Solar Powering Your Community

Addressing Soft Costs and Barriers

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U.S. Department of Energy

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.

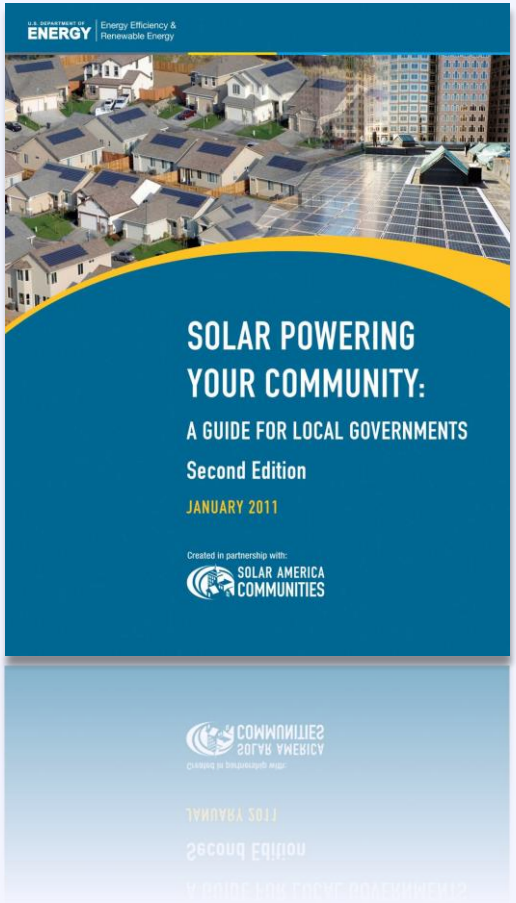
SunShot Solar Outreach Partnership: 2013-16

- 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

Solar Development in the US

As of 2014, the US solar industry installed

645,000 solar installations

of which

93% were residential projects

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U.S. Department of Energy

Source: SEIA 2014 Year In Review Report

Agenda

10:15 – 10:40	Putting Solar Energy on the Local Policy Agenda
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Solar Technologies

Solar Photovoltaic (PV)

Solar Hot Water

Concentrated Solar Power

Solar Technologies

Solar Photovoltaic (PV)

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Concentrated Solar Power

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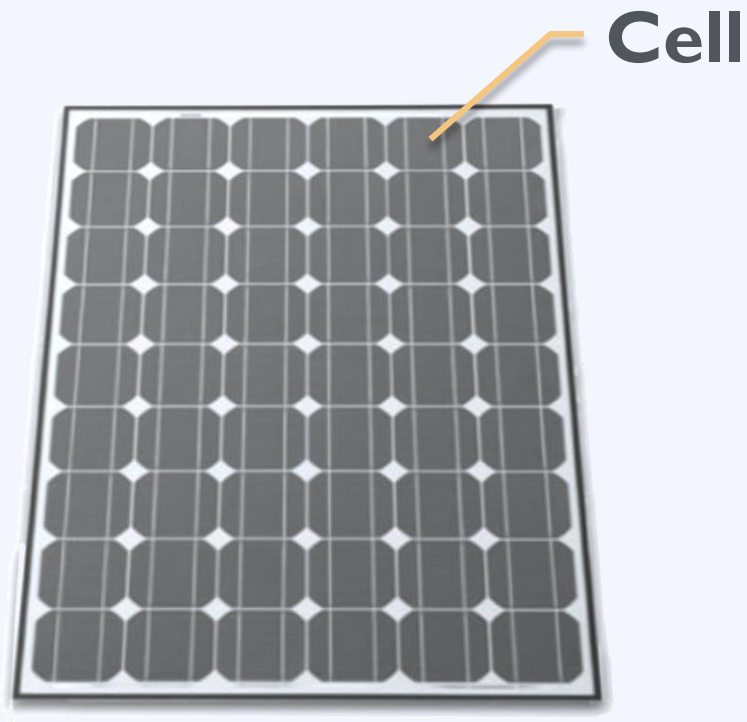
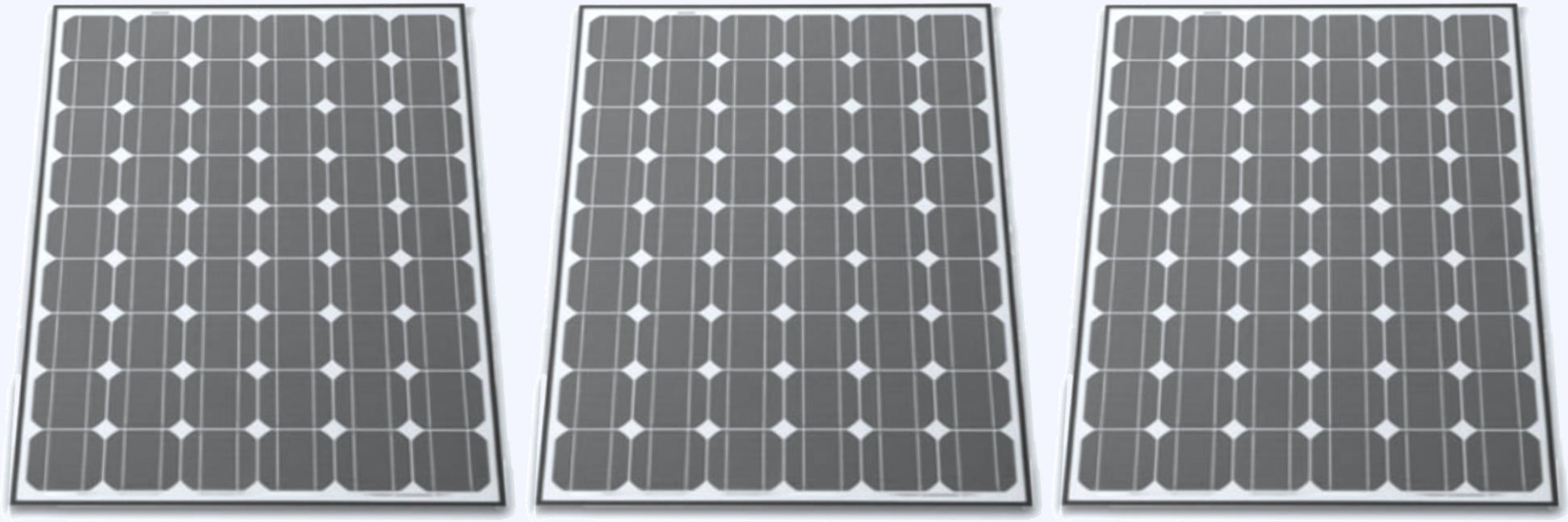
Some Basic Terminology



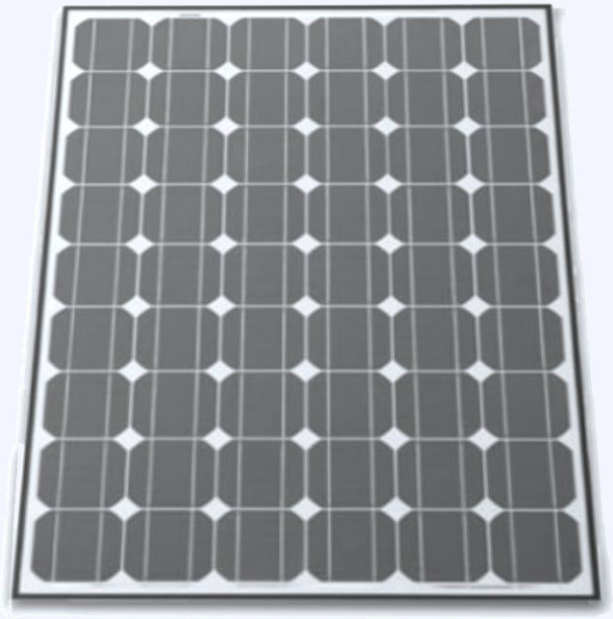
Panel / Module

Some Basic Terminology



Array

Some Basic Terminology



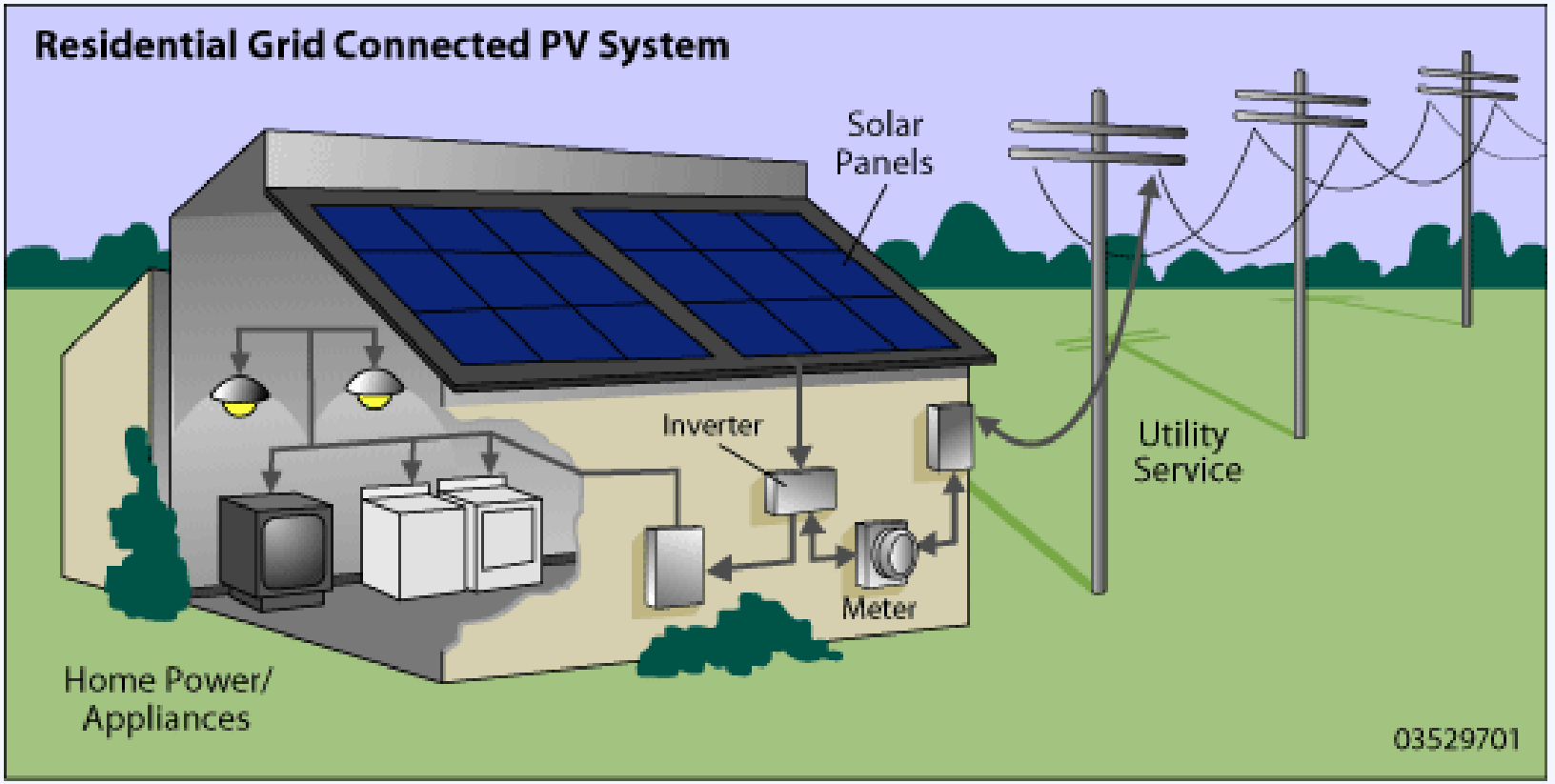
Capacity / Power

kilowatt (kW)

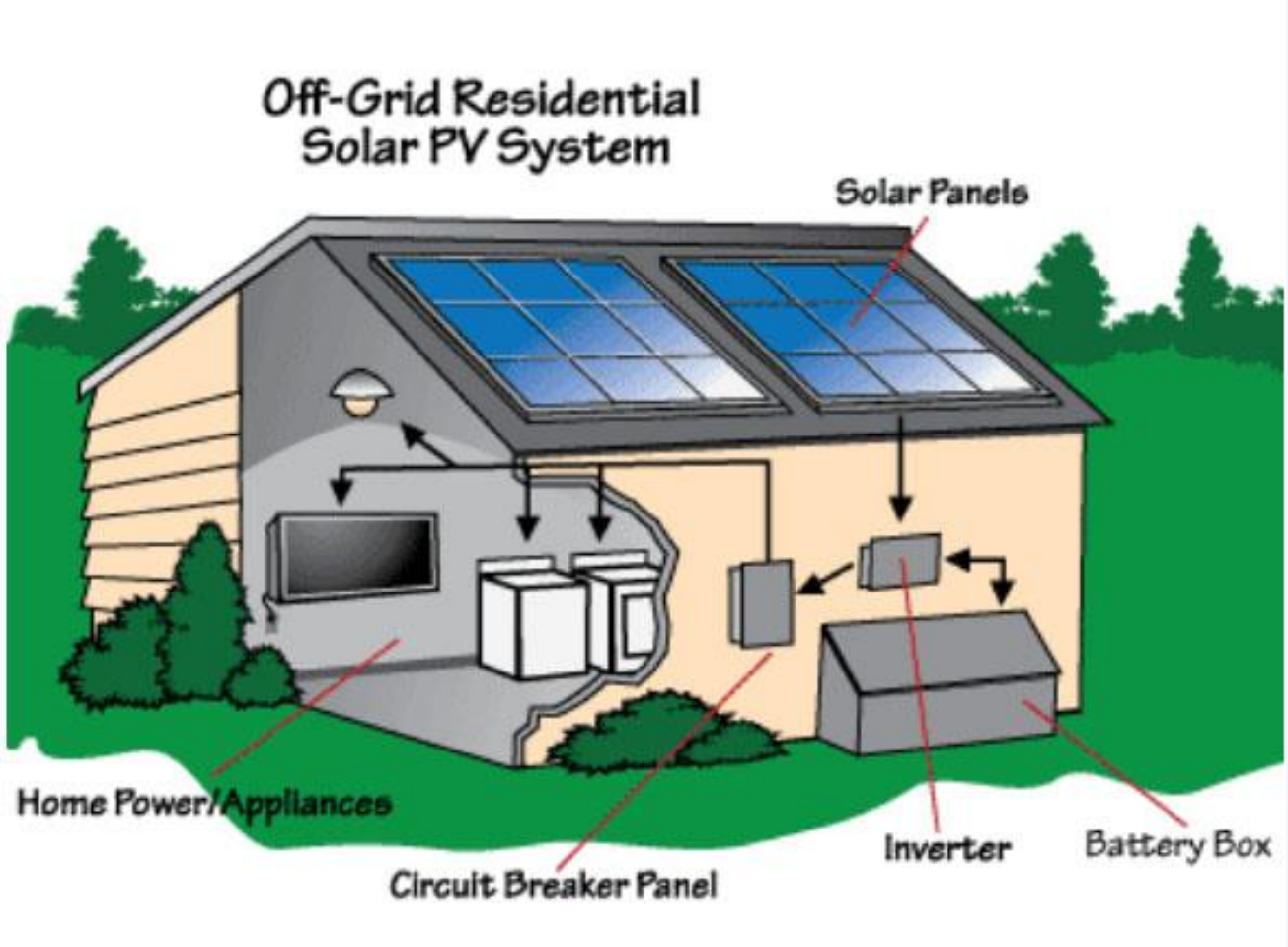
Production

Kilowatt-hour (kWh)

System Components



System Components – Off-Grid



Some Basic Terminology

Residence
5 kW

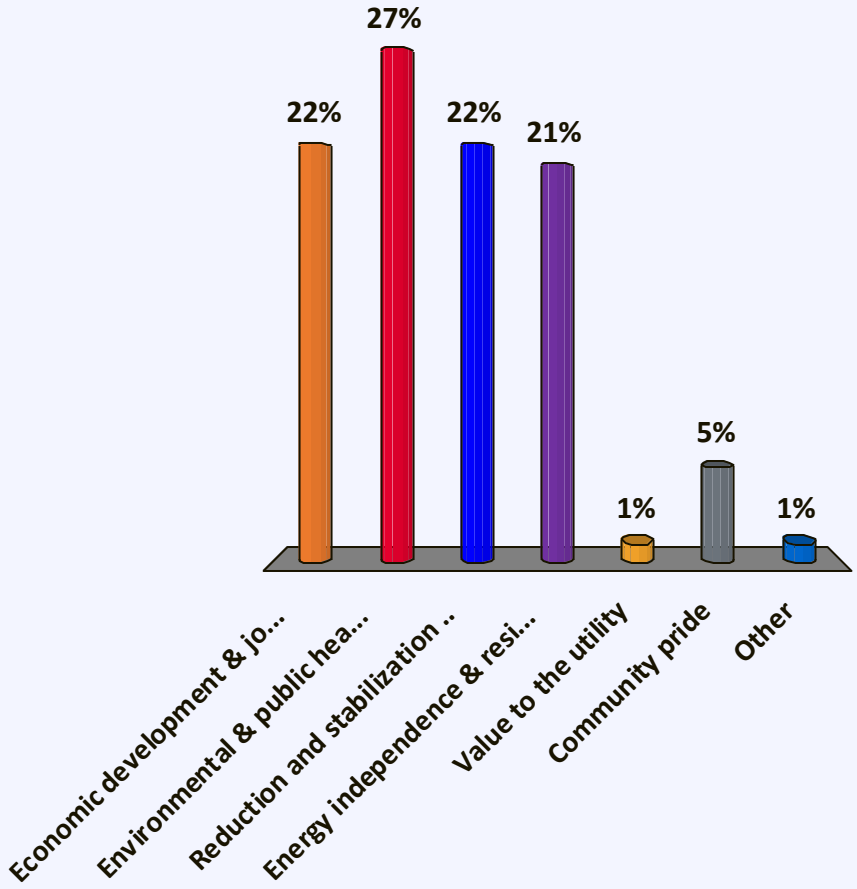
Factory
1 MW+

Office
50 – 500 kW

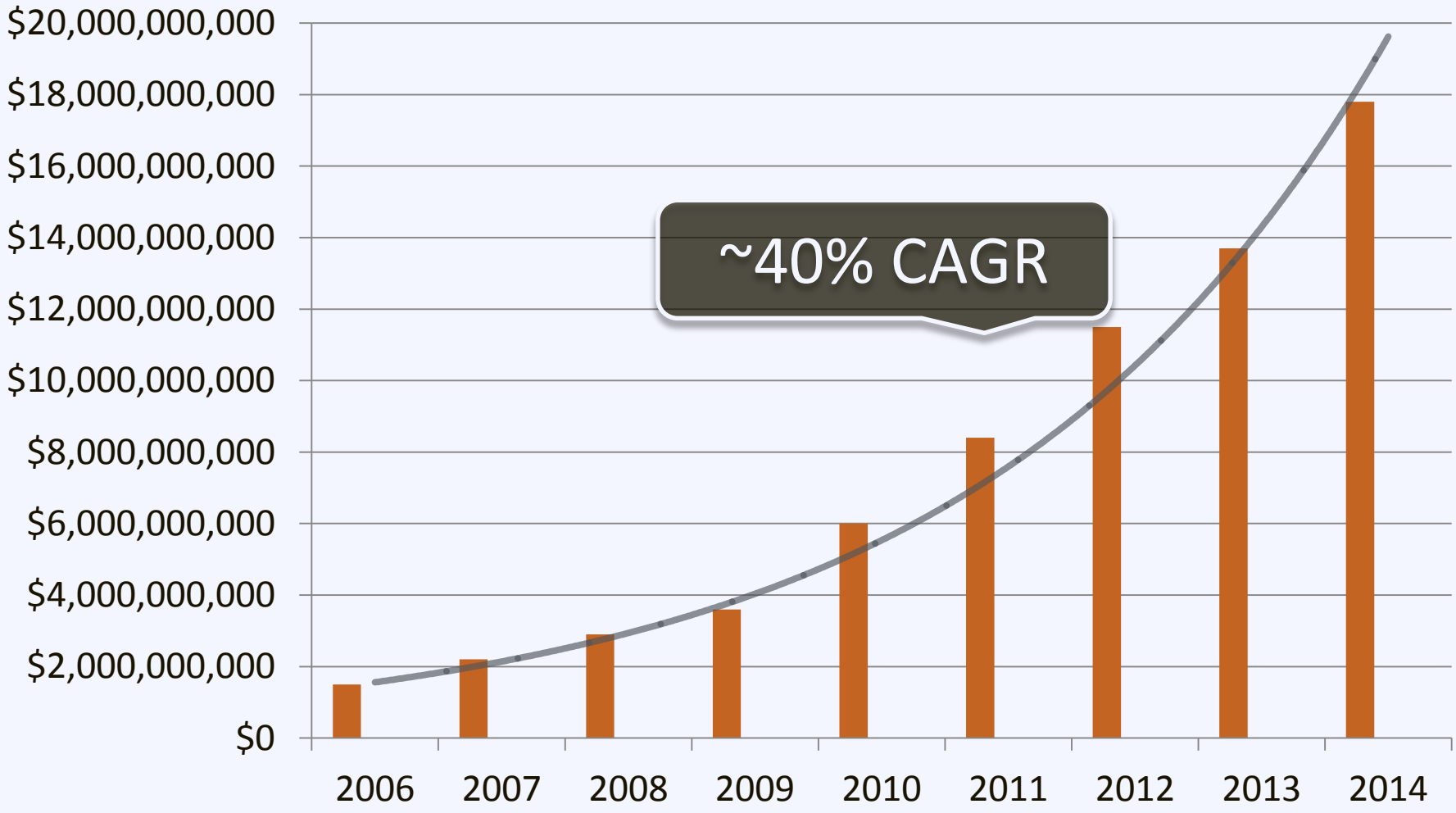
Utility
2 MW+

What are the top 3 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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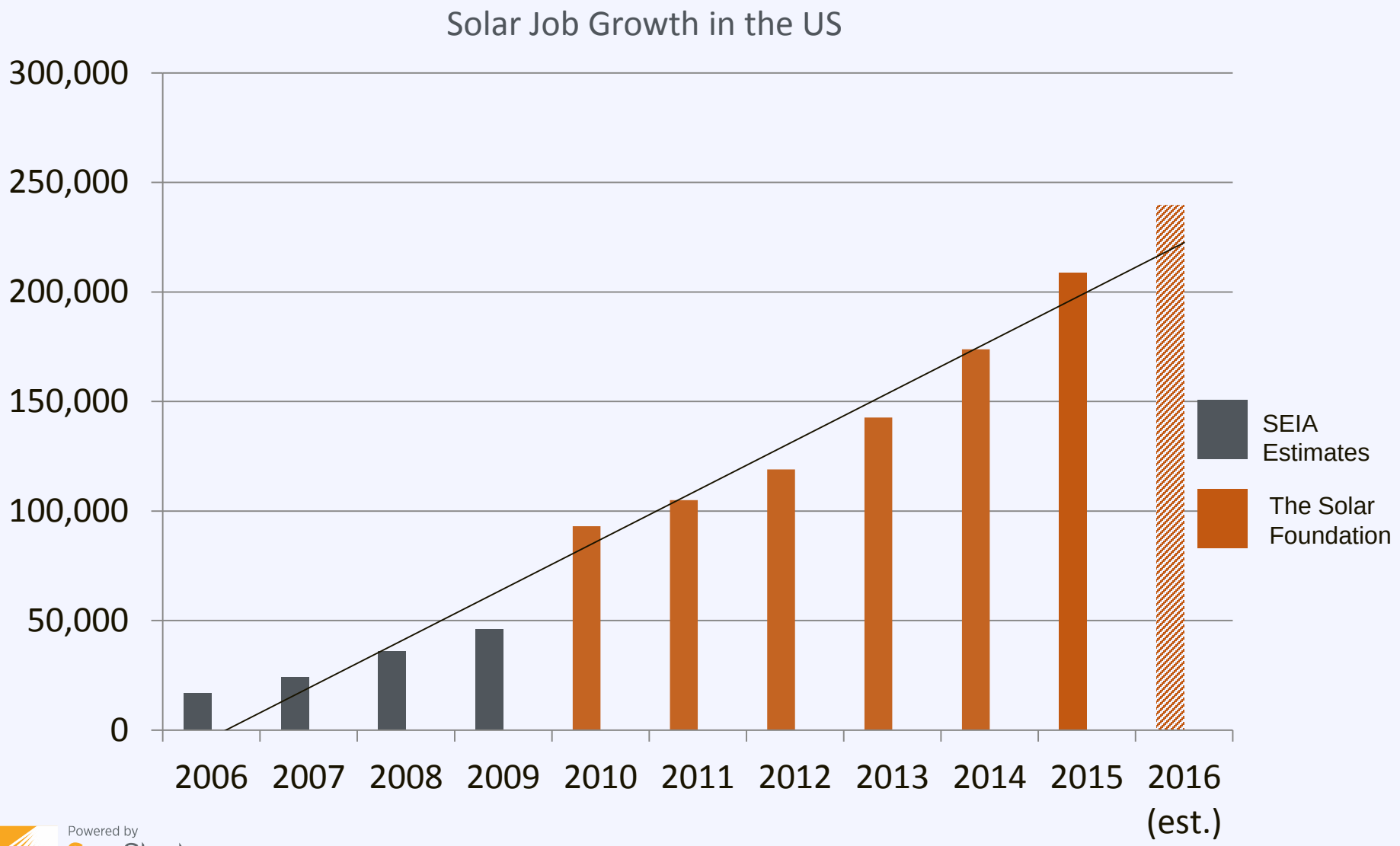
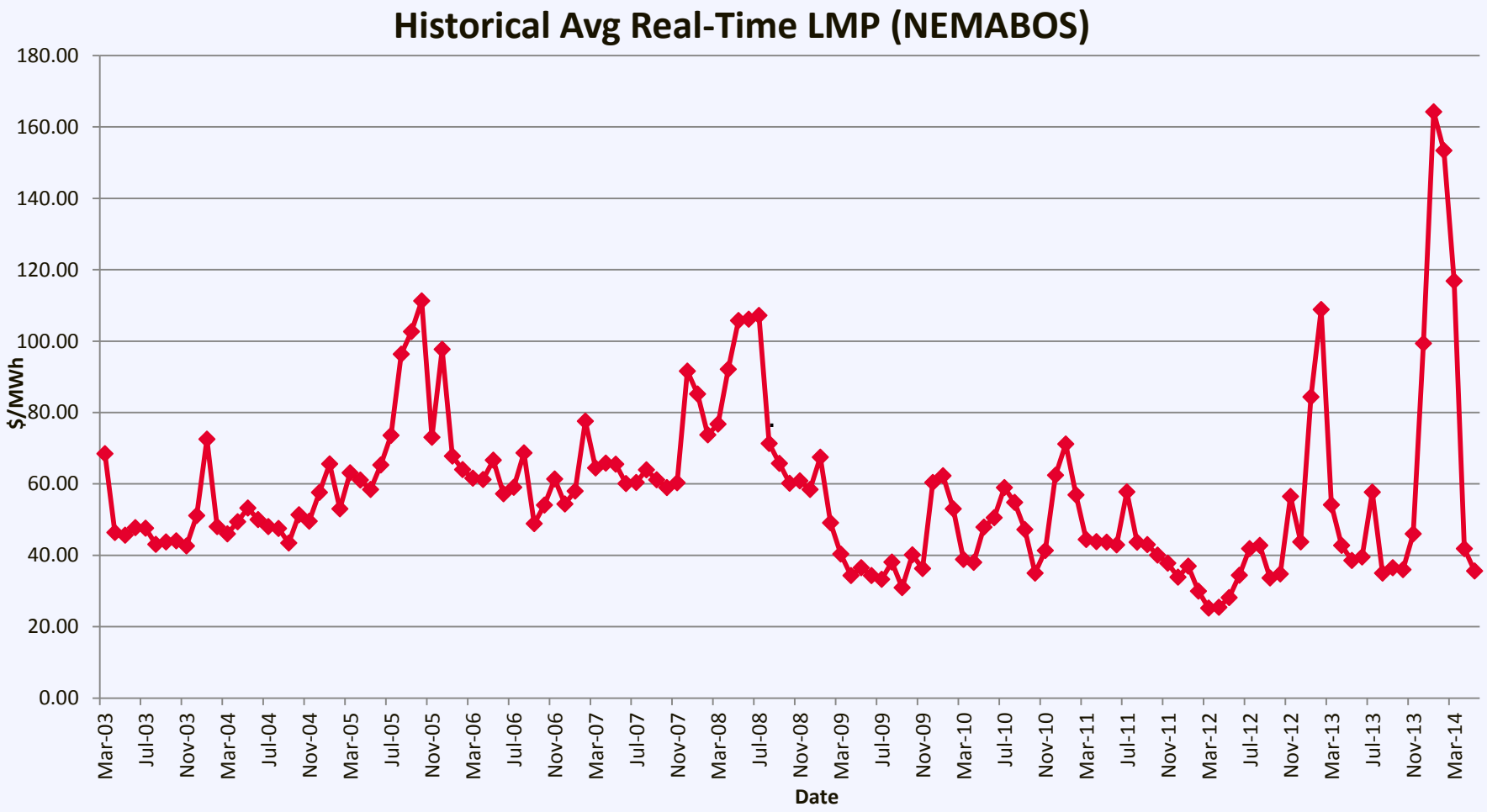
Source: SEIA/GTM Research – 2009/2010/2011/2012 Year in Review Report
http://www.seia.org/research-resources/us-solar-market-insight

Benefits: Solar Job Growth



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

Benefit: Stabilize Energy Prices



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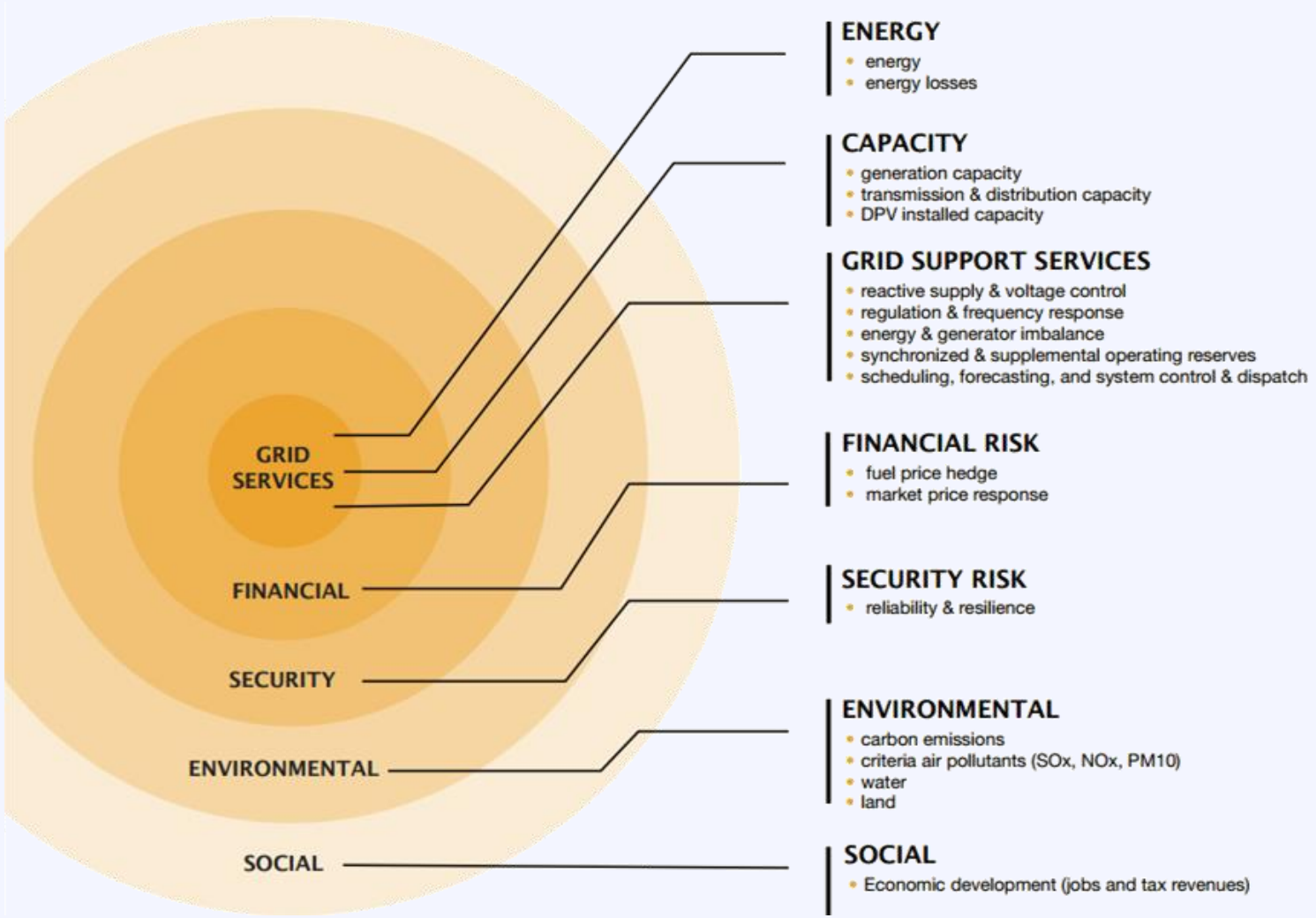
Source: NEPOOL

Valuable to Community & Utilities



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

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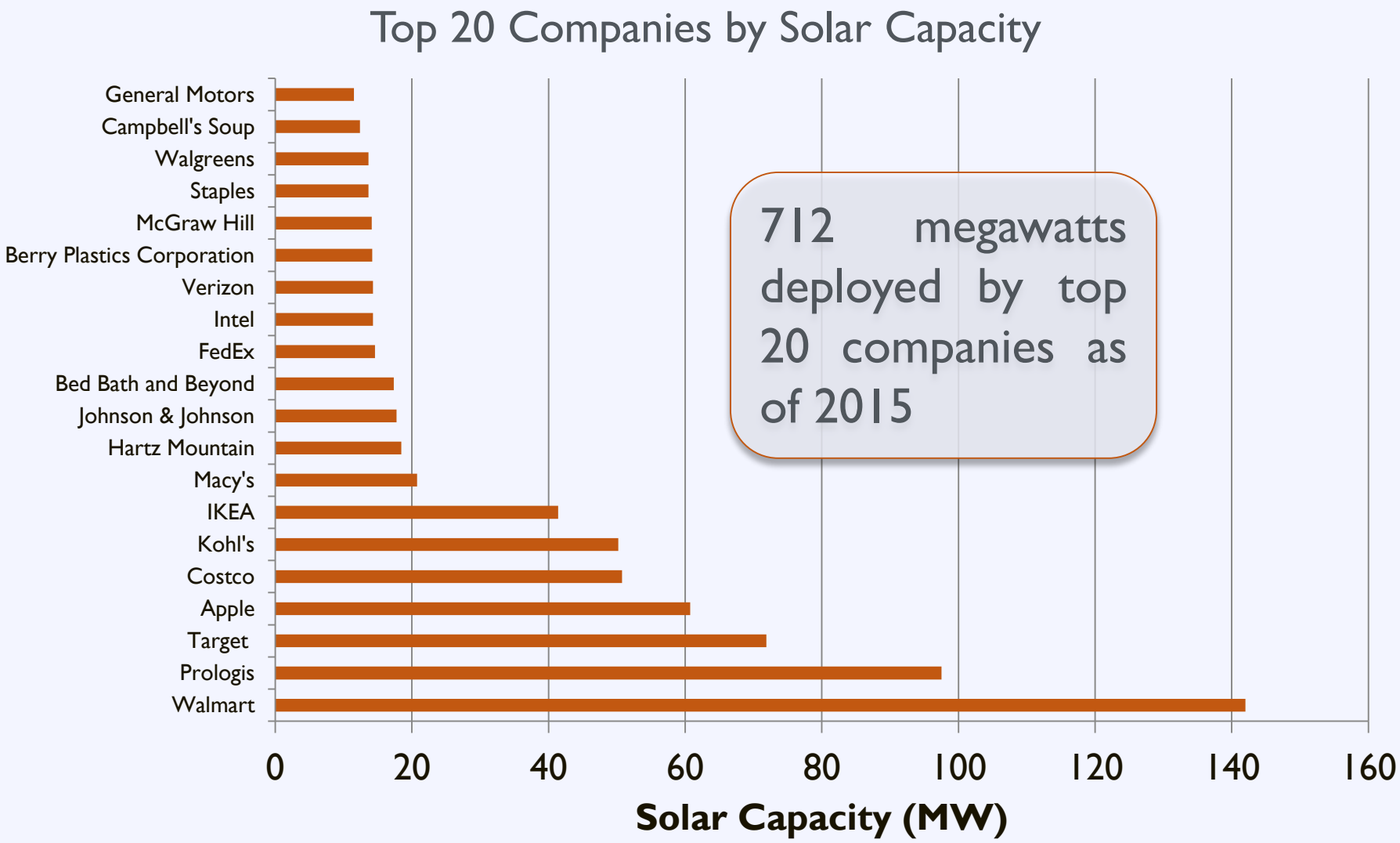
Source: LBNL, *Selling Into the Sun* (2015), non-California homes

Smart Investment for Businesses



Source: SEIA Solar Means Business 2015

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U.S. Department of Energy

Smart Investment for Governments

Source: Borrego Solar

Smart Investment for Schools

Current:

