Solar Powering Your Community

Addressing Soft Costs and Barriers

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U.S. Department of Energy

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About the SunShot Solar Outreach Partnership

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.

About the SunShot Solar Outreach Partnership

- 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

Complimentary Services

Technical Resources

Regional Workshops

One to One Assistance

Strategy Session

Complimentary Services

Technical Resources

Helping Policymakers Understand Best Practices:

- Case Studies
- Fact Sheets
- How-to Guides
- Toolkits

www.solaroutreach.org

One to One Assistance

Regional Workshops

Strategy Session

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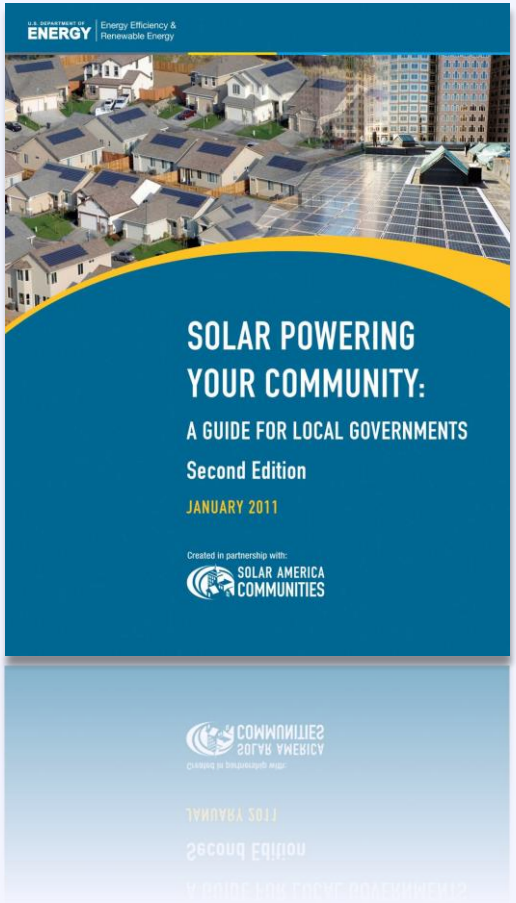
Email solar-usa@iclei.org to request a 20 minute consultation

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



Complimentary Services

Quickly get up to speed on key solar policy issues:

- Solar 101
- Planning for Solar
- Implementing an Ordinance
- Streamlining Solar Permits
- Growing your Market

Regional Workshops

Strategy Session

Email solar-usa@iclei.org to request a 20 minute consultation

Complimentary Services

Technical Resources

Regional Workshops

Develop an implementation strategy for smart solar policy

One to One Assistance

Strategy Session

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Email solar-usa@iclei.org to request a 20 minute consultation

Complimentary Services

Technical Resources

Regional Workshops

One to One Assistance

Receive customized technical support on implementation of smart solar policy

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Email solar-usa@iclei.org to request a 20 minute consultation

After This Session

Talk to Us!

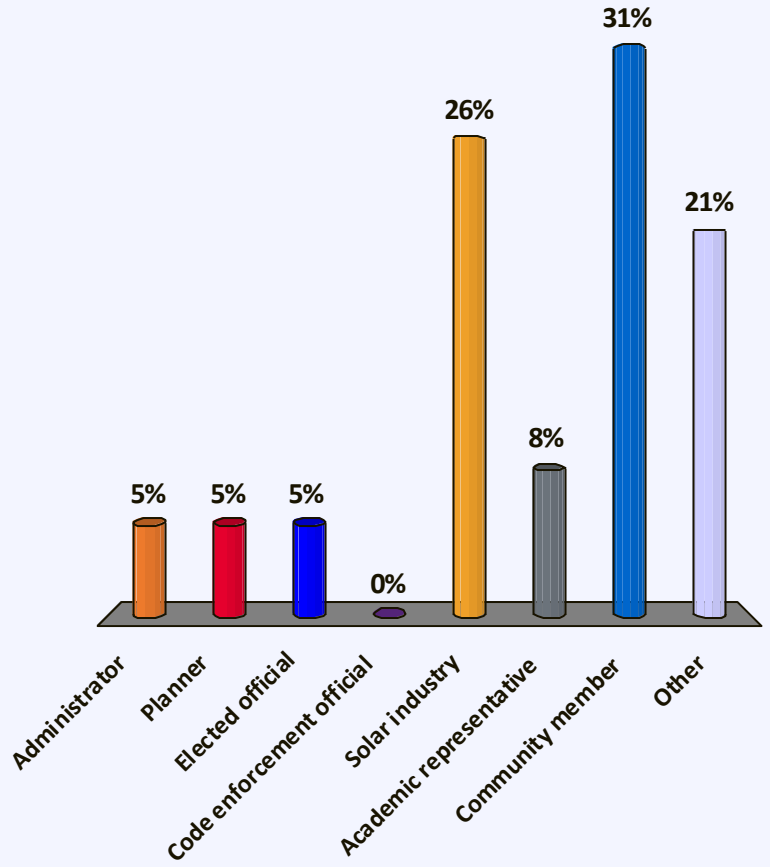
Sign up for a 20 minute consultation to learn more about our free services

See Riana Ackley to sign up.

We want to get to know you better

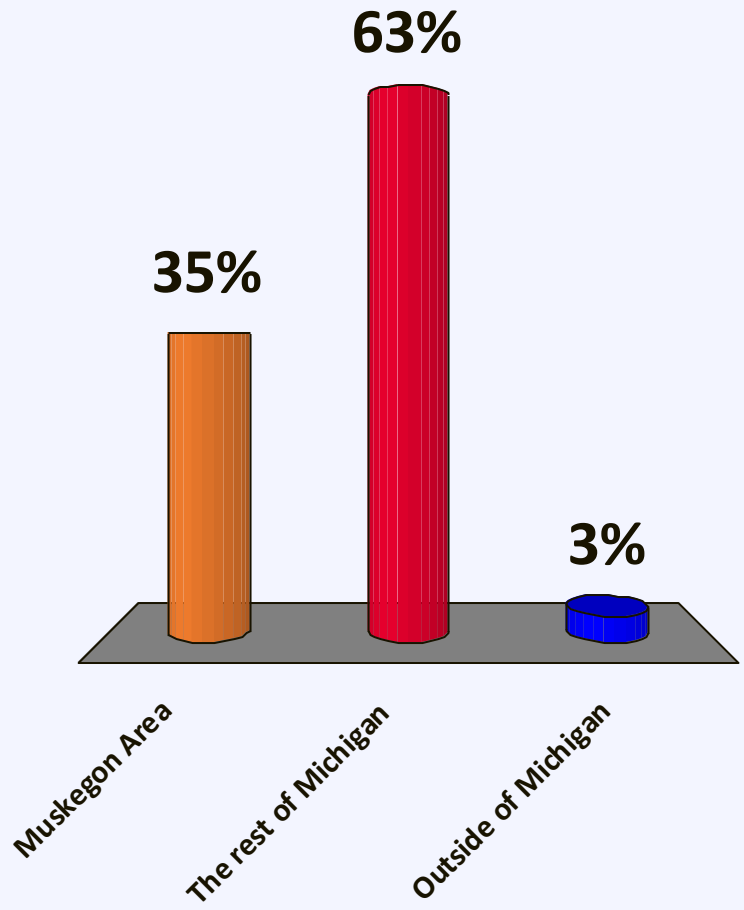
Who are you?

A. Administrator
B. Planner
C. Elected official
D. Code enforcement official
E. Solar industry
F. Academic representative
G. Community member
H. Other



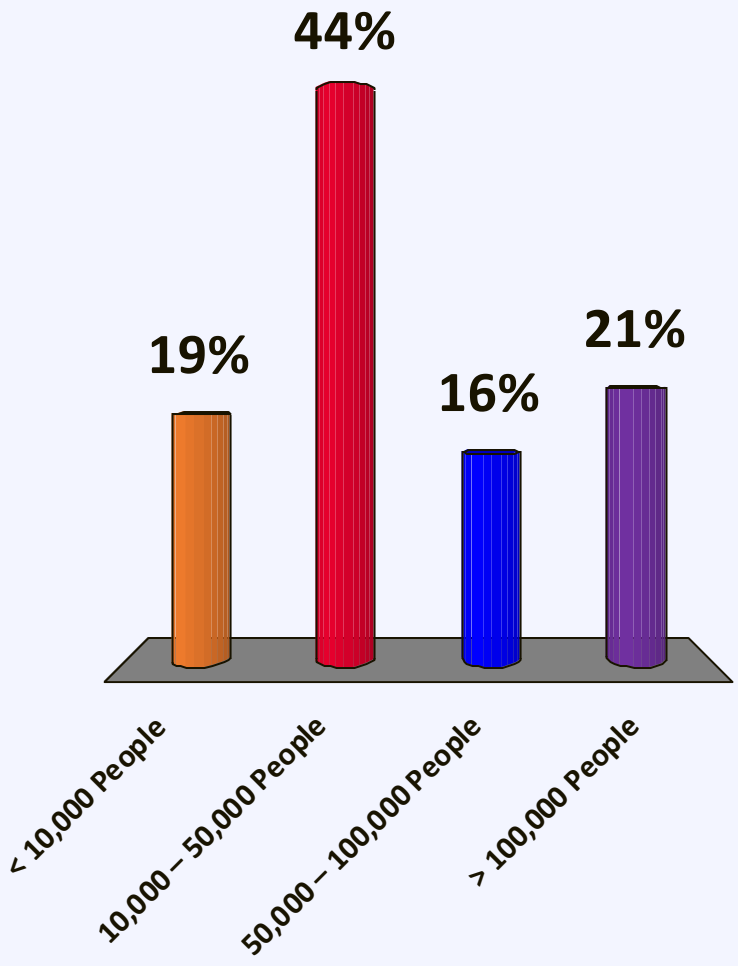
Where are you coming from?

A. Muskegon Area
B. The rest of Michigan
C. Outside of Michigan



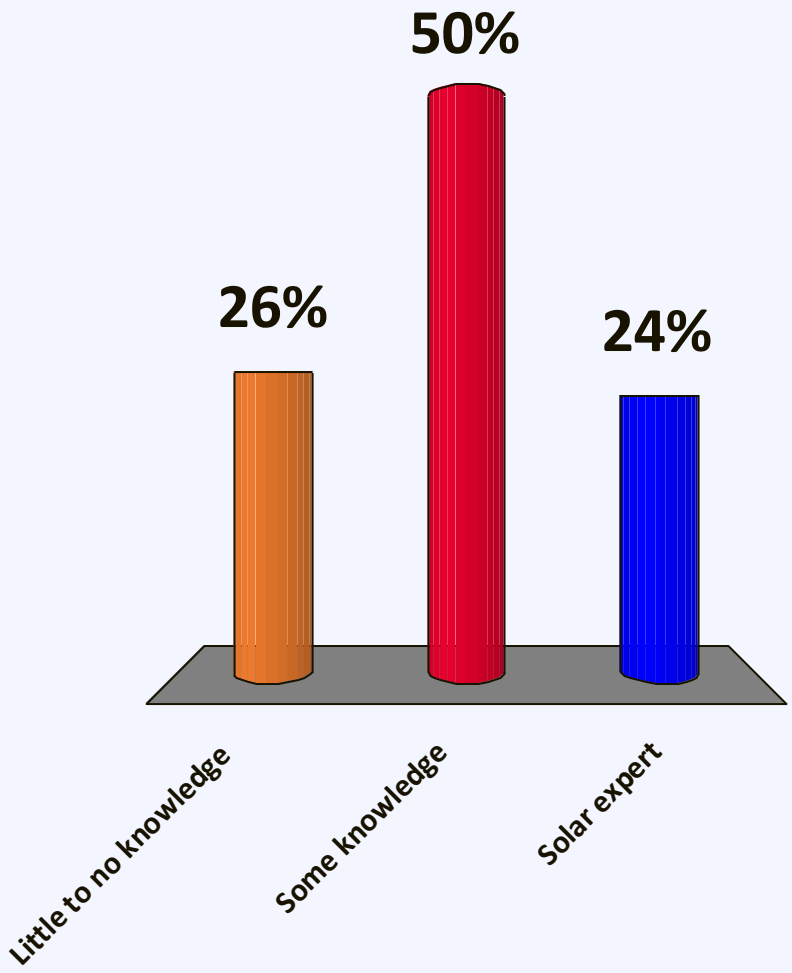
What size is your community?

A. < 10,000 People
B. 10,000 – 50,000 People
C. 50,000 – 100,000 People
D. > 100,000 People



How familiar are you with solar?

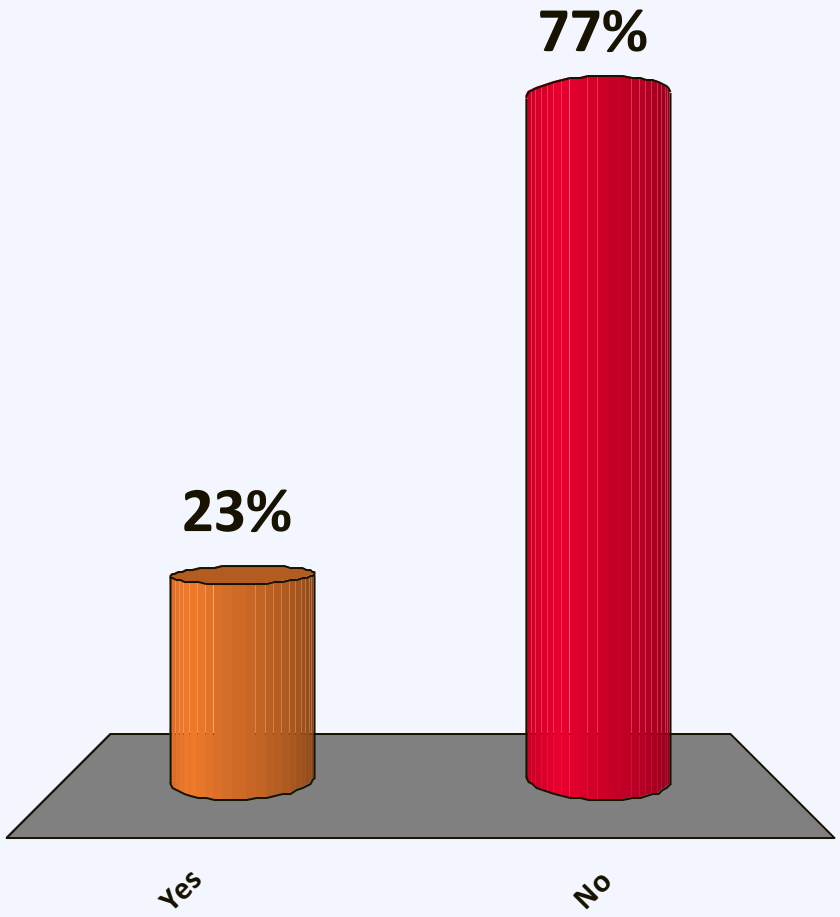
A. Little to no knowledge
B. Some knowledge
C. Solar expert



Do you have solar on your home?

A. Yes

B. No



Solar Development in the US

In 2013, the US solar industry installed

131,000 new solar installations

of which

94% were residential projects

If you do have solar on your home:

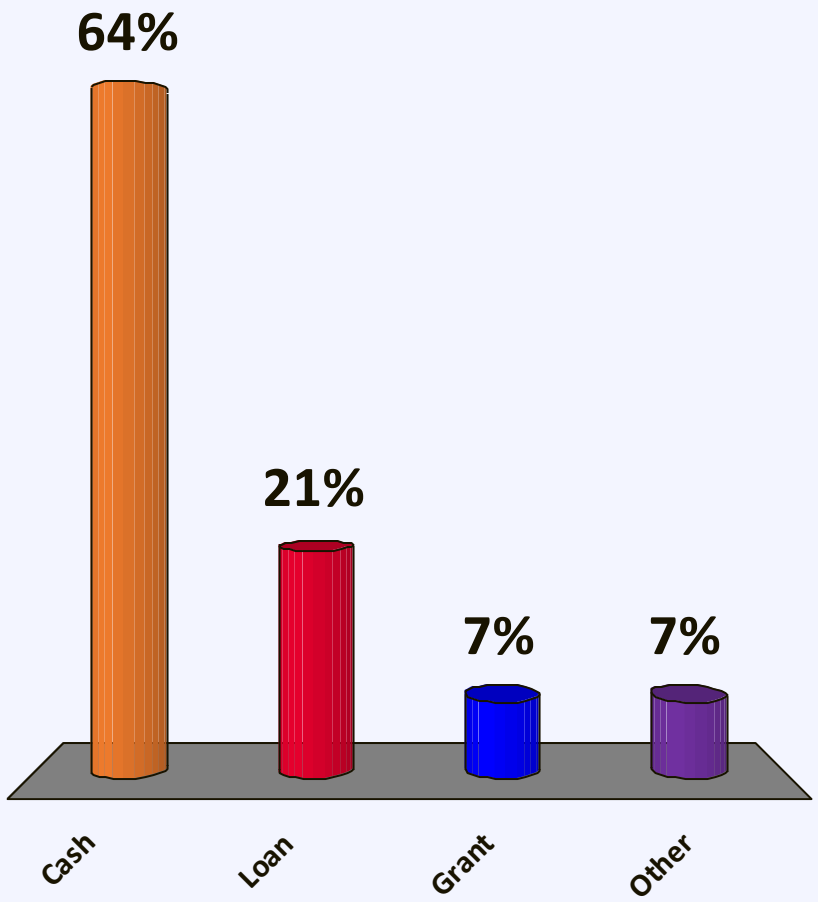
How did you finance it?

A. Cash

B. Loan

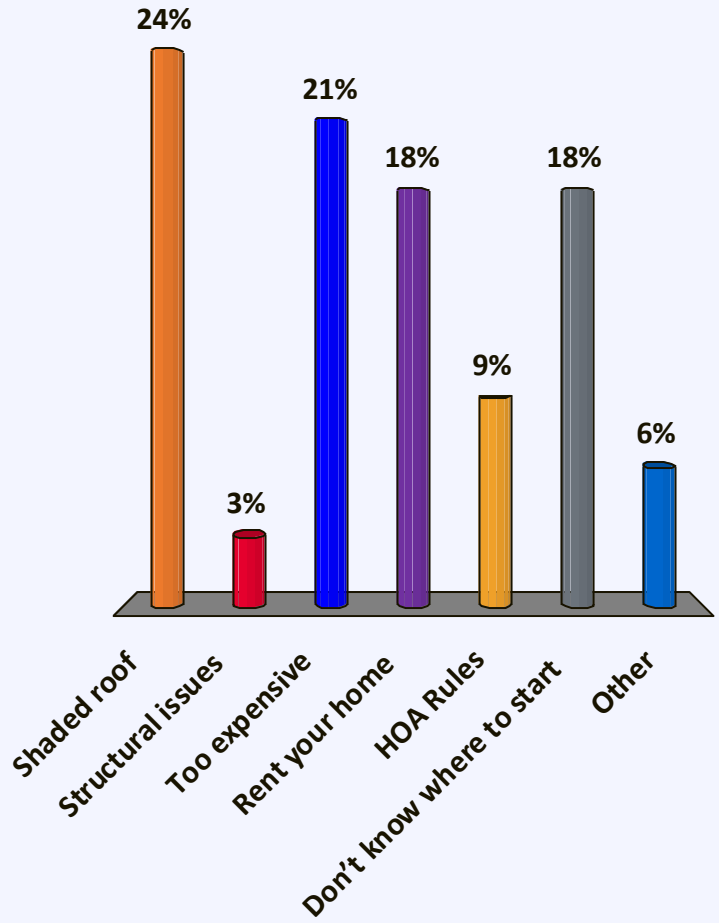
C. Grant

D. Other



If you don't have solar on your home: **Why not?**

A. Shaded roof
B. Structural issues
C. Too expensive
D. Rent your home
E. HOA Rules
F. Don't know where to start
G. Other

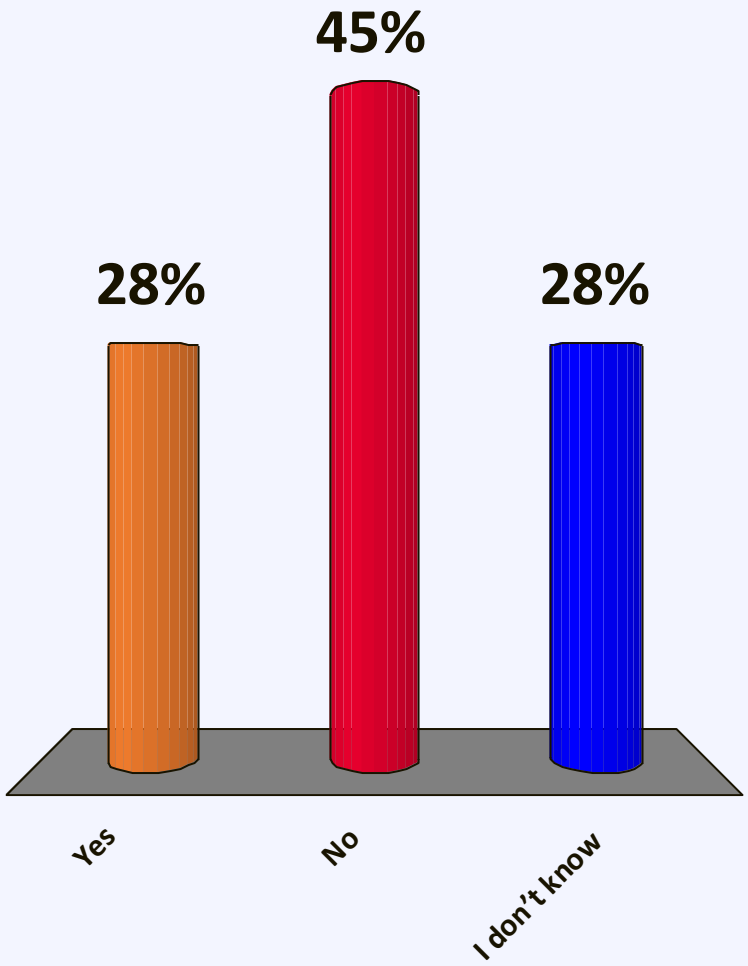


Does your local government have solar on public properties?

A. Yes

B. No

C. I don't know



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 – 12:50	Planning for Solar: Getting Solar Ready
12:50 – 1:25	Solar Market Development Tools
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1:35 – 2:20	Local Speakers
2:20 – 3:00	Developing and Solar Policy Implementation Plan for Your Community and Next Steps

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Solar Technologies

Solar Photovoltaic (PV)

Solar Hot Water

Concentrated Solar Power

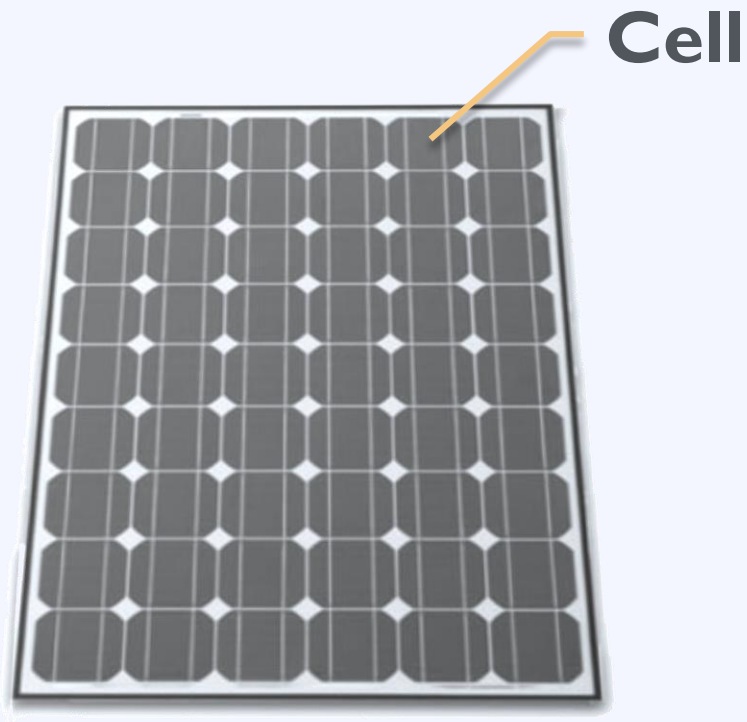
Solar Technologies

Solar Photovoltaic (PV)

Solar Hot Water

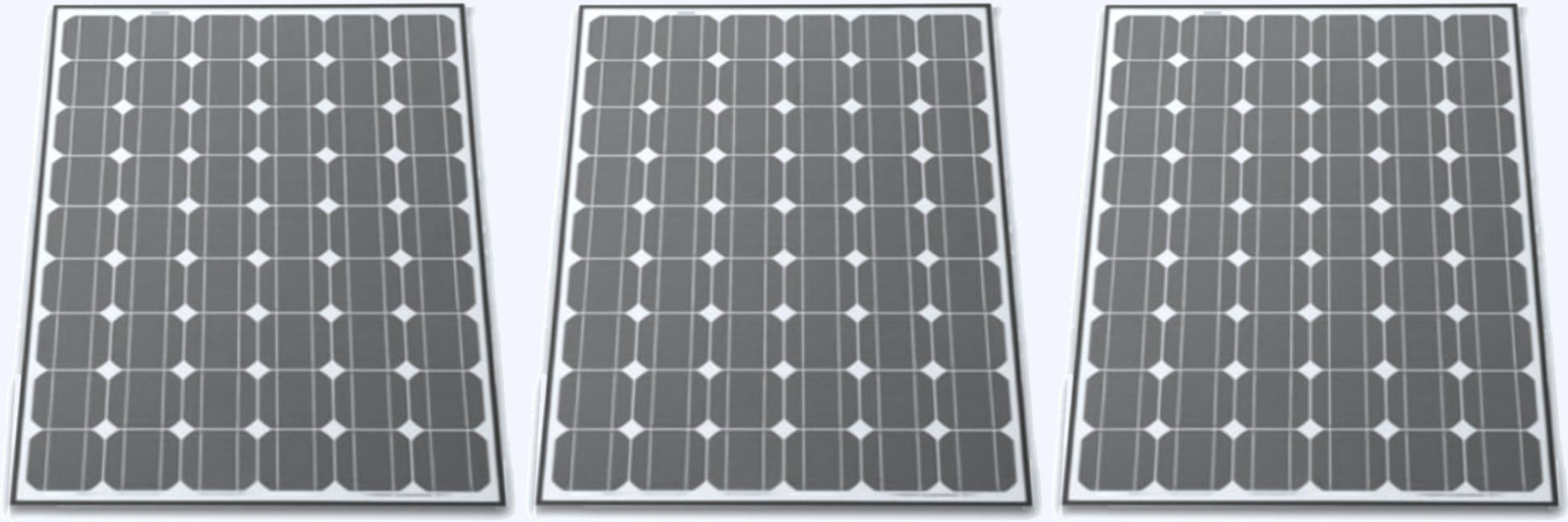
Concentrated Solar Power

Some Basic Terminology



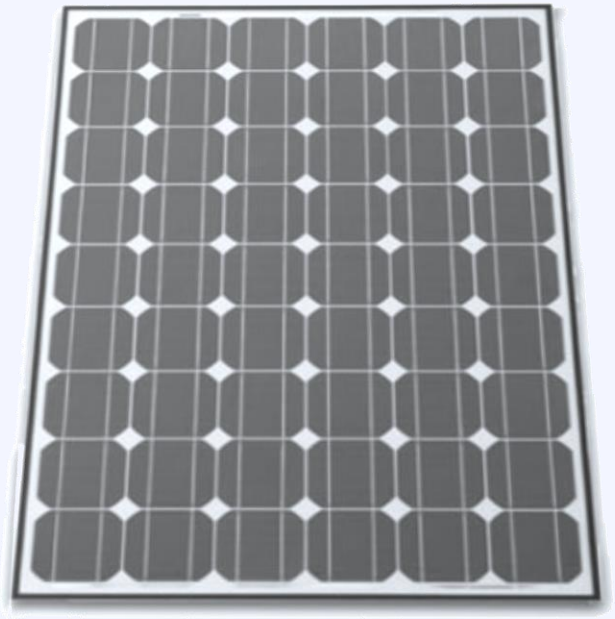
Panel / Module

Some Basic Terminology



Array

Some Basic Terminology



Capacity / Power

kilowatt (kW)

Production

Kilowatt-hour (kWh)

Some Basic Terminology

Residence
5 kW

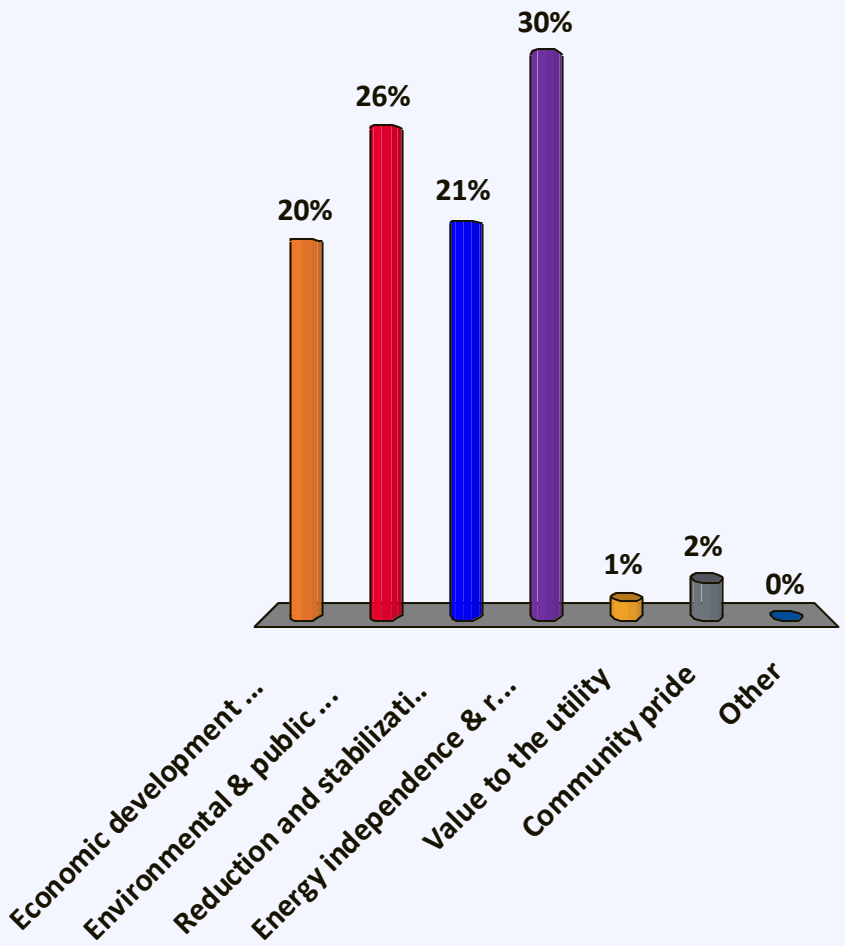
Factory
1 MW+

Office
50 – 500 kW

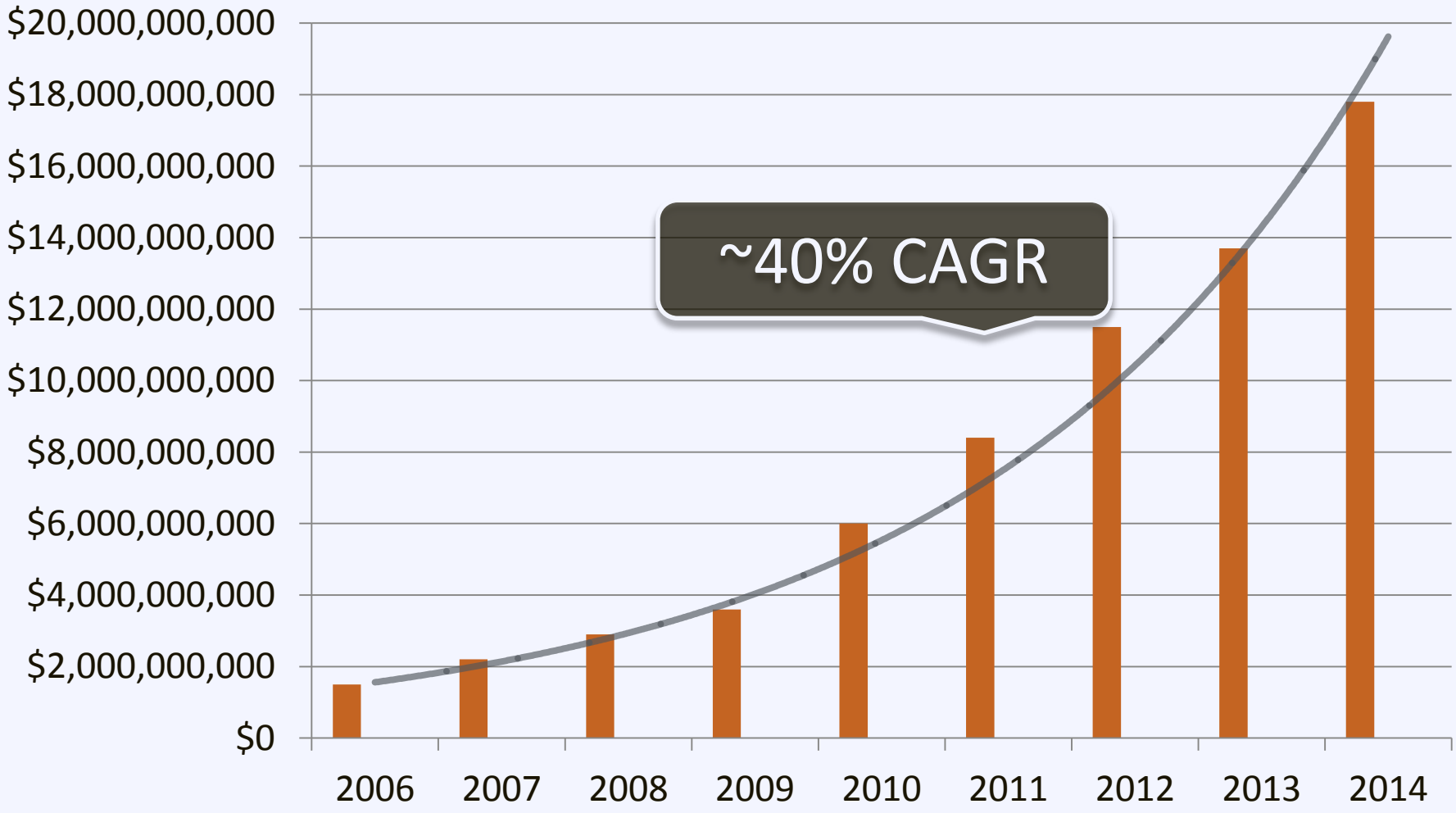
Utility
2 MW+

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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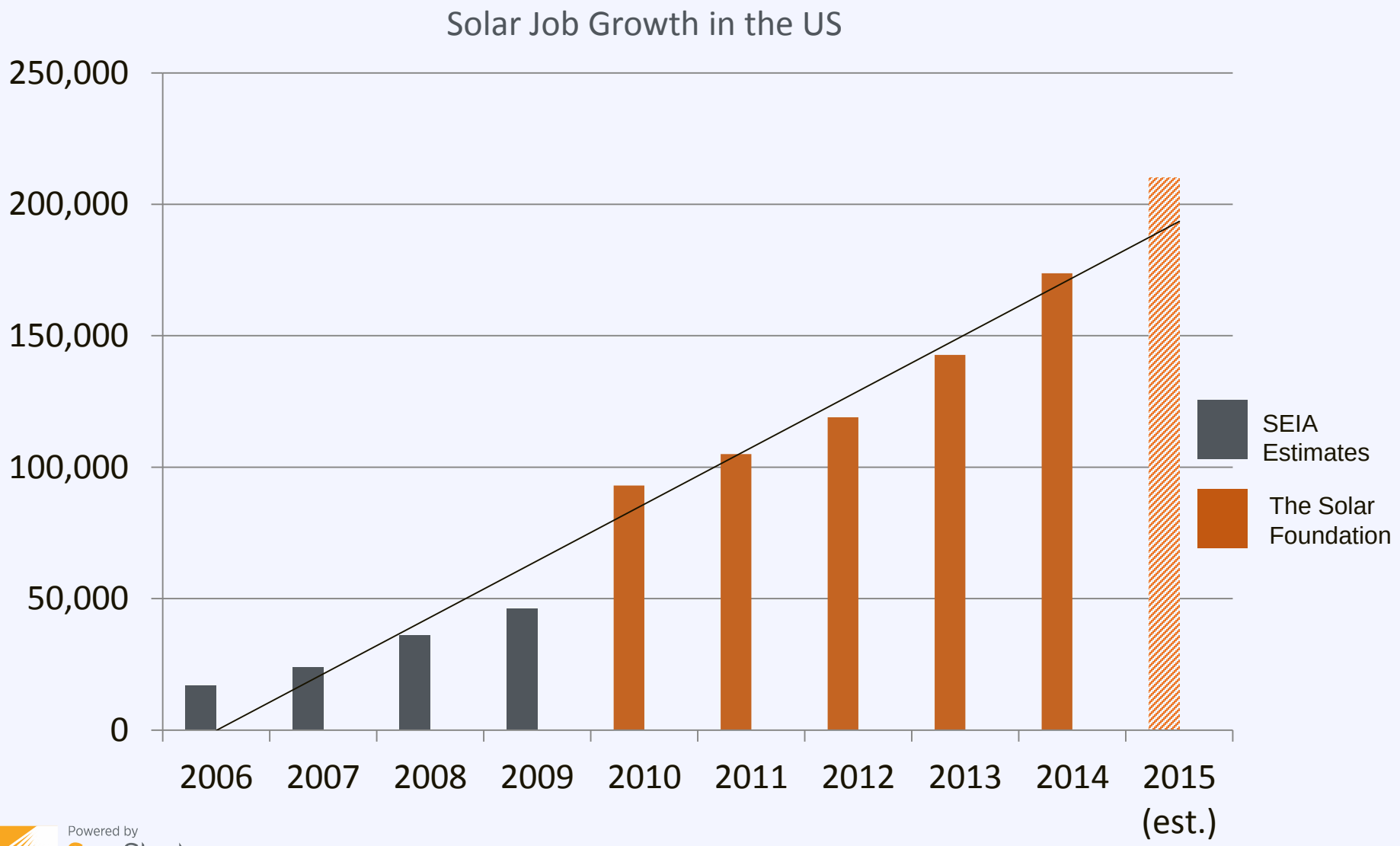
Source: SEIA/GTM Research – 2009/2010/2011/2012 /2014 Year in Review Report
http://www.seia.org/research-resources/us-solar-market-insight

