Solar Powering Your Community

Addressing Soft Costs and Barriers

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MEISTER CONSULTANTS GROUP

NC CLEAN ENERGY TECHNOLOGY CENTER

SunShot Solar Outreach Partnership: 2013-16

ICMA
Leaders at the Core of Better Communities

APA
American Planning Association
Making Great Communities Happen

NARC
Building Regional Communities
National Association of Regional Councils

ICLEI
Local Governments for Sustainability USA

IREC
Interstate Renewable Energy Council

MEISTER
CONSULTANTS GROUP

NC CLEAN ENERGY TECHNOLOGY CENTER
Formerly the NC Solar Center

The SOLAR FOUNDATION

SEPA
solar electric power association

The SunShot Solar Outreach Partnership (SolarOPs) is a U.S. Department of Energy (DOE) program designed to increase the use and integration of solar energy in communities across the US.

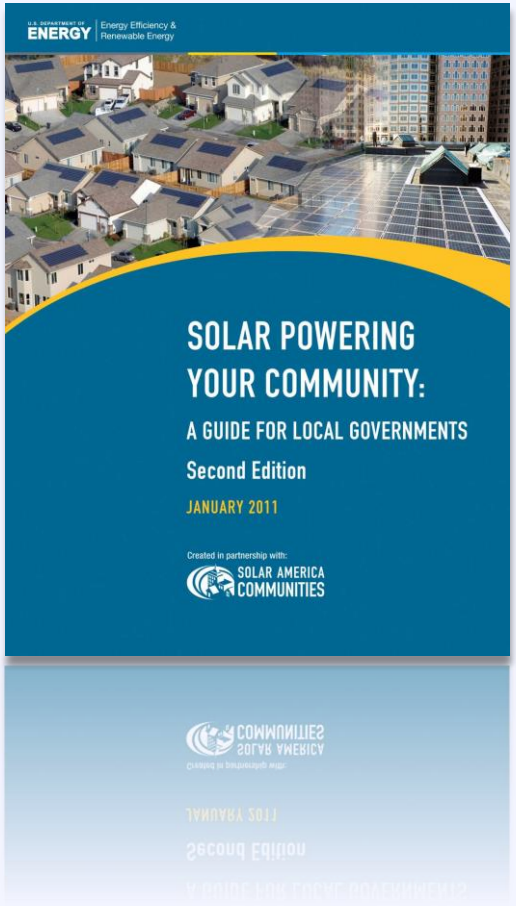
SunShot Solar Outreach Partnership: 2013-16

- Increase installed capacity of solar electricity in U.S. communities
- Streamline and standardize permitting and interconnection processes
- Improve planning and zoning codes/regulations for solar electric technologies
- Increase access to solar financing options

Technical Resources

Resource **Solar Powering Your Community Guide**

A comprehensive resource to assist local governments and stakeholders in building local solar markets.



www.energy.gov

www.solaroutreach.org

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We want to get to know you better

Who are you?

1. Who do you represent?

   Local or state government, academic institution, solar industry, community, other

2. Where do you live/work?

   Within or outside Brazos Valley Region?

3. What size is your community?

What is your experience with solar?

1. How familiar are you with solar?
2. Do you have solar on your home?
3. Does your local government have solar on public properties?

Solar Technologies

Solar Photovoltaic (PV)

Solar Hot Water

Concentrated Solar Power

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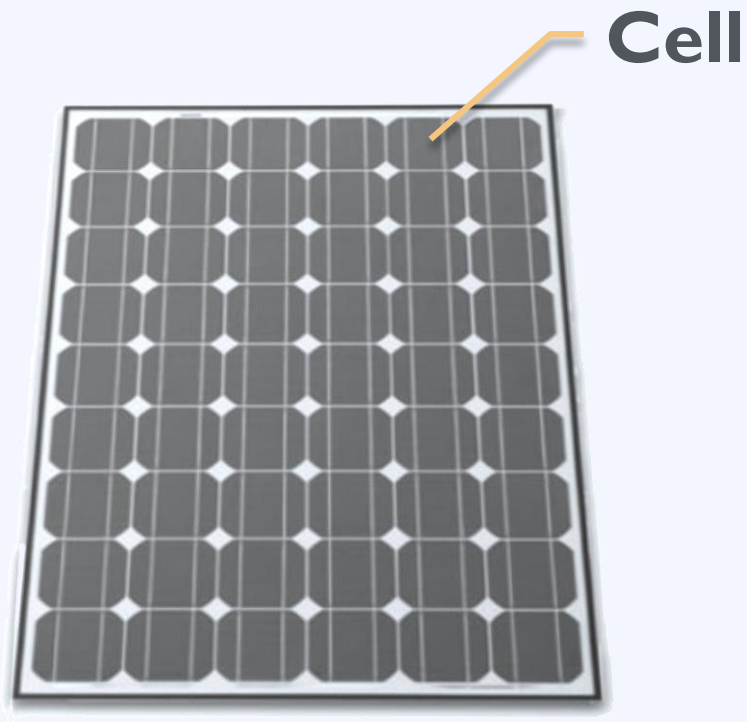
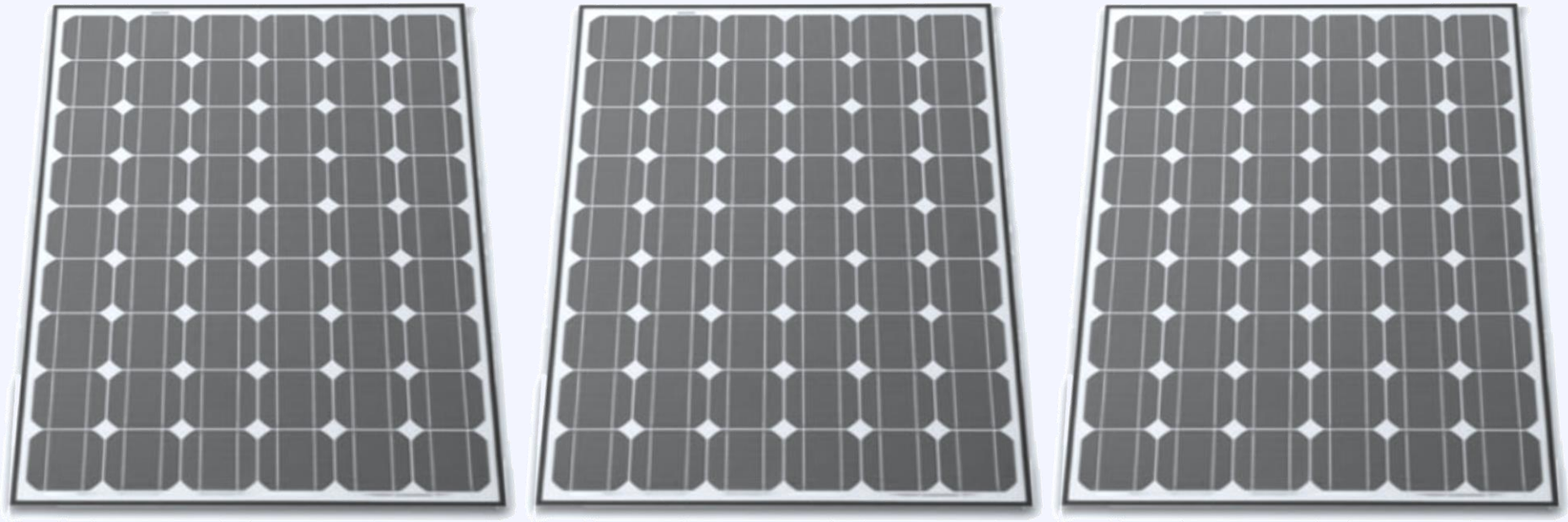
Some Basic Terminology



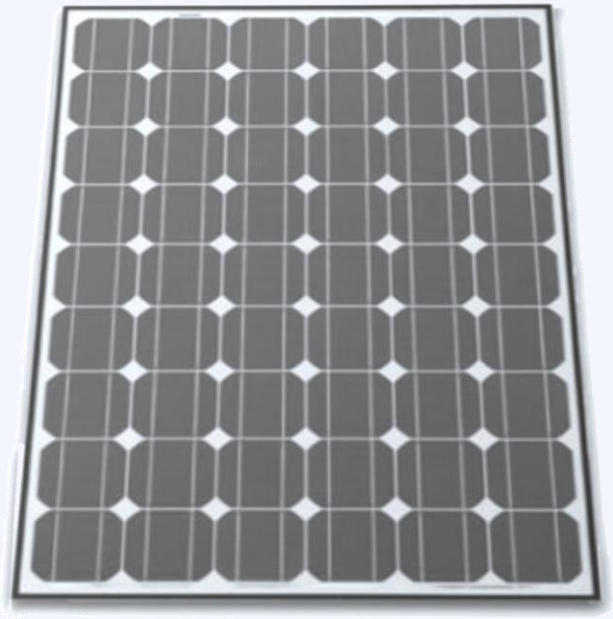
Panel / Module

Some Basic Terminology



Array

Some Basic Terminology



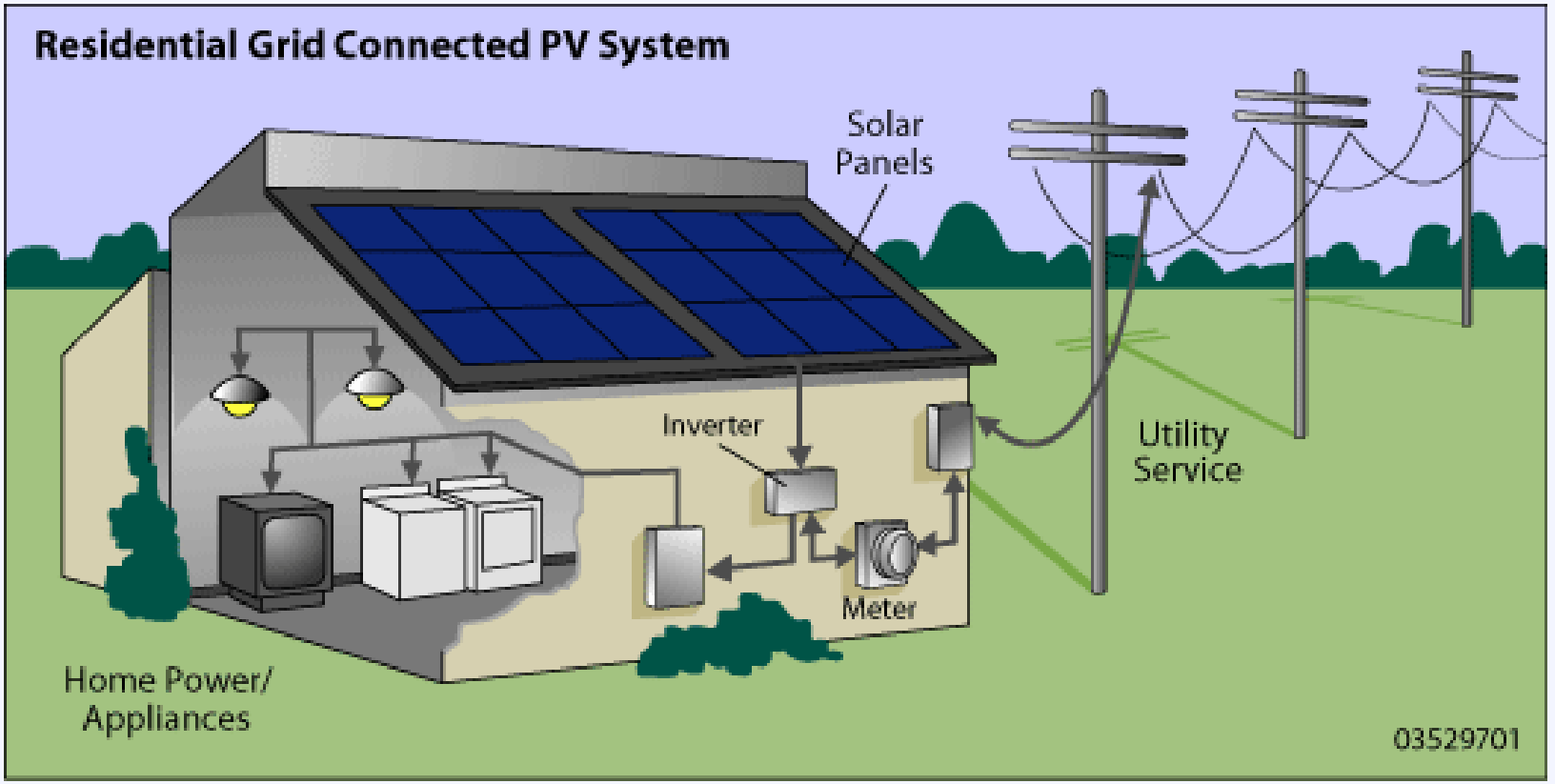
Capacity / Power

kilowatt (kW)

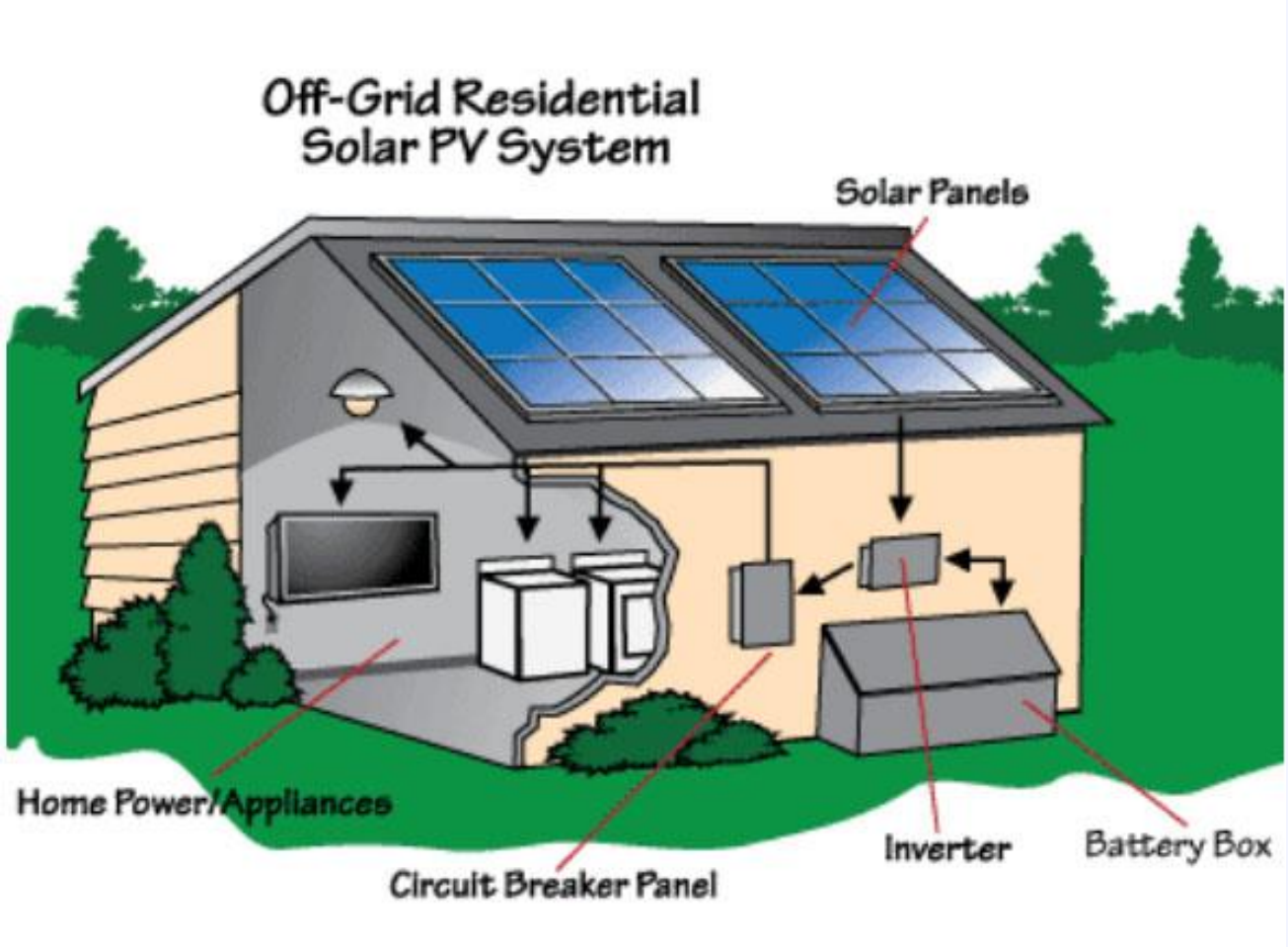
Production

Kilowatt-hour (kWh)

System Components



System Components – Off-Grid



Some Basic Terminology

Residence
5 kW

Factory
1 MW+

Office
50 – 500 kW

Utility
2 MW+

Agenda

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12:45 – 1:20	Solar Market Development Tools
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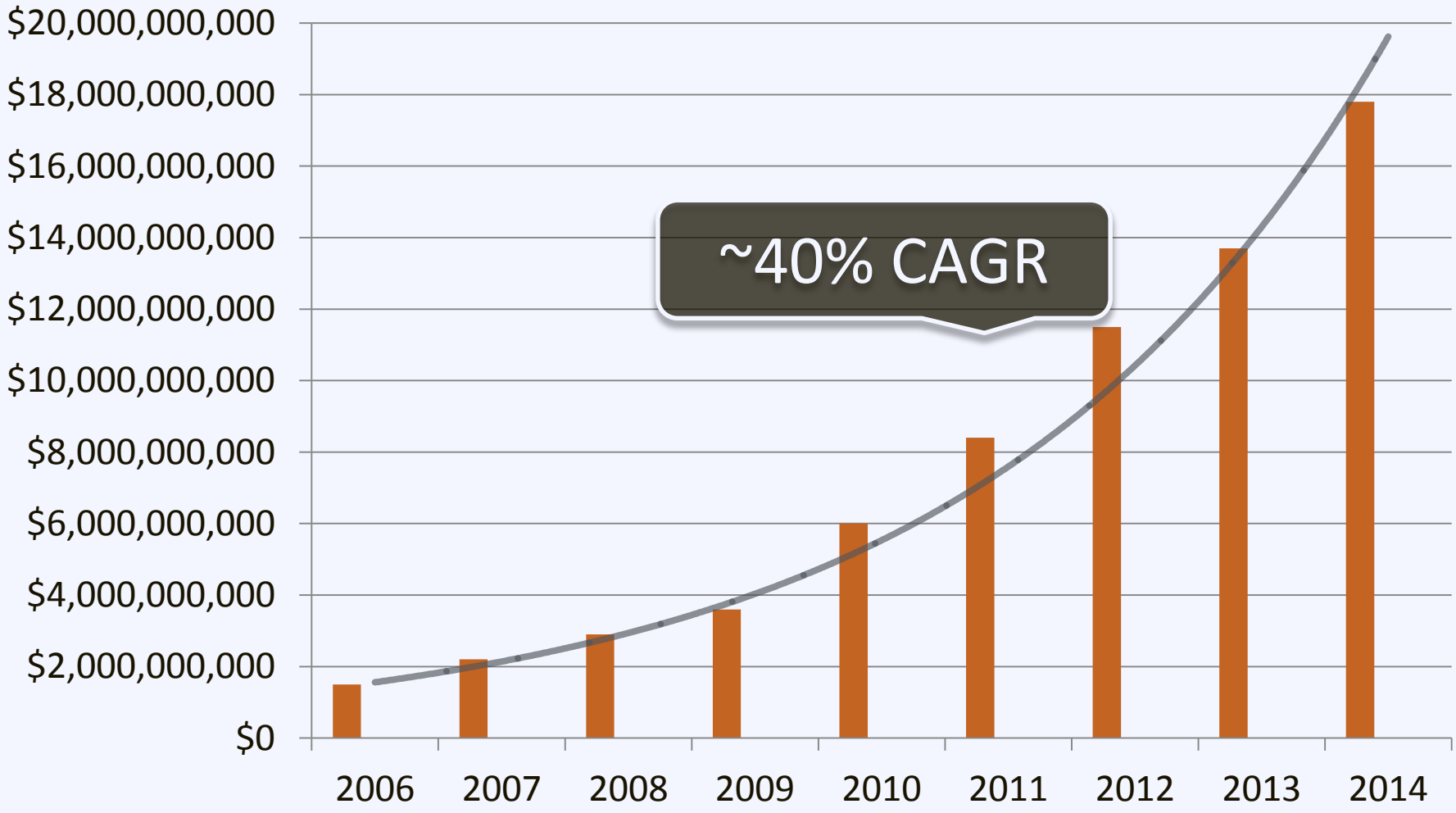
1:30 – 2:45	Local Speakers
2:45 – 3:00	Solar Powering Your Community: Next Steps

What are the benefits solar can bring to your community?

A. Economic development & job creation
B. Environmental & public health benefits
C. Reduction and stabilization of energy costs
D. Energy independence & resilience
E. Value to the utility
F. Community pride
G. Other

Benefits: Solar Economic Growth



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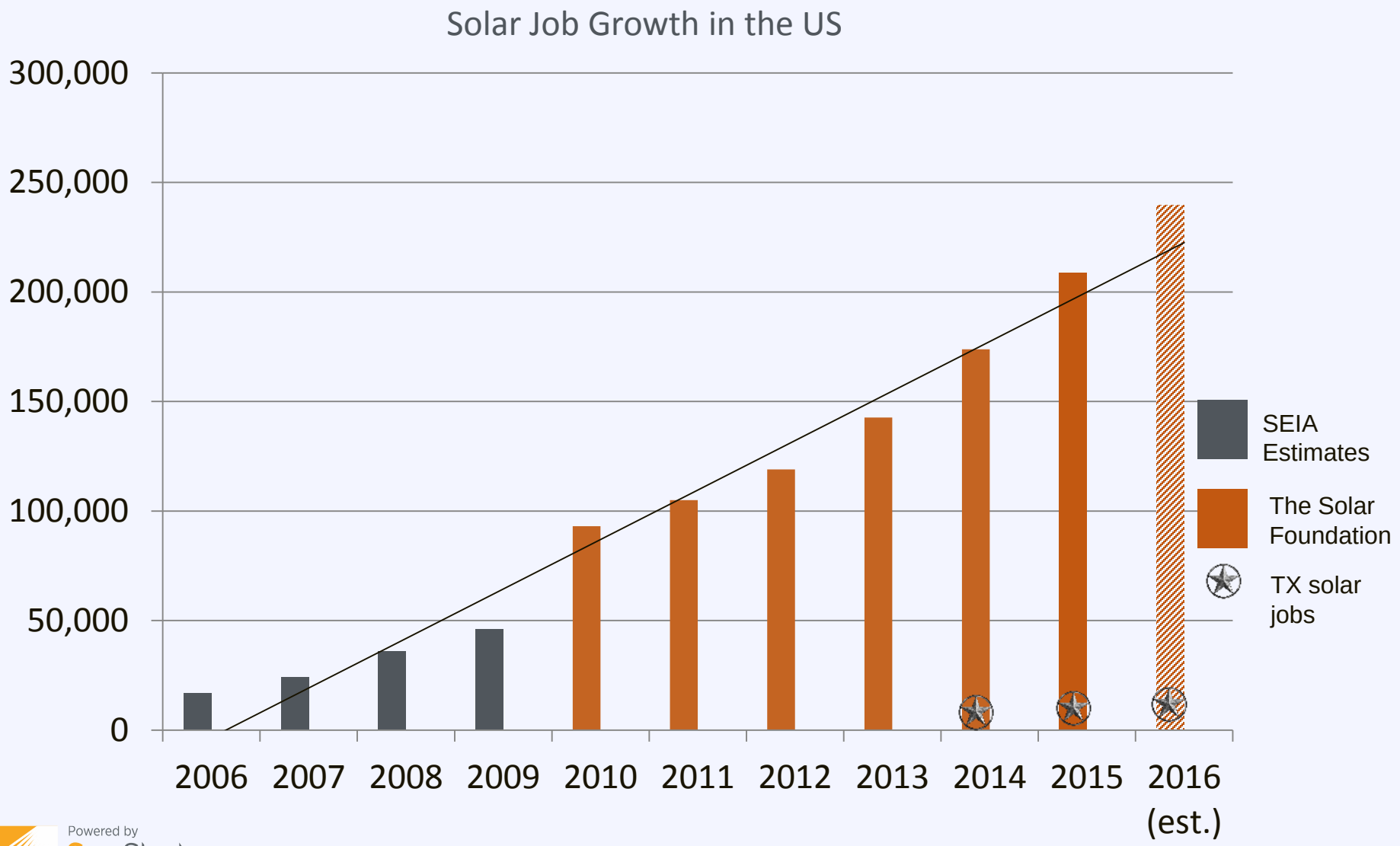
Source: SEIA/GTM Research – 2009/2010/2011/2012 Year in Review Report
http://www.seia.org/research-resources/us-solar-market-insight

Benefits: Solar Job Growth



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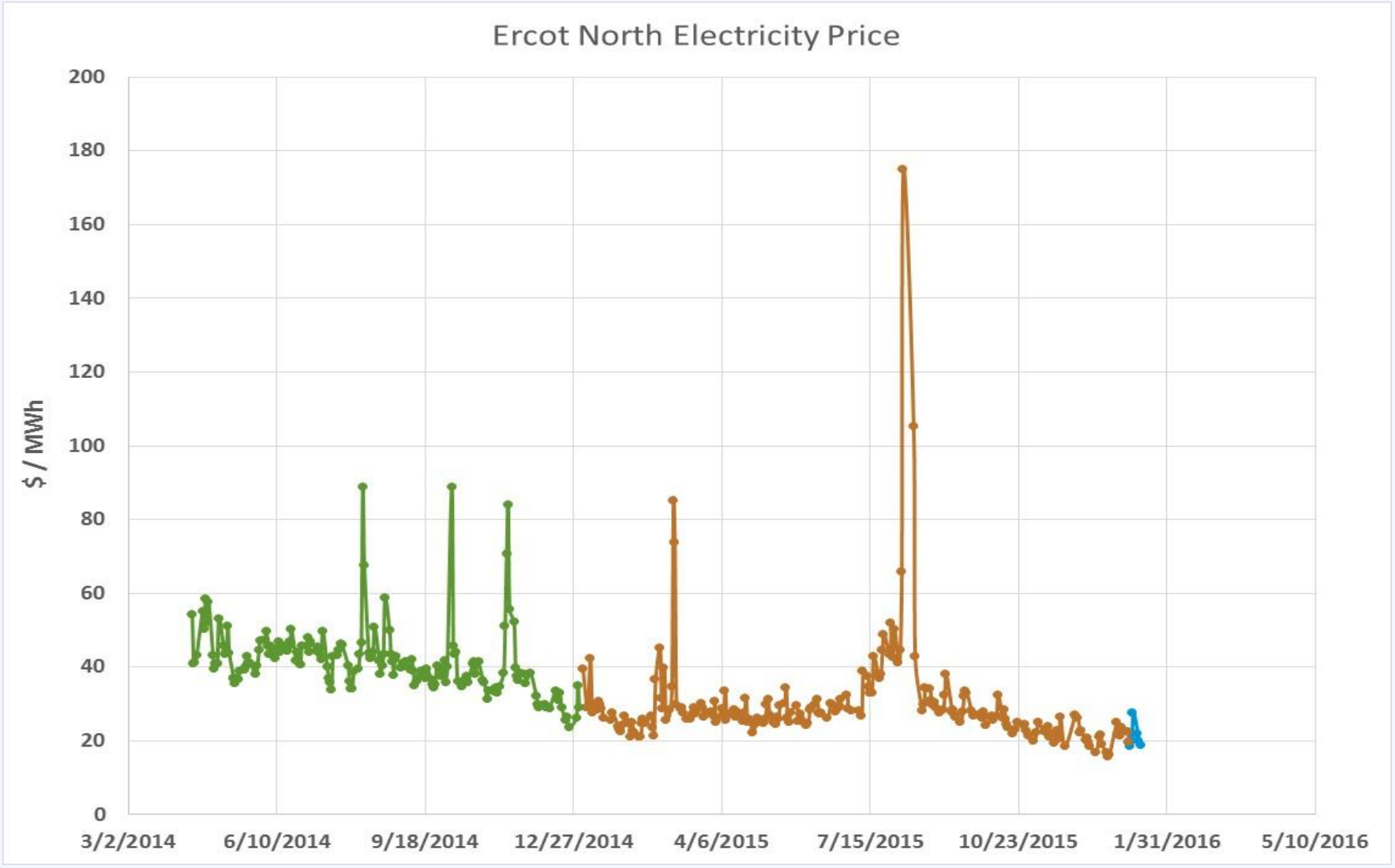
Source: SEIA Estimates (2006-2009), The Solar Foundation's *National Solar Jobs Census* report series

Benefit: Stabilize Energy Prices



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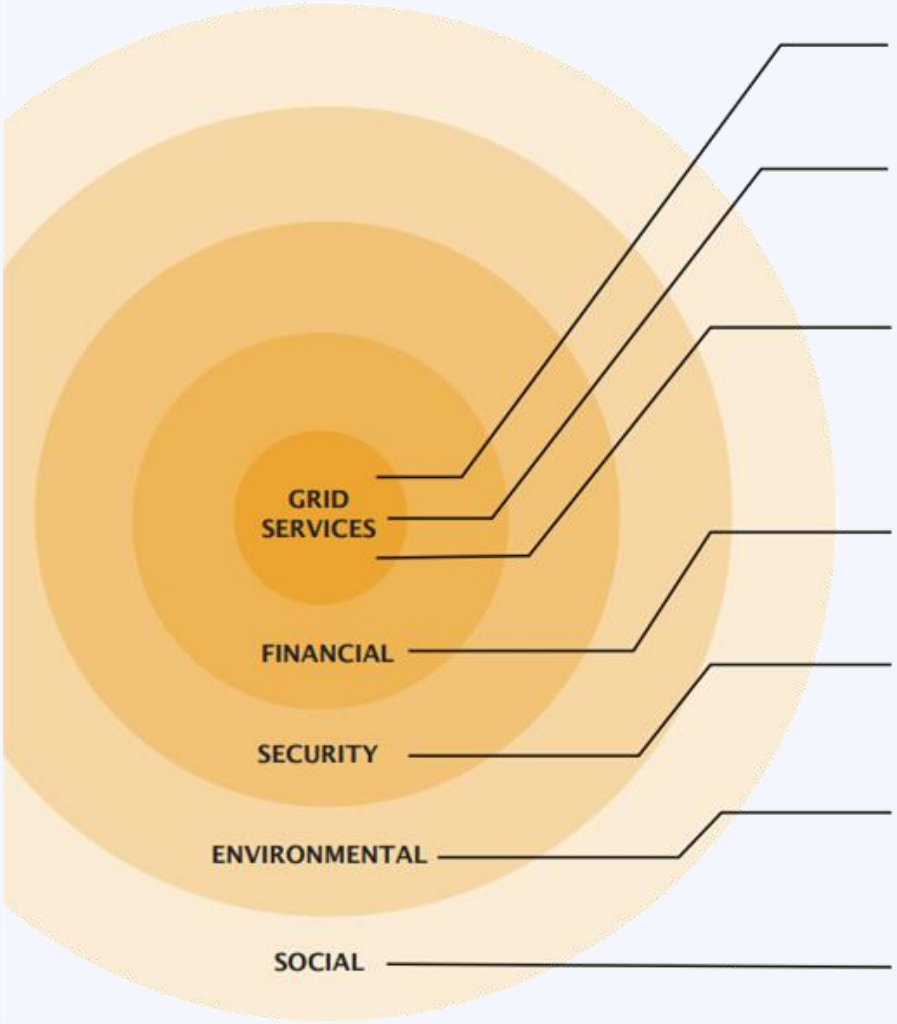
Source: EIA

Valuable to Community & Utilities



ENERGY
- energy
- energy losses

CAPACITY
- generation capacity
- transmission & distribution capacity
- DPV installed capacity

GRID SUPPORT SERVICES
- reactive supply & voltage control
- regulation & frequency response
- energy & generator imbalance
- synchronized & supplemental operating reserves
- scheduling, forecasting, and system control & dispatch

FINANCIAL RISK
- fuel price hedge
- market price response

SECURITY RISK
- reliability & resilience

ENVIRONMENTAL
- carbon emissions
- criteria air pollutants (SOx, NOx, PM10)
- water
- land

SOCIAL
- Economic development (jobs and tax revenues)

Source: Rocky Mountain Institute
(http://www.rmi.org/Content/Files/eLab-DER_cost_value_Deck_130722.pdf)

