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Sunny Expose
A Tax and Managerial Accounting Case

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ABSTRACT

Residence owners who install solar panels, and certain other sustainable energy property, currently receive an energy tax credit. The homeowner usually has the option to purchase energy from a producer who installs and owns panels placed on the property. Theoretically, the producer will pass on at least part of the tax benefits to the homeowner in the form of reduced pricing. This case allows instructors to analyze many of the issues, including how much of the benefit really accrues to the homeowner (cost and benefit analysis) and basic capital budgeting decision. Other policy issues can be addressed.

INTRODUCTION

This case involves a two-party Power Purchase agreement that can be adapted for upper division undergraduates and graduate students.

The authors, including a graduate student who completed the materials at the end of this proposal, organize the information used by the student in revising the case and prepare detailed teaching notes, plus collected other information that is required.

SOURCES OF INFORMATION

Information that is available was collected, or shall be collected by the student:

- Cost of the system if purchased outright (the purchaser enjoys the tax benefits, primarily the federal tax credit).
- The required rate of return or the discount rate.
- The expected rate increase in the standard electricity from a utility company.
- The terms of the power purchase agreement (the purchaser pays for the electricity, but the provider retains the tax benefits, including the federal and state tax credits and depreciation).
- The anticipated production of electricity and the price if the electricity is purchased instead.

Alternatively, the student could be asked to locate this information from the following website, or another online site: https://www.energysage.com/.

QUESTIONS

Instructors can ask subjective questions, including one or more of the following:

1. Calculate the payback period for the outright purchase.
2. Calculate the net present value (NPV) of the outright purchase. Compare the result to the present value of the lease payments. The model should be constructed so as to allow variations in the discount rate, and perhaps other variables like system life and inflation assumption
3. Evaluate the costs and lives of solar panels, and based on projected output, estimate the full absorption cost of production, and based on your conclusions, develop a pricing model for the producer.
4. What are the likely economic effects of the phase down and eventual repeal of the renewable energy credits beginning in 2019?
5. Based on the answers to the previous questions discuss which option is better: leasing the solar energy system or purchasing the system outright.

TEACHING NOTES

Facts

Your client, Sunny Expose' ("Sunny"), was contacted by SunRun Corporation ("SunRun") offering to install an 8kW solar energy system (the "System") at Sunny's property. SunRun offered Sunny two options to install the System. The first option was a power purchase agreement for the System and the second option was for Sunny to purchase the System outright from SunRun.

Issue

Which of SunRun's options is better from a tax and financial perspective for Sunny?

Scope and Assumptions

To provide this opinion we have made several assumptions and estimates regarding information which was not provided to us so we could arrive at this opinion. For example, we assume Sunny is considering having the System installed on a single family residential home in San Diego County. We have estimated the cost of the System and the performance of the System because we have not been provided with any bids or proposed agreements from SunRun. Furthermore, the scope of this analysis is limited to the tax and financial benefits of the system. Sunny may want to consider other factors when deciding which option to select to install the System. Other such factors include but are not limited to maintenance of the system, legal issues such as liability and construction/installation issues, eligibility to claim the whole amount or partial

tax credits and variability in annual cash inflow. Changes to any of the above listed facts or information may cause us to change our opinion.

Analysis

According to Sunny, SunRun's first option was a power purchase agreement. In general, a solar energy power purchase agreement is a lease agreement. This means the installer owns the solar energy system. The installer is responsible for the costs to install the system, is entitled to the system's tax benefits, including cost recovery deductions and the energy tax credit, and is responsible for maintaining the system.

In return, the lessee pays a monthly fee to the installer for the use of the system. The lessee may also be responsible for any excess electrical costs owed to the local utility company. The intended purpose of such agreements is the lessee's costs pursuant to the agreement will be less compared to when they did not have a solar energy system and the installer will make a profit from the agreement.

The advantage to the lessee in a power purchase agreement is they incur no installation or maintenance costs related to the system. The disadvantages to the lessee is they are not entitled to the tax benefits of the system and they share the solar energy savings with the installer. However, if the market is efficient, the investor does share, or pass on, the tax benefits with the customer in the form of reduced energy costs.

SunRun's BrightSave Monthy Program (Lease)

According to SunRun's website it has a program called BrightSave Monthly ("BrightSave") which has the characteristics of a leased power purchase agreement.

We summarize the obligations of SunRun and Sunny pursuant to the BrightSave program according to SunRun's website. SunRun would own the System, be responsible for the costs to install and maintain the System, and be entitled to the tax benefits from the System.