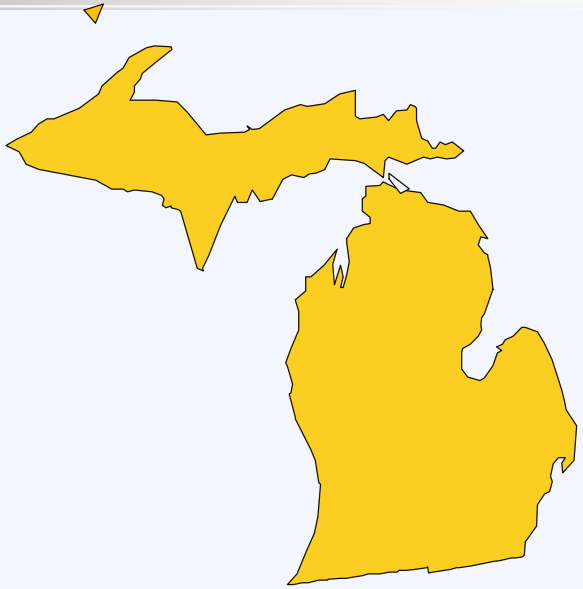
Benefits: Solar Job Growth



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

The Local Economic Opportunity

1 Megawatt of Residential Solar Development in Michigan:



32 Jobs *and* **$3.8 Million**

In economic output

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Source: JEDI Model, NREL

Economic Development in Michigan

There are currently

196 solar companies

that employ

2,100 people

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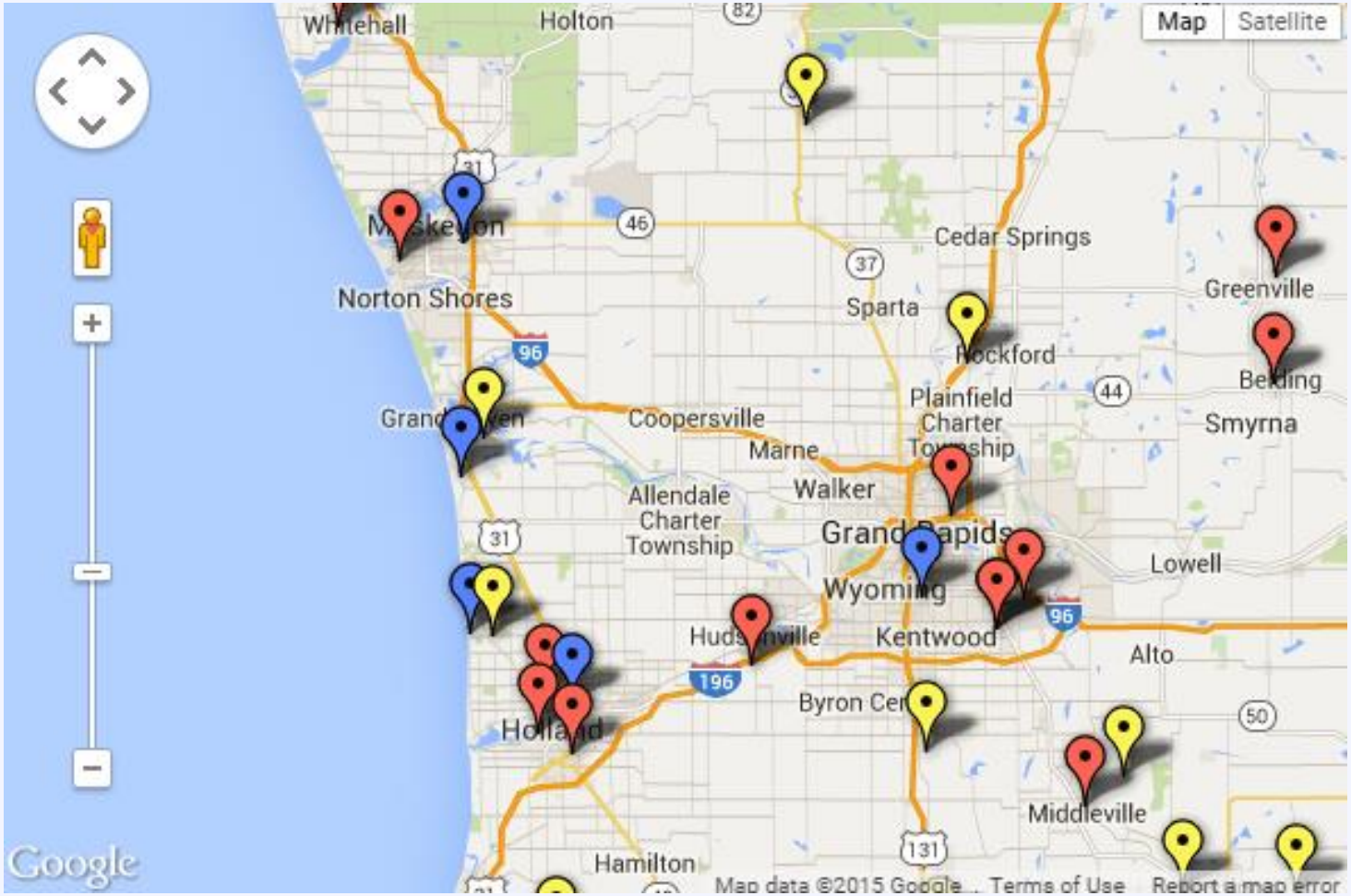
Source: SEIA, The Solar Foundation

Economic Development in Michigan



Key: Manufacturer Installer Other

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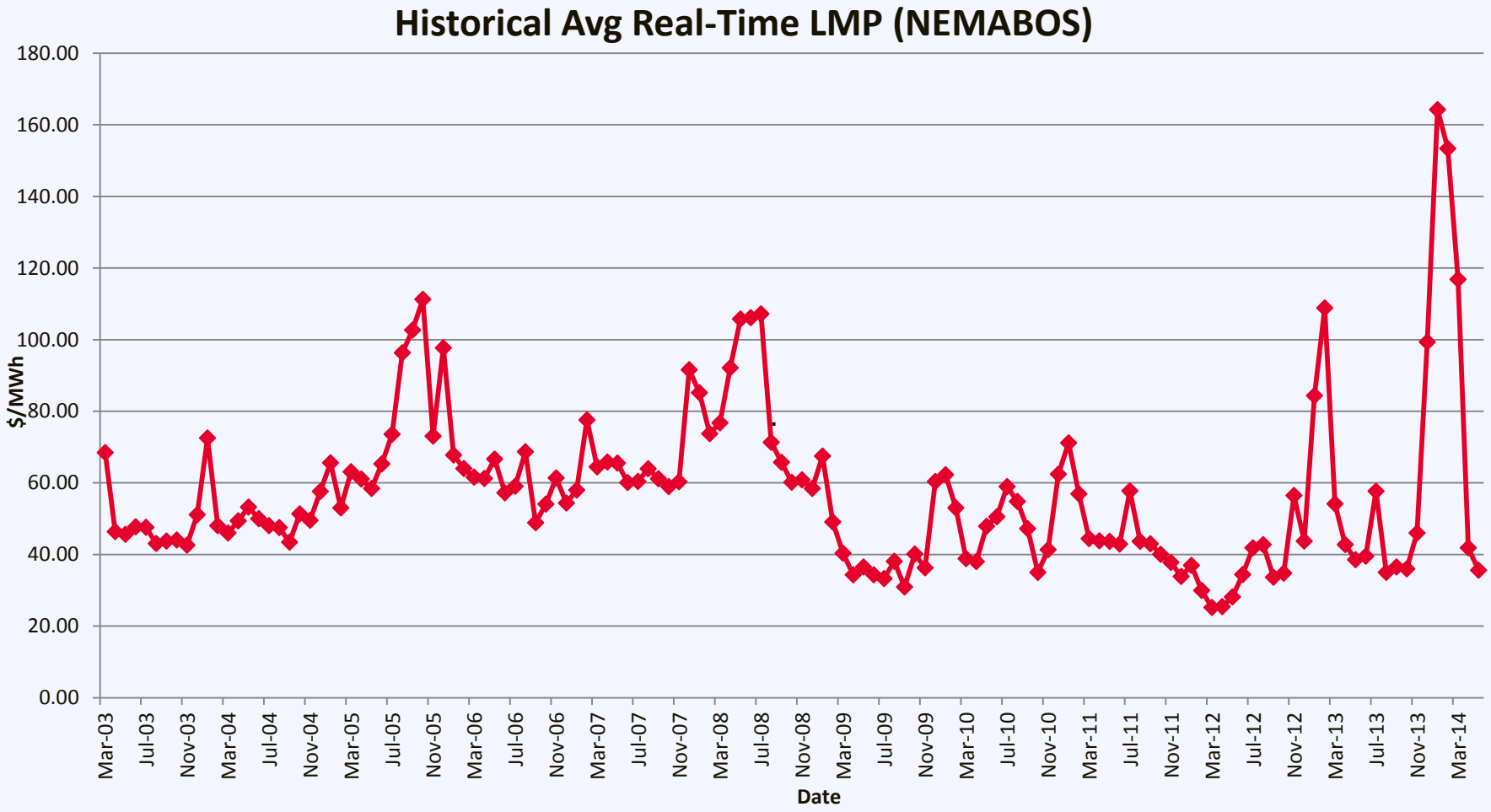
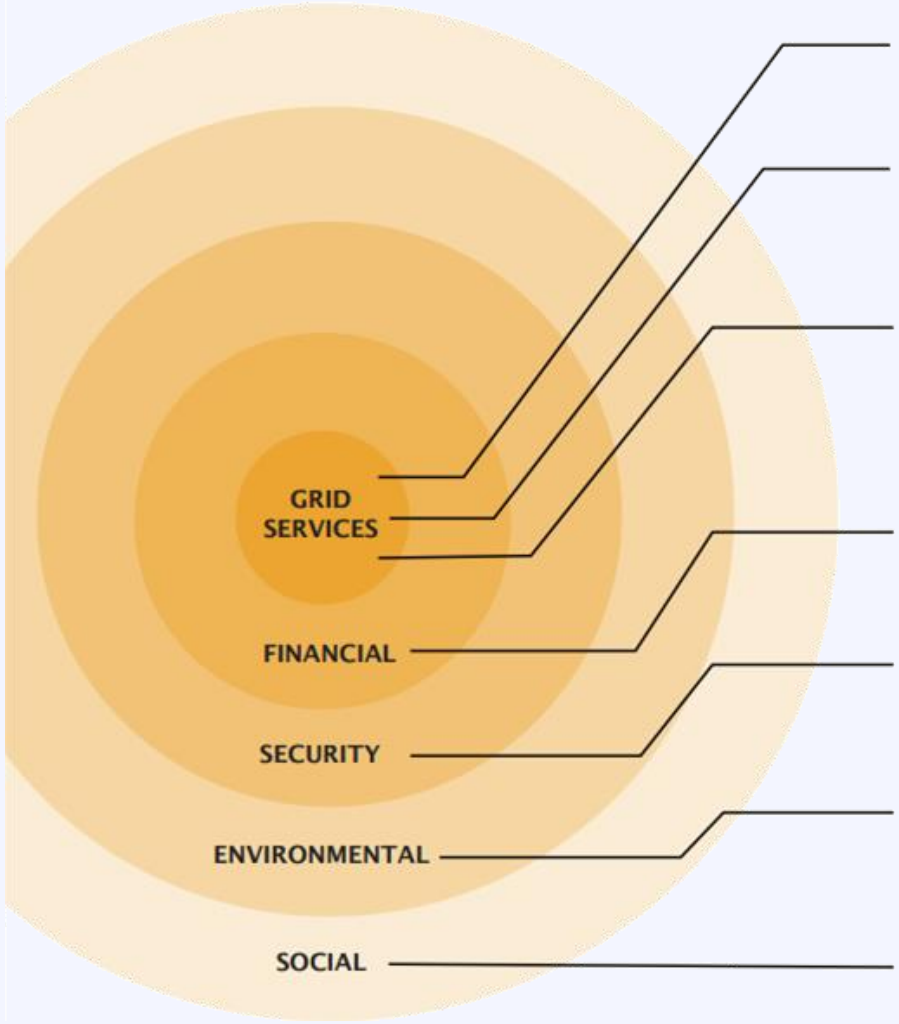
Source: SEIA

Benefit: Stabilize Energy Prices



Source: NEPOOL

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

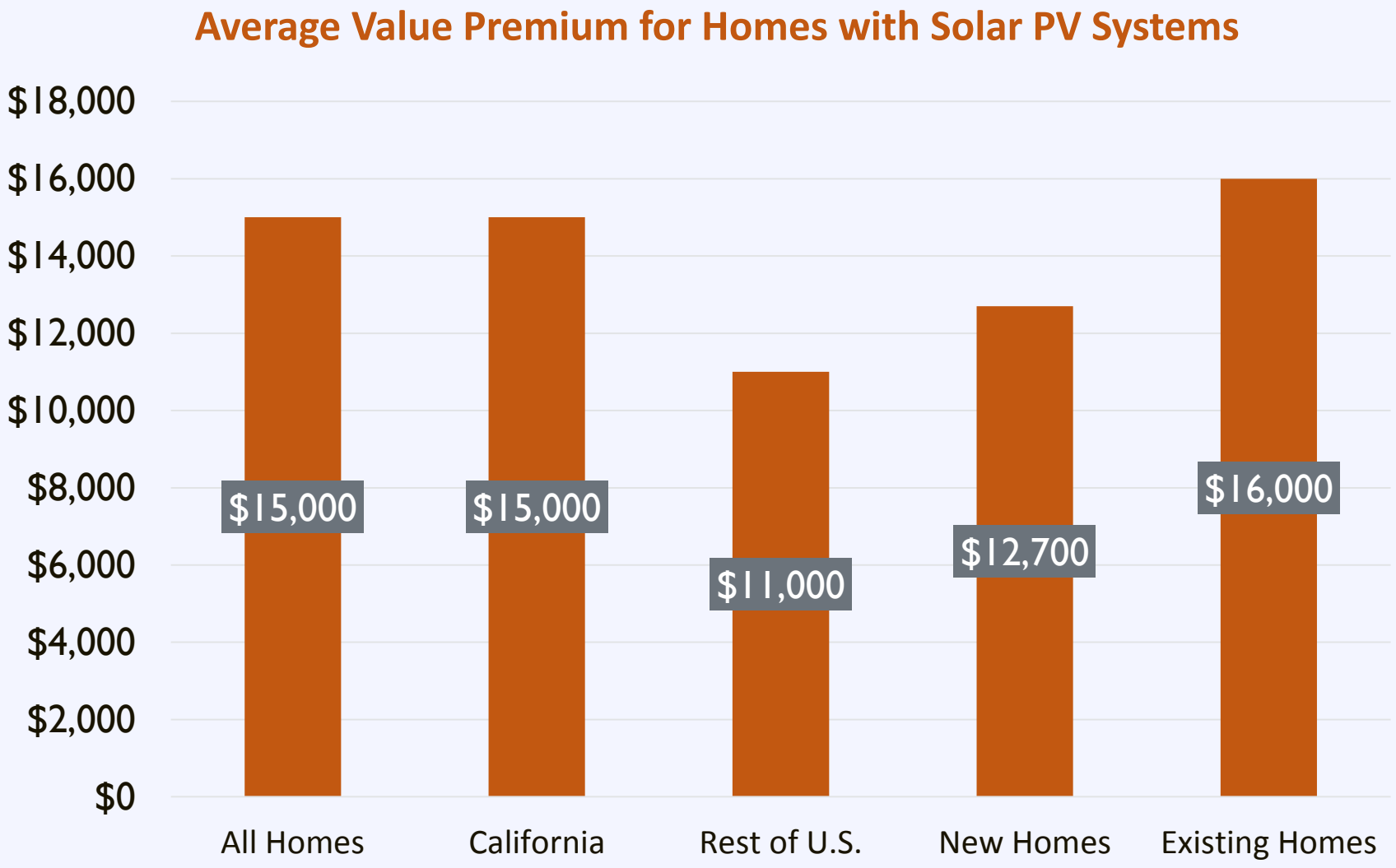
SECURITY RISK
- reliability & resilience

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

SOCIAL
- Economic development (jobs and tax revenues)

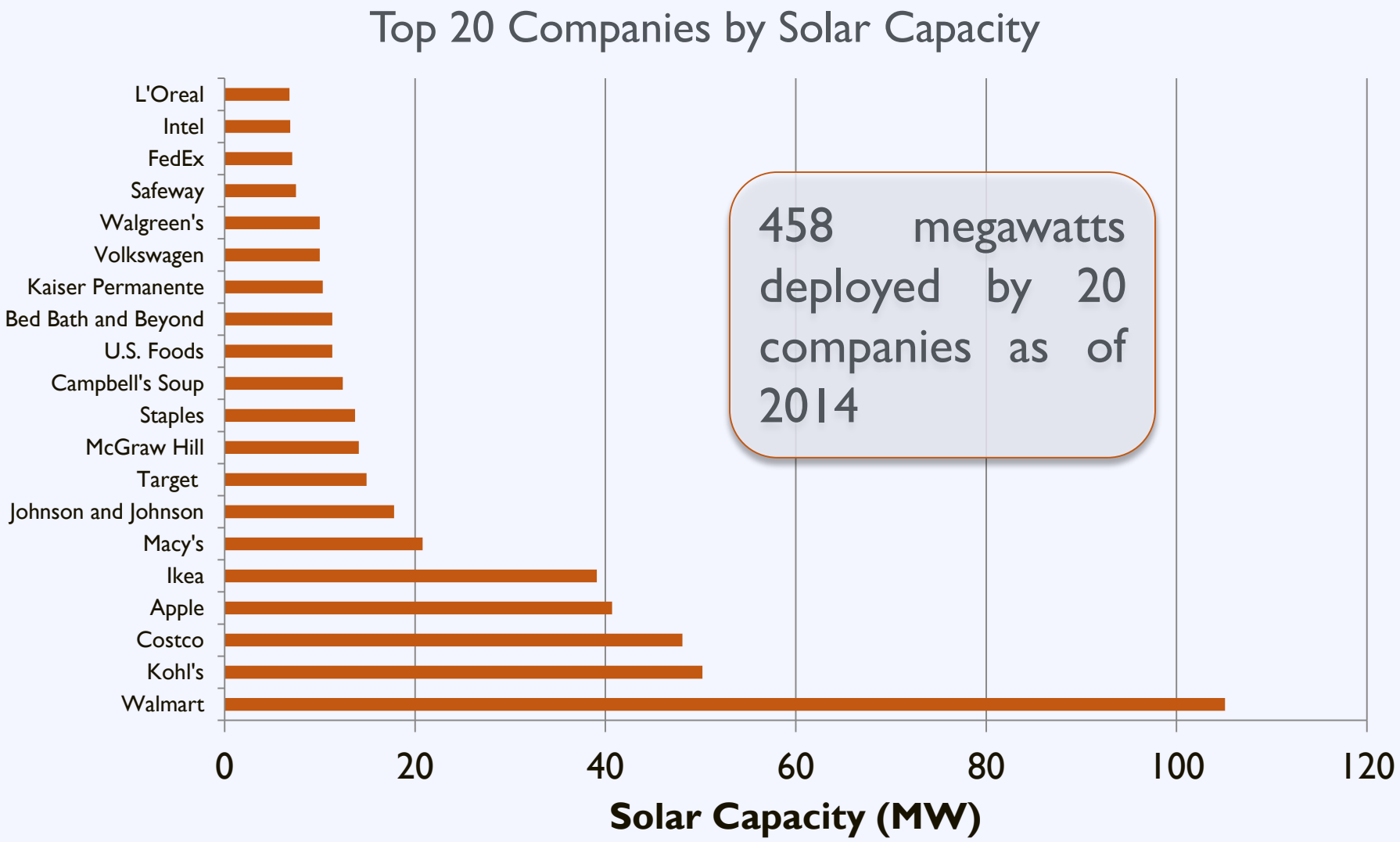
Source: Rocky Mountain Institute
(http://www.rmi.org/Content/Files/eLab-DER_cost_value_Deck_130722.pdf)

Smart Investment for Homeowners



Source: LBNL, *Selling Into the Sun* (2015)

Smart Investment for Businesses



Source: Solar Energy Industries Association

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U.S. Department of Energy

Smart Investment for Governments

Source: Borrego Solar

Smart Investment for Schools

Current:

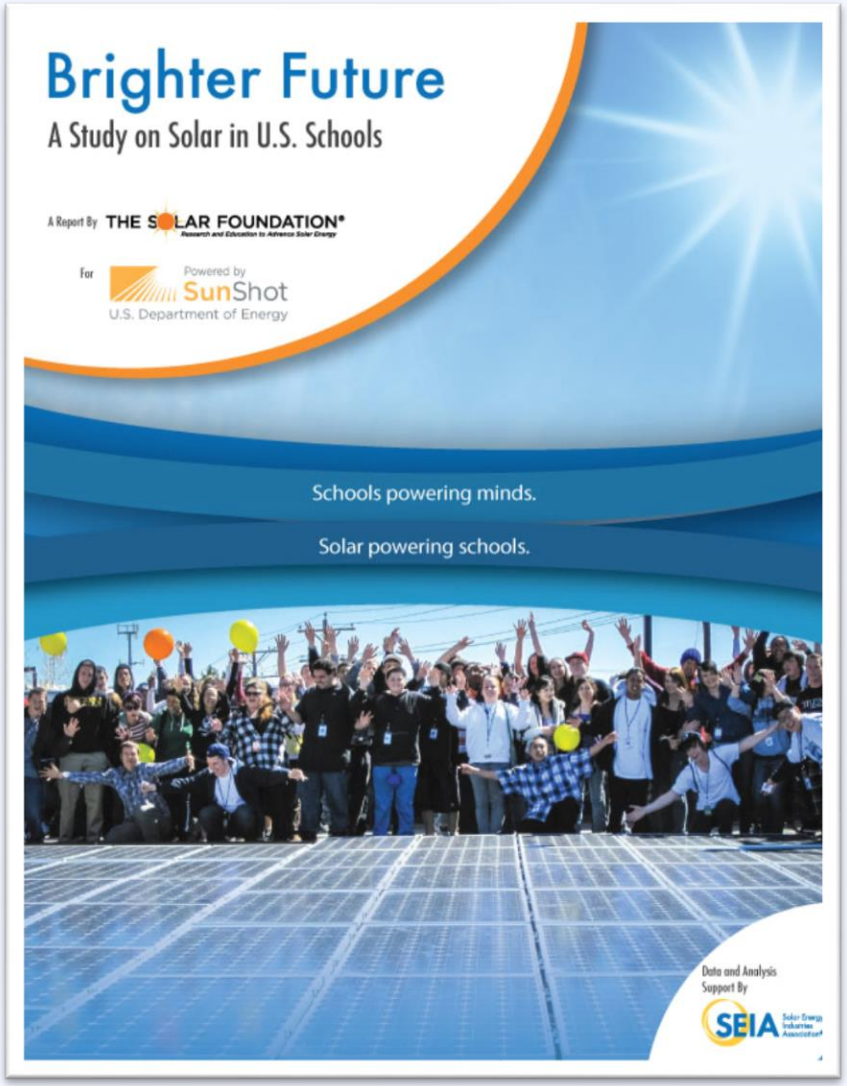
× 3,752

= $77.8m

Potential:

× 40,000 – 72,000

= $800m



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

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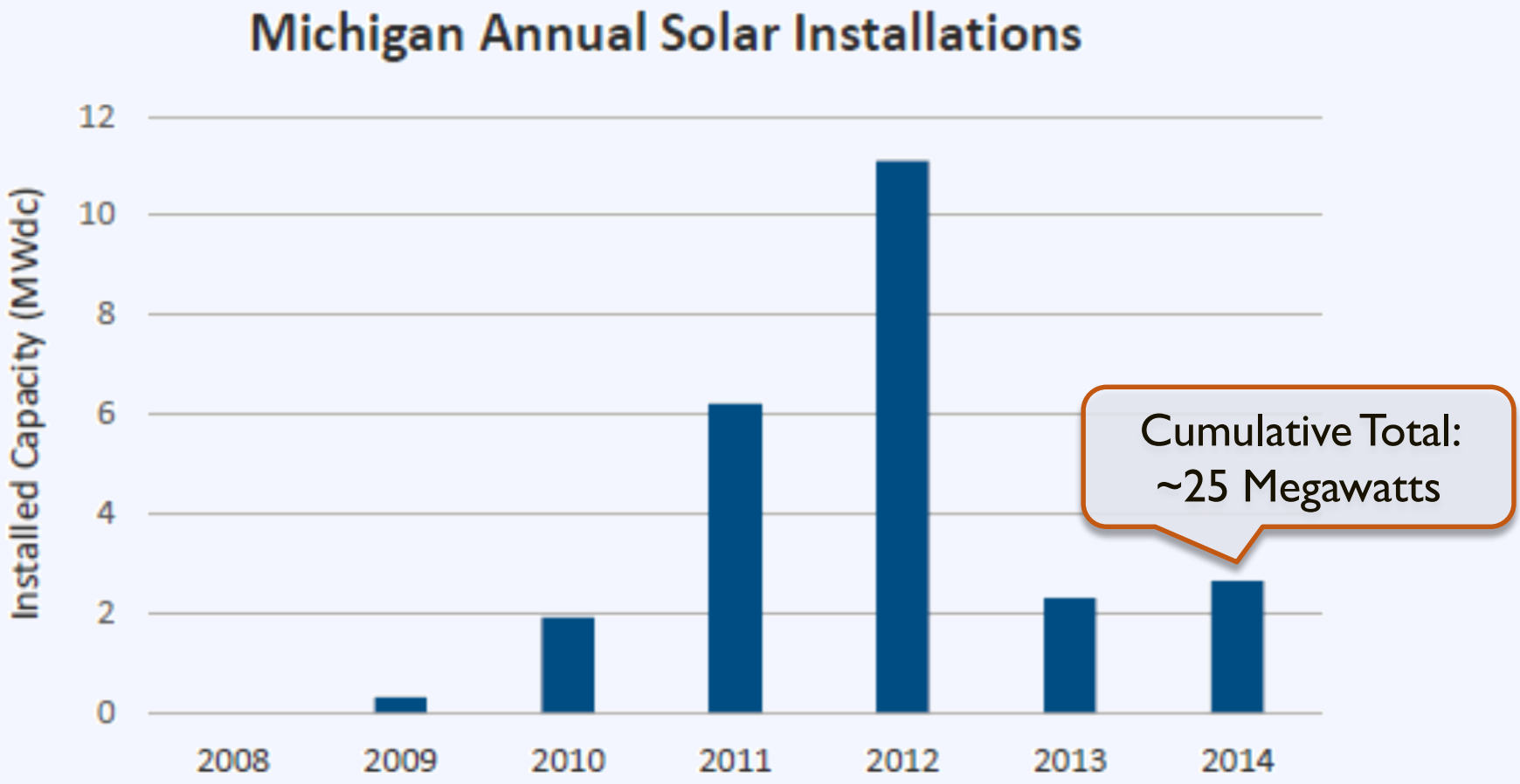
Michigan Solar Market



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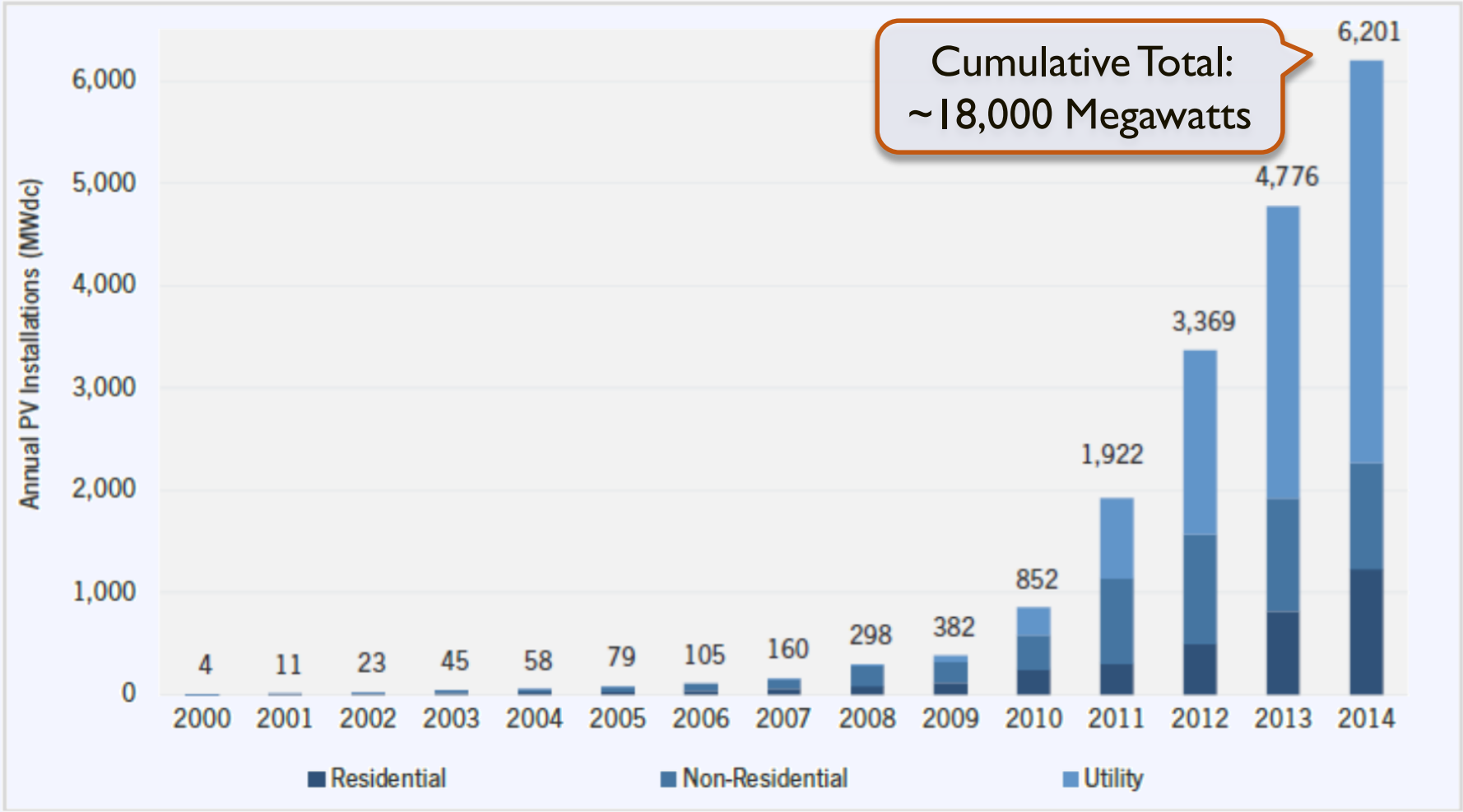
Source: SEIA

US Solar Market



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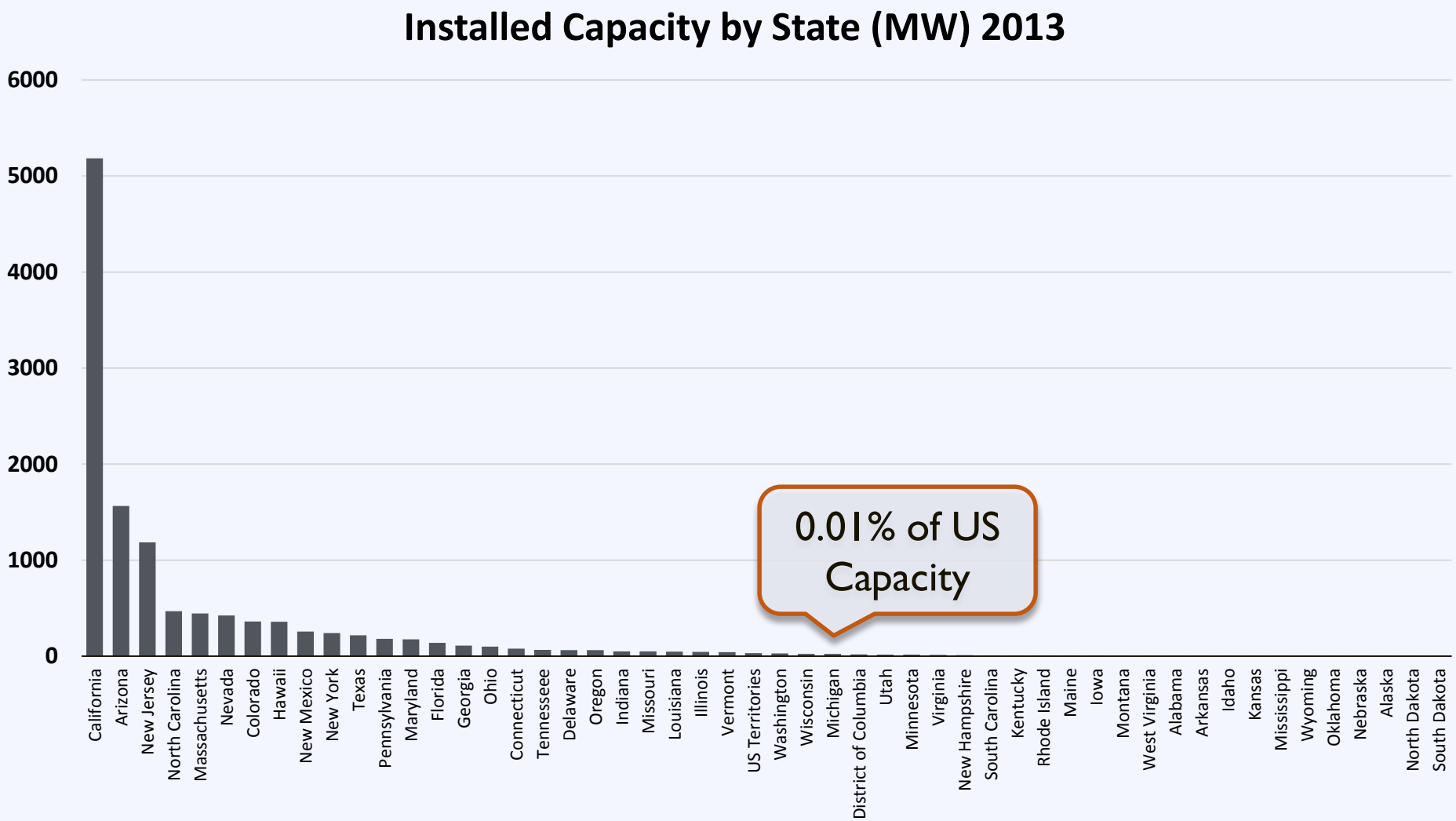
Source: Solar Energy Industries Association/ GTM Research, *Solar Market Insight: 2014 Year-in-Review*

US Solar Market



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U.S. Department of Energy

Source: IREC, Solar Market Trends 2013

Michigan Solar Market

Michigan

2.5

watts per person

US

39

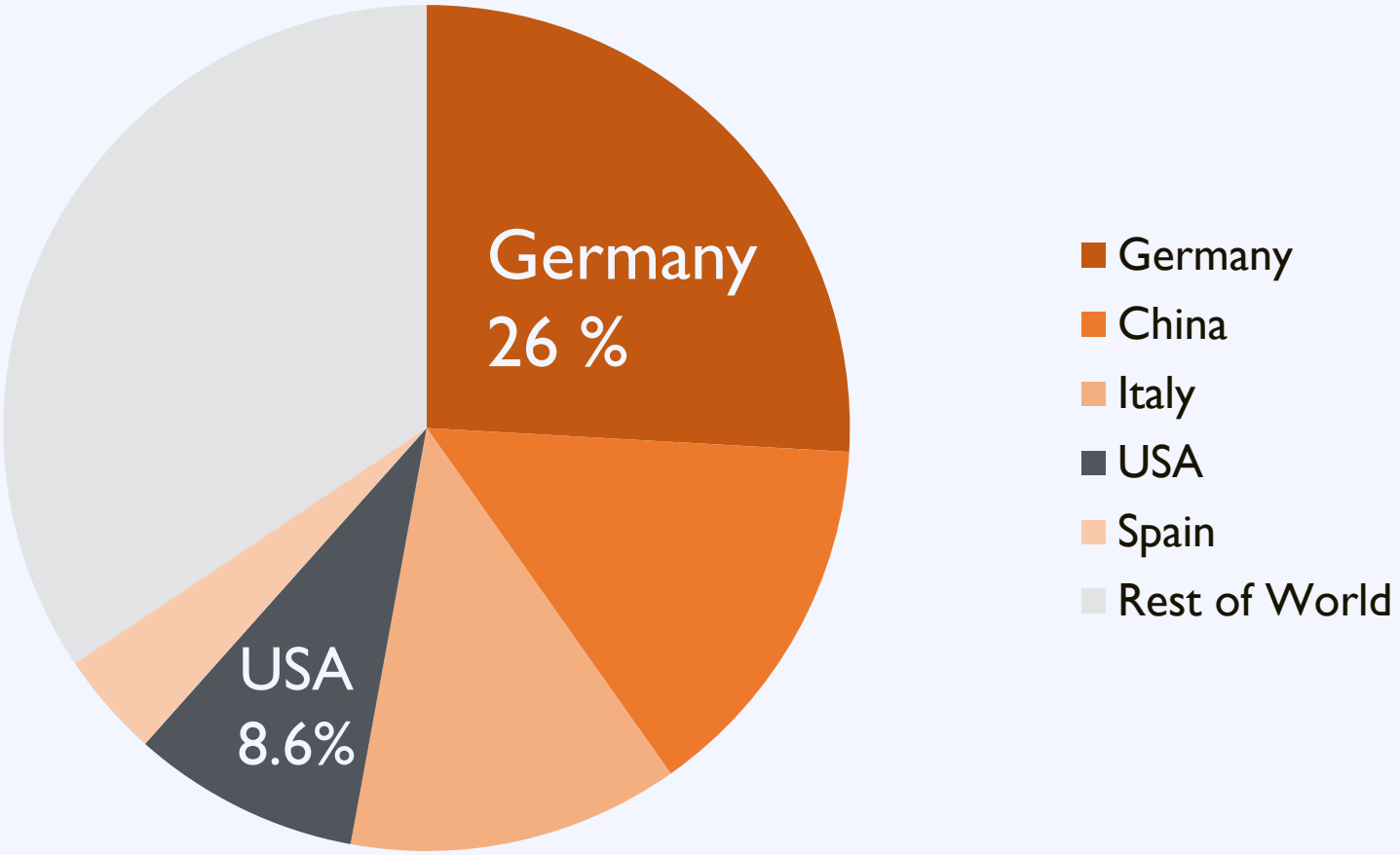
watts per person

Powered by SunShot U.S. Department of Energy

Source: IREC Solar Market Trends 2013

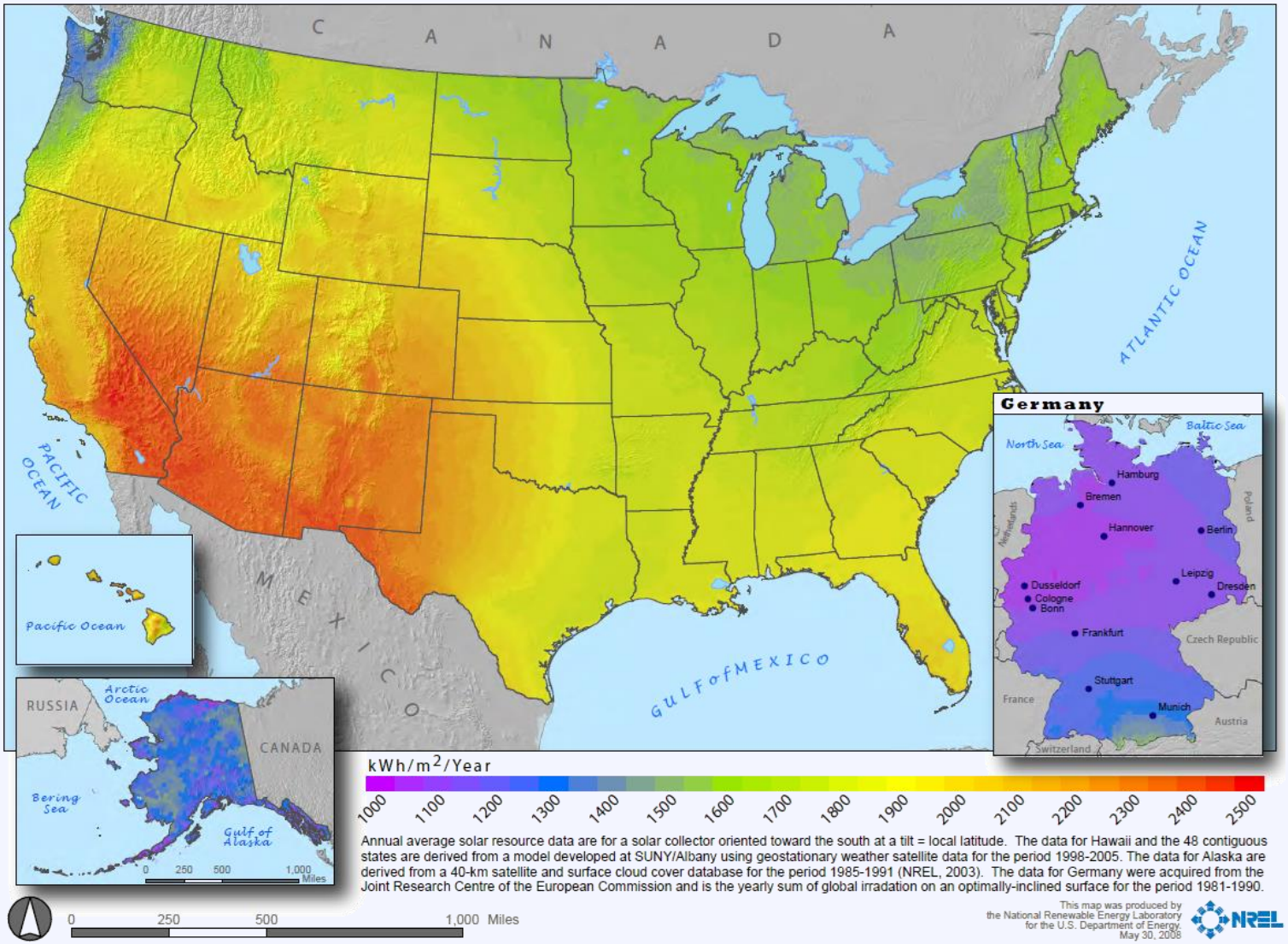
World Solar Market

Top 5 Countries Solar Operating Capacity (2013)



Source: REN 21

US Solar Resource



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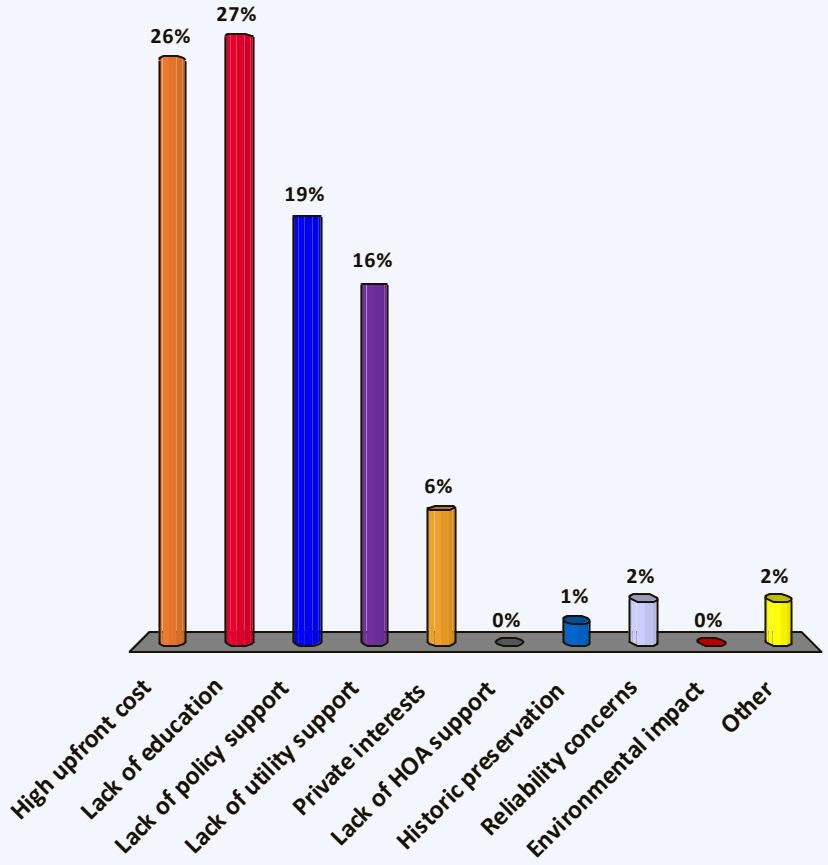
Source: National Renewable Energy Laboratory

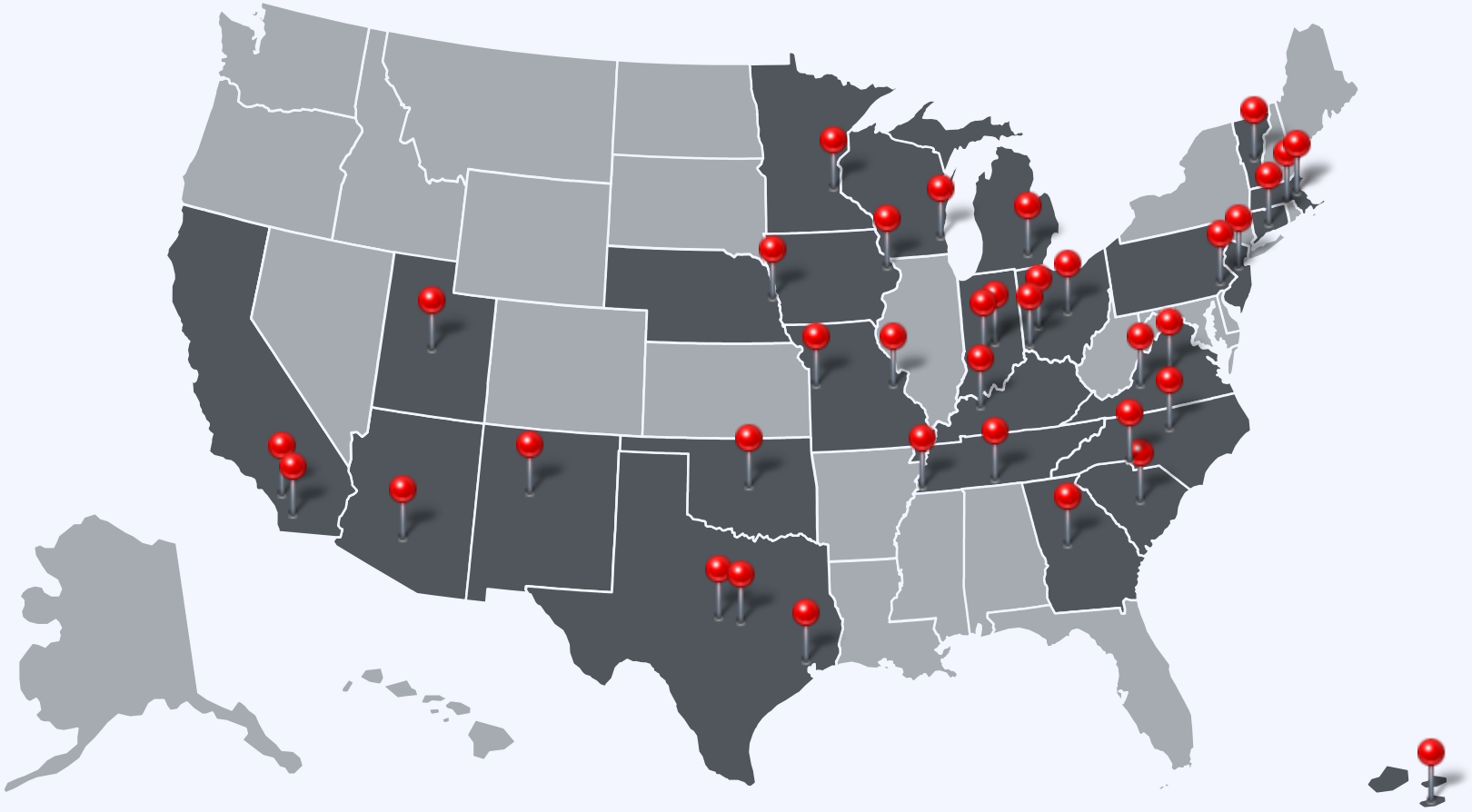
What are the top 3 barriers to solar adoption in your community?

