

## About 57 Alexander Street

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The solar powered home at 57 Alexander Street is a well-designed combination of old and new. It is estimated that the home was built around 1915. In 1997, the current owners built an addition onto the side of the existing house and simultaneously renovated the majority of the existing home in an effort to improve the design, energy efficiency and incorporate alternative energy sources.

*"Throughout the process we kept ourselves focused on the fact that this is where we plan to live indefinitely. So, we needed to ask ourselves what did we want in our home and what will be our future needs as our family grows?"*

This has resulted in a long-term investment in design, quality materials, insulation, efficient appliances and fixtures, solar hot water & solar electricity.

## Good Design

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After struggling on our own to come up with a design that incorporated so many wants and needs we finally solicited the help of an architect. We feel very strongly that money spent on thoughtful design is crucial to the success of the end product. The architects provided the right sense of flow, scale, efficient layout and creativity. They had the added challenge of providing a south facing roof surface for the solar system, given the house and lot are angled 45° off of due south. Storage & closet design were also an important consideration, which is typically lacking in older homes. Built in shelving and bench seats have created abundant storage and sitting areas. Emphasis was also given to passive solar gain by installing many tall southeast-facing windows.

## Energy Efficiency

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**Insulation** - Not satisfied with the minimum insulation standards used in today's construction (even in R2000 homes), we felt a longer-term investment would be a more sensible approach. The old house had no insulation except in the attic. The cavities of the old walls have been filled with 4" of spray foam insulation. An additional 1" foam board was installed on both the interior and exterior walls. Most of the above-grade exterior walls are now R40, more than twice that of typical construction. The basement concrete block has 2" of foam insulation on both the exterior and interior, then a standard insulated 2 x 4 wall on the interior - most houses would have only the insulated 2 x 4 wall. This gives a value of R31, or 3 times the insulation of a typical 2 x 4 wall. In addition, the basement floor has 2" of rigid foam under the concrete. All of these measures, including the new windows, make the house very comfortable. This is one of the most insulated homes in the area. Despite a larger house and increased gas prices, the heating bills are now lower.

**Reflective Vapor Barrier** - most of the new vapor barrier is a shiny reflective material, which not only stops moisture from condensing in the wall, but also reduces radiant heat loss and gives an additional R3 (not included in the above values).

**Lighting Loads** - Compact fluorescents and halogen lighting have been incorporated throughout the house. Compact fluorescents use approximately 1/4 of the electricity of a regular incandescent bulb. For example, the light over the kitchen table can hold 7 x 60 watt light bulbs using a total of up to 420 watts. Changing to compact fluorescents reduced the total load to 35 watts. This also reduces air conditioning costs.

**Windows** - We have gone from 10 windows to 40 to allow as much natural light in as possible. The windows have fiberglass frames, which are durable and maintenance free. Since the thermal expansion of fiberglass and glass are similar this keeps the windows sealed whereas vinyl or wood windows tend to expand

and contract as the temperature changes. Most of the windows are triple paned argon-filled to improve efficiency and prevent condensation.

**Appliances** - Careful consideration has been given to household appliances. The hi-efficiency gas furnace uses about 1/10th the electricity of a normal furnace (only 60 watts of power). We chose this furnace because it was good on both gas & electricity, whereas most furnace designs do not focus on electrical efficiency. Due to the air tightness of the house, a heat recovery ventilator has been installed to provide fresh air and to pre-warm the in-coming air.

Typically, the refrigerator is the biggest power user in the home because it runs almost continuously. At the time of our purchase, the refrigerator was the most efficient in its class using 535 kilowatts/year. Careful selection of the washer & dryer has not only allowed us to have the laundry on the second floor, closest to where laundry is generated, but the front loading washing machine uses less water, energy and detergent.

Almost all appliances and electronics use power even when turned off. We make use of power bars and switches to cut off power to such items as the TV & Stereo and central vacuum when not in use. We have also opted for a computer with a liquid crystal display, which uses far less energy than a regular computer and monitor.

## Green Power

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**Solar Hot Water** - 3 black panels on the roof provide solar hot water for the house, which is held in an 80-gallon stainless steel tank located in the attic. A 20-gallon electric tank provides backup heating for days without sun. We bought the small electric tank to have hot water during the renovation, and found that a large hot water tank is not necessary. The tanks are in the attic, closer to the solar panels, bathrooms & laundry, which means less loss of heat from the pipes and no long waits for hot water. An electric pump for this