



Financing Renewable Energy in Multifamily Housing

Moderator: Crystal Bergemann, HUD

Panelists: Ben Healey, Clean Energy Finance and Investment Authority

Chris Jedd, Denver Housing Authority; Jared Lang, National Housing Trust;
Elaine Ulrich, Solar Energy Technology Program, DOE



Empowering you to make
smart energy choices

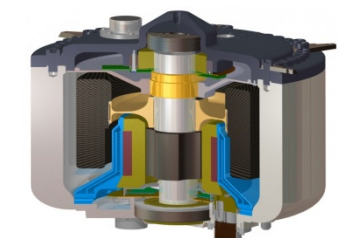
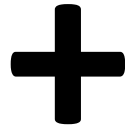
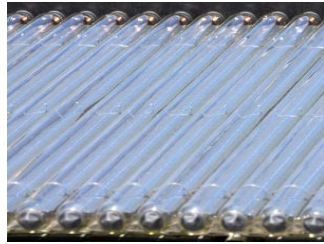
Clean Energy Finance and Investment Authority

Renewable Energy on Multifamily Housing

Better Buildings Summit
May 9, 2013

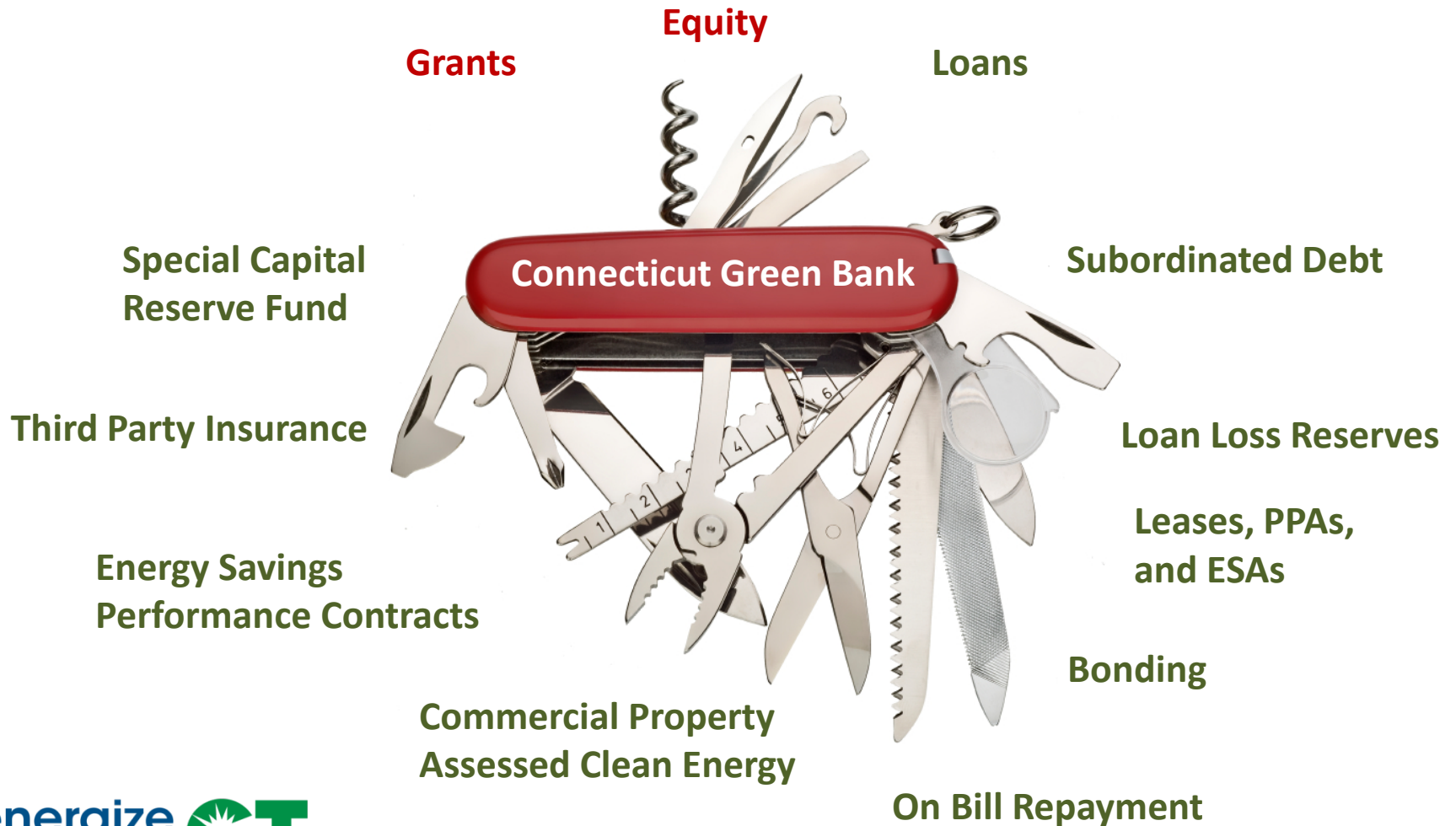
Connecticut Green Bank

Clean Energy Defined by Public Act 11-80



Connecticut Green Bank

Clean Energy Defined by Public Act 11-80



Connecticut's Multifamily Sector

The Energy Opportunity

- ▶ **Significant Opportunity – potential annual energy cost savings on the order of \$125,000,000 per year**
 - ▶ 250,000 multifamily units in buildings with > 4 units (approx. 18% of CT's total housing units)
 - ▶ Potential to save \$500+ in utility costs per unit each year, conservatively
 - ▶ Buildings concentrated in CT's ring cities near gas lines



Connecticut's Multifamily Sector

The Challenges

- ▶ **Fuel Poverty Imperative –** low-income households owe much more in utility bills than they can afford



- ▶ **Challenges**
 - ▶ Capital to plan and finance
 - ▶ Securing lender consent
 - ▶ Split incentives
 - ▶ Health and safety issues
 - ▶ No performance data
 - ▶ Confusion negotiating the improvement process

Connecticut's Multifamily Sector

CEFIA's Approach

- ▶ Leverage CT's strengths, address gaps, seed and grow the market, support private financing to move in and take over
- ▶ Bring in national leaders with a demonstrated track record to help build the market and “crack the MFH nut”
- ▶ Partner with and source projects through key channels



