Solar Powering Your Community

Addressing Soft Costs and Barriers

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U.S. Department of Energy

About the SunShot Solar Outreach Partnership

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

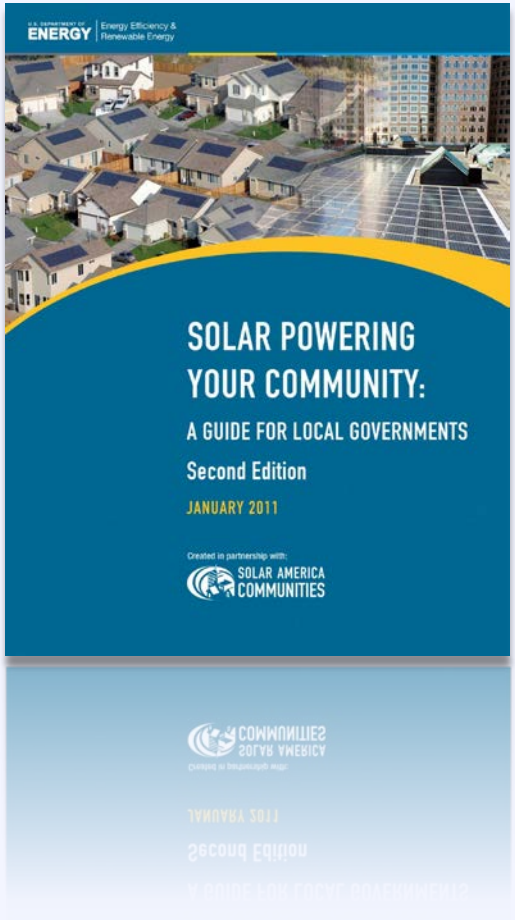
- Increase installed capacity of solar electricity in U.S. communities
- Streamline and standardize permitting and interconnection processes
- Improve planning and zoning codes/regulations for solar electric technologies
- Increase access to solar financing options

About the SunShot Solar Outreach Partnership

Resource **Solar Powering Your Community Guide**

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

www.energy.gov



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About the SunShot Solar Outreach Partnership

Resource Sunshot Resource Center

- Case Studies
- Fact Sheets
- How-To Guides
- Model Ordinances
- Technical Reports
- Sample Government Docs

www4.eere.energy.gov/solar/sunshot/resource_center

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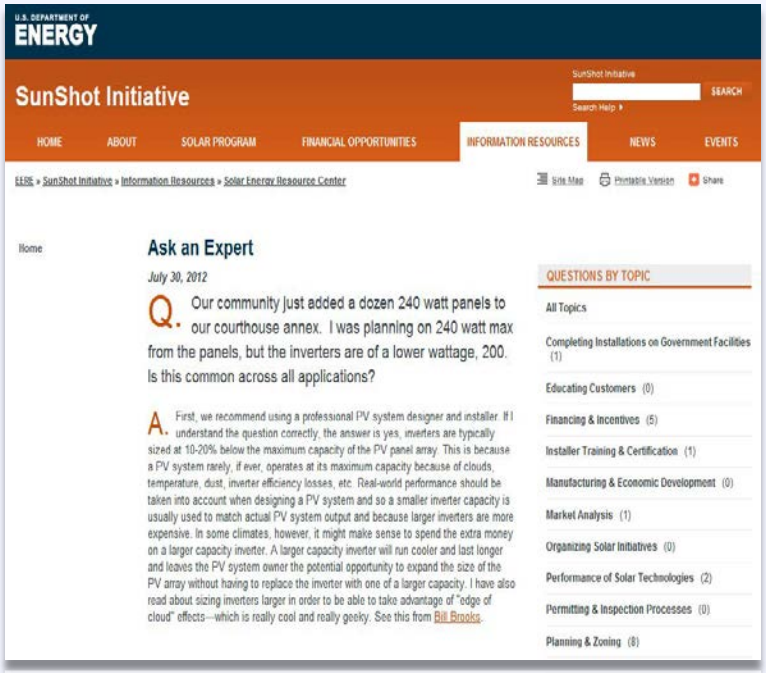
About the SunShot Solar Outreach Partnership

Technical Support

- 'Ask an Expert' Live Web Forums
- 'Ask an Expert' Web Portal
- Peer Exchange Facilitation
- In-Depth Consultations
- Customized Trainings



www4.eere.energy.gov/solar/sunshot/resource_center

For more information email: solar-usa@iclei.org

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Agenda

01:40 – 02:00	Solar 101
02:00 – 02:40	Creating a Regulatory Landscape for Solar
02:40 – 02:50	*Break*
02:50 – 03:10	Benefits and Barriers Activity
03:10 – 03:40	Introduction to Solar Project Finance
03:40 – 03:50	Understanding Utility Interconnection
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Poll

Who's in the room?

Poll

What is your experience with solar?

Solar Technologies

Solar Photovoltaic (PV)

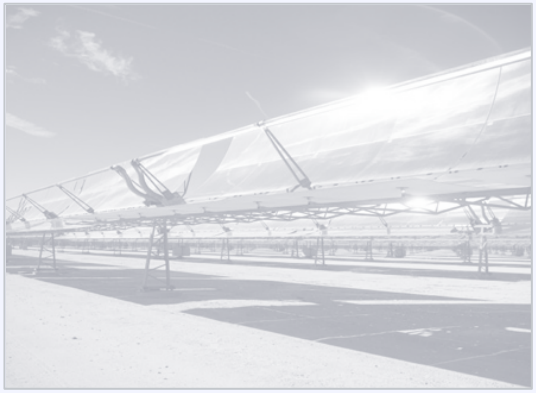
Solar Hot Water

Concentrated Solar Power

Solar Technologies

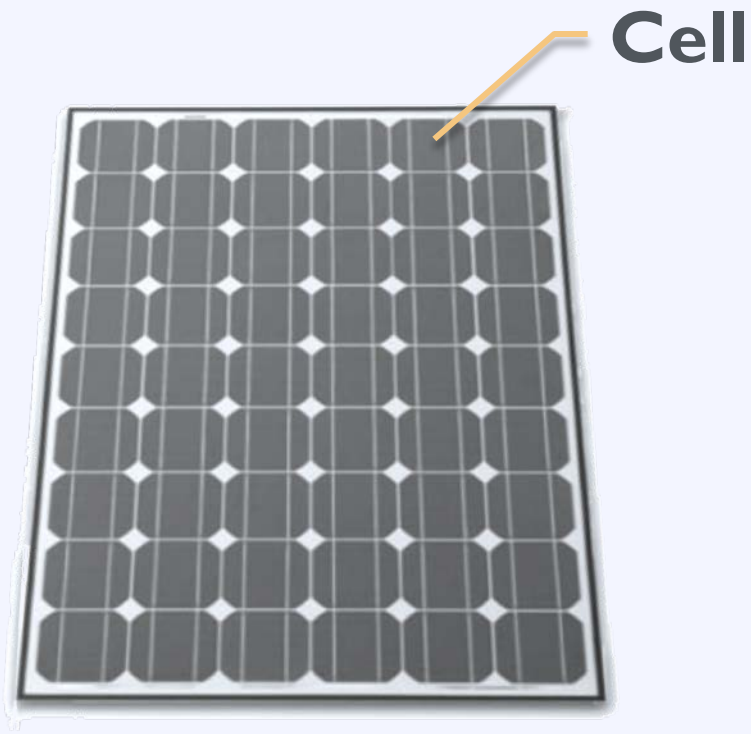
Solar Photovoltaic (PV)

Solar Hot Water



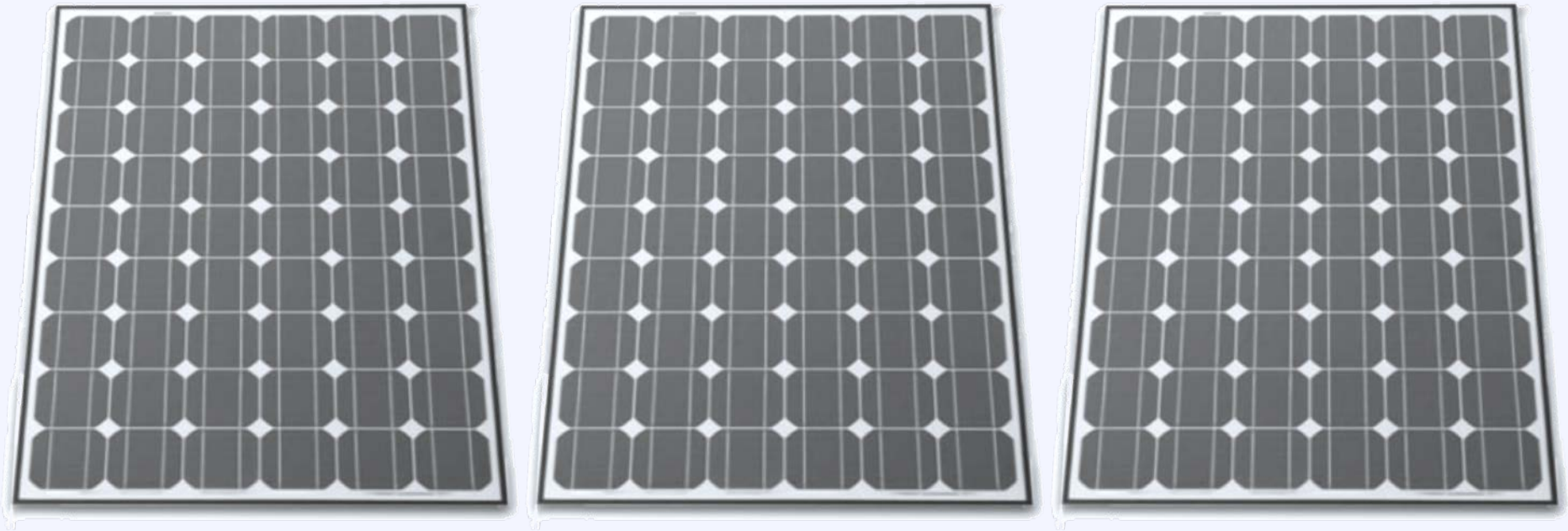
Concentrated Solar Power

Some Basic Terminology



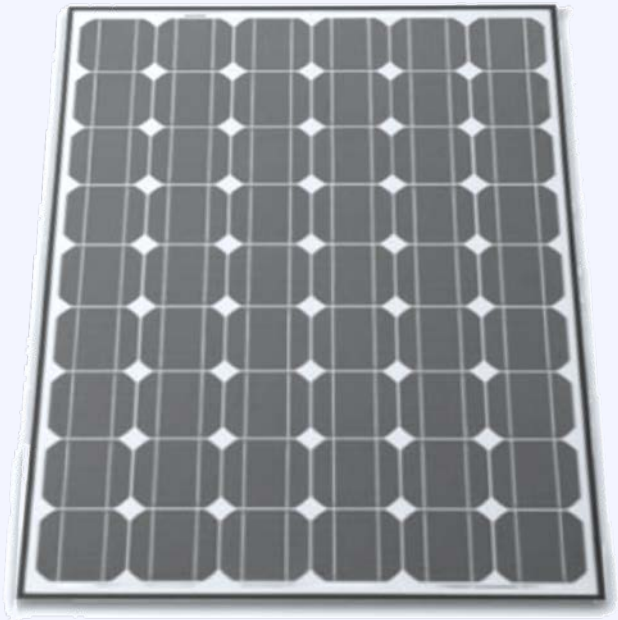
Panel / Module

Some Basic Terminology



Array

Some Basic Terminology



Capacity / Power

kilowatt (kW)

Production

Kilowatt-hour (kWh)

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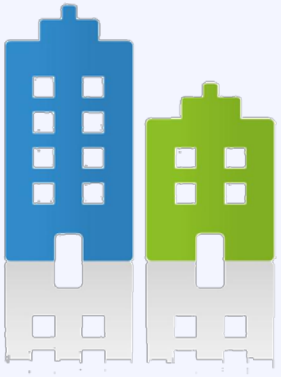
U.S. Department of Energy

Some Basic Terminology

Residence
5 kW

Factory
1 MW+



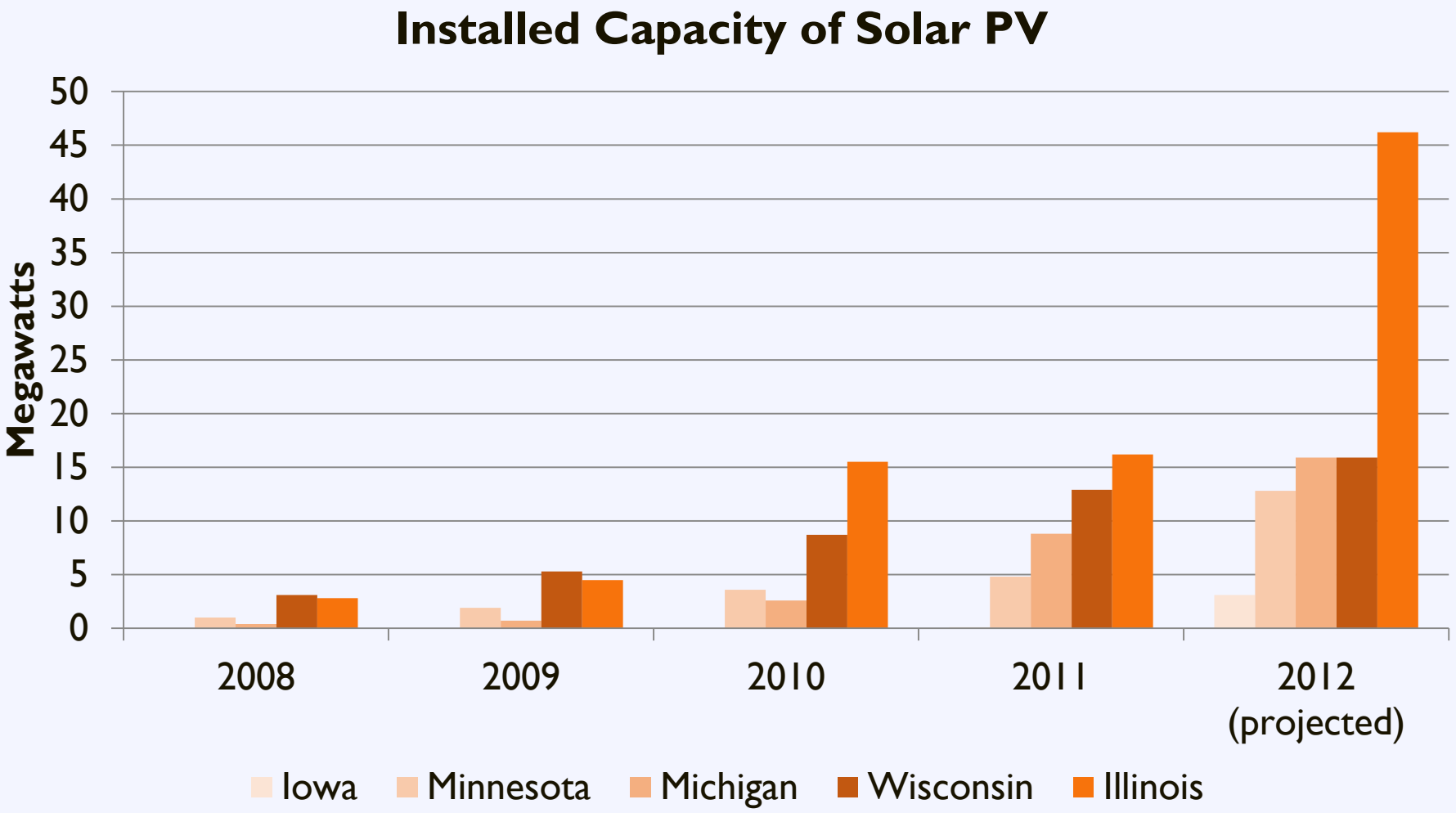
Office
50 – 500 kW

Utility
2 MW+

Workshop Goal

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

Midwestern Solar PV Market



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Source: IREC, Photon Magazine

Explore benefits

and

Overcome barriers

Activity: Identifying Benefits

What is the greatest benefit solar can bring to your community? [Blue Card]

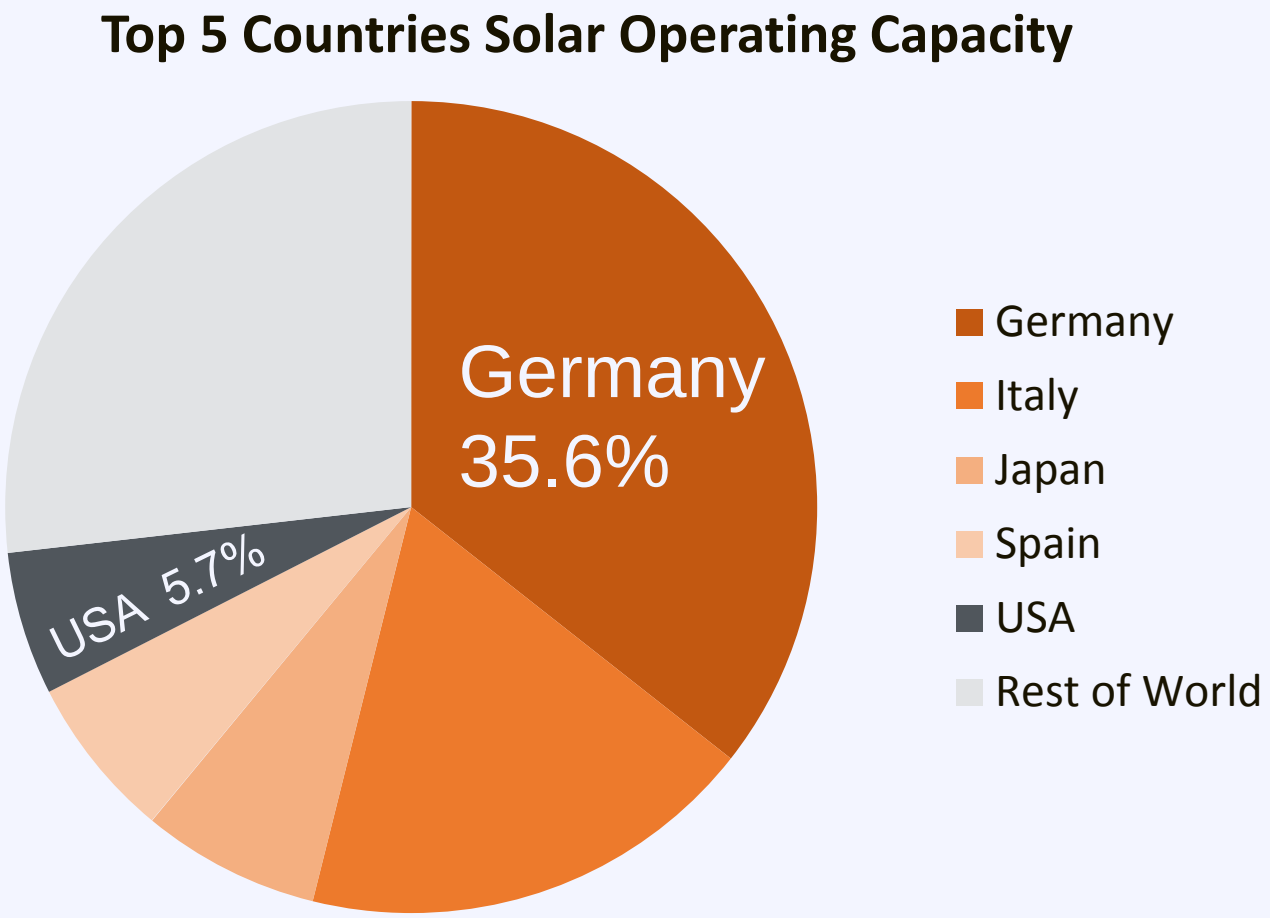
Right Now	During Session	After Break
		
Write answer on card	Compile results	Group discussion

Activity: Addressing Barriers

What is the greatest barrier to solar adoption in your community? [Green Card]

Right Now	During Session	After Break
		
Write answer on card	Compile results	Group discussion

Installed Capacity



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http://www.map.ren21.net/GSR/GSR2012.pdf

Installed Capacity

Total installed solar capacity in the US

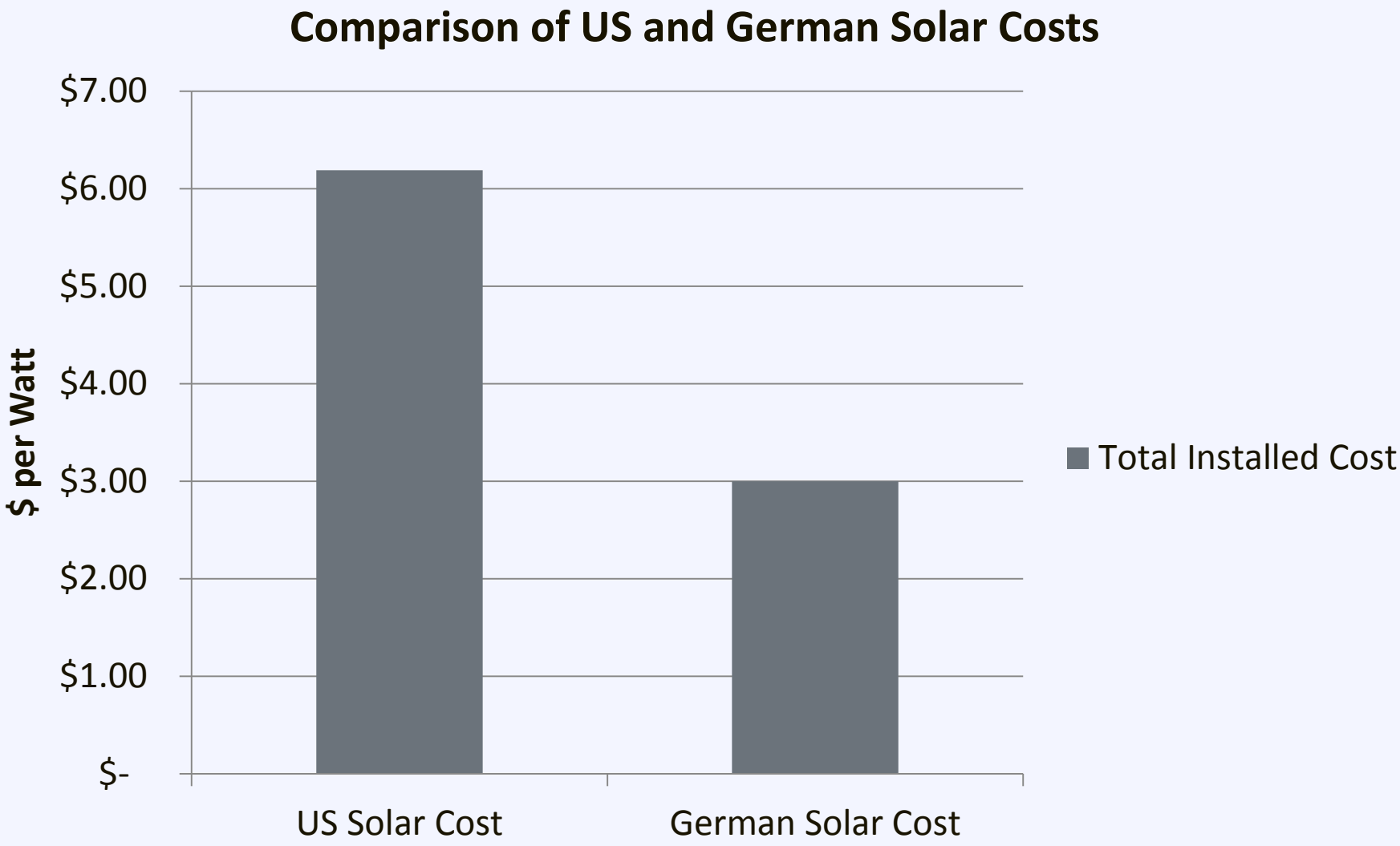
4 GW

Capacity installed in Germany in Dec 2011

4 GW

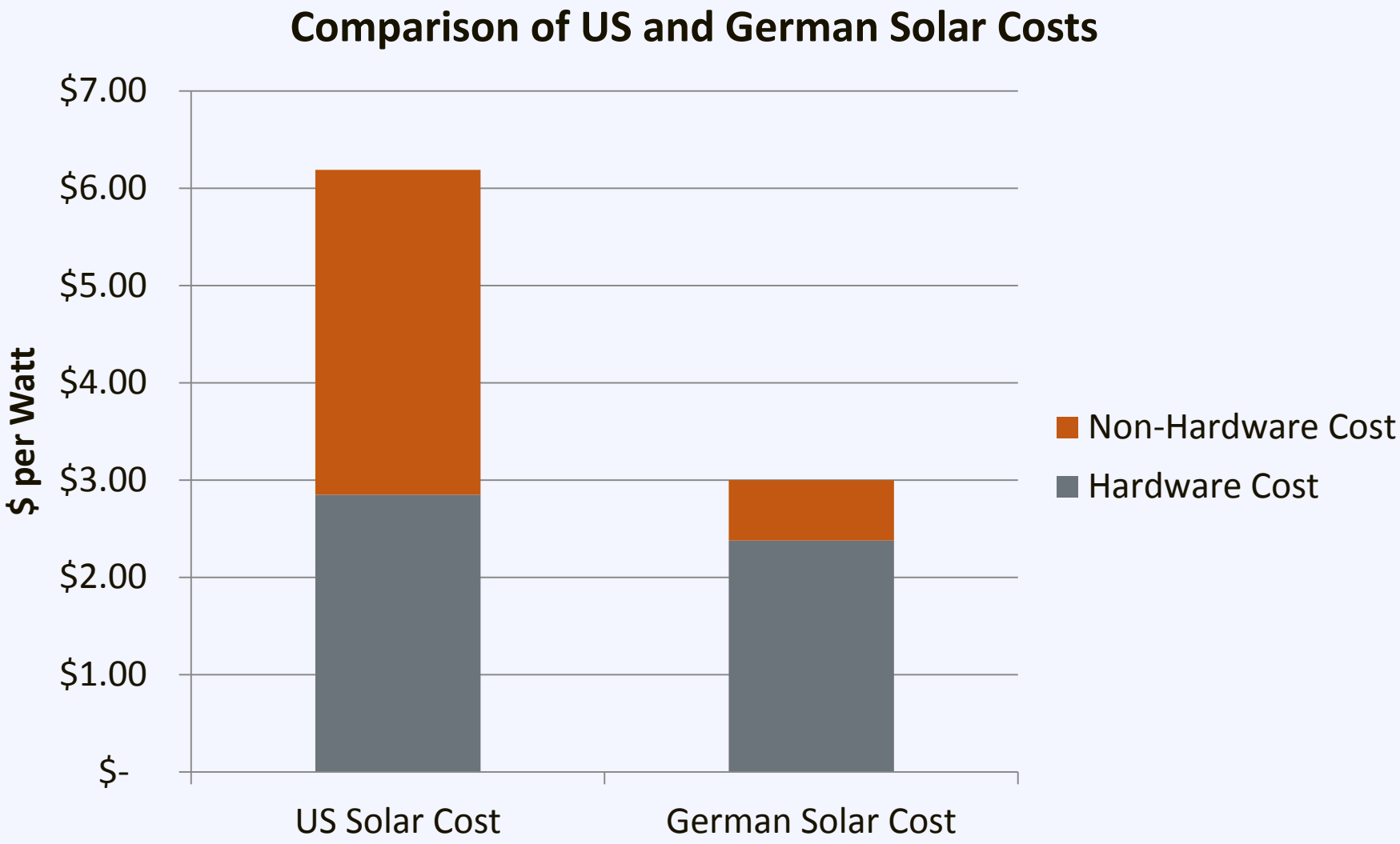
http://www.map.ren21.net/GSR/GSR2012.pdf

The Cost of Solar in the US



Source: NREL (http://ases.conference-services.net/resources/252/2859/pdf/SOLAR2012_0599_full%20paper.pdf) (http://www.nrel.gov/docs/fy12osti/53347.pdf) (http://www.nrel.gov/docs/fy12osti/54689.pdf)

The Cost of Solar in the US



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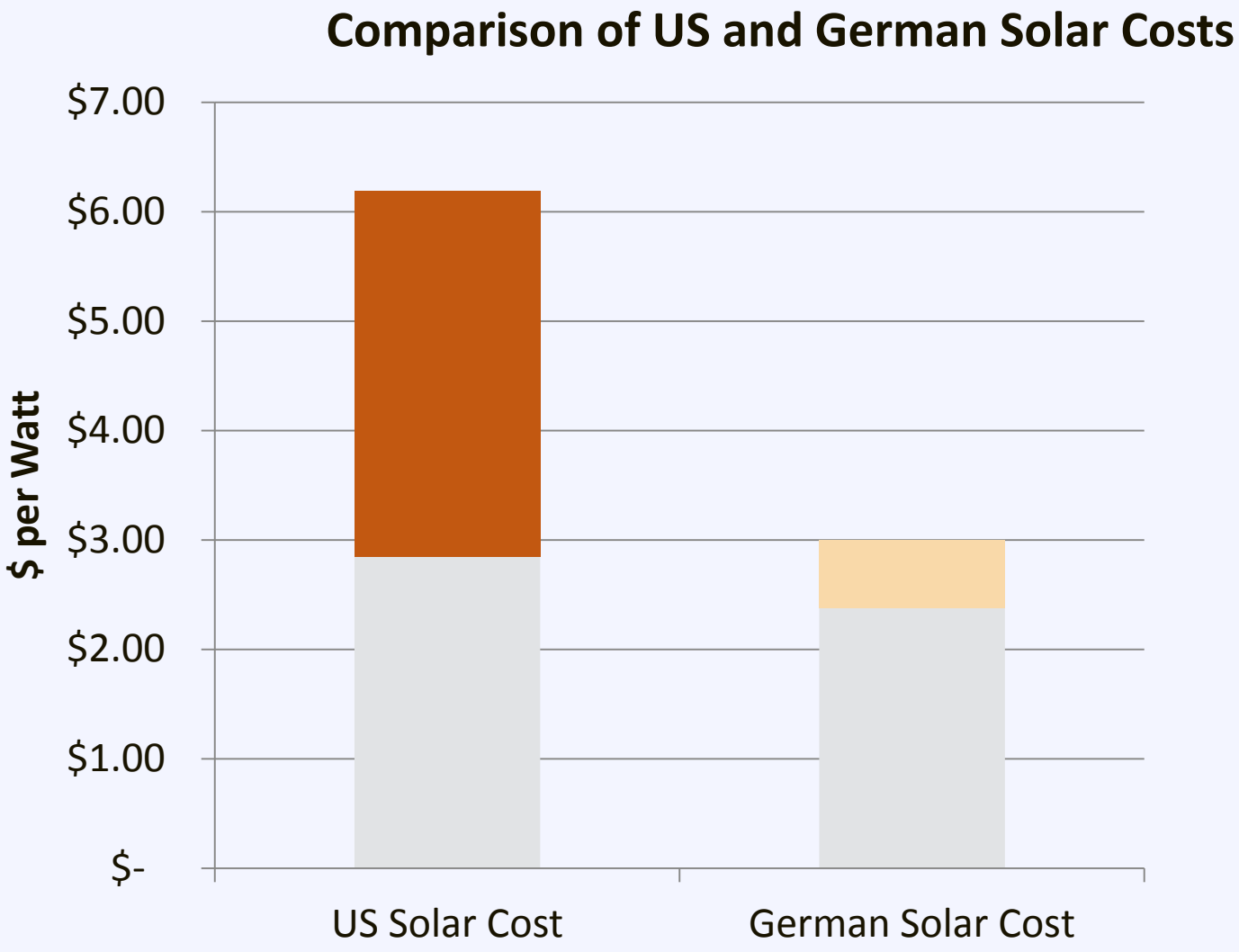

