



## The Benefits of Solar Water Heating

With the cost of energy going up, and likely to continue going up (a lot), it's time to remind folks again about the benefits of solar water heating. Two past articles, "The Resurrection of Solar Water Heating" and "Solar Water Heating Choices", touched on the subject but today we're going to cover the economic benefits in more depth. Before I forget, if you'd like to see any of the many past articles I've written, they're all posted here - <http://www.theenergyguy.com/Articles.html>.

Solar water heating (SWH) is a much better investment than most people seem to realize. The key is choosing the right system and financing it with a home loan. The right system is one that doesn't have high maintenance and repair costs over time, as they can significantly reduce the investment value (see past article mentioned earlier). Financing most of the cost with a home loan and taking the Federal Mortgage Interest Deduction Credit allowed for SWH also helps improve the economics. The same is true for a solar electric investment.

Let's focus on the table below for a minute. The first column is the number of years the system has been operational (year 1 is the end of the first year of operation). The next column is the net cash flow at the end of a given year, which is the sum of all the costs and savings in the remaining columns to the right. Costs are negative values and are shown in parentheses; savings are positive numbers and do not have parentheses.

The installed cost of the system in this example is \$7,789. After the federal tax credit of \$2,000 the cost is reduced to \$5,789. With \$1,000 down (in "year zero") and the remaining \$4,789 financed over 30 years at a fixed rate of 6.5%, we have a fixed annual payment of \$363/yr or about \$30/month (3<sup>rd</sup> column).

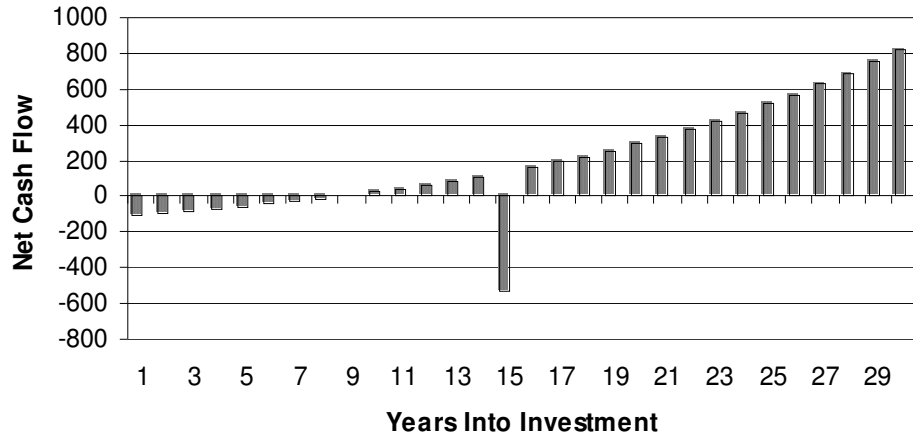
While the savings in the first year are \$163, note that they go up every year by 7%, which is the fuel escalation rate for natural gas. This is a very conservative assumption for future gas prices because they're likely to increase at a faster rate in the future. Of course when they do, that would only improve the investment value. These savings are based on an average home using 63 gallons of hot water every day and a sunny location. Smaller homes that don't use as much hot water or sites with a lot of shading won't save as much and will therefore be less cost-effective.

The second to last column labeled "service cost" shows the cost to replace the pump, controller and sensor after fifteen years. The last column, labeled "tax benefits", shows the mortgage interest deduction.

If we look at the economics in terms of the "rate of return" on investment, including the \$1,000 down payment, the return is 6.4% or approximately the same as the average (after tax) stock market return

over the last few decades.

