Solar PV - Return on Investment for typical Anguilla home

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Overview

A Grid Tied Solar PV system has the potential to reduce the cost of electricity to an average Anguilla home by allowing the home owner to invest in equipment that will supply a portion of their consumption. This arrangement also reduces the country's reliance on foreign oil and provides a predicable investment for the homeowner.

In this paper, we will set out a typical Anguilla home's consumption, cost of installation for a solar system, and examine the potential of the investment using the IRR method.

Assumptions

- Home Size: 3 bedroom family home, no air conditioning, no pool.
- Average consumption: 700 KWh (units) per month
- Unit Cost: US$.34 (blended cost as of this date)

Netmetering

Netmetering is the arrangement under which the excess power produced during the day feeds back into the grid, turning the meter backwards. It is the simplest and best way to enable Solar PV to have an impact on the market. Most of the meters installed in Anguilla at present will work this way.
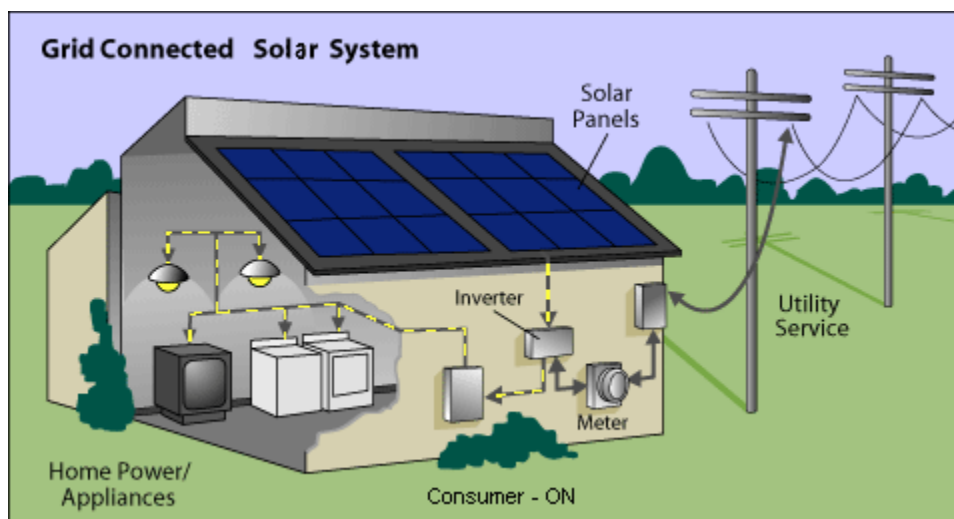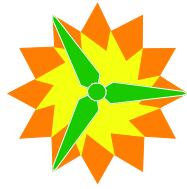
Grid Tied PV System

A Solar PV system can be setup in two main ways. The off-grid system is well known as it was where solar got its start, mainly supply power to mountain cabins too far from the grid to get a connection.

In those days, solar modules were so expensive the power produced was far more expensive than grid power, so it was only deployed as an off-grid solution.

As the cost of solar modules came down, solar became a viable source of power especially in areas where the cost of electricity was above average. In order that the system could be cost effective, the batteries used in an off-grid system were not needed and the systems were simplified by connecting the output directly to the grid. This required an extensive effort on the part of the engineering groups to develop standards to ensure safety against which all equipment could be tested. The grid tied inverter has been safely used in the USA for some twenty years now without incident.

Grid tied inverters are the only way Solar PV systems can be used to reduce the cost of electricity and reliance on foreign oil.

The investment

The best way to assess the value of investing in Solar PV is to use the Internal Rate of Return, much like would be used to assess a Certificate of Deposit. The cost of the system is the Cash Investment, and the savings is the Positive Cash Flow. As a Solar PV system has a life expectancy exceeding 25 years, it is reasonable to use 25 years as the period, and to have a salvage value of 10% at the end of the period.
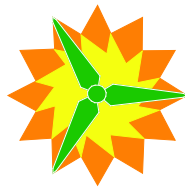
Costs

The cost of solar has been dropping over time, and is expected to drop significantly at the end of this year due to over capacity. The supply of oil, on the other hand, is declining as the demand increases, and will increase sharply when the recession ends and economic activity returns to previous levels. This means that the returns will only improve over time.

We are going to use a 3.15KW Solar PV system for our system sizing. We are also going to use standard solar modules. Although new technologies are appearing, such as thin film solar, not enough is known about these technologies to establish the case for their use in Anguilla.

While the system we are using will be 3.15KW, the numbers hold true for larger systems, up to where the output exceeds the consumption. The size of the home and the amount of electricity consumed is really not that relative to the investment analysis as long as the home consumes more electricity than the Solar PV system produces. If the system produces more units of electricity then than creates a situation where the utility would owe the customer money, and that becomes more difficult to accommodate.

We are currently able to supply and install a 3.15KW system on a sloping concrete roof, where there is minimal change required to the electrical system, for about US $12,000. These prices change all the time as supply and demand affects the module prices. The system installation will meet National Electrical Code requirements.

Production

The 3.15KW system should produce 16 KWh of electricity every day on average. That amounts to 487 KWh per month, 70% of the homeowner's consumption.

Returns

The attached spreadsheet shows the value of the investment. The result of the savings shows an IRR of 16%, which is very reasonable by any standards, but this is a simple calculation which does not take into account the rising cost of oil, electricity, and the salvage value of the equipment at the end of the period (or continued use).

There are very few investments available in Anguilla that can practically guarantee to return 16% to the investor. With the yield on savings accounts being about 1% today, this is a very attractive investment.

Other methods

It is very common to see the return on investment in solar quantified using the Payback Period method. This method looks at the period of time that must elapse before the equipment has been paid for. While
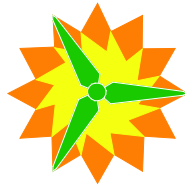
this is a valid method, the homeowner tends to looks for an unrealistically fast payback period as it is hard to visualize the value of the positive cash flows for 25 years.

However, using this as the method, we estimate the payback as being 6 years, but this does not account for a rise in electricity costs. I believe it is a safe bet to expect a five year payback period, then to have twenty years of electricity production.

There are other reasons people install solar.

- Homeowners that install solar tend to be more careful with their consumption and to find ways to reduce the amount of electricity not covered by the solar system.
- Homeowners also get the satisfaction of not having to worry about the cost of electricity to the same degree as their neighbors.
- If energy costs skyrocket, as they did in 2008, the homeowner with solar will enjoy a greater return on investment and less impact.
- Having a solar system on the roof of your house is a great way to teach your children about energy production and the environment.

Return on investment for Sample Solar PV System

Cost	$12,000
Period (Months)	300
Unit Cost	0.34
Average Production per month	486.6667
Percentage of consumption	**0.695238**
Monthly Savings on electricity	165.4667

Monthly cash flow	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 25
	($12,000)	1985.60	1985.60	1985.60	1985.60	1985.60	1985.60
	($12,000)	-10014.40	-8028.80	-6043.20	-4057.60	-2072.00	37640.00

Internal rate of return	16%