



Solarize!

Accelerating Local Adoption of Rooftop Solar!

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Plano Solar Advocates grassroots volunteers
Oct 2014



Opening Thoughts

- History of Air Conditioning in Texas

Solar PV technology can offset the A/C load that has increased electricity demand in Texas for the last 50-60 years

- Energy Literacy *in North Texas?*

We use more electricity, and apparently care less about it
Need to improve Energy Literacy!



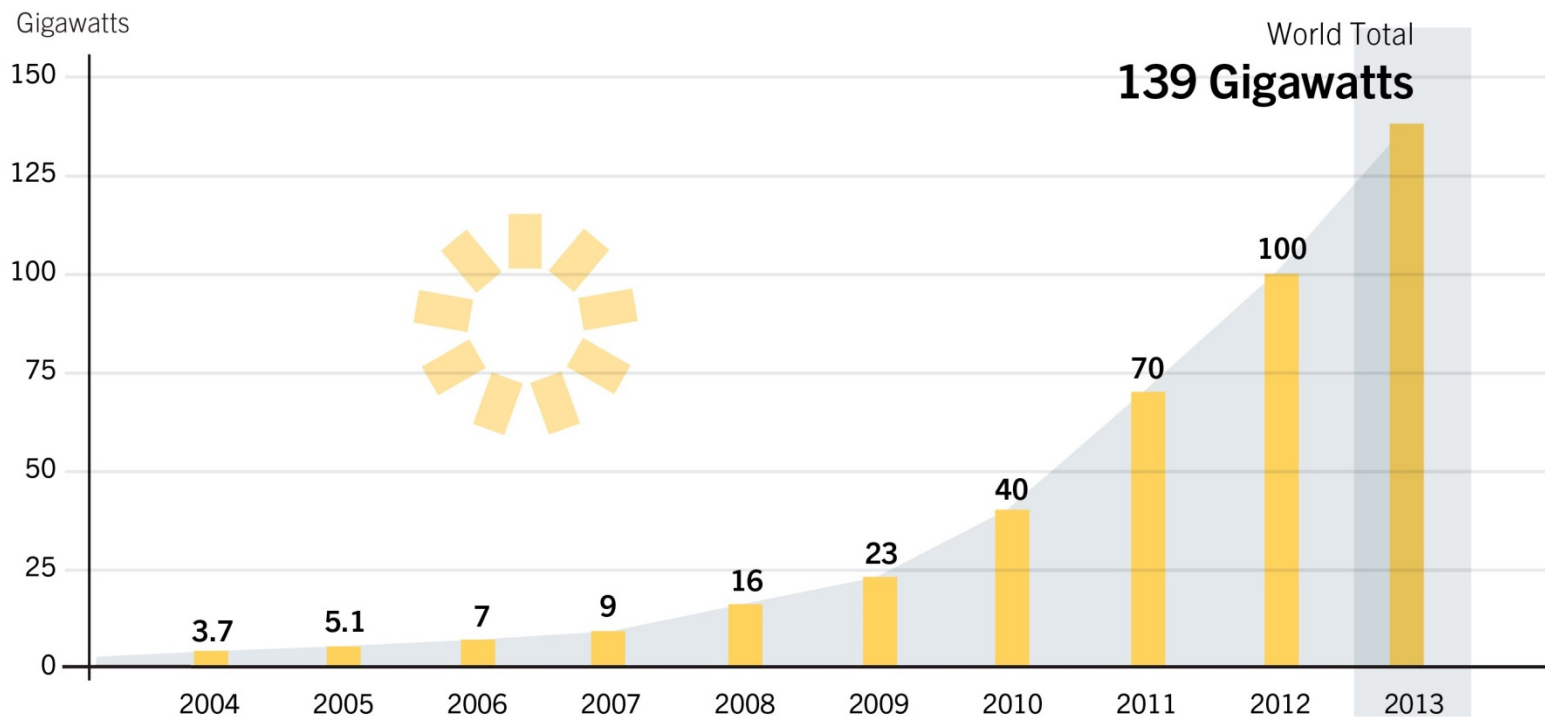
Energy Literacy in North Texas

- Reference Plano Solar Advocates August 25 blog posting
 - <http://www.planosolar.org/2014/08/energy-literacy-in-plano-and-north-texas.html>
- Some may understand \$ spent, but less understand kWh used
- Improving our "energy literacy" is significant for two broad reasons.
 - First - it appears that the North Texas area annually uses more electricity than any other region of the state.
 - Second, most of the electricity we consume in North Central Texas is generated by central power plants outside the area we live. Therefore, the impacts of this electricity generation delivered to our region - good or bad - we don't seem to know, or care about.
- Over time, we can dramatically shift this second point, by taking advantage of clean local energy available to us almost every day - from the sun!



Growth of Global Solar PV

Solar PV Total Global Capacity, 2004–2013



REN21. 2014. *Renewables 2014 Global Status Report* (Paris: REN21 Secretariat).