Smart Investment for Homeowners

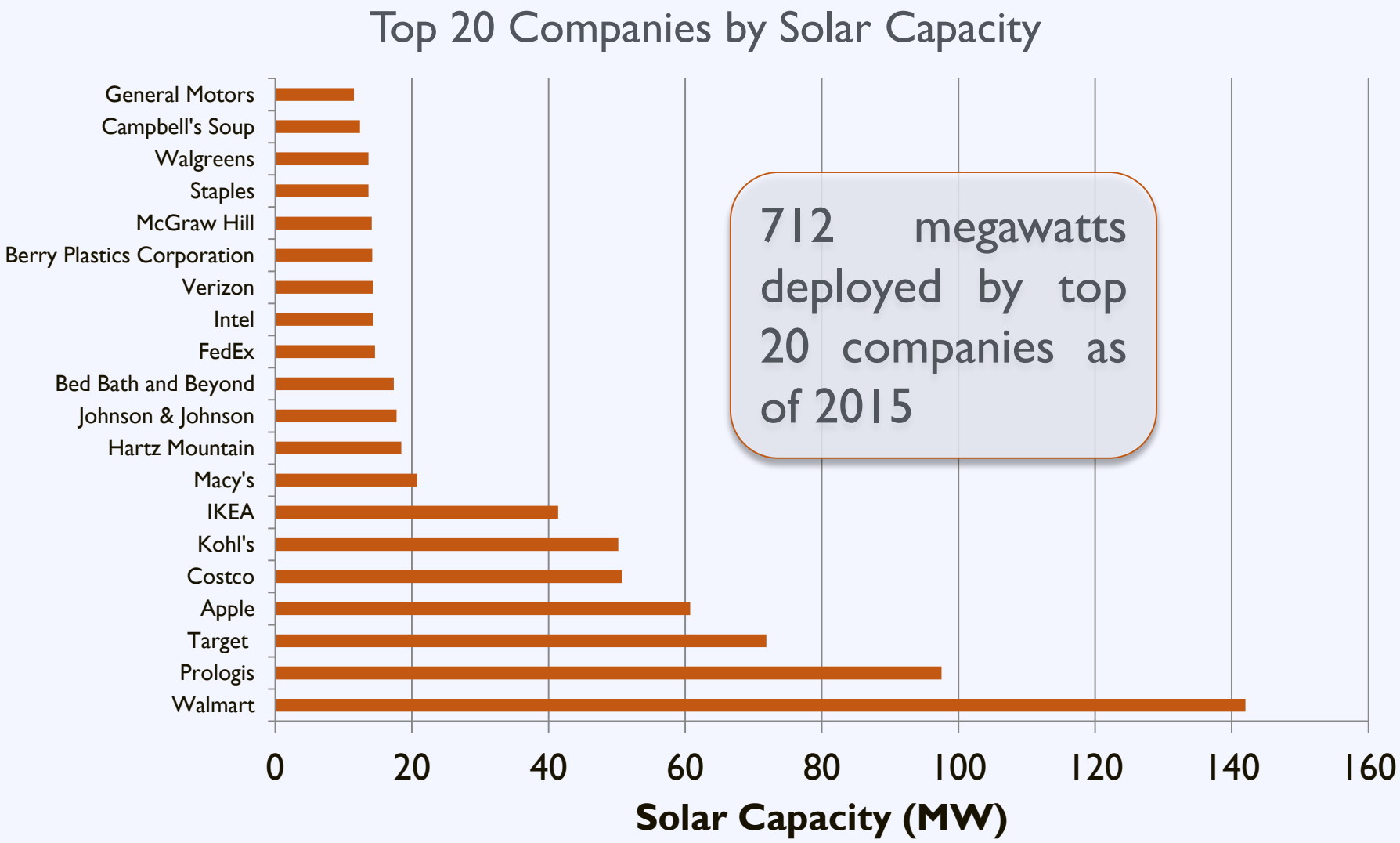
A typical residential solar system increases a home's property value by

an average of $11,000 - $14,500

Source: LBNL, *Selling Into the Sun* (2015), non-California homes

Sandra Adomatis, SRA, and Ben Hoen, "An Analysis of Solar Home Paired Sales across Six States", The Appraisal Journal, Winter 2016

Smart Investment for Businesses



Source: SEIA Solar Means Business 2015

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Smart Investment for Governments

Source: Borrego Solar

Smart Investment for Schools

Current:

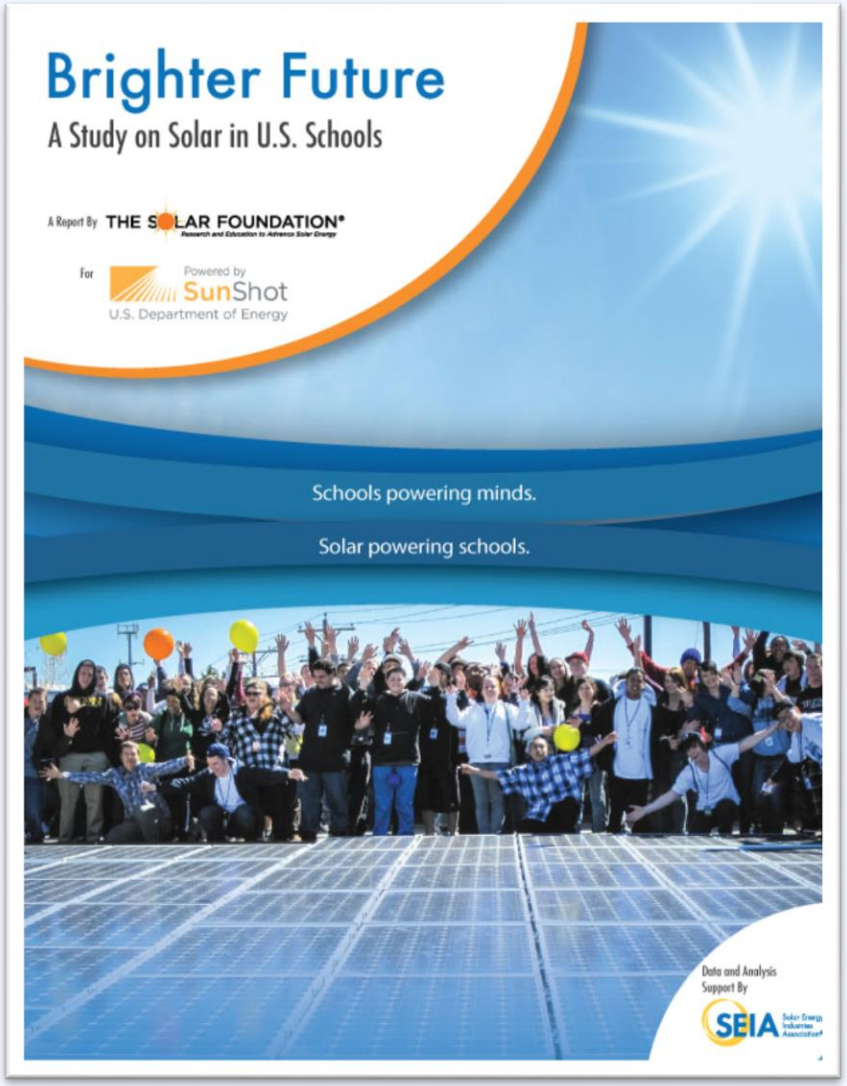
× 3,752

$ = $77.8m

Potential:

× 40,000 – 72,000

$ = $800m



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Source: The Solar Foundation (http://schools.tsfcensus.org)

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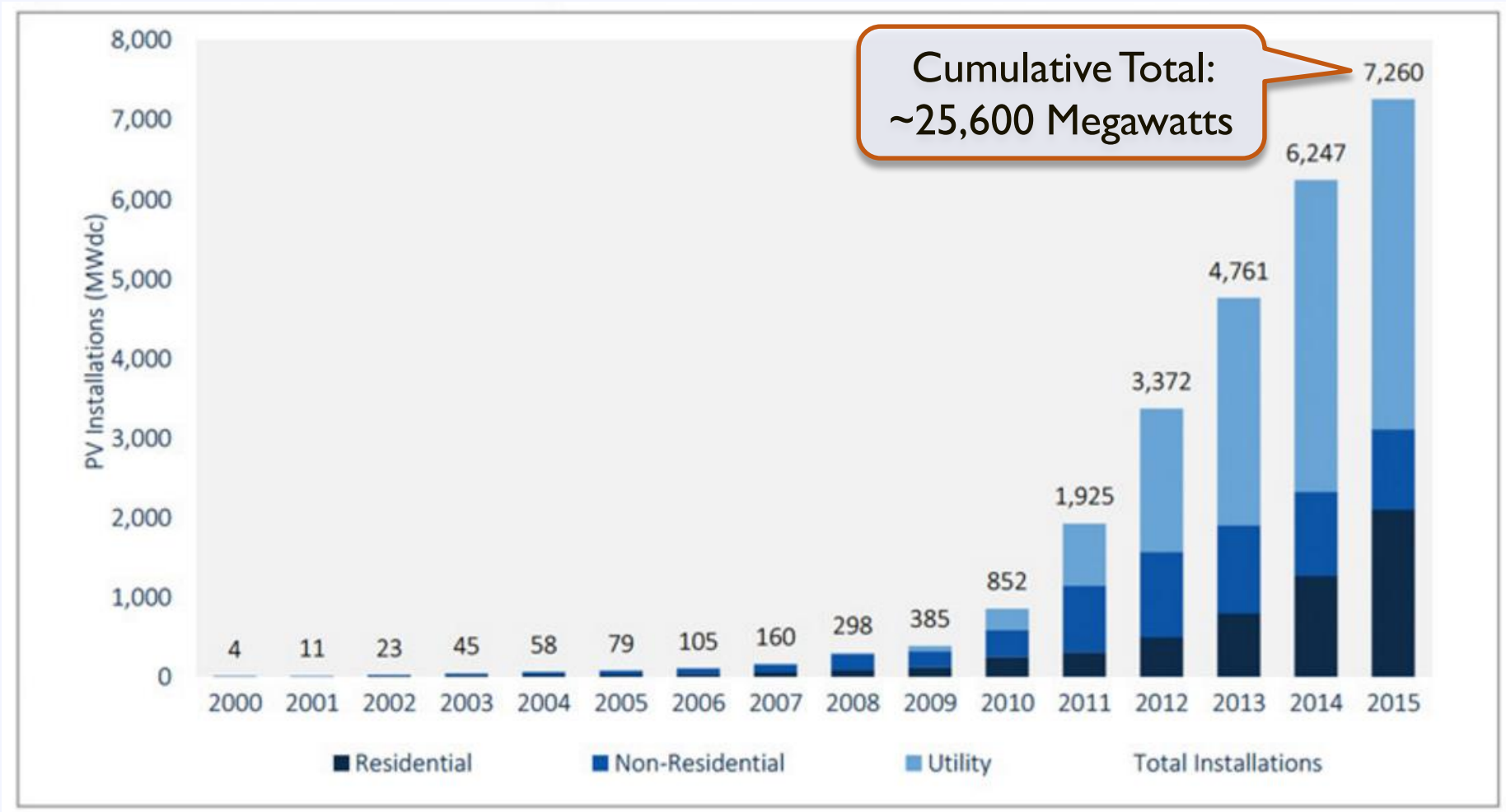
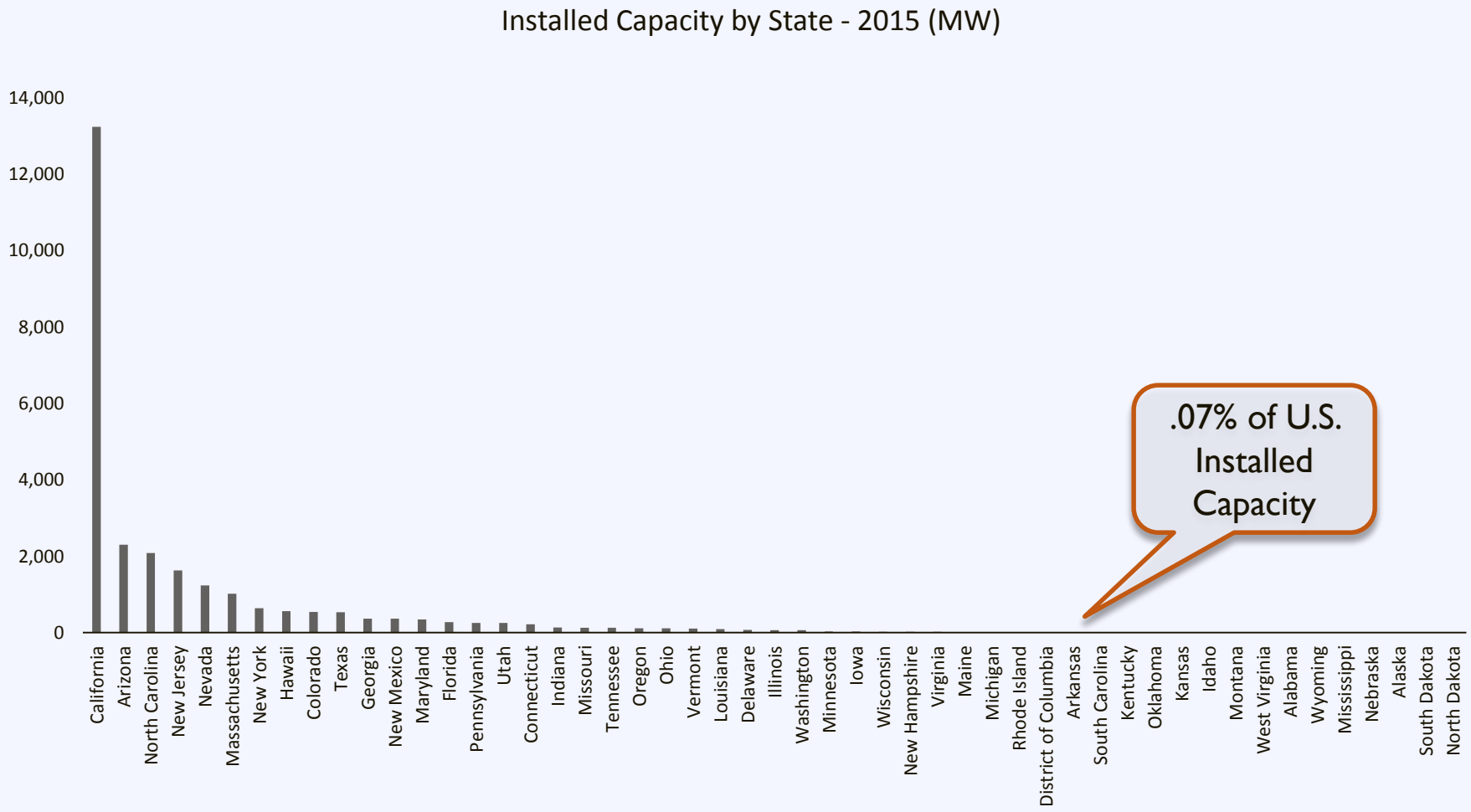
US Solar Market



Powered by SunShot U.S. Department of Energy

Source: SEIA/GTM Research, U.S. *Solar Market Insight: 2015 Year-in-Review*

US Solar Market



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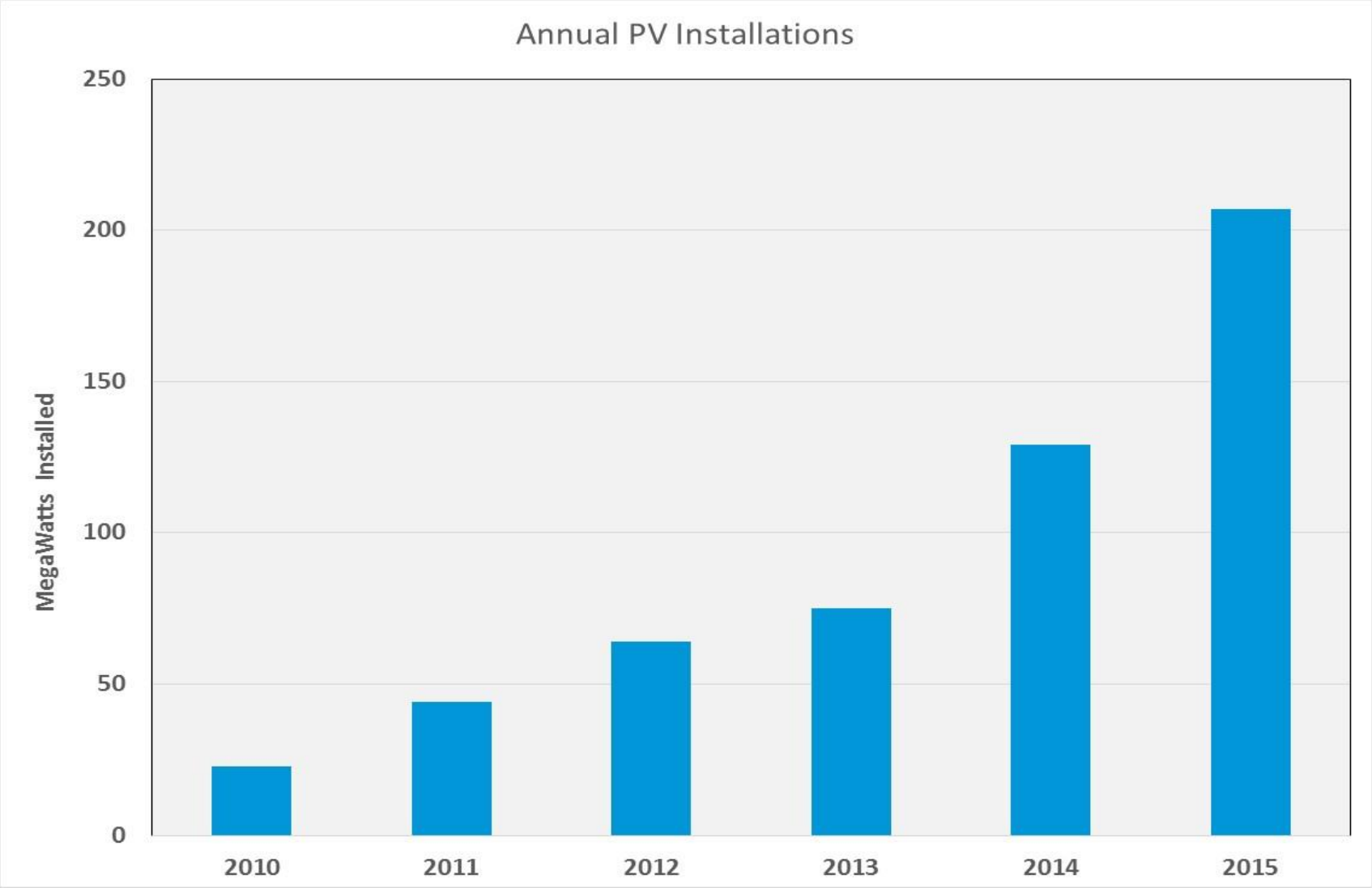
Source: IREC, Solar Market Trends 2013

Texas Solar Market



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SEIA/GTM Research U.S. Solar Market Insight 2010-2015 Year in Review

Solar Jobs in Texas

In 2015, Texas had

9,100 solar jobs

roughly

220% growth since 2014

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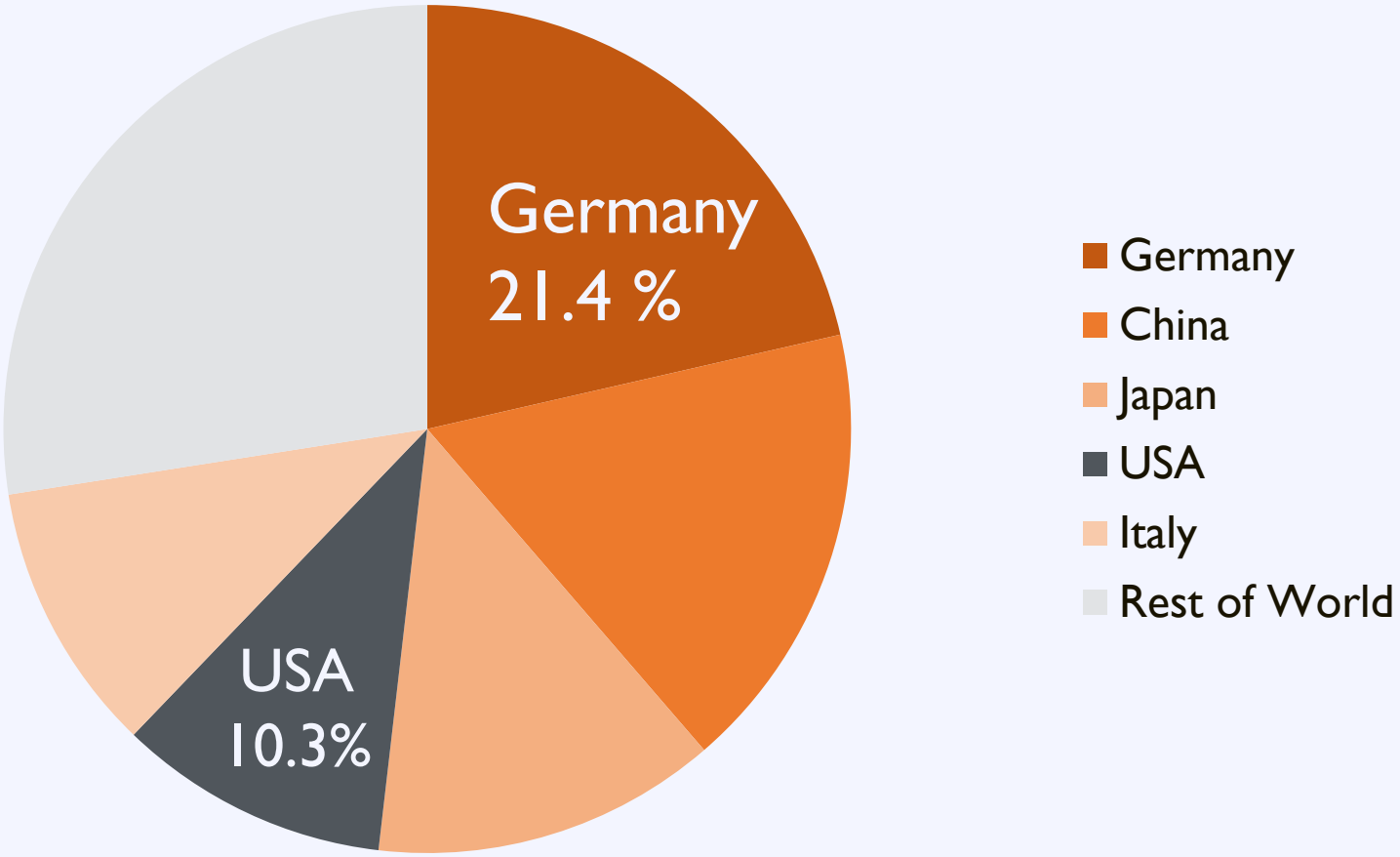
The Solar Foundation – National Solar Jobs Census (2015) and Texas Solar Jobs Census 2014

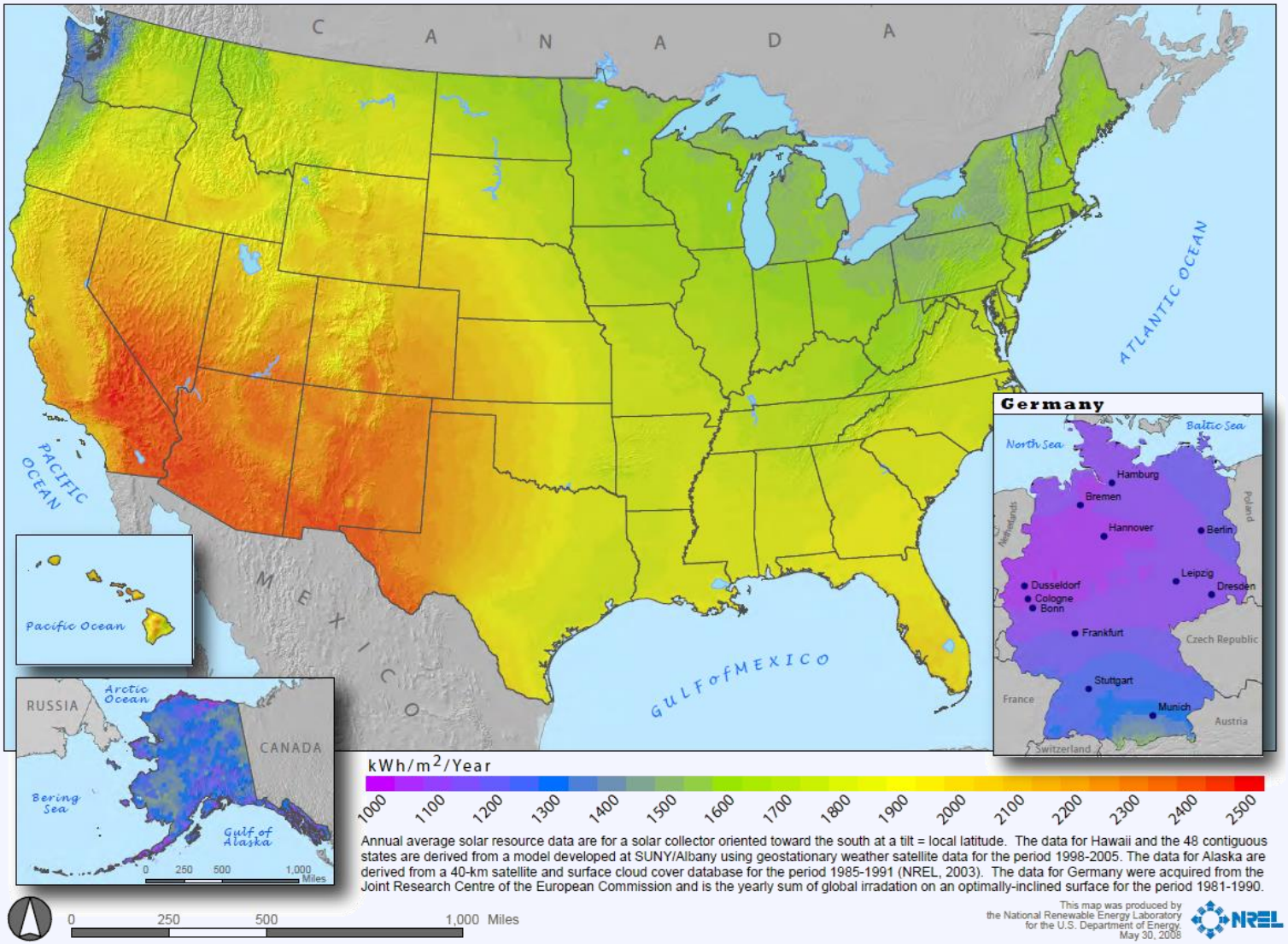
World Solar Market

Top 5 Countries Solar Operating Capacity (2014)



Source: REN 21, 2015

US Solar Resource



Annual average solar resource data are for a solar collector oriented toward the south at a tilt = local latitude. The data for Hawaii and the 48 contiguous states are derived from a model developed at SUNY/Albany using geostationary weather satellite data for the period 1998-2005. The data for Alaska are derived from a 40-km satellite and surface cloud cover database for the period 1985-1991 (NREL, 2003). The data for Germany were acquired from the Joint Research Centre of the European Commission and is the yearly sum of global irradiation on an optimally-inclined surface for the period 1981-1990.

This map was produced by the National Renewable Energy Laboratory for the U.S. Department of Energy. May 30, 2008

NREL

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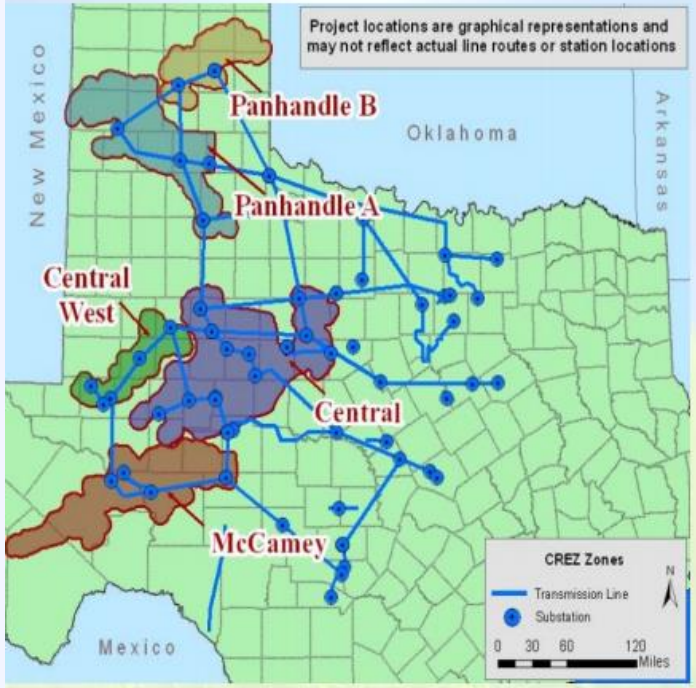
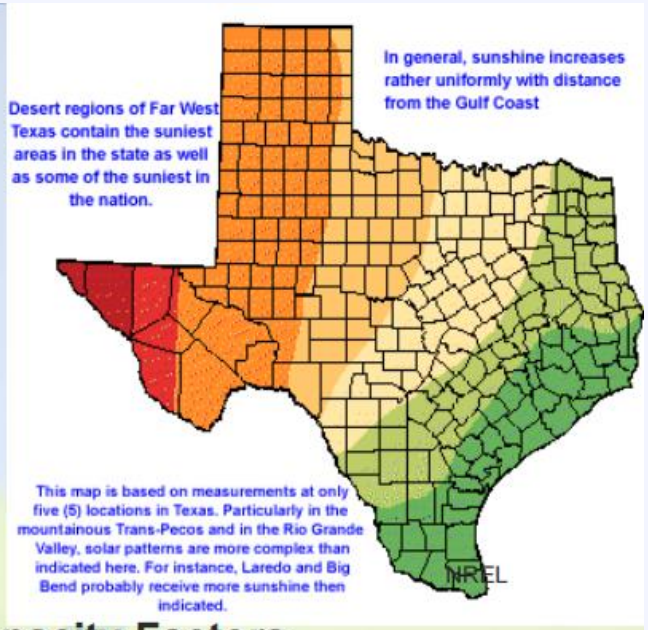
Source: National Renewable Energy Laboratory

TX Solar Resource

Texas has the highest potential for solar in the nation





Annual Capacity Factors (PV, 1-axis tracker / fixed tilt):

- West Texas: 32% / 26%
- Panhandle: 30% / 25%
- Austin/Houston:24% / 21%

Texas solar resource estimated potential:

- 38,993 TWh utility-scale PV (14% of the entire U.S.)
- 22,786 TWh utility-scale CSP (20% of the entire U.S.)

Sources: ERCOT (URS)
NREL

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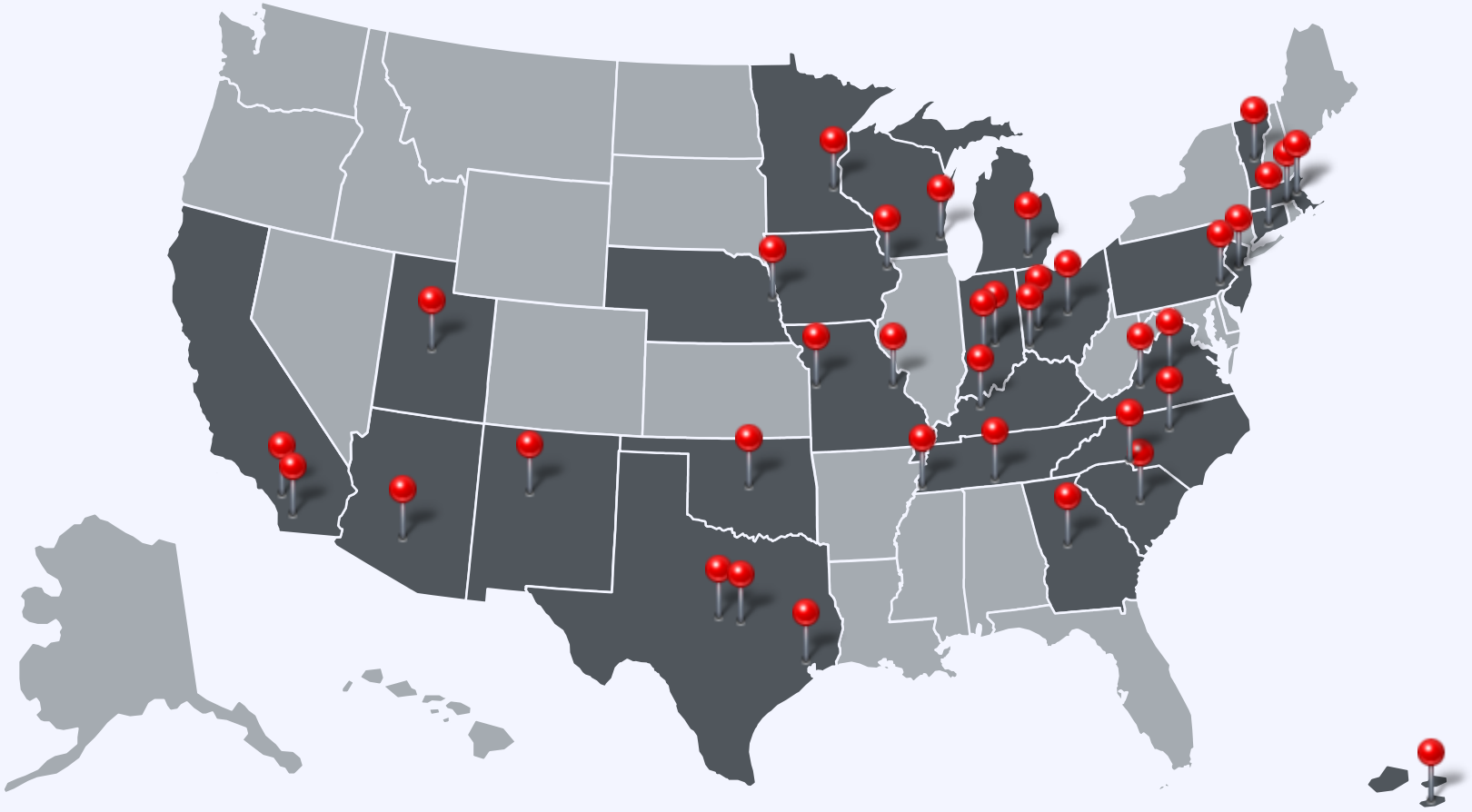
Source: SEIA, 2014

What are the barriers to solar adoption in your community?

A. High upfront cost
B. Lack of education
C. Lack of policy support
D. Lack of utility support
E. Private interests
F. Lack of HOA support
G. Historic preservation
H. Reliability concerns
I. Environmental impact
J. Other

Regional Workshop Surveys

Q: What is the greatest barrier to solar adoption in your community?



