



Performance & Financial Analysis

Prepared May 23, 2019 for

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Executive Summary

Electric Utility Savings: Anticipate a savings of approximately \$3,827 in electric bills (28%) at current utility rates in the first year. Savings will grow as electric utility rates are expected to rise 3.00% a year. The purchase of electric energy (kWh) from your utility is expected to be reduced by 28%.

Over 30 years, annual utility savings are anticipated to average \$5,802, for a total utility savings of \$174,061.

Performance Summary

Solar Electric (PV) System: 28.8 kW DC producing 35,100 kWh/Year.

Purchase Price & Net Cost

Contract Price: \$61,550

Incentives to Customer: **(\$18,465)**

Net Purchase Cost: \$43,085

MACRS Bonus & Straight Line **(\$18,584)**(P.V.)

Depreciation:

Net-Present Cost: \$24,501

Includes present value (P.V.) of these future cash flows.

Financial Ratios

Customer's Profitability Index: 2.2

Cashflow Payback: 6 years
6.3 years (modified)

Internal Rate of Return (IRR): 15.7%

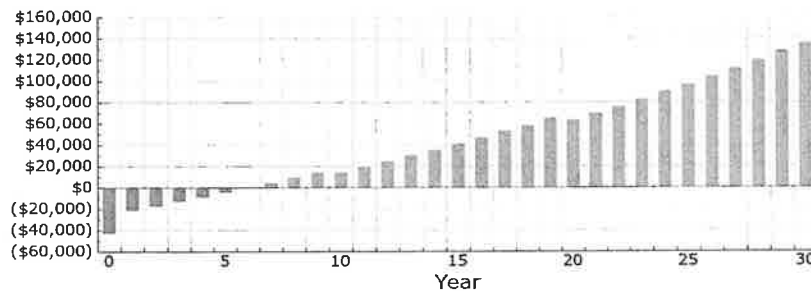
Net Present Value (NPV): \$49,562

Cash Gained over Life: \$135,688

- CO2 Saved over System Life: 863 tons. Equivalent to driving 1,726,000 auto miles

Finance: Cash

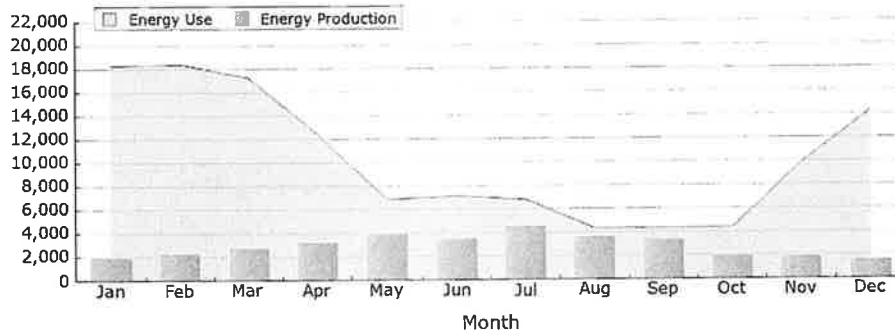
Cumulative Cash Flow



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Solar Electric (PV) System Summary

Solar Electric (PV) kWh Production by Month (typical)



Tilt: 18° Azimuth: 175° 6" Air Gap

Shade reduces production: 0%

PV Panels: 80 x Heliene, Model: 72M360

Inverters: 3 x SMA America, Model: SB7.7-1SP-US-40
(240V)

Total Panel Area: 1,638 sq-ft

System Peak Power: 28.8 kW DC

Annual Production: 35,100 kWh. Supplying 28% of annual electric use

Contract Price Summary: Solar Electric (PV) System

Contract Amount: \$61,550 (\$2.14 per watt DC)

Incentives available to Customer in 1st Year

Federal Tax Credit (30% of Gross Cost at Installation): (\$18,465)

