

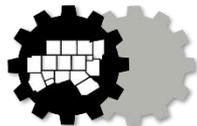


# SolSmart Training

## Permitting, Inspection, and zoning

October 11, 2017

Sponsored by:



North Central Texas  
Council of Governments



[www.GoSolarTexas.org/solsmart](http://www.GoSolarTexas.org/solsmart)

# **North Central Texas Local Context**

# NCTCOG Solar Efforts



**2013 - 2014**

- ▶ **Reduce Soft Costs**
- ▶ **Streamline Processes**
- ▶ **Develop Best Management Practices**

**2015 - 2016**

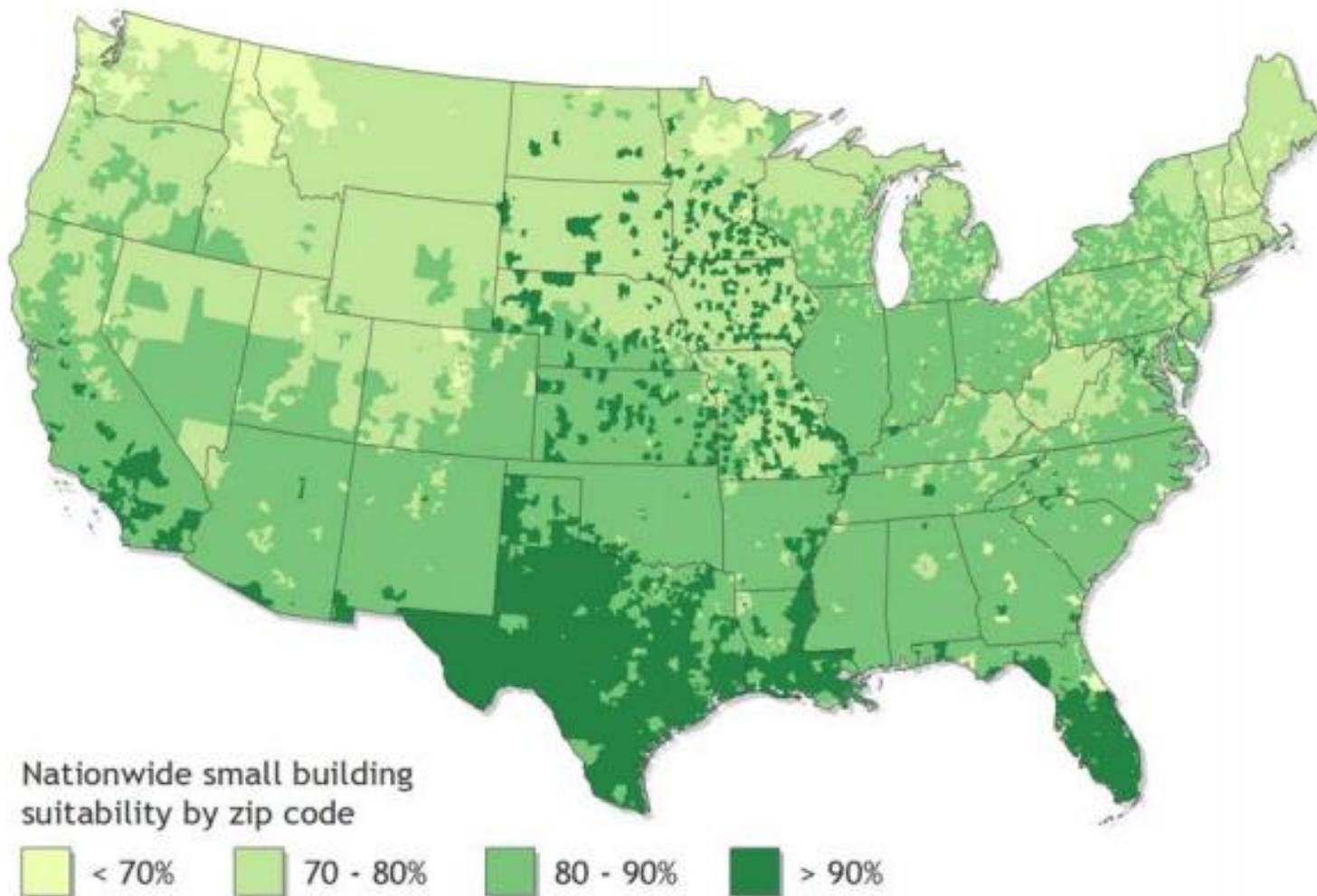
- ▶ **Website Clearinghouse**
- ▶ **Resources for Niche Markets**
- ▶ **Cost Benefit Analysis**
- ▶ **Case Studies**
- ▶ **Videos**
- ▶ **And more!**

**2017**

- ▶ **Designate Regional Communities**
- ▶ **Host Trainings & Webinar**
- ▶ **Provide Technical and Policy Assistance**