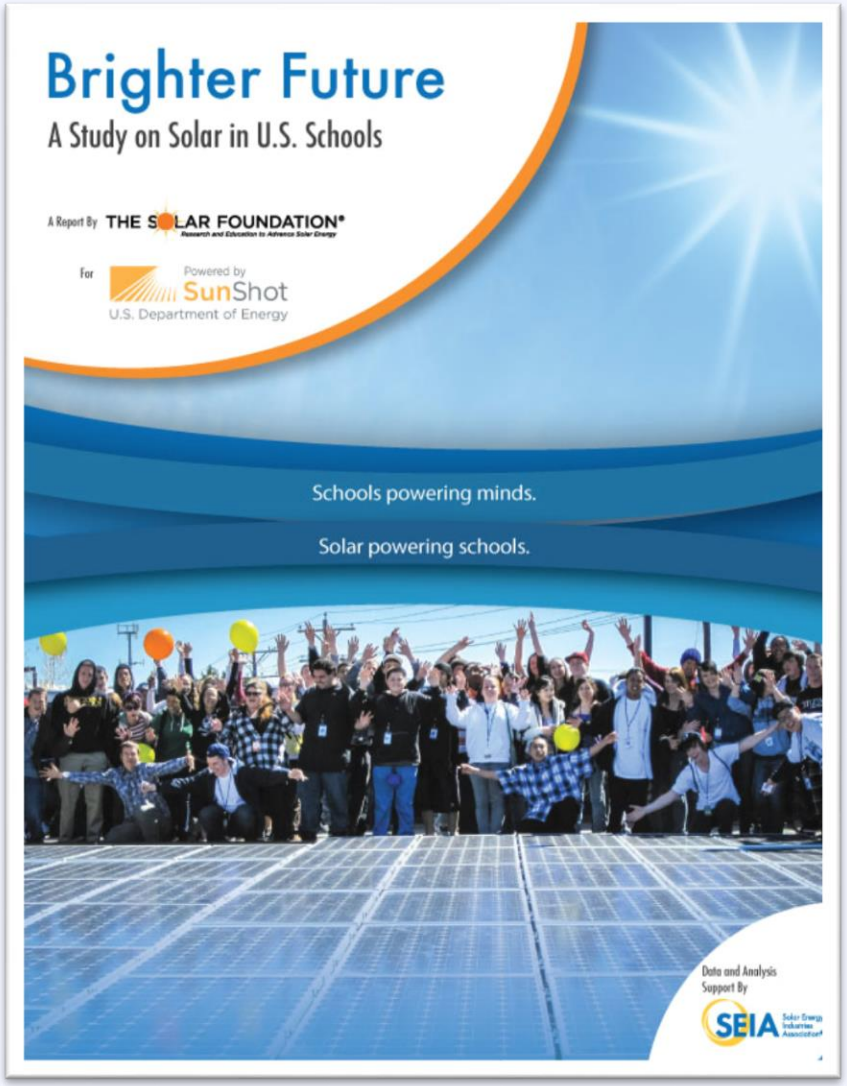
× 3,752

$ = $77.8m

Potential:

× 40,000 – 72,000

$ = $800m



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

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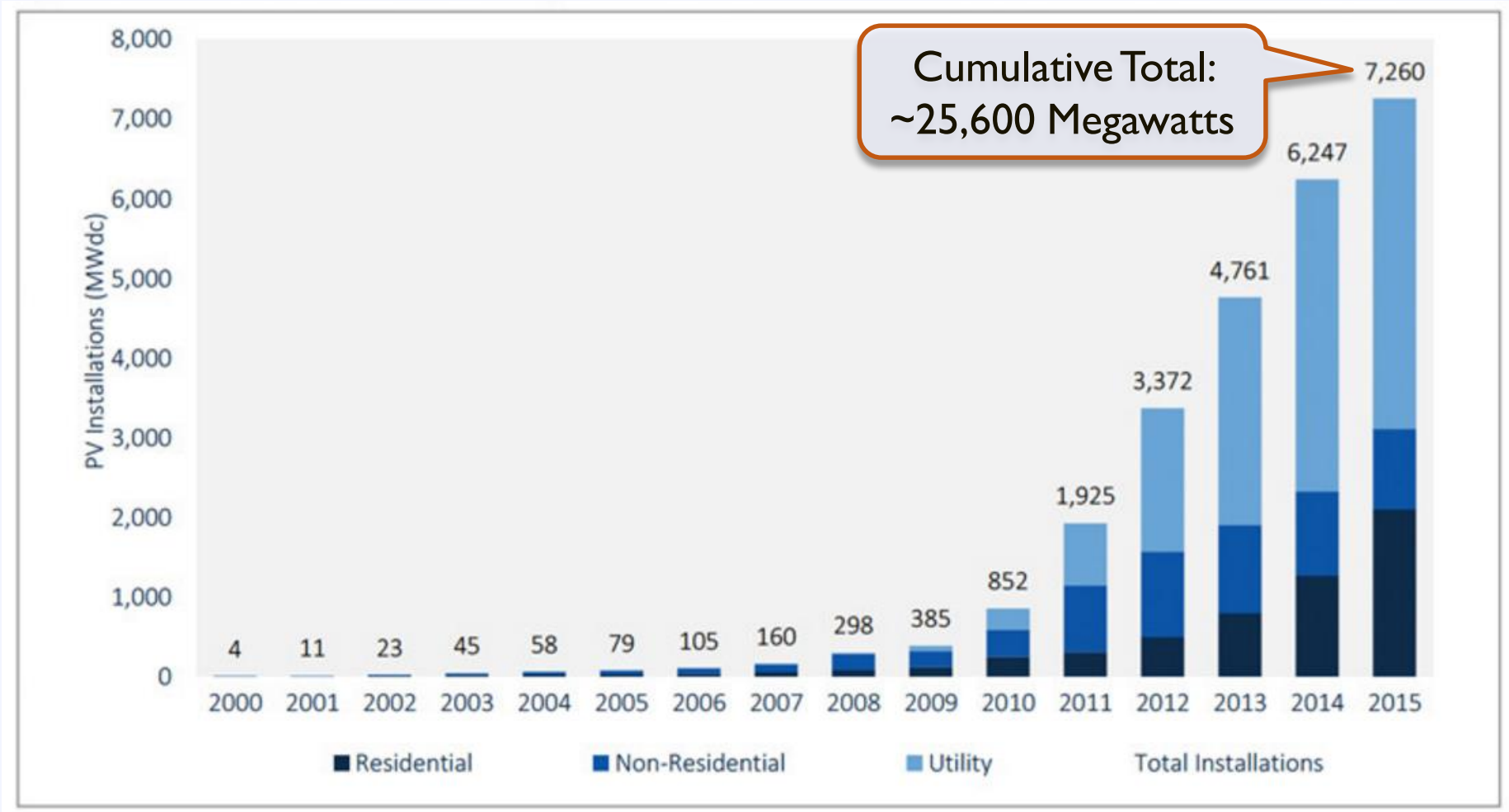
US Solar Market



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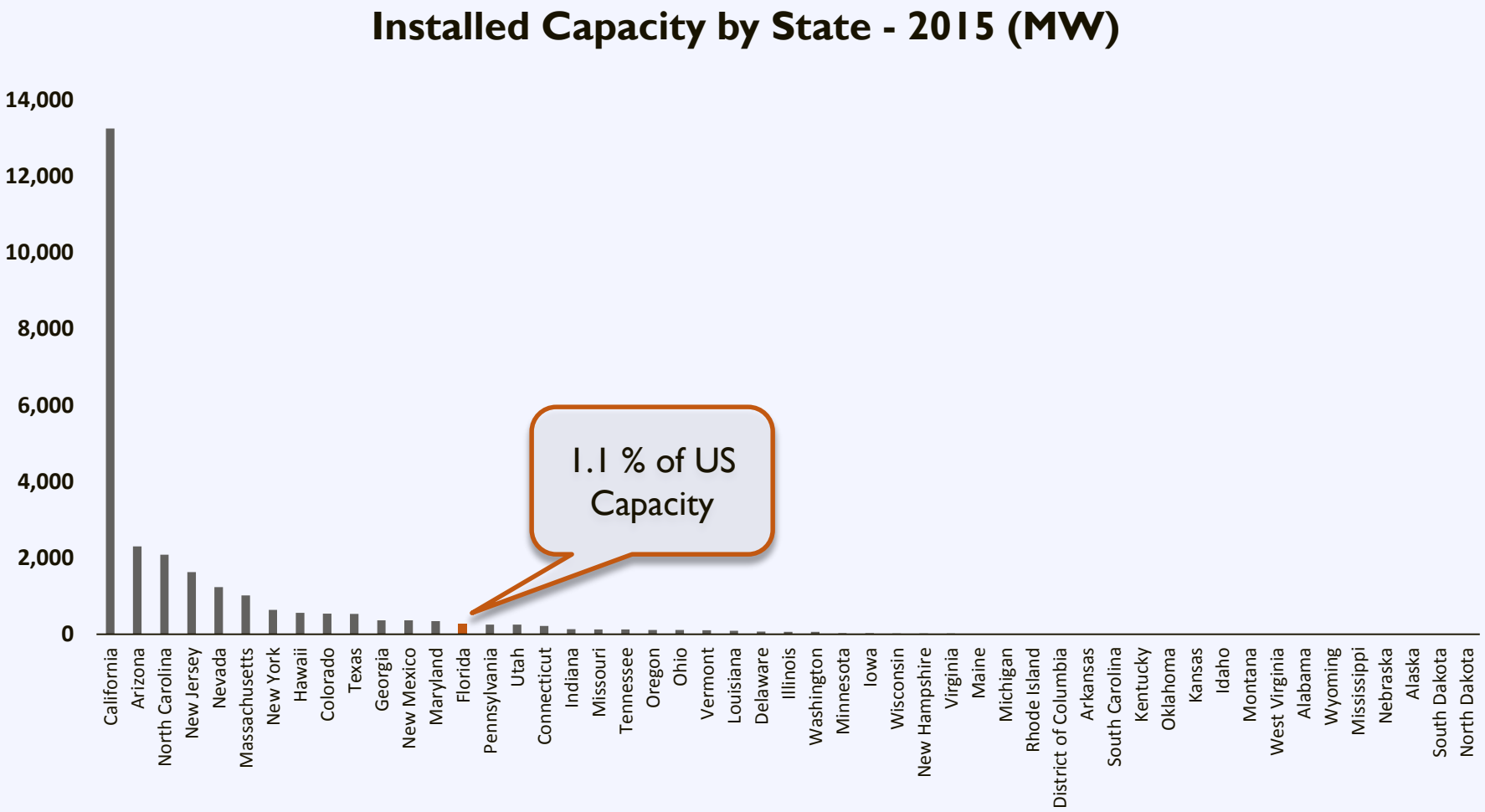
Source: SEIA/GTM Research, U.S. *Solar Market Insight: 2015 Year-in-Review*

US Solar Market



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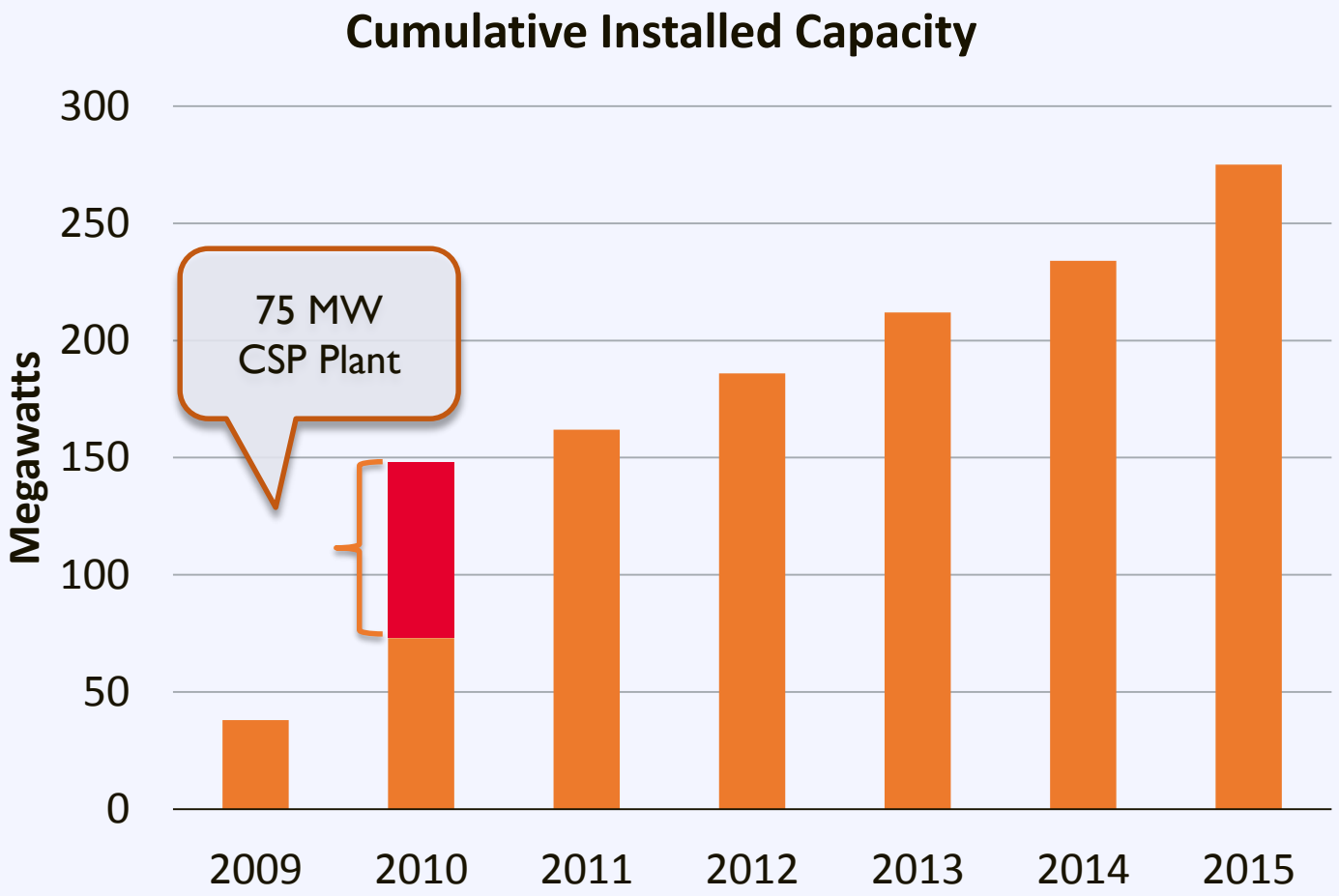
Source: IREC, Solar Market Trends 2013

Florida Solar Market



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

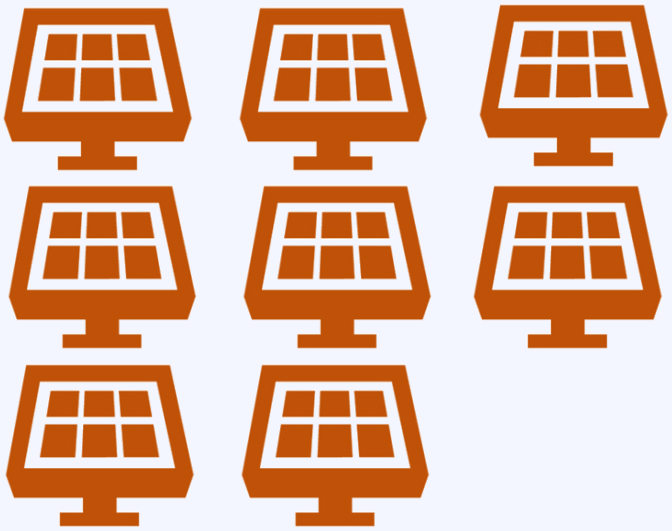
Florida Solar Market

Florida

14

watts per person

US



80

watts per person

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

Solar Jobs in Florida

In 2015, Florida had

6,560 solar jobs

78% of solar employers reported some difficulty in hiring qualified candidates

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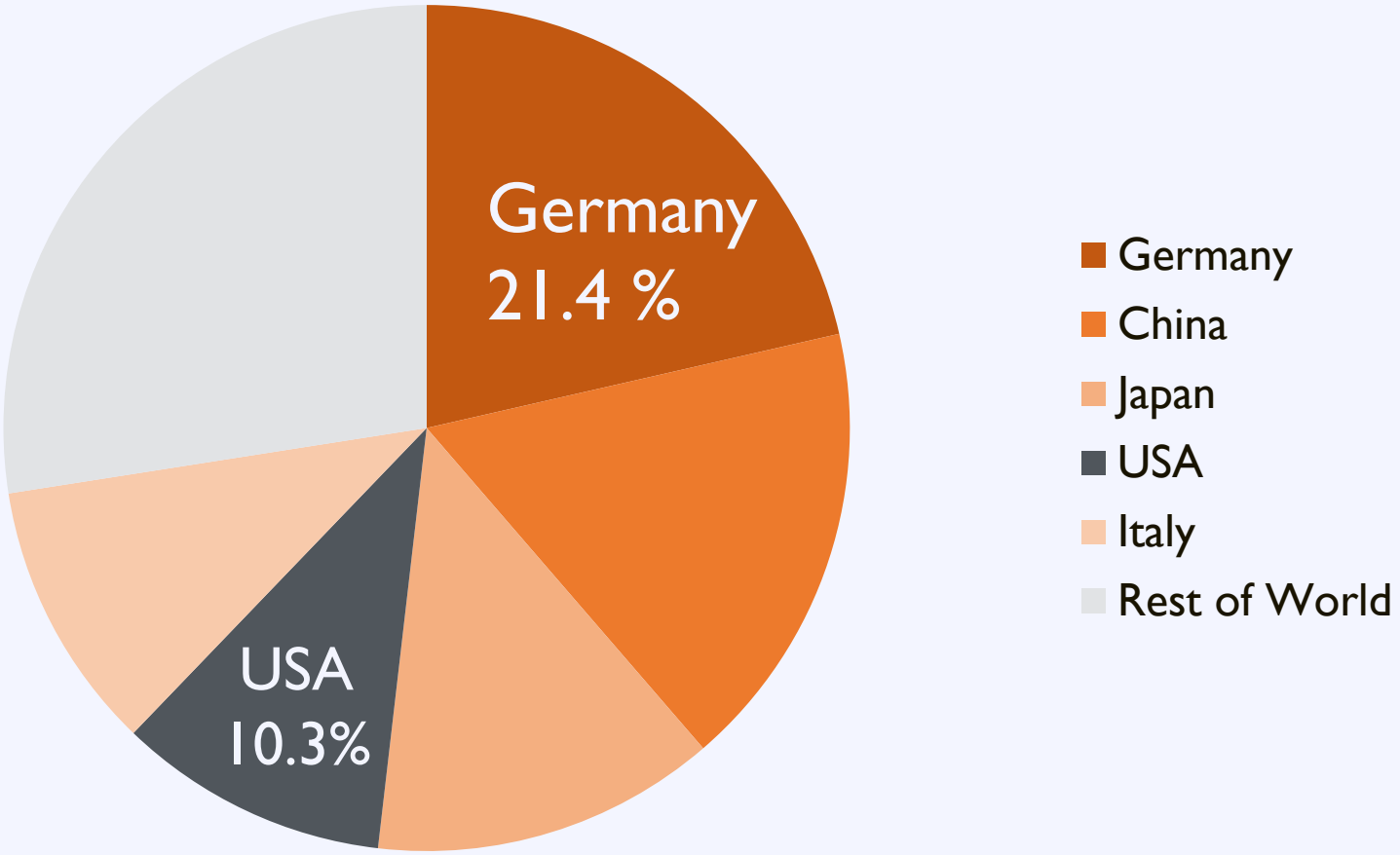
The Solar Foundation – National Solar Jobs Census (2015) and Florida Solar Jobs Census (2015)

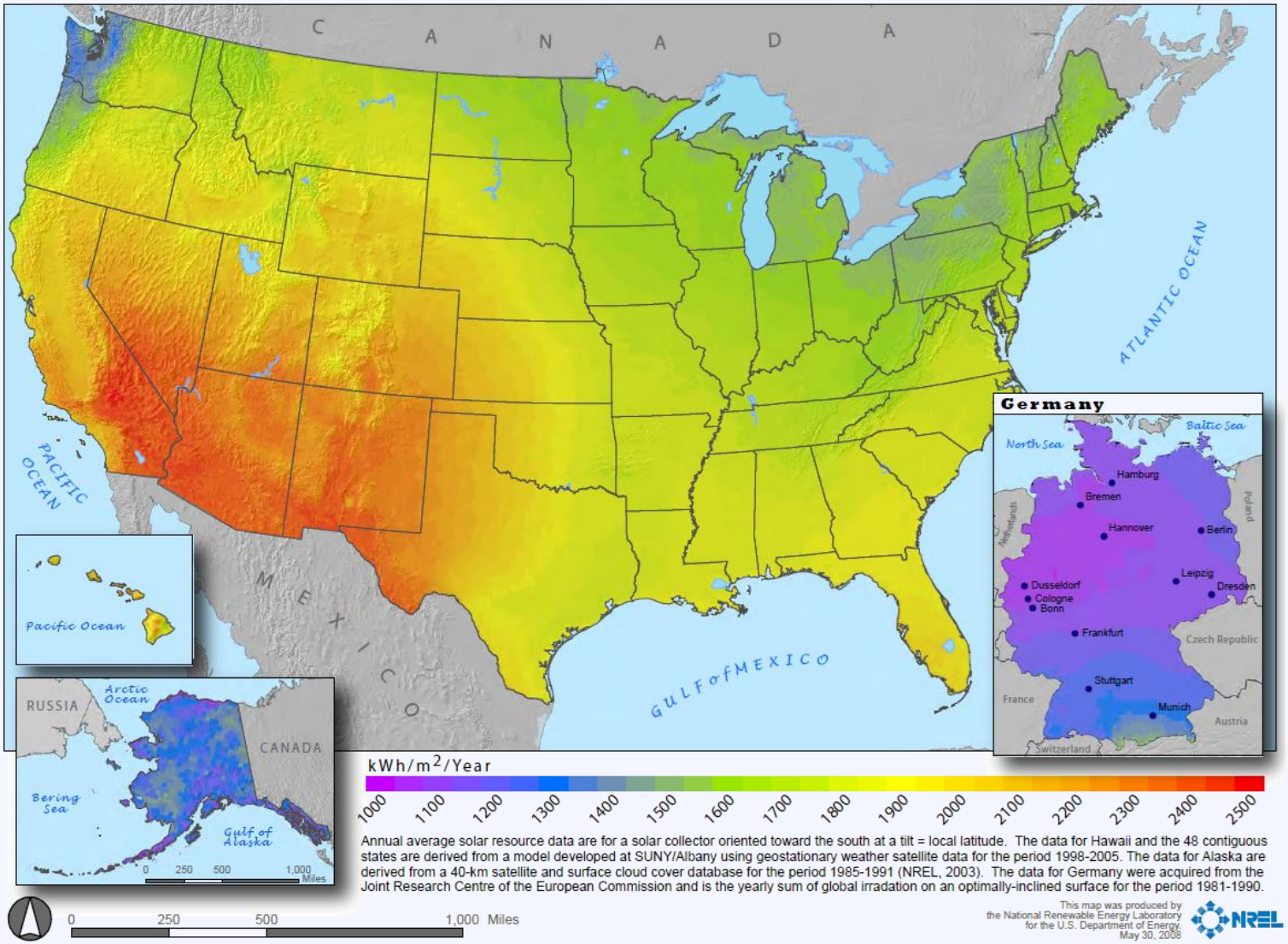
World Solar Market

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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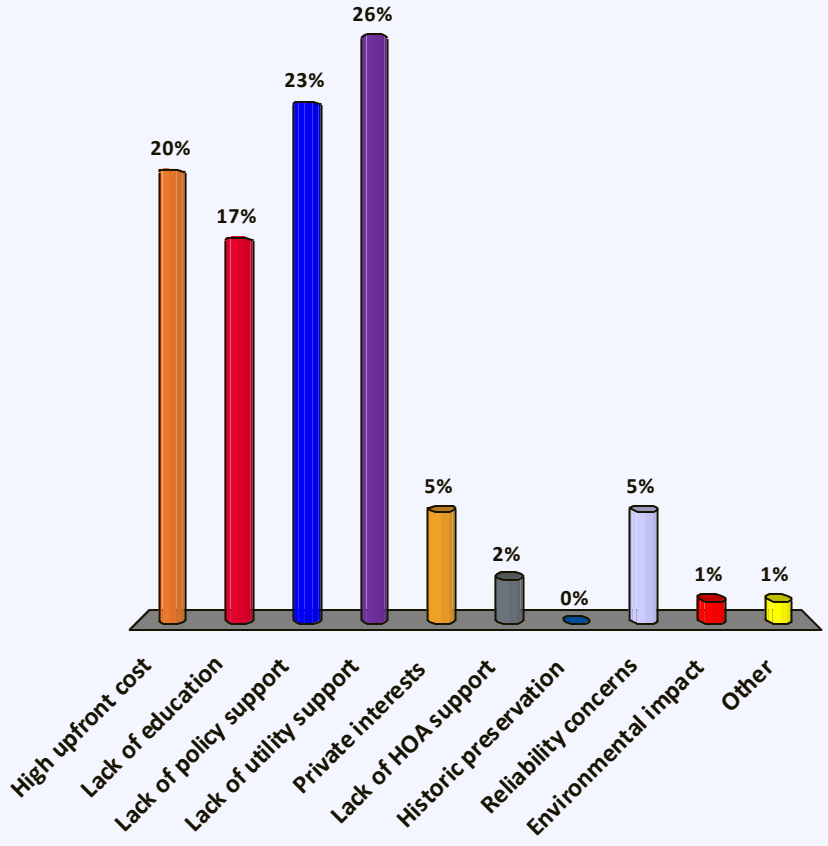
U.S. Department of Energy

Source: National Renewable Energy Laboratory

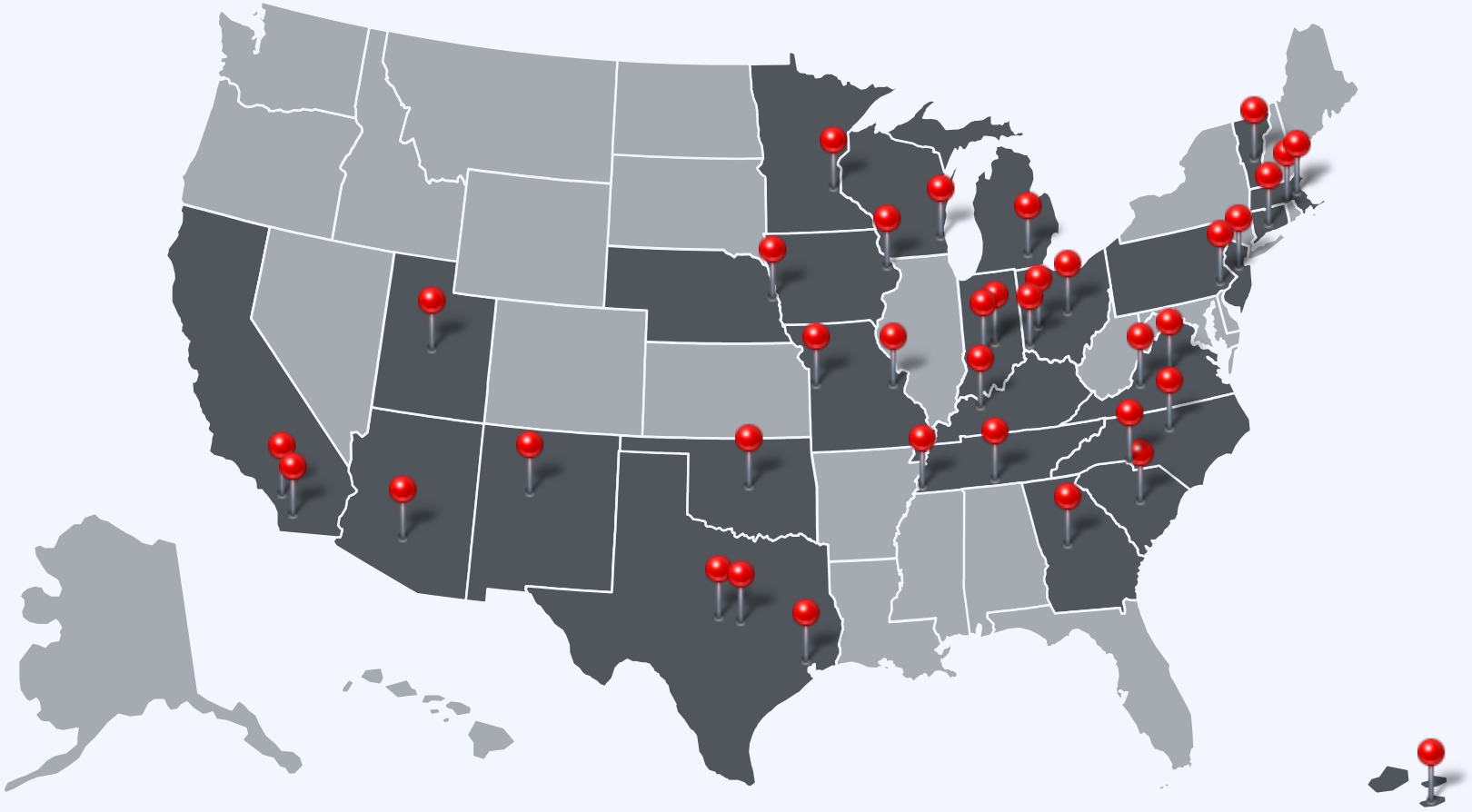
What are the top 3 barriers to solar adoption in your community?

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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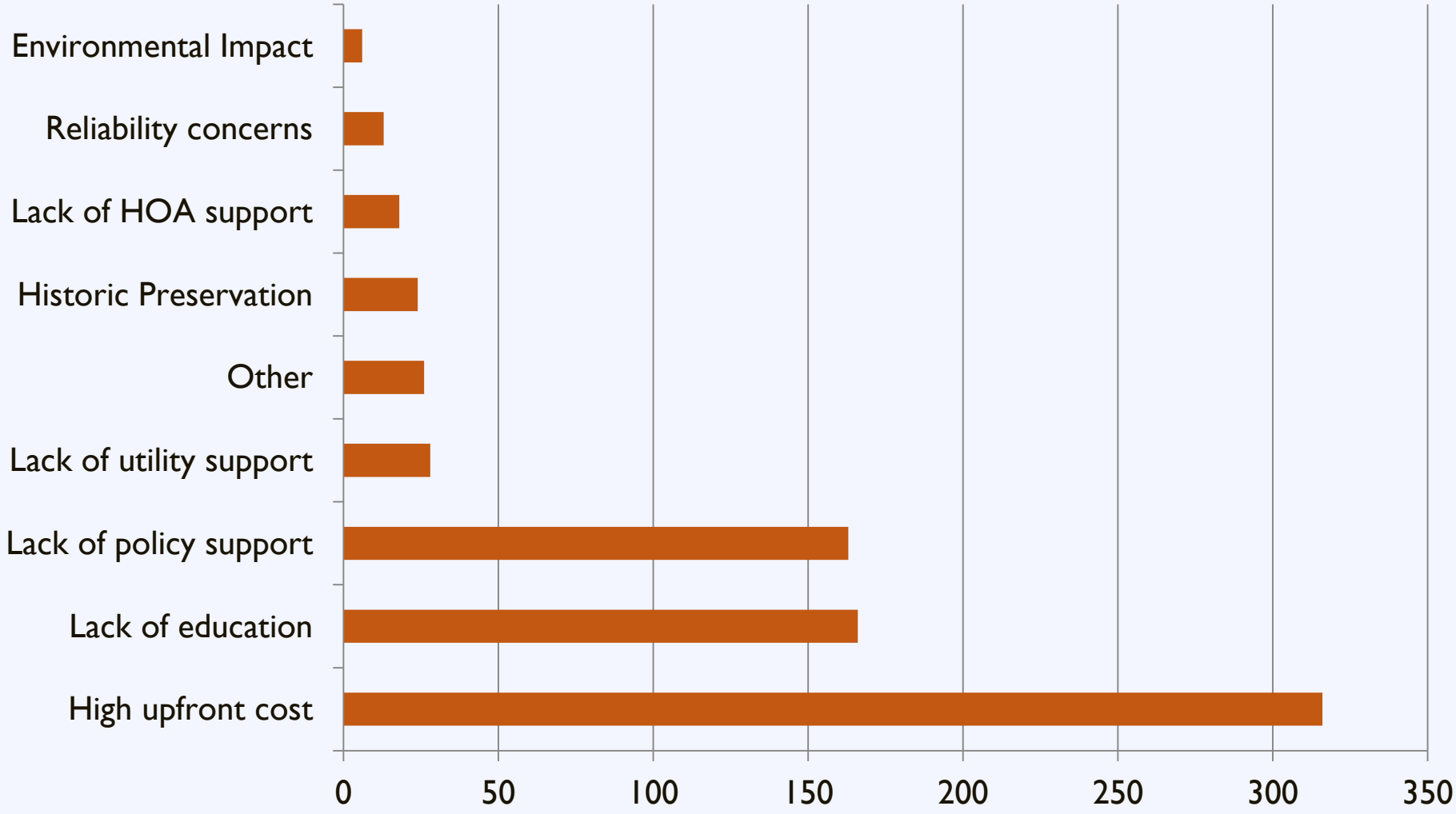
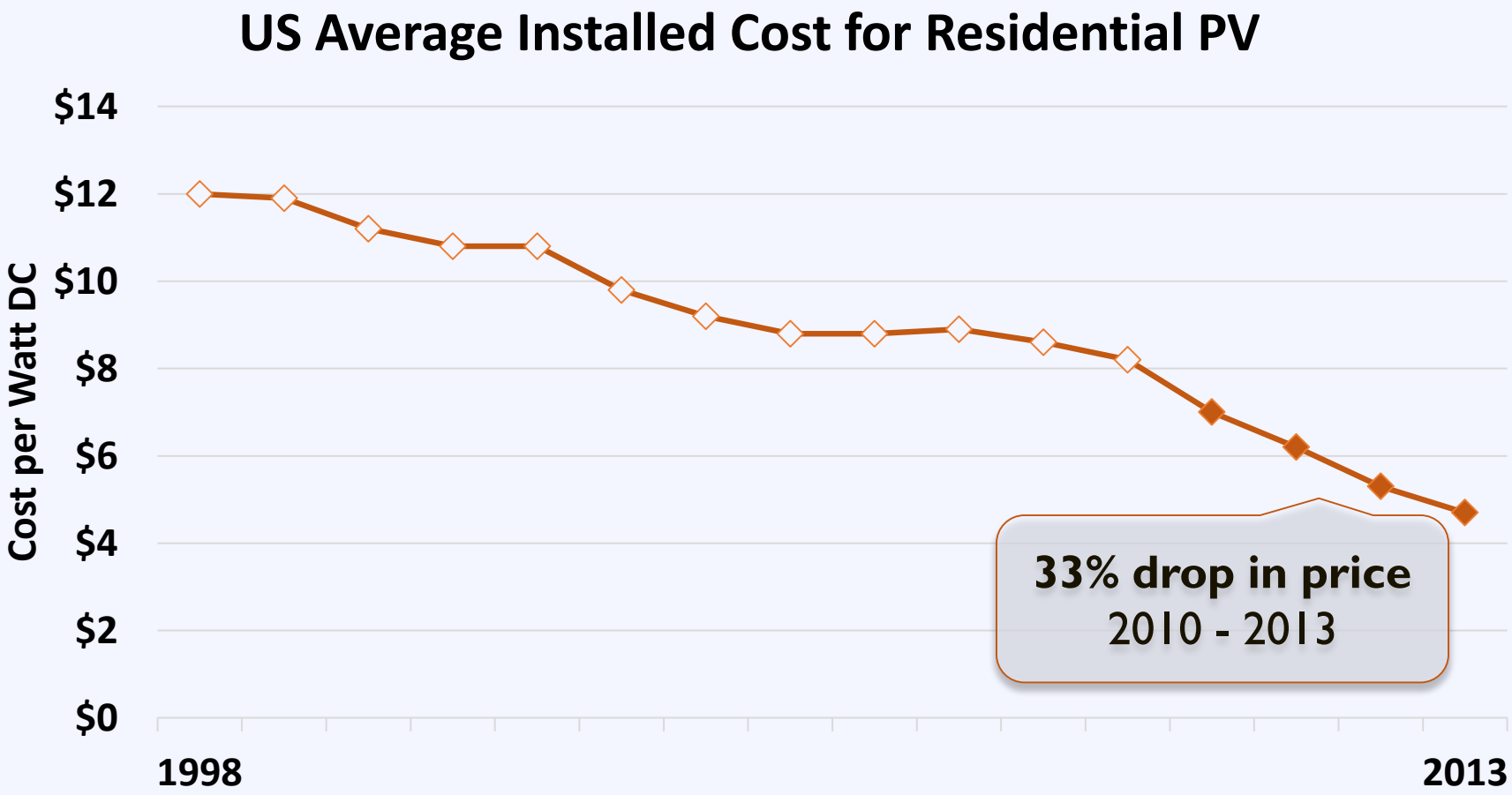
Activity: Addressing Barriers



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

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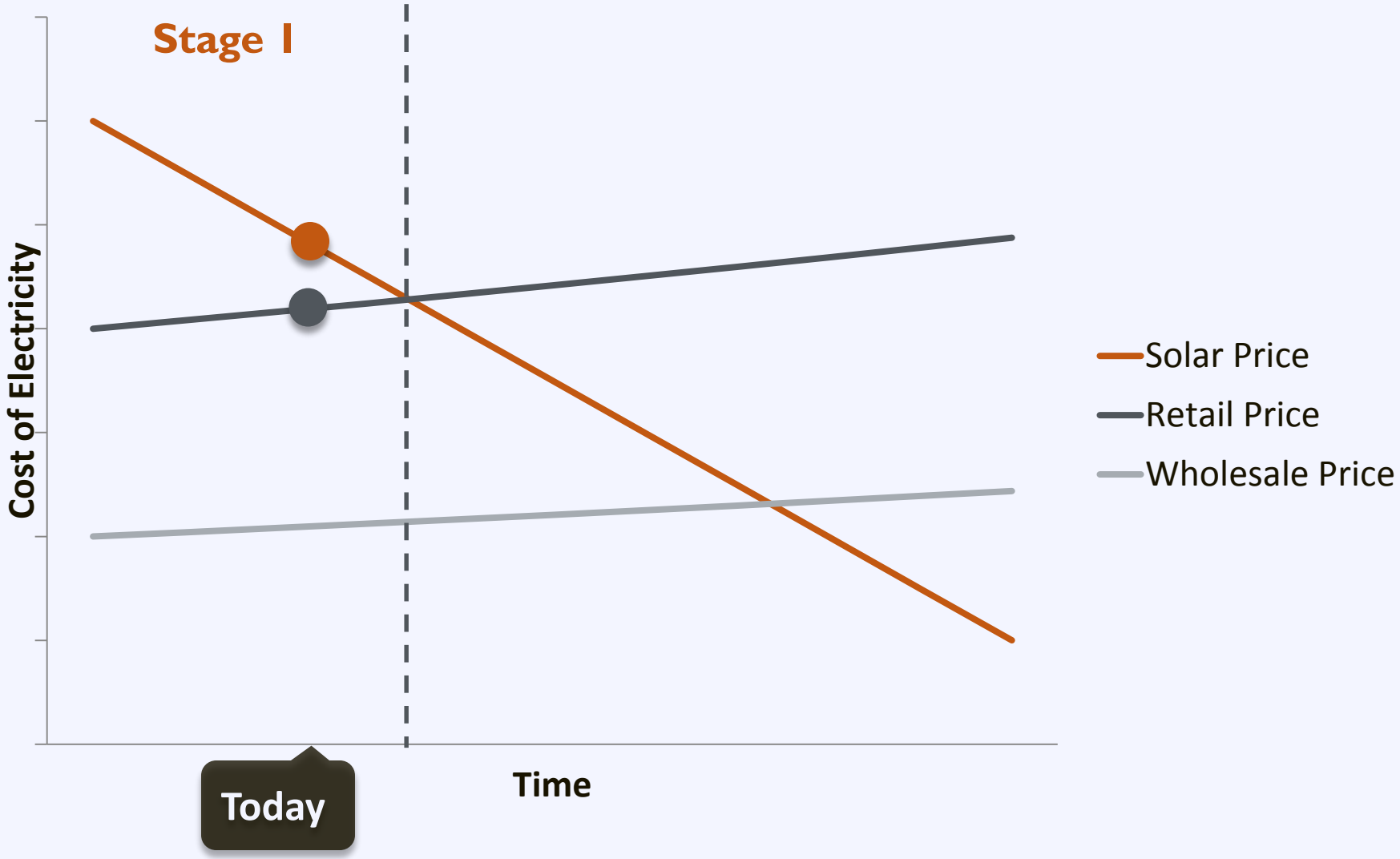