Growth of Rooftop Solar PV

- Some US stats
 - 470,000 solar PV installations (end of 2013)
 - 155,000 (33%) of those installed during 2013
- Some Texas stats
 - 4,600 solar PV installations in de-regulated ERCOT area as of Sept 2014, up from 2,300 in early 2013
 - Adding recent figures from SA (1,800+) and Austin (3,372), Texas is rapidly approaching 10,000 installations

Ref(s) :

- Solar Today Magazine, July/August 2014
- ERCOT profile count data
- Solar San Antonio website
- Austin Energy Aug FY14 Solar Rebate Program Participation Report



Potential PV Solar Energy in Texas

- Utility Scale PV Solar
 - 20,000 GW in Rural Areas
 - 154 GW in Urban Areas

1 GigaWatt (GW) =
1,000 MegaWatts (MW) =
1,000,000 KiloWatts (kW) =
1,000,000,000 Watts (W)

- Distributed Generation on Rooftops – Residential and Businesses
 - 60 GW

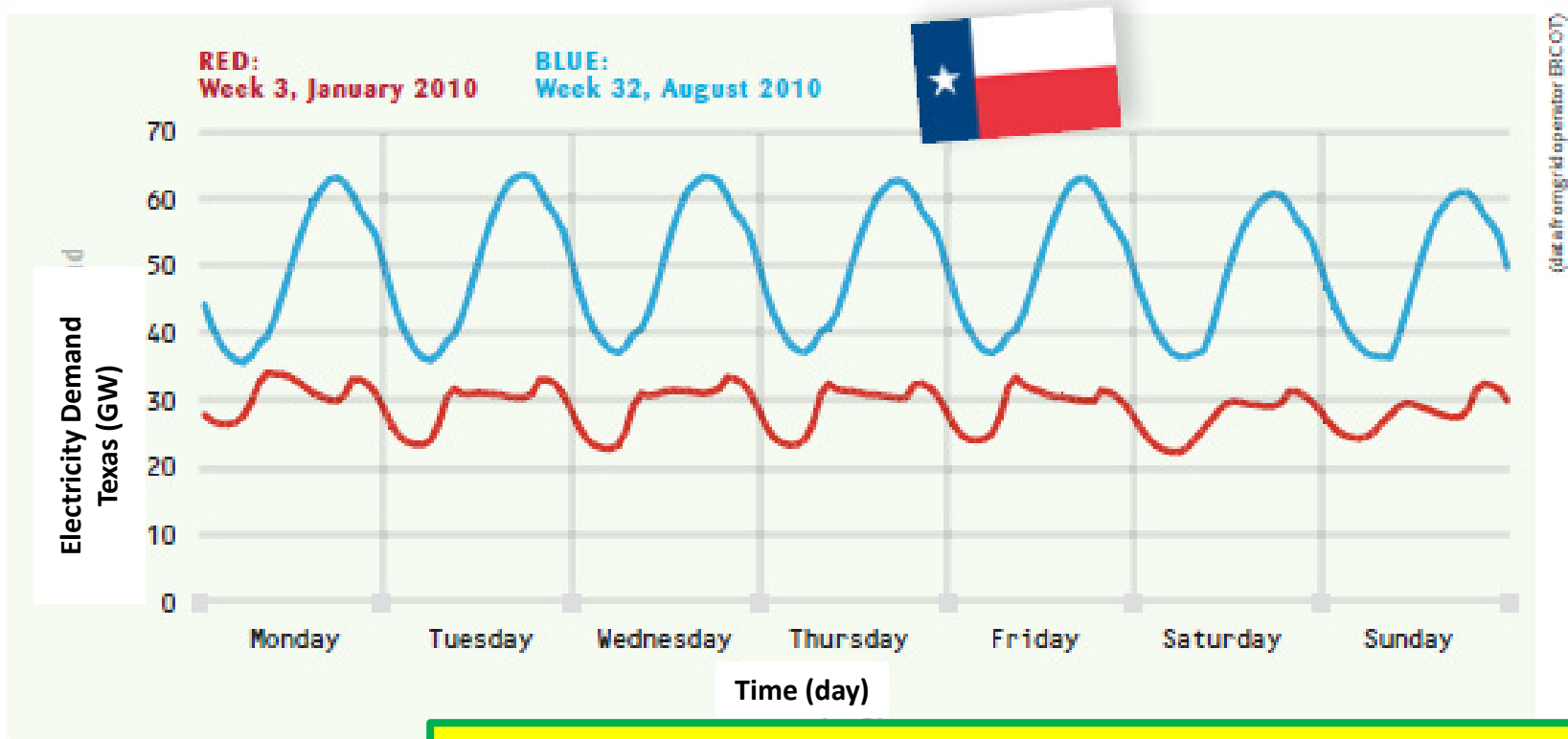
Ref: NREL 2012

Conclusion - Tapping just 0.34% of this total potential could power all of the electricity needs in Texas on a bright summer day!



Electricity Usage in Texas

- Power Demand Pattern in Texas



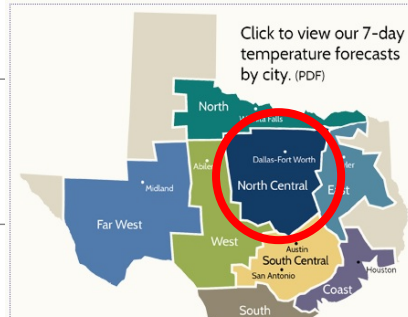
These demand peaks are generally caused the sun shining.....
Solar PV can provide much of the needed electricity when we
need it most – when the sun is shining!



