

## The Rundown

A BLOG OF NEWS AND INSIGHT

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### This Investment Fits Obama's Energy Plan and Is Even Safer Than I-Bonds

BY: HILTON DIER

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*Making your home energy efficient just might be the safest personal investment. Photo courtesy of Empowerhouse Solar Decathlon.*

**Paul Solman:** Boston University finance guru Zvi Bodie, co-author of the bestselling investment textbook known informally as "Bodie-Kane-Marcus" and the recent trade book "**Risk Less and Prosper**," has often graced the Making Sen\$e Business Desk with investment advice. Most recently, **he again stressed** the only investment "no-brainer" out there: U.S. Treasury Series I inflation-protected savings bonds.

But a reader with the Internet handle "Minor Heretic" posted the following comment in response:

"Here's a better option, depending on your situation: energy efficiency and renewable energy. If you are a homeowner, chances are that your house is part of the 99 percent of our housing stock that is grossly energy inefficient. Get an audit by a trained energy specialist and pick the low hanging fruit (generally air sealing and insulation). Your investment will pay you better returns than any financial instrument out there."

The reader's point was certainly provocative. And if true, very useful. So I contacted the emailer. He turned out to be a Vermont energy expert named Hilton Dier III who consults under the name **Renewable Energy Design** and blogs at [minorheresies.com](http://minorheresies.com). I asked Hilton (or "Minor") if he would expand on his advice for the Making Sen\$e Business Desk. Now he does so, on the heels of President Obama's climate change speech Tuesday, in which he lauded the value of energy efficient home upgrades, saying "the savings show up in our electricity bills every month -- forever."

I've also sought Professor Bodie's reaction to Hilton's investment advice, which will appear here in our next post.

**Hilton Dier:** Energy efficiency investments can have returns so handsome they will rival those of successful criminal enterprises. **Efficiency Vermont**, my home state's efficiency utility, reports an average return on investment (ROI) for participating businesses **in excess of 50 percent**.

A colleague of mine who runs a home weatherization non-profit reports that it is easy to get 10 percent ROI in the first round of energy retrofits. Returns on solar energy projects are in the 6-12 percent range.

I recently read the **Zvi Bodie piece** on this website touting I-bonds as the safest investment vehicle out there. They are inflation-protected and backed by the full faith and credit of the U.S. government; very safe investments. And yet -- energy efficiency and solar energy are better investments, backed by the full faith and credit of, you could say, planet Earth.

First, a few caveats are in order. This investment vehicle works for owners of homes and businesses, not for renters. Second, your returns will vary, as I will explain in a bit. And finally, full disclosure, I know about this because I am in the solar business.

With the caveats out of the way, it's time to make what some might consider a subtle point of distinction. To understand the advantages of energy efficiency and solar energy as an investment, you need to start thinking in terms of *savings* rather than *earnings*.

The key point is that it doesn't matter whether you earn \$100 on an investment or save \$100 on your electric bill. In both cases, you are \$100 ahead of where you were otherwise. There is one crucial difference: The advantage of saving \$100 on your electric or heating bill is that it is tax free. You're \$100 ahead and you don't even have to report it to the IRS.

There's a second not-so-obvious advantage of personal energy investments as well: They are more than inflation adjusted, or at least they have been for a generation now. Over the past 20 years, the price of oil has averaged 12 percent annual inflation. The price of propane in the northeastern U.S. has averaged 9 percent annual inflation over the past decade. So the price of energy is going up faster than inflation.

Therefore, if you save \$100 on your heating bill this year, that's likely to be the equivalent of saving \$110 or so next year, since that's how much next year's energy would cost you.

Being in the business, I know the response of skeptics: Natural gas is cheap right now; energy prices are coming down. Perhaps. But as best I can tell, the price will have to almost double for the shale gas producers to break even. Eventually it will.

Electricity is harder to write about in general because differing state laws affect the price. Still, electric rates have consistently increased over time. So the return from any investment in electricity savings or production will increase over time as well.

A third advantage to investing in personal energy efficiency and solar energy over I-bonds: it is *insured*, just like your near-zero interest FDIC-protected bank deposits. Any energy improvements you make to your real estate will be covered by your homeowner's insurance or business insurance. If your new solar panels go up in smoke, your mandatory home insurance policy will replace them.