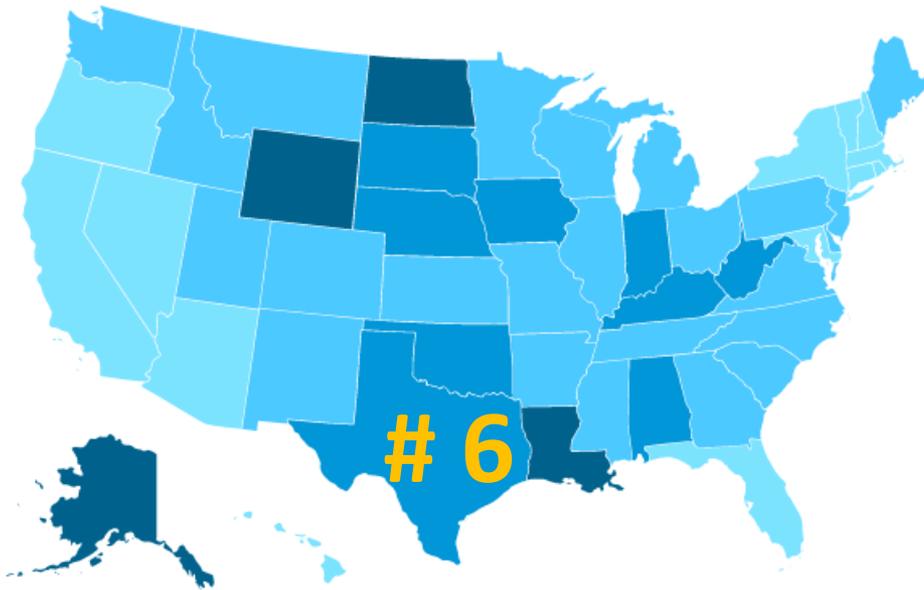
# Solar Abundance

---



**Figure ES-1. Percentage of small buildings suitable for PV in each ZIP code**

# Growing Energy Demand



New Peak Demand Records  
are being set each year:

**2015:** 69,877 MW

**2016:** 71,093 MW

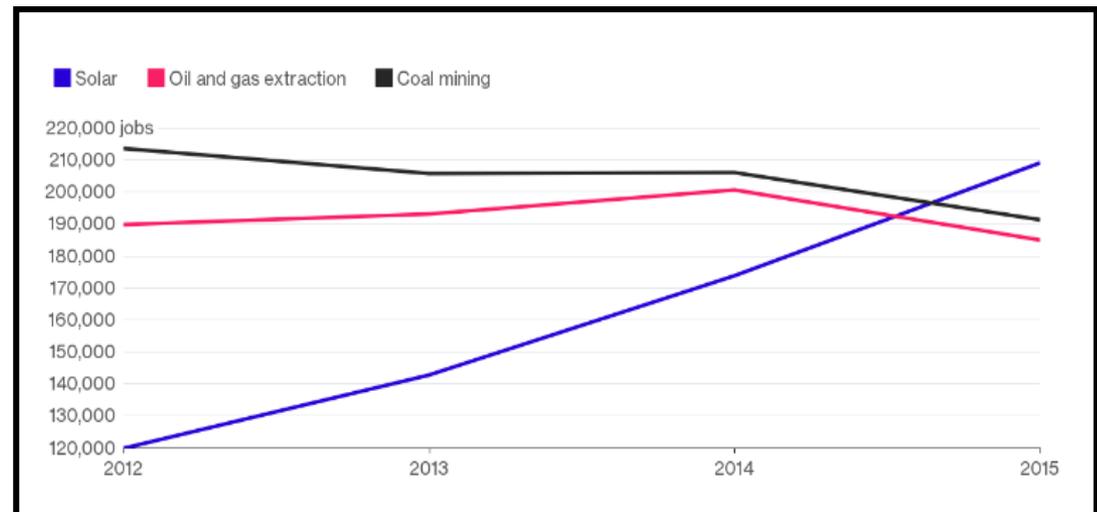
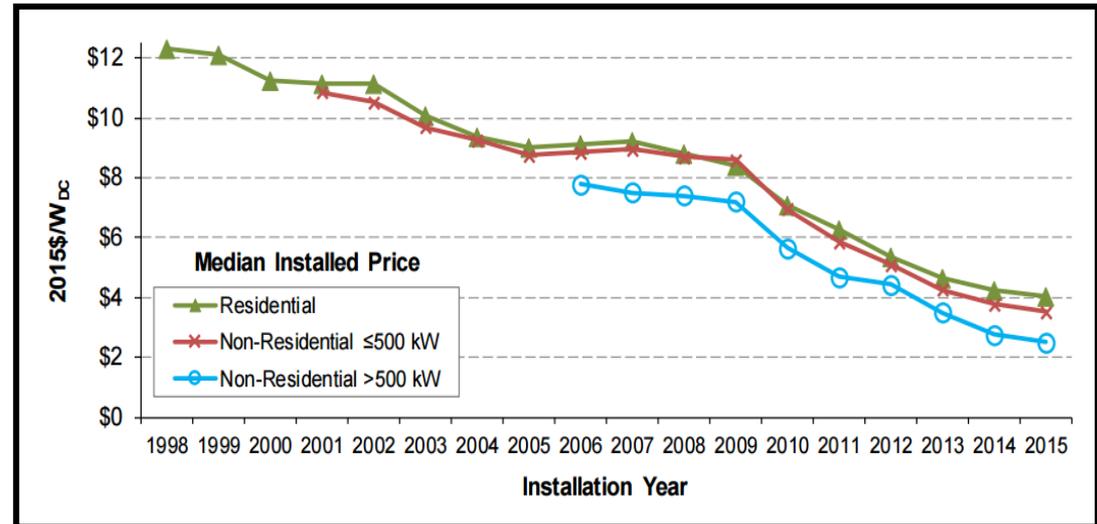
Meanwhile population,  
and corresponding  
energy needs, are  
growing across North  
Central Texas