Connecticut's Multifamily Sector

Initiatives to Build the Market



CDFI's



CL&P



CHFA Partnership



WINN-HUD OME



Renewables for a Multifamily Portfolio

Three Legs of the Stool



cpac | An Energize CT Program

URBAN ATLANTIC

HANNON ARMSTRONG

WELLS FARGO

clean energy *solutions*

CHFA Partnership



CHFA
the key to affordable housing



energize **CT**SM
CONNECTICUT

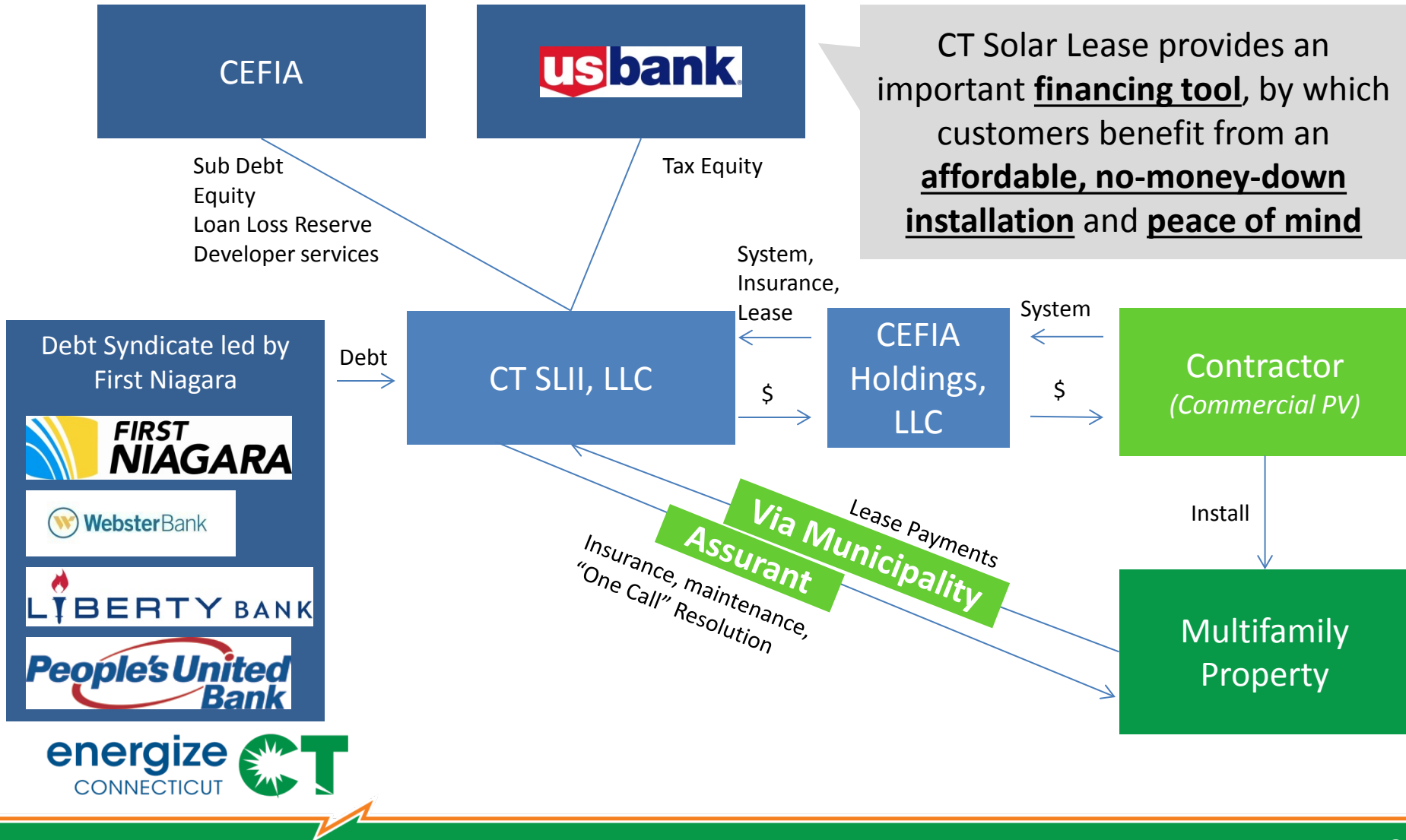
CT SOLAR LEASE



energize **CT**
CONNECTICUT

CT Solar Lease

Basic Structure for Multifamily



CT Solar Lease

The Breakdown

- Solar lease facility combining tax equity and leveraged bank debt
 - \$60 million fund overall
- The first solar lease facility for
 - Residential solar PV (~11MWs, 1,600 systems)
 - Residential solar hot water (~400 systems)
 - **Commercial solar PV (~3MWs / 30-50 systems / 50-350kw / needs ZREC / C-PACE)**
- Expected life - two years (if successful ... more to come)

CT Solar Lease

Qualifying Host Customers

- Municipalities and schools
 - Must be rated A3 (Moody's) or A- (S&P/Fitch)
- Commercial properties
 - Must be rated Aa2 (Moody's) or AA (SP/Fitch)
 - **OR** C-PACE to secure the investment

Commercial Property Assessed Clean Energy (C-PACE)

- An innovative financing structure that enables commercial, industrial, and multi-family property owners to access financing for qualified energy upgrades and repay through a benefit assessment on their property tax

Private capital
provides 100%
upfront, low-cost,
long-term funding

Repayment through
property taxes

A senior C-PACE lien is
put on the property
and stays regardless
of ownership

C-PACE

Advantage for Owners

Near term plan to sell?

Lack of funding?

Cannot assume more debt?

Insufficient payback/ROI?

Split incentives?

Uncertain savings/technical expertise?

Tax obligation fixed to property

100% upfront, 20 year financing

Assessments may qualify as OPEX

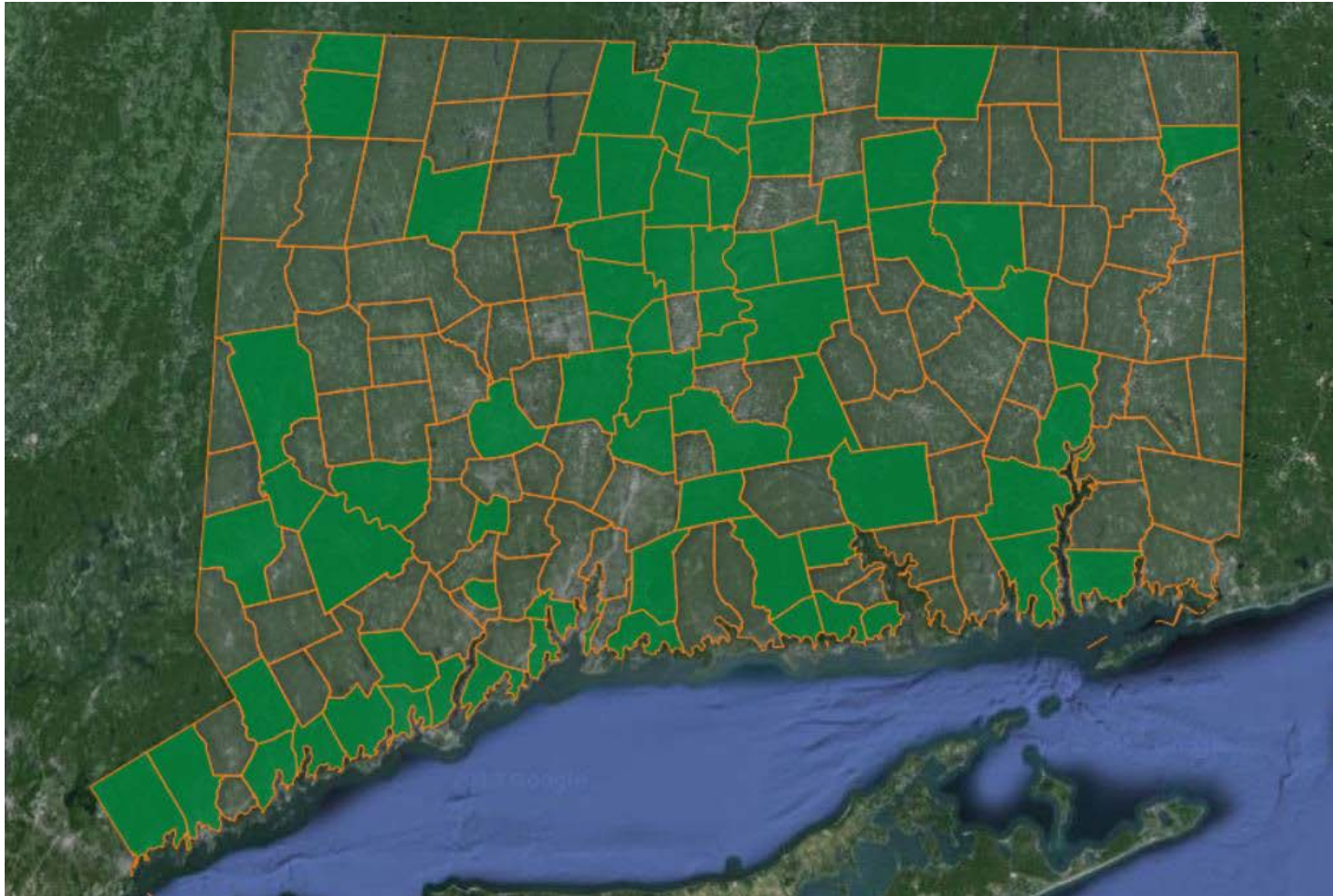
Positive cash flow in year 1

Assessment/savings pass to tenants

Technical underwriting / SIR>1

C-PACE

80 Municipalities Signed Up



C-PACE Website

Owners / Contractors / Municipalities



An
Energize CT
Program

www.c-pace.com

[Contact Us](#) | [About Us](#) | [Resources](#) | [Login](#)



ABOUT C-PACE

RESOURCES

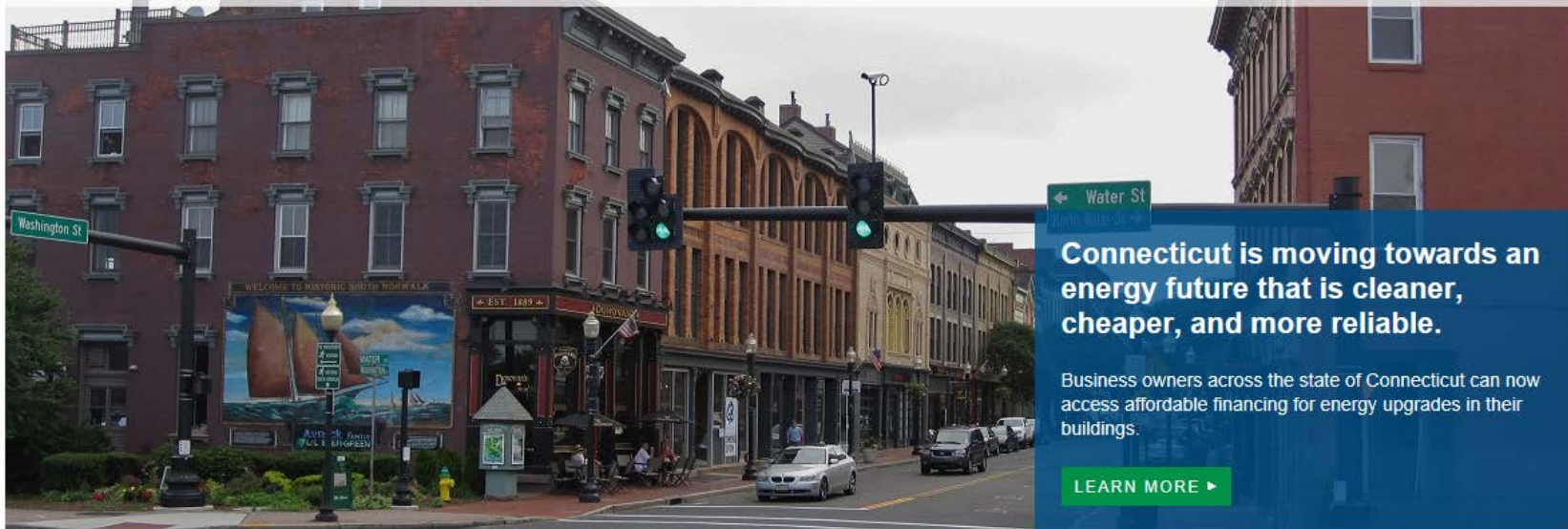
APPLICATION

CONTRACTORS

EXPLORE MAP

PROJECTS

PRESS



Whether you are a building owner, a municipality, a contractor, project developer, or an investor, you can get started on C-PACE now. It's easy.



