

**CPET 581 Smart Grid & Energy Management
Homework 11**

Assigned Date: Dec. 2, 2013, Due Friday Dec. 6, 2013, before 5 PM.

Hand-in requirement and Due Date:

- Submit the team's "Iterative System Design Report- VI", and prepare to make the team's presentation.

PART I. (Individual) Project Cost Budgeting and Decision Making

1. If we invest \$1,000 today at 10% for 2 years, what is the future value would worth. ([Ans: \$1,210])
2. If an investment yields \$1,000 a year from now, how much is it worth today if the cost of money is 10%? [Ans: \$909]
3. Consider a capital expenditure for project B: Initial investment \$20,000 for installing a new energy saving system, Expected cash inflows are
 - Energy Saving: Year 1: \$2,000, Year 2: \$4,000, Year 3: \$4,000, Year 4: \$10,000, Year 5: \$4,000
 - Discount rate is 8%
 - (a) Construct a table similar to Example 3
 - (b) Calculate the NPV
 - (c) Make your decision using NPV to see if the Project B should be funded
4. Use question 3 data for Life-cycle cost analysis, and assume there will be additional factor to be considered
 - Energy Saving (fixed as indicated): Year 1: \$2,000, Year 2: \$4,000, Year 3: \$4,000, Year 4: \$10,000, Year 5: \$4,000
 - Repair and maintenance cost: \$500 for the first year, with an escalation rate of 3%
 - (a) Construct a table similar to Example 5
 - (b) Find its net present value

(Team-based) EV & Plug-in EV Charging Station Development Project – Iteration System Design Report VII

- (A) Prepare a meeting minute for team meeting on Nov. 1; (a summary on discussion and follow-up items should be added)
- (B) Team member roles assignment: Greg – General Manager, Ryan – Co-General Manager of Marketing & Sales, Bob – Manager of System Hardware, Peter – Manager of System Software (Role unchanged)
- (C) Design a diagram that shows all major components of the conceptual new EV & Plug-In EV Charging station which should include the following subsystems (to be finalized with the refined inputs and design info from all team members)
 - a. Charging System Hardware system, with proper specification such as Charging Capacity (kWH), Voltage, Current, Level of Charging, etc
 - b. Power sources including, utility, power source, solar power rating, wind power, etc
 - c. Smart Grid Communication subsystem AMI, communication protocols, etc
 - d. User interface and service fee payment methods
 - e. Other features
- (D) Refine the team's Charging Station Selection and Recommendation and study with weighted voting from all four members and final decision (using the format as shown in CPET 575's lecture

on “Design Evaluation of Alternatives”),

http://www.etcslipfw.edu/~lin/CPET575_MangOfTech/2012F/Lectures/DesignEvaluationAlternatives-8-30-2012.pdf

- (E) Add team’s discussion and consideration of solar power subsystem design consideration with roof-top solar panel on the charging station’s parking space. (need official design and selection report - Bob)
- (F) Add team’s discussion and consideration on wind power (vertical axis wind turbine, box type) on the top of the Helmke library (need official design and selection report – Bob)
- (G) Investigate and elaborate the values added with texting to smartphone, and email charging completion message, and other green energy promotion messages (considering Google texting support, need official design selection report - Peter)
- (H) Revise the Ethernet and Embedded PC on the top of Charging station electronics, also the WiFi features. (need official design report – Peter)
- (I) Prepare an estimate overall cost of the system: subsystems or modules, construction costs, others (2nd draft)
- (J) Refine team project subtasks assignment (use either Microsoft Project or Excel Spreadsheet); each team member should also create a set of needed subtasks assignment, and give a status of the progress
- (K) Prepare a Report in PPT file for team discussion

References

- [1] Hope at last? California offers net metering compromise,
http://www.smartgridnews.com/artman/publish/Business_Policy_Regulation/Hope-at-last-California-offers-net-metering-compromise-6096.html/
 - a. California Assembly Bill (AB) 327
- [2] Has Austin Energy figured out a valid net metering solution? Aug. 28, 2013,
http://www.smartgridnews.com/artman/publish/Technologies_DG_Renewables/Has-Austin-Energy-figured-out-a-valid-net-metering-solution-5993.html
- [3] Smart Meters and Net Metering for PV Solar Customer, San Diego Gas & Electric,
<http://www.sdge.com/residential/about-smart-meters/smart-meters-and-net-metering>