## Population Trends

- One of the fastest growing states
- NCTCOG population forecasted to grow by 47% between 2017 and 2040, to over 10.5 million
- Per capita Income expected to increase
- Thousands of housing units being developed
- Business relocation to North Central Texas

# Economics & Financial Stability

- Federal Investment Tax Credit
- Declining Solar Costs
- Solar Job Growth



# Air Quality Benefits from Solar

## Annual Regional Emission Displacements

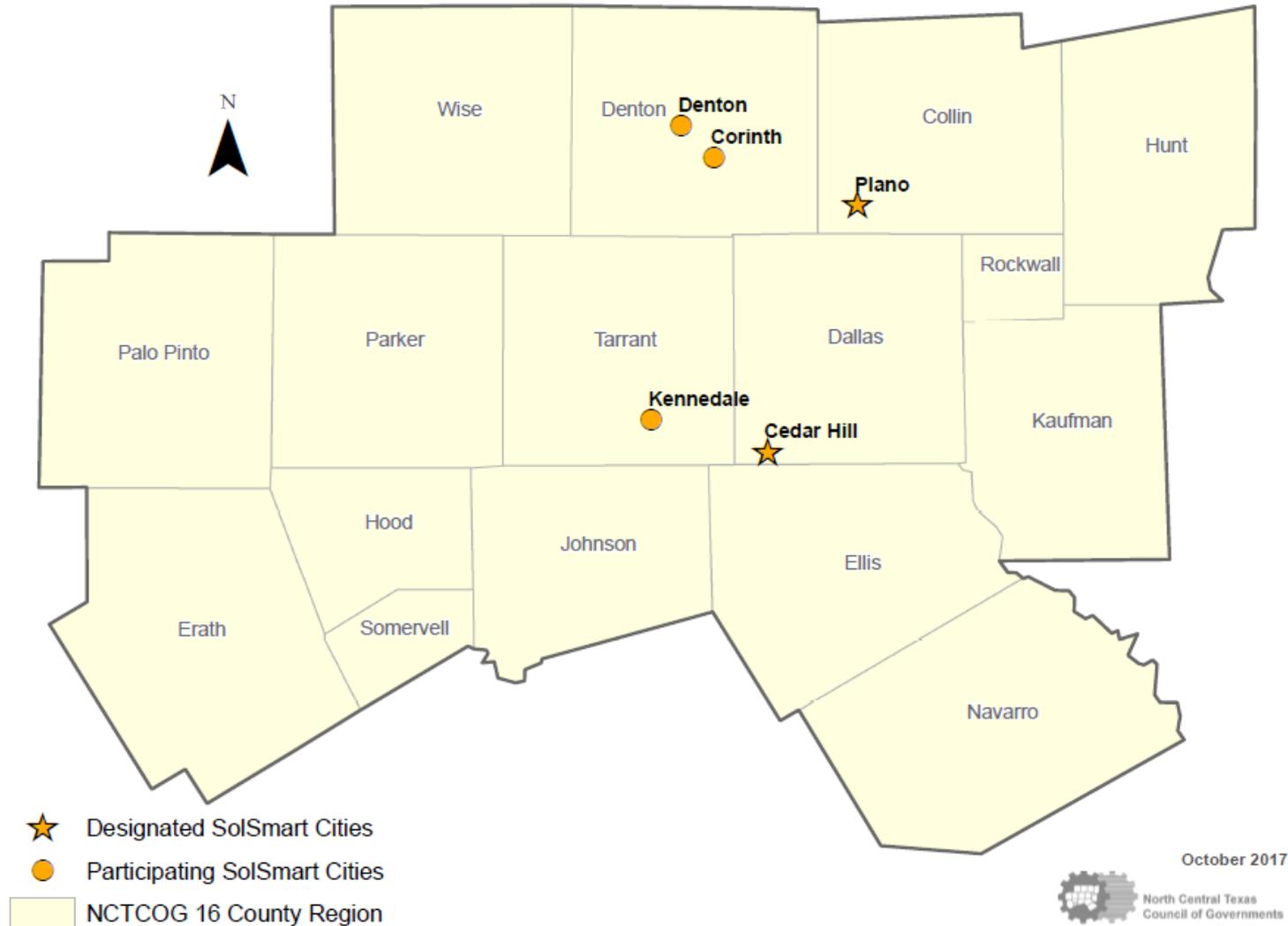


# 22.5 MW

### U.S. EPA AVERT Tool Output

	Original	Post-EERE	Impacts
Generation (MWh)	266,402,800	266,370,600	32,200
Total Emissions			
SO <sub>2</sub> (lbs)	608,041,700	608,001,300	40,400
NO <sub>x</sub> (lbs)	225,566,700	225,543,200	23,500
CO <sub>2</sub> (tons)	201,045,000	201,024,900	20,100

# Regional Leadership





# Go Solar North Texas

## NCTCOG Resources

SolSmart Trainings, October 11-12, 2017

---



**North Central Texas  
Council of Governments**

Kristina Ronneberg & Derica Peters  
North Central Texas  
Council of Governments



# SolSmart Resources



About

Audience Type...

Resources

FAQ

Case Studies

Events

Training

My account

Log out

Search



## SolSmart

View

Edit

Outline

Is Your Community SolSmart? Earn recognition for your sola...



**SolSmart is a national community designation program**, funded by the U.S. Department of Energy, designed to recognize communities that take steps to make it easier for businesses and residents to go solar. Communities committed to pursuing SolSmart designation will be eligible for no-cost technical assistance from a team of national solar and local government experts.

Participating cities can earn SolSmart designation—at the bronze, silver, or gold level—by completing criteria that fall into eight categories: 1) Permitting; 2) Planning, Zoning, and Development; 3) Inspection; 4) Construction Codes; 5) Solar Rights; 6) Utility Engagement; 7) Community Engagement; and 8) Market Development and Finance. For more information on SolSmart, view the [SolSmart Program Guide](#). The resources to the right hand side include regional guidance and best practices for each category.

