

Energy Investments for Buildings and Communities

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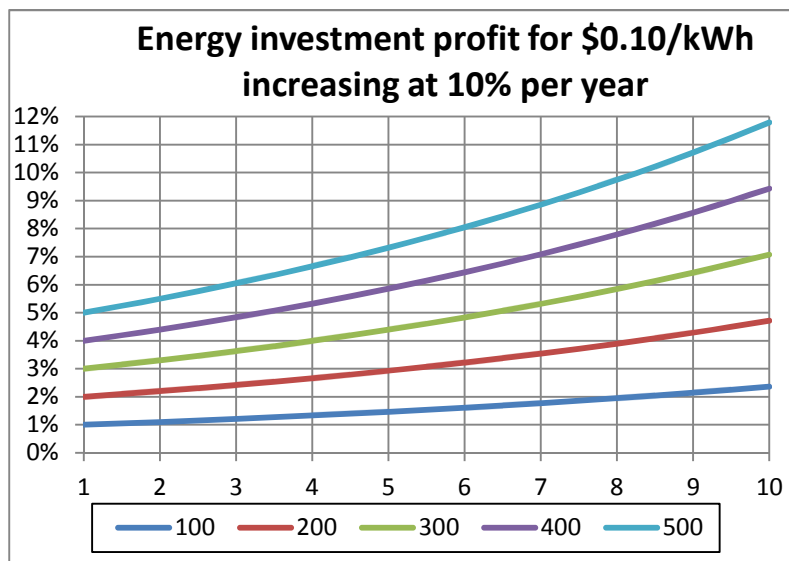
This article discusses the best energy investments for buildings and communities.

Energy Investments for Buildings

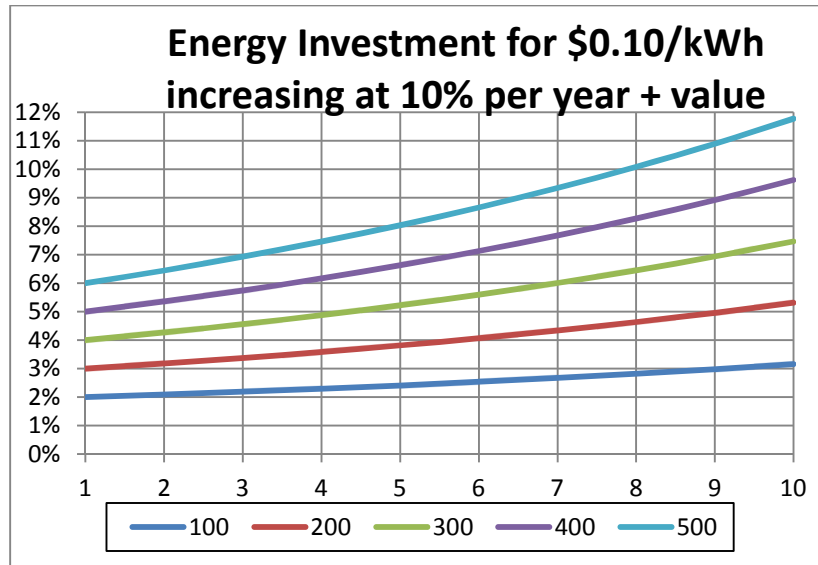
One should make decisions concerning energy investments for energy conservation and renewable energies for buildings by calculating the investment profit earned instead of calculating payback as has been the common practice. Such investments have a very long lifetime, often the lifetime of the building at least for energy-conservation investments.

Such investments will be returned with a final profit when the building is sold in the future, because the cost of energy will have risen by then, probably by a large amount. In the meantime, one always will make a yearly profit by not spending funds for energy, contrary to the case for many other investments.

