# Solar Powering Your Community

## Addressing Soft Costs and Barriers

Powered by SunShot

U.S. Department of Energy

Powered by SunShot

U.S. Department of Energy


**Jayson Uppal**

Meister Consultants Group

jayson.uppal@mc-group.com

(617) 209 -1990

**Jim Kennerly**

NC Solar Center

jdkenne2@ncsu.edu

(919) 513 - 0792

# 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

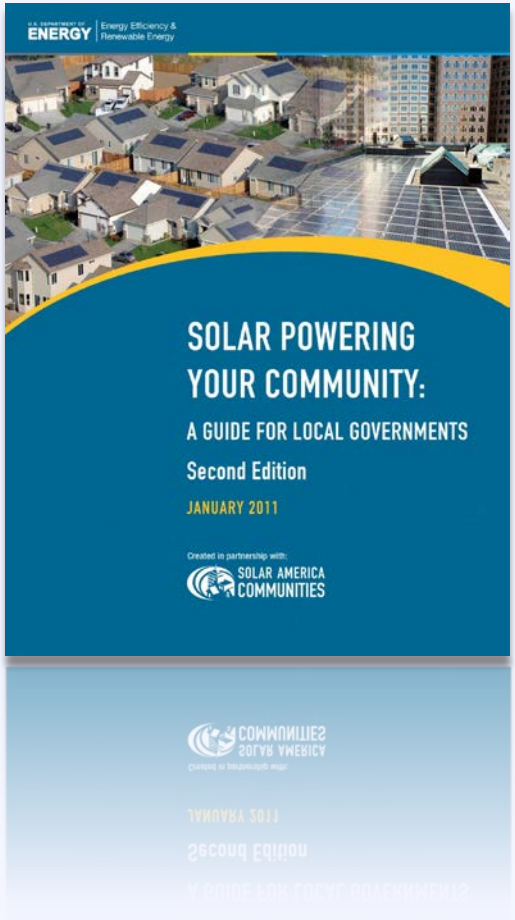
- Increase installed capacity of solar electricity in U.S. communities
- Streamline and standardize permitting and interconnection processes
- Improve planning and zoning codes/regulations for solar electric technologies
- Increase access to solar financing options

# 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



# About the SunShot Solar Outreach Partnership

## Resource Sunshot Resource Center

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

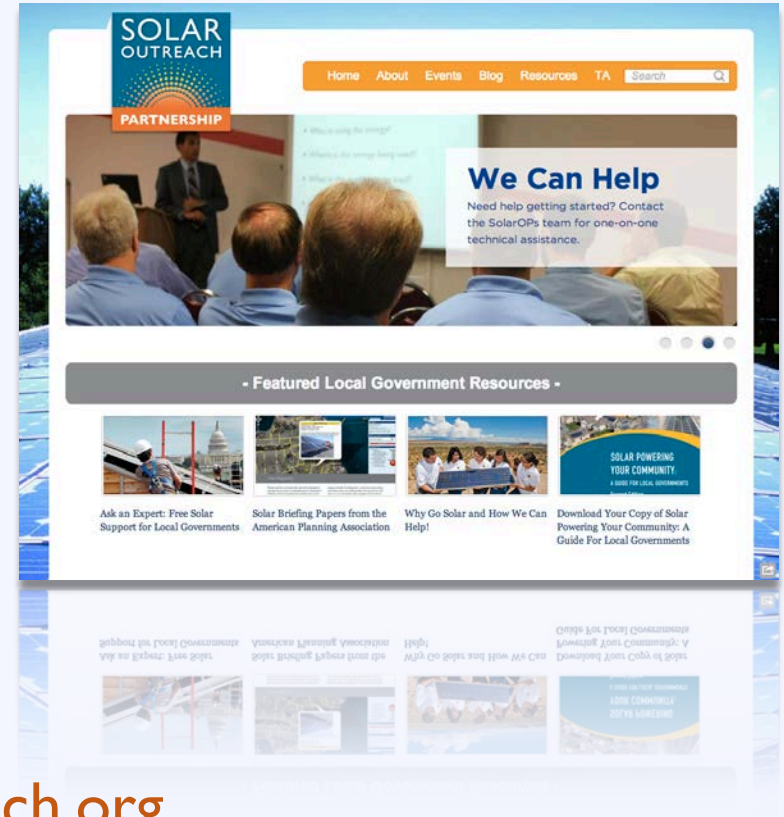

www4.eere.energy.gov/solar/sunshot/resource_center

Powered by SunShot
U.S. Department of Energy

# 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




www.solaroutreach.org

Powered by SunShot
U.S. Department of Energy

# Poll

# Who's in the room?

# Poll

# What is your experience with solar?

# Agenda

| | |
|---|---|
| 08:40 – 09:00 | Solar 101 for Communities |
| 09:00 – 09:30 | Understanding the Solar Regulatory Landscape |
| 09:30 – 09:45 | Permitting Solar Projects in Vermont |
| 09:45 – 09:55 | *Break* |
| 09:55 – 10:10 | Benefits and Barriers Activity |
| 10:10 – 10:40 | Introduction to Solar Project Finance |
| 10:40 – 11:00 | Growing Your Local Solar Market |
| 11:10 – 11:10 | *Break* |
| 11:10 – 12:15 | Regional Perspective: Panel of Local Speakers |

# Agenda

| | |
|---|---|
| 08:40 – 09:00 | Solar 101 for Communities |
| 09:00 – 09:30 | Understanding the Solar Regulatory Landscape |
| 09:30 – 09:45 | Permitting Solar Projects in Vermont |
| 09:45 – 09:55 | *Break* |
| 09:55 – 10:10 | Benefits and Barriers Activity |
| 10:10 – 10:40 | Introduction to Solar Project Finance |
| 10:40 – 11:00 | Growing Your Local Solar Market |
| 11:10 – 11:10 | *Break* |
| 11:10 – 12:15 | Regional Perspective: Panel of Local Speakers |

# Solar Technologies

Solar Photovoltaic (PV)