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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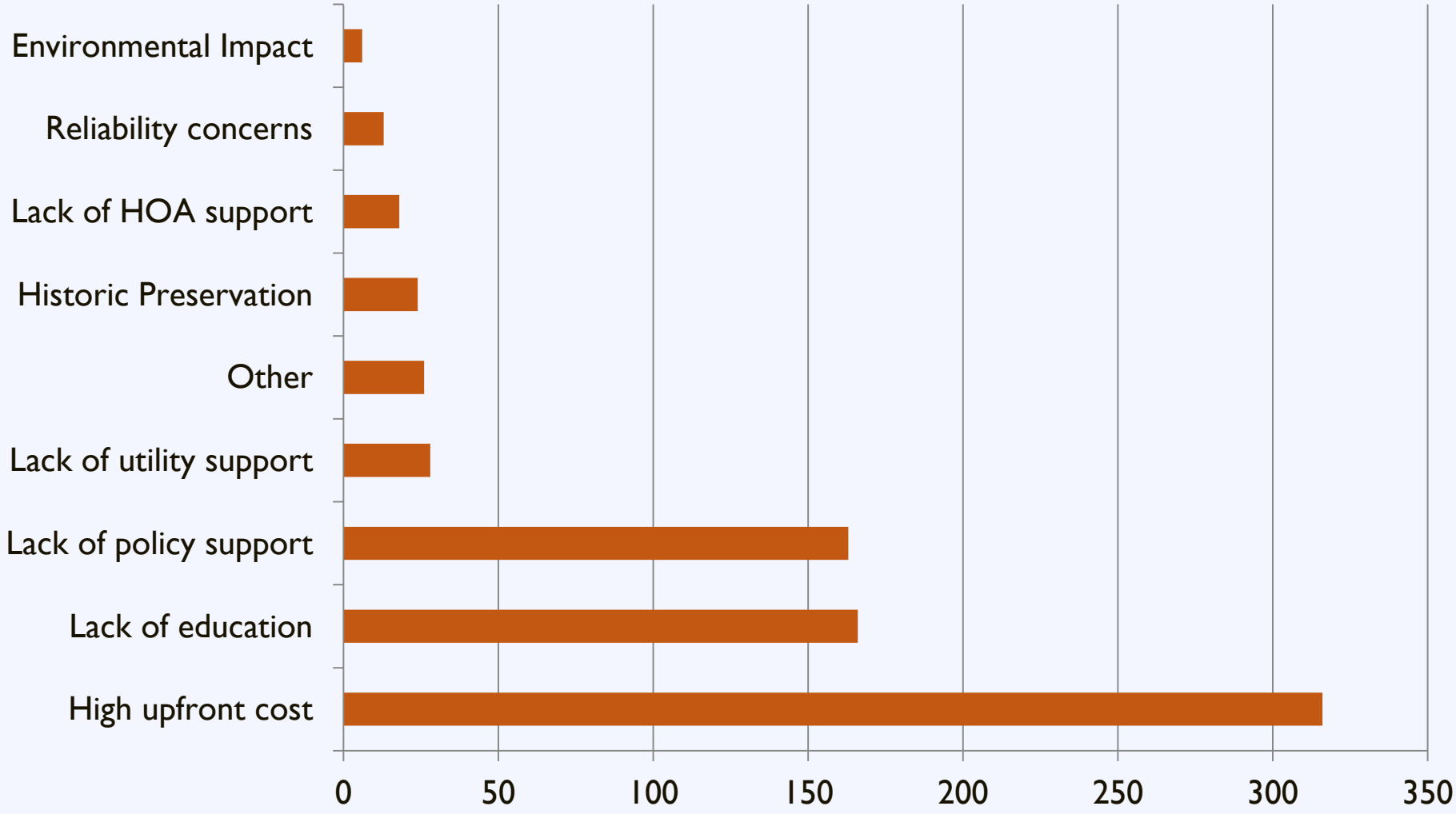
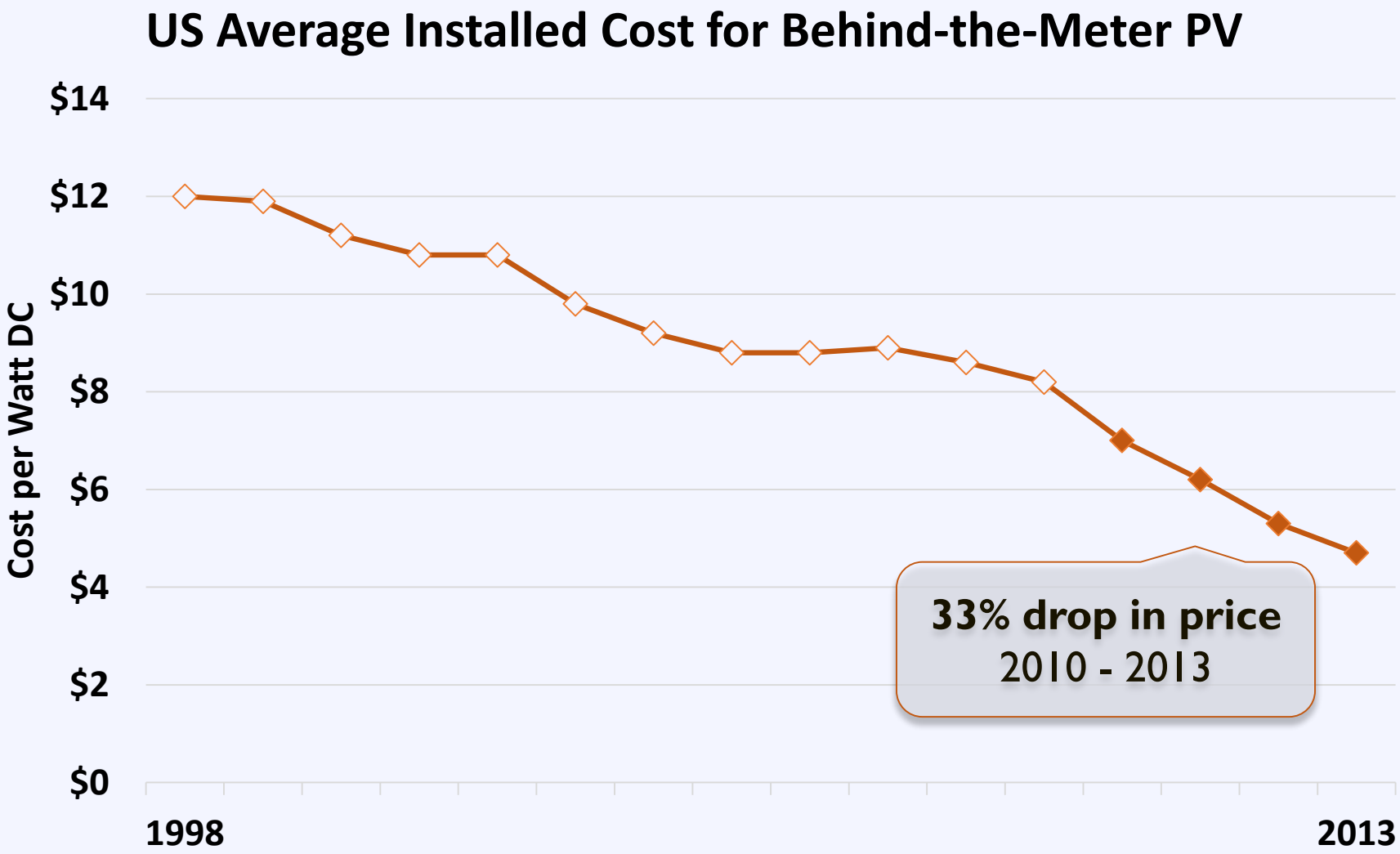
Activity: Addressing Barriers



The Cost of Solar PV



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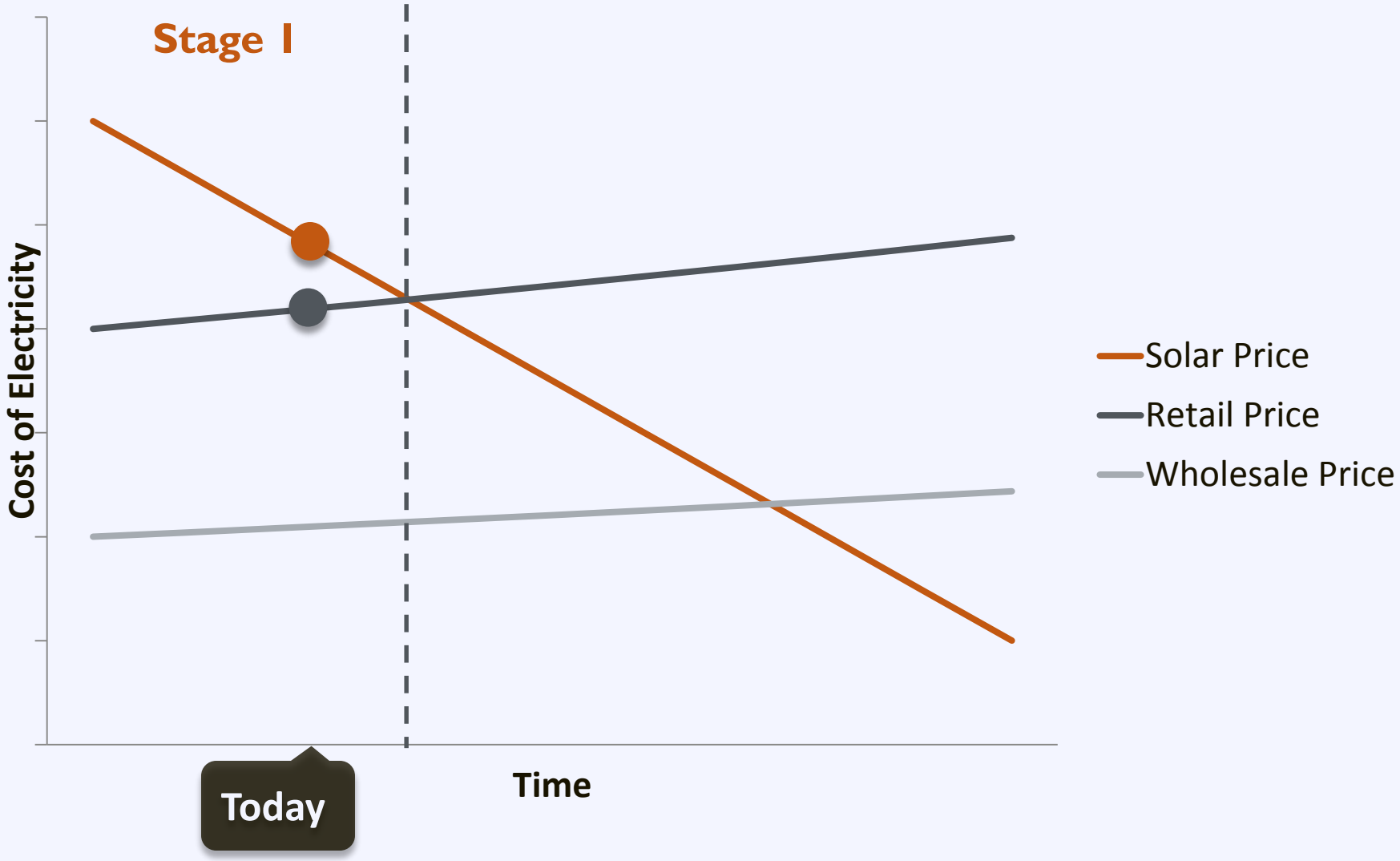
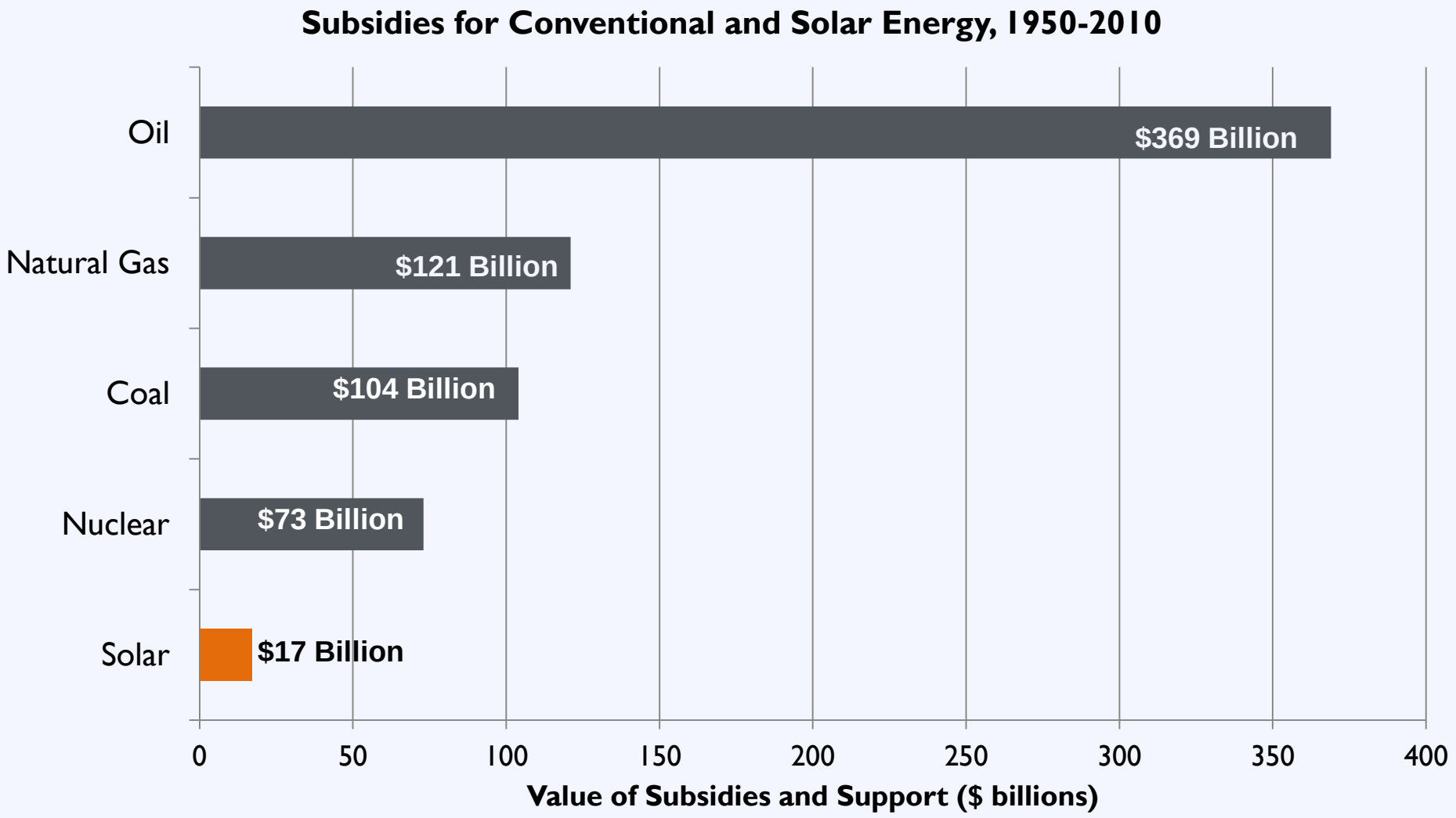
Tracking the Sun VII: The Installed Cost of Photovoltaics in the US from 1998-2013 (LBNL)

The Cost of Solar PV



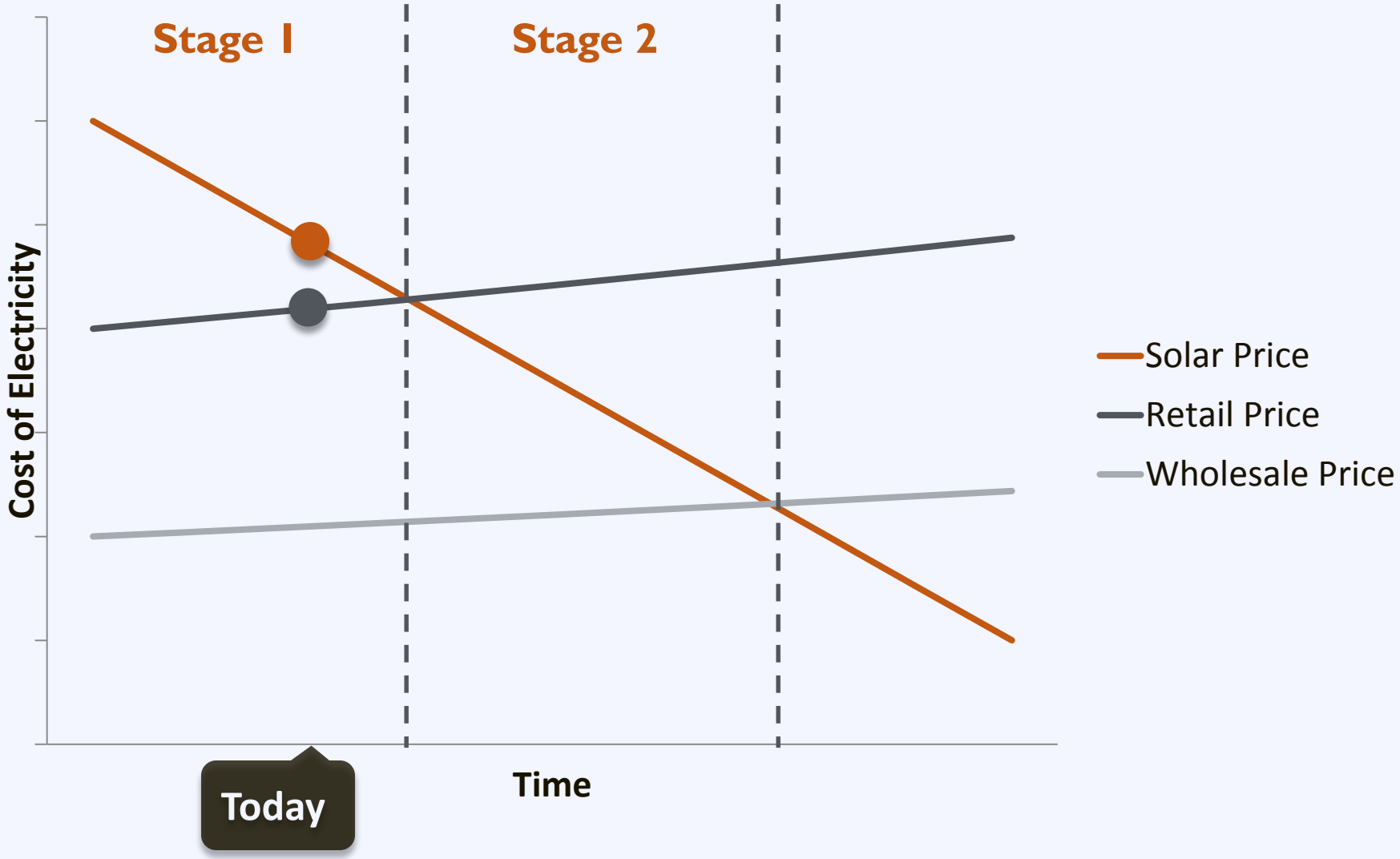
Source: Solar Electric Power Association

Subsidies and Support



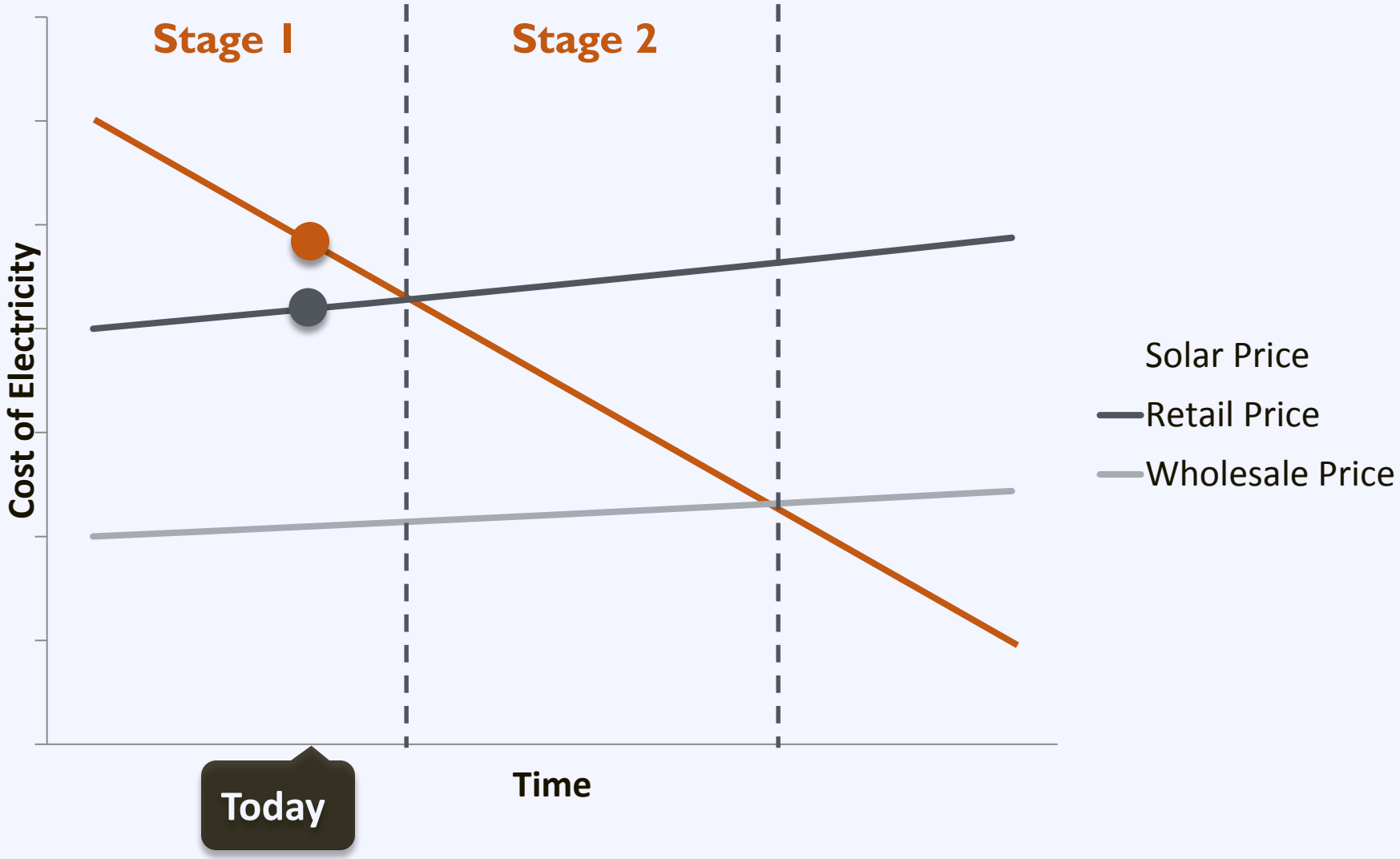
Source: Management Information Services, Inc. October 2011. *60 Years of Energy Incentives: Analysis of Federal Expenditures for Energy Development*; SEIA, May 1, 2012. *Federal Energy Incentives Report.*

The Cost of Solar PV



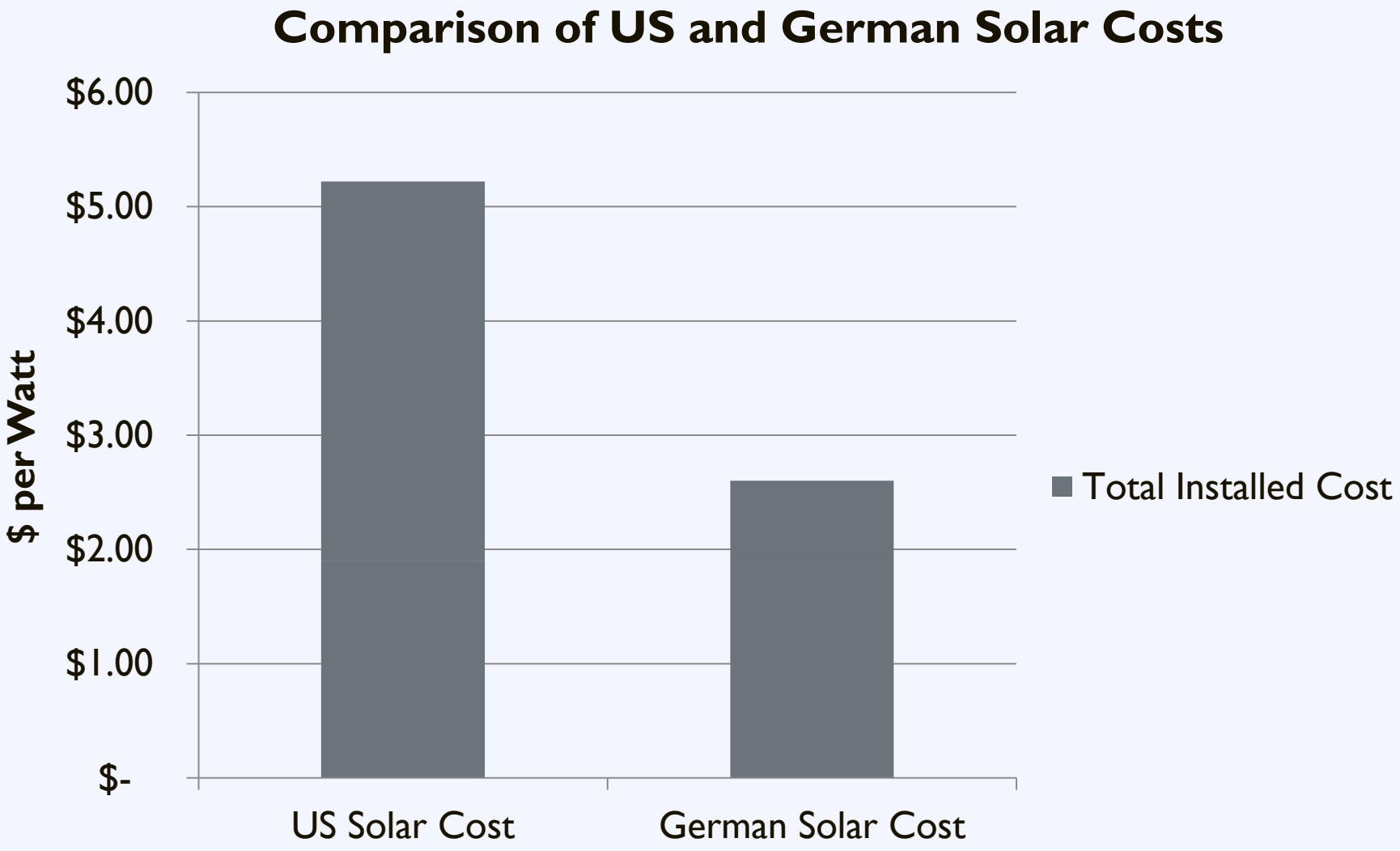
Source: Solar Electric Power Association

The Cost of Solar PV



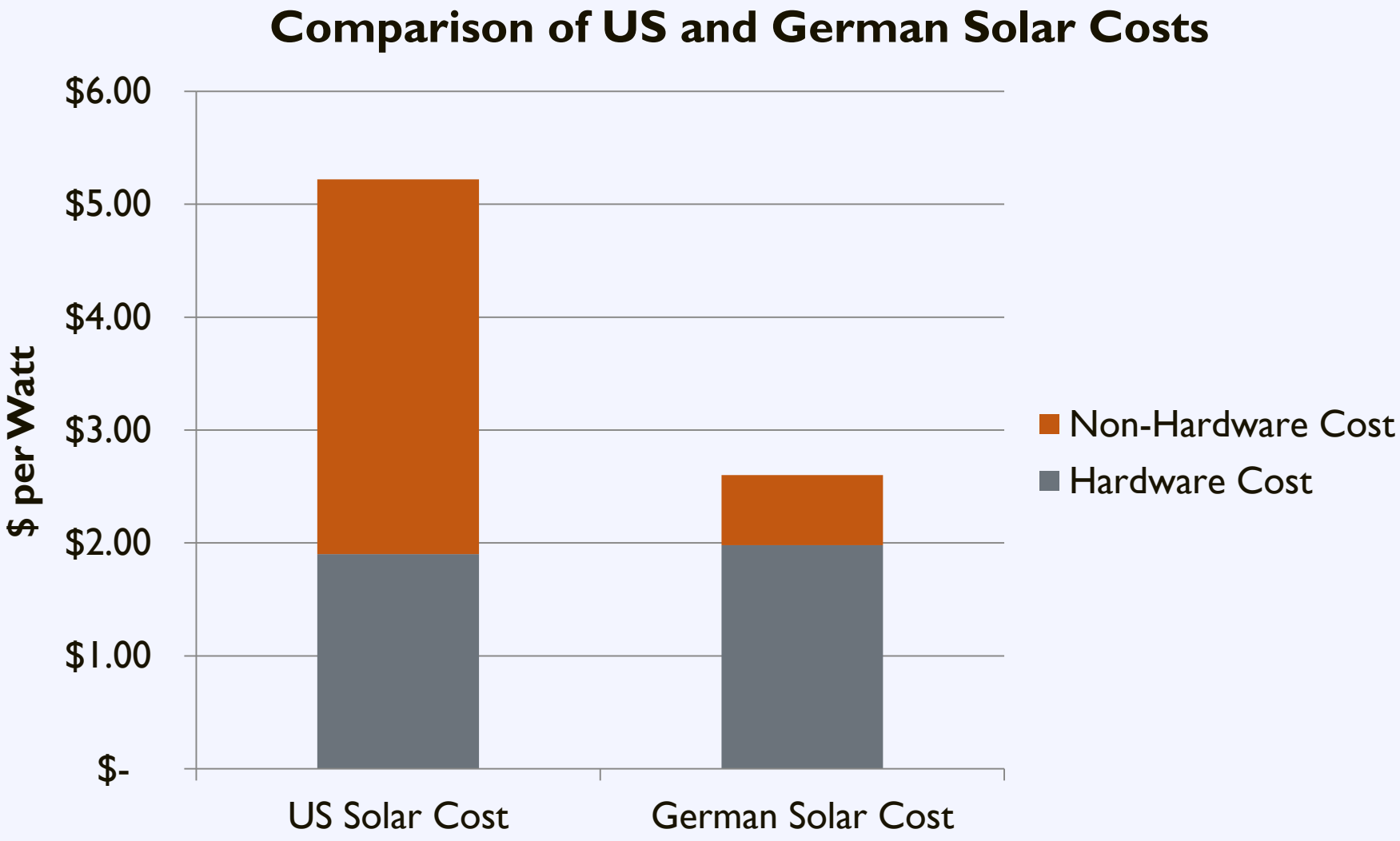
Source: Solar Electric Power Association

The Cost of Solar in the US



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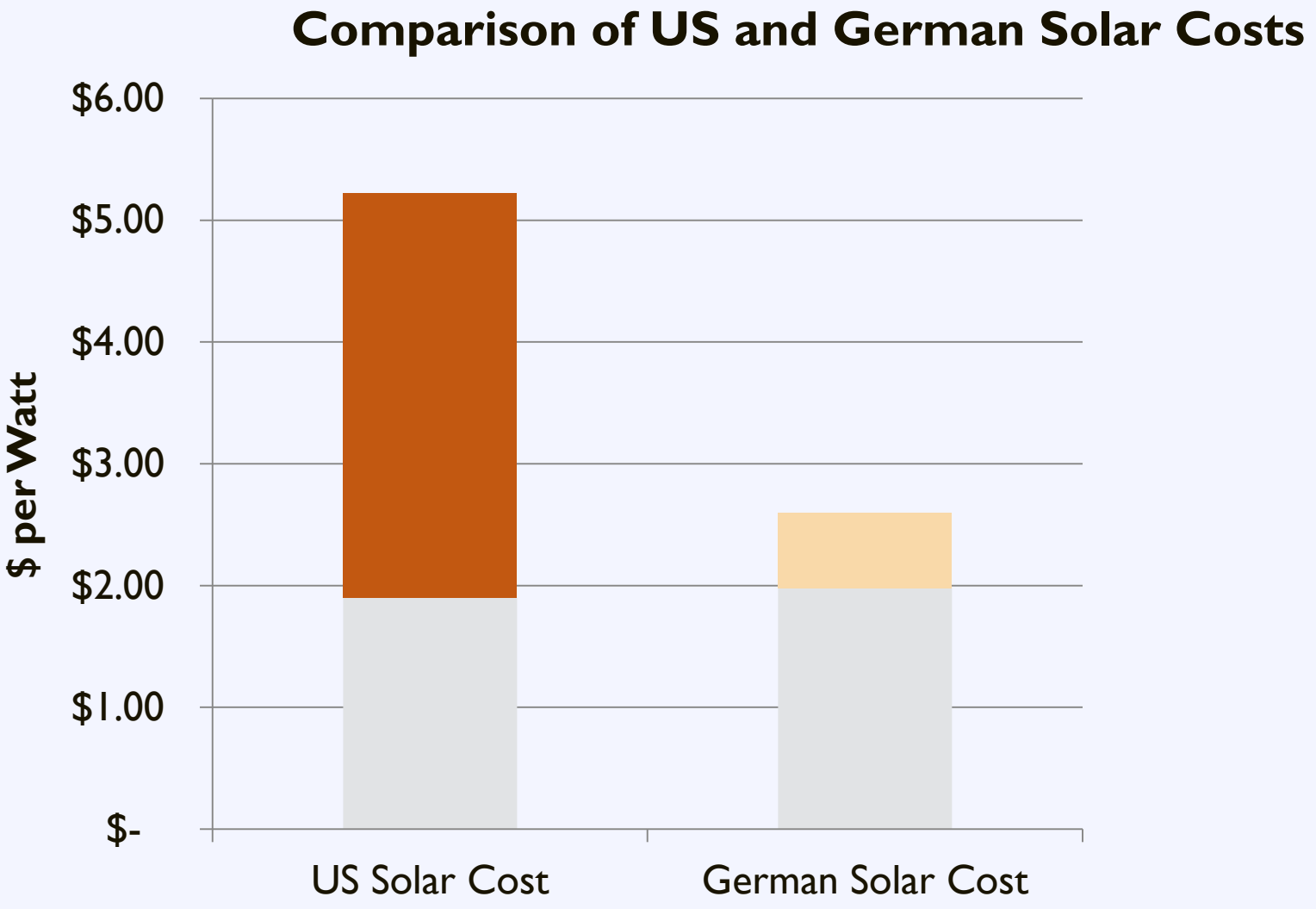
Source: NREL (http://www.nrel.gov/docs/fy14osti/60412.pdf)
LBNL (http://emp.lbl.gov/sites/all/files/lbnl-6350e.pdf)(http://www1.eere.energy.gov/solar/pdfs/sunshot_webinar_20130226.pdf)