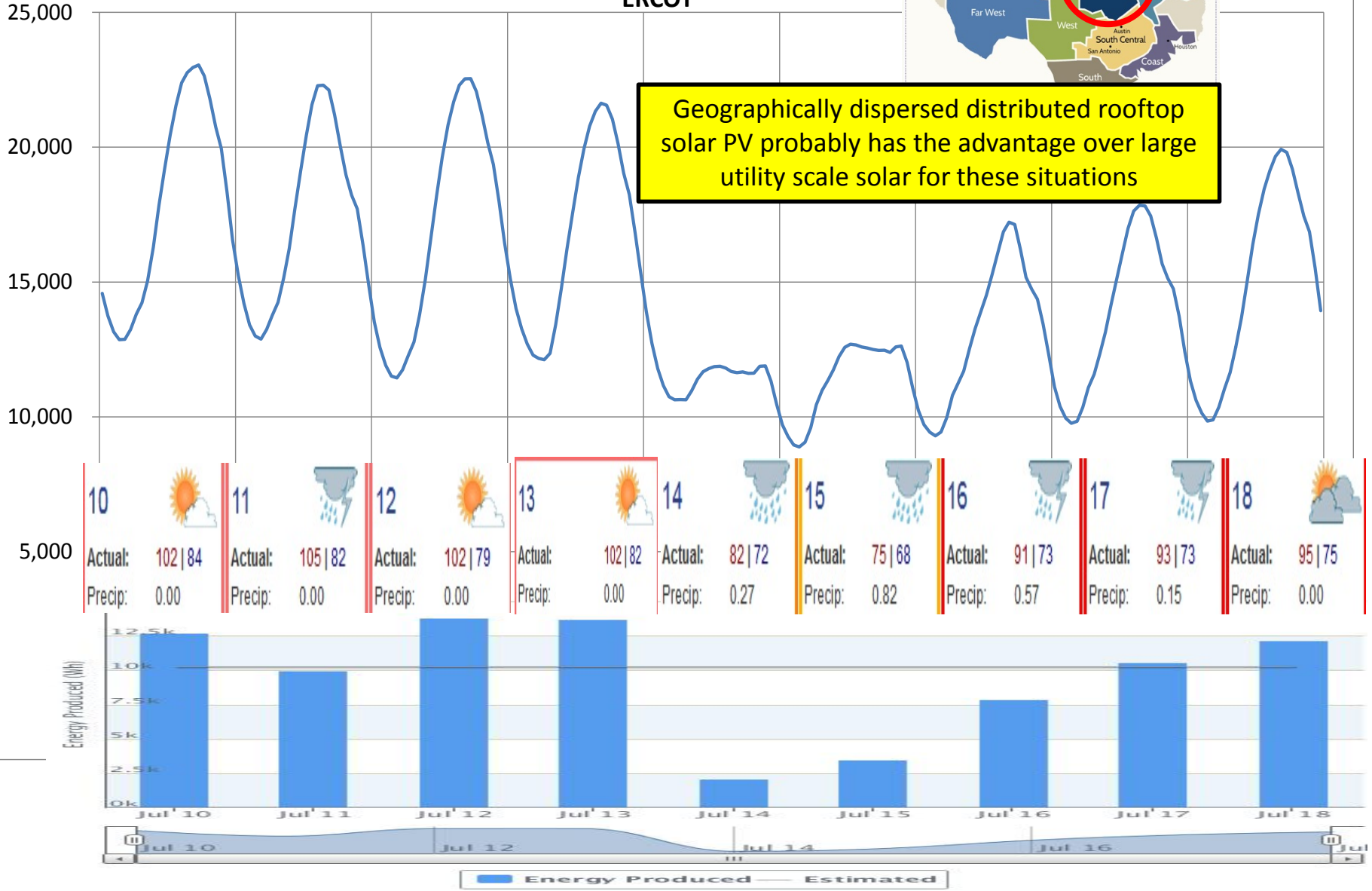
What if the sun doesn't shine?



North Central Texas Demand (MW) July 10 - July 18, 2013 ERCOT



Geographically dispersed distributed rooftop solar PV probably has the advantage over large utility scale solar for these situations