To learn more about the SolSmart program, designated cities, and resources available for cities interested in pursuing a SolSmart designation, explore the following pages.



[About SolSmart](#)



[Designated Cities](#)



[Permitting](#)



[Planning, Zoning and Development](#)



# SolSmart Resources

3  
pursuing a SolSmart designation.

Plano	
Number of kW	21.00
Number of Installations	4.00
SolSmart Designation	Bronze

Details

Click each city to view the number of kilowatts (kW) installed as well as the number of installations (INSTALLS).

Visit the [GoSolar Texas SolSmart page](#) for more information!

# SolSmart Resources

## Permitting

[View](#) [Edit](#) [Outline](#)

Permitting is one of the foundational categories for the SolSmart designation program. To achieve a **Bronze** designation, a city must complete **P-1** and **earn at least 20 points** in this category. To achieve a **Gold** designation, a city must also complete **P-2**. Below is list of regional guidance and best practice documents. When regional examples are not available, national examples are available through [SolSmart resources](#).



[P-1](#)

[P-2](#)

[P-3](#)

[P-4](#)

[P-5](#)

[P-6](#)

[P-7](#)

[P-8](#)

[P-9](#)

[P-10](#)

[P-11](#)

[P-12](#)

[P-13](#)

## SolSmart

[About SolSmart](#)

[Designated Cities](#)

[Permitting](#)

[Planning, Zoning and Development](#)

[Inspection](#)

[Construction Codes](#)

[Solar Rights](#)

[Utility Engagement](#)

[Community Engagement](#)

[Market Development and Finance](#)

### P-1

Create and make available an online checklist detailing the steps of your community's solar PV permitting process (**required for Bronze**).

#### Resources & Best Practices

[Create a Permitting Checklist \(BMP Resources\)](#)

#### Samples

[City of Plano Solar PV Checklist](#)

# SolSmart Resources

---

## P-1

Create and make available an online checklist detailing the steps of your community's solar PV permitting process (**required for Bronze**).

### Resources & Best Practices

[Create a Permitting Checklist \(BMP Resources\)](#)

### Samples

[City of Plano Solar PV Checklist](#)

[NCTCOG Solar PV System Permit Application Checklist](#)

## P-2

Provide a streamlined permitting pathway for small solar PV systems with turn-around time of no more than 3 days (**20 points, required for Gold**).