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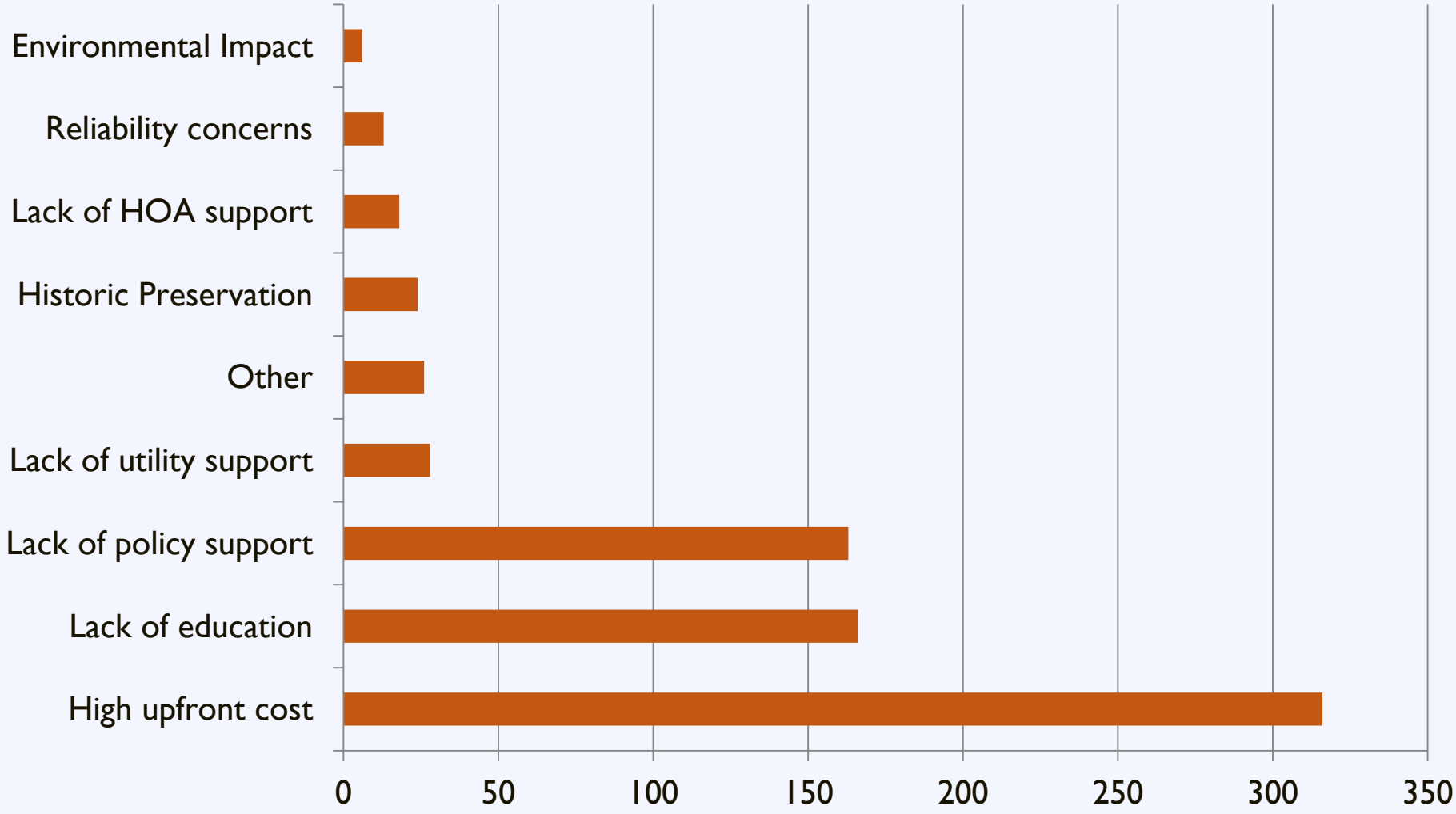
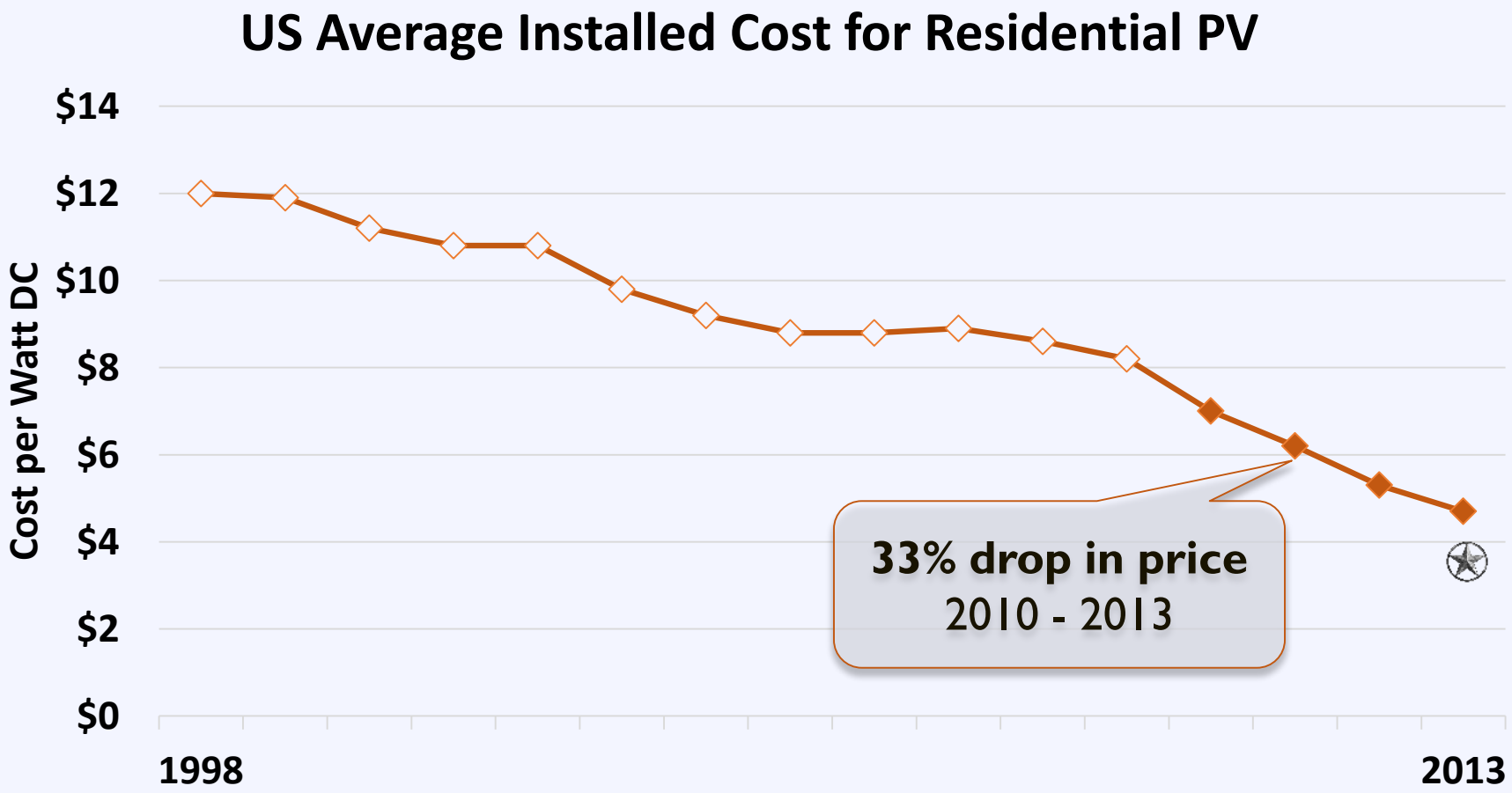
Activity: Addressing Barriers



The Cost of Solar PV



Avg. for 2015: $3.50/W (SEIA)

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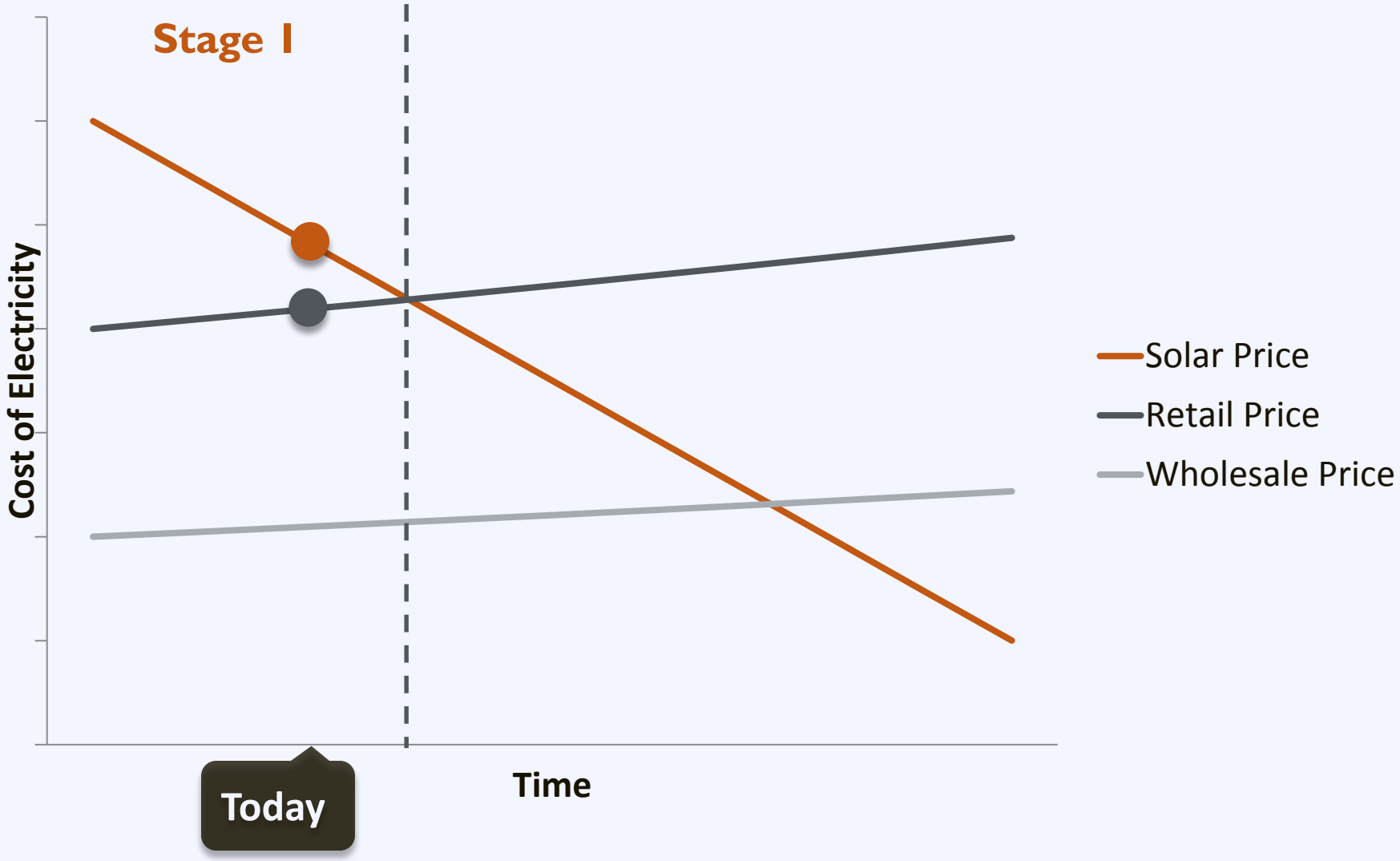
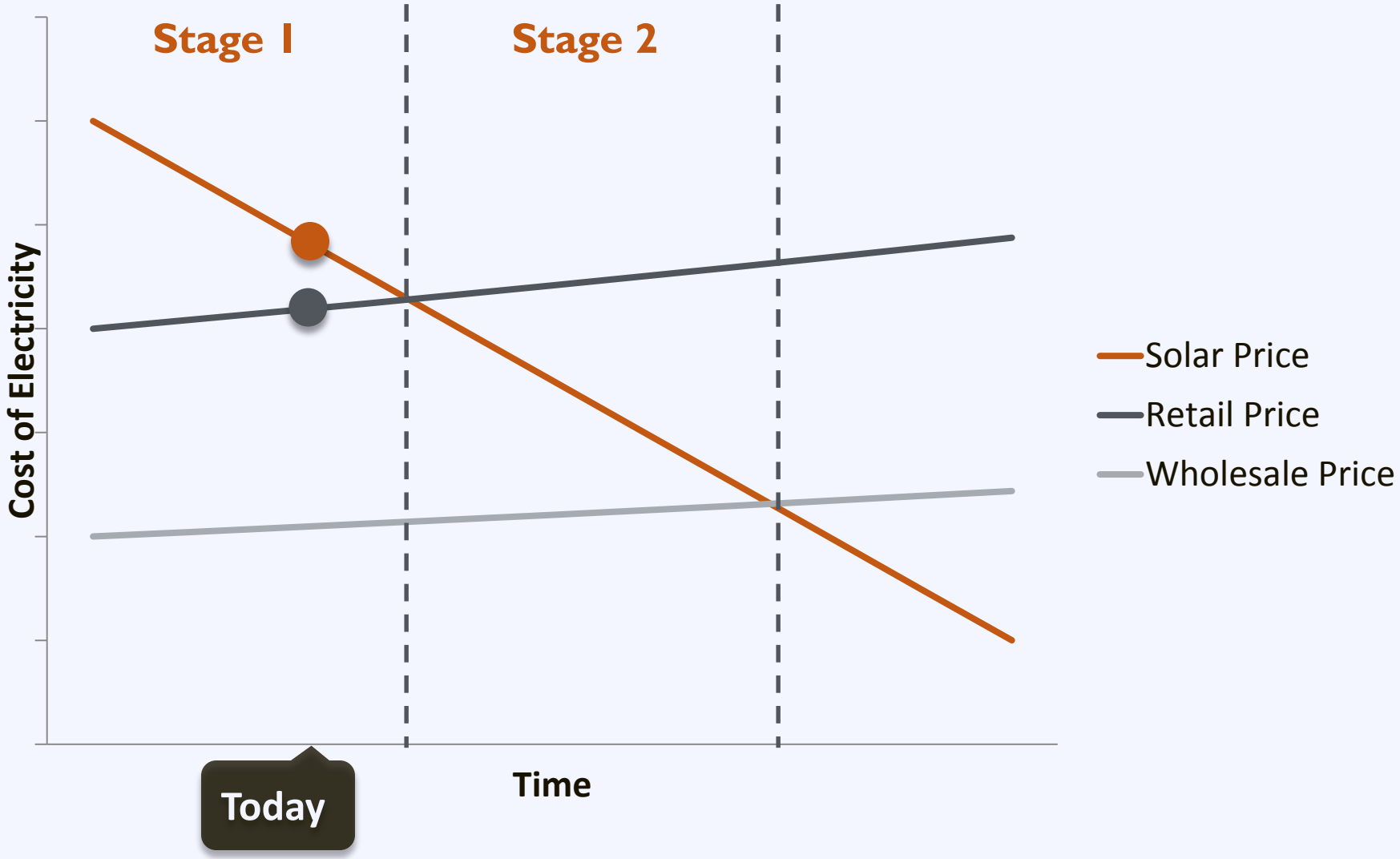
Tracking the Sun VII: The Installed Cost of Photovoltaics in the US from 1998-2013 (LBNL); SEIA/GTM Research U.S. Solar Market Insight Report Year-In-Review 2015

The Cost of Solar PV



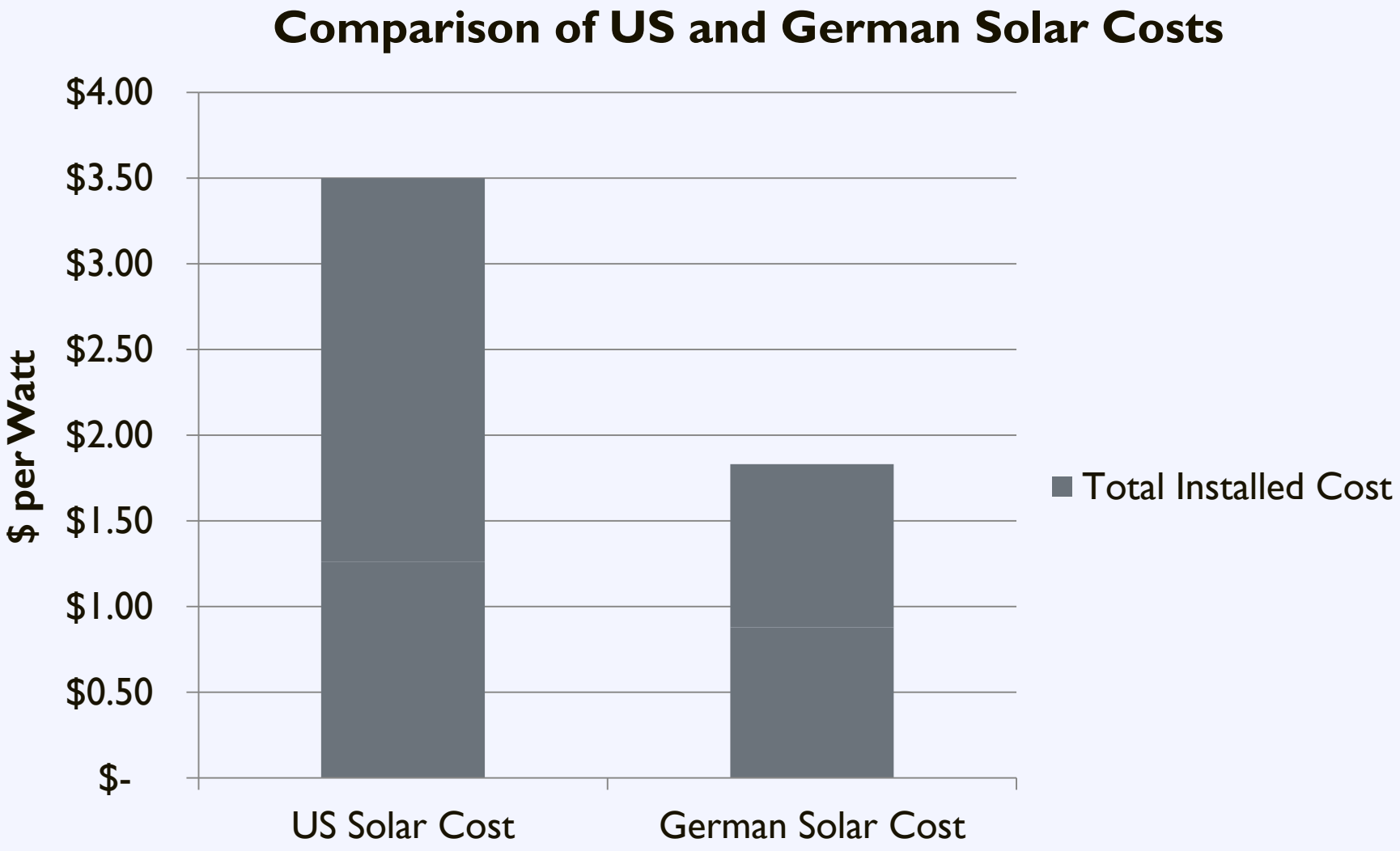
Source: Solar Electric Power Association

The Cost of Solar PV



Source: Solar Electric Power Association

The Cost of Solar in the US



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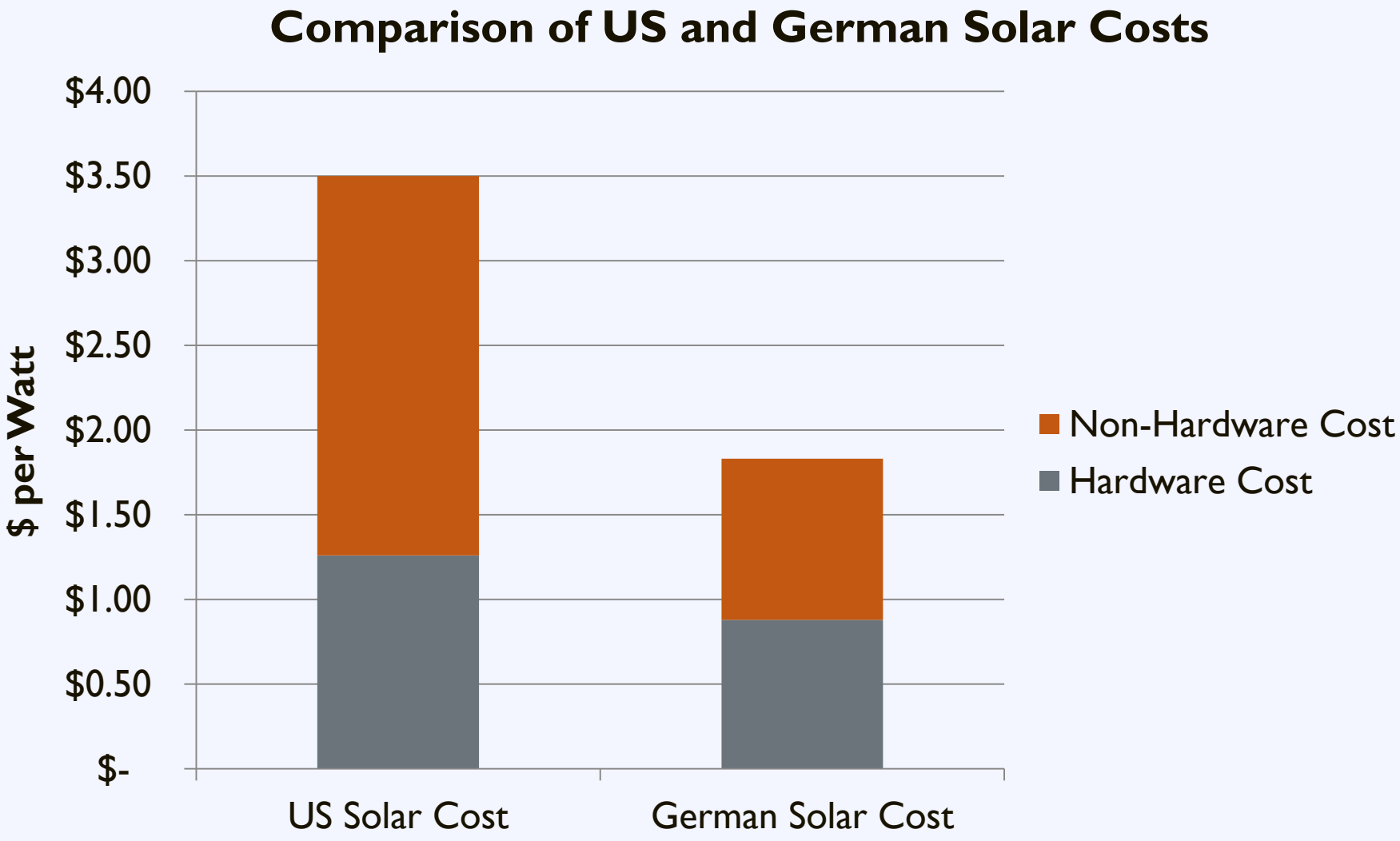
Source: SEIA/GTM Research U.S. Solar Market Insight Report Year-in-Review 2015; Fraunhofer ISE Recent Facts about Photovoltaics in Germany 2015; http://energy.gov/eere/sunshot/soft-costs

The Cost of Solar in the US



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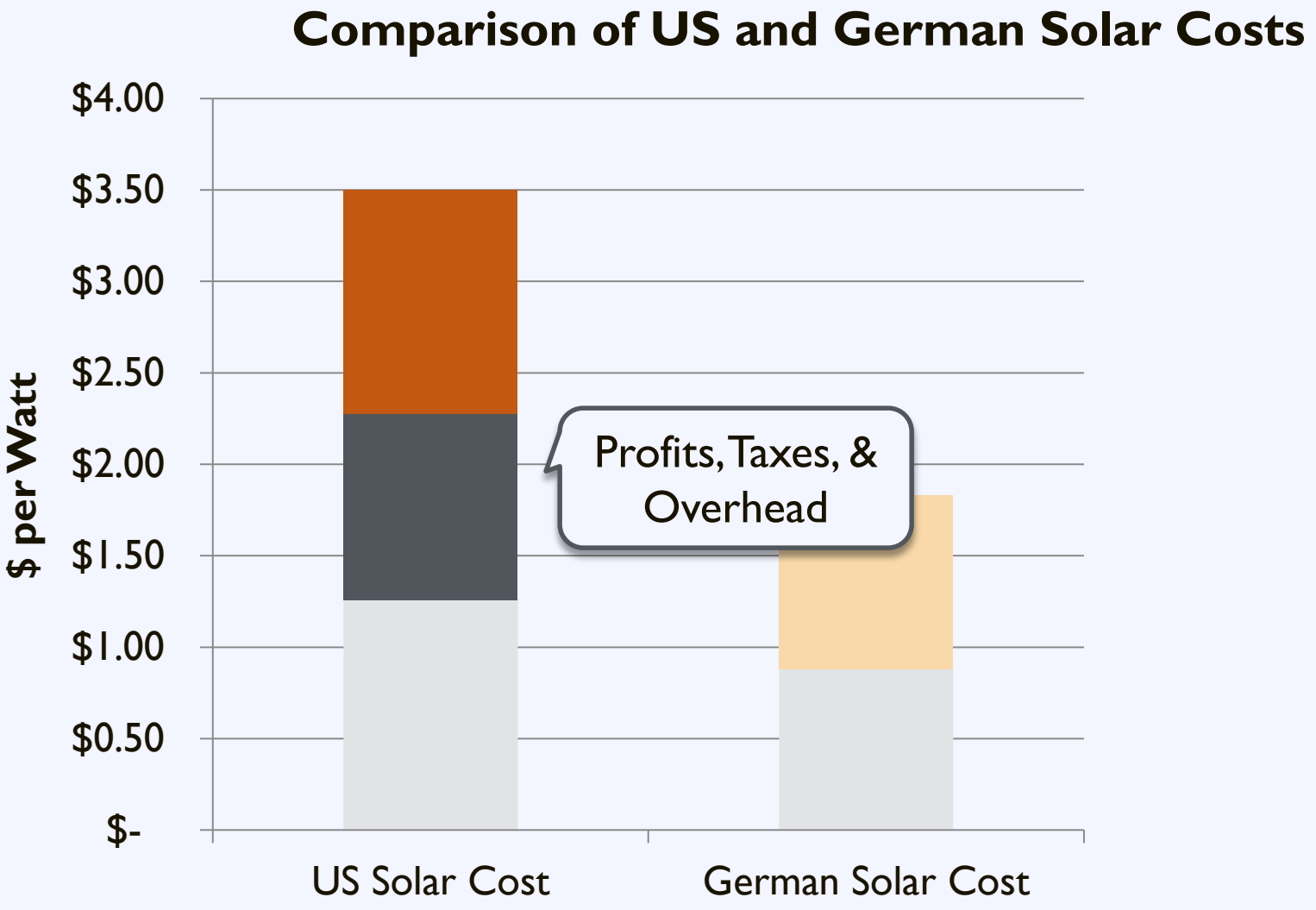

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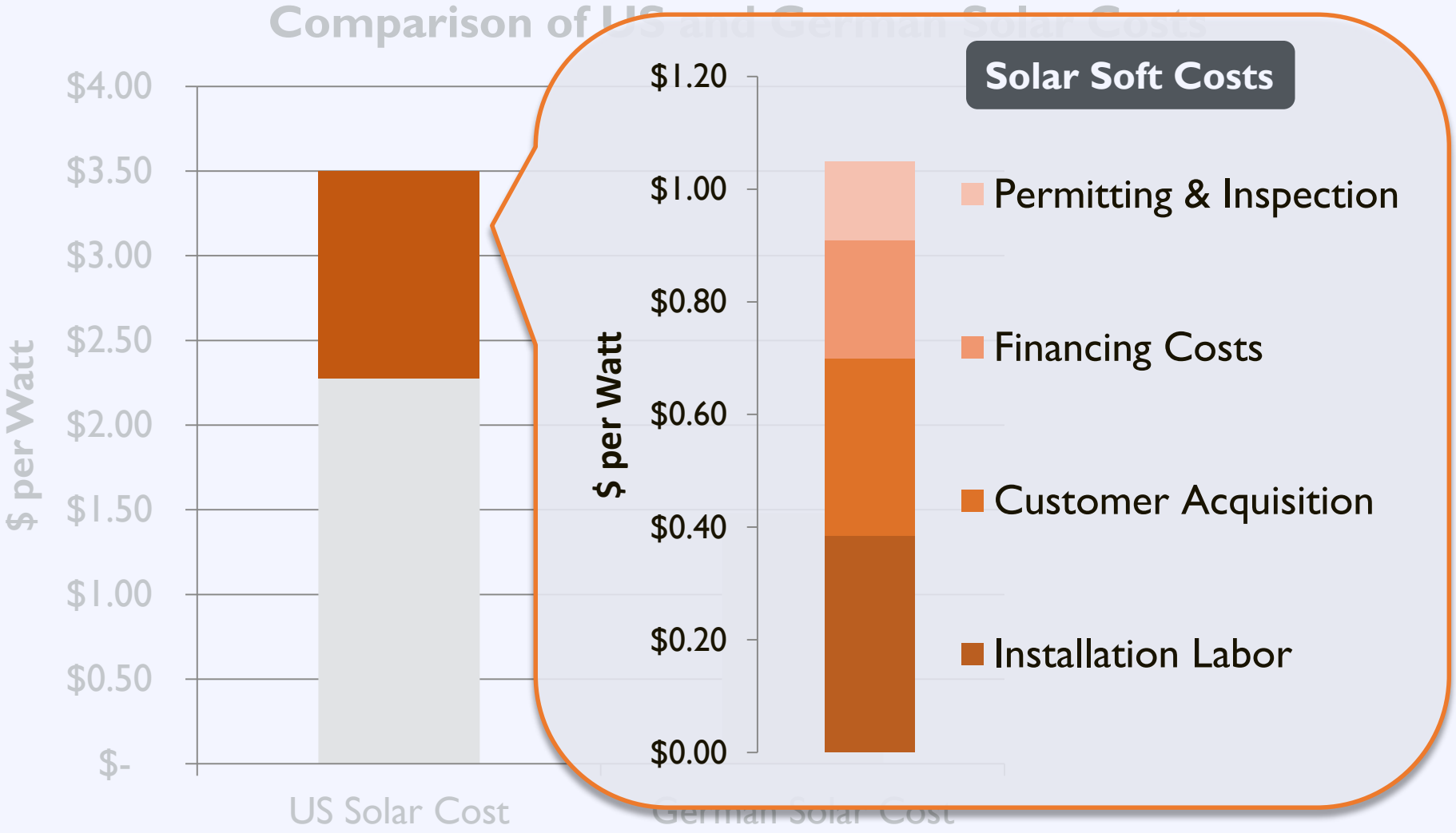
Source: NREL (http://www.nrel.gov/docs/fy14osti/60412.pdf)
LBNL (http://emp.lbl.gov/sites/all/files/lbnl-6350e.pdf)(http://www1.eere.energy.gov/solar/pdfs/sunshot_webinar_20130226.pdf)

The Cost of Solar in the US



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Source: NREL (http://www.nrel.gov/docs/fy14osti/60412.pdf)
LBNL (http://emp.lbl.gov/sites/all/files/lbnl-6350e.pdf)(http://www1.eere.energy.gov/solar/pdfs/sunshot_webinar_20130226.pdf)