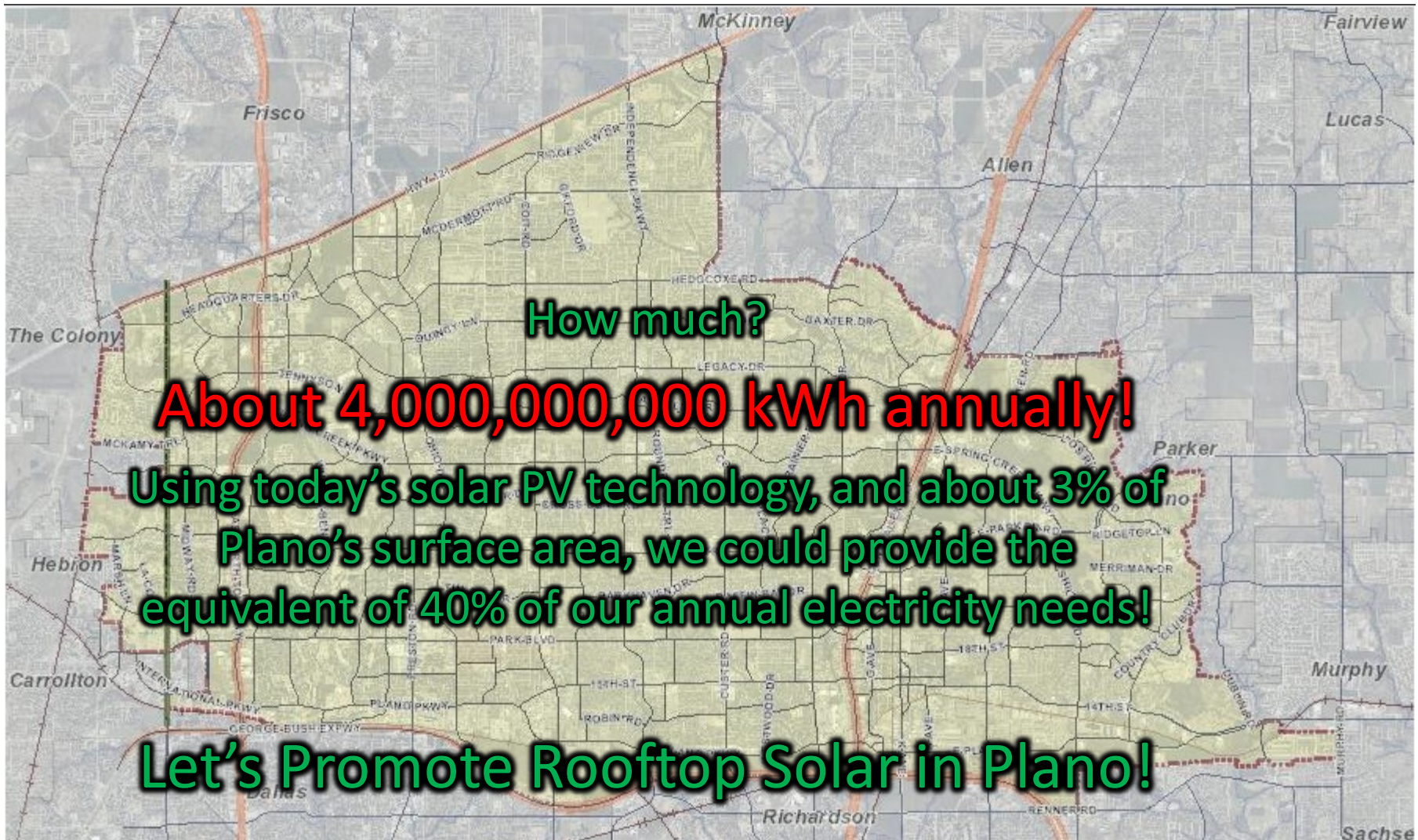




Now Let's Talk
SOLARIZE!



Plano Electricity Usage





Group Solar Purchase

Key Point

Accelerate the adoption of solar energy in a local area !!

- **Lot of people want to learn more about solar and install solar, but they don't know where to get started**

With Solarize/Group Purchase

- **Educate consumers**
- **Simplify the process**
- **Discounted pricing**
- **Limited time offer**

Good Reference Material:

1. [Solarize Guidebook](#) - a community guide to collective purchasing of residential PV systems
2. Great Solarize introductory video – [Purchasing Solar Collectively With Solarize](#)
3. Community Power Network website - See <http://communitypowernetwork.com/> and [Solar Group/Bulk Purchase](#) - <http://communitypowernetwork.com/bulkpurchase>



Solarize – Many Shapes and Sizes

- Solarize “train” size – large group of people
 - Early examples - Solarize Portland, Salt Lake City, Massachusetts, others
- Solarize “bus” size – medium size group of people
 - Plano, Garland, others
- Solarize “carpool” size – small neighborhood group of interested people – as few as 3 people
 - Know of one example in Garland, probably others out there
- Group discount based on “tiered” pricing
- Group discount based on flat pricing



Getting Started

Solarize Plano
Example

- **Plano Solar Advocates (PSA)** volunteers helped educate, coordinated and provided technical support for homeowners (and all other stakeholders) throughout this process.
- In collaboration with **Live Green in Plano**
- Utilized Plano's **Smart Energy Loan Program** (<http://smartenergyloans.com/>) as an option for participant financing and the program as a communication channel for Solarize Plano
- **Established website** for information, enrollment, and links to PSA website for ongoing communications – www.solarizeplano.org

Initiate,
Lead,
Manage

Sponsors,
partners,
collaborators

Communication
channels



Tools

Solarize Plano Example

Leverage free and easy-to-use tools!

For example, Plano Solar Advocates and the Solarize Plano Project used:

- Google blogger for simple webpage and blog features
- Google “Docs” for collaboration of documents, spreadsheets, and forms (sharing and file protection)
- Google Forms to create online enrollment forms
- Google “hangouts” for audio and video collaboration
- FreeConferenceCall.com for hosting call-in information session
- Youtube to post on-demand information session recording



Solarize Plano

2013 Solarize
Plano Example

Highlights and Timeline

Make a project
schedule with
milestones

- **Pilot Project Announced** - May 31, 2013 **(completed)**
- Held first Information Meeting for enrollees - June 27, 2013 **(completed)**
- Surpassed pilot project enrollment **target of 20 enrollees** - July 8, 2013 **(completed)**
- Issue RFP (Request for Proposal) - July 29, 2013 **(completed)**
- Participant **Enrollment period to close** (had been August 31, 2013) - **August 5, 2013 (completed)**
- RFP responses due - August 7, 2013 **(completed)**
- Two shortlisted companies selected - August 12, 2013 **(completed)**
- Shortlisted company interviews - August 14 - August 15, 2013 **(completed)**
- **Solar company selected** - August 16, 2013 **(completed)**
- All contracts completed with individual customers - September 15, 2013 or earlier **(completed)**
- **All installations** - *to be started beginning Jan 2014*

Posted and
updated on
website



Participant Process & Key Decisions

1. Decide to Enroll – go to www.solarizeplano.org to enroll
 - This is NOT a commitment to buy. This is an agreement to look at the options and learn more about solar.
 - Learn about how to determine the size of a system you will need, its approximate cost, and other considerations and tradeoffs
 - MUST do a little homework!
 - Determine your annual electricity usage in kWh
 - Think about how energy efficient is your home
2. Decide to move forward with a Site Assessment
 - This will be done by the company selected by the participant RFP Review Team.
3. Decide to Install
 - Individuals sign a contract directly with the selected company. This is when you are making a financial commitment. The more persons that commit to install systems, the better the overall discount.

**Solarize Plano
Example**



Project Communications

- Information Session meetings
 - Held multiple in-person meetings
 - Project overview and Residential Solar 101 included
 - Eventually provided online information for persons not able to attend in-person meetings
- Regular Project Communications
 - Periodic emails and also available at the Solarize Plano website
- RFP Review Team
 - RFP documentation developed from existing solarize project templates
 - RFP Team consisted of interested project participants
 - RFP information available at the Solarize Plano website
 - RFP scoring and final company selection made by RFP Review Team made up project enrollees



Residential Solar 101

The basic principles of solar power generation are easy to understand, but beyond the actual technology, there are several questions Solarize participants need to consider before deciding to install rooftop solar on a residential home. The following topics should be included in a Solarize education/information session:

What size solar system do I want/need?

