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A Step-by-Step "How To *Go Solar*" *Guide*

Using New Mexico's New Solar Energy Incentives[1]

Published by the New Mexico Coalition for Clean Affordable Energy, a nonpartisan, nonprofit organization promoting renewable energy and energy efficiency in New Mexico. For more information about renewable energy policy and incentives, visit www.NMCCAE.org. For more information about solar energy, including solar events and workshops, visit the New Mexico Solar Energy Association website at www.NMSEA.org.

[1] Please email comments, suggestions, or questions about this document to Ben Luce at BenLuce@NMCCAE.org, using the email subject heading "Go Solar". This is a work in progress, and we welcome your input.

Note: This document covers only photovoltaic and *active* solar heating systems (systems that utilize solar energy collecting *panels*). For information about *passive* solar energy, please see the **Passive Solar Design Guidelines** and other materials at www.NMSEA.org.

Disclaimer: Use this document at your own risk: The author, the New Mexico Coalition for Clean Affordable Energy, and the New Mexico Solar Energy Association, are not responsible for accidents, injury, financial losses, or any other consequences resulting from or in any way connected with the use of this document.

Introduction

Welcome to the *How To **Go Solar** Using New Mexico's New Solar Energy Incentives* Guide. This guidebook is intended to provide New Mexico residents with a basic introduction to becoming involved with solar energy, following the onset of new solar energy incentives in 2006 and 2007: These incentives include the Solar Market Development Act, adopted by the State Legislature, which creates a personal income tax credit for homeowners, businesses, or agricultural entities that install solar electric or (active) solar heating systems; a photovoltaic power buyback program for customers of PNM, the utility serving the Albuquerque/Santa Fe area; a Federal Solar Tax Credit, a stronger solar rights law, and a sales tax exemption (going into effect after July 1, 2007). We hope you will find this guidebook useful.

How to *Go Solar*:

Step 1: ***Be Patient, and move carefully:*** Plan from the outset to take your time, research your options first, and make your choices carefully. Develop a long-range *energy plan* for yourself. Please keep in mind that although New Mexico's Solar Installation Industry is quite competent, it is still very small, and perhaps not fully equipped yet to meet the increasing demand for solar today due to rising gas costs, environmental concerns, concerns about dependence on foreign energy sources, and now the existence of new federal and state incentives. ***It may take several months to a year to obtain installation services and/or the equipment you're seeking. Please help New Mexico's solar industry grow into a robust and useful part of society by being a patient and well-informed customer.***

Also, don't buy a solar system right away without checking into the eligibility requirements and pre-requisites associated with the various new incentives. First, see the application form and instructions for the federal solar tax credits, which can be found at http://www.irs.gov/pub/irs-pdf/f5695.pdf. Secondly, see the requirements for the NM state solar tax credit. Note especially that the new state solar credits require that systems be *pre-certified*, via an application process, by the New Mexico Energy, Minerals, and Natural Resources Department. The Department has published requirements and forms on their website at www.cleanenergynm.org (see the section on incentives below). These requirements prevent substandard equipment that gave solar a black eye in the '80s. ***Those problems must not reoccur if solar is to thrive!*** Self-installed systems are eligible, but the owner must conform to state self-permitting rules.

Work with reputable installers only: If you can, visit an installer's previous work before you commit, and/or talk with the system owners. Even better, take some time to participate in solar

tours if you can (such as those offered occasionally by the New Mexico Solar Energy Association) or other educational opportunities first, and get a feel for what's working, and who does good work.

Step 2: ***Energy Efficiency:*** Before you start looking into solar systems, first take a look at the energy efficiency of your home or business. Are your gas, propane, or electric bills high? If so, you should invest in *energy efficiency* first. Replace those conventional light bulbs with compact fluorescent lights right away (the new CFLs produce high quality light, and use about 25% of the power that conventional incandescent bulbs use). A high efficiency refrigerator, for example, will use less than 1.5 kilowatt-hours of power per day, whereas many older models use 5 or more. How about those windows? You might add weather stripping and caulking, or perhaps it's time to upgrade to thermal pane windows, or upgrade the insulation of the whole building. Perhaps the furnace needs upgrading to a higher efficiency model. Air leakage is a major loss of heat for many buildings – there are services that can measure leakage with "blower door tests", and help patch things up (for example see www.buildingenergysolutions.com). Of course you don't want the building to be too tight – having some leakage is important. But many older homes have *5 to 10* times the leakage rate that they should – a terrible loss of energy!