Challenge: Installation Time

New York City's Goal

100 days

from inception to completion

Germany Today

8 days

from inception to completion

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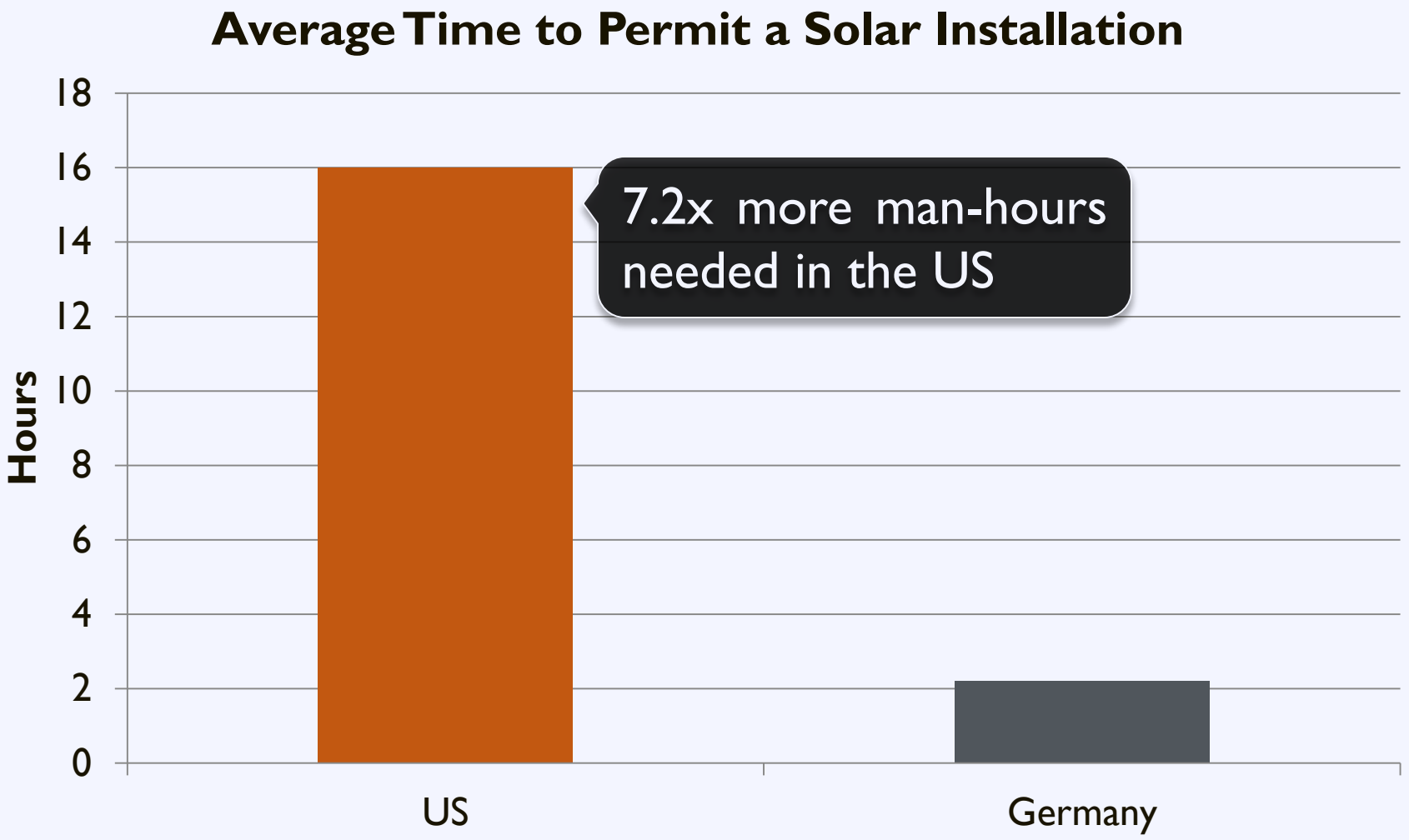
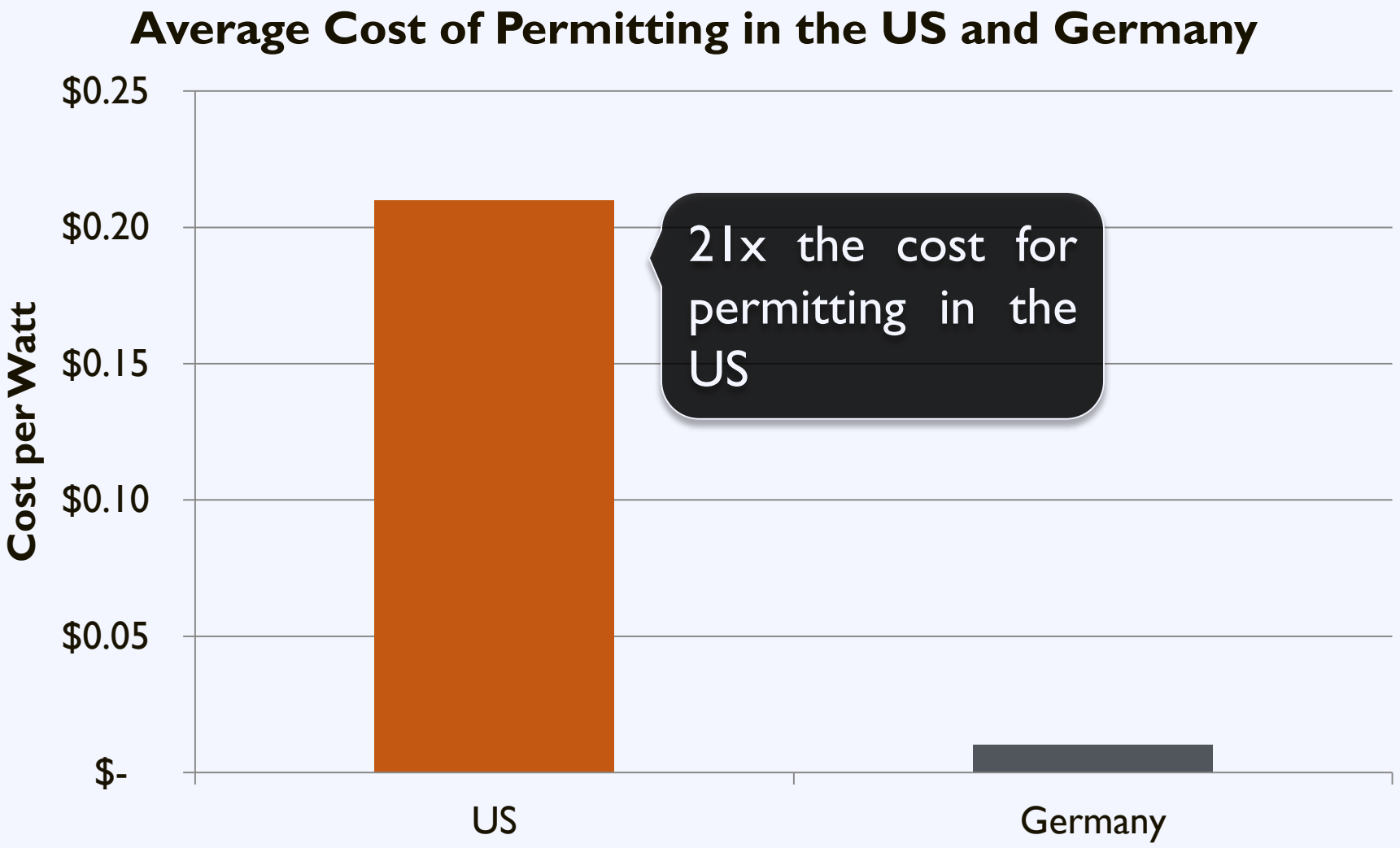
Photon Magazine

Time to Installation



Source: NREL, LBNL

Permitting Costs



Source: NREL, LBNL

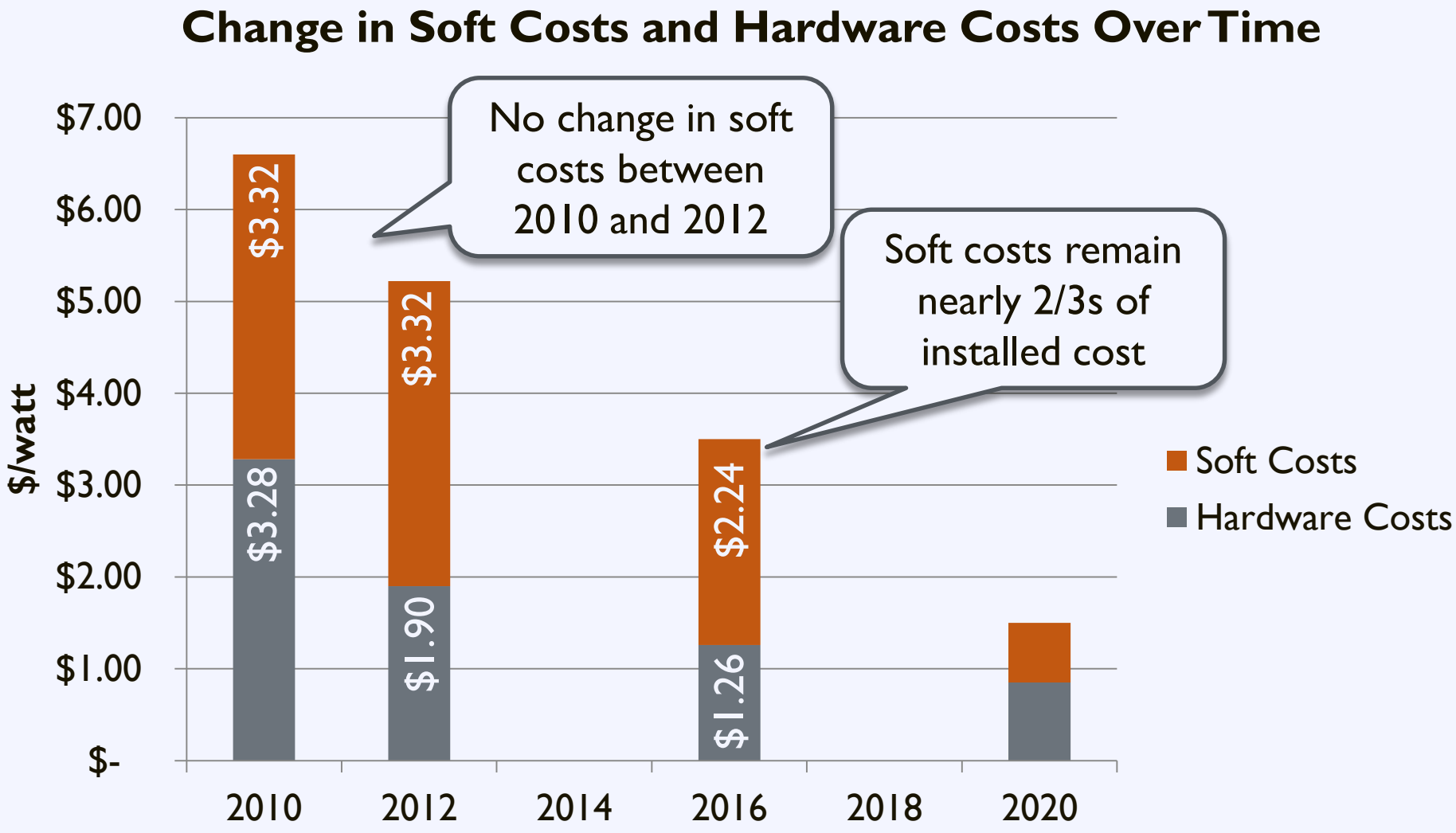
Germany's Success

Consistency and Transparency

through

Standardized Processes

The Cost of Solar in the US



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Local Government Impact

What would be the impact of a 25% reduction in local government-addressable soft costs on the value of a 5 kW solar investment?

Q4 2015 US Avg. Residential Installed Cost:	$3.48/W
Net Present Value:	$2,924
Payback Period:	14.8 years

After 25% Reduction in addressable soft costs:	$3.26/W
Net Present Value:	$3,696
Payback Period:	13.9 years

Difference:	$0.22/W
Net Present Value:	**+ 26%**
Payback Period:	**- 6%**

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Other Assumptions: Muskegon, MI TMY2 Weather Data; 5kW solar PV system (30 deg. tilt, 180 deg. azimuth); 0.86 DC to AC derate factor; 0.5%/year degradation rate; 100% debt financing for 25 years at 5%; 30 year analysis period; 28% federal income tax rate; 7% state income tax rate; 5% sales tax rate; 100% assessment for property taxes at 2% tax rate; 30% federal ITC; Consumers Energy Residential RS Rate; 2.5% annual rate escalator; 8,500 kWh/year electricity consumption

Workshop Goal

Enable local governments to replicate successful solar practices to reduce soft costs and expand local adoption of solar energy

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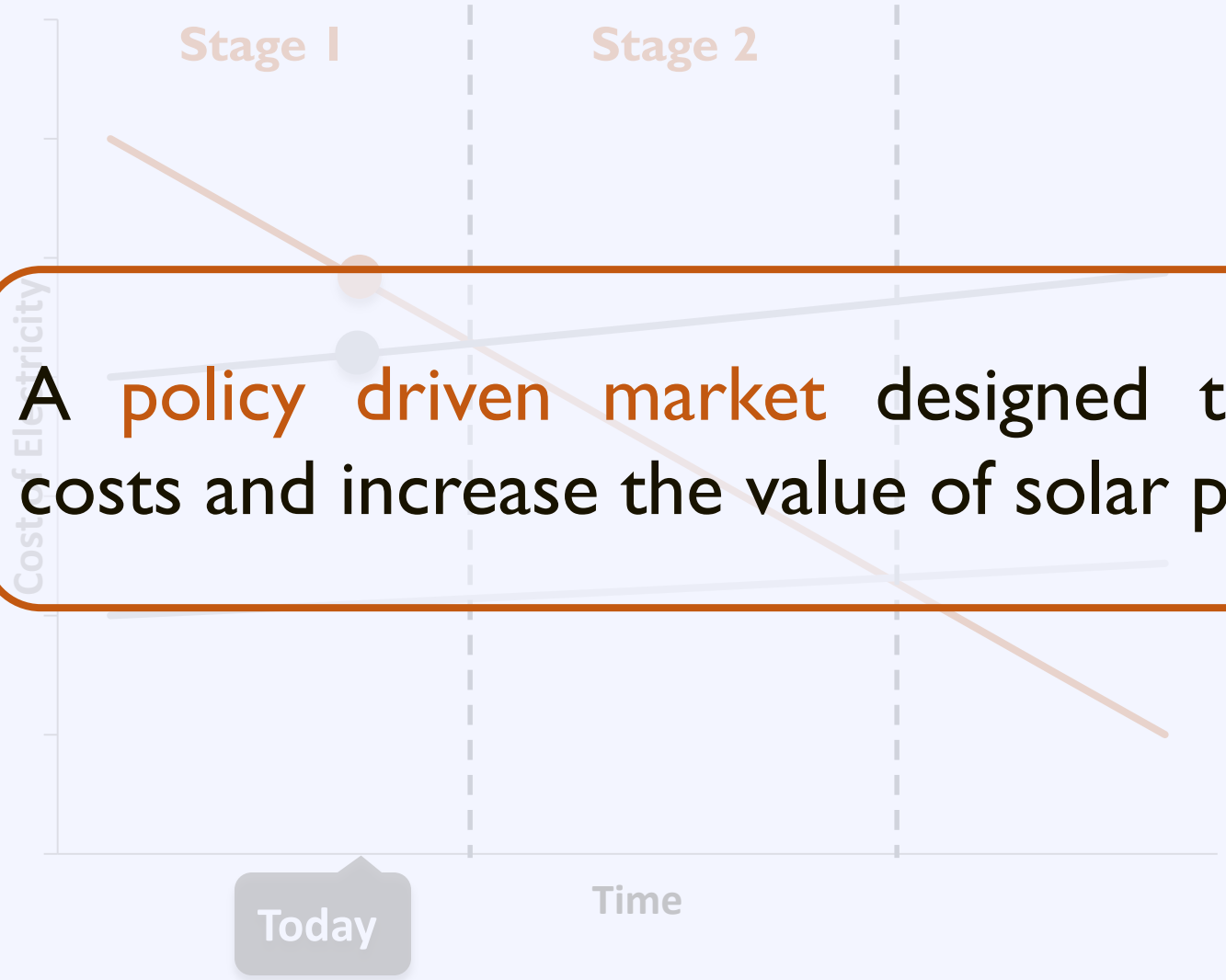
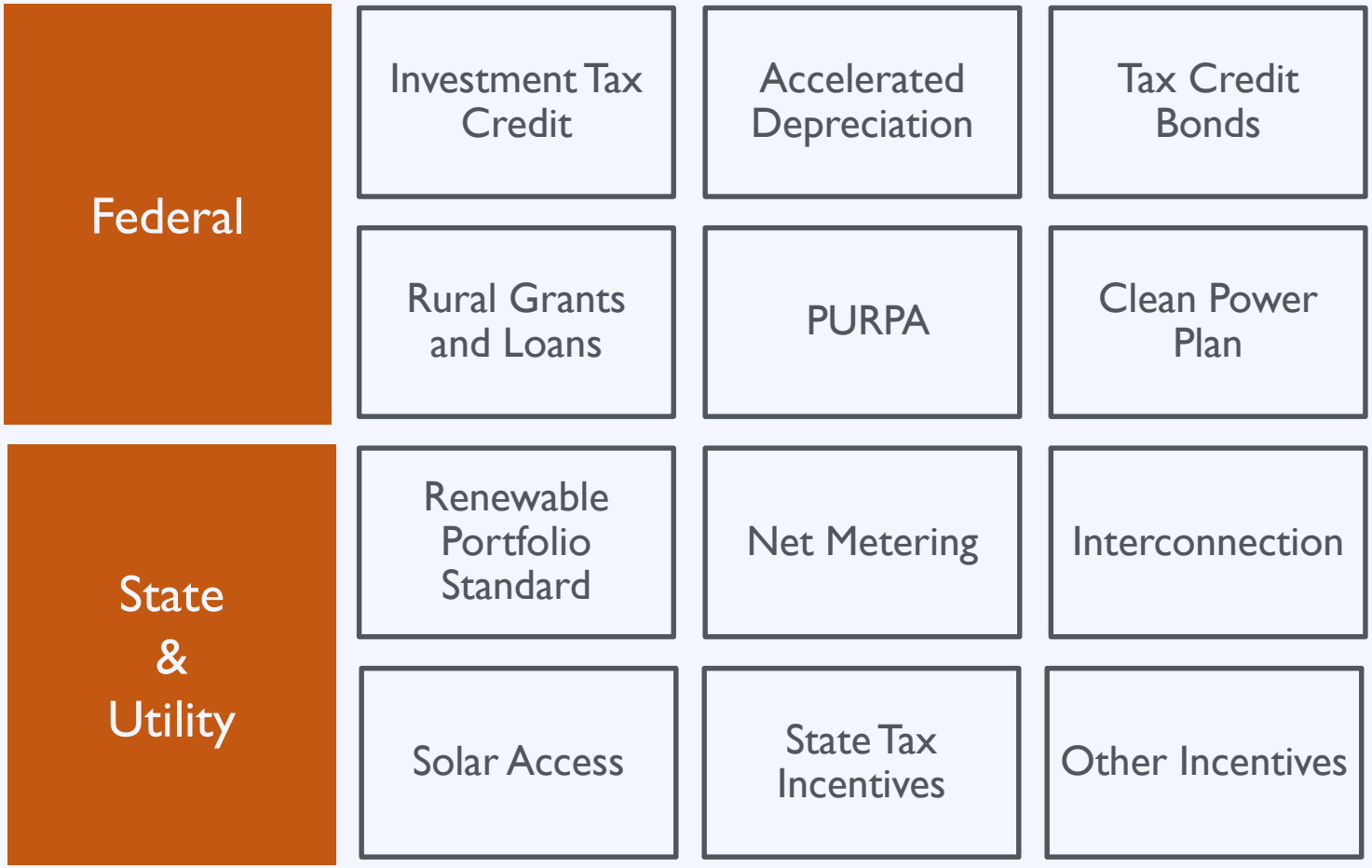
Solar Market: Trends



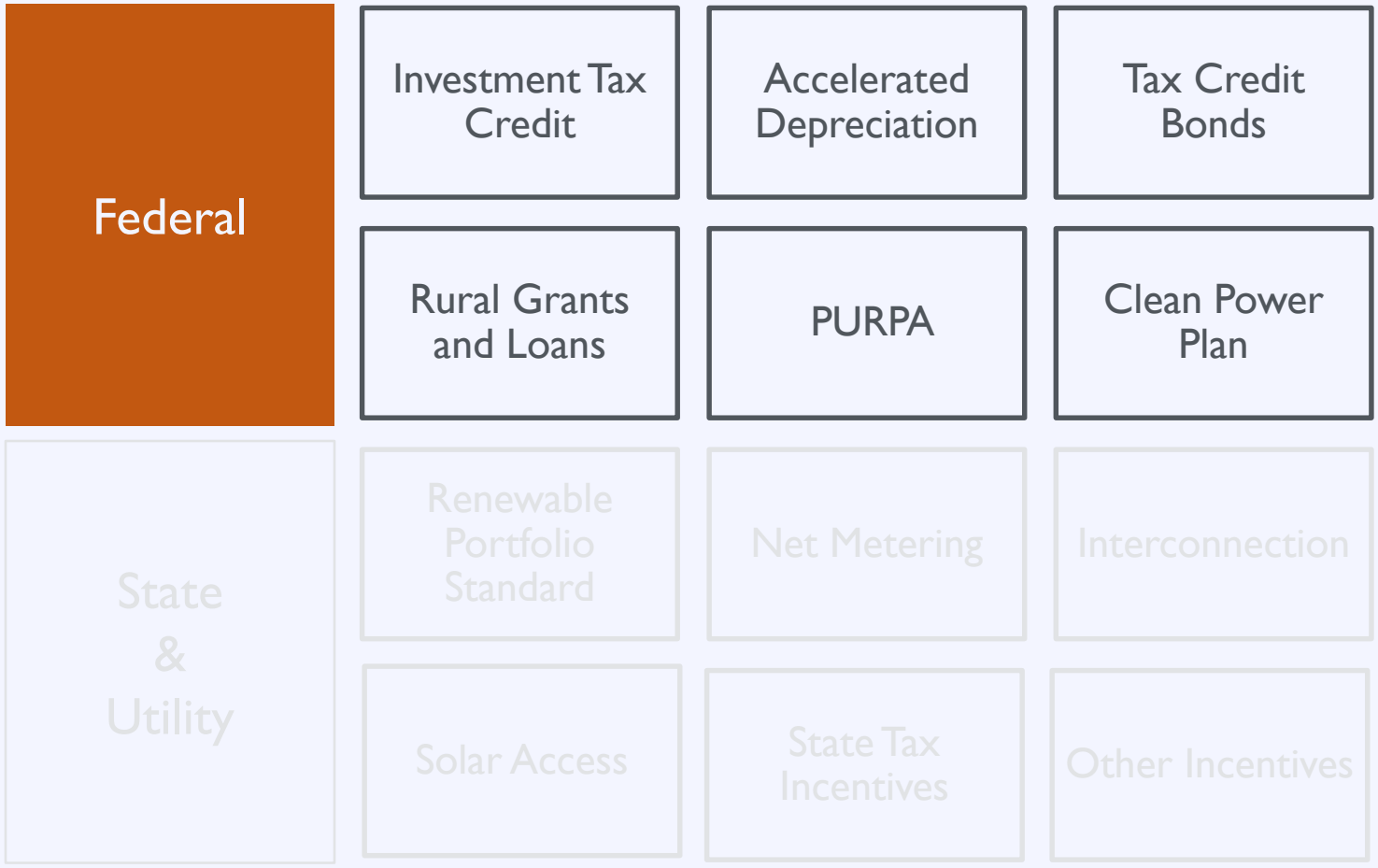
A policy driven market designed to mitigate costs and increase the value of solar production

Source: Solar Electric Power Association

A Policy Driven Market



A Policy Driven Market



Investment Tax Credit

Type: Tax Credit

Eligibility: For-Profit Organization

Value: 30% of the installation cost through 2019

Availability: Steps down to 26% in 2020, 22% in 2021, 10% in 2022 for commercial, expires for residential

Credit available if construction commences before end of year (rather than system operational)

Modified Accelerated Cost Recovery System (MACRS)

Type: Accelerated depreciation

Eligibility: For-Profit Organization

Value: Depreciate solar asset over 5 years (vs. lifetime of system)

USDA Rural Energy for America Program

Type: Federal Grant and Loan Program

Eligibility: Rural small businesses and agricultural producers

Renewable energy grant: 25% of project cost

Energy efficiency grant: 25% of project cost

Loan Guarantees: 75% of project cost up to $25 million

http://www.rurdev.usda.gov/bcp_reap.html

Rural Utilities Service EECLP

Type: Federal loans

Eligibility: Rural Cooperative and Municipal Utilities

Low-cost lending based on treasury rate

Can be passed on to customers with on-bill repayment

Complex application process for non-RUS borrowers

http://www.rd.usda.gov/programs-services/energy-efficiency-and-conservation-loan-program

Tax Credit Bonds

- Federally subsidized bond where bond holder receives federal tax credits in lieu of interest payments
- Qualified Energy Conservation Bonds
  - http://www.energyprograms.org/programs/qualified-energy-conservation-bonds/
- Clean Renewable Energy Bonds
  - http://www.irs.gov/Tax-Exempt-Bonds

Tax Credit Bonds

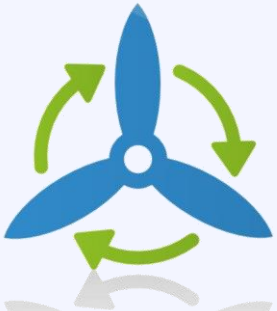
US Treasury

+ 3.7%

+ 2.3%

$

Local Gov



Project

QECB or CREB

Bond Holders

PURPA

- Public Utility Regulatory Policies Act (PURPA)
  - Federal law requiring utilities to interconnect renewable or CHP generators up to 80 MW ("Qualifying Facilities" or "QFs") and compensate for power produced at avoided cost rate
  - Also requires utilities to offer standard contracts to generators up to 100 kW unless a competitive market exists

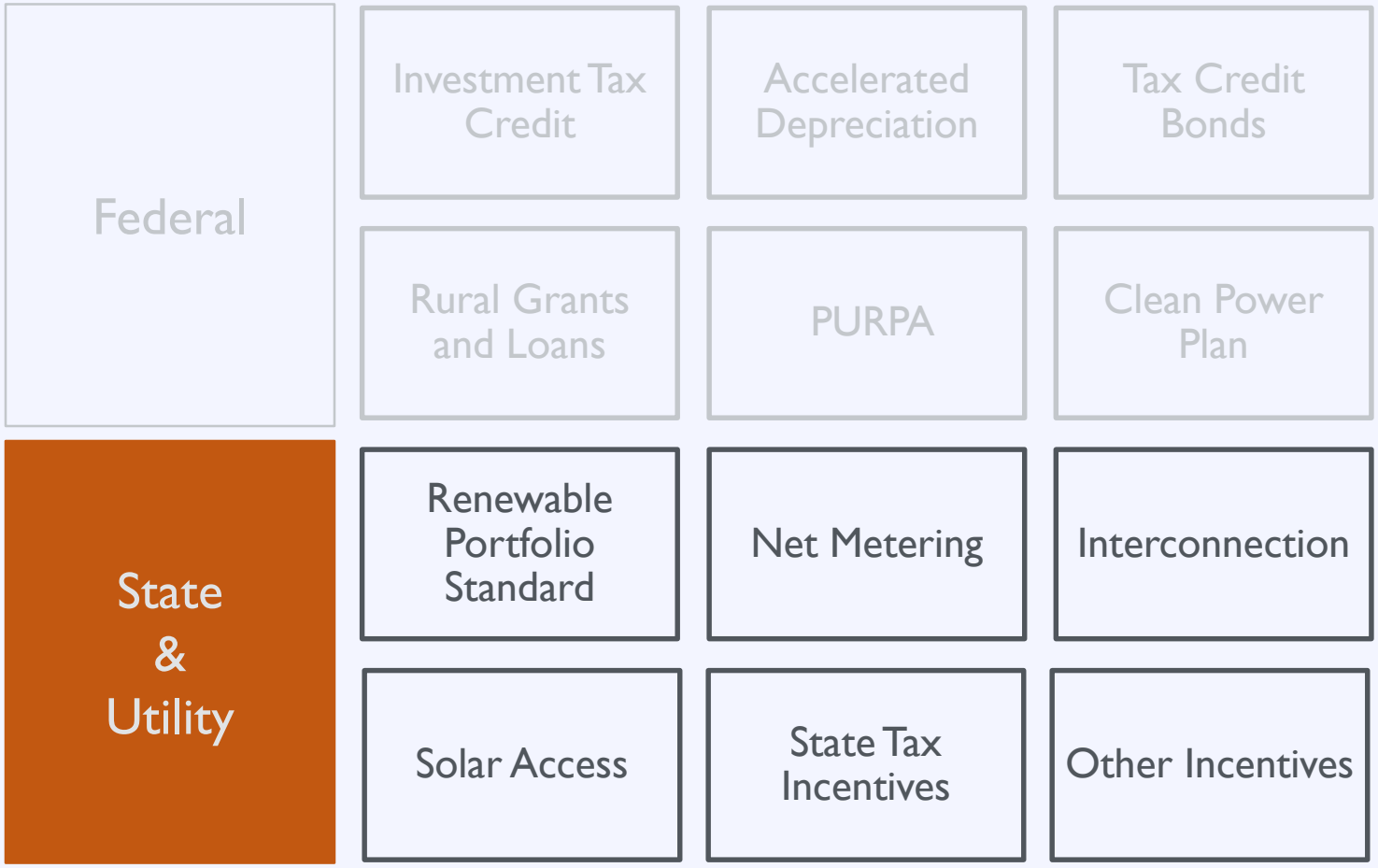
Clean Power Plan

- The Clean Air Act – under section 111(d) – creates a partnership between EPA, states, tribes and U.S. territories – with EPA setting a goal and states and tribes choosing how they will meet it.
- EPA is establishing interim (2022-2029) and final (2030) carbon dioxide (CO_2) emission performance rates for natural gas and fossil fuel electric generating units (EGUs)
- States may choose from multiple emission metrics and compliance strategies for meeting the targets

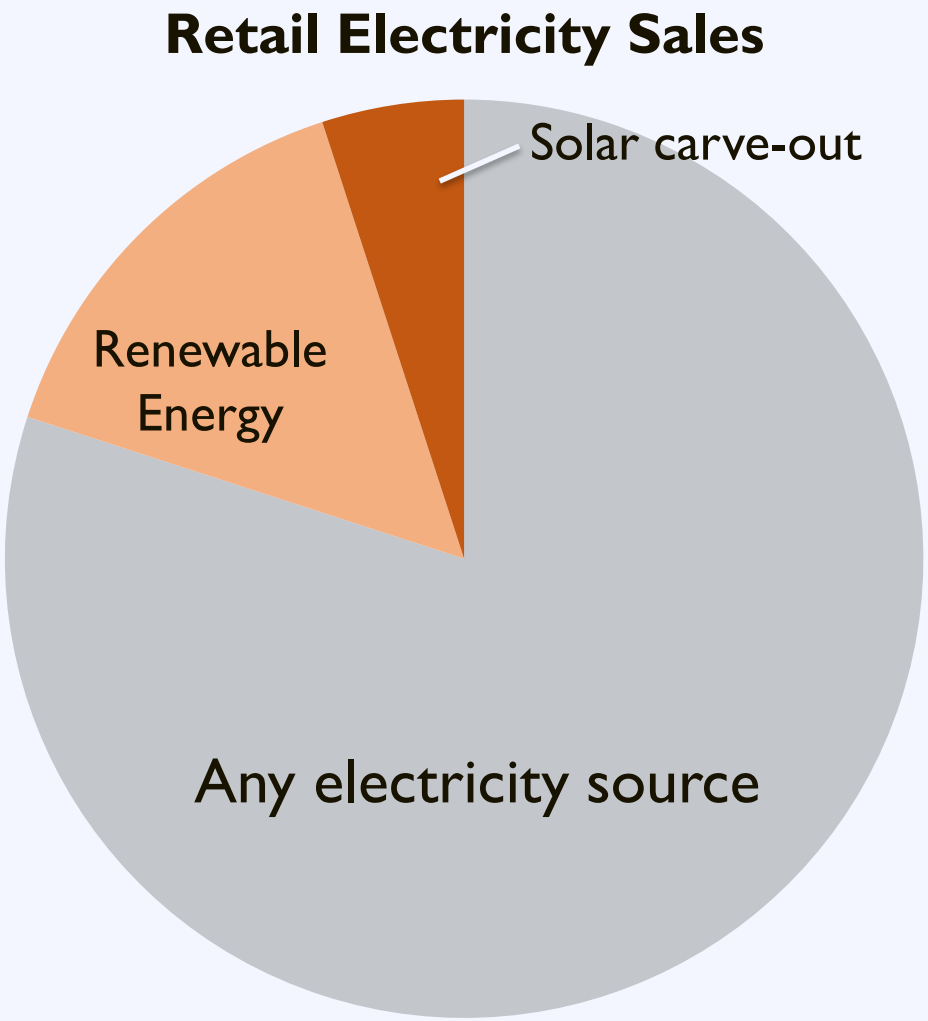
Clean Power Plan

- On February 9, 2016, the Supreme Court stayed implementation of the Clean Power Plan pending judicial review. The Court's decision was not on the merits of the rule.
- Texas is part of a large coalition of states opposing the Clean Power Plan and has suspended the state's development of a compliance strategy

A Policy Driven Market

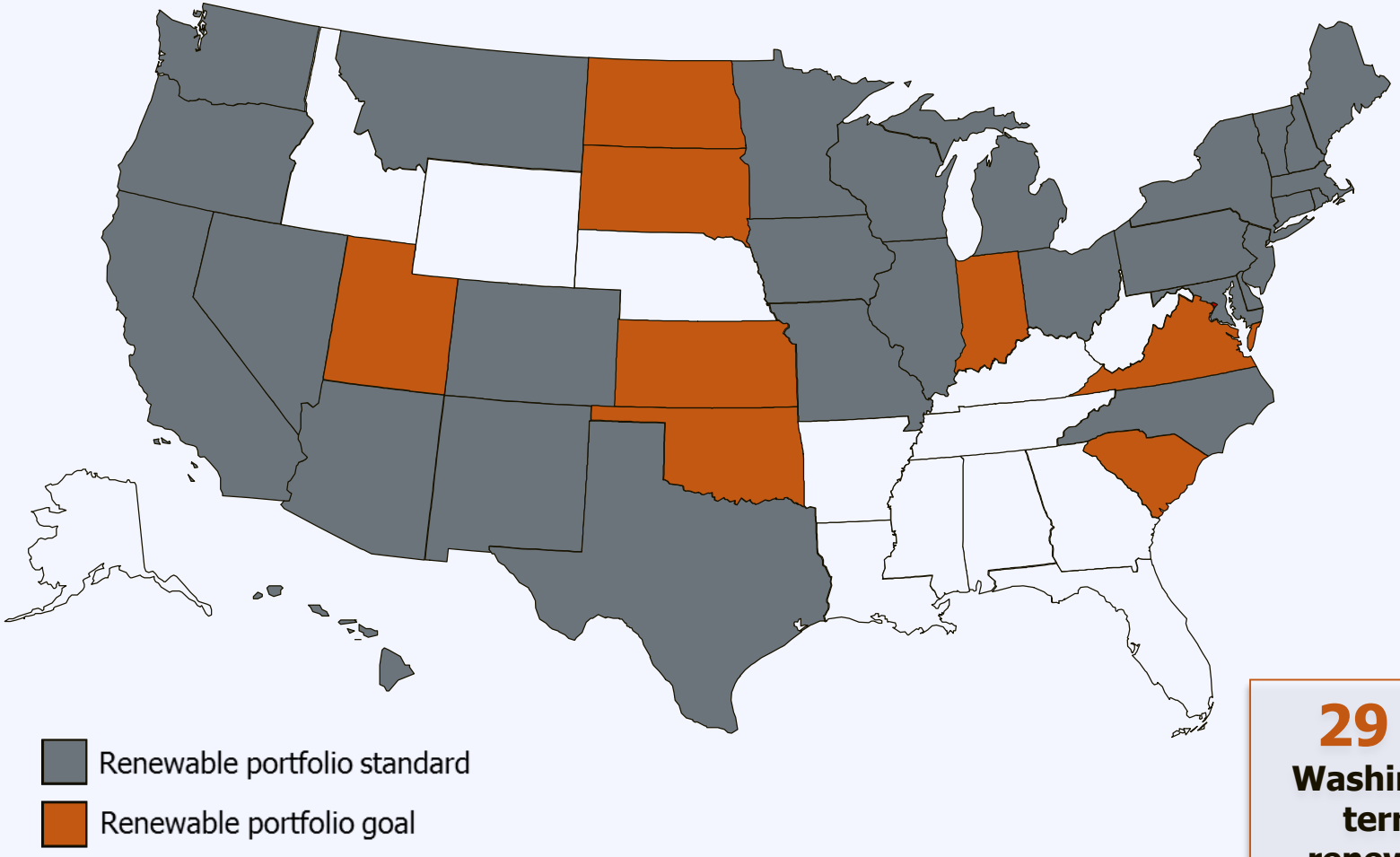


Renewable Portfolio Standard



Renewable Portfolio Standard

www.dsireusa.org / June 2016



29 states, + Washington DC and 3 territories have renewable portfolio standards
(8 states and 1 territory have renewable portfolio goals)