### Resources & Best Practices

[Develop Criteria for Expedited Processes \(BMP Resources\)](#)

### Samples

[NCTCOG Solar PV Expedited Permit Checklist](#)

## P-3

Distinguish between systems qualifying for streamlined or standard review (**5 points**).

### Resources & Best Practices

[Develop Criteria for Expedited Processes \(BMP Resource\)](#)

## P-4

Require no more than one application form for a residential rooftop PV project (**5 points**).

### Samples

[City of Plano Miscellaneous Simple Permit Application](#)

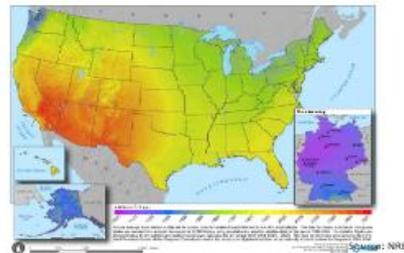
[City of Denton Building Inspections Universal Application](#)

# SolSmart Resources

## Solar Basics

View Edit Outline

The following resources are an introduction to the basics of solar energy, the potential for solar in Texas, the current state of solar energy in Texas, and important solar terminology.



### Solar 101

If you are interested in going solar, these resources will help educate you on the basics of solar energy, solar as an energy source, solar equipment, and key solar terminology.

### The Case for Solar in Texas

Due to abundance of solar radiance and land availability, Texas is poised to lead the country in solar. Already, Texas is well on its way.

## Solar Basics

[Solar 101](#)

[The Case for Solar in Texas](#)

[The State of Solar in Texas](#)

[Solar Glossary](#)



### Solar Glossary

<b>A</b>	
<b>AC</b>	Alternating current (AC) is the standard form of electrical power that enters a building and is used to power most electrical equipment.
<b>AC System</b>	The system that converts solar energy into AC power. It consists of a solar panel array, an inverter, and a meter.
<b>ADP</b>	Air conditioning design condition. The design condition used to size air conditioning equipment.
<b>ADP Ratio</b>	The ratio of air conditioning design condition to the actual condition. It is used to determine the capacity of air conditioning equipment.
<b>ADP Ratio</b>	The ratio of air conditioning design condition to the actual condition. It is used to determine the capacity of air conditioning equipment.
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<b>ADP Ratio</b>	The ratio of air conditioning design condition to the actual condition. It is used to determine the capacity of air conditioning equipment.

### The State of Solar in Texas

These resources give an overview of the current state of solar energy in Texas.

### Solar Glossary

# SolSmart Resources

## Local Governments



The success of solar is largely dependent on local government support. Decisions about planning and zoning can decide how solar friendly, or unfriendly, a municipality is. This portal provides resources



### Best Management Practices

These resources are meant to assist cities with planning and soft cost reduction so that homeowners, businesses, schools, and other entities interested in solar energy have an easier path to getting solar up and running.



### SolSmart Designation

SolSmart is a national community designation program funded by the U.S. Department of Energy to recognize communities that take steps to encourage for businesses and residents to go solar. Communities committed to pursuing SolSmart designation will be eligible for no-cost technical assistance from a team of national solar and local government experts.

**Link to our website:**  
[www.gosolartexas.org](http://www.gosolartexas.org)

incentives and to demonstrate the viability of solar power themselves through installations on municipal properties.



### Cost-Benefit Analysis

These documents, developed by Frontier Associates, present information and analysis about five model solar applications likely to be of interest to local government officials. Frontier produced a detailed report, 2-page fact sheets, and Microsoft Excel-based financial pro forma templates that can be customized and applied to specific projects under consideration.



### Community Solar

Community solar is one way to improve citizens' accessibility to solar energy. These resources provide an overview of community solar, its benefits, and current community solar programs in Texas.



### Local Government Solar Initiatives

Want to find out how other jurisdictions are making solar work for them? These are the projects, programs, and policies from Texas solar leaders.



### Inspectors, Firefighters, & Code Officials

These resources are meant to educate and assist inspectors, firefighters, and code officials to the relevant issues surrounding solar PV systems.



### Frequently Asked Questions



### Additional State and National Resources

## Solar Rights—1

## Market Development and Finance-- 1

## Market Development and Finance-- 3

## Community Engagement— 5&b

# Resources for Local Governments



## Best Management Practices for Solar Installation Policy

### Planning Improvements

#### Step 1, PL 1-A

#### Address Solar in the Zoning Code and

#### Address solar in the zoning code

Zoning codes, solar ordinances and comprehensive plans community. These documents can establish solar as "by-right" development of rooftop, ground-mounted and large-scale barriers for solar deployment by creating a precise, regulatory policies can include integrating solar into comprehensive modifying aesthetic requirements, and encouraging solar can also address solar in historic districts/structures.