Source: Solar Electric Power Association

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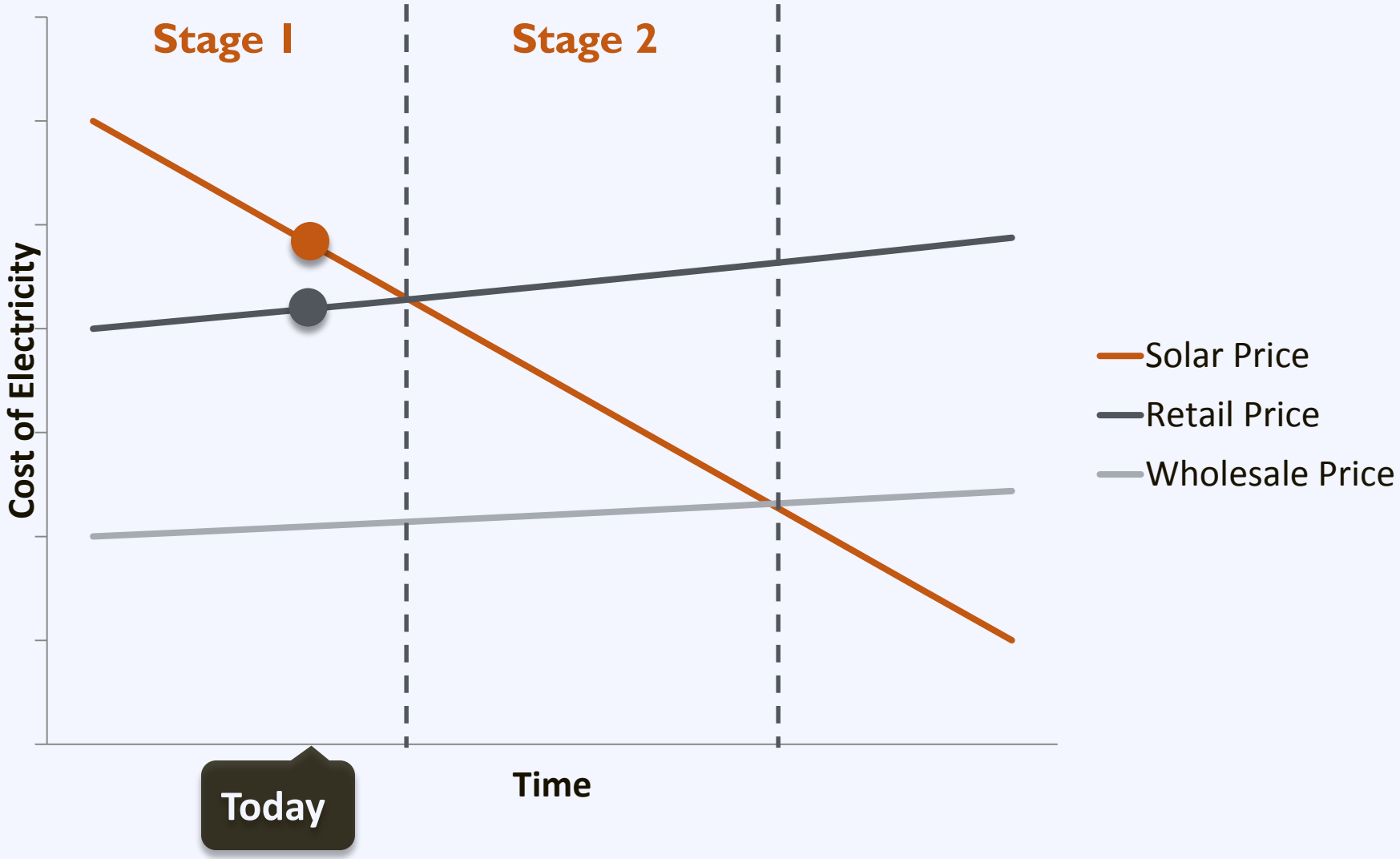

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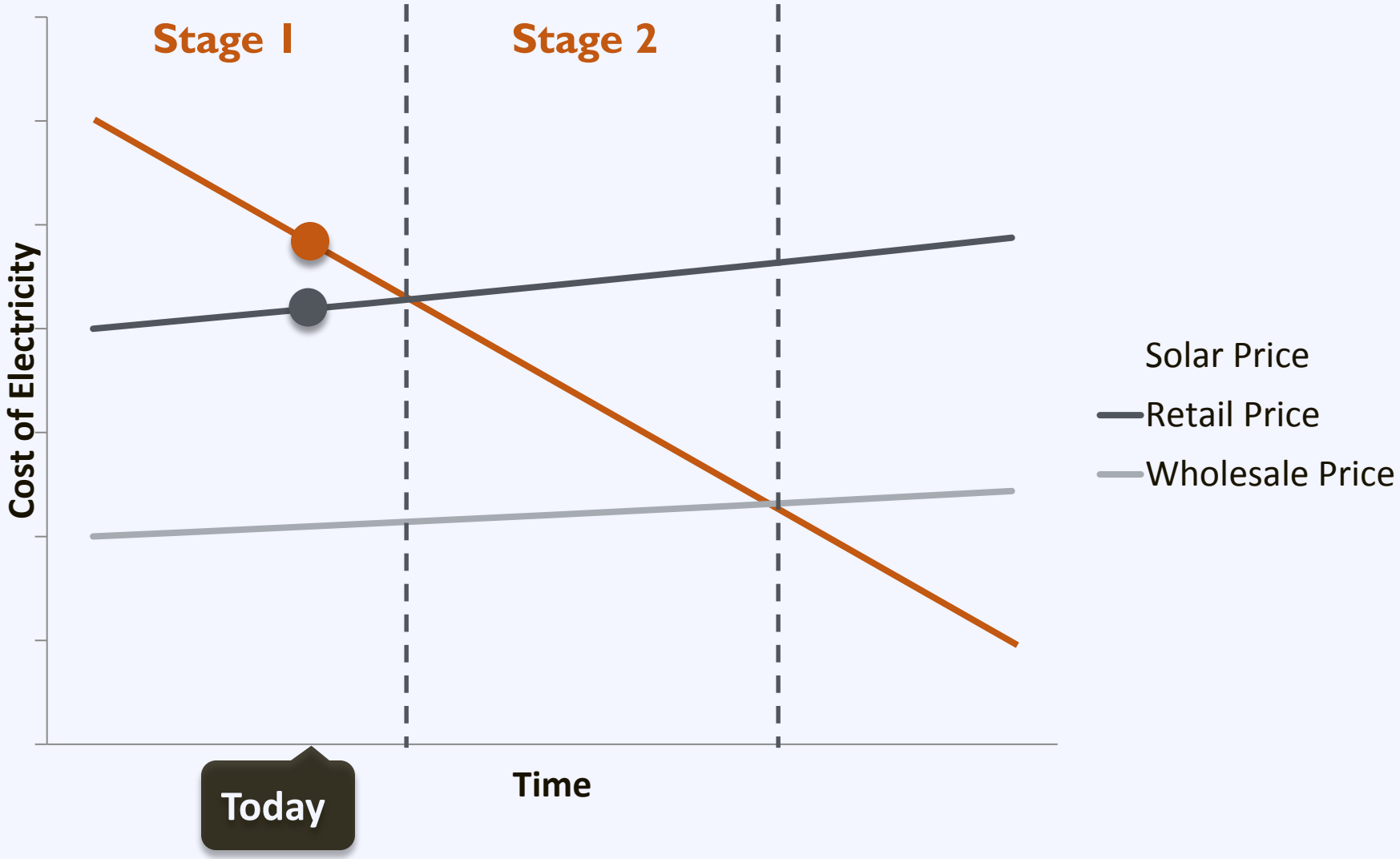
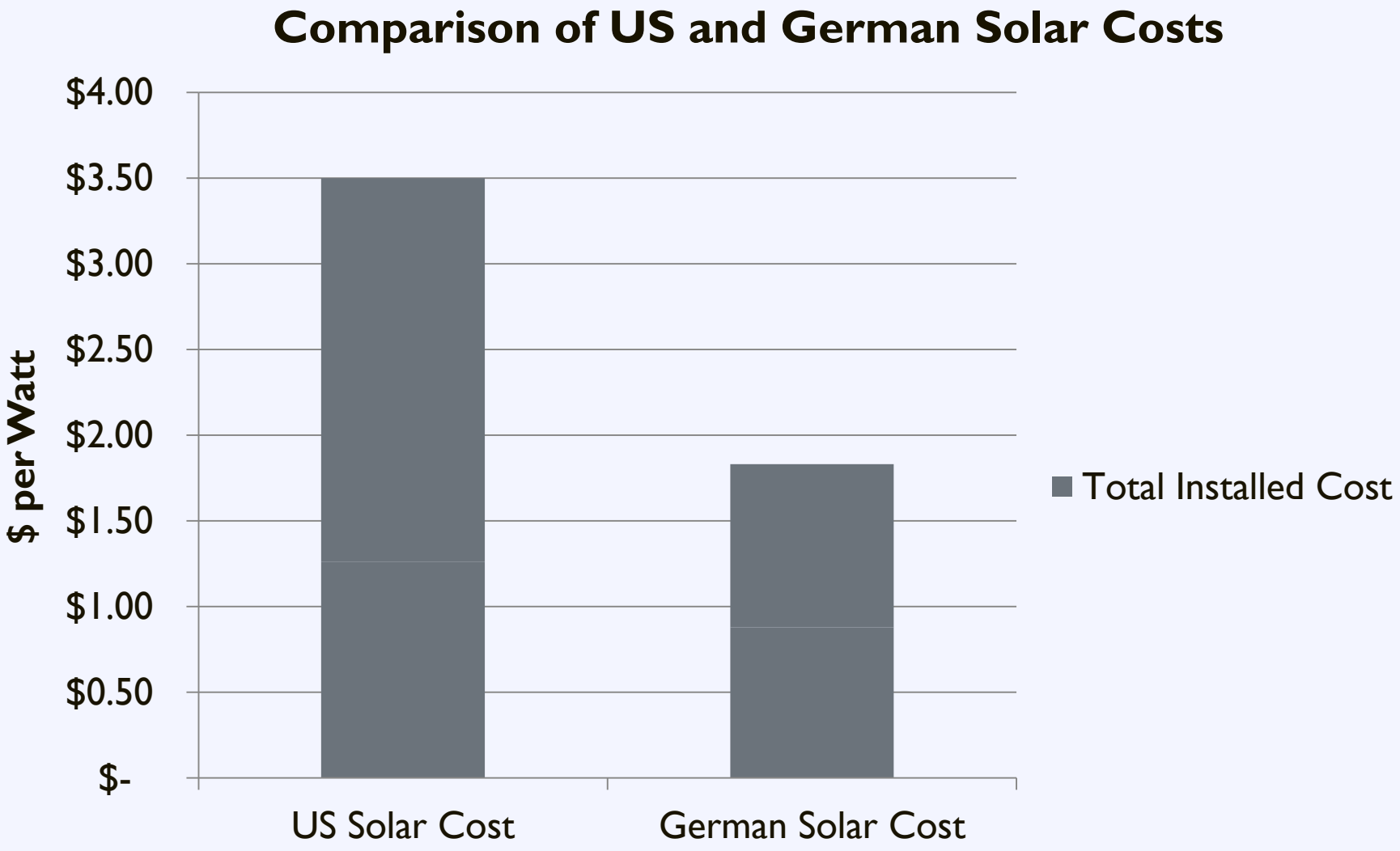


Source: Solar Electric Power Association

The Cost of Solar in the US



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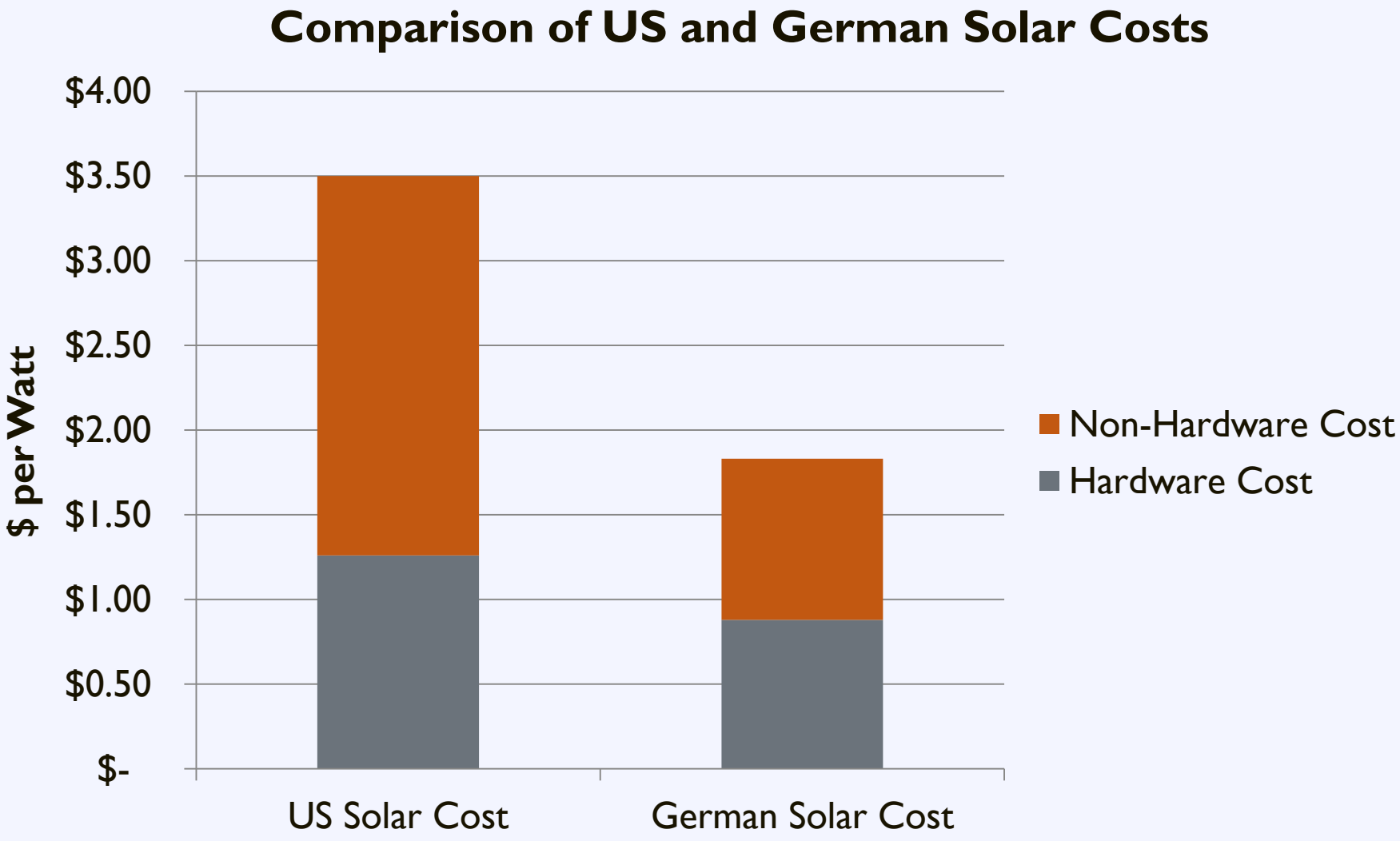
Source: SEIA/GTM Research U.S. Solar Market Insight Report Year-in-Review 2015; Fraunhofer ISE Recent Facts about Photovoltaics in Germany 2015; http://energy.gov/eere/sunshot/soft-costs

The Cost of Solar in the US



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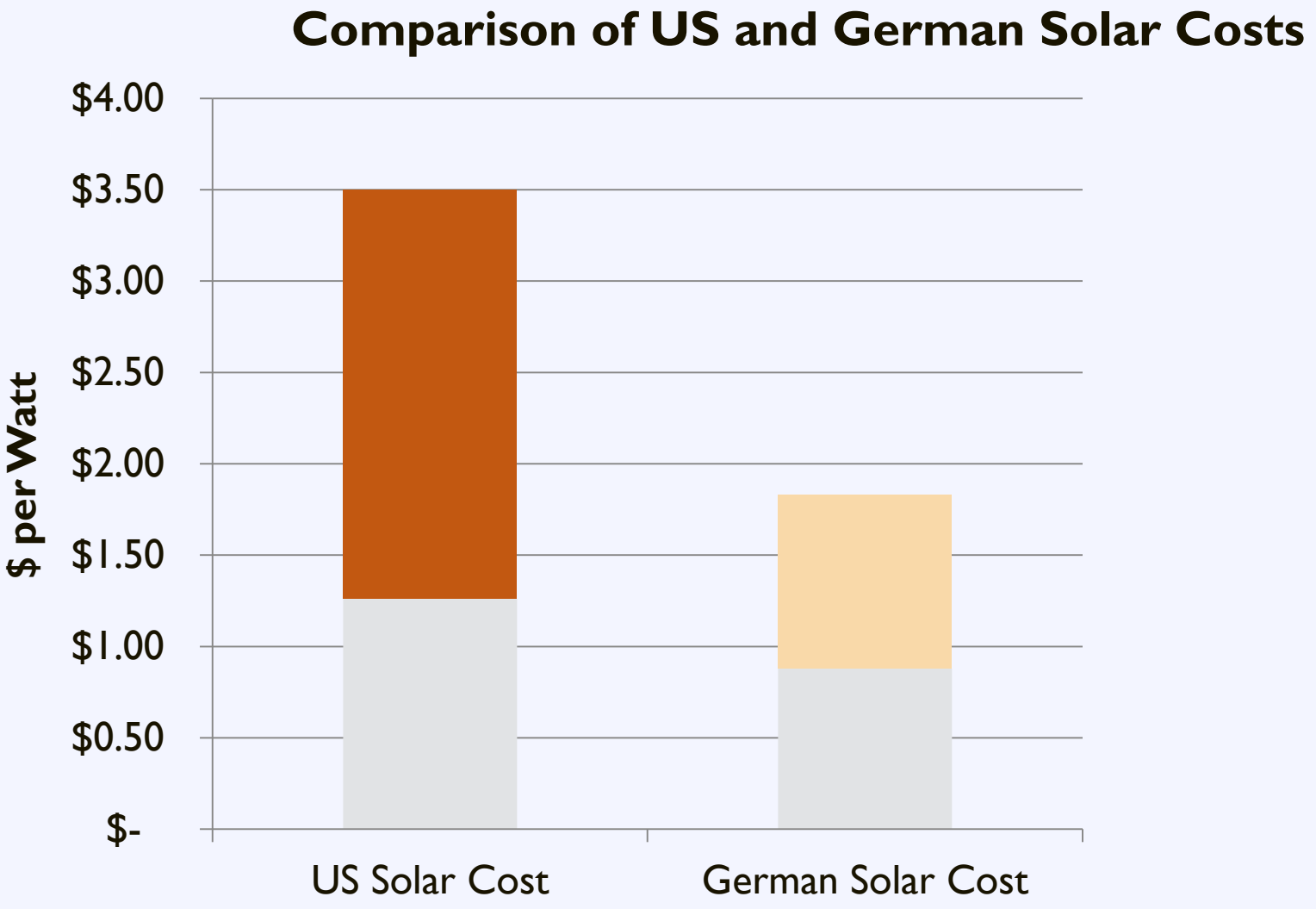

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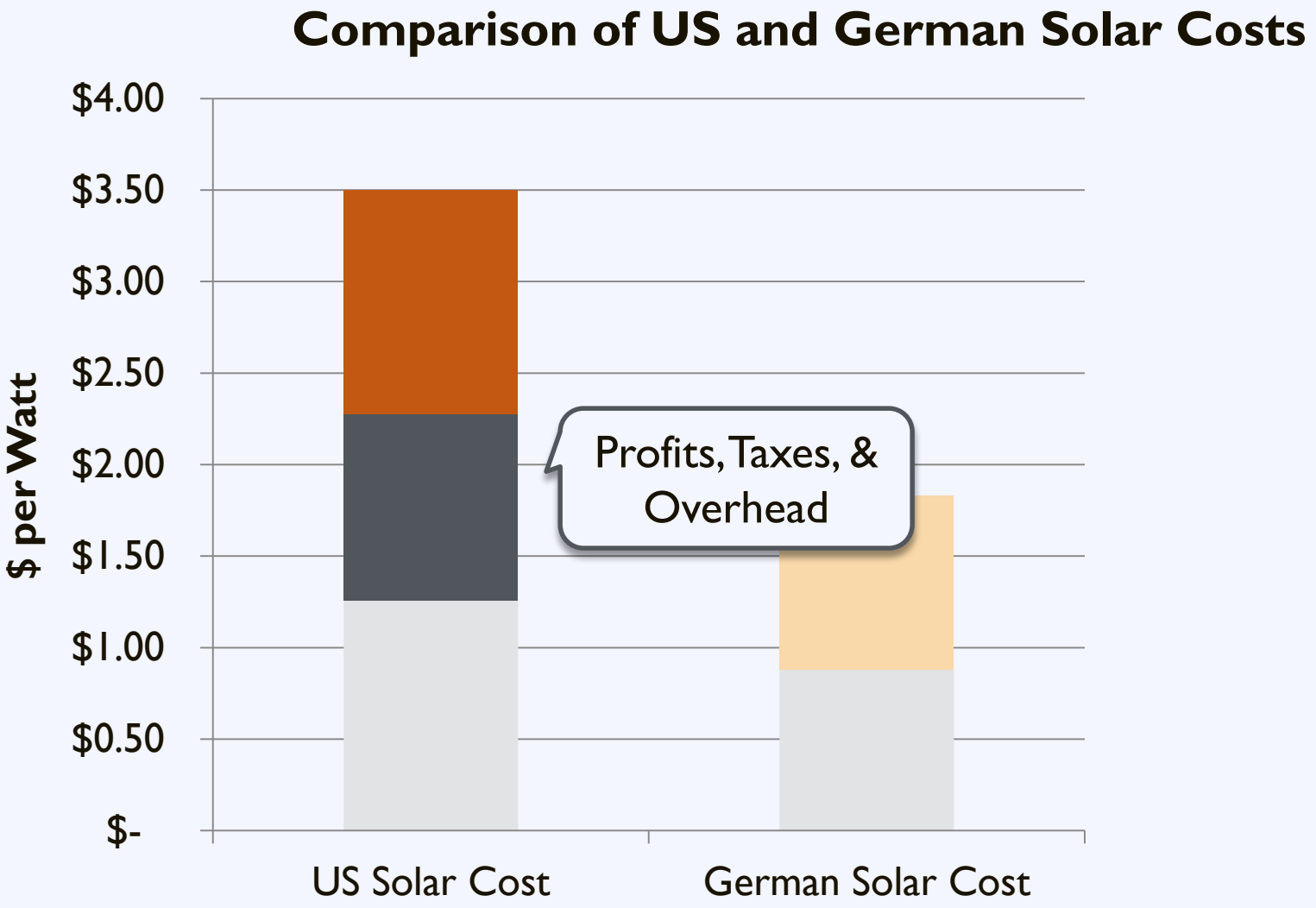

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Source: NREL (http://www.nrel.gov/docs/fy14osti/60412.pdf)
LBNL (http://emp.lbl.gov/sites/all/files/lbnl-6350e.pdf)(http://www1.eere.energy.gov/solar/pdfs/sunshot_webinar_20130226.pdf)

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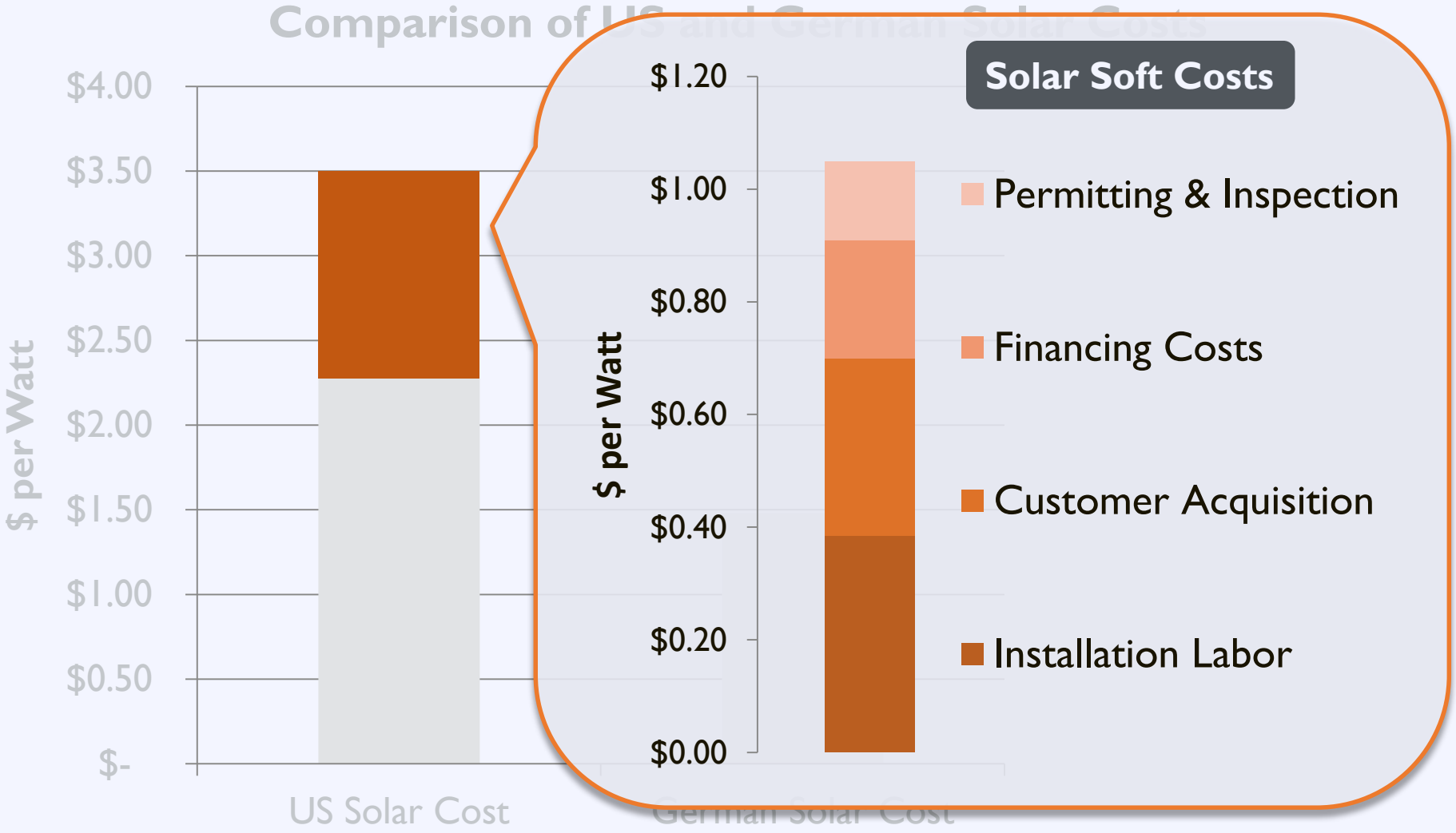

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Source: NREL (http://www.nrel.gov/docs/fy14osti/60412.pdf)
LBNL (http://emp.lbl.gov/sites/all/files/lbnl-6350e.pdf)(http://www1.eere.energy.gov/solar/pdfs/sunshot_webinar_20130226.pdf)

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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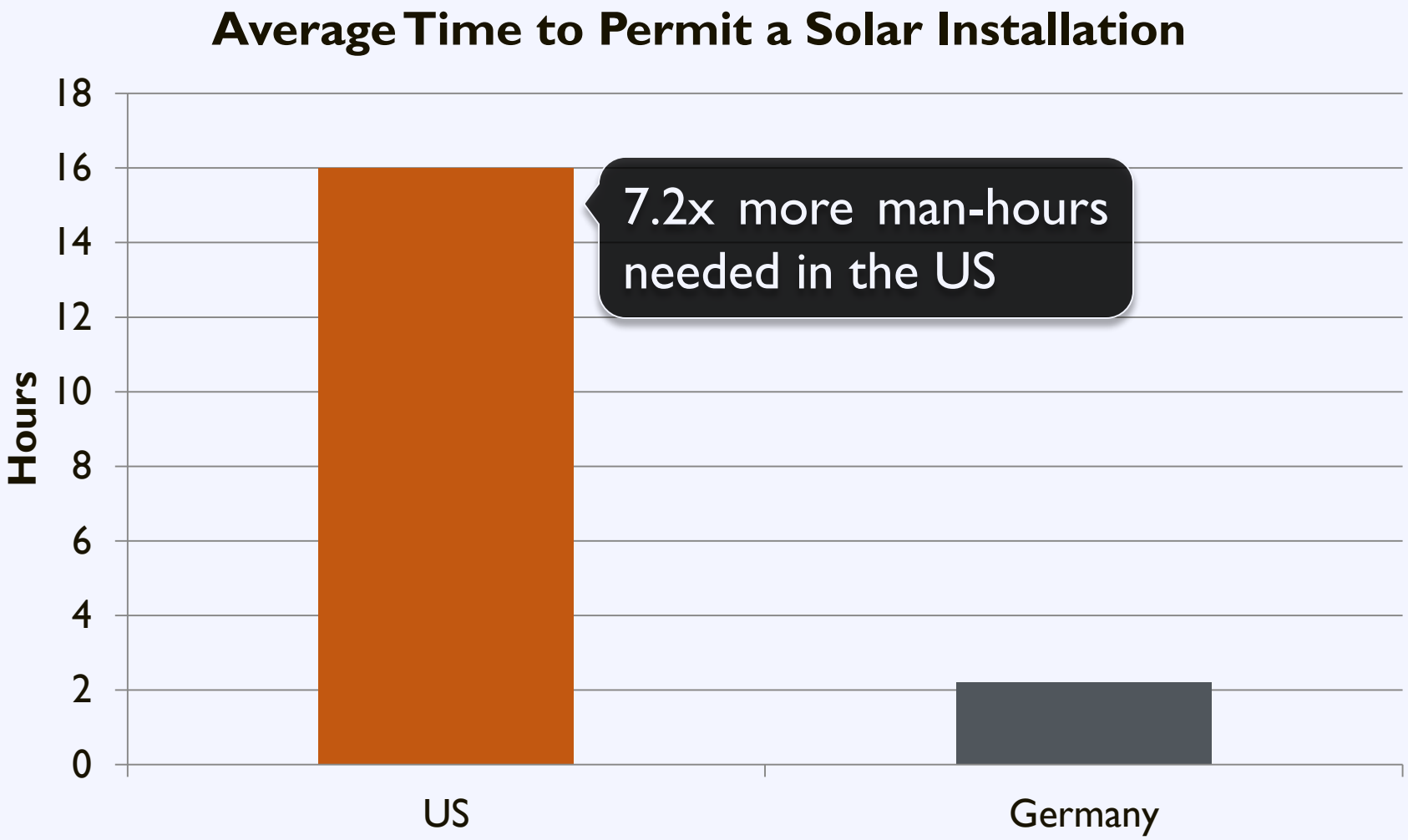
U.S. Department of Energy

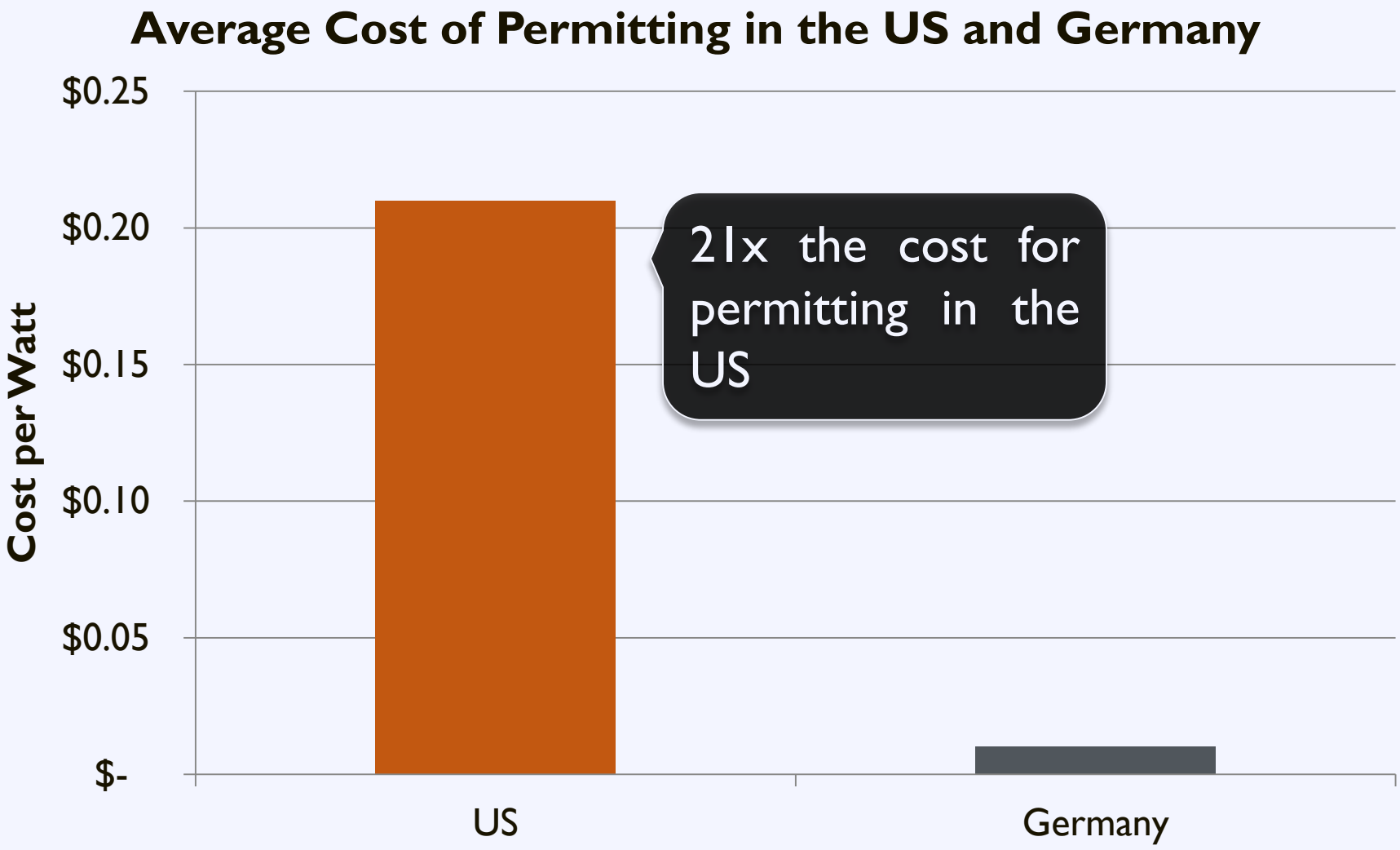
Photon Magazine

Time to Installation



Source: NREL, LBNL

Permitting Costs



Source: NREL, LBNL

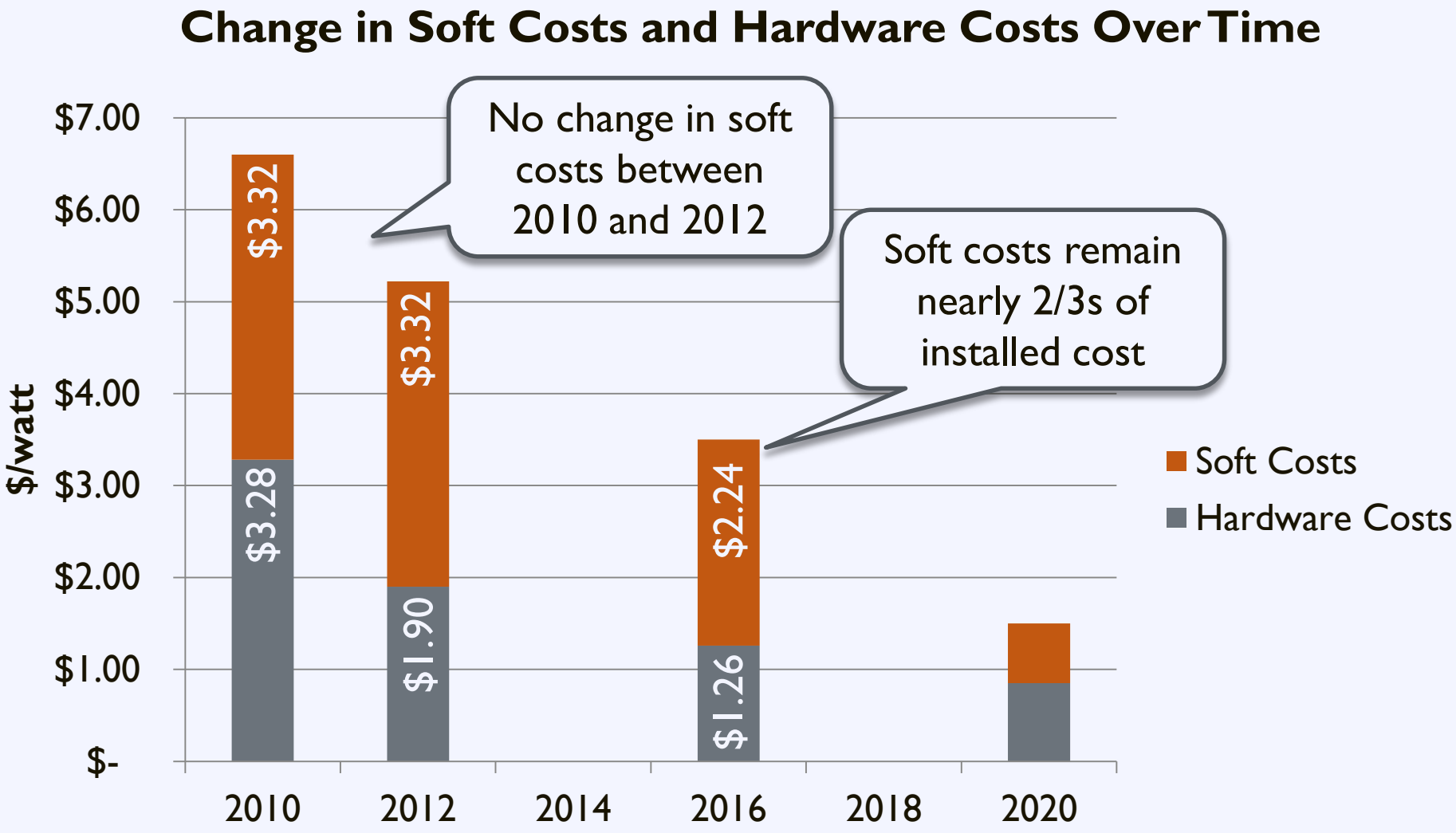
Germany's Success

Consistency and Transparency

through

Standardized Processes

The Cost of Solar in the US



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U.S. Department of Energy

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:	$3.50/W
Net Present Value:	$1,236
Payback Period:	13.6 years