C-PACE

Eligible for CHFA Properties



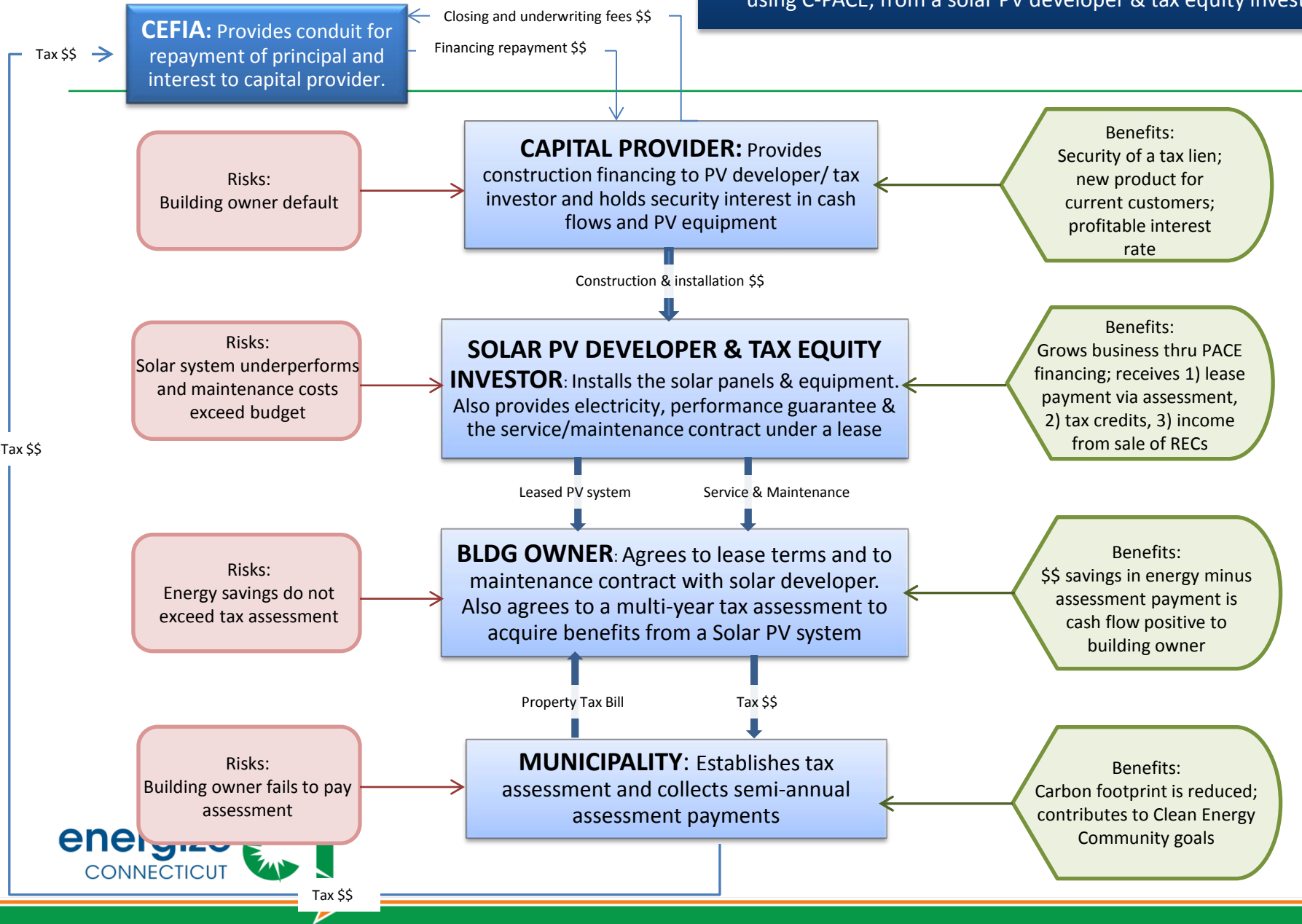
MEMORANDUM

FROM: Hawkins Delafield & Wood LLP
TO: Connecticut Housing Finance Authority
DATED: May 7, 2013
RE: C-PACE

You have advised us that it has been proposed that the Connecticut Housing Finance Authority (the "Authority") take certain actions with respect to the Commercial Property-Assessed Clean Energy program enacted into law in Connecticut in 2012 (known as "C-PACE"). C-PACE entails the extension of financing to owners of multi-family housing properties (as well as commercial and industrial properties, not the subject of this Memorandum) to enable them to install energy upgrades to the property. Repayment of the financing is accomplished with a benefit assessment imposed by the related municipality against the property. As with other municipal assessments, any assessments in arrears have a lien status senior to mortgages upon the sale of the property. The C-PACE legislation, among other requirements, includes the requirement that the property owner receive the consent of the current mortgage holder(s). It is proposed that the Authority, upon request, formally consent to the imposition of such a lien with respect to multi-family properties to which it has previously extended mortgage financing.

You asked that we, as your bond counsel, review any contractual and statutory limitations, if any, on the Authority's giving such consents. The Authority is statutorily governed by Chapter 134 of the General Statutes of Connecticut, as amended (the "Act"). The Act provides that mortgage lending by the Authority may include loans secured by liens that are in a first lien position, second lien position or, in certain cases, not secured by liens on the property at all. The Act does not preclude or address the imposition of municipal liens that would take priority over the lien of an Authority-financed mortgage or the Authority's giving consent thereto. The Authority's General Housing Mortgage Finance Program Bond Resolution adopted September 27, 1972, as amended and supplemented (the "General Resolution"), which is the contractual obligation securing the bonded indebtedness of the Authority incurred for multi-family housing loans, requires that such indebtedness be incurred for the origination of mortgages that constitute a first lien on real estate in fee simple or on a leasehold. Nothing in the General Resolution precludes or addresses the imposition of municipal liens on such properties that would take priority over the lien of mortgages originated under the General Resolution or the Authority's giving consent thereto.

COMMERCIAL ENTITY (Leased Solar Equipment):
Cash flow, risks and benefits arising from leasing solar PV equipment, using C-PACE, from a solar PV developer & tax equity investor





Empowering you to make
smart energy choices

Thank You!

Ben Healey

Senior Manager

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Stamford, CT 06901

www.ctcleanenergy.com

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(860) 257-2882

Power Purchase Agreements for Multi-Family Housing

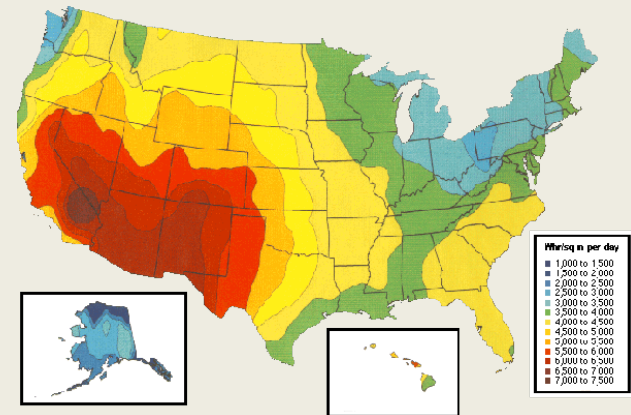
Chris Jedd – LEED AP BD+C
Portfolio Energy Manager – Denver Housing Authority



Why a PPA for DHA ?



- Continual expansion of DHA's renewable energy portfolio
- Long-term predictable energy costs for DHA
- Supports HUD's interest in sustainability
- Payments from site license agreement
- Minimal upfront costs
- Availability of sunlight



Power Purchase Agreement Overview

Project Facts

- 2.5 Megawatts
- 666 roof tops
- 10,471 panels
- Single family & row homes
- CO2 reduction of 3,500 tons
- Generates 3.4 million kilowatt hours annually

Project Partners



Site Host



Project Developer



Financer & Owner



Designer & Installer

Phase 1: Request for Proposals



“The Housing Authority of the City and County of Denver invites responses from qualified entities to provide cost effective solar photovoltaic generating systems at multiple DHA sites by providing all design, construction, operation, application and financing services necessary to the successful installation and operation of said systems.”