The Cost of Solar in the US



Powered by SunShot U.S. Department of Energy

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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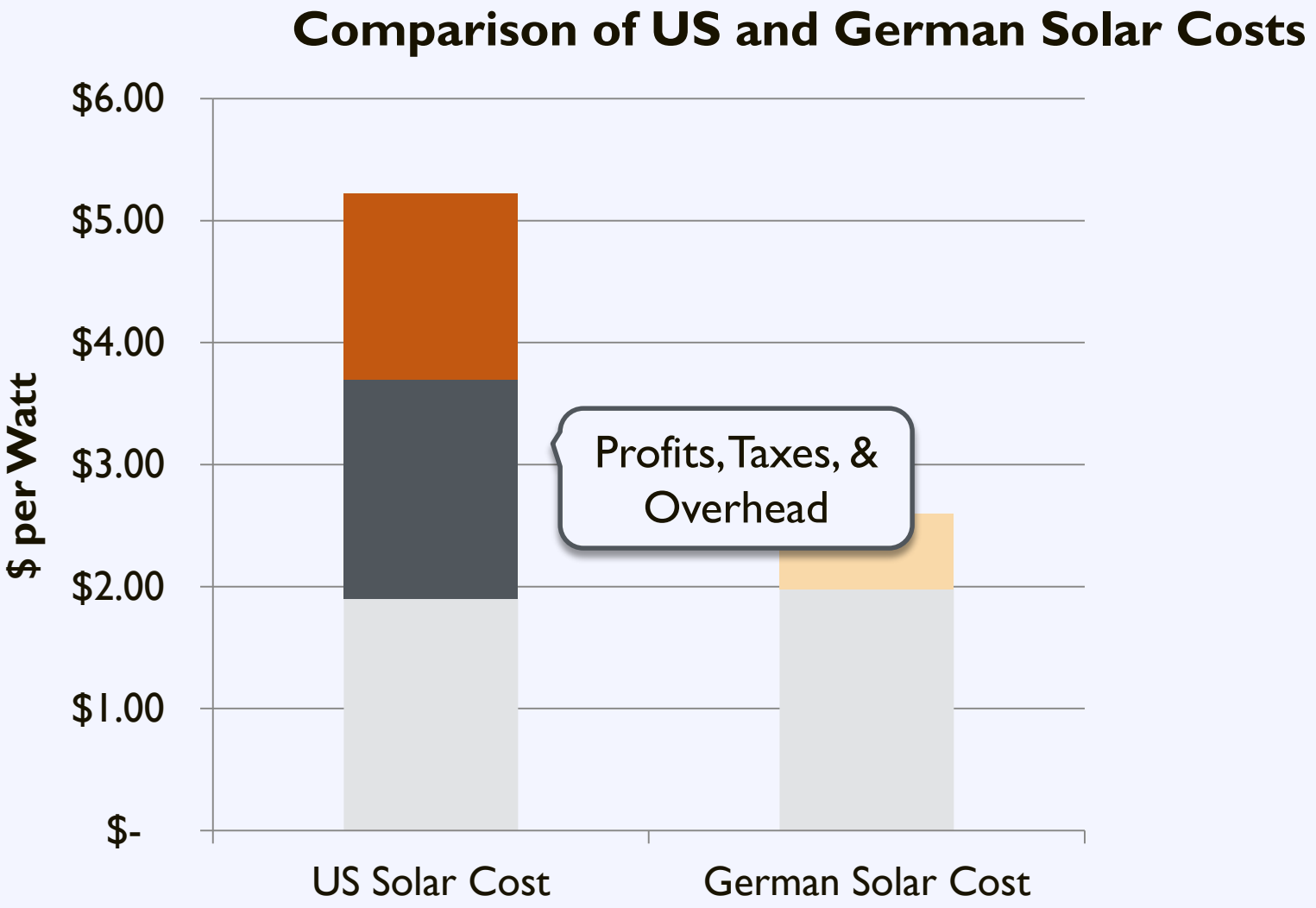

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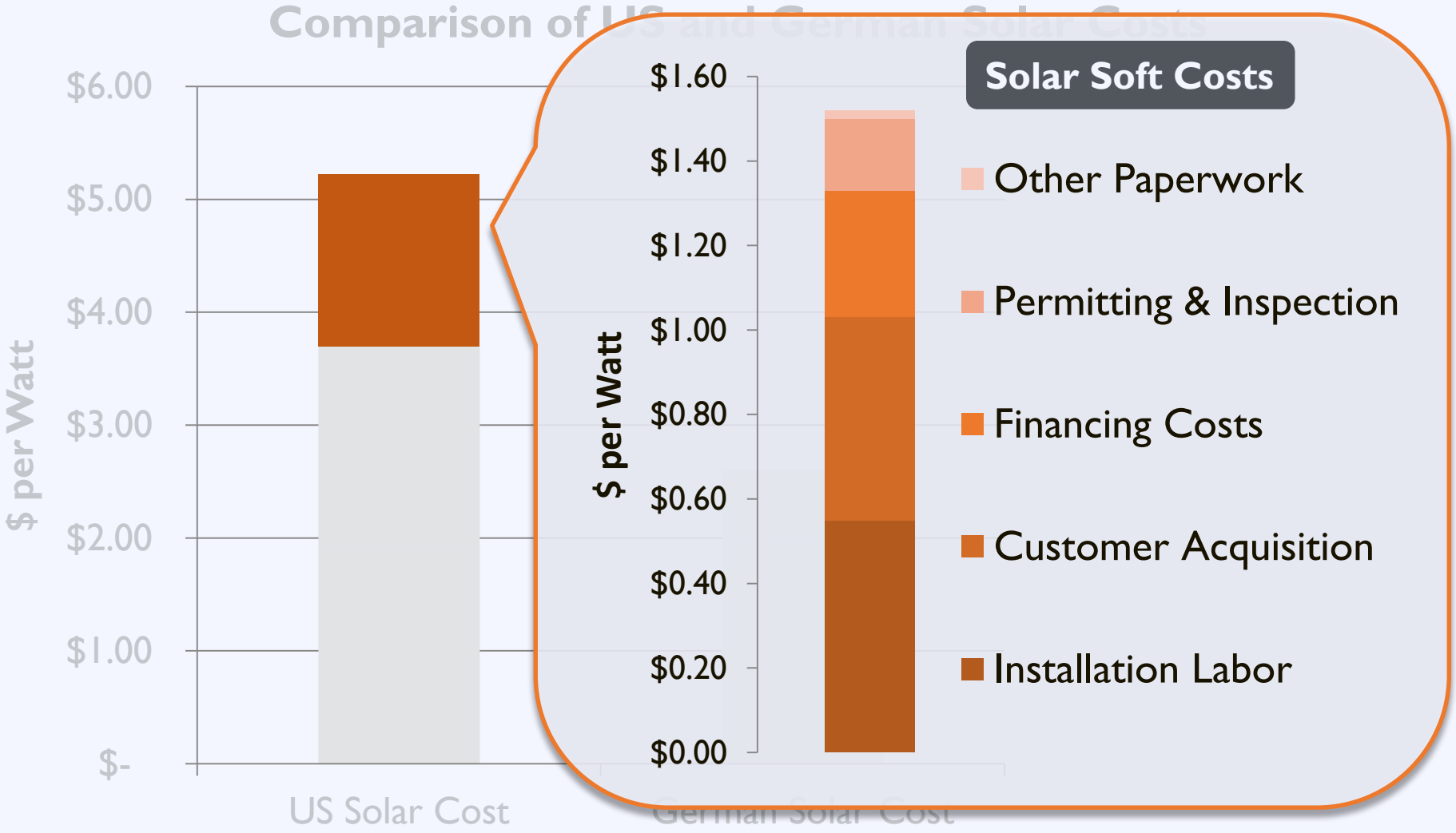

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Challenge: Installation Time

New York City's Goal

100 days

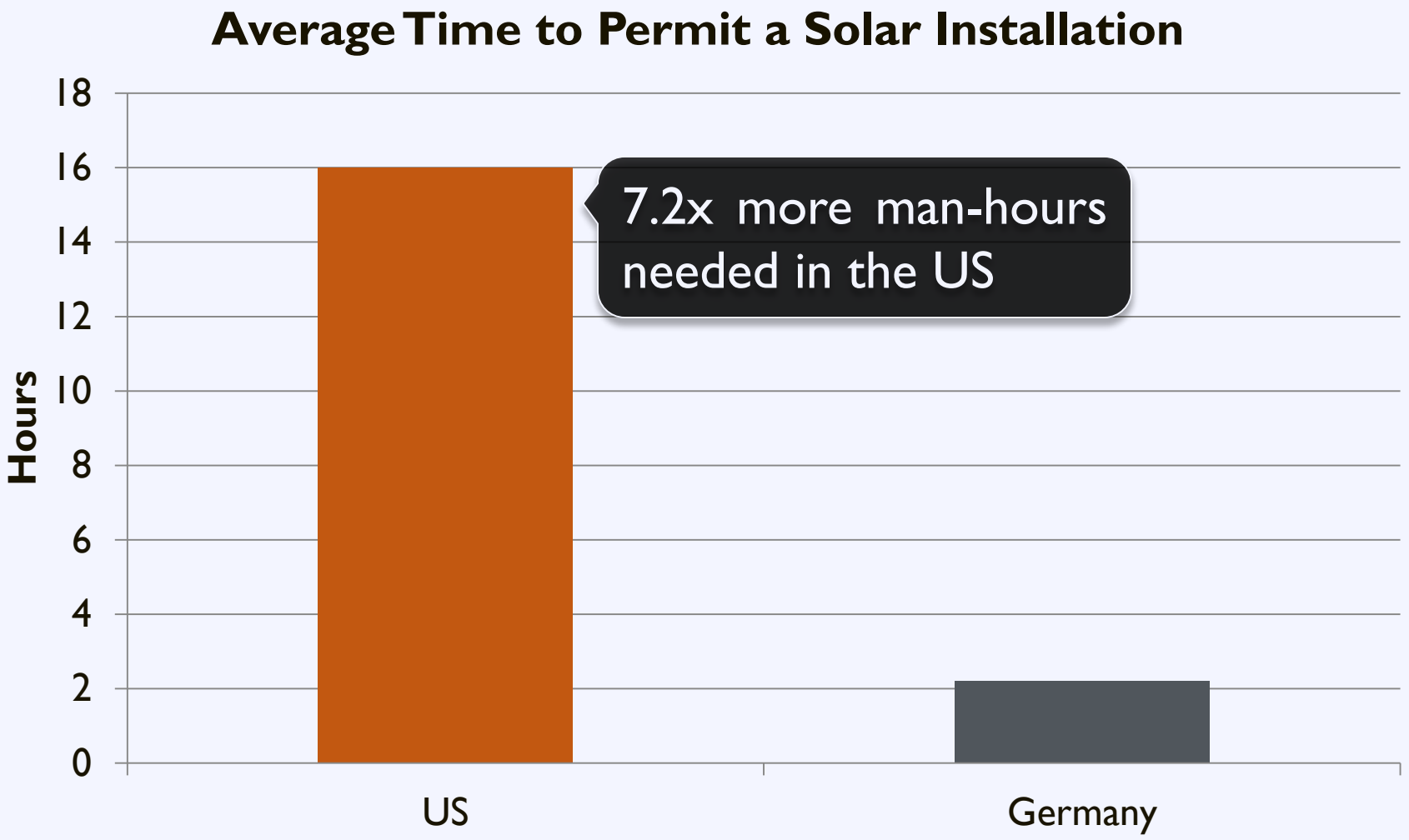
from inception to completion

Germany Today

8 days

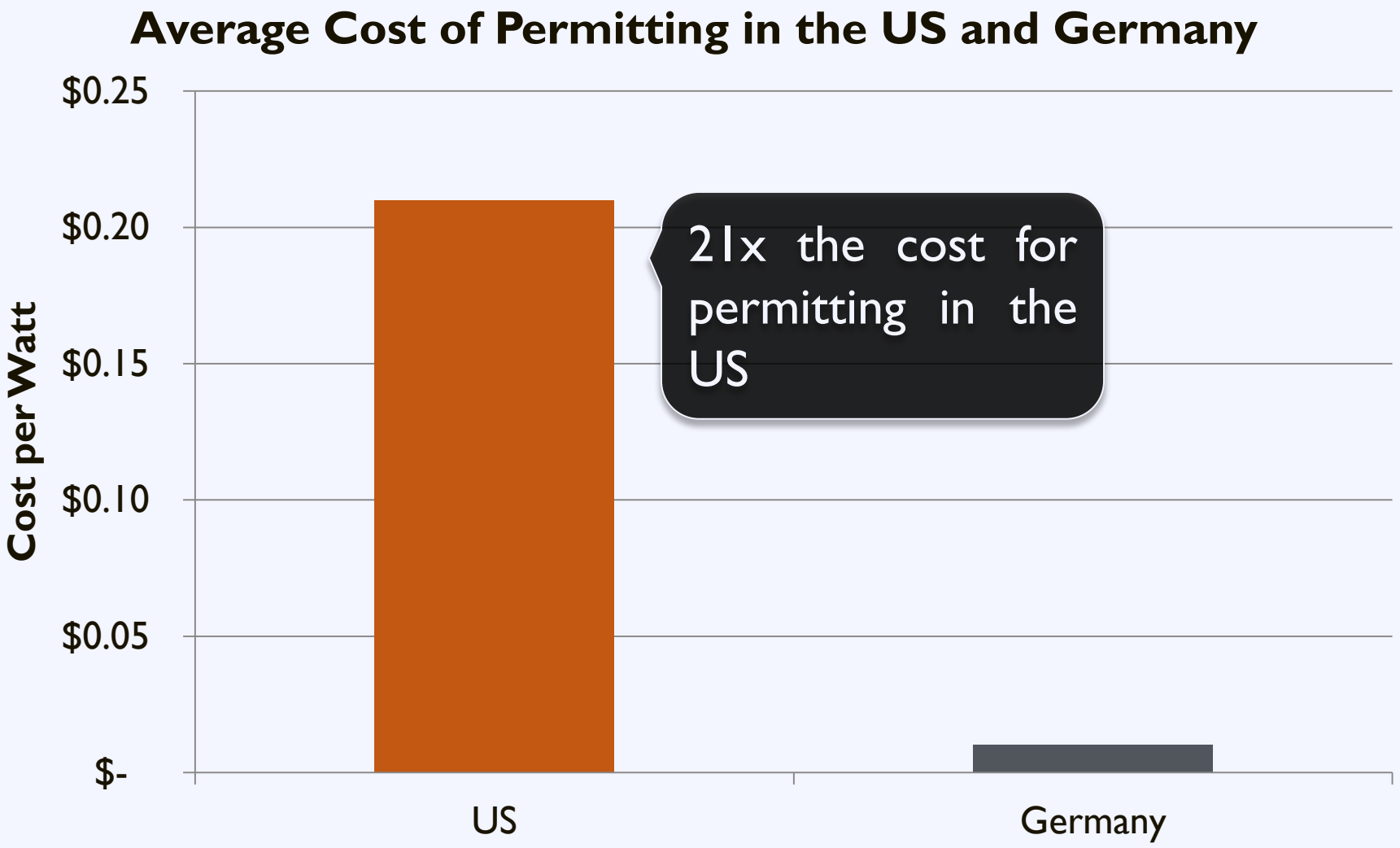
from inception to completion

Time to Installation



Source: NREL, LBNL

Permitting Costs



Source: NREL, LBNL

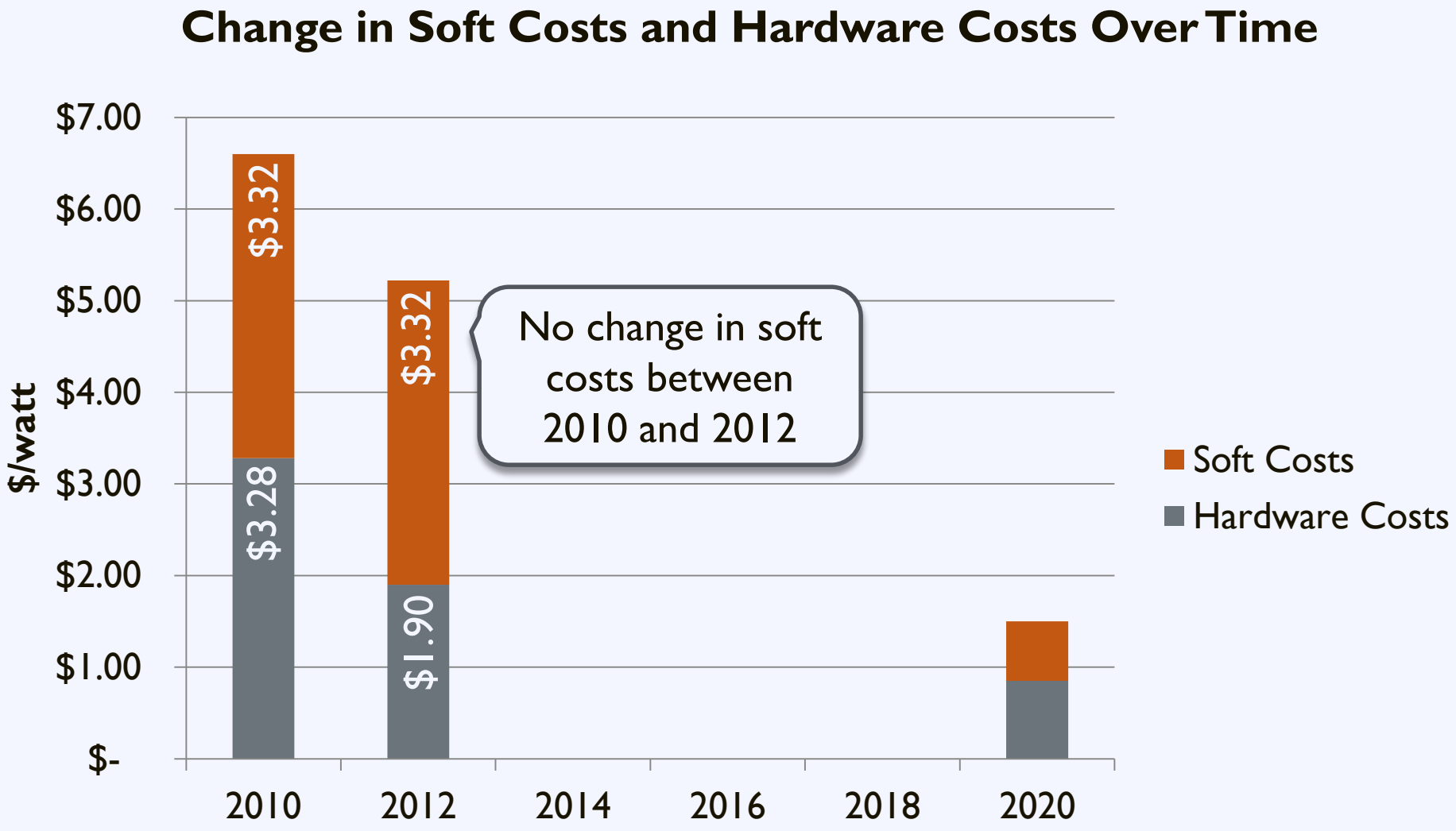
Germany's Success

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 2014 US Avg. Residential Installed Cost:	$3.48/W
Net Present Value:	$2,744
Payback Period:	15.0 years

After 25% Reduction in addressable soft costs:	$3.26/W
Net Present Value:	$3,525
Payback Period:	14.1 years

Difference:	$0.22/W
Net Present Value:	**+ 28.5%**
Payback Period:	**- 6%**

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; 5.25% state income tax rate; 6% sales tax rate; 50% assessment for property taxes at 4.1% 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

Agenda

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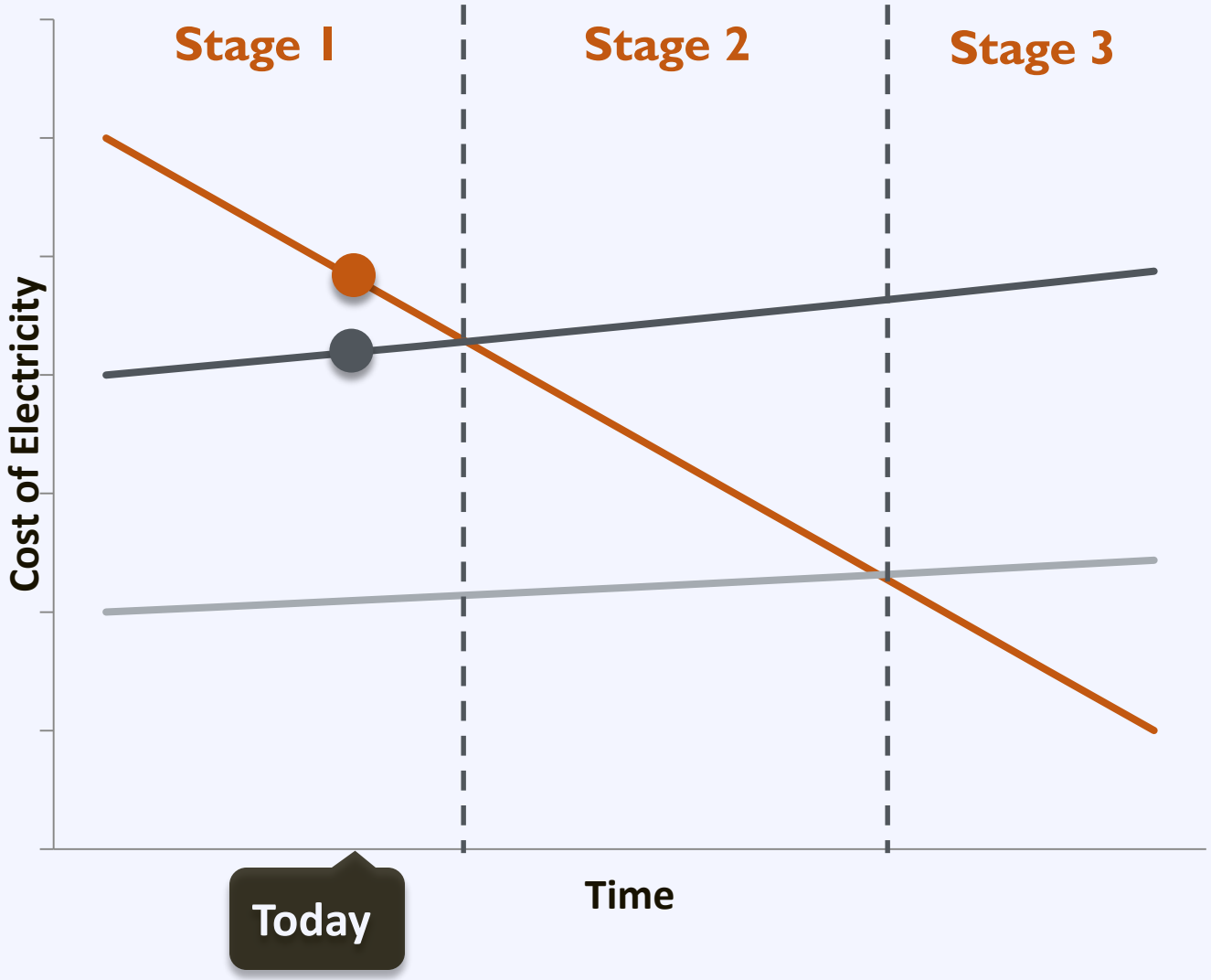
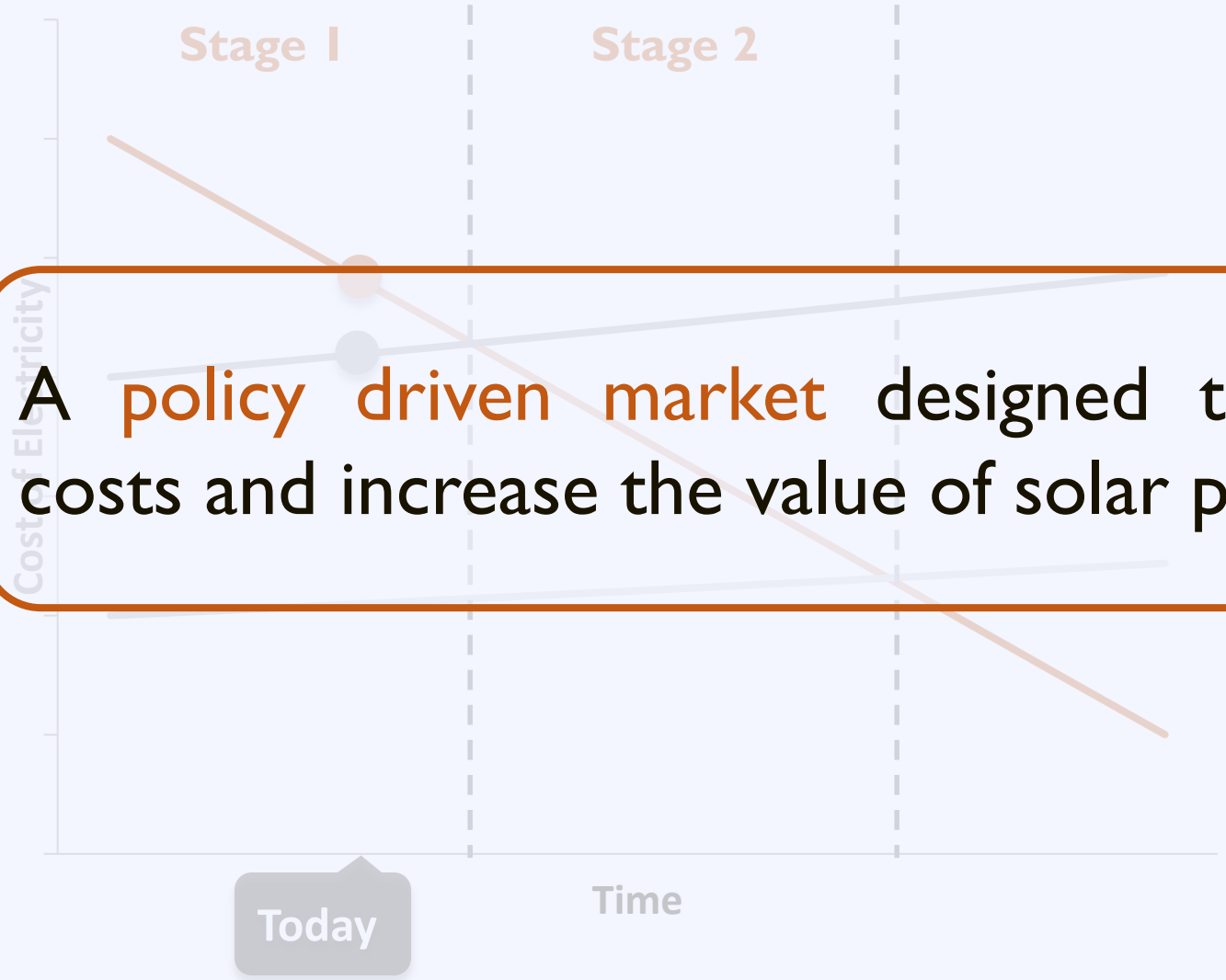
Solar Market: Trends



Source: Solar Electric Power Association

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

Federal	Investment Tax Credit	Accelerated Depreciation	Qualified Energy Conservation Bond
State & Utility	Renewable Portfolio Standard	Net Metering	Interconnection
	Solar Access	Feed-In Tariff	

A Policy Driven Market

Federal	Investment Tax Credit	Accelerated Depreciation	Qualified Energy Conservation Bond
State & Utility	Renewable Portfolio Standard	Net Metering	Interconnection
	Solar Access	Property Tax Exemption	

