Light Bulb Exchange Program

The Problem:

Electric usage at the College has nearly doubled since the 1990-1991 academic year. This growth trend can be expected to continue as long as the student population and their demand for electronic devices continue to increase.

The electricity used by the College carries with it both economic and environmental consequences. The economic price is easy to calculate - about .08 per kWh. At our current level of usage (approximately 15.5 million kWh), that is about $1.2 million per year.

The environmental cost of our electric use is harder to determine, but it equally as important. Currently the New England power grid relies heavily on dirty and dangerous sources of electricity such as coal, oil, and nuclear power. These sources of electricity have a negative impact on the health of all members of the campus community and to the natural environmental around us.

Therefore, by reducing our electric usage we will reduce the amount of damage that we are doing to the world around us, and ultimately to ourselves. We can also save significant amounts of money in the process, which can then be re-allocated for other purposes.

The Solution:

Electricity consumption is a large and complex problem. The good news is that this means that there are many different opportunities for creative solutions.

There are two primary strategies that we can pursue to reduce electric use. The first is to educate the members of the campus community about the impacts of electric use in an effort to change their attitudes and behaviors. This is often the more difficult and time consuming option, especially in an institution with a highly transient population such as Connecticut College. However, if a campus culture of conservation can be established and maintained, this is ultimately the most effective strategy because it leads to other innovative solutions to any given problem.

The second strategy is to increase the efficiency of the electric systems on campus. This can be done in many ways. Some examples include upgrading old equipment to more efficient models (purchasing Energy Star office products), using technology to turn off devices when they are not needed (installing motion sensors on the lights), improving access to usage controls (putting thermostats in the rooms so that students won't open their windows and let heat escape), or simply by eliminating excessive electric devices (removing the planter lights in front of Olin, which serve no practical purpose).

The Light Bulb Exchange Program:

The light bulb exchange program is an attempt to educate the campus community about electric use while at the same time replacing an old device with a newer, more efficient one.

This program also has several other benefits. It is economically self sustaining on two levels. First, it produces energy savings that pay for the program's initial investment in 1-2 years. Secondly, it takes an item that would normally be considered a waste product and transforms it into a valuable commodity whose revenue stream can be used to purchase more CFLs and to continue the program. This program also has the added benefit of diverting a potentially hazardous item from the waste stream (incandescent bulbs contain lead) and of providing students with a fun and creative activity that they can participate in.

The program is a simple three phase cycle. Once the program is started, all three phases can be performed simultaneously. Here is how it works:

Step 1: Use money to purchase CFLs
Step 2: Trade CFL's for incandescent bulbs
Step 3: Decorate the incandescent bulbs and sell them for money

*Step 4: Return to Step 1 and repeat the cycle

Program History:

The program began when the Environmental Coordinator discovered an EPA Energy Star promotion at Wal-Mart. High efficiency 14 Watt (W) compact fluorescent bulbs (CFLs) that were made to replace 60 W standard incandescent bulbs were on sale for $0.94 per bulb ($1 per bulb after taxes). The Arboretum agreed to make a $100 donation to purchase 100 CFLs.

After the bulbs were purchased, the Environmental Coordinator worked with the Renewable Energy Club (REC) to establish the light bulb exchange program. The REC took on the role of educating the campus about CFLs and making students aware that they could exchange a used incandescent bulb for a new CFL. There was no limit on how many bulbs could be exchanged, and several conscientious and motivated students really capitalized on the opportunity.

Once the old incandescent light bulbs began to accumulate, the REC had several meeting where they decorated the old light bulbs. A mother of one of the REC members donated decorating materials such as paint and pipe cleaners and helped the students brainstorm decorating ideas. Their creativity was very impressive. Several students made Christmas ornaments out of their bulbs. Others made decorative figures such as cowboys or bumblebees. There were even discussions of how the light bulbs could be made into an hourglass or a vase to hold flowers.

Once the light bulbs were all decorated, they were sold for $1 as pieces of recycled art. This money was then used to purchase more CFLs, and the cycle began all over again.

The Financials:

As mentioned above, not only is the program economically self-sustaining, but it is also very likely to pay for itself in less than 1 year. Here's how the energy consumption numbers work out:

1) A normal incandescent light bulb uses 60 W (or .060 kW). The CFLs they were replaced with use 14 W (or .046 kW). The difference in electric use between the bulbs can be found by subtracting the usage rate of the CFL from the usage rate of the incandescent bulb:

$$.060 \text{ kW} - .014 \text{ W} = .046 \text{ kW}$$

2) With this information we can find out how much more it costs per hour to run the incandescent than the CFL. Assuming that price of electricity is $.08 per kWh:

$$(.046 \text{ kW}) \text{ X } (\$.08 \text{ per kWh}) = \$.00368 \text{ per hour}$$

3) We can then calculate how many hours of operation it will take for the CFL to pay for itself with saved electric cost:

$$(\$1.00) / (\$.00368) \text{ per hour} = 271.7 \text{ hours}$$

4) Students spend approximately 200 days living on campus during an average academic year. We can now calculate approximately how many hours per day the bulb would have to be in use for it to save enough energy to pay for itself.

$$(271.7 \text{ hours}) / (200 \text{ days}) = 1.36 \text{ hours per day}$$

I believe it to be a fair assumption that students will use the light in their room an average of 1.36 hours per day. In this scenario, the CFL will pay for itself in saved electric costs in one year.

Possible Pitfalls:

There are two minor pitfalls that should be avoided to keep the program running smoothly. First, the price of CFLs is important. So far we have been able to find good quality, low cost CFLs at Walmart and at the Dollar Store in Waterford (in the Stop & Shop Plaza). If we are not able to continue to find good bulbs at low prices, this could be problematic. In order to continue the program, we will have to either raise the price of the recycled bulb art (which may not be possible) or we will have to find outside financial support.

Second, we must continue to create decent quality light bulb art without incurring a high costs for materials. The ability of the program to function as it does now is based on the

assumption that you can continue to sell light bulb art for more money than it takes to create it. If this is no longer true either because the product is poor or because materials become expensive, the program will once again be forced to raise the price of the art or to seek alternative funding methods.

Opportunities for the Future:

This program has many opportunities to grow, evolve and expand. Here are a few:

Funding:

1) The program could apply for additional funding from the newly created Energy Conservation and Efficiency Fund.
2) The College could donate its expired incandescent bulbs to the project. This could either provide additional revenue by providing materials for more art, or could be used to lower the price of recycle art to make it more attractive.

Decorating:

3) The Art Department here at the College could be contacted about integrating a light bulb art project into the curriculum.
4) Light bulb decorating could be an activity that is in the OVCS Big Sisters program.
5) Light bulb decorating could become a part of the children's activities at Earth Day.