Phase 2: Project Design



- Minimum of 2.5 Megawatts
- Housing portfolio of over 4,000 homes
- East and South facing roofs only
- Average system size is 4.7 KWs
- Estimated effective useful life of roofs
- Considered DHA's long range demolition and rehab plans



Phase 3: Project Financing



- Third party owns and operates panels on DHA's buildings and sells DHA electricity at a discount
- \$10 million investment (Non DHA Money)
- No (or minimal) upfront costs to DHA
- DHA receives payment of site license agreement (roof Lease)
- 20 year contract
- Option to purchase panels at 75% discount in 6 years

Phase 4: Construction



- New roofs
- 11 month schedule
- Namaste Solar
- 9 crews
- 2 days per installation



Phase 5: Operations & Maintenance



Impact on DHA operations

Maintenance staff training

Resident education

Tree maintenance



PV Install at North Lincoln Homes



114 Homes * 357 KW



Questions?



Chris Jedd, LEED AP BD+C
Portfolio Energy Manager, Denver Housing Authority
cjedd@denverhousing.org

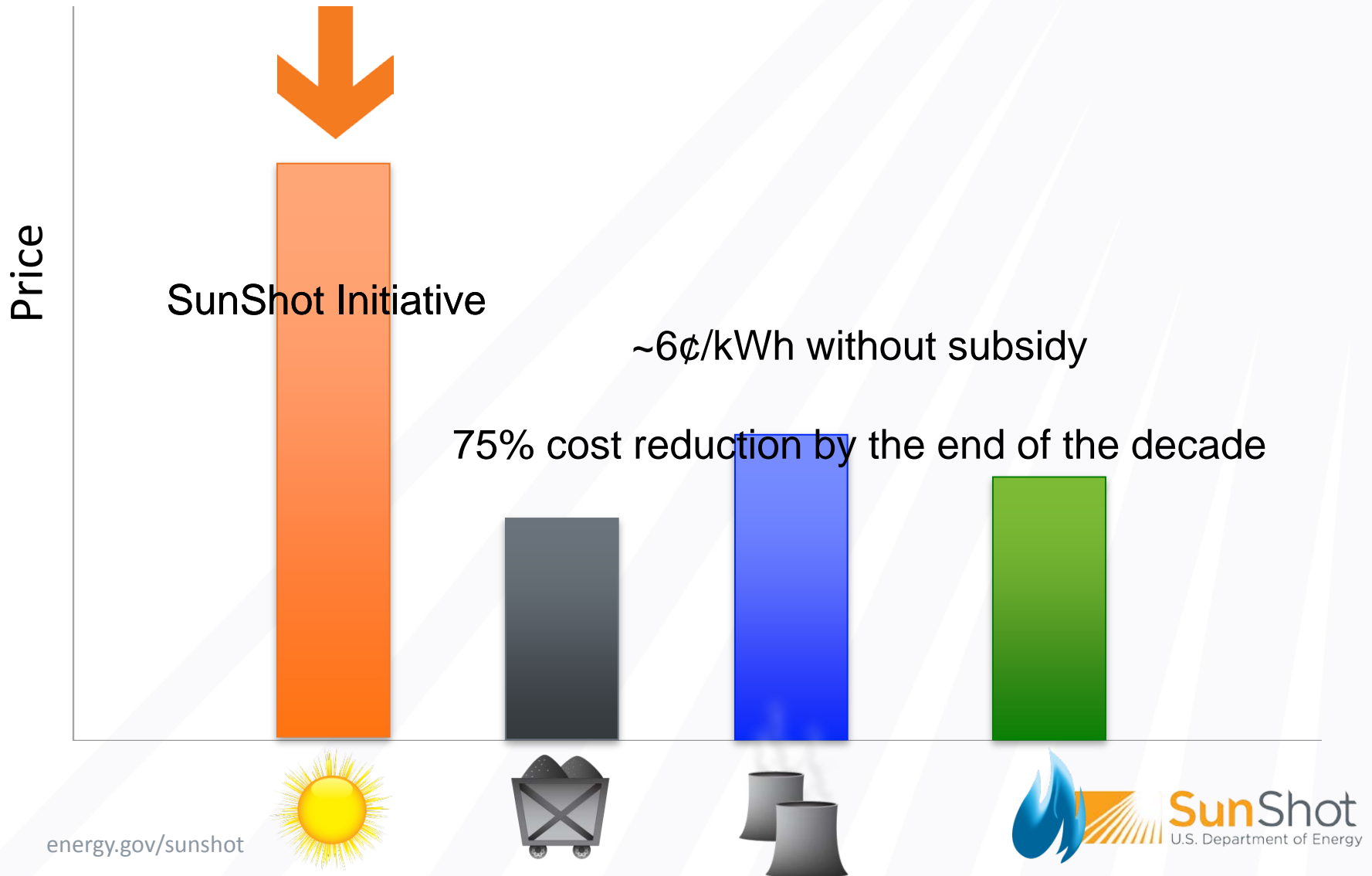




The SunShot Initiative

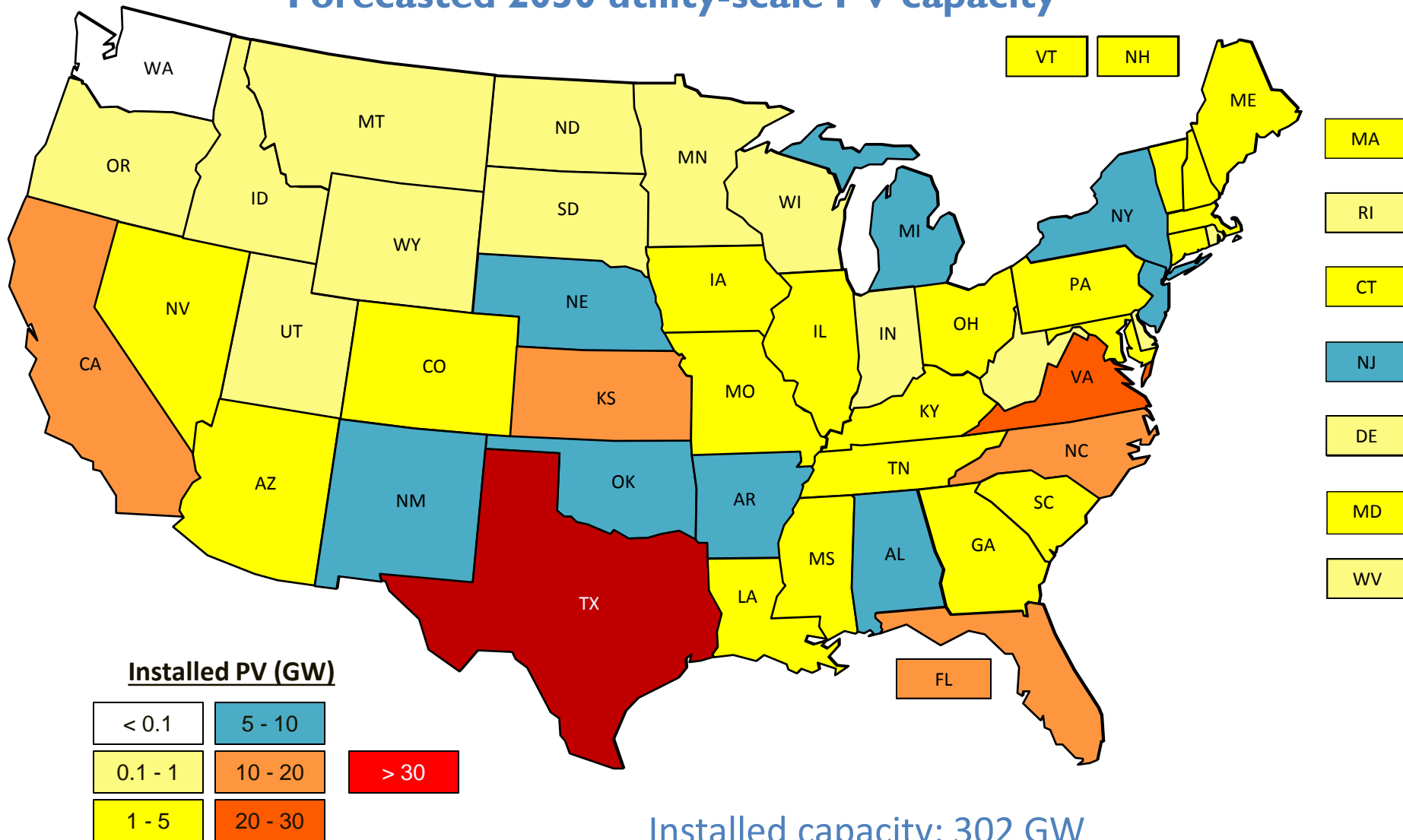


So what is SunShot Targeting?



