For Your Information *EG-6*

MAKING THE DECISION TO GO SOLAR

If you are thinking about installing a solar photovoltaic (PV) system on your home, there are a number of important factors to consider and many online resources that are worth consulting. This brief guide will answer some basic questions and provide links to additional sources of information. ***Please note: the Public Utilities Commission does not regulate companies that sell, lease and/or install PV systems.***

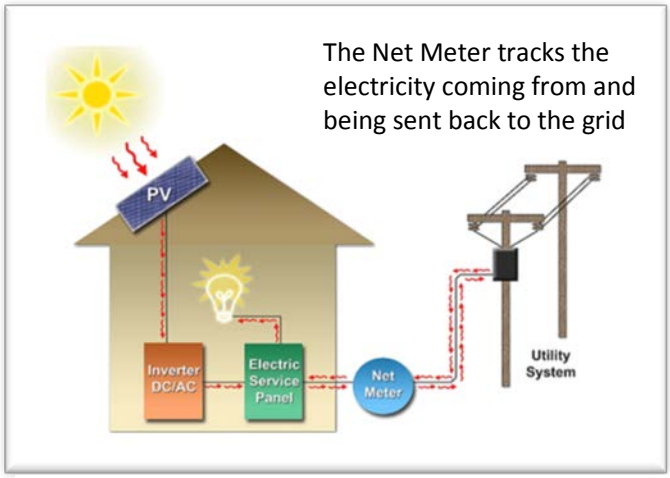
WOULD SOLAR PANELS BE EFFECTIVE ON MY HOME?

Solar panels need access to the sun. If there is foliage shading your roof, solar panels may not receive enough energy to be effective. In addition, you need a roof with a southern orientation that is large enough to support multiple solar panels. A reputable solar provider will assess the suitability of your home to support an appropriately-sized and oriented PV system, so be sure to ask for the details of this analysis. For a more complete discussion, see these guidelines from the Department of Energy: http://energy.gov/energysaver/articles/planning-home-solar-electric-system. This DOE publication may also be helpful: http://www1.eere.energy.gov/solar/pdfs/43844.pdf

http://www.greenbeltsolar.com/solar_shading_article.htm

WILL INSTALLING A PV SYSTEM MAKE ME "ENERGY INDEPENDENT?"

Probably not. Some people find solar energy attractive because they believe they will be "off the grid." However, this would require a battery backup system to store excess electricity generated by the PV system and provide it whenever the sun is not shining. An off grid-system would not qualify for utility incentives and, at current battery costs, would be significantly more expensive than a grid-connected system. For now, off-grid systems in Colorado are only economically justified for remote locations that do not have existing utility service. This guide addresses grid-connected PV systems.



http://www.everblue.edu/blog/net-metering-legislative-crossroads

By law, most utilities in Colorado must offer net-metering for small on-site PV systems. As currently implemented, Net Metering (NM), also known as Net Energy Metering (NEM), is an electricity tariff billing mechanism that enables a utility customer to generate electricity on site to offset the customer's load and deliver any excess electricity to the utility in exchange for an equal amount of electricity from the utility at other times. See this Xcel Energy publication for more details: CO-SR-Metering-and-Billing-FAQs.pdf

WHICH IS BETTER – PURCHASING THE PV SYSTEM OR USING A THIRD-PARTY PROVIDER?

This depends on your specific circumstances. The third-party provider model means that you do not own the PV system. Instead you make payments to a third-party owner through a lease or power-purchase agreement (PPA). If you can afford to purchase a system either outright or by obtaining financing, you should compare the economics of all of your options.

While the total cost of PV systems has been declining every year, the net cost to you depends on several factors, including the availability and level of utility incentives and federal and state/local tax credits, and the terms of your purchase, lease or PPA. Whether you are interested in buying the PV system, prefer the third-party model or have not determined which makes more sense, you will want to get quotes from more than one provider. Three is generally recommended. Be sure to research your options and the potential providers[1] and consider talking to a financial professional about this investment.