Net Cost at Install (after incentives): \$43,085

Net Installed Price per Watt: \$1.50 per watt DC

Present Value of Depreciation: \$18,584 (in today's dollars)

Net-Present Cost: \$24,501



Utility Energy Summary: Electric

| Electric Utility Rates | | | | | | | | | | | | | |
|---|---------|---------|---------|---------|---------|---------|-------------------------------|---------|---------|---------|---------|---------|----------|
| Current Rate | | | | | | | Post Project Rate | | | | | | |
| Fixed Price per unit \$0.1090/kWh | | | | | | | Fixed Price per unit | | | | | | |
| Average Cost: \$0.109 per kWh | | | | | | | Average Cost: \$0.109 per kWh | | | | | | |
| Tiered Rate: No | | | | | | | Tiered Rate: No | | | | | | |
| Time-of-Use Rate: No | | | | | | | Time-of-Use Rate: No | | | | | | |
| Demand Charges: No | | | | | | | Demand Charges: No | | | | | | |
| | | | | | | | | | | | | | |
| Summary of Utility & New Source Electricity | | | | | | | | | | | | | |
| Electric by Month (kWh) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total |
| <u>Entered into Software (historical)</u> | | | | | | | | | | | | | |
| Monthly Use | 18,240 | 18,400 | 17,280 | 12,480 | 6,880 | 7,120 | 6,800 | 4,320 | 4,320 | 4,400 | 9,840 | 14,240 | 124,320 |
| Historical Cost | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 | \$0 |
| <u>Estimated by Software at Current Rates</u> | | | | | | | | | | | | | |
| Estimated Use | 18,240 | 18,400 | 17,280 | 12,480 | 6,880 | 7,120 | 6,800 | 4,320 | 4,320 | 4,400 | 9,840 | 14,240 | 124,320 |
| Current Cost | \$1,988 | \$2,006 | \$1,884 | \$1,360 | \$750 | \$776 | \$741 | \$471 | \$471 | \$480 | \$1,073 | \$1,552 | \$13,552 |
| PV Production | (1,988) | (2,360) | (2,767) | (3,235) | (4,022) | (3,513) | (4,573) | (3,670) | (3,315) | (2,058) | (1,949) | (1,650) | |
| Post Project Use | 16,252 | 16,040 | 14,513 | 9,245 | 2,858 | 3,607 | 2,227 | 650 | 1,005 | 2,342 | 7,891 | 12,590 | 89,220 |
| Post Project Cost | \$1,771 | \$1,748 | \$1,582 | \$1,008 | \$312 | \$393 | \$243 | \$71 | \$110 | \$255 | \$860 | \$1,372 | \$9,725 |
| Production Self-Consumption Percent: | | | | | | | | | | | | | |
| | 100% | 100% | 100% | 100% | 74% | 87% | 67% | 54% | 54% | 74% | 100% | 100% | |

Minimum monthly meter fees may apply and are not included in this analysis.

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Cash Flow Details for the System

| Cash Flows in Year | 0 | 1 | 2 | 3 | 4 |
|--|-----------------|---------------|--------------|--------------|--------------|
| Gross Cost: PV | (61,550) | | | | |
| O&M Cost: PV | 0 | (95) | (98) | (100) | (103) |
| Utility Bill Savings with Inflation Applied | 0 | 3,942 | 4,042 | 4,146 | 4,252 |
| Solar Electric (PV) Incentives | | | | | |
| Federal Tax Credit (30% of Gross Cost at Installation) | 18,465 | 0 | 0 | 0 | 0 |
| Total Incentives | 18,465 | 0 | 0 | 0 | 0 |
| Tax Savings from O&M Expense Deduction | 0 | 37 | 38 | 39 | 40 |
| Federal MACRS Bonus Depreciation Tax Savings | 0 | 16,742 | 0 | 0 | 0 |
| State Straight Line Depreciation Tax Savings | 0 | 153 | 305 | 305 | 305 |
| Net Annual Cash Flow | (43,085) | 20,779 | 4,287 | 4,390 | 4,494 |
| Cumulative Cash Flow | (43,085) | (22,306) | (18,019) | (13,629) | (9,135) |