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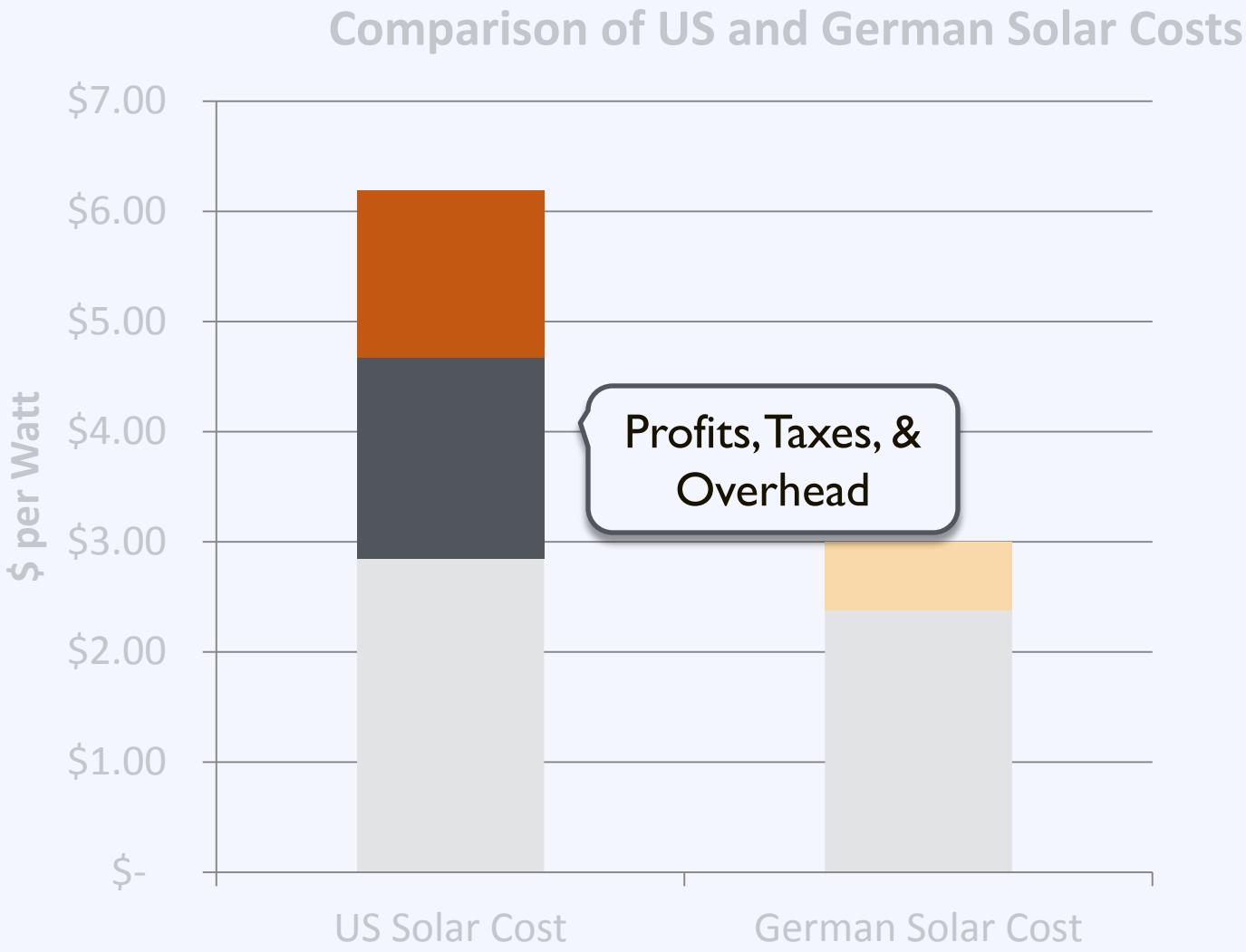

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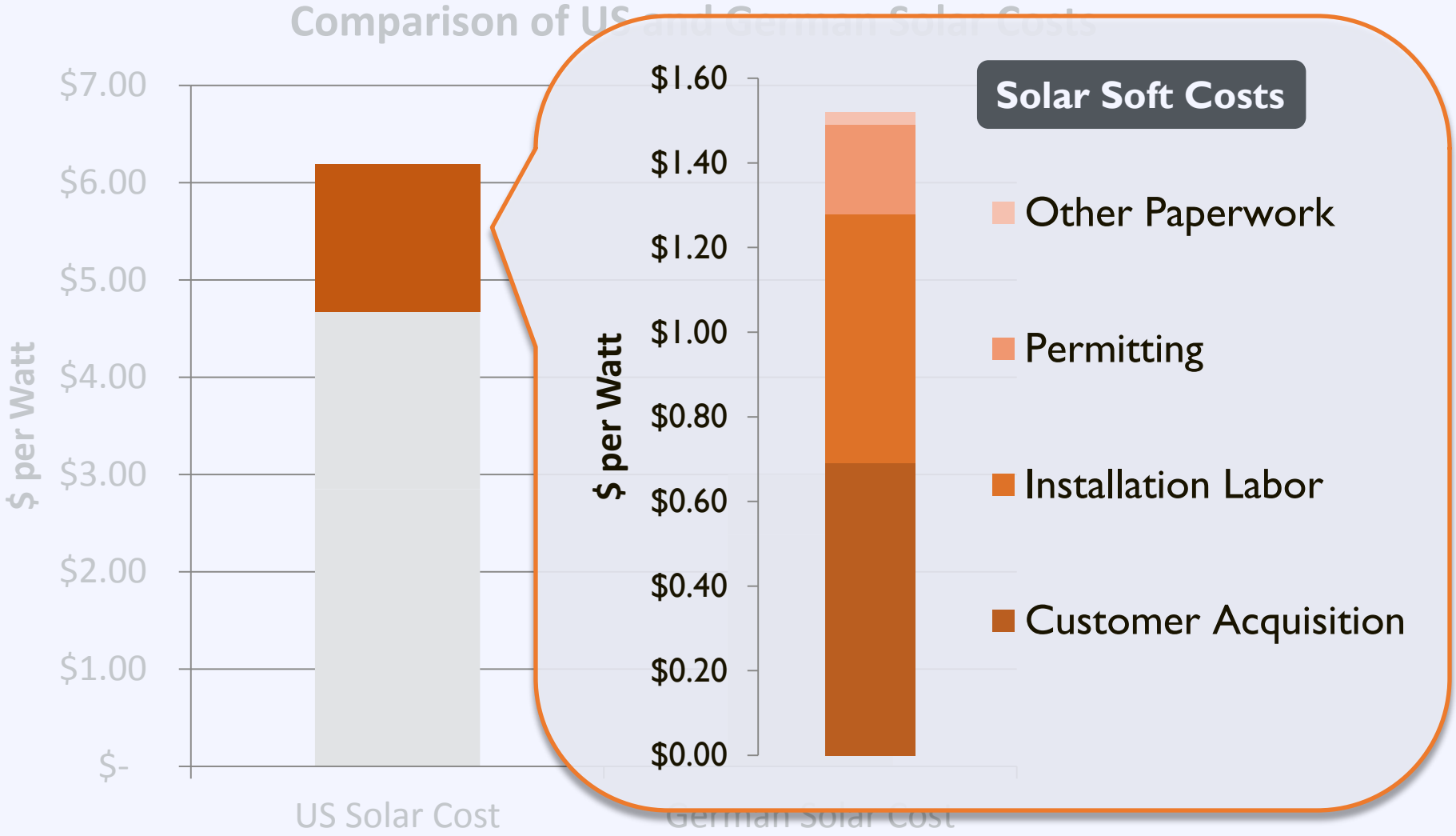

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The Permitting Process: Challenges

18,000+ local jurisdictions

with unique permitting requirements

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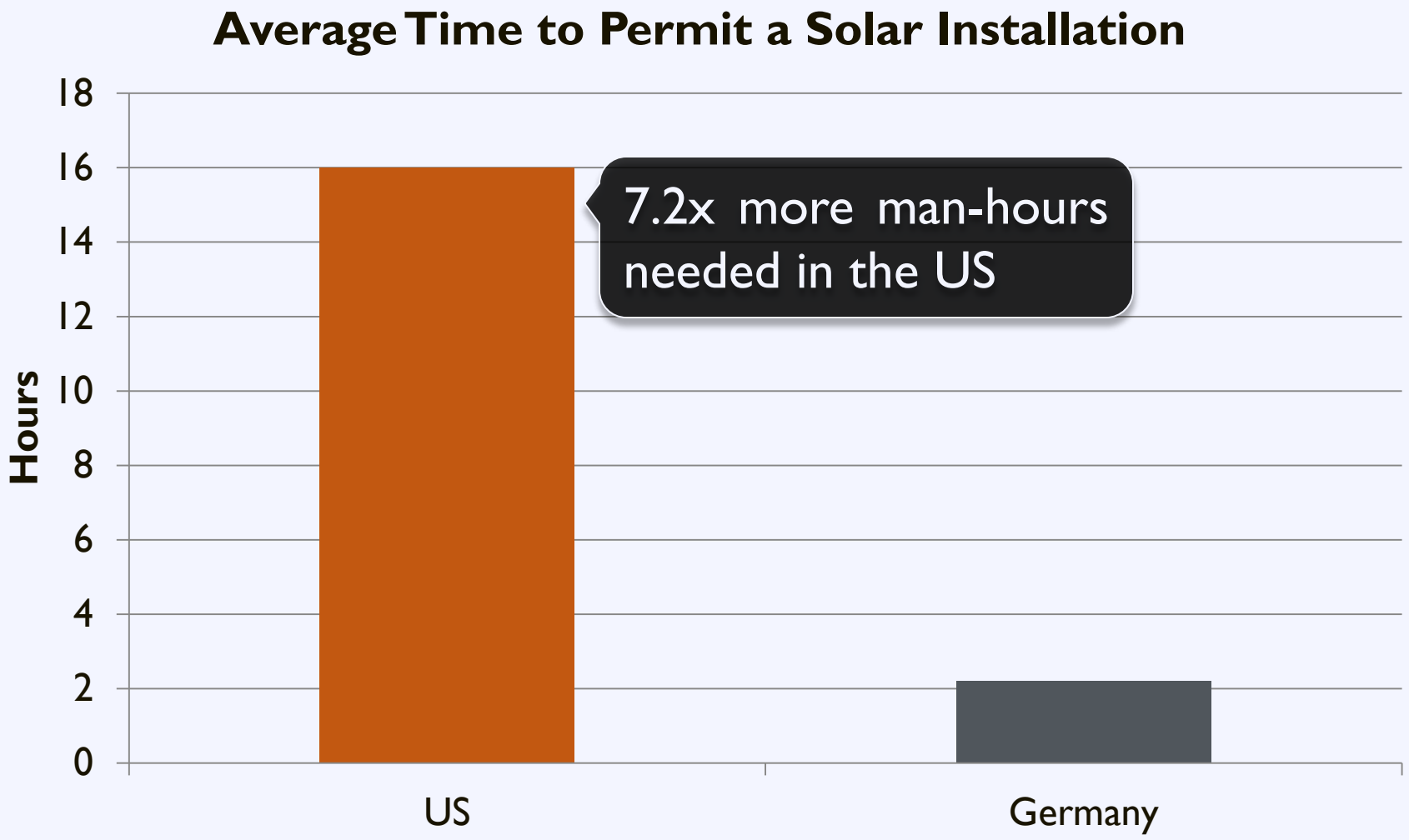
Source: http://www.nrel.gov/docs/fy12osti/54689.pdf

Time to Installation



Time to Installation

New York City's Goal

100 days

from inception to completion

Germany Today

8 days

from inception to completion

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Photon Magazine

Germany's Success

Consistency and Transparency

through

Standardized Processes

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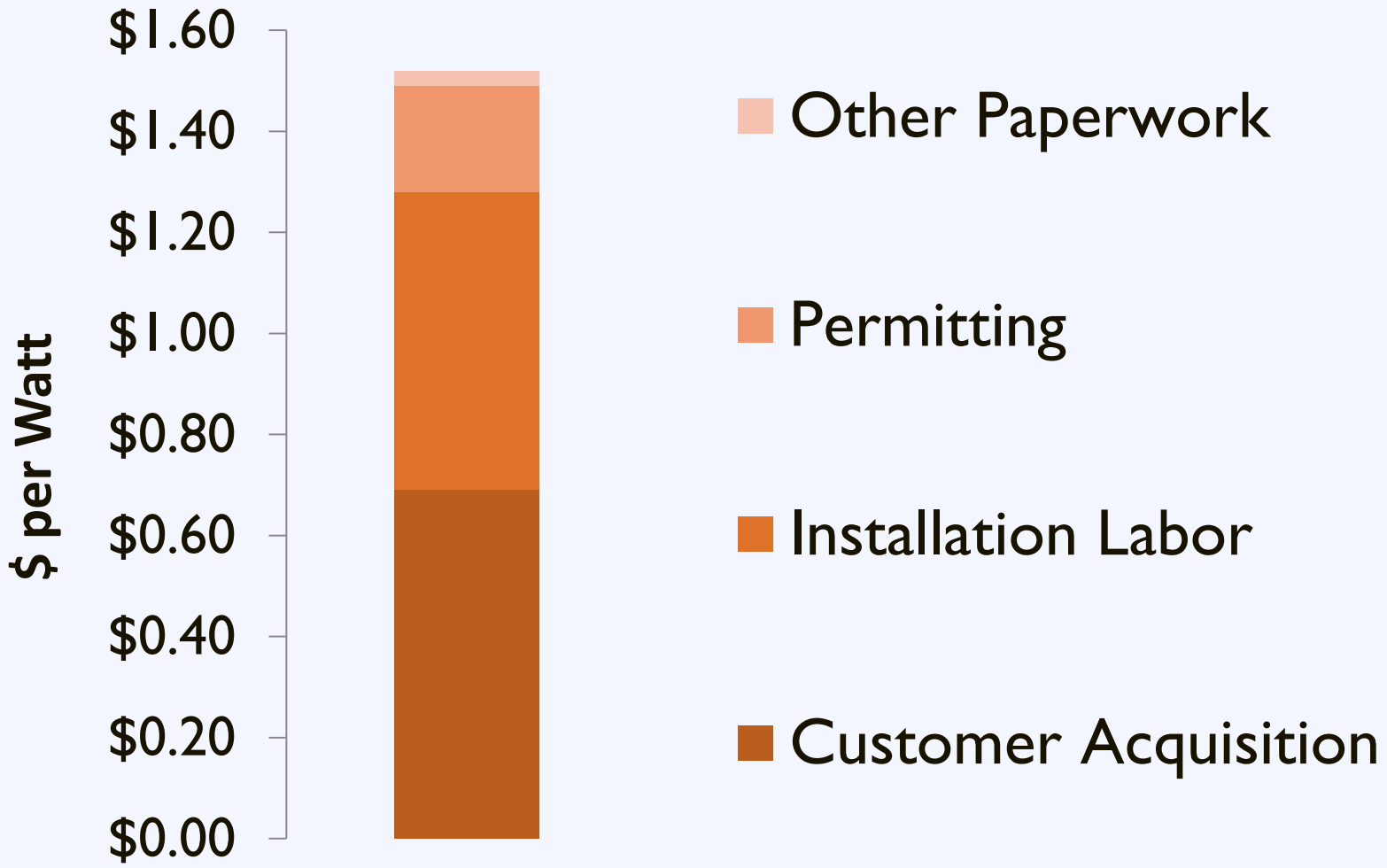
Mitigate Soft Costs



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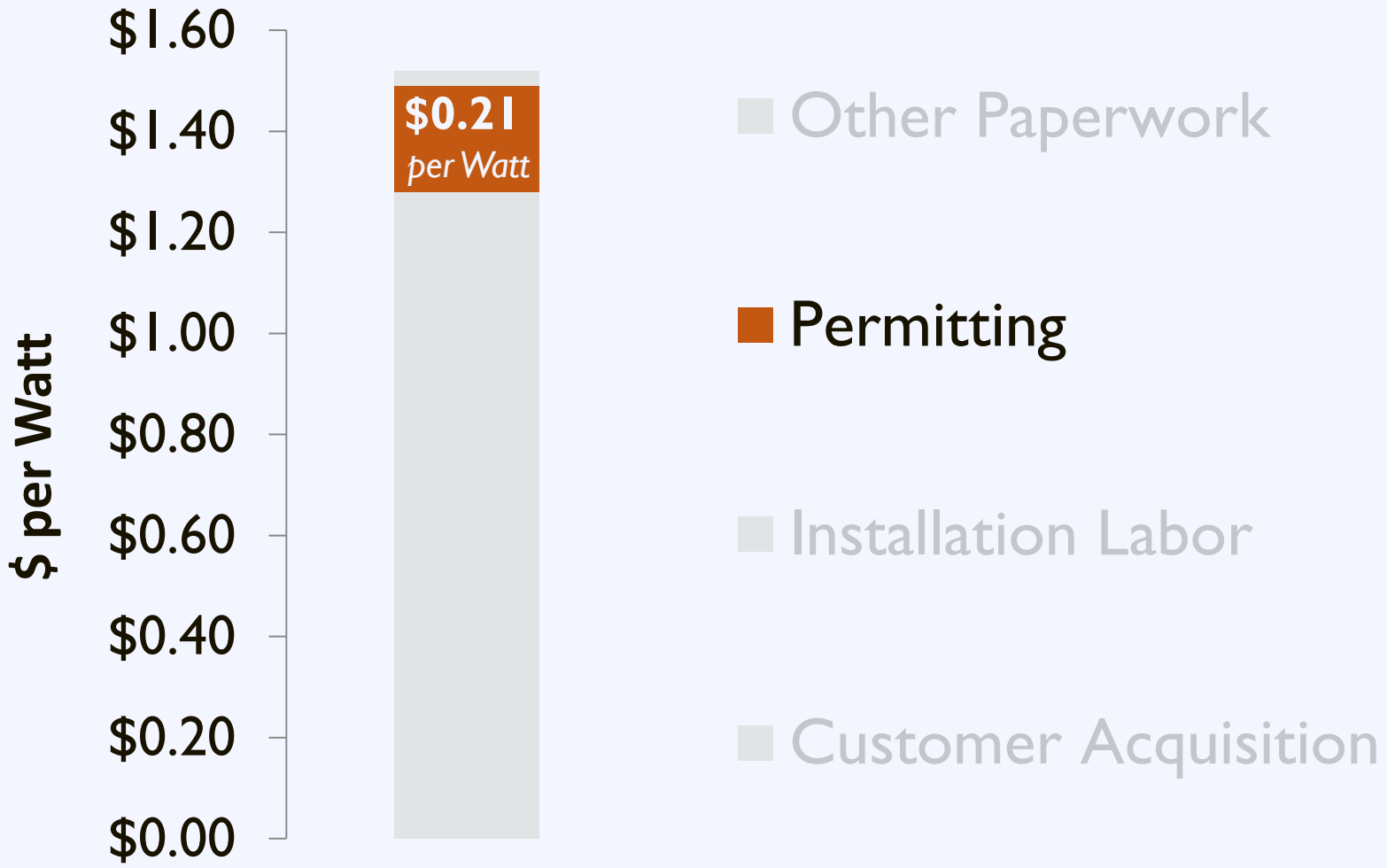
Mitigate Soft Costs



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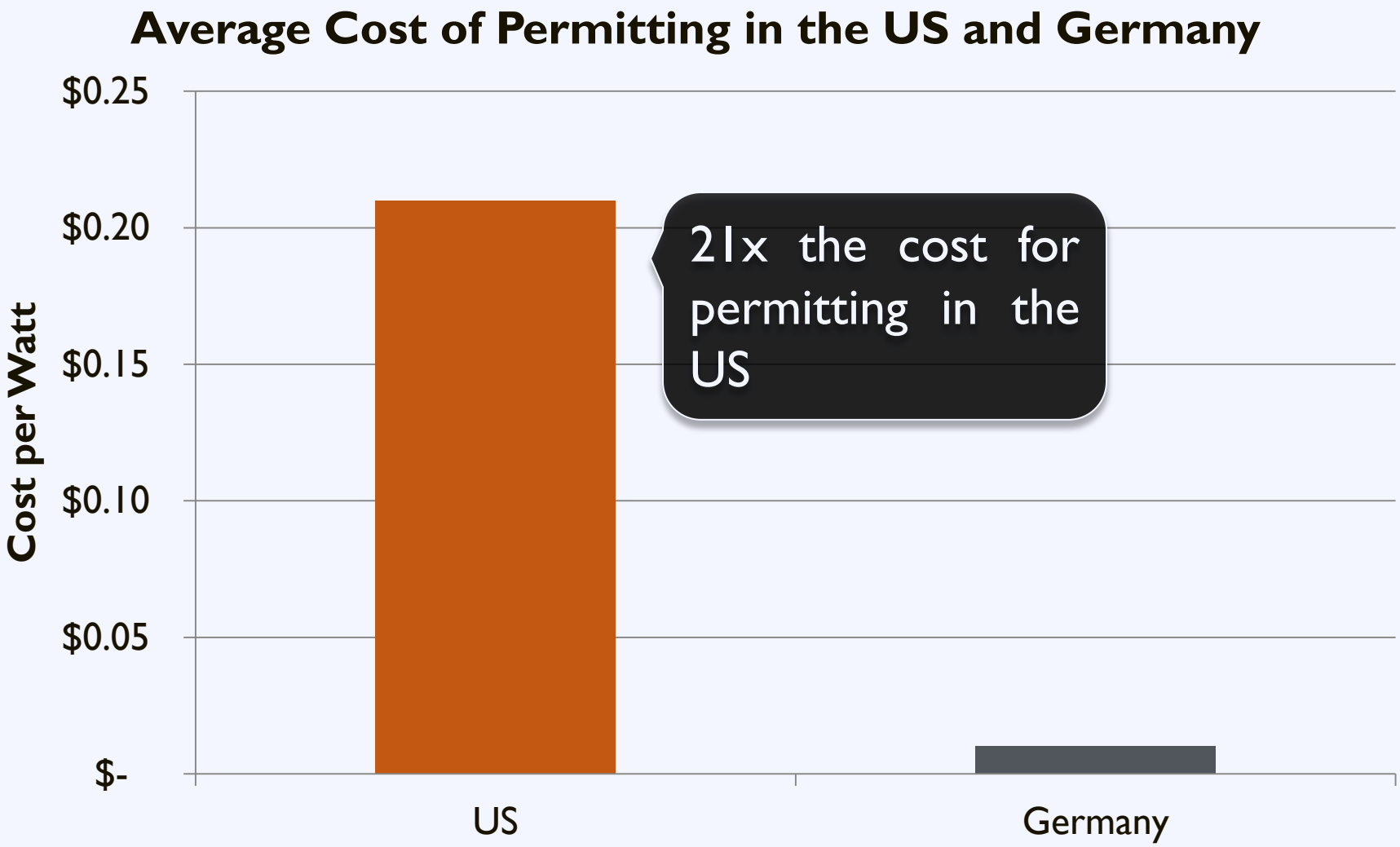
Source: NREL (http://www.nrel.gov/docs/fy12osti/54689.pdf)

Permitting Costs



Source: NREL, LBNL

Permitting

Remove barriers by:

- Make qualified solar projects a by-right accessory use
- Modify regulations to clarify what types of solar projects are allowed where
- Define and protect solar access
- Streamline the permitting process

Zoning Codes: Regulations

Section	Topics to Address
Permitted Uses	Primary vs. accessory
Dimensional Standards	• Height • Lot coverage • Setbacks
Development Standards	• Screening • Placement • Site Planning
Definitions	Types of solar systems

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U.S. Department of Energy

Source: American Planning Association

Zoning Codes: Small Scale Solar

Typical Requirements:

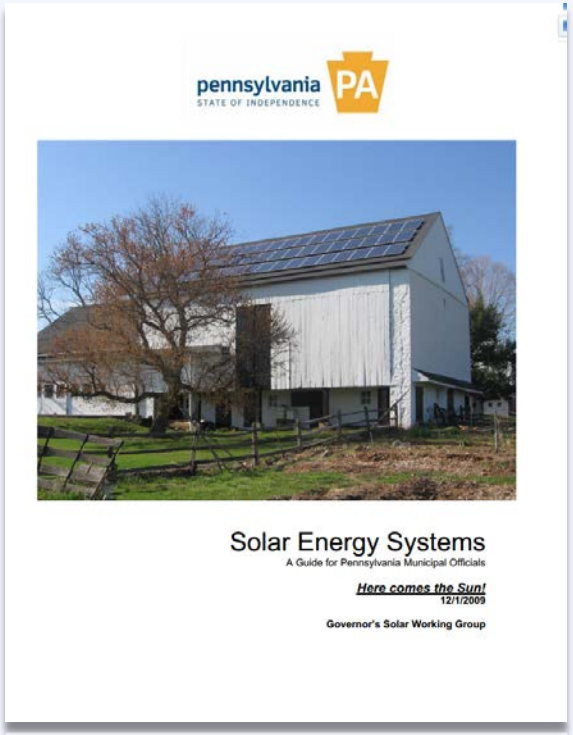
- Permitted as accessory use
- Minimize visibility if possible
- Requirements:
  - District height
  - Lot coverage
  - Setback

Zoning Code: Small Scale Solar

Resource **Pennsylvania Model Ordinance**

Prepared to assist local governments in establishing reasonable standards to facilitate the development of small-scale solar

state.pa.us



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Zoning Codes: Large Scale Solar

Typical Requirements:

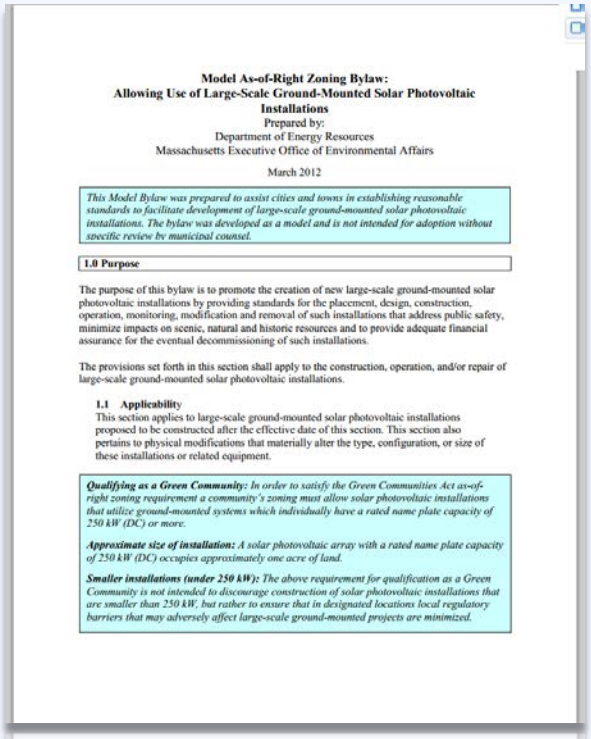
- Allowed for primary use in limited locations
- Requirements:
  - Height limits
  - Lot coverage
  - Setback
  - Fencing and Enclosure

Zoning Code: Large Scale Solar

Resource **Massachusetts Model Ordinance**

Prepared to assist local governments in establishing reasonable standards to facilitate the development of large-scale solar installations

www.mass.gov



Model As-of-Right Zoning Bylaw:
Allowing Use of Large-Scale Ground-Mounted Solar Photovoltaic Installations
Prepared by:
Department of Energy Resources
Massachusetts Executive Office of Environmental Affairs

March 2012

This Model Bylaw was prepared to assist cities and towns in establishing reasonable standards to facilitate development of large-scale ground-mounted solar photovoltaic installations. The bylaw was developed as a model and is not intended for adoption without specific review by municipal counsel.

1.0 Purpose

The purpose of this bylaw is to promote the creation of new large-scale ground-mounted solar photovoltaic installations by providing standards for the placement, design, construction, operation, monitoring, modification and removal of such installations that address public safety, minimize impacts on scenic, natural and historic resources and to provide adequate financial assurance for the eventual decommissioning of such installations.

The provisions set forth in this section shall apply to the construction, operation, and/or repair of large-scale ground-mounted solar photovoltaic installations.

1.1 Applicability
This section applies to large-scale ground-mounted solar photovoltaic installations proposed to be constructed after the effective date of this section. This section also pertains to physical modifications that materially alter the type, configuration, or size of these installations or related equipment.