SunShot Vision: Spurring Rapid Solar Deployment

Forecasted 2030 utility-scale PV capacity

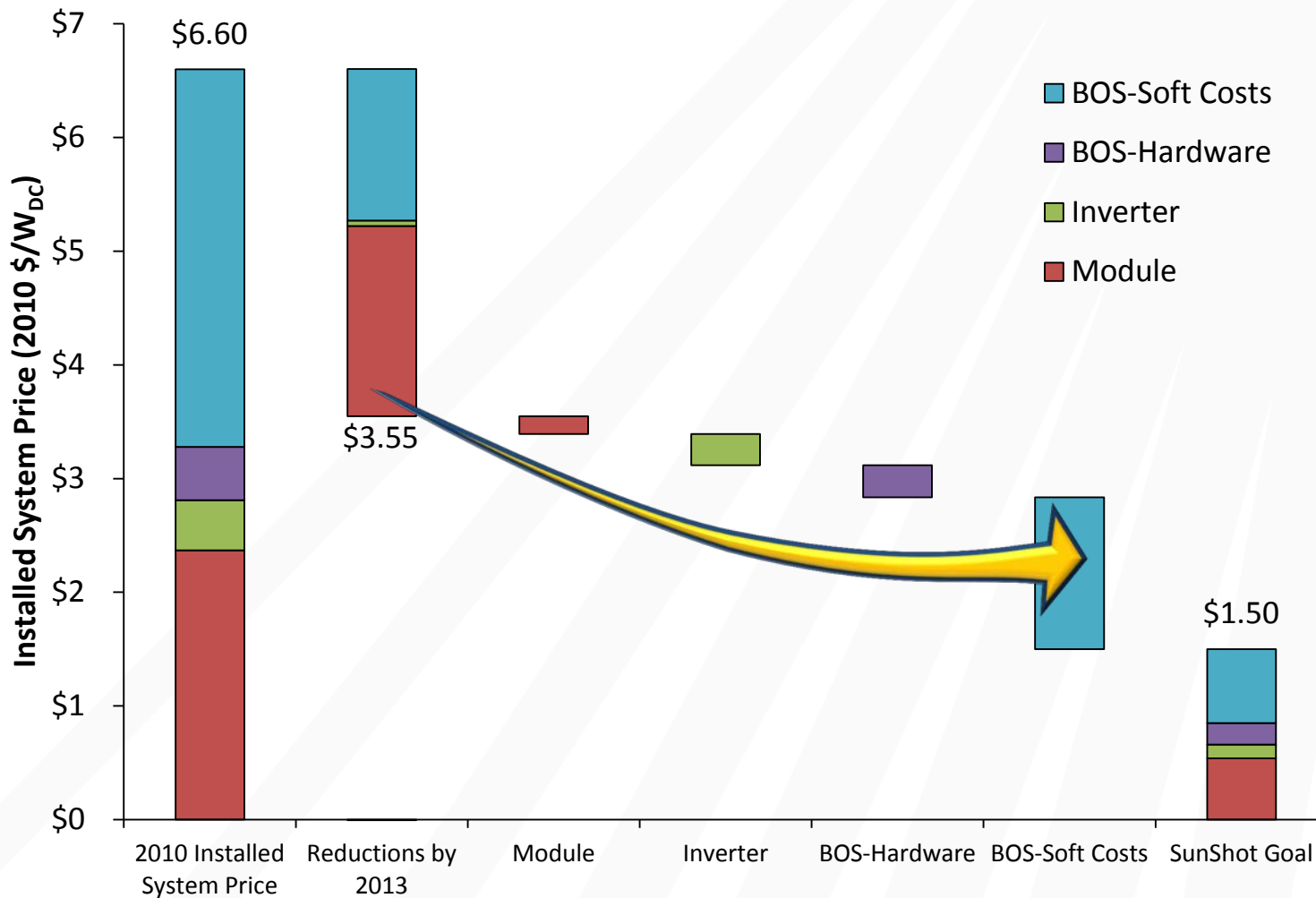


Installed capacity: 302 GW
14% of electrical demand

SunShot Strategy



PV System Pathway to SunShot Residential



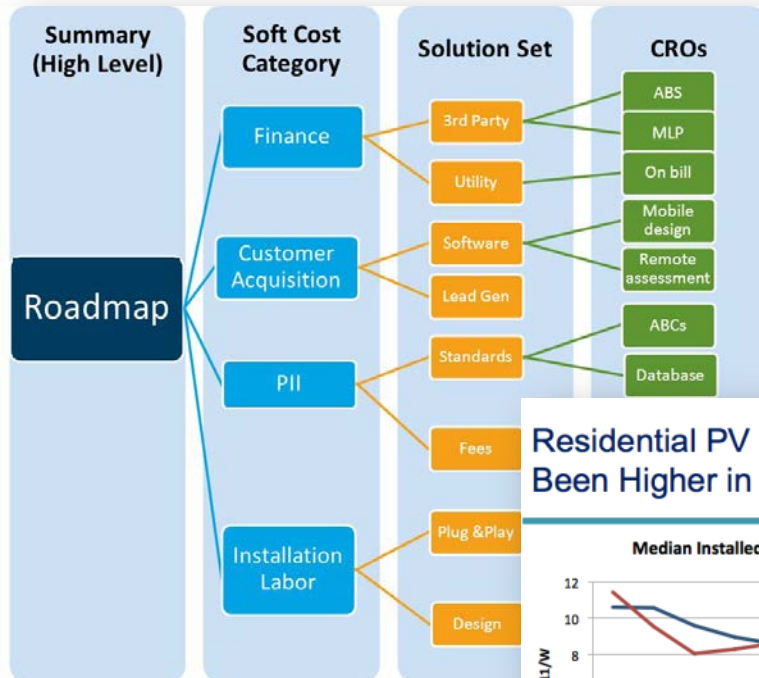
Soft Costs Dominating Overall Costs



Up to ~~50%~~ **64%** of the cost of a solar installation

Solar Soft Cost Analysis

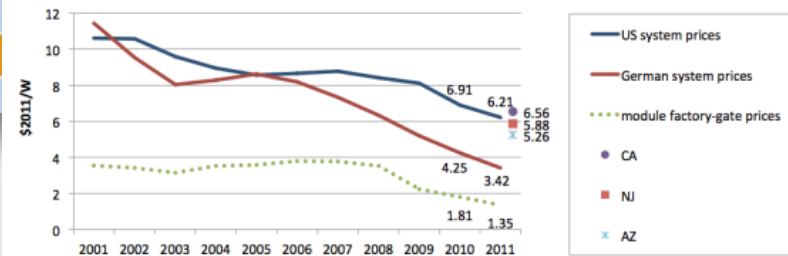
Solar Soft Cost Roadmap



Solution Set	Cost-Reduction Opportunity (CRO)	Roadmap, Enabled Reduction from 2010 Baseline (\$./W)								
		2013	2014	2015	2016	2017	2018	2019	2020	
Standardization	Uniform permitting & inspection requirements across jurisdictions (excludes interconnection)	\$0.01	\$0.01	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02
Transparency	Online database of requirements by jurisdiction	< \$0.01	< \$0.01	\$0.01	\$0.01	\$0.01	\$0.02	\$0.02	\$0.02	
Online Permitting	Online permit application submittal	< \$0.01	< \$0.01	< \$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	
Lower Permitting Fees	Market-wide average fee reduction from \$430 to \$250	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.01	\$0.02	\$0.03	
Interconnection Best Practices	Interconnection best practices (e.g., rapid application process, defined process for systems > 15% peak load)	< \$0.01	< \$0.01	< \$0.01	< \$0.01	< \$0.01	< \$0.01	< \$0.01	< \$0.01	
		\$0.02	\$0.02	\$0.03	\$0.05	\$0.05	\$0.06	\$0.07	\$0.07	
		\$0.04	\$0.05	\$0.07	\$0.09	\$0.10	\$0.14	\$0.16	\$0.16	
		\$0.16	\$0.15	\$0.13	\$0.11	\$0.10	\$0.06	\$0.04	\$0.04	

Residential PV System Prices Have Often Been Higher in the U.S. Than in Germany

Median Installed Price of Customer-Owned PV Systems ≤10 kW*



Data Sources:

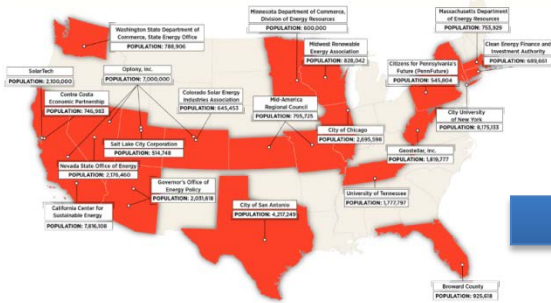
U.S. System Prices are derived from LBNL's TTS dataset and are equal to the median of customer-owned systems ≤10kW installed in each year. **German System Prices** are the averages of individual price quotes in EuPD's dataset (2008-2011) or the average of prices reported by IEA, Photon, KfW, and Schaeffer (2001-2007). **Module Factory-Gate Prices** are the average of prices reported by IEA, GTM, IRENA, Navigant, and Photon (annual currency exchange rates were used for module prices estimates)

* Note: Focusing on systems ≤10kW serves as a proxy for the residential market, as the project-level installed price data for German systems used for this figure do not include host customer type

Slashing Red Tape and Driving Local Innovation



ROUND 1 (2012-2013)