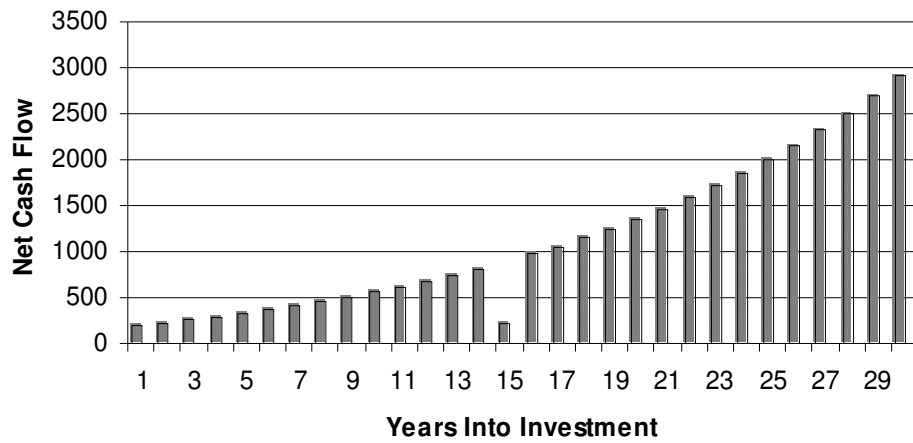
### Net Cash Flow Solar Water Heating System (Natural Gas Backup)



Years Into Investment	Net Cash Flow	Loan Payment	Energy Savings	Service Cost	Tax Benefits
1	(\$105)	(\$363)	\$166	\$0	\$92
2	(\$94)	(\$363)	\$178	\$0	\$91
3	(\$83)	(\$363)	\$190	\$0	\$90
4	(\$71)	(\$363)	\$203	\$0	\$89
5	(\$58)	(\$363)	\$218	\$0	\$88
6	(\$44)	(\$363)	\$233	\$0	\$86
7	(\$29)	(\$363)	\$249	\$0	\$85
8	(\$13)	(\$363)	\$267	\$0	\$83
9	\$4	(\$363)	\$285	\$0	\$82
10	\$22	(\$363)	\$305	\$0	\$80
11	\$41	(\$363)	\$327	\$0	\$78
12	\$62	(\$363)	\$350	\$0	\$76
13	\$85	(\$363)	\$374	\$0	\$74
14	\$109	(\$363)	\$400	\$0	\$72
15	(\$536)	(\$363)	\$428	(\$670)	\$69
16	\$162	(\$363)	\$458	\$0	\$67
17	\$191	(\$363)	\$490	\$0	\$64
18	\$222	(\$363)	\$525	\$0	\$61
19	\$256	(\$363)	\$561	\$0	\$58
20	\$292	(\$363)	\$601	\$0	\$55
21	\$331	(\$363)	\$643	\$0	\$51
22	\$372	(\$363)	\$688	\$0	\$48
23	\$416	(\$363)	\$736	\$0	\$44
24	\$463	(\$363)	\$787	\$0	\$39
25	\$514	(\$363)	\$842	\$0	\$35
26	\$568	(\$363)	\$901	\$0	\$30
27	\$626	(\$363)	\$964	\$0	\$25
28	\$688	(\$363)	\$1,032	\$0	\$20
29	\$755	(\$363)	\$1,104	\$0	\$14
30	\$826	(\$363)	\$1,181	\$0	\$8

In the case of a propane backup heater, assuming the cost of propane is \$3/gallon, the return on investment is 31% and the cash flow chart is shown below. I should point out that propane costs vary wildly in Nevada County, so you may pay more or less per gallon. But because propane is more than twice the cost of natural gas, the savings exceed the costs from the first year forward. To put it another way, you're essentially paying the bank less than you used to pay your propane company.

### Net Cash Flow Solar Water Heating System (Propane Backup)



A small percentage of households in Nevada County have an electric water heater but, that said, the cash flow for a SWH system with an electric backup heater is even more attractive than with propane because of the high cost of electricity.

The bottom line is that SWH systems are a good investment if you have natural gas, an excellent investment if you have propane gas, and a “no brainer” if you have an all electric home!

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