Qualifying as a Green Community: *In order to satisfy the Green Communities Act as-of-right zoning requirement a community's zoning must allow solar photovoltaic installations that utilize ground-mounted systems which individually have a rated name plate capacity of 250 kW (DC) or more.*

Approximate size of installation: *A solar photovoltaic array with a rated name plate capacity of 250 kW (DC) occupies approximately one acre of land.*

Smaller installations (under 250 kW): *The above requirement for qualification as a Green Community is not intended to discourage construction of solar photovoltaic installations that are smaller than 250 kW, but rather to ensure that in designated locations local regulatory barriers that may adversely affect large-scale ground-mounted projects are minimized.*

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Solar Access

Solar Access Laws:

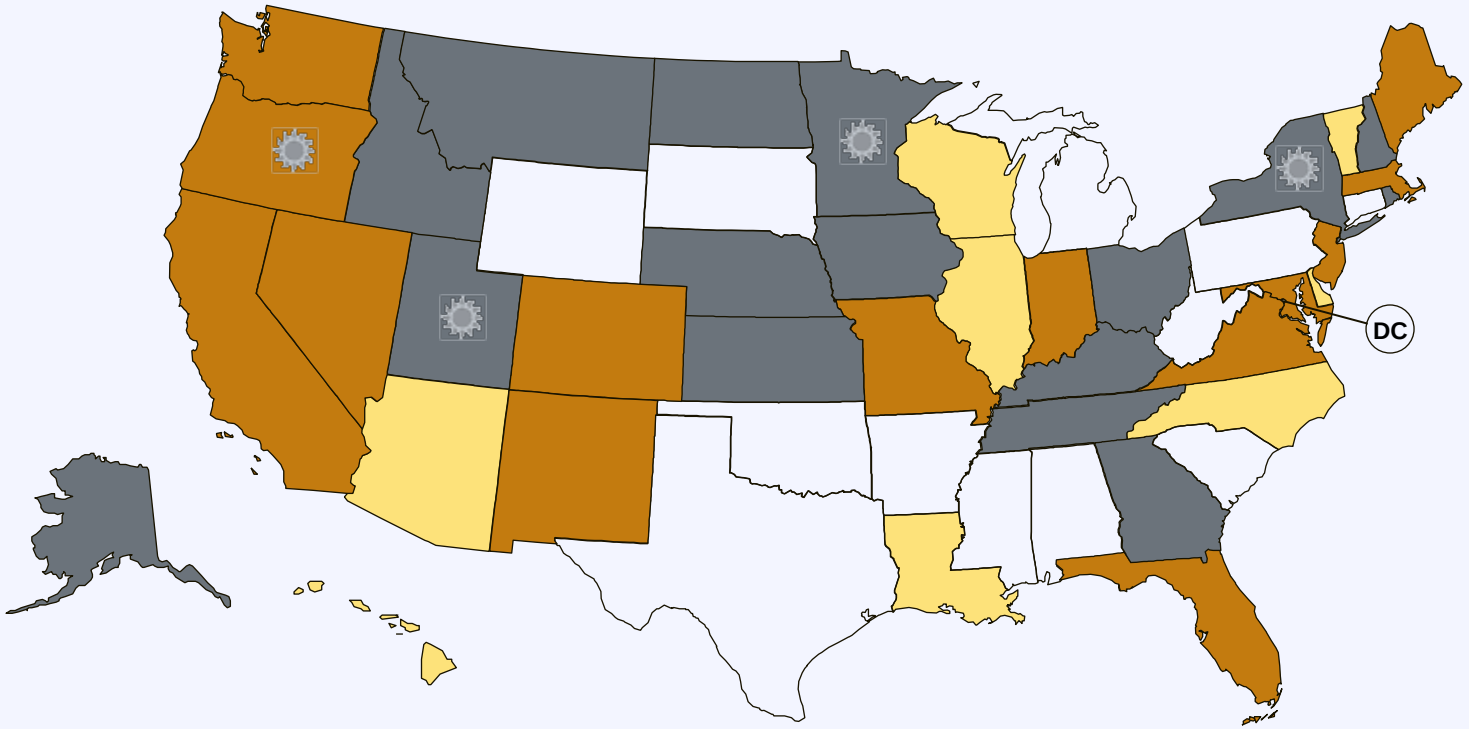
1. Increase the likelihood that properties will receive sunlight
2. Protect the rights of property owners to install solar
3. Reduce the risk that systems will be shaded after installation

Fontainebleau V. Eden Roc (1959)

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

Source: Solar ABCs (Image: Google Earth)

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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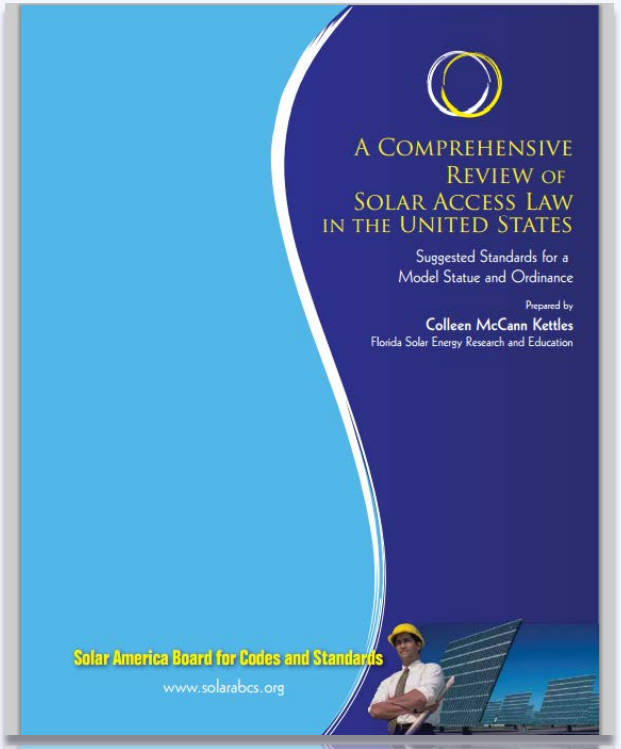
Source: DSIRE

Solar Access

Resource **Solar ABCs**

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

www.solarabcs.org



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The Permitting Process: Challenges

18,000+ local jurisdictions

with unique permitting requirements

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

The Permitting Process: Challenges

Local permitting processes add on average

$2,516

to the installation cost of residential PV

Powered by SunShot U.S. Department of Energy

Source: SunRun

The Permitting Process: Challenges

Source: Forbes

Expedited Permitting

Solar Permitting Best Practices:

- ✓ Fair flat fees
- ✓ Electronic or over-the-counter issuance
- ✓ Standardized permit requirements
- ✓ Electronic materials

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U.S. Department of Energy

Source: Vote Solar

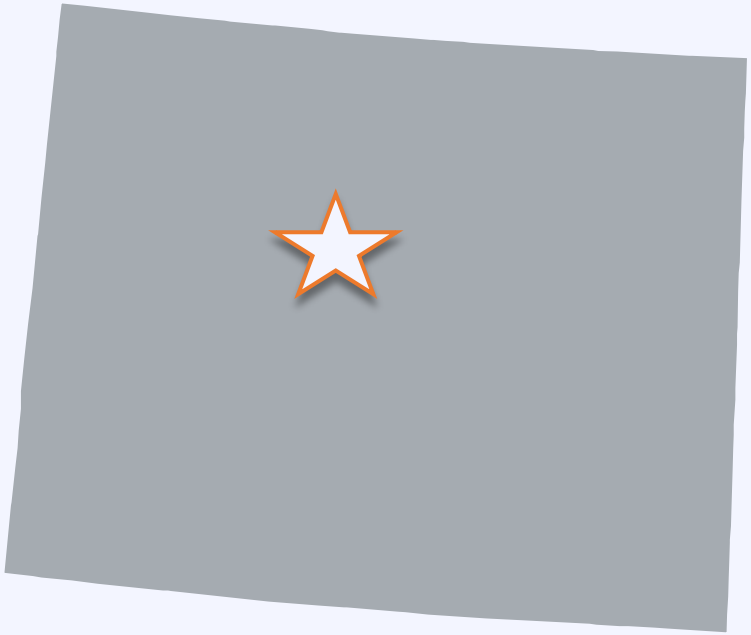
Expedited Permitting

Solar Permitting Best Practices:

- ✓ Training for permitting staff in solar
- ✓ Removal of excessive reviews
- ✓ Reduction of inspection appointment windows
- ✓ Utilization of standard certifications

Source: Vote Solar

Expedited Permitting: Case Study



Breckenridge, Colorado

Population: 4,540

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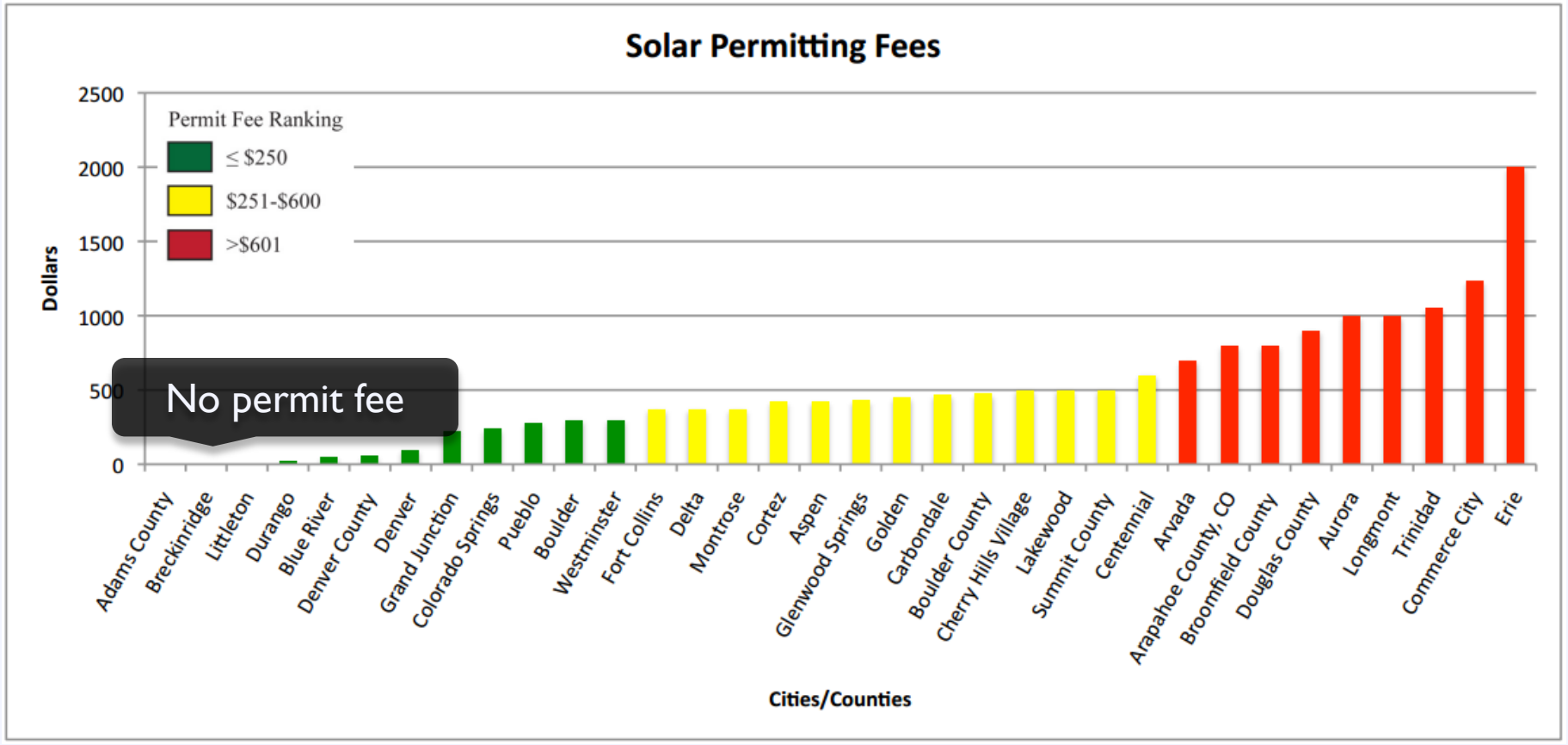
U.S. Department of Energy

Source: Wikipedia

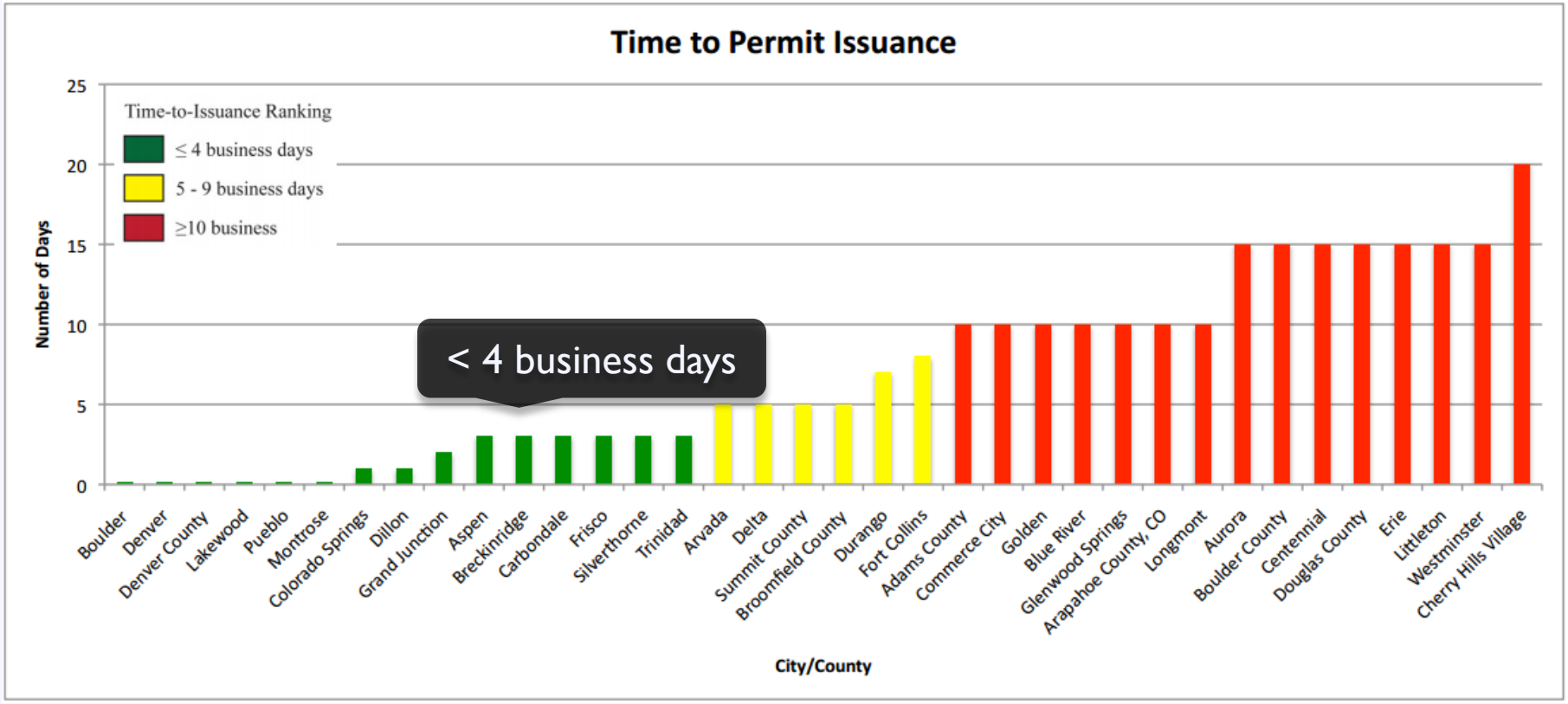
Expedited Permitting: Case Study

Breckenridge charges no fees to file for a solar permit



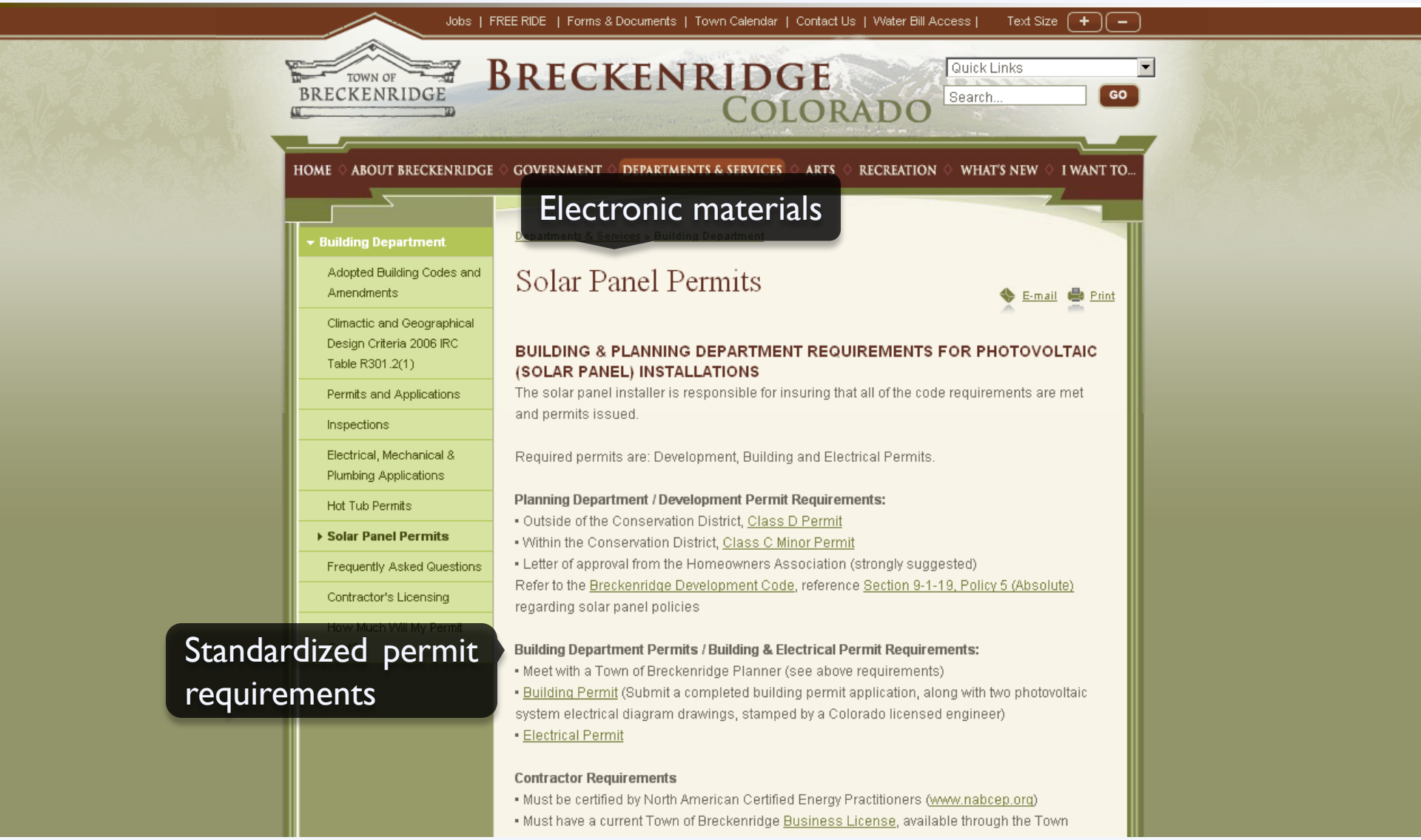
Expedited Permitting: Case Study

Breckenridge offers a short turn around time for solar permits



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

Expedited Permitting: Case Study



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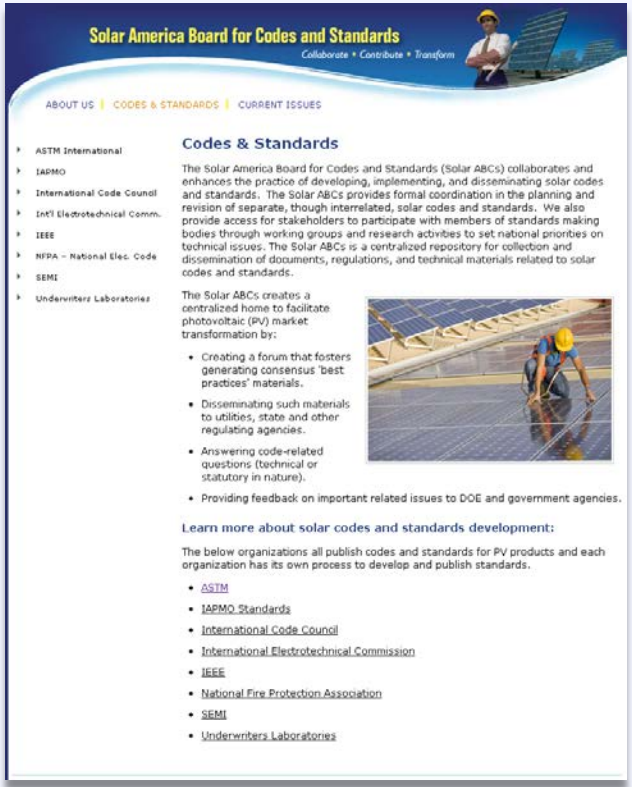
Source: Breckenridge, CO (http://www.townofbreckenridge.com/index.aspx?page=694)

Expedited Permitting

Resource **Solar ABCs**

Expedited Permitting:

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



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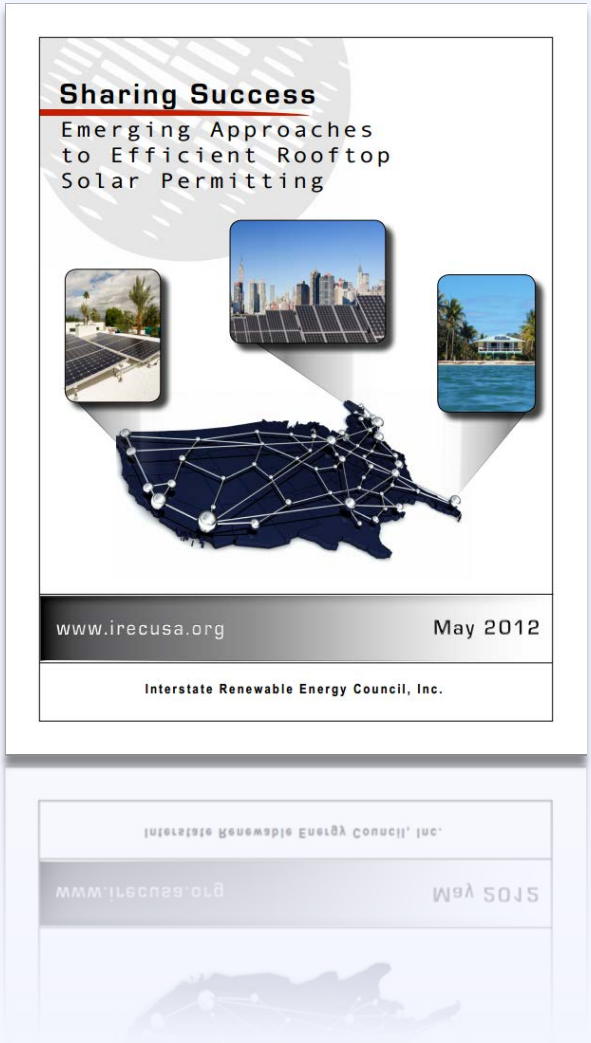
Expedited Permitting

Resource **Interstate Renewable Energy Council**

Outlines emerging approaches to efficient rooftop solar permitting

www.irecusa.org



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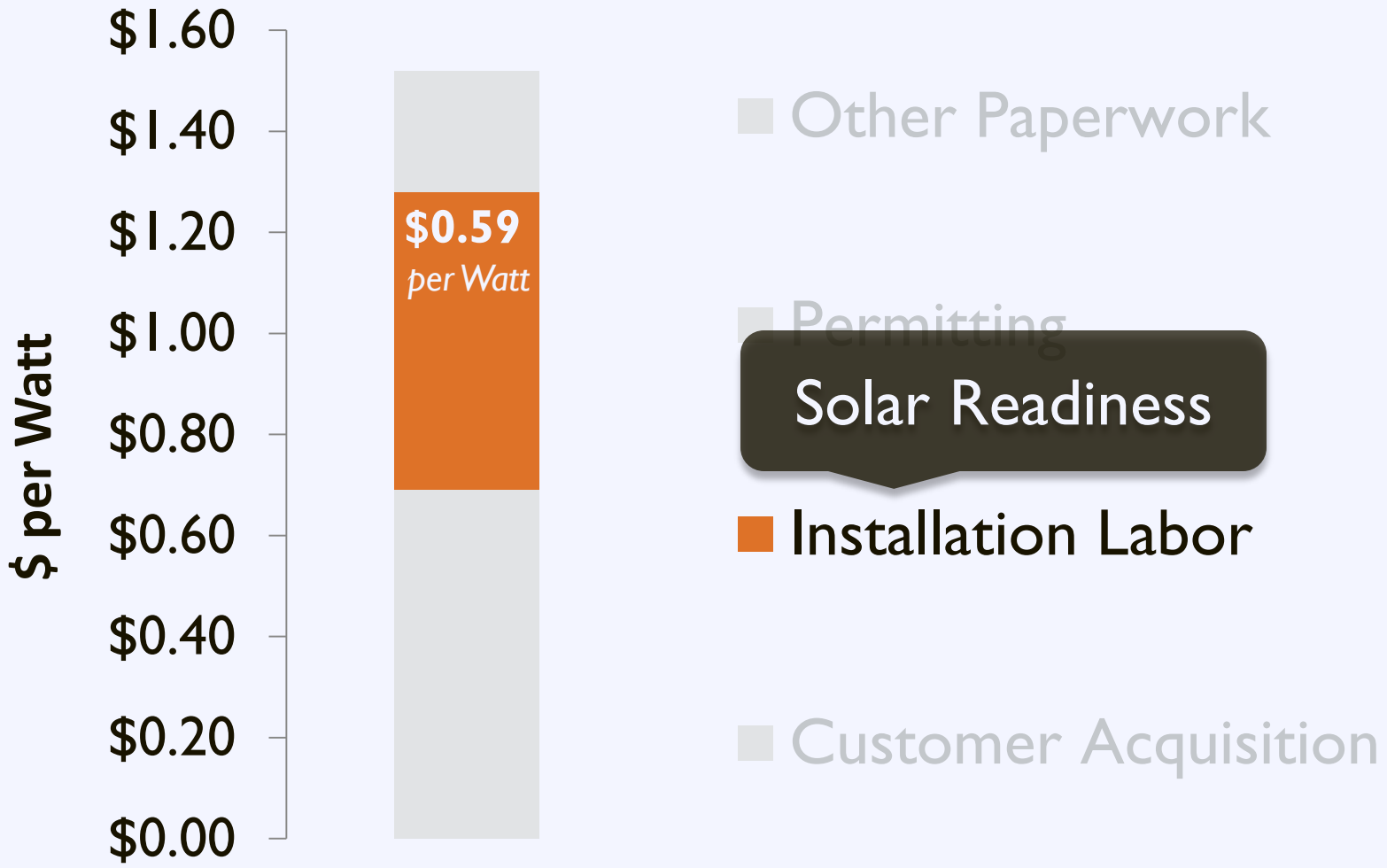
Mitigate Soft Costs



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

Solar Readiness

Creating solar-ready guidelines and promoting energy efficiency at the outset can help make future solar installations easier and more cost effective.

Solar Readiness

Resource **NREL**

Creating a solar ready guide for buildings:

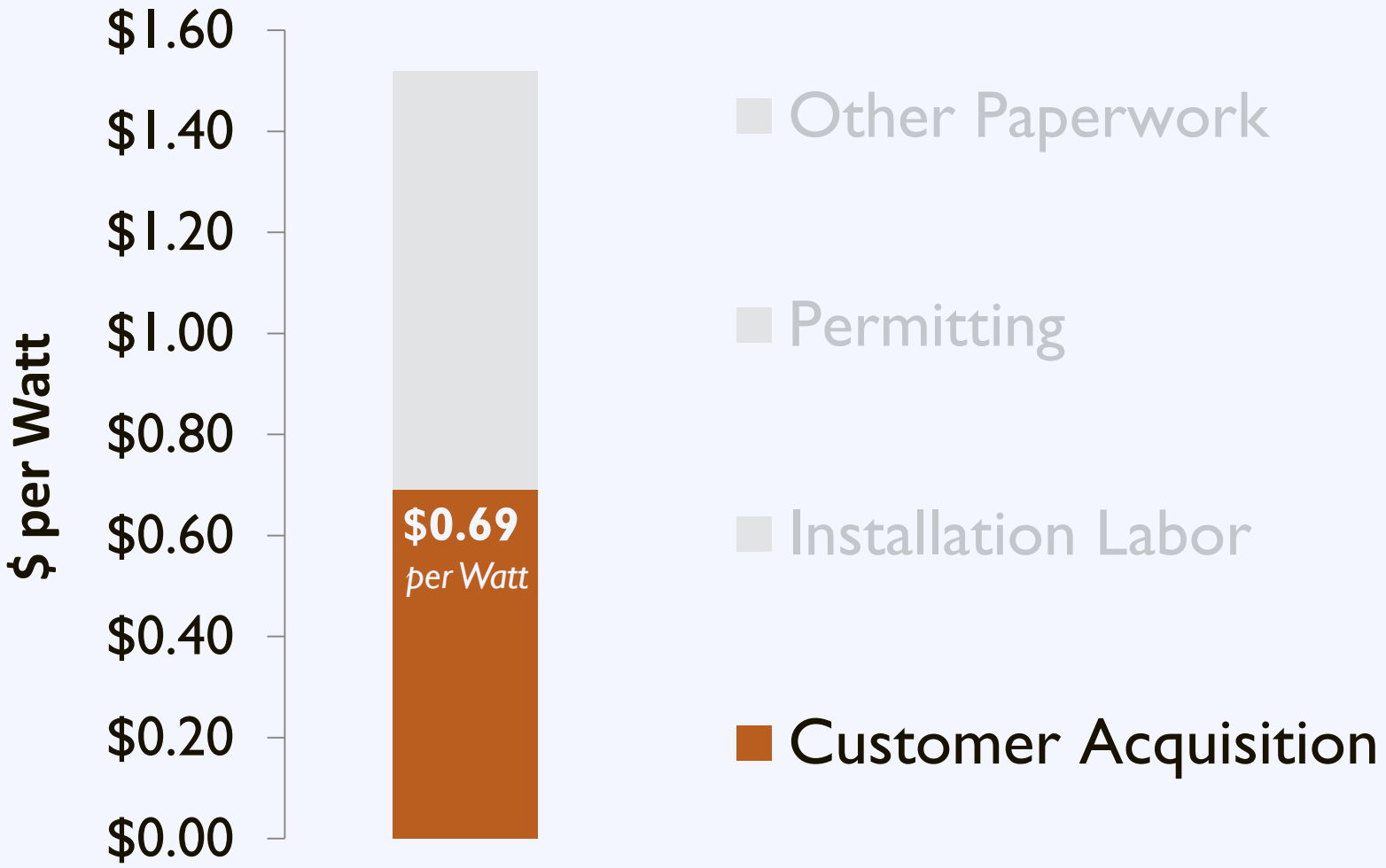
- Legislation
- Certification programs
- Stakeholder Education

www.nrel.gov

Powered by SunShot U.S. Department of Energy

Source: NREL

Mitigate Soft Costs



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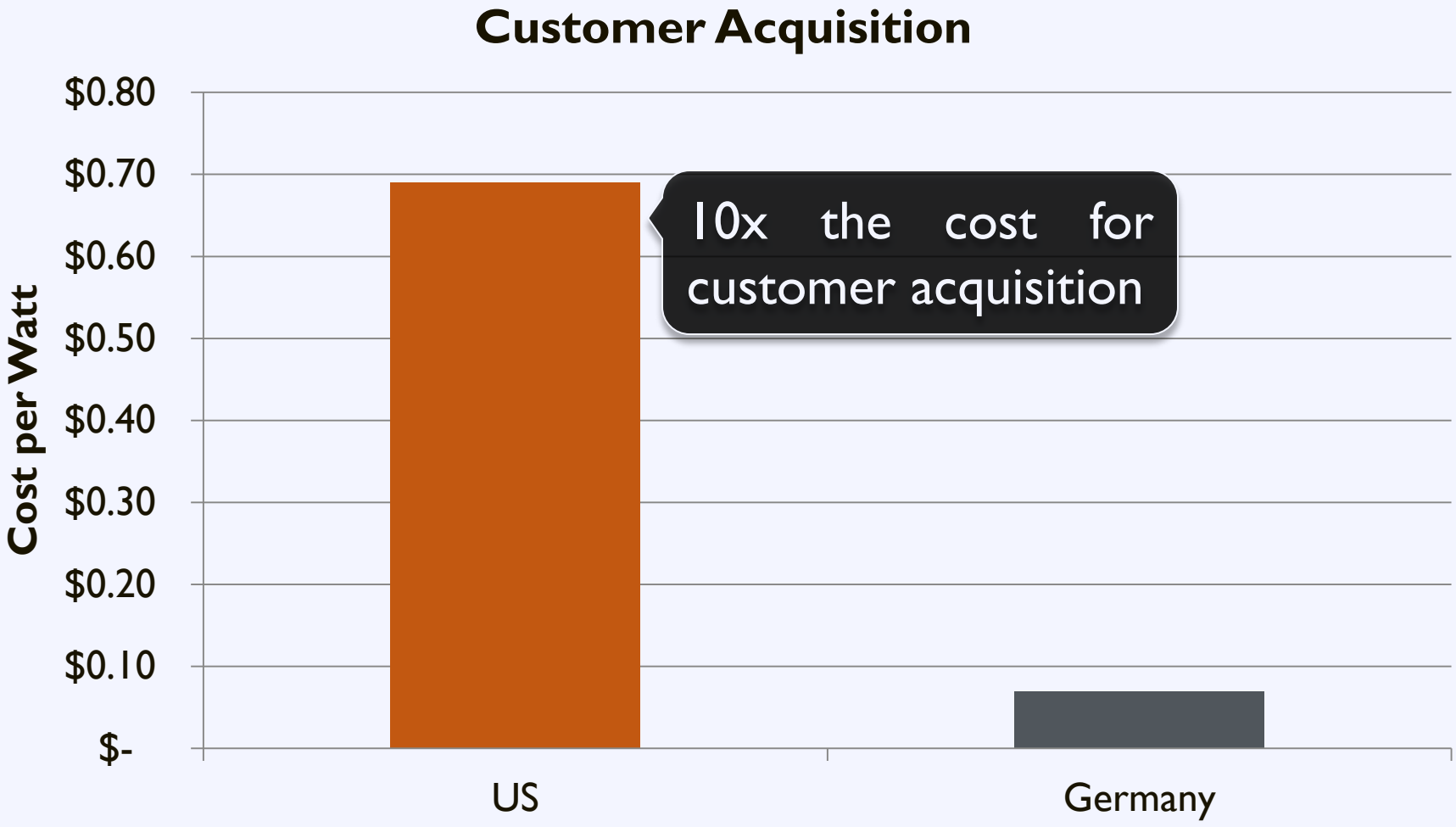
Source: NREL (http://www.nrel.gov/docs/fy12osti/54689.pdf)

