problem 3:

A small, 10-*kW* wind turbine that costs $15,000 has a capacity factor of 0.25. If it is paid for with a 6-%, 20-*year* loan and it is an equal payment cash flow set, what is the cost of the electricity generated if the wind turbine always works at 10-*kW*?

Problem 4:

7.10, 7.11 (skip parts c and d), and 7.13 from the textbook.