Investment Tax Credit

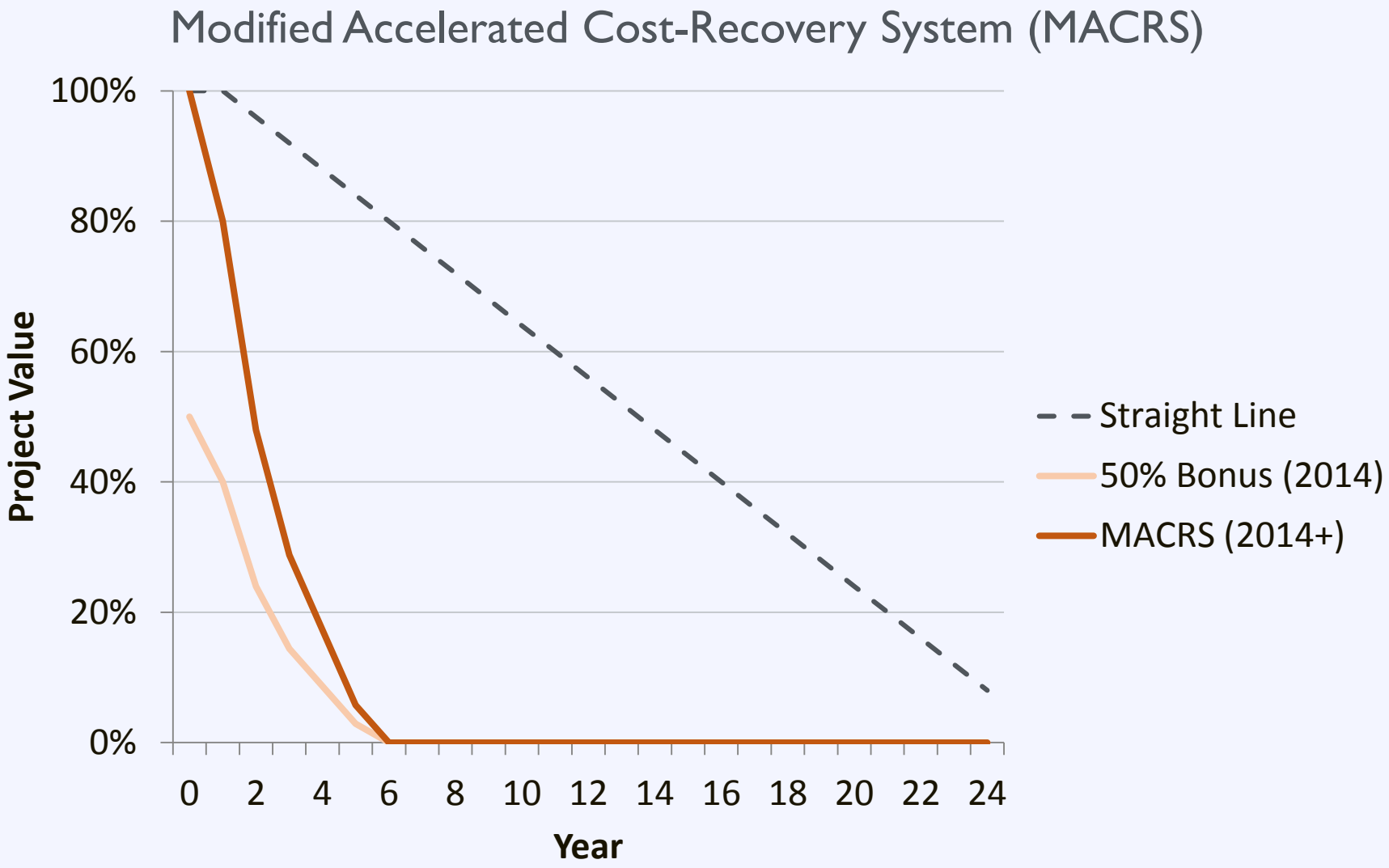
Type: Tax Credit

Eligibility: For-Profit Organization

Value: 30% of the installation cost

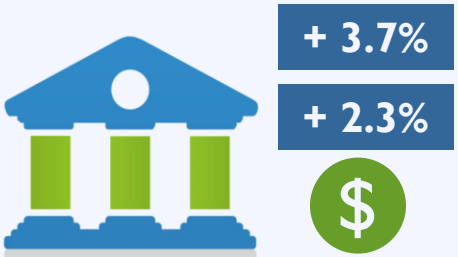
Availability: Through 12/31/2016

Accelerated Depreciation

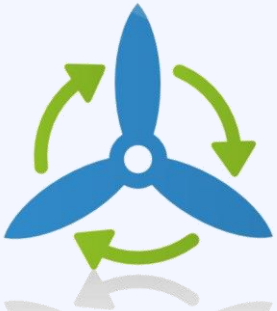


Qualified Energy Conservation Bond

US Treasury



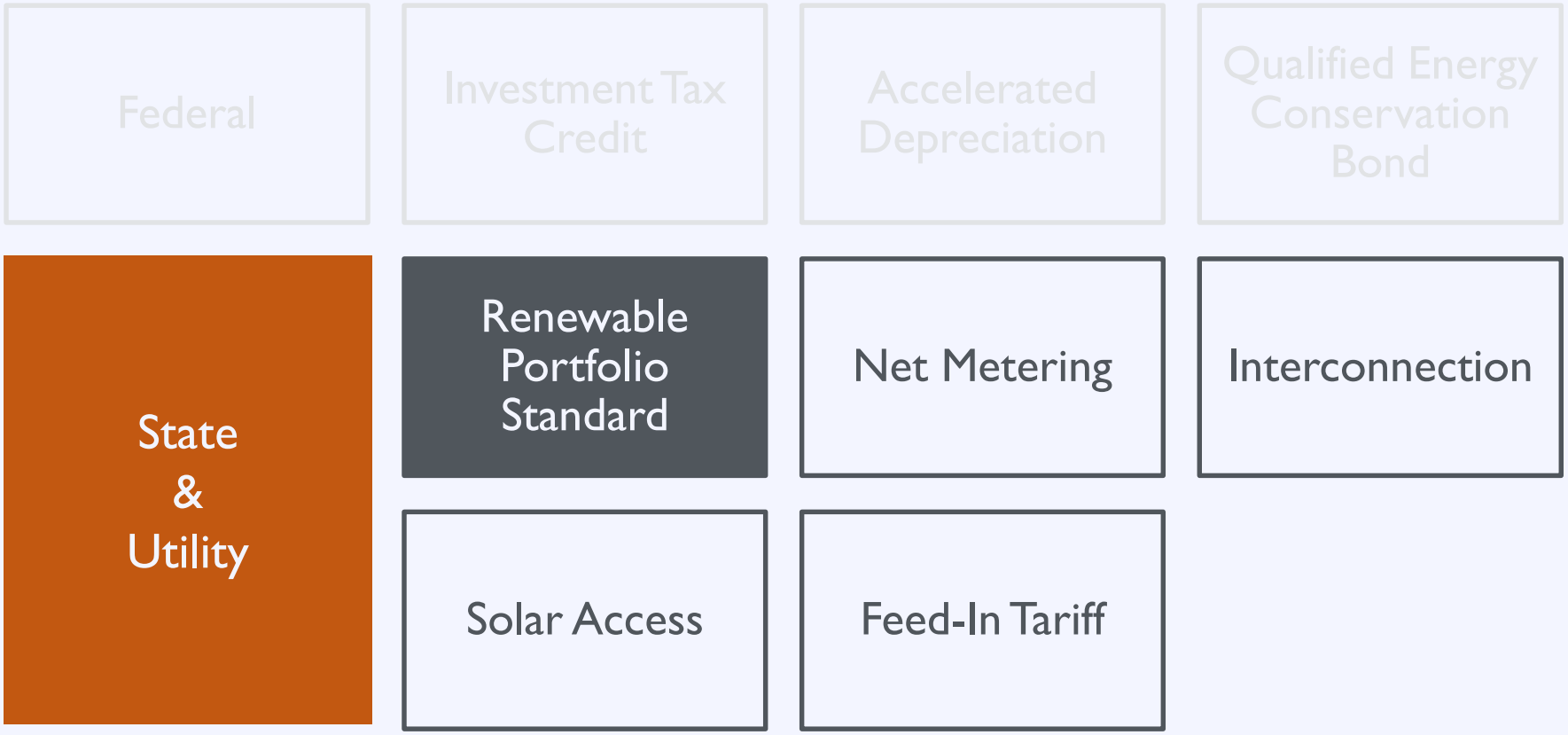
Local Gov



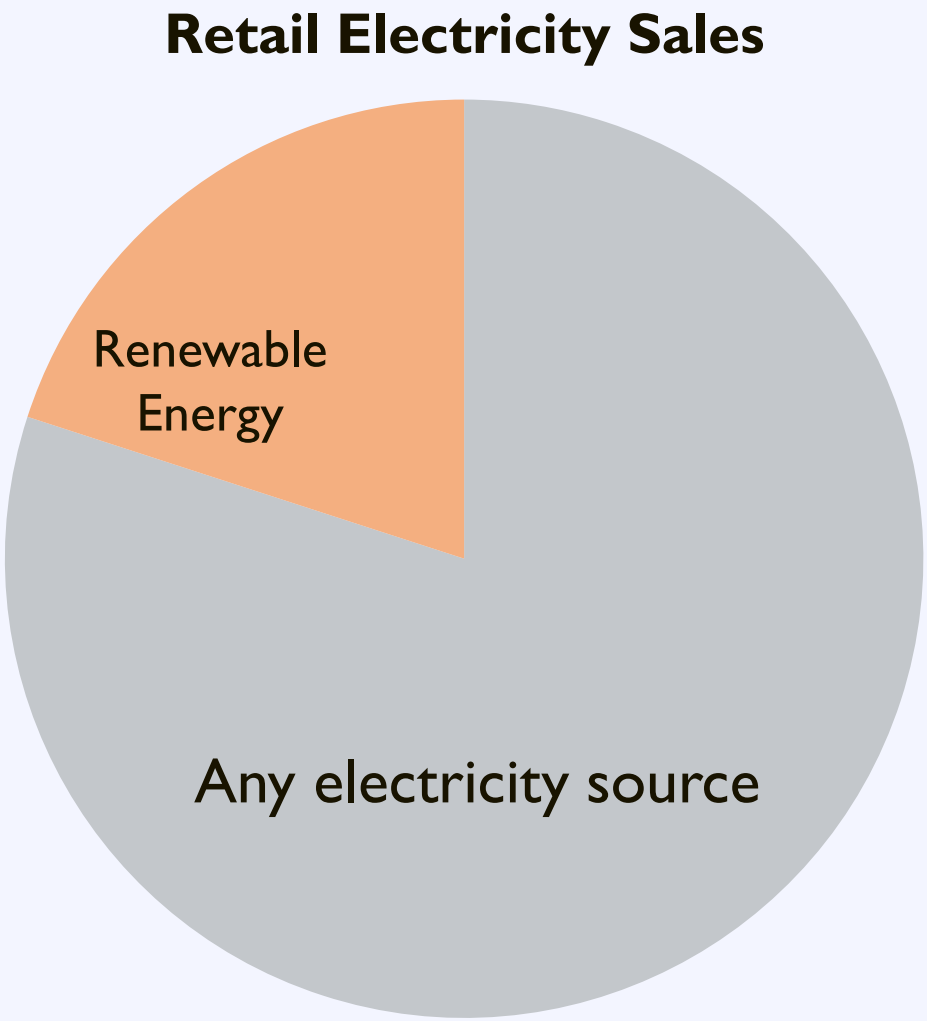
Project

Bond Holders

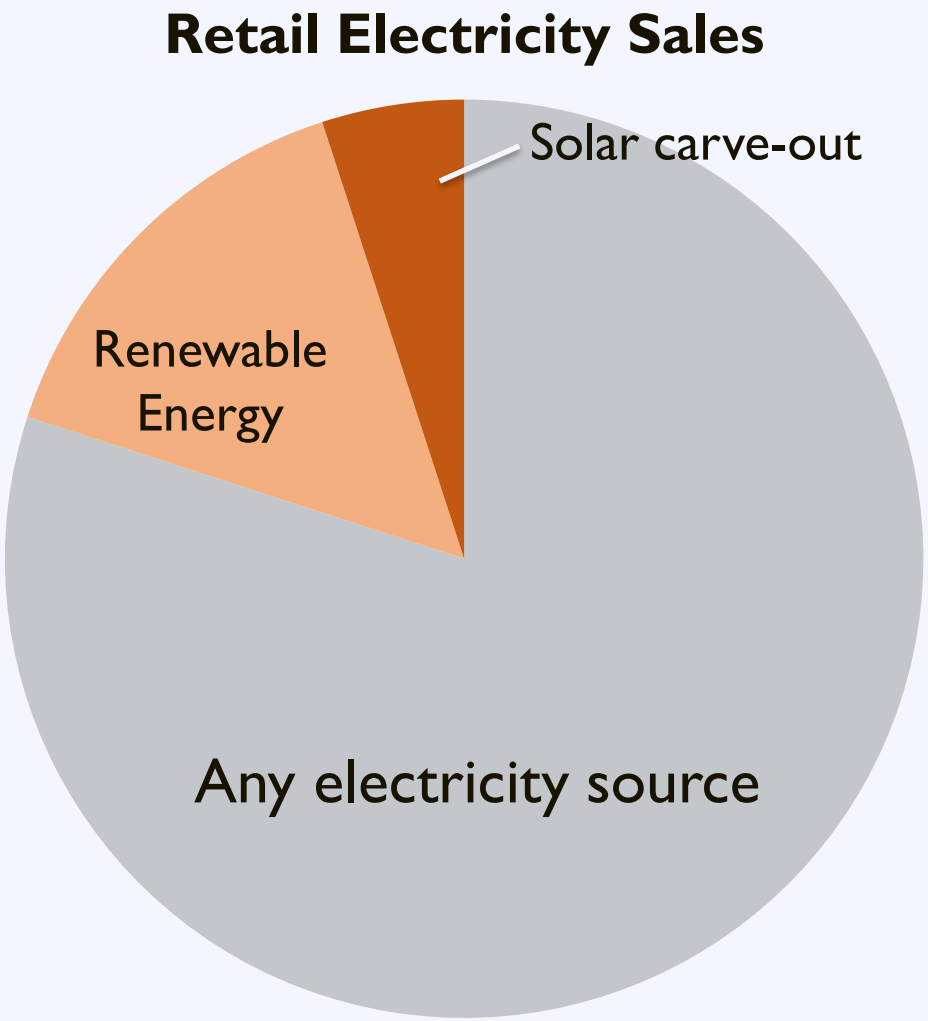
A Policy Driven Market



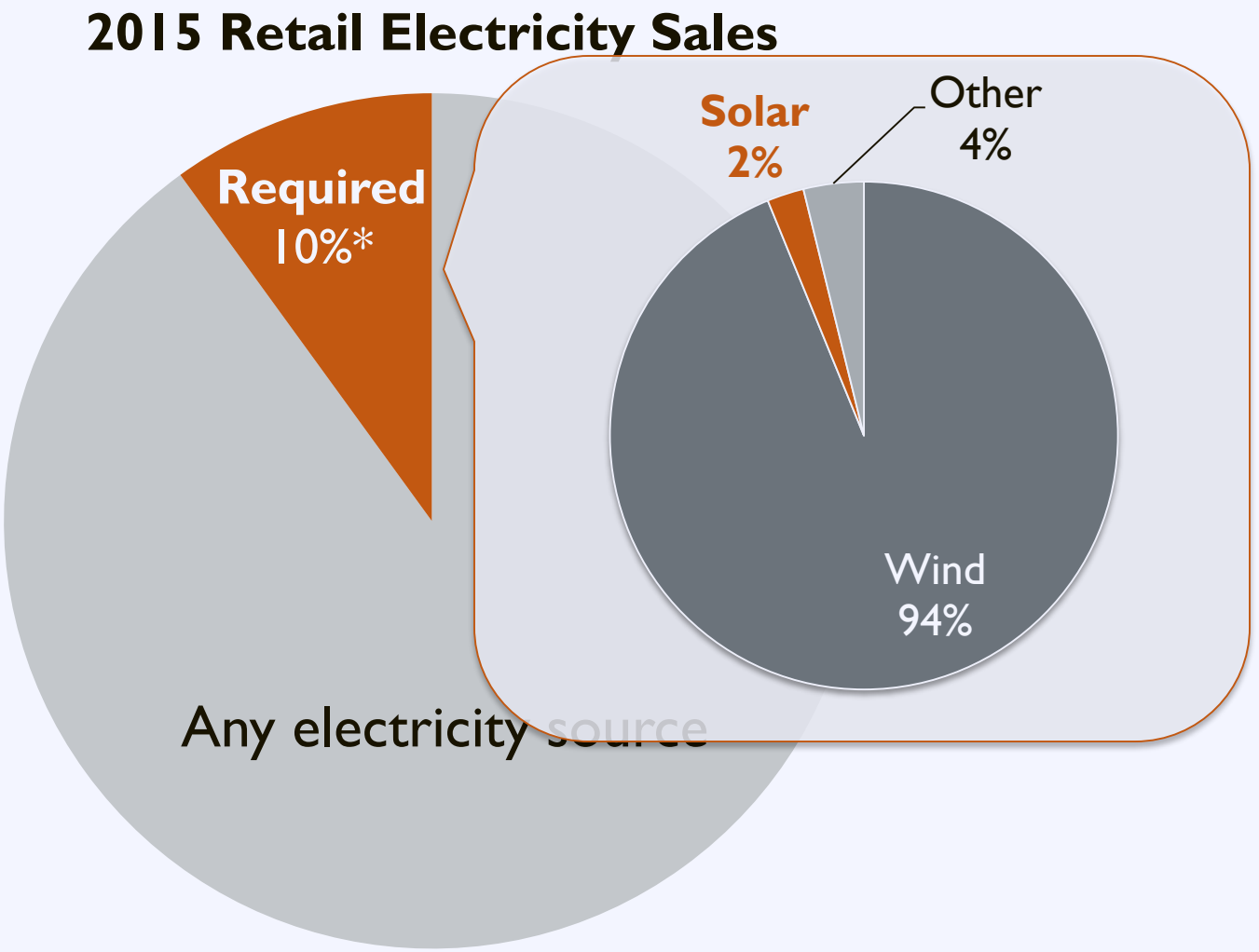
Renewable Portfolio Standard



Renewable Portfolio Standard



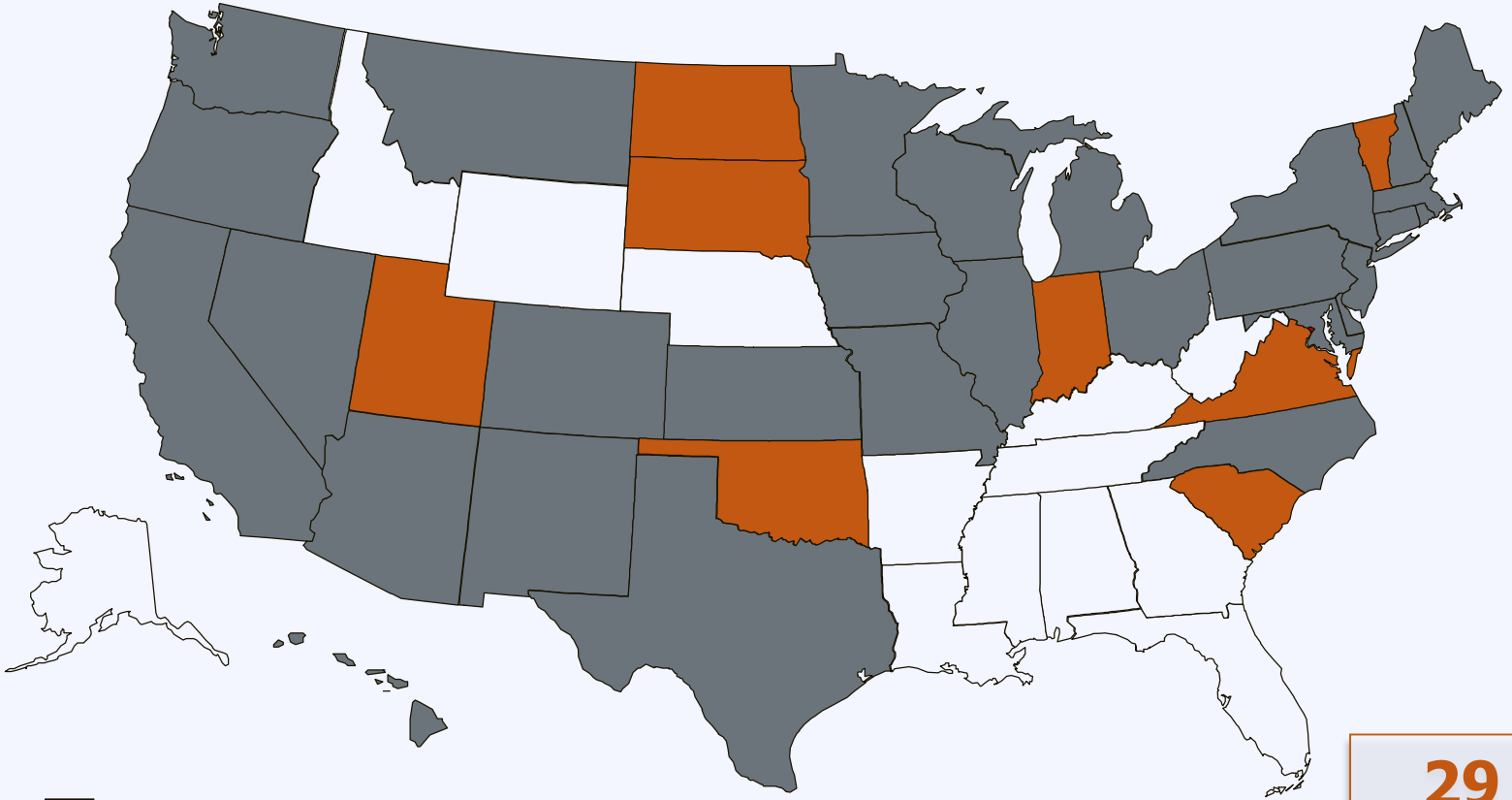
Michigan RPS



Source: DSIRE

Renewable Portfolio Standard

www.dsireusa.org / March 2015



Renewable portfolio standard

Renewable portfolio goal

29 states, + Washington DC and 2 territories have Renewable Portfolio Standards

(8 states and 2 territories have renewable portfolio goals)

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U.S. Department of Energy

RPS Impacts: Solar Deployment

RPS and Solar/DG Status of Top Ten Solar States by Cumulative Installed Capacity (as of Q4 2014)

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	Texas	Y	N

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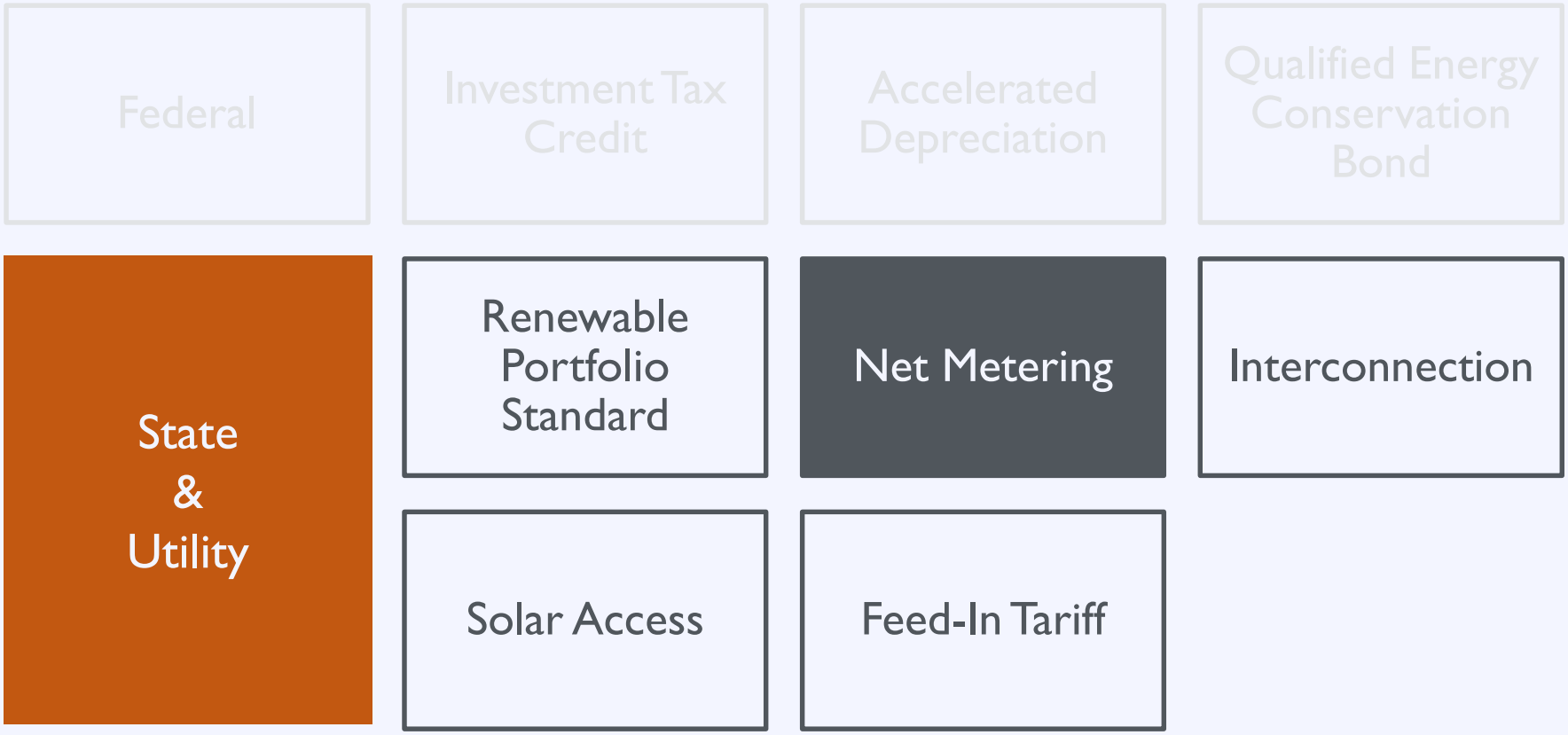
Source: DSIRE Solar (http://dsireusa.org/documents/summarymaps/Solar_DG_RPS_map.pdf); Solar Energy Industries Association/ GTM Research *Solar Market Insight 2014 Year-in-Review*

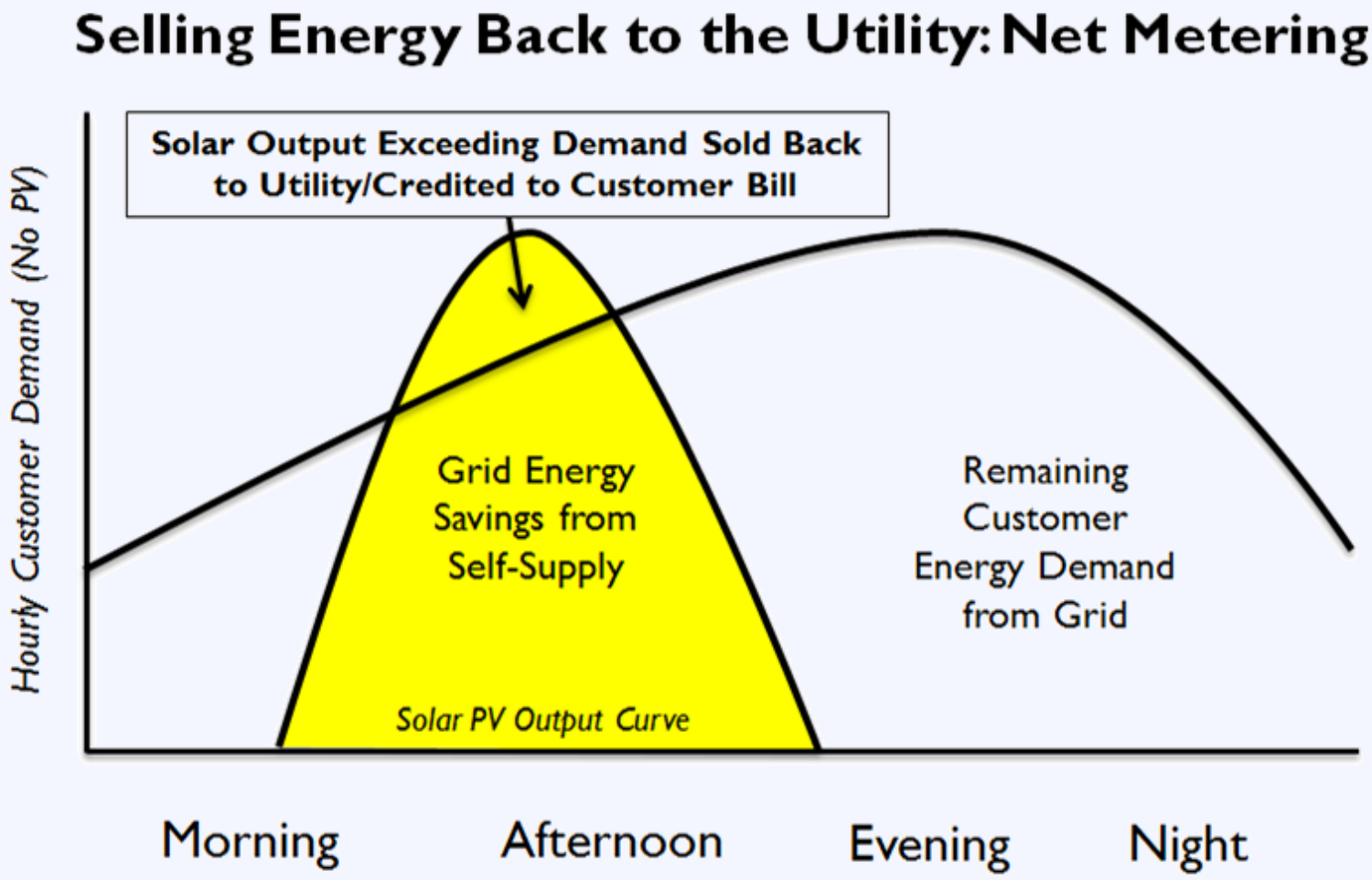
A Policy Driven Market



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



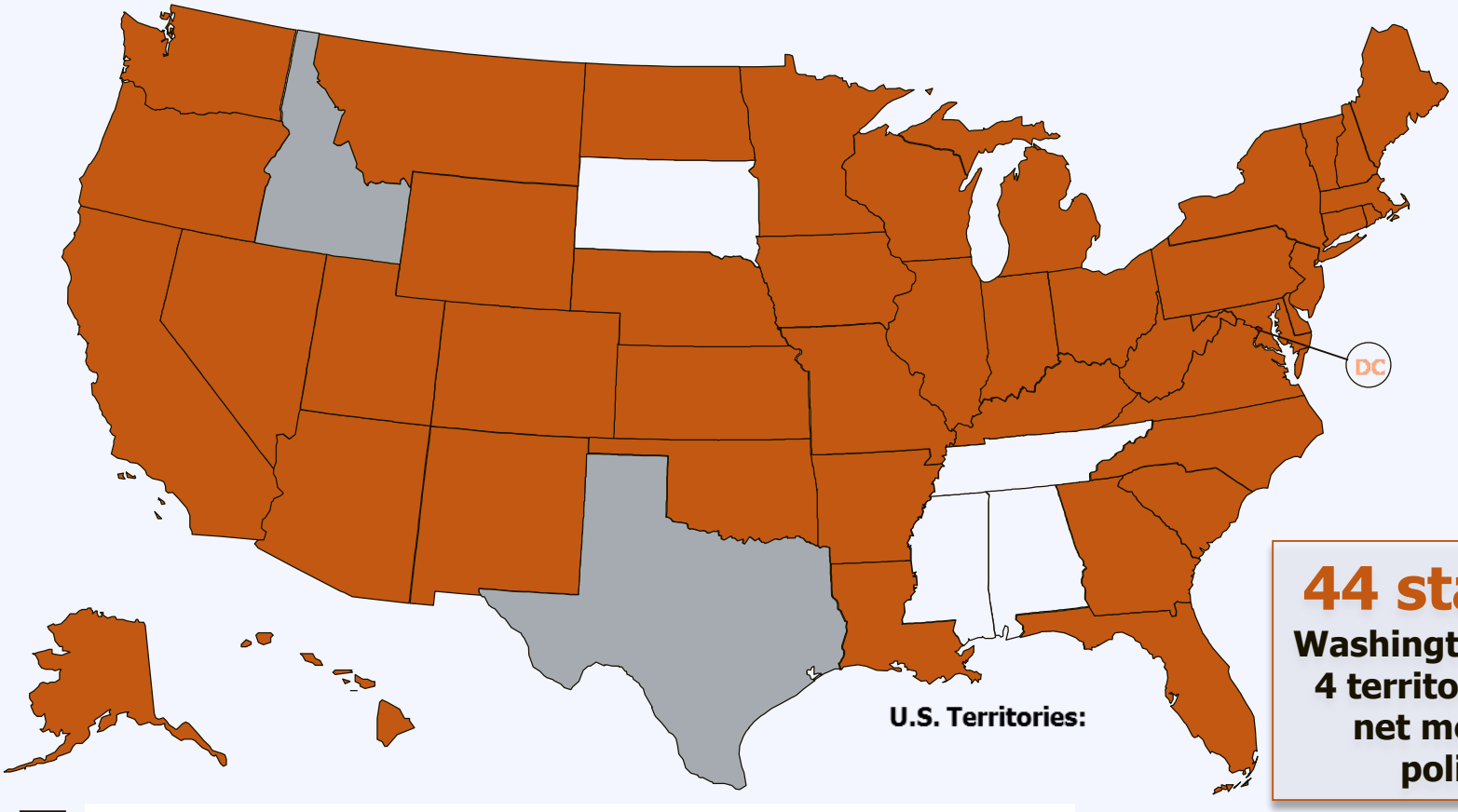
Net Metering: Market Share

More than **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

State-developed mandatory rules for certain utilities

No uniform or statewide mandatory rules, but some utilities allow net metering

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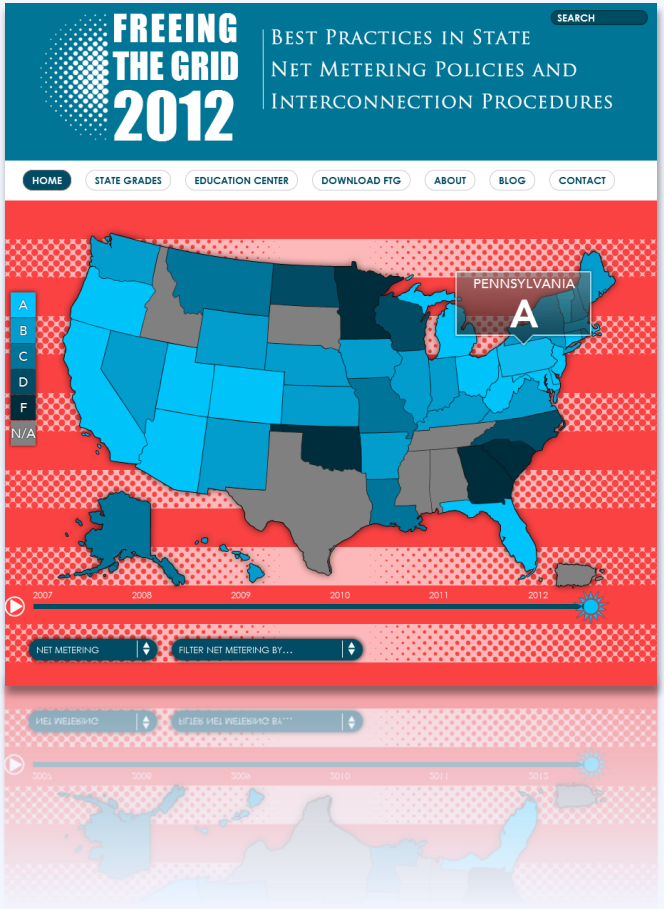
Source: DSIRE (April 2015)

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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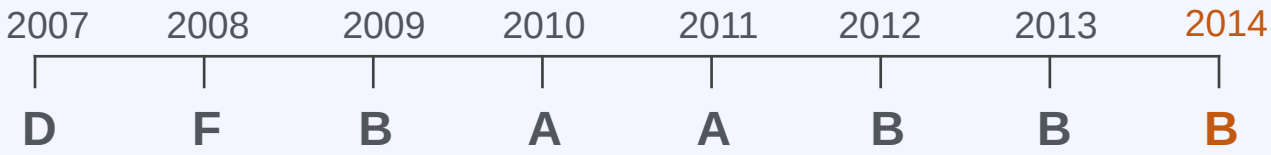
Net Metering: Michigan

B



Net Excess Credit Value
Retail Rate (<20 kW)
Power Rate (>20 kW

Credit Rollover
Indefinite

System Capacity Limit
150 kW

Aggregate Limit
0.75% of peak load

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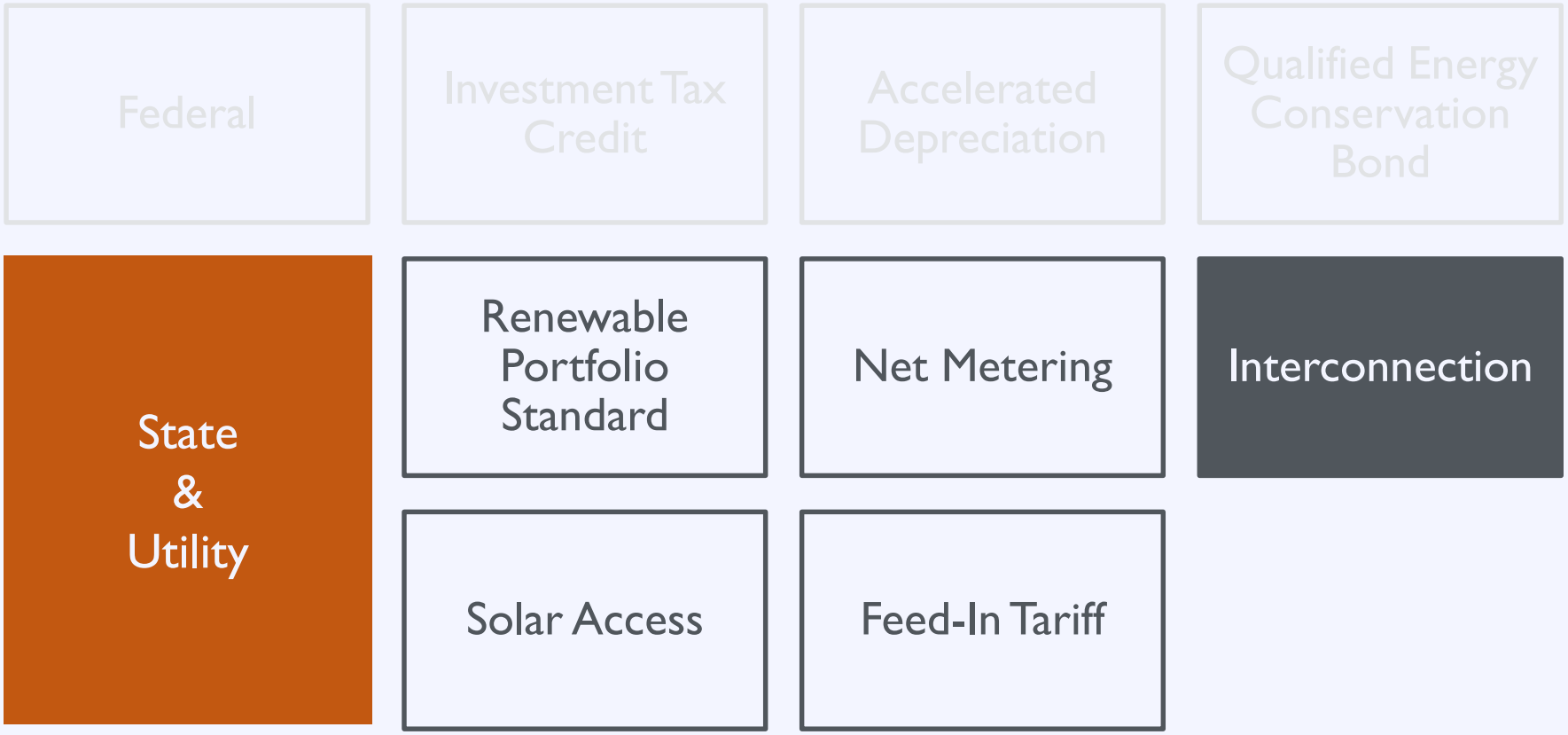
Source: Freeing the Grid

A Policy Driven Market



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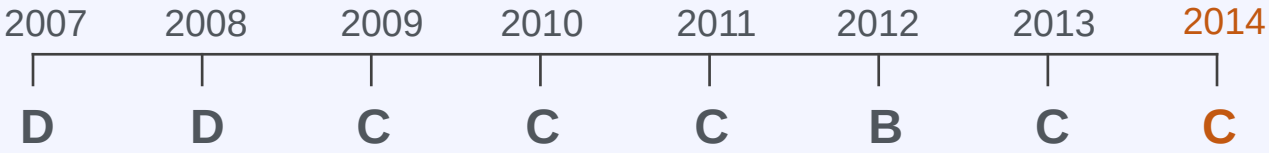
Interconnection

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: Michigan



Applicable Technologies
Includes solar PV, as well as other distributed generation technologies

System Capacity Limit
No limit specified

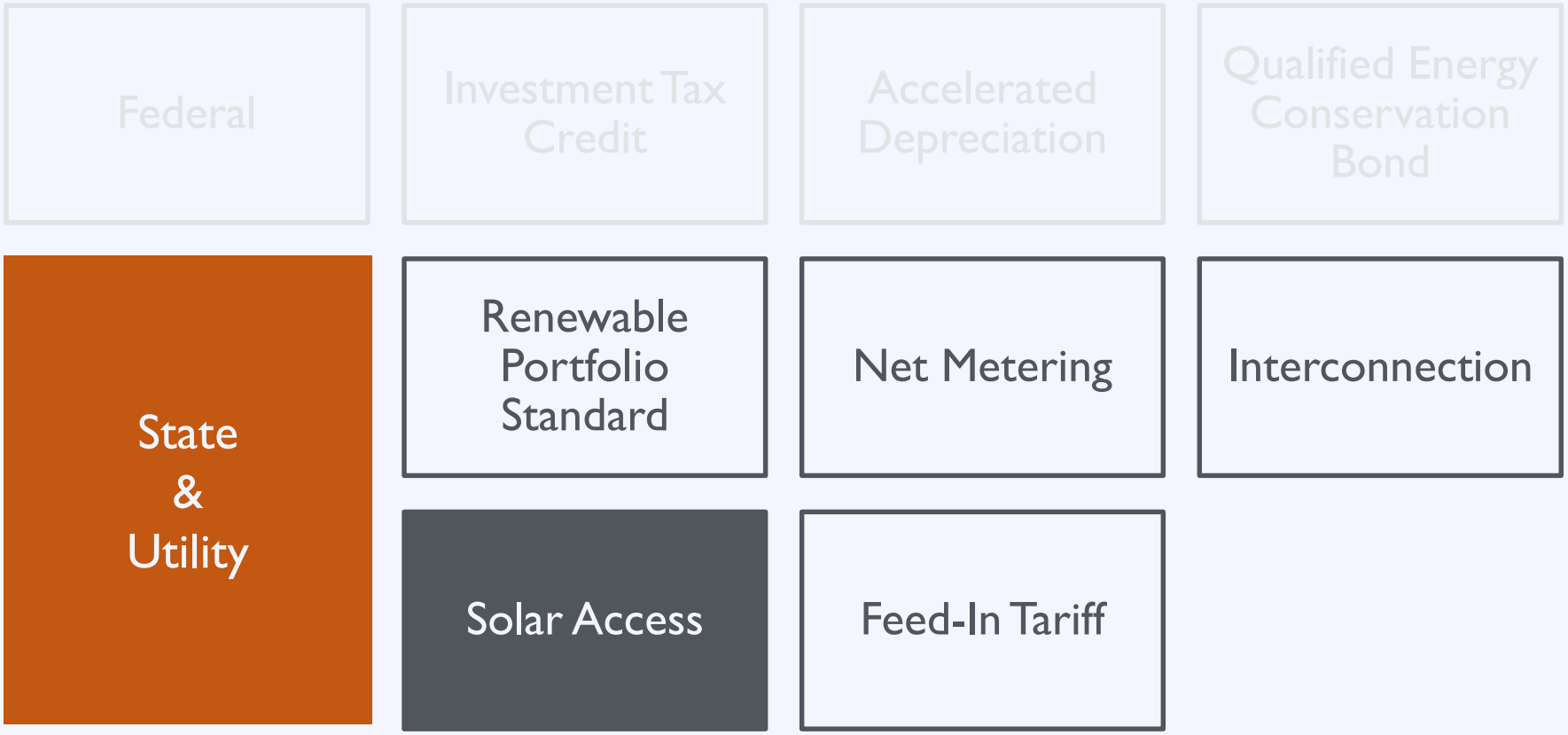
Applicable Utilities
IOUs, electric co-ops

Bonus
Insurance waived for generators up to 25 kW; dispute resolution process

Powered by SunShot
U.S. Department of Energy

Source: Freeing the Grid

A Policy Driven Market



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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

Powered by SunShot
U.S. Department of Energy

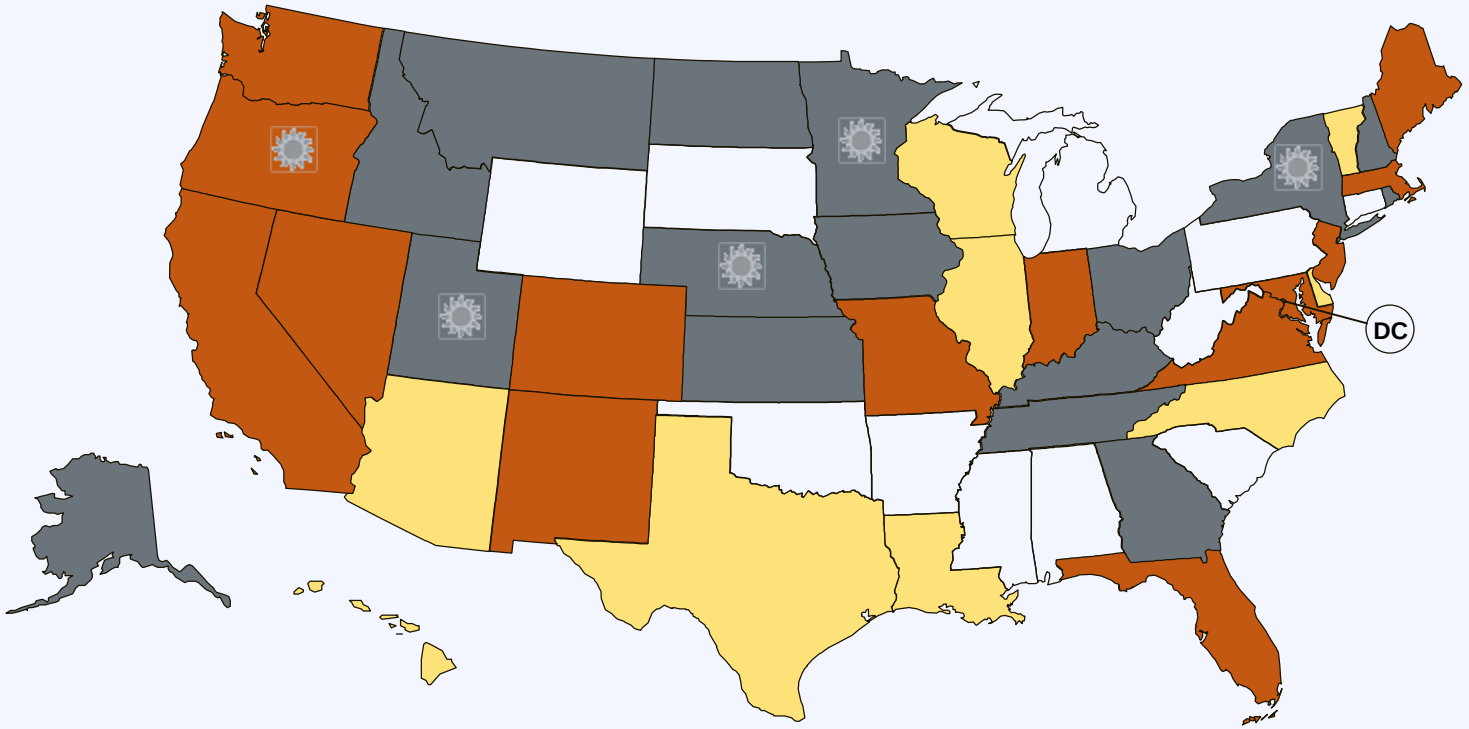
Source: Google Earth

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

Powered by SunShot
U.S. Department of Energy

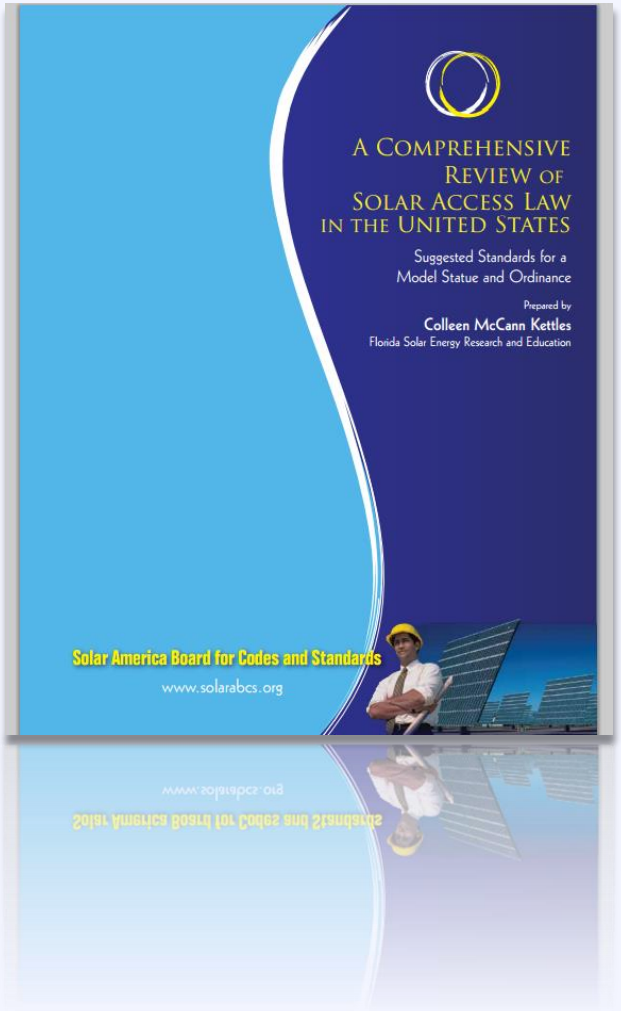
Source: Database of State Incentives for Renewables & Efficiency (www.dsireusa.org)

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

Federal	Investment Tax Credit	Accelerated Depreciation	Qualified Energy Conservation Bond
State & Utility	Renewable Portfolio Standard	Net Metering	Interconnection
	Solar Access	Feed-In Tariff	

Feed-In Tariff

- Alternative to net metering
- "Buy-All, Sell-All"
- Contract to buy solar electricity at special rate over long (10-20 years) time period

Feed-In Tariff

- Consumers Energy - Experimental Advanced Renewable Program (EARP)
  - Payments (through Aug. 2029)
    - Residential: $0.24/kWh
    - Non-residential: $0.199/kW
  - Max size: 100% of consumption
    - Residential: 20 kW residential
    - Non-residential: 150 kW
  - System constructed 70% Michigan labor or at least 50% manufactured/assembled in Michigan

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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

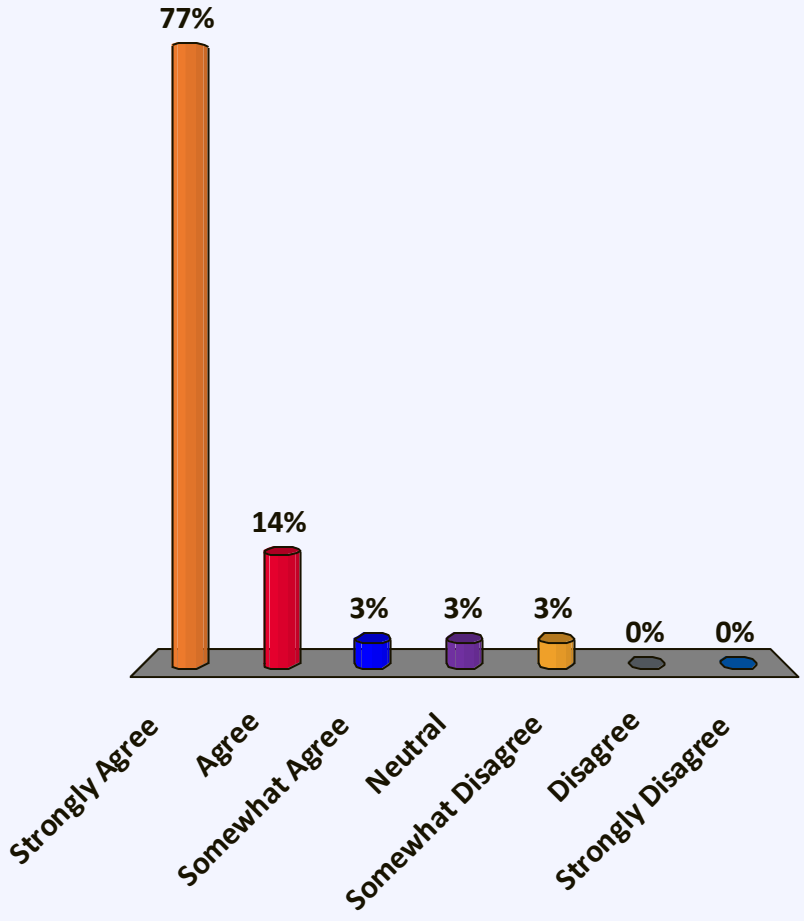
Regulation

Effective Solar Permitting Process

Solar Market Development Tools

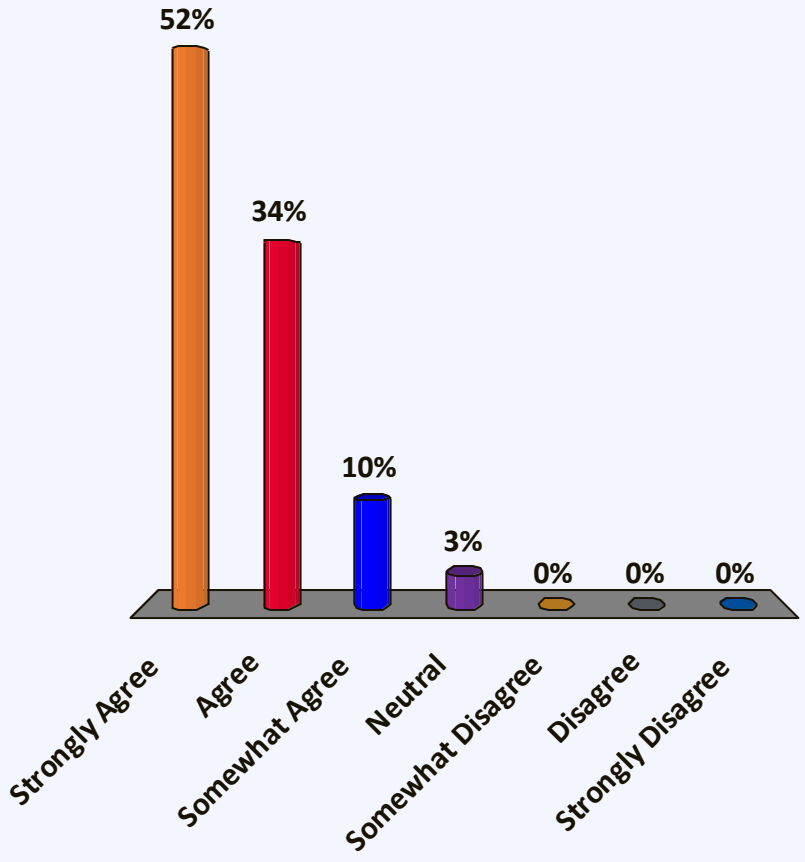
Solar advances your energy goals

A. Strongly Agree
B. Agree
C. Somewhat Agree
D. Neutral
E. Somewhat Disagree
F. Disagree
G. Strongly Disagree



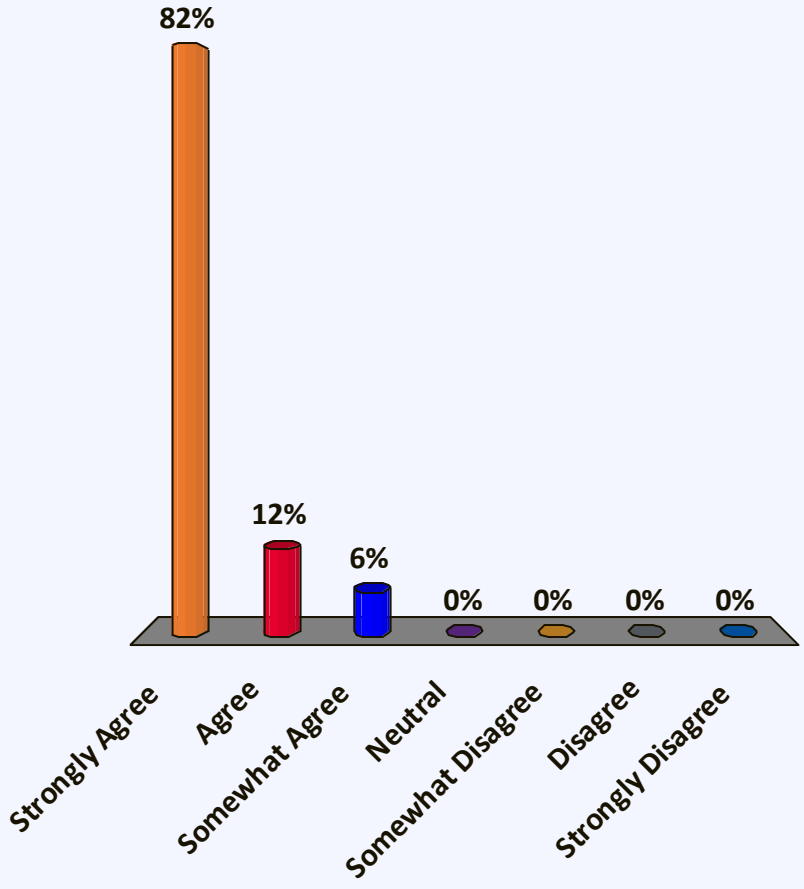
Solar advances your economic development goals

A. Strongly Agree
B. Agree
C. Somewhat Agree
D. Neutral
E. Somewhat Disagree
F. Disagree
G. Strongly Disagree



Solar advances your environmental & health goals

A. Strongly Agree
B. Agree
C. Somewhat Agree
D. Neutral
E. Somewhat Disagree
F. Disagree
G. Strongly Disagree



Visioning: Scales & Contexts

Poll

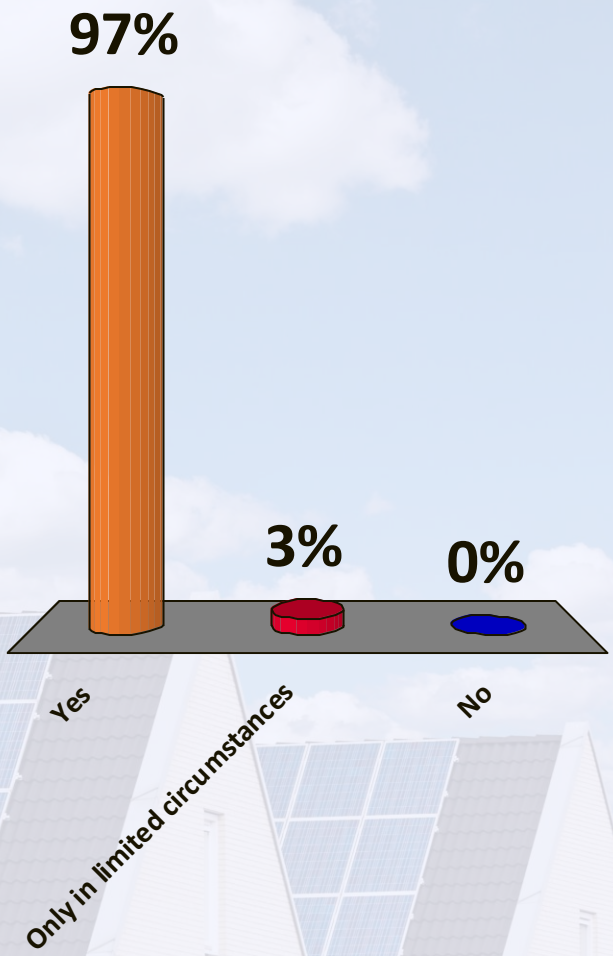
Is solar on residential rooftops appropriate for your community?