After 25% Reduction in addressable soft costs:	$3.26/W
Net Present Value:	$2,157
Payback Period:	12.7 years

Difference:	$0.22/W
Net Present Value:	**+ 75%**
Payback Period:	**- 7%**

Other Assumptions: Orlando, FL TMY3 Weather Data; 5kW solar PV system (24 deg. tilt, 180 deg. azimuth); 1.1 DC to AC ratio; 0.5%/year degradation rate; 100% debt financing for 10 years at 5.5%; 30 year analysis period; 28% federal income tax rate; 0% state income tax rate, sales tax rate, property assessment; 30% federal ITC; 2% annual rate escalator; 15,000 kWh/year electricity consumption; OUC PBI Incentive

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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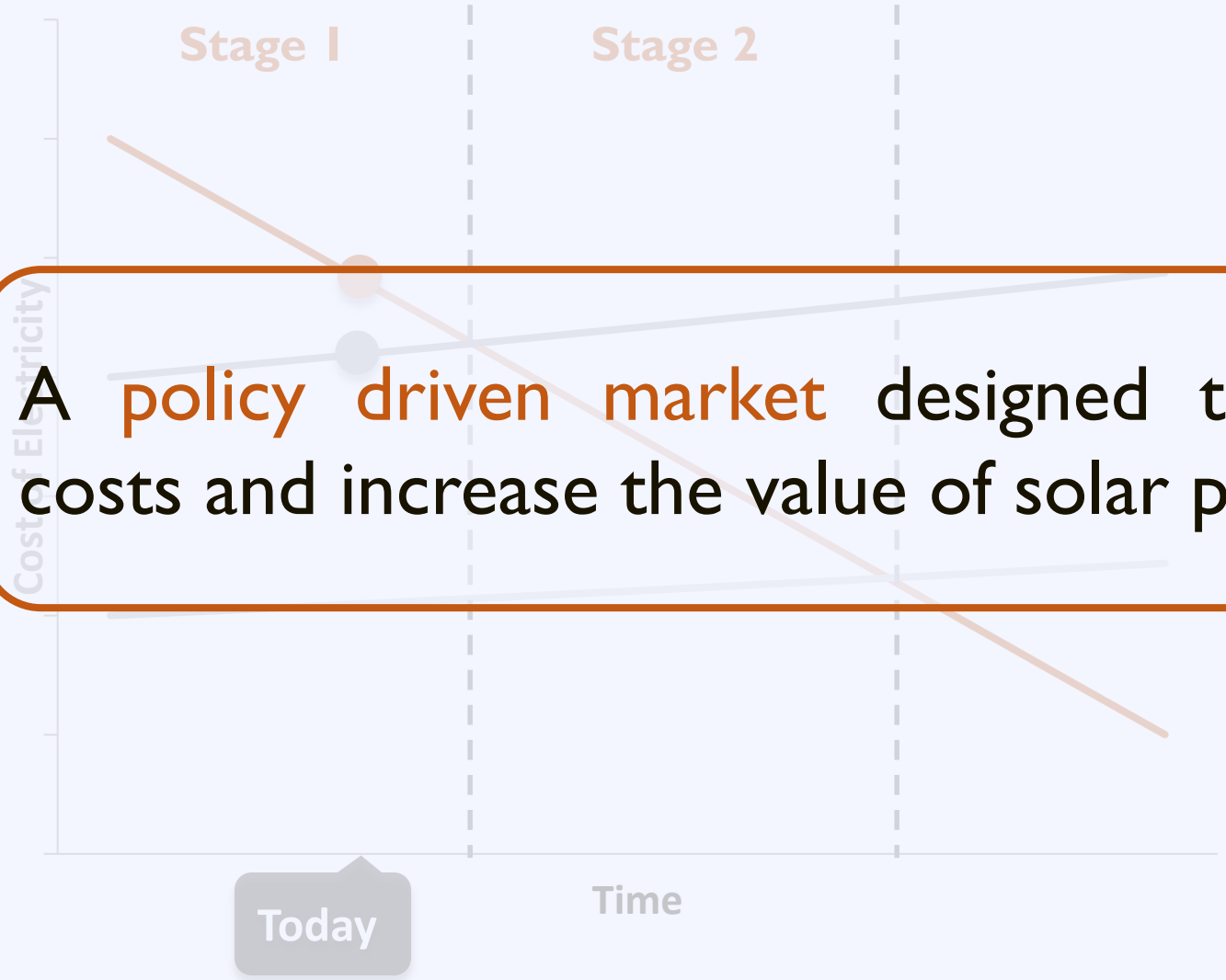
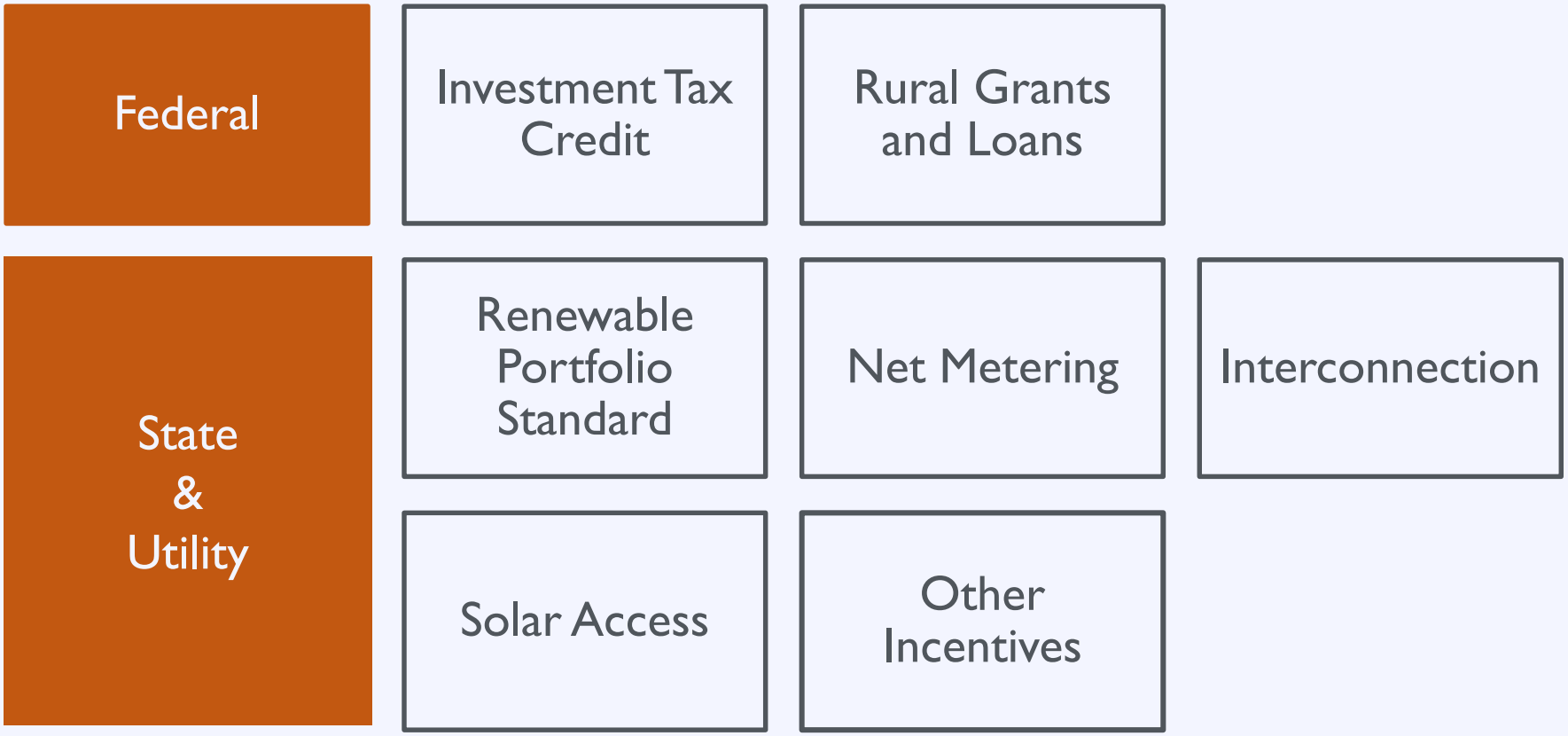
Solar Market: Trends



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

Federal

Investment Tax Credit

Rural Grants and Loans

State & Utility

Renewable Portfolio Standard

Net Metering

Interconnection

Solar Access

Other Incentives

Investment Tax Credit

Type: Tax Credit

Eligibility: For-Profit Organization

Value: 30% of the installation cost through 2019

Availability: Steps down 26% in 2020, 22% in 2021, expires in 2022

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

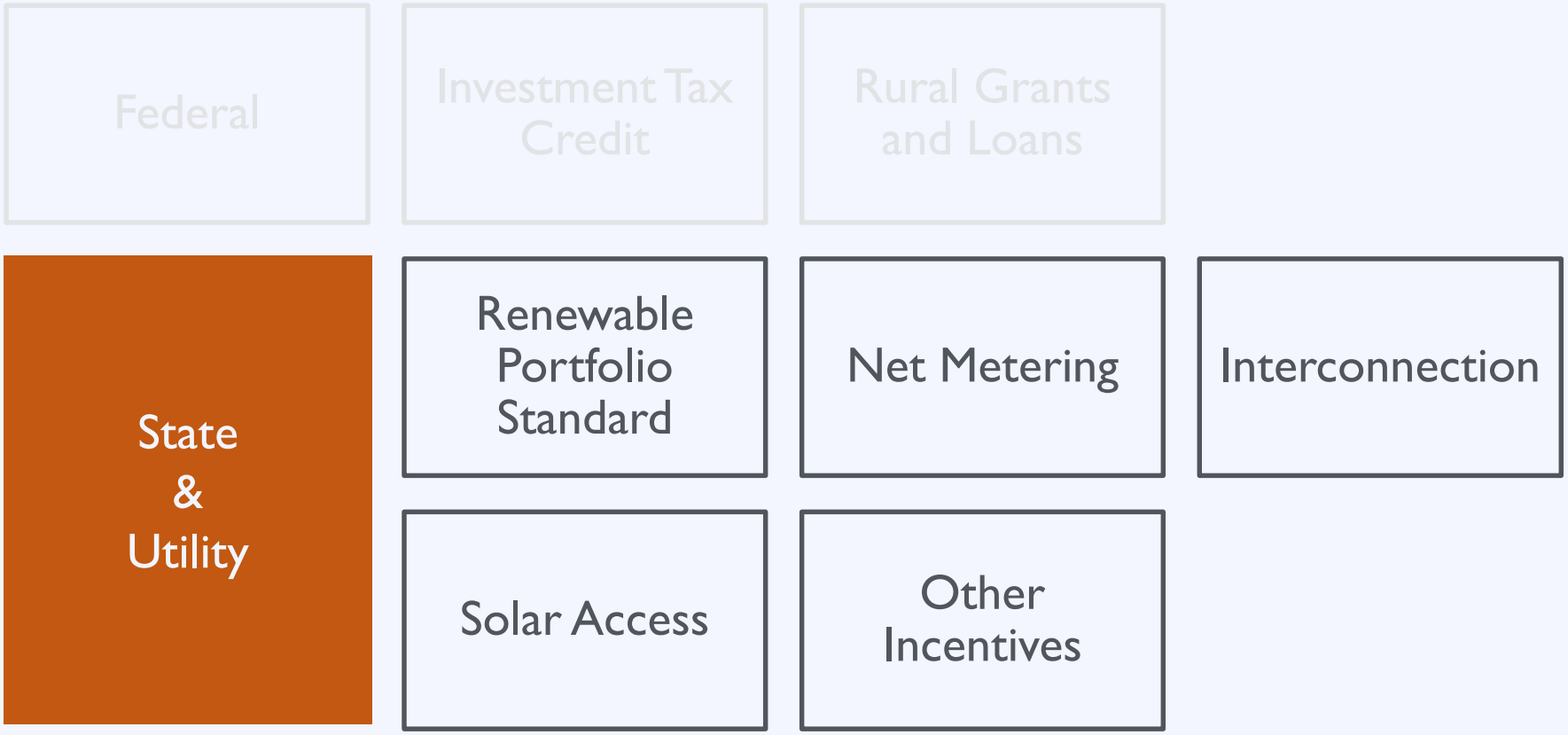
Low-cost lending based on treasury rate

Can be passed on to customers with on-bill repayment

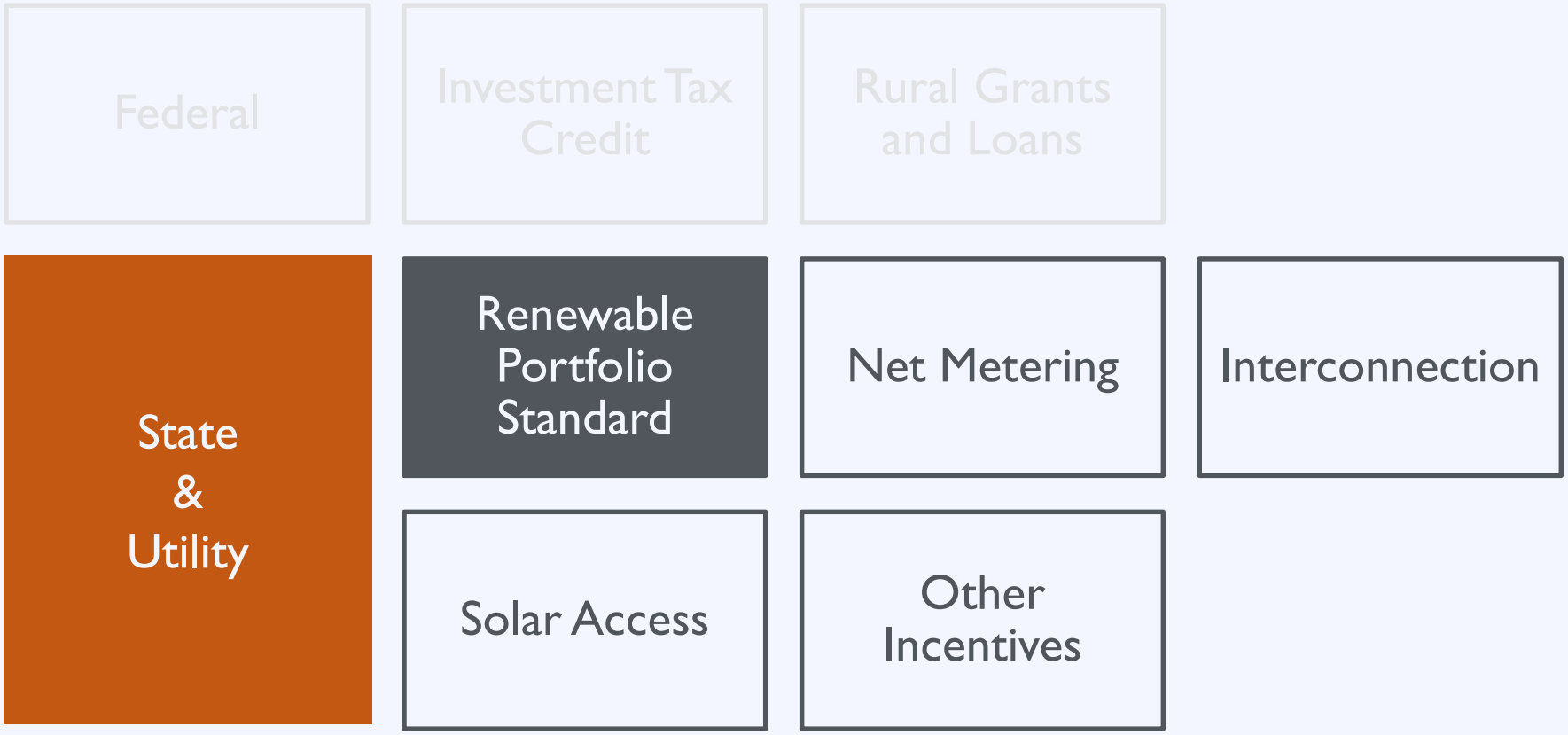
Complex application process for non-RUS borrowers

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

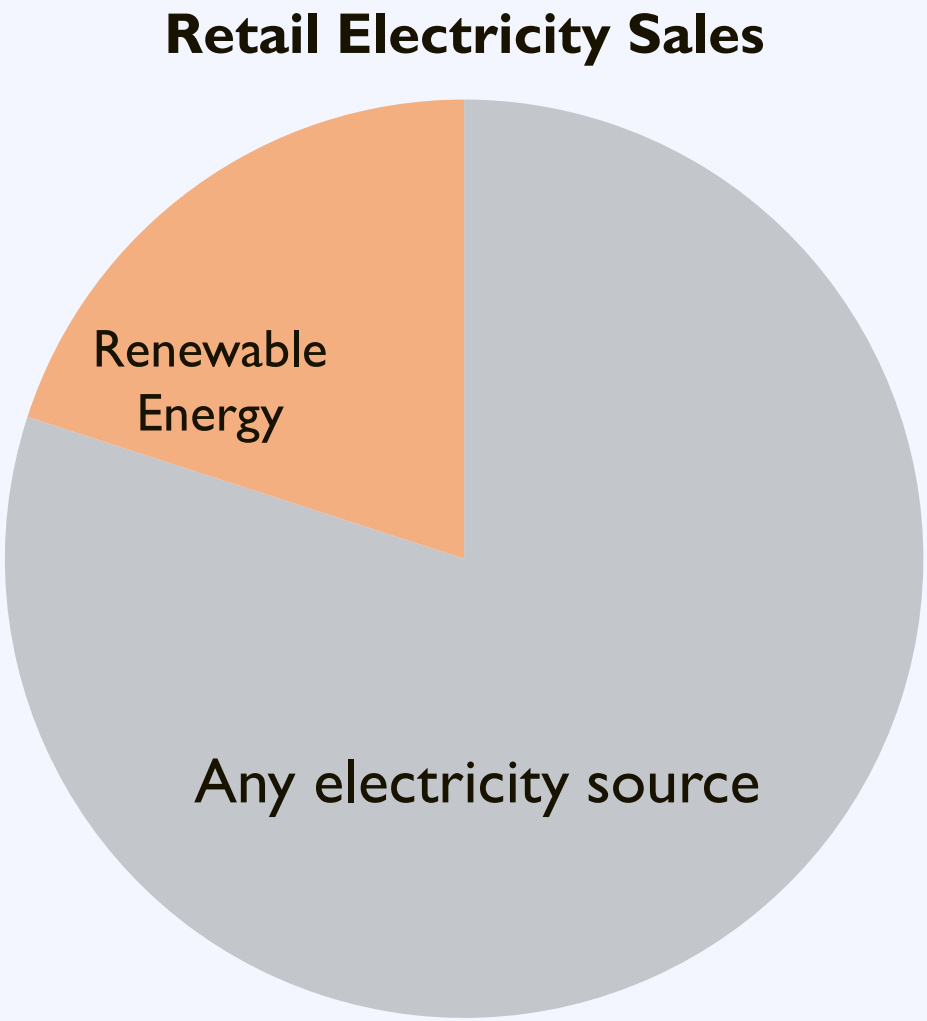
A Policy Driven Market



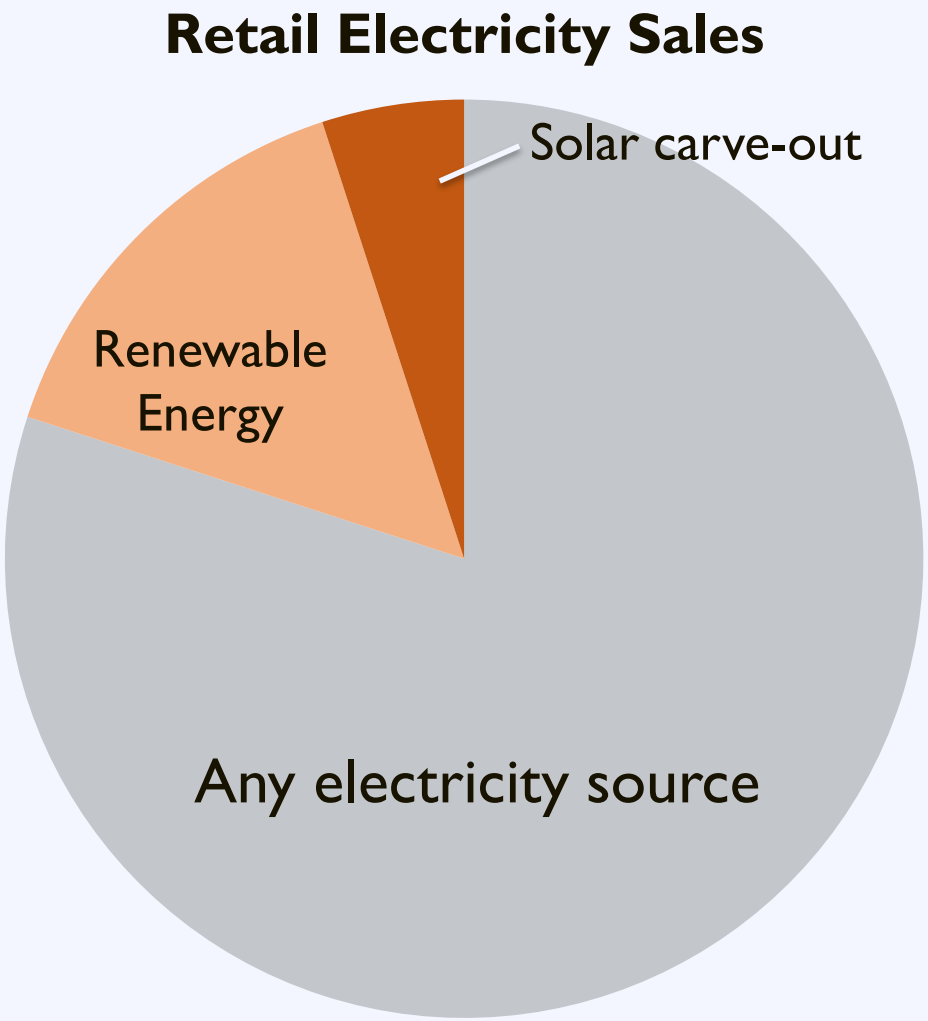
A Policy Driven Market



Renewable Portfolio Standard



Renewable Portfolio Standard



RPS Impacts: Solar Deployment

RPS and Solar/DG Status of Top Ten Solar States by Cumulative Installed Capacity (as of Q4 2013)

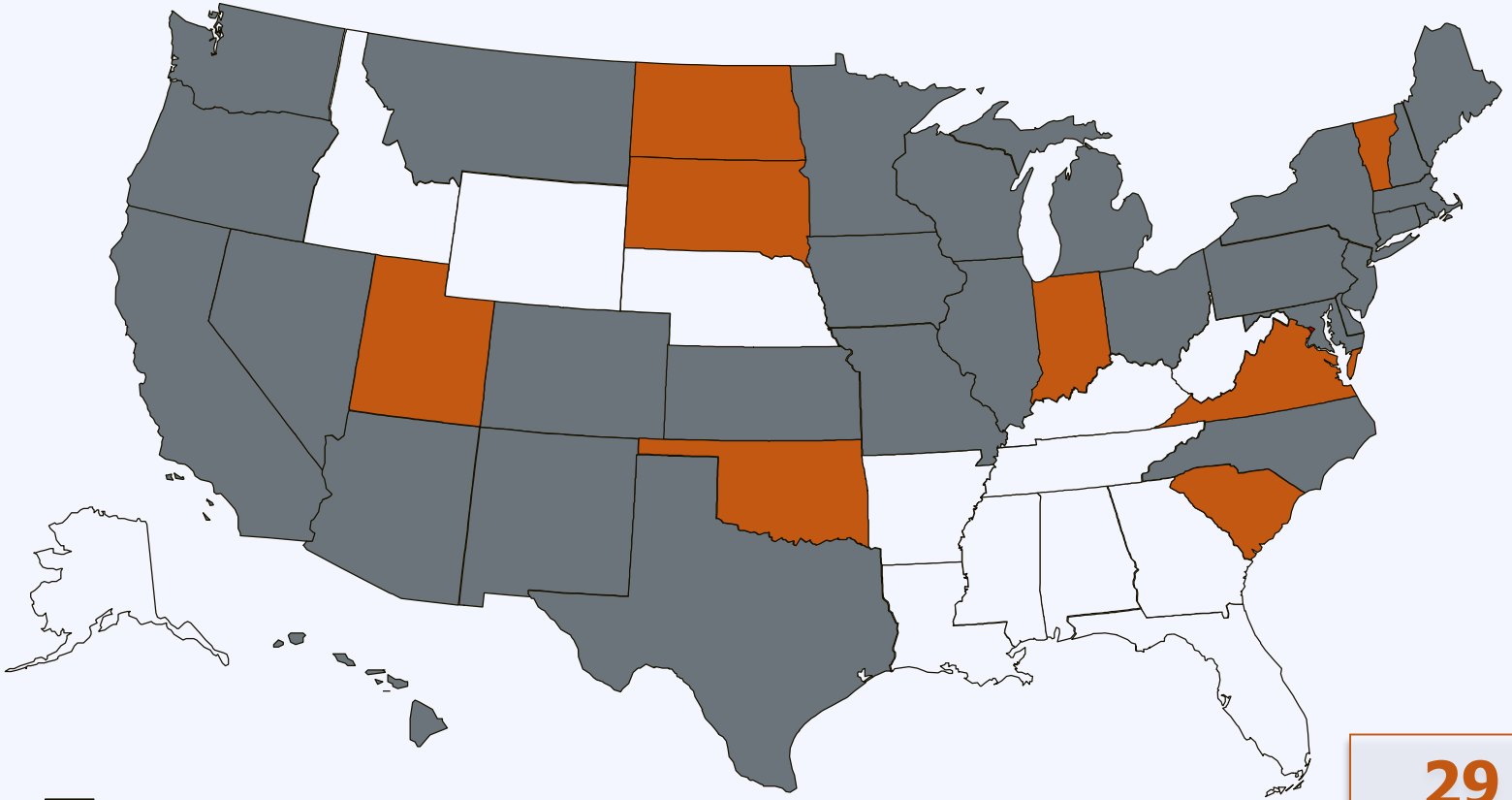
Ranks	State	RPS?	Solar/DG Provision?
1	California	Y	N
2	Arizona	Y	Y
3	New Jersey	Y	Y
4	North Carolina	Y	Y
5	Nevada	Y	Y
6	Massachusetts	Y	Y
7	Hawaii	Y	N
8	Colorado	Y	Y
9	New York	Y	Y
10	New Mexico	Y	Y

Powered by SunShot U.S. Department of Energy

Source: DSIRE Solar (http://dsireusa.org/documents/summarymaps/Solar_DG_RPS_map.pdf); Solar Energy Industries Association/ GTM Research *Solar Market Insight 2013 Year-in-Review*

Renewable Portfolio Standard

www.dsireusa.org / March 2015



29 states, + Washington DC and 2 territories have renewable portfolio standards
(8 states and 2 territories have renewable portfolio goals)

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Florida Renewable Portfolio Standard

2008: Section 366.98, F.S. amended to require FPSC to submit a draft RPS rule; rulemaking workshops held

2009: FPSC submits draft RPS rule to legislature

- 20% renewable generation by 2020
- 25% carve-out for solar and wind
- Rate increase capped at 2% per year

Proposed RPS rule was never acted upon by the legislature

http://www.dms.myflorida.com/content/download/54597/229343/file/02.23.2009

A Policy Driven Market

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Net Metering

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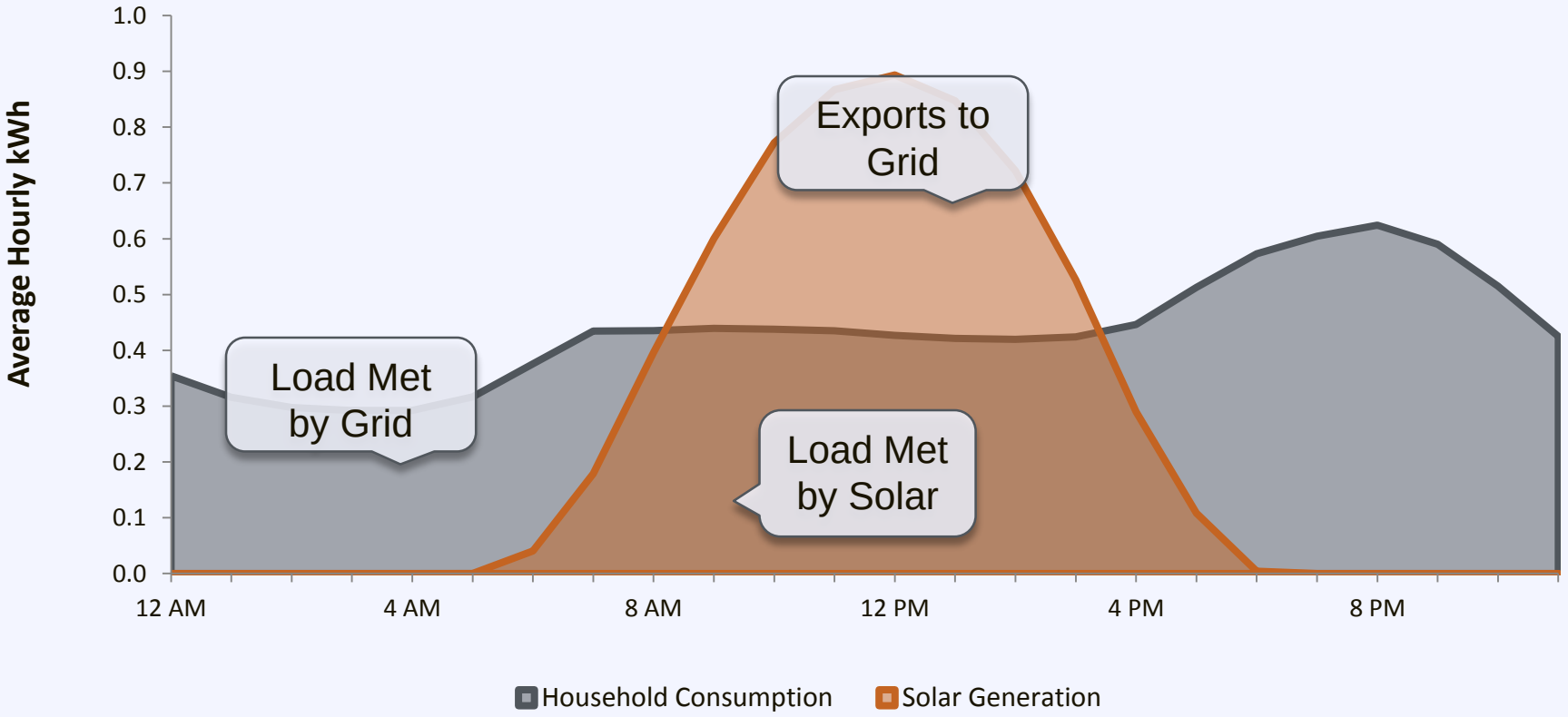
Solar Access

Other Incentives

Net Metering



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.

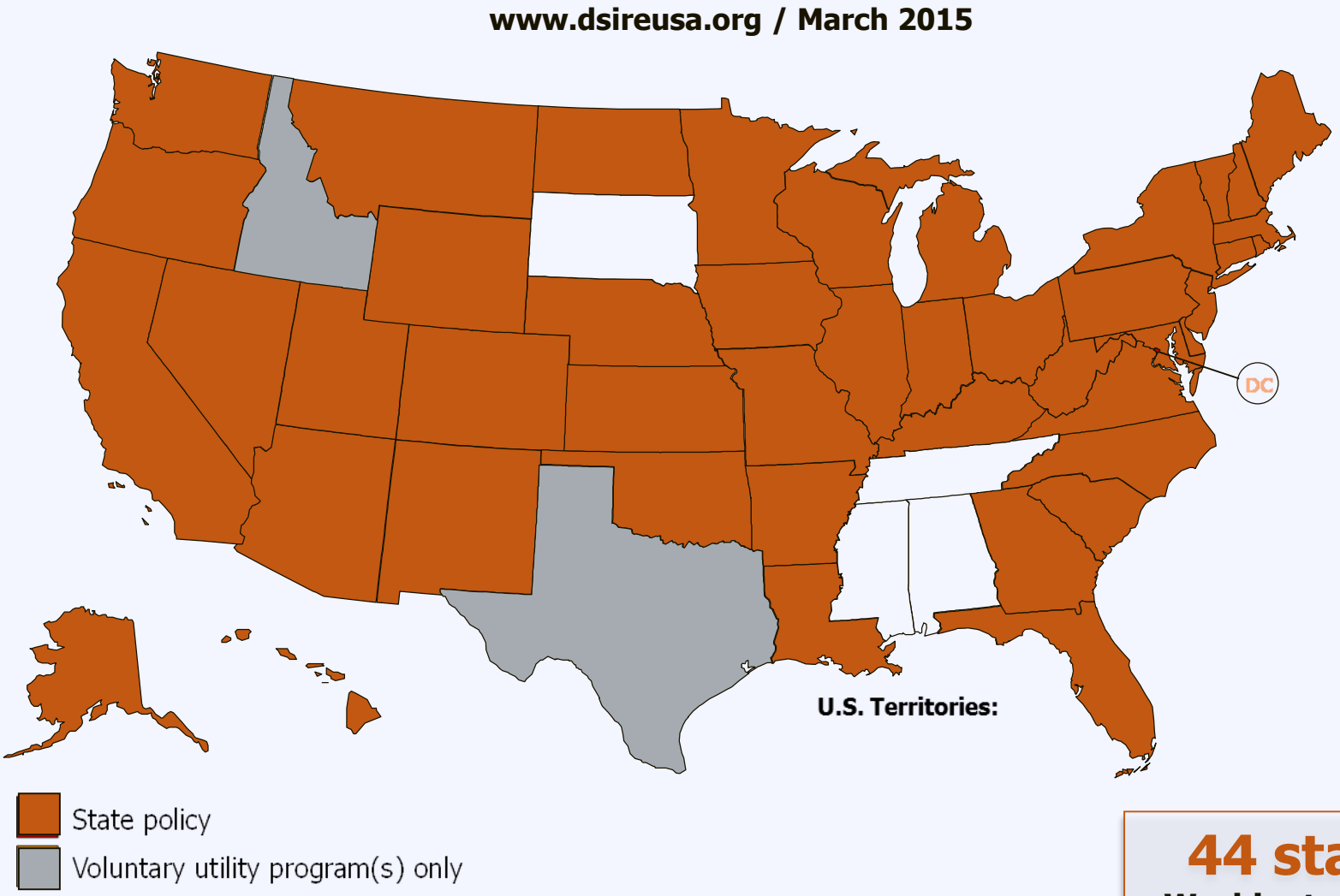
Net Metering: Market Share

More than **93%** of distributed PV Installations are net-metered

Powered by SunShot U.S. Department of Energy

Source: IREC (http://www.irecusa.org/wp-content/uploads/IRECSolarMarketTrends-2012-web.pdf)

Net Metering



44 states, +
Washington DC and 4 territories have net metering policies

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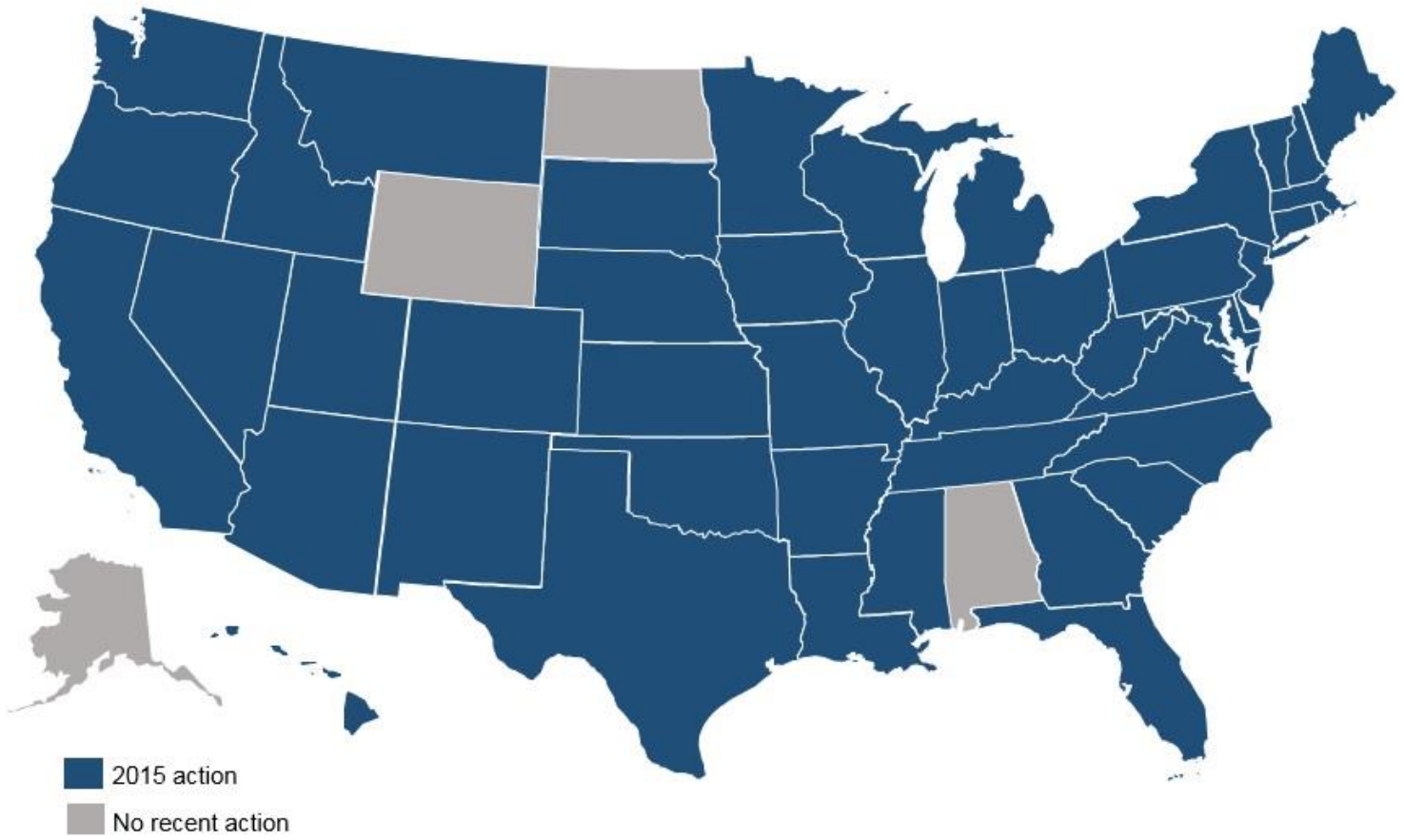
U.S. Department of Energy

