Practical Applications in Renewable Energy

Pedersen Apiaries

Saskatchewan econetwork

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Special Thanks To:

Glen Brebner
North Saskatchewan River Environmental Society,
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The Problem: In 2008 the farm had a leaking, exterior coal furnace that needed to be replaced. We had 9,300 sq. ft. to heat in 3 buildings. The honey-house required significant heat in the summer as well.

The Options

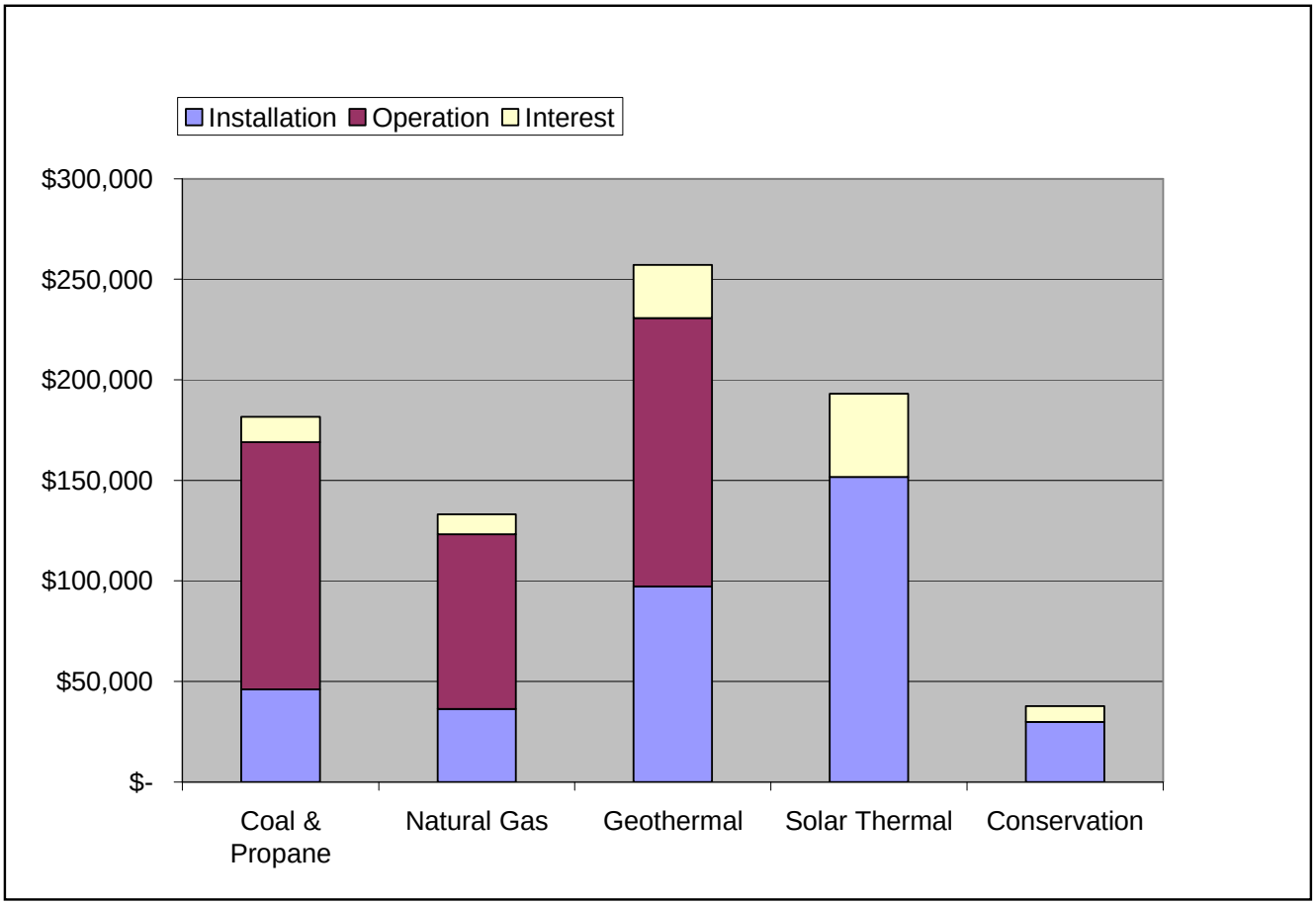
Coal & propane (status quo): The coal furnaces only lasted about 7 years. The coal required babysitting day and night. The cost of the coal was rising steadily while the quality of the coal was declining. Trucking costs were rising. The price of propane, which we used to heat hot water and as backup heat, was also rising.

Natural Gas: The nearest natural gas is about 1 mile away. It would cost $20,000 to get it to the yard. We were advised that a natural gas furnace would cost at least as much as a coal furnace. We based our estimates on 80% of actual usage numbers of other buildings.

Wood (biomass): In 1994 it was an inexpensive option due to availability of wood, but by 2008 there was no longer a ready source. In addition, wood was costly in terms of labour.

Geothermal: The initial installation was estimated at approximately $90,000 based on quotes provided. However, finding out that the electricity requirements for the house alone, would increase our annual power consumption by almost 50% took that option off the table. We could not justify both expensive installation and expensive operation.