Visioning: Scales & Contexts

Poll

Is solar on residential rooftops appropriate for your community?

A. Yes
B. Only in limited circumstances
C. No



Visioning: Scales & Contexts

Poll

Is solar on commercial rooftops appropriate for your community?

Visioning: Scales & Contexts

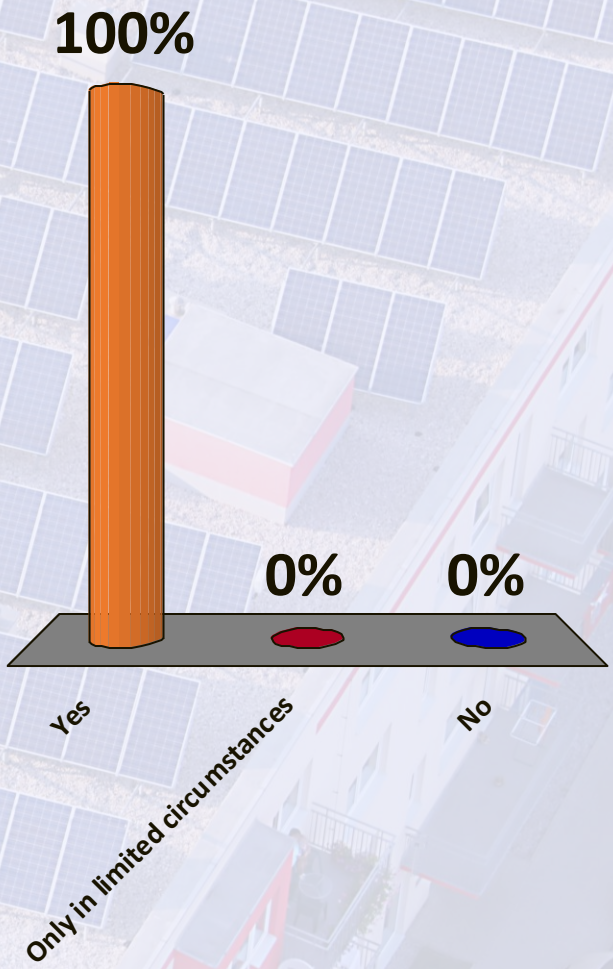
Poll

Is solar on commercial rooftops appropriate for your community?

A. Yes

B. Only in limited circumstances

C. No



Visioning: Scales & Contexts

Poll

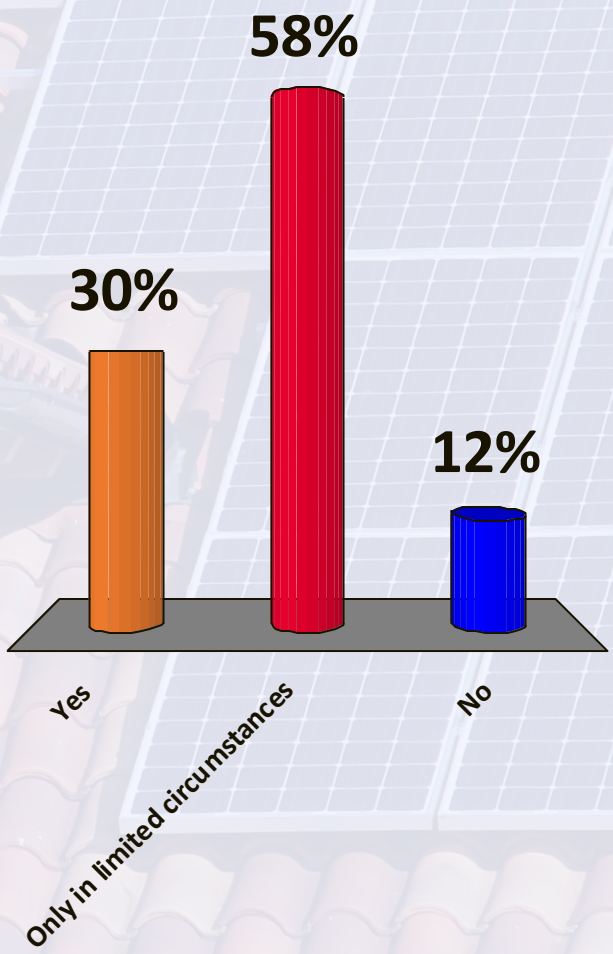
Is solar on historic structures appropriate for your community?

Visioning: Scales & Contexts

Poll

Is solar on historic structures appropriate for your community?

A. Yes
B. Only in limited circumstances
C. No



Visioning: Scales & Contexts

Poll

Is solar on brownfields appropriate for your community?

Visioning: Scales & Contexts

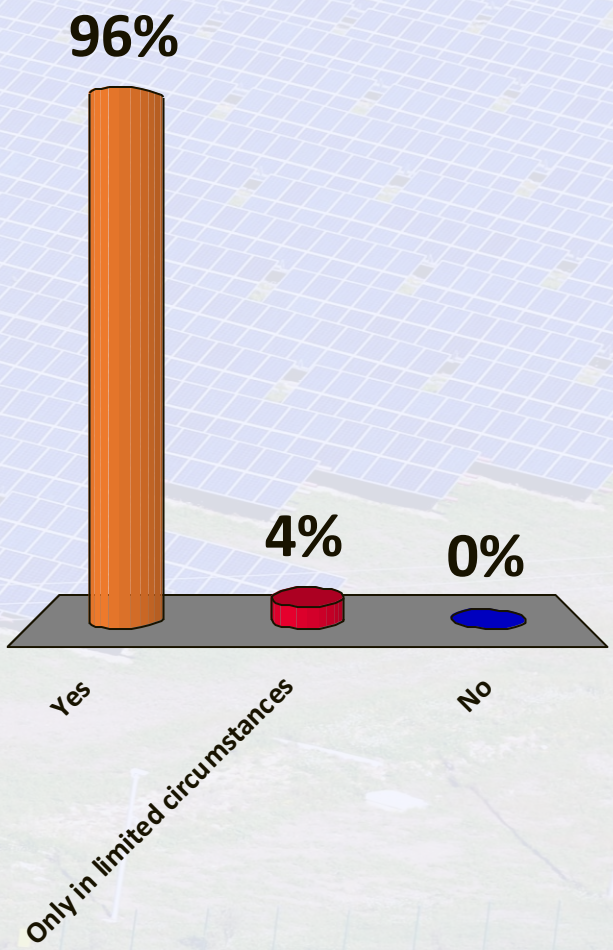
Poll

Is solar on brownfields appropriate for your community?

A. Yes

B. Only in limited circumstances

C. No



Visioning: Scales & Contexts

Poll

Is solar on greenfields appropriate for your community?

Visioning: Scales & Contexts

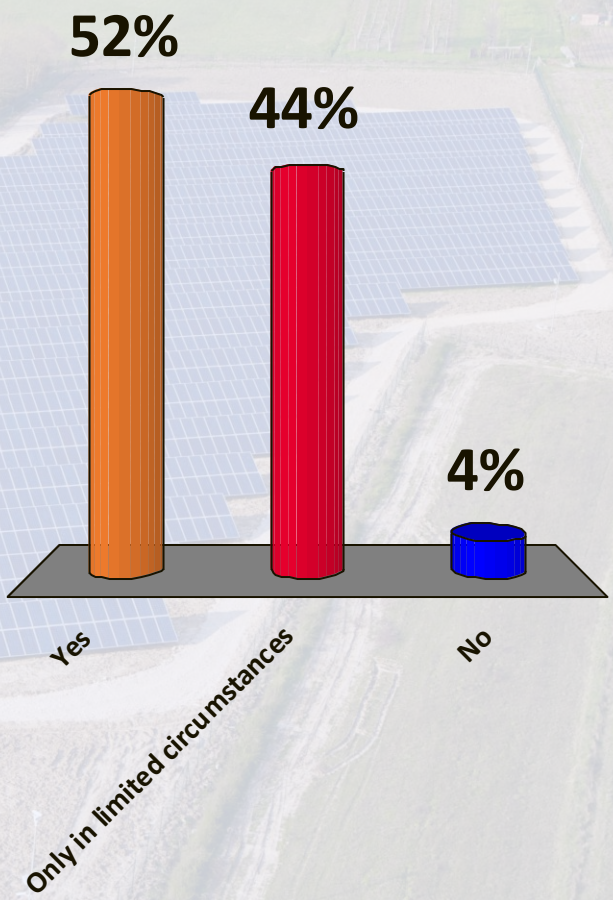
Poll

Is solar on greenfields appropriate for your community?

A. Yes

B. Only in limited circumstances

C. No



Visioning: Scales & Contexts

Poll

Is solar on parking lots appropriate for your community?

Visioning: Scales & Contexts

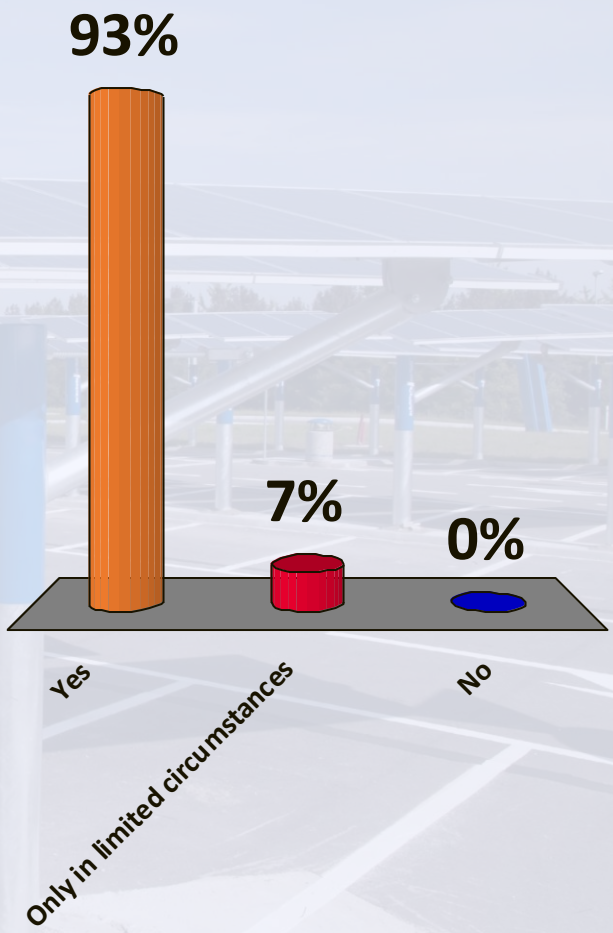
Poll

Is solar on parking lots appropriate for your community?

A. Yes

B. Only in limited circumstances

C. No



Visioning: Scales & Contexts

Poll

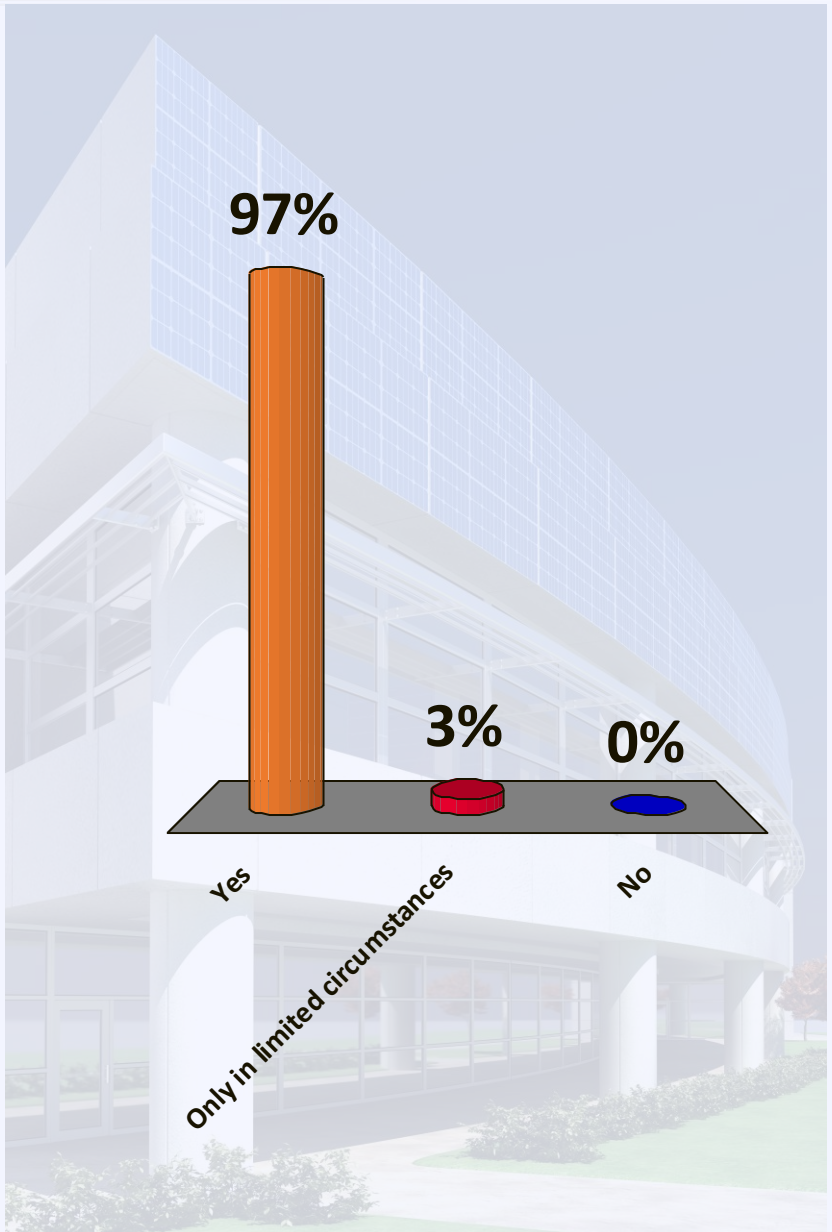
Is building-integrated solar appropriate for your community?

Visioning: Scales & Contexts

Poll

Is building-integrated solar appropriate for your community?

A. Yes
B. Only in limited circumstances
C. No



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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U.S. Department of Energy

Effective Local Solar Policy

Local Solar Policy

Planning for Solar

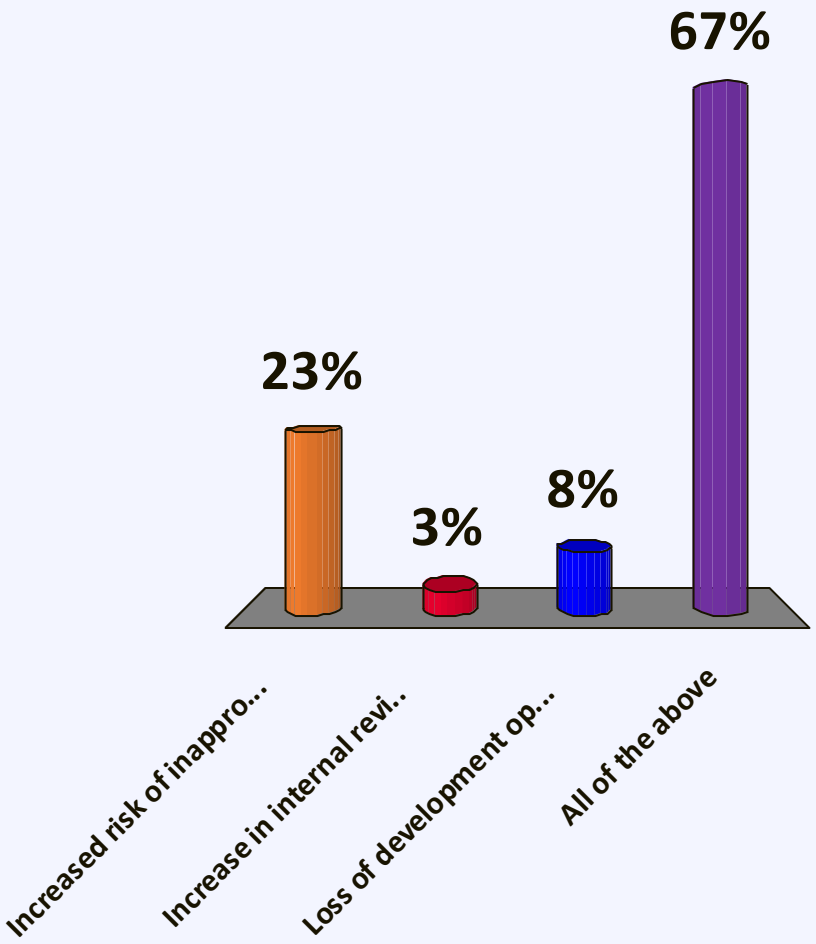
Solar in Development Regulation

Effective Solar Permitting Process

Solar Market Development Tools

What is the cost of convoluted regulations or "regulatory silence"?

A. Increased risk of inappropriate development
B. Increase in internal review costs
C. Loss of development opportunities
D. All of the above



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

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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

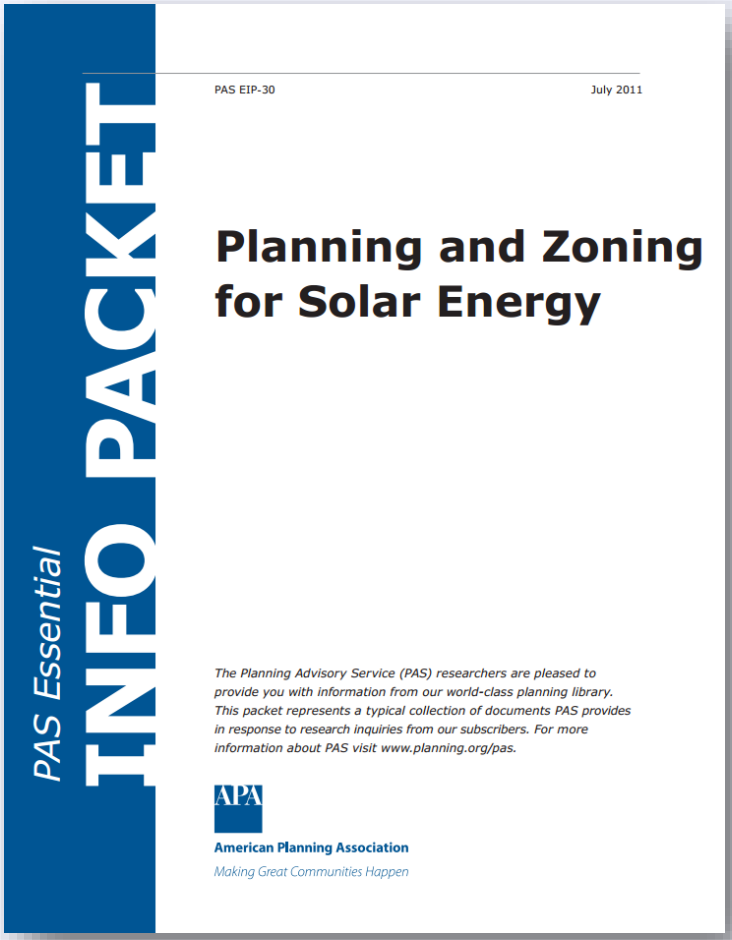
Typical Requirements:

- 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: Model Ordinances

SECTION 12.05 SOLAR STRUCTURES AND EASEMENTS (Troy, Michigan)

A. **Permitted.** Active and passive solar energy devices, systems or structures *shall be permitted in all zoning classifications by right*, subject to administrative approval, except when such solar devices or architectural features project into required front or side yards, or are free-standing elements in a required front or side yard, in which case they are subject to site plan review in accordance with Article 8.

B. **Maximum Height of Structures**. Passive solar energy structures, such as flat plate collectors, photovoltaic cells, etc., which are roof-mounted or integrated otherwise into the roof structure shall not be included in the calculation of maximum height. *Active solar energy structures*, when mounted on either freestanding structural elements or integrated architecturally with a principal or accessory building *shall not exceed a height of forty (40) feet.*

C. **Easements.** A landowner may enter into an easement, covenant, condition or other property interest in any deed or other instrument, to protect the solar skyspace of an actual, proposed or designated solar energy structure at a described location by *forbidding or limiting activities, land uses, structures and/or trees that interfere with access to solar energy.*

www.troymi.gov/Portals/0/Files/Planning/TroyZoningOrdinance.pdf

Zoning Standards: Historic

Typical Requirements:

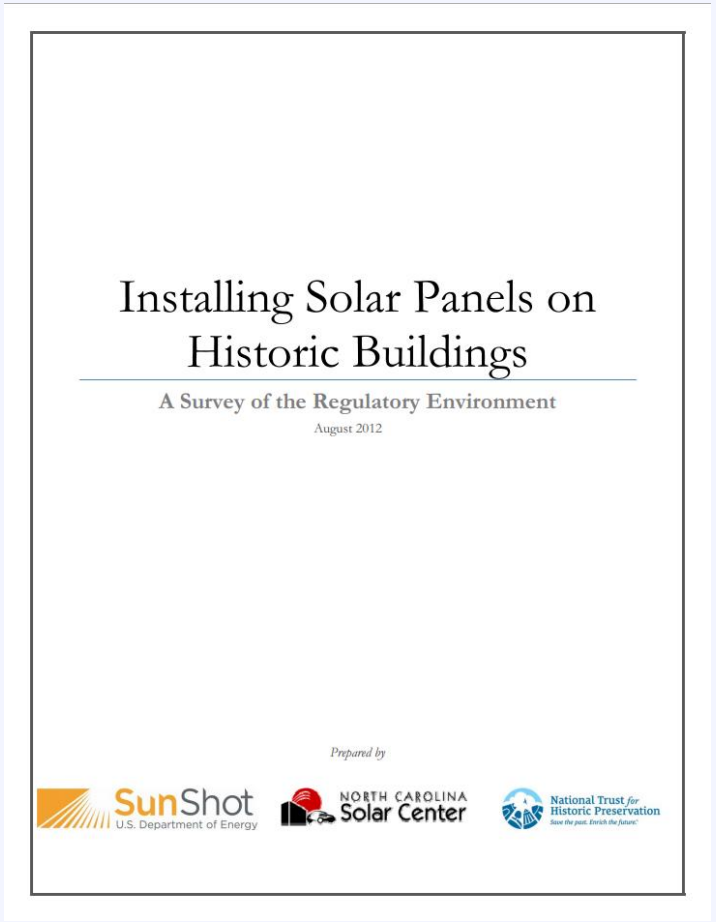
- Prevent permanent loss of "character defining" features
- Possible design requirements
  - Ground mounted
  - Flat roof with setback
  - Panels flush with roof
  - Blend color

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**

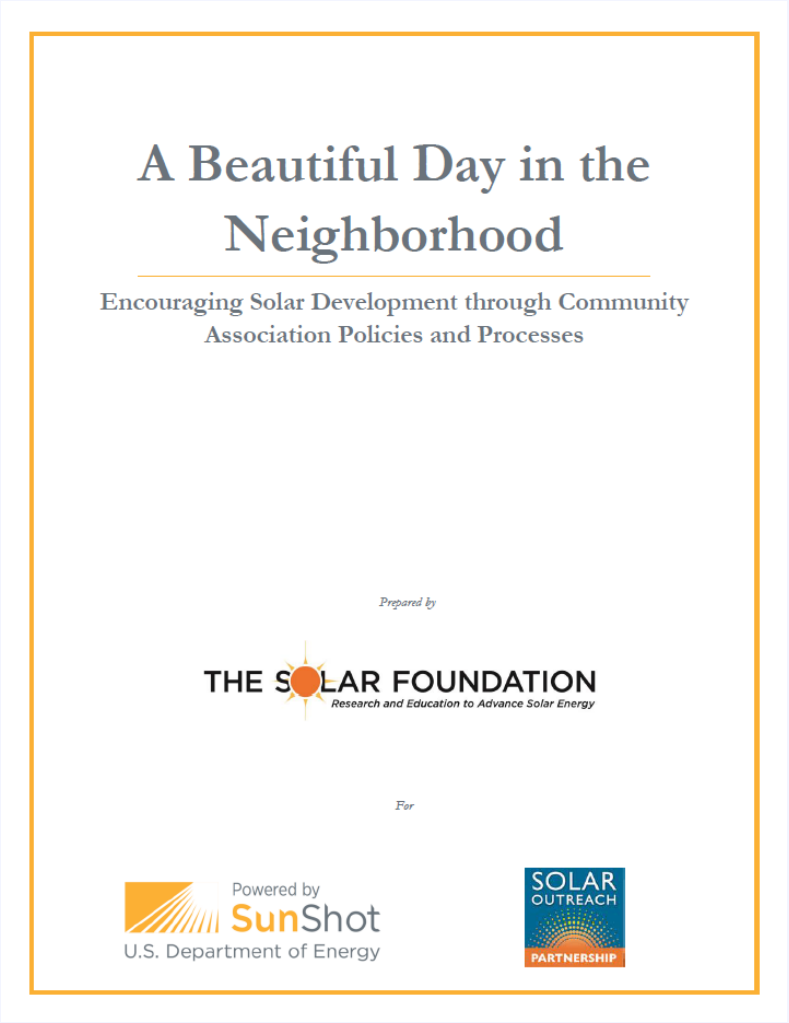
Provides sample design principles and example regulations incorporating historic preservation into sustainability and energy projects.



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

Private Rules on Residential Solar

There are currently

8,200 community associations in Michigan

that cover

1.4 million people

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Source: Community Associations Institute, *National and State Statistical Review for 2014*

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:

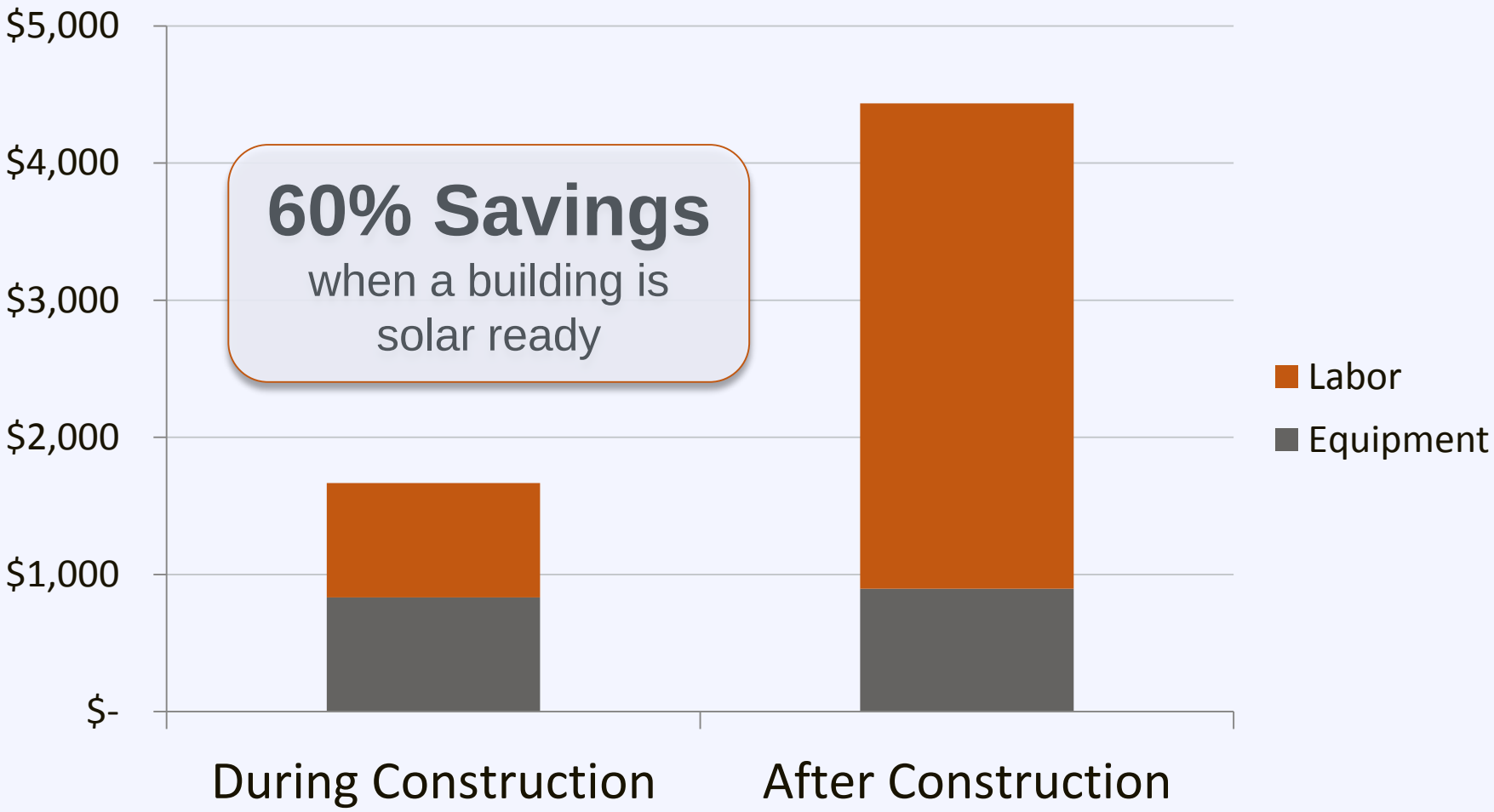
Preparing a building for solar at the outset can help make future solar installations easier and more cost effective.

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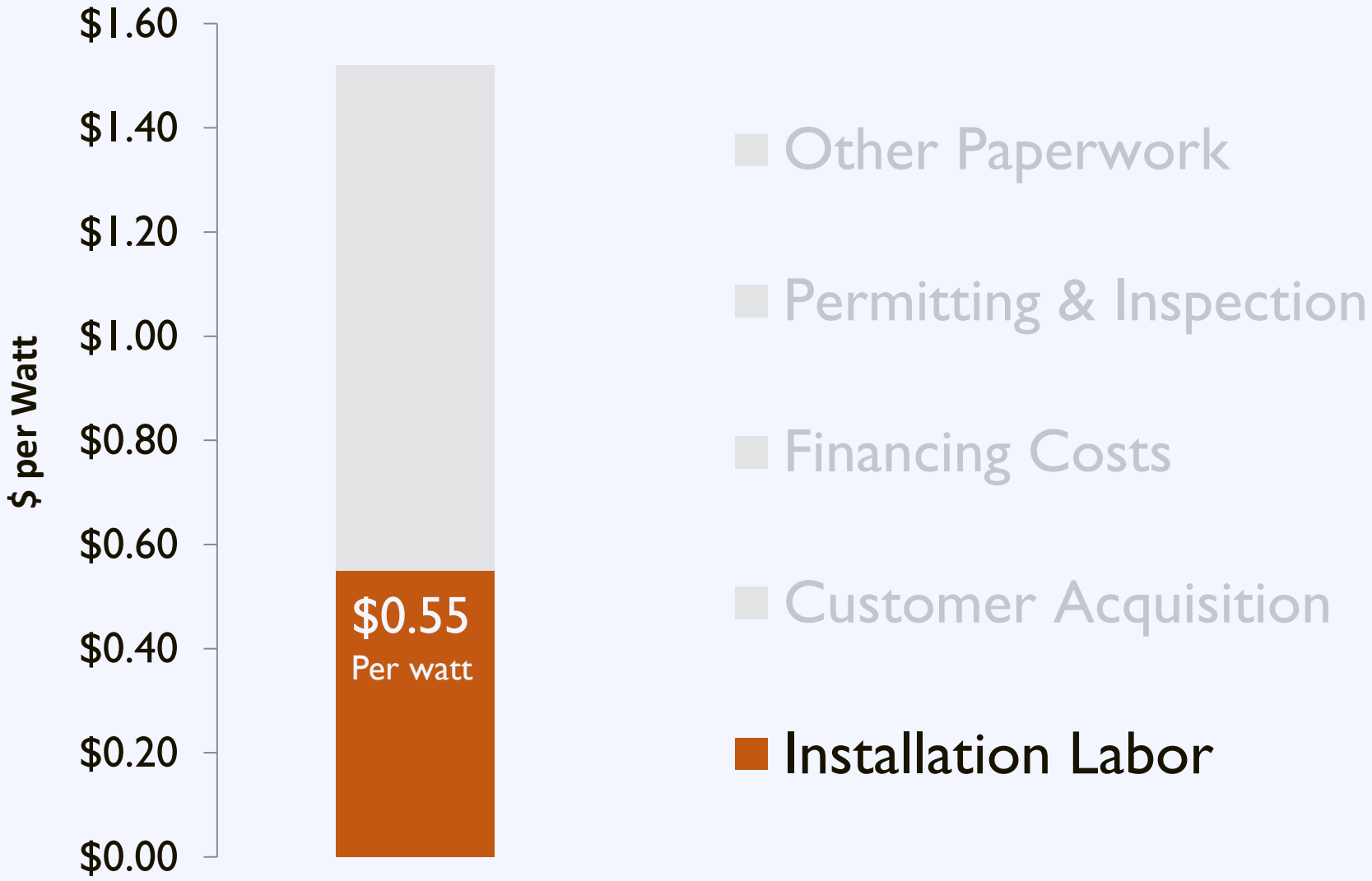
Source: Solar Ready: An Overview of Implementation Practices [Draft]. NREL, Feb. 18, 2011.