Net Metering

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



Powered by SunShot U.S. Department of Energy

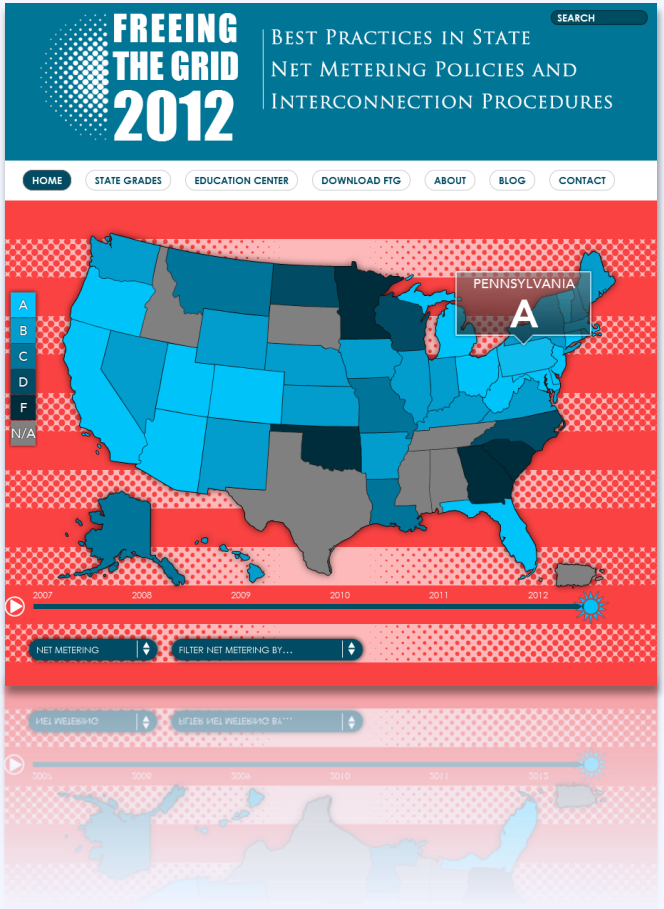
Source: The 50 States of Solar 2015 Policy Review and Q4 Quarterly Update (http://www.mc-group.com/wp-content/uploads/2016/02/50sosQ4-FINAL.pdf)

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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Other Incentives

Interconnection

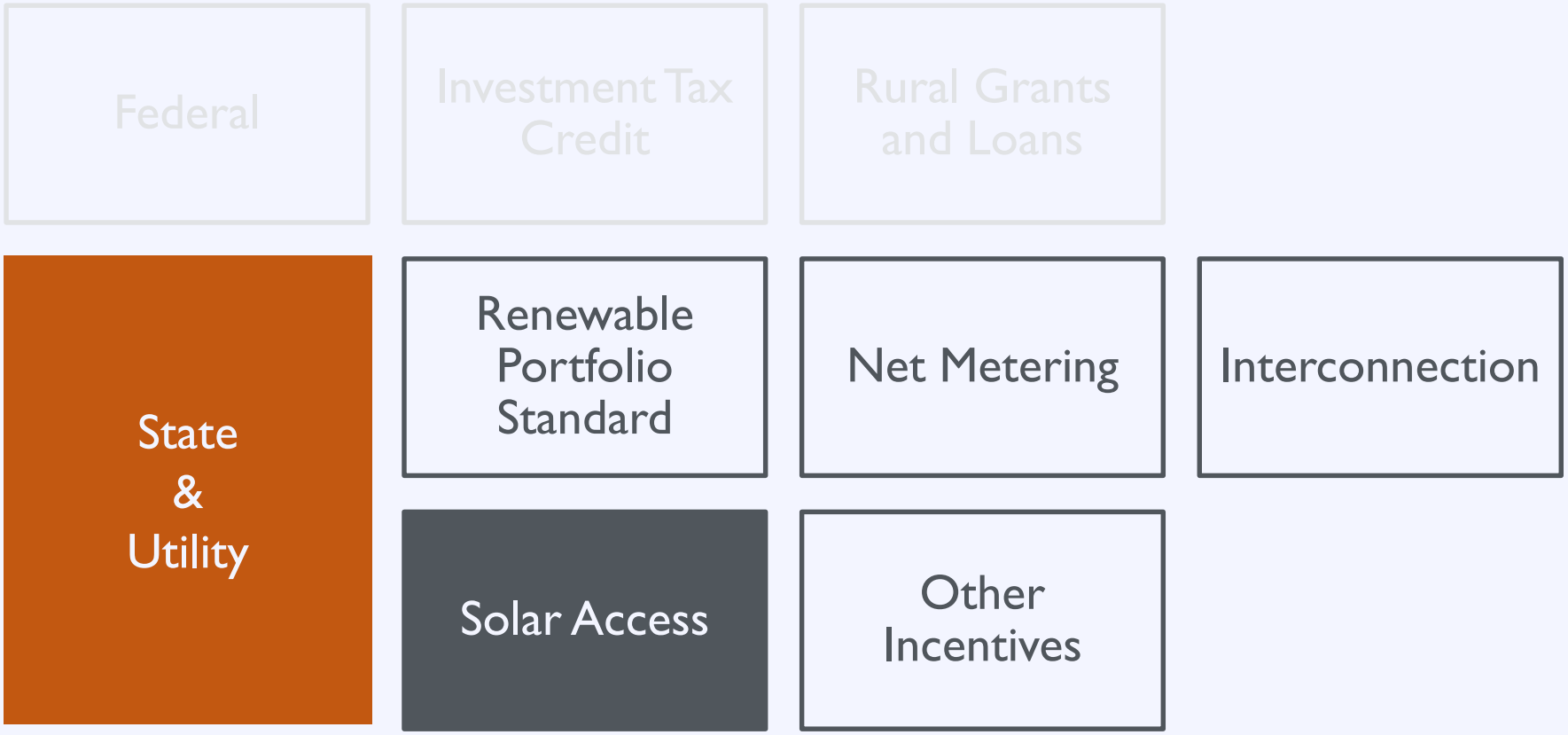
Standardized interconnection rules require utilities to provide a fair and transparent pathway for customer-generators and other developers of distributed energy resources to interconnect with the utility's grid.

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 NY: 50 days and 68 days
  - 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)

A Policy Driven Market



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

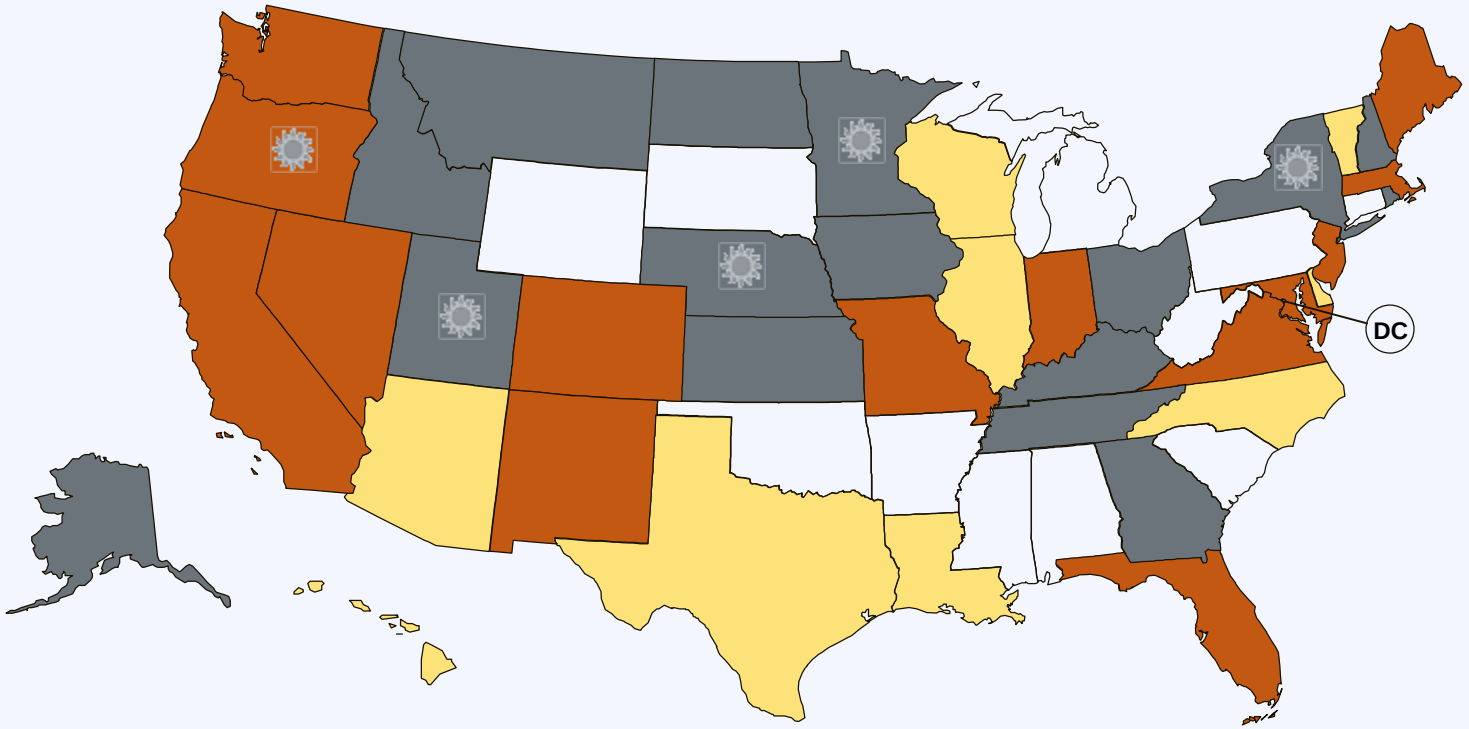
Source: Google Earth

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

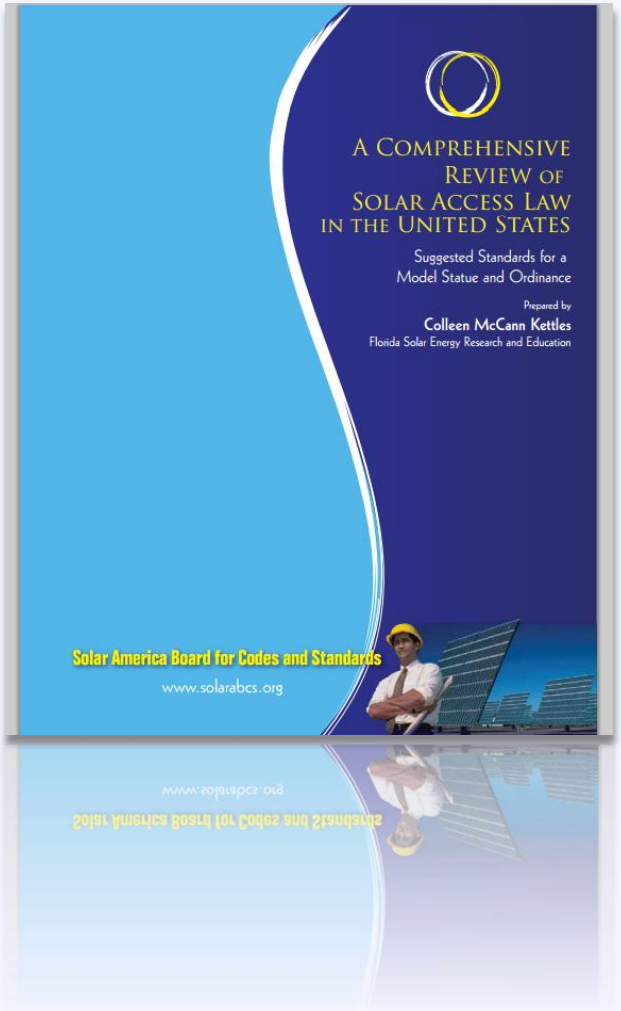
Source: Database of State Incentives for Renewables & Efficiency (www.dsireusa.org)

Solar 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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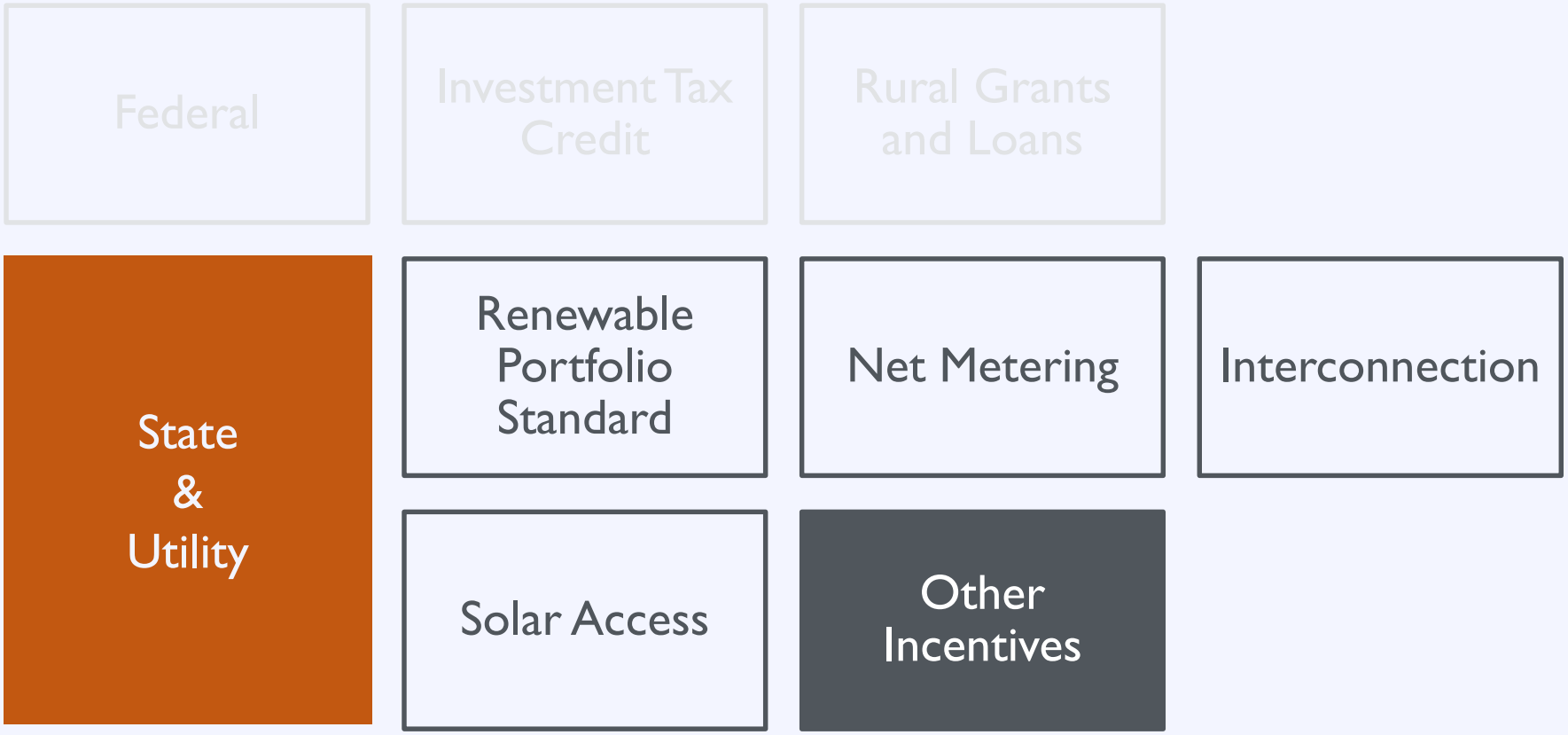
A Policy Driven Market



Solar Sales Tax Exemption

Type: Tax Exemption

Eligibility: Solar technologies (certified by FSEC)

Passed in 1997, exempts solar systems from 6% state sales tax

Tangible Personal Property Tax Exemption

Type: Property tax exemption for added value of solar PV system

Eligibility: Residential

Does **NOT** include commercial

- When you lease a system, the lessor (a business) is subject to the TPP tax – which adds 3-5 cents/kWh to the cost of the system

Renewable Energy Production Tax Credit

Type: Tax Credit

Eligibility: Businesses

Value: $0.01/kWh of electricity exported to grid (capped at $10 million/year)

Availability: **Expires 6/30/16**

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Source: http://programs.dsireusa.org/system/program/detail/1608

OUC Photovoltaic Credit Program

Type: Production-based incentive

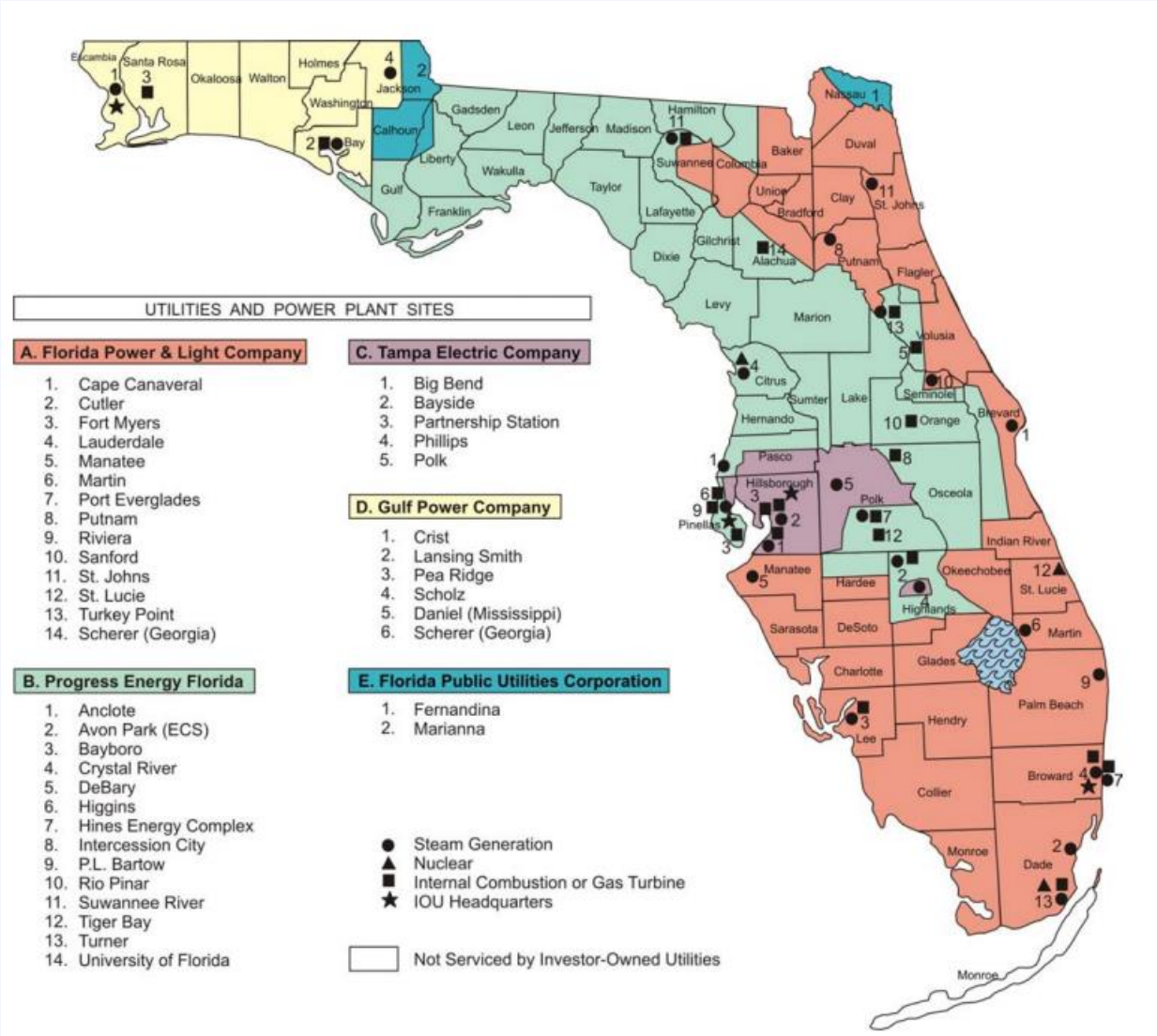
Eligibility: Residential and Commercial

Value: $0.05/kWh of generation (regardless of whether it is exported or used on-site)

Not strictly a "production credit": OUC is purchasing the environmental attributes (RECs) from the system owner

Source: http://www.ouc.com/environment-community/solar/solar-incentives; http://www.ouc.com/docs/solar/residential_solar_service_agreement.pdf?sfvrsn=2

Dominated by IOUs



Source: http://www.publicpower.com/pdf/stats/florida_territories.pdf

Agenda

10:15 – 10:40	Putting Solar Energy on the Local Policy Agenda
10:40 – 11:10	Keynote: Jim Fenton – Director, FSEC
11:10 – 11:30	State of the Local Solar Market
11:30 – 12:00	Federal, State, and Utility Policy Drivers
12:00 – 12:25	Break and Grab Lunch
12:25 – 1:05	Solar Market Development Tools
1:05 – 1:30	Planning for Solar: Getting Your Community Solar Ready
1:30 – 1:40	Break
1:40 – 2:40	Local Speaker Panel
2:40 – 3:15	Developing a Solar Policy Plan for Your Community
3:15 – 3:30	Next Steps – SolSmart

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Effective Local Solar Policy

Local Solar Policy

Understanding solar financing

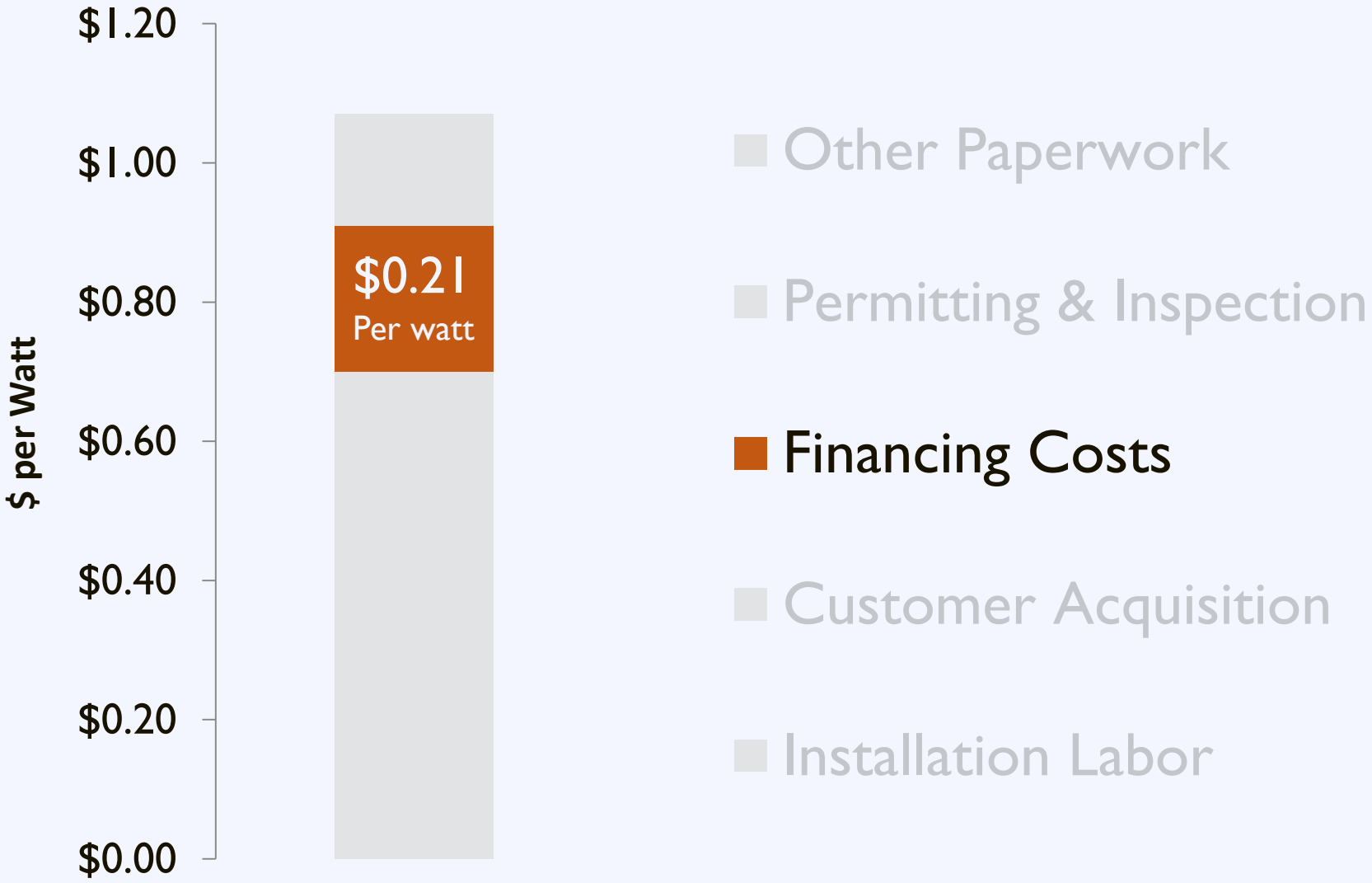
Expanding financing options

Addressing customer acquisition

Effective Solar Permitting Process

Solar Market Development Tools

Third Party Ownership



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The Solar Equation

Cost

+ Installed Cost

+ Maintenance

- Direct Incentive

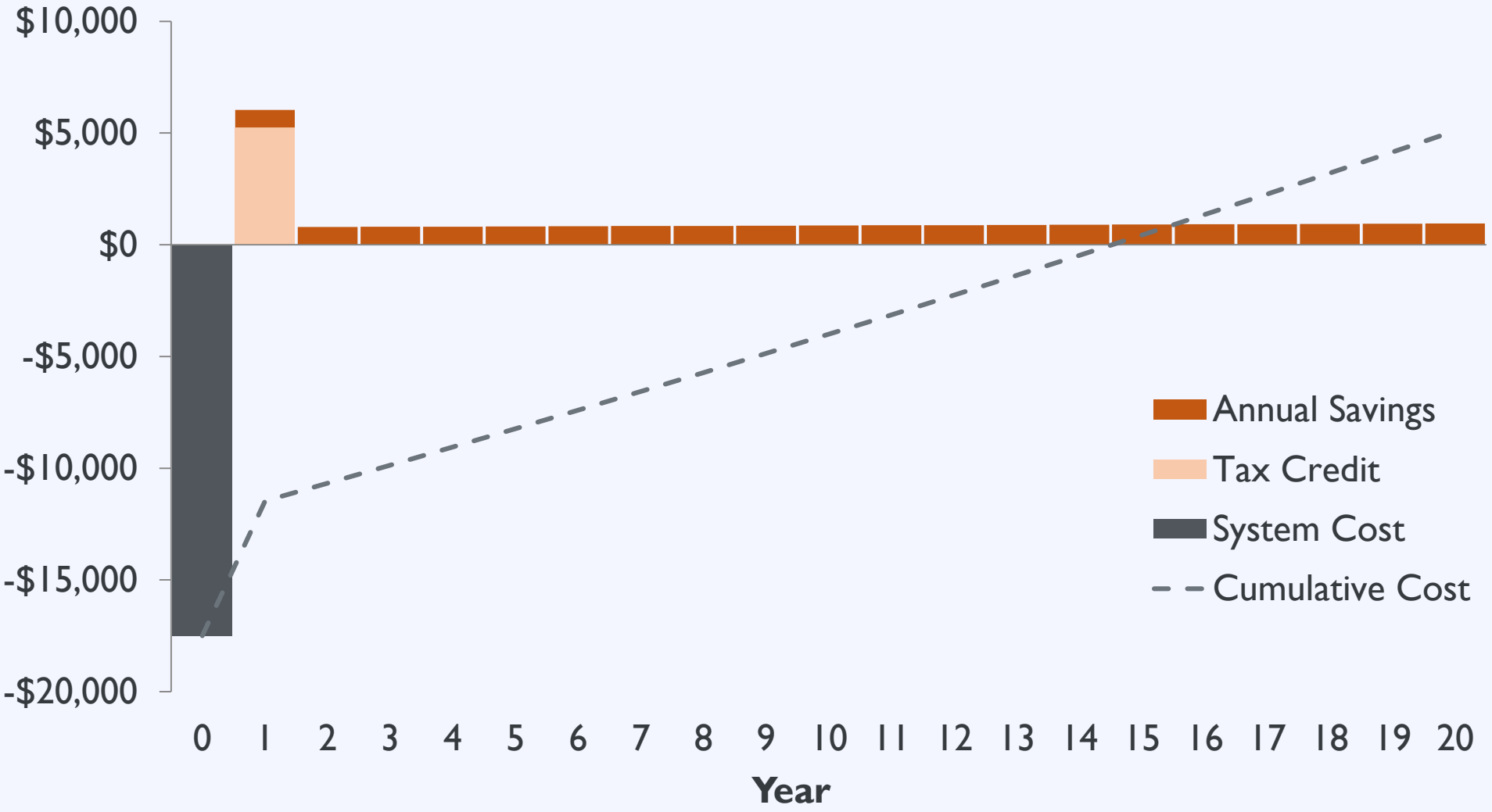
Benefit

+ 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

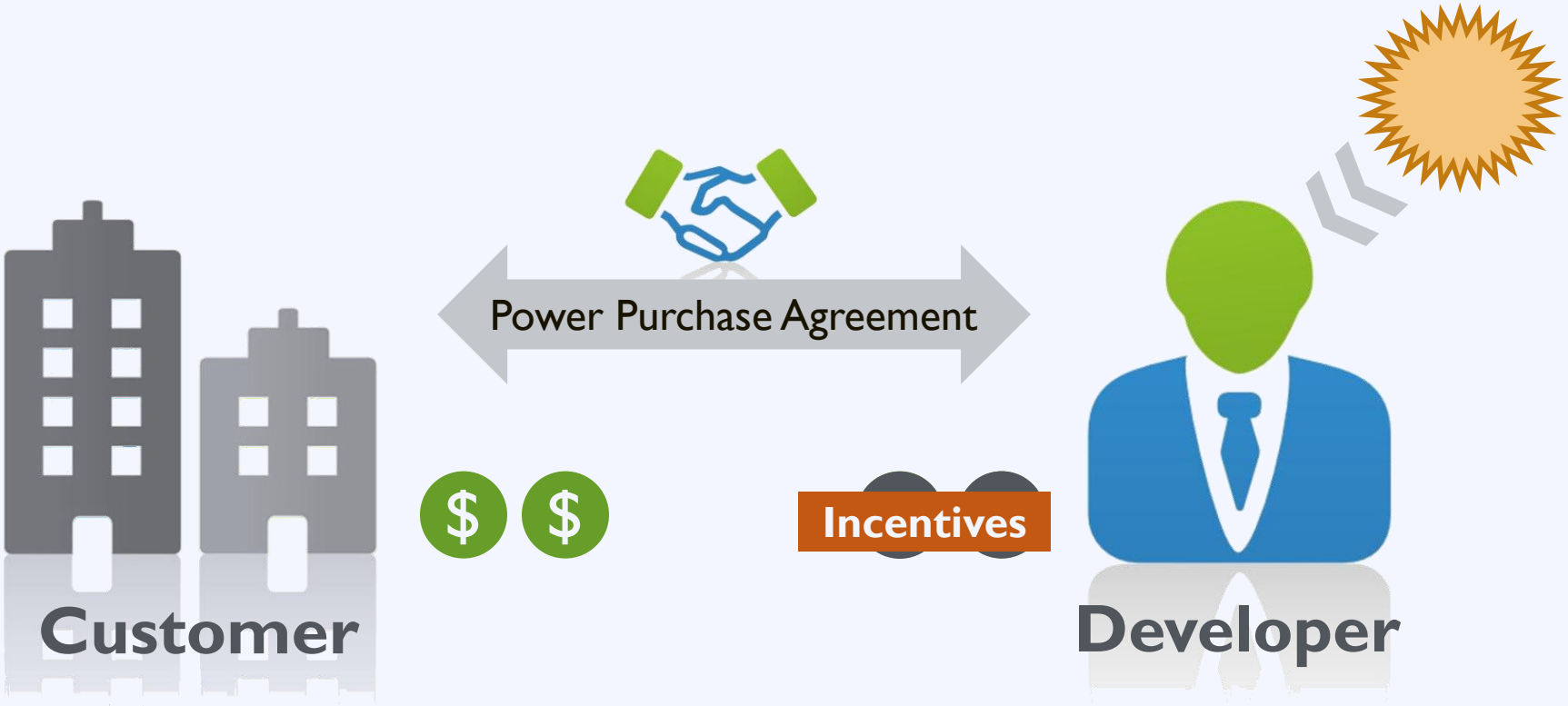
Solar Financing Options

Third Party Ownership

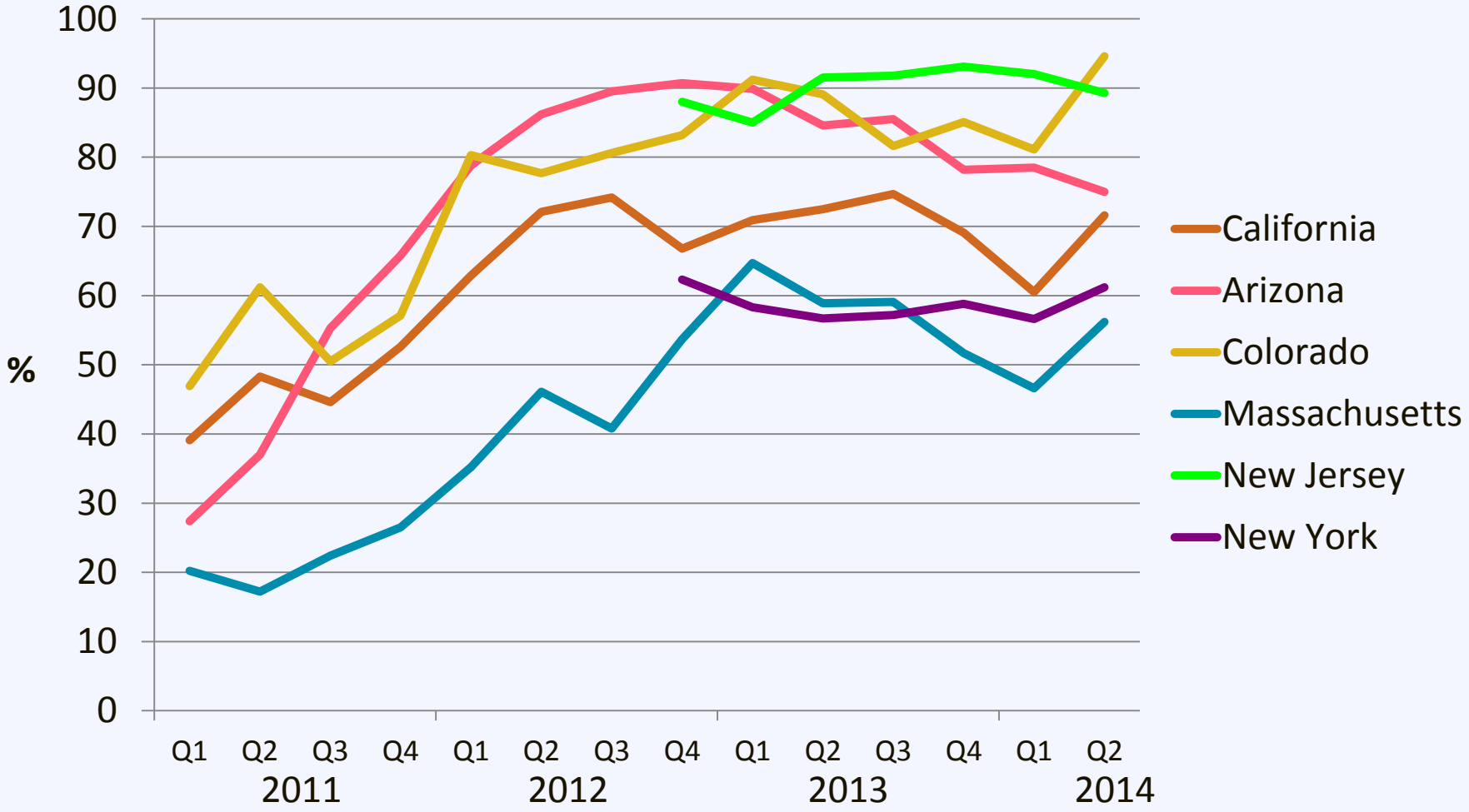
Customer Owned and Financed

Utility-Owned Solar

Third Party Ownership



Third Party Ownership



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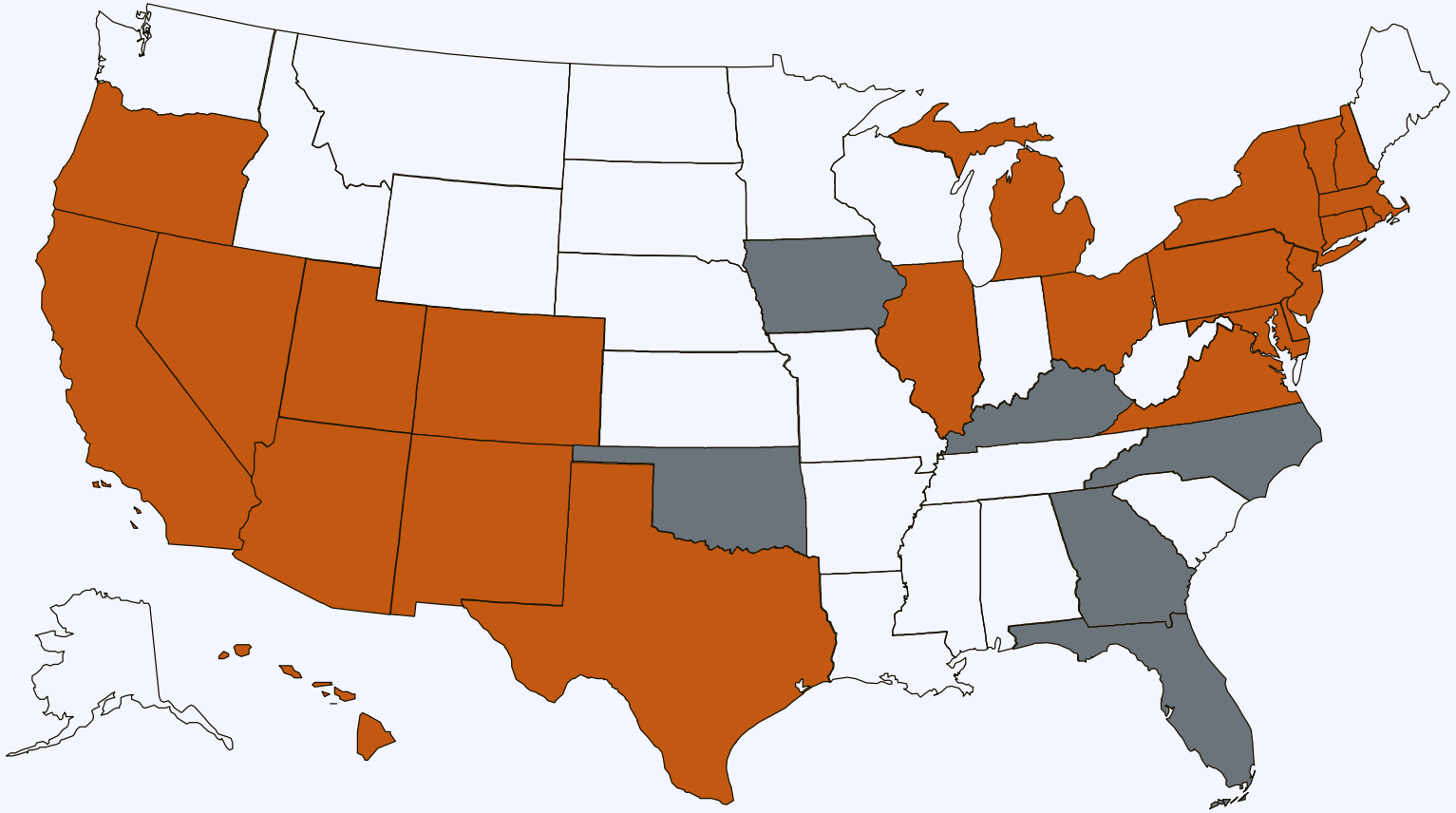
Source: GTM Research/ Solar Energy Industries Association, *U.S. Solar Market Insight 2012 Year-in-Review & U.S. Solar Market Insight Q2 2014*