Solar Hot Water

Concentrated Solar Power

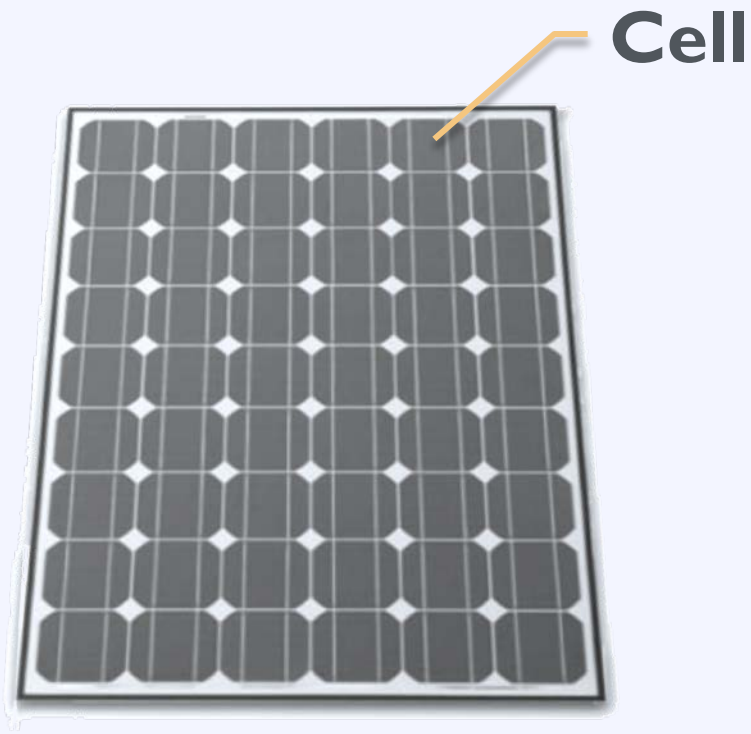
# Solar Technologies

**Solar Photovoltaic (PV)**

Solar Hot Water

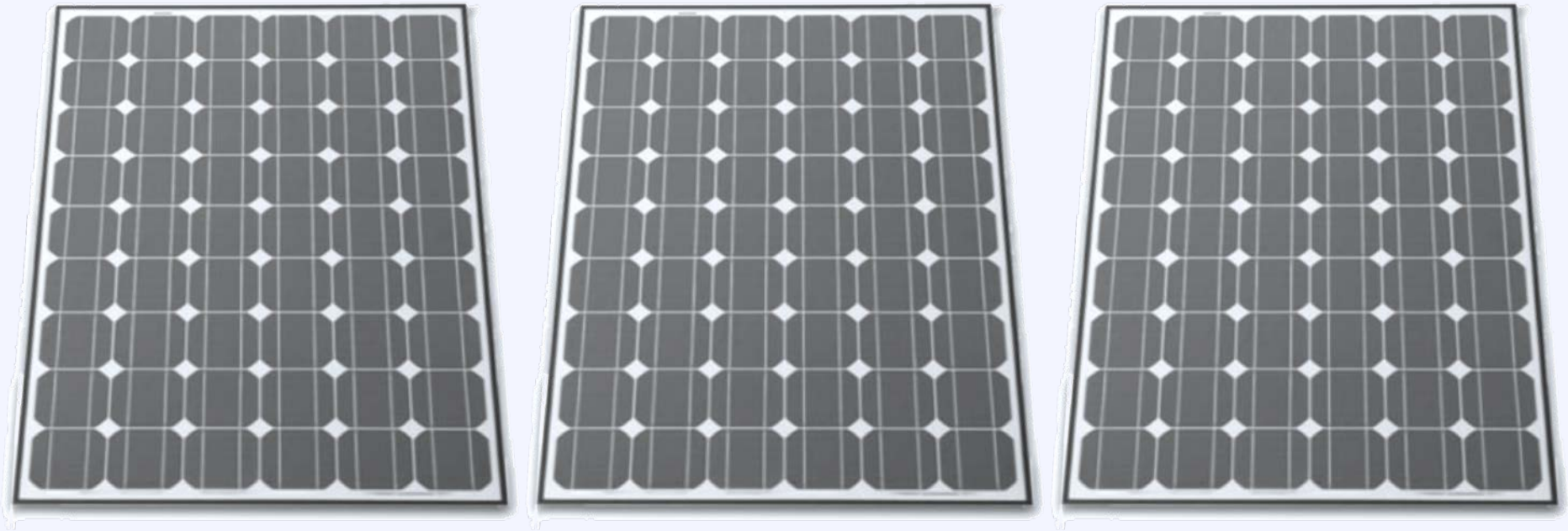
Concentrated Solar Power

# Some Basic Terminology



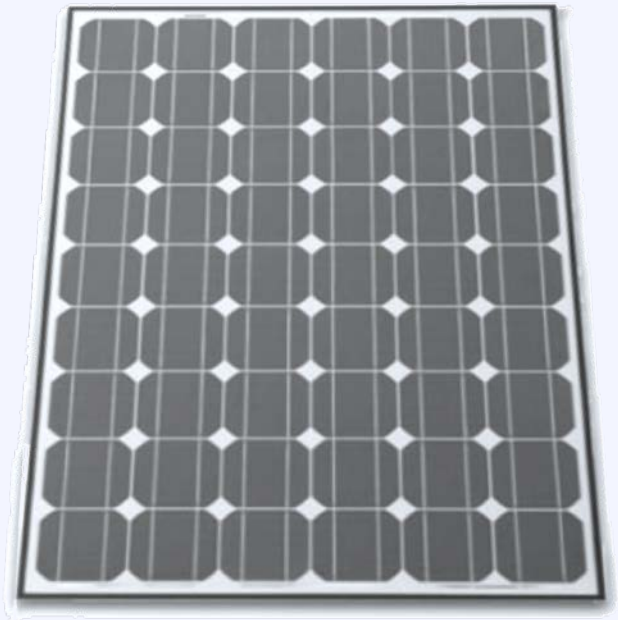

Panel / Module

# Some Basic Terminology



Array

# Some Basic Terminology



**Capacity / Power**

*kilowatt (kW)*

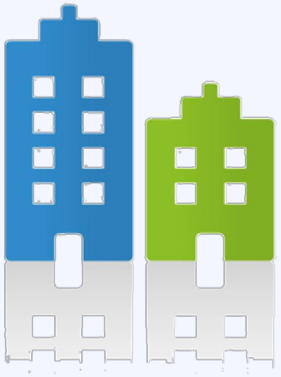
**Production**

*Kilowatt-hour (kWh)*

# Some Basic Terminology

**Residence**
5 kW

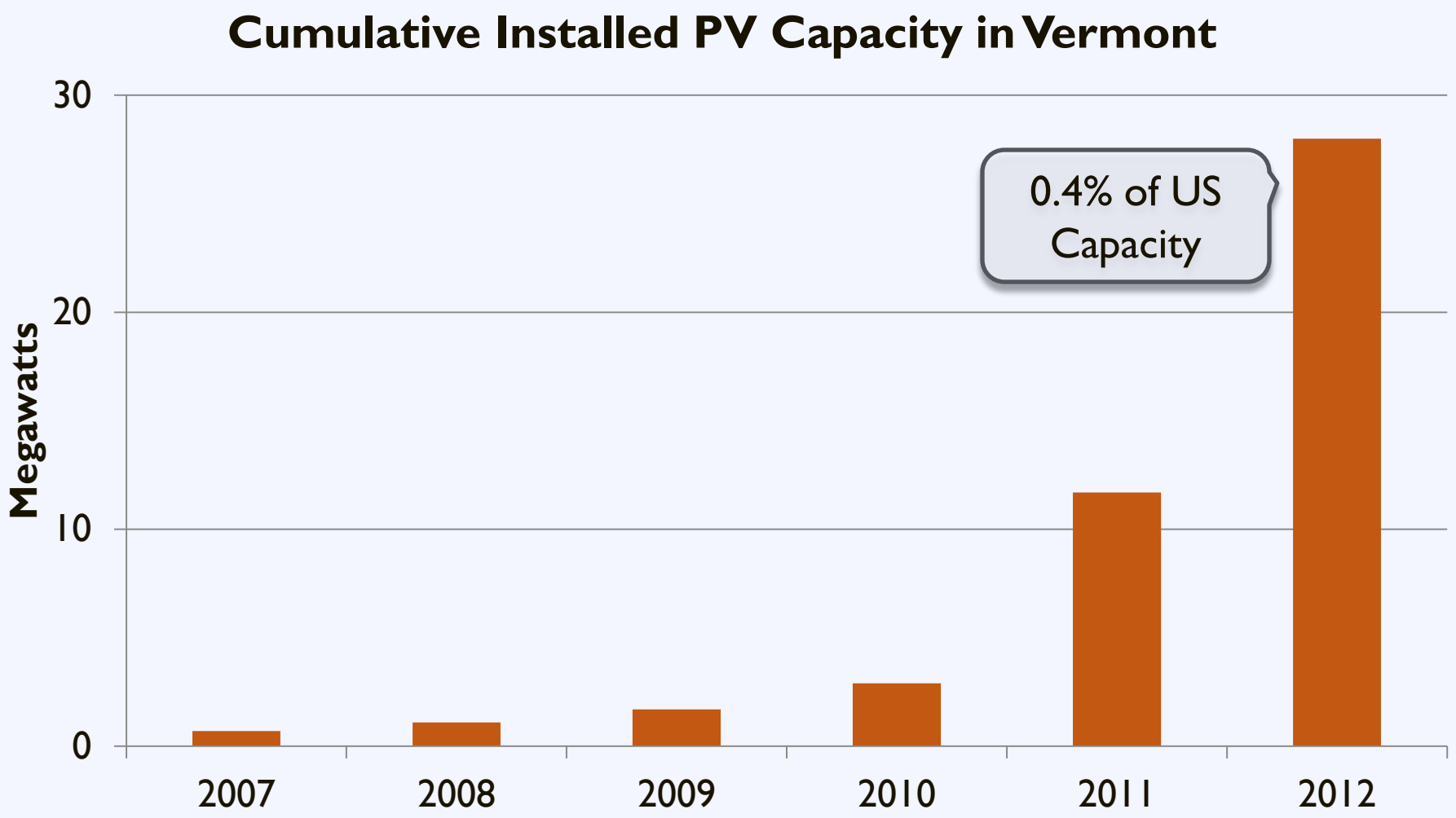
**Factory**
1 MW+



**Office**
50 – 500 kW

**Utility**
2 MW+

# Vermont Solar Market

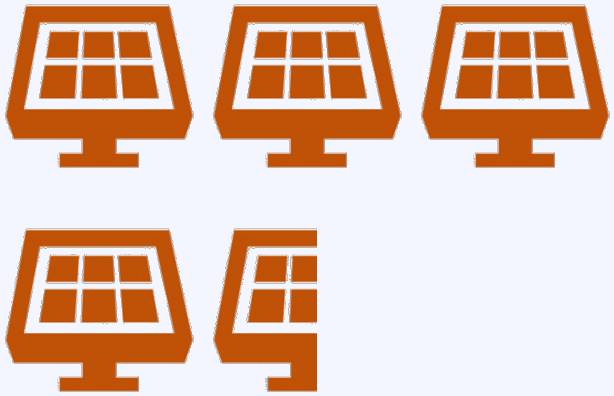



Powered by SunShot U.S. Department of Energy

Source: IREC: US Solar Market Trends

# Vermont Solar Market

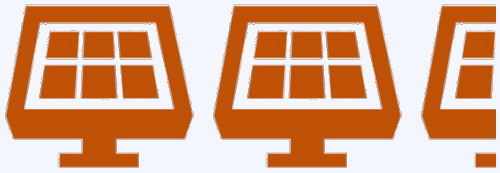
## Vermont



**46**

*watts per person*

## US



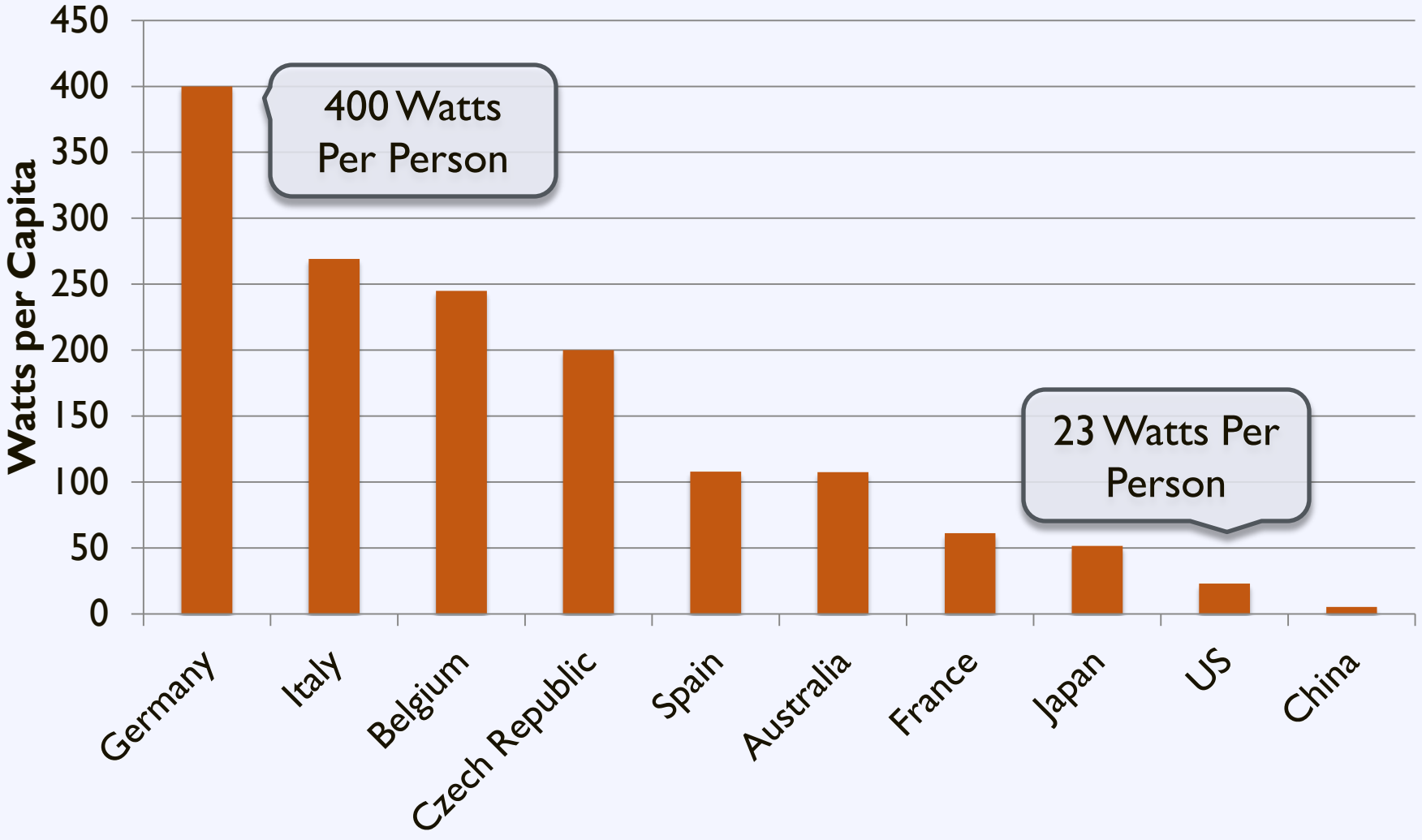
**23**

*watts per person*

Powered by SunShot
U.S. Department of Energy

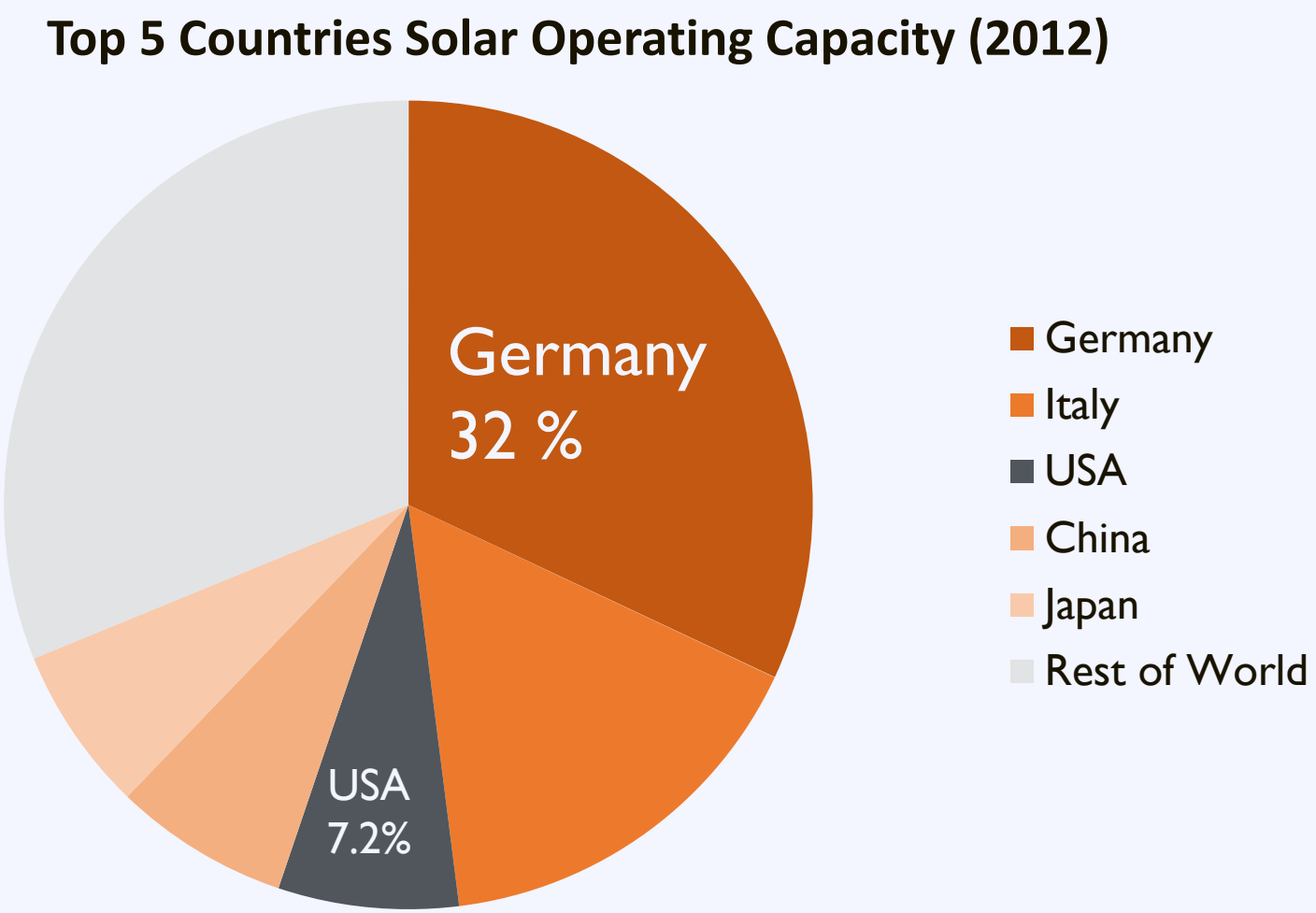
Corrected

# Installed Capacity per Capita



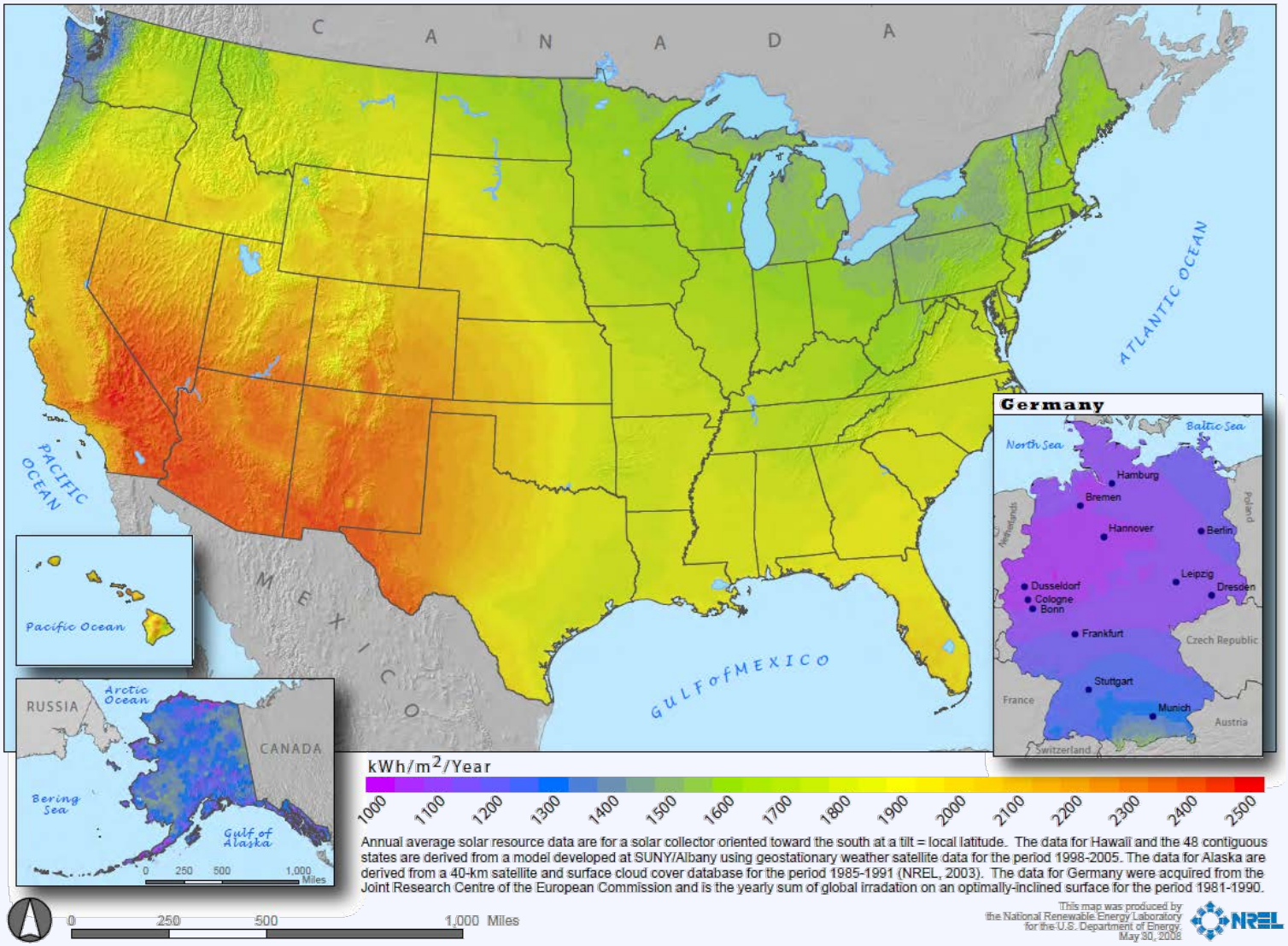

Source: REN 21, World Bank

# Installed Capacity




Source: REN 21

# US Solar Resource




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

Powered by SunShot U.S. Department of Energy

Source: National Renewable Energy Laboratory

# Installed Capacity

Total installed solar capacity in the US

**7.7 GW**

Capacity installed in Germany in 2012 alone

**7.6 GW**

Powered by SunShot U.S. Department of Energy

Source: (1) GTM Research/ Solar Energy Industries Association. *U.S. Solar Market Insight Report 2012 Year-in-Review*;
(2) www.erneuerbare-energien.de/fileadmin/Daten_EE/Dokumente__PDFs_/20130328_hgp_e_ppt_2012_fin_bf.pdf

# Explore benefits

and

# Overcome barriers

# **Activity:** Identifying Benefits

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

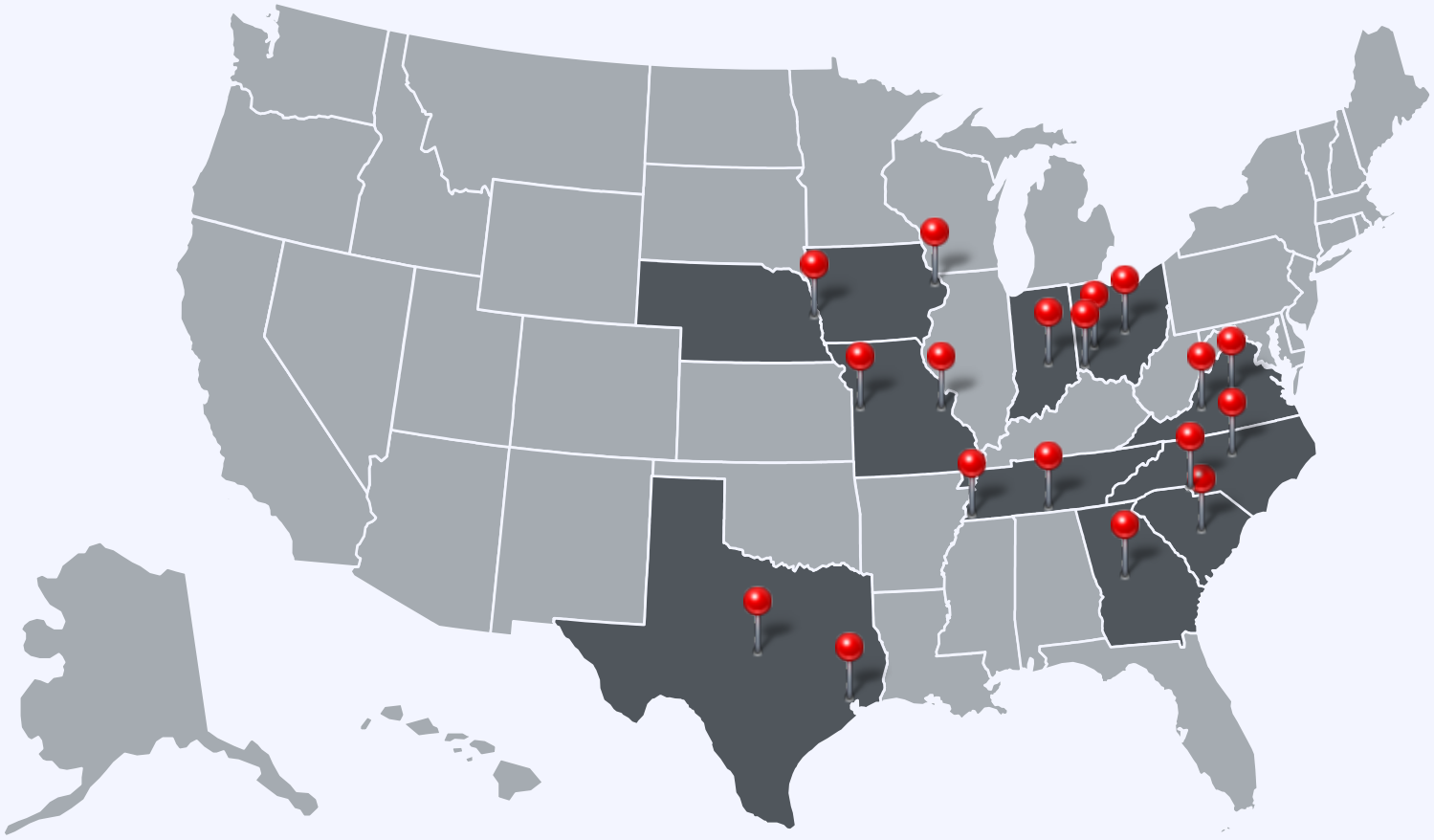
| Right Now | During Session | After Break |
| --- | --- | --- |
|  |  |  |
| Write answer on card | Compile results | Group discussion |

# **Activity:** Addressing Barriers

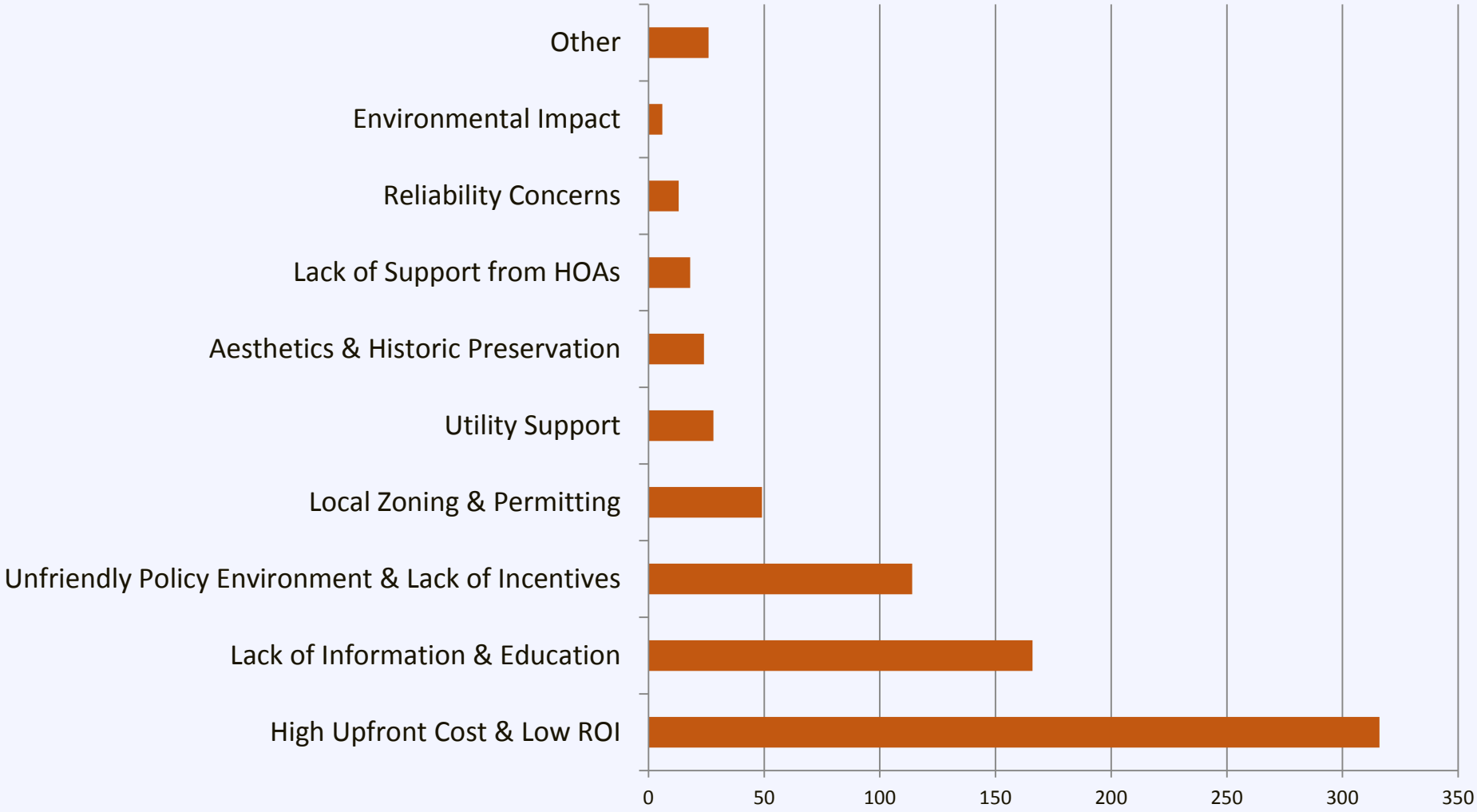
**What is the greatest barrier to solar adoption in your community? [Green Card]**

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

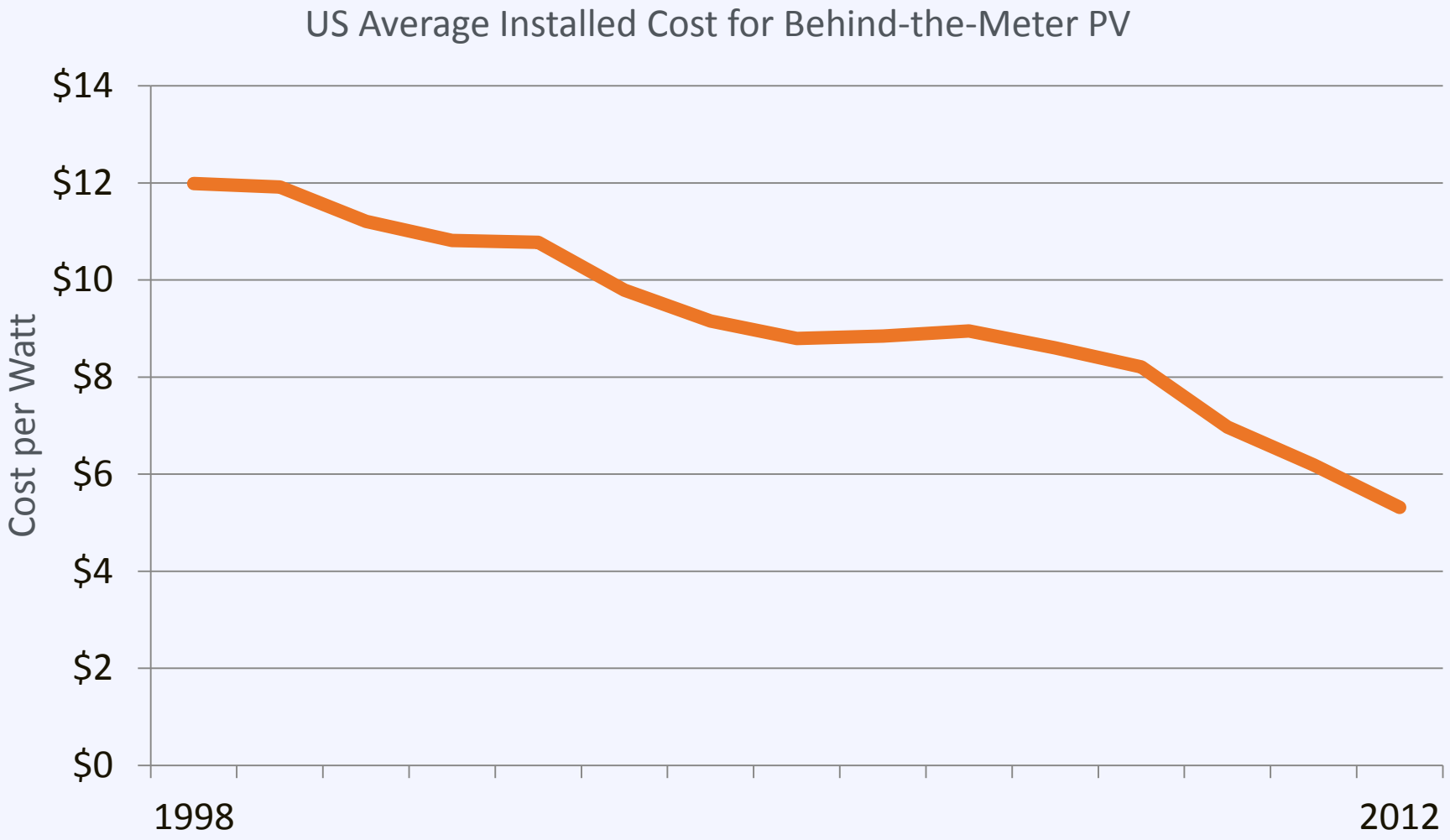
# **Activity:** Addressing Barriers



# **Activity:** Addressing Barriers

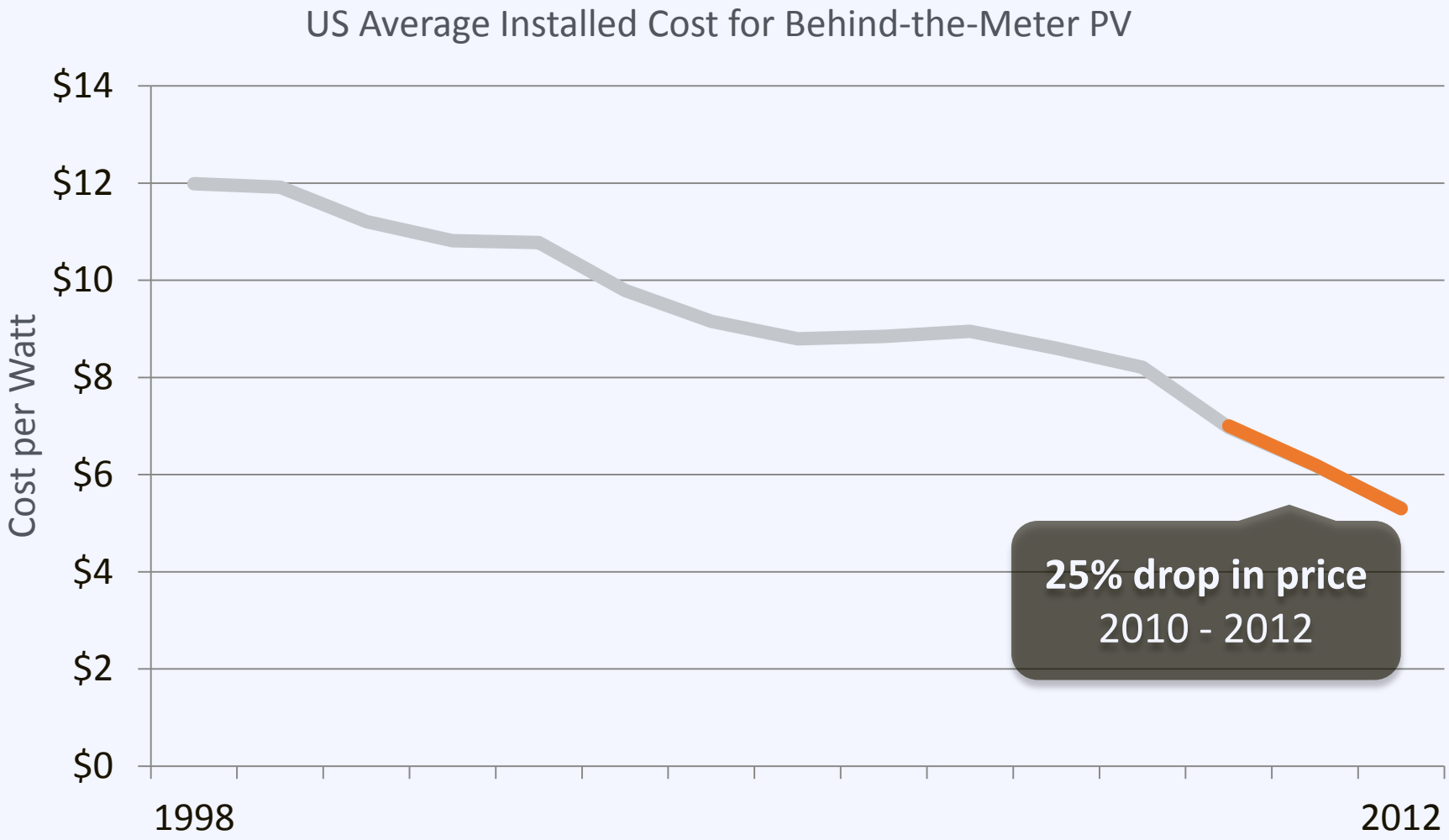


# The Cost of Solar PV




Tracking the Sun VI: The Installed Cost of Photovoltaics in the US from 1998-2012 (LBNL)