There are many other measures for saving energy: Low-flow showerheads, water heater tank wraps, etc. There are some federal incentives for energy efficiency: See http://www.irs.gov/pub/irs-pdf/f5695.pdf (which is the same document for the federal solar tax credits), and EPA's chart of federal incentives: http://www.energystar.gov/index.cfm?c=products.pr_tax_credits#chart. PNM is now also offering rebates to their customers for a variety of gas efficiency measures (see www.pnm.com). Check with your local utility provider for other programs. Other good sources of information on efficiency include the Southwest Energy Efficiency Project (www.SWEEP.org), the Efficient Windows Collaborative (http://www.efficientwindows.org/) the Alliance for Saving Energy (http://www.ase.org - See their consumer info, especially the **Home Energy Checkup**). *Energy efficiency pays, and you should only invest in solar after you have already achieved a high level of efficiency.*

Step 3: ***Next Check for Restrictions on Solar Equipment or Net-Metering (for PV systems):*** When you are reasonably sure you want a solar system of some kind, first find out if there are any restrictions on solar energy systems specific to *your* home or business, such as homeowner association covenants, historical district restrictions, etc. Don't invest in *anything* until you're sure you won't have to remove the system later. There is strong state law protecting your solar rights (see below), but you can still be prohibited in historic districts from installing solar. If there is any doubt, but you are given verbal assurances, get it in writing. If you want to have grid-tied (net-metered) photovoltaics (solar electricity), check with your local utility provider or electric co-op first to make sure they offer it and give full retail credit. Investor-owned utilities, such as PNM, SPS, and El Paso Electric, and New Mexico's many rural electric co-ops, are all required by a Public Regulatory Commission rule to offer "net-metering" for renewable energy systems. But it is our experience that some co-ops may not acknowledge this at first – be persistent. You can contact your PRC Commissioner if there is a problem (see

www.nmprc.state.nm.us). Some, but not all *municipal* utilities also offer now net-metering, such as Los Alamos. Check first!

Step 4: *Protect your solar rights after your system gets built (if there is any chance of your system being shaded)*: New Mexico has a Solar Rights Law that enables you, in most zoning areas, to register and protect your solar rights for certain sufficiently powerful systems, and for devices that convey light into a building, to prevent structures being built next door that will shade your system. *Note however, that you must register your rights after your system is installed before a neighbor applies for a building permit that would infringe your solar rights, and you must inform your neighbors ahead of time.* You register your rights with your local county clerk after your system is installed.

The text of the solar rights law, and further information about the law, can be found at http://www.nmccae.org/Policies/solar_rights_act.htm.

Note that municipalities and counties can regulate, but not "restrict" solar, *except in historic districts*, where they can potentially restrict solar.

Homeowner Association Covenants and such: As of 2007, new language in the law also states that: "A covenant, restriction or condition contained in a deed, contract, security agreement or other instrument, effective after July 1, 1978, affecting the transfer, sale or use of, or an interest in, real property that effectively prohibits the installation or use of a solar collector is void and unenforceable."

What does "effectively prohibit" mean? This language is essentially identical to Arizona law, for which there was a recent legal case. The decision in that case can be downloaded here. This decision essentially gives legal precedent that any prohibition that significantly raises the cost or hampers the output constitutes "effectively prohibiting" a solar installation. We strongly urge people to work proactively with their homeowner associations, and provide them with a copy of this legal decision if necessary.