There are several common practices for integrating solar

- Establish clear "as-of-right" zoning procedures for systems in appropriate districts.
- Small-scale residential and commercial systems districts.
- Solar systems can be exempted from unreasonable covenants.
- Height requirements on principal building structure. Exemptions should be outlined in zoning ordinance may also inadvertently restrict optimal deployment.
- Accessory uses can be restricted by lot regulation impervious surface and lot coverage requirement ground, they are not an impervious surface. These installations.
- Review processes for solar installations in historic districts by increasing labor costs through delayed installation districts minimally restrictive. A solar ordinance significantly impact the aesthetics of the zone.
- New subdivisions or developments can be required process through subdivision regulations. This may (see Step 2-1A), optimizing building orientation options were considered.

For information on Solar Ready II and the Best Management Practices  
This material is based upon work supported by the U.S. Department of Energy



North Central Texas  
Council of Governments



Powered by  
**SunShot**  
U.S. Department of Energy

## SOLAR PHOTOVOLTAIC (PV) SYSTEM PERMIT APPLICATION CHECKLIST

This Permit Application Checklist is intended to be used as a best management practice when establishing local government requirements for residential and commercial solar photovoltaic (PV) system permits. Local governments may modify this checklist to accommodate their local ordinances, code requirements, and permit procedures. The following application items may, at the community's discretion, be replaced by an expedited process such as those published by the Solar America Board for Codes and Standards or referenced as examples in the Solar Ready II materials posted at [www.nctcog.org/solar](http://www.nctcog.org/solar).

### 1. REQUIRED INFORMATION

#### Type of Application

- Residential
- Commercial (Also see Part 2)

#### Type of Solar PV System

- Roof Top
- Ground Mount
- Other: Click here to enter text

#### Size of System (kW): Click here

#### Completed permit application(s) Building Department for standard

- Roof Top: An electrical permit
- Ground Mount: Building and
- Other: Building and/or electrical

#### Installed in accordance with the by the State of Texas, applicable etc.); subject to plan approval.

NOTE: The National Electrical Code State Code on September 1 of a

NOTE: Potential impacts of solar evaluated by the local government

#### Construction Documents: Two items:

- Site specific, stamped engineering, if determined to be installation plans, manufacturer
- Make, model, and quantity 1741 standard by a National

NCTCOG, in partnership with the National Association of State Governments, is participating in the Solar Ready II which is striving to position the United States as a

**Model Ordinance Guidelines**  
for Municipalities

**GO SOLAR** TX

Produced by the North Central Texas Council of Governments in partnership with the State Energy Conservation Office (SECO)

July 2016

# Cost Benefit Analysis

## Project Deliverables

Report

Fact Sheets

Excel Tool



### Benefits and Costs of Model Solar Applications for Local Governments

Frontier Associates, August 2016  
www.frontierassoc.com



## 1 SIMPLE GRID-TIED SOLAR

Simple grid-tied solar installations can offset purchased electricity on public properties such as wastewater treatment facilities, city halls or libraries, etc. These systems are by far the most common solar application deployed by public and private entities.

**MODEL SOLAR APPLICATIONS**

1. SIMPLE GRID-TIED SOLAR
2. SOLAR ON LANDFILLS OR OTHER UNDERUTILIZED SITES
3. SOLAR ON SHADING STRUCTURES
4. GRID-TIED SOLAR WITH ENERGY STORAGE
5. MOBILE SOLAR WITH ENERGY STORAGE

Solar and energy storage applications can provide energy, capacity, shade, mobility, resilience and other benefits to local communities. The North Central Texas Council of Governments (NCTCOG), with support from the Texas State Energy Conservation Office (SECO), identified a need for efficient approaches to evaluating solar and storage costs and benefits. This fact sheet, developed by Frontier Associates, presents information and analysis about one of five model solar applications likely to be of interest to local government officials. Frontier also produced a detailed report and Microsoft Excel-based financial pro forma templates that can be customized and applied to specific projects under consideration. All of this information may be obtained at [www.gridtiedtexas.org](http://www.gridtiedtexas.org).

**CLOSE UP**

### FIRE STATION #6 IN MCKINNEY

An example simple grid-tied solar energy system is the 52 kWdc solar array at Fire Station #6 in McKinney. The system produces an estimated 137,000 kWh of electricity annually, about 50 percent of the Fire Station's annual energy needs.

This project was funded in part by a grant through the Texas State Energy Conservation Office. It consists of 222 polycrystalline solar modules, rated at 235 watts each, installed on 3 different roof surfaces. The panels are attached to the roof seam utilizing clamps that allow the modules to be attached to the roof without making penetrations. It utilizes multiple string inverters due to limited space for a large centralized inverter, and includes a web based monitoring system that provides real time energy production data through a standard web browser.