Customer Acquisition



Source: NREL, LBNL

Customer Acquisition

Solarize

Group Purchasing

Solarize: Advantages

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

Solarize: Advantages

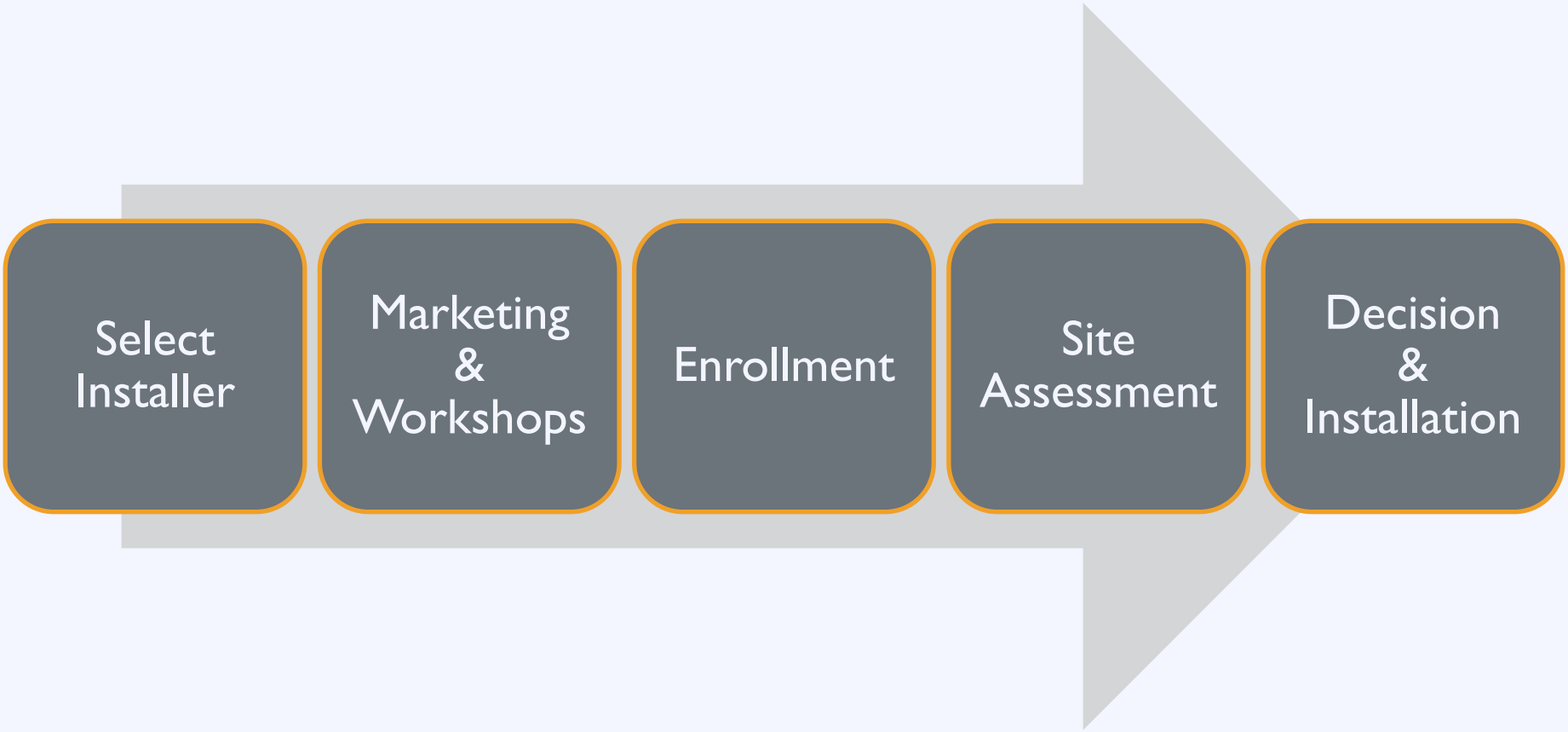
Benefits to Local Government:

Low implementation cost: $5,000 - $10,000

Quick turn-around: 9 Months

Long-term impact: Sustainable ecosystem

Solarize: Process



Solarize: Case Study

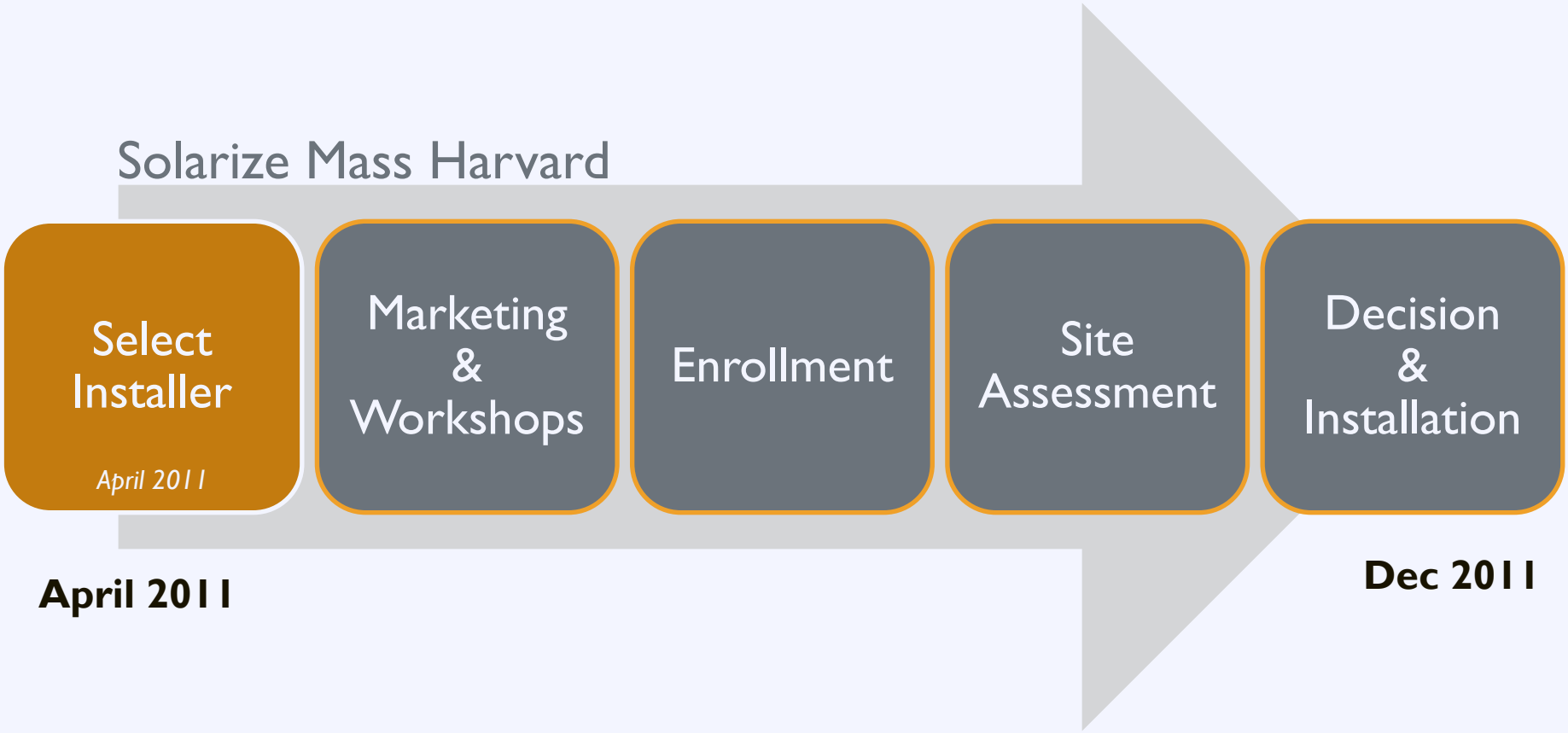
Harvard, Massachusetts

Population: 6,520

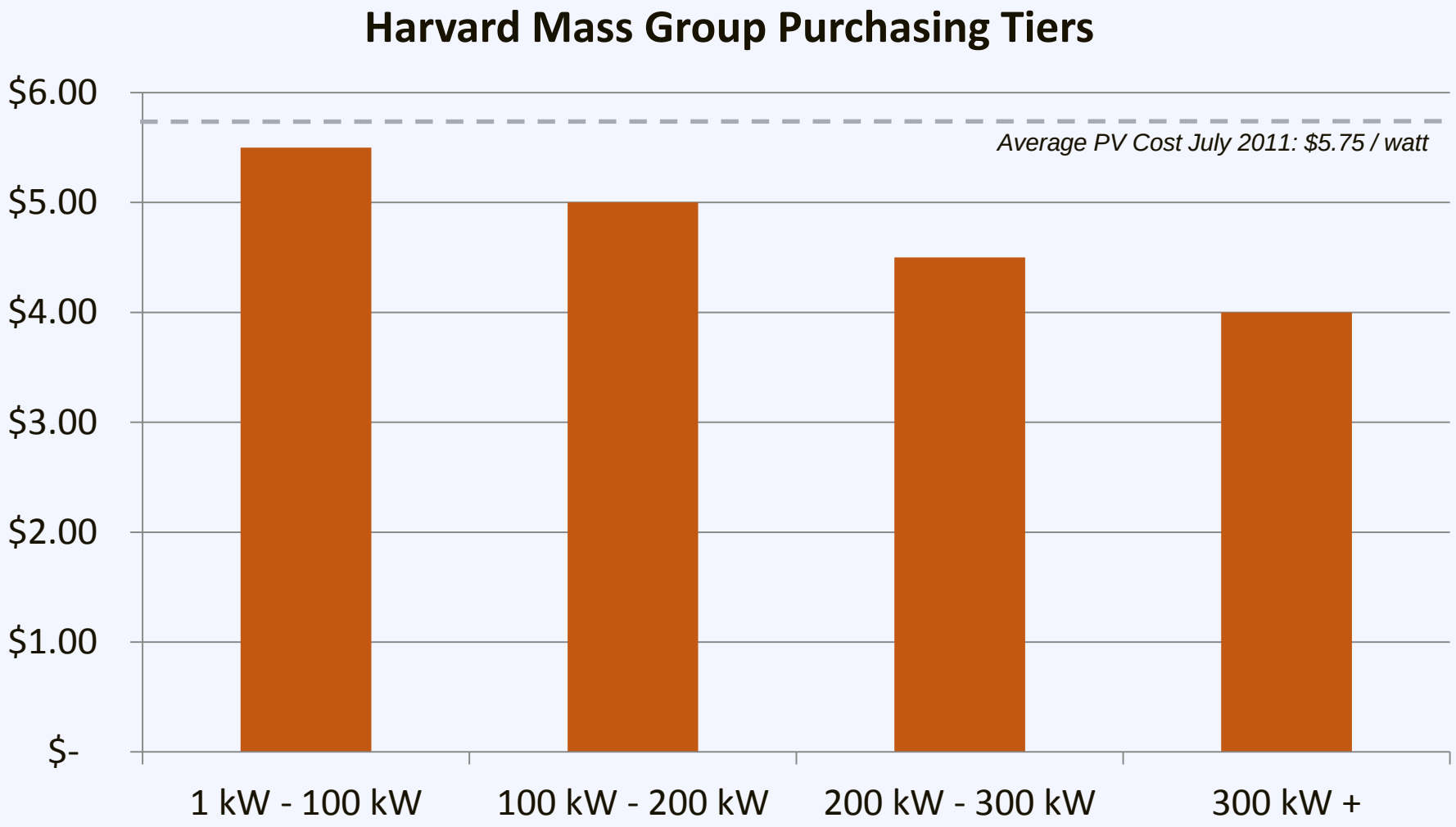
Powered by SunShot
U.S. Department of Energy

Source: Wikipedia

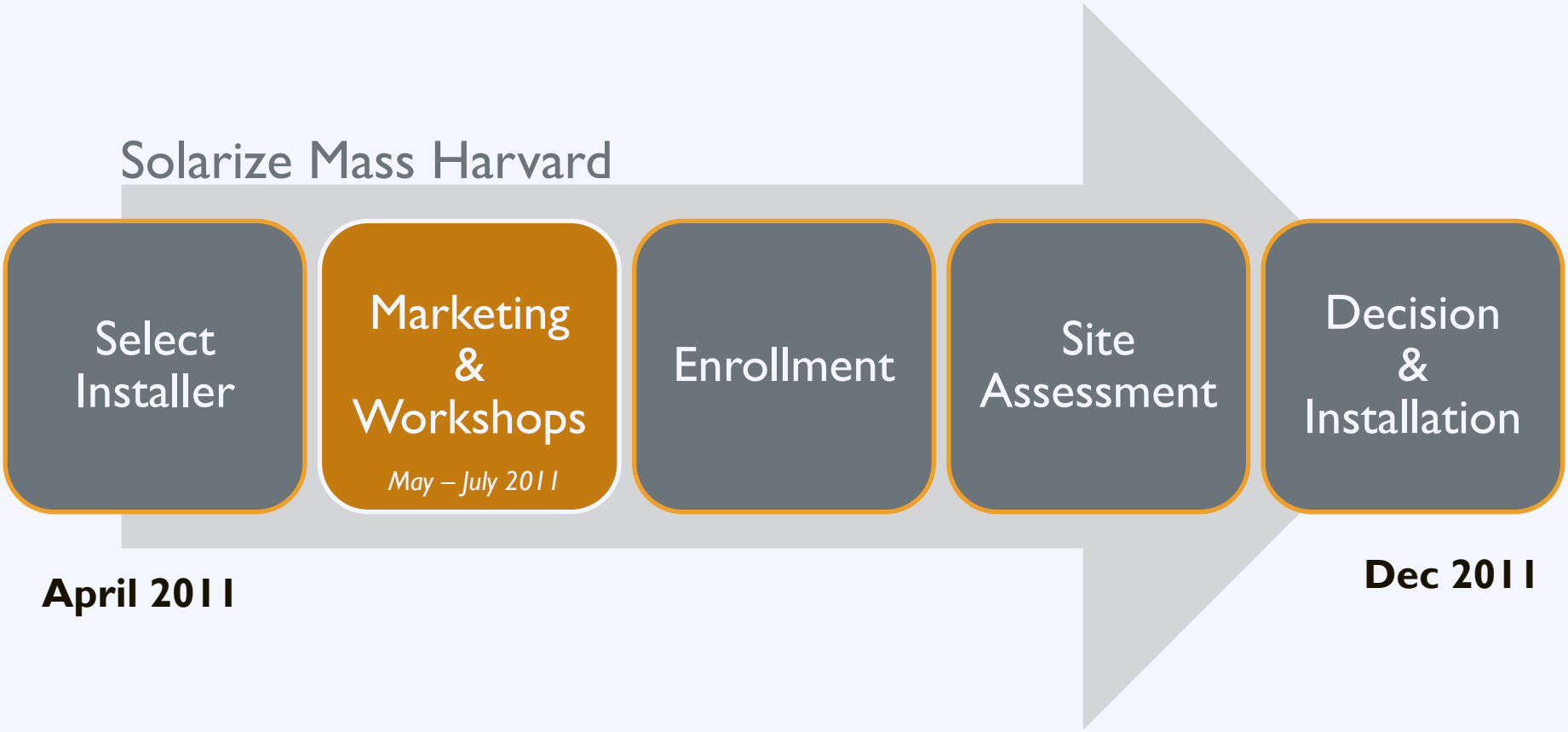
Solarize: Case Study



Group Purchasing



Solarize: Case Study



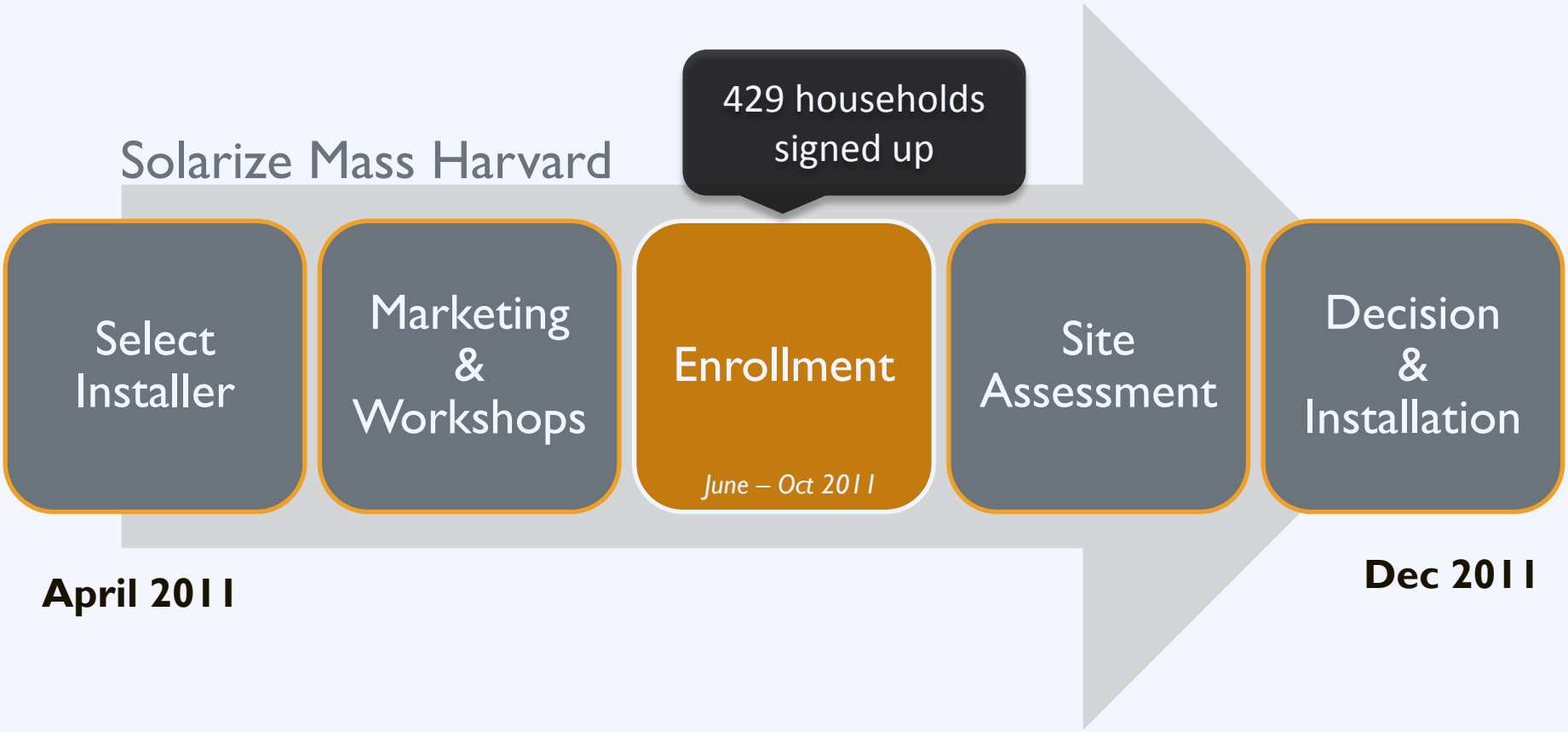
Solarize: Case Study

Marketing Strategy:

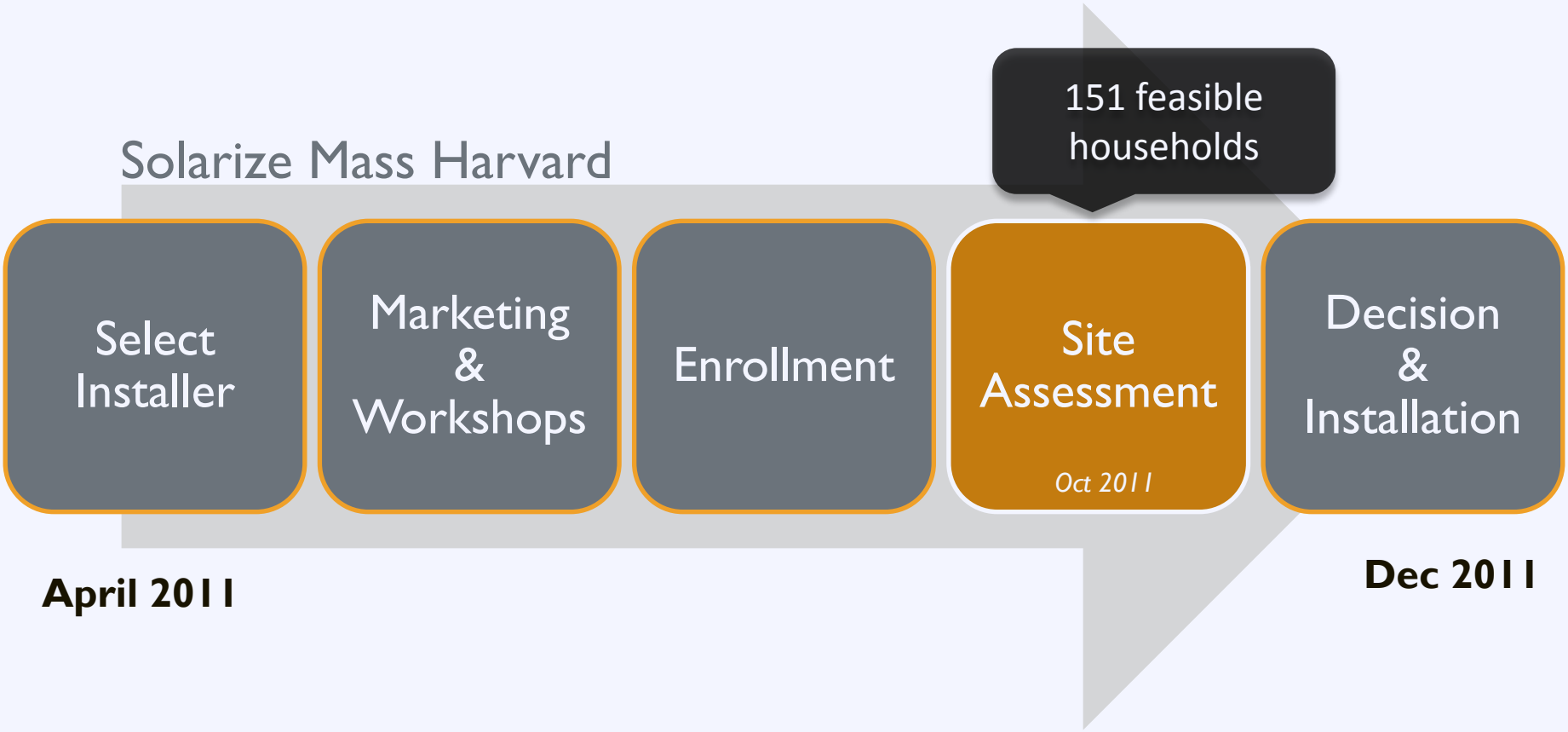
- Electronic survey of 1,100 households
- Email newsletters and direct mailings
- Float in July 4 parade
- Articles and advertisements in local newspaper
- Facebook page and online discussion board

Source: Vote Solar

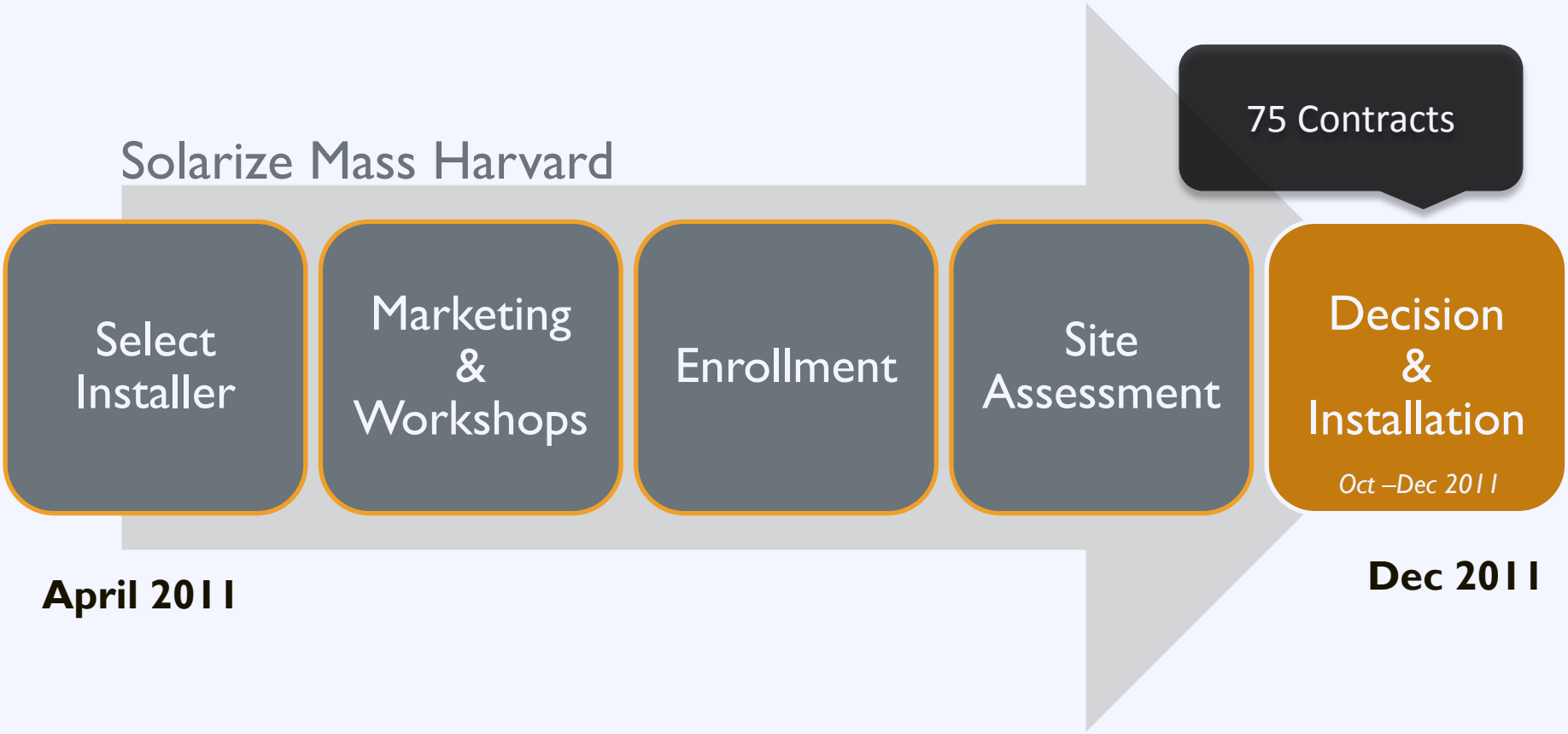
Solarize: Case Study



Solarize: Case Study



Solarize: Case Study



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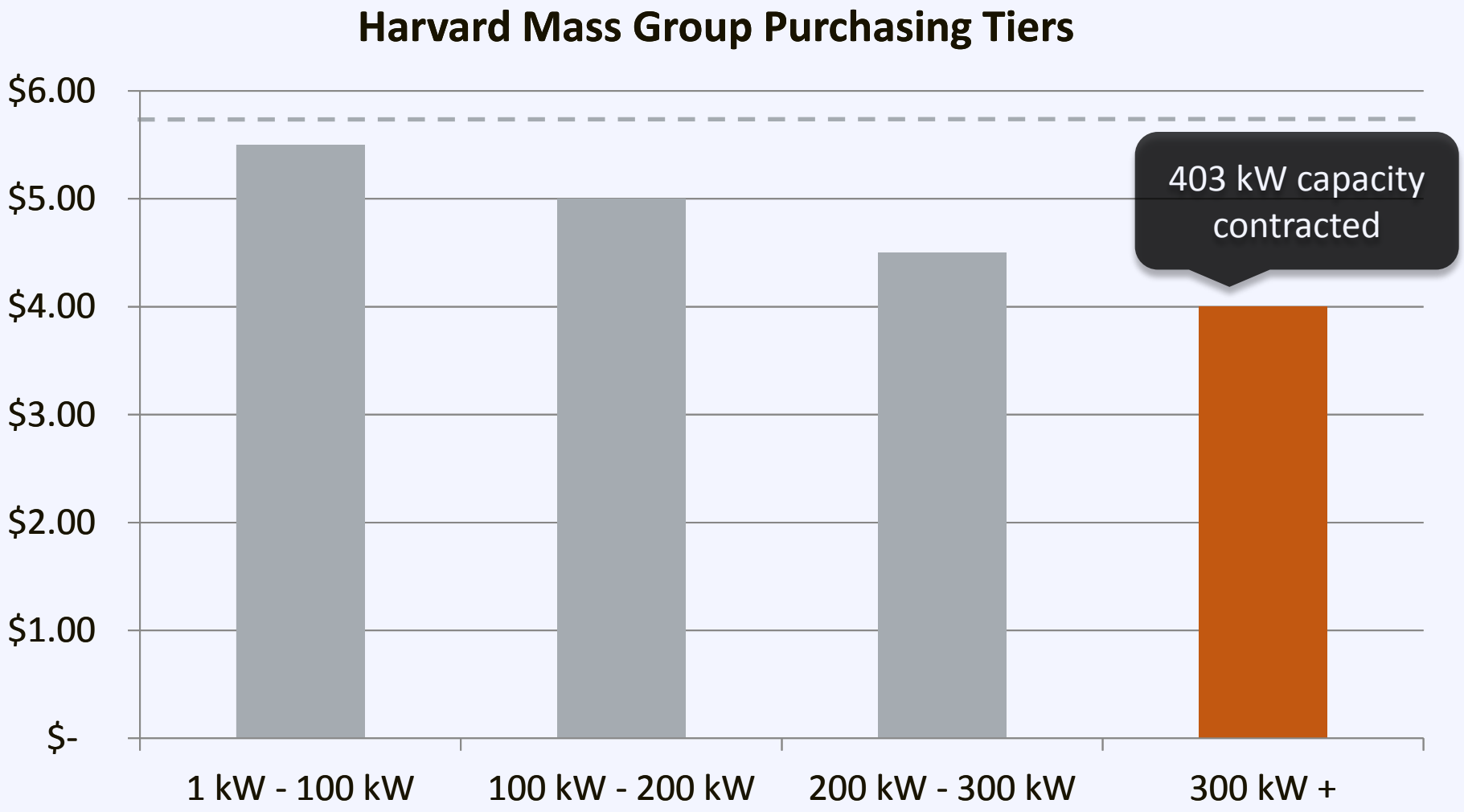