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U.S. Department of Energy

TX Renewable Generation Requirement

- Capacity, rather than percentage based
- 5,880 MW by 2015; goal of 10,000 MW by 2025
  - Has surpassed both these targets
- Applies to retail entities
  - Bundled IOUs, retail electric providers, muni's and coops with customer choice
- Also required utilities to update transmission as needed to meet goal
- Voluntary target of 500 MW of non-wind resources

RPS Impacts: Solar Deployment

RPS and Solar/DG Status of Top Ten Solar States by Cumulative Installed Capacity (as of Q4 2015)

Rank	State	RPS?	Solar/DG Provision?
1	California	Y	N
2	Arizona	Y	Y
3	North Carolina	Y	Y
4	New Jersey	Y	Y
5	Nevada	Y	Y
6	Massachusetts	Y	Y
7	New York	Y	Y
8	Hawaii	Y	N
9	Colorado	Y	Y
10	Texas	Y	N

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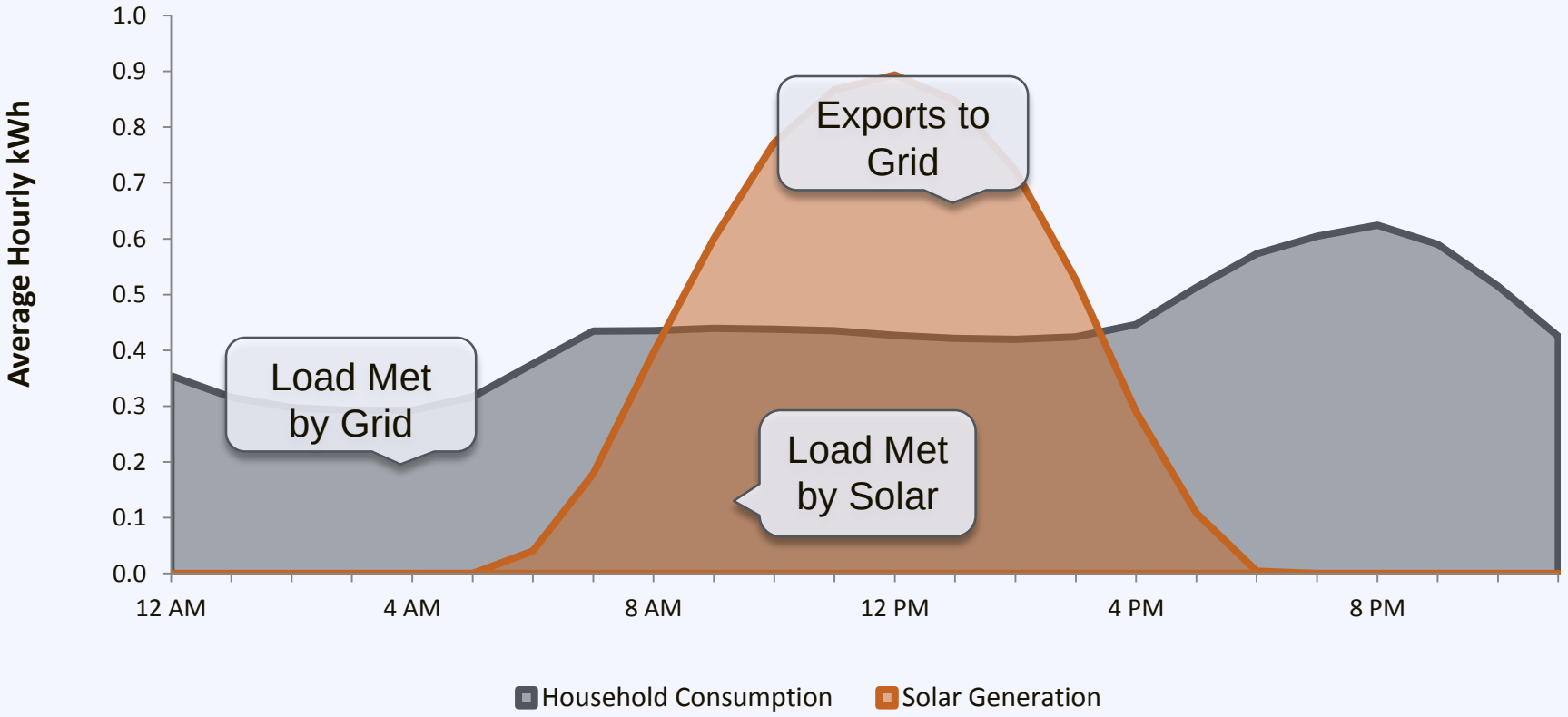
Source: DSIRE Solar (http://dsireusa.org/documents/summarymaps/Solar_DG_RPS_map.pdf); Solar Energy Industries Association/ GTM Research *Solar Market Insight 2015 Year-in-Review*

Net Metering

Net metering allows customers to export power to the grid during times of excess generation, and receive credits that can be applied to later electricity usage.

Net Metering



Net Metering: Market Share

More than **95%** of distributed PV Installations are net-metered

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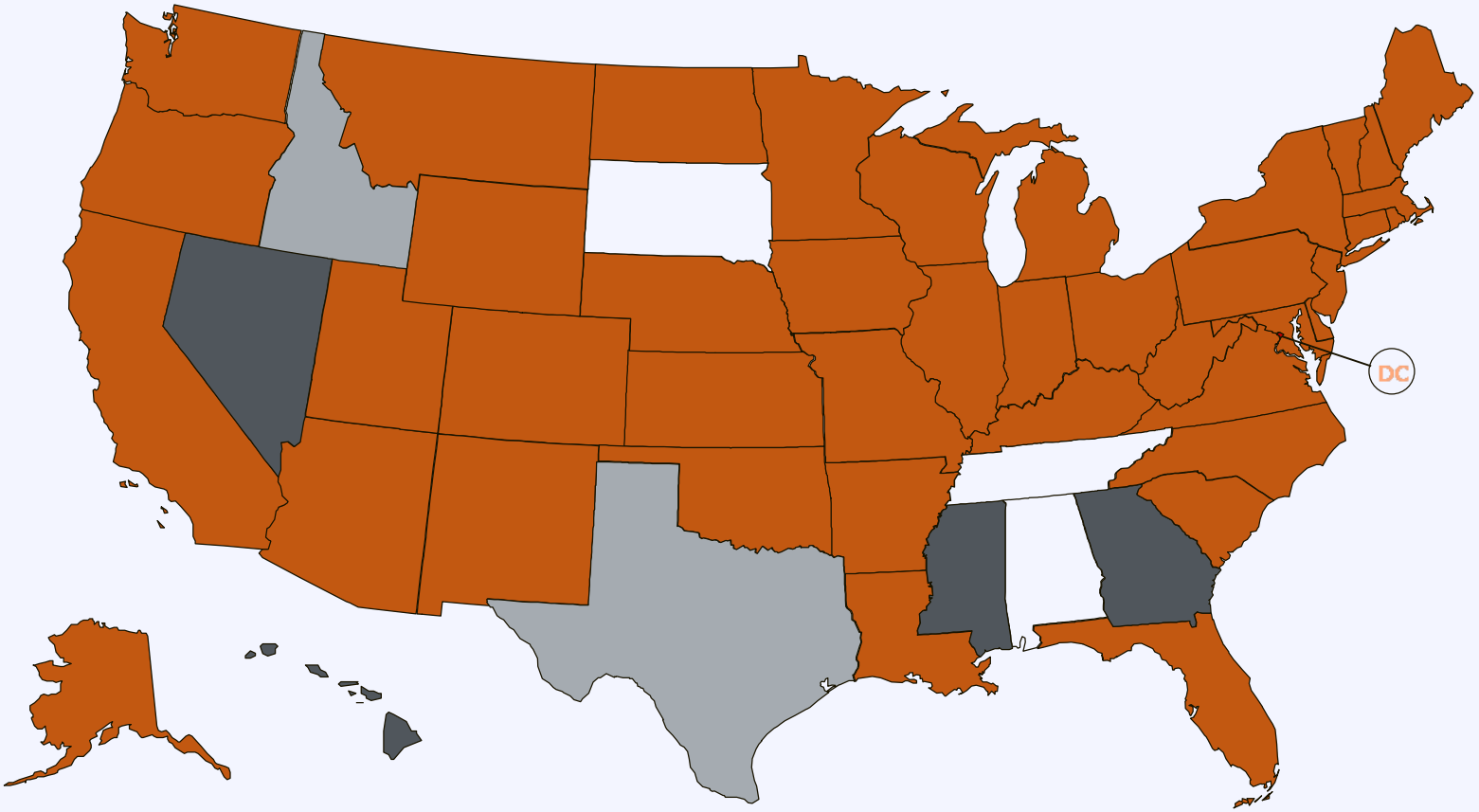
Source: IREC Solar Market Trends 2013

Net Metering

www.dsireusa.org / February 2016



Mandatory statewide policy

State rules other than net metering

Utility net metering programs

41 states + DC and 3 territories have mandatory net metering

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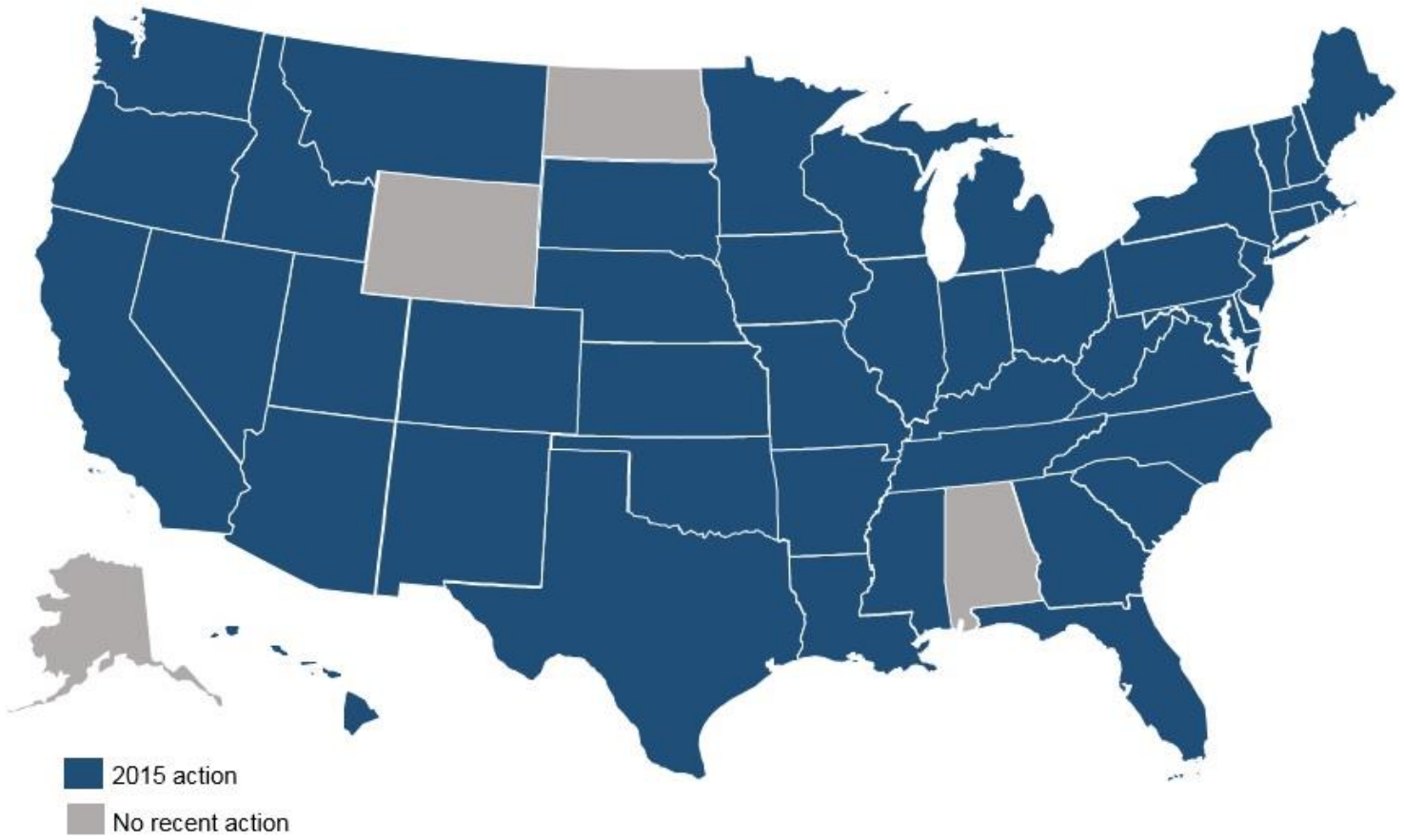
Net Metering

Figure 2. 2015 Policy Action on Net Metering, Rate Design, or Solar Ownership



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Source: The 50 States of Solar 2015 Policy Review and Q4 Quarterly Update (http://www.mc-group.com/wp-content/uploads/2016/02/50sosQ4-FINAL.pdf)

Net Metering: Resources

Resource **Freeing the Grid**

Provides a "report card" for state policy on net metering and interconnection

http://freeingthegrid.org/

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Net Metering in TX

- State law permits, but does not require, utilities to offer net metering
- Utilities with net metering: City of Brenham, El Paso Electric, CPS Energy, Austin Energy (non-residential), City of Wadsworth, Bluebonnet; Reliant, MP2
  - Austin Energy: value of solar tariff for residential; Green Mountain Energy – reduced credit rate after 500 kWh of net excess generation

Interconnection

Standardized interconnection rules require utilities to provide a fair and transparent pathway for customer-generators and other developers of distributed energy resources to interconnect with the utility's grid.

Interconnection

- A 2015 NREL study analyzed 5 of the major solar markets in the U.S. and found that the median time for utility interconnection was **53 days**
  - Median times in CA and AZ: 50 days and 54 days
    - AZ has no standard timeframe requirements for interconnection (though AZ utilities do much better than some states that have such requirements!)
  - Only 7 states received an "A" grade from Freeing the Grid on their interconnection standards

Photon Magazine; NREL – Ardani et al. 2015 (http://www.nrel.gov/docs/fy15osti/63556.pdf)

Texas Interconnection

- Rules apply for systems up to 10 MW
- Pre-certification provisions allow for fast-track for distributed renewable generation < 2MW (DRG)
- Owners of DRG must provide proof of warranty but are not required to purchase additional liability insurance
- Freeing the Grid grade: D
  - (requires external disconnect switch, insurance for systems >2MW)

Solar Access

A landowner does not have any legal right to the free flow of light and air across the adjoining land of his neighbor

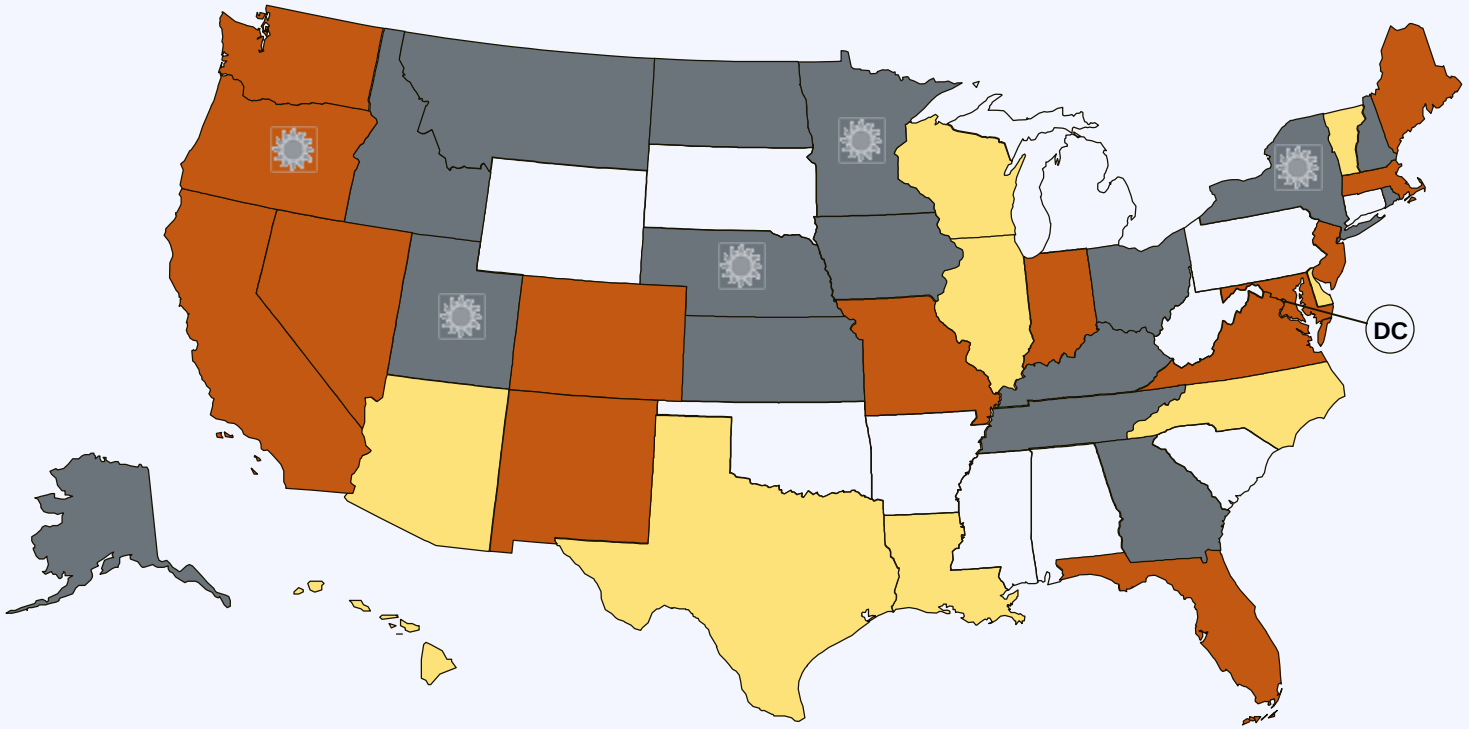
Source: Google Earth

Solar Access

Solar Access Laws:

1. Increase the likelihood that properties will receive sunlight
2. Protect the rights of property owners to install solar
3. Reduce the risk that systems will be shaded after installation

Solar Access



Solar Easements Provision

Solar Rights Provision

Solar Easements and Solar Rights Provisions

U.S. Virgin Islands

Local option to create solar rights provision

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U.S. Department of Energy

Source: Database of State Incentives for Renewables & Efficiency (www.dsireusa.org)

Solar Rights in Texas

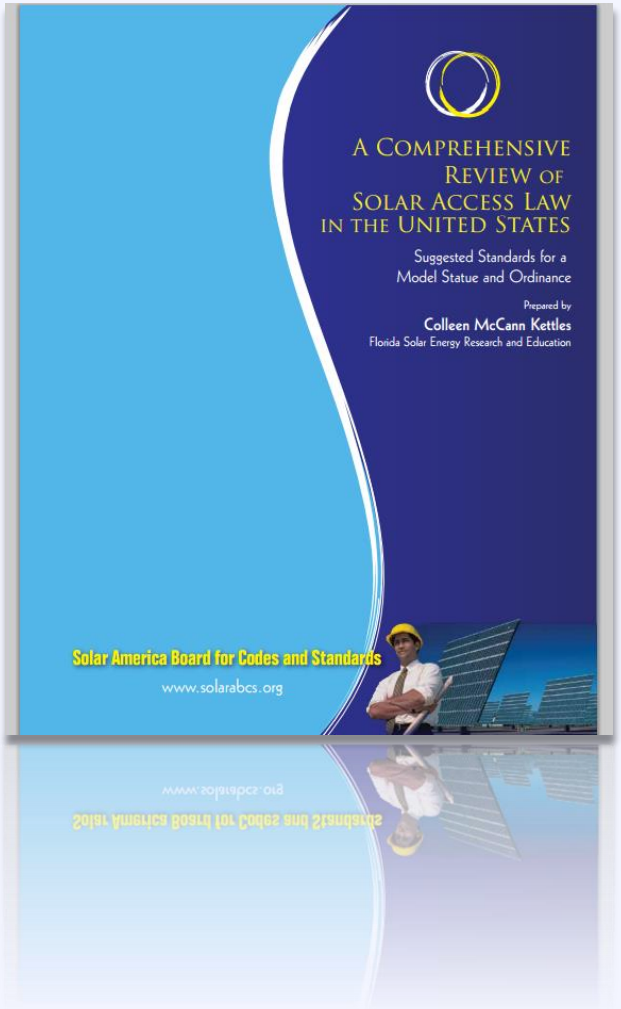
- Generally, homeowners' associations may not prohibit members from installing solar
  - May restrict solar in developments with fewer than 50 units if in development phase
  - May restrict in common areas, or make aesthetic or health and safety requirements

Solar Access

Resource **Solar America Board for Codes & Standards**

A comprehensive review of solar access law in the US – Suggested standards for a model ordinance

www.solarabcs.org



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State Tax Incentives

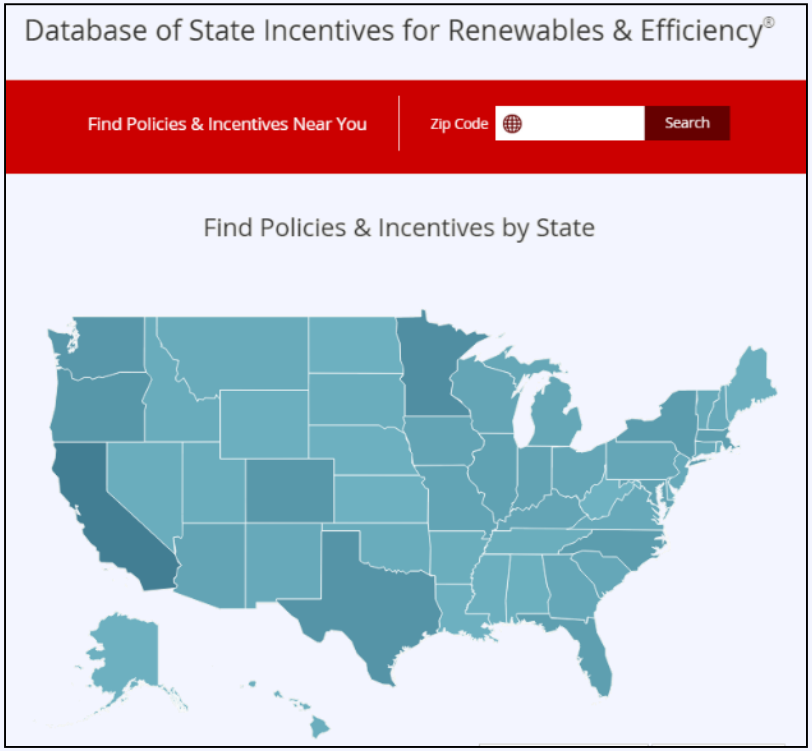
- **Property tax exemption** for solar and wind energy devices. Available to residential, industrial, and commercial taxpayers.
- TX offers a **franchise tax exemption** for businesses manufacturing, selling, or installing solar energy devices
- Businesses may also deduct the cost of a solar energy device they have purchased from the franchise tax owed

Other Incentives

- Oncor Solar PV Standard Offer Program – incentives available through participating solar service providers (regardless of retail electric provider)
  - One time payment of $538.53/kW AC or $0.2519 kWh
  - 2016 budget fully reserved (as of July)
- The LoanSTAR revolving loan program provides low-cost financing for energy retrofits for institutional facilities (schools, hospitals, state buildings)

Resource: DSIRE

- For more info on these and other policies and incentives, see www.dsireusa.org



Agenda

10:20 – 10:50	Putting Solar Energy on the Local Policy Agenda
10:50 – 11:20	State of the Local Solar Market
11:20 – 11:50	Federal, State, and Utility Policy Drivers
11:50 – 12:15	Break and Grab Lunch
12:15 – 12:45	Planning for Solar: Getting Your Community Solar Ready
12:45 – 1:20	Solar Market Development Tools
1:20 – 1:30	Break
1:30 – 2:45	Local Speakers
2:45 – 3:00	Solar Powering Your Community: Next Steps

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Effective Local Solar Policy

Local Solar Policy

Planning for Solar

Solar in Development Regulation

Effective Solar Permitting Process

Solar Market Development Tools

Effective Local Solar Policy

Local Solar Policy

Planning for Solar

Visioning & goal setting

Regulation

Effective Solar Permitting Process

Solar Market Development Tools

Visioning: Scales & Contexts

Every community is different!

Is solar on residential rooftops appropriate for your community?

Visioning: Scales & Contexts

Every community is different!

Is solar on commercial rooftops appropriate for your community?

Visioning: Scales & Contexts

Every community is different!

Is solar on historic structures appropriate for your community?

Visioning: Scales & Contexts

Every community is different!

Is solar on brownfields appropriate for your community?

Visioning: Scales & Contexts

Every community is different!

Is solar on greenfields appropriate for your community?

Visioning: Scales & Contexts

Every community is different!

Is solar on parking lots appropriate for your community?

Visioning: Scales & Contexts

Every community is different!

Is building-integrated solar appropriate for your community?

Planning for Solar Development

Communitywide Comprehensive Plan

Neighborhood Plans

Corridor Plans

Special District Plans

Green Infrastructure Plans

Energy Plan

Climate Action Plan

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Source: American Planning Association

Technical Resources

Resource **Planning for Solar Energy**

A guide for planners on determining and implementing local solar goals, objectives, policies, and actions

www.planning.org

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Effective Local Solar Policy

Local Solar Policy

Planning for Solar

Solar in Development Regulation

Effective Solar Permitting Process

Solar Market Development Tools

Zoning Standards

Section	Topics to Address
Definitions	Define technologies & terms
Applicability	Primary vs. accessory use
Dimensional Standards	• Height • Size • Setbacks • Lot coverage
Design Standards	• Signage • Disconnect • Screening • Fencing

Source: American Planning Association

Zoning Standards: Small Solar

Typical Requirements:

- Permitted as accessory use
- Minimize visibility if feasible
- Requirements:
  - District height
  - Lot coverage
  - Setback

Zoning Standards: Large Solar

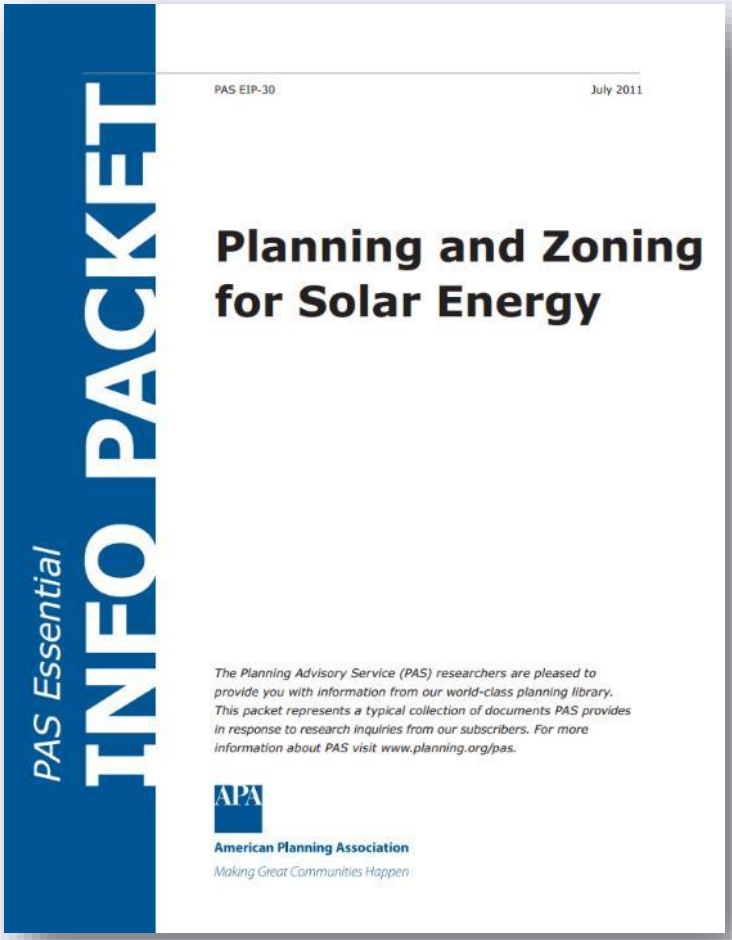
Typical Requirements:

- Allowed for primary use in limited locations
- Requirements:
  - Height limits
  - Lot coverage
  - Setback
  - Fencing and Enclosure

Zoning Standards: Model Ordinances

Resource **American Planning Association**

This Essential Info Packet provides example development regulations for solar.



https://www.planning.org/pas/infopackets/open/pdf/30intro.pdf

Zoning Standards: Historic

Typical Requirements:

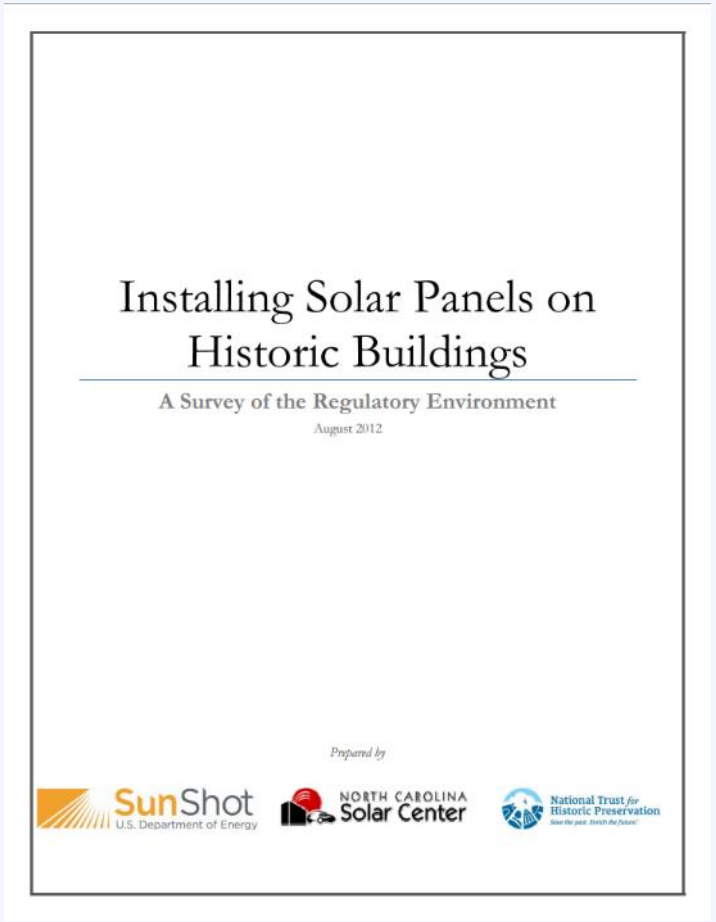
- Prevent permanent loss of "character defining" features
- Possible design requirements
  - Ground mounted
  - Flat roof with setback
  - Panels flush with roof
  - Blend color

Solar installation on rear of building out of sight from public right of way
Heritage Hill Historic District of Grand Rapids, Michigan
(Source: Kimberly Kooles, NC Solar Center)

Zoning Standards: Historic

Resource **North Carolina Clean Energy Technology Center**

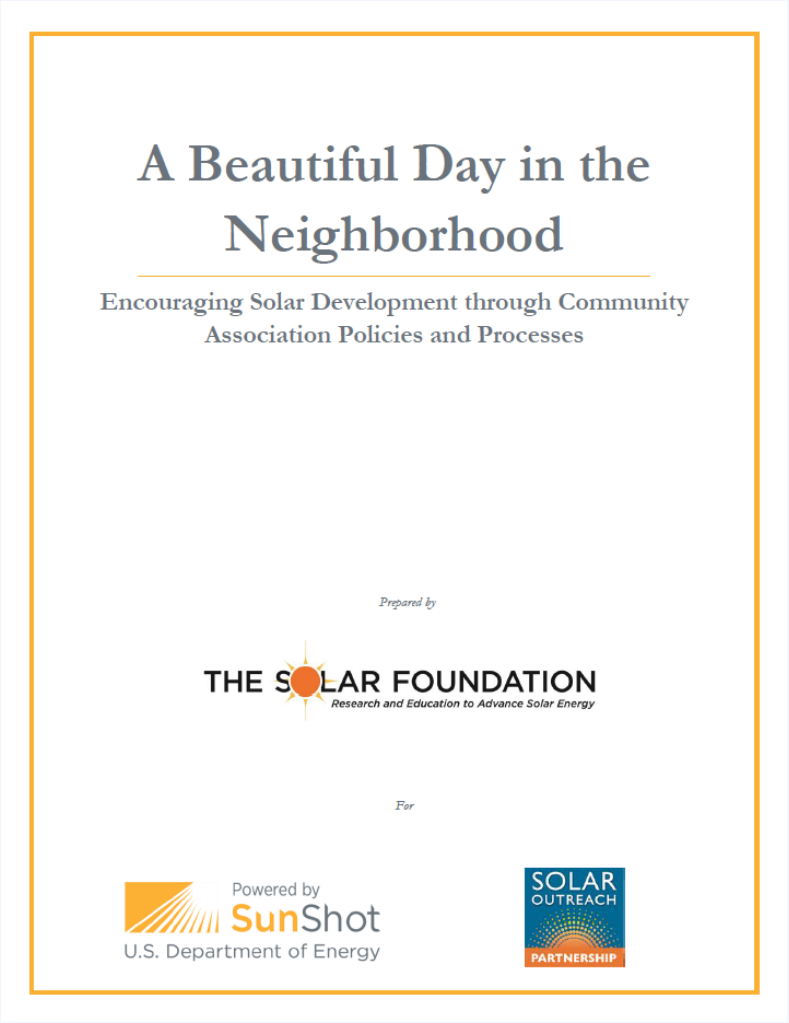
Provides sample design principles and example regulations incorporating historic preservation into sustainability and energy projects.