The definition of a solar collector in the law is:

"solar collector" means any device or combination of devices or elements which rely upon sunshine as an energy source, and which are capable of collecting not less than twenty-five thousand Btu's on a clear winter solstice day, or which is used for the conveyance of light into a building (i.e. solatubes, light shelves, skylights). The term also includes any substance or device which collects solar energy for use in:

1) the heating or cooling of a structure or building;
2) the heating or pumping of water;
3) industrial, commercial or agricultural processes; or
4) the generation of electricity.

A "solar right" in the law means:

"A right to an unobstructed line-of-sight path from a solar collector to the sun, which permits radiation from the sun to impinge directly on the solar collector".

Solar rights are only semi-protected: How much your system can be protected depends on how high neighboring buildings are allowed to build under local codes. The law establishes protection relative to shading created by certain hypothetical walls at the edge of your property. The key section of the law you need to take into account is:

"In the absence of the local regulation of solar rights, the following principles shall apply in addition to those set forth in the Solar Rights Act. If the property burdened by a solar right has or could have improvements constructed to a maximum height of twenty-four feet, then the solar right shall be limited, as to that burdened property, to protecting an unobstructed line-of-sight path from the solar collector to the sun only as to obstructions located on the burdened property which cast a shadow greater than the shadow cast by a hypothetical fence ten feet in height located on the property line of the property on which the solar collector is located. If the property burdened by a solar right has or could have improvements constructed in excess of twenty-four feet in height, but no greater than thirty-six feet, then the solar right shall be limited, as to that burdened property, to protecting an unobstructed line-of-sight path from the solar collector to the sun only as to obstructions located on the burdened property which cast a shadow greater than the shadow cast by a hypothetical fence fifteen feet in height located on the property line of the property on which the solar collector is located. No solar right shall be obtained against property which has or could have improvements constructed in excess of thirty-six feet in height unless so provided in a local ordinance or agreed to by contract. Unless otherwise provided by contract or local ordinance, a person may allow vegetation to grow or construct or plan to construct any improvement which obstructs the protected solar right so long as such obstruction does not block more than ten percent of the collectible solar energy between the hours of 9:00 a.m. and 3:00 p.m. Unless otherwise provided by contract or local ordinance, solar rights shall be protected between 9:00 a.m. and 3:00 p.m. "

From this, and a call to your local zoning authority, you should be to determine *if* you *can* protect your intended system, and whether you should plan to. If you plan to, keep very clear records of everything you do, and every person you talked with and about what. If possible, use written correspondence: Make copies of your letters, and save any responses.

Step 5: *Get a Basic Idea About What Type(s) and Size of System You Want:* Decide *roughly* what type, and what size (what cost range) of solar system you want before you do further research. Regardless of whether there are tax incentives or other incentives, you will likely still have to pay the full system cost upfront, so the unsubsidized cost is still an important variable.

The most common types of systems, their purpose, and their rough price ranges are:

System Type	Purpose	Price Range (sans incentives)
Solar Hot Water System	Provide domestic hot water	$4000-$8000
Large Solar Hot Water System	Space Heating (best with radiant floors)	$10-$20/square foot
(Direct) Solar Hot Air System	Space Heating	$7-$10/square foot
Grid-Tied Photovoltaic System	Solar Electricity (without batteries)	$7-10K/kilowatt (two kilowatts is typical)
Off-grid Photovoltaic System	Solar Electricity (with batteries)	$15K/kilowatt+ (two kilowatts is typical)

Note that there is a wide range of prices quoted above for solar hot water and heating systems. This is because labor tends to be a large fraction of the price, configuration is very site dependent, there is a wide range of options (stainless steel lined tanks vs. regular, etc), and there is very little competition in this market presently. Photovoltaic costs are easier to characterize, but even PV costs can be substantially different depending on whether a system is mounted on a tracker, in a physically challenging site, etc.

Which of these options is best for you depends on why you're interested in solar, how much you can spend, and what kind of site you have, etc.

Solar hot water systems for domestic hot water heating are a relatively simple, cost effective measure that almost anyone with a well exposed roof area can take advantage of.