Net Annual Cash Flow is the sum of values in gray lines.

| Cash Flows in Year | 5 | 6 | 7 | 8 | 9 |
|--|--------------|--------------|--------------|--------------|--------------|
| O&M Cost: PV | (106) | (109) | (112) | (115) | (118) |
| Utility Bill Savings with Inflation Applied | 4,360 | 4,471 | 4,585 | 4,702 | 4,821 |
| Tax Savings from O&M Expense Deduction | 41 | 43 | 44 | 45 | 46 |
| State Straight Line Depreciation Tax Savings | 305 | 305 | 305 | 305 | 305 |
| Net Annual Cash Flow | 4,600 | 4,710 | 4,822 | 4,937 | 5,054 |
| Cumulative Cash Flow | (4,535) | 175 | 4,997 | 9,934 | 14,988 |

| Cash Flows in Year | 10 | 11 | 12 | 13 | 14 |
|--|--------------|--------------|--------------|--------------|--------------|
| O&M Cost: PV | (9,332) | (125) | (129) | (132) | (136) |
| Utility Bill Savings with Inflation Applied | 4,944 | 5,069 | 5,198 | 5,330 | 5,465 |
| Tax Savings from O&M Expense Deduction | 3,639 | 49 | 50 | 51 | 53 |
| State Straight Line Depreciation Tax Savings | 305 | 305 | 305 | 153 | 0 |
| Net Annual Cash Flow | (444) | 5,298 | 5,424 | 5,402 | 5,382 |
| Cumulative Cash Flow | 14,544 | 19,842 | 25,266 | 30,668 | 36,050 |

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Cash Flow Details for the System

| Cash Flows in Year | 15 | 16 | 17 | 18 | 19 |
|---|--------------|--------------|--------------|--------------|--------------|
| O&M Cost: PV | (140) | (144) | (148) | (152) | (156) |
| Utility Bill Savings with Inflation Applied | 5,603 | 5,745 | 5,889 | 6,038 | 6,191 |
| Tax Savings from O&M Expense Deduction | 55 | 56 | 58 | 59 | 61 |
| Net Annual Cash Flow | 5,518 | 5,657 | 5,799 | 5,945 | 6,096 |
| Cumulative Cash Flow | 41,568 | 47,225 | 53,024 | 58,969 | 65,065 |

| Cash Flows in Year | 20 | 21 | 22 | 23 | 24 |
|---|----------------|--------------|--------------|--------------|--------------|
| O&M Cost: PV | (12,300) | (165) | (169) | (174) | (179) |
| Utility Bill Savings with Inflation Applied | 6,346 | 6,507 | 6,670 | 6,838 | 7,009 |
| Tax Savings from O&M Expense Deduction | 4,797 | 64 | 66 | 68 | 70 |
| Net Annual Cash Flow | (1,157) | 6,406 | 6,567 | 6,732 | 6,900 |
| Cumulative Cash Flow | 63,908 | 70,314 | 76,881 | 83,613 | 90,513 |

| Cash Flows in Year | 25 | 26 | 27 | 28 | 29 |
|---|--------------|--------------|--------------|--------------|--------------|
| O&M Cost: PV | (184) | (189) | (195) | (200) | (206) |
| Utility Bill Savings with Inflation Applied | 7,185 | 7,365 | 7,550 | 7,738 | 7,931 |
| Tax Savings from O&M Expense Deduction | 72 | 74 | 76 | 78 | 80 |
| Net Annual Cash Flow | 7,073 | 7,250 | 7,431 | 7,616 | 7,805 |
| Cumulative Cash Flow | 97,586 | 104,836 | 112,267 | 119,883 | 127,688 |

| Cash Flows in Year | 30 | 31 | 32 | 33 | 34 |
|---|--------------|----------|----------|----------|----------|
| O&M Cost: PV | (211) | 0 | 0 | 0 | 0 |
| Utility Bill Savings with Inflation Applied | 8,129 | 0 | 0 | 0 | 0 |
| Tax Savings from O&M Expense Deduction | 82 | 0 | 0 | 0 | 0 |
| Net Annual Cash Flow | 8,000 | 0 | 0 | 0 | 0 |
| Cumulative Cash Flow | 135,688 | 0 | 0 | 0 | 0 |