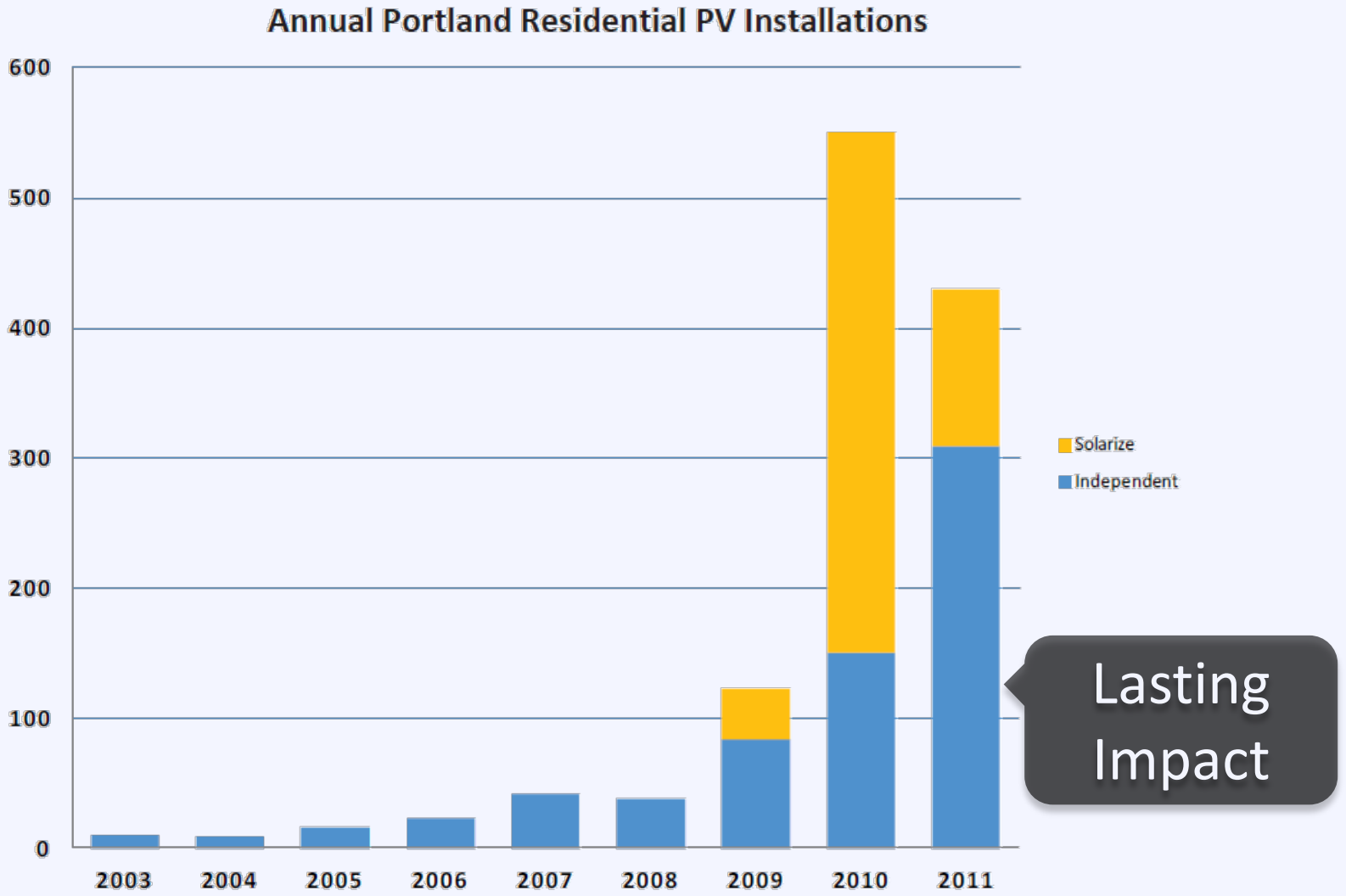
Solarize: Case Study

75 new installations totaling 403 kW

30% reduction in installation costs

575% increase in residential installations

Solarize: Lasting Impact



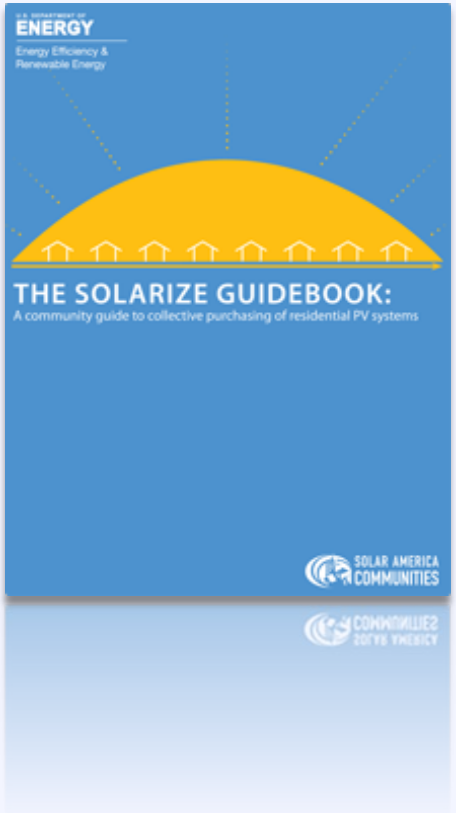
Source: NREL

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



Agenda

01:40 – 02:00	Solar 101
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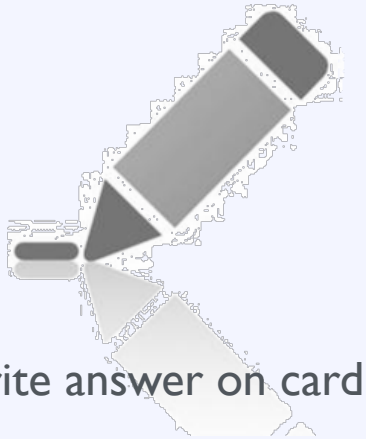
Activity: Identifying Benefits

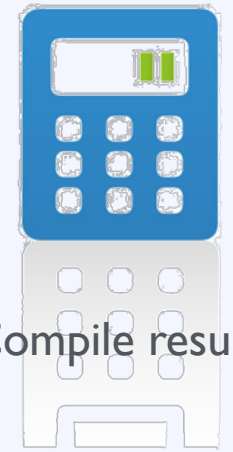
What is the greatest benefit solar can bring to your community? [Blue Card]

Right Now



Write answer on card

During Session

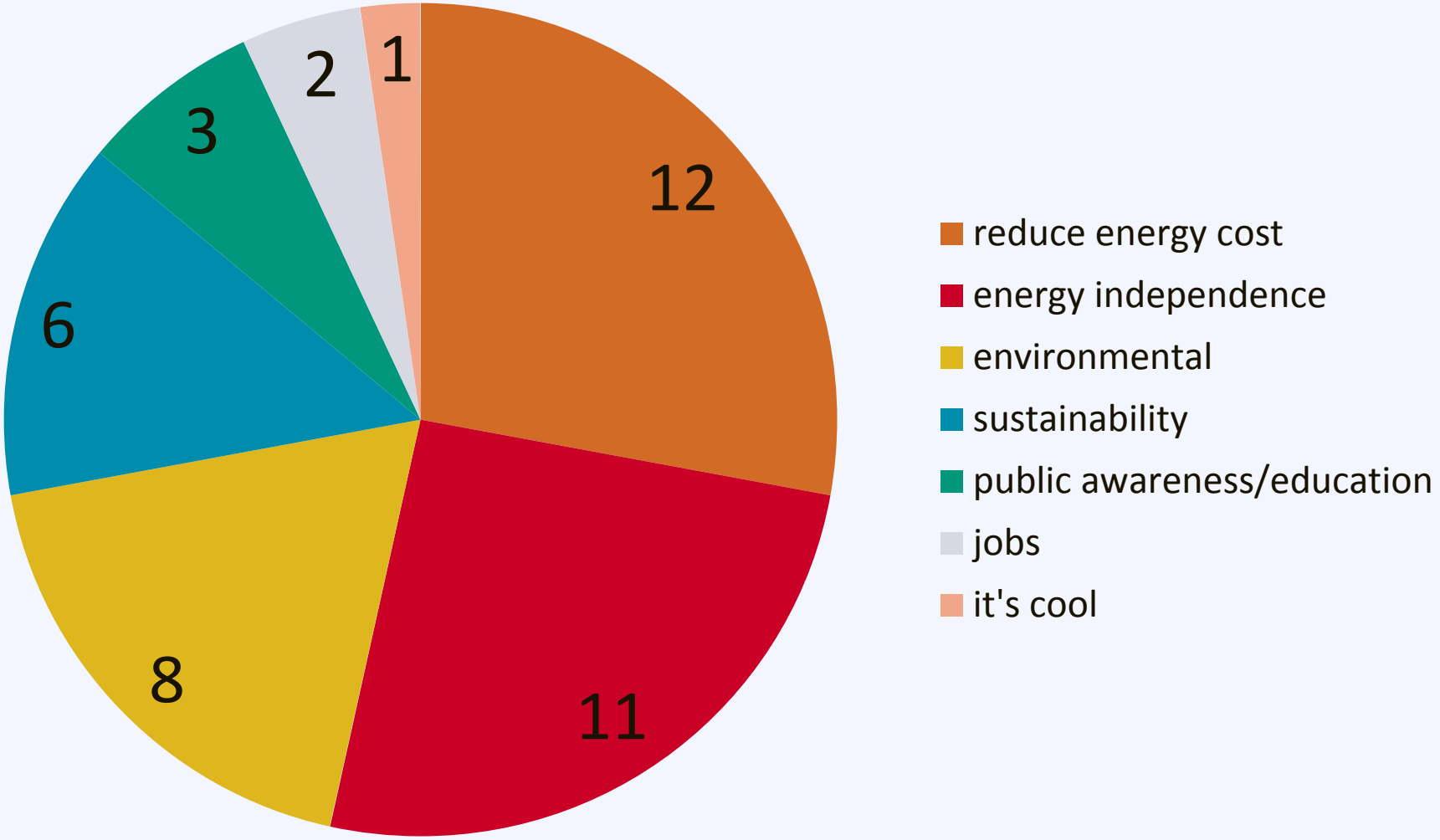


Compile results

After Break

Group discussion

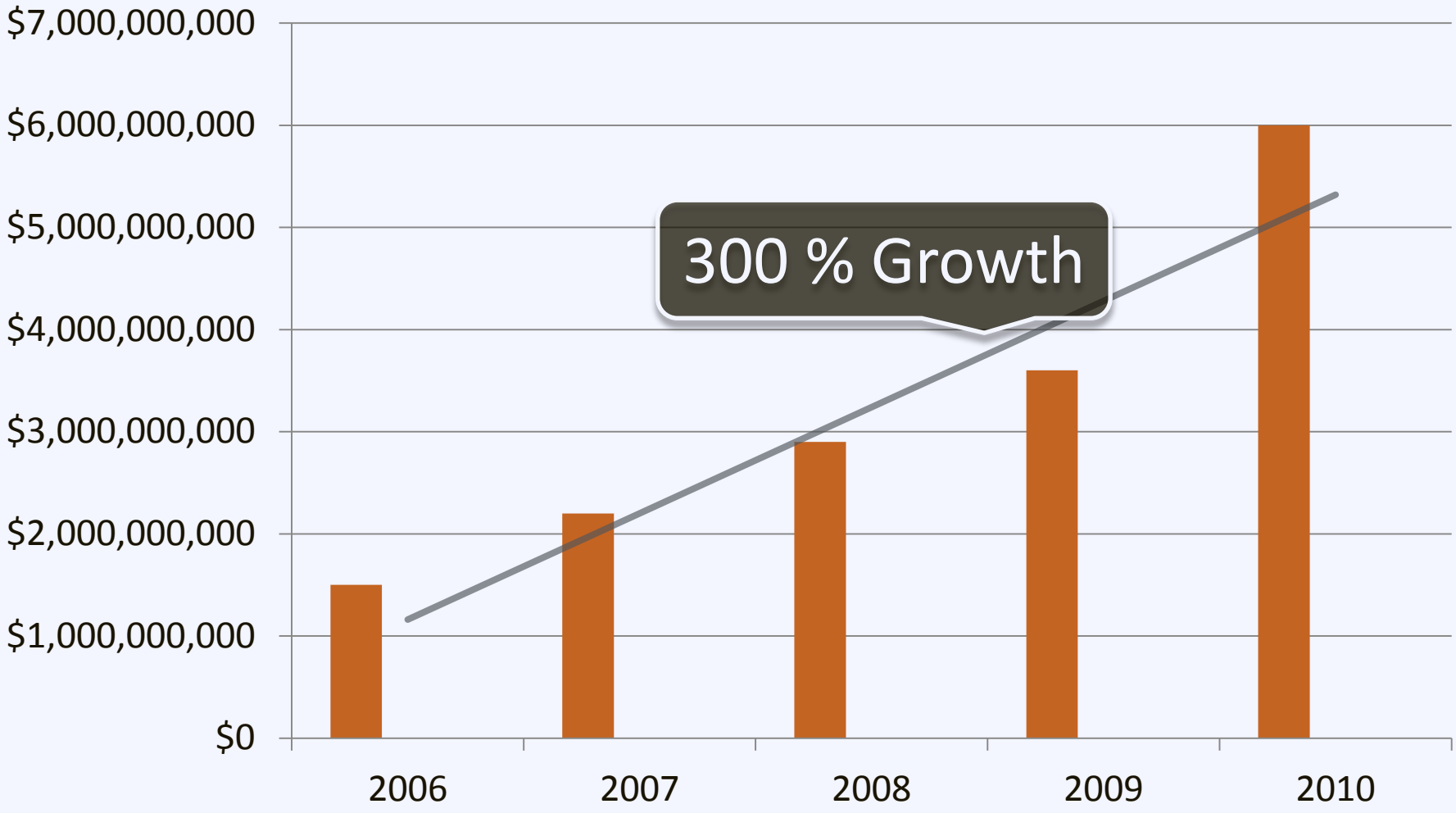
Benefits Survey Results



Benefits of Solar Energy

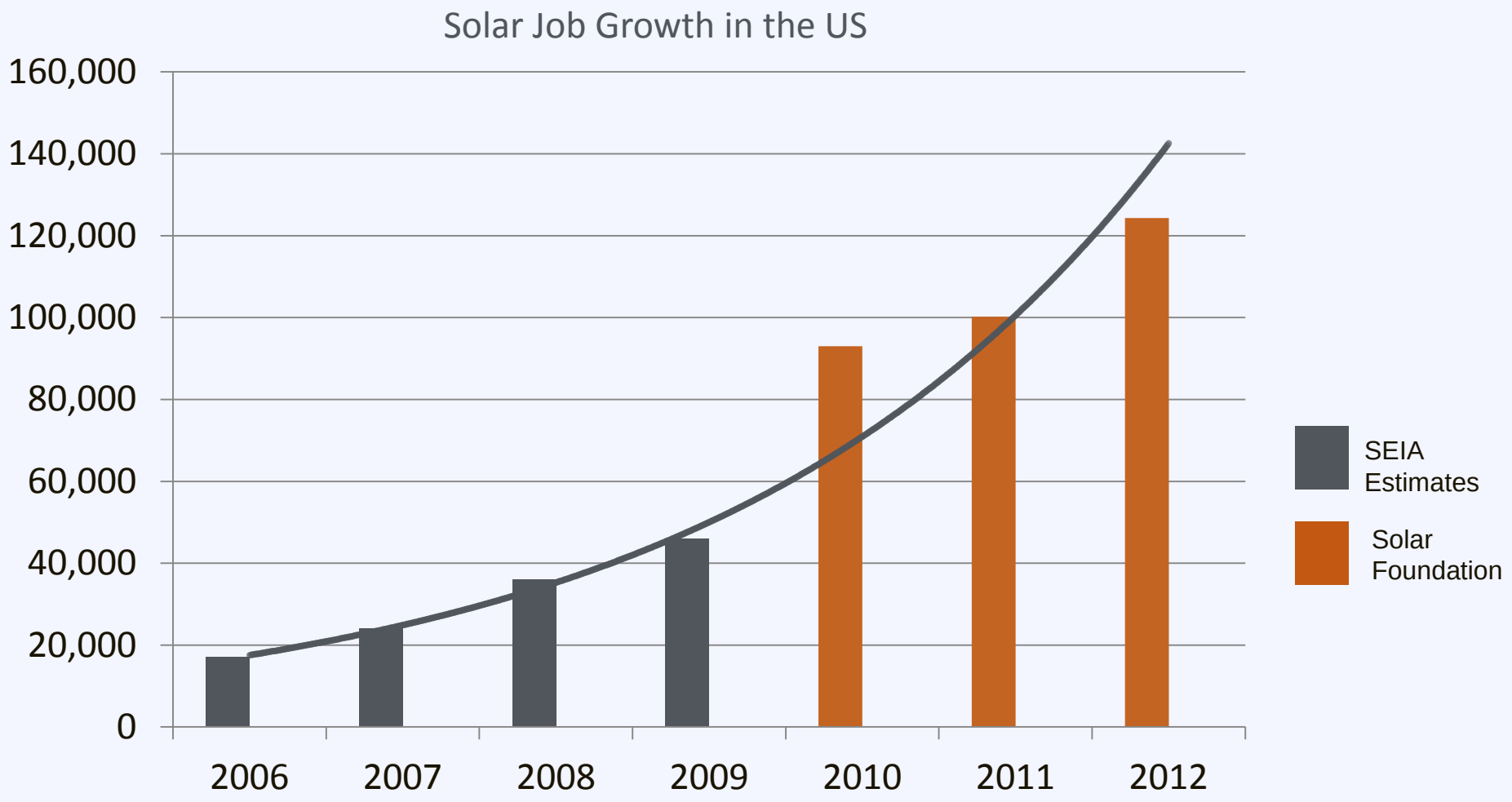
- Local economy growth
- Local jobs
- Energy independence
- Stabilizes price volatility
- Valuable to utilities
- Smart investment

Benefit: Economic Growth



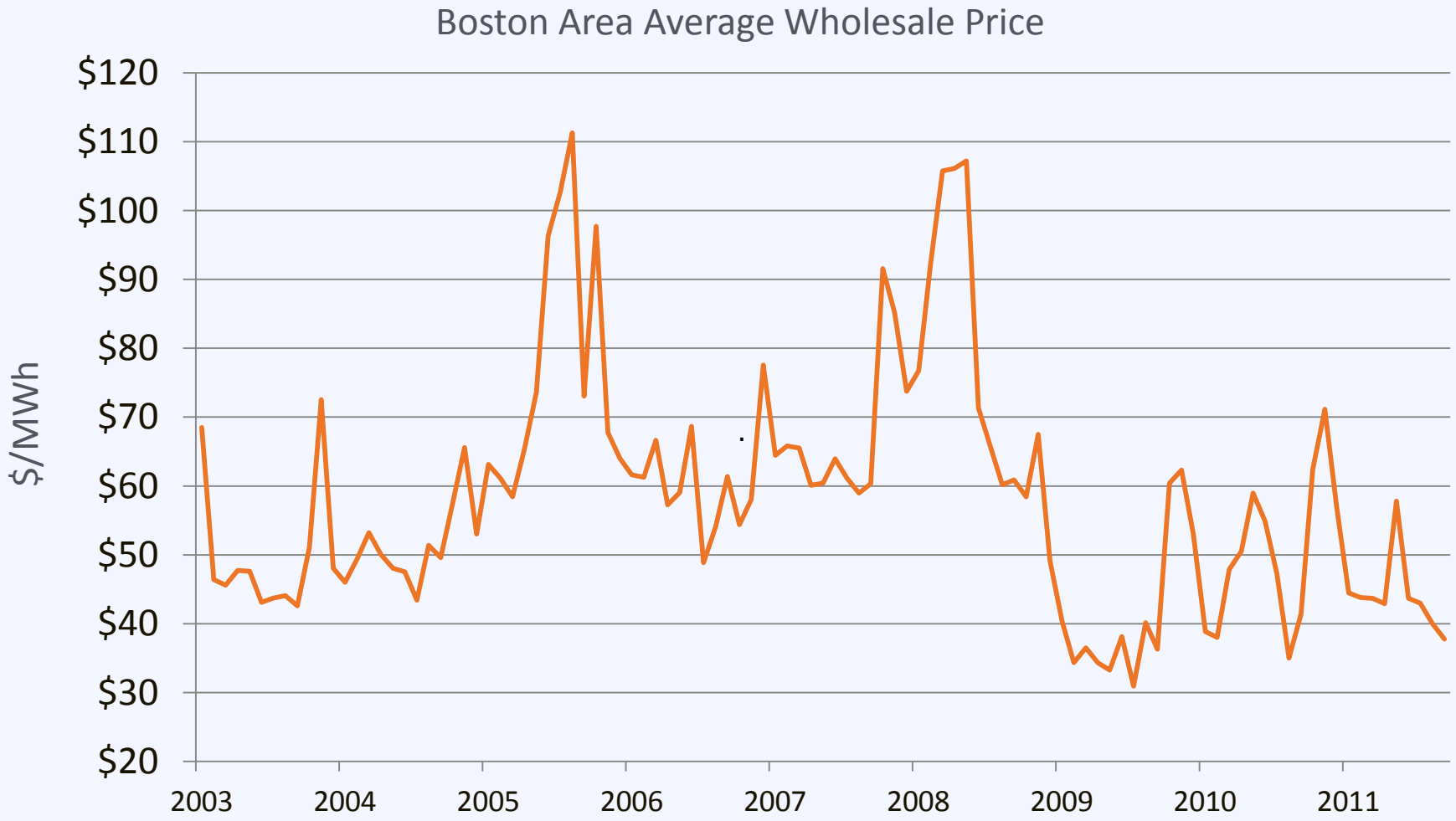
Source: SEIA/GTM Research - 2010 Year in Review Report http://www.seia.org/galleries/pdf/SMI-YIR-2010-ES.pdf SEIA/GTM Research- 2009 year in Review Supplemental Charts

Benefit: Job Growth



Source: SEIA Estimates (2006-2009), The Solar Foundation's National Solar Jobs Census 2010 (2010), The Solar Foundation's National Solar Jobs Census 2011 (2011-2012).

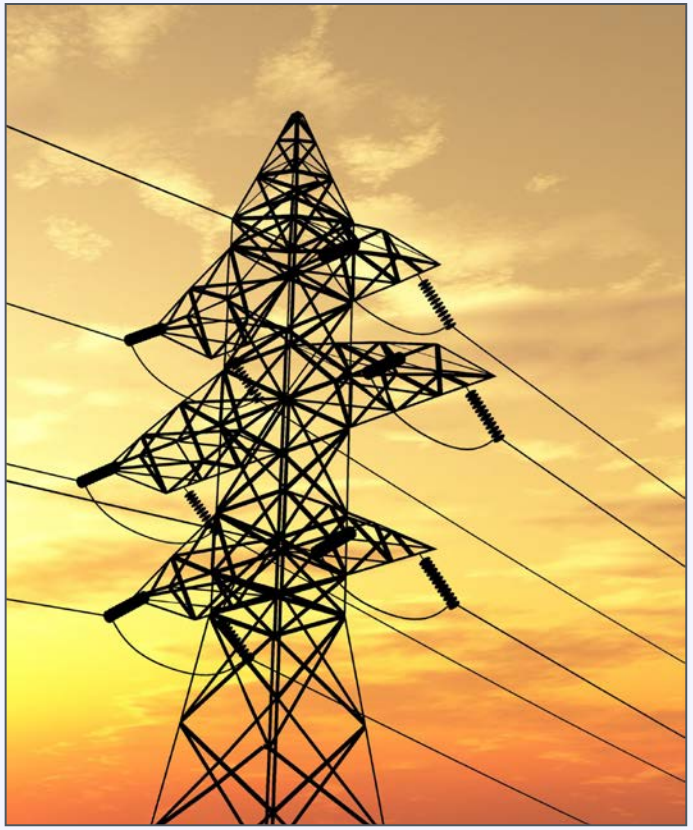
Benefit: Stabilize Energy Prices



Source: NEPOOL

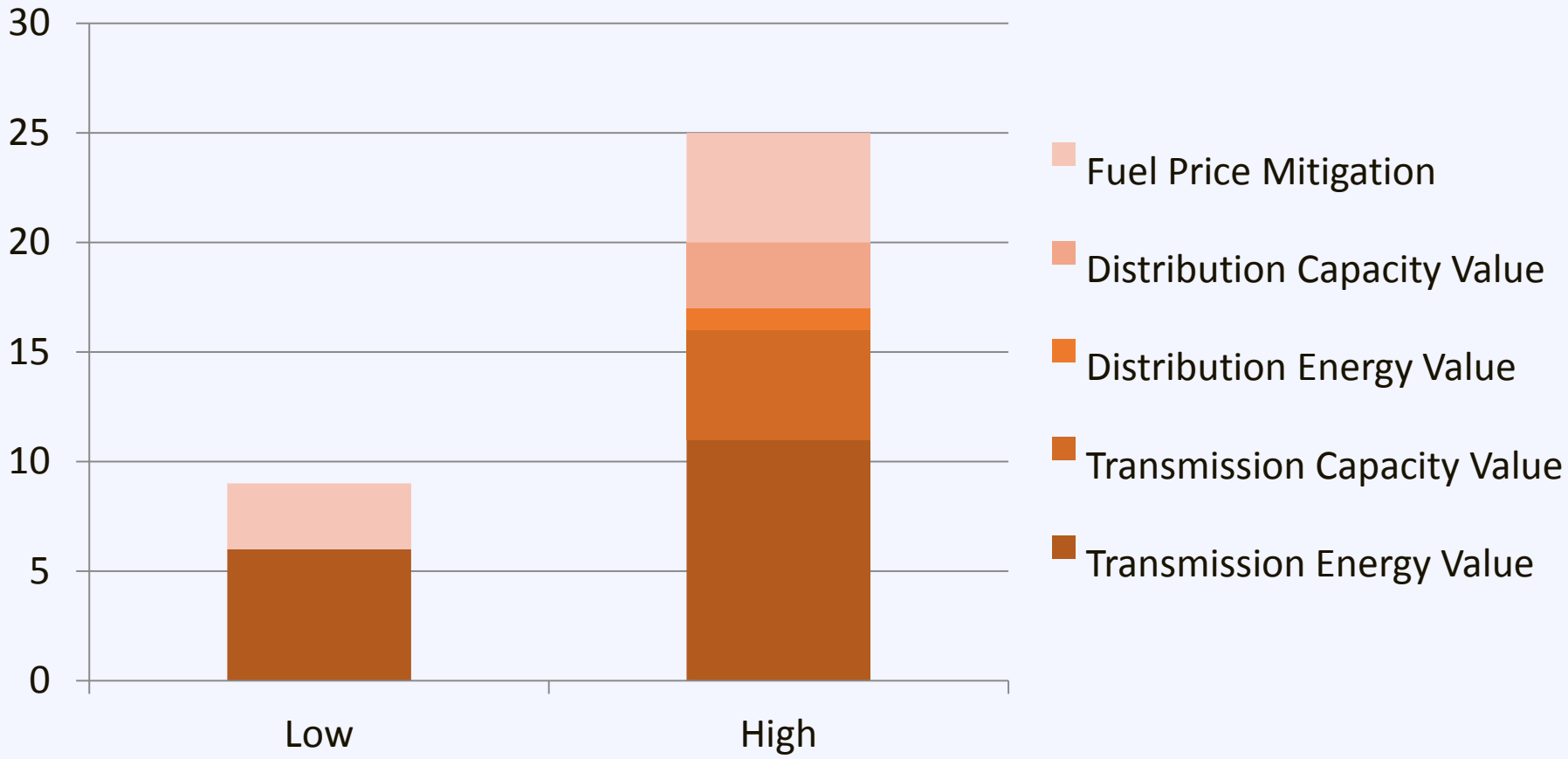
Benefits: Valuable to Utilities

- Avoided Energy Purchases
- Avoided T&D Line Losses
- Avoided Capacity Purchases
- Avoided T&D Investments
- Fossil Fuel Price Impacts
- Backup Power



Benefits: Valuable to Utilities

Value to the utility is **10 to 25 cents** beyond the value of the electricity



Source: http://www.asrc.cestm.albany.edu/perez/2011/solval.pdf

Benefit: Smart Investment for Homes

From NREL:

Solar homes sold

20% faster

and for

17% more

than the equivalent non-solar homes

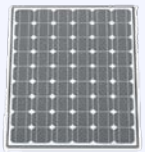
in surveyed California subdivisions

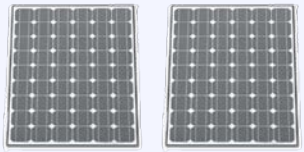
Powered by SunShot U.S. Department of Energy

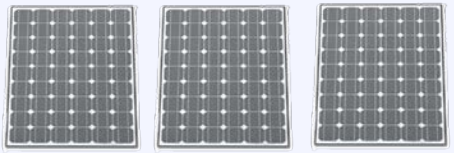
Source: http://www.nrel.gov/docs/fy07osti/38304-01.pdf

Benefit: Smart Investment for Homes

From SunRun:

3 kW  = **$ 16,500** *added sale premium*

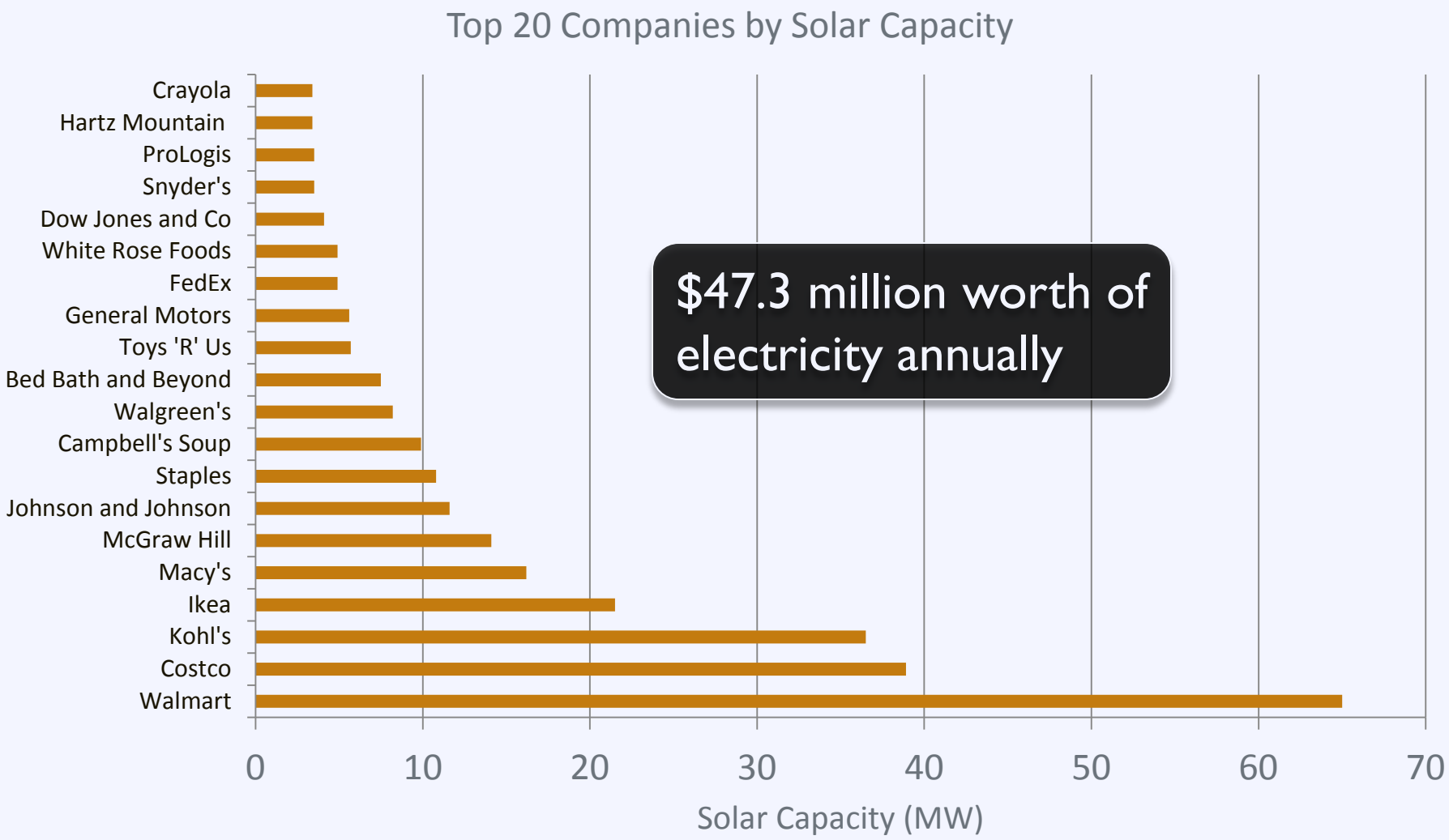
6 kW  = **$ 33,000** *added sale premium*