- Available **roof space, condition/age, orientation** (south facing/tilt angle) & potential **shading** (not all homes are a good fit)
- Percentage of **annual energy consumption** homeowner wants to offset with solar
- **Net-metering** potential (AC power sent back to the grid), special considerations for Texas
- **Budget**

How much does it cost?

- **Installed cost** (typically quoted in \$/DC Watt) normally includes equipment, labor and all installation related costs (permits, inspections, design, etc.)
- Cost can be lowered with utility **incentives** (Oncor, Municipal or Co-op and 30% Federal Investment Tax Credit
 - Retail installed cost – utility incentives – Federal ITC = Final customer out of pocket cost
- Getting from **\$/installed watt** to **\$/kWh**; Include discussion about lifetime cost benefits per kWh, which is often below current utility cost per kWh

Follow this link to Solarize Plano Information Session presentations and archived presentation videos

[Schedules and Presentations](#)



2013 Solarize Plano Project Stats

200+ Initial Enrollment – *started end of May 2013*

175 persons participating in Information Sessions

- *PSA mission – increase awareness!*

52 site assessments

25 installation contracts (120.8 kW)

- *Solar company very pleased with contract closure rate > 45%*

20 Final installations (102.6 kW) – *completed March 2014*



2013 Solarize Plano Project Sun-Blazers!

Adding 100kW+ of CLEAN LOCAL electricity to Plano Neighborhoods!

2013 Solarbration! (May 10, 2014)

(see www.solarizeplano.org/p/solarbration.html)

- **Twenty (20) Plano homeowners elected to install solar PV electric systems as part of the 2013 Solarize Plano Group Purchase Project.**
- **The combined total electrical capacity of these installations is 102.6 kW.**
- **Installed in early 2014, this brought the total number of residential installations in Plano to about 120.**
- **What are the impacts of these most recent installations?**
 - These residents have made long term investments in their homes to create LOCAL CLEAN energy which will help them hedge and stabilize a portion of their long term electricity costs.
 - They have helped reduce the peak electricity demand on the state's electric grid by locally producing 140,000 kWh annually, and with no air, water, or noise pollution!
 - They have helped reduce water consumption in North Texas, because unlike traditional electricity generation, creating electricity from solar PV panels requires no water.
 - They have helped the local economy through increased business sales revenue and the associated local jobs.



Solarbration





Current Plano Solar PV Stats

- 2013 Solarize Plano Project
 - 200+ enrolled, 52 site assessments, 20 installations completed
- 2014 Solarize Plano Project
 - 193 enrolled, 56 site assessments, 22 installations in process
- Plano total installations as of Aug 2014 - approximately **175**
 - totaling an estimated **1,350 KWdc** of capacity.
 - Annual estimated production **1,890,000 kWh** of electricity.
 - Resulting in:
 - Reduction of 1,309 tons of CO2
 - offsets the equivalent of 33,480 trees
 - is equivalent to saving 153,000 gallons of gas
 - saves an estimated 708,750 gallons of WATER



What needs to happen to expand rooftop solar?

- Talk about rooftop solar!
 - Get the word out
 - Put it in people’s vocabulary
- Write to the Texas Public Utility Commission
 - Tell them the “public” needs the PUC to study rooftop solar as long term solution to resource adequacy, especially peak demand
- Contact your city governments & state legislator(s)
 - ask them to remove barriers and promote consumer choice for rooftop solar
 - *e.g, legislation loophole allows residential developers the option to block homeowners choice to install solar until “last lot sold”; and lacking consumer disclosure*
 - *Encourage state and LOCAL jurisdictions to adopt “solar ready” building codes for new residential construction (see 2015 IRC, Appendix U)*



Start Your Local Solarize Project!

- **Encourage neighbors, groups, and organizations to join together**
- **What can you do?**
 - small group - find 3 or more interested persons in your neighborhood and obtain quotes from 3 companies, choose and then install
 - for larger group - form or find group or organization to sponsor and run a solarize project
- **Where to start?**
 - Review the Solarize Plano Project information on the web
 - *PSA available to share our experiences*
 - Go to www.ntreg.org, see “Solarize” Networks page
 - Review existing information from across the country



Start a “Solarize” Project in Your Neighborhood

Check out SolarizeTexas.org to learn about other solarize projects starting to *shine* all across Texas!

The screenshot shows the Solarize Texas website interface. At the top is a navigation menu with links for Home, Solarize Resources, Solarize Programs, Solarize News, and Contact Us. Below the menu is the 'SOLARIZE TEXAS' logo and a search bar. A large image of solar panels is displayed. The main content area features an article titled 'Group Purchasing for Reduced Solar Prices'. To the left is a 'START HERE' sidebar with links to Contact Us, Group Purchasing for Reduced Solar Prices, Solarize Gillespie County, Solarize News, Solarize Programs, and Solarize Resources. To the right is a 'LATEST POSTS' section with two articles: 'FLATONIA ROTARY CLUB HOSTS SOLAR ENERGY DISCUSSION' and 'GILLESPIE COUNTY RESIDENTS EAGER TO BENEFIT FROM SOLAR'. At the bottom of the article is a 'Share this:' section with social media icons for Twitter, Facebook, and Google+, and a '+1 like' button.



Q&A

THANKS!