Colorado State University Extension has published a consumer guide with tips for considering PV leasing: CSU Guide. Also consult this DOE guide comparing owning to leasing/PPAs: DOE Guide

Solar Lease/PPA versus Customer Ownership

FINANCING OPTION	UPFRONT COST	MONTHLY COST	20-YEAR BENEFIT	SYSTEM OWNED BY
$0-down Lease / PPA	—	$$$	$	Solar Co.
Prepaid Lease / PPA	$$$	—	$$$	Solar Co.
Custom Lease / PPA	$	$	$$	Solar Co.
Purchase	$$$$	—	$$$$	You
Purchase with loan	—	$$	$$	You

http://www.energysage.com/solar/financing/comparing-solar-loans-vs-solar-leases

HOW DO I EVALUATE THE COST/SAVINGS ANALYSIS AND COMPARE MY OPTIONS?

Once you have quotes from one or more PV companies, you will need to evaluate how the costs compare to the savings over time. If such an analysis is presented by the provider, make sure that you understand the assumptions that went into the calculations and pay particular attention to the following factors:

- What is the assumed annual increase in the rate you pay your utility for electricity? If this value is higher than the increase that actually occurs, your savings will be lower than portrayed by this analysis.
- When do the advertised savings occur? Savings are less certain if they are realized towards the end of the contract (since future utility rates are unknown) and are worth less today (due to the time value of money).
- If you are evaluating purchasing the system:
  - Does the analysis include the cost of replacing the inverter? [2]
  - If you are financing the PV system, does the analysis accurately portray the loan payments and any tax credits (e.g., for a home equity loan)?
  - Will you recoup the investment tax credit as portrayed?
  - What are the warranty terms? Does the warranty apply for the entire period that is evaluated?
  - Will there be implications for homeowner's insurance? You should ask your homeowner's insurance provider how installing rooftop PV will affect your policy.

[1] Ask for references and see, for example, http://www.bbb.org/ or http://www.solarreviews.com/

[2] Inverters are the devices that convert the direct current (DC) produced by the PV panels to the alternating current (AC) used in your house. Inverters generally have a lifespan of less than 20 years. Use the warranty term for a conservative estimate.

- If you are evaluating paying a third-party owner:
    - Are all maintenance and equipment replacement costs included in the estimate? For example, the inverter(s) will need to be replaced.
    - Are the monthly or per kWh payments fixed or do they increase each year? If they increase, what is the escalation rate?
    - What guarantees are included in the contract? If a lease arrangement is offered, is the monthly PV production guaranteed? What happens if production is lower than promised? Are the terms of the contract guaranteed for the entire period?

Be aware that the price you pay for electricity service could change over time in a way that impacts the savings analysis. For example, most residential customers now pay a small fixed monthly charge for "Service and Facilities" (currently $7.53 for Xcel customers) and the remainder of their monthly bill depends on the amount of electricity used (i.e., the number of kilowatt hours (kWh)). A PV system offsets the kWh through "net-metering," potentially leaving zero net usage charges. However, if the rate structure for residential customers changes, customers may be asked to pay a larger fixed amount each month. That would reduce the estimated cost savings for installing a PV system.

http://realtybiznews.com/solar-companies-donate-solar-arrays-to-dallas-habitat-for-humanity-homes/9876577/

A detailed look at these and other considerations was provided by a solar financial analyst in this 2009 paper: http://www.ongrid.net/papers/PaybackOnSolarSERG.pdf

You can also do your own calculations to determine how the costs and savings are likely to work out. See, for example: http://www.find-solar.org/index.php

ARE THERE OTHER ISSUES I SHOULD CONSIDER?