9 kW  = **$ 49,500** *added sale premium*

Source: Tracking the Sun IV, SunRun

Benefit: Smart Investment for Business

Benefit: Smart Investment for Business



Powered by SunShot U.S. Department of Energy

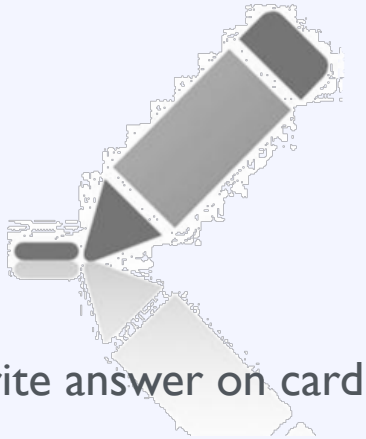
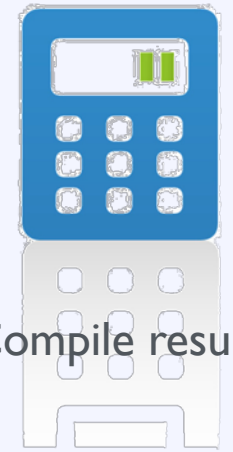
Source: Solar Energy Industries Association

Benefit: Smart Investment for Government

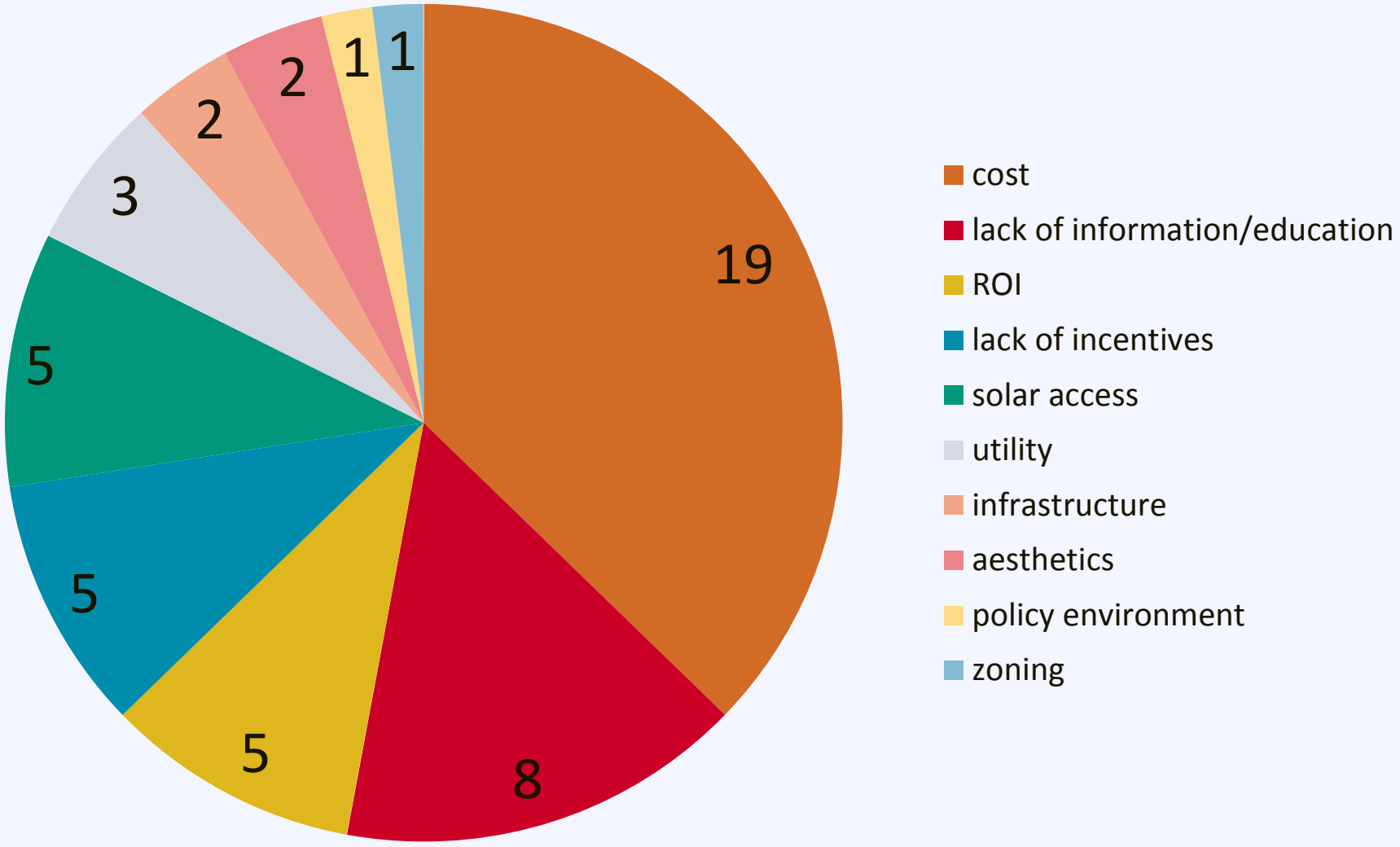
Source: Borrego Solar

Activity: Addressing Barriers

What is the greatest barrier to solar adoption in your community? [Green Card]

Right Now	During Session	After Break
		
Write answer on card	Compile results	Group discussion

Barriers Survey Results



Some things you may hear…

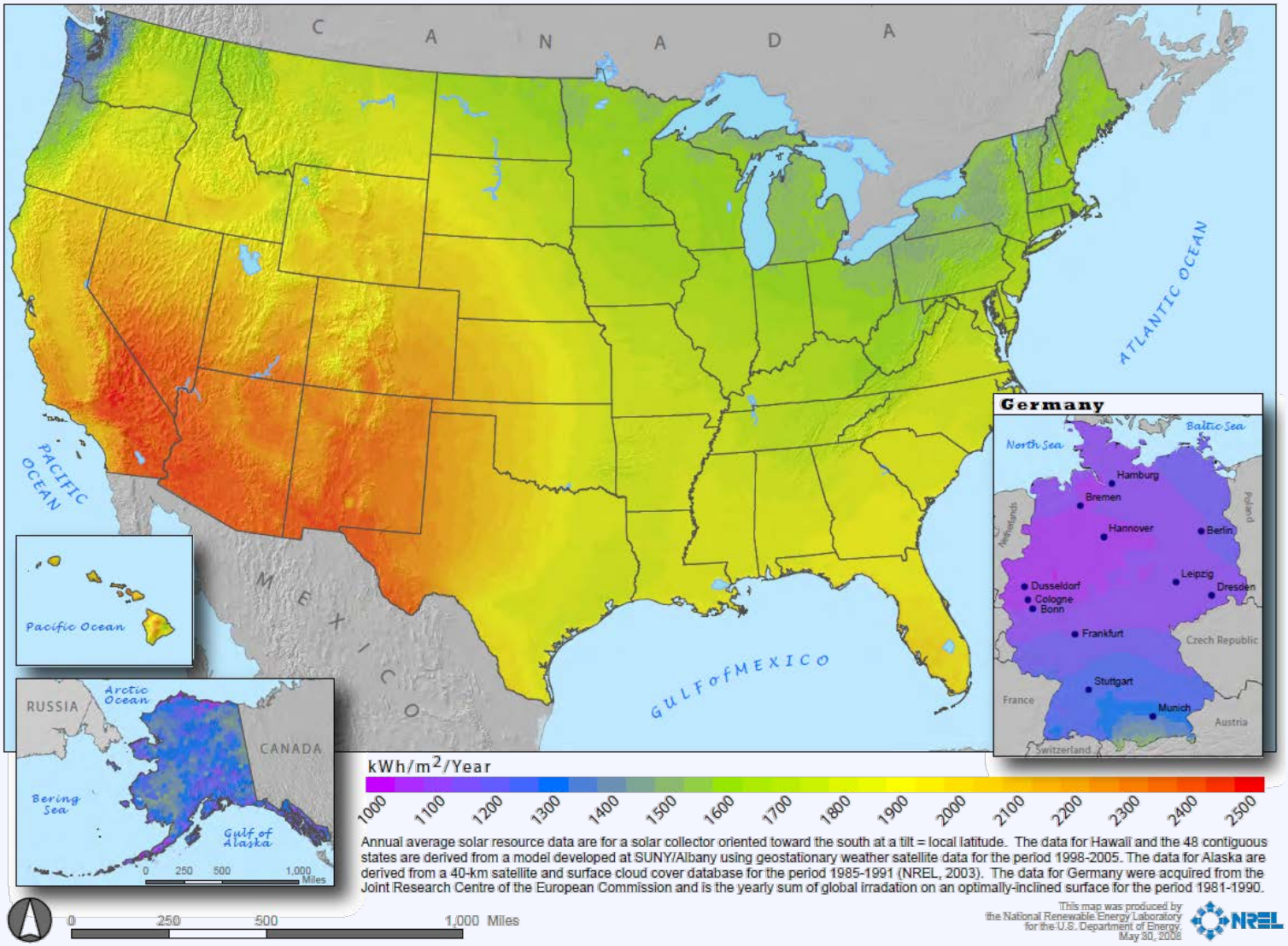
My area isn't sunny enough for solar

Going solar is too expensive

Solar is not ready to compete as a serious energy source

The government should not "pick winners and losers"

Fact: Solar works across the US

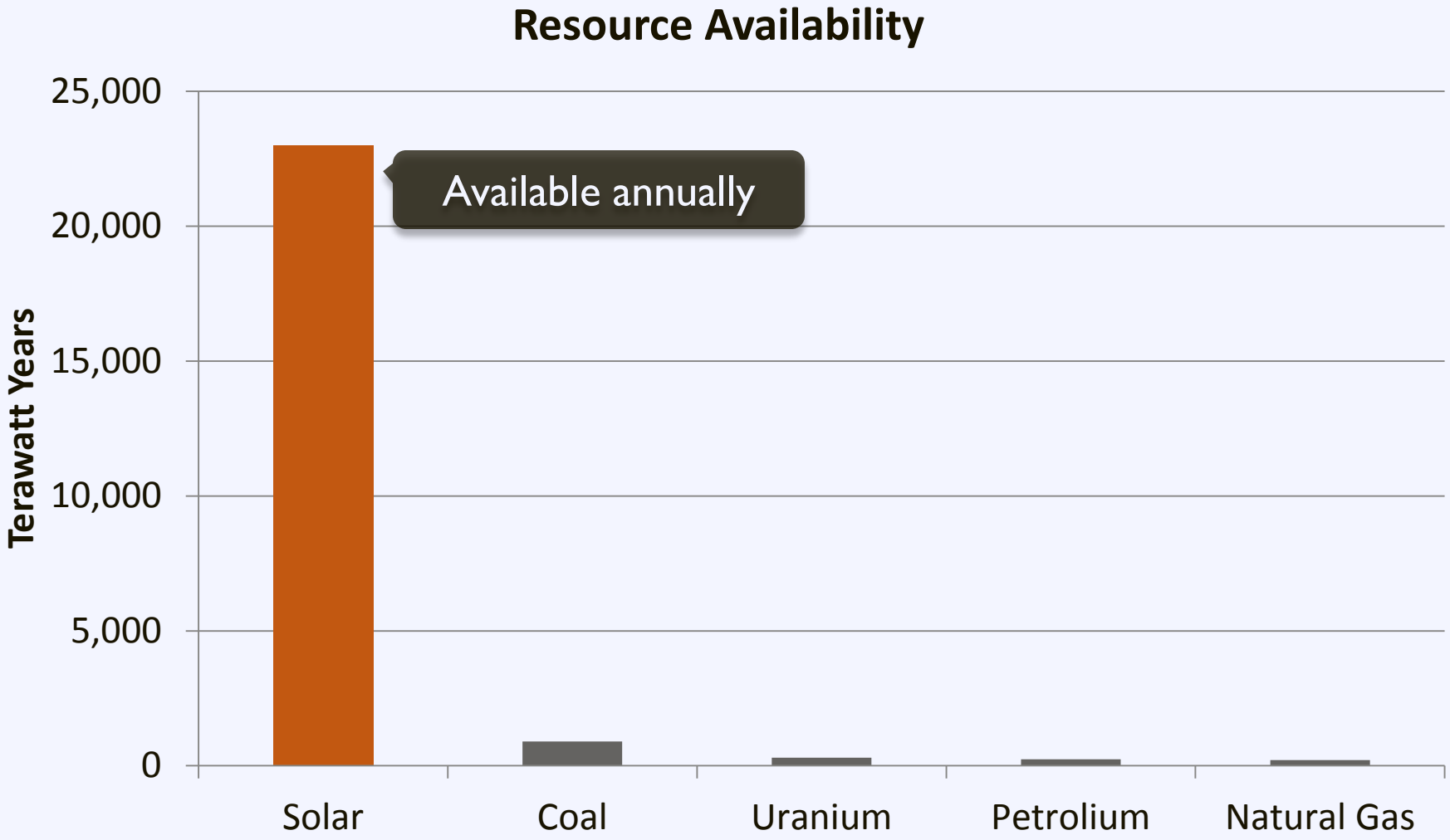


Annual average solar resource data are for a solar collector oriented toward the south at a tilt = local latitude. The data for Hawaii and the 48 contiguous states are derived from a model developed at SUNY/Albany using geostationary weather satellite data for the period 1998-2005. The data for Alaska 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 irradation on an optimally-inclined surface for the period 1981-1990.

Powered by SunShot U.S. Department of Energy

Source: National Renewable Energy Laboratory

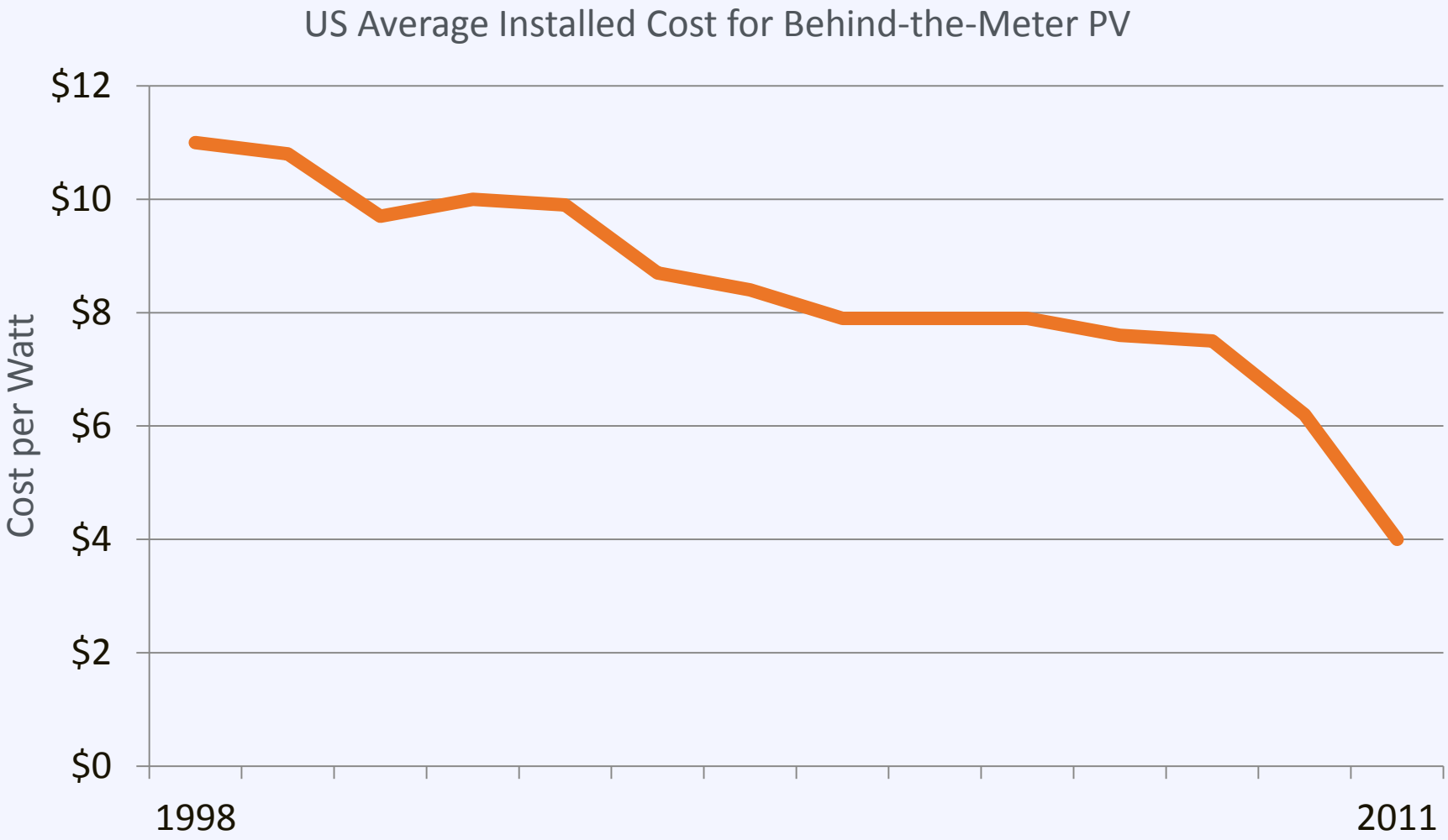
Fact: Solar is a ubiquitous resource



Powered by SunShot
U.S. Department of Energy

Source: Perez & Perez. 2009. *A fundamental look at energy reserves for the planet.*

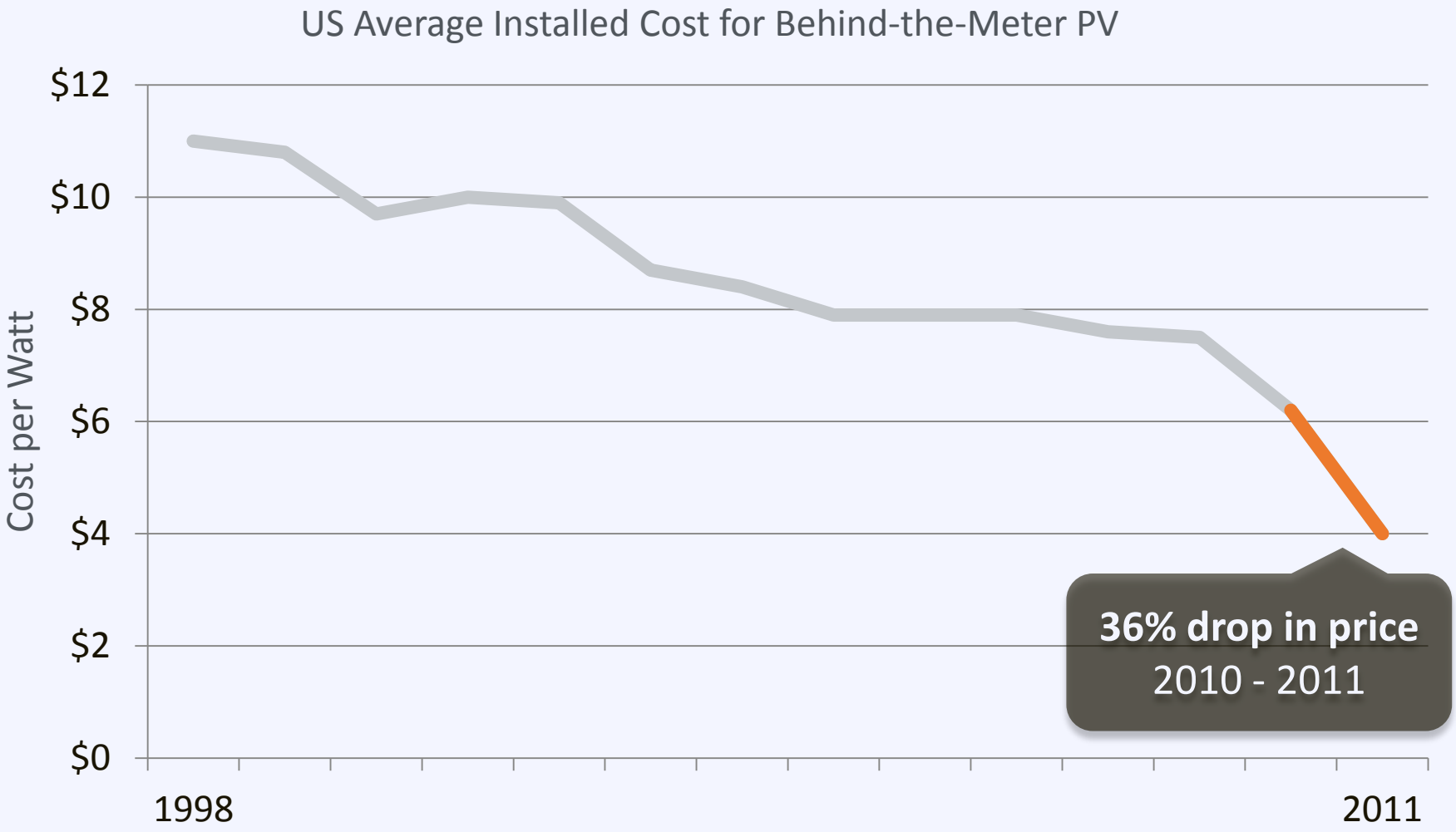
Fact: Solar is cost competitive



Tracking the Sun IV: The Installed Cost of Photovoltaics in the US from 1998-2010 (LBNL), SEIA/GTM Research. 2012. *Solar Market Insight 2011 Year-in-Review.*

Powered by SunShot U.S. Department of Energy

Fact: Solar is cost competitive



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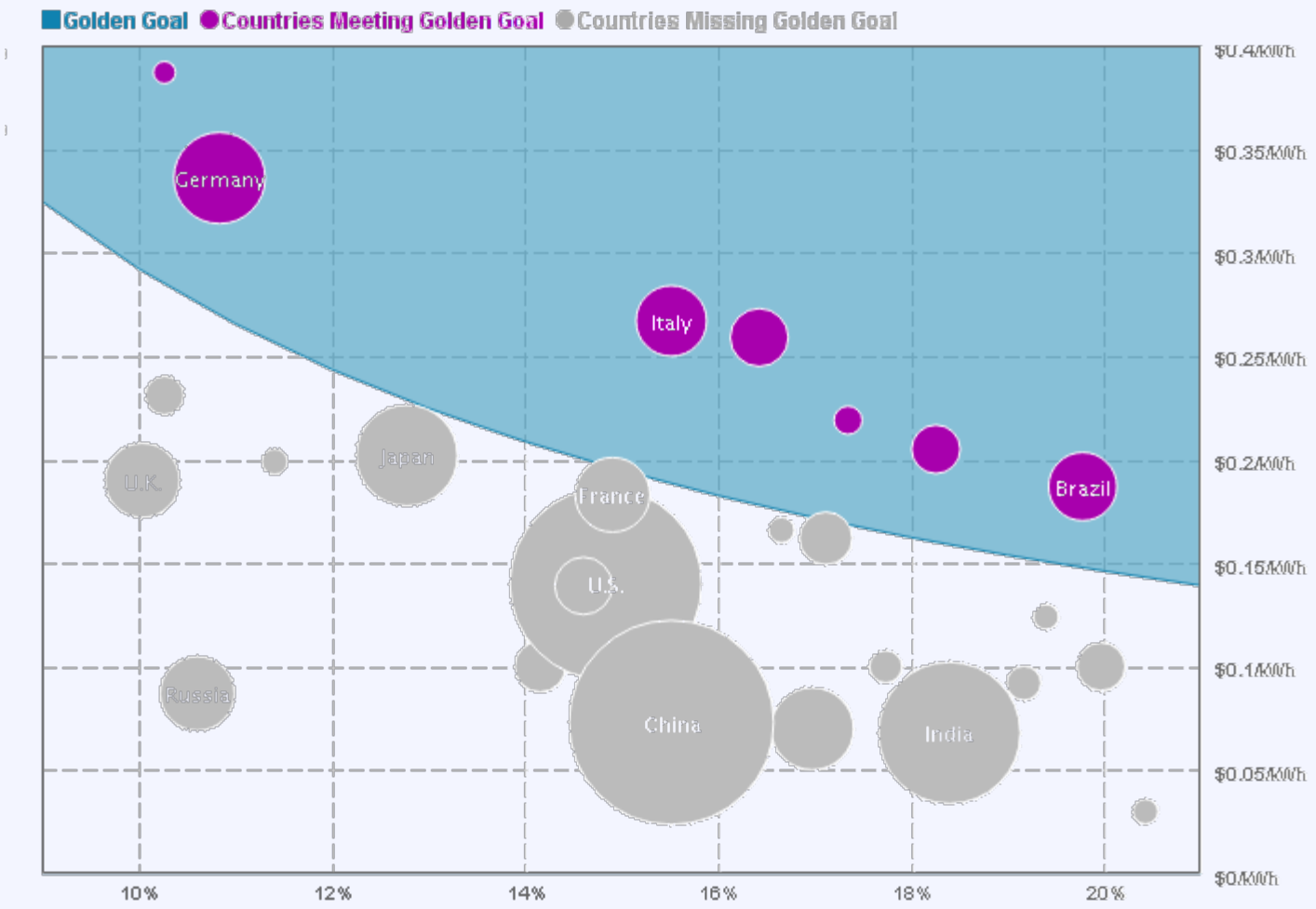
Powered by SunShot U.S. Department of Energy