Private Rules on Residential Solar

Resource **The Solar Foundation**

Guide for HOAs on solar access law and simple recommendations for reducing barriers to solar in association-governed communities.



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www.solaroutreach.org

Solar in HOAs: Best Practices

- ✓ Provide clear, unambiguous design guidelines
- ✓ Post rules and requirements online
- ✓ Provide a list of all required documents
- ✓ Waive design rules that significantly increase cost or decrease performance
- ✓ Allow exceptions from tree removal rules for solar

Update Building Code

Solar Ready Construction:

Preparing a building for solar at the outset can help make future solar installations easier and more cost effective.

Update Building Code

Require builders to:

- ✓ Minimize rooftop equipment
- ✓ Plan for structure orientation to avoid shading
- ✓ Install a roof that will support the load of a solar array
- ✓ Record roof specifications on drawings
- ✓ Plan for wiring and inverter placement

Update Building Code

Solar Ready Cost-Benefit						
	Costs				Installation Savings	
	No- Conduit, Designate Pathway	Conduit/Wire + Panel			No Conduit, Designate Pathway	Conduit & Panel Capacity Pre-Installed
		Inverter On Roof	Inverter 1 Story Below	Inverter 3-4 Stories Below		
1. Single Family Residence	-$60-$120	N/A	-$360	-$660	$400	$1300
2. Two- or Three- Family Residence					$990	$3300
3. 4-8 Unit Apartments					$1600	$5300
4. 8+ Unit Apartments						
5. Small Commercial		-$2,650	-$2,900	-$3,700	$2,200	$6,500
6. Larger Commercial, Office		-$3,600	-$4,000	-$5,100	$3,700	$11,000
7. Large Commercial, High Tech		-$4,400	-$4,800	-$6,100	$5,500	$16,000
8. Parking Canopies	NA					

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Source: "City of Cambridge Solar Ready Requirement Evaluation", draft, Meister Consultants Group, July 2016

Effective Local Solar Policy

Local Solar Policy

Planning for Solar

Solar in Development Regulation

Effective Solar Permitting Process

Solar Market Development Tools

Challenge: Inconsistency

18,000+ local jurisdictions

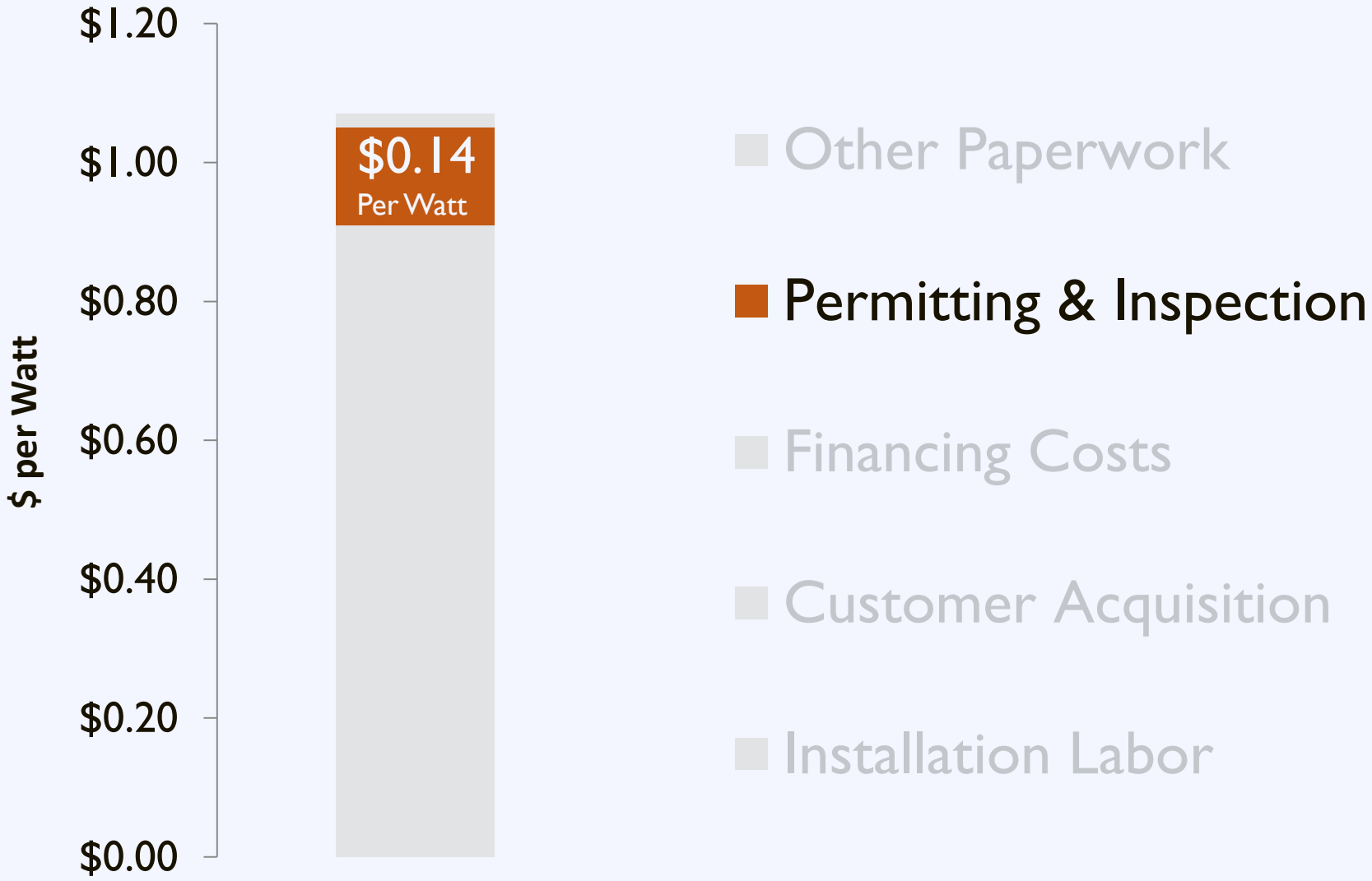
with unique zoning and permitting requirements

Source: http://www.nrel.gov/docs/fy12osti/54689.pdf

Consumer Challenges

Source: Forbes

Regulatory Barriers



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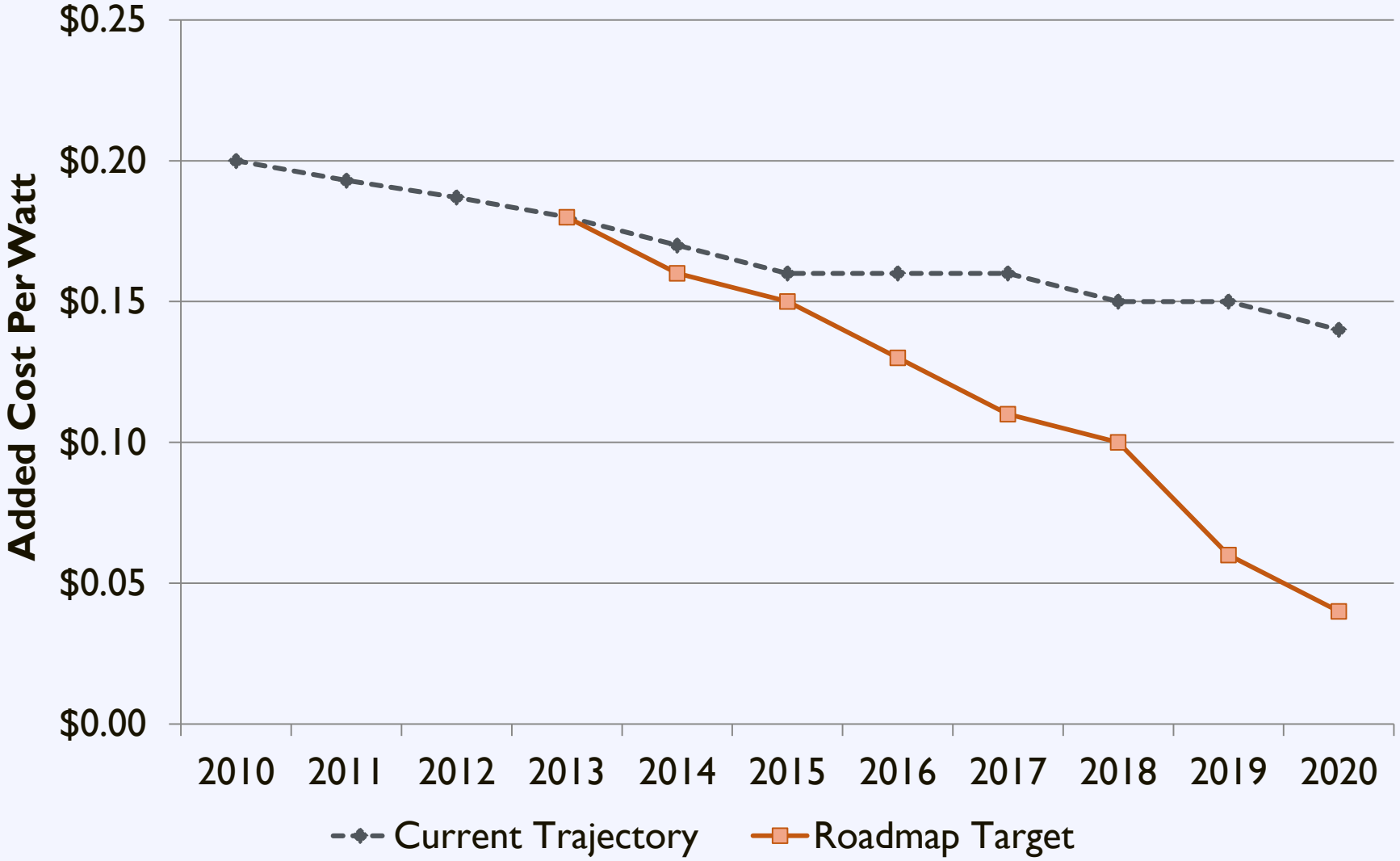
Planning & Permitting Roadmap



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Identifying Challenges

Solar Developer Perspective:

- Unclear or inconsistent requirements
- Lengthy application review process, even for small projects
- High or inconsistent fees
- Multiple inspections and long inspection appointment windows
- Lack of familiarity with solar

Added together, these cost a lot of time and money!

Identifying Challenges

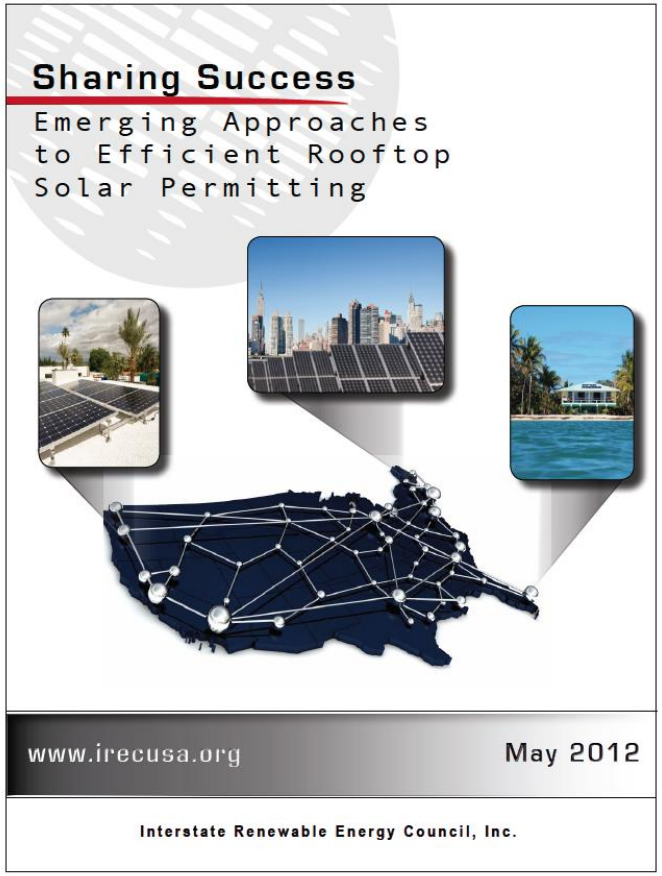
Local Government Perspective:

- Solar permitting is a small portion of everything else local governments do
- Many local governments are resource-constrained
- Inexperienced installers submit incomplete applications
- Installations do not match design drawings

Importance of balancing government needs and demands with encouraging solar energy and economic development

Implementing Improvements

- **Responsibility** for change should be shared between permitting authorities and the solar industry.
- Changes to permitting policies should **benefit both** local governments and solar installers (as well as their customers).



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www.irecusa.org/sharing-success/

Expedited Permitting

Solar Permitting Best Practices:

- ✓ Post Requirements Online
- ✓ Implement an Expedited Permit Process
- ✓ Enable Online Permit Processing
- ✓ Ensure a Fast Turn Around Time

Powered by SunShot U.S. Department of Energy

Source: IREC/ Vote Solar

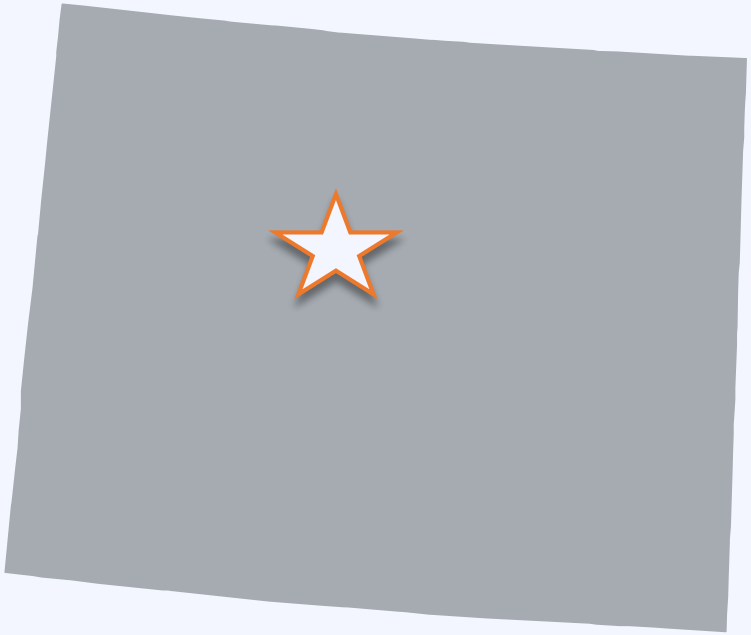
Expedited Permitting

Solar Permitting Best Practices:

- ✓ Collect Reasonable Permitting Fees
- ✓ No Community-Specific Licenses
- ✓ Narrow Inspection Appointment Windows
- ✓ Eliminate Excessive Inspections
- ✓ Train Permitting Staff in Solar

Source: IREC/Vote Solar

Expedited Permitting: Case Study



Breckenridge, Colorado

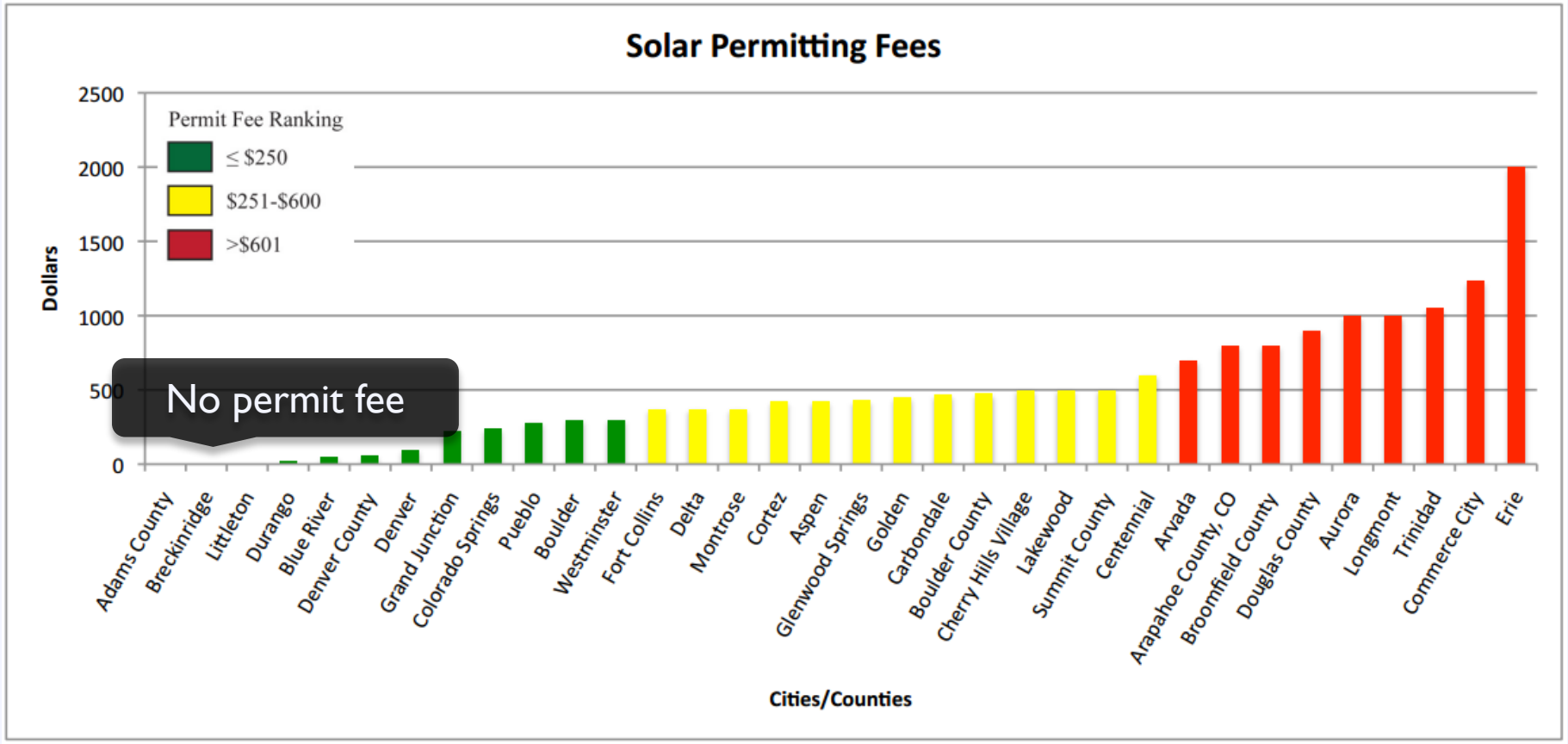
Population: 4,540

Powered by SunShot
U.S. Department of Energy

Source: Wikipedia

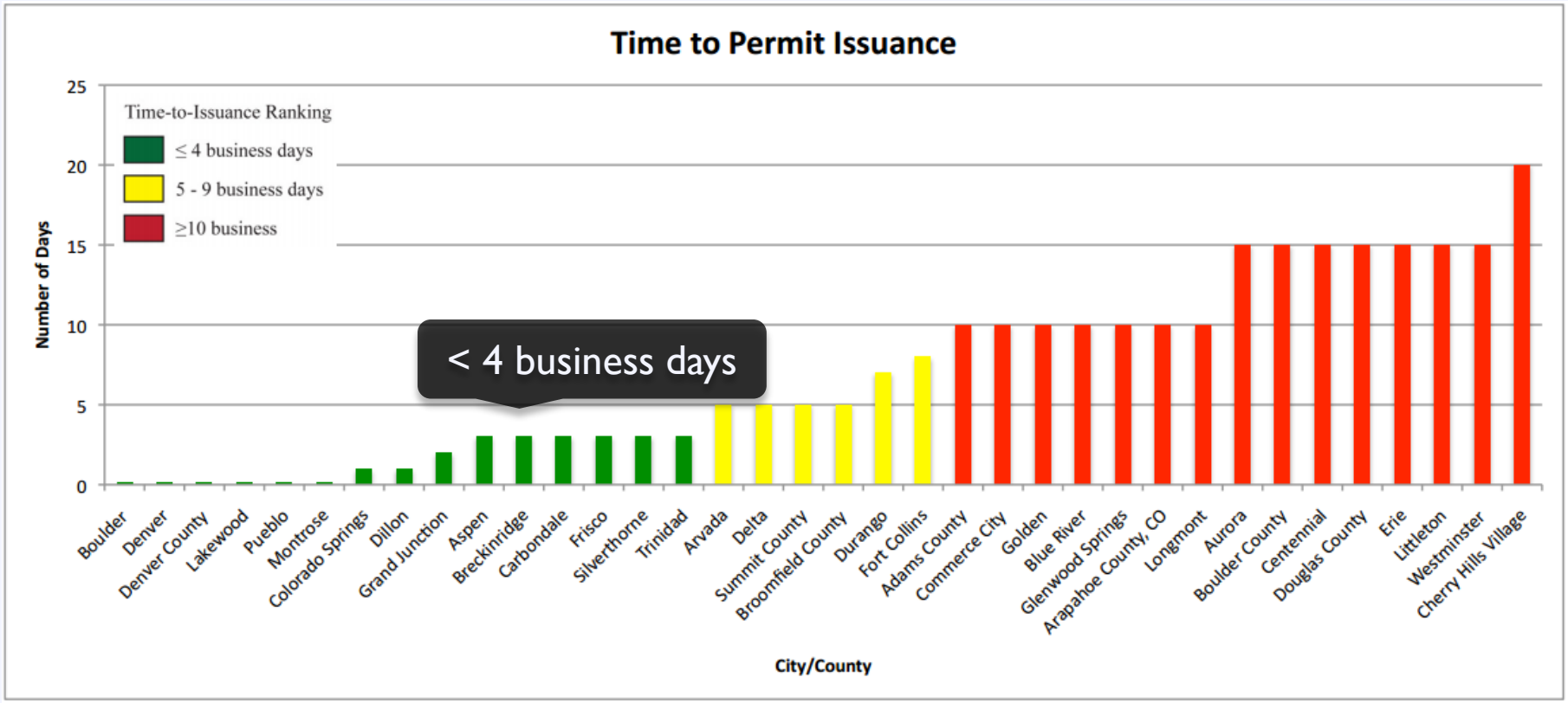
Expedited Permitting: Case Study

Breckenridge charges no fees to file for a solar permit



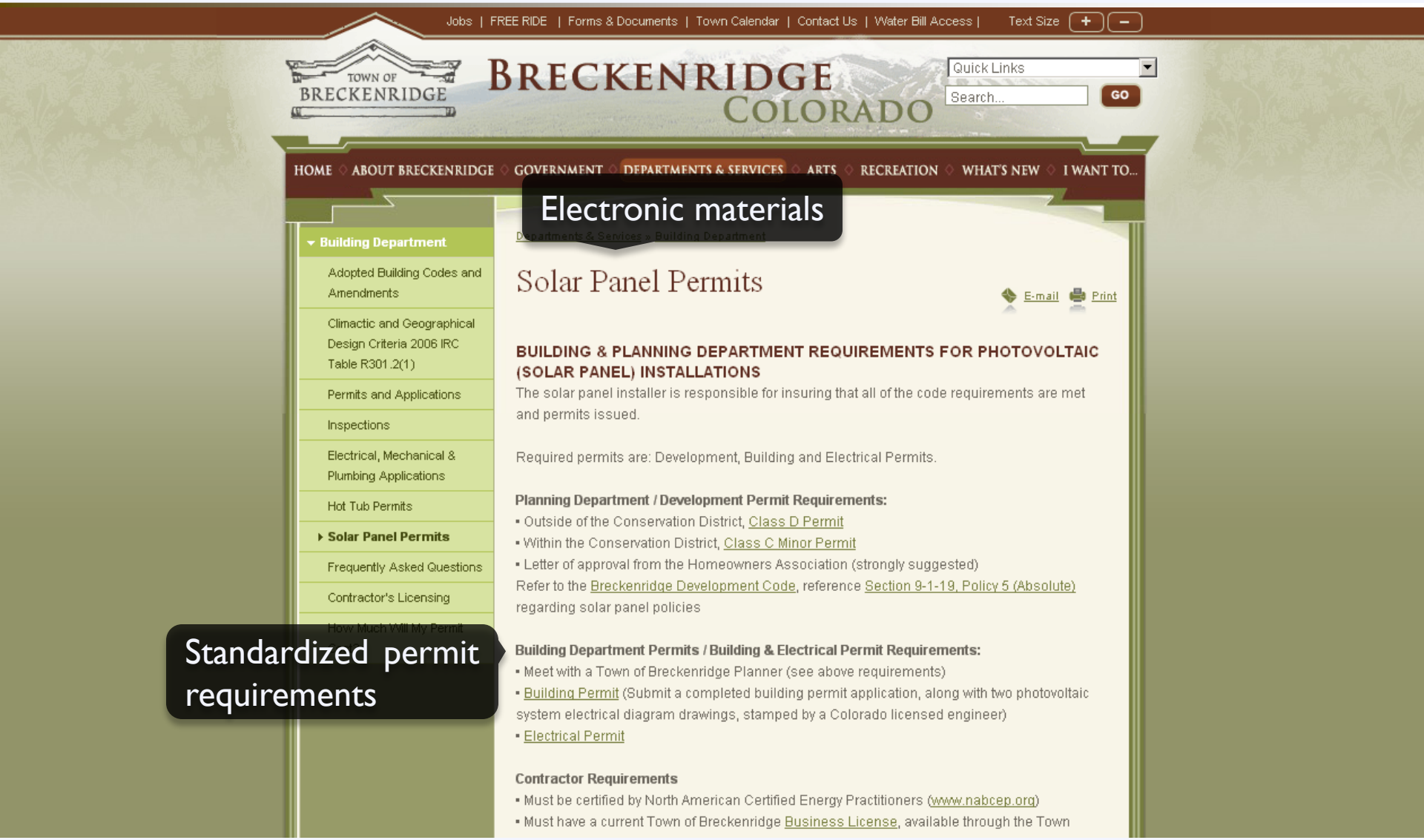
Expedited Permitting: Case Study

Breckenridge offers a short turn around time for solar permits



Source: Vote Solar (http://votesolar.org/wp-content/uploads/2011/03/COPermitReport.pdf)

Expedited Permitting: Case Study



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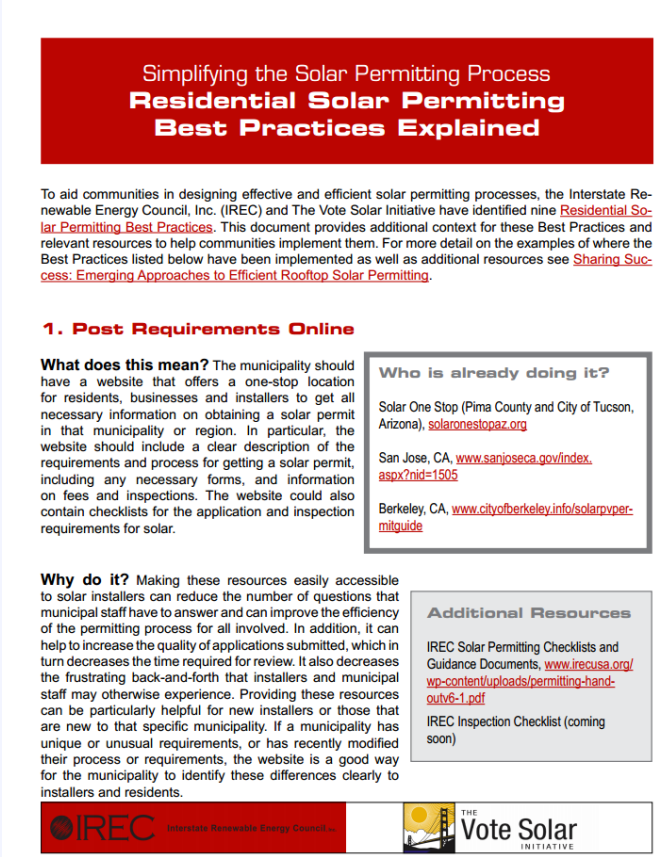
Source: Breckenridge, CO (http://www.townofbreckenridge.com/index.aspx?page=694)

Permitting: Best Practices

Resource **Interstate Renewable Energy Council**

Outlines leading best practices in residential solar permitting and provides examples of implementation.



Simplifying the Solar Permitting Process
Residential Solar Permitting Best Practices Explained

To aid communities in designing effective and efficient solar permitting processes, the Interstate Renewable Energy Council, Inc. (IREC) and The Vote Solar Initiative have identified nine Residential Solar Permitting Best Practices. This document provides additional context for these Best Practices and relevant resources to help communities implement them. For more detail on the examples of where the Best Practices listed below have been implemented as well as additional resources see Sharing Success: Emerging Approaches to Efficient Rooftop Solar Permitting.

1. Post Requirements Online

What does this mean? The municipality should have a website that offers a one-stop location for residents, businesses and installers to get all necessary information on obtaining a solar permit in that municipality or region. In particular, the website should include a clear description of the requirements and process for getting a solar permit, including any necessary forms, and information on fees and inspections. The website could also contain checklists for the application and inspection requirements for solar.

Who is already doing it?

Solar One Stop (Pima County and City of Tucson, Arizona), solaronestopaz.org

San Jose, CA, www.sanjoseca.gov/index.aspx?nid=1505

Berkeley, CA, www.cityofberkeley.info/solarpvpermitguide

Why do it? Making these resources easily accessible to solar installers can reduce the number of questions that municipal staff have to answer and can improve the efficiency of the permitting process for all involved. In addition, it can help to increase the quality of applications submitted, which in turn decreases the time required for review. It also decreases the frustrating back-and-forth that installers and municipal staff may otherwise experience. Providing these resources can be particularly helpful for new installers or those that are new to that specific municipality. If a municipality has unique or unusual requirements, or has recently modified their process or requirements, the website is a good way for the municipality to identify these differences clearly to installers and residents.