Third Party Ownership: State Policy

Third Party Ownership is not always available



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

Apparently disallowed by state or otherwise restricted by legal barriers

Status unclear or unknown

Puerto Rico

The Status of TPO in Florida

- Florida does not currently allow power purchase agreements (only utilities can sell electricity)
- Leasing is allowed, but inhibited by the fact that TPPT must be paid (adds $0.025-0.05/kWh)

The Constitutional Amendments

- Florida Right to Solar Energy Choice Initiative, (Amendment 1)
  - **Does not change status quo**
    - PPAs are still illegal
  - Approved by FL Supreme Court by 4-3 margin
- Florida Right to Produce and Sell Solar Energy Initiative (failed to make ballot)
  - Would have enabled non-utility supply of solar from installations of up to 2 MW

The Constitutional Amendments

- Florida Tax Exemptions for Renewable Energy Measure (Amendment 4)
  - Exempts solar from tangible personal property tax
    - Residential exemption already in place, will provide TPPT exemption for businesses
    - Will unlock potential for solar leasing
  - Exemption begins 2018, lasts through end of 2037

Solar Financing Options

Third Party Ownership

Customer Owned and FInanced

Utility-Owned Solar

Engage Local Lenders

Fewer than **5%**

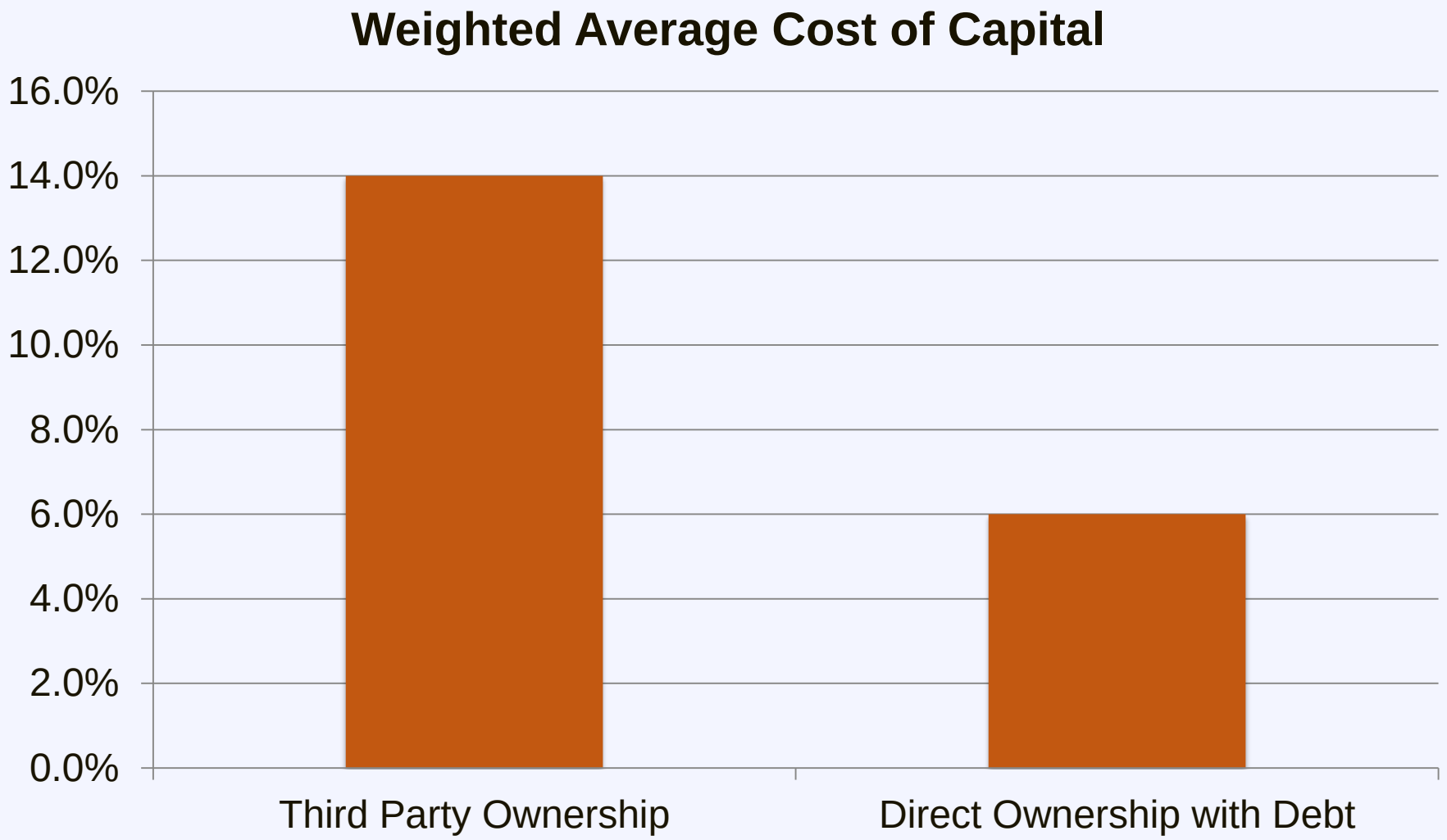
of the

6,500 banks in the US

are

actively financing solar PV projects

Third Party Ownership: Cost



Financing 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

Learn more about loan options at

https://www.energysage.com/solar/financing/loan-providers

Utility and Municipal Loan Programs

Orlando Utilities Commission

- Partnership with Orlando Federal Credit Union
- Up to $20,000 loan for PV
- 2% (3-year) and 5.5% (10-year) options

City of Tallahassee Utilities Energy Efficiency Loan Program

- Up to $20,000 secured loan, 10-year term at 5% interest

Municipal & utility partnerships can beat existing options

Source: http://www.ouc.com/environment-community/solar/solar-incentives; https://www.talgov.com/Uploads/Public/Documents/you/learn/library/documents/cotu_loan_handbook.pdf

PACE Financing

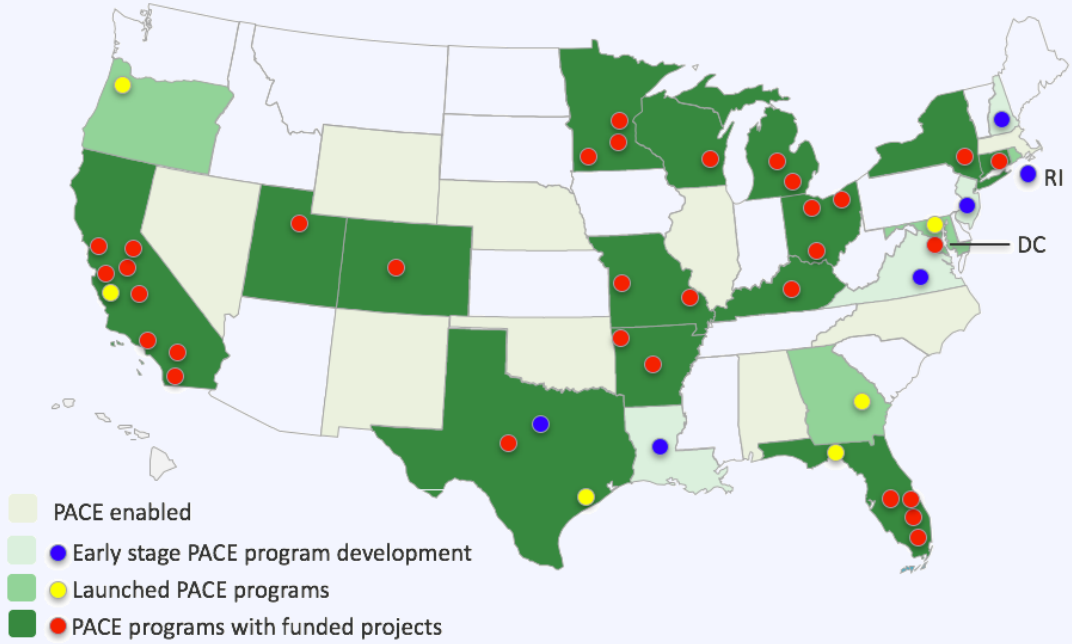
- Finance energy efficiency projects or renewable energy installations through a property assessment

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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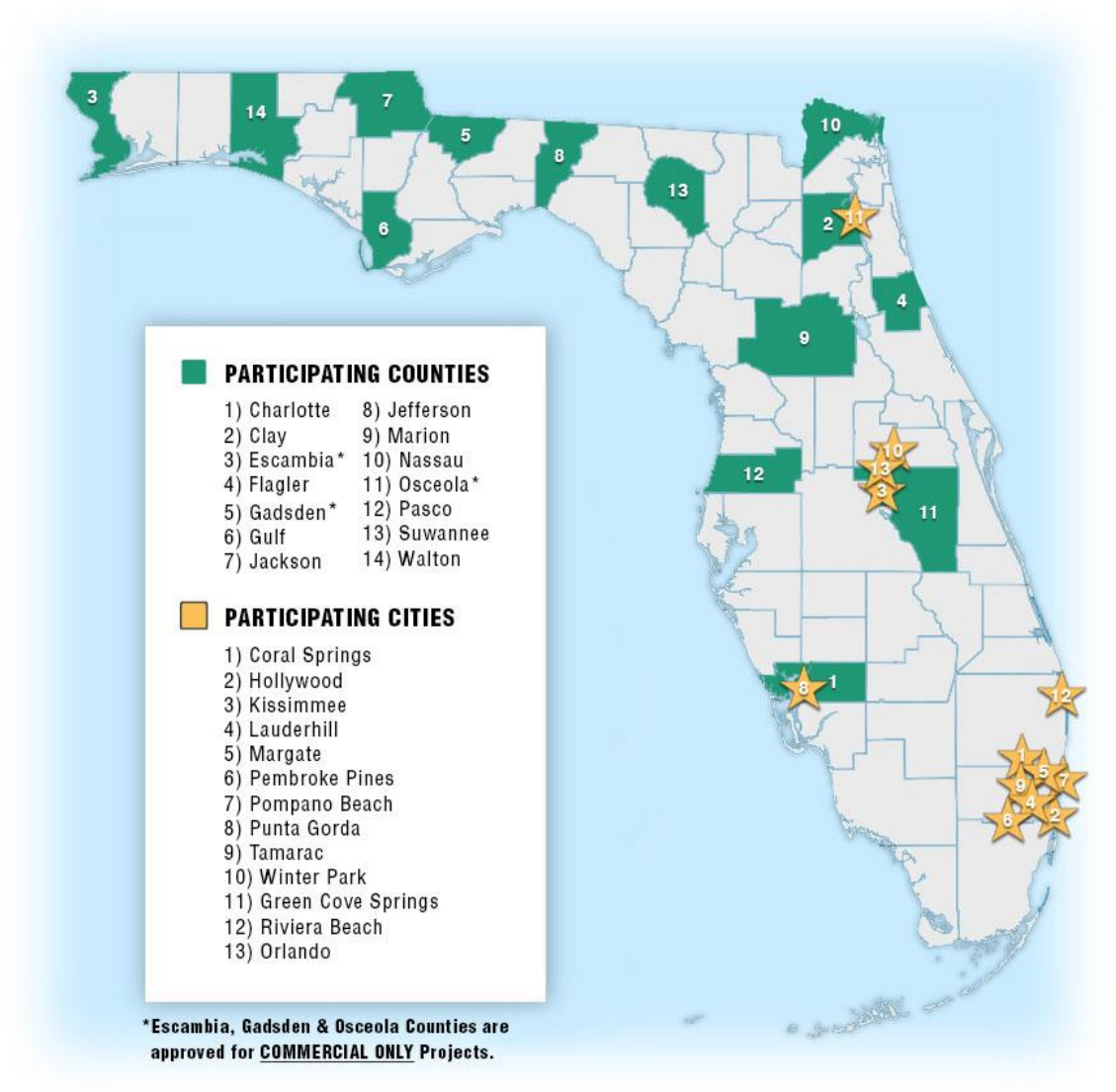
Source: PACENation.us

PACE Financing in Florida



- Up to 20 year loan terms, ~7% interest rate

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Source: https://www.floridapace.gov/participating-communities; http://www.sun-sentinel.com/business/personal-finance/fl-pace-financing-update-20150109-story.html

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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U.S. Department of Energy

Solar Financing Options

Third Party Ownership

Customer Owned and Financed

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

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

Examples:

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

Roanoke Electric Cooperative
Your Touchstone Energy® Partner

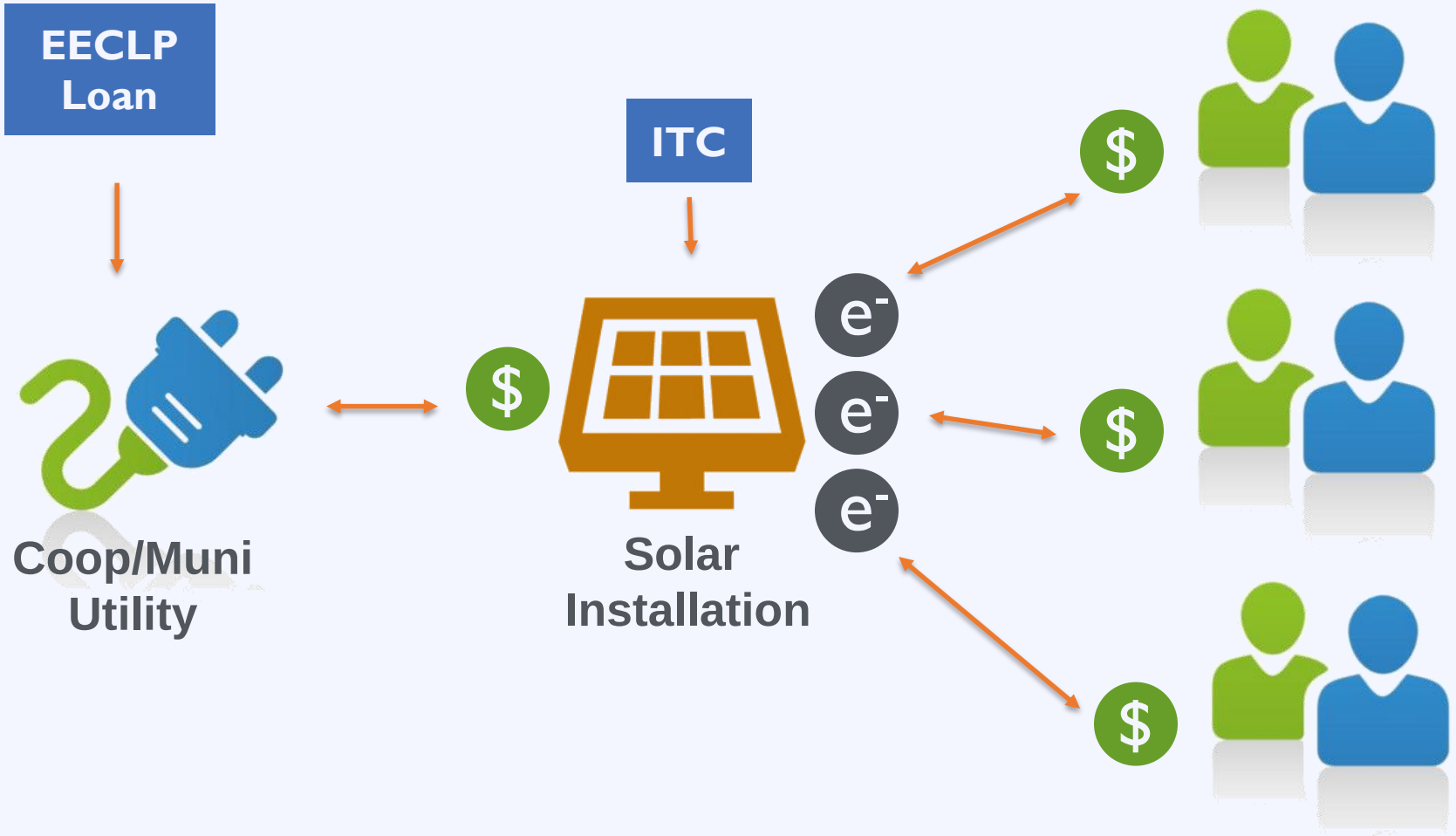
How$martKY™

Utility-Run Community Solar

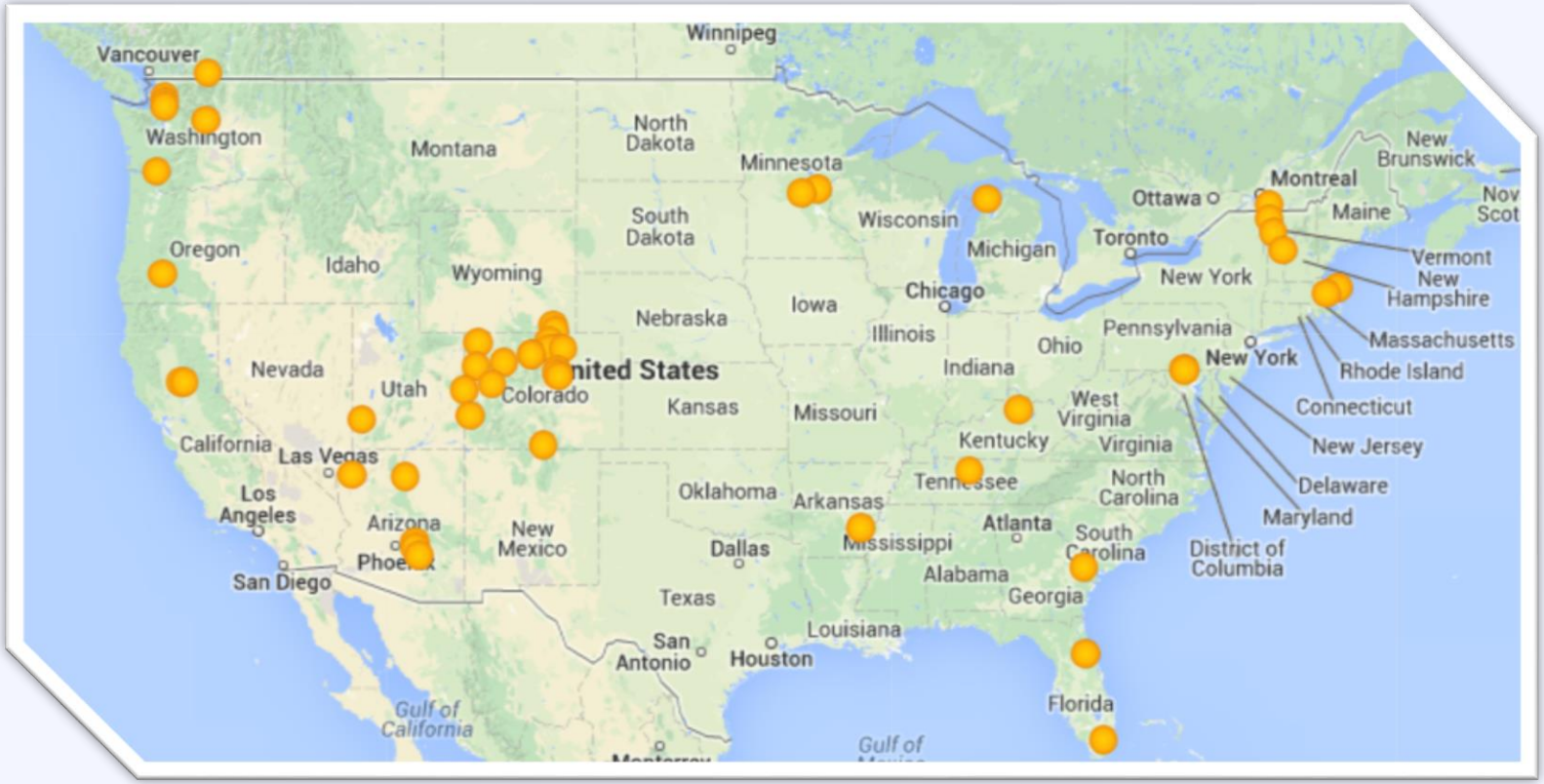
Utility lends money to solar developer

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

Community Solar in Florida

Orlando Utilities Commission

- Subscribe to blocks of up to 15 kW from community array
- $0.13/kWh locked-in rate for 25 years

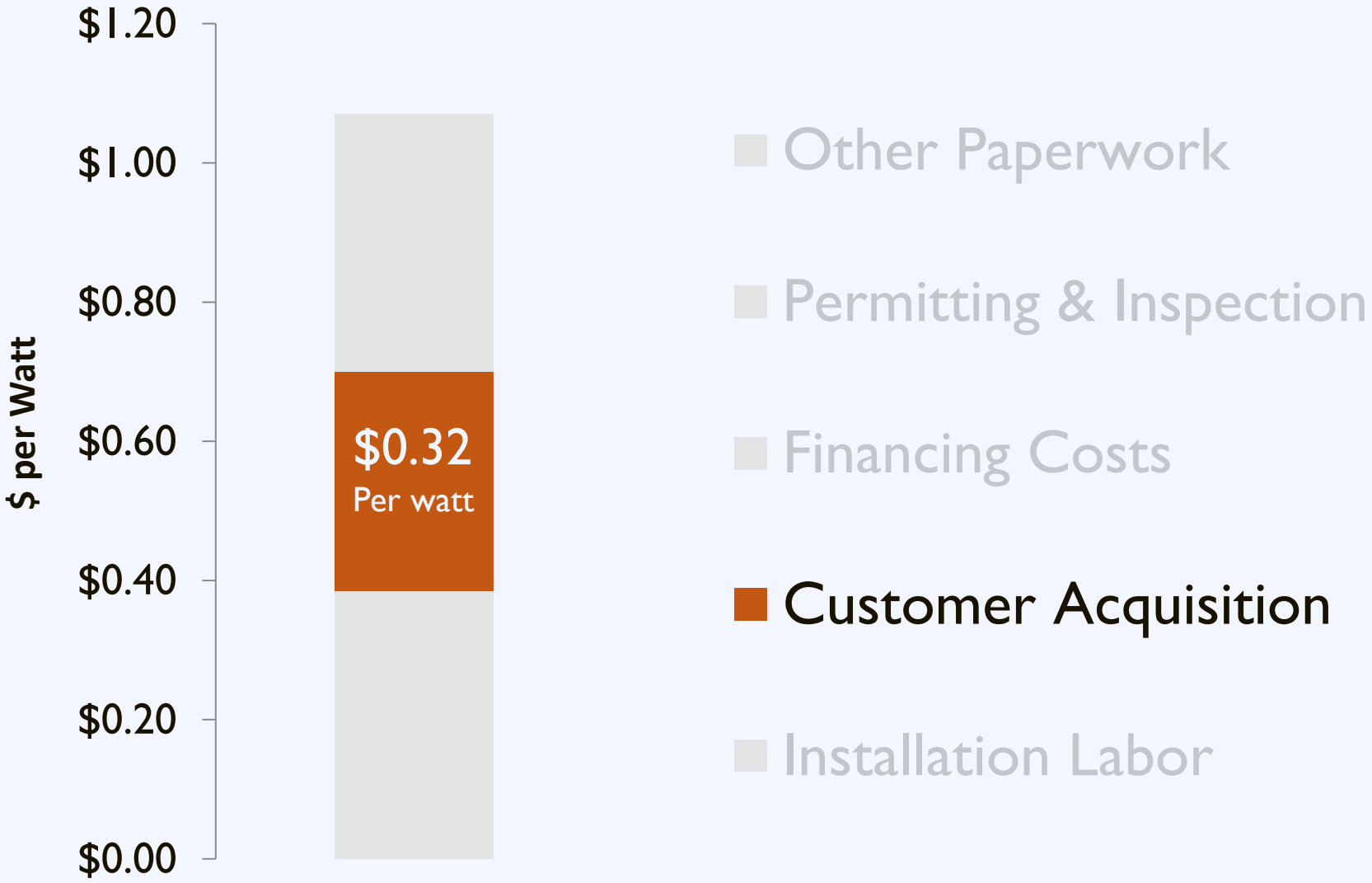
Florida Keys Electric Cooperative Association

- Upfront lease payment of $999 per 175W panel ($5.71/W), 25-year agreement
- Bill credited at retail rate for generation from panels

Gulf Power Energy Share (forthcoming)

- Subscription of $99/year ($89/year for 5-year commitment) for ~750 kWh of generation
- Monthly bill credit from offset of $2-$2.50/month for 2016

Customer Acquisition



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U.S. Department of Energy

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

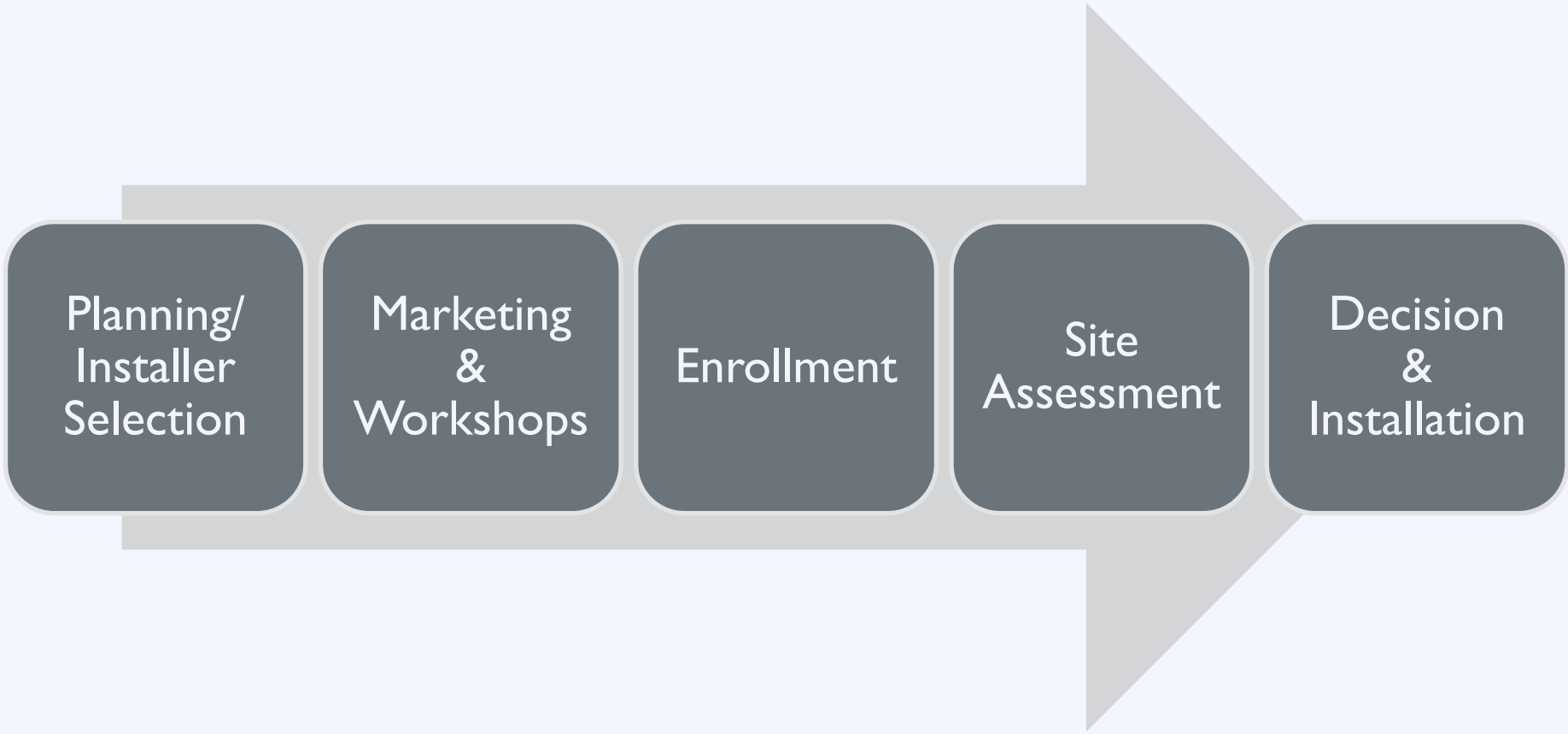
The Solarize Program

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



SanCap: Case Study

SOLAR CONNECT

Sanibel & Captiva Islands, Florida

Population: ~7,000

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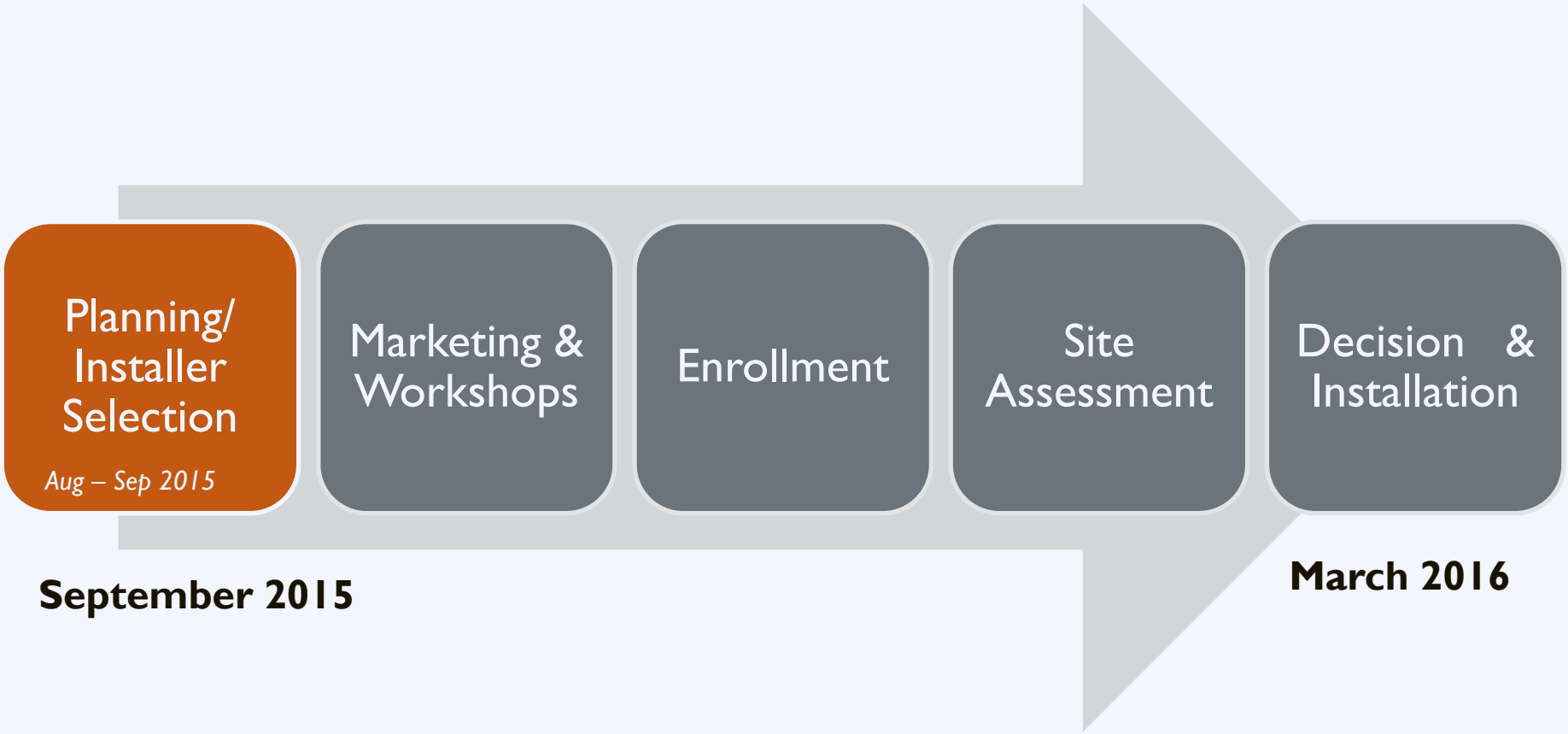
U.S. Department of Energy

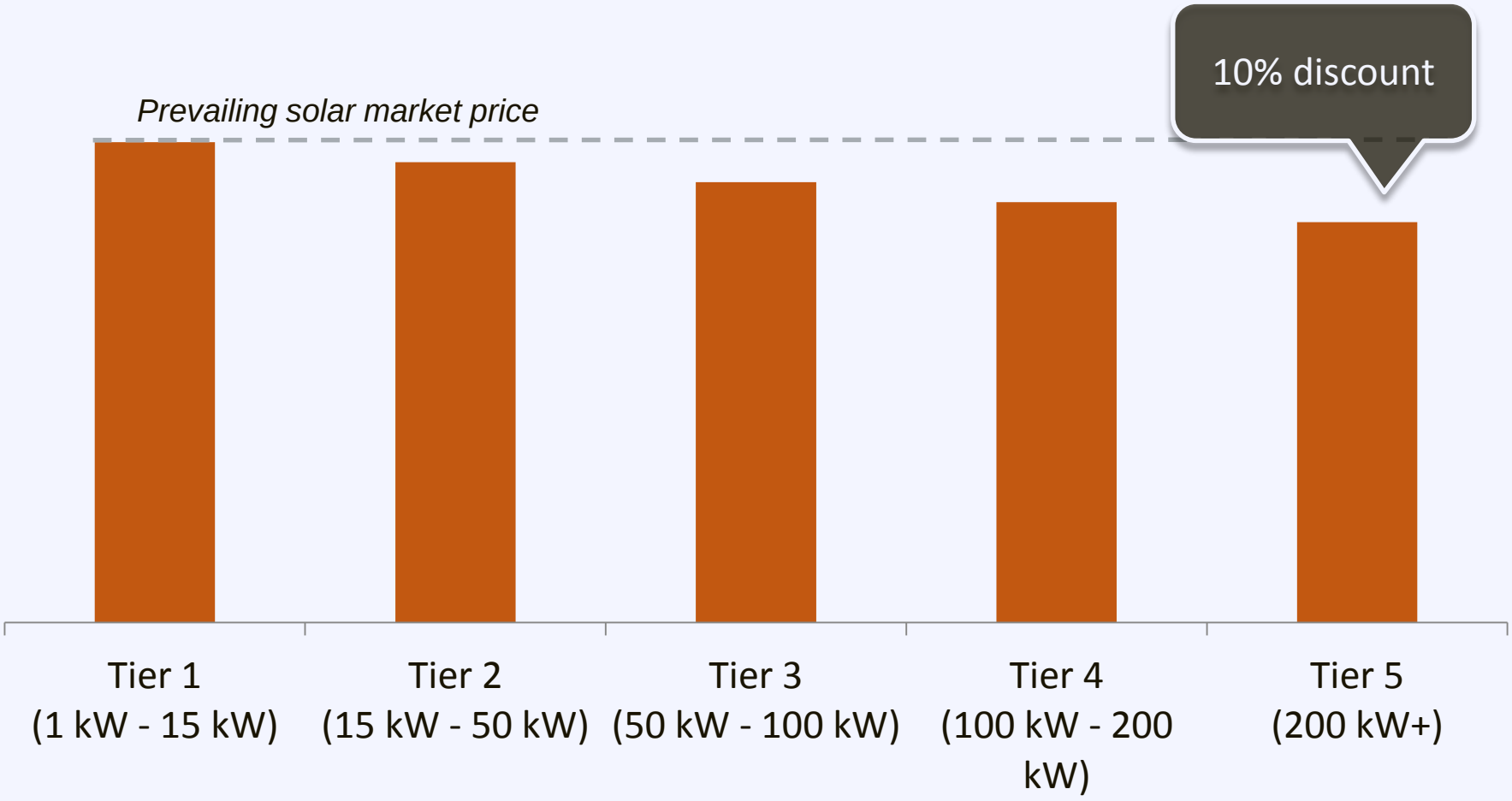
SanCap SOLAR CONNECT: Case Study



SanCap: Case Study

SOLAR CONNECT

Pricing Tiers



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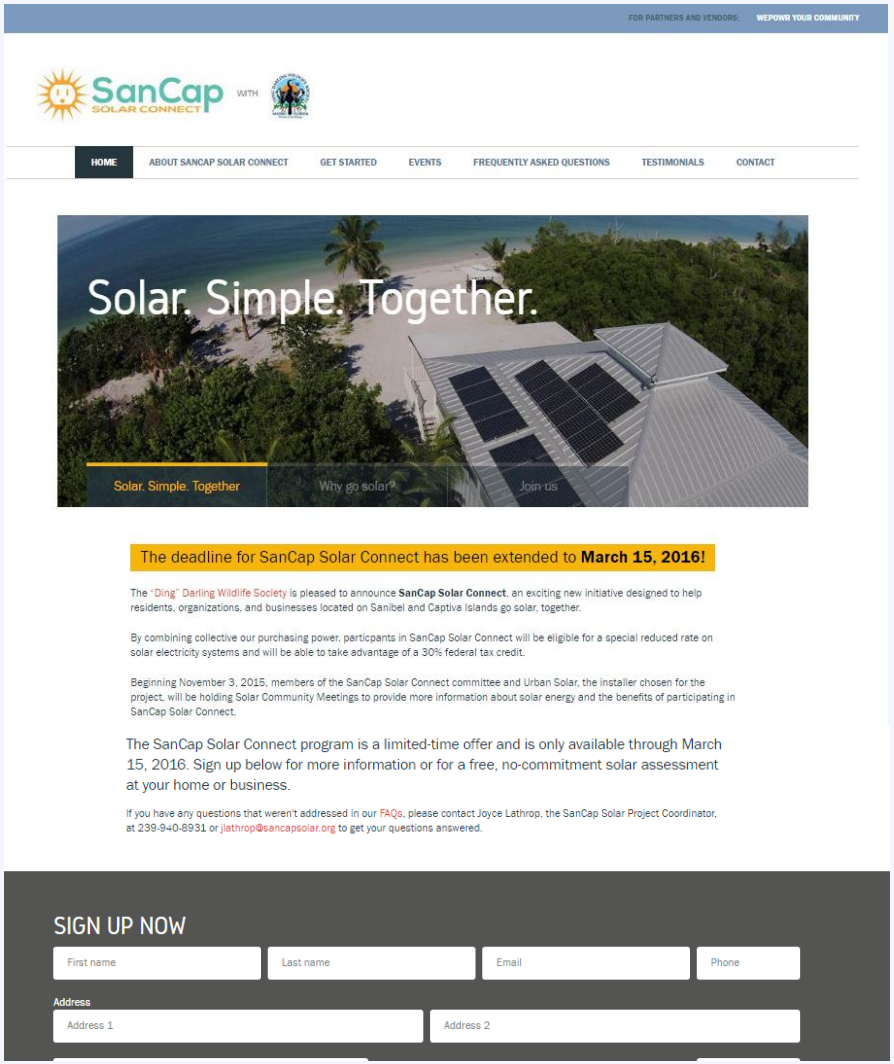
U.S. Department of Energy