The System would save Sunny up to 20% on his electrical bill. Other sources state power purchase agreements save the lessee between 10% and 30% on their electrical bill. Sunny would make monthly payments (most companies will increase that monthly payment by 2.9% each year) to SunRun. The term of the lease would be twenty years.

System Purchase (User Ownership)

According to Sunny, SunRun made a second offer which was Sunny would purchase the System outright from SunRun. This type of arrangement is much simpler than a power purchase agreement. In an outright purchase the solar energy company installs a solar energy system on the purchaser's residence in exchange for monetary consideration. The purchaser then owns the system and is entitled to all the benefits and obligations of the system.

The advantage to the purchaser is they are entitled to the tax benefits for the system and the full solar energy savings for the system. The disadvantage for the purchaser is they are responsible for the costs to install and maintain the system.

SunRun has a program called BrightBuy which would enable Sunny to buy the System outright from SunRun and own the System. SunRun's fees to install an 8kW system are $29,000.00.

Other sources state an 8kW system costs between $15,904.00 and $20,272.00 in California.

Sunny would be responsible for paying SunRun for the installation costs, paying for the maintenance of the System and would be entitled to the tax benefits from the System. SunRun's

website does not state by what percentage the purchased System would reduce Sunny's electricity costs. Another source state purchased systems reduces electricity costs by 40% to 70%.

Tax Credit and Financial Incentives

We now address the tax benefits and incentives of the System. The primary tax benefit possibly available to Sunny is the Solar Investment Tax Credit ("ITC") set forth by IRC §25D et seq. It entitles the owner of a solar power system to a federal tax credit of 30% of the installation costs of the system in the year it was installed. The tax credit is listed on form 5695 which is filed with taxpayer's taxes. This tax credit would be available to Sunny if she purchased the System from SunRun under the BrightBuy program but not if she leased it pursuant to the BrightSave program. Another incentive is the San Diego Gas & Electric ("SDG&E") Net Metering program ("NMP"). The NMP enables owners of solar energy systems to sell excess solar power generated through their system to SDG&E.

Based on our limited facts we are unable to determine if the System would generate any excess energy which make it eligible for this program. Sunny would likely only benefit from this program if she bought the System from SunRun rather than leasing the System from SunRun. Finally, the State of California created the California Solar Initiative ("CSI") which entitles owners of solar power systems to cash back rebates for installing solar energy systems on their properties. Unfortunately, the rebates have been exhausted and the program is closed for SDG&E customers.

Payback Model (Question 1)

The simplest calculation that is explored is the payback period for a purchased system. There is a wide range of estimates as to the cost of a system. For this question, we assume a 5kW system that could cost $11,655 to $13,305 before the 30 percent federal tax credit; $8,159 to $9,314, after the credit (https://www.solar-estimate.org/solar-panels-101/5kw-solar-system#how-much-does-a-5kw-solar-system-cost).

Assume an average system cost of $8,737 (($8,159 +$ 9,314) / 2)). A 5kW system on a south-facing, unshaded roof could produce 7,517 kWh per year. The average cost of electricity in the U.S. is $0.1301/kW; but in California, that jumps to $0.1939, and in San Diego, $0.2110 (https://www.google.com/search?source=hp&ei=aPMjXOfTKM61tgX-sLuwBQ&q=cost+of+electricity+in+san+diego&btnK=Google+Search&oq=cost+of+electricity+in+san+diego&gs_l=psy-ab.3..0j0i22i30l3.2308.10330..11064...0.0..0.354.3756.27j5j0j2.....0.0...1..gws-wiz.....0..0i131j0i10.YPAQCHLvyMg). The total annual cost of 7,517 units across the U.S. would be $977; $1,458, across California; $1,586, in San Diego. The payback period would be 8.93 years' average across the U.S.; 5.99, across California; and 5.51 in San Diego.

This is consistent with payback periods reported on the internet (https://news.energysage.com/understanding-your-solar-panel-payback-period/). The benefits for having students do this calculation are applying the payback model for themselves (showing their calculations and sources), finding resources and evaluating them, and effectively communicating their results.

