

ENVIRONMENTAL STUDIES 74

Lighting

HOMEWORK #1

Name: _____

Key Definitions (from the lecture):

1) Why is improving lighting efficiency important in the context of overall building energy consumption?

2) What is a footcandle? How is it measured? Why is it important?

3) What is color rendering index (CRI)? Name one place where color rendering is important and another where it is not.

4) Describe two extreme examples of color temperature. How is this different than CRI?

5) Lighting energy consumption can be reduced in what three specific ways?

6) Using the equation presented in class, how much energy and power will be avoided if the following retrofit is completed:

Location: **Small Lobby**

Existing condition:

8 fixtures with 100 watt incandescent bulbs

10 hours per day, 6 days per week, 50 weeks per year.

Proposed Condition:

8 fixtures with 20 watt compact fluorescent lamps

10 hours per day, 6 days per week, 50 weeks per year.

Power reduced (kW)

Energy reduced per year (kWh)

7) What are the dollar savings in the above example? Use our PG&E A1 rate example of \$0.177/kWh.

Lighting

HOMEWORK #1 cont.

8) To understand better the type of information that is necessary to complete a lighting energy audit please answer the following questions and prepare for a brief (three minute) presentation to the class on February 10th. You may use a separate piece of paper or develop a simple spreadsheet if that helps you to communicate the information.

Find a room in your home or a business (e.g. office, store, restaurant) and determine the following.

1. Describe the setting.
2. Number of fixtures.
3. Lamps per fixture.
4. Watts per lamp.
5. Hours per year of operation.
6. Order of magnitude estimate of annual energy cost to operate this space (use the equation above or other estimating technique described in class – show work and list assumptions).
7. Condition of fixture (e.g. clean, dirty, old, discolored, etc.)
8. Your opinion of the effectiveness of the lamp/fixture combination
9. Describe some of the more subjective aspects of this fixture and the impact on the space (Glare, color, light level, etc.)
10. How are these lights controlled (Manually, or with local or central controls)?
11. How are these lights maintained and by whom?
12. Would you change the existing lighting system if you had a chance?
13. Anything else interesting about your selected site?