SanCap SOLAR CONNECT: Case Study

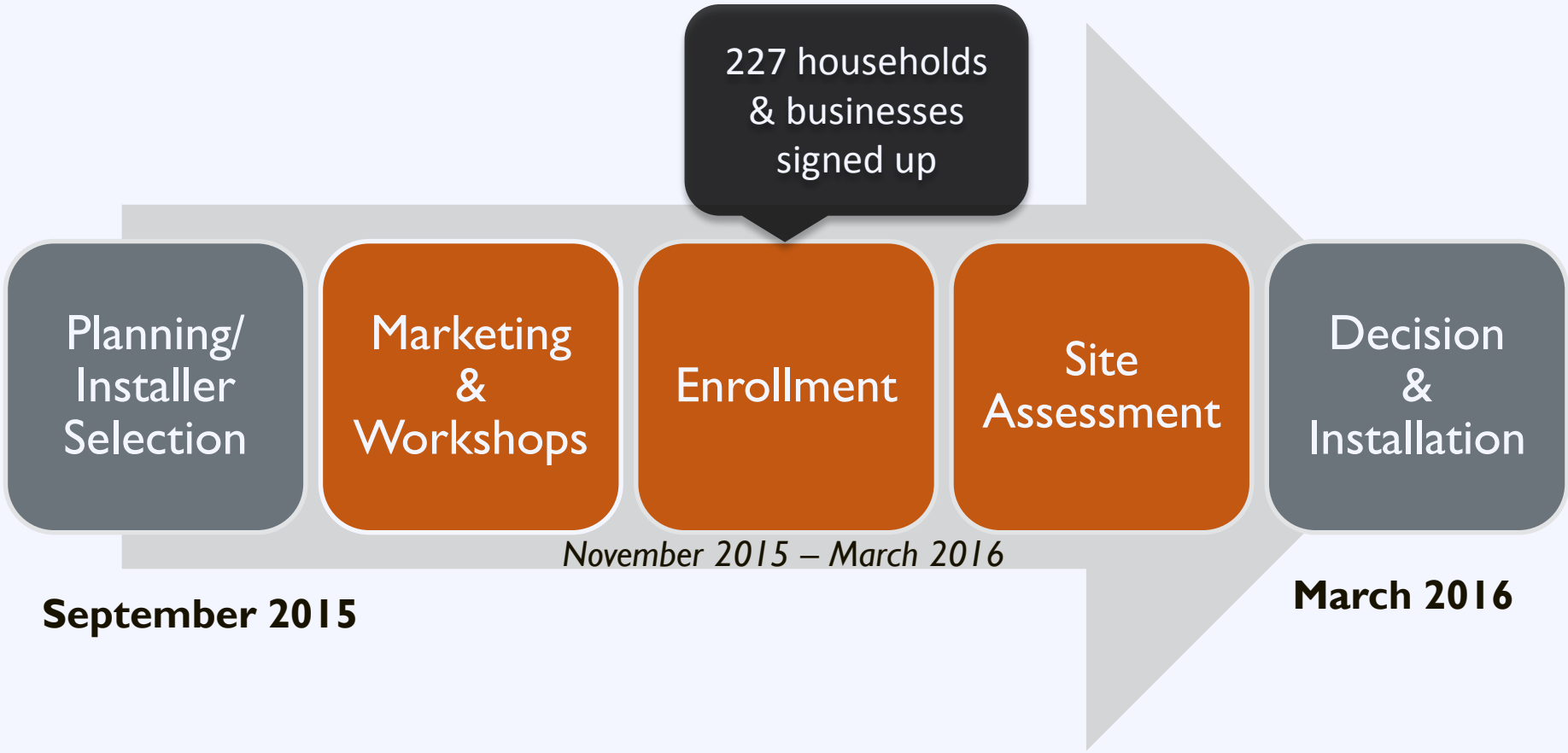
SanCap SOLAR CONNECT: Case Study

Marketing Strategy:

- Social media
- 4 Solar Community Meetings at "Ding" Darling Wildlife Society
- Local newspaper and media
- Mailers/newsletters to Friends of DDWS



SanCap SOLAR CONNECT: Case Study



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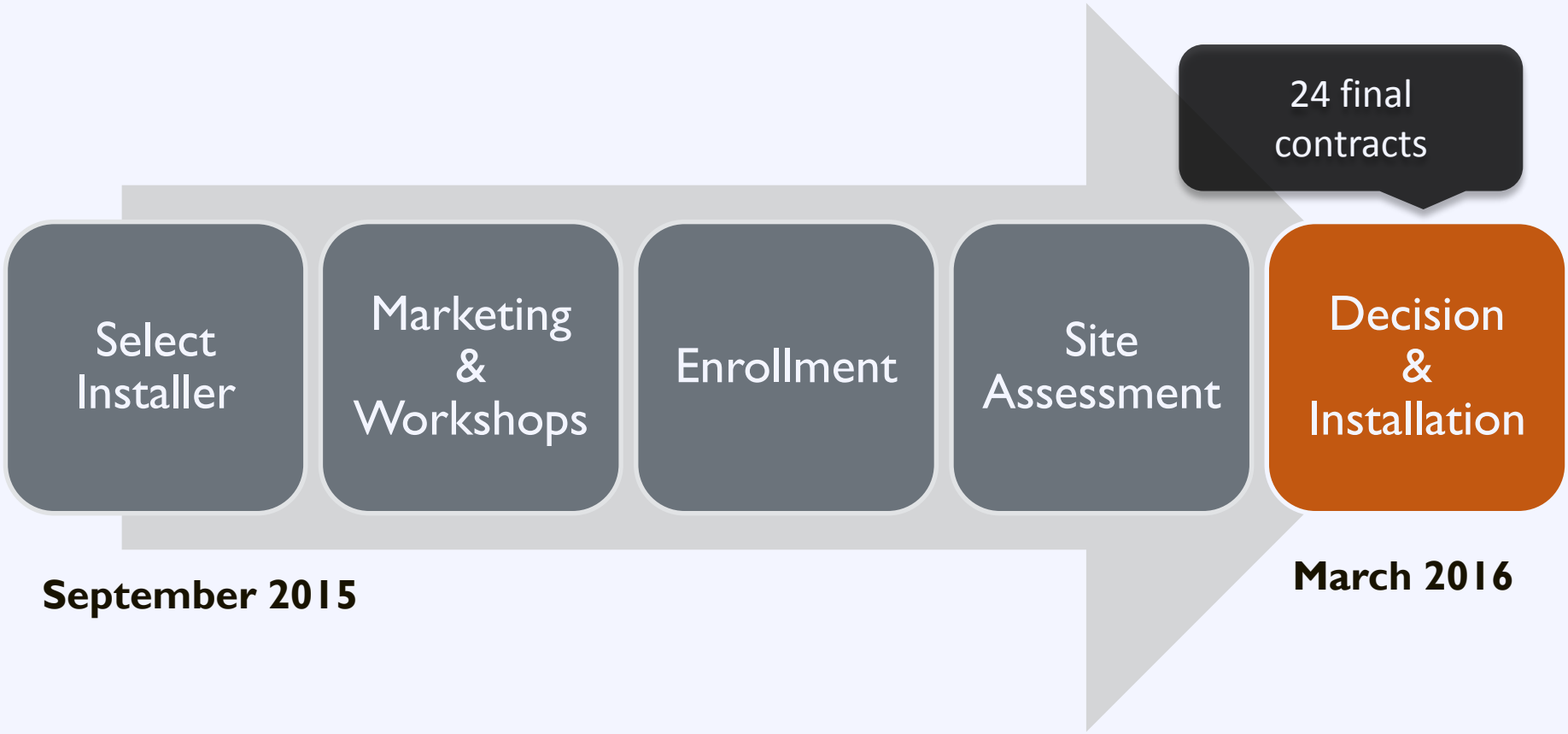

SanCap SOLAR CONNECT: Case Study

Results:

24 new installations totaling 272 kW

- 20 homes (134 kW)
- 4 businesses (138 kW)

$2.62/W base price (final tier) achieved

Partnerships with two local banks

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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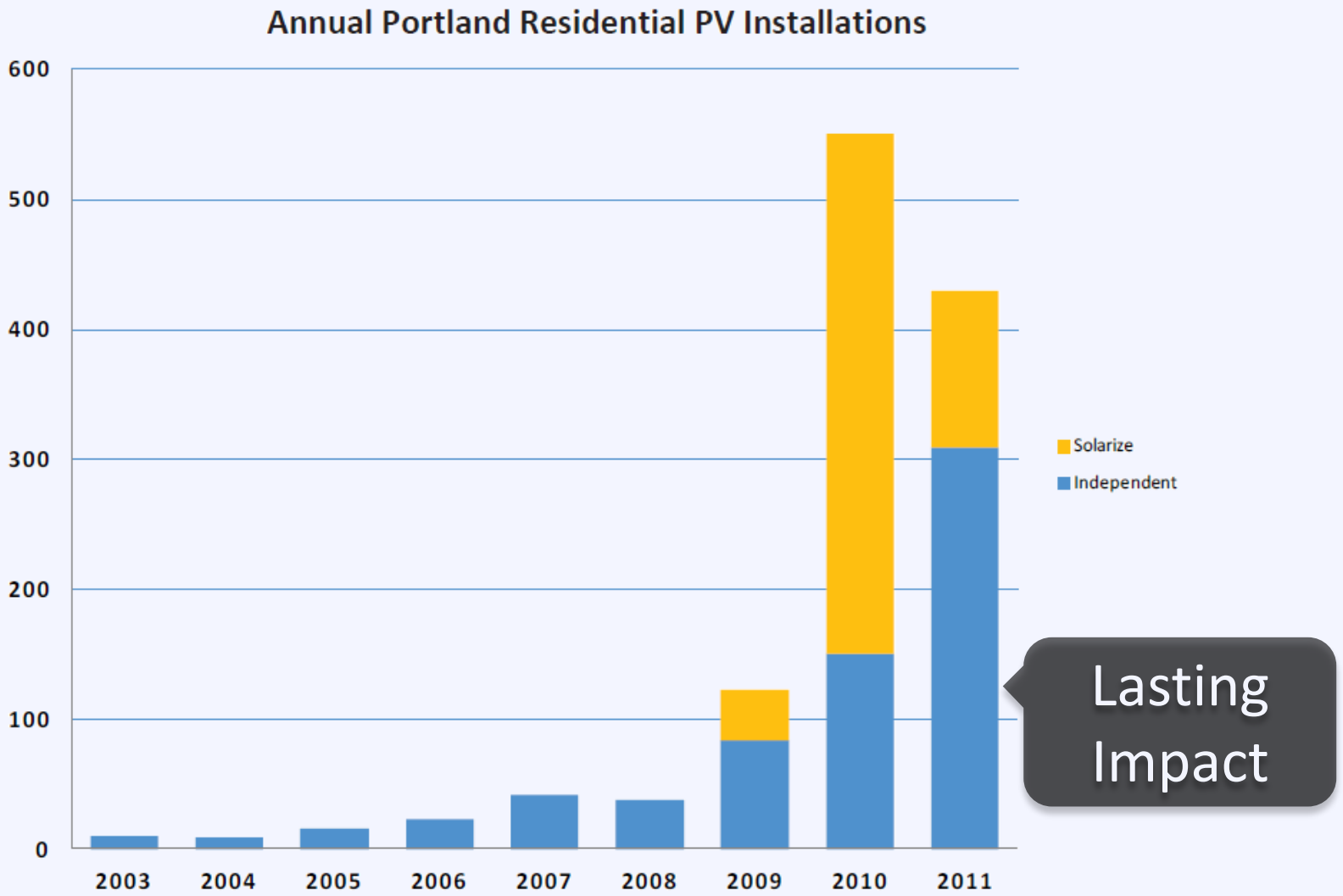
U.S. Department of Energy

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

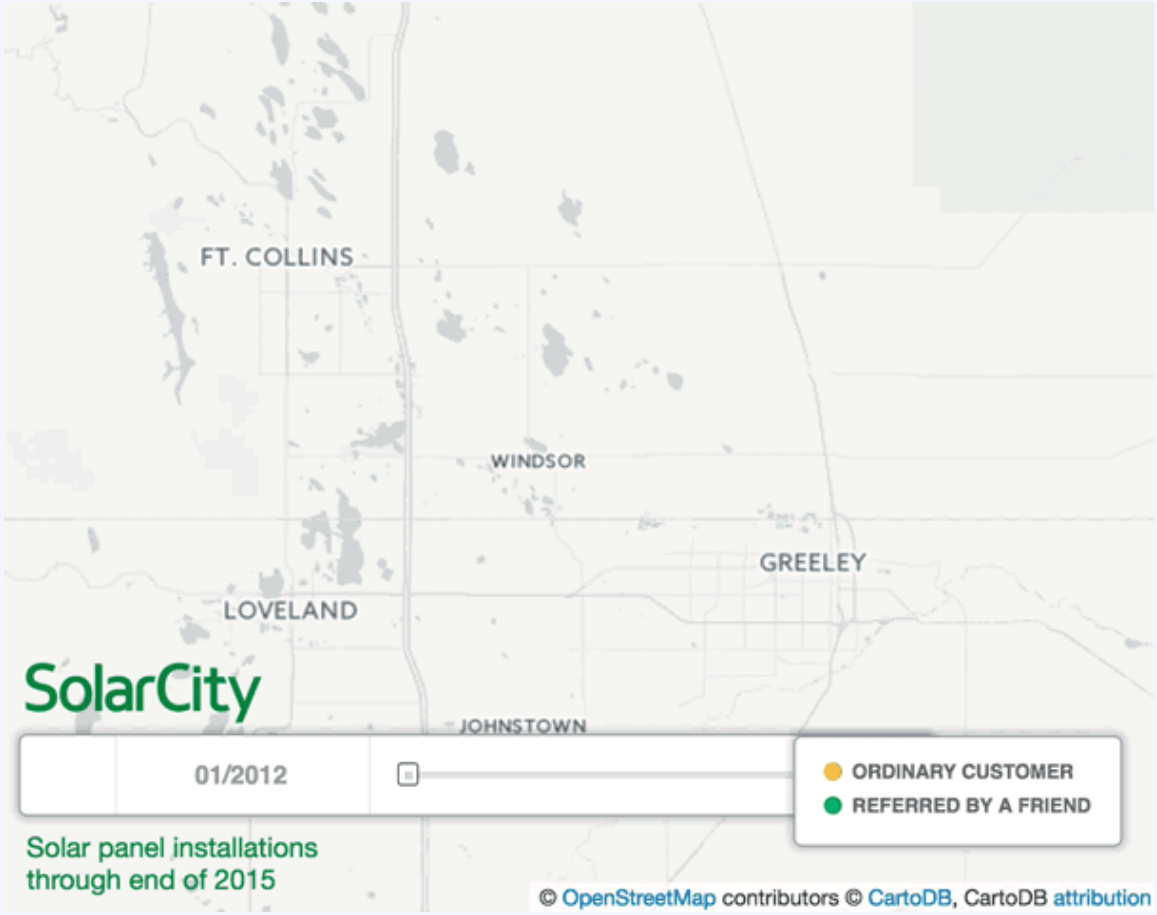
Solarize: Lasting Impact



Solarize: Lasting Impact

Solar is contagious!

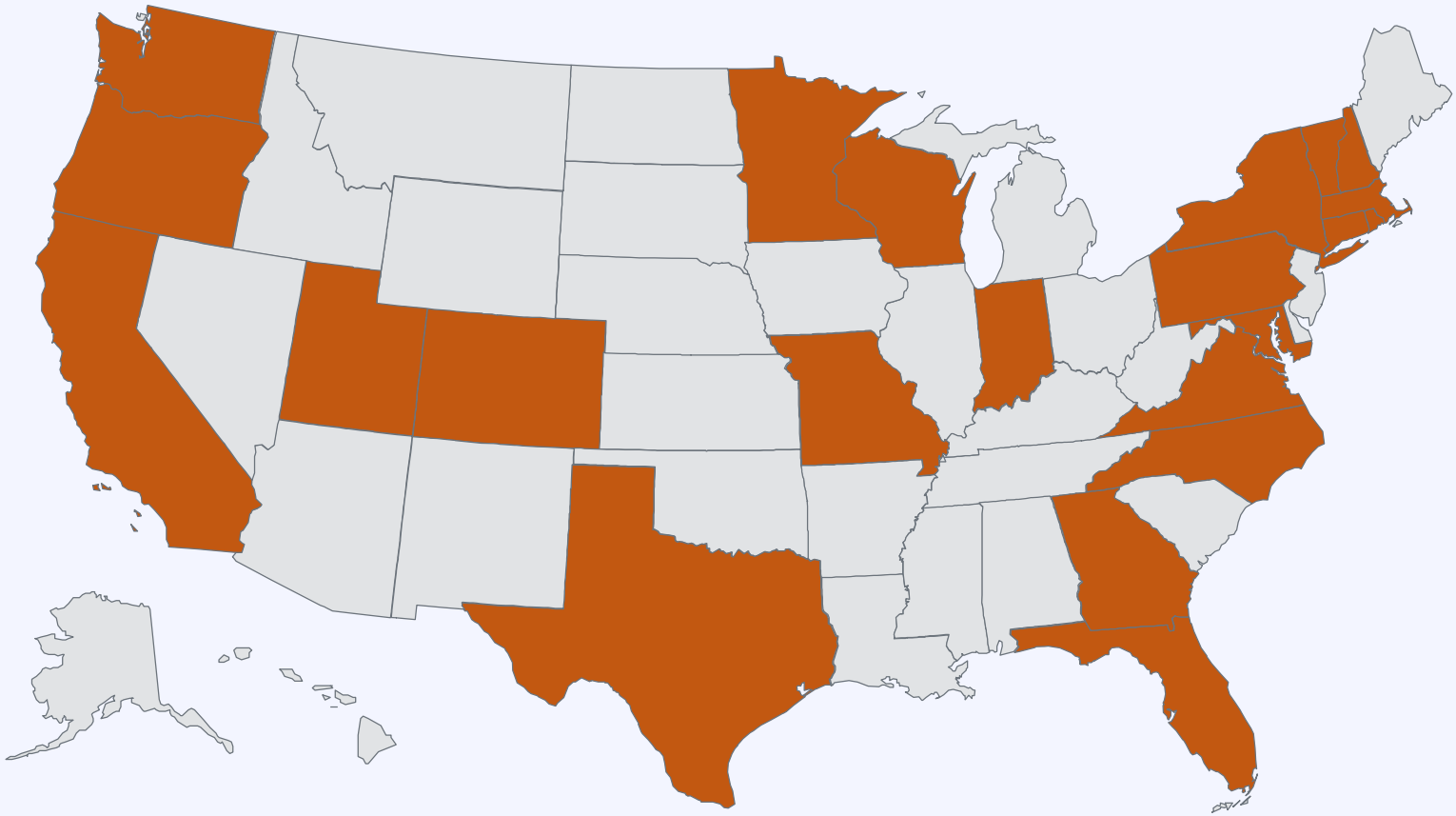
69% of SolarCity's installations in Ft. Collins came from referrals



Source: SolarCity (http://www.vox.com/2016/5/4/11590396/solar-power-contagious-maps)

Solarize: National Growth

Over 200 Campaigns in 22 States



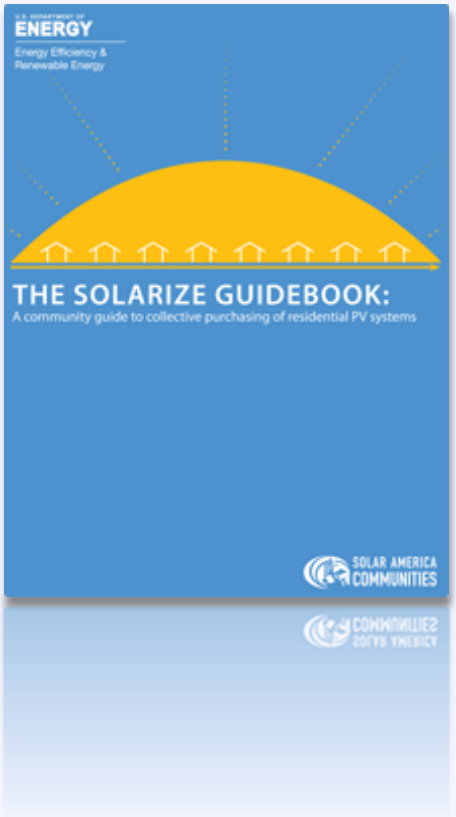
Thousands of homes Solarized!

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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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

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?

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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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U.S. Department of Energy

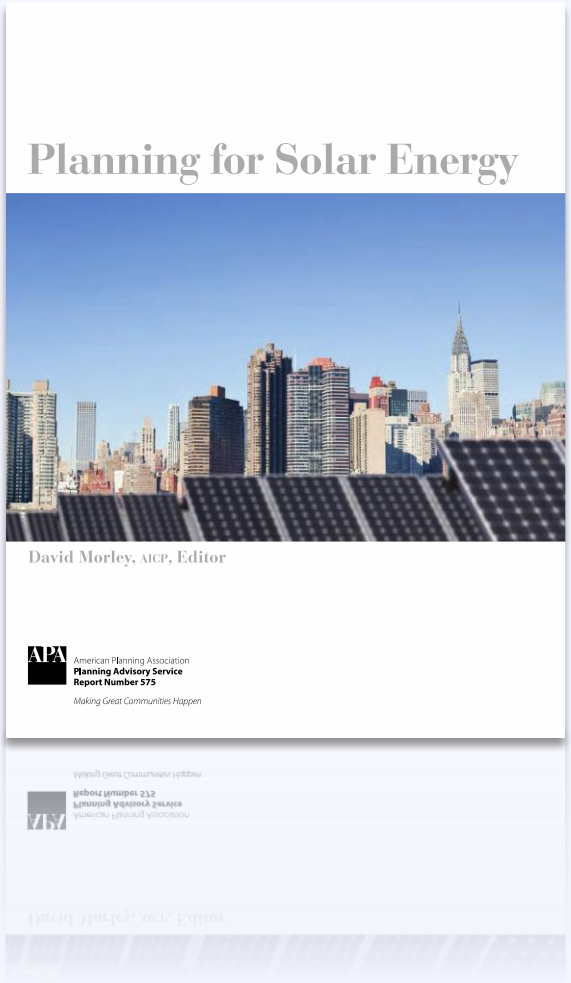
Source: American Planning Association

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

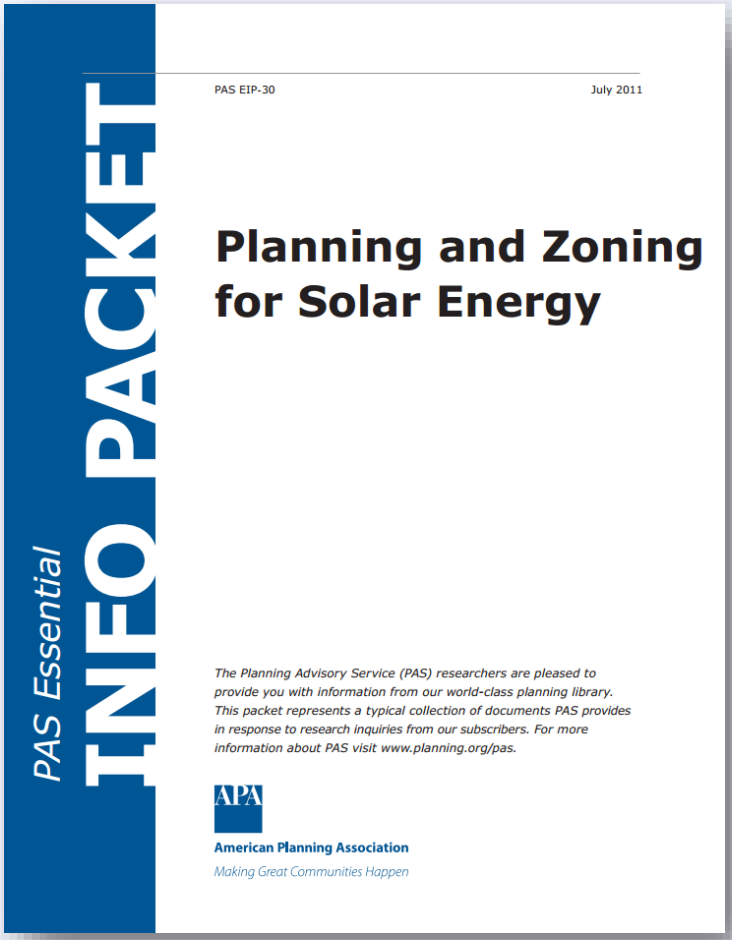
Typical Requirements:

- 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:

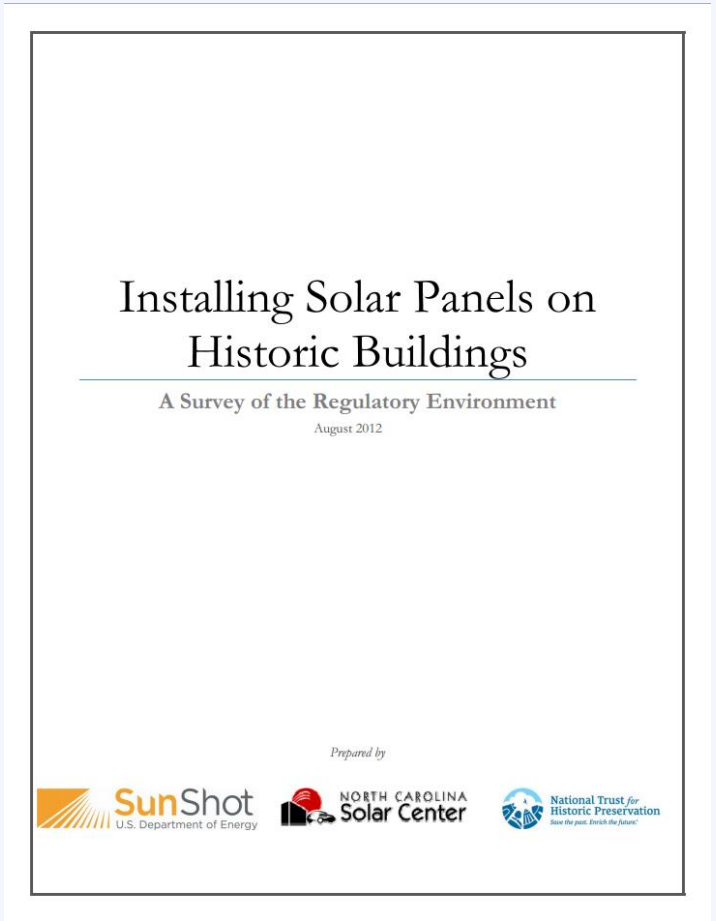
- Prevent permanent loss of "character defining" features
- Possible design requirements
  - Ground mounted
  - Flat roof with setback
  - Panels flush with roof
  - Blend color

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**

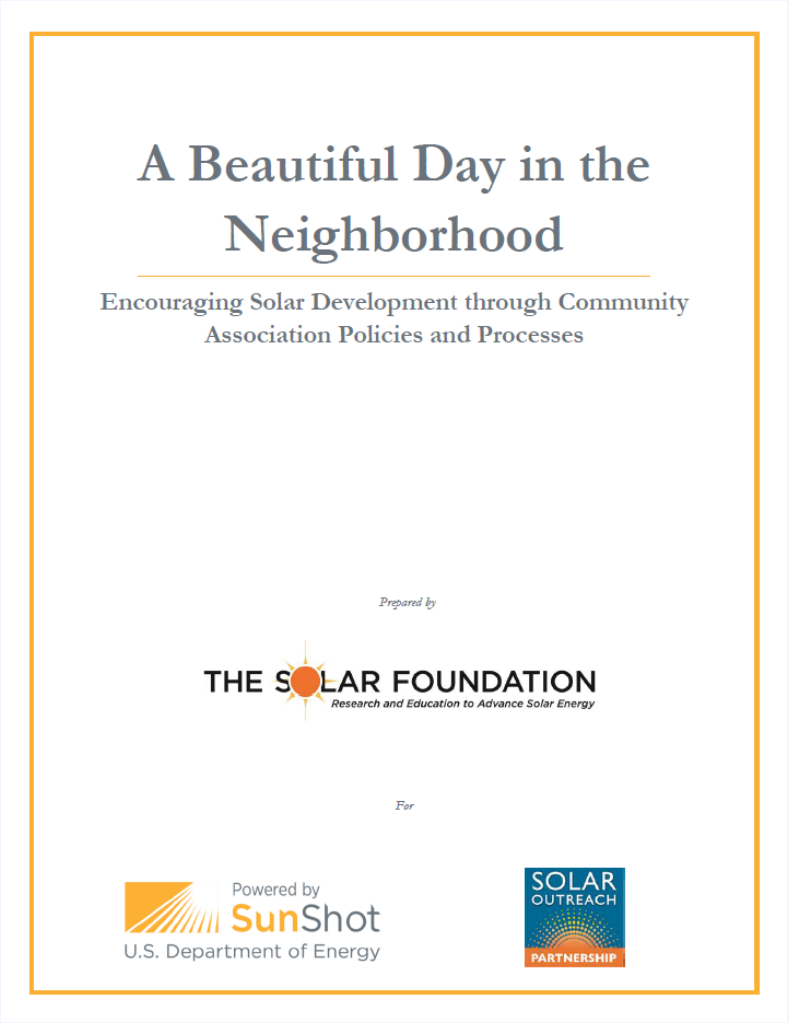
Provides sample design principles and example regulations incorporating historic preservation into sustainability and energy projects.



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:

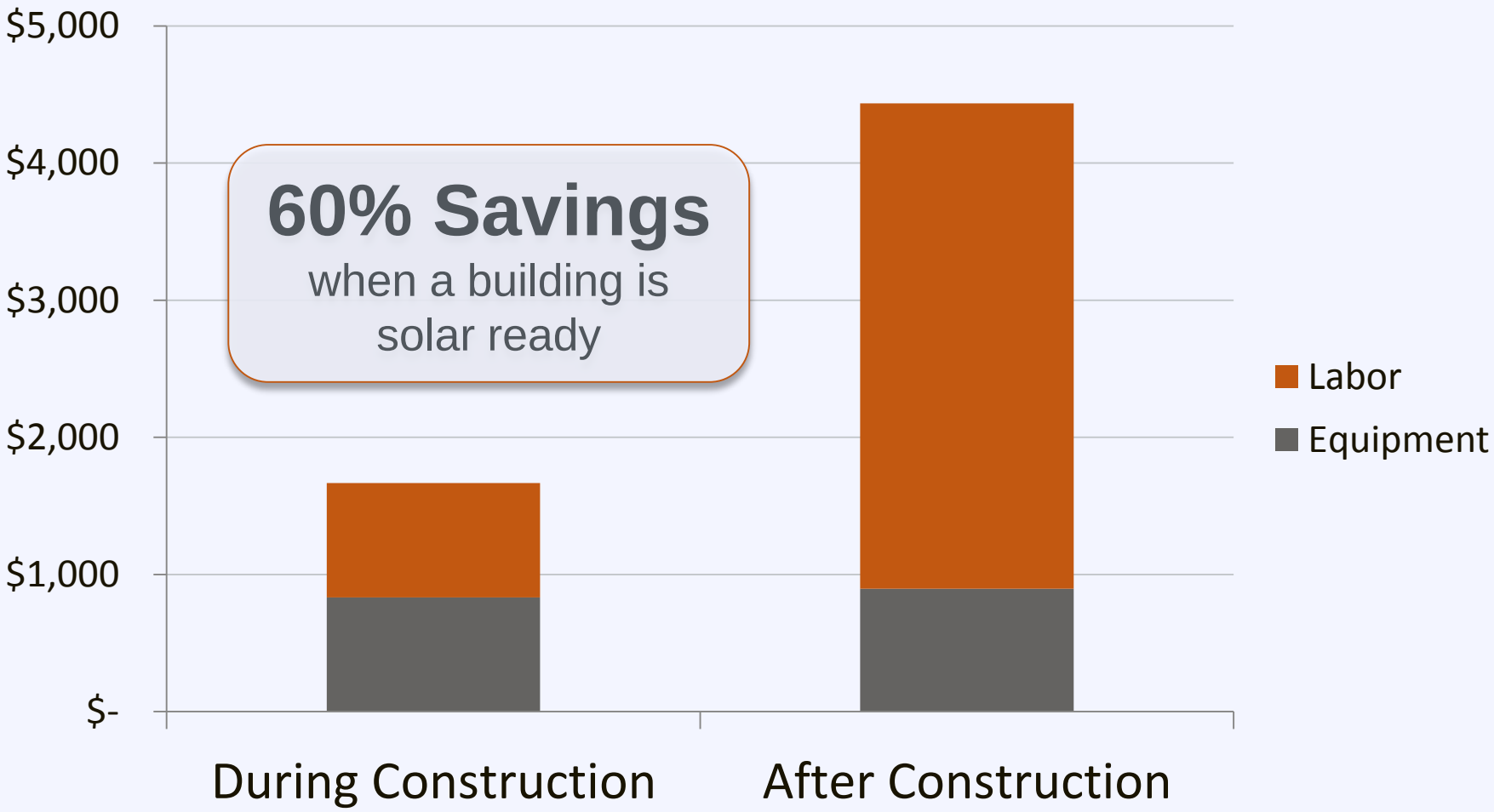
Preparing a building for solar at the outset can help make future solar installations easier and more cost effective.

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



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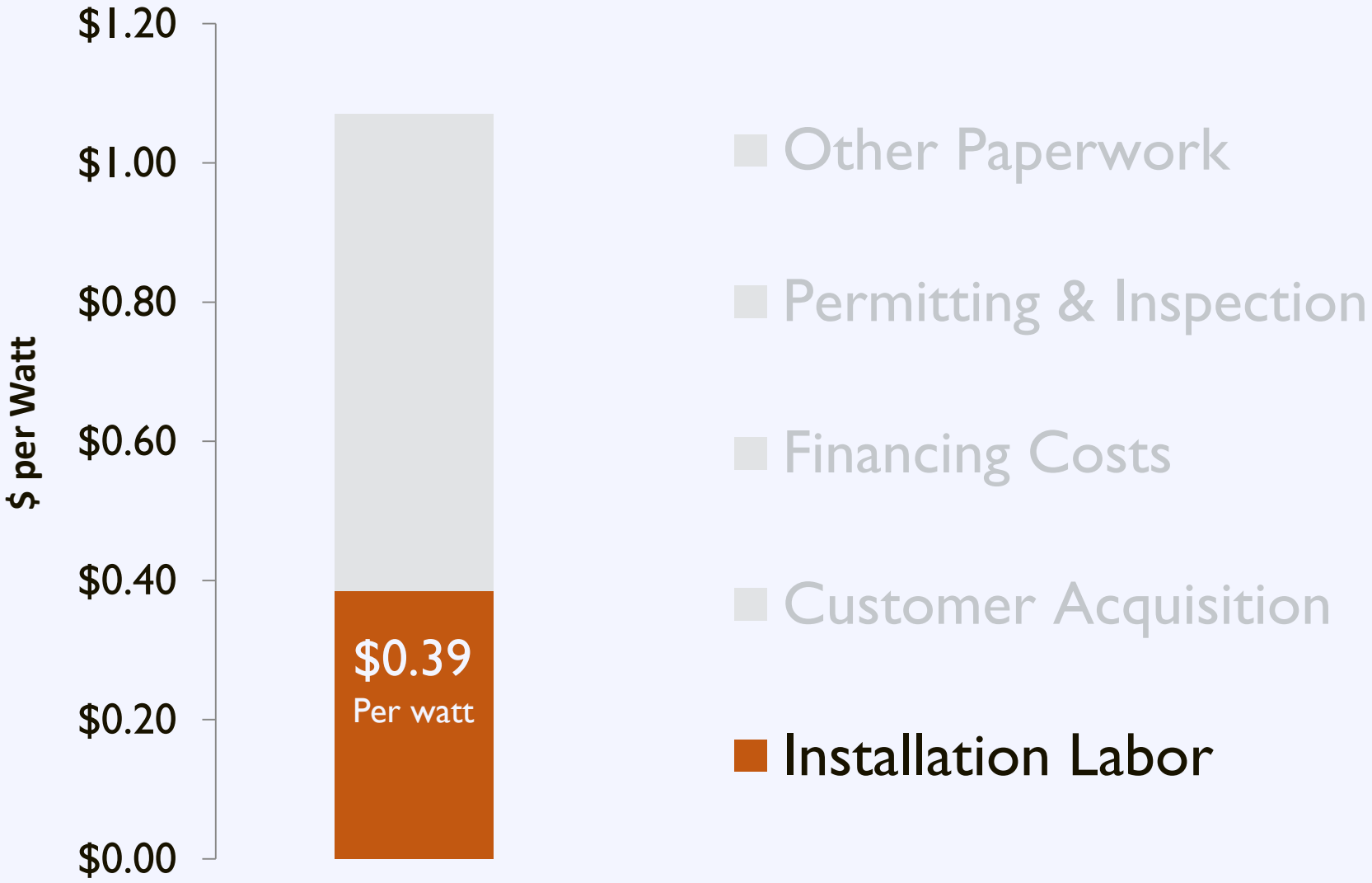
Source: Solar Ready: An Overview of Implementation Practices [Draft]. NREL, Feb. 18, 2011.