Large Solar Hot Water Systems for Space Heating are a more serious undertaking, and need a significant amount of space, but work very well with radiant floor (hydronic) heating systems, because the floor acts as a heat storage mechanism, storing up solar heat during the day and radiating it at night. A radiant floor is not necessary: Such systems can also utilize large hot water storage tanks to store solar heat, and use another means, such as radiant wooden floor, or a water-to-air heat exchanger to distribute the heat. Thermal storage tanks can add significant additional cost, but also very good performance.

Direct Solar Hot Air Systems use panels that resemble solar hot water panels, but heat air directly with sunlight. These can be quite cost effective, but tend to work best for homes that are fairly well insulated, have few south-facing windows, and that have a significant amount of "thermal mass" (masonry floors and/or walls that can absorb the solar heat effectively during the day, and release it at night).

Grid-Tied, or "Net-Metered" Photovoltaic Systems are simple (low maintenance) way to generate solar electricity and thereby reduce emissions from conventional power plants, for those that already have conventional electricity service. Besides the obvious environmental and practical benefits on not using batteries, these systems are also attractive because all of the solar power gets used (if you don't use it, it gets put back on the grid, so someone else does). Moreover, it increases local (distributed) power generation on the grid, which is philosophically attractive, and benefits ratepayers generally (because the decreased load on the grid helps extend the life of transformers and other components, and avoids upgrades to the system).

Off-grid Photovoltaic Systems are an attractive way to live away from the power grid without sacrificing the amenities of electrical power, and lessening the need to run a noisy, highly polluting generator.

System Sizing and Cost:

To estimate the size system you'll need, see the easy to use rules of thumb for these calculations in CCAE's Info on System Sizing and Cost, available at:
http://www.nmccae.org/Incentives_Laws/index.htm.

Step 6: Now that you've decided *roughly* what type, what size, and what cost range of solar system you want, look more closely at what incentives are available. The basic incentives available in New Mexico, at the time of this writing, are:

- **Federal Solar Tax Credit:** This credit is worth 30% of installed system cost, up to a maximum credit of $2000 per system for residences (no cap for commercial). Only available for systems purchased and installed before December 31, 2008. Direct Solar Hot *Air* (for residences), and hot tub/swimming pool collectors are *not* eligible. The form and instruction for these credits can be found at http://www.irs.gov/pub/irs-pdf/f5695.pdf. You can apply for both electric and solar hot water systems separately with this form, for up to $2000 for each system separately. For both homeowners and businesses, an excellent guide for navigating the fine details of the federal credits, should you need to, is the Guide to Federal Tax Incentives for Solar Energy, which can be obtained free of charge at www.seia.org. This covers, for example, to what extent hybrid systems are eligible (i.e. combining solar with conventional heat sources), and many other important details. Solar hot water heaters, for example, *must* be certified by the Solar Rating Certification Corporation (www.solar-rating.org) to be eligible for the federal credits.

- **New Mexico Solar Tax Credit:** The value of this *personal* income tax credit is calculated as follows: Its 30% of installed system cost, then *less any applicable federal tax credits*, up to $9000 per system. Credits will be available for systems purchased after January 1, 2006, through 2015. Systems can be installed on both homes and businesses (although it can only be applied against personal income tax). LLCs are apparently *not* eligible at this point, so developers beware (we are trying to eliminate this restriction). Eligible systems include grid-tied commercial PV systems, off-grid and grid-tied residential PV systems, and (active) solar hot water or hot air systems. Hot tub/swimming pool collectors are not eligible (but direct solar hot air systems *are* eligible, unlike the federal). Agricultural PV water pumping systems are also eligible. ***To be eligible, systems must be certified first by the New Mexico Energy, Minerals, and Natural Resources Department.*** The Department has published certification requirements and application forms on their website at www.cleanenergynm.org. These requirements take some extra time, but they prevent substandard equipment that gave solar a black eye in the '80s. ***Those problems must not reoccur if solar is to thrive!*** Self-installed systems are eligible, but the owner must conform to state self-permitting rules. For example, electrical work must be done with a self-install permit, which first requires the person to take a test. Self-installed duct work is not allowed at all, for safety reasons, so that a self-installer will need to contract with a professional for that part of the process.