Sensitivity Analysis: Utility Rate Inflation Scenarios

Sensitivity Analysis is a process of analyzing possible future events by considering alternative possible outcomes.

The average change in utility rates (inflation) over the system life is perhaps the variable which may most affect the return on your investment. The following table summarizes how utility rate inflation may impact your investment. The project, as quoted, is compared to utility rate inflation that averages -5%, 0% and +5% over the system life.

| | <u>As Quoted</u> | <u>-5% Inflation</u> | <u>0% Inflation</u> | <u>+5% Inflation</u> |
|---|------------------|----------------------|---------------------|----------------------|
| Total Utility Savings: | \$174,061 | \$54,455 | \$107,645 | \$246,252 |
| Cash Gained over Life: | \$135,688 | \$16,082 | \$69,272 | \$207,879 |
| Return on Initial Cash Invested (IRR): | 15.7% | 5.8% | 12.2% | 17.9% |
| Wealth Created Over System Life (NPV): | \$49,562 | \$1,394 | \$24,075 | \$75,665 |

Utility Inflation, as Quoted: Electric Rates: 3.00%

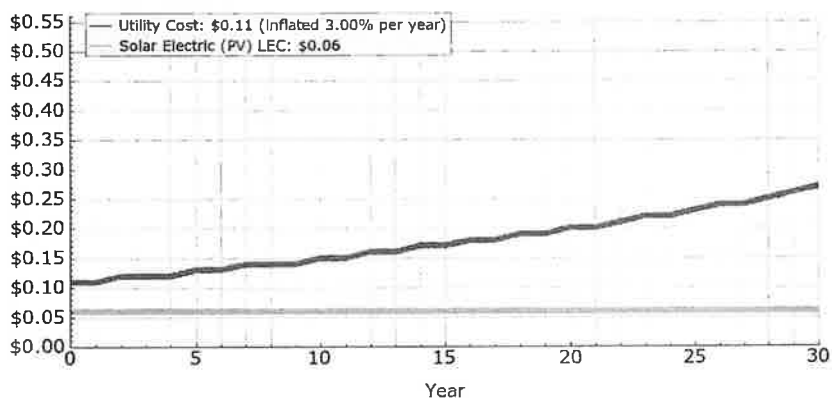
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Levelized Energy Cost (LEC)

Your Hedge Against Utility Inflation: Your investment in this project will protect you from utility rate inflation. Levelized Energy Cost (LEC) analysis provides us with a "hurdle rate" (the levelized energy cost) which can be compared to the expected change in utility rates (by way of utility rate inflation). LEC is the average lifetime cost of energy produced by a particular system. We can compare the LEC to the current utility rate and its expected change in price as time goes on. In this manner one can judge the investment as a "better bet" than utility rates to contain energy costs. Represented below is the average cost of utility energy versus the cost of energy produced (LEC) by your system over time.

