

Residential Solar Thermal Homer, Alaska

A Buderus Solar System Case Study



Photo by Lanny Simpson, www.alaskahighmountain.com

Dear Buderus,

We have been in operation for over 20 years. A big portion of our work is in higher end homes, with high efficiency boiler systems, radiant heated floors, etc. We installed our first Buderus panels in 2008. Since then, we have installed 10 systems, and are currently involved in 3 more at this time. Most are 3-panel systems, with a couple of 2-panel, one 6-panel, and one 8-panel system.

Obviously we do not have a long history of operation of these systems, or recorded data. However we are estimating projected savings of around \$1200 to \$1500 per year for 3-panel systems with the PL750 and heating both dhw and space heating (radiant floors). Sorry for not having more firm data. By this time next year we will. We started installing btu meters on current installs, and think they will prove to be helpful.

The total installed cost (before 30% tax credits) of these systems starts around \$14,000 for a system that is only producing dhw. The average system designed for space heating, (3 panels plus a PL750 tank), costs about \$22,000. Of course these prices exclude the boiler and basic boiler system components. Projected pay back for adding solar? After deducting the 30% tax credit, these will likely range from 6 to 12 years, at current fuel prices. The shortest payback is for systems that do dhw only and cost less to install, but have an extra large dhw consumption. (We have many Bed and Breakfast businesses in this area, with very large dhw needs.)

The average new house here is well built, and has gone through an energy audit, and usually surpasses the highest energy ratings, so heat loads are a lot lower than one might expect for a cold climate. The average heat load in these houses is about 50% dhw and 50% space heating. We have found the year-round average we are able to supply is 70-80% of the dhw load and around 30% of the space heating load. This means we are able to reduce the overall fuel consumption by about 50%.

Our standard install is normally Buderus SKS 4.0 solar panels in either a 2 or 3 panel package, which includes the pump station, solar tubing, storage tank, and controls. Since we are at about 60 degrees latitude and most roofs are not that steep, we use your flat roof mounting brackets so that the panels can be mounted at a steeper angle.

We love your PL750 tank. It is big (almost 200 gal.), has a good design for stratification, and the extra ports in the boiler jacket allow for more versatility. I believe the PL750 tank is a big reason we are able to achieve decent solar output for low temperature space heating. The SM300 and 400 also work great but we use them mainly for dhw production only.

For boilers we use either the G125BE, GB125BE, or the GB142. The RC35/SM10 control package for the GB142 boiler is a first class setup. The variable speed pumping appears to be a key element for obtaining the most output from the solar panels. There are lots of panels on the market, but the system is only as good as the control strategy and the other components. I believe Buderus excels at it all.

Thanks,
Steve Eayrs
Eayrs Plumbing and Heating
Homer, Alaska

Project Quick Facts

Project Partners

- Eayrs Plumbing and Heating – Contractor
Contact: Steve Eayrs, 907-235-2333
- Ferguson Enterprises, Soldatna Branch - Distributor
Contact: Mark Shinn, 907-262-5990

Project Equipment

- Buderus SKS 4.0 Flat Plate Collectors with flat-roof mounting kit
- Buderus PL750/2S Thermosiphon Combi-Storage Tank
- Buderus GB142 Wall-Hung Condensing Gas Boiler
- RC35/SM10 Control

Other Eayrs P&H Preferred Equipment

- Buderus Logalux SM400 Dual Coil Indirect Storage Tanks
- Buderus G125BE Low-NOx Oil Boilers
- Buderus GB125BE Low-NOx Condensing Oil Boilers
- Logalux 2107 Controls

Typical Costs (for addition of solar, does not include boiler and its components)

- \$14,000 typical for residential DHW
- \$22,000 typical for residential DHW plus space heating

Typical Projected Payback

- 6-12 years, at current fuel prices
- Approx. 50% reduction in fuel usage



Buderus SKS 4.0
Flat Plate Collector

Buderus PL750/2S
Thermosiphon
Combi-Storage Tank



Buderus GB142
Wall-Hung Condensing
Gas Boiler



50 Wentworth Ave., Londonderry, NH 03053
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Riverside Correctional Facility Philadelphia, Pennsylvania

A Buderus Solar System Case Study



The “greening” of a prison facility through the installation of a Buderus solar thermal system

Since December 24, 2008, 800 inmates of Riverside Correctional Facility have been in hot water, but not of their own making. This hot water is made by a Buderus solar thermal system, which is estimated to save the City of Philadelphia \$1.1 million and prevent one million pounds of carbon emissions over the estimated 25-year life of the system.

Unveiled on December 4, 2008 by Philadelphia Mayor Michael A. Nutter, this is the first solar thermal system installed in a large urban jail in the U.S. and is one project towards the Mayor's goal for Philadelphia to become the greenest city in America. The system was paid for with \$400,000 from the prison system's budget (spread over 3 years) with additional funding of \$265,000 from the Mayor's Office of Sustainability. It is expected to completely pay for itself in 8–10 years.

The Riverside Correctional Facility, a multi-building complex, is the central intake for all women sent to jail in Philadelphia. The solar system was installed on one building with an average daily population of 800 that had recurring water heater failures. One project challenge was making the transition to the new system without interrupting the existing hot water service for personal hygiene, laundry, and cleaning. Another challenge was the limited existing boiler room space.

The Buderus solar system replaced 15-year-old direct-fired water heaters with 45 roof-top solar collectors, 15 indirect storage tanks, 2 dual-fuel back-up boilers, and associated controller and pumps. The solar panels transfer their heat to a closed, antifreeze-filled system, with “overheat protection” set to 265°F. The heat is transferred via dual coils to the water in the storage tanks. The back-up boilers provide additional heat, if needed, and are dual-fuel to take advantage of the lowest energy costs.

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Project Quick Facts

Project Partners

- U.S. Facilities, Phila. - Facility Management
- Herman Goldner Company, Phila. - Contractor
Contact: Jim Childs, 267-346-2987
- J. Lorber Company, Phila. - Distributor
Contact: Bruce Kershaw, 215-791-2783
- Philadelphia Mayor's Office of Sustainability
Michael A. Nutter, Mayor

Equipment

- 45 Buderus SKS 4.0 Flat Plate Collectors, mounted in 2 rows at a 40° angle facing SSE
- 15 105-gallon Buderus Logalux SM400 Dual Coil Indirect Storage Tanks
- 2 Buderus G515 1 million BTU Dual-Fuel Boilers
- 15 Buderus KS0120 Solar Pump Stations
- Buderus TR0310 U Solar Controller

Cost

- \$665,000

Savings

- 1st Year: \$54,974
- 8-Year: \$673,295 (based on 20% energy cost increase)
- 10-Year: \$712,863 (based on 10% energy cost increase)
- \$1.1 million over estimated service life of 25 years
- 1 million pounds carbon emissions

Project Size

- 1 building, 200,000 ft²
- 800 inmates average daily population