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Bob Litwins (rlitwins@gmail.com)

To Learn More about Plano Solar Advocates

www.planosolar.org

To Learn More about the North Texas Renewable Energy Group

www.ntreg.org

To Learn More about the Texas Solar Energy Society

www.txses.org



Backup Slides



Plano Solar Advocates (PSA)

www.planosolar.org

- Who we are:

- A volunteer grass-roots group of Plano citizens (non-profit)
- To learn more see www.planosolar.org/p/about.html
- Especially see - *Why is Plano Solar Advocates focused on advocating for solar electric generation?*

- Our Mission:

- To increase the awareness and expand the use of Solar Energy for electricity generation in Plano.

- Our projects

- see www.planosolar.org/p/projects.html



PSA Projects

www.planosolar.org/p/projects.html

- Solarize Plano
- Plano's Comprehensive Plan Update – Think “Solar Friendly” and “Solar Ready”
- Outreach Events – Learn2LiveGreen Expo, Earth Day Texas, Collin County Farmers Market, local Eco Fairs



- Working Groups - Buildings and Fire Codes, Net Metering, Real Estate Valuation
- Solar for Schools
- Solar Education for Schools





Plano Solar Advocates - Community Outreach

- To help increase awareness, Plano Solar Advocates is available to speak to local groups - businesses, schools, church/faith organizations, civic groups, HOAs, etc.
- See www.planosolar.org to learn more & contact us at planosolar@gmail.com



Basics of a Solarize Program

Program Setup

- Initial planning, develop **partnerships with trusted organizations**, meet with local utility (Oncor, Muni, Co-op), local solar installers, and city inspectors. Discuss financing options (City loan programs, Credit Unions, Solar Installer options, etc.), Define timeline, Establish a web/blog site to capture information and report information
- **Volunteer recruitment**, for RFP (Request for Proposal) and Outreach committee established
- Outreach committee determines methods to “get the word out” to the community. Also plan/host information workshop for prospective/enrolled homeowners to discuss solar 101, local utility incentives, federal investment tax credit, financing options, etc.
- **RFP committee** should begin drafting the RFP
- Begin participant enrollment!

Outreach and Education

- Continue **community outreach** via various marketing options including, website, blog, emails, print materials, flyers, local festivals, farmers market, press release, etc.
- **Workshops with participants** to provide project overview, residential solar 101, and project timelines
- **Participant solar company selection**; Complete customer enrollment, decision time for participants, and schedule site assessments

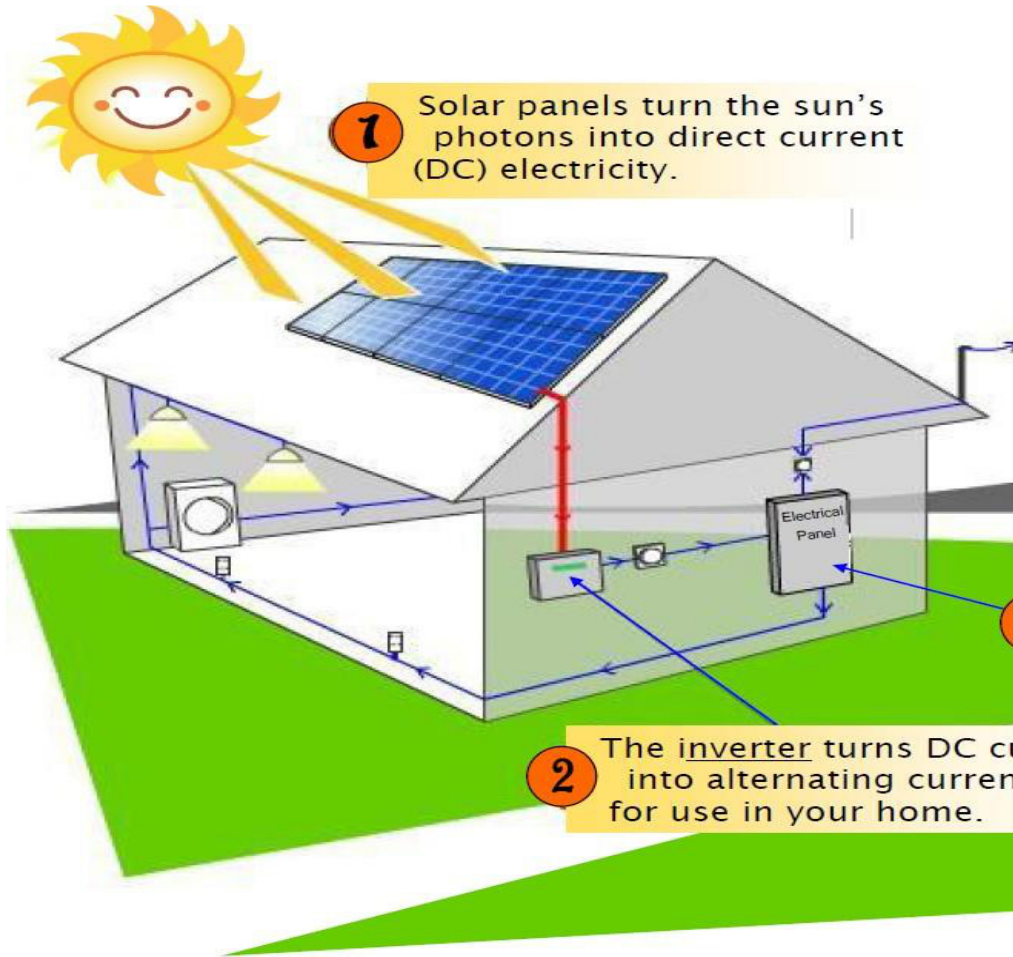
Installations

- Status updates, monitor installations, periodic team meetings, problem resolution and correction when needed
- Install solar systems!
- Tour of new installations, Celebrations!