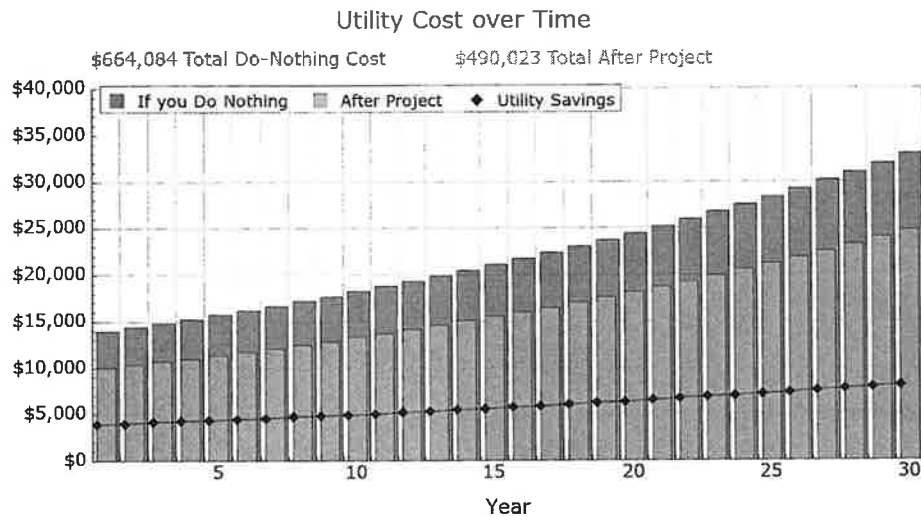
Electric: Levelized Energy Cost (LEC)

\$/kWh: Utility vs. System Levelized Energy Cost (LEC)



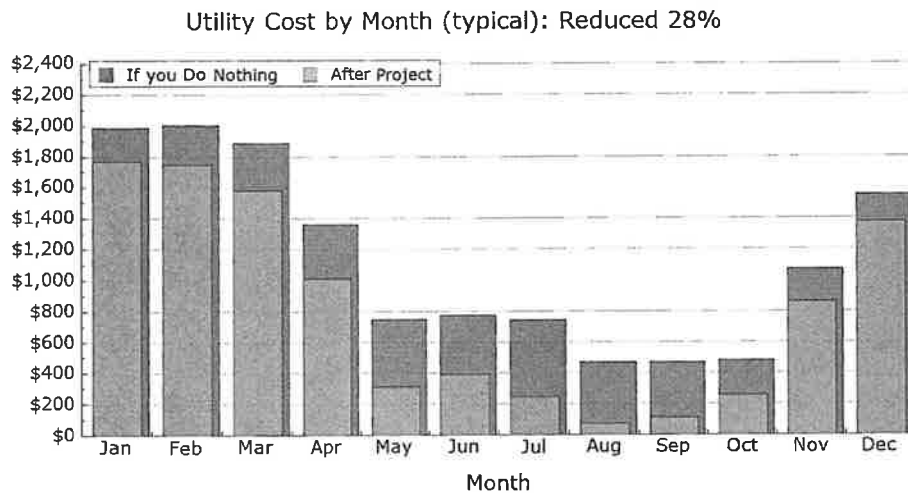
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The Cost of Doing Nothing



Your Hedge Against Utility Inflation: Your investment in this project will protect you from utility rate inflation.

Utility Cost by Month



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Carbon Footprint

Your carbon footprint will be reduced. Over the life of your system 863 tons of carbon dioxide (CO₂) will be eliminated from your footprint. Equivalent to:



Planting 20,108 trees.



Driving reduced by 1,726,000 auto miles, or 88,026 gallons of gasoline.



Recycling 2,727 tons of waste instead of sending it to landfill.



Displacing CO₂ emissions from the annual electric use of 98 homes.



840,926 pounds (420.5 tons) of coal burned.



and you will help avoid the use of up to 21,060,000 gallons of water by Thermoelectric Powerplants.

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Other Assumptions Used in this Analysis

Customer Type: Business/Commercial.

Tax Effects Applied to Utility Savings: We have assumed utility bill savings will not increase your income tax liabilities. As a business customer, utility savings may result in lower business expenses (a tax deduction or "write off") for utility services.

System Life: PV System: 30 years. Inverters: 10 years.

PV System Modeling Variables (PVWatts references): System Losses: 9.5%, DC-to-AC Ratio: 1.24, Module Type: Standard, Inverter Efficiency: 97.00%.