Installation Soft Costs



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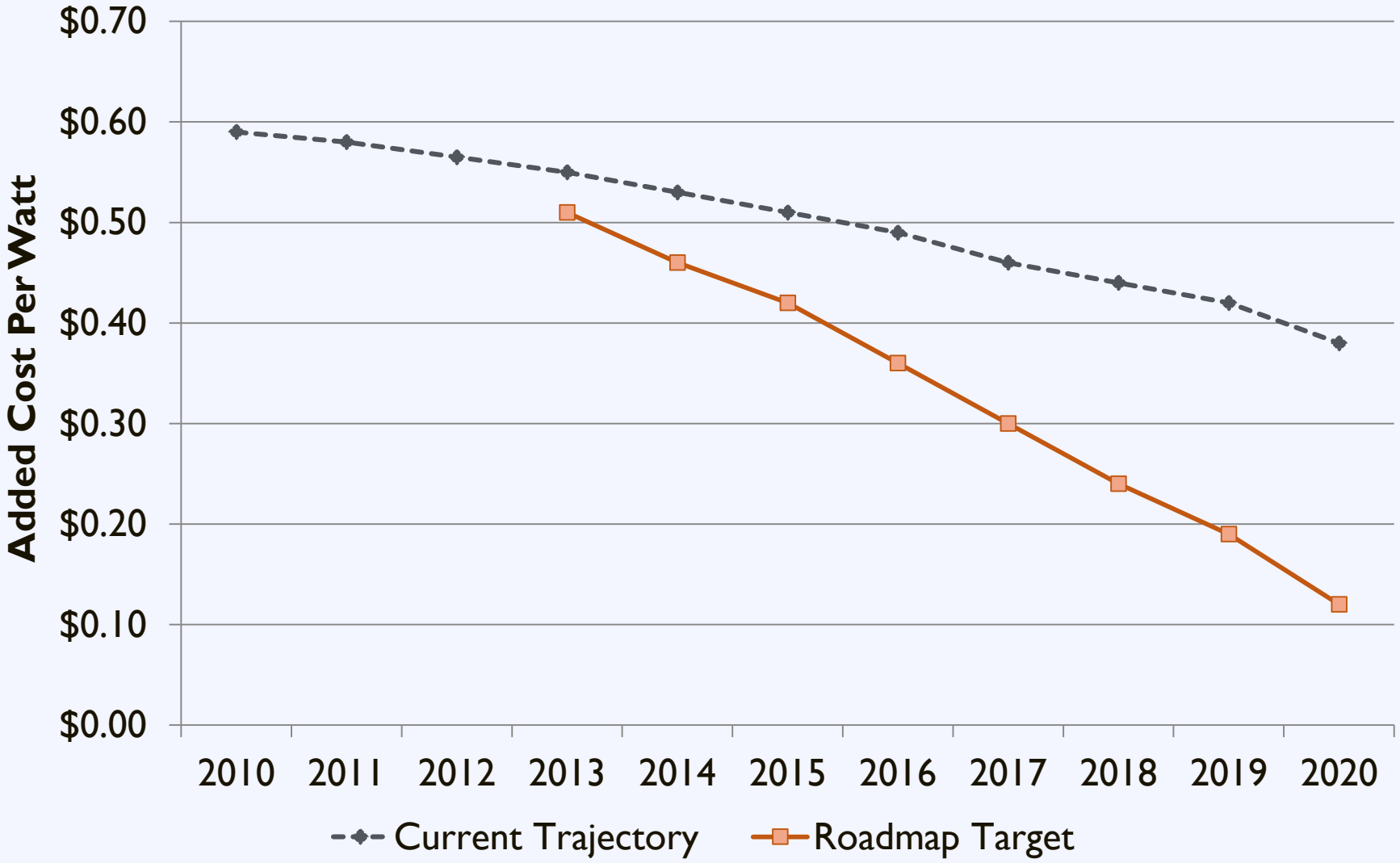
Installation Labor Roadmap

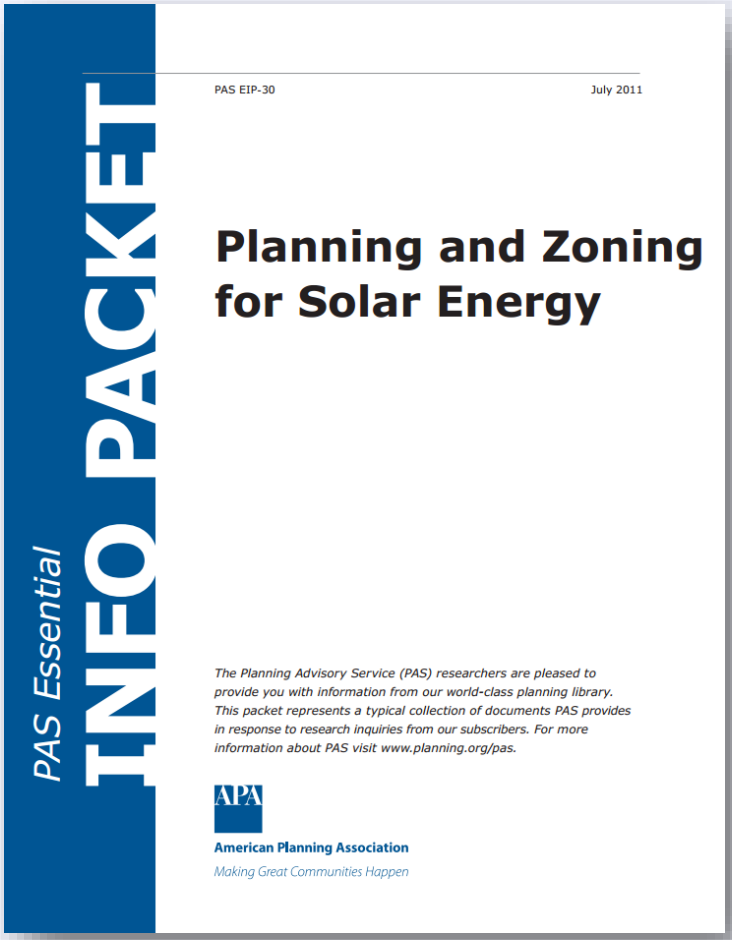


Source: NREL (http://www.nrel.gov/docs/fy13osti/59155.pdf)

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

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

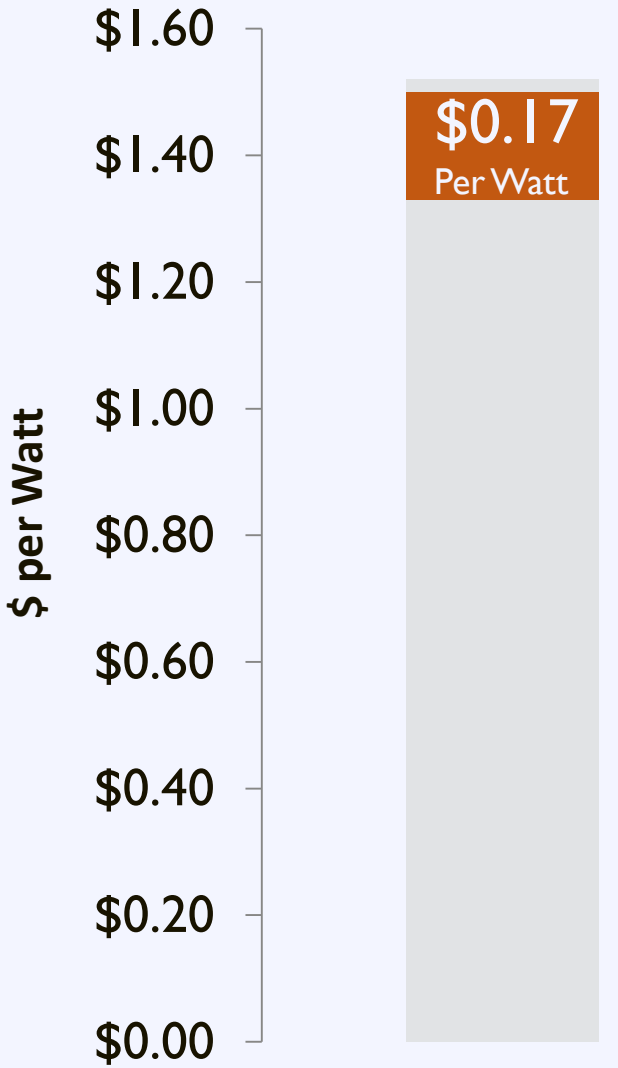
with unique zoning and permitting requirements

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

Consumer Challenges

Source: Forbes

Regulatory Barriers



- Other Paperwork
- **Permitting & Inspection**
- Financing Costs
- Customer Acquisition
- Installation Labor

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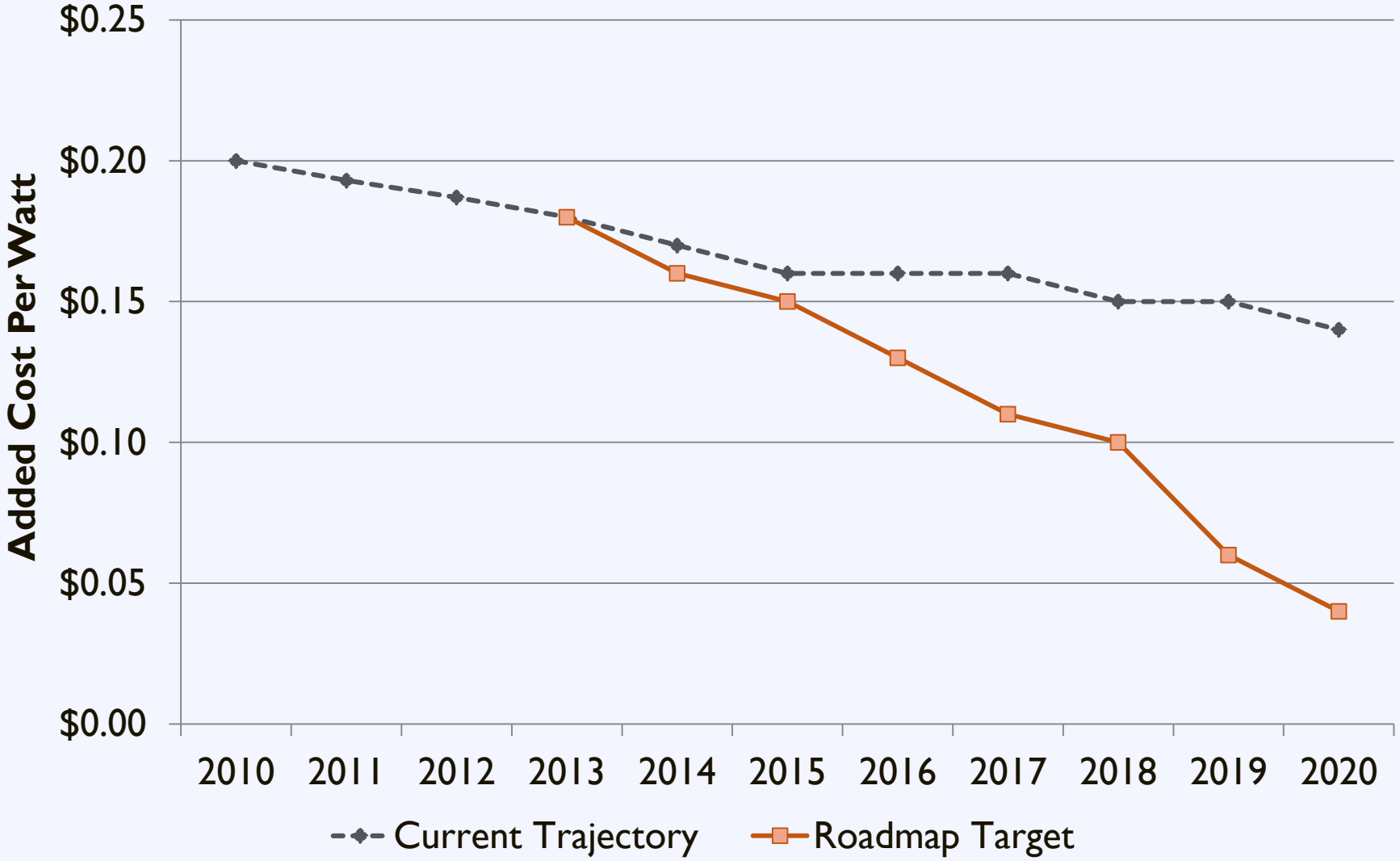
Planning & Permitting Roadmap



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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

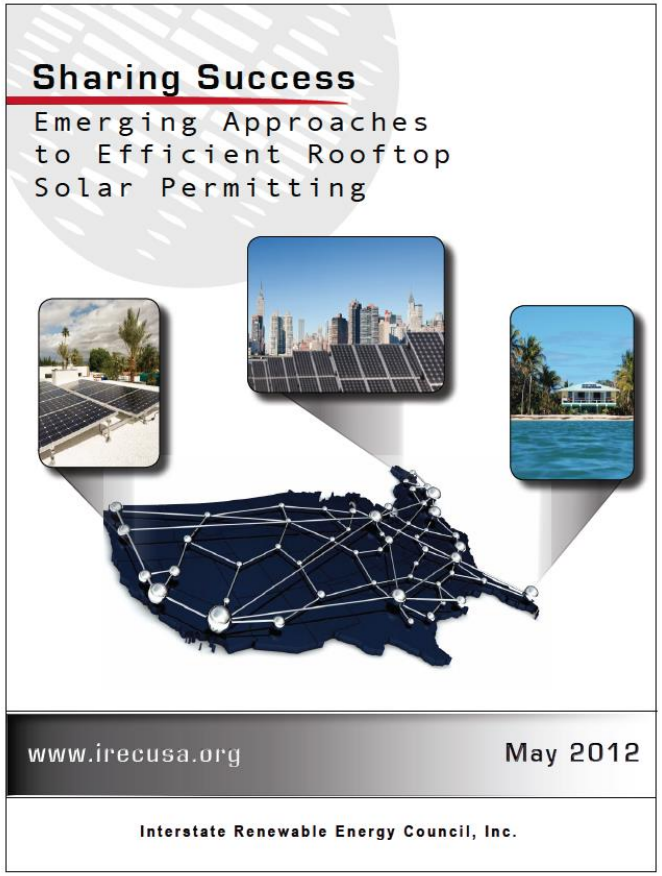
Local Government Perspective:

- 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:

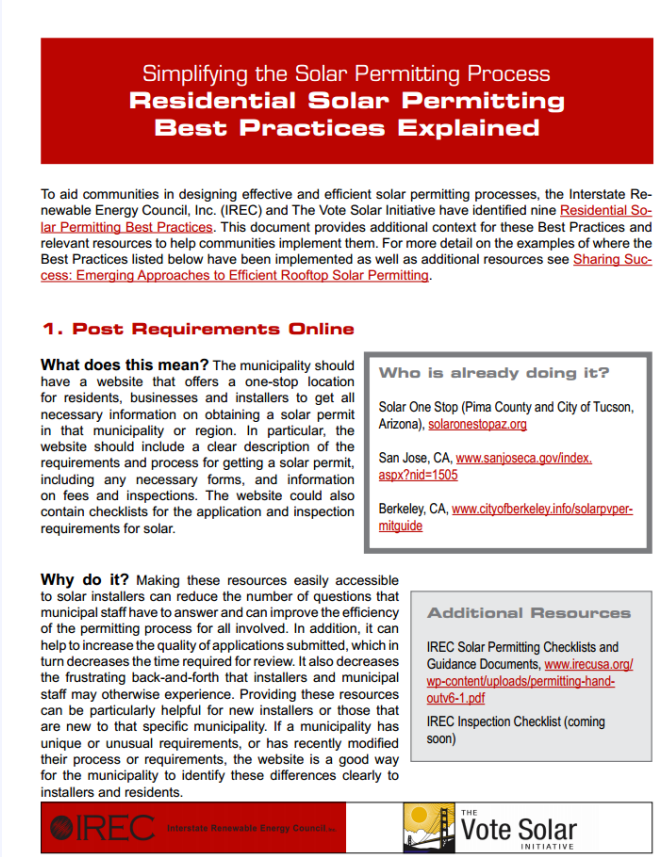
- ✓ Collect Reasonable Permitting Fees
- ✓ No Community-Specific Licenses
- ✓ Narrow Inspection Appointment Windows
- ✓ Eliminate Excessive Inspections
- ✓ Train Permitting Staff in Solar

Source: IREC/Vote Solar

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

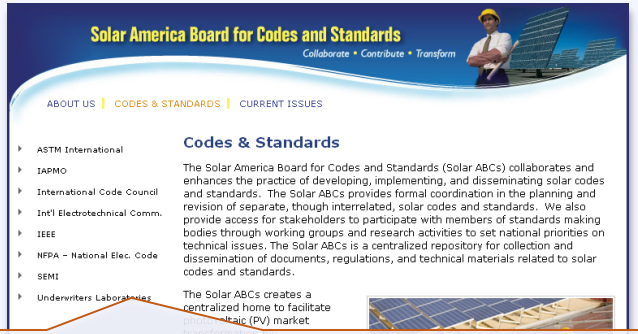
http://projectpermit.org/wp-content/uploads/2013/04/Expanded-Best-Practices-7.23.13_VSI.pdf

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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U.S. Department of Energy

The Solar Equation

Cost

+ Installed Cost

+ Maintenance

- Direct Incentive

Benefit

+ Avoided Energy Cost

+ Excess Generation

+ Performance Incentive

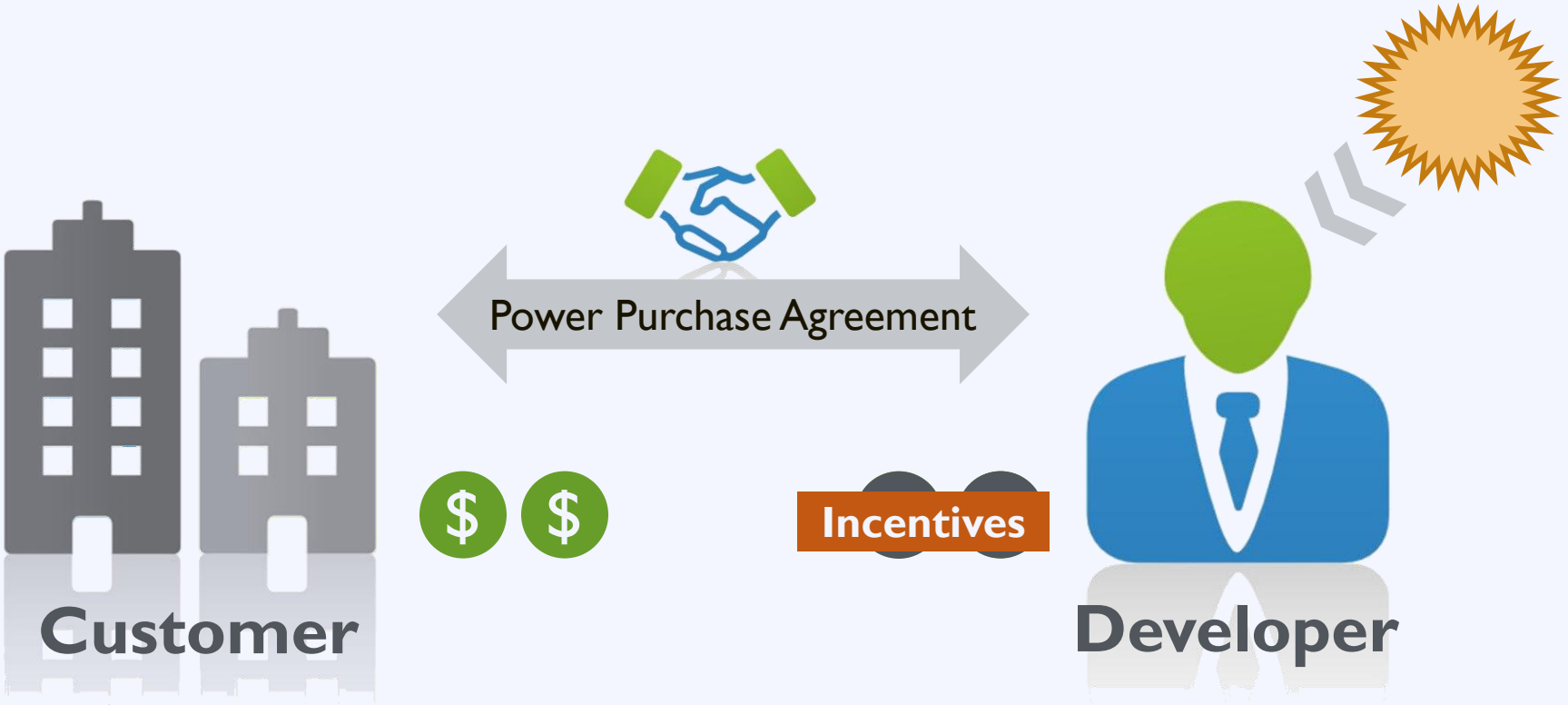
Ownership Options for Solar

Direct Ownership

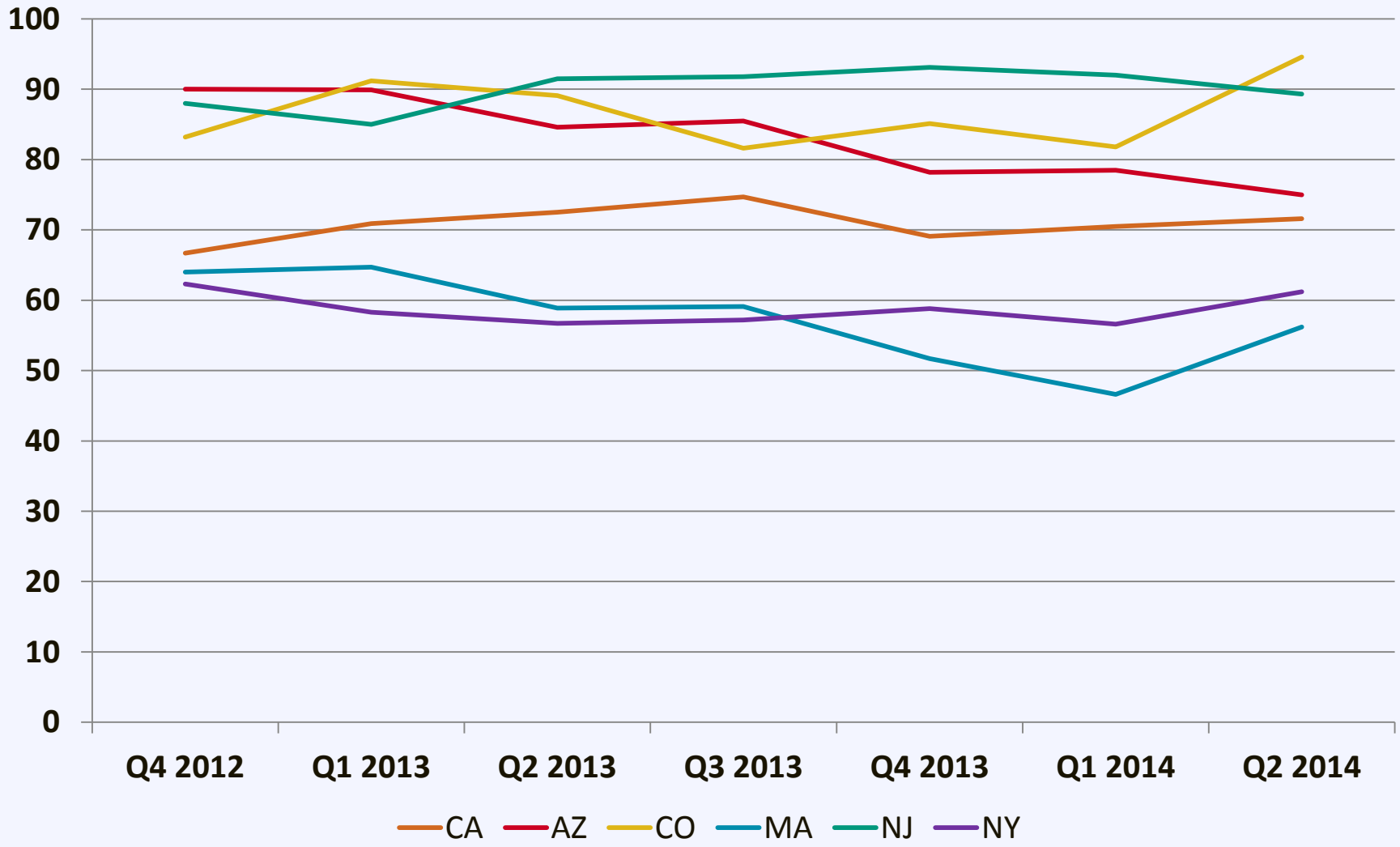
Third-Party Ownership

Direct Ownership

Third Party Ownership



Third Party Ownership



Source: GTM Research/ Solar Energy Industries Association, *U.S. Solar Market Insight Q2 2014*

Third Party Ownership

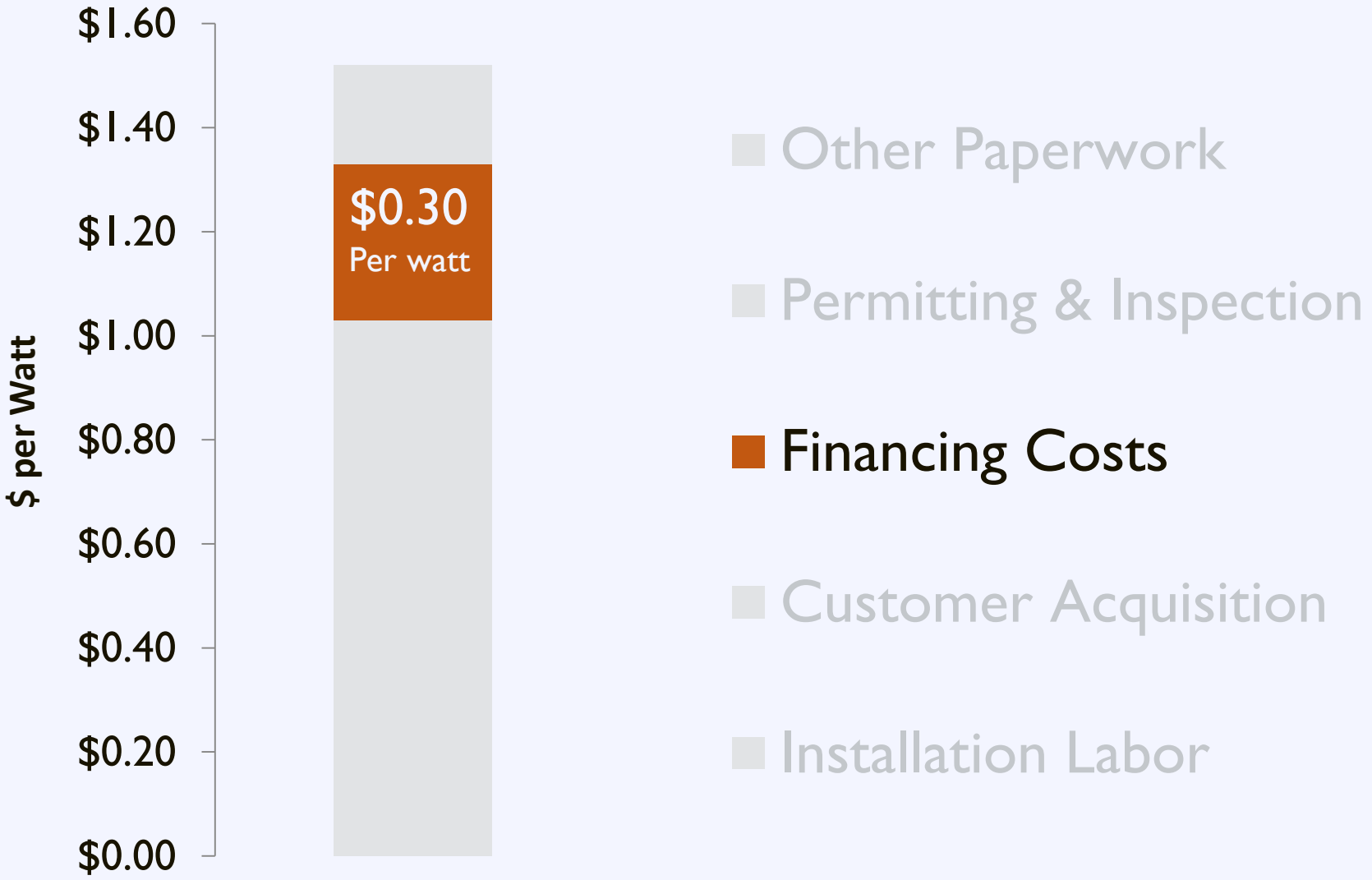
Benefits

- No upfront cost
- No O&M costs
- Low risk
- Predictable payments

Drawbacks

- Investor needs higher ROI
- Not available in all states

Third Party Ownership



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Ownership Options for Solar

Direct Ownership

Third-Party Ownership

Expand direct ownership options by engaging local lenders

Engage Local Lenders

Fewer than **5%**

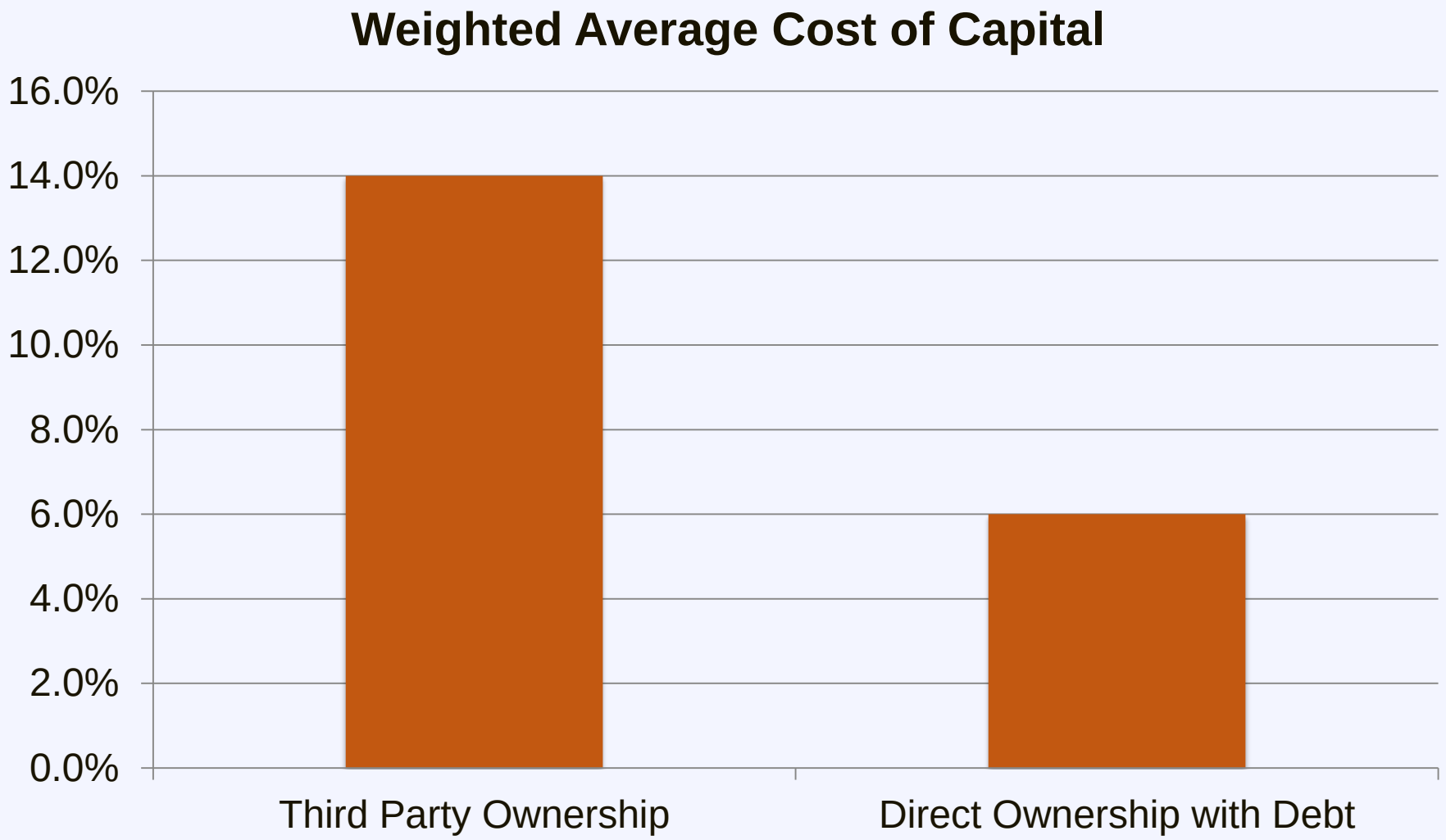
of the

6,500 banks in the US

are

actively financing solar PV projects

Third Party Ownership: Cost



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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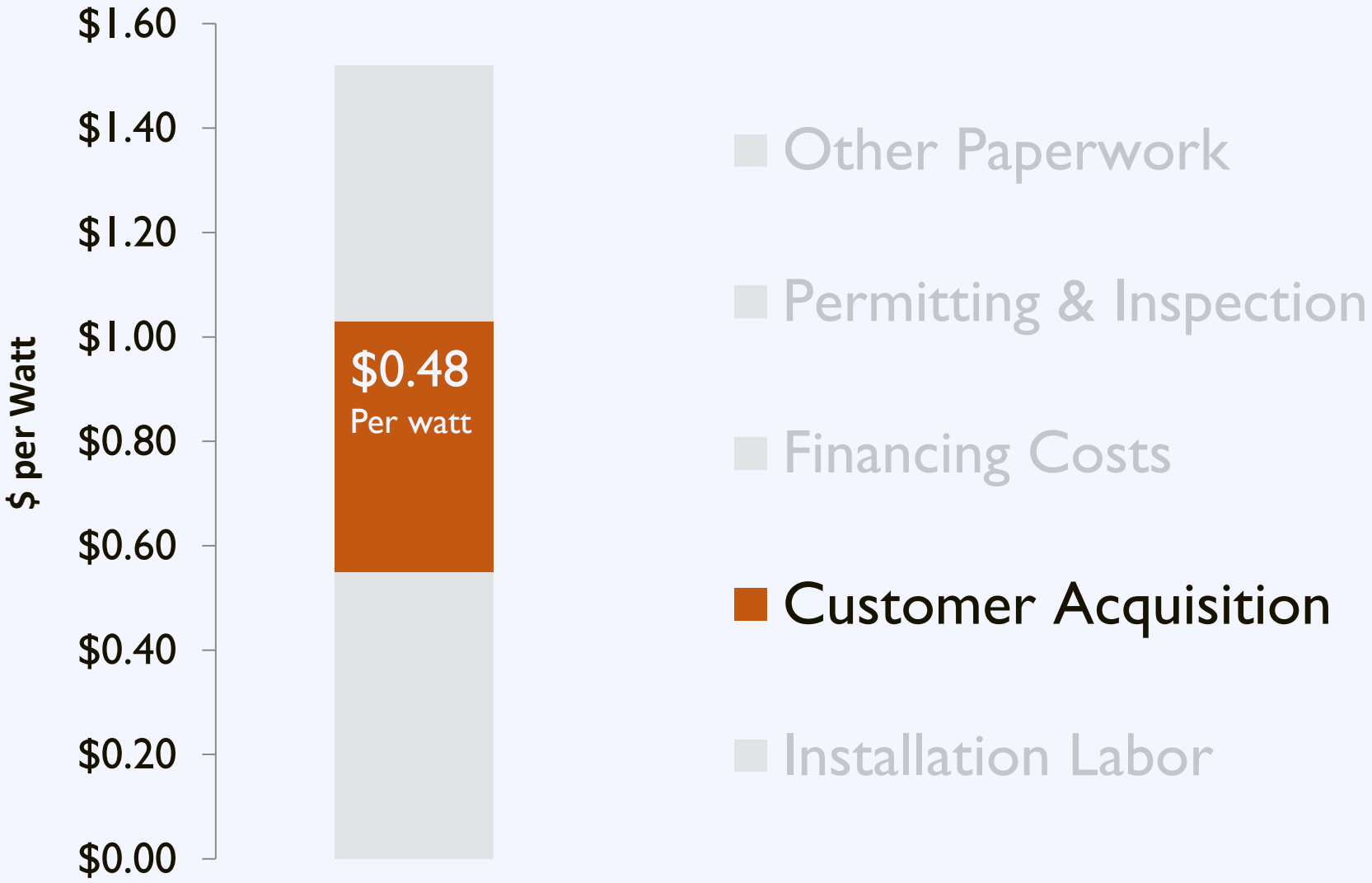
Customer Acquisition



Source: National Renewable Energy Laboratory

Customer Acquisition

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

Customer Acquisition

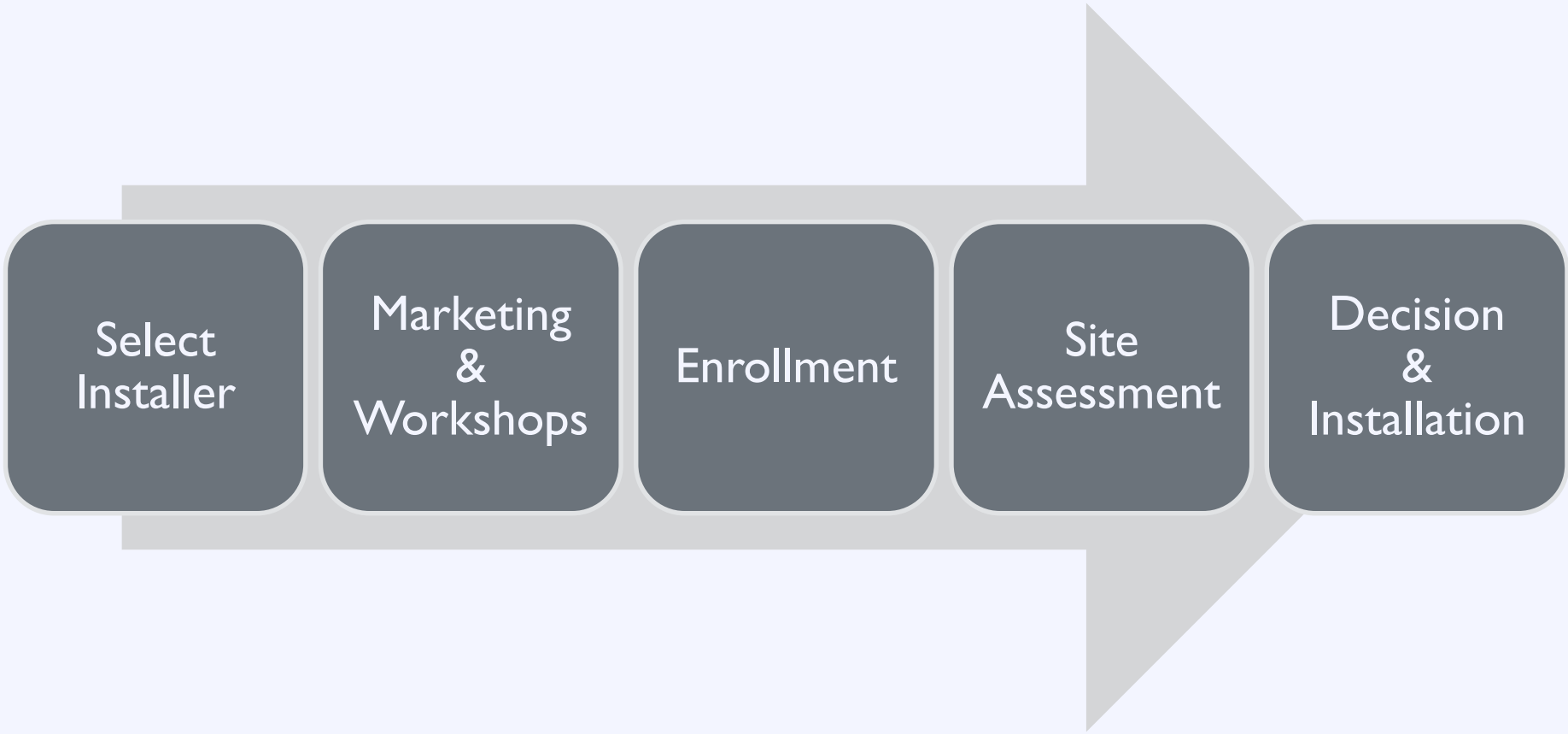
Barriers

- High upfront cost
- Complexity
- Customer inertia

The Solarize Program

Group purchasing for residential solar PV

Solarize: Process



The Solarize Program

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

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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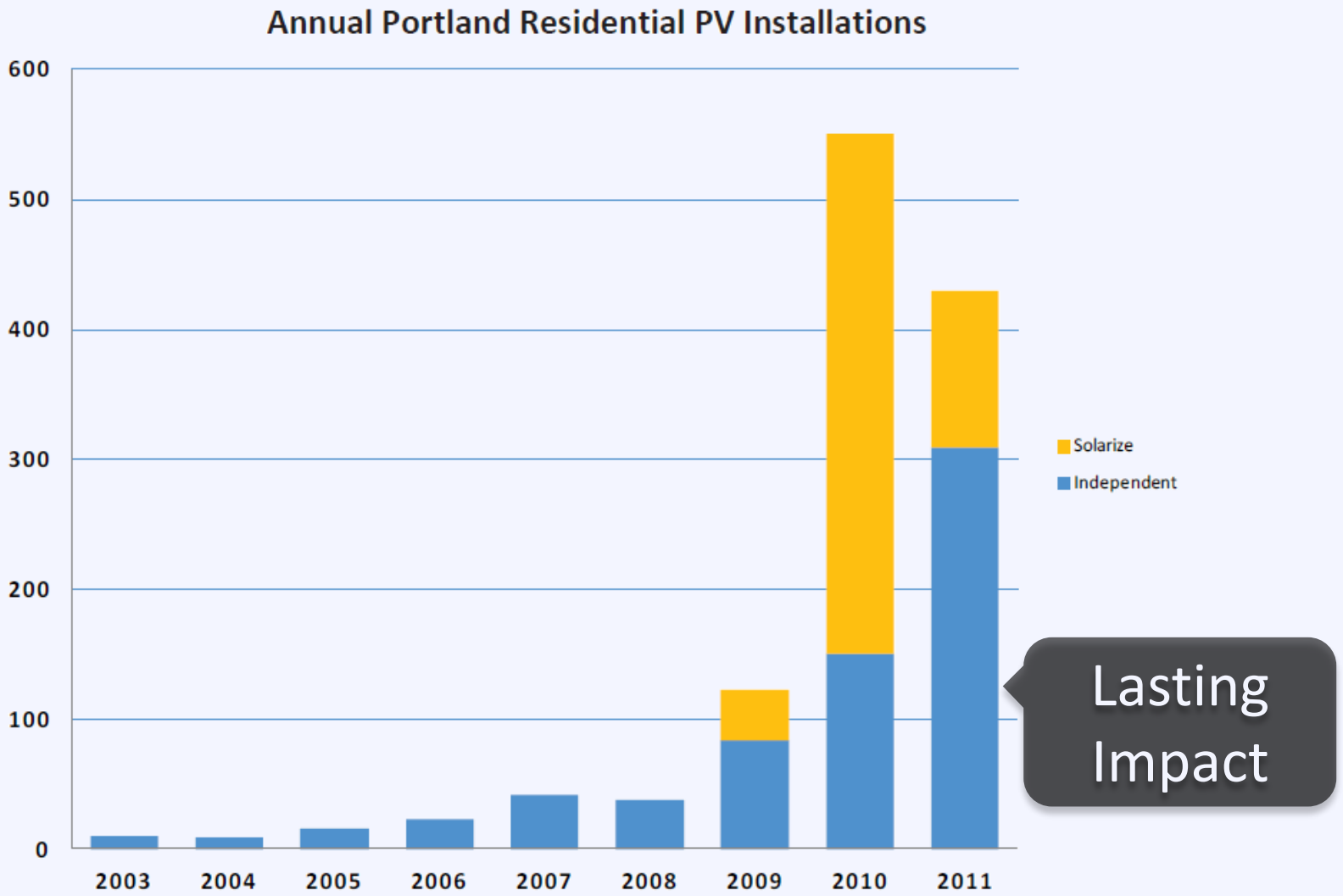
U.S. Department of Energy

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

Solarize: Lasting Impact



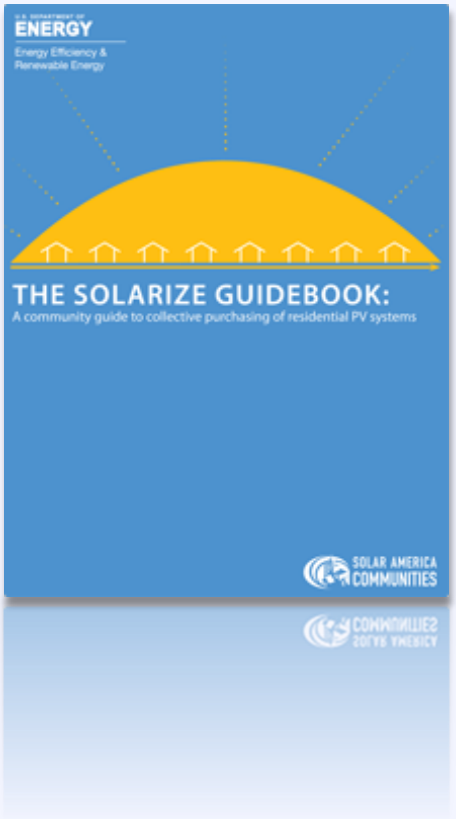
Source: NREL

Solarize: Resources

Resource **The Solarize Guidebook**

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

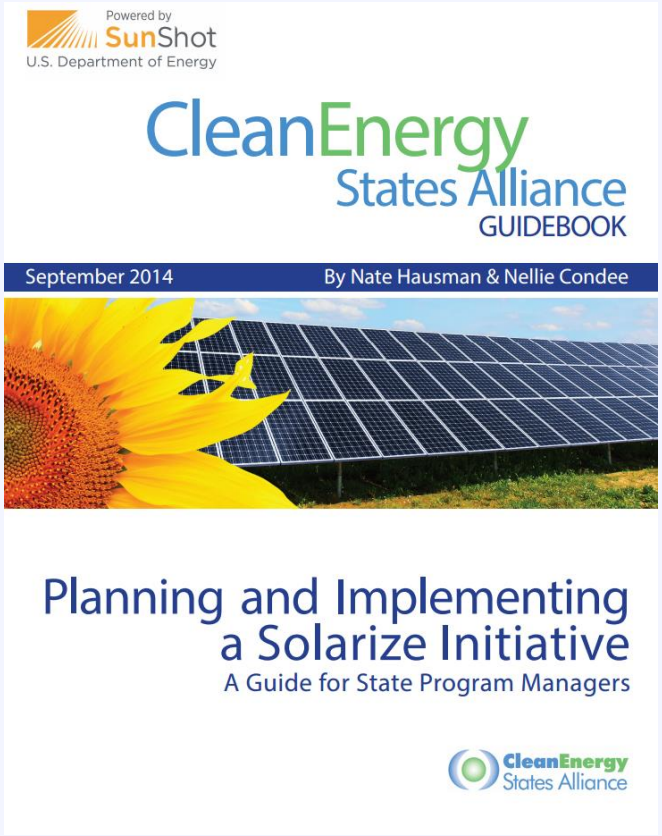
www.nrel.gov



Solarize: Resources

Resource **Planning and Implementing a Solarize Initiative**

Presents two successful state-driven Solarize programs (Solarize Mass and Solarize Connecticut) to provide best practices to stakeholders interested in replicating these successes.



http://solaroutreach.org/wp-content/uploads/2014/04/CESA-Solarize-Guide-September-2014-Final.pdf

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Long Shadows:
Policies for Community-Based Clean Energy, Clearing Barriers & Building Pathways for Growth

Tom Stanton
Principal Researcher – Energy and Environment
National Regulatory Research Institute
tstanton@nrri.org 517-775-7764

Major takeaways (1)

- U.S. distributed PV cumulative capacity has roughly doubled every two years from 2003 to the present, with the rate growing even faster… nearing full launch velocity.
- Lower cost PV and other changes have ignited, in the last year, an explosion of proposed legislative and regulatory actions, already touching (just in the last six months) 43 states plus DC.
- Several traditional utilities are promoting a "playbook" of higher fixed charges and net metering rollbacks that could dampen consumer interest in DER… but green energy advocates, several state legislatures and commissions, and some innovating utility companies are proposing changes to grow DER broader and faster.