Installation Soft Costs



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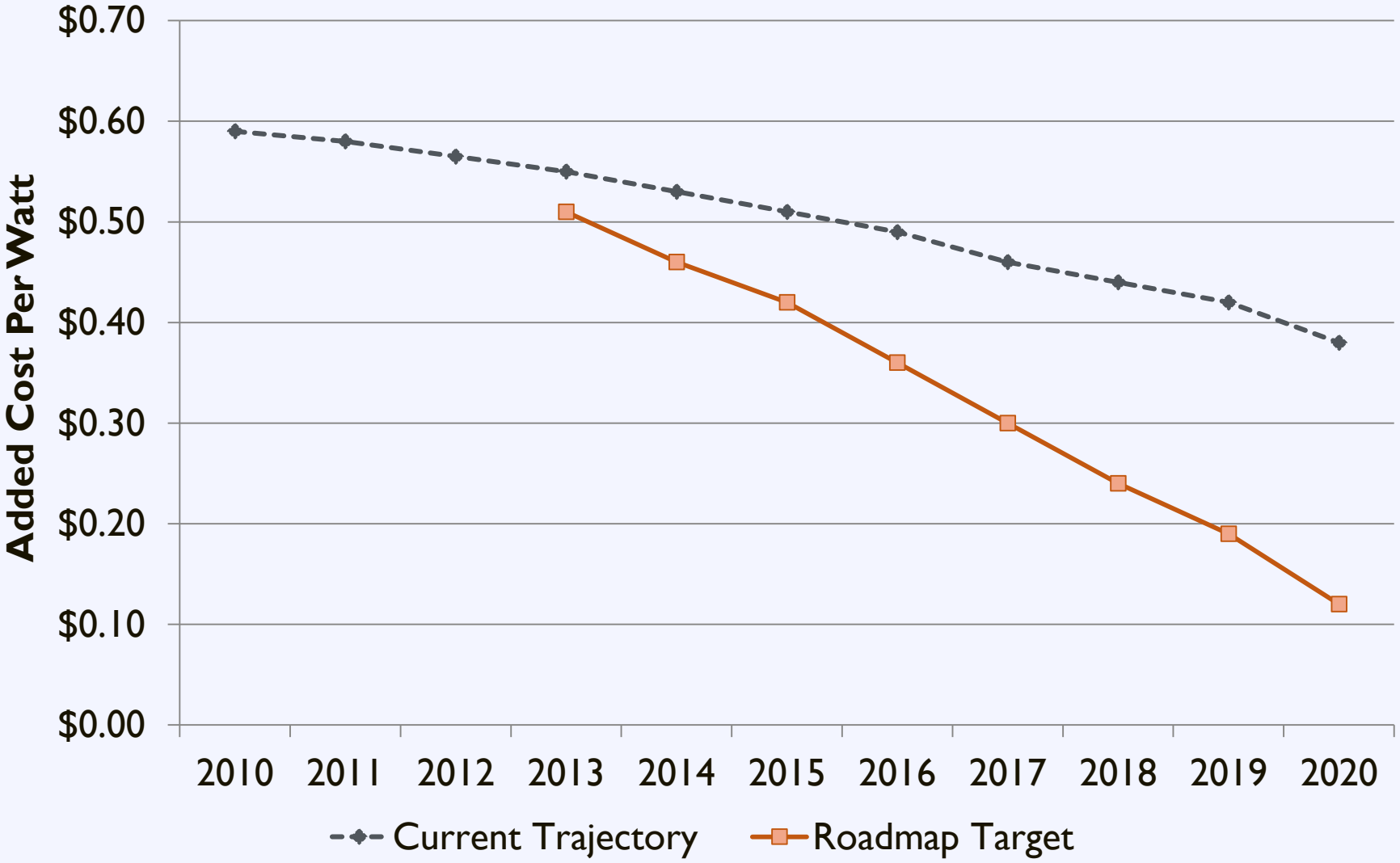
Installation Labor Roadmap



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Source: NREL (http://www.nrel.gov/docs/fy13osti/59155.pdf)

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

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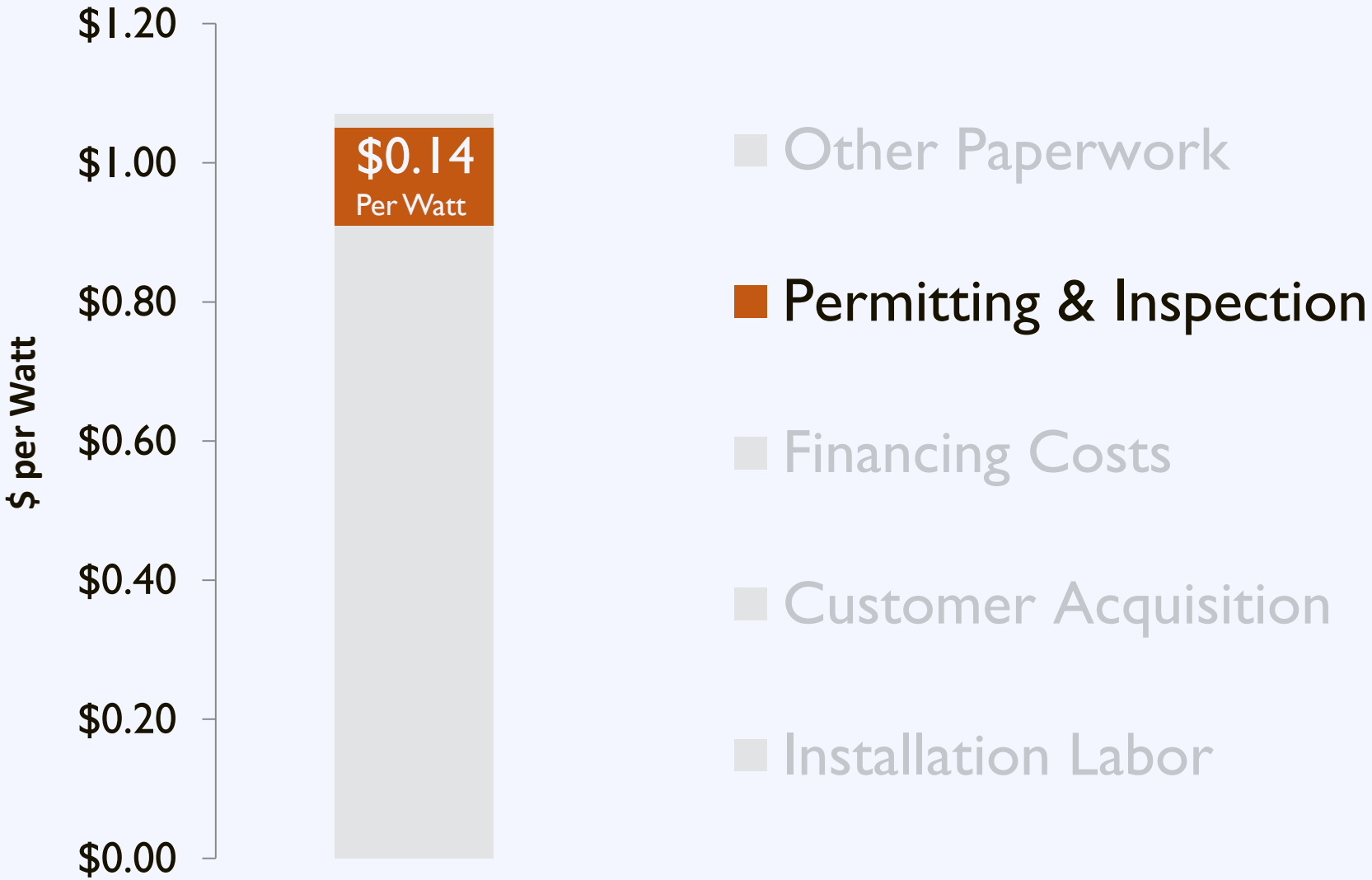
Source: http://www.nrel.gov/docs/fy12osti/54689.pdf

Consumer Challenges

Source: Forbes

Regulatory Barriers



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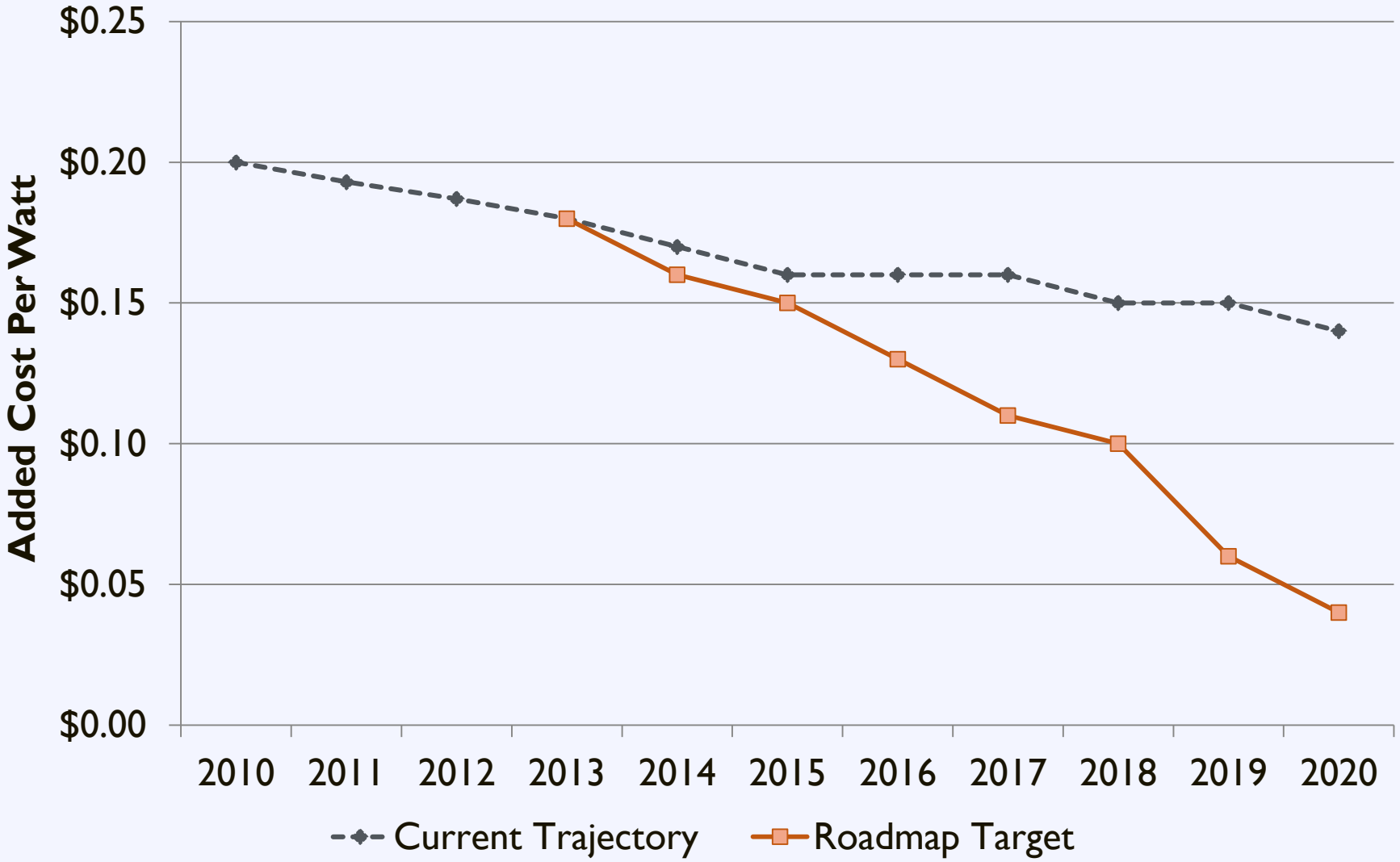
Planning & Permitting Roadmap



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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

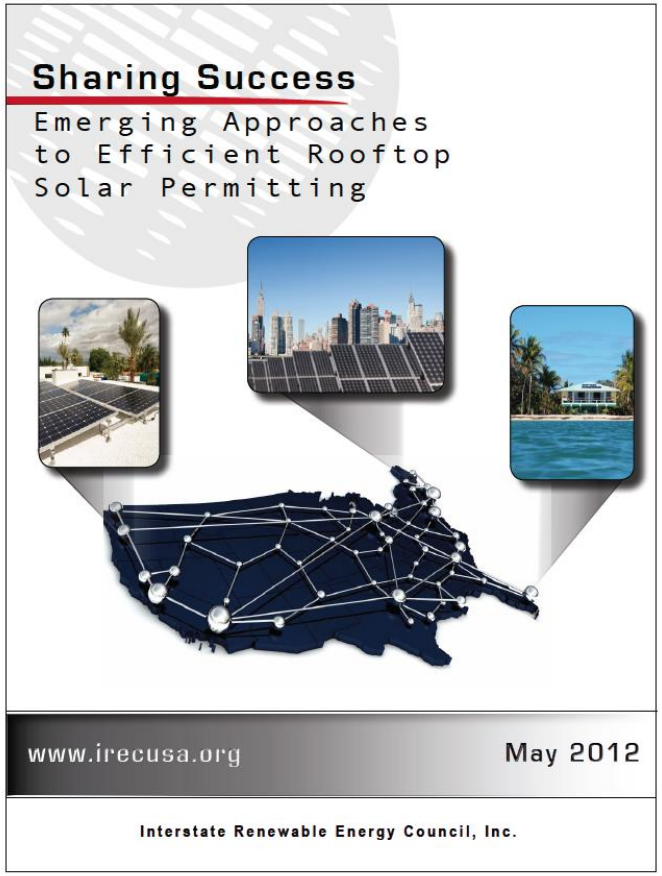
Local Government Perspective:

- 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

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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

Florida Rooftop Solar Challenge

Go SOLAR Florida (Part I)

- Led by Broward County
- Developed an online Florida Solar Permitting System
  - Flat fee of $552
  - Created set of preapproved design plans, enabling permit to be issued within ~1 hour
- Developed and promoted best management practices for interconnection, net metering, financing, and planning & zoning

Source: http://www.osti.gov/scitech/servlets/purl/1091335

Florida Rooftop Solar Challenge

Go SOLAR Florida (Part II)

- Expanding online permitting platform to 9 municipalities and 6 counties

Still work to be done – **818 different permitting jurisdictions** in the state of Florida!

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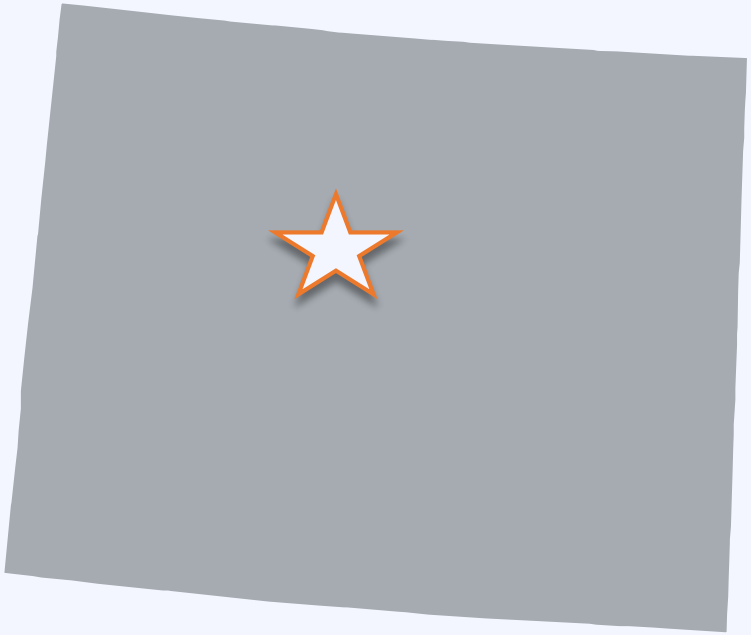
Source: http://energy.gov/eere/sunshot/rooftop-solar-challenge; Go SOLAR Florida team

Expedited Permitting: Case Study



Breckenridge, Colorado

Population: 4,540

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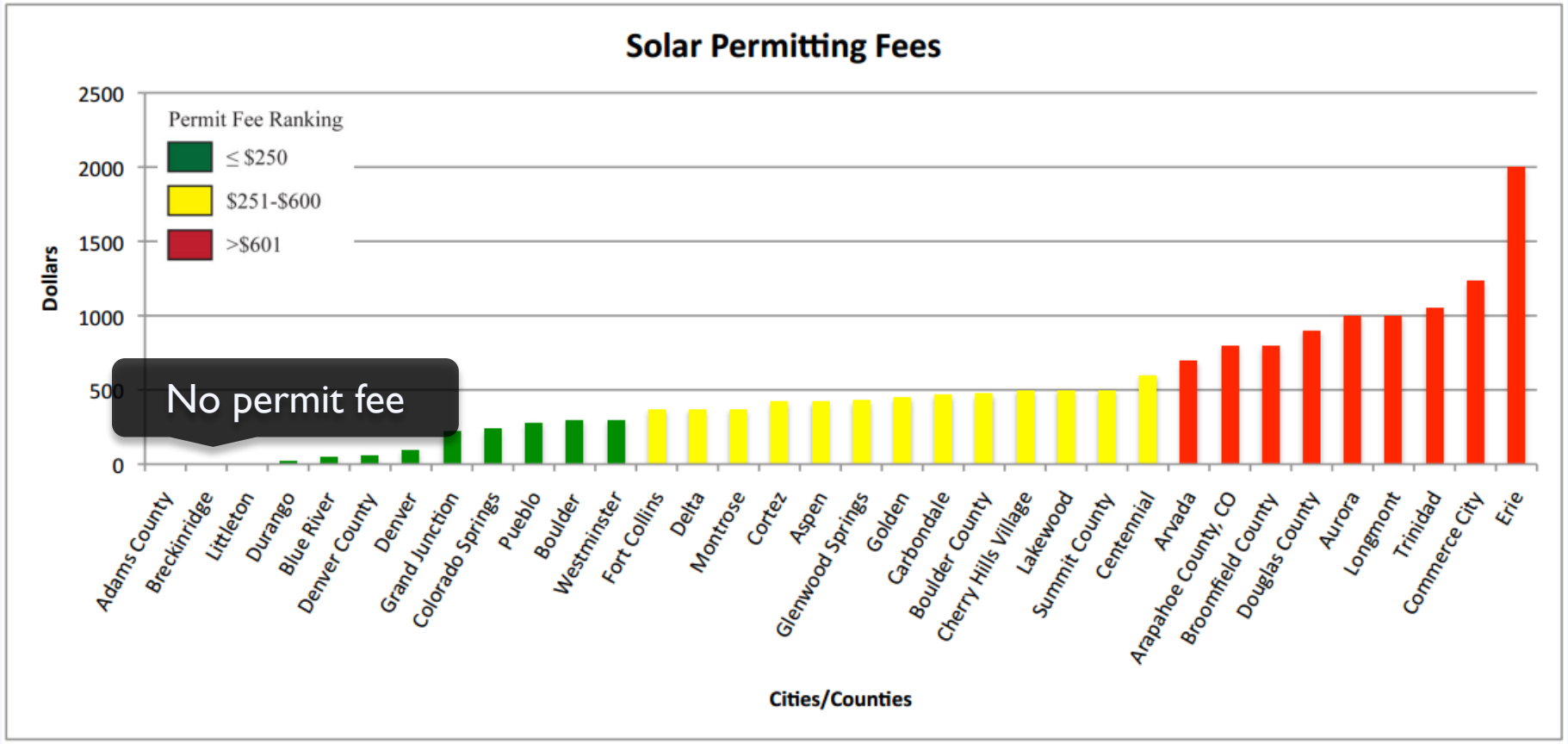
Source: Wikipedia

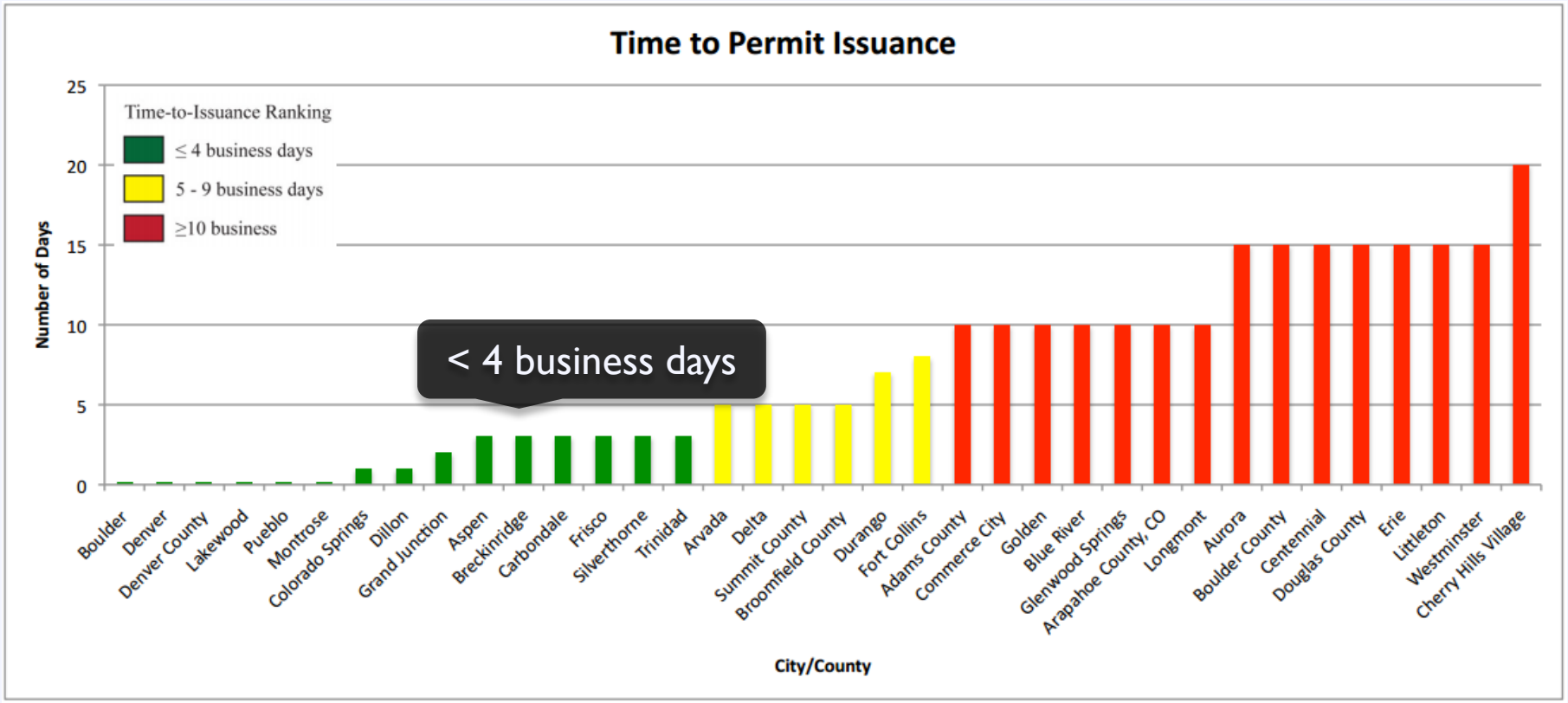
Expedited Permitting: Case Study

Breckenridge charges no fees to file for a solar permit



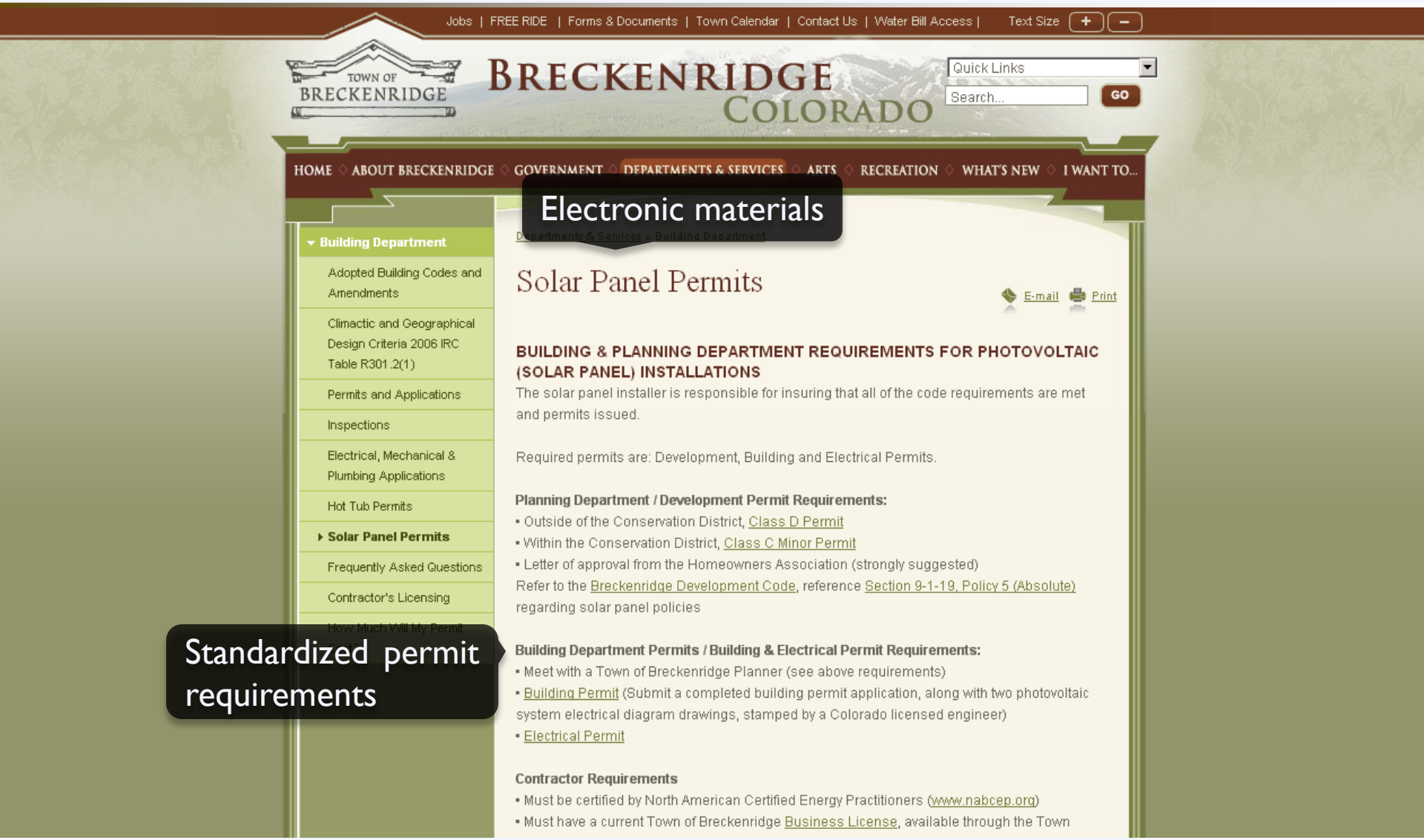
Expedited Permitting: Case Study

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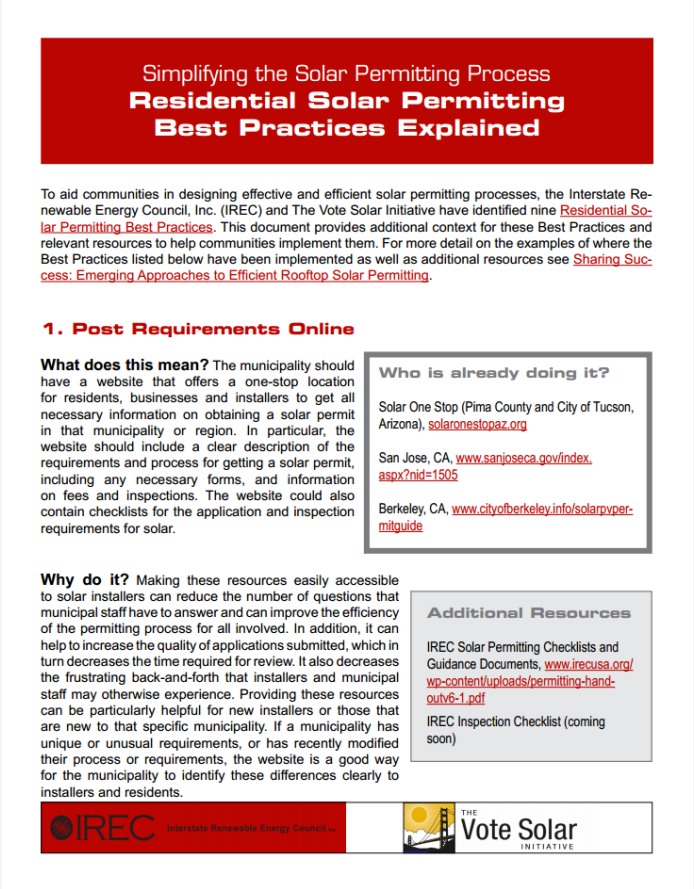
Source: Breckenridge, CO (http://www.townofbreckenridge.com/index.aspx?page=694)

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

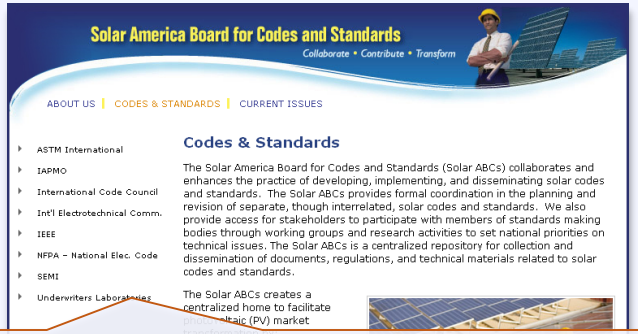
http://projectpermit.org/wp-content/uploads/2013/04/Expanded-Best-Practices-7.23.13_VSI.pdf

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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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
- Implement solarize program
- Advocate for state-level policy changes

How does my community get started with becoming more solar-friendly?

The Next Solution: SolSmart

National recognition program for 300 communities taking steps to make solar more affordable for residents

(formerly known as SPARC)

SolSmart: Program Structure

The SOLAR FOUNDATION

ICMA

TA Delivery

NREL NATIONAL RENEWABLE ENERGY LABORATORY

MEISTER CONSULTANTS GROUP

RAP

EPRI ELECTRIC POWER RESEARCH INSTITUTE

BROOKS ENGINEERING

Designation Program Expertise

NATIONAL CIVIC LEAGUE

Home Innovation RESEARCH LABS

TA Pipeline

NACo NATIONAL ASSOCIATION of COUNTIES

NATIONAL LEAGUE of CITIES

SEIA Solar Energy Industries Association®

Solar Outreach Experience

MEISTER CONSULTANTS GROUP

The SOLAR FOUNDATION

SolSmart: Designation Tiers

Bronze

Commitment Letter, Permitting and Planning, Zoning and Development Regulations Pre-Requisites

Option of Actions in Special Focus Areas

Achieve 60+ points

Silver

(Complete Bronze Requirements)

Planning, Zoning and Development Regulations and Inspection Pre-requisites

Option of Actions in Special Focus Areas

Achieve 100+ points

Gold

(Complete Silver Requirements)

Final Permitting Pre-Requisite

Option of Actions in Special Focus Areas

Achieve 200+ points

SolSmart: Earning Points

Permitting

Action	Points	We've done this!	Documentation
Create and make available an online checklist detailing the steps of your community's solar permitting process (Required).	Req'd	☑	Share link:
Provide a streamlined permitting pathway for small PV systems with turn-around time of no more than 3 days (Required for Gold).	20 Req'd for Gold	☐	Share link:
Distinguish between systems qualifying for streamlined or standard review.	5	☐	Share link:
Require no more than one application form for a residential rooftop PV project.	5	☐	Share link:
Review of solar permit fees for residential and commercial solar.	5	☐	Share link:
Earn additional points: Revise or demonstrate that permit fees reflect national best practices (e.g. $400 or less for residential, and based on cost-recovery for commercial).	5	☐	Share link:
Review permitting process for efficiency improvements and reduce processing time to 10 days or fewer.	10	☐	Share link:
Adopt a standard solar permit form aligned with best practices (e.g. Solar ABCs).	10	☐	Share link:
Train permitting staff on best practices for permitting solar PV and/or solar and storage systems.	10	☑	Share link:
Train fire and safety staff on solar PV.	10	☐	Share link:
Develop a regular communication schedule to solicit recommendations from the solar installer community regarding procedural changes.	10	☐	Share link:
Offer an online process for permitting submission and approval.	20	☐	Share link:
Share open source permit data with fire, safety, and other key third parties.	20	☐	Share link:
Total Points: Add up the total number of points you believe you have achieved in this category.	35		

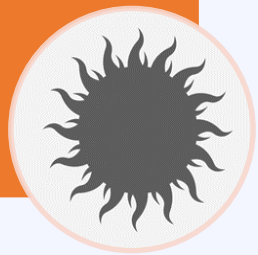
- Eight criteria categories:
  - Permitting
  - Planning, Zoning, & Development
  - Inspection
  - Construction Codes
  - Solar Rights
  - Utility Engagement
  - Community Engagement
  - Market Development & Finance
- Ex. Designation Criteria for Permitting

Full list of designation criteria available here:
http://www.gosparc.org/s/SolSmart-Application-FINAL.pdf

SolSmart: Awards & Innovation

- Complete 60% points in a category
  - E.g. Award for Excellence in Inspection

Special Awards



- Original submissions reviewed bi-weekly by technical committee
- Maximum 20 points per action
- Case studies posted on blog

Innovation

SolSmart: Free Technical Assistance

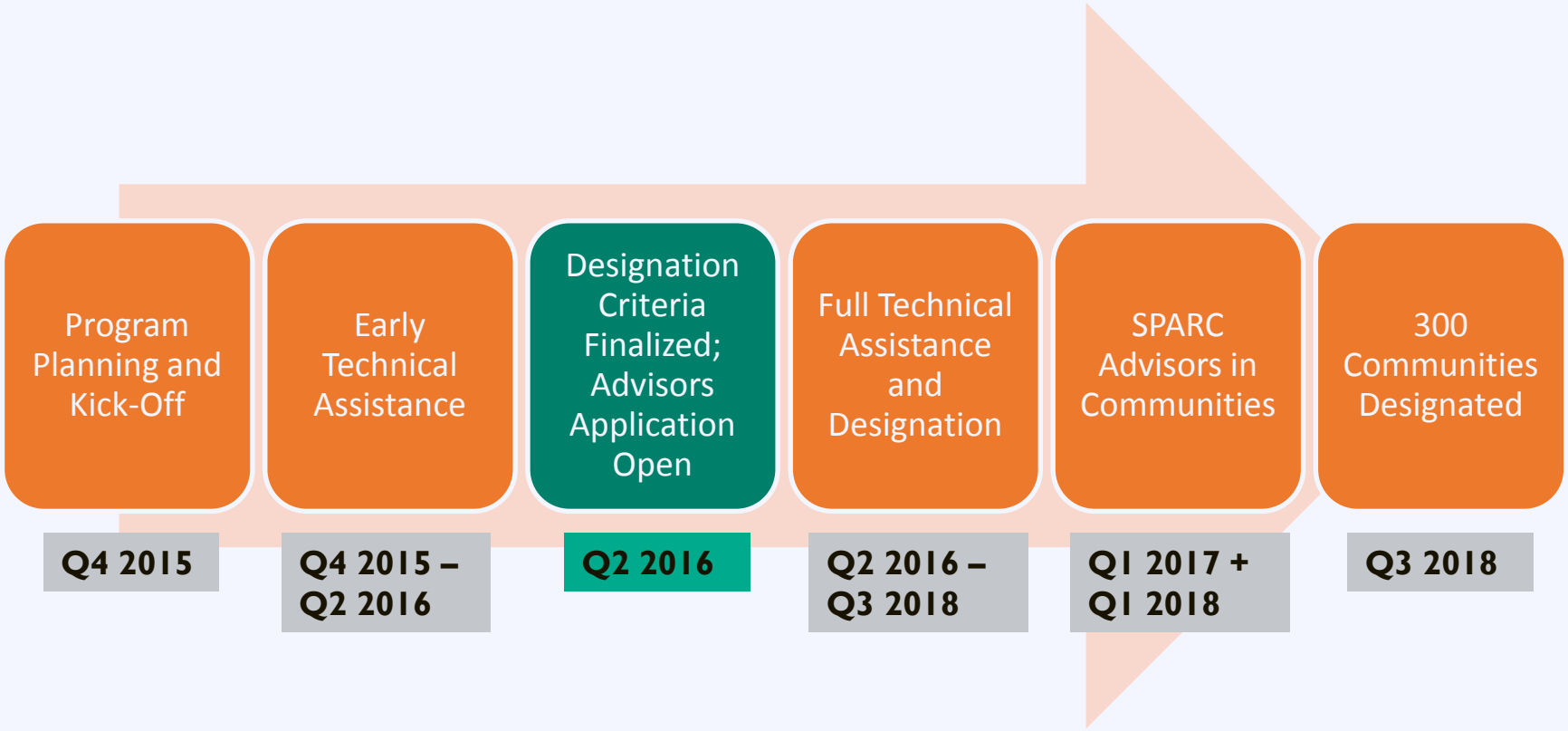
- Communities pursuing SolSmart designation will be **eligible for no-cost technical assistance** from national solar experts.
- Technical assistance will be designed to **help a community achieve the basic requirements for designation**.
  - Depending on demand, some TA may also be available to help more advanced communities achieve higher levels of designation.
- **Topic areas for TA include:**
  - Overall SolSmart pre-requisite action
  - Permitting and Planning, Zoning, & Development Regulations pre-requisite actions
  - SolSmart Silver and Gold pre-requisite actions
  - Additional actions in the eight main criteria categories
  - Approved innovation areas

SolSmart Advisors

- **Funded temporary staff** to help SolSmart-committed communities achieve designation.
- Advisors will **evaluate existing local government policies/processes** and **apply industry leading best practices** to 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.

SolSmart Advisors: Timeline

SolSmart: Overall Timeline



SolSmart Application Process

- Apply for SolSmart today! http://www.gosparc.org/apply-now
- Contact Philip Haddix at phaddix@solarfound.org with any questions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