**Personal Energy Audit and Report**

Most of the principles set forth in this environmental science course are illustrated in all aspects of life’s activities, from the personal to the planetary level. One area of critical importance is energy consumption, particularly electrical energy consumption. The fuel of choice for electricity production in the United States is coal. About two-thirds of the SO2 emitted into the atmosphere is a result of burning coal in electrical power plants. The use of pollution control devices, or scrubbers, can effectively reduce the amount of SO2 emitted, but the majority of power plants in the US have not been equipped with scrubbers. About 80 percent of the incidence of acid rain in our atmosphere is attributed to these emissions.

Global warming is also impacted by the combustion of fossil fuels to produce electricity. About one-third of CO2 emissions are due to the production of electricity. Coal produces more CO2 per energy unit than either oil or natural gas due to its carbon content. Approximately 0.77 kg of CO2 is emitted per kilowatt-hour of energy produced. (This value will vary depending on the actual carbon content of the coal and the efficiency of the power plant.) There are no pollution control devices that can convert carbon dioxide into an environmentally harmless substance. The only way to reduce the CO2 emissions associated with the combustion of fossil fuels is to reduce consumption.

All of us have a stake in all levels of energy use and production, but it is certainly easier to assess our impact when examining personal energy habits and attitudes. In this assignment you will examine your personal energy habits with regard to electricity consumption and the impacts those habits have on the environment. Having a thorough understanding of your own system’s dynamics and connections will lead to an easy transition to understanding the energy dynamics at a broader level, for example, those of a regional or global system. Positive changes that can be made effectively at an individual level can be amplified at the national level.

Therefore, keep in mind the following ideas when evaluating your home as a small part of a larger shared energy system:

1. Areas where reduced consumption will result in monetary savings (for you).
2. Changes on both a personal level and a household level that will be reflected in an improvement to a larger, shared system (for example, reduced electricity consumption leading to reduced fuel consumption by the utilities, less air pollution, less peak electricity consumption, and so forth).

**Analysis of Electricity Consumption**

1. Reading and Recording Electricity Consumption:
* Read the electric meter at the same time every day for a 10-day period and record the values.
* Make daily notes on the patterns of electricity use in your household, particularly the use of large appliances.
* Note the usual settings for the air conditioner and water heater, the amount of cooking done, the type of lights used, the amount of laundry done, and so forth.
* Also, make notes on aspects of the weather that may affect heating or cooling. Weather notes should include cloud cover and high and low temperature readings for that day. Report local temperature readings and thermostat settings in degrees Celsius. An example data table is provided below:

Table 1: Meter Readings, Observations and Usage Notes for the period of \_\_\_**2/27 – 3/8**\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date | Meter Reading (kWh) | Daily Usage (kWh) | Weather Observations | Notable Appliance Usage |
| **2/27/13** | **63308** | **───────────** | **Cool, sunny, 59˚F** | **TV, refrigerator, computer** |
| **2/28/13** | **63333** | **25** | **Cool, sunny, 50˚F** | **TV, refrigerator, computer, washing machine** |
| **3/1/13** | **63372** | **39** | **Cool, sunny, 49˚F** | **TV, refrigerator, computer, washing machine** |
| **3/2/13** | **63412** | **40** | **Cool, sunny, 48˚F** | **TV, refrigerator, computer, washing machine** |
| **3/3/13** | **63452** | **40** | **Cool, sunny, 46˚F** | **TV, refrigerator, computer, washing machine** |
| **3/4/13** | **63496** | **44** | **Cool, sunny, 50˚F** | **TV, refrigerator, computer, washing machine** |
| **3/5/13** | **63535** | **39** | **Cool, sunny, rain, 50˚F** | **TV, refrigerator, computer, washing machine** |
| **3/6/13** | **63571** | **36** | **Cool, sunny, rain, 46˚F** | **TV, refrigerator, computer, washing machine** |
| **3/7/13** | **63594** | **23** | **Cool, sunny, 51˚F** | **TV, refrigerator** |
| **3/8/13** | **63621** | **27** | **Cool, sunny, 55˚F** | **TV, refrigerator** |
| Average Daily Usage | **31.3** |

1. Calculating Monthly Energy Consumption:
2. Obtain a copy of your electricity bill. Calculate the average daily cost for electricity in your house.

**241.81 / 29 = 8.34**

**Average Daily cost = $8.34**

1. After calculating the daily electricity usage (in Table 1), average out the cost per kWh. If it is indicated on your electricity bill, how does your estimate compare?