Major takeaways (2)

- Community solar is definitely part of the picture going forward, but for communities and investors to benefit, critically important will be who defines it and how
- Doing community solar in Michigan, absent new policies, is a big challenge, but not impossible

Presentation Outline

- Brief status check on legislative and regulatory policies
- Community solar values and available strategies for growing community solar in Michigan

What's your utility's problem?

- "Disruptive challenges… game changers" (EPRI). "Three irreversible forces": deregulating, decentralizing, digitizing (Carratturo). "Doomed to obsolescence" (Martin et al.)
- Flat, even declining sales, increasing efficiency, permanent changes in manufacturing.
- Cost-effective and cheaper wind & solar, batteries, and more, with low-cost, often no-money-down financing, leading to: socket parity & some load defection, and then grid parity & possibly grid defection.
- Higher utility costs because of aging infrastructure, smart-grid, environmental regulations, managing variability, interconnecting DG.

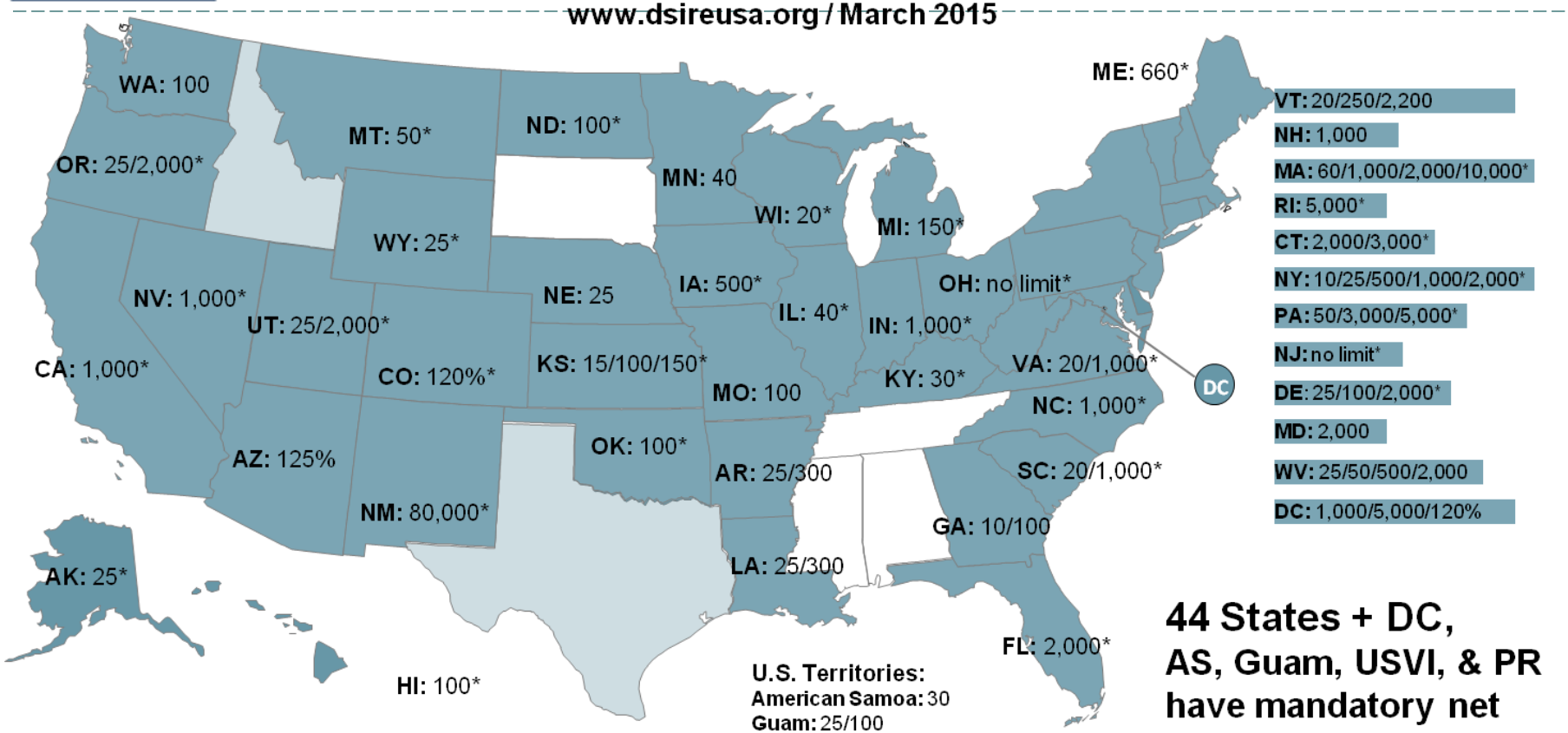
Are Utilities Cooking the Books?

- EPRI: "We estimate that the cost of providing grid services for customers with [DG] is about $51/month on average… [and] providing that same service completely independent of the grid would be four to eight times more expensive."
- EEI: end PV subsidies, utility solar is 2x cheaper and will remain so, net metering has "outlived its intended use," costs are being shifted to non-participating customers, utilities should be allowed to play on the customer side of the meter.
- Game plan: raise fixed charges, lower NEG payments, limit or end net metering, end solar subsidies, shift to utility owned solar…

Net Metering

www.dsireusa.org / March 2015

Note: Net Metering rules are being actively discussed in over a dozen state public service & utility commissions across the country.



U.S. Territories:
American Samoa: 30
Guam: 25/100
Puerto Rico: 25/1,000/5,000
Virgin Islands: 20/100/500

44 States + DC, AS, Guam, USVI, & PR have mandatory net metering rules

State-developed mandatory rules for certain utilities

No uniform or statewide mandatory rules, but some utilities allow net metering

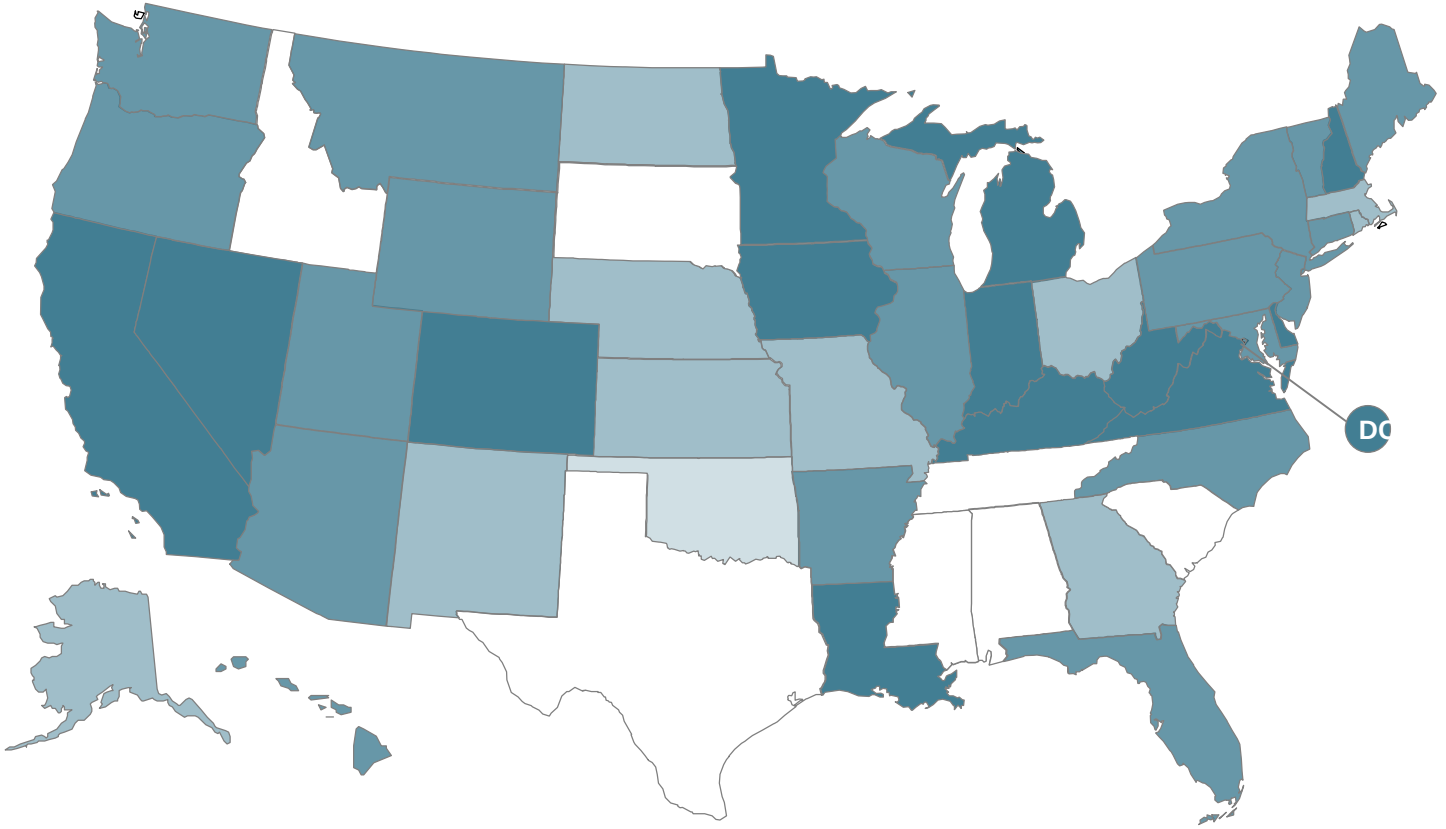
∗ State policy applies to certain utility types only (e.g., investor-owned utilities)

State: kW limit residential/ kW limit nonresidential

Note: Numbers indicate individual system capacity limit in kW. Percentages refer to customer demand. Some limits vary by customer type, technology and/or application. Other limits might also apply. This map generally does not address statutory changes until administrative rules have been adopted to implement such changes.

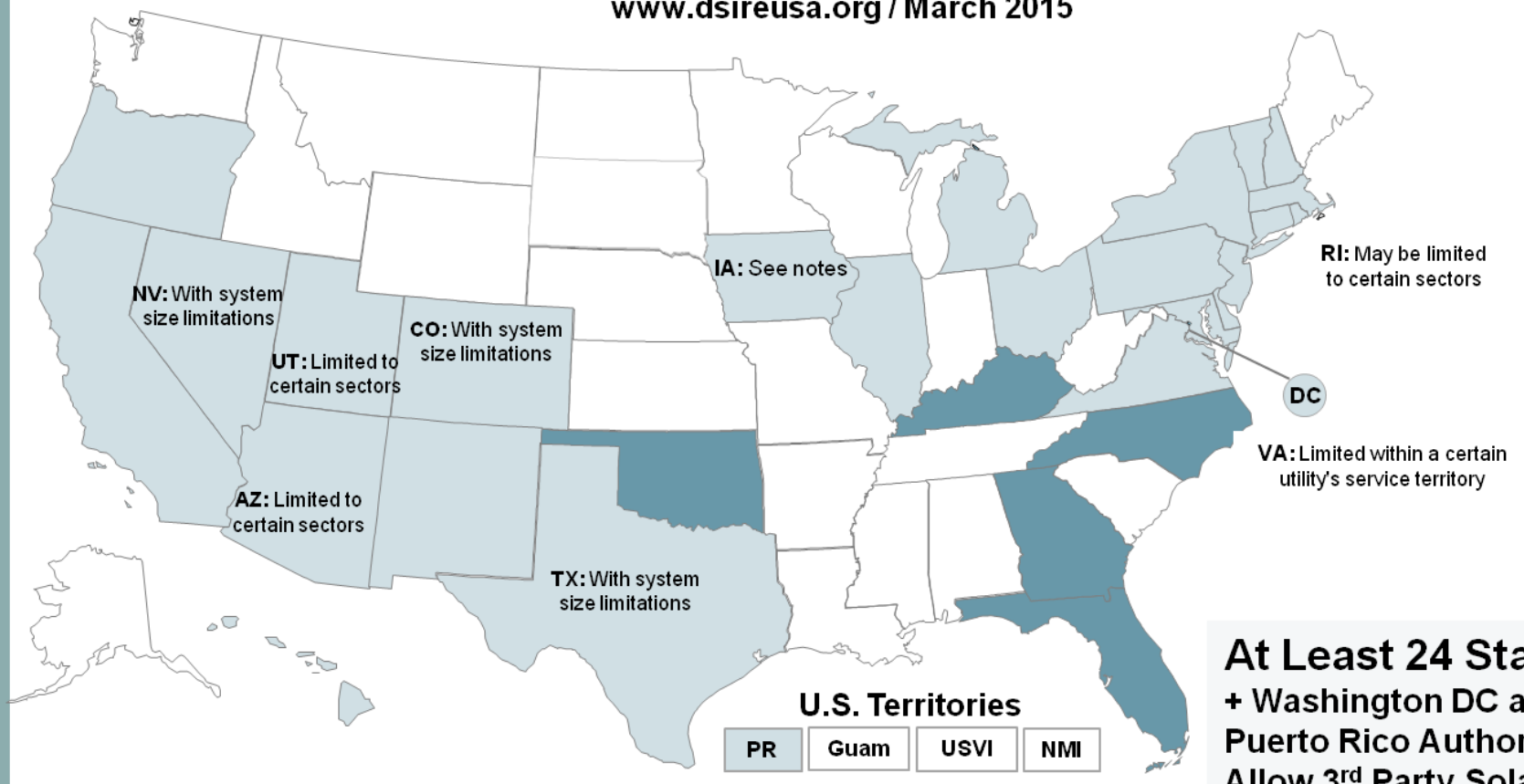
Customer Credits for Monthly Net Excess Generation (NEG) Under Net Metering

www.dsireusa.org / March 2015



3rd Party Solar PV Power Purchase Agreement (PPA)

www.dsireusa.org / March 2015



At Least 24 States
+ Washington DC and Puerto Rico Authorize or Allow 3rd Party Solar PV Power

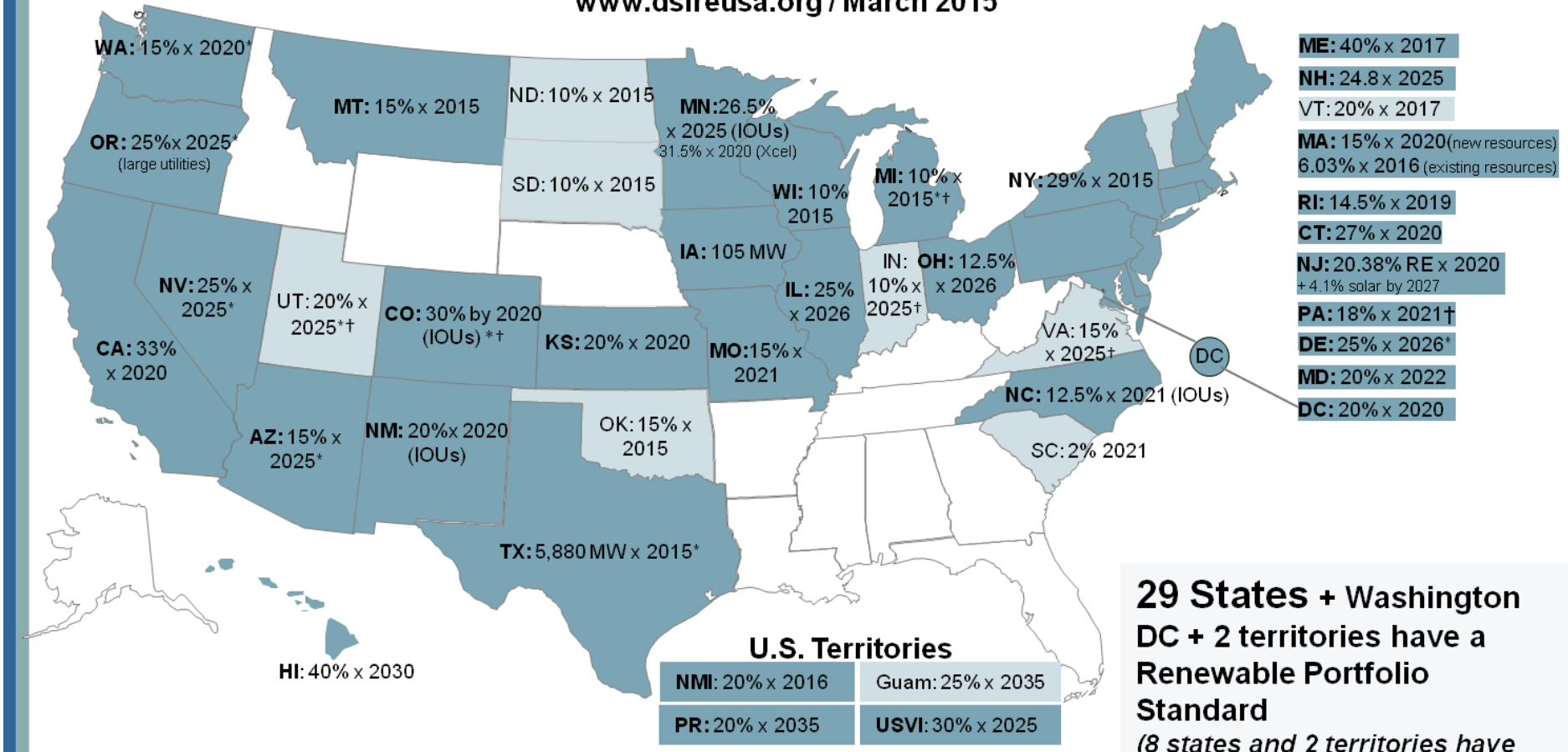
Apparently disallowed by state or otherwise restricted by legal barriers

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

Status unclear or unknown

Renewable Portfolio Standard Policies

www.dsireusa.org / March 2015



U.S. Territories

NMI: 20% x 2016	Guam: 25% x 2035
PR: 20% x 2035	USVI: 30% x 2025

29 States + Washington DC + 2 territories have a Renewable Portfolio Standard

(8 states and 2 territories have renewable portfolio goals)

Renewable portfolio standard

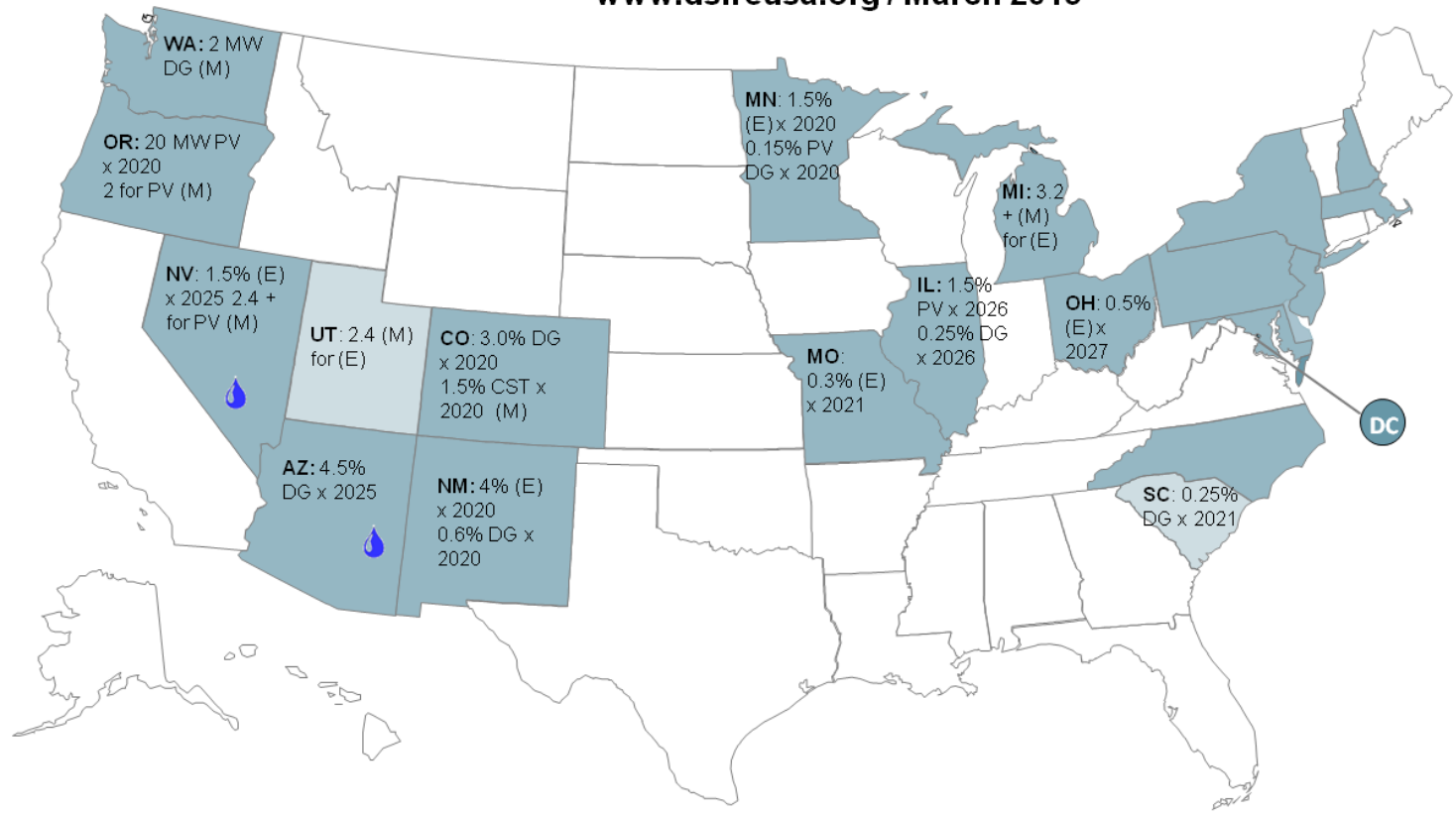
Renewable portfolio goal

* Extra credit for solar or customer-sited renewables

† Includes non-renewable alternative resources

Renewable Portfolio Standards (RPS) with Solar or Distributed Generation Provisions

www.dsireusa.org / March 2015



Renewable Portfolio Standard with solar/distributed generation (DG) provision

Renewable Portfolio Goal with solar/DG provision

(E): Solar Electric
PV: Solar Photovoltaic
DG: Distributed Generation
(M): Multipliers
(CST): Customer - Sited

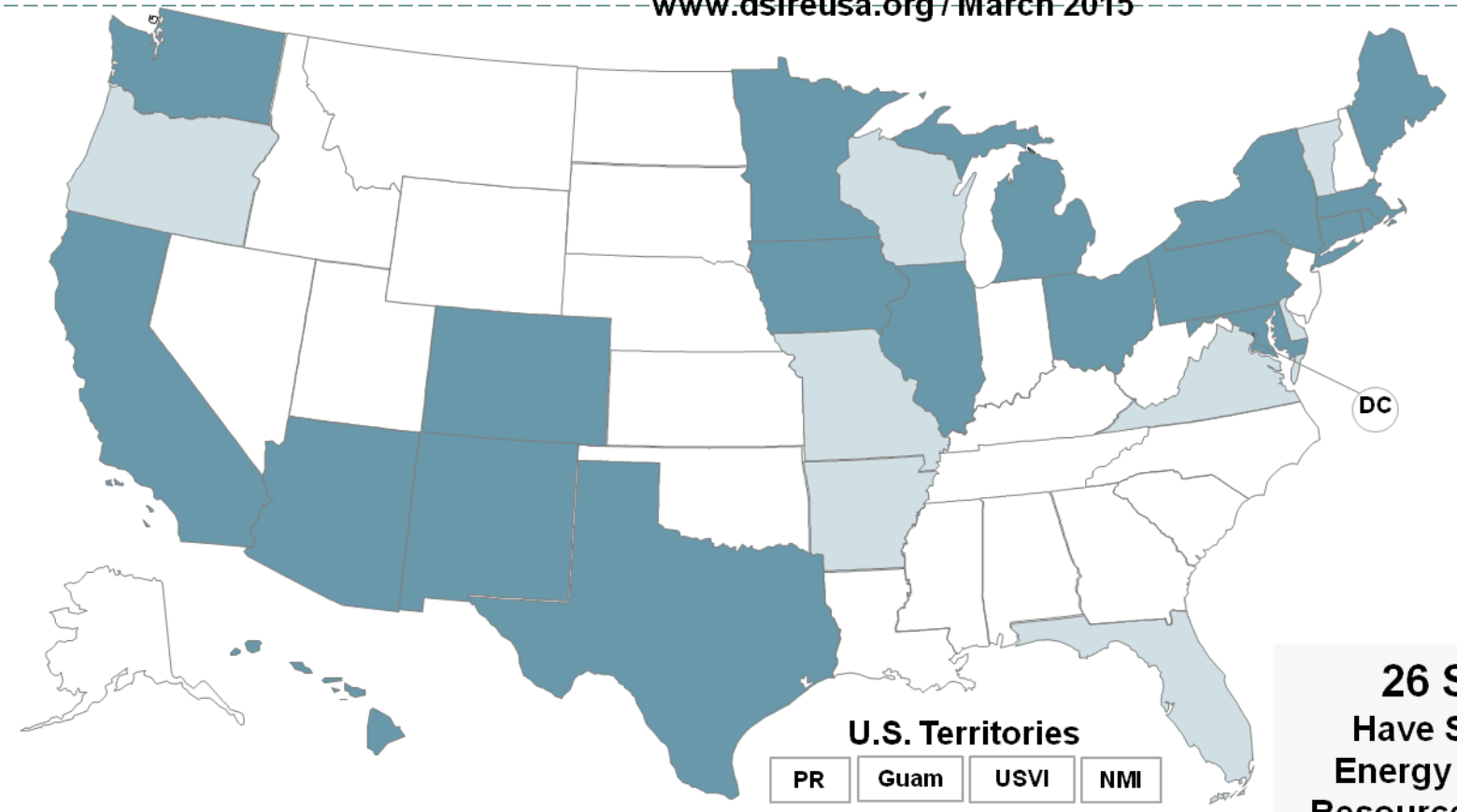
Delaware allows certain fuel cell systems to qualify for the PV carve-out

Solar water heating counts toward solar/DG provision

23 States + DC have an RPS with solar or DG provisions

Energy Efficiency Resource Standards (and Goals)

www.dsireusa.org / March 2015



26 States
Have Statewide Energy Efficiency Resource Standards (or Goals)

States with an Energy Efficiency Resource Standard

States with an Energy Efficiency Resource Goal

No State Standard or Goal

Legislative & Regulatory Activity (1)

- **Aggregated Net Metering** – New Hampshire, New York
- **Community Solar –** Colorado, DC, Hawaii, **Michigan**, Minnesota, Wisconsin
- **Fixed charge increases** – Arizona, Connecticut, Hawaii, Indiana, Kansas, Maryland, Minnesota, Missouri, Nevada, New Mexico, Pennsylvania, Washington, Wisconsin, Wyoming
- **Legalizing 3rd Party Ownership** – DC, Florida, Georgia, Hawaii, North Carolina
- **Generic NEM reviews** – Arizona, California, Colorado, Hawaii, Indiana, Iowa, Louisiana, Maine, Massachusetts, Minnesota, Mississippi, Montana, New Hampshire, New York, Ohio, Oregon, Rhode Island, South Carolina, Tennessee, Utah, Vermont, Virginia, West Virginia, Wisconsin (only 6 states do not now have NEM).

Legislative & Regulatory Activity (2)

- **General Microgrids –** California, Hawaii, Maine, New York
- **Public Purpose Microgrids** – Connecticut, Maryland, Massachusetts, New Jersey, New York
- **REV reviews** – California, Hawaii, New York, Massachusetts,
- **Utility ownership** – Arizona (Y), New York (N)

Michigan Legislative Landscape Spring 2015: Dueling Proposals (Source: Adapted from MiEIBC, 2015)

	House Reps (Nesbitt)	Senate Reps (Nofs)	House Dems	Governor Snyder
Renewables Portfolio	Keeps 10%, adding WTE & "geothermal"	Repeal standard, add green pricing.	RPS 20% by 2022, with off-ramps	11-24% total by 2025, depends on nat gas price
Energy Optimization	Repeals standard	Repeal standard	Double EO to 2%/year	15% more by 2025
Net Metering	Silent	Increase size cap > 150kW	Silent	Silent
Retail Choice	Eliminates choice as contracts end	"Lock" cap at 10%	Limits access to out-of-state providers	Keep 10% cap w/"fair choice" policy
Planning	5-yr IRPs	3 to 5-yr IRPs	Vague	Silent
Other	Reform UCPB	ROI on PPAs?	Expand UCPB?	Mandates?

Community Solar Value Stacks

- Economy of scale in siting, construction, financing, O&M
- Energy value: Wholesale energy (average, on/off peak, real time?), Line losses, Retail mark-up
- Co-gen benefits: Waste heat? Thermal & energy storage?
- Capacity value: Avoid(able) G, T, & D?
- Grid support services: ancillary services
- Financial risk: Fuel price hedge
- Security, reliability, resilience
- Environmental: air emissions, water, land
- Social: economy, employment, tax revenues

See Hansen et al., 2013, RMI.

Mapping Values to Programs

- Who finances it and how?
  - Who gets ITC benefits?
  - Does PV production get taxed as income?
- How is production valued?
- Which values are monetized and to whom?
- Location, location, location:
  Co-gen benefits, Capacity value, Grid support services, Security, reliability, resilience

Michigan Program Options

- Cherryland
- More coops? Muni's? With on-bill financing?
- IOUs? Consumers?, Detroit Edison?
- Behind the meter?
  - Straight retail, or net metering?
  - Retail plus ancillary services?
  - Plus reliability, resilience? (Public Purpose Microgrids?)
- Special financing options: PACE, Michigan Saves, Third Party Ownership, Michigan MILE Act

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Learn More (3)

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Learn More from NRRI

- www.nrri.org, then "Latest Research – View All"
  - **NRRI 15-02 Non-Transmission Alternatives**
  - **NRRI 15-01 Distributed Generation**
  - **NRRI 14-08 Energy Storage**
  - **NRRI 14-05 Solar PV Study**
  - **NRRI-13-07 State, Utility Solar Energy Programs**
  - **NRRI-12-15 Microgrids**
  - **NRRI-12-11 Electric Standby Rates**
  - **NRRI-11-05 Smart Grid Strategy**

MICHIGAN PACE

Solar Energy Finance

Resources for Communities and Businesses

Gregory Truex, CPA






Resources for Individuals

Owned Project
Local Bank or Credit Union
Financed from Savings
Crowdsourcing
Private Equity

Leased Project
Regionally available, Not in Michigan yet

PACE is NOT available for individuals in Michigan






Resources for Communities and Businesses

Resources for Communities
Private Equity
Leasing Companies
PACE Energy District

Resources for Businesses
Private Equity
Leasing Companies
Crowdfunding
PACE Energy District

GRAND VALLEY STATE UNIVERSITY
MICHIGAN ALTERNATIVE AND RENEWABLE ENERGY CENTER






PACE – Property Assessed Clean Energy

What is PACE?

On December 14, 2010 the Governor signed the Property Assessed Clean Energy Act

The law allows the creation of municipal districts and a financing tool for them

PACE applies not only to renewable energy but also to energy efficiency

PACE financing applies to businesses – NOT to residences

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solar policy information

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MICHIGAN
Incentives/Policies for Renewables & Efficiency

Printable Version

Local Option - Property Assessed Clean Energy

Last DSIRE Review: 01/03/2011

Program Overview:

State:	Michigan
Incentive Type:	PACE Financing
Eligible Efficiency Technologies:	Lighting, Chillers , Furnaces , Boilers, Heat pumps, Central Air conditioners, CHP/Cogeneration, Heat recovery, Energy Mgmt. Systems/Building Controls, Caulking/Weather-stripping, Duct/Air sealing, Building Insulation, Windows, Doors, Roofs, Motor Vehicle Charging, Water Usage Reduction Measures,
Eligible Renewable/Other Technologies:	Solar Water Heat, Solar Space Heat, Photovoltaics, Landfill Gas, Wind, Biomass, Geothermal Heat Pumps, Geothermal Direct-Use
Applicable Sectors:	Commercial, Industrial






PACE – Property Assessed Clean Energy

What does “Property Assessed” mean?

- An assessment is attached to a property, not a specific borrower. PACE financing allows local governments the option of creating a district to finance renewable and efficiency projects thru tax assessments.

This structure has potential advantages for end users, lenders and municipalities

Michigan PACE Energy Program, L3C

- PACE - The mechanics
  - PACE is rooted in traditional municipal finance.
  - A local government creates an energy, development or improvement district;
  - A bond, a bank loan or private equity secured by real property within the district, is issued;
  - Bond proceeds are used to fund renewable energy and energy efficiency projects.
  - Property owners then repay the debt service on the bond in fixed payments as part of their property tax bill.
  - PACE may also be financed through banks, private equity and private placement debt

Source: Department of Energy

Commercial PACE Mechanism

$$ Upfront

$$ Repaid on tax bill

- Creates financing district & approval process
- Provides upfront capital
- Attaches repayment obligation to the building

- Identifies work & chooses contractor
- Repays financing as a line item on the property tax bill
- Repayment obligation transfers with ownership

Michigan PACE Energy Program, L3C

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

Three Financing Pathways

Pathway	Description
Pooled Bond	PACE applications are aggregated, and a revenue bond is issued to fund proposed projects
Stand-Alone Bond	For sufficiently large projects, a revenue bond is issued to fund an individual (or small number of) projects
Owner-Arranged Bond	An owner arranges project financing with a private lender and the lender accepts PACE securitization and payback framework

Michigan Solar Finance

Thank You!

Gregory Truex, CPA

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 – 12:50	Planning for Solar: Getting Solar Ready
12:50 – 1:25	Solar Market Development Tools
1:25 – 1:35	*Break*
1:35 – 2:20	Local Speakers
2:20 – 3:00	Developing and Solar Policy Implementation Plan for Your Community and Next Steps

Activity: Solar in Your Community

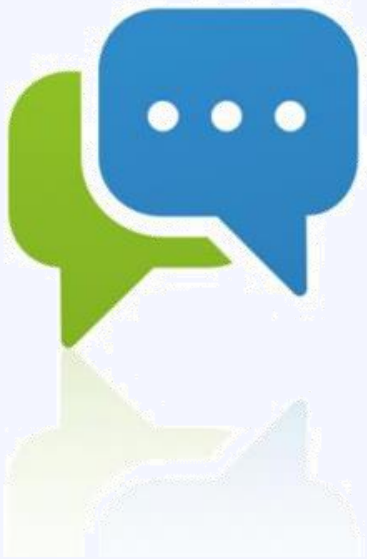
1. Recognize successes
2. Identify opportunities
3. Select strategies & best practices
4. Outline implementation plan
5. Discuss barriers to implementation

Activity: Solar in Your Community

Part 1: Take 5 minutes to complete the questions in the *Developing Effective Solar Policies in Your Community* handout.

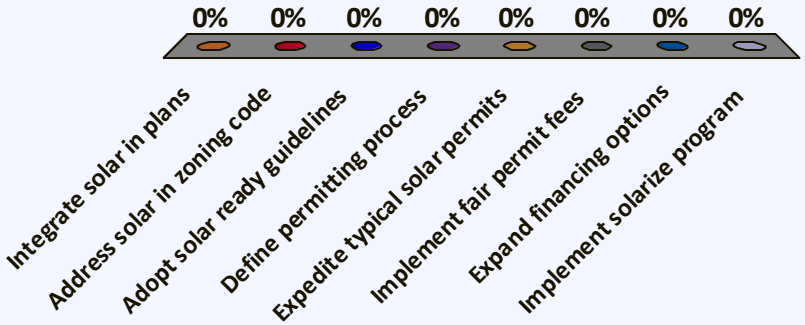
Activity: Solar in Your Community

Part 2: Spend the next 10 minutes discussing your responses to Questions 8 – 12 with the others at your table. Discuss strategies for overcoming potential obstacles to implementation.



Which “best practice” did you select to pursue first?

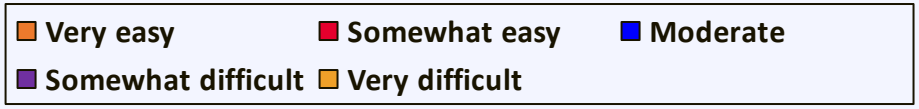
A. Integrate solar in plans
B. Address solar in zoning code
C. Adopt solar ready guidelines
D. Define permitting process
E. Expedite typical solar permits
F. Implement fair permit fees
G. Expand financing options
H. Implement solarize program



How difficult will it be to implement this policy/program?

1. Very easy
2. Somewhat easy
3. Moderate
4. Somewhat difficult
5. Very difficult

0%



Discussion

What obstacles stand in the way of implementation?

Discussion

What are possible strategies to overcome those obstacles?

Activity: Next Steps

What do you pledge to do when you leave today's workshop? [Orange Card]

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U.S. Department of Energy

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