Fact: Solar is cost competitive

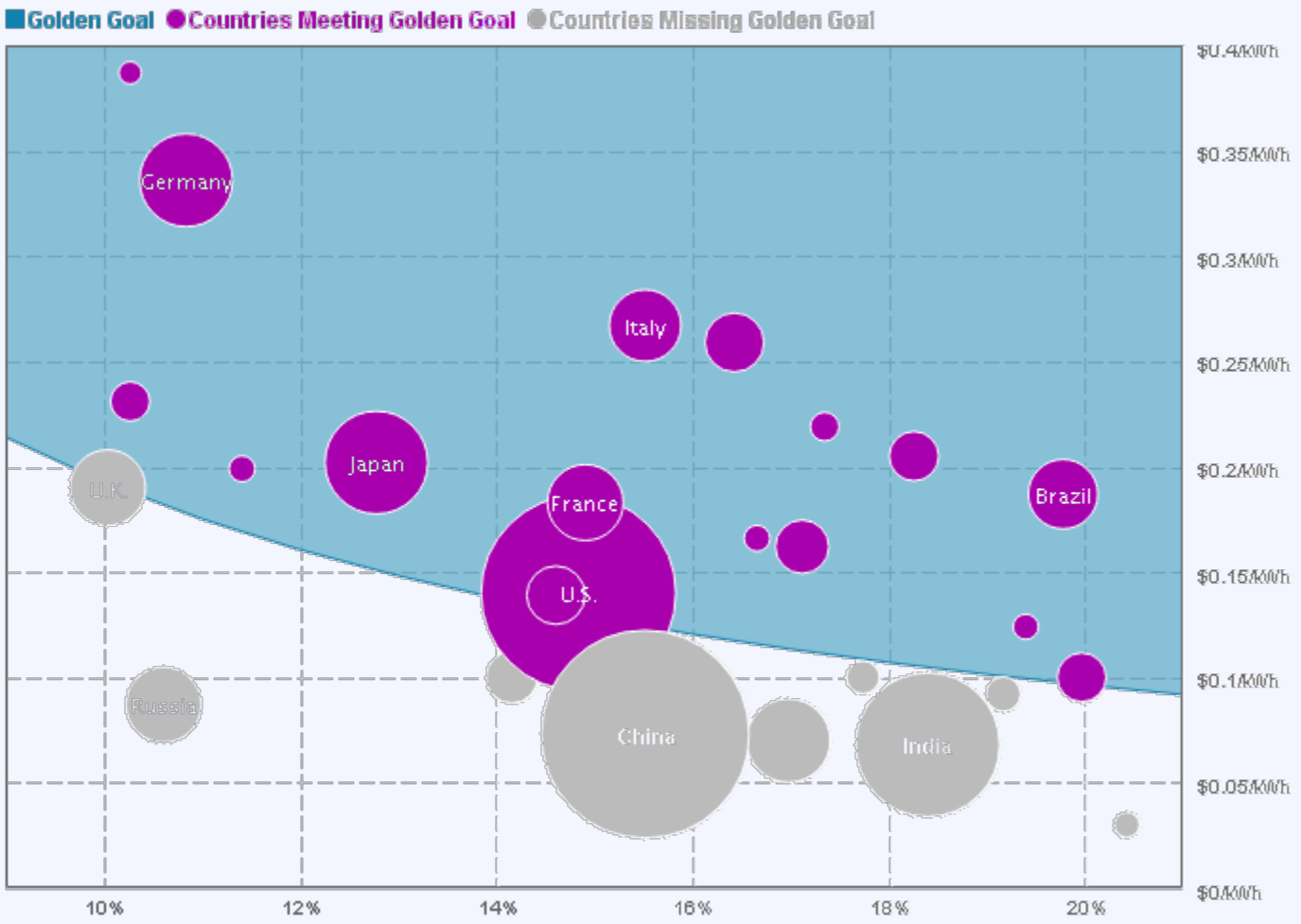
2012



Source: Bloomberg

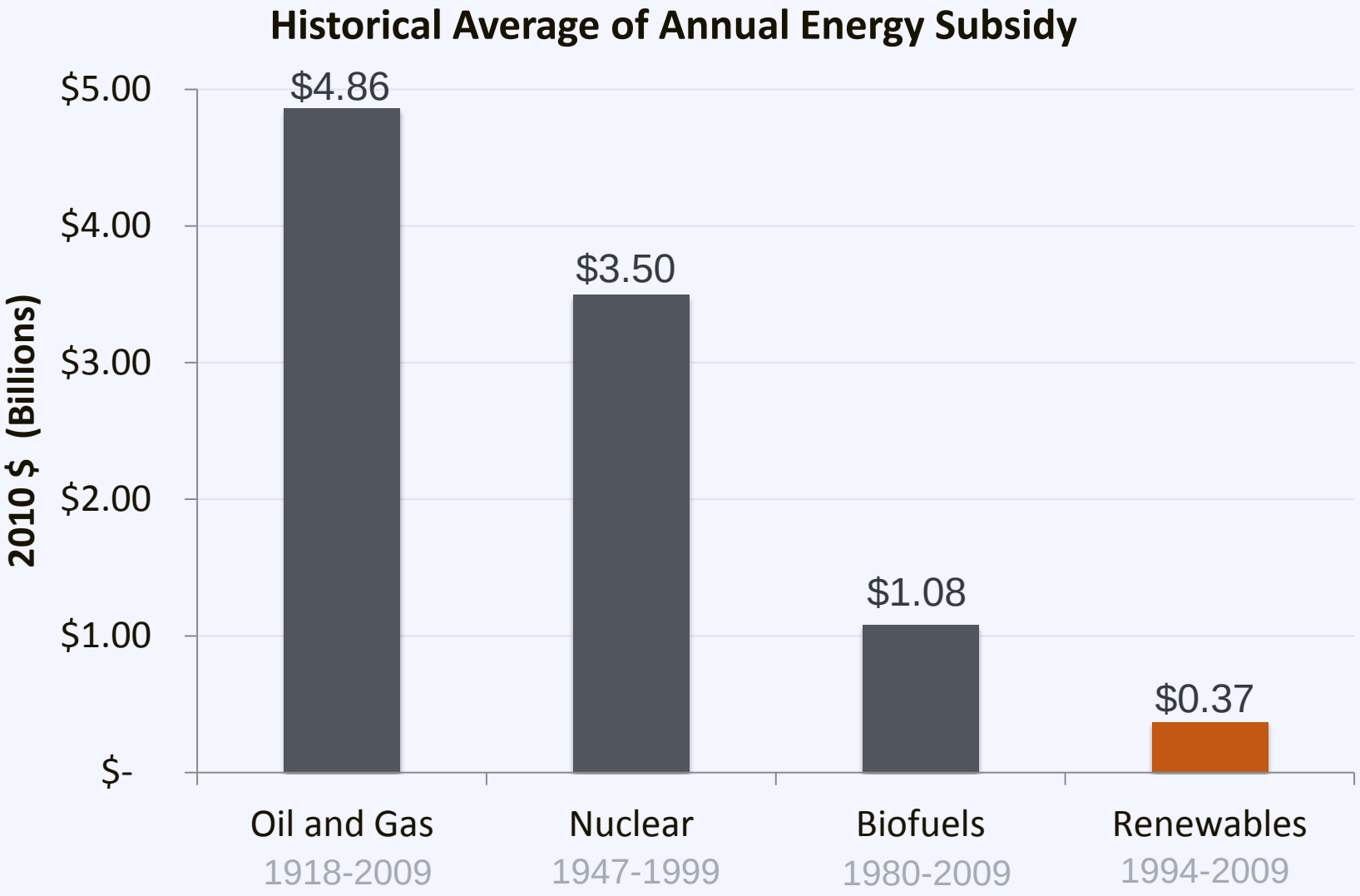
Fact: Solar is cost competitive

2020



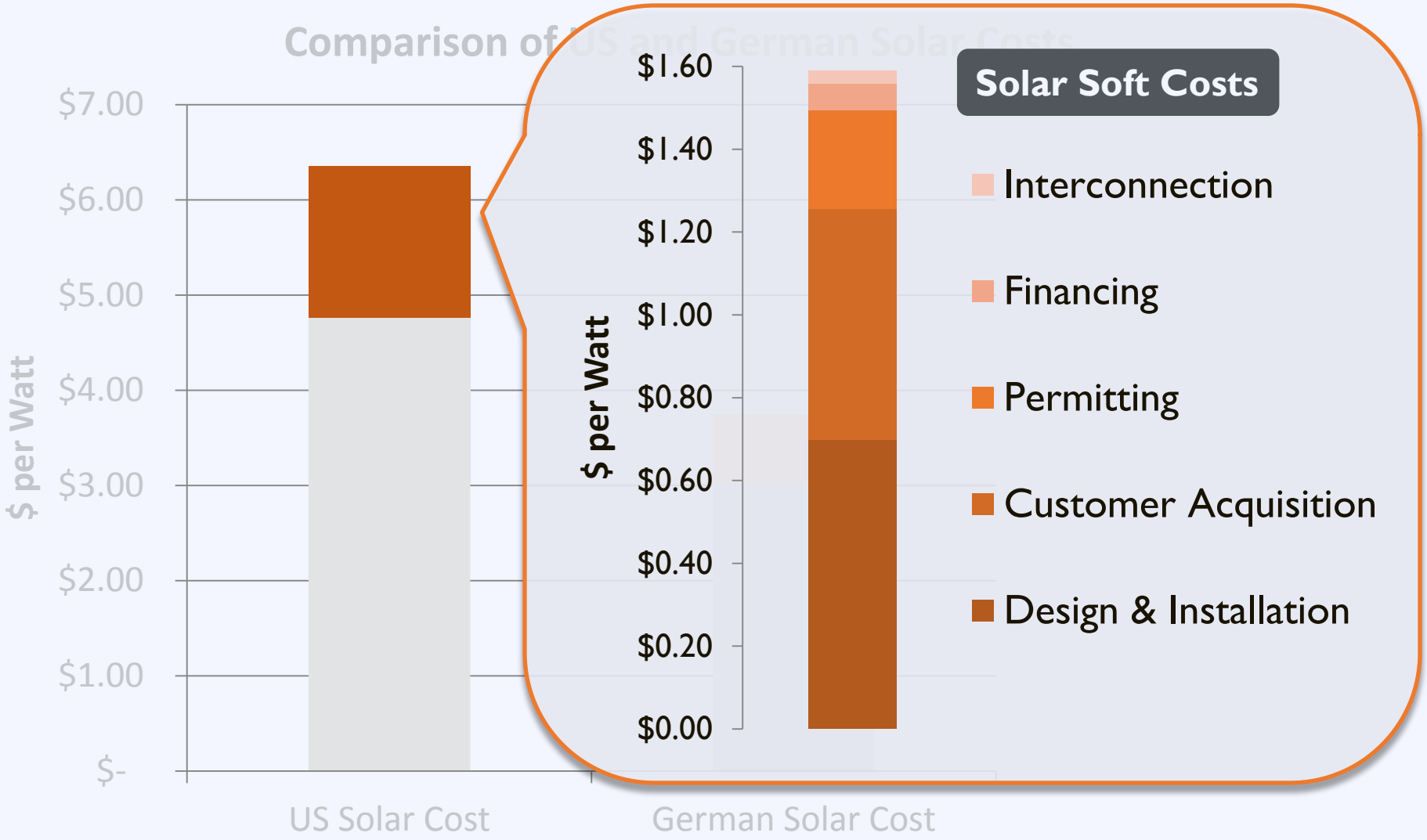
Source: Bloomberg

Fact: All energy is subsidized



Sources: DBL Investors

Barriers Still Exist



Powered by SunShot U.S. Department of Energy

Source: NREL (http://ases.conference-services.net/resources/252/2859/pdf/SOLAR2012_0599_full%20paper.pdf) (http://www.nrel.gov/docs/fy12osti/53347.pdf) (http://www.nrel.gov/docs/fy12osti/54689.pdf)

Q & A

Agenda

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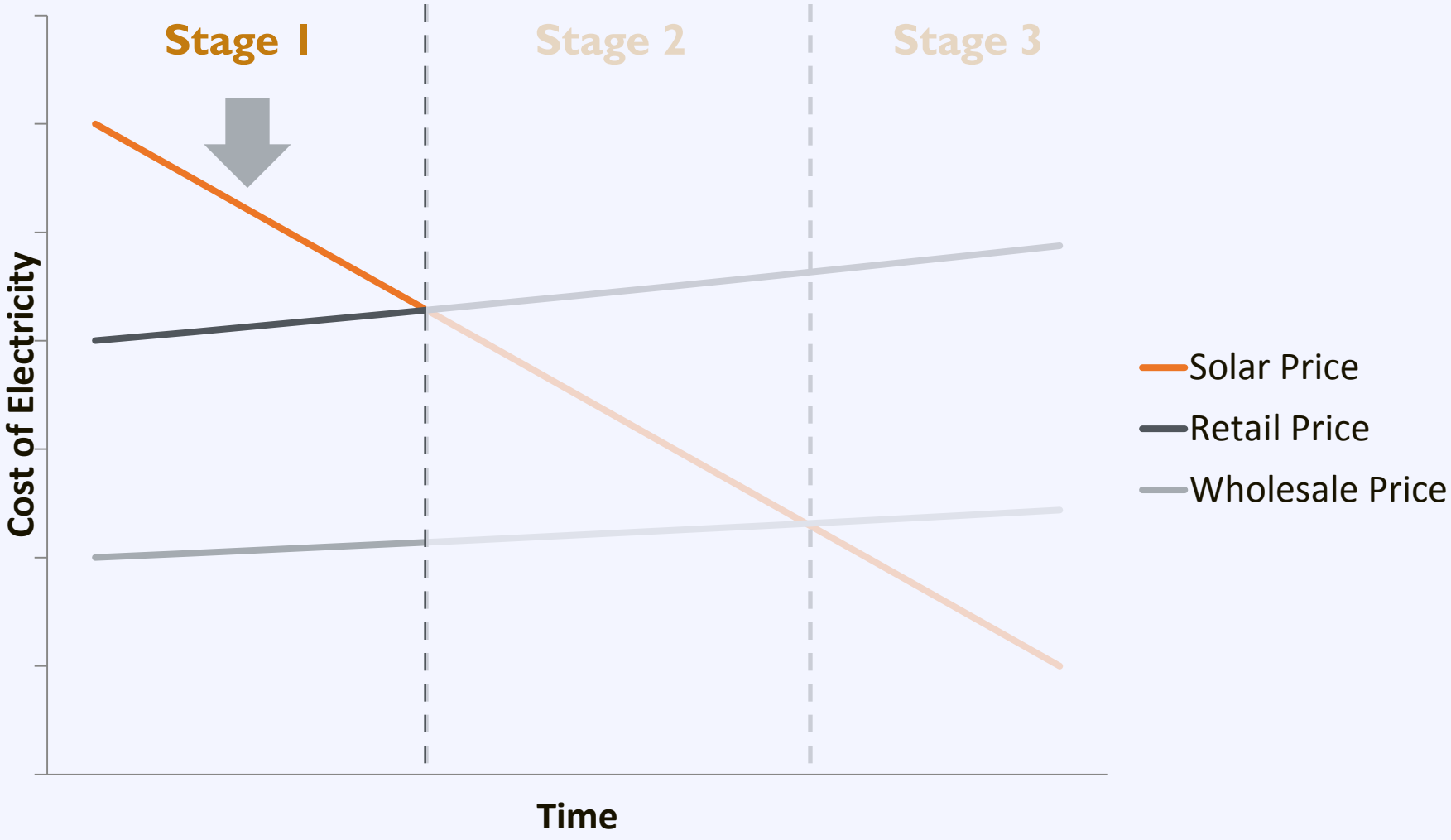
Solar Market Stages



Source: Solar Electric Power Association

In 2012 market terms (with no incentives)…

Costs > Benefits

What does it take to flip the equation?

Costs < Benefits

The Solar Equation

Cost

+ Installed Cost

+ Maintenance

- Direct Incentive

Benefit

+ Avoided Energy Cost

+ Excess Generation

+ Performance Incentive

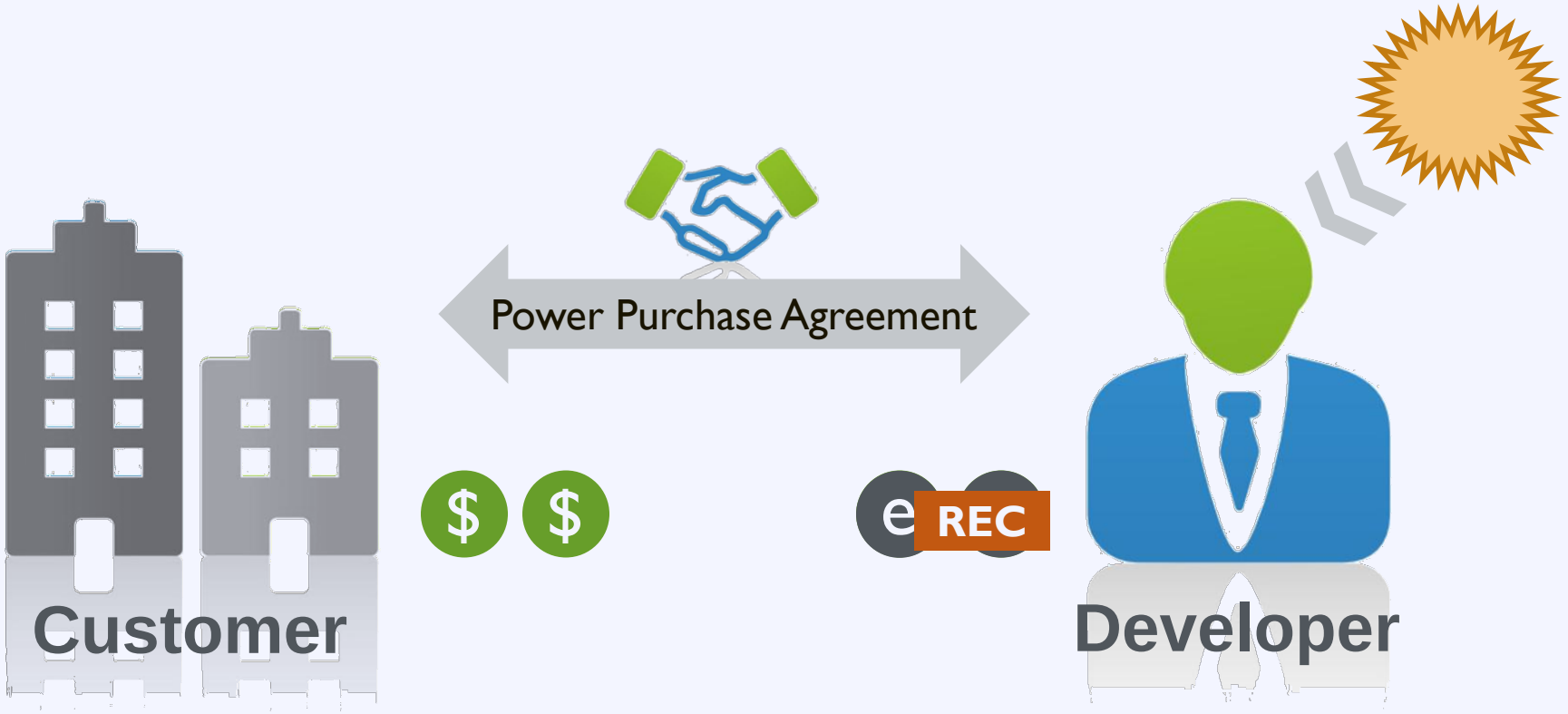
Ownership Options

Direct Ownership

Third-Party Ownership

Direct Ownership

Third Party Ownership



Third Party Ownership Equation

Cost

+ PPA or Lease Rate

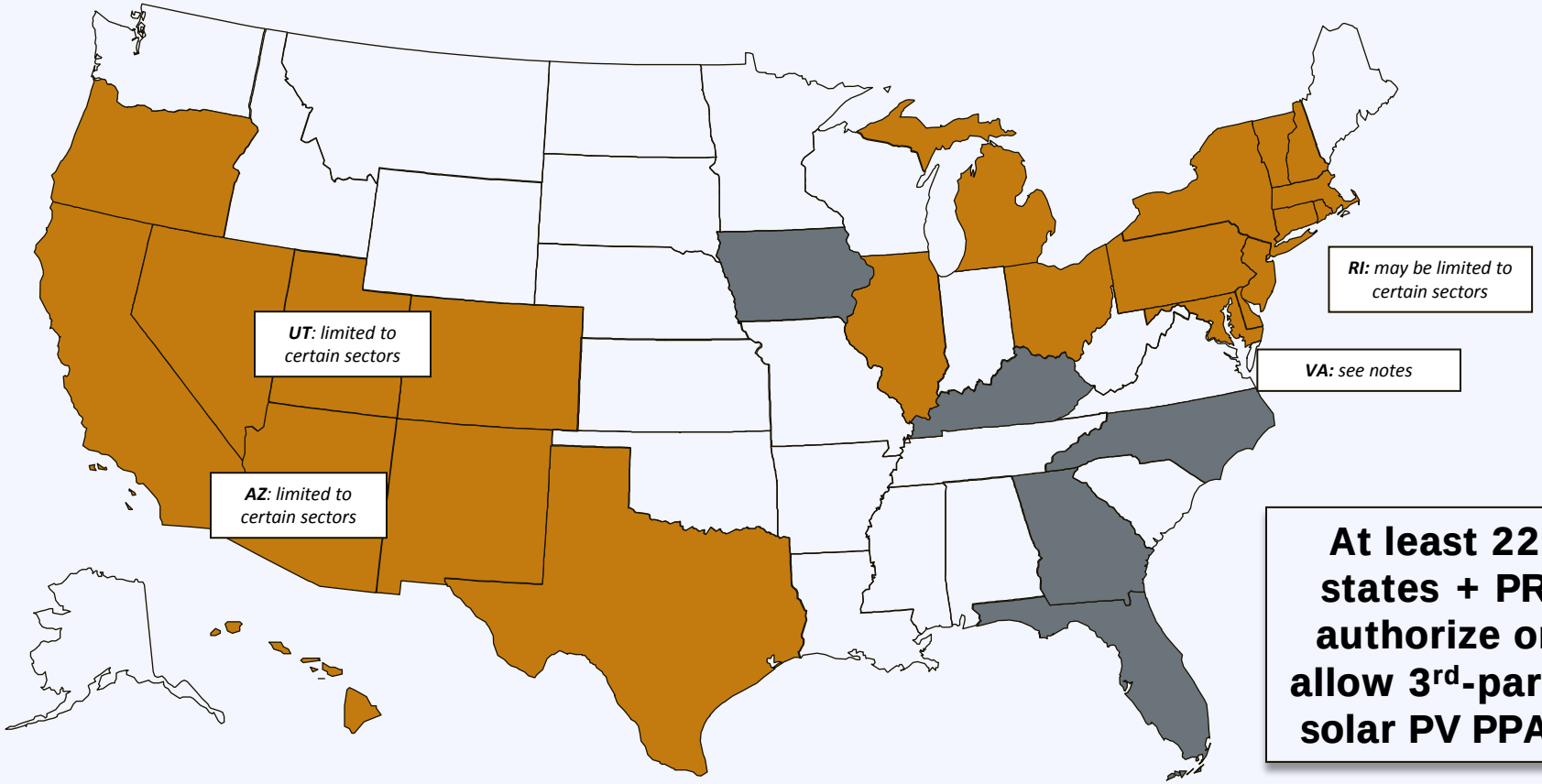
Benefit

+ Avoided Energy Cost

+ Excess Generation

Third Party Ownership: State Policy

www.dsireusa.org / August 2012



Note: This map is intended to serve as an unofficial guide; it does not constitute legal advice. Seek qualified legal expertise before making binding financial decisions related to a 3rd-party PPA. See following slides for additional important information and authority references.

Incentives

Federal	Investment Tax Credit	Qualified Clean Energy Bonds	Accelerated Depreciation	
State	Tax Credits	Tax Exemptions		
Utility	Renewable Energy Credits	Net Metering	Rebates	Feed-in Tariff

Incentives

Federal	Investment Tax Credit	Qualified Clean Energy Bonds	Accelerated Depreciation	
State	Tax Credits	Tax Exemptions		
Utility	Renewable Energy Credits	Net Metering	Rebates	Feed-in Tariff

Investment Tax Credit

Type: Tax Credit

Eligibility: For-Profit Organization

Value: 30% of the installation cost

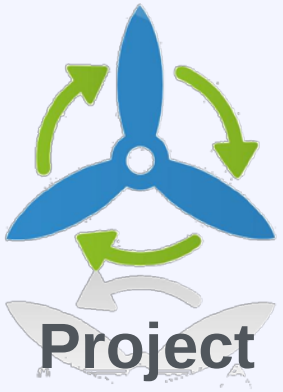
Availability: Through 2016

Qualified Conservation Energy Bond

Qualified Conservation Energy Bond

US Treasury

Local Gov

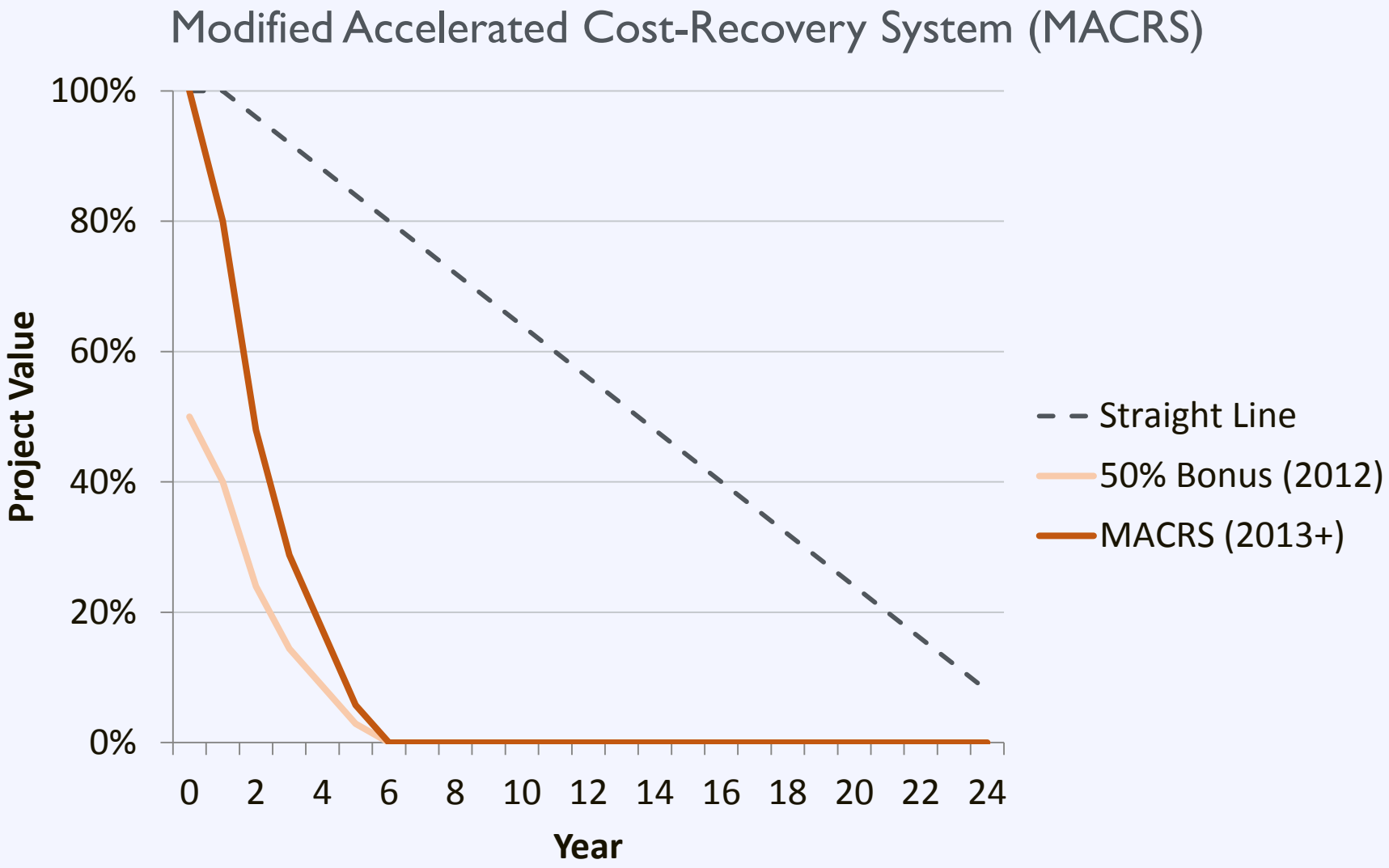


Project

QCEB

Community

Accelerated Depreciation



Incentives

Federal	Investment Tax Credit	Qualified Clean Energy Bonds	Accelerated Depreciation	
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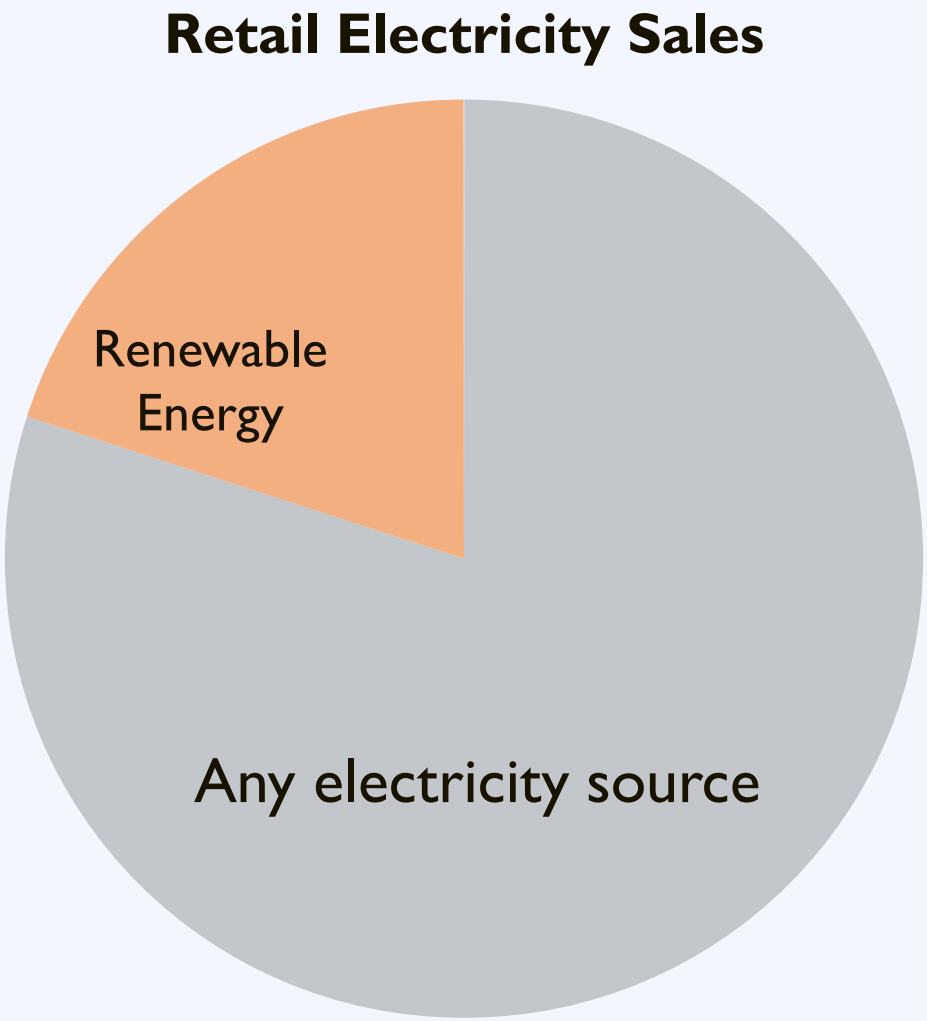
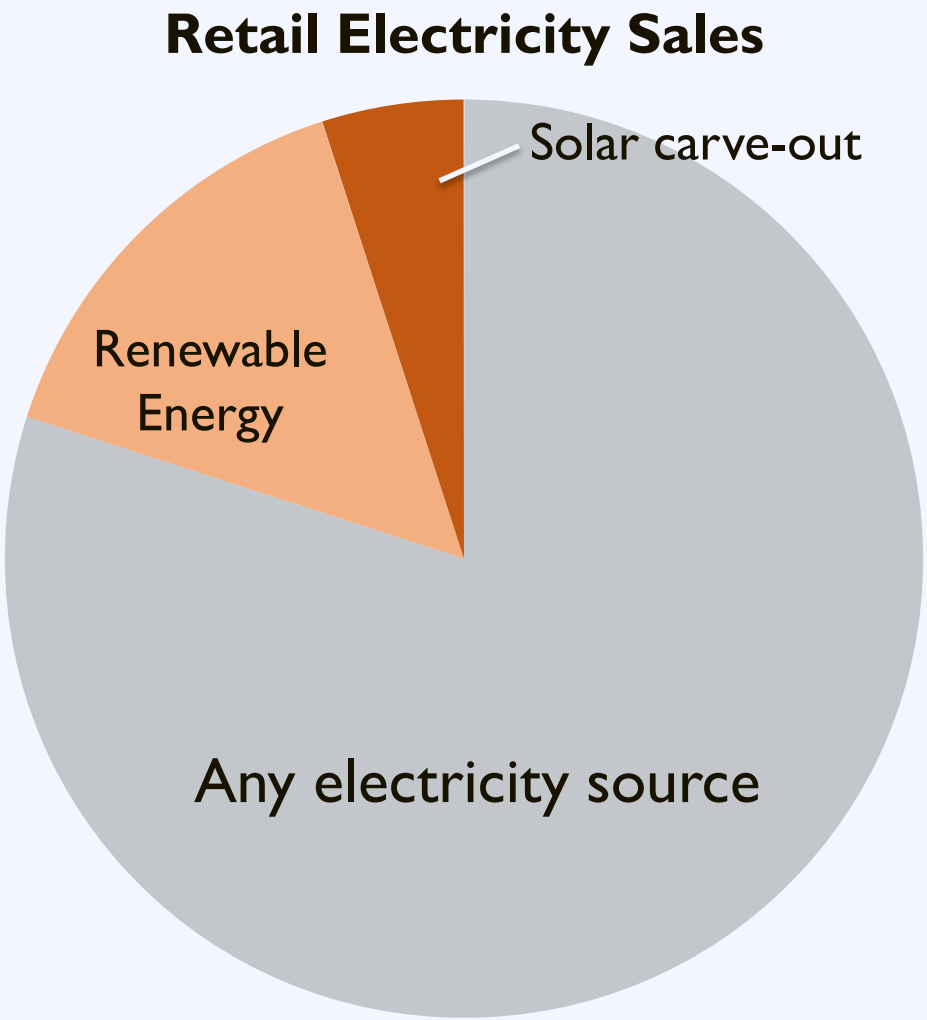
Incentives

Federal	Investment Tax Credit	Qualified Clean Energy Bonds	Accelerated Depreciation	
State	Tax Credits	Tax Exemptions		
Utility	Renewable Energy Credits	Net Metering	Rebates	Feed-in Tariff