Note on the Combination of the Federal and State Solar Credits: Because any applicable federal credits are subtracted from the state credits, **the state and federal credits work to provide a 30% tax credit *combined***, that is, up to the maximum amounts allowed, and for a longer time period than was offered by the federal tax credits alone. In this way, an overly large credit is avoided (which many feared would create an overheated, unscrupulous industry), New Mexico gets to fully leverages the federal credits, and at the same time the long duration of the state credits keep incentives in place long enough to truly help our solar industry develop.

- **Net-Metering Incentive:** Investor-owned utilities, such as PNM, SPS, and El Paso Electric, and New Mexico's many rural electric co-ops, are all required by a Public Regulatory Commission rule to offer net-metering. Systems at or below 10 kilowatts get full retail net-metering metering with an annual or a system lifetime "true-up", that is, you can carry over the excess credits for up to a year, or until your system is eventually disconnected. Systems larger than 10 KW get net-metering with a monthly (billing-cycle) true-up. Net excess credits left over after a true-up are reimbursed at "avoided cost" rates (basically the wholesale rate for electric power, which is far below retail). You should therefore not oversize your system – you will not receive full retail credit for power beyond the true-up period. Some co-ops may not acknowledge your right to net-meter at first – be persistent or call your PRC Commissioner if there is a question. Some, but not all *municipal* utilities also offer now net-metering, such as Los Alamos. A grid-tied PV system can recoup 45% or more of its initial cost (relative to today's cost of PV) in avoided electricity bills alone over 25 years. This is really a very significant, and often under-appreciated incentive.

- **PNM PV Power Buyback Program:** In addition to net-metering, customers of PNM who own net-metered PV systems can also sell the "renewable energy credits" of their PV power to PNM for 13 cents per kilowatt-hour through 2018. PNM will then apply these credits towards meeting their obligations under New Mexico's Renewable Energy Standard, which requires utilities such as PNM to provide 10% of the power from renewable sources by 2011, and 20% by 2020. **These sales to PNM are *in addition* to the net-metering benefits (i.e. the benefits of spinning your meter backwards), and apply to *each and every* kilowatt-hour of PV power generated**, whether the customer utilizes those kilowatt-hours or feeds them back into the grid (the customer must install a separate "credits" meter that measures the full output of the PV system to be eligible). Those who begin selling credits to PNM in 2006 will recoup approximately 25% of their system cost (relative to today's PV prices) by 2018 (when the program is currently scheduled to be re-evaluated, and possibly terminate). See www.pnm.com for more details on this program.

- **Sales Tax Exemption:** Starting July 1, 2007, sales tax will not be charged for solar equipment or installations in New Mexico.

Putting it all Together: For customers of PNM that utilize all three of the major incentives listed above (not counting the sales tax exemption), the total combined incentives will approximately equal the total cost of the system over 25 years, making PV a break even proposition, at least for PNM customers, for the first time in New Mexico:

Total Incentive: Tax Credits (30%) + Net-Metering (45%) + PNM Buyback (25%) = 100%!

For more information on incentives and renewable energy policy, see CCAE's incentives summary, available at http://www.nmccae.org/Incentives_Laws/index.htm, and the website www.NMCCAE.org more generally. CCAE has a clean energy email network you can join via the website if you're interested in participating in clean energy policy development in New Mexico.

Step 7: ***Locating a Reputable Installer:*** First you need to find installers who serve your area, and then figure out which of these is *licensed* and *reputable*. You can check if an installer is licensed in NM at http://www.contractorsnm.com/search/. Both contractors and journeymen can be checked here. As was stressed at the beginning of this guide, working with reputable installers is crucial: Visit an installer's previous work before you commit if you can. Talk with the system owners. Even better, take some time to participate in solar tours (such as those offered occasionally by the New Mexico Solar Energy Association) or other educational opportunities, and get a feel for what's working, and who does good work.