Performance Degradation and O&M Costs: We have assumed performance will degrade by 0.60% per year due to soiling and general wear. Annual operating and maintenance (O&M) costs are inflated 2.80% per year, and are estimated as a percent of gross system price, as follows: Solar Electric (PV): 0.15%.

Income Tax Rates: Federal: 32.00%, State: 7.00%

Annual Inflation Rates: Consumer price index: 2.80%, Electric Rates: 3.00%

Energy Metering Type: Net Metering

Net Excess Generation (NEG): Monthly NEG credited at Utility Rate. Monthly NEG may be carried forward to the next month for application to future utility bills. Annual NEG sold at \$0.03350 per kWh.

Discount Rate: 5.00%. Used to estimate net present value of future cash flows.

Depreciation Methods: Federal: 100% Bonus MACRS Schedule. State: Straight-Line Schedule (12 yr).

| Amounts Depreciated by Year | 0 | 1 | 2 | 3 | 4 |
|-----------------------------|---------|----------|---------|---------|---------|
| Federal (\$52,318 total) | \$0 | \$52,319 | \$0 | \$0 | \$0 |
| State (\$52,318 total) | \$0 | \$2,186 | \$4,357 | \$4,357 | \$4,357 |
| Amounts Depreciated by Year | 5 | 6 | 7 | 8 | 9 |
| State | \$4,357 | \$4,357 | \$4,357 | \$4,357 | \$4,357 |
| Amounts Depreciated by Year | 10 | 11 | 12 | 13 | 14 |
| State | \$4,357 | \$4,357 | \$4,357 | \$2,186 | \$0 |

Carbon Dioxide (CO2) Calculations: The following assumptions are used to calculate carbon dioxide (CO2) reductions: Electricity: 1.64 lbs. CO2 per kWh. Natural Gas: 0.12 lbs. CO2 per cubic foot (12 lbs. per Therm). Fuel Oil: 22.29 lbs. CO2 per gallon. Propane: 12.17 lbs. CO2 per gallon. Trees Planted: 0.0429 tons CO2 per Tree planted (23.3 Trees/Ton CO2). Automobiles Saved: 1 lb CO2 per mile for medium passenger car (2,000 Miles/Ton CO2). Gallons Gasoline: 0.009812 tons CO2/gallon (102 Gal/Ton CO2). Landfill Tons: 3.16 tons CO2 per ton of waste recycled instead of landfilled. Single-family Homes (electric use): 8.82 tons CO2/home (0.11 Homes/Ton CO2). Tons of Coal Burned: 2.0525 lbs. of CO2 per lb. of Coal (2,000 lbs. per ton). Source: www.epa.gov/cleanenergy/energy-resources/refs.html

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Water used by Thermoelectric Powerplants: Depending upon the technology used, natural gas and coal power plants withdraw up to 20 gallons of water for every kWh of energy produced and consume (via evaporation) about 0.47 gallons per kWh produced. Sources: <http://nrel.gov/docs/fy04osti/33905.pdf> and <http://www.wri.org/resources/charts-graphs/typical-range-water-withdrawals-and-consumption-thermoelectric-power-plants> which summarizes the Electric Power Research Institute's report *Water & Sustainability (Volume 3): U.S. Water Consumption for Power Production - The Next Half Century*



PV Production by Year

PV system production will vary according to weather patterns, changes in obstacles that may shade the PV panels, and the like. Over time system production may also "degrade" due to general soiling and other effects of aging. The table below provides a range (+/- 20%) of typical annual production values for the system, by year, with an annual performance degradation of 0.60% included. The "Typical" values were used to provide this report.