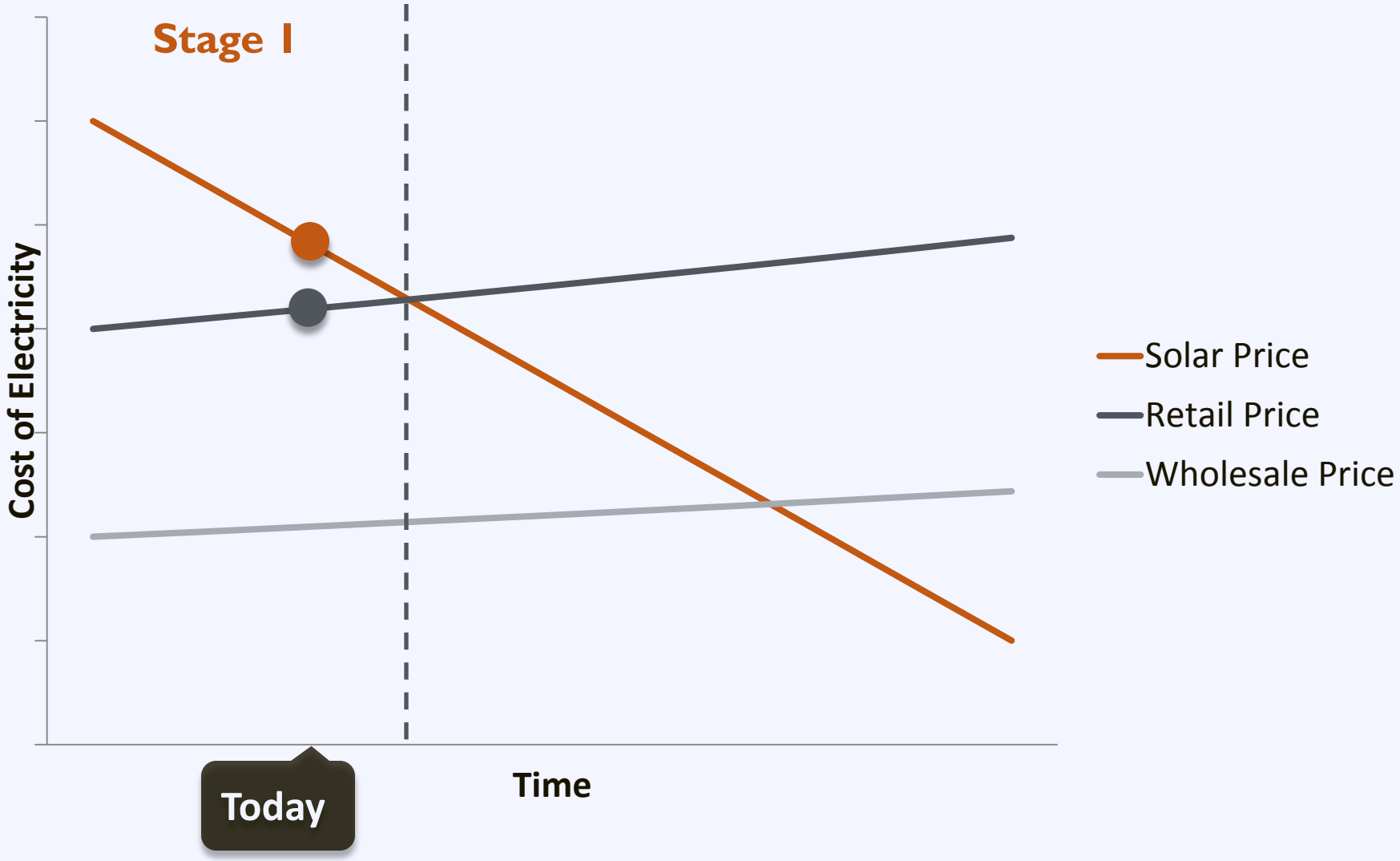
# The Cost of Solar PV




Powered by SunShot U.S. Department of Energy

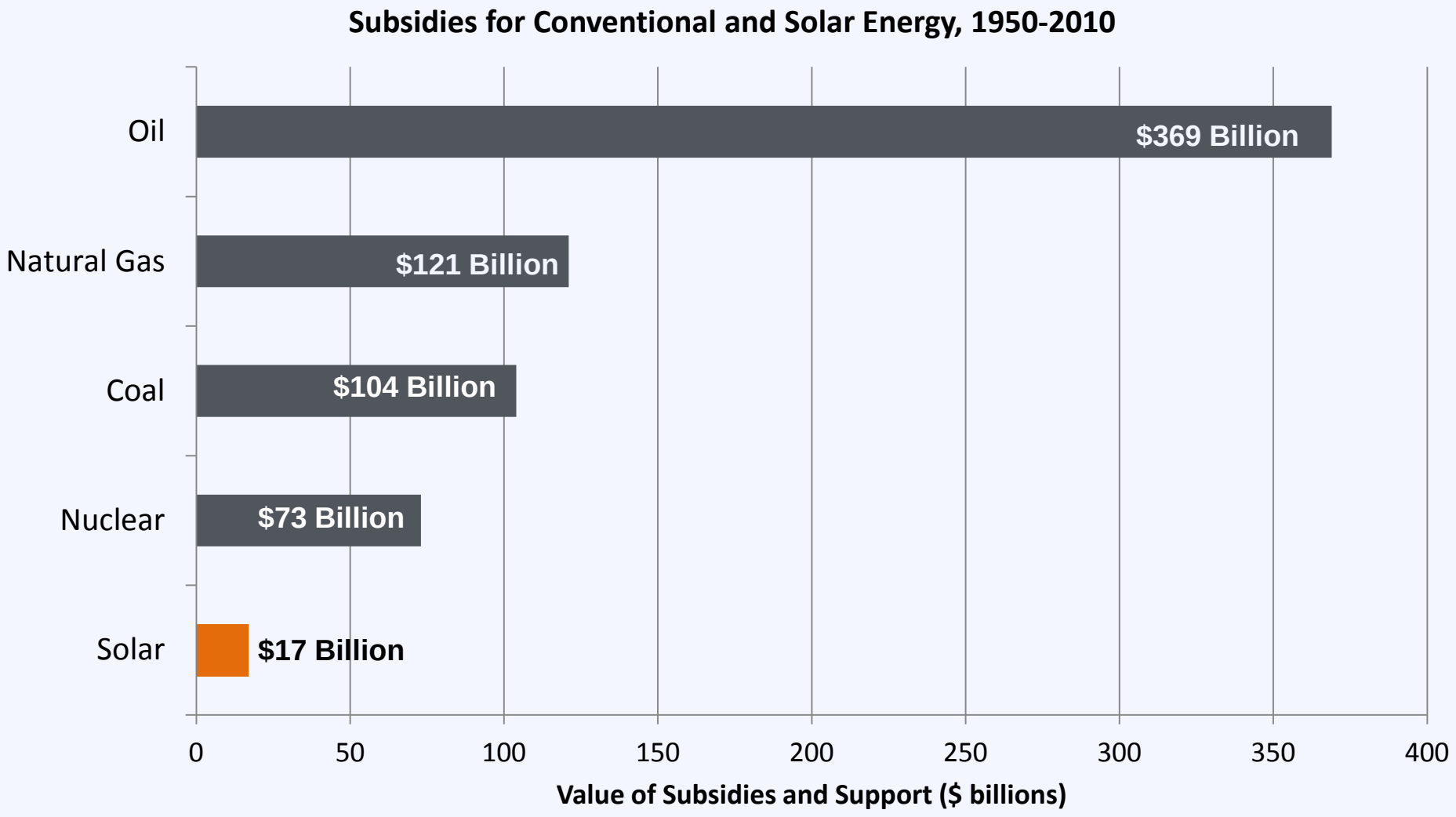
Tracking the Sun VI: The Installed Cost of Photovoltaics in the US from 1998-2012 (LBNL)

# The Cost of Solar PV



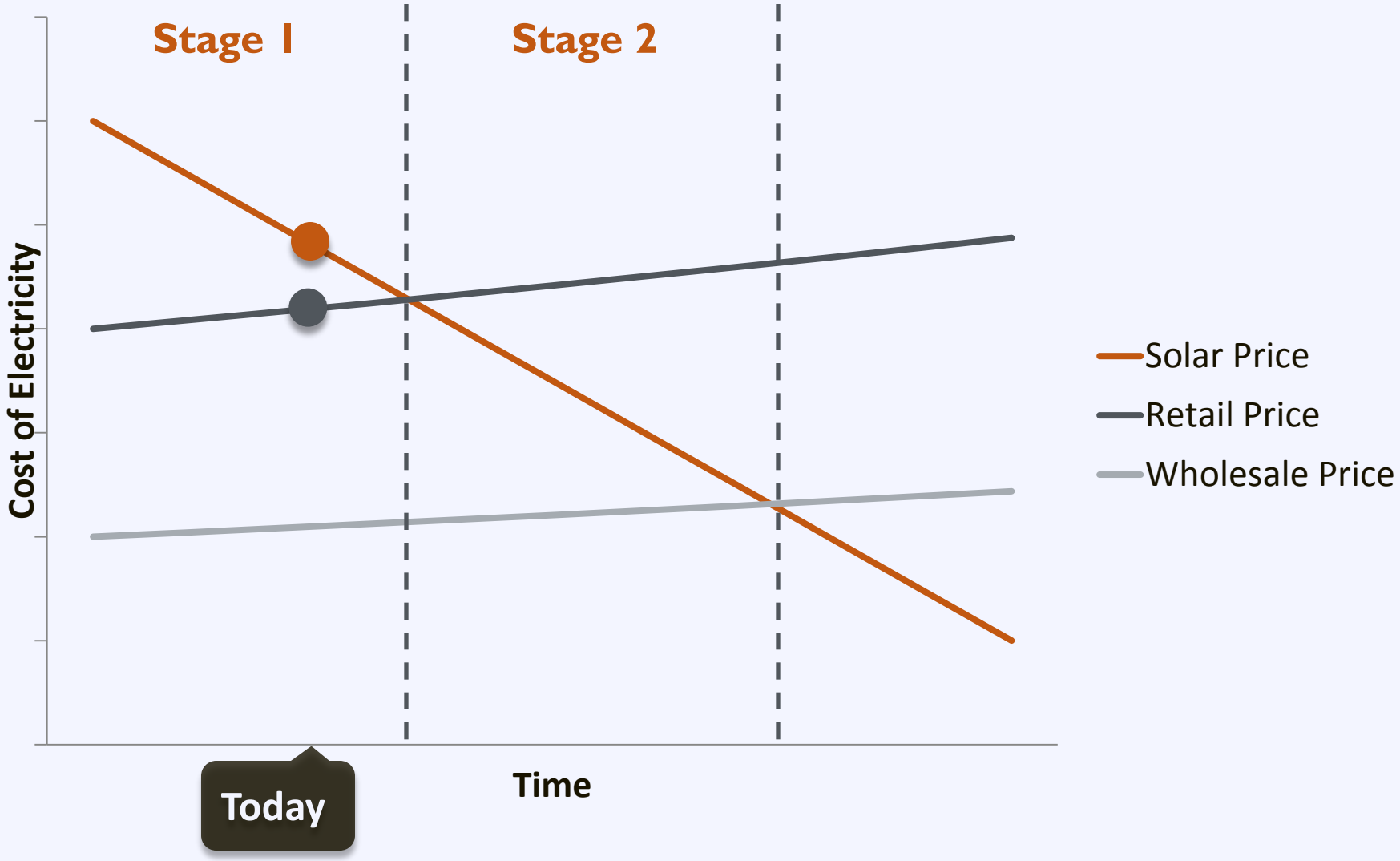

Source: Solar Electric Power Association

# Subsidies and Support



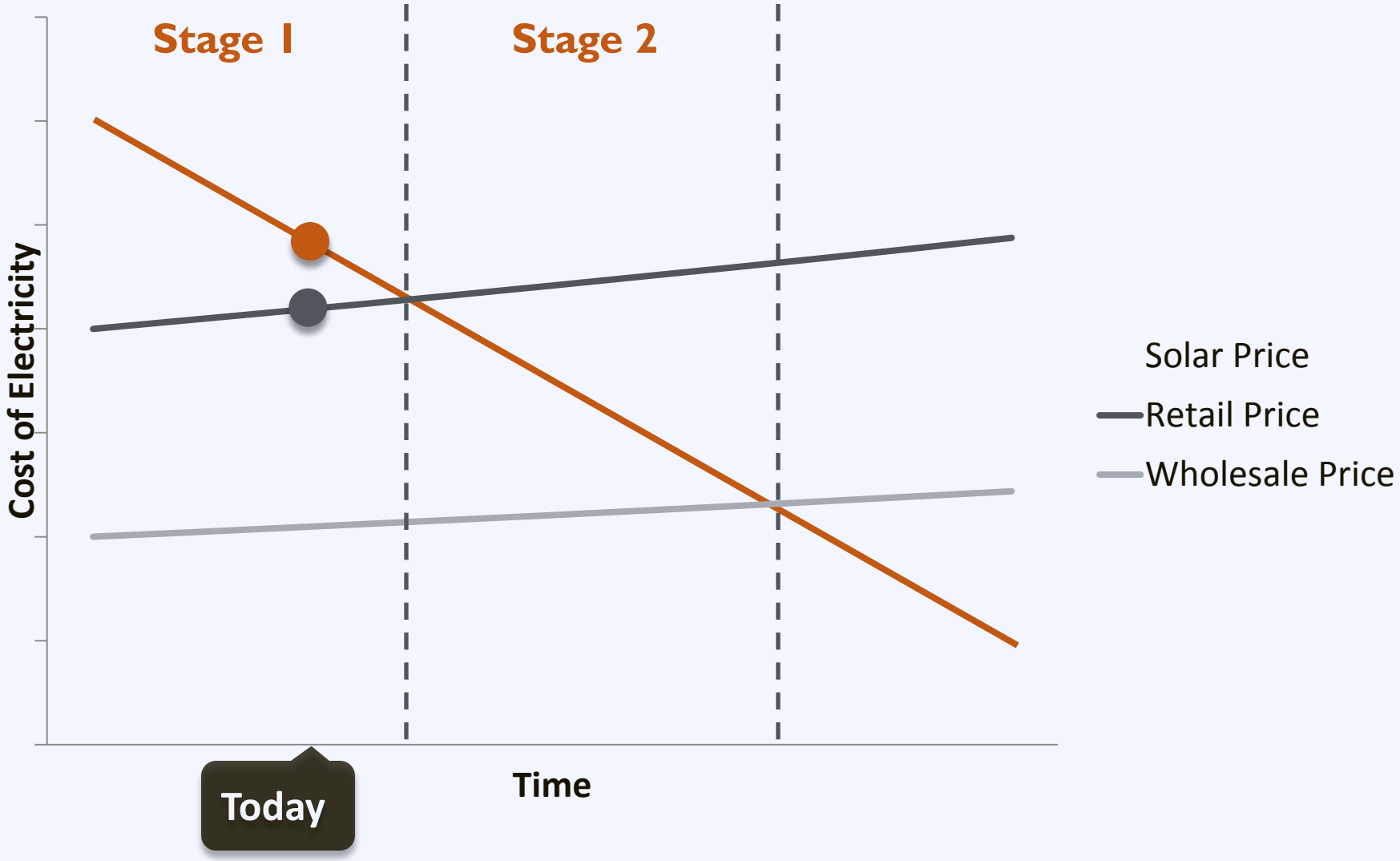

Source: Management Information Services, Inc. October 2011. *60 Years of Energy Incentives: Analysis of Federal Expenditures for Energy Development*; SEIA, May 1, 2012. *Federal Energy Incentives Report.*

# The Cost of Solar PV



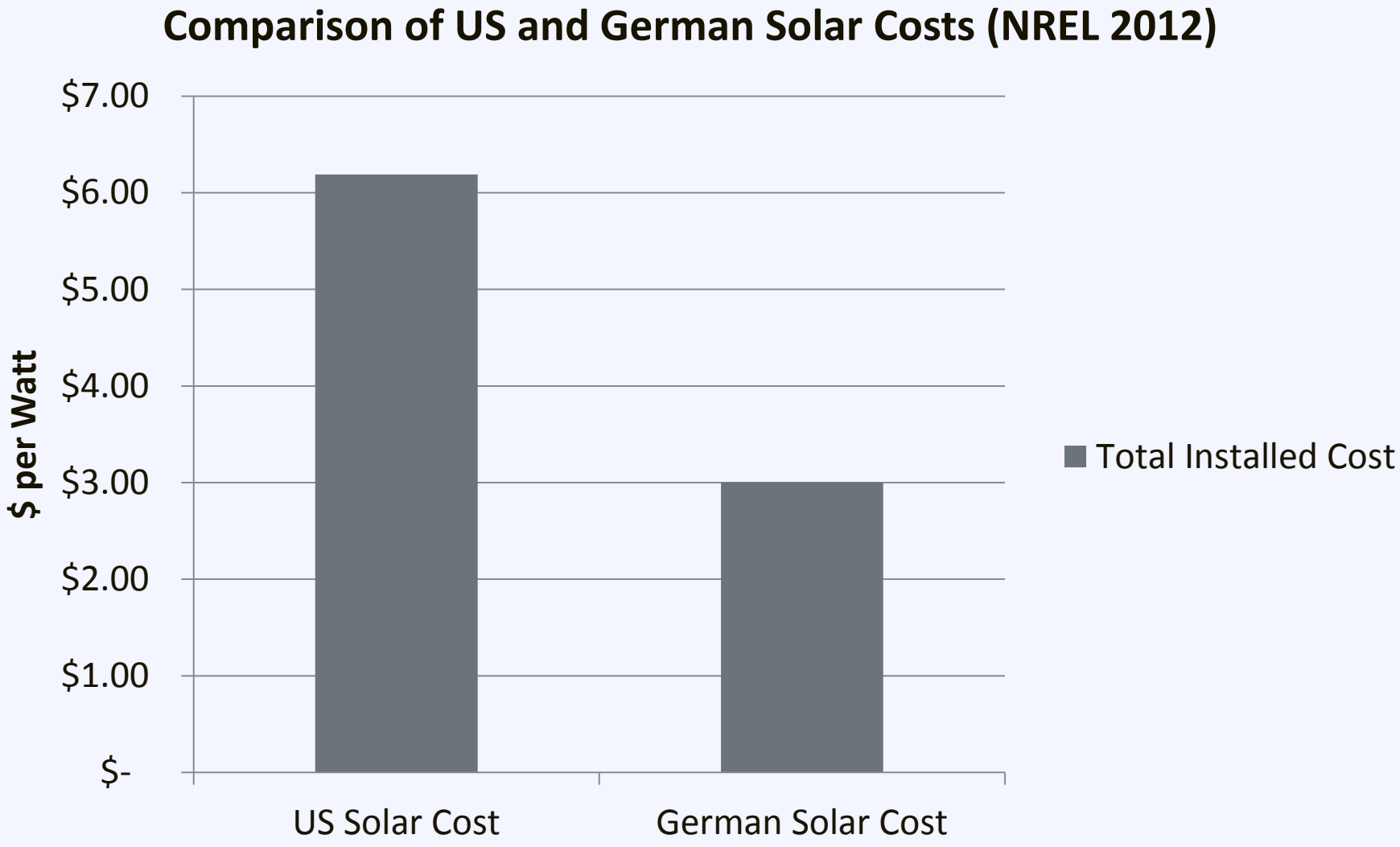

Source: Solar Electric Power Association

# The Cost of Solar PV



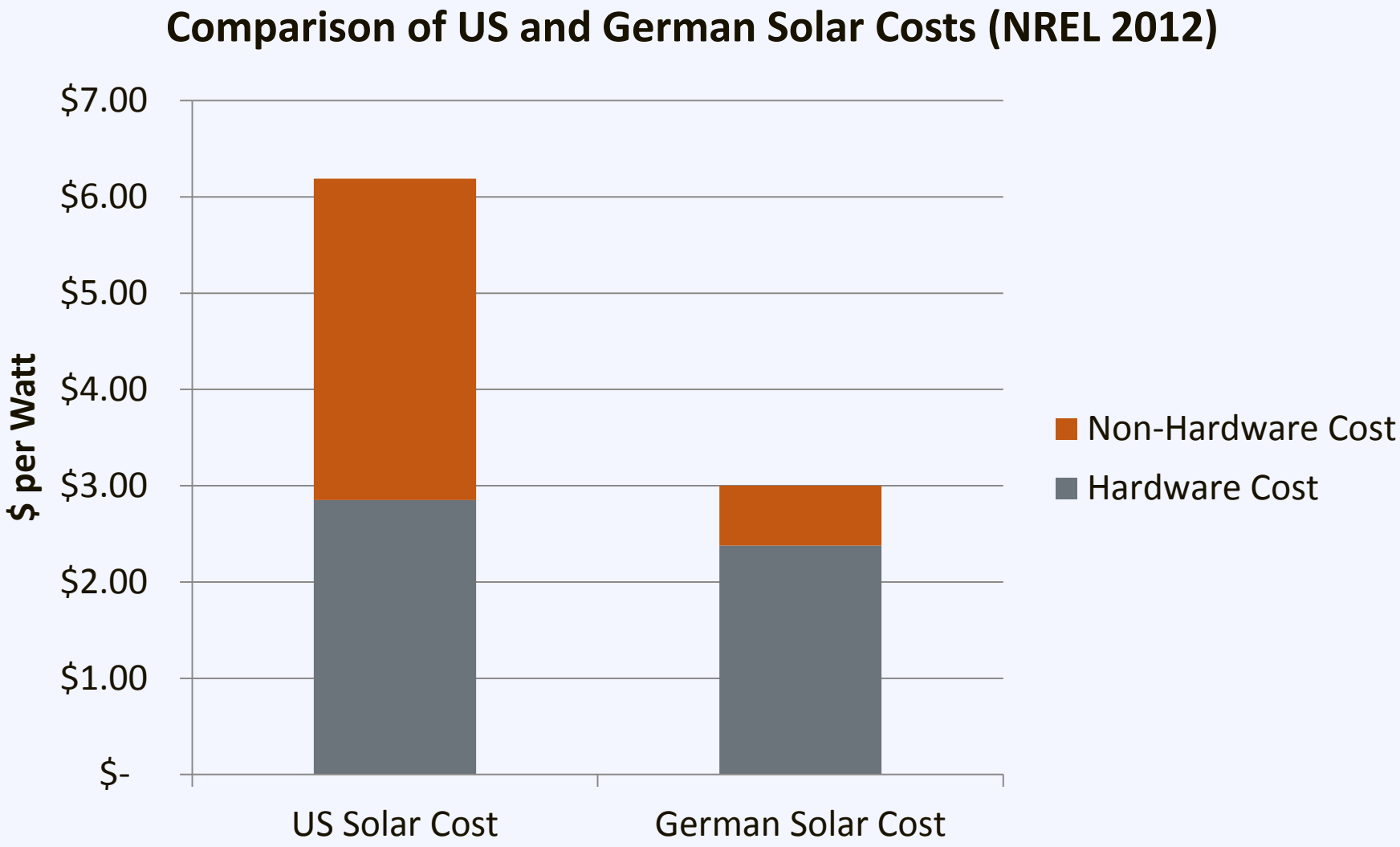

Source: Solar Electric Power Association

# The Cost of Solar in the US




Source: NREL (http://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)

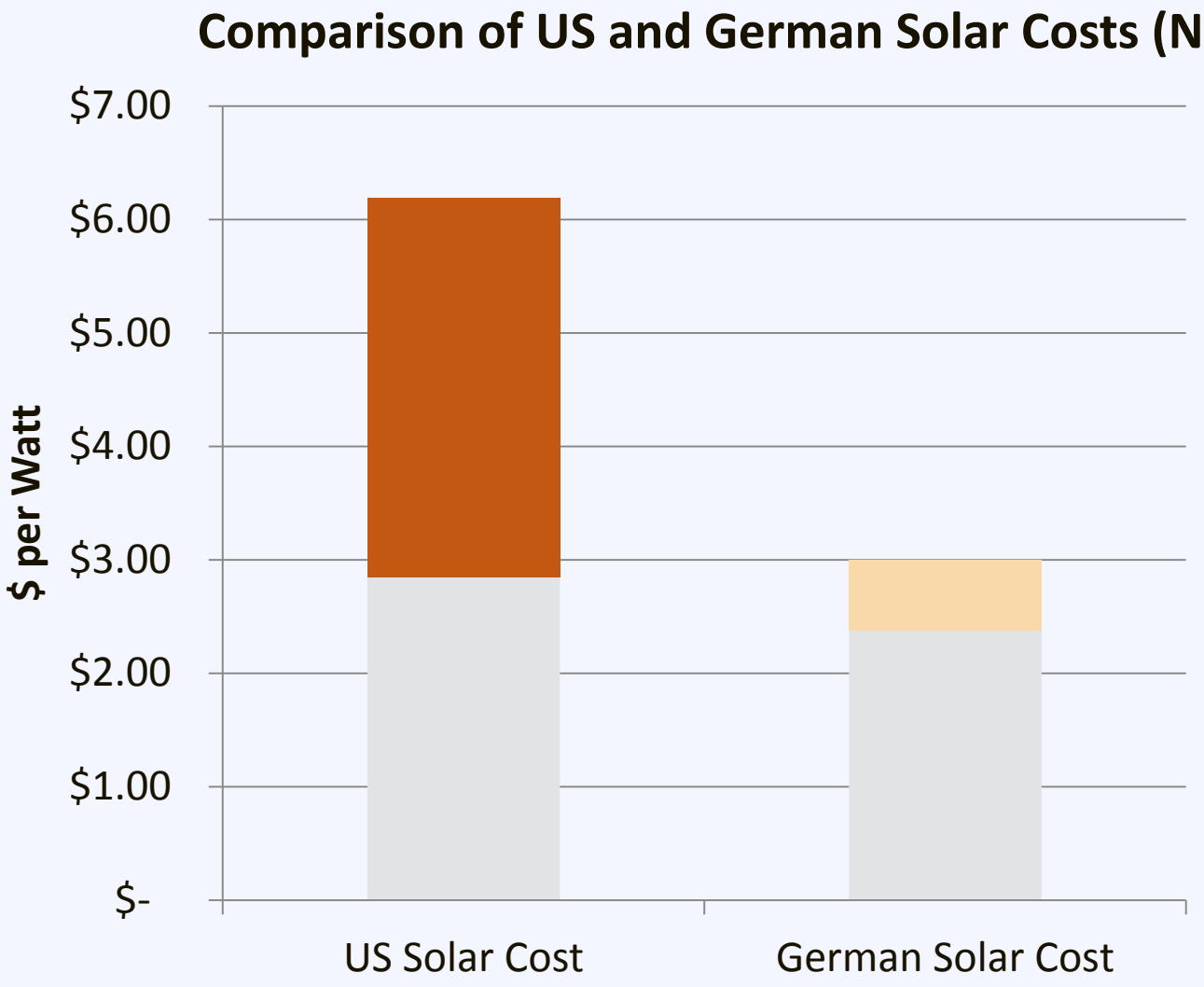
# The Cost of Solar in the US




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)

