

Christians and Creation

Energy Efficiency Upgrades at St. Luke's (Part 2)

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April 2008

The environmental problems that traditional fuels have on ecosystems are extremely worrisome. As a biologist I am concerned with these issues and hope that we might begin to change the way we relate to the environment.

Previously I discussed the efforts to reduce our footprint at St. Luke's in respect to the gas fired space heating systems (20-30% reduction). This time I will discuss our electrical use, which is less energy intensive than space heating but still considerable.

Fluorescent lighting accounts for about 50% of our total electrical use in the Church Hall. Starting around 2001, we replaced our emergency exit signs with extremely efficient LED bulbs. These have a payback of less than one year and should be replaced immediately and instead of waiting till burn out (2200 kWh and \$160/yr savings).

By 2003 we had halved our electrical use in the Hall (Figure 1). This was largely due to 1) the LED exit lights, 2) taking more care in turning off lights, 3) replacing old appliances such as photocopiers and computers, and 4) replacing most of the T12 fluorescent tubes with newer lower wattage T12 tubes (34W instead of 40W). In 2005 we installed compact fluorescent bulbs in the bathrooms with only a small effect on our total energy consumption.

All of our existing 4-foot fluorescent lights are T12 lights (1.5" diameter). These lights are old technology and currently more efficient T8s (1-inch diameter) are standard. We have 39 two lamp, and 10 four lamp fixtures that will be retrofitted with T8s tubes and ballasts. This does not require the replacement of the fixtures themselves, only the ballast and bulbs.

The new tubes are 30W and replace the old 40W bulbs without noticeable loss in light. The new ballasts are electronic instead of magnetic; which means they do not hum or cause light flickering. The new T8 bulbs have better color rendering with a wide range of color options. For these reasons alone, the replacement of older ballast and bulbs is very attractive for offices and workspaces. There are reasonable financial paybacks for this type of retrofit especially for lights that remain on 24/7.

BC Hydro will do a free electrical use audit. They advise on the upgrade cost, Hydro rebates available, energy saved, and payback period.

In our case, as T8s last longer, the savings are \$370 on electrical and maintenance costs per year for payback of 3 years. The retrofit, after the payback period, yields a 17% annual rate of return assuming energy costs do not rise (30% return for energy plus maintenance).

The Church is mainly used on Sundays and for a few nights every week. Despite this, its electrical needs are similar to the Hall. This is because we heat two small rooms in the Church with electricity. The Church has undergone upgrades for insulation and gap sealing since 2004, and this has helped to reduce our electrical space heating in the two small rooms. Comparing year 2000 to 2007 use, when annual temperatures outside were approximately the same, we find that Church total electrical use is down 20% (Figure 1).

We are considering replacing about half of the 200 W incandescent bulbs in the main part of the Church with compact fluorescent lights (CFLs). These CFLs use only 85 W each, saving 115 W per bulb, plus giving an increase in light levels. The payback period for this is 9 years, but would be much shorter if the lights were used more. The total energy savings for replacing half of the incandescent bulbs with CFLs are 975 kilowatt hours (kWh) per year, or about 5% of our electrical use in the Church.

Our churches use a large amount of resources. Fortunately, we can reduce our impact and obtain a financial payback at the same time. The larger concerns about the environment are actually even more important. The road to more efficient and sustainable energy systems is vital. Most people are not aware of the return on investment that energy efficiency yields once the payback period has been reached. As pointed out in my first article, fairly large differences can be made with small amounts of initial capital outlay plus a time commitment and some basic knowledge. We hope that this work encourages others to do the same.

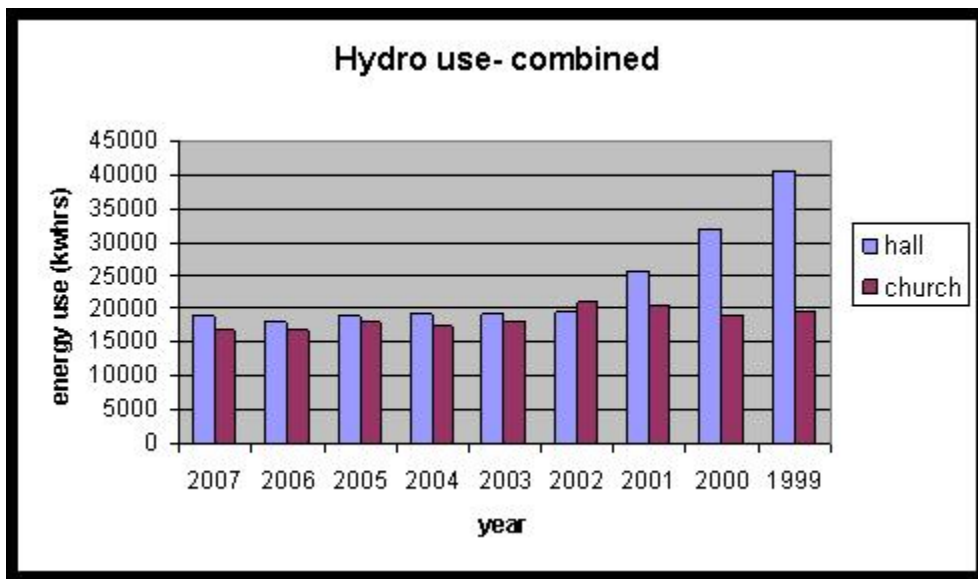


Figure 1. Electrical use in the Church Hall and Church