Solar/Energy Storage Financial Pro Forma and Benefit/Cost Analysis Tool			
Model Application 1. Simple Grid-Tied Solar			
<b>A. Model Inputs</b>		<b>B. Model Outputs</b>	
Category	Item	Value	Unit
System	PV System Size	200	kWdc
	Storage System Size	0	kWh
	Storage System Size	0	kWh
Costs	PV System Cost	\$100,000	\$
	Storage and Other Costs	\$0	\$
Incentives/	Utility Incentives	\$100,000	\$
Tax Credits	Additional Grants	\$0	\$
	Federal ITC Value %	20%	%
	Does ITC Apply?	No "Y" or "No"	
Financials	Financing	No "Y" or "No"	
	% Financed	100%	%
	Term	30	yrs
	Rate	4.00%	%
	Loan origination costs	5%	%
	Loan origination rate base?	Yes "Y" or "No"	
PV Specs	Annual PV Production (or 1)	235,593	kWh (from PV Watts)
	Annual PV Degradation Risk	0.50%	%
	PV Output/Factor Production R	92%	%
	PV Demand Diversity Factor	92%	%
Retail Billing	Credit value for reduced inflows	\$1,000	\$/kWh
Details	Credit value for outflows	\$1,000	\$/kWh
	Demand charge?	Yes "Y" or "No"	
	Demand charge savings rate	\$5.00	\$/kW
	Time of use savings rate	\$1,000	\$/kWh
	Energy/demand rates escalator	15%	%
ASST Storage	Storage ownership efficiency	80%	%
Space	Storage useful life	10	yr
Shading Value	Shaded parking spaces	0	#
	Increased daily rental fee/spot	2	\$
	Utilization rate	50%	%
Tax Value	Increases in tax revenue	\$0	\$/yr, yr 1-5
		\$0	\$/yr, yr 6-10
		\$0	\$/yr, yr 11-20
Resilience	Resilience value	0	\$/ (from DOE CEEI)
REC Value	REC value	\$1	\$/REC, yr 1-5
		\$0	\$/REC, yr 6-10
		\$0	\$/REC, yr 11-20
Operating	PV O&M costs	\$13.33	\$/kW (from NREL)
	Other costs	0	\$/yr
	O&M cost escalator	15%	\$/yr
	Inverter to % of installed cost	0%	%
	Inverter life	10	yr
	Inverter cost reduction	-2.0%	\$/yr
Depreciation	Depreciation method	None, "MACRS"	
	Depreciation basis	\$100,000	\$
Tax Rate	Marginal tax rate	0%	%
	Is flat income taxable?	No "Y" or "No"	
Discount Rate	Discount rate for NPV calc.	4%	%
PV Watts	Month	AC Energy	
Monthly	January	18,551	kWh
	February	20,306	kWh
Output	March	26,305	kWh
	April	28,000	kWh
	May	28,843	kWh
	June	29,757	kWh
	July	29,758	kWh
	August	28,990	kWh
	September	25,110	kWh
	October	24,430	kWh
	November	19,250	kWh
	December	16,243	kWh
	Annual	235,593	kWh
<b>Direct Financial Benefits and Costs (from financial pro-forma model at right)</b>			
Direct	IRR	6.5%	%
Financial	Simple Payback Yrs	12	years
Metrics	NPV	\$58,971	\$
	Benefit/Cost Ratio	1.1	
<b>Annual and Cumulative Cash Flows</b>			
	Year	Annual Cash Flow	Cumulative Cash Flow
	0	\$0	\$0
	10	\$10,000	\$10,000
	20	\$20,000	\$20,000
	30	\$30,000	\$30,000
<b>Jobs and economic development impacts (see notes on Instructions worksheet)</b>			
<b>Jobs Created</b>			
Dining	Jobs	3.7	
construction	Emphasis	\$50,000	\$100,000 2016
retail	Output	\$15,000	\$100,000 2016
Dining	Jobs	0.1	
operating	Emphasis	\$3,411	\$100,000 2016
retail	Output	\$5,700	\$100,000 2016
<b>Annual avoided emissions impacts (see notes on Instructions worksheet)</b>			
<b>Annual avoided monthly kWh</b>			
Annual	Nitrogen Oxides	195	pounds/yr
Avoided	Sulfur Dioxide	648	pounds/yr
Emissions	Carbon Dioxide	367,000	pounds/yr
<b>Annual avoided emissions equivalents (see notes on Instructions worksheet)</b>			
Avoided	CO2 equivalents	588,971	average passenger vehicle miles
emissions	CO2 emissions	24.4	average home's annual electricity equivalents; Carbon sequestered
		4,716	tree seedlings grown for 10 years

# Cost Benefit Analysis

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## Model Applications

Simple  
Grid-Tied  
Solar



Solar with  
Ancillary  
Benefits



Solar with  
Storage





# Trainings and webinars

## Putting Underutilized Land to Work for Solar



Jul 27, 2016

This webinar provides information to local governments, special districts, and businesses interested in going solar by siting PV arrays on brownfields, landfills, and other previously unusable lands.