Equipment and Installation Costs Are Upfront

NO ONGOING FUEL COSTS

Making a long term **INVESTMENT** in **LOCALLY** generated power



Total PV Solar system costs =
Equipment costs + Installation
Related costs

Equipment related

- **Solar panels**
- **Inverter(s)**
- Mounting hardware
- Wiring, disconnects, junction boxes, monitoring devices, misc items

Installation related

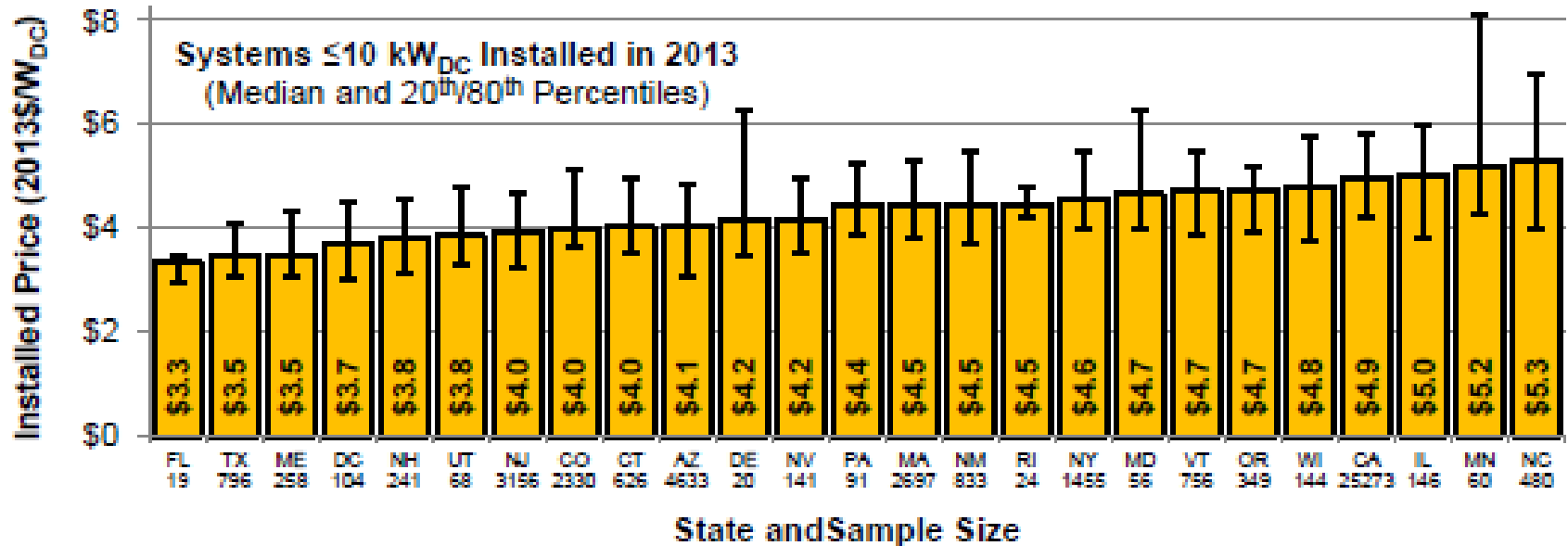
- Site assessment
- System design for specific installation
- Installation drawings
- Permits, inspections
- **Labor to install and commission system**

Total PV Solar systems are generally priced as

- \$ per installed Watt
- \$ per installed kW (kilowatt)



Texas Residential Solar Costs Near Lowest



Notes: Median installed prices are shown only if 15 or more observations were available for a given state.

Figure 16. Installed Price of Residential & Commercial PV Systems by State (≤ 10 kW Systems)

- Extract from “Tracking the Sun VII: The Installed Price of Photovoltaics in the United States from 1998 to 2013”, Sept 2014



Five Cost Elements to Know

Example 4.8kW

Total Installed Cost	\$18,000
Utility Incentives (if available)	- \$5,232
Federal Investment Tax Credit	<u>- \$3,830</u>
Final Net Cost	\$8,938

Equivalent Cost/kWh **\$0.053/kWh**

Why incentives? See [Solarize Plano Project Frequently Asked Questions](#)



PV Solar Cost Example

• This \$/watt example represents an estimate for the average in Texas mid-2013, before any group purchase discount
• Participants are encouraged to use different price examples e.g. \$3.50, 3.25, 3.00, 2.75, etc

- **Key Assumptions:**

- If installed retail cost of **\$3.75/watt** (example price per watt)
- South facing exposure for solar panels (typical panel (3' x 5') is rated at about 240W dc)
- In North Texas area, **1 kWdc-p** creates about **1,400 kWh** per year
- Annual electricity usage for this example is **15,000 kWh**

- **Example system size/production calculations would be:**

- **20 panels** - approx 4.8kW PV solar, produce 6,720 kWh, approx **45%** of annual usage

- **System Cost Calculations for MEDIUM system (20 panels):**

- 4800 Wdc-p (4.8kWdc-p) installed system at $\$3.75/W = \$18,000$
- Less $\$1.09/W$ approx Oncon incentive for 2014, then $= \$1.09 \times 4800 = \$5,232$
- Apply 30% tax credit to total installed cost less incentive, $\$12,768 \times .3 = \$3,830$
- Net cost to customer $= \$18,000 - \$5,232 - \$3,830 = \mathbf{\$8,938}$, or **\$1.86/Wdc-p**

Sweet Spot?