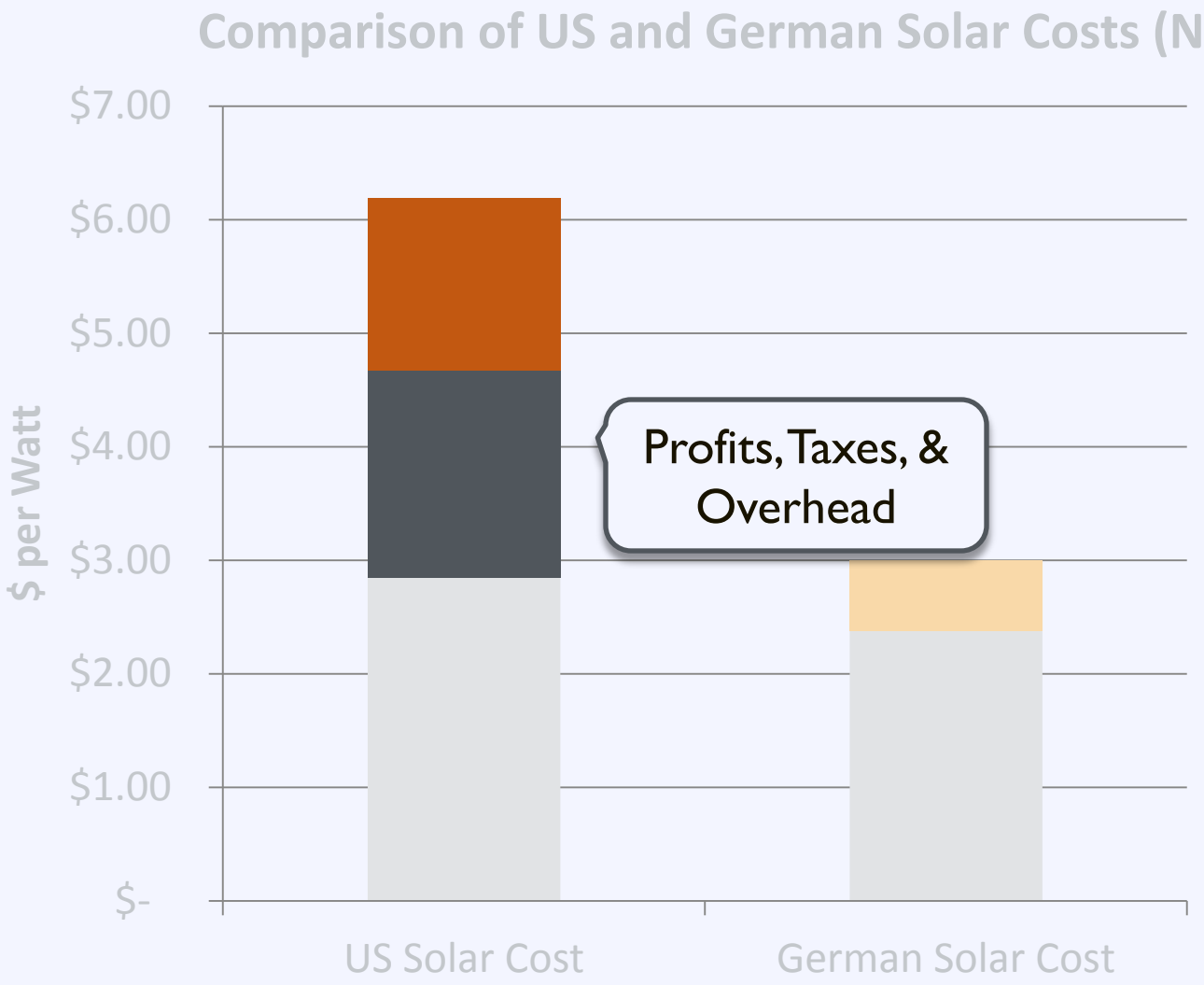
# The Cost of Solar in the US




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)

Powered by SunShot U.S. Department of Energy

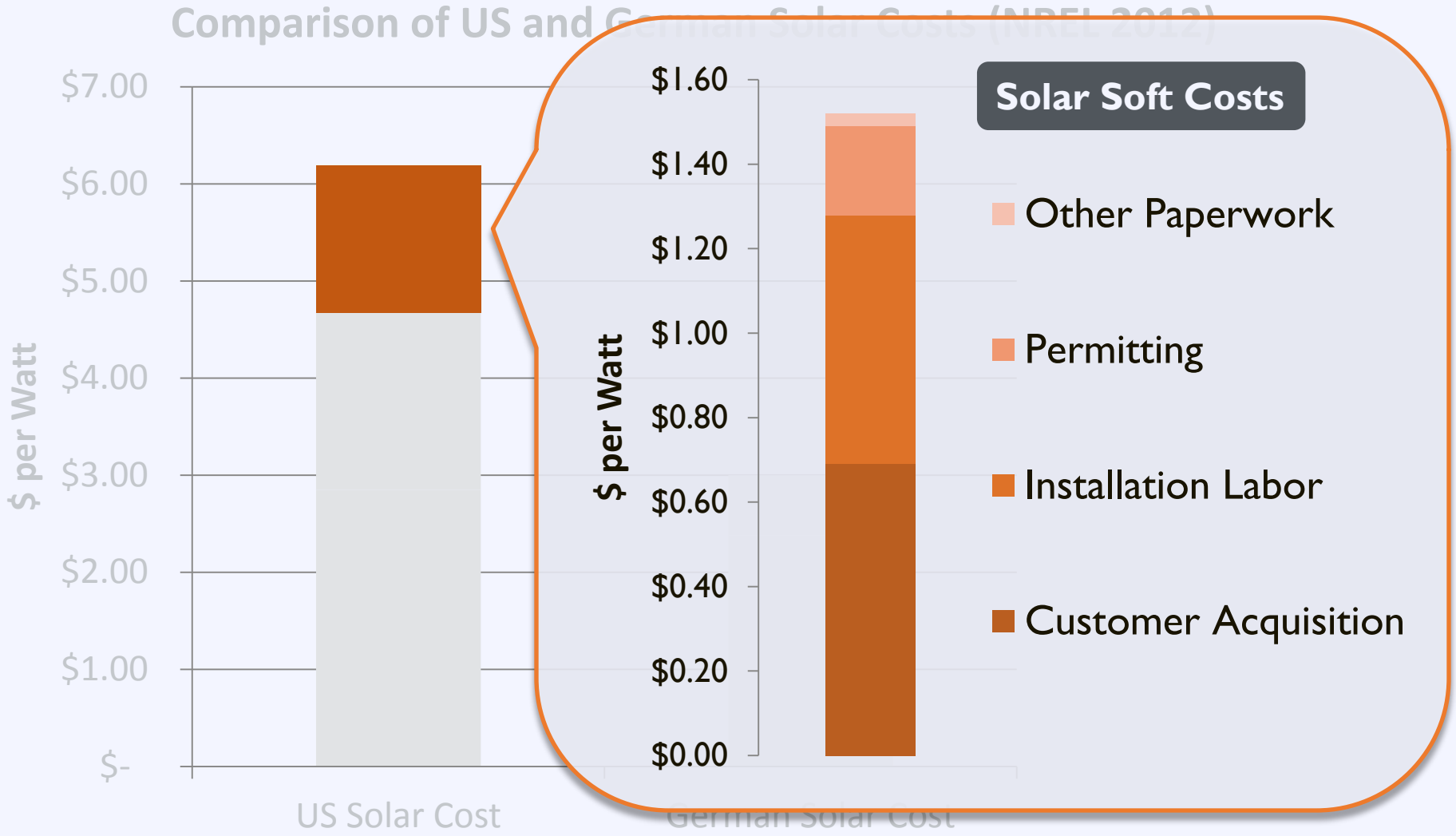
# The Cost of Solar in the US




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)

# The Cost of Solar in the US




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)

# **Challenge:** Installation Time

**New York City's Goal**

100 days

from inception to completion

**Germany Today**

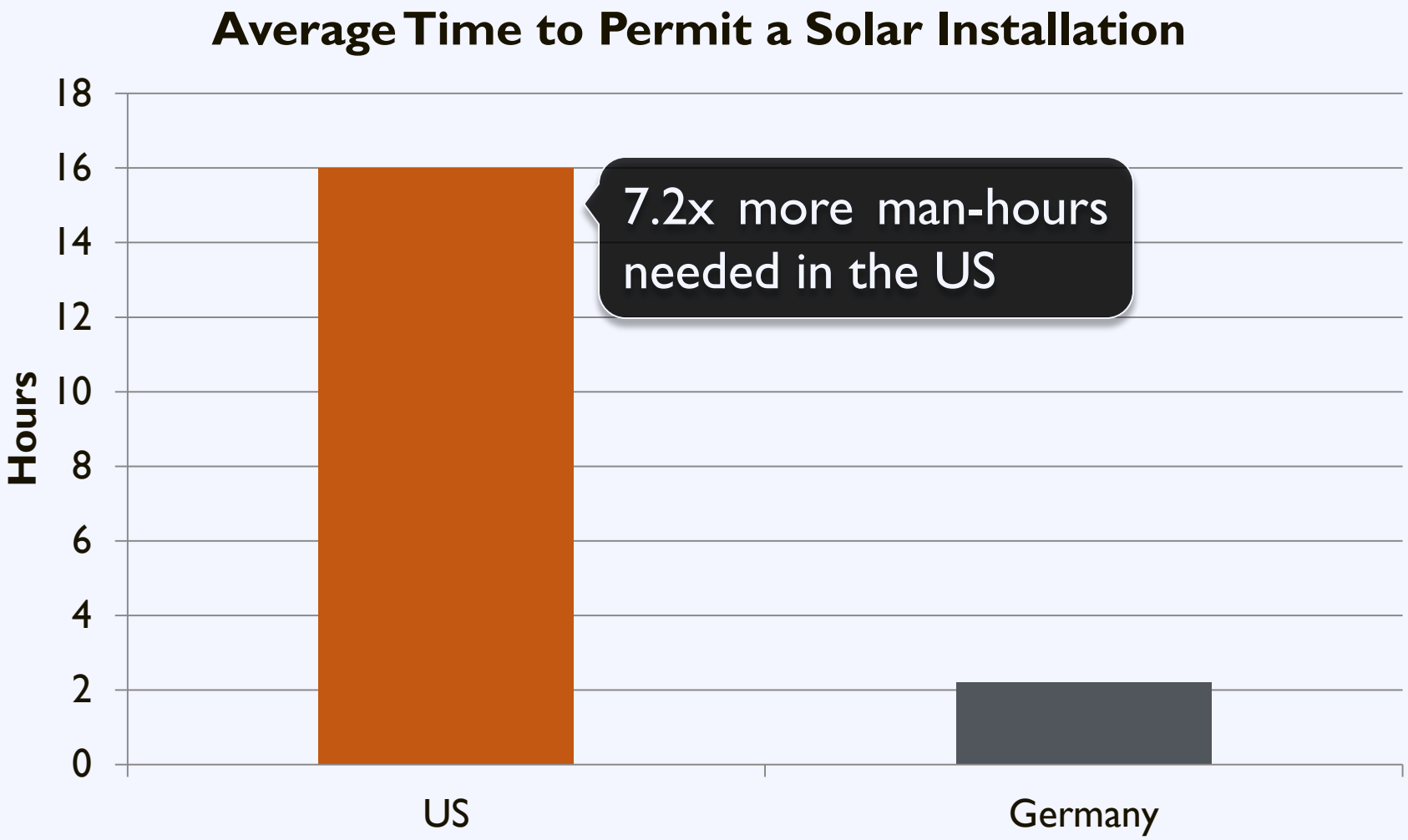
8 days

from inception to completion

Powered by SunShot U.S. Department of Energy

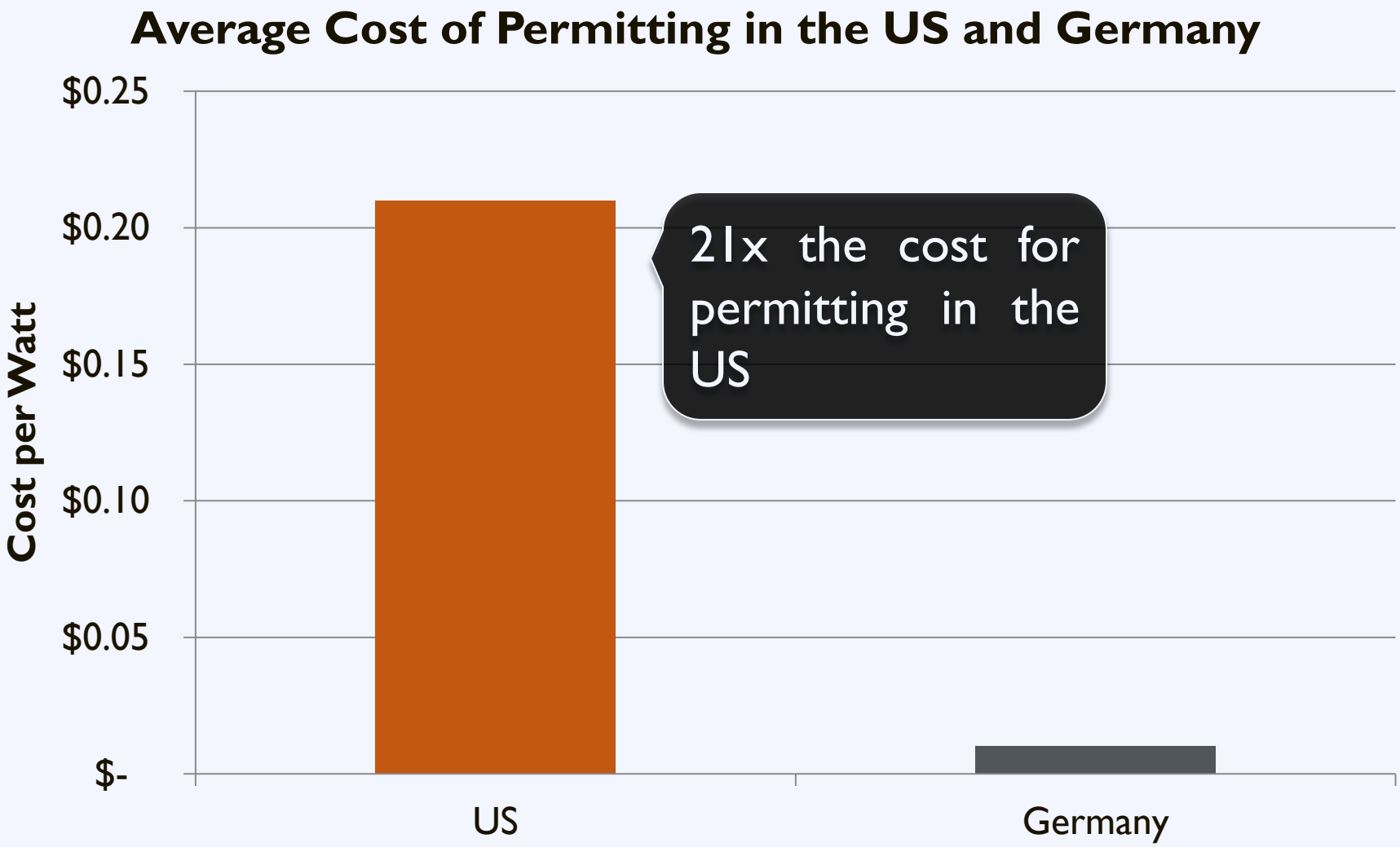
Photon Magazine

# Time to Installation




Source: NREL, LBNL

# Permitting Costs




Source: NREL, LBNL

# Germany's Success

Consistency and Transparency

through

**Standardized Processes**

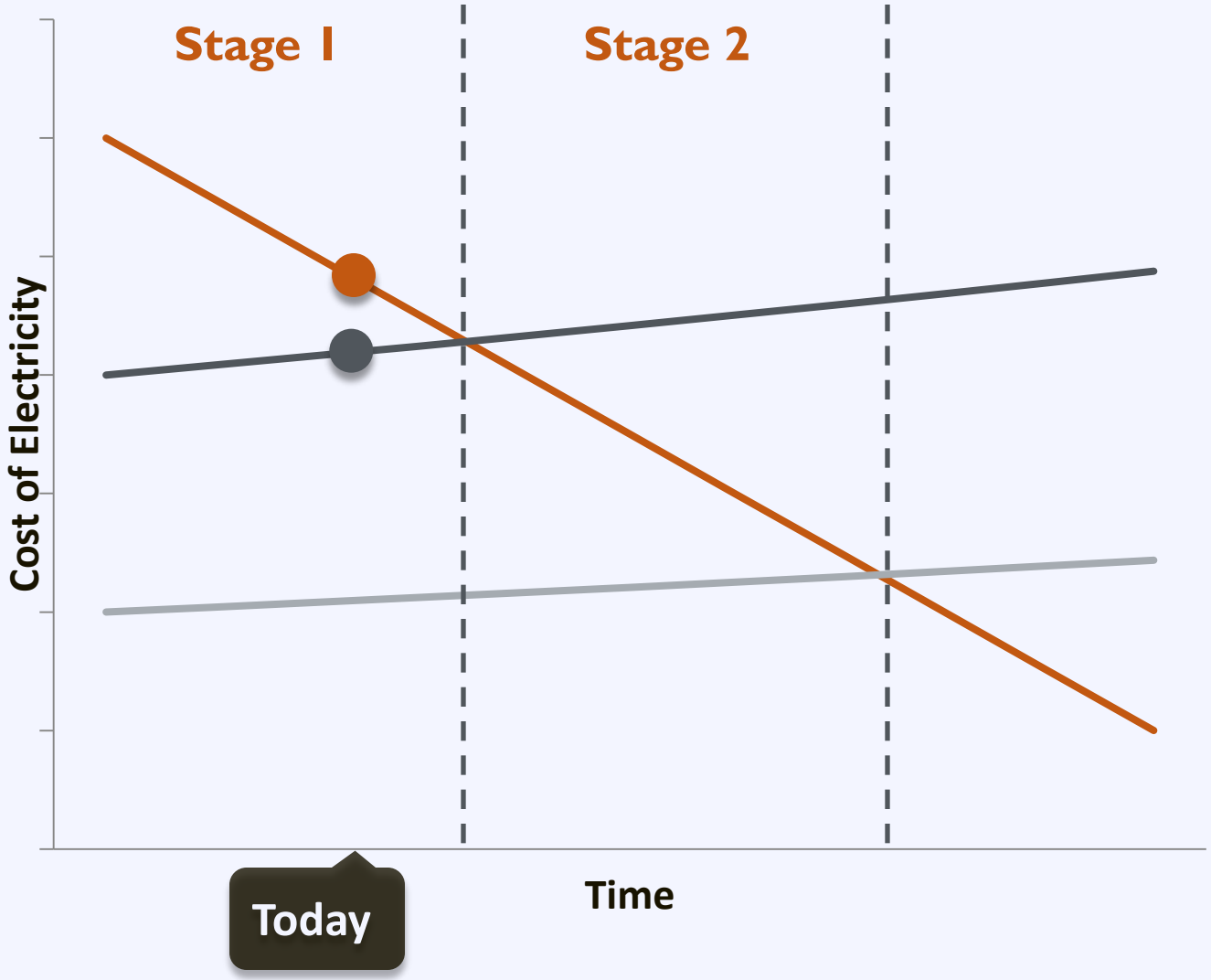
# Workshop Goal

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

# Agenda

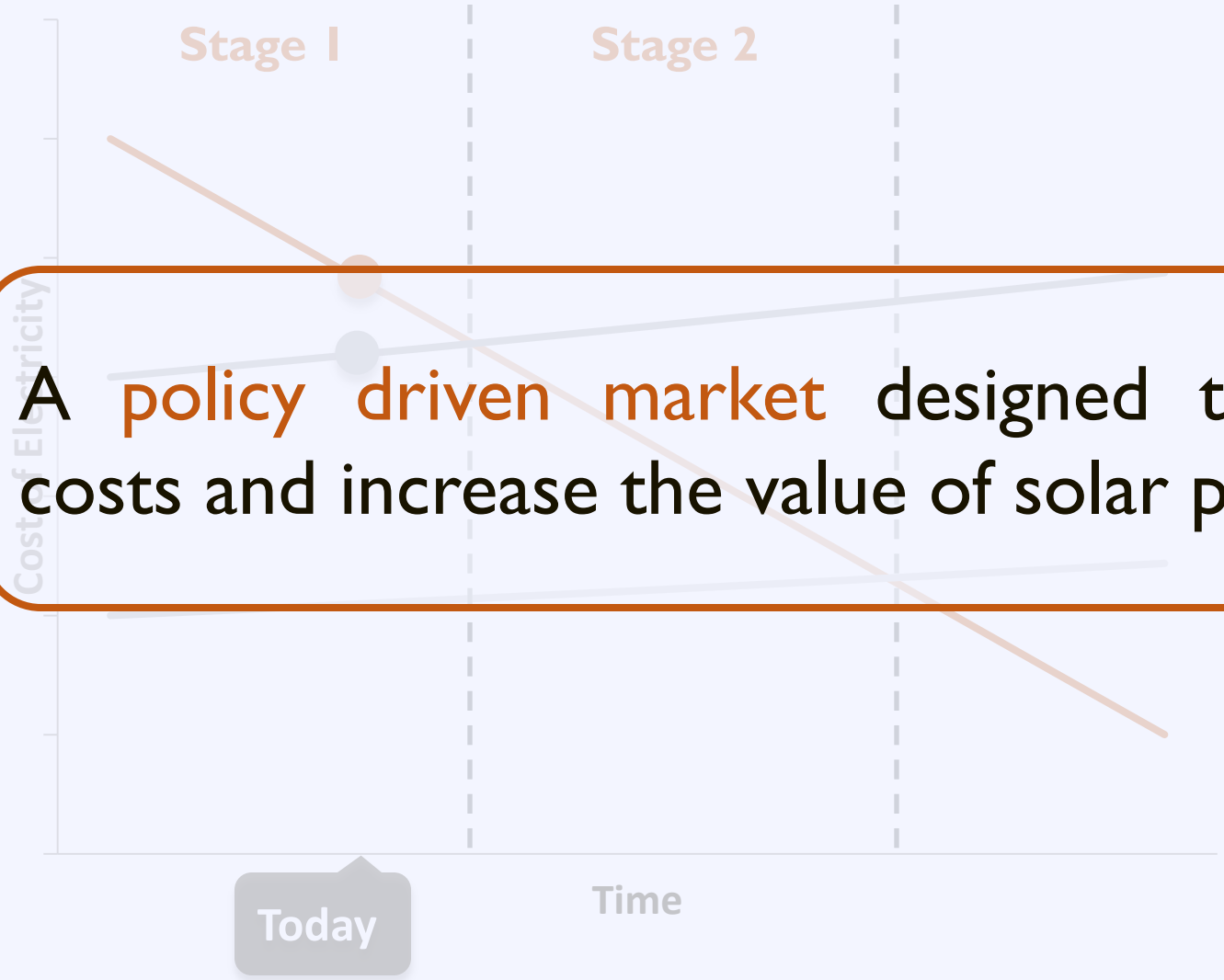
| | |
|---|---|
| 08:40 – 09:00 | Solar 101 for Communities |
| 09:00 – 09:30 | Understanding the Solar Regulatory Landscape |
| 09:30 – 09:45 | Permitting Solar Projects in Vermont |
| 09:45 – 09:55 | *Break* |
| 09:55 – 10:10 | Benefits and Barriers Activity |
| 10:10 – 10:40 | Introduction to Solar Project Finance |
| 10:40 – 11:00 | Growing Your Local Solar Market |
| 11:10 – 11:10 | *Break* |
| 11:10 – 12:15 | Regional Perspective: Panel of Local Speakers |