And of course, finally, there's the bottom line: the actual size of the return on

investment. With personal energy investment, the return will be much higher than anything you can get from similarly safe financial instruments. Here in Vermont, where I do estimates and financial projections for my clients, I find returns of between 6 percent and 12 percent for solar hot water and solar electric (photovoltaic).

Returns will vary according to the cost of the commodity you are replacing (natural gas or oil, propane or electric). They will also vary by region: an investment in solar works better in New Mexico than Seattle, for example, and the cost of installation varies from place to place. But almost anywhere, even in the most disadvantageous of circumstances, personal energy investment promises to be a better and safer investment than I-bonds.

So how do you go about getting into personal energy investment? Let's start, as we should, with energy efficiency.

Ninety-nine percent of the existing housing stock in this country consists of leaky, poorly insulated buildings that require endless gallons of heating oil or kilowatt-hours of electricity (powering air conditioners) to keep them livable by modern standards. There is an entire industry dedicated to sealing up those leaks and insulating those walls, as well as improving the efficiency of heating, cooling and ventilating systems. There are also state agencies, non-profits and utility programs focused on both electrical and heating/cooling efficiency. Some states and utilities offer rebates and low interest loans for this kind of work.

The first step for a homeowner or business owner is to have an energy audit. Do a local search for "weatherization," "energy audit" and "building performance contractor." An audit might cost a few hundred dollars, a necessary first part of the investment.

What you should get out of this process is a report on the deficiencies in your building, the solutions to these problems, a cost estimate for performing the upgrades and an estimate of the resulting savings. You can then choose the work you want done, starting with the low-hanging fruit -- those investments that will yield the highest returns, given their cost -- and work your way down the list to the projects with lower returns: first, air sealing; next, insulation; and so on.

A weatherization colleague of mine says:

"Air sealing produces the greatest bang for the buck. But as you start filling holes, the pressure makes the other holes leak faster until you reach a certain threshold. So the savings per dollar invested is non-linear.

Once air sealing is done, insulation has a lower ROI. The next inch of insulation will have a lower return than the previous one, so there is a diminishing return. Most of the cost of insulation is getting someone in place to do it, so insulation while air sealing makes sense because the people and equipment are in place.

The average job cost is around \$7,000, but the range is anywhere from several hundred dollars to a \$100,000 (for a full exterior shell insulation job with new triple-glazed windows or deep energy retrofit)."

Think of this in investment terms. You invest somewhere between a \$1,000 and a \$100,000. Your investment is tax free and insured. You start with a 10 percent rate of return. In fact, you can choose your rate of return depending

on how deep you want your retrofit to go. Your return increases annually, by something up to 12 percent. Try to find a standard investment vehicle that can do that.

Once you have fixed the leak in the bucket, it's time to fill that bucket. A solar electric system starts with a set of solar panels mounted on your roof or on a frame on the ground. The power from these panels goes to one or more inverters -- electronic devices that convert the DC power from the panels into AC power like you buy from the utility. The inverter feeds the power into the main breaker panel for your home or business. The power then goes to whatever lights and appliances you are using, with the excess going back to the utility.

Almost every state, excluding Tennessee, Mississippi and South Dakota, has laws allowing net metering, which means the utility credits your account at the retail rate for whatever excess you produce -- what you *pay* per kilowatt-hour (kwh), you *get back* per kilowatt hour. Generally speaking, these credits roll over for a year. Most solar energy system owners end up banking credits in the sunny summer months and using them up in the winter. If you size your system just right, you can end up breaking even -- no energy charges at all.

So how big a system will you need, and how much will it cost? You'll really need to consult with a local solar contractor about that, but here are some boundary numbers. The average American household uses 12,000 kwh annually. In the middle of the Mojave Desert, it would take about 7,000 watts of solar to produce that much; in rainy Seattle, about 12,000 watts. Everywhere else will be somewhere in between. Hand over 12 months of power bills and your local contractor can tell you what will work for you. If your budget can't handle a full net-zero system, you can decide to offset only part of your annual electrical demand.