- **Using 25 years lifetime, a 4.8kWdc-p system will produce:**

- **25 years x 6,720 kWh = 168,000 kWh**
- Net installed system cost $\$8,938$ divided by 168,000 kWh = **\$0.053/kWh** (not including O&M or module time degradation, which are really not significant to this cost calculation)
- **Already less than the \$0.08-\$0.13/kWh typical utility cost today, and then FREE!**
- While absolute costs would increase for a larger system (or decrease for a smaller system), **the \$/kWh would remain the same**

- **Note - PV solar systems produce electricity for a long time – 30-40 years or more**



Financing Options

- Generally there are three ways
 - Purchase outright (most common for solarize projects)
 - take out a loan
 - lease the system
- Not all solar installation companies offer all options
- Regardless, the most important things to know
 - How much electricity do you use on an annual basis
 - The basic \$/Watt solar installed cost calculations and resulting \$/KWh
 - Then the purchase, borrow, or lease decision is a personal decision
- Just remember, financing and leasing companies are like any other company, they offer these product options to make money



Recent Quotes from NRG CEO David Crane

March 25, 2014 - <http://www.scientificamerican.com/article/fight-over-rooftop-solar-forecasts-a-bright-future-for-cleaner-energy/>

"The solar cost battle has been won," NRG's Crane notes.
"It's all friction costs."

By friction costs, Crane means the cost of finding a solar panel maker and installer, and then filing the appropriate paperwork with the appropriate state and local authorities as well as the local utility, then making sure the solar array is installed properly and safely.



Excerpts from 9/2/14 Forbes article “Solar Energy Revolution: A Massive Opportunity”

From the article’s Author - Peter Diamandis - founder and chairman of the [X PRIZE Foundation](#)

6 D’s: Tying It All Together The convergence of *solar*, *batteries* and *EVs* will democratize energy production and offer billions of people access to cheap, carbon-neutral energy. **Looking at solar energy through my 6 Ds paradigm of exponential technologies** may offer some added insights:

- **Digitized:** How we manufacture, measure and control solar electricity has become digitized, and therefore hopped on an exponential growth path.
- **Deceptive:** Today we are in the deceptive phase of solar growth. Remember, a 30% increase per year means we are only 7 doublings, or 21 years, away from a 128-fold increase.
- **Disruptive:** With 5,000 times more solar hitting the Earth’s surface in a year than humanity uses today, solar has plenty of ‘head-room’ for growth. The [UBS study](#) said it well: **“Our view is that the ‘we have done it like this for a century’ value chain in developed electricity markets will be turned upside down within the next 10-20 years, driven by solar and batteries.”**
- **Dematerialized:** a distributed, pervasive solar grid will create a far more robust and capable energy grid. Again, from the UBS report, “(Today’s) large-scale power generation, will be the dinosaur of the future energy system: Too big, too inflexible, not even relevant for backup power in the long run”.
- **Demonetized:** Ultimately, energy from the Sun is free. Better yet, the poorest countries in the world are also the sunniest. Imagine a world where there is a squanderable amount of cheap and clean energy?
- **Democratized:** As said above, solar scales globally, available to everyone, even in the poorest countries in the world.

It’s Time to Join the Revolution UBS continues:

- “By 2025, everybody will be able to produce and store power. And it will be green and cost competitive, i.e., not more expensive or even cheaper than buying power from utilities. It is also the most efficient way to produce power where it is consumed, because transmission losses will be minimized. Power will no longer be something that is consumed in a ‘dumb’ way. Homes and grids will be smart, aligning the demand profile with supply from (volatile) renewables.”



Distributed Generation = Distributed Investment

Major benefit of DG is also DI= Distributed Investment

- Besides all the grid and system benefits of DG, part of regulatory body's concern (i.e. the Texas Public Utility Commission) is ***ensuring enough investment in the industry and infrastructure.***
- Utilities may say their profitability will be hurt if they have to adapt to the ***competition*** of local distributed generation and that may lower investment and stability in their companies
- But overall DG is ***raising private investment dramatically,*** thus avoiding major costs of capital and stranded asset risk for utilities, bringing great economic value especially to non-participating ratepayers.

Reference: [General Overview, Context and History of Distributed Generation - By Andy Johnson](#), Jan 2014



The “REAL” Power to Choose!

Here’s an idea – Let’s promote rooftop solar as the real “power to choose” in Texas

- The Texas Public Utility Commission created and maintains the “Power to Choose” website to help consumers navigate, find, and compare retail electric plans
- Let’s all contact them to request a feature upgrade to this very good website tool
- Technology is now available to allow Texas electricity consumers the option to locally generate some of their electricity and the “Public” Utility Commission should step up to help consumers learn about and help find reputable solar companies in their zip codes – just as they help them find Retail Electric Providers!



Energy Subsidy Topic

- Reference Plano Solar Advocates Website – Resources page
 - <http://www.planosolar.org/p/resources.html>
 - Then scroll down to the section “The Subsidy Topic”
- [The Subsidy Game](#) - A good article about energy subsidies from a historical perspective.
- [The Historical Role of Federal Subsidies in Shaping America’s Energy Future](#) - see the report and article [here](#)
- [Assessment of Incentives and Employment Impacts of Solar Industry Deployment](#) - examines the impact and looks to the future of solar energy as compared with other energy sources. See article at <http://bakercenter.utk.edu/news/assessment-of-incentives-and-employment-impacts-of-solar-industry-deployment-5-1-12/>
- Solar Energy Industries Association (SEIA)
 - [Federal Energy Incentives Report \(May 2012\)](#)
 - [The Case for the Solar Investment Tax Credit \(ITC\) June 2012](#)
- [An Introduction to Government Subsidies](#) - this is a link to website that has information about subsidies - Earth Track works to make government subsidies that harm the environment easier to see, value, and eliminate.



Net Metering Topic

- Reference Plano Solar Advocates Website – Useful Links page
 - <http://www.planosolar.org/p/useful-links.html>
 - Then scroll down to the section “Net Metering”
- [Vote Solar - Free the Grid](#)
- [Net Metering considerations in North Texas](#), also see blog article - [The "Real" Power to Choose!](#)
- [Additional Information on Distributed Generation and Net Metering](#)