22 Awards
~50M Americans
19 States + Puerto Rico
\$12M

Performance-based
 Local-level innovation
 Teams quantitatively tracked and scored via market maturity scorecard
Year-end results:
 Fees reduced
 Online permitting spreading
 Statewide standards emerging
 Innovative digital solutions unveiled

ROUND 2 (2013-2015)



8 Awards
~150M Americans
27 States + DC
\$12M

Local Results, National Impact



PV Installed in RSC locales:

Residential: 225 MW

Commercial: 357 MW

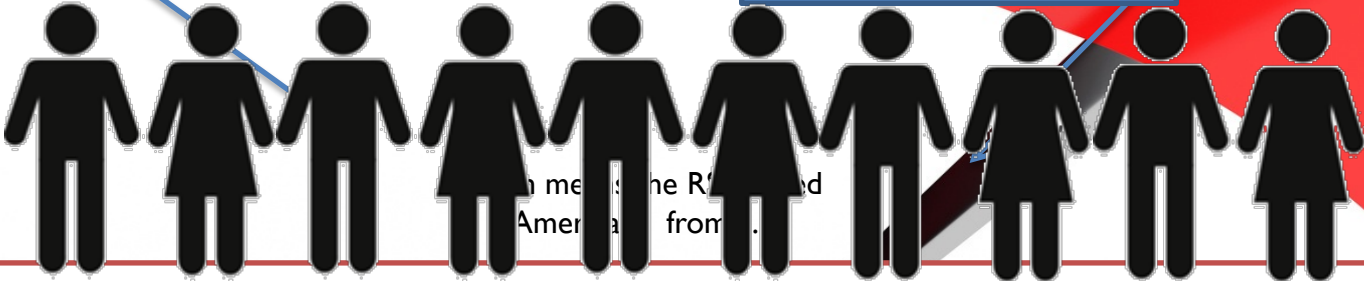
38K Residential Systems

3K Commercial Systems

=

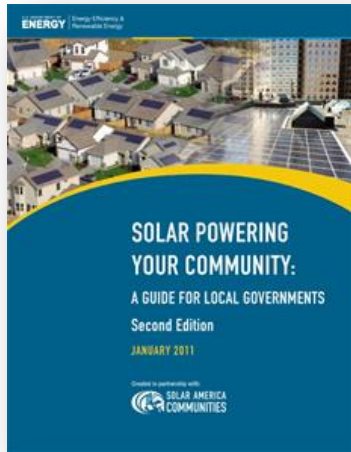
Average Business Days Saved Per Install = 5.1

Average Business Days Saved Per Install = 4.1



OVER 10 LIFETIMES SAVED

Access the latest resources, a calendar of events, and information on technical assistance at: www.solaroutreach.org



SOLAR ENERGY MYTHS

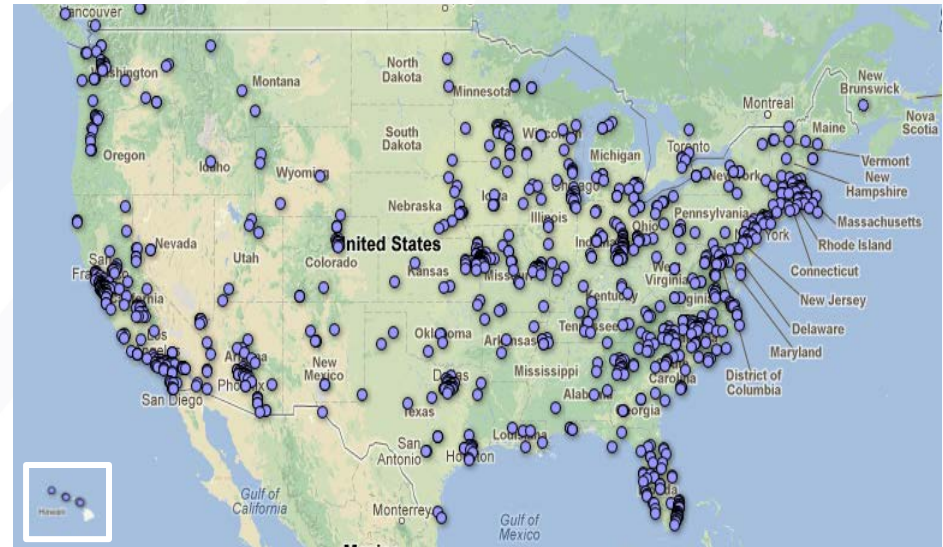
7 MISCONCEPTIONS ABOUT SOLAR PV

MYTH: IT ISN'T SUNNY ENOUGH WHERE I LIVE
FACT: SOLAR WORKS IN EVERY STATE
 While solar irradiation levels vary across the United States, a homeowner can produce a significant portion of their electric load from their roof space no matter what state they are in (assuming unshaded, proper tilt, orientation and installation). Germany, with a solar resource equivalent to Seattle and Alaska (illustrated in the figure to the right), has six times the installed capacity of the United States.

MYTH: SOLAR IS TOO EXPENSIVE
FACT: SOLAR IS COST COMPETITIVE
 While solar power isn't free, global solar industry growth has reduced costs equally and rapidly in recent years, dropping 30% in the past five years.* Combined with recent technological advancements, solar is cost competitive with natural gas peaking plants tomorrow and is predicted to be cheaper than coal within the next five years.*

MYTH: SOLAR IS ONLY AN OPTION BECAUSE OF LAVISH SUBSIDIES
FACT: ALL ENERGY SOURCES ARE SUBSIDIZED
 Every energy technology takes advantage of subsidies. Fossil fuel and nuclear power enjoy loan guarantees, accelerated depreciation, tax credits, cash on production facilities, and even bankruptcy protection. In the case of renewable energy, subsidies have only been in place in recent years, whereas the majority of fossil fuel and nuclear subsidies have been in place up to a century.*

*Source: SunShot, U.S. Department of Energy, MEISTER ENERGY RESEARCH



ASK THE EXPERT: SOLAR ACCESS

Ask the Expert Video Podcast Series presented by the SunShot Solar Outreach Partnership.



energy.gov/sunshot

SolarOPs has reached over 4,000 individuals, in all 50 states, representing more than 1,200 local governments through partnership workshops, e-learning activities, and technical assistance



NREL: Advanced Financing Mechanisms & In-depth Technical Assistance



Expand availability of capital

- Facilitate capital market investment and retail (community) bank lending
- Solar Access to Public Capital (SAPC):
 - Standard Documents
 - Mock Ratings Filing
 - 150 Members and Growing

Lower cost of capital

- Open Solar Performance and Reliability Clearinghouse (oSPARC database)

Reduce transaction cost, time to access capital

- Analysis of opportunities and barriers

Project Status: In-depth and Quick Response TA

19 PROJECTS UNDERWAY IN 16 LOCALITIES

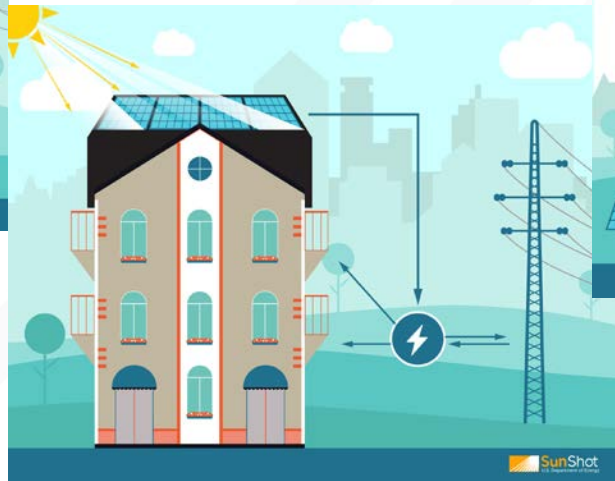
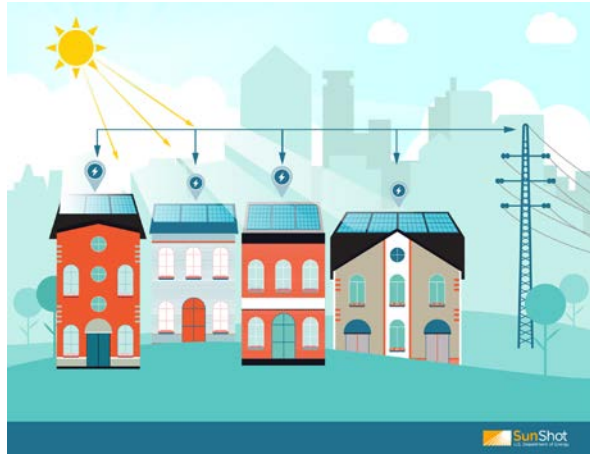


- Community Solar
- Harmonizing Codes
- Solar Valuation
- State Permitting Guide
- Solar Development for Public Power Utilities
- Consumer Protections
- Virtual Net Metering
- In-State PV Benefits
- Solar in Climate Plan
- Net Metering Caps
- Solar Financing
- Metering Accuracy
- RFP/Project Assistance