Additional Resources

IREC Solar Permitting Checklists and Guidance Documents, www.irecusa.org/wp-content/uploads/permitting-hand-outv6-1.pdf

IREC Inspection Checklist (coming soon)

IREC Interstate Renewable Energy Council

THE Vote Solar INITIATIVE

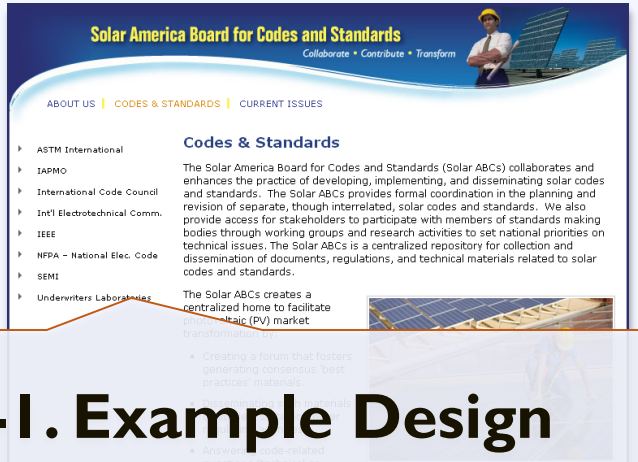
http://projectpermit.org/wp-content/uploads/2013/04/Expanded-Best-Practices-7.23.13_VSI.pdf

Model Permitting Process

Resource **Solar America Board for Codes & Standards**

Expedited Permitting:

- Simplifies requirements for PV applications
- Facilitates efficient review of content
- Minimize need for detailed studies and unnecessary delays



1-1. Example Design Criteria:

- Size < 10-15 kW
- Code compliant
- Weight < 5 lb / sqft
- 4 strings or less

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Effective Local Solar Policy

Local Solar Policy

Understanding solar financing

Expanding financing options

Addressing customer acquisition

Solar Market Development Tools

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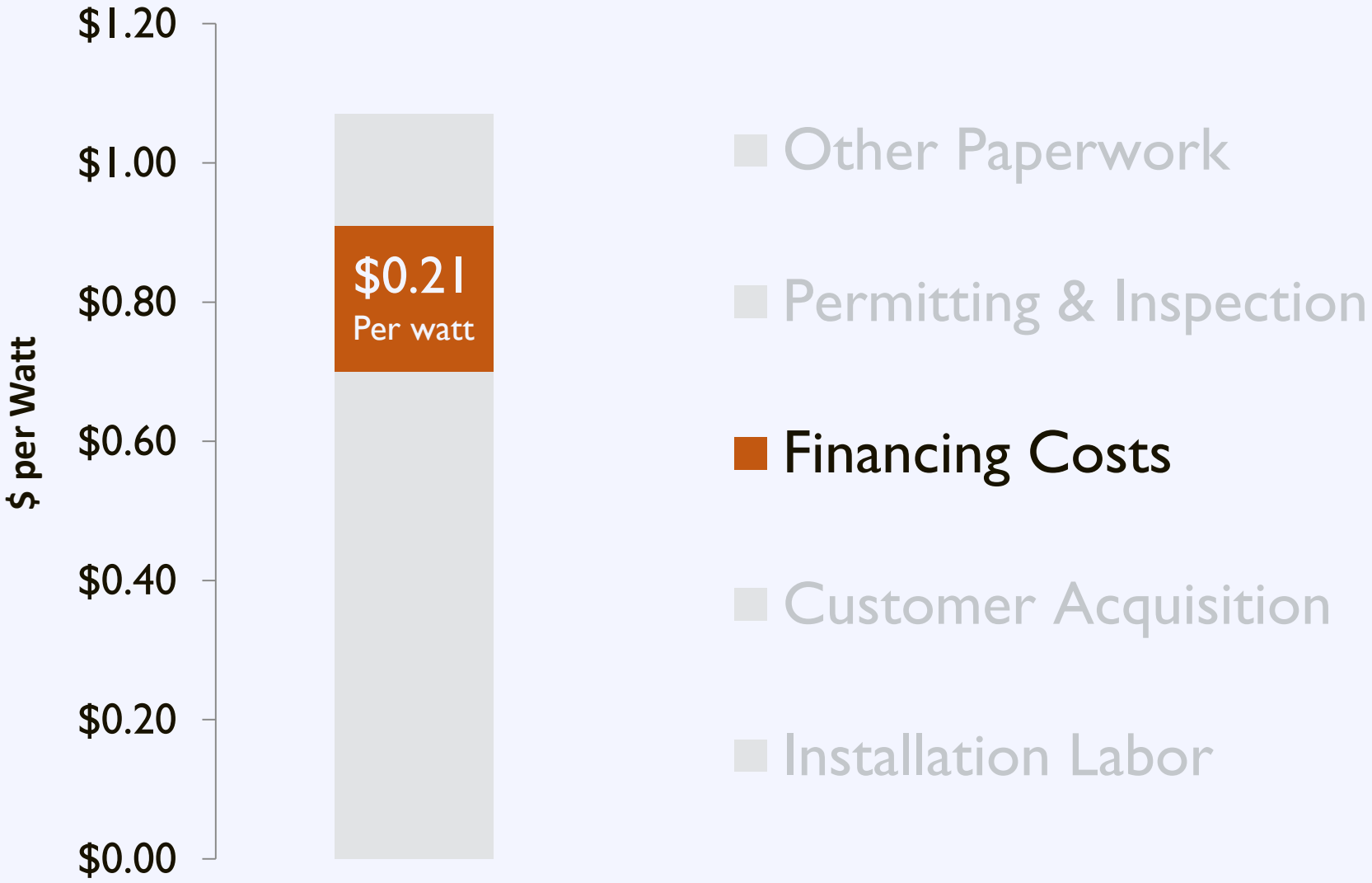
Soft Costs: Financing



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The Solar Equation

Cost

+ Installed Cost

+ Maintenance

- Direct Incentive

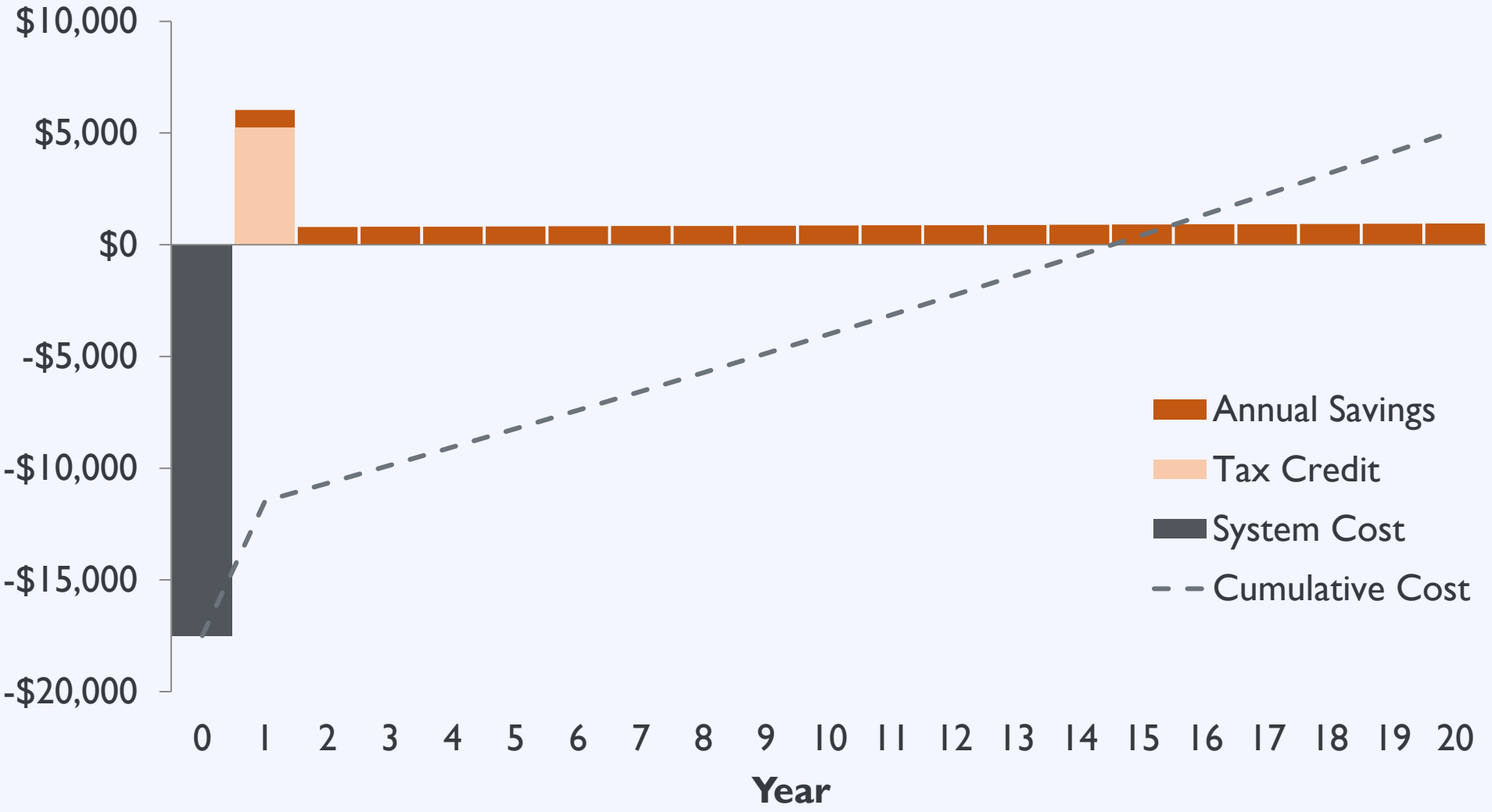
Benefit

+ Avoided Energy Cost

+ Excess Generation

+ Performance Incentive

The Solar Finance Problem



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Solar Financing Options

Third Party Ownership

Customer Owned and Financed

Utility-Owned Solar

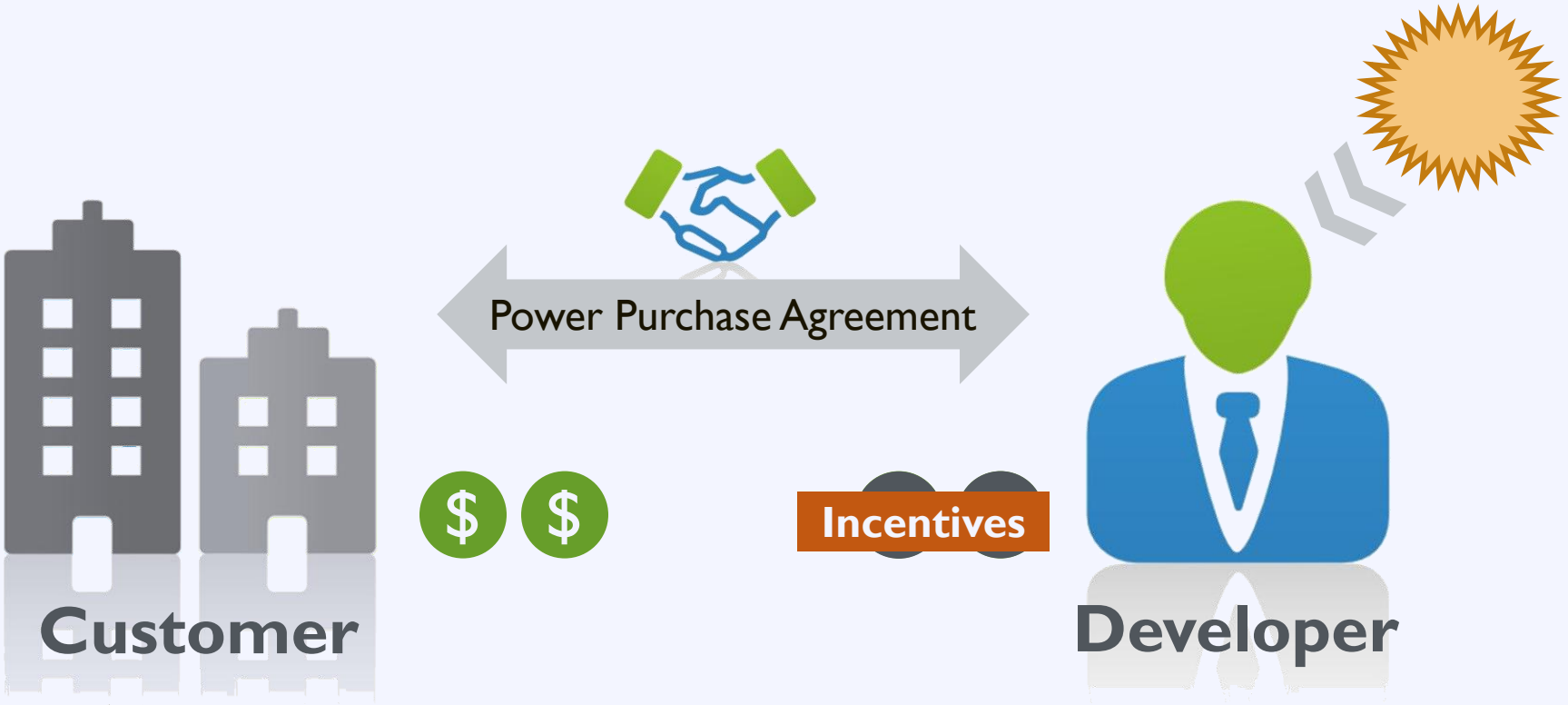
Solar Financing Options

Third Party Ownership

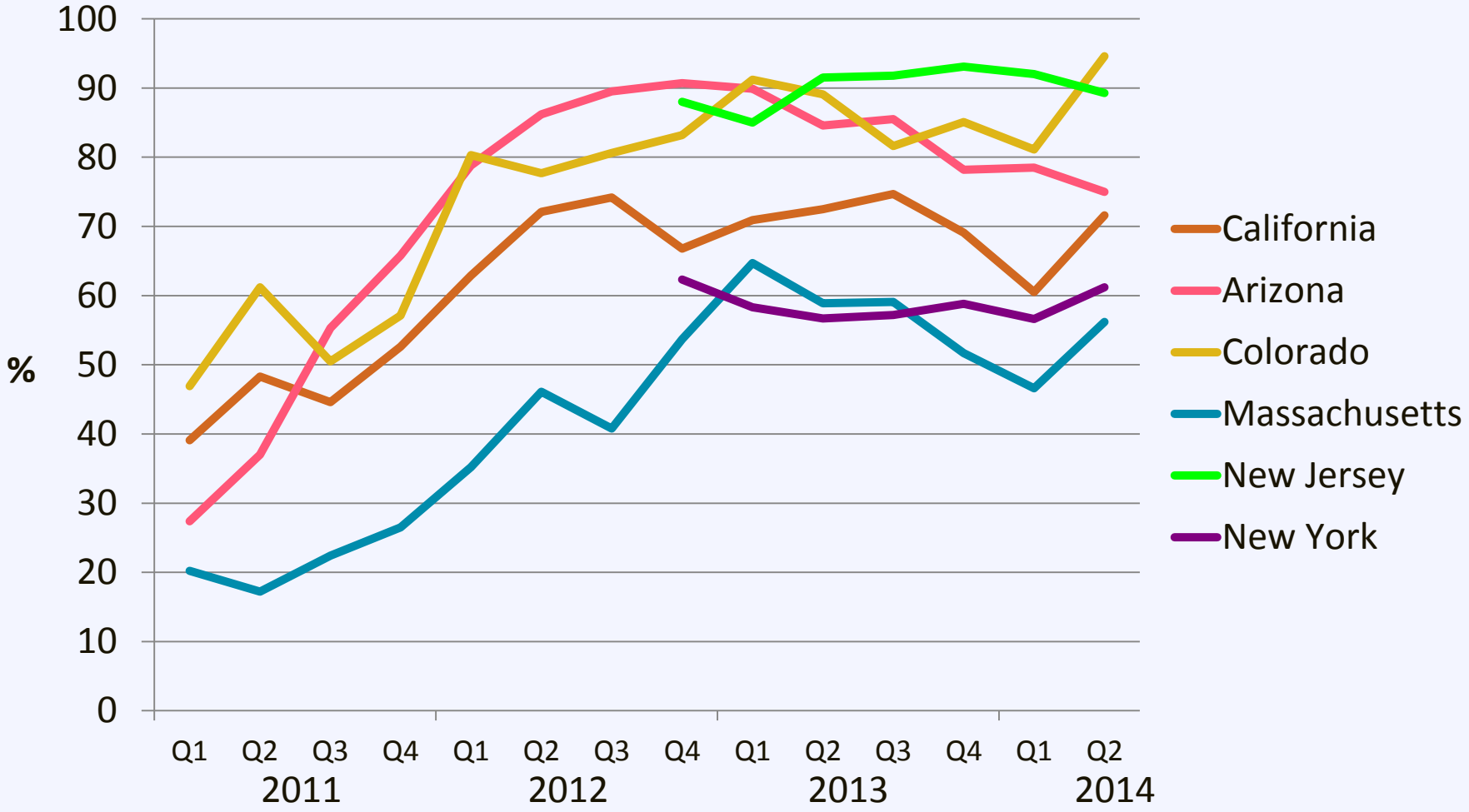
Customer Owned and Financed

Utility-Owned Solar

Third Party Ownership



Third Party Ownership



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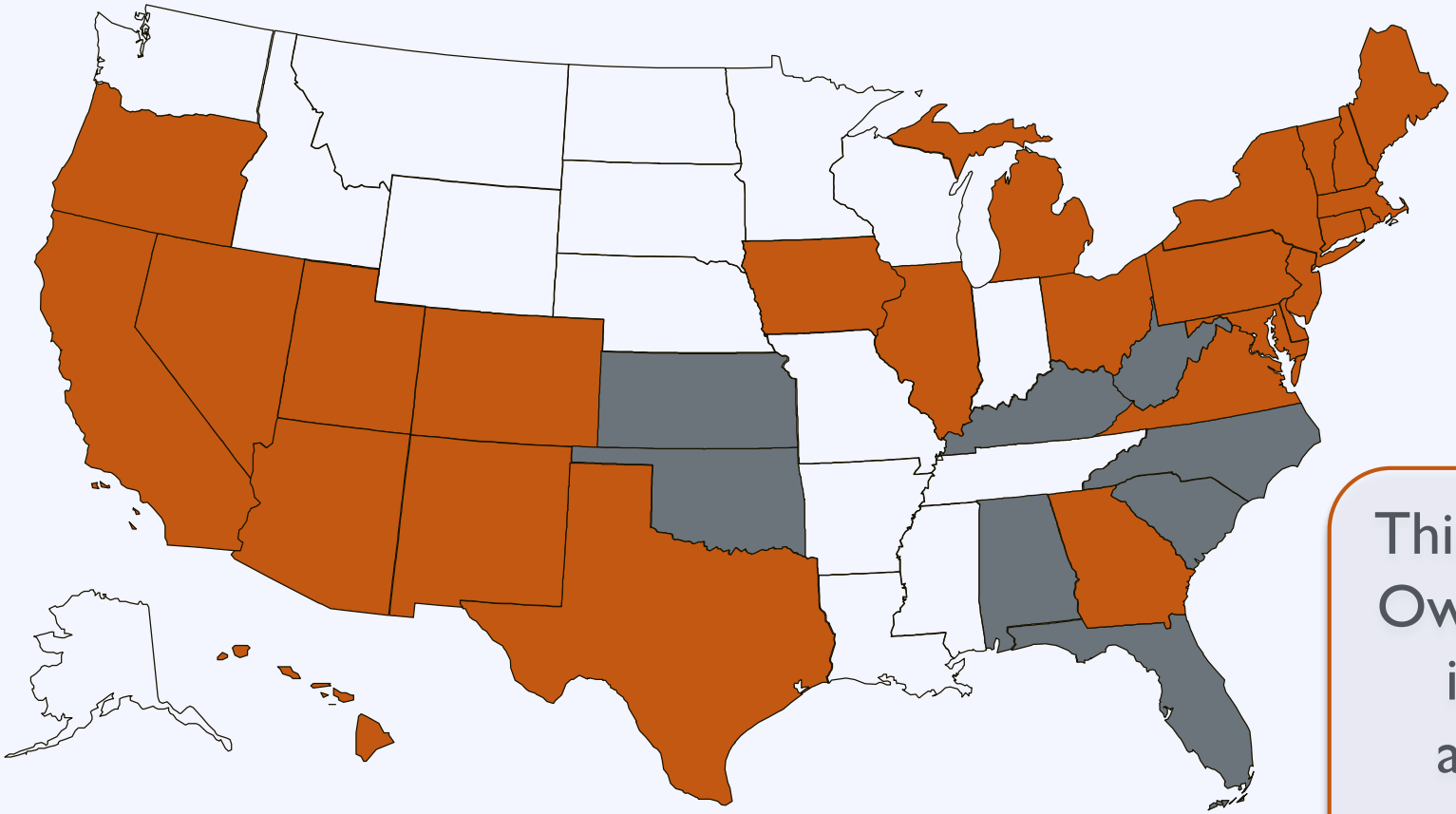
Source: GTM Research/ Solar Energy Industries Association, *U.S. Solar Market Insight 2012 Year-in-Review & U.S. Solar Market Insight Q2 2014*

Third Party Ownership: State Policy

www.dsireusa.org / February 2016



Authorized by state or otherwise currently in use, at least in certain jurisdictions

Apparently disallowed by state or otherwise restricted by legal barriers

Status unclear or unknown

Third Party Ownership is not always available

Solar Financing Options

Third Party Ownership

Customer Owned and Financed

Utility-Owned Solar

Engage Local Lenders

Fewer than **5%**

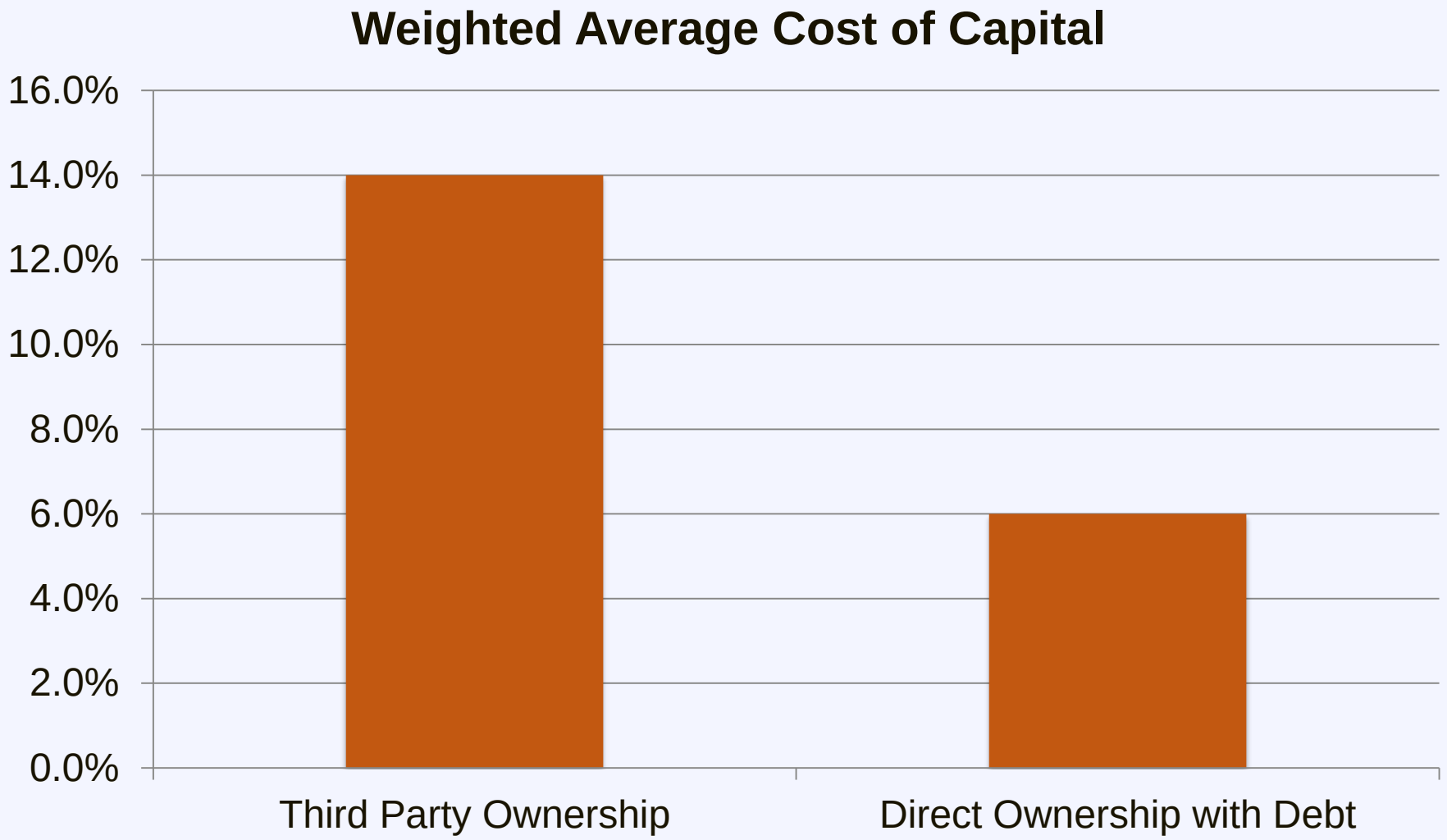
of the

6,500 banks in the US

are

actively financing solar PV projects

Third Party Ownership: Cost



Loan Options

- Secured loan
  - Admirals Bank: 4.95% - 9.95%
- Unsecured loan
  - Admirals Bank: 9.99% - 11.99%
- Federal loan
  - HUD PowerSavers: 7.98%
- RUS loans

ADMIRALS BANK

PowerSaver Loan®
Powered by AFC FIRST
HUD Approved FHA PowerSaver Lender

Municipal – Lender Partnership

Milwaukee SHINES

- Partnership with Summit Credit Union
- 4.5% (5-year) and 5.25% (15-year) options

Austin Energy Power Saver Loans

- Partnership with Velocity Credit Union
- Market-variable rate

Municipal partnerships can beat existing options

Opportunities to improve lending options by offering loan loss reserves or credit enhancements

Engage Local Lenders: Resources

Resource **Local Lending for Solar PV**

A guide for local governments seeking to engage financial institutions

www.solaroutreach.org

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Property Assessed Clean Energy

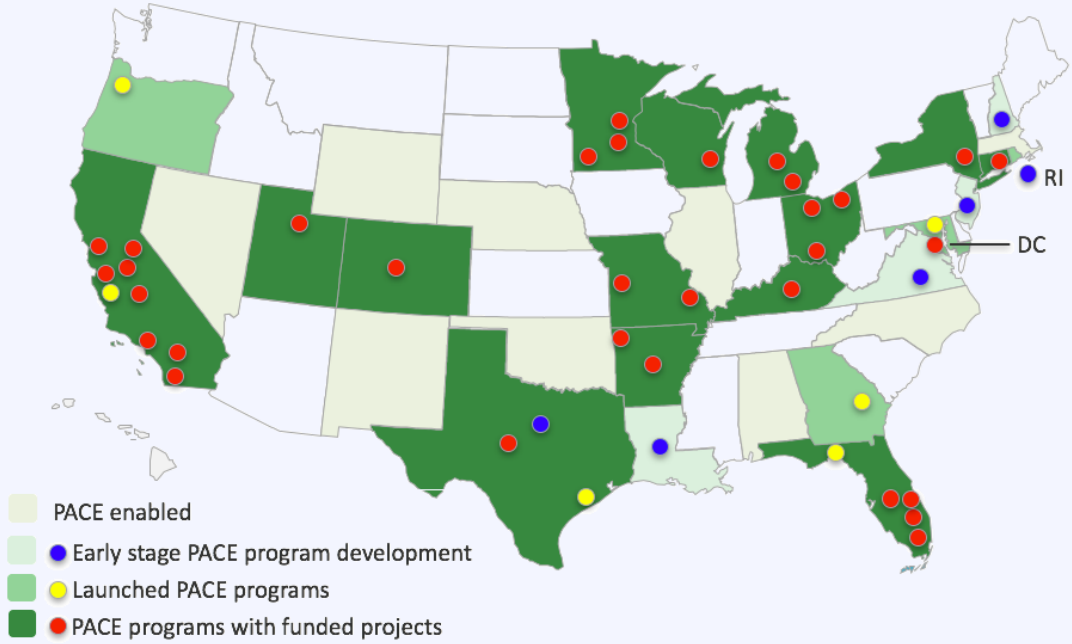
- PACE allows customers to finance energy efficiency projects or renewable energy installations through a property assessment

PACE Financing

Barriers		Solutions
High upfront cost	→	100% external funding
Poor credit or debt capacity	→	Tied to property, not owner; off-balance sheet
Long term investment	→	Positive cash flow from beginning; Assessment transfers to new owner

Fast PACEd Growth

- $230 Million in Commercial Projects; 734 buildings
- $1,697 Million in Residential Projects; 82,000 homes
- 32 States + DC with enabling legislation



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U.S. Department of Energy

Source: PACENation.us

Solar Financing Options

Third Party Ownership

Traditional Lending

Utility-Owned Solar

Utility-Owned Solar

Utility Options for Distributed Solar

- Centrally owned solar
- Utility-owned rooftop solar
- Customer-owned with On-Bill Financing
- Community Solar

Utility-Owned Rooftop Solar

Utility pays for and owns rooftop system

Customer either:

1. Purchases energy from the system at a special rate
2. Purchases energy from the grid but receives a monthly payment for hosting

Examples:

- Arizona Public Service
- Tuscon Electric Power
- CPS Energy (San Antonio)

Utility On-Bill Financing

Utility pays for customer-owned rooftop system

1. Customer repays cost of system through added charge on electric bill
2. Proven Concept for Electric Coops for energy efficiency program
3. **Examples:**

- Roanoke Electric Coop (North Carolina)
- How$martKY (coalition of five Kentucky Cooperatives)

Roanoke Electric Cooperative
Your Touchstone Energy® Partner

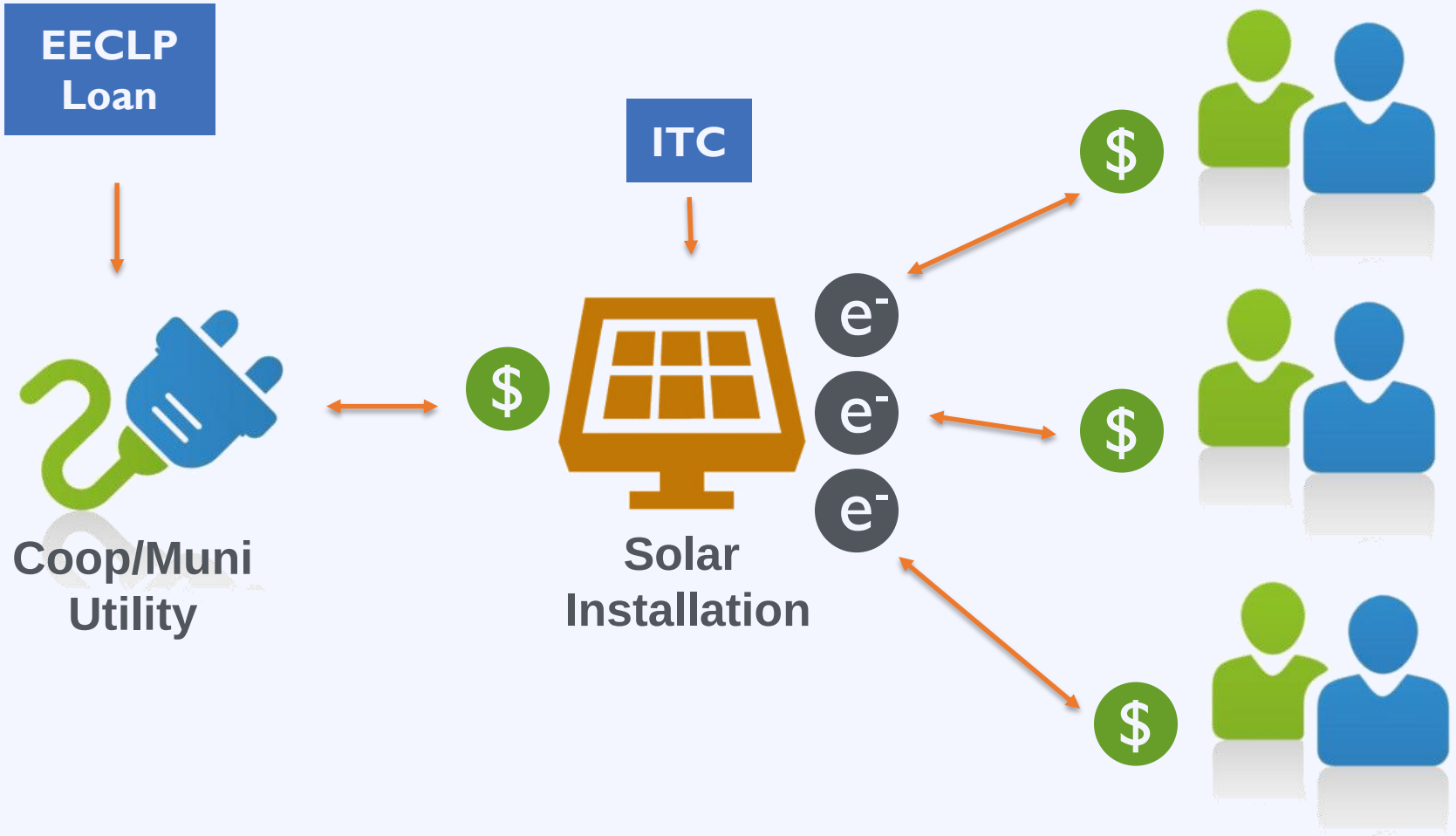
How$martKY™

Utility-Run Community Solar

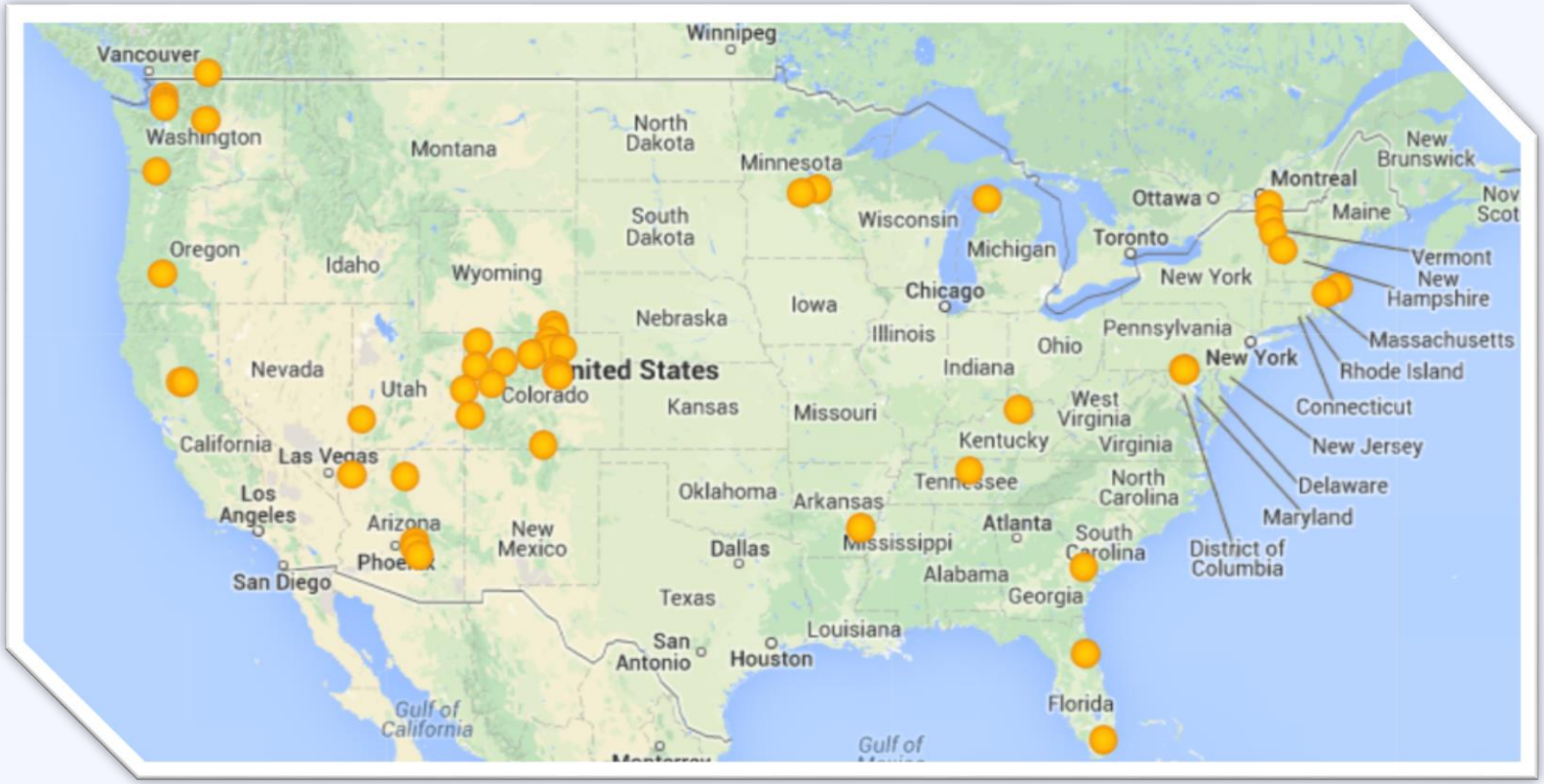
Utility lends money to solar developer

1. Developer constructs large system and claims tax credit
2. Utility allows customers to purchase portion of system
3. Utility credits customer bills for the solar they own
4. Upfront cost repaid by customer purchases

Community Solar: Utility Model



Community Solar in the U.S.