| <u>Year</u> | <u>Low Typical</u> | <u>Typical</u> | <u>High Typical</u> |
|---------------|--------------------|--------------------|----------------------|
| 1 | 28,080 kWh | 35,100 kWh | 42,120 kWh |
| 2 | 27,912 kWh | 34,889 kWh | 41,867 kWh |
| 3 | 27,743 kWh | 34,679 kWh | 41,615 kWh |
| 4 | 27,575 kWh | 34,468 kWh | 41,362 kWh |
| 5 | 27,406 kWh | 34,258 kWh | 41,109 kWh |
| 6 | 27,238 kWh | 34,047 kWh | 40,856 kWh |
| 7 | 27,069 kWh | 33,836 kWh | 40,604 kWh |
| 8 | 26,901 kWh | 33,626 kWh | 40,351 kWh |
| 9 | 26,732 kWh | 33,415 kWh | 40,098 kWh |
| 10 | 26,564 kWh | 33,205 kWh | 39,846 kWh |
| 11 | 26,395 kWh | 32,994 kWh | 39,593 kWh |
| 12 | 26,227 kWh | 32,783 kWh | 39,340 kWh |
| 13 | 26,058 kWh | 32,573 kWh | 39,087 kWh |
| 14 | 25,890 kWh | 32,362 kWh | 38,835 kWh |
| 15 | 25,721 kWh | 32,152 kWh | 38,582 kWh |
| 16 | 25,553 kWh | 31,941 kWh | 38,329 kWh |
| 17 | 25,384 kWh | 31,730 kWh | 38,076 kWh |
| 18 | 25,216 kWh | 31,520 kWh | 37,824 kWh |
| 19 | 25,047 kWh | 31,309 kWh | 37,571 kWh |
| 20 | 24,879 kWh | 31,099 kWh | 37,318 kWh |
| 21 | 24,710 kWh | 30,888 kWh | 37,066 kWh |
| 22 | 24,542 kWh | 30,677 kWh | 36,813 kWh |
| 23 | 24,373 kWh | 30,467 kWh | 36,560 kWh |
| 24 | 24,205 kWh | 30,256 kWh | 36,307 kWh |
| 25 | 24,036 kWh | 30,046 kWh | 36,055 kWh |
| 26 | 23,868 kWh | 29,835 kWh | 35,802 kWh |
| 27 | 23,700 kWh | 29,624 kWh | 35,549 kWh |
| 28 | 23,531 kWh | 29,414 kWh | 35,297 kWh |
| 29 | 23,363 kWh | 29,203 kWh | 35,044 kWh |
| 30 | 23,194 kWh | 28,993 kWh | 34,791 kWh |
| Totals | 769,111 kWh | 961,389 kWh | 1,153,667 kWh |



Renewable Resources

The following renewable resource assumptions were used to develop estimates for the project location. These are typical values based upon observed data over several decades. Actual values (and system performance) will vary from month to month, and from year to year, in accordance to weather and climate pattern changes.

Weather station referenced: "LONE ROCK FAA AP" (Wisconsin)

| Solar Resources: Flat-Plate, South-facing Tilted at Latitude | | | | | | | | | | | | |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Month | <u>Jan</u> | <u>Feb</u> | <u>Mar</u> | <u>Apr</u> | <u>May</u> | <u>Jun</u> | <u>Jul</u> | <u>Aug</u> | <u>Sep</u> | <u>Oct</u> | <u>Nov</u> | <u>Dec</u> |
| kWh/m2/day | 3.168 | 3.83 | 3.681 | 4.291 | 4.972 | 4.484 | 5.868 | 4.884 | 4.935 | 2.952 | 3.28 | 2.677 |

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How to Interpret Financial Ratios and Measures

A Measure of Security: Cashflow Payback: 6 years - 6.3 years (modified)

The most common measure of the security of a proposed investment is its payback, defined as the length of time until one gets one's money back. Cashflow Payback is when cumulative cash flow stays positive for good. Modified Cashflow Payback is when the cumulative cash in-flows exceed the total of all cash out-flows over the system life; future maintenance expenses are accommodated.

Profitability Index: 2.2

What PI Means: Generally, if $PI > 1$ then accept the project. If $PI < 1$ then "qualitative" factors may justify the project.