Last FY13 Application Round Closed in June 2013

NATIONAL RENEWABLE ENERGY LABORATORY

Shared and Community Solar

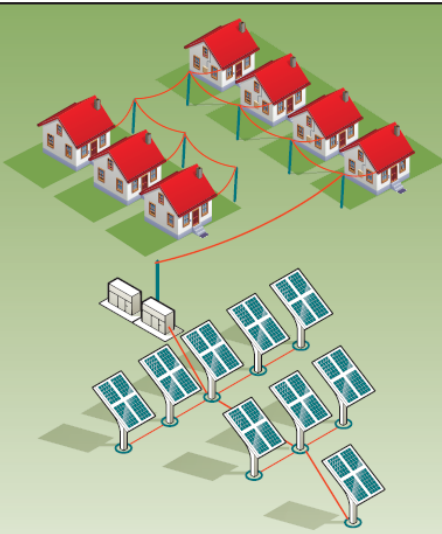


Shared and community solar models can:

- Remove the siting requirement
- **Expand the market** for solar
- Take advantage of **economies of scale**
- Provide **opportunities for innovation**

Resources

Model Rules for Shared Renewable Energy Programs



IREC Interstate Renewable Energy Council


THE Vote Solar INITIATIVE

Interstate Renewable Energy Council
<http://www.irecusa.org>

energy.gov/sunshot

Projects Shared Renewable Projects **52**

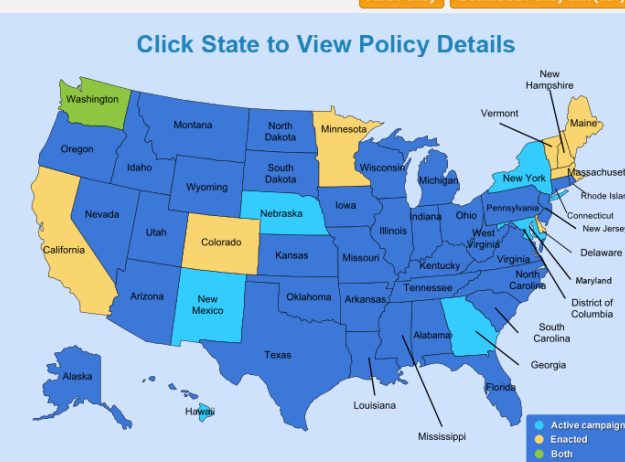
Search by zip code/state



Google

Policy States with Shared Renewable Policy **10**

Click State to View Policy Details

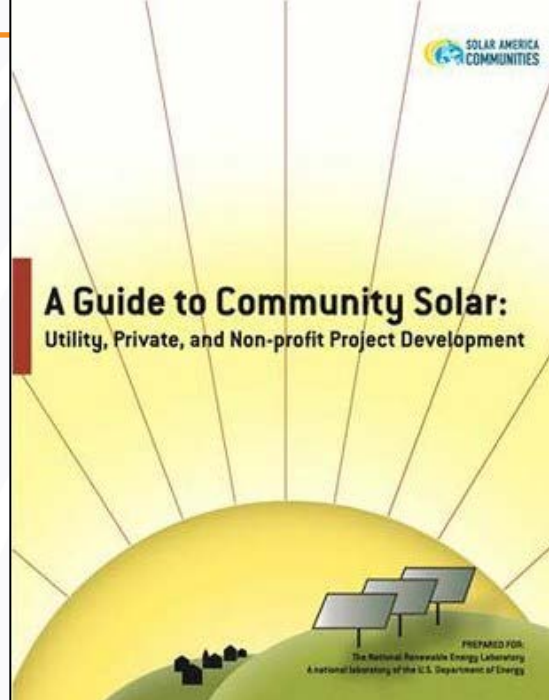


Legend: Active campaign (blue), Enacted (yellow), Both (orange)

Shared Renewables HQ
www.sharedrenewables.org

SOLAR AMERICA COMMUNITIES

A Guide to Community Solar:
 Utility, Private, and Non-profit Project Development



PREPARED FOR:
 The National Renewable Energy Laboratory
 A national laboratory of the U.S. Department of Energy

SunShot Initiative
Solar Energy Resource Center
<http://www1.eere.energy.gov/solar/sunshot/resources.html>



Solar Technology Diffusion Research

Under the SEEDS program, DOE supports projects that advance and apply cutting-edge strategies for accelerating solar adoption.

	Yale	NREL	Sandia National Laboratories	THE UNIVERSITY OF TEXAS AT AUSTIN
Foundational Scientific Advances	tracing social networks that spread solar	evolution of motivations beyond early adopters	agent-based modeling of innovation diffusion	micro-level data and analysis of energy consumers
Real-world Market Applications	spreading community solar through CT	four pilot experiments in CA, AZ, NY & NJ	testing economic + social incentives in San Diego	new incentive structures piloted with TX utilities
Research and Market Partners	Yale, NYU, SmartPower, CT Clean Energy Finance and Investment Authority	Portland State U, U of A, LBNL, CU-Boulder, MichState, UMich, Social and Environmental Research Inst., Clean Power Finance	UPenn-Wharton, Vanderbilt, NREL, California Center for Sustainable Energy	Austin Energy, Frontier Associates

Driving Soft Cost Innovation

SunShot Incubator Program



Clean Power  Finance



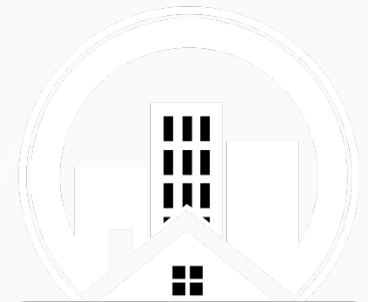
Big Data Lowers Solar Soft Costs

- Sun Number Scores - engaging consumers
- Roof top data processed to qualify buildings
- Lowering the cost of customer acquisition

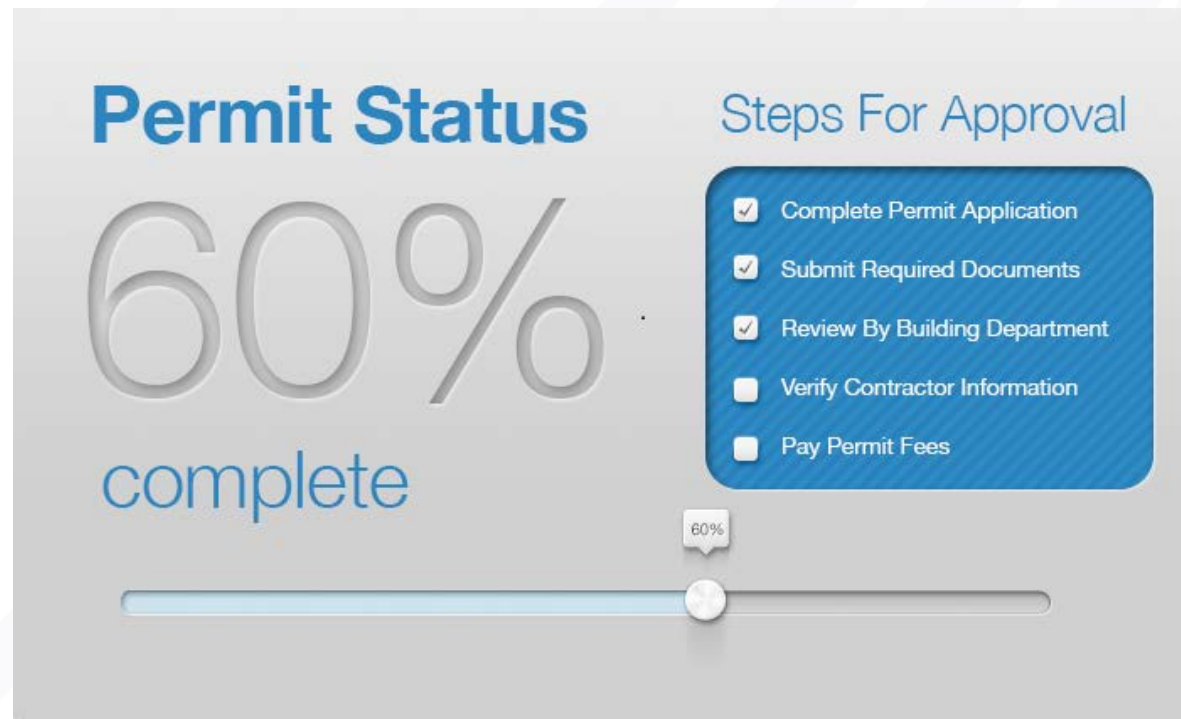


Streamlined Permitting, Inspection

- Web-Based permitting
- Track your permits in real time
- Eliminate trips to permitting office