# 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

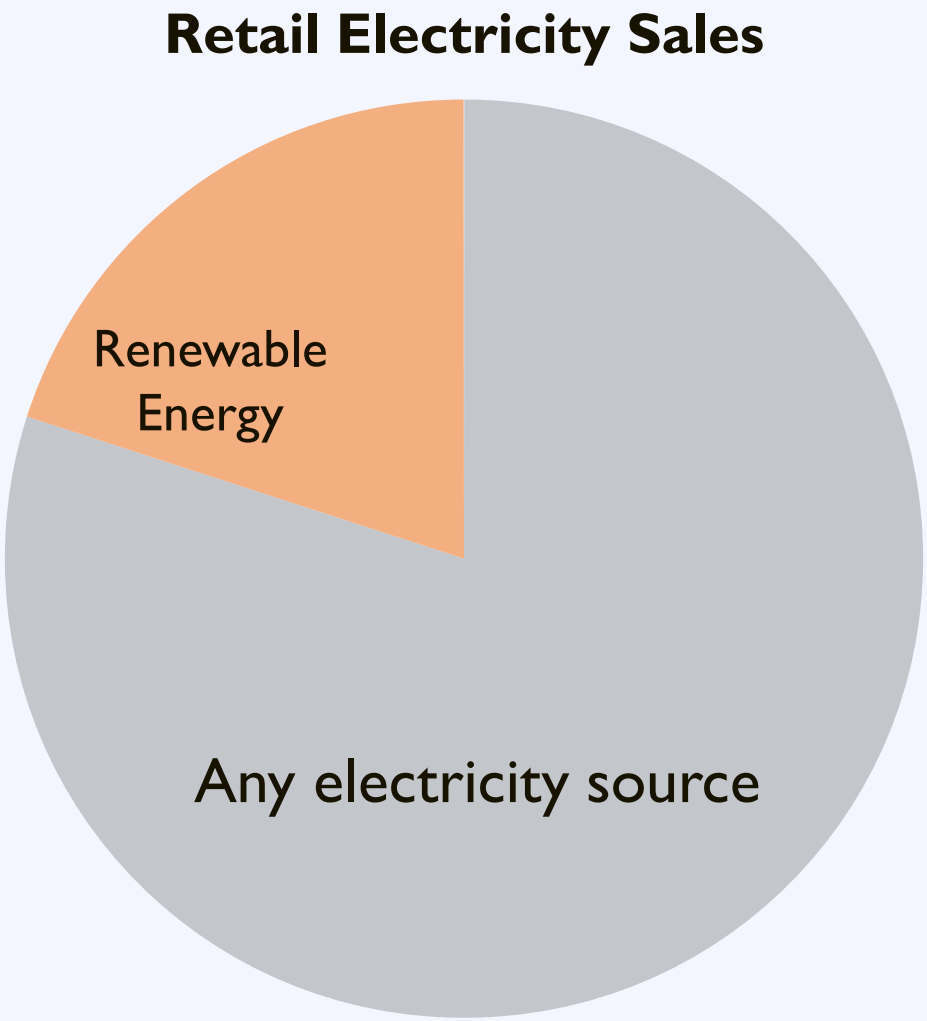
# A Policy Driven Market

| | | | |
|---|---|---|---|
| **Federal** | Investment Tax Credit | Accelerated Depreciation | Qualified Energy Conservation Bond |
| **State & Utility** | Renewable Portfolio Standard | Net Metering/ Interconnection | Solar Access |
| | Permitting & Interconnection | Tax Credits & Exemptions | Direct Cash & Performance Incentives |
| **Local** | Property Assessed Clean Energy | Solarize | |

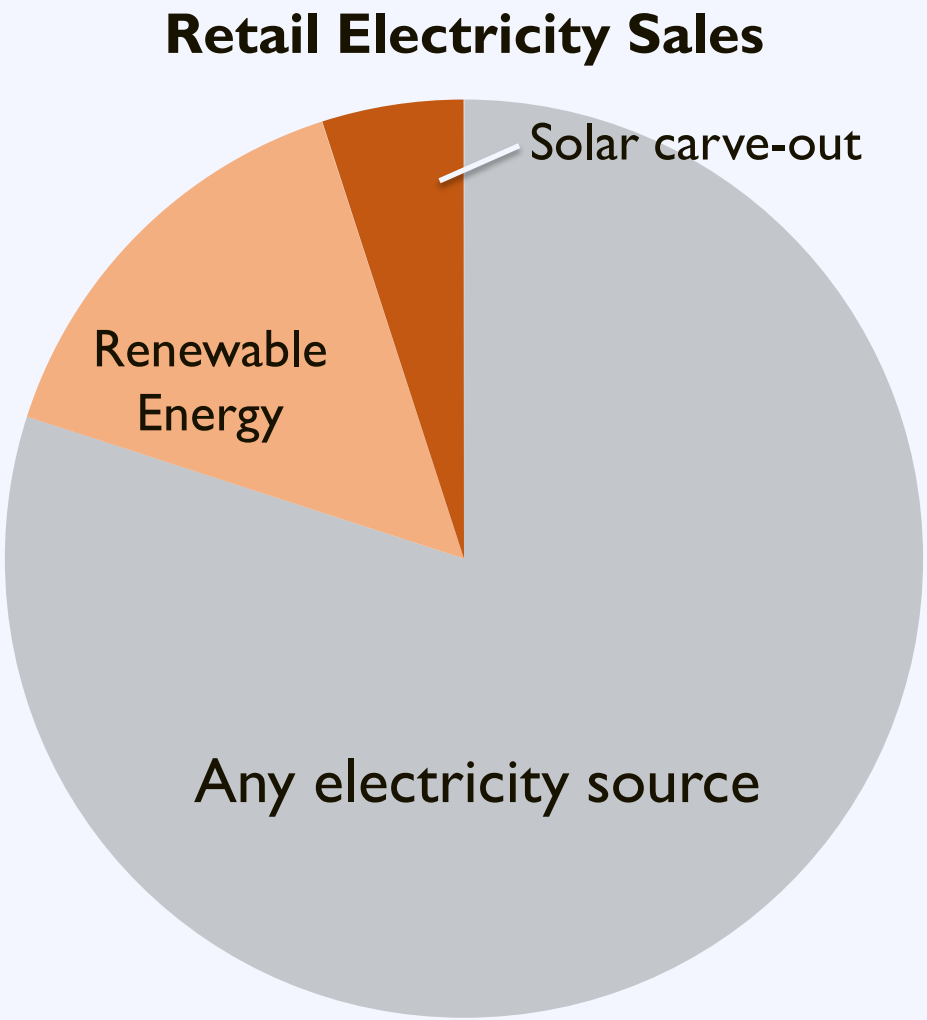
# A Policy Driven Market

| | | | |
|---|---|---|---|
| **Federal** | Investment Tax Credit | Accelerated Depreciation | Qualified Energy Conservation Bond |
| **State & Utility** | Renewable Portfolio Standard | Net Metering/ Interconnection | Solar Access |
| | Permitting & Interconnection | Tax Credits & Exemptions | Direct Cash & Performance Incentives |
| **Local** | Property Assessed Clean Energy | Solarize | |

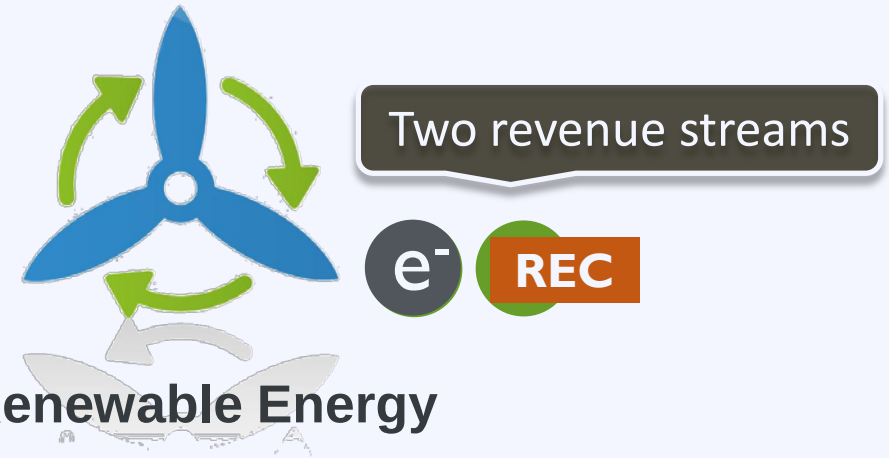
# Renewable Portfolio Standard



# Renewable Portfolio Standard

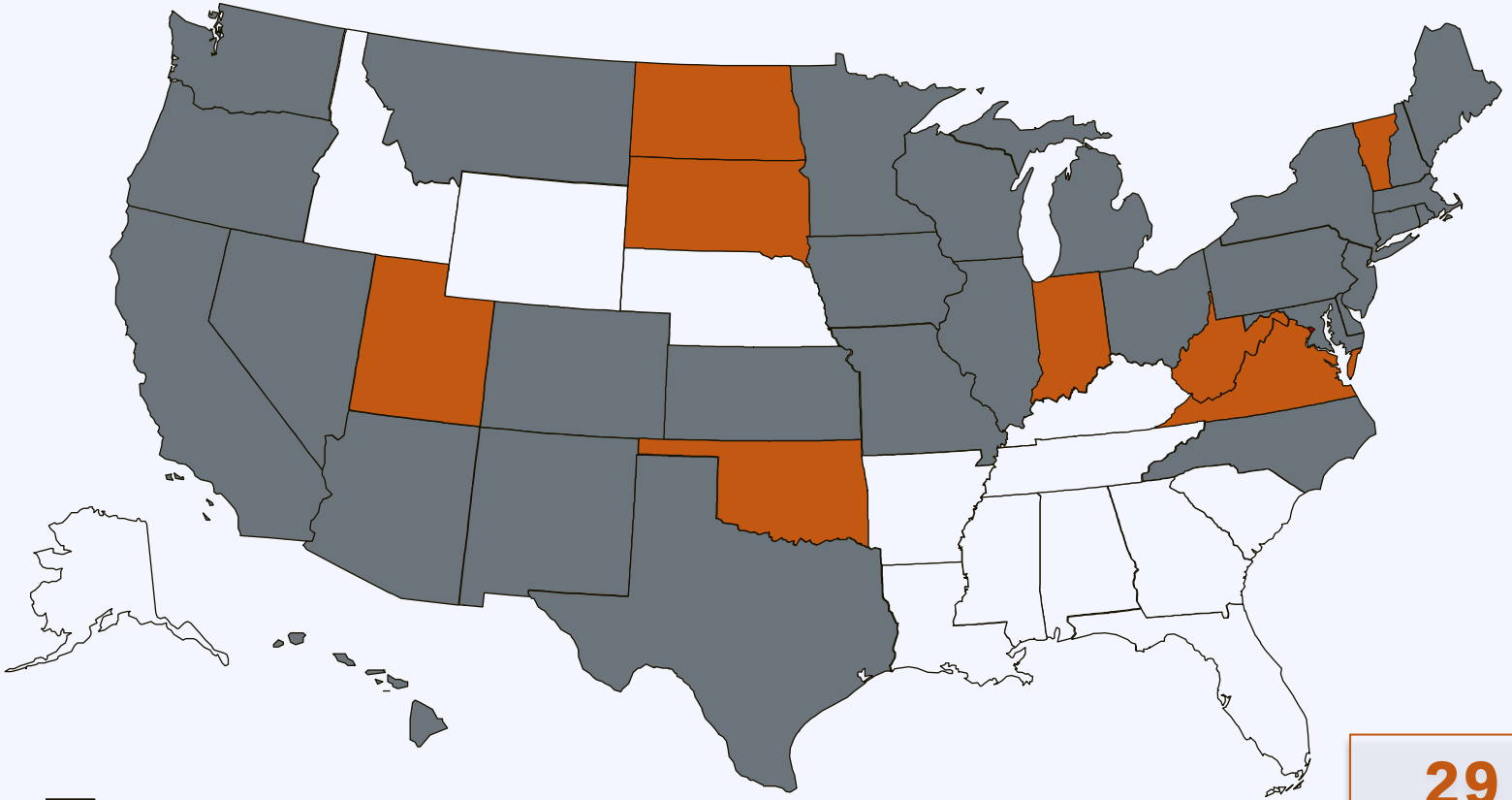


# Renewable Portfolio Standard


# Renewable Portfolio Standard

**www.dsireusa.org / August 2012**




**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

# **RPS Impacts:** Solar Deployment

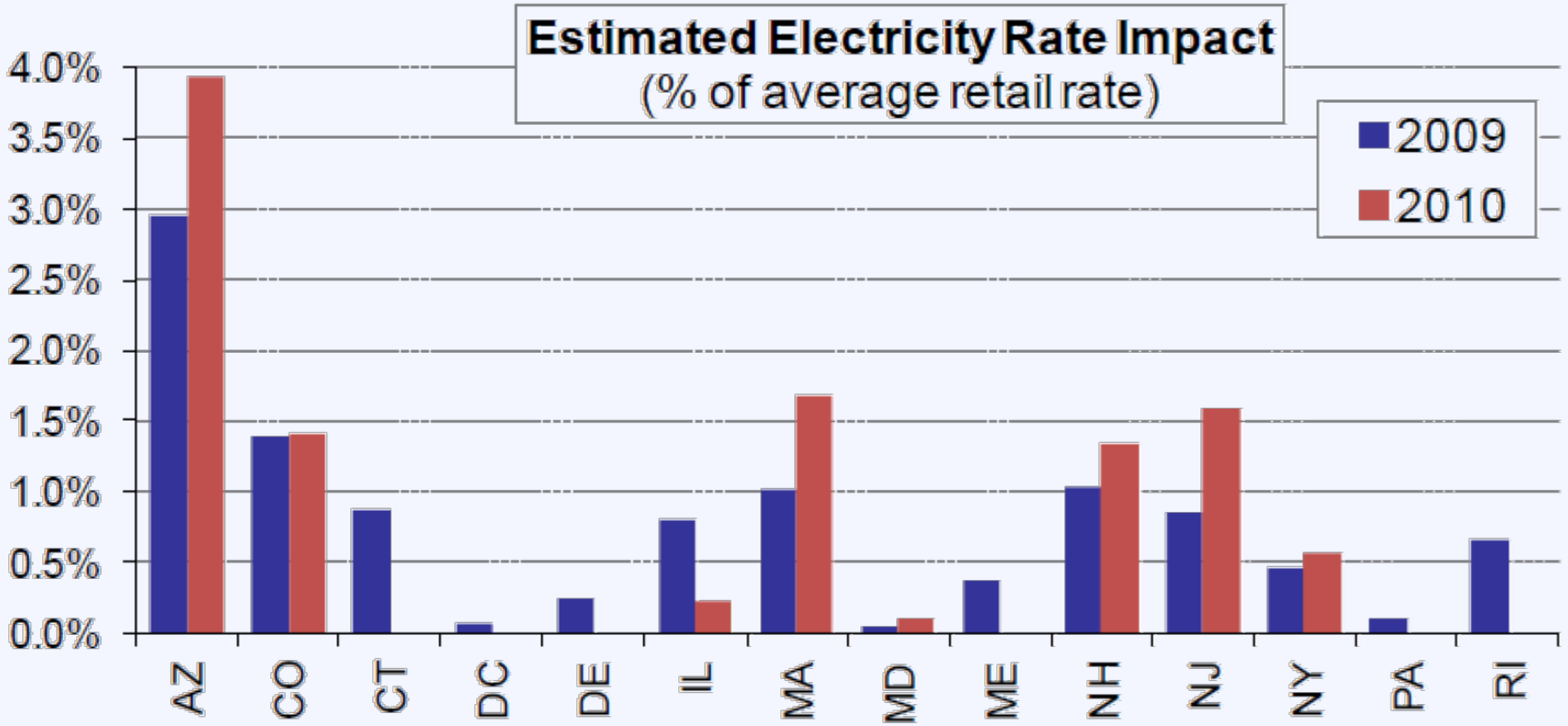
**RPS and Solar/DG Status of Top Ten Solar States by Cumulative Installed Capacity (as of Q4 2012)**

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

Powered by SunShot U.S. Department of Energy

Source: DSIRE Solar (http://dsireusa.org/documents/summarymaps/Solar_DG_RPS_map.pdf ); Solar Energy Industries Association/ GTM Research *Solar Market Insight 2012 Year-in-Review*

# RPS Impacts: Retail Rates




*States not included if data on incremental RPS compliance costs are unavailable (CA, IA, HI, MN, MT, NC, NM, NV, OH, TX, WI) or if RPS did not apply in 2009-10 (KS, MI, MO, OR, WA).*

Powered by SunShot U.S. Department of Energy

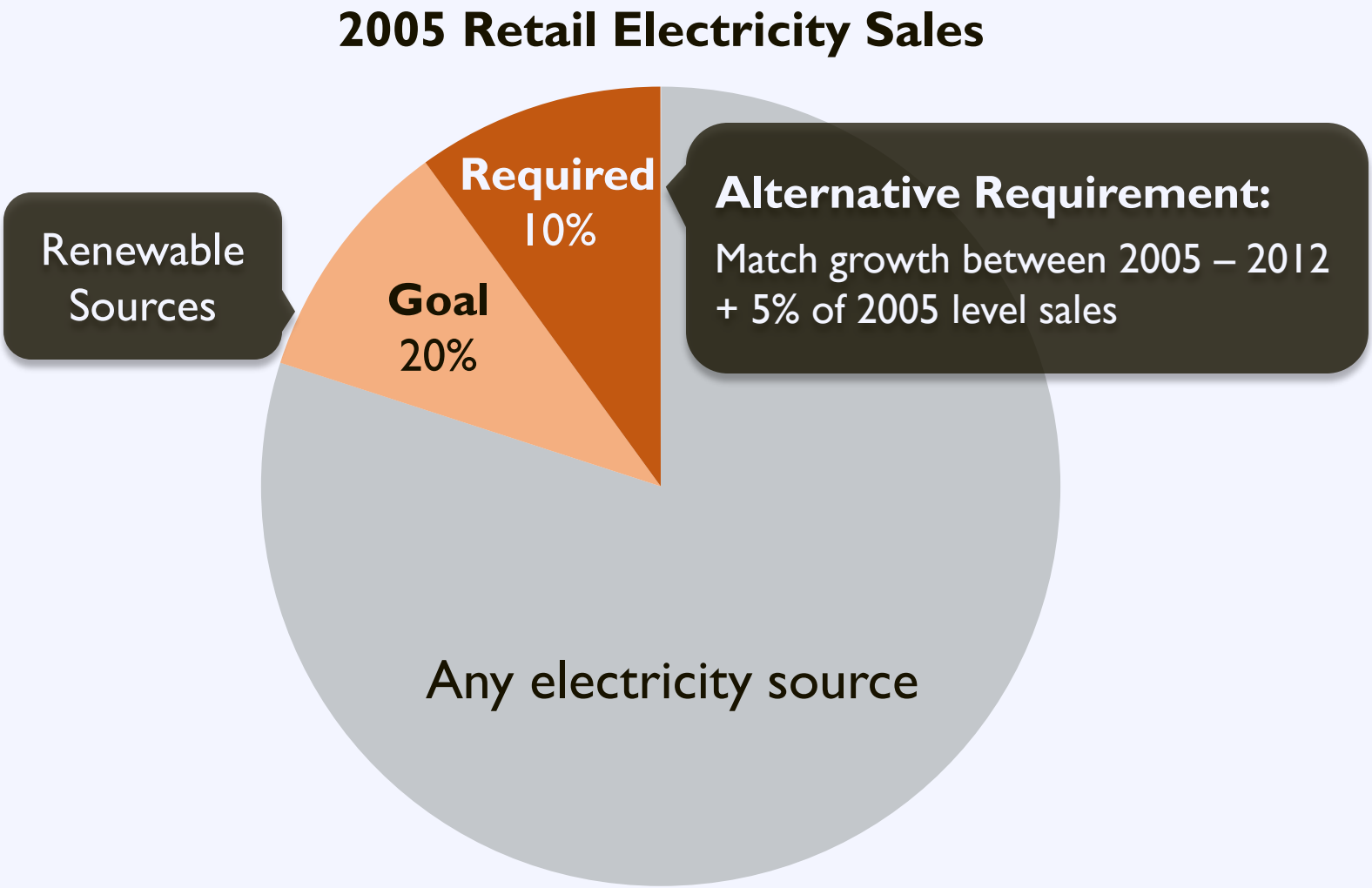
Source: Lawrence Berkeley National Laboratory. *Renewable Portfolio Standards in the United States: A Status Update*. December 2012. www.cleanenergystates.org/assets/2012-Files/RPS/RPS-SummitDec2012Barbose.pdf

# **SPEED:** Vermont's Alternative to RPS

## Sustainably Priced Energy Enterprise Development (SPEED):

- Not a Renewable Portfolio Standard
- Sets purchase goals and minimum requirements
- RPS triggered if minimum requirements are not met
- Intent is to promote long-term contracts

# **SPEED:** Goal by 2017




Powered by SunShot
U.S. Department of Energy

Source: DSIRE

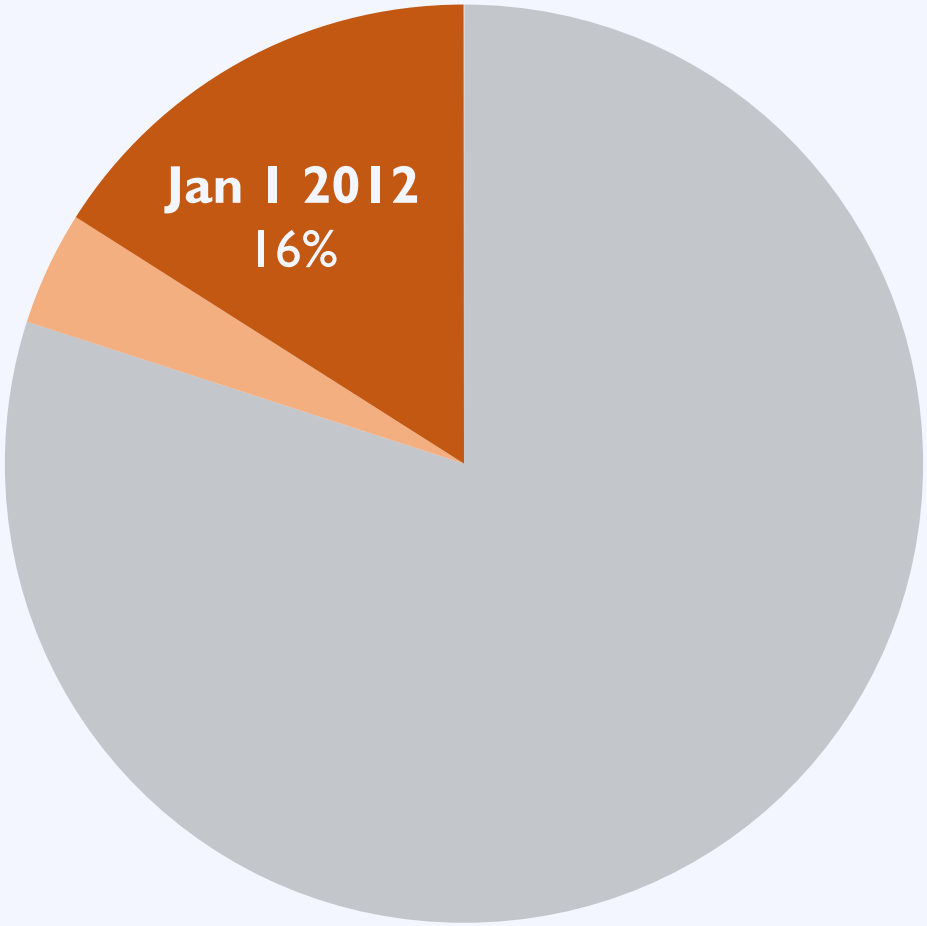
# **SPEED:** Comparison with RPS

## How SPEED differs from an RPS:

- Utilities are not required to purchase RECs
- Utilities can meet obligations through long term power purchase contracts:
  - With independent power producers
  - With individuals
  - With out of state generators

# **SPEED:** Progress

## 2005 Retail Electricity Sales




Source: DSIRE

# A Policy Driven Market

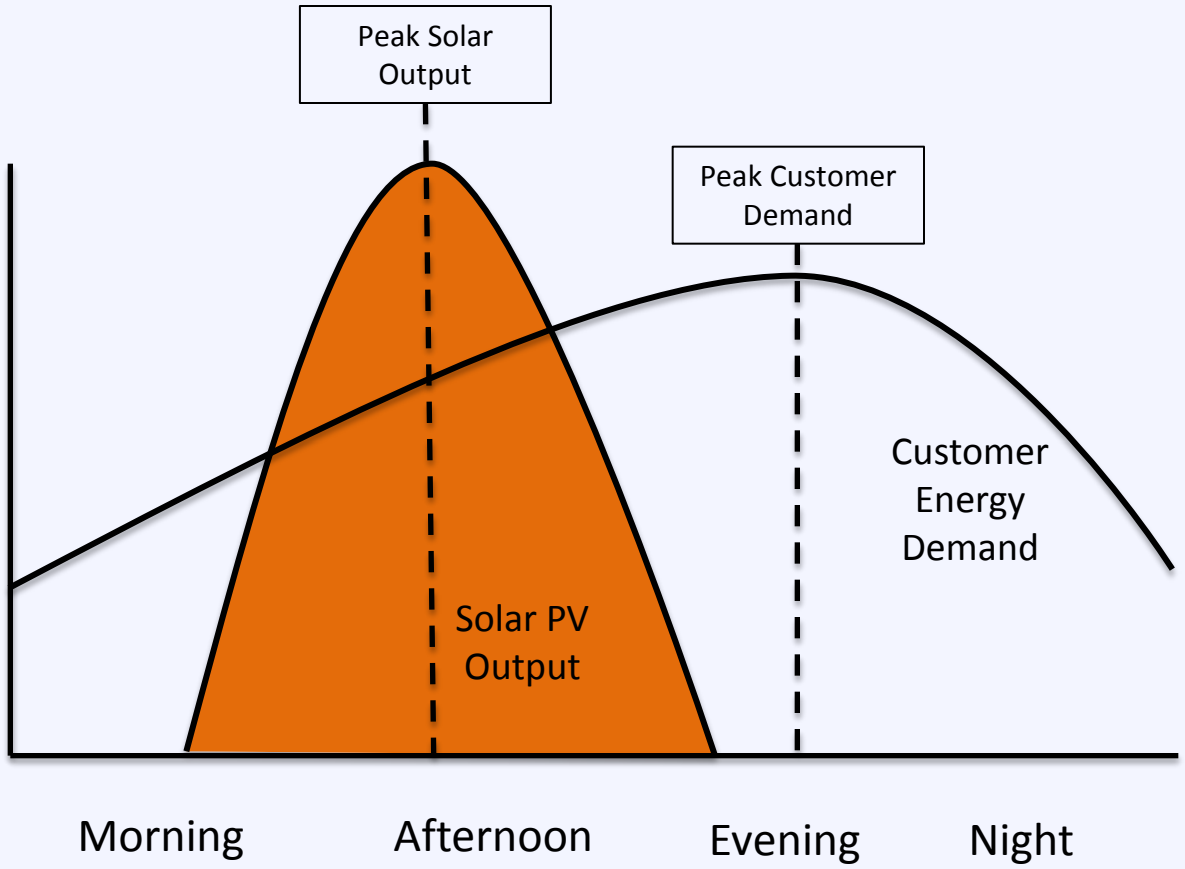
| | | | |
|---|---|---|---|
| **Federal** | Investment Tax Credit | Accelerated Depreciation | Qualified Energy Conservation Bond |
| **State & Utility** | Renewable Portfolio Standard | Net Metering/ Interconnection | Solar Access |
| | Permitting & Interconnection | Tax Credits & Exemptions | Direct Cash & Performance Incentives |
| **Local** | Property Assessed Clean Energy | Solarize | |