It is easy to calculate the investment profit for energy renovations and renewable-energy installations. For \$1000 spent that saves paying for 100 kWh of energy per year at \$0.10 per kWh hour rate, the investment yield is 1%. If the energy savings is doubled to 200 kWh the investment is doubled and if the cost is doubled to \$0.20 per kWh the investment is doubled. For example, if 500 kWh per year is saved and the cost is \$0.15 per kWh, the investment profit is 7.5%. The following chart shows the investment profit for a \$1000 investment for a range of savings from 100 kWh/year to 500 kWh/year, assuming an initial \$0.10/kWh rate increasing 10% per year:

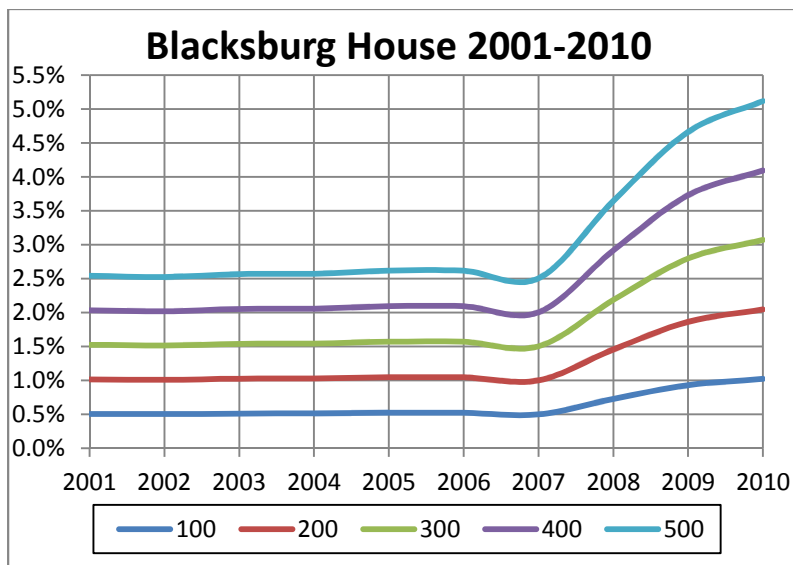


These calculations do not take into account any government energy incentives or the value of the investment increasing with time. If one assumes that the investment value increase is one-tenth as fast as the rate increase the investment profits are:



If the building owner does not have the cash to make the investment, she/he can borrow it at a rate less than the investment rate and still make money.

Consider a real case for a Blacksburg VA house from 2001 to 2010:



The investment profit would have been low until the fast rise in electricity rate in 2008, then it became much higher.

Of course, the problem is calculating how many kWhs would be saved by a specific energy renovation.

Energy Conservation for Buildings

It is widely recognized that investing in energy conservation for buildings yields the highest investment profit. That is why so many new buildings are being built to high energy-conservation standards ([Passive House](#), [Earthcraft](#), [LEED](#), [Energy Star](#), etc.).

Most existing buildings can be renovated to reduce their energy use by large amounts. The renovation needs to be done only after a careful study of how best to do it for each building. This involves having a low-cost energy audit done by a professional energy-conservation specialist, using a blower-door test, ducts' test and infrared-camera pictures. Steady investment profits of 5% and higher are possible by energy renovations of buildings.

Highly energy-efficient heat pumps are always a good investment for energy conservation. Often lateral or vertical pipes in the earth or in lakes as the outside heat sink are a good investment.

For some buildings investment in water conservation, such as using rainwater for non-potable uses, can return a profit.

Renewable Energies for Buildings

It is widely recognized that solar hot water is a good renewable-energy investment for buildings that use much hot water, such as houses and some business buildings. The best system is a drain-back system, which is not possible for some situations which required an anti-freeze system. Investment profits of 5% and higher are possible by installing solar hot water systems.

Next in investment profit is solar-photovoltaic energy. These systems have a very long lifetime, so the initial capital investment will likely be recovered with a profit when the building is sold, in addition to the 5% or higher yearly profit achieved by collecting solar energy. Governments need to make higher profits possible for building owners who invest in PV energy.

In some special cases wind energy for buildings yields an investment profit. This investment requires a careful year-long study of the available wind speeds at various pole heights at the location. The larger the wind power installed the higher the profit.

Energy Investments for Communities

Communities usually do not consider investment profits when spending its funds. An investment that returns a profit is helpful to the far-future bottom lines for the community.

It is difficult to calculate which community investments will yield the highest investment profits. It hinges on state and national energy policies as much as on physics.

My current view is that the best energy investment for community buildings is solar PV. In cases for buildings that use much hot water, solar hot water may be the best investment. In some cases wind-investment may yield a profit; some communities have made such an investment.

A solar-PV farm at the edge of a community can be a profitable investment that serves both private and community buildings. State policies on energy production need to be made to encourage such investments, which may be funded by cooperation between communities and private investors.