

Problem Set 1b

CEEG 340–Introduction to Environmental Engineering
Instructor: Deborah Sills

August 23, 2017

Due Date

Monday 28 August, in class.

Learning Goals

1. Compare energy saving measures in terms of reduction of CO₂ emissions.
2. Describe the contribution of the main energy sectors to US emissions of CO₂.
3. Describe the goal, scope, and functional unit for a life cycle assessment (LCA) model.
4. Analyze results from LCA models.

Relevant Reading

Textbook, pp.11–17

Questions

1. Energy
 - (a) **(10 points)** Problem 1.6 on p. 33 of the textbook. But please look for information on eia.gov and epa.gov if you can't find relevant information on doe.gov.
 - (b) **(10 points)** Problem 1.7 on p. 33 of the textbook. Numerical answers: (b) 1320 lbs of CO₂ saved per year; 66 gal of gasoline equivalents saved per year. (c) 200 gal of gasoline saved per year; 4000 lbs of CO₂ saved per year. (d) 76 gal of gasoline saved per year; 1520 lbs of CO₂ saved per year.
 - (c) **10 pts** LCA is most appropriate for comparing multiple products or processes. You want to compare the life cycle environmental impacts of the following pairs of products. Choose a functional unit for the LCA models:
 - i. steak vs. tofu
 - ii. ethanol vs. conventional gasoline (assume that both are used to power automobiles)

- iii. electric powered vehicle vs. gasoline powered vehicle
- iv. plastic bag vs. paper bag
- v. construction project with or without incorporation of LEED certified standards
- vi. tequila vs. beer
- vii. electric-powered hand dryer vs. paper towels
- viii. aerobic vs. anaerobic wastewater treatment

(d) **10 pts** 1.10

(e) **5 pts** 1.11

(f) **5 pts** 1.12