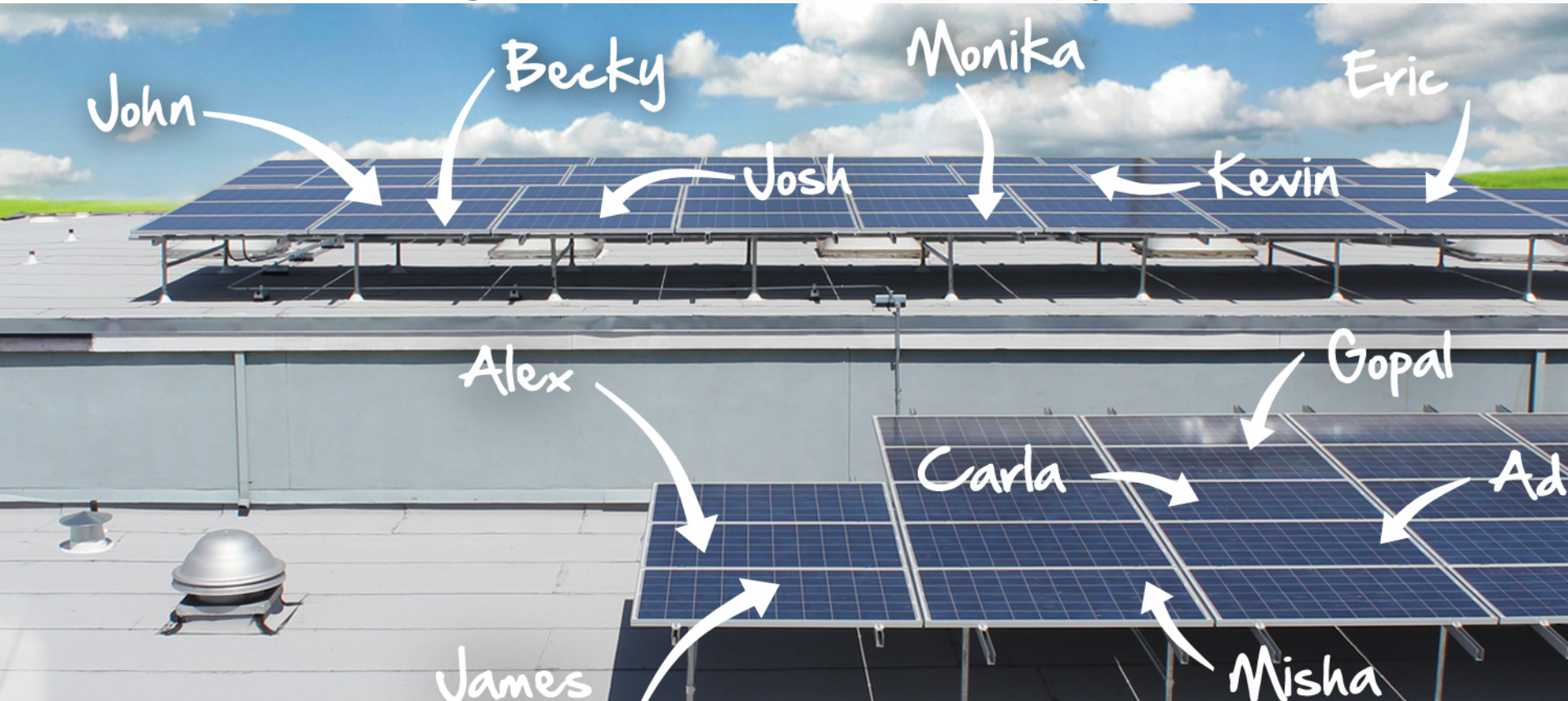
simply civic



Crowd-Funded Solar



- Non-homeowners can go solar for \$25
- Crowdfunding lowers the cost of capital



Thank You

Elaine Ulrich
Program Manager
SunShot Initiative

U.S. DEPARTMENT OF
ENERGY



NHT Renewable Solar Financing Model

Jared Lang
Better Buildings Summit
May 9th, 2014

Key Questions

1. What are the risks and rewards of purchasing versus leasing solar systems?
2. How do you make the benefit worth the brain damage?

National Housing Trust / Enterprise Preservation Corporation

- ❖ Own & Operate approximately 3,000 affordable rental units along the East Coast and Illinois; typically with a local partner.
- ❖ NHT/Enterprise has achieved green certification (Enterprise, Earthcraft or other) on approximately 1/3 of units, 1000 units, in its portfolio.
- ❖ First Enterprise Green Communities Certified property in DC (Galen Terrace) developed by NHT/Enterprise.
- ❖ Typically reduce energy consumption >20%.

Purchasing

Benefits

1. Energy Savings
2. Environmental benefit
3. Local energy production
4. Price stability

Challenges

1. Roof Condition and Structural Reviews
2. Up-front Capital
3. Approvals
4. Construction Risk
5. O&M

Leasing

Benefits

1. Energy Savings, but much less
2. No installation costs
3. No O&M
4. Environmental benefit
5. Local energy production
6. Price stability

Challenges

1. Roof Condition and Structural Reviews
2. Legal fees associated with onerous approvals
3. 3rd-party owning an asset on your roof
4. Less energy savings (must share)

St. Dennis Financials

Solar PV Example

System Size (kW)	15
Estimated Output (kwh/year)	20,000
Power Price / kwh	0.14

	2014	2015	2016	2017	2018	2019
<u>Purchase Option</u>						
Equity Investment	\$ (50,000)					
Federal Tax Credit (30%)	\$ 15,000					
Income (Savings and Credits)		\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000
Net Cash Flow	\$ (35,000)	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000

Payback 4 Years

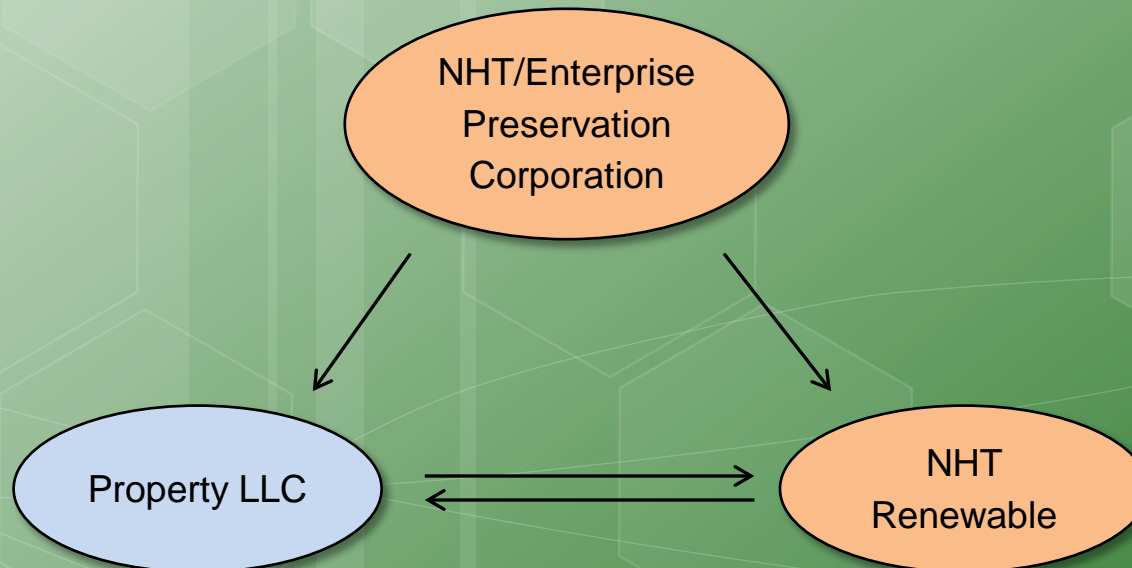
Leasing Option

Equity Investment	\$ (5,000)					
Income (Savings)		\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000
Net Cash Flow	\$ (5,000)	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000

Payback 5 Years

NHT Renewable Model

1. Owning and operating solar at the portfolio-level (5 properties)
2. Setting up leases with the property partnerships
3. Opening projects up to new income streams
4. Aggregating multiple properties
5. Making the benefit worth the brain damage



NHT Renewable (Hybrid)

Benefits

1. Environmental benefit
2. Energy Savings
3. New income streams
4. Local energy production
5. Price stability
6. Properties: No upfront cost or O&M

Challenges

1. Roof Condition and Structural Reviews
2. Up-front Capital
3. Approvals
4. Construction Risk
5. O&M

Renewable Project Scope

NHT/Properties Impacted: 5
Solar Thermal Systems: 2
Solar Photovoltaic Systems: 4
Total Project Cost: \$1.25 million
Photovoltaic: 300,000 kw/year
Thermal: 10,000 therms/year
Project Installation: Q2 2014

R Street Apartments



Meridian Manor



Galen Terrace



Copeland Manor



St. Dennis Apartments

NHT Renewable Financials

NHT Renewable

System Size

Photovoltaic (kW)	250
Thermal (Therms)	10,000
Estimated Output (kwh)	500,000

	2014	2015	2016	2017	2018	2019
Financials						
Equity Investment	\$(1,250,000)					
Federal Tax Credit (30%)	\$ 375,000					
Income (Savings and Credits)		\$ 210,000	\$ 210,000	\$ 210,000	\$ 210,000	\$ 210,000
Net Cash Flow	\$ (875,000)	\$ 210,000	\$ 210,000	\$ 210,000	\$ 210,000	\$ 210,000

Payback	4-5 Years
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NHT Renewable

If you want to learn more...

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