Please remember that energy efficiency improvements will be a fraction of the cost of solar energy or utility electricity. It's cheaper to update your refrigerator than to buy the extra solar panels to power your old one.

The raw cost of a standard solar system varies widely, between \$3.00 and \$5.00 per installed watt nationwide. I say "raw cost" because there are various federal and state tax breaks and incentives that bring down the cost dramatically. The feds offer a 30 percent tax credit on solar electric and solar hot water systems, so this drops the final price per watt to between \$2.10 and \$3.50. Post-tax credit, that 7,000-watt system might cost between \$14,700 and \$24,500. Businesses can rapidly depreciate a system (over just five years) as a tax write-off, however, which saves more money and increases the return on investment.

Moreover, states have their own incentives and tax breaks, which can be found [here](#). Every state between Maryland and Maine offers a rebate for solar installations, along with California, Oregon, Nevada, Illinois, Minnesota, Hawaii, Puerto Rico and the U.S. Virgin Islands. Many other states have utility-sponsored programs. Some states exempt solar installations from sales and property taxes. The incentives range from 40 cents to \$2.50 per watt.

I'll use Vermont, where it's not particularly sunny and there are low incentives but high electrical costs, as an example. Let's say that the raw cost for a 7,000-watt system is \$4.25 per watt, or \$29,750. The federal tax credit drops that to \$20,825, and the Vermont 45 cents per watt incentive drops it to \$17,675. At 1,200 kwh per 1,000 watts, the system will produce 8,400 kwh annually.

Electricity prices in Vermont vary by utility, but state law requires utilities to give net metering customers an additional payment to bring their return up to 20 cents per kwh. That puts this system's initial annual return at \$1,680, or 9.5 percent of the installation cost.

Solar hot water systems circulate fluid from rooftop collectors to a heat exchanger on a tank in your basement to preheat your domestic hot water. The system has to be undersized because there is no hot water grid to take your excess when you don't use it. If sized correctly, it can reduce your water heating bills by 40-60 percent.

Again, using Vermont as a not-so-sunny example, a typical two-collector system will produce about 15 million British thermal units of heat annually. Adjusting for combustion efficiency, that's equal to about 240 gallons of propane, 170 gallons of number two fuel oil, 20 Mcf of natural gas or 4,400 kwh of electricity. Going with electricity, electric water heaters being common, and a rate of 14 cents per kwh, the annual cost savings would be \$617.

Let's assume the raw cost of this solar hot water system is about \$10,500. After deducting the 30 percent tax credit and Vermont's incentive, the cost would be \$6,450. There again, we have a 9.5 percent return in the first year: a \$617 return on a \$6,450 investment. Find that on the bond market this side of Athens.

I should re-emphasize that returns will vary from this scenario depending on: solar resource, installation cost, local tax breaks and incentives and local energy prices. Even so, one-half or a third of this return would be brilliant, given the near-zero risk, tax-exempt status and inflation adjustment. In Zvi Bodie's terms, think of a personal energy investment as a 20-year I-bond with an insanely high interest rate. And should you decide to sell your solar-enhanced home, there's even more joy. [A study by Lawrence Berkeley National Laboratory](#) found that solar-equipped homes sold for a premium averaging around \$5 per installed watt.

The final advantage of a personal energy investment is that no matter what happens with the deficit, interest rates, bank malfeasance, stock fraud, or even the collapse of the euro, you *own* this thing. It is a productive physical asset, built into your house or sitting there on your roof. No computer algorithm or London Whale is going to make it disappear into a string of zeroes. And should some catastrophe (or market manipulators) cause energy prices to explode, you're protected.

**Paul Solman:** As I wrote in the introduction, Zvi Bodie's response will appear here soon. But you may also be interested in this brand new post from one of our Making Sen\$e Business Desk contributors, Rob Stavins of Harvard, who wrote here in March: "[Is Obama's Climate Change Policy Doomed to Fail? Maybe Not.](#)" Here is Rob's latest and very pertinent post: "[Thinking About the Energy Efficiency Gap.](#)"

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*This entry is cross-posted on the [Making Sen\\$e](#) page, where correspondent Paul Solman answers your economic and business questions.*

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