57 Community Solar programs to date, all but 5 are utility-led

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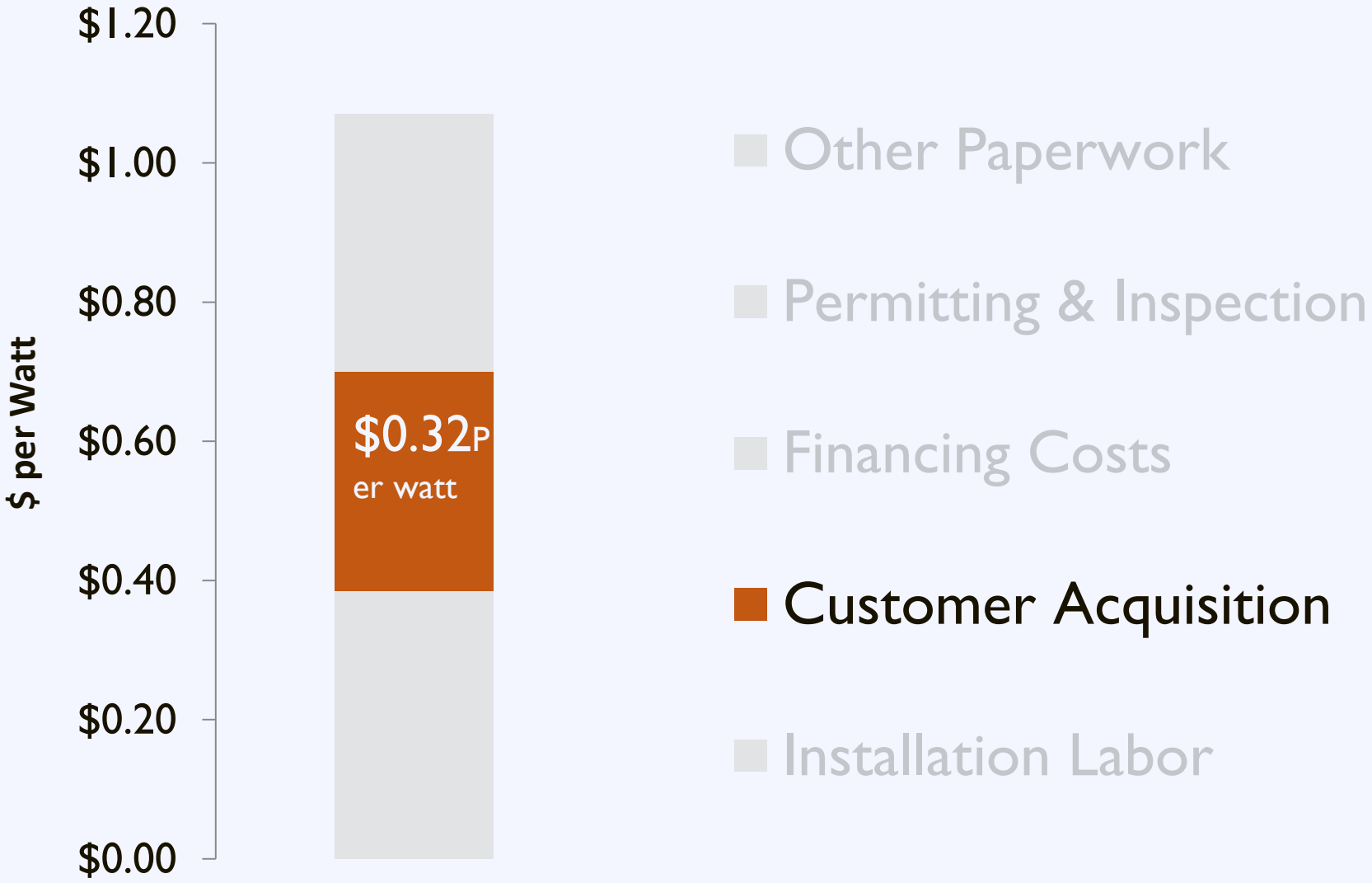
U.S. Department of Energy

Source: http://www.sharedrenewables.org/index.php?option=com_projects&view=display&Itemid=2

Customer Acquisition



Source: National Renewable Energy Laboratory

Customer Acquisition

5 % of homeowners that request a quote choose to install solar.

Customer Acquisition

Barriers

- High upfront cost
- Complexity
- Customer inertia

The Solarize Program

Group purchasing for residential solar PV

SOLARIZE MASS

SOLARIZE ROANOKE

solarize ASHEVILLE

solarize washington
a program of northwest seed

SOLARIZEtybee

SanCap SOLAR CONNECT

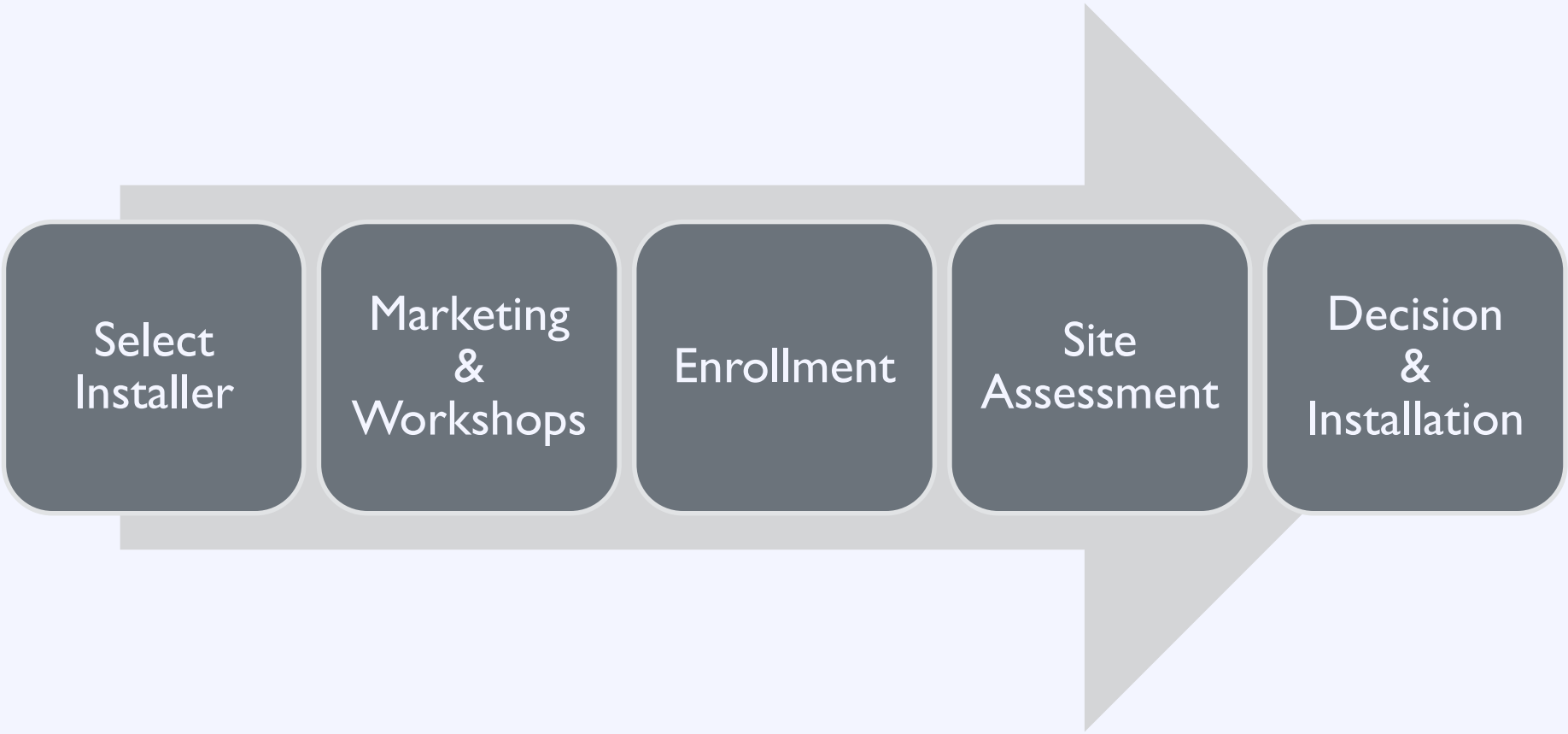
The Solarize Program

Barriers		Solutions
High upfront cost	→	Group purchase
Complexity	→	Vetted offer
Customer inertia	→	Limited-time offer

Solarize: Partnership

Program Sponsor	Community ties Technical knowledge
Solar Contractor	Solar installations Volume discounts
Citizen Volunteers	Campaign support Neighborhood outreach
Community Residents	Program participation Word of mouth

Solarize: Process



Solarize: Lasting Impact

A household is

0.78% more likely to adopt solar

for

each additional installation in their zip code

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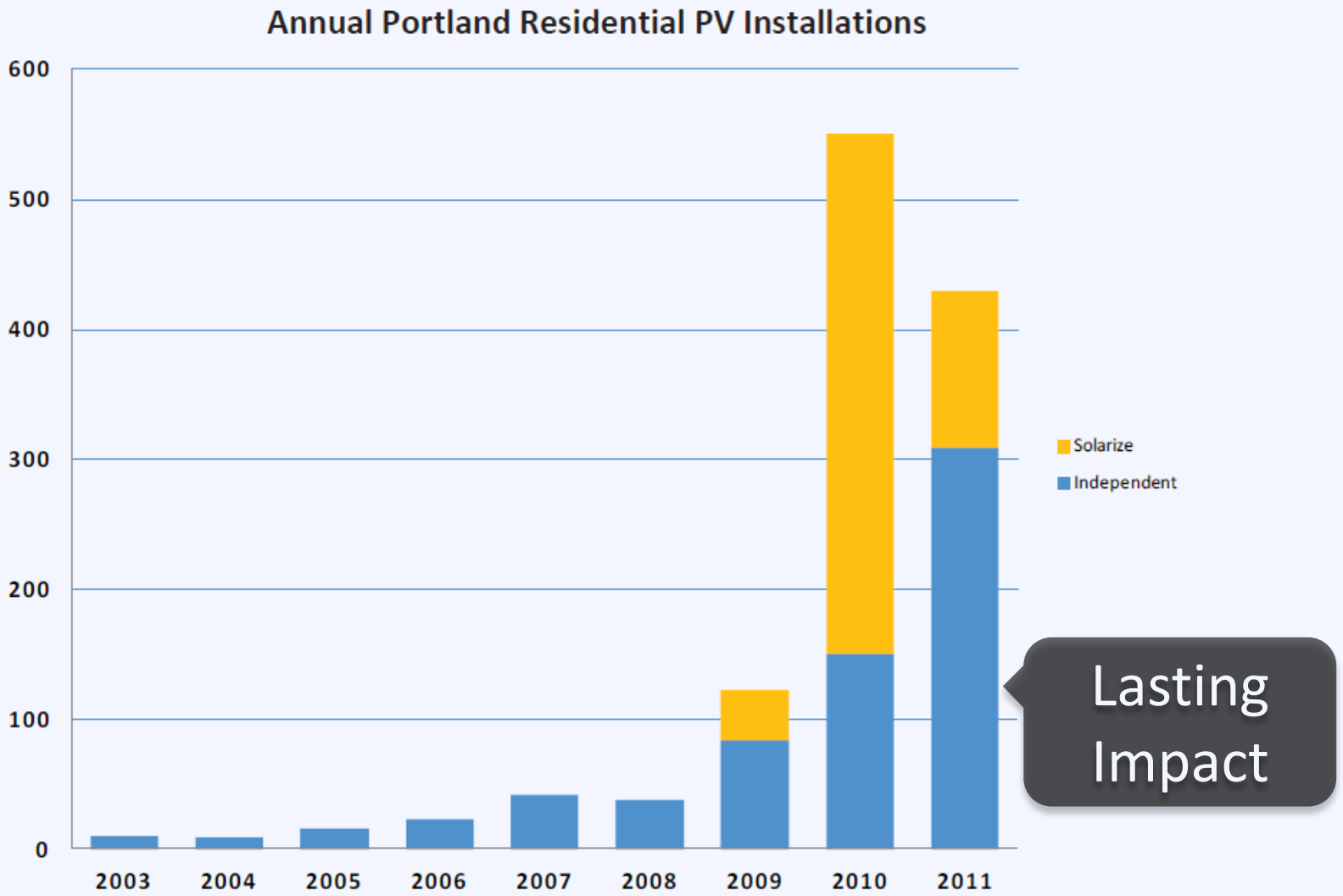
Source: NYU Stern and Yale School of Forestry – Peer Effects in the Diffusion of Solar Panels

Solarize: Lasting Impact



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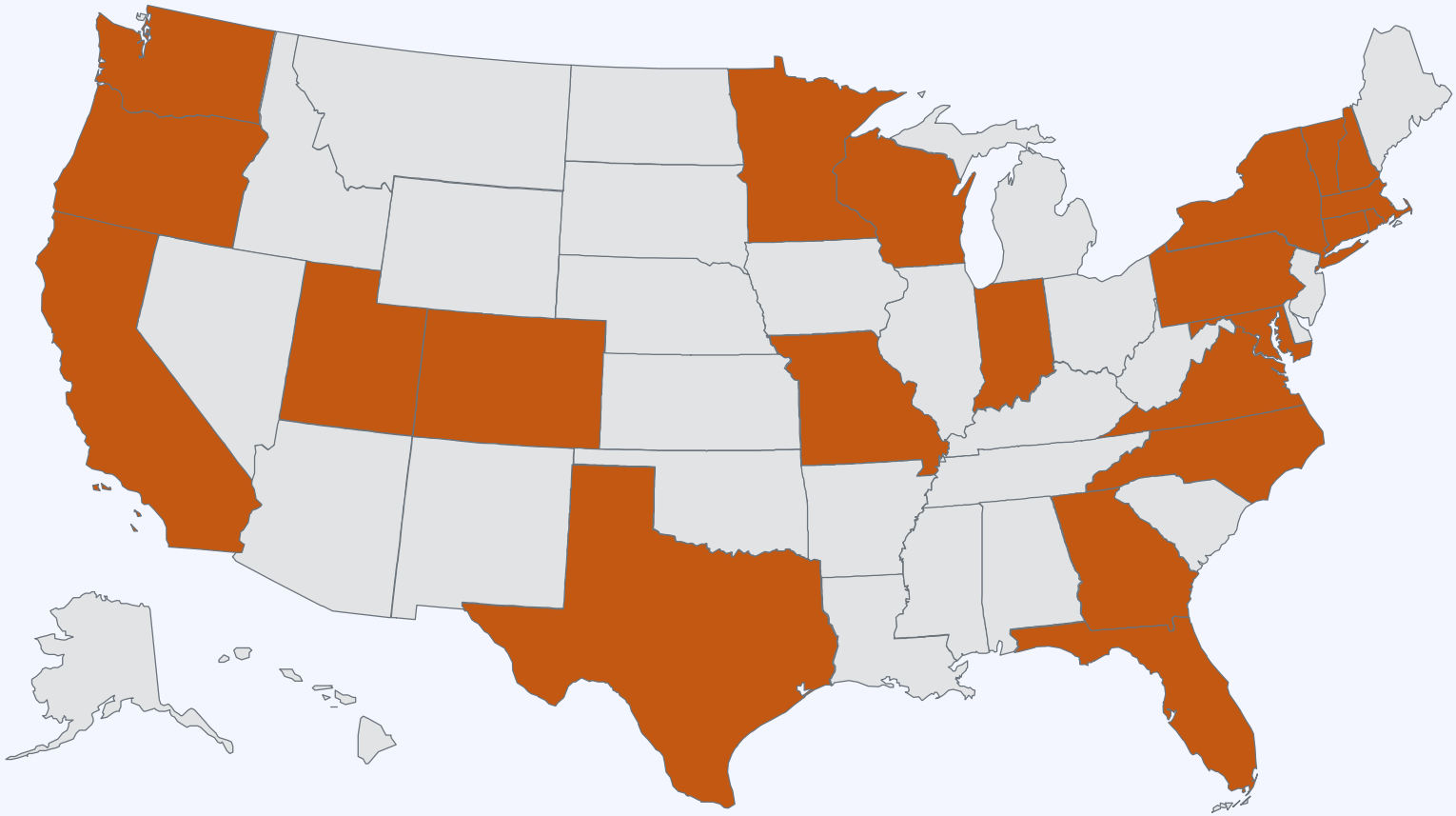
Solarize: National Growth

Over 200 Campaigns in 22 States



Thousands of homes Solarized!

Example: Plano, Texas

- Run by Plano Solar Advocates volunteers
- Coordinated with Live Green in Plano
- $mart Energy Loan Program
- Solarize Plano Website

PSA

live green in plano

$mart Energy LOAN PROGRAM

Powered by SunShot U.S. Department of Energy

Source: Solarize Plano & Lori Pampell Clark, NCTCOG

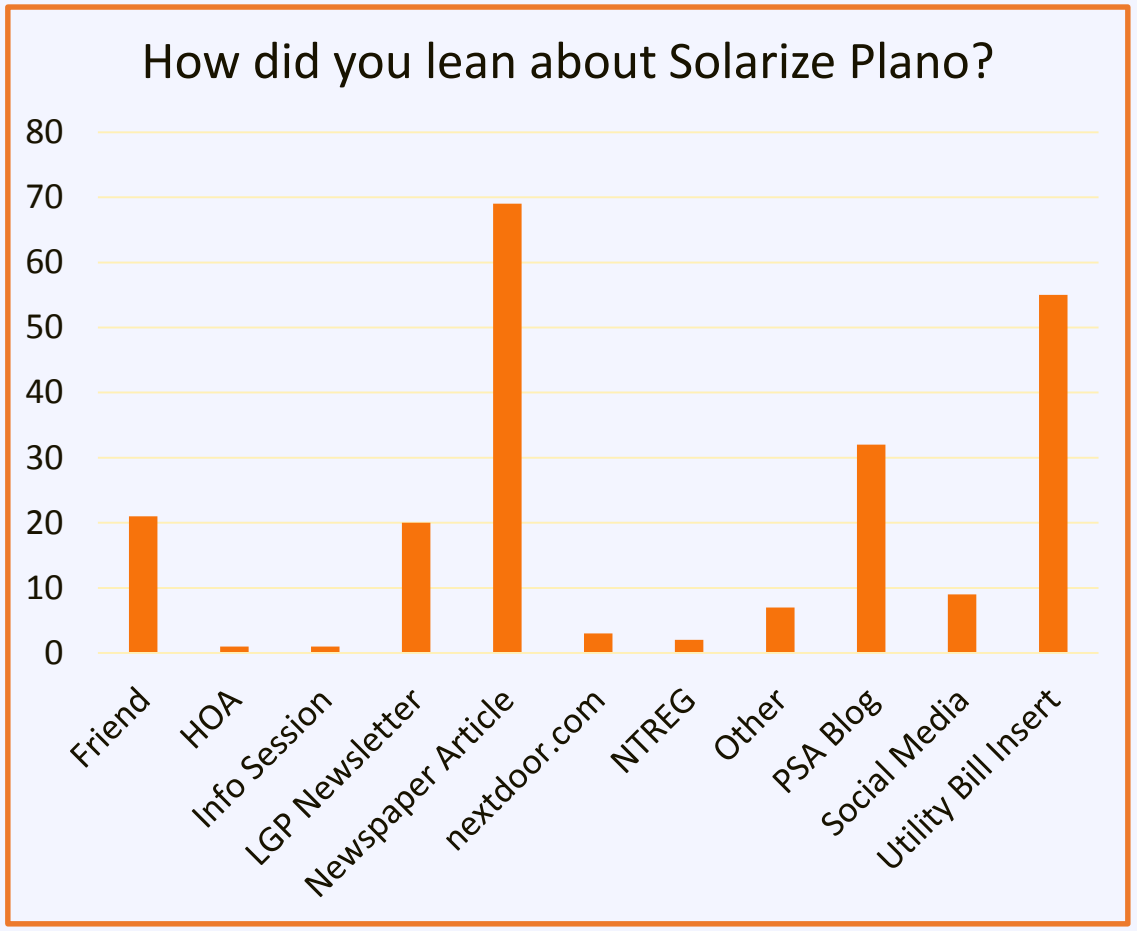
Solarize Plano Process

- Released RFP
- 7 installer responses, 1 chosen
- RFP review team
- Enrollees had to do some homework
  - Determine annual elec. usage
  - Think about energy efficiency
  - Consider how much to offset
  - Estimate potential system size
- Free installer site assessment after homework was completed
- Sign contract with installer

Source: Solarize Plano & Lori Pampell Clark, NCTCOG

Solarize Plano Outreach

- Used Google for online communications
- Posted Solar 101 presentations and videos (pdf and Youtube)
- Local newspaper and media
- Utility bill insert

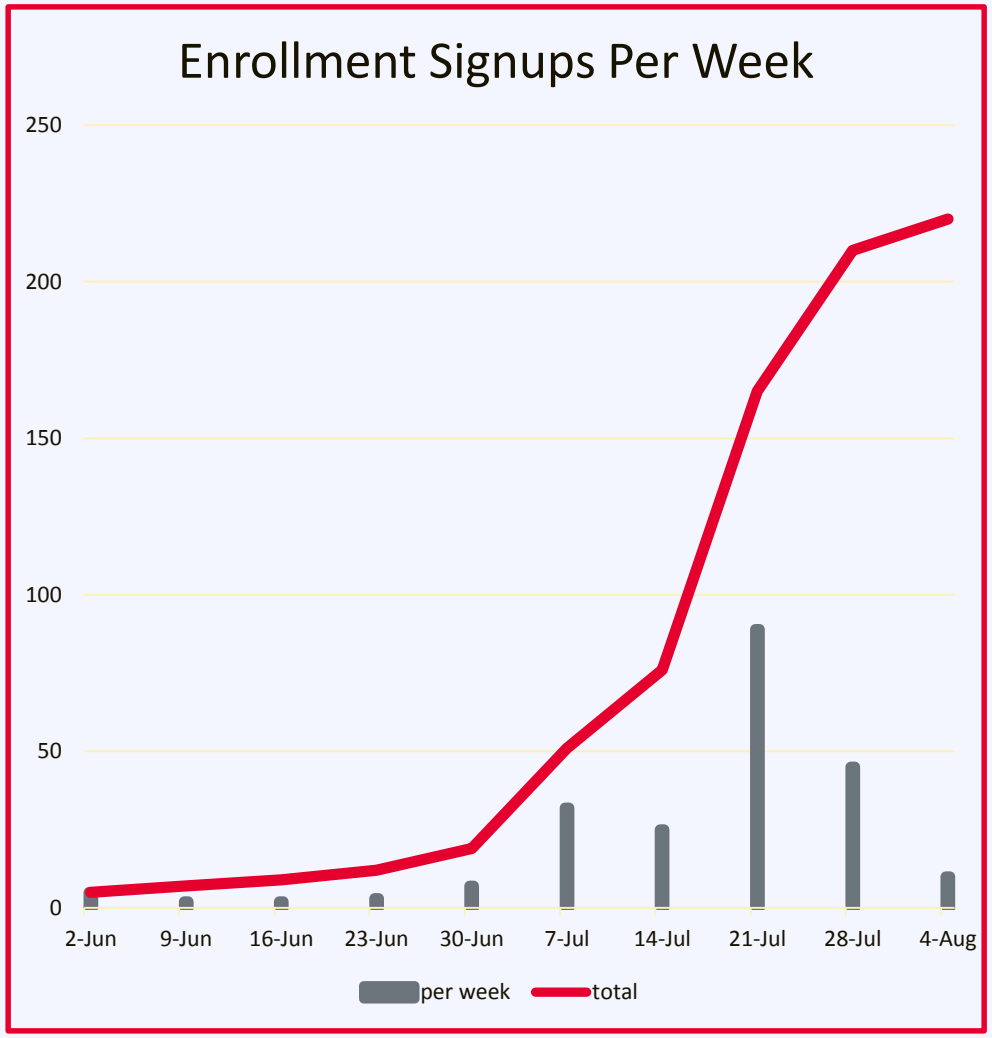


Source: Solarize Plano & Lori Pampell Clark, NCTCOG

Success!

- Target enrollment = 20
- Actual enrollment = **220**
- 49 site assessments
- 23 contracts
- Target installed capacity = 80 kW
- Actual installed capacity = **225.9 kW**
- Contract closure rate

  > 45% !



Source: Solarize Plano & Lori Pampell Clark, NCTCOG

Plano Lessons Learned

- Make sure Participants are ready to learn
- Cooperate with well-known organizations
- Volunteers should not be installers
- Release FAQs early
- Hold multiple information meetings
- Time campaign to incentive schedules and highest energy use season

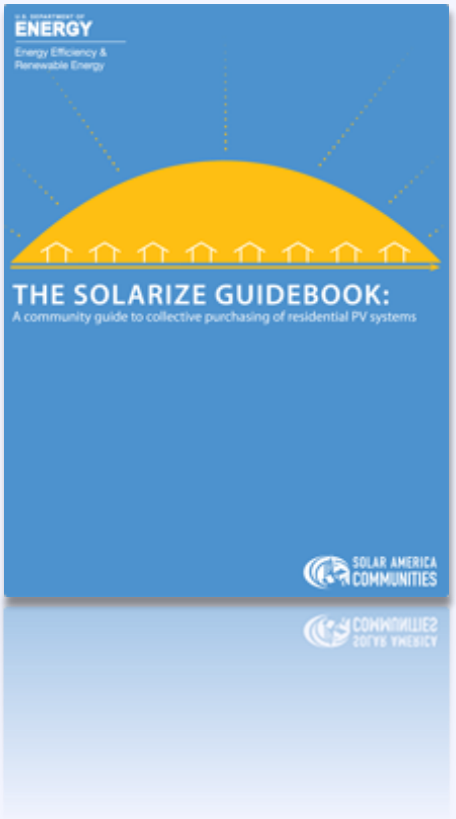
Source: Solarize Plano & Lori Pampell Clark, NCTCOG

Solarize: Resources

Resource **The Solarize Guidebook**

A roadmap for project planners and solar advocates who want to create their own successful Solarize campaigns.

www.nrel.gov



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Activity: Solar in Your Community

1. Understand the federal, state, & utility policy landscape
2. Think about your community's solar goals
3. Recognize local successes and review current local policies/procedures
4. Identify opportunities and barriers to implementation
5. Outline implementation plan

Where to begin?

- Integrate solar in plans
- Address solar in zoning code
- Adopt solar ready guidelines
- Define permitting process
- Expedite typical solar permits
- Implement fair permit fees
- Expand financing options (including loans or PACE)
- Implement solarize program
- Work with utility for on-bill financing or community solar

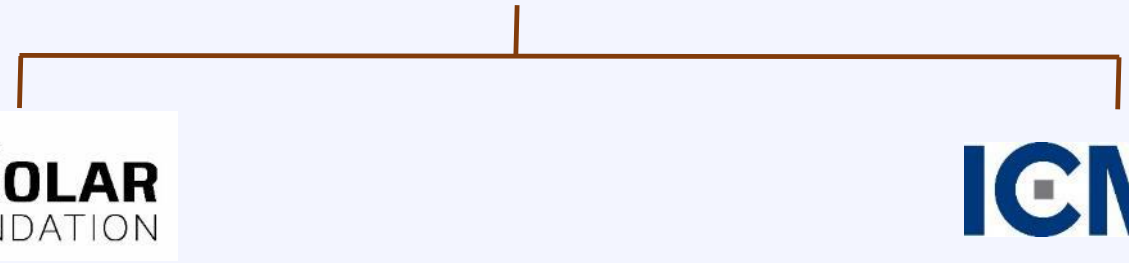
Technical Assistance

- Available to local governments
  - Can request through a non-profit or regional organization (RPC)
  - Previously available through SolarOPs
  - Provided by RSC Teams
  - If not provided by RSC Team, then SolarOPs could help
  - **Now will be available through SolSmart**

The Next Solution

Community recognition program for 300 communities taking steps to reduce soft costs and promote solar locally

SPARC Program Structure



TA Delivery

Designation Program Expertise

TA Pipeline

Solar Outreach Experience

Designation Program Development

- **Tiered designation program** with different levels of achievement
- **Ongoing competitions** to reward success in real-time
- **Annual awards** recognizing outstanding achievement in soft cost, market growth, community engagement, other categories

FINAL CRITERIA AND STRUCTURE AVAILABLE:
SPRING 2016

SolSmart Bronze Designation

60 Points Needed

Public statement of solar goals via commitment letter and tracking of key metrics

Planning and Zoning

1 Pre-requisite

Must achieve 20 points

- Inspection
- Building Codes
- Solar Rights

Permitting

1 Pre-Requisite

Must achieve 20 points

- Utility Engagement
- Community Engagement
- Market Development

Each has 1 pre-requisite and menu of options for additional points

No-Cost Technical Assistance

- Communities pursuing SPARC designation will be **eligible for up to 100 hours (on average) of no-cost technical assistance** from national solar experts.

- Technical assistance will be designed to **help a community achieve the basic requirements for designation**. Depending on demand, some TA may also be available to help more advanced communities achieve higher levels of designation.

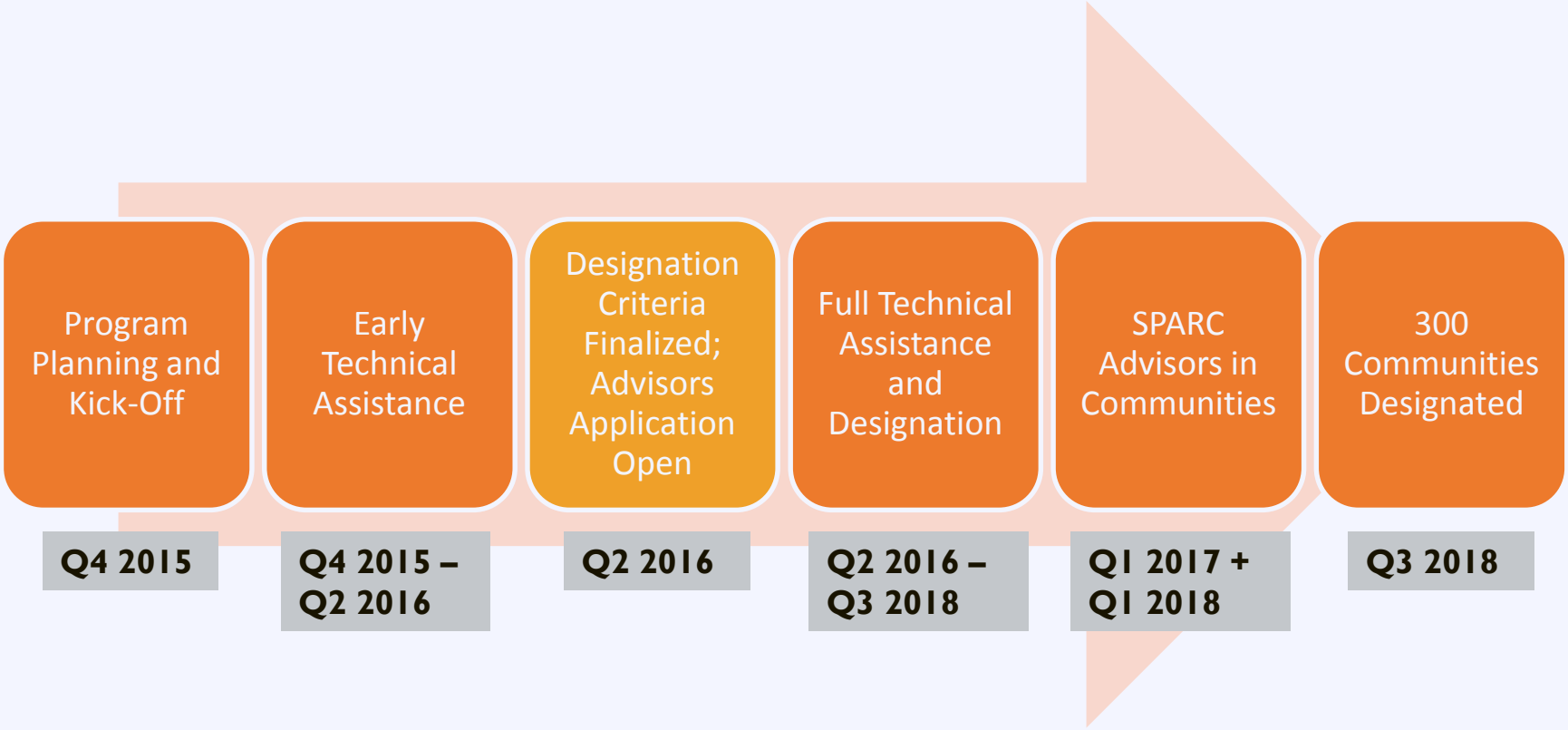
- **Possible topic areas** for TA include: streamlining permitting and inspection processes for solar, planning and zoning for solar, solar financing options, codes and standards, community and utility engagement, market development programs, and others.

SPARC Advisors

- **Funded temporary staff** to help communities achieve designation. Communities must apply to participate in SPARC to host an Advisor.
- Advisors will **evaluate existing local government policies/processes** and **apply industry leading best practices** that will move a community toward designation.
- SPARC Advisors will assist communities through **engagements lasting up to six months.**
- There will be **two opportunities** for a community to be chosen as a SPARC Advisor host, and these will occur through a highly competitive process.

FIRST ROUND OF COMMUNITY SELECTION BEGINS: April 2016

SPARC Timeline



What do municipalities ask for?

- Review solar zoning ordinance, or HOA language – is it solar friendly?
- Review permitting processes
- Help with solarize program
- Review RFP
- Review responses to RFP
- Feasibility analysis for solar PV
- Myth busting

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ICMA
Leaders at the Core of Better Communities

APA
American Planning Association
Making Great Communities Happen

NARC
Building Regional Communities
National Association of Regional Councils

ICLEI
Local Governments for Sustainability USA

IREC
Interstate Renewable Energy Council

MEISTER
CONSULTANTS GROUP

NC CLEAN ENERGY TECHNOLOGY CENTER
Formerly the NC Solar Center

The SOLAR FOUNDATION

SEPA
solar electric power association