# Net Metering

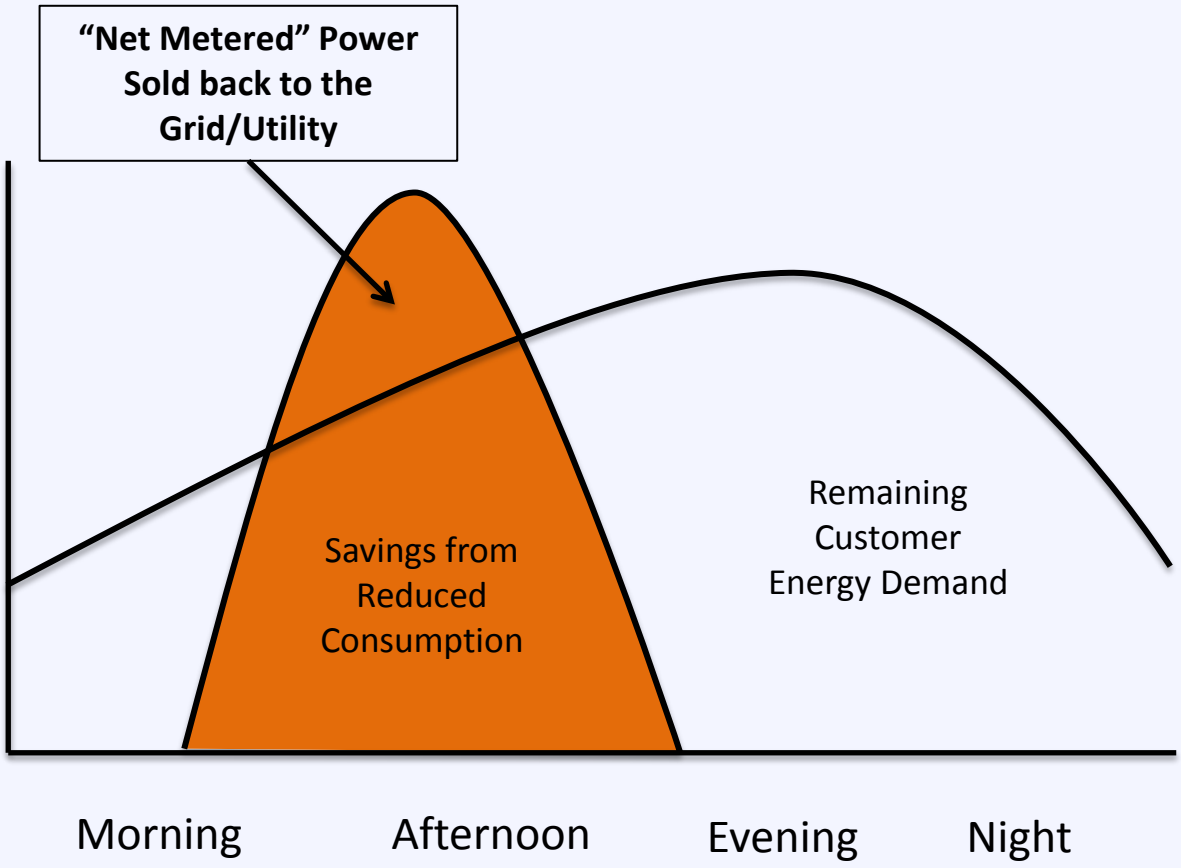
Net metering allows customers to export power to the grid during times of excess generation, and receive credits that can be applied to later electricity usage.

# Net Metering

## Typical Residential Customer With Net Metering



# Net Metering




The Result: Solar covers most (or all) of a customer's bill, even at night!

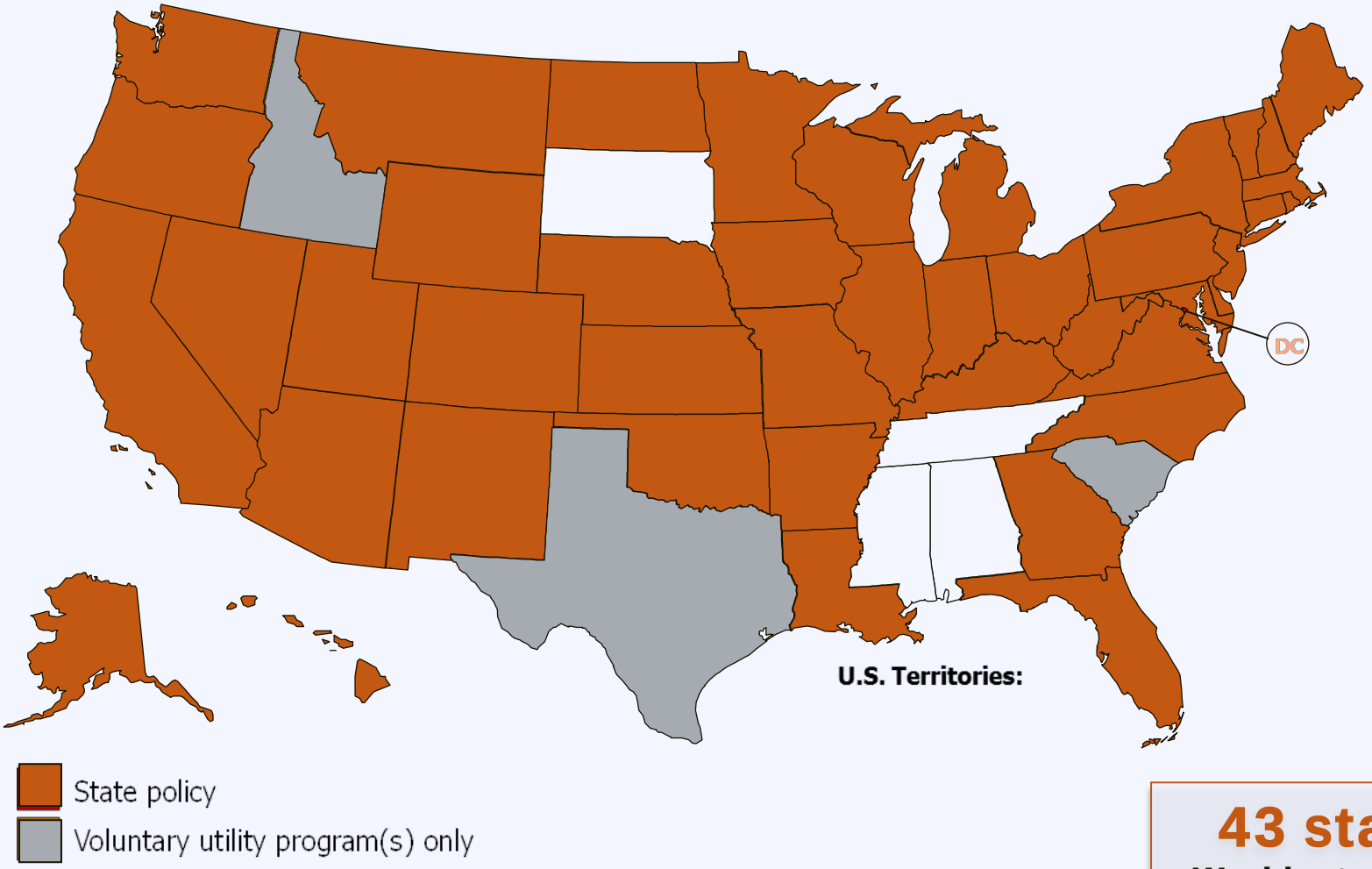
# **Net Metering:** Market Share

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)

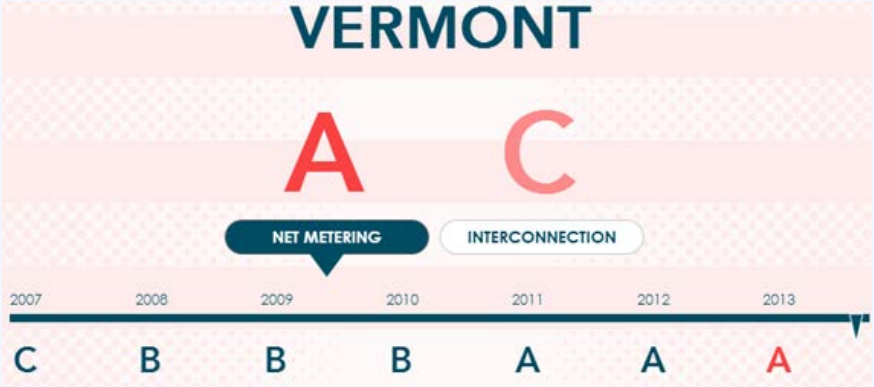
# Net Metering




**43 states, +**
**Washington DC and 4 territories have Net Metering Policies**

Source: DSIRE (July 2013)

# **Net Metering:** Vermont




## Vermont Net Metering Policy:

**Credit Value**
Retail Rate

**Credit Rollover**
Up to one year

**System Capacity Limit**
500 kW

**Aggregate Limit**
4% of monthly peak

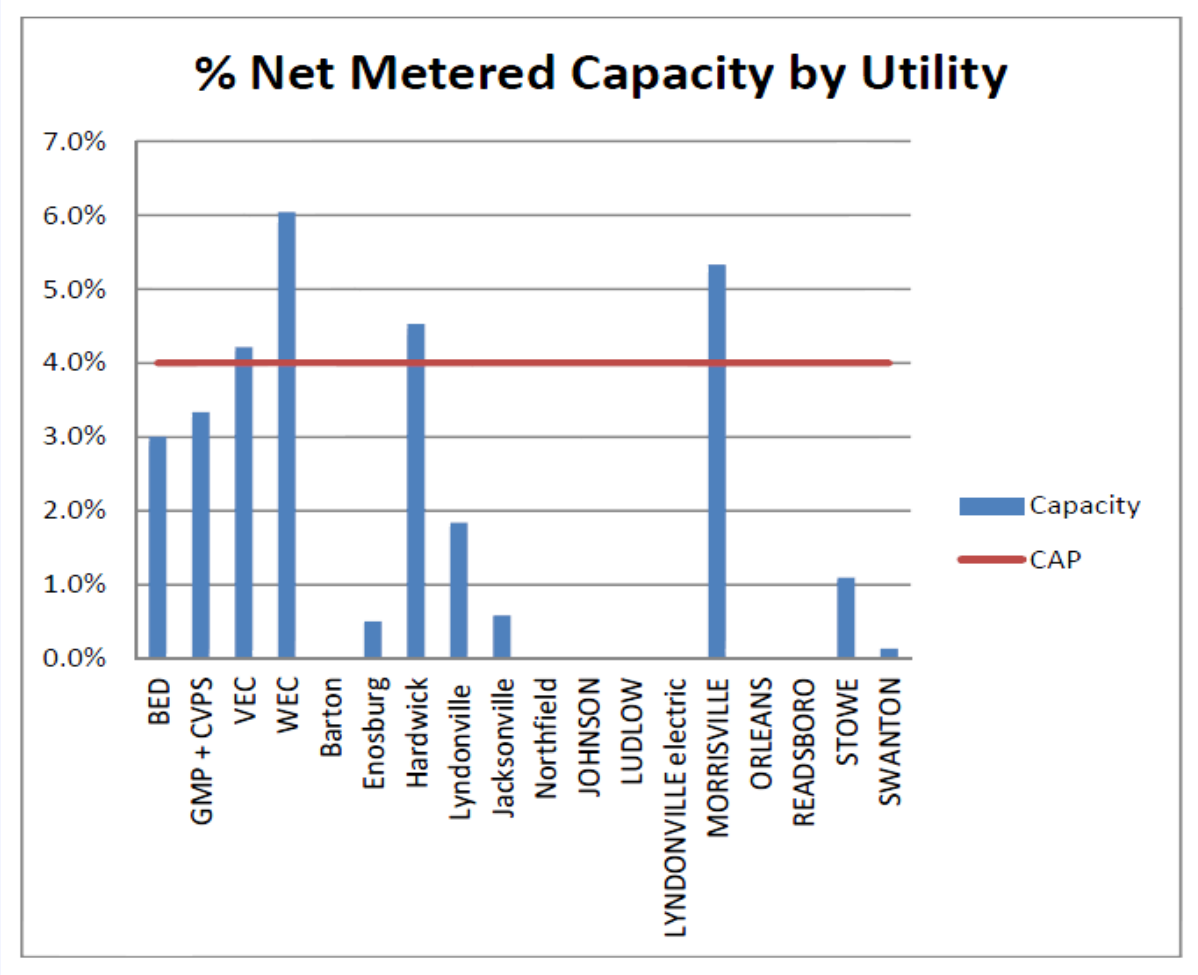
Powered by SunShot
U.S. Department of Energy

Source: Freeing the Grid

# **Net Metering:** Recent Developments in Vermont

- Aggregate caps currently being reached in cooperative territory.
  - Washington Electric, Hardwick Electric and Vermont Electric have all reached 4% limits
  - All will/have place limits on new net metering installs
- Green Mountain Power, Burlington Electric Department remain under cap
- Issue likely to be revisited in upcoming legislative sessions

# **Net Metering:** Recent Developments in Vermont



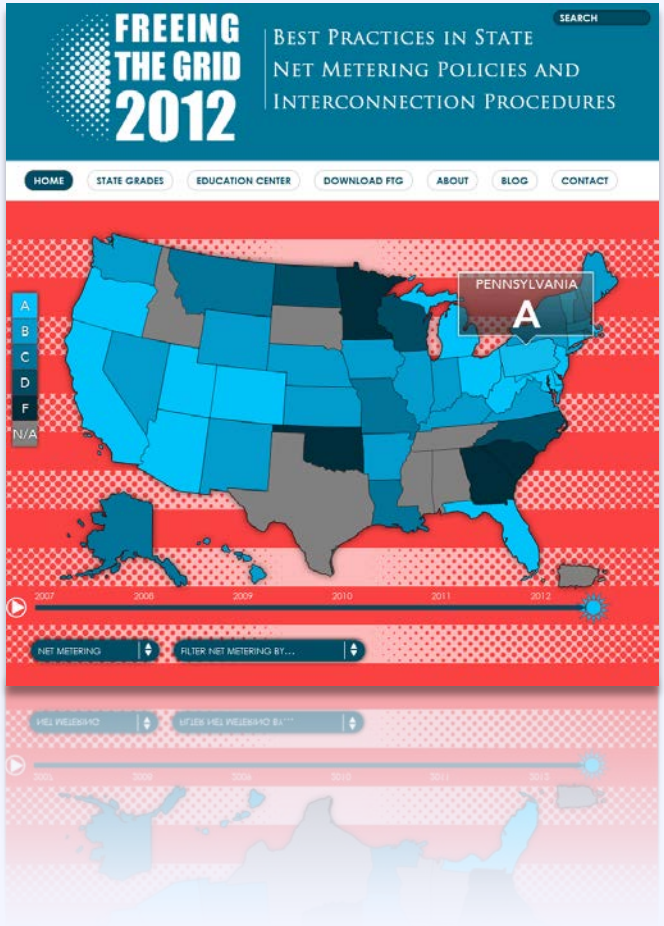

Source: Vermont Department of Public Service, 27 August 2013

# Net Metering: Resources

**Resource** **Freeing the Grid**

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

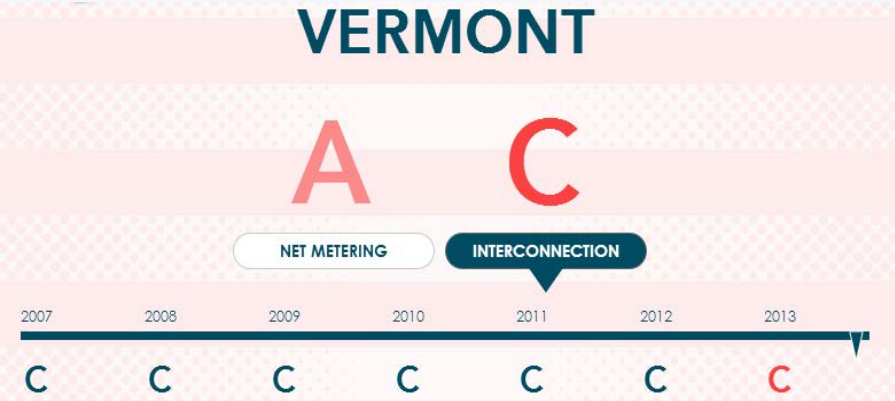
http://freeingthegrid.org/



# 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:** Vermont




## Vermont Interconnection Policy:

**Applicable Technologies**
All DG, including renewables

**Applicable Utilities/ Customer Classes**
All

**System Capacity Limit**
None

**External Disconnect Switch Requirement**
Yes

Powered by SunShot
U.S. Department of Energy

Source: Freeing the Grid

# **Interconnection:** Recent Developments

- State level
  - Streamlined permitting for residential-scale PV systems
- Federal level
  - Federal Energy Regulatory Commission (FERC) reconsidering its Small Generator Interconnection Procedures (SGIP) to permit greater streamlining and more rapid interconnection approvals
  - Majority of states offering interconnection meet or exceed SGIP minimum standards
  - New SGIP could lead to states considering more streamlined interconnection procedures.



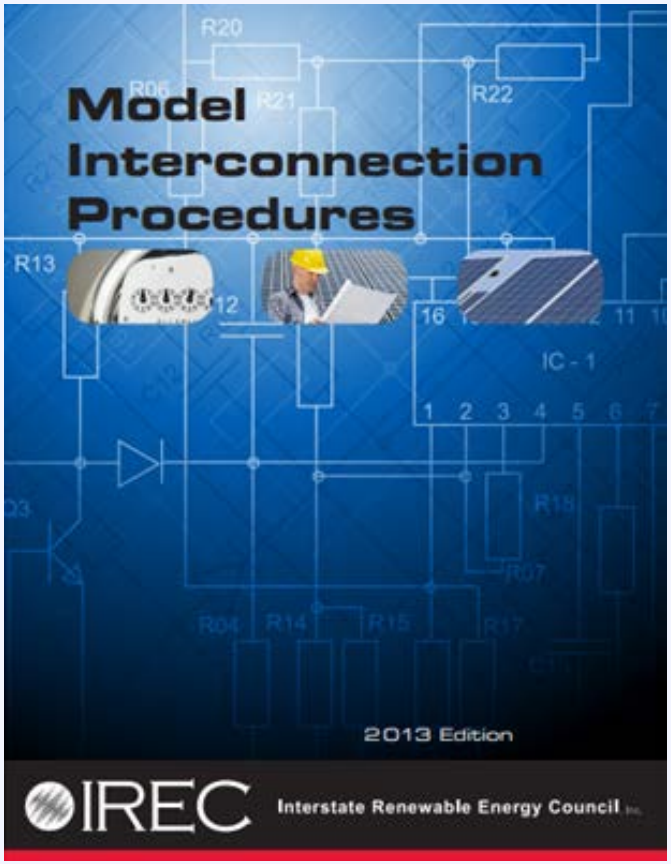
Source: Freeing the Grid

# **Interconnection:** Resources

**Resource** **Interstate Renewable Energy Council**

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

www.irecusa.org



# A Policy Driven Market

| | | | |
|---|---|---|---|
| **Federal** | Investment Tax Credit | Accelerated Depreciation | Qualified Energy Conservation Bond |
| **State & Utility** | Renewable Portfolio Standard | Net Metering/ Interconnection | Solar Access |
| | Permitting & Interconnection | Tax Credits & Exemptions | Direct Cash & Performance Incentives |
| **Local** | Property Assessed Clean Energy | Solarize | |

# Solar Access

## Solar Access Laws:

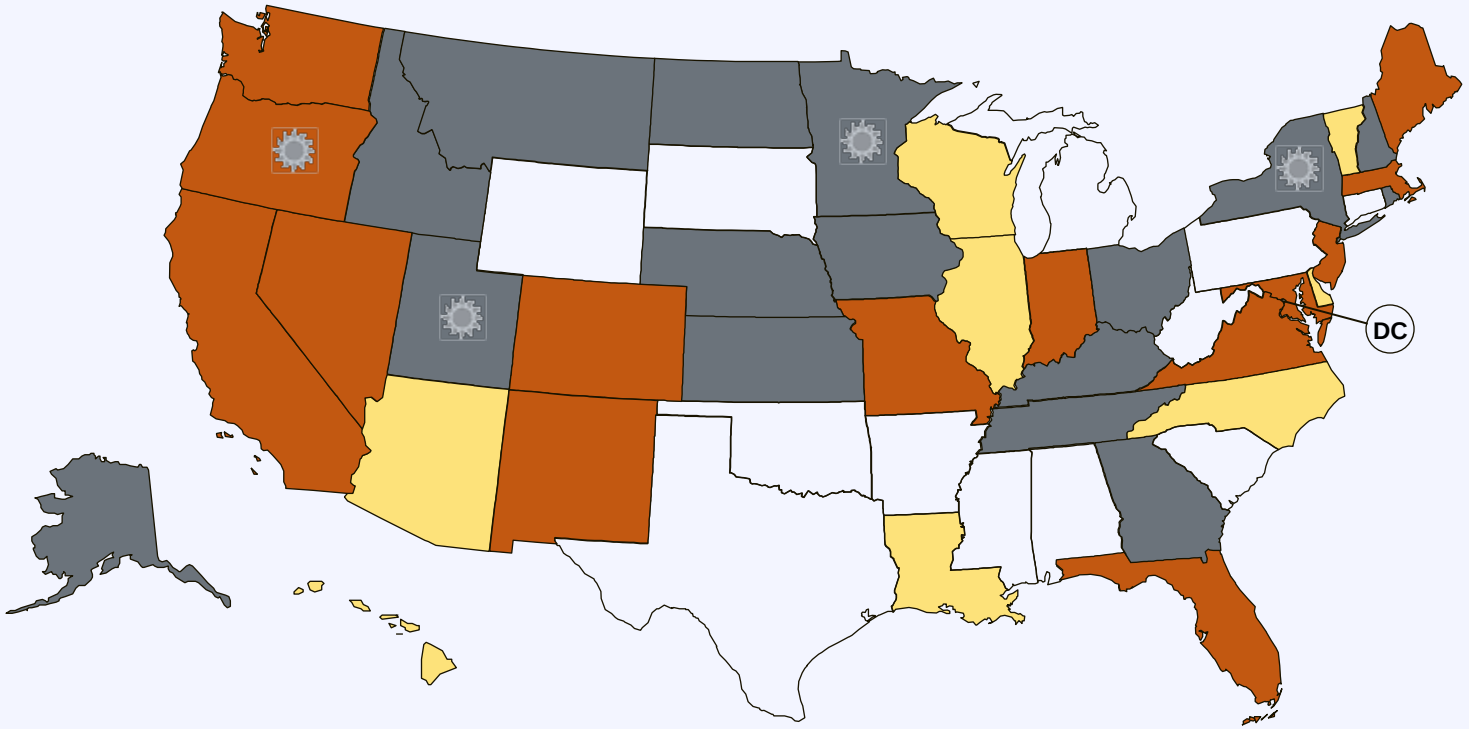
1. Increase the likelihood that properties will receive sunlight
2. Protect the rights of property owners to install solar
3. Reduce the risk that systems will be shaded after installation

# 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: 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

Powered by SunShot
U.S. Department of Energy

Source: DSIRE

# **Solar Access:** Vermont

## Solar Rights Provision (27 V.S.A. S 544):

Vermont law forbids ordinances, by laws, deed restrictions, covenants, declarations or similar binding agreements from prohibiting the use of solar collectors.