[View Training Materials](#)

## PACE Financing



Jul 12, 2016

Property Assessed Clean Energy (PACE) is a financing method available to businesses that allows them to finance 100% of a solar energy system.

[View Training Materials](#)

## Community Solar in Texas



Jul 8, 2016

This webinar provides information to electric utility cooperatives and municipal owned utilities who may be interested in exploring opportunities for community solar programs.

[View Training Materials](#)

## Solar for Local Governments



Jun 8, 2016

Local government officials will learn about the basics of solar energy, ways to ease the permitting process, and discover the economic benefits of solar energy.

[View Training Materials](#)

## Solar PV for Fire and Code Officials Workshop



Jun 8, 2016

Fire Inspectors will learn about applicable fire codes and methods for implementing code requirements in residential and commercial photovoltaic (PV) systems.

[View Training Materials](#)

## Financing Solar Energy Systems



Jun 7, 2016

This class covers available rebates and tax credits for purchasing solar energy systems for commercial and multi-family property owners and lenders.

[View Training Materials](#)

# Community Solar

## Texas Community Solar Guidelines

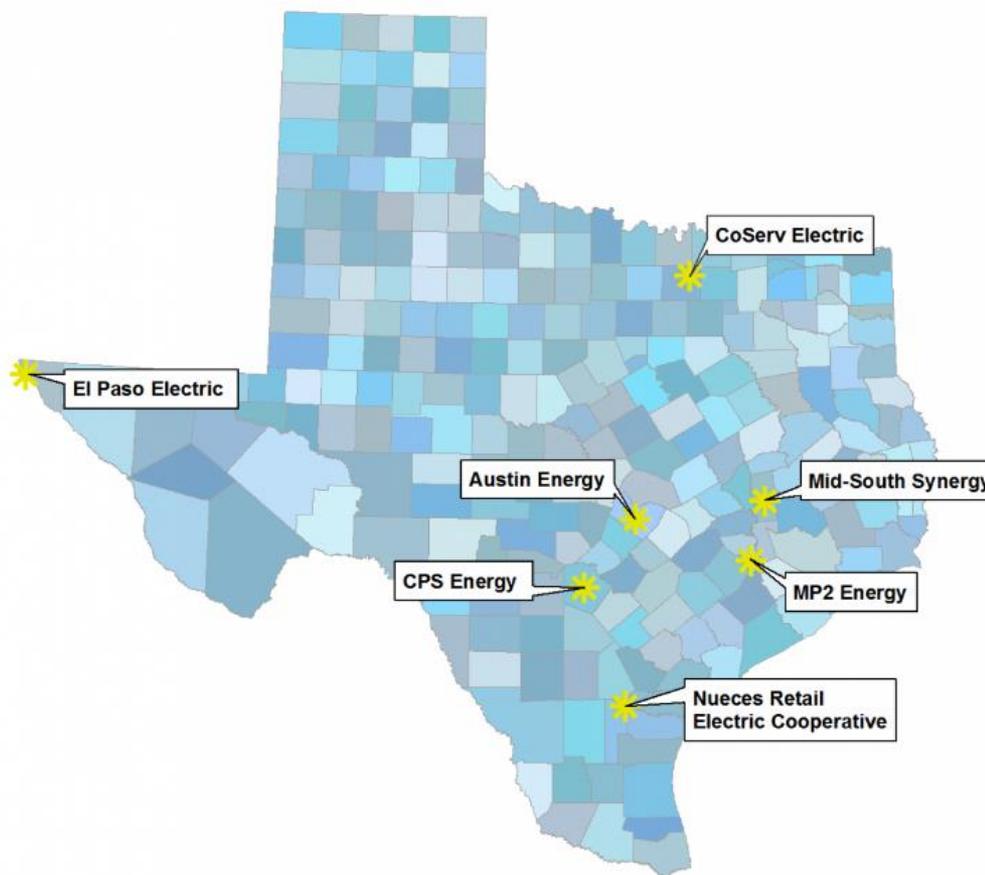
for Electric Cooperatives and Municipally Owned Utilities



Produced by the North Central  
in partnership with the State En

Augu

Find out if your area has a Community Solar program!



# Questions and Contact

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## Kristina Ronneberg

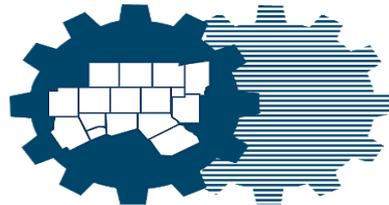
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Council of Governments**



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