Excellent Sources for Locating Solar Companies and Installers are:

- **The Solar Professionals Directory;** Published by the New Mexico Solar Energy Association. The Directory can be accessed for free online at www.NMSEA.org, or purchased by mail by sending a check for $5 and a written request to: The New Mexico Solar Energy Association, 1009 Bradbury Se, #35, Albuquerque, NM 871067.
- **The Website www.findsolar.com.**
- **The Yellow Pages.**

Doing it yourself: While this appeals to the self-reliant spirit, and while we are grateful to all the do-it-your-self folks out there who have kept solar alive and kicking, we *do not* recommend self-installation for several reasons, unless you truly know what you're doing: Self-installation can be dangerous and/or costly. Secondly, self-installation does not help the installation industry grow very much. While it may ostensibly cost less to self-install, hiring a qualified installer greatly increases you chances of avoiding problems, helps the industry develop, and the experience gained with your system will add to the collective knowledge of the professionals out there.

Installer Certification: Note that there now exists a national certification & training program for installers, called the North American Board of Certified Energy Practitioners, or "NABCEP" (see www.nabcep.org). NABCEP is already training and certifying PV installers, and will soon be issuing certification & training materials for solar thermal. There are already several NABCEP certified installers in New Mexico. *Encourage installers to become properly trained and certified if they aren't already. Look for installers who are.*

Beware of installers who suggest that systems not be inspected.

Report Problems: Report problems with installers to the Renewable Energy Industries Association of New Mexico (www.REIA-NM.org) and/or your local chamber of commerce or better business bureau. Remember, unscrupulous or incompetent installers or companies are not helpful to the development of solar.

General Information:

State Energy Department website: www.cleanenergy.org. Contact is Brian Johnson: 505-476-3313.

Renewable Energy Policy Information: New Mexico Coalition for Clean Affordable Energy: www.NMCCAE.org. Contact is Ben Luce: 505-660-4041 (author of this document). There is a complete listing of NM Clean Energy Policies on this website as well.

.Technical Information by the New Mexico Solar Energy Association:

- Passive Solar Guidelines: www.NMSEA.org (Click on FAQs section).
- Education info: www.NMSEA.org/Curriculum/Listing.htm

Locating Renewable Energy Services/Businesses:

- Solar Business Directory: www.NMSEA.org (then see menu-bar on left side)
- Renewable Energy Industries Association of New Mexico: www.REIA-NM.org
- A new website: www.findsolar.com, which allows customers to learn about PV dealers, read customer reviews, and estimate system size and costs.
- The website www.nabcep.org, which lists nationally certified PV (and soon thermal) installers who have successfully proven field experience and who have passed a rigorous certification test.
- Check if an installer is licensed in NM at http://www.contractorsnm.com/search/.

Workshops and Energy Fairs offered by the New Mexico Solar Energy Association:

- **Solar Fiesta!** Two days of comprehensive workshops and exhibits held by the NMSEA in late September in Albuquerque. A great way to get to know the solar energy community as well.
- **Solar Village:** Exhibits held in conjunction with the Taos Solar Music Festival.
- **SynergyFest:** Solar Music Fair held each spring in Las Vegas, New Mexico.
- **Albuquerque Chapter of the NMSEA (see NMSEA website).**
- **School Visits:** Contact the NMSEA at info@NMSEA.org.

Chapters of the New Mexico Solar Energy Association: (Contact the Association at info@NMSEA.org for contact information)

- Santa Fe Chapter ("Santa Fe Circle"), Alamogordo Chapter, Las Vegas Chapter ("Synergy Club"), Taos Chapter (closely linked with "Sustain Taos!"), Los Alamos Chapter ("Los Alamos Sustainable Energy Network" or "LASE Network"): http://www.lasenergy.net/, Albuquerque Chapter

Other New Mexico Clean Energy Organizations:

- Rebuild New Mexico: http://www.rebuildnewmexico.org/
- UNM Students for Clean Energy: http://www.unm.edu/~cleannrg/
- Regional Development Corporation: http://www.rdcnm.org/pRenewableEnergy.aspx