- The amount of electricity you use determines the appropriate size for your PV system. If you can reduce your electricity use through energy efficiency measures (e.g., replacing incandescent with CFL or LED light bulbs), you will need a smaller PV system.
- To qualify for net-metering, on-site PV systems cannot produce more than 120% of the customer's average annual electricity consumption. You should confirm that your provider is not proposing a system that would exceed this level of production. Also, if you are an Xcel Energy customer and elect to be paid for any excess generation at the end of the year (rather than continuously rolling over the excess), you will only earn the average hourly incremental cost of electricity. In recent years this value on Xcel Energy's system has ranged from 1.7 to 2.9 cents per kilowatt hour (kWh). Check with your electricity provider to determine its specific policy for net-metering.
- Make sure you know the implications for either an owned or third-party system if you decide to sell your home or need to replace your roof.
- By committing to a long-term investment or contract, be aware that you may be unable to take advantage of technological innovations in solar.
- If you purchase the system and receive incentives from your utility, you may need to determine whether those payments are taxable as income.
- Currently, PV systems that are located on and producing power for residential property are exempt from personal property tax in Colorado. (Must be less than 2 MW for customer-owned systems and less than 100 kW for third-party systems.) You should confirm that this is still the case.

ARE THERE OTHER OPTIONS TO OBTAIN SOLAR ENERGY?

If your house is not suitable for a PV system or you do not own a house, you may be able to invest in a Community Solar Garden. Information about Xcel Energy's program is available here: Xcel CSG
And information about Black Hills' program is available here: Black Hills CSG

If you are not an Xcel or Black Hills customer, contact your electricity provider to determine whether there are any Solar Gardens to which you could subscribe.[3]

WHERE CAN I LEARN MORE ABOUT ROOFTOP SOLAR PV?

If you are a customer of Xcel Energy or Black Hills Energy, check their websites for information about the incentives they offer and the required process for installing a grid-connected PV system.

Xcel Energy: https://www.xcelenergy.com/programs_and_rebates/residential_programs_and_rebates/renewable_energy_options_residential/solar/available_solar_options/on_your_home_or_in_your_yard/solar_rewards_for_residences

And see in particular Xcel's "Frequently Asked Questions" (FAQ) publication. Many of the questions are relevant to anyone considering a grid-connected PV system, even if you are not an Xcel customer: https://www.xcelenergy.com/staticfiles/xe-responsive/Admin/Managed%20Documents%20&%20PDFs/CO-Res-Bus-Solar-FAQs.pdf

Black Hills Energy: http://www.blackhillsenergy.com/solar

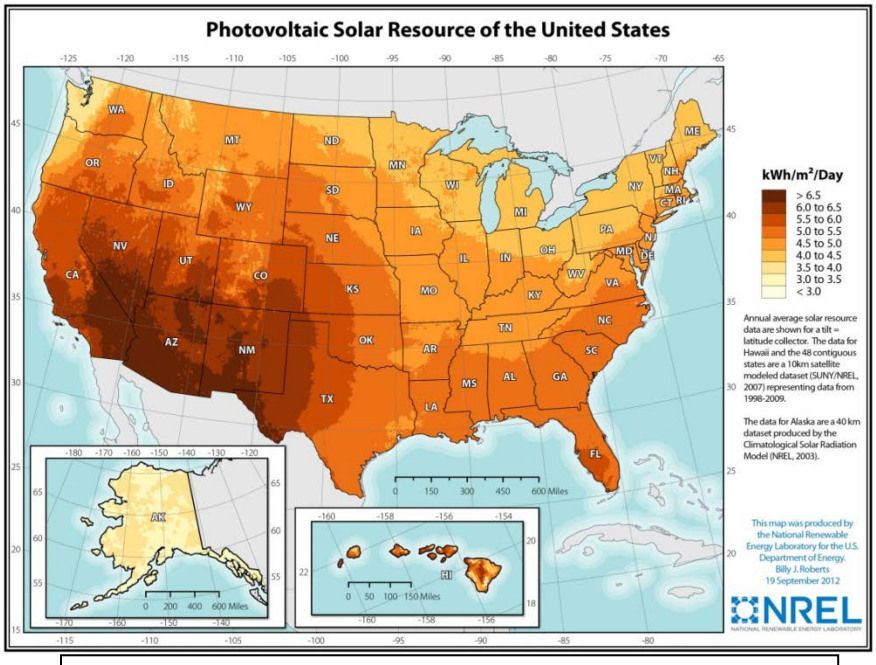
If your electricity provider is a cooperative electric association or a municipal agency, check their website or call them for more information.[2] You can also find information about all Colorado incentive programs and policies related to solar PV at the Database of State Incentives for Renewables & Efficiency (DSIRE) website: http://www.dsireusa.org/