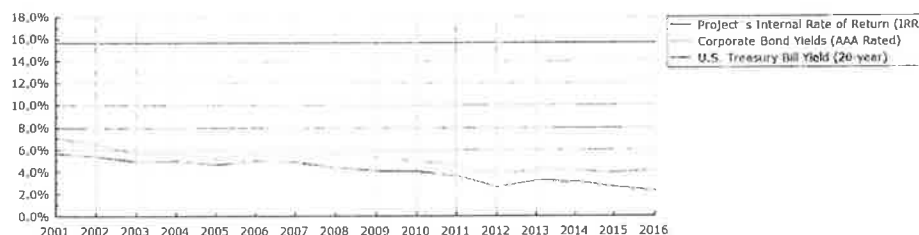
Profitability Index (PI) is a measure of investment efficiency. It identifies the relationship of investment to its return. Profitability Index (PI) is calculated as: (Net-Present Value of the Returns plus the Initial Investment) divided by the Initial Investment. For example: \$43,085 is invested and the NPV of the returns is \$49,562, then the $PI = (\$43,085 + \$49,562) / \$43,085 = 2.2$, or more generically, for every \$1 invested you received \$2.2 in return.

Net Present Value (NPV): \$49,562.

What NPV Means: NPV is an indicator of how much value (wealth) an investment adds to the customer. If NPV is positive then the investment would add value. If NPV is zero or negative then other "qualitative" factors may be of adequate value to justify the project (for example, lengthening a swimming pool season). *Net Present Value (NPV)* is one way to account for the time value of money. NPV calculates the current value of each future cash flow. For example, \$1.00 received two years from now is equivalent to something less today, if it can be invested now at some interest rate. This allows us to "discount" the cash flows (whether positive or negative) that the proposed investment is expected to generate at various times in the future back to their equivalent value today (that is, their "present value"). If one then subtracts the cost of the proposed investment from the sum of the present values of the ongoing cash inflows, one obtains the net present value (NPV) of the investment.

Internal Rate of Return (IRR): 15.7%

Internal Rate of Return (IRR) is a common measure of investment efficiency. Equivalent to the yield to maturity of a bond. The internal rate of return (IRR) is the annualized effective compounded rate of return earned on the invested capital.



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Measures of Predictability: Using "hurdle rates" Levelized Energy Cost (LEC)

Solar Electric (PV): \$0.06 per kWh

Another dimension of concern about a proposed investment is the predictability of its anticipated costs and returns, which requires measures of the uncertainty associated with them. Levelized Energy Cost (LEC) analysis provides us with a "hurdle rate" (the levelized energy cost). LEC is the average lifetime cost of energy produced by a particular system. We can compare LEC to the current utility rate and its expected change in price as time goes on. In this manner one can judge the investment as a "better bet" than utility rates to contain energy costs.

Assessing Option Value: The option value of a proposed investment represents the value of future opportunities that would be made available only if the investment were made. Like the ante in a poker game, the investment may promise no return other than the opportunity to look at the cards being dealt, at which point one can either fold or "exercise the option" by making additional investments in an attempt to win the pot. To realize future value here new investments are not necessarily required to "exercise the options" - ownership is enough. In the case of renewable energy systems in general, there are primarily two opportunities, or options, which may have future value: Property value appreciation, and Renewable energy certificates (RECs or SRECs):

Renewable Energy and/or Carbon Credits or Certificate (REC or SREC): Renewable Energy Certificates (sometimes called "solar renewable energy credits/certificates" - SRECs, S-RECs, or simply RECs) are a new and evolving method to ascribe future financial value to a renewable energy system. RECs represent the bundle of legal rights to the "green" part of each unit of energy produced by a renewable energy system. This green part can be sold for a value, which generates additional revenue for the seller. These certificates can be sold and traded or bartered and the owner of the REC can claim to have purchased renewable energy.