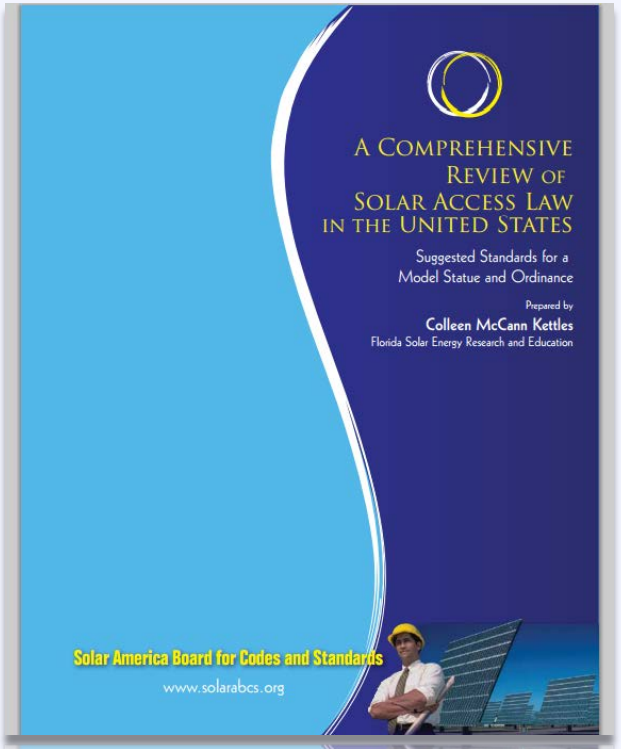
Source: DSIRE

# Solar Access

**Resource** **Solar ABCs**

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

www.solarabcs.org

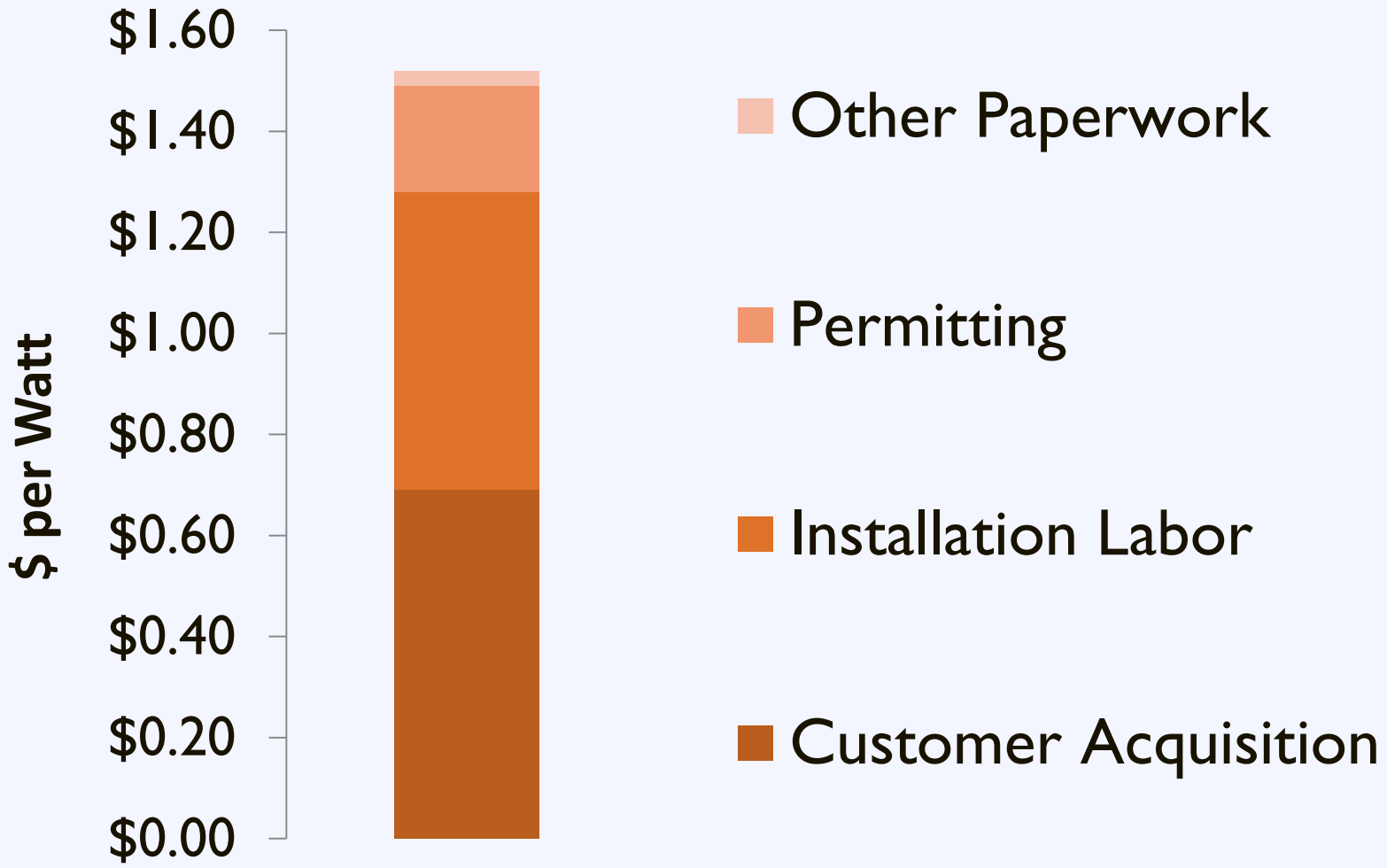


# Q & A

# Agenda

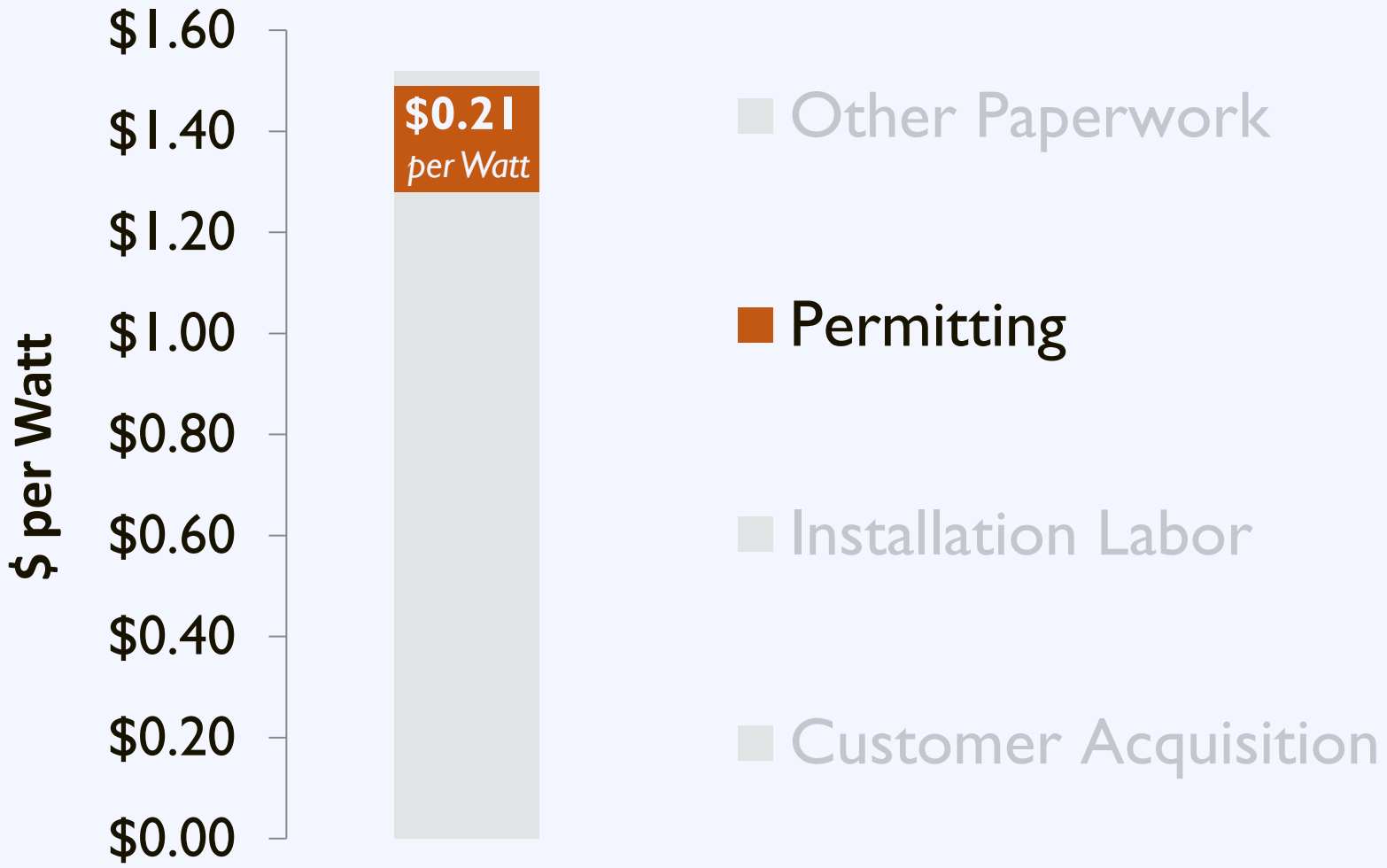
| | |
|---|---|
| 08:40 – 09:00 | Solar 101 for Communities |
| 09:00 – 09:30 | Understanding the Solar Regulatory Landscape |
| 09:30 – 09:45 | Permitting Solar Projects in Vermont |
| 09:45 – 09:55 | *Break* |
| 09:55 – 10:10 | Benefits and Barriers Activity |
| 10:10 – 10:40 | Introduction to Solar Project Finance |
| 10:40 – 11:00 | Growing Your Local Solar Market |
| 11:10 – 11:10 | *Break* |
| 11:10 – 12:15 | Regional Perspective: Panel of Local Speakers |

# Mitigate Soft Costs




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

# Mitigate Soft Costs




Powered by SunShot
U.S. Department of Energy

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

# **Challenge:** Inconsistency

**18,000+** local jurisdictions

with unique zoning and permitting requirements

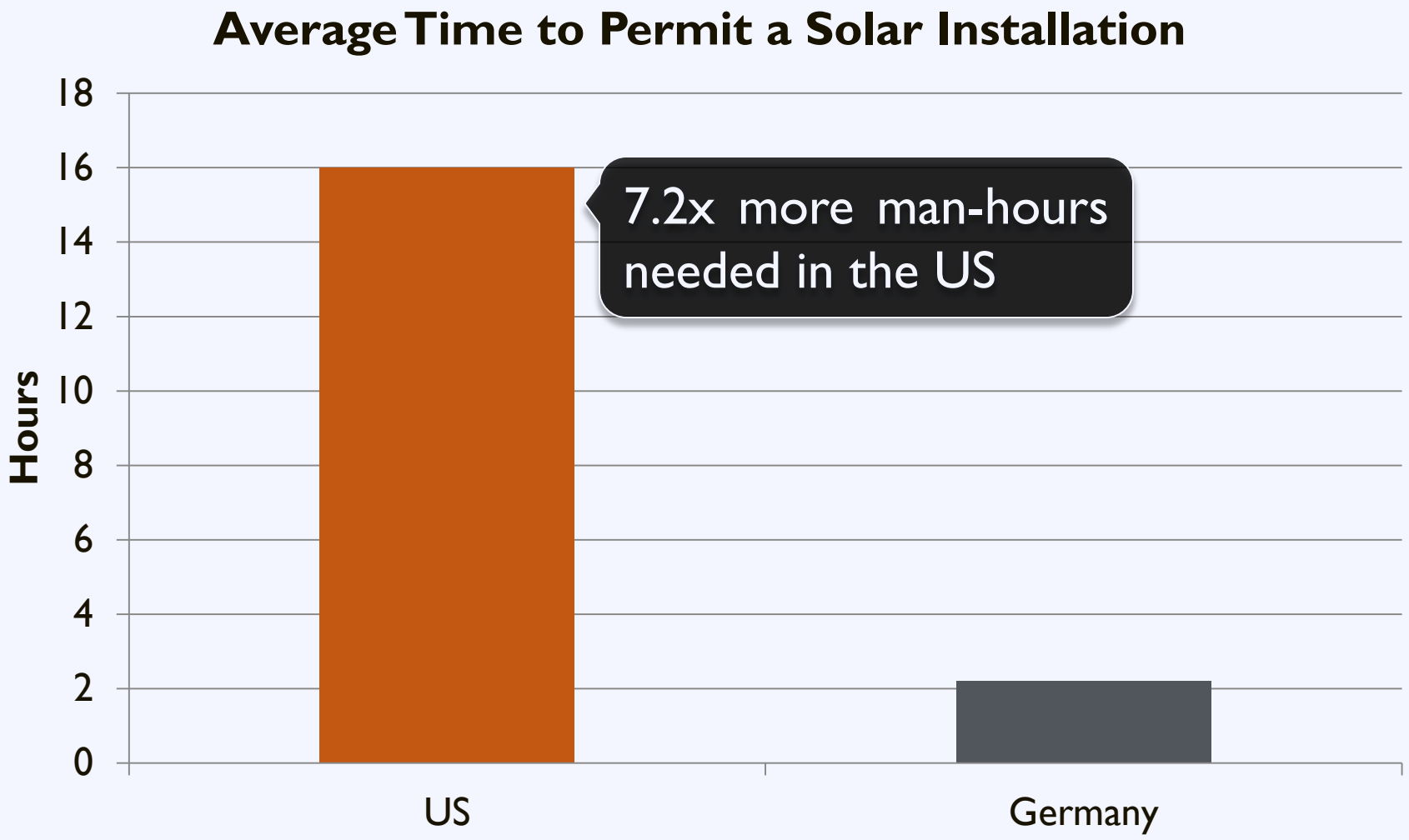


Source: http://www.nrel.gov/docs/fy12osti/54689.pdf

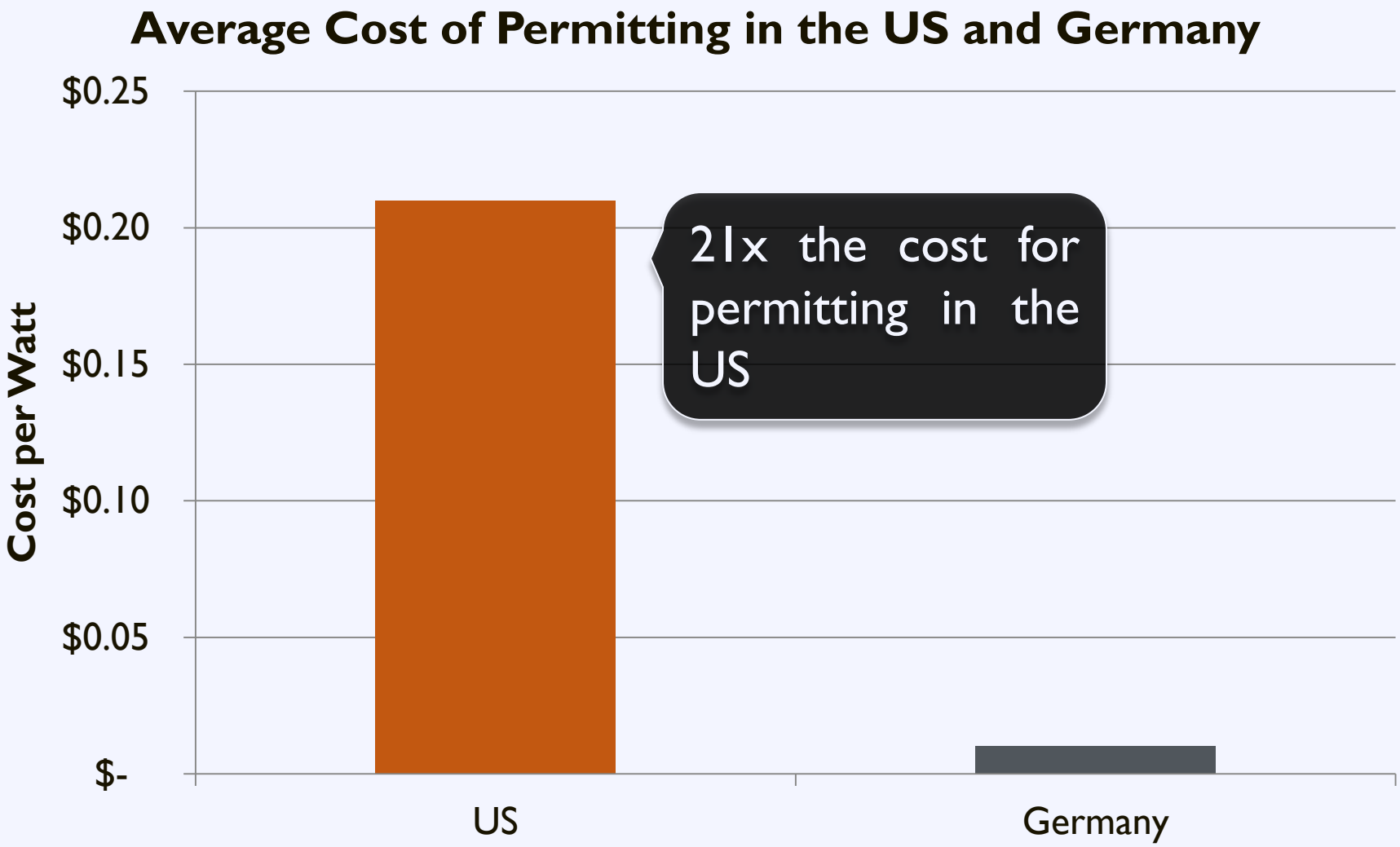
# Consumer Challenges


Source: Forbes

# Time to Installation



# Permitting Costs




Source: NREL, LBNL

# A Policy Driven Market

| | | | |
|---|---|---|---|
| **Federal** | Investment Tax Credit | Accelerated Depreciation | Qualified Energy Conservation Bond |
| **State & Utility** | Typically managed at the local level | Net Metering | Solar Access |
| | Permitting & Interconnection | Tax Credits & Exemptions | Direct Cash & Performance Incentives |
| **Local** | Property Assessed Clean Energy | Solarize | |

Powered by SunShot
U.S. Department of Energy

# **Vermont Permitting:** History

**1999** All projects applying for net metering must receive a Certificate of Public Good

- Shifted burden of permitting to the Public Services Board
- Same process as large power plants
- Typically 45 business days to turn around permit



Source: The SunShot Solar Outreach Partnership – Harmonizing Permitting and Interconnection Processes

# **Vermont Permitting:** History

**1999** All projects applying for net metering must receive a Certificate of Public Good

**2011** Projects under 5 kW automatically receive a CPG within 10 business days

- Customer submits 1 page form
- Utilities have 10 days to object
- If no objection, CPG is granted

Powered by SunShot U.S. Department of Energy

Source: The SunShot Solar Outreach Partnership – Harmonizing Permitting and Interconnection Processes

# **Vermont Permitting:** History

**1999** All projects applying for net metering must receive a Certificate of Public Good

**2011** Projects under 5 kW automatically receive a CPG within 10 business days

**2012** Expedited permitting process extended to projects up to 10 kW in size



Source: The SunShot Solar Outreach Partnership – Harmonizing Permitting and Interconnection Processes

# Vermont Permitting: Today

## Projects less than 10 kW:

- Permits issued by PSB
- One page form
- Utilities have 10 days to object

State of Vermont Public Service Board

Registration Form for Net-Metered Photovoltaic Systems with Capacities of 5 Kw or Less

(Please print all information clearly)

Customer Name:

Service Address (please include street name and number; no P.O. boxes):

Town/City/State:

Zip Code:

Mailing Address (if different from above):

Daytime Phone #:

e-mail address:

Name of Utility and Account #:

Total Array Output: DC Watts

Installer Name, Phone #, and e-mail address:

The undersigned declares, under the pains and penalties of perjury, that:

(1) having exercised due diligence and made reasonable inquiry, the information which I have provided on this form and any attachments is true and correct to the best of my knowledge;

(2) the system will be installed in compliance with the interconnection, safety, and technological requirements of Public Service Board Rule 5.100, including Appendix A; and

(3) I have sent a copy of this complete registration form to the Public Service Board, the Vermont Department of Public Service, and my serving utility.

**Making false or misleading statements on this application is subject to penalties under 30 V.S.A. § 30 and/or revocation of any approval granted.**

Customer Signature Date

Installer Signature Date

Source: Institute for Local Self Reliance

# Vermont Permitting: Case Study

**Resource** **The SunShot Solar Outreach Partnership**

A case study on Vermont's harmonized permitting, inspection, and interconnection review process for all PV systems under 10 kW

www.solaroutreach.org

SunShot
Solar Center

**Vermont Public Service Board**

Harmonizing Permitting and Interconnection Processes

**The time and effort involved in satisfying local permitting, inspection and interconnection (PII) requirements can add significant cost to a typical rooftop solar installation.** According to recent estimates by the U.S. Department of Energy, PII costs for the average solar PV system in the U.S. can be as high as $0.24/watt installed.[1] As a result, these costs could add as much as an additional $2,400 for a typical 10kW residential rooftop system.

A key driver of these costs is the lack of uniformity in permitting requirements at the local level and limited harmonization of local solar permitting and interconnection processes. However, several innovative state and local governments are beginning to take steps to ensure that the permitting and interconnection processes are considered jointly so as to reduce the costs of (and days involved in) obtaining PII approvals.

This case study will focus on the State of Vermont's unique approach to addressing PII costs. While Vermont's integrated statewide permitting is relatively uncommon, and may not be an option for many states, Vermont's approach to permitting and interconnecting could provide guidance for local governments interested in integrating permitting and interconnection into a single transaction.

**Vermont's PII Process Through 2011**

Since the enactment of Vermont's first net metering law in 1999, nearly all customer-sited residential solar installations in Vermont receive service from their local utility under a net-metering arrangement. When Vermont's initial net-metering law passed in 1999, the Vermont legislature took the unusual step of requiring all systems looking to conduct net-metering to go through the same permitting process as a large power plant, and removed all local-level requirements.[6]

Therefore, prior to 2011, in order to receive permission to construct a net-metered rooftop system under 150kW, customers had to file an application with the Vermont Public Service Board (PSB) for a Certificate of Public Good (CPG). Upon submitting the application, the PSB would then submit the application for a 30-business day utility and public comment period.[7][8]

During the comment period, the public was allowed to raise concerns that, if judged reasonable by the Board, could trigger a public hearing. In addition, the utility could also raise concerns regarding the interconnection of the customer's system during the comment period. If no concerns were voiced by either the customer or the utility, an order granting the CPG would be written and issued by the Public Service Board.[9]

In all, according to developers operating in Vermont, the PII process could average 45 business days before construction was allowed to commence.[9]

[1] See i.e. "Why Are Residential PV Prices So Much Lower in Germany than in the United States?: A Scoping Analysis". February 2013 revision. Available at: http://emp.lbl.gov/sites/all/files/german_us_pv_price_ppt.pdf

[6] Conversation with Andrew Perchlik, Vermont Department of Public Service, 27 June 2013.

[7] Conversation with Gregg Faber, Vermont Public Service Board, 19 June 2013.

[8] Ibid.

[9] Savage, Andrew. "Fifth to Nation Solar Registration Offering Model for Expansion". Renewable Energy World, 9 May 2012. Available at: http://www.renewableenergyworld.com/rea/blog/post

This material is based upon work supported by the U.S. Department of Energy under Award Number DE-EE0003525.