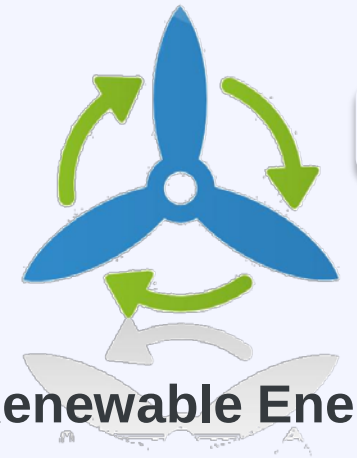
Renewable Portfolio Standard



Renewable Portfolio Standard



Renewable Portfolio Standard



Two revenue streams

e- REC

Renewable Portfolio Standard

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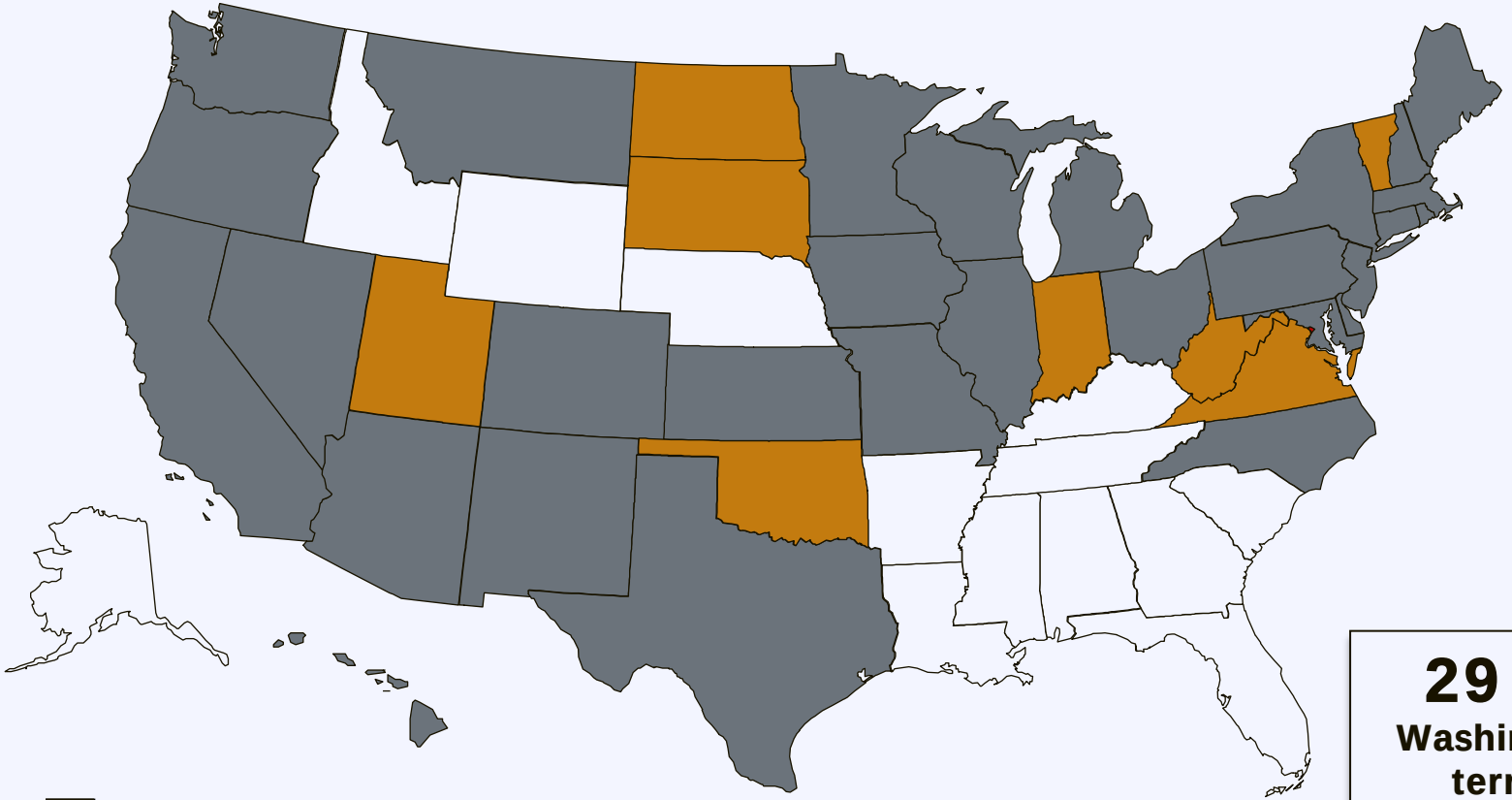


29 states +
Washington DC and 2 territories have Renewable Portfolio Standards
(8 states and 2 territories have renewable portfolio goals)

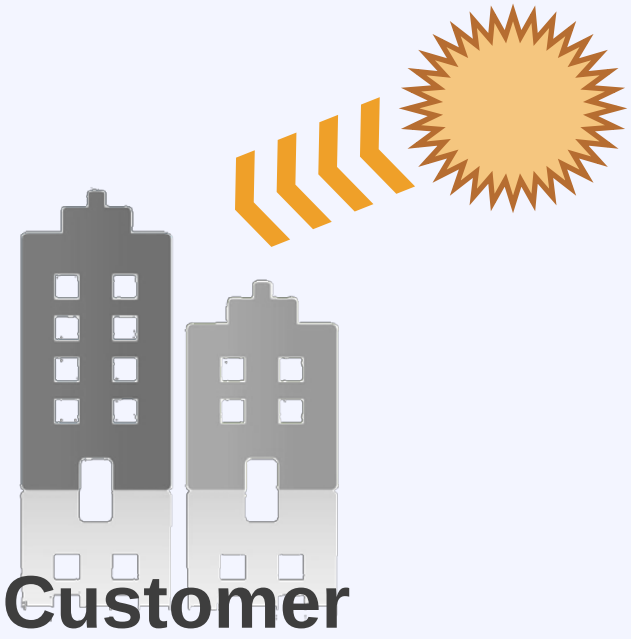
Powered by SunShot
U.S. Department of Energy

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

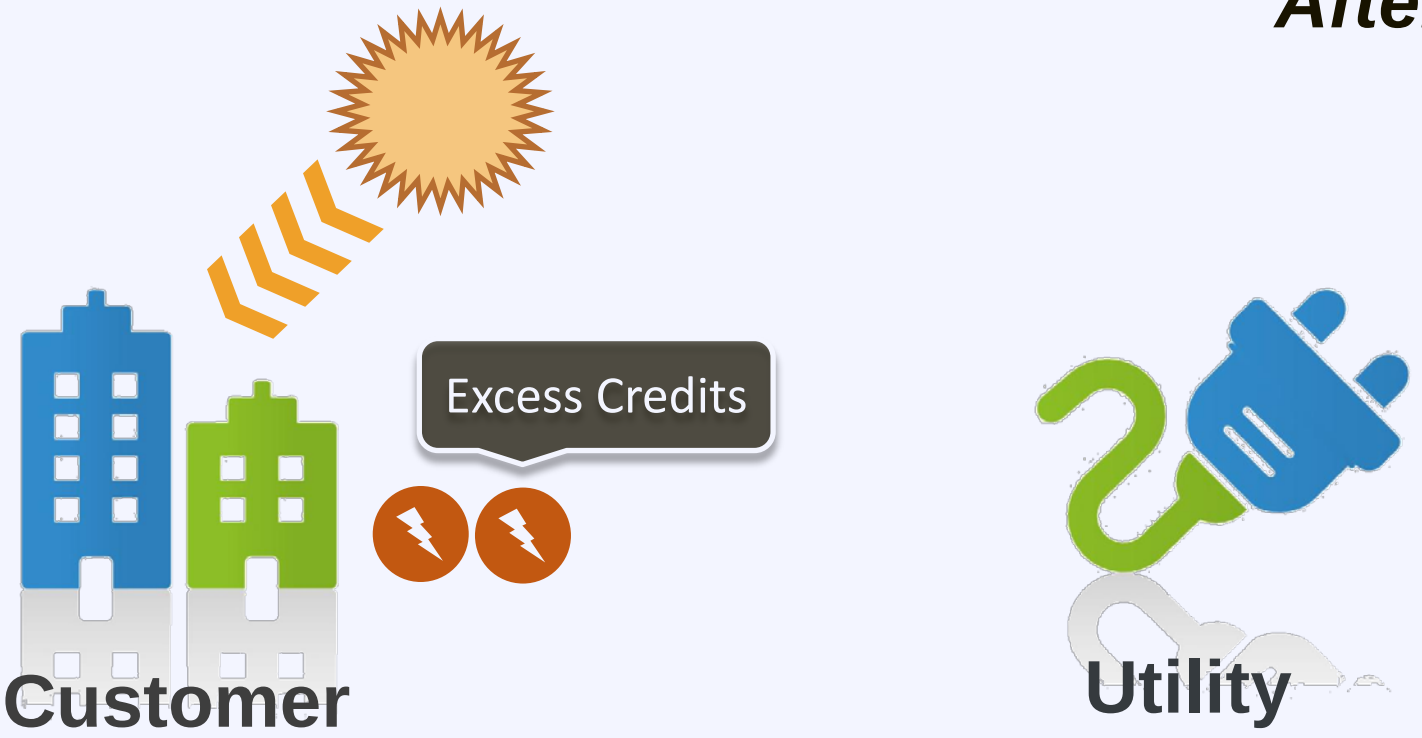
Net Metering: Overview

Morning



Net Metering: Overview

Afternoon



Net Metering: Overview

Night

Customer

Utility

Solar covers 100% of the customer's load, even at night!

Net Metering: Market Share

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

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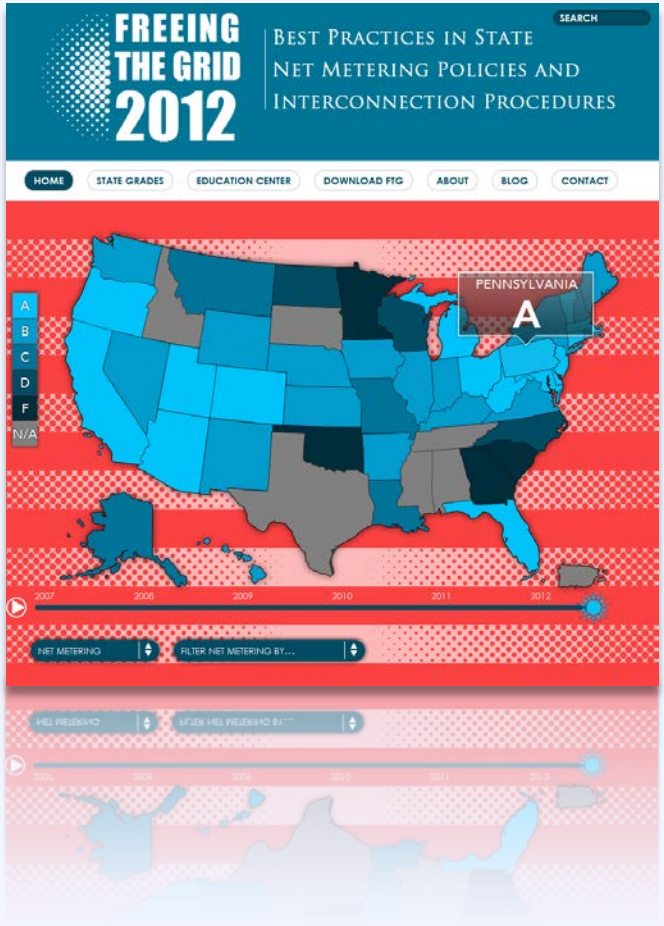
Source: IREC (http://www.irecusa.org/wp-content/uploads/IRECSolarMarketTrends-2012-web.pdf)

Net Metering: Resources

Resource **Freeing the Grid**

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

http://freeingthegrid.org/

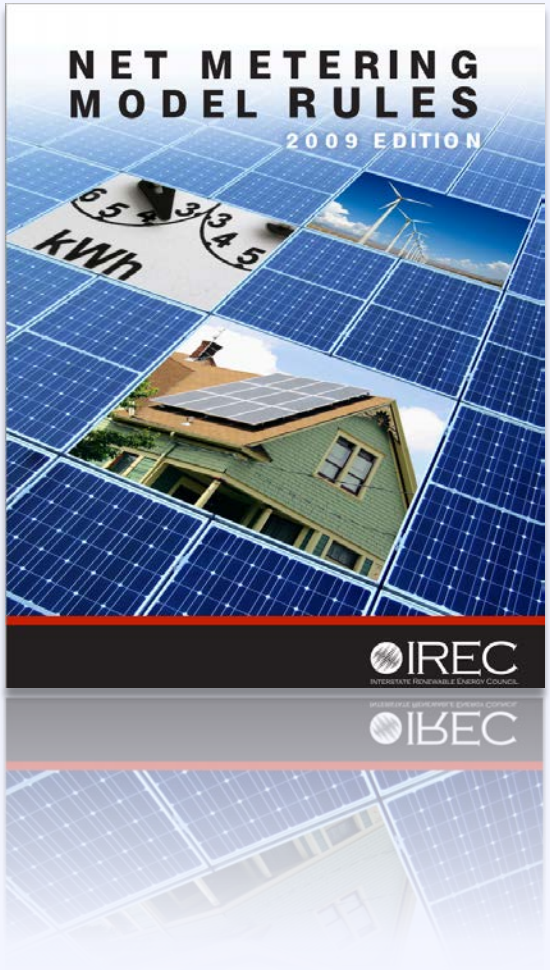


Net Metering: Resources

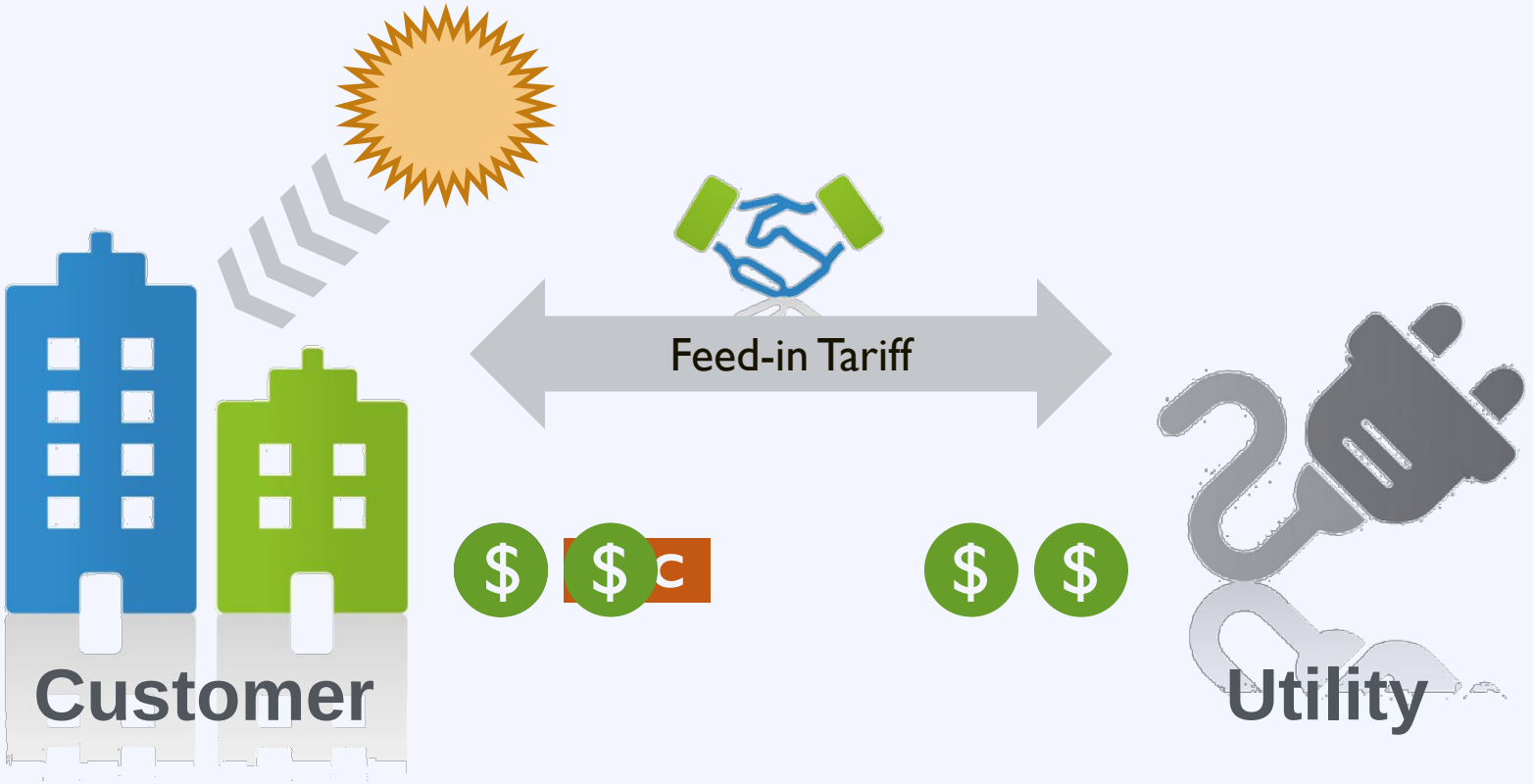
Resource **Interstate Renewable Energy Council**

IREC developed its model rules in an effort to capture best practices in state net metering policies.

www.irecusa.org



Feed in Tariff



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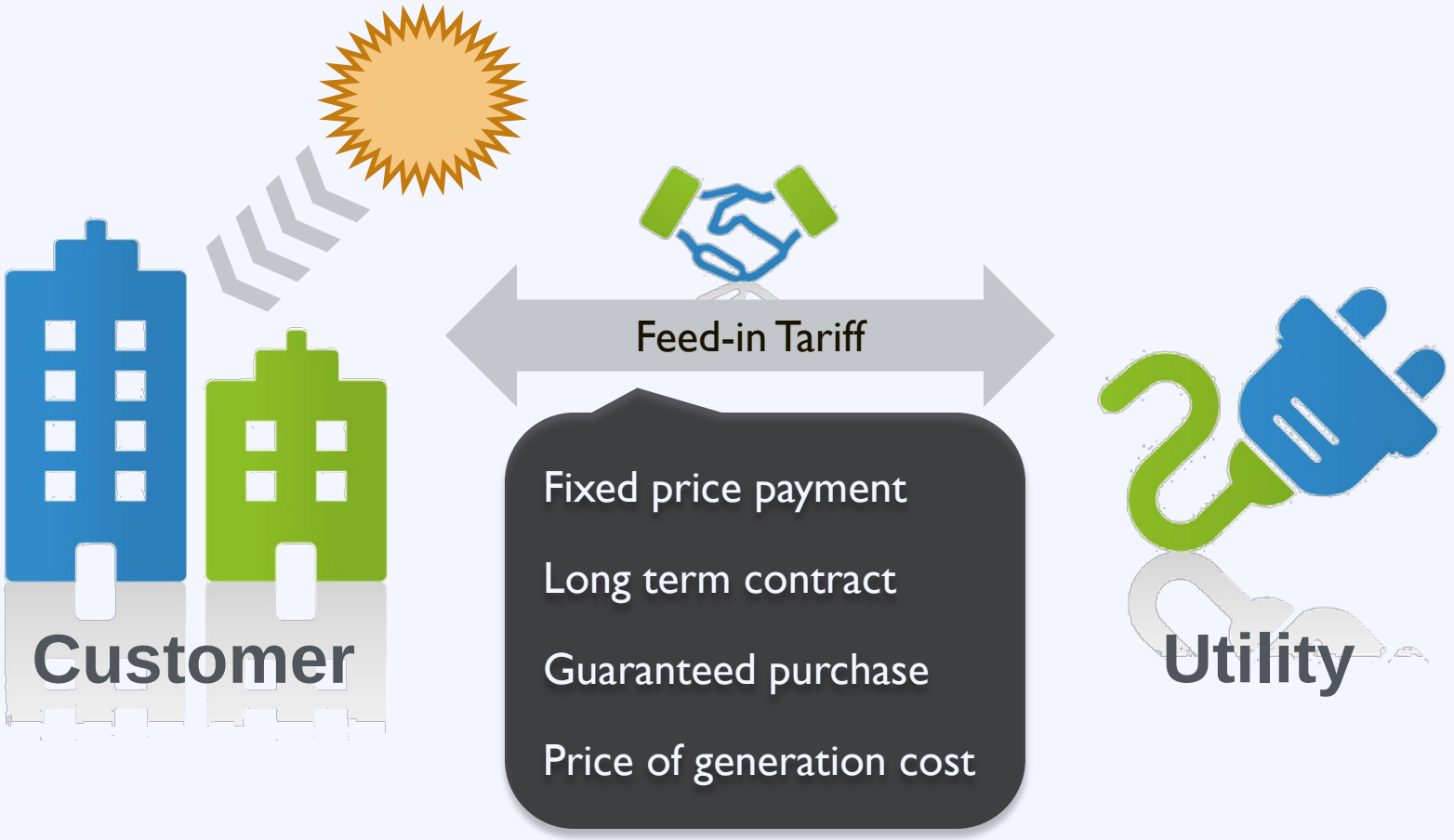

Agenda

01:40 – 02:00	Solar 101
02:00 – 02:40	Creating a Regulatory Landscape for Solar
02:40 – 02:50	*Break*
02:50 – 03:10	Benefits and Barriers Activity
03:10 – 03:40	Introduction to Solar Project Finance
03:40 – 03:50	**Understanding Utility Interconnection**
03:50 – 04:00	*Break*
04:00 – 04:20	Barry Shear, Eagle Point Solar
04:20 – 04:30	Next Steps for Solar in Region

Interconnection

5,000+ utilities

with unique interconnection procedures

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

Interconnection: Background

2000: NREL finds that interconnection is a significant barrier to customer sited DG

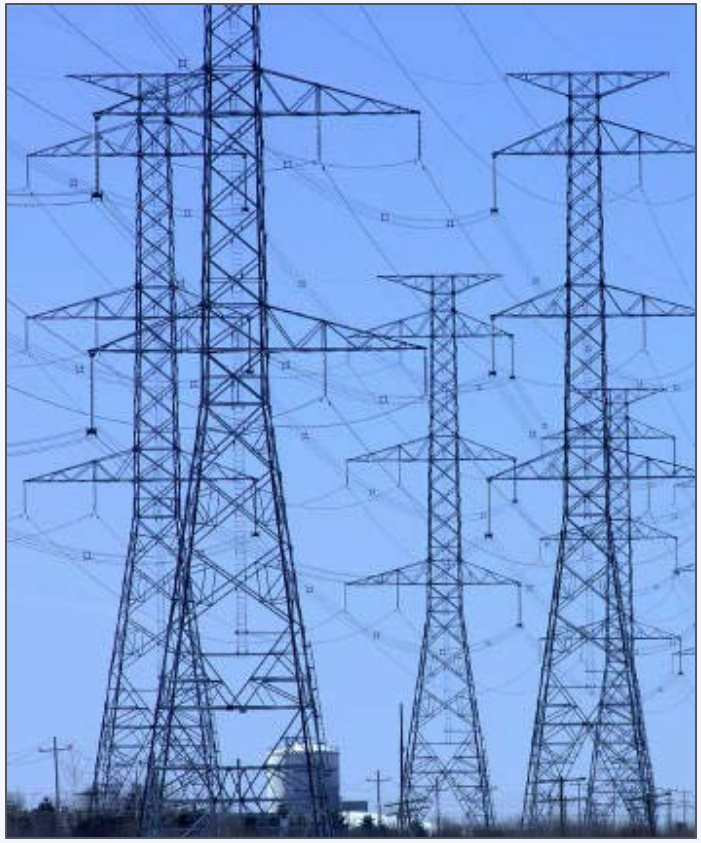
2005: Congress requires state regulator authorities to consider an interconnection standard (IEEE 1547)

2012: 43 States & DC have adopted interconnection standards

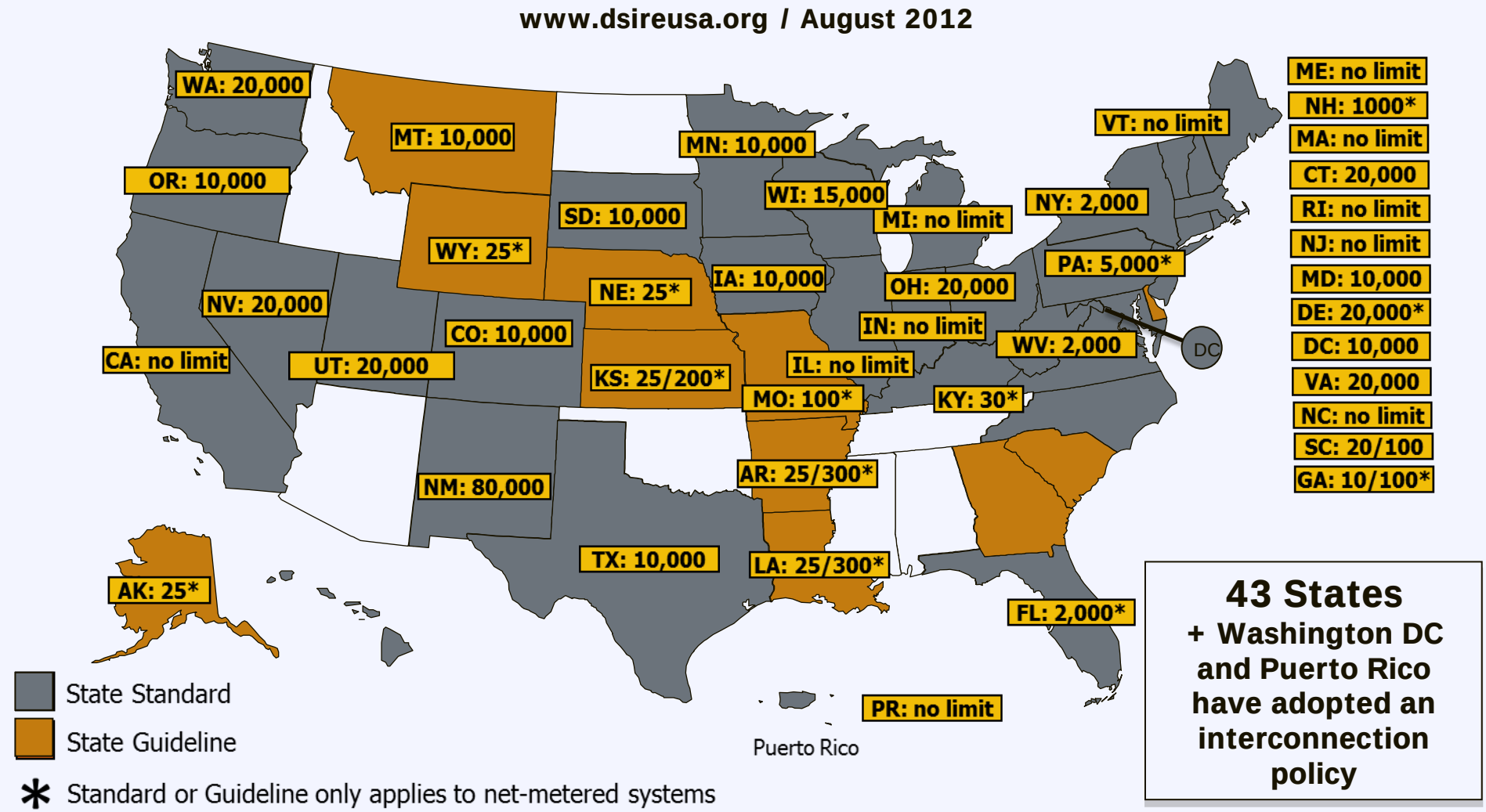
- CA Rule 21
- FERC SGIP
- MADRI Procedures
- IREC Procedures

Interconnection: Best Practices

1. Use standard forms and agreements
2. Implement expedited process
3. Implement simplified procedure for small solar arrays



Interconnection: State Policies



Notes: Numbers indicate system capacity limit in kW. Some state limits vary by customer type (e.g., residential versus non-residential). "No limit" means that there is no stated maximum size for individual systems. Other limits may apply. Generally, state interconnection standards apply only to investor-owned utilities.

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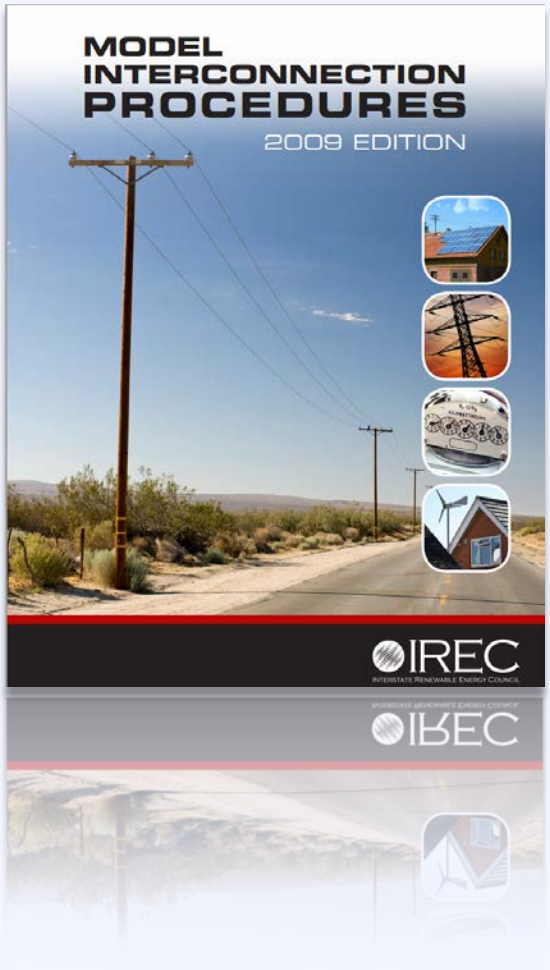
Interconnection: Resources

Resource **Interstate Renewable Energy Council**

IREC developed model interconnection procedures in an effort to capture emerging best practices in this vital area.

www.irecusa.org



Q & A

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Barry Shear

President and CEO

Eagle Point Solar

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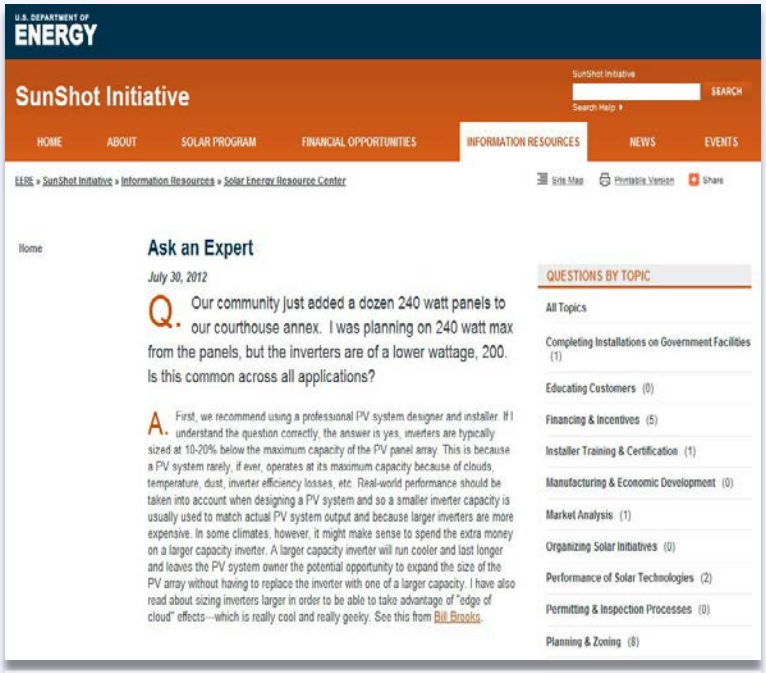
Activity: Next Steps

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

About the SunShot Solar Outreach Partnership

Technical Support

- 'Ask an Expert' Live Web Forums
- 'Ask an Expert' Web Portal
- Peer Exchange Facilitation
- In-Depth Consultations
- Customized Trainings



www4.eere.energy.gov/solar/sunshot/resource_center

For more information email: solar-usa@iclei.org

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