It is impossible to evaluate energy consumption in heating without also evaluating energy consumption in electricity and vice versa. To do a proper energy audit requires accurate information.



Lesson Learned:

Every building is solar heated.

Most buildings are poorly designed and built: constant back-up heat is needed in the form of natural gas, coal, or some other fuel. Thus, insulation and conservation are the cheapest form of heating. We spent $30,000 on insulation and other measures that were partially offset by grants.

Active Solar Thermal: Because these were existing buildings, we couldn't build to maximize passive solar heating. However, the honeyhouse had clear southern exposure which could accommodate solar panels. In addition, solar thermal could replace electric heat used in the summer and thus reduce electricity usage. It was expected that some backup heat would be required which would be provided by electricity. In the end, it cost us about $150,000 to install the solar thermal system, heat dump included. This cost was then reduced by grants. There would be little ongoing fuel costs and little labour involved in normal operations.

Reasons Solar Thermal Chosen

1. Cost effective over life of system.
2. Ability to service it in-house.
3. Worked well with existing infrastructure of a hydronic heating system and a heat sink (concrete floor).
4. No daily maintenance.
5. No worry about the increasing cost of energy.
6. Supported Saskatchewan small businesses.
7. There were attractive grants for commercial buildings.
8. Lower greenhouse gases.
9. No fire risk.
10. The panels were extremely efficient such that even during cloudy weather or when covered in frost, they would still generate heat.

How We Saved Power Before 2009

1. Shut off lights.
2. Used clothes lines for houses.
3. Shut off computers and other electronics.
4. Decorated with light coloured walls. Then light reflects so bulbs can be reduced.
5. Used timers for block heaters.
6. No yard light.

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Rural Municipality of Hillsdale

Conservation has the best return on investment.

They can't charge you for what you don't use.

Simply by paying a little attention to electricity usage, we reduced our consumption by 33% (10,000 kWh/yr) with little impact on either our business or residence.

How We Changed our Power Use After Becoming More Informed

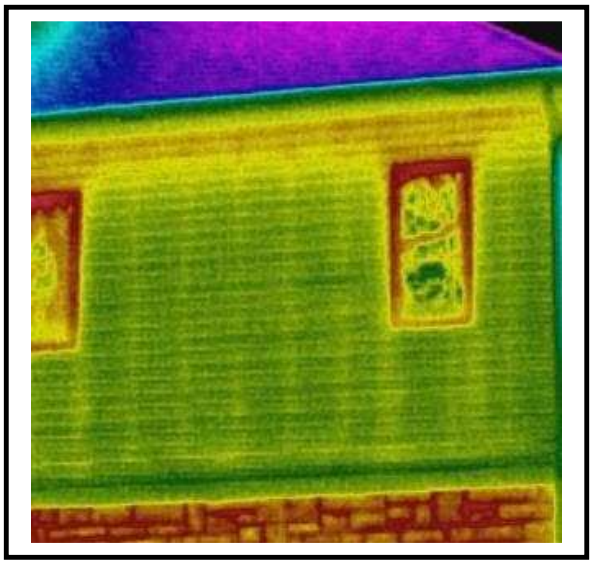
1. Replaced and reduced freezer space.
2. Shut off hot water heaters when they weren't in use.
3. Replaced honeyhouse dryer with clothes line.
4. Manage wax melters differently so that hot water was reused instead of drained and reheated.
5. Installed remote controlled outside light on house in main yard.
6. Installed a motion light in a high walkway area.
7. Cook differently. Examples: used slow cooker more; combined baking and cooking so not heating the oven every day.
8. Sealed doors and windows, stopped thermal bridging so we're not heating the outside with inside heat.

Reasons for Choosing Small Turbines Instead of a Big Turbine

1. During a breakdown, still producing.
2. No specialized equipment to put them up.
3. Start at a lower wind speed.
4. No gearing up or down, so fewer parts to service.
5. Cost is about the same.
6. Lack of space is not a factor in our decision.

Thermal Bridging

Heat follows the path of least resistance to the cold. In a typical building, the path of least resistance is along the studs, joists, windows and doors.



House: We used horizontal purlins across wall studs and then a layer of offset vertical studs. Therefore, we used 2 layers of Styrofoam insulation. The vertical studs gave us something to carry the siding. We should have put a vapour barrier on the outside wall before adding any insulation.

Honeyhouse: We used Plasti-Fab's structurally insulated panels. There are only studs in the corners and beside big windows, doors.

We blew insulation into both attics to cover the trusses.

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Plasti-Fab is proud to be sponsoring the Practical Applications in Renewable Energy Open House.

Plasti-Fab supplied the Structural Insulating Panels for this project.

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Passive Solar Residence

In our second yard, there is a 1970's 3000 sq foot house. Little was known about passive solar heating when we built it. The walls are R40 and the ceiling is R60.

On the south side, there are 8 big windows. Inside you only see 5 windows. Three of the windows have black painted cement (trombe walls) behind them as heat sinks. They look like normal walls from the inside. Roll shutters are used to cover the windows at night to keep the heat inside.

It has deep eaves to shade the windows in the summertime. A small wood burning stove is used for backup heat.

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