Net Present Value Analysis (Question 2)

We performed a net present value analysis of the future expected cash flows of the purchase option for the System. We used the above used in the payback model. We calculated the initial costs and returns over 20 years because that is the length of the BrightSave lease. A 2% discount

rate was used, which is considered conservative, due to the fact that utility charges are expected to increase over time. Perhaps a zero-discount rate, or lower, could be justified. In general, the

Year	Present Value Solar Savings	Current Cost
0		$8,737
1	$1,458	
2	$1,429	
3	$1,401	
4	$1,374	
5	$1,347	
6	$1,321	
7	$1,295	
8	$1,269	
9	$1,244	
10	$1,220	
11	$1,196	
12	$1,173	
13	$1,150	
14	$1,127	
15	$1,105	
16	$1,083	
17	$1,062	
18	$1,041	
19	$1,021	
20	$1,001	
Total		$24,317

required rate of return should reflect the return that Sunny could expect to receive elsewhere for an investment of comparable risk. For example, if Sunny can pay off their credit card debt and save 15% interest, then 15% should be used as the required rate of return.

The model that is shown below reveals production valued at $24,317 (present value of comparable off-grid energy) versus a current cost of $8,737. This represents a $15,508 advantage over grid-provided energy.

Any maintenance costs (e.g., panel or inverter replacement) are ignored due to the fact that they vary widely and are difficult to estimate.

Reliable lease cost comparisons were not readily available. Available data also indicates that financing costs are significant, and savings can be enjoyed with an outright purchase(https://www.energysage.com/solar/financing/your-financing-options/).

This present value exercise can be enriched by adding sensitivity analysis. To present the basics of NPV, we have assumed that the expected value of solar savings will occur for certain. However, there may be substantial uncertainty in each of the inputs to the NPV calculation.

Instructors could provide cost estimates and have students do analyses with varying utility charge inflation rates and/or varying discount rates.

Pricing Model for the Producer (Question 3)

The expectations for solar panel productivity is generally that panels will maintain 80 percent of their production after 25 – 30 years (https://news.energysage.com/how-long-do-solar-panels-last/). They will probably continue to produce after that. On the supply side, sellers will evaluate their costs and typical markups. On the demand side, they will consider the present value of the savings to customers. Negotiated prices will fall between these two markers.

Phase-down and Elimination of Incentives (Question 4)

The cut-back in the solar credit beginning in 2020 is certain to have an effect on the market. First, the credit is some ways a subsidy that benefits the producer and the consumer. The dynamics in the marketplace will certainly affect how the credit is shared, and before credit prices might decline. Other factors such as continuous declines in product costs and changing tariffs will play a role (https://www.utilitydive.com/news/can-the-price-of-rooftop-solar-keep-falling/539612/). In short, the subsidized industry will adapt in order to maintain a market. Perhaps the after-credit cost will remain somewhat stable as the industry matures.

Some argue that these tax breaks create unfair market conditions favoring the companies that benefit from them. In a speech to the House Committee on Science, Space, and Technology's Subcommittee on Energy titled "Subsidies Are the Problem, Not the Solution, for Innovation in Energy," Veronique de Rugy from the Mercatus Center, addressed the issues with government intervention in the energy market saying, "policymakers, instead of the market, pick winners and losers." These huge tax rebates if continued into the future would show blatant favoritism on the behalf of the government to certain industries over others. The gradual reduction of these tax breaks would allow for the market to operate normally and for fair competition to decide the winner and losers. It would also force solar energy companies to find ways to make their product cheaper as there will no longer be the incentive brought about by tax rebates which would be beneficial to anybody interested in purchasing solar panels.
(https://www.mercatus.org/publications/government-spending/subsidies-are-problem-not-solution-innovation-energy).

Another perspective is that that the solar market has matured since the price of solar power has been greatly reduced. According to a study, "Futurism predicts a drop of another 25% by the year 2022 (Sendy, Andrew. "Will Congress Extend The 30% Solar Tax Credit Beyond 2020?." *Solar-Estimate*. N. p., 2018. Web. 19 Apr. 2019)." How does that compare against the 2019 tax credit? Currently, with the average price of a solar installation is $15,800 and a 30% tax credit, the net price of solar power installation would be $11,060. If the current price was to be reduced by 25%, that would lead to the net future cost being $11,850, 7.18% higher than the net cost today. Depending on the elasticity of consumers, this could deter some from making the purchase and cut into solar panel sales in the United States, or not.

Overall Recommendation (Question 5)

Generally, one would expect ownership to be more attractive than leasing. In addition to the leasing rate increases by 2.9% annually, leasing involves another level of profit (the leasing party) and often unknown financing costs. If the buyer has good credit, the financing costs are known and can be managed. The extra level of profit is avoided.

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