Additional Resources are available from the National Renewable Energy Laboratory (NREL) website. http://www.nrel.gov/learning/re_solar.html

For example, NREL's PVWatts tool lets you calculate expected monthly electricity production based on a PV system's size, orientation and tilt. See http://pvwatts.nrel.gov/

NREL and other DOE Offices also provide information about other renewable energy and energy efficiency options that you may want to research as alternatives to or in conjunction with rooftop PV.

http://energy.gov/public-services/homes/saving-electricity



http://www.nrel.gov/gis/images/eere_pv/national_photovoltaic_2012-01.jpg

[3] A map of and links to Colorado Electric Cooperatives are available here: http://www.coloradorea.org/ColoradoCoops/CoopMapofColorado.aspx.
A map of and links to Colorado Municipal Utilities are available here: http://coloradopublicpower.org/

ADDENDUM – AUGUST 2016

Since this Consumer FYI was originally published in May 2014, a number of new consumer resources have been made available by a variety of organizations. Consult the following for further information:

CSU Extension Energy Resources – Solar Energy (includes links to case studies, DIY Solar Assessment and Solar Lease Financial Calculator): http://extension.colostate.edu/topic-areas/energy/energy-resources-solar-energy/

Sunshot's Homeowner's guide to going solar: http://energy.gov/eere/sunshot/homeowner-s-guide-going-solar

SEIA's Residential Consumer Guide to Solar Power:
http://www.seia.org/research-resources/residential-consumer-guide-solar-power, www.seia.org/consumers

A Checklist for Residential Consumers Considering Solar Energy (IREC – 2016):
http://www.irecusa.org/consumer-protection/consumer-checklist/

A New Mexico HOMEOWNER'S GUIDE TO SOLAR Leases, Loans, and Power Purchase Agreements (July 2015): http://www.emnrd.state.nm.us/ECMD/RenewableEnergy/documents/NMGuidetoSolarFinancing.pdf

Going Solar in America: Ranking Solar's Value to Consumers in America's Largest Cities:
https://nccleantech.ncsu.edu/wp-content/uploads/Going-Solar-in-America-Ranking-Solars-Value-to-Customers_FINAL.pdf

Solar Power for Your Home: A Consumer's Guide (February 2015):
http://www.lsuagcenter.com/portals/communications/publications/publications_catalog/home%20improvement/energy/solar-power-for-your-home--a-consumers-guide

A Homeowner's Guide to Solar Financing (February 2015): http://cesa.org/about-us/member-news/newsitem/cesa-creates-solar-financing-guide-for-homeowners

Homeowners Guide to Leasing a Solar Electric System (July 2014): http://www.nrel.gov/docs/fy14osti/60972.pdf

Financing Home Energy and RE improvements with FHA PowerSaver Loans (July 2014):
http://www.nrel.gov/docs/fy14osti/61936.pdf

Residential Consumer Guide to Community Solar (July 2016)
https://www.communitysolarhub.com/images/uploads/general/Residential_Consumer_Guide_to_Community_Solar_-_FINAL.pdf

CSU Extension – Energy Resources - Home Energy Efficiency:
http://extension.colostate.edu/topic-areas/energy/energy-resources-home-energy-efficiency/

FTC – Something New Under the Sun:
https://www.ftc.gov/news-events/events-calendar/2016/06/something-new-under-sun-competition-consumer-protection-issues

Yahoo finance: http://finance.yahoo.com/news/want-solar-3-ways-started-184600768.html