# Q & A

# Agenda

| | |
|---|---|
| 08:40 – 09:00 | Solar 101 for Communities |
| 09:00 – 09:30 | Understanding the Solar Regulatory Landscape |
| 09:30 – 09:45 | Permitting Solar Projects in Vermont |
| 09:45 – 09:55 | *Break* |
| 09:55 – 10:10 | Benefits and Barriers Activity |
| 10:10 – 10:40 | Introduction to Solar Project Finance |
| 10:40 – 11:00 | Growing Your Local Solar Market |
| 11:10 – 11:10 | *Break* |
| 11:10 – 12:15 | Regional Perspective: Panel of Local Speakers |

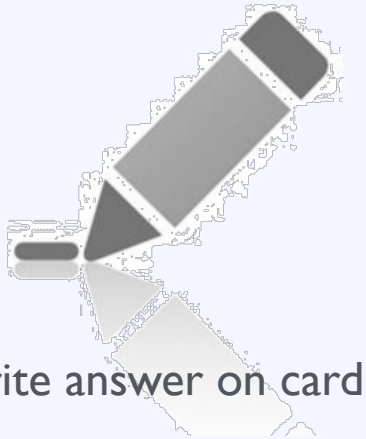
# Agenda

| | |
|---|---|
| 08:40 – 09:00 | Solar 101 for Communities |
| 09:00 – 09:30 | Understanding the Solar Regulatory Landscape |
| 09:30 – 09:45 | Permitting Solar Projects in Vermont |
| 09:45 – 09:55 | *Break* |
| 09:55 – 10:10 | Benefits and Barriers Activity |
| 10:10 – 10:40 | Introduction to Solar Project Finance |
| 10:40 – 11:00 | Growing Your Local Solar Market |
| 11:10 – 11:10 | *Break* |
| 11:10 – 12:15 | Regional Perspective: Panel of Local Speakers |

# **Activity:** Identifying Benefits

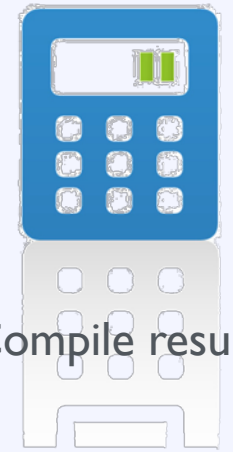
**What is the greatest benefit solar can bring to your community? [Blue Card]**

## Right Now



Write answer on card

## During Session

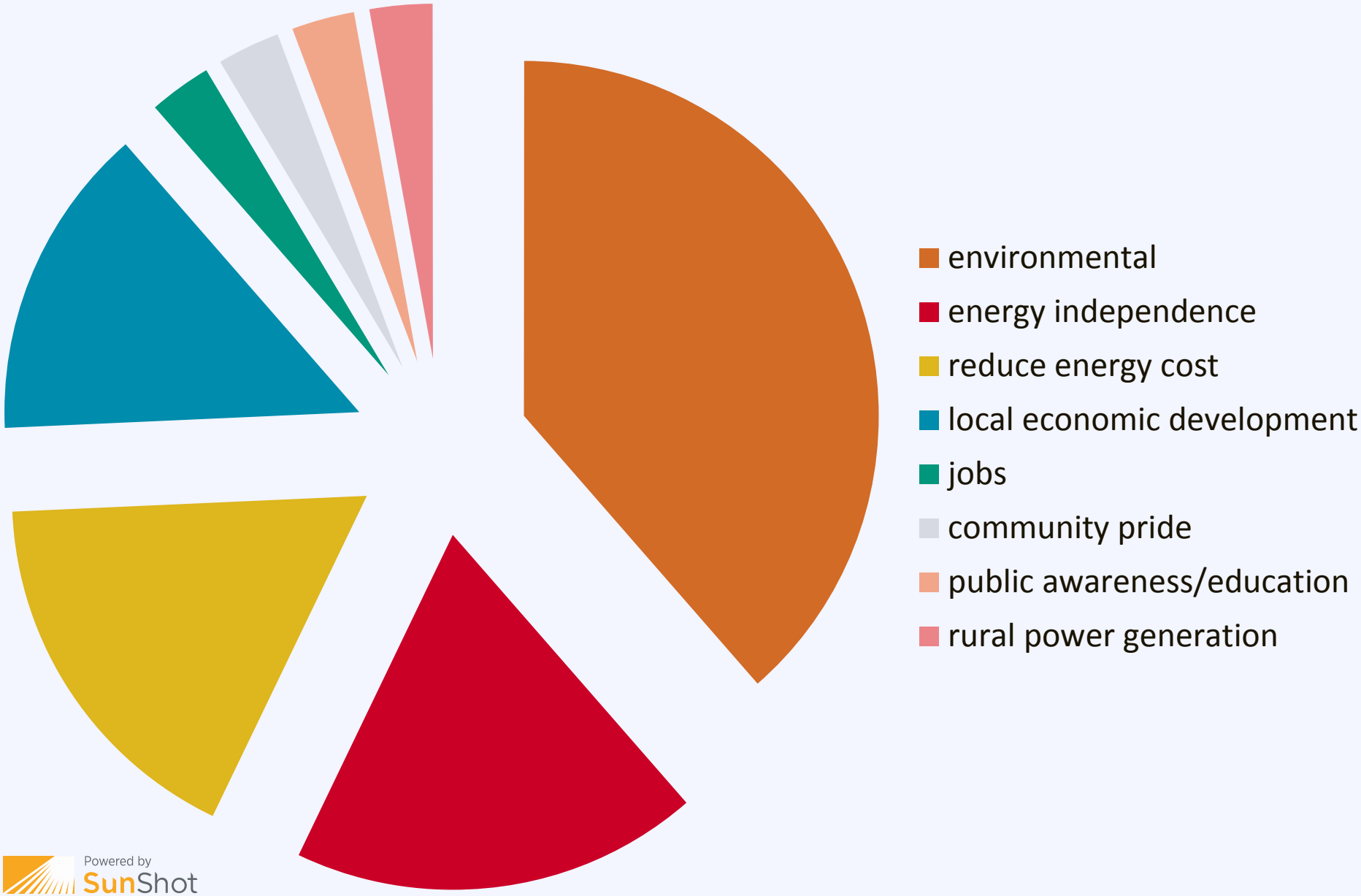


Compile results

## After Break

Group discussion

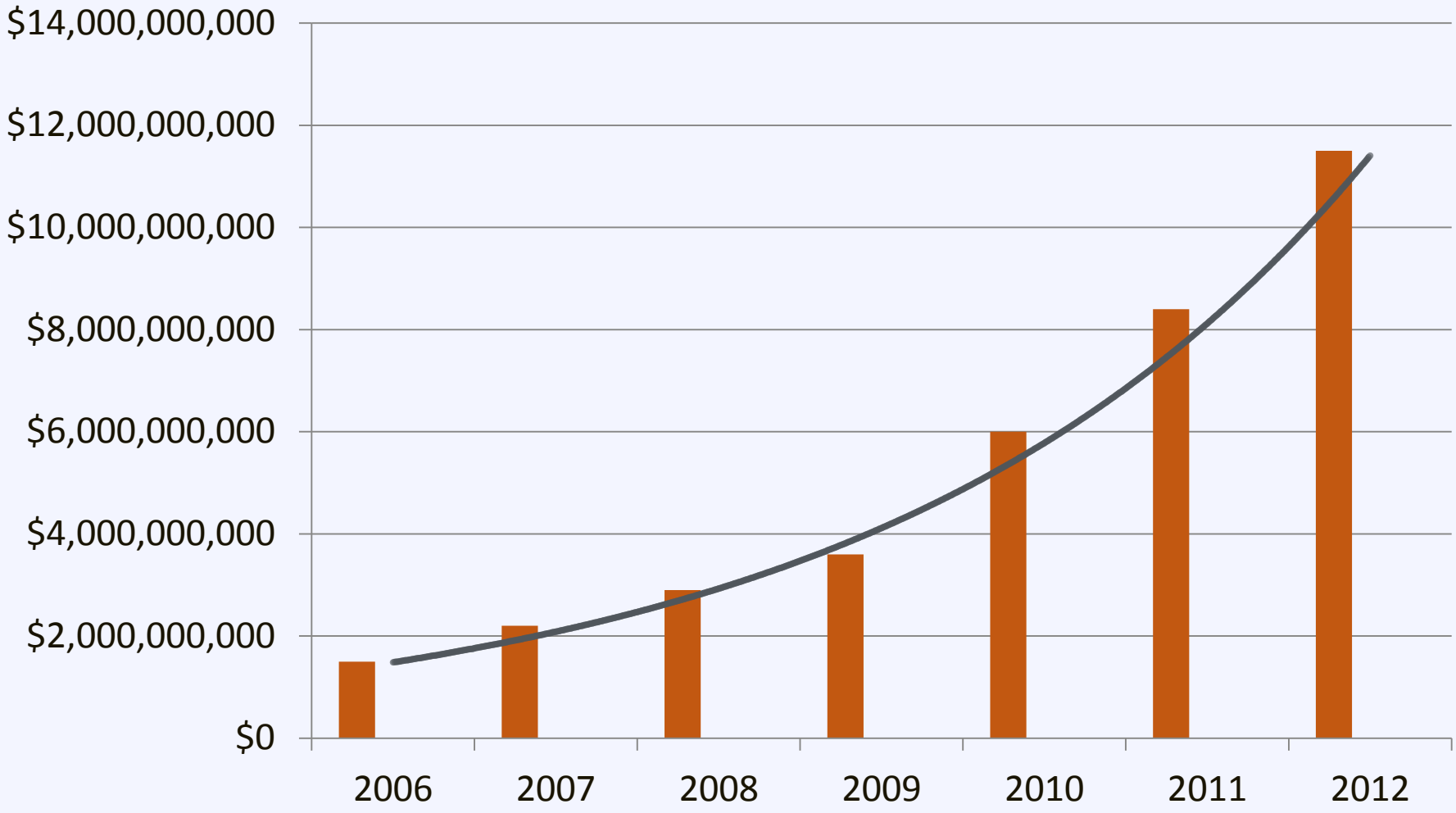
# Results of Benefits Poll



# Benefits of Solar Energy

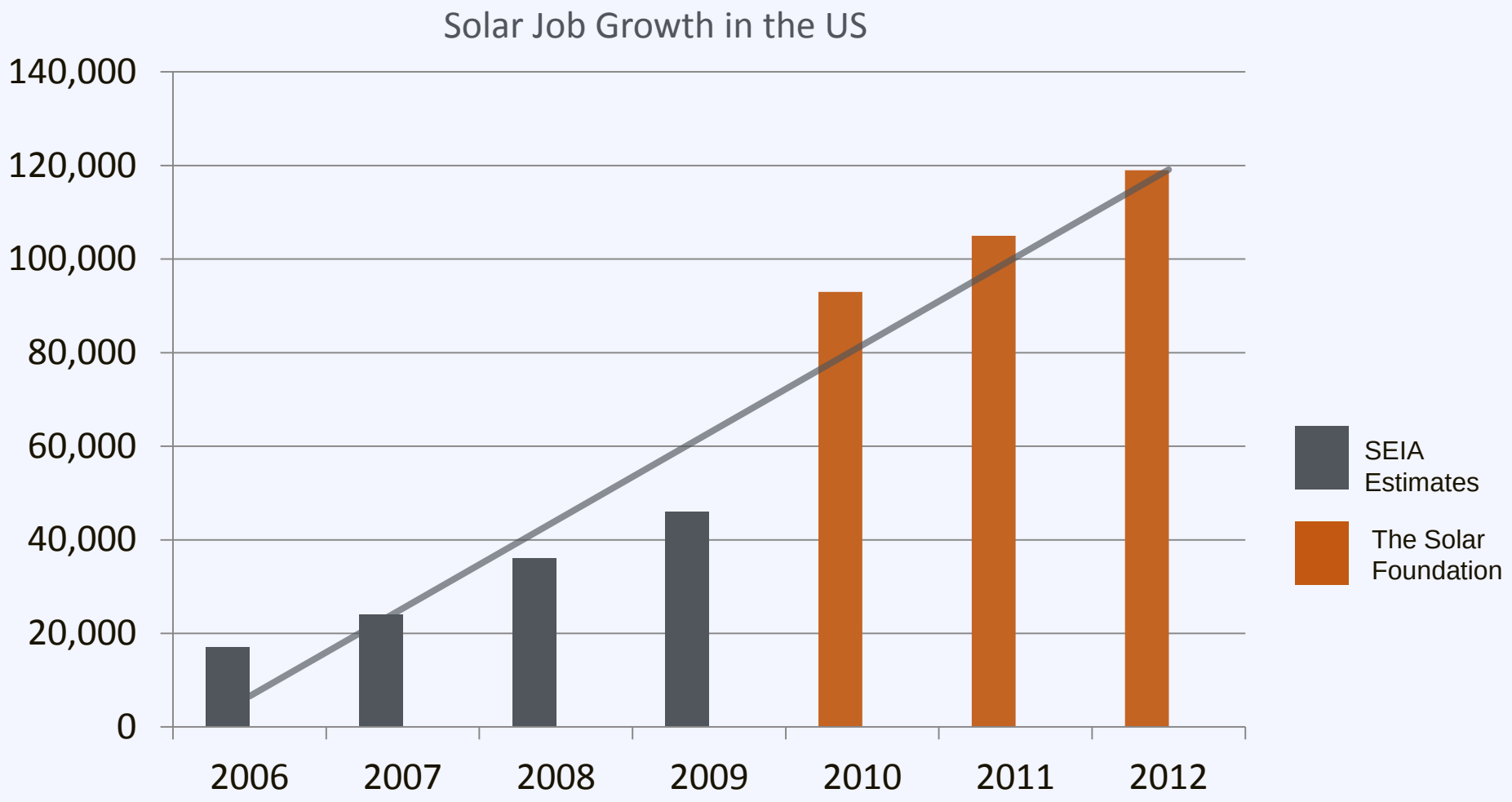
- Local economy growth
- Local jobs
- Energy independence
- Stabilizes price volatility
- Valuable to utilities
- Smart investment

# **Benefit:** Economic Growth



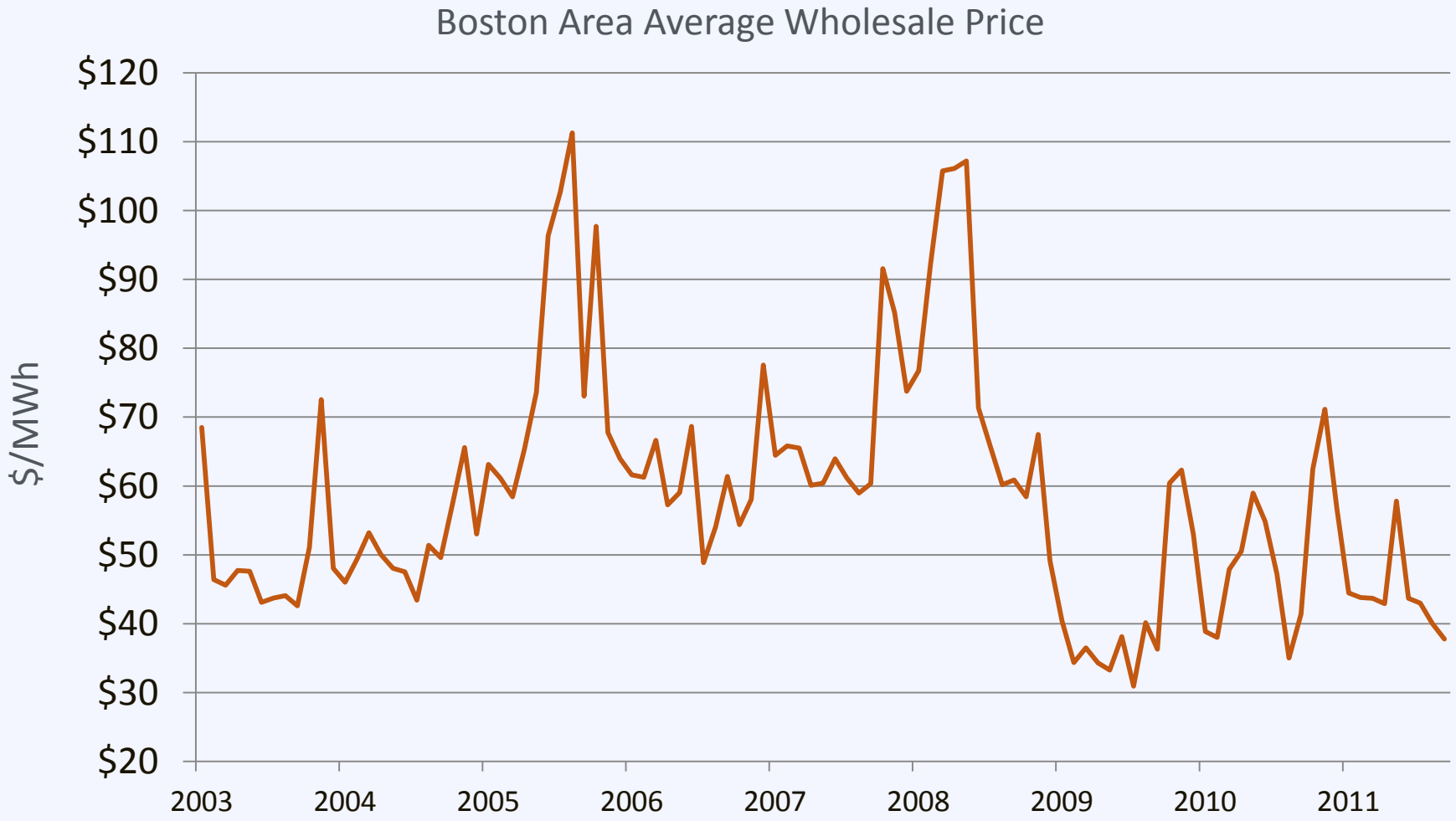

Source: SEIA/GTM Research – 2009/2010/2011/2012 Year in Review Report
http://www.seia.org/research-resources/us-solar-market-insight

# **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 2012 (2011-2012).

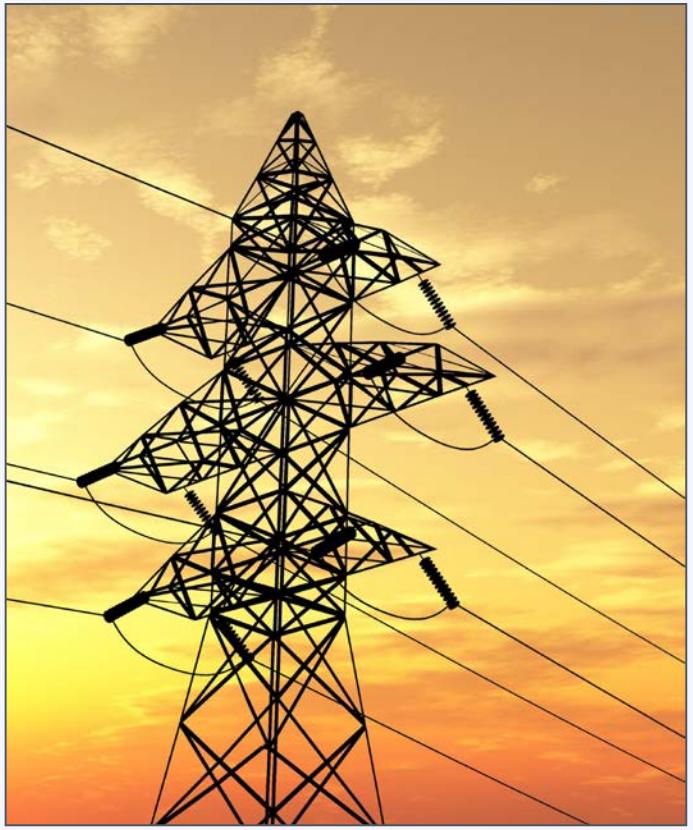
# **Benefit:** Stabilize Energy Prices



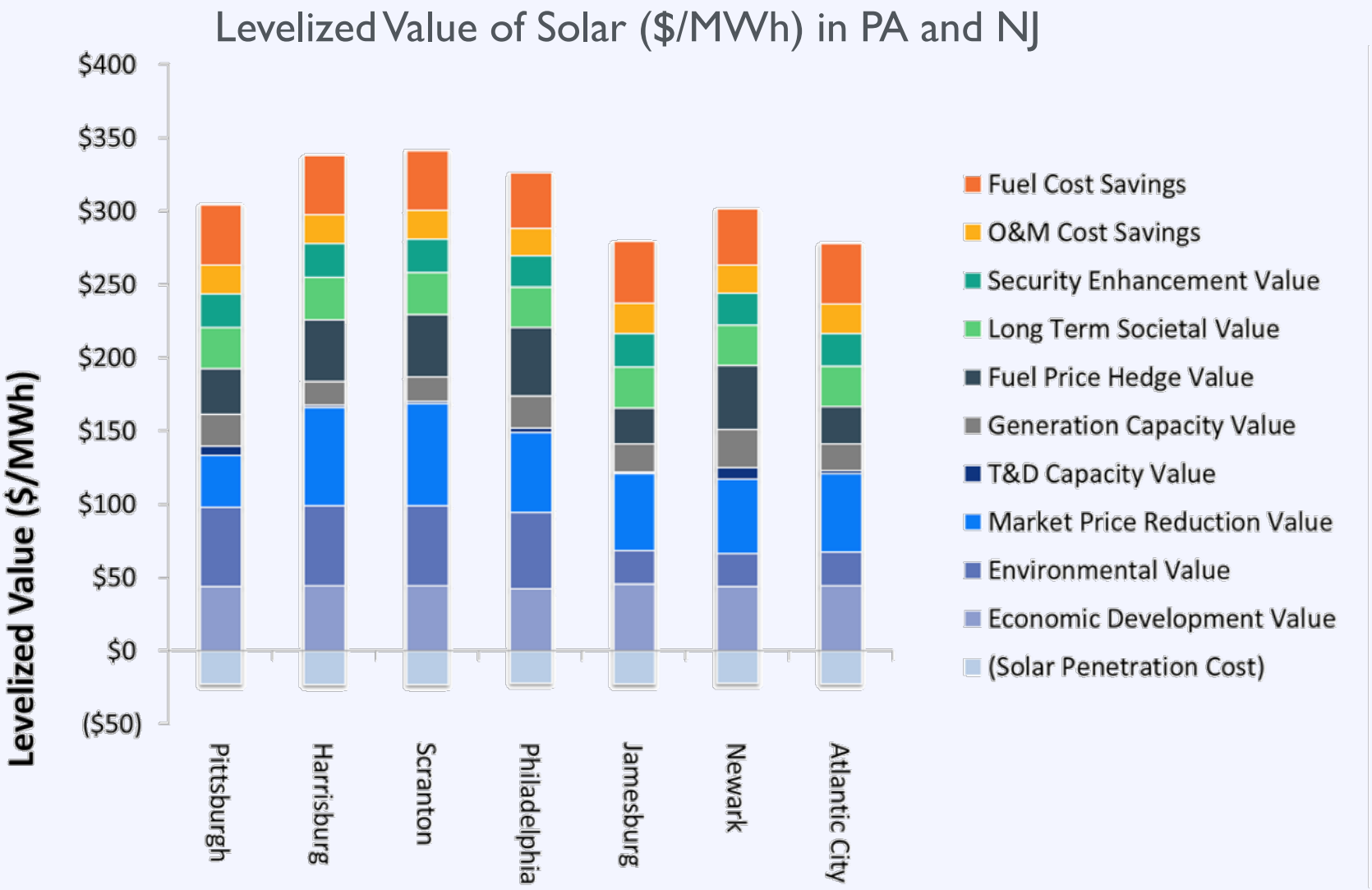

Source: NEPOOL

# **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



# Value to Community & Utility




Source: Clean Power Research http://mseia.net/site/wp-content/uploads/2012/05/MSEIA-Final-Benefits-of-Solar-Report-2012-11-01.pdf

# **Benefit:** Smart Investment for Homes

**From NREL:**

Solar homes sold

**20% faster**

and for

**17% more**

than the equivalent non-solar homes

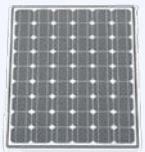
in surveyed California subdivisions

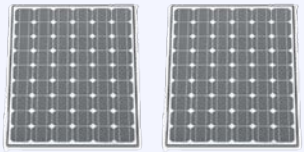
Powered by SunShot U.S. Department of Energy

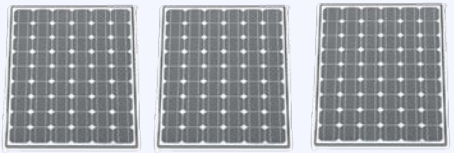
Source: http://www.nrel.gov/docs/fy07osti/38304-01.pdf

# **Benefit:** Smart Investment for Homes

## From SunRun:

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