**Estimate: 8.34 / 31.3 = $0.27**

**Actual: $1.04**

**My estimate is way lower than the actual cost indicted on the electricity bill.**

1. Table 2: The Cost of Electricity

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Total Amount of Power Bill | Days of Power Bill | Average cost per day | Average usage per day (from table 1) | Average cost per kWh |
| **$241.81** | **29** | **$8.34** | **31.3** | **$0.27** |

1. In order to determine the amount of CO2 released by your electricity consumption each month, multiply the number of kilowatt-hours used per month by the kilograms of CO2 produced per kWh (see table 3 below). If a coal-burning power plant is the main source for your electricity, the amount of SO2 emitted per month can be approximated by multiplying the number of kilowatt-hours used per month by kilograms of SO2/kWh. Consult your local power utility to determine the fuel mix used to generate electricity in your area. (If coal or oil is used, determine the amount of SO2 produced.)

Table 3: Carbon Dioxide and Sulfur Dioxide Emissions, by Source, for generating electricity



 **233 • 0.47= 109.51**

 **Amount of CO2 released: 109.51 kg/kWh**

 **Amount of SO2 released: 0 kg/kWh**

1. Compare a utility bill from a summer month with one for March or April. Estimate what amount of the summertime bill is due to air-conditioner use.

**The utility bill from the summer compared with the one from March is considerably higher. The bill from the summer was a little over a hundred dollars more, which is most likely due to the air-conditioner running.**

1. Inspect and report on the following for your home:
	1. The amount, location and quality (type and R-value) of insulation

**There is about 3-4 inches of insulation and it is a loose and blow-in type that is located in the walls, floor, and attic. The R-value for the entire house is about R38.**

* 1. The amount of shade provided by trees or shrubs

**There is little to no shade provide by trees and shrubs, except for the two trees located in the front of the house.**

* 1. The condition, composition, and color of the roof

**The roof is in good condition, there are no pieces falling off or missing, and the roof is a dark blackish-brown. It is a cross hipped roof with a protruding layer at the top of the house, where there are vents to let air in and out.**

* 1. The air circulation in the attic

**The air circulation in the attic is good. There are vents in the sealing to let air exchange in and out.**

* 1. The tightness of the fit for doors and windows

**The doors and windows are pretty snug. There is a rubber lining on the edges of the doors and windows, and also the window seal and doorway to keep air in or out.**

* 1. The color of outer walls (does it absorb or reflect heat?)

**The color of the outer walls of the house is light tan, so since it is a light color, the walls reflect heat.**

* 1. Any other features that may affect the dwelling’s heat balance

**The house has a large number of widows that are pretty big in size, which allow for more heat or sunlight to come in.**



**The Report**

1. Data and Descriptions
2. Table 1
3. Table 2
4. CO2 and SO2 emissions for your home
5. Description of your dwelling and a picture
6. Discussion

In this section, analyze what you have learned through this project and make some detailed suggestions about how you and the members of your household can conserve energy by changing patterns of consumption. Examine the economics of these changes and their possible impact on the emission of pollutants from power plants. Some well-intended changes may carry an economic disadvantage (that is, they may not be cost effective at this time), In these cases, suggest what steps could be used to remedy this situation. Supplement the discussion with drawings, graphs, or charts, as appropriate. The focus of this discussion should be on your home.

**From this audit, I learned that the appliances I run in my house are not efficient and increase my monthly energy usage. I also learned that the weather plays a major role in the amount of energy my house uses. The energy audit also taught me that not only does the appliances I use play a role in my energy usage, so does the way my house is built. I believe that my family members and I could reduce our energy usage and keep it low, if we use curtains to cover our large windows during the summer months to reduce heat from coming in, paint our house a medium color so that it absorbs some heat but not a large amount, and use energy efficient appliances to reduce our energy use. All of these changes would help reduce the energy we use, the money we spend on energy, and also the amount of carbon dioxide we emit. These changes would help a great bit and do not have any major effects on the environment but they are expensive and in order for my family to make them, we would have to do them overtime to spread out the cost. If we do make these changes, we could potentially receive incentives from our energy provider because in recent reports, energy companies our starting to give their customers incentives for saving energy. These incentives help people to be more energy friendly and promote saving energy, which could help lower the amount of energy we use across the U.S.**

**Jackson, Tarryl. "Consumers Energy awarded $17.4 million in energy-efficiency incentives to business customers in 2012." *Michigan Live*. Michigan Live LLC, 11 Mar. 2013. Web. 11 Mar. 2013. <http://www.mlive.com/business/index.ssf/2013/03/consumers\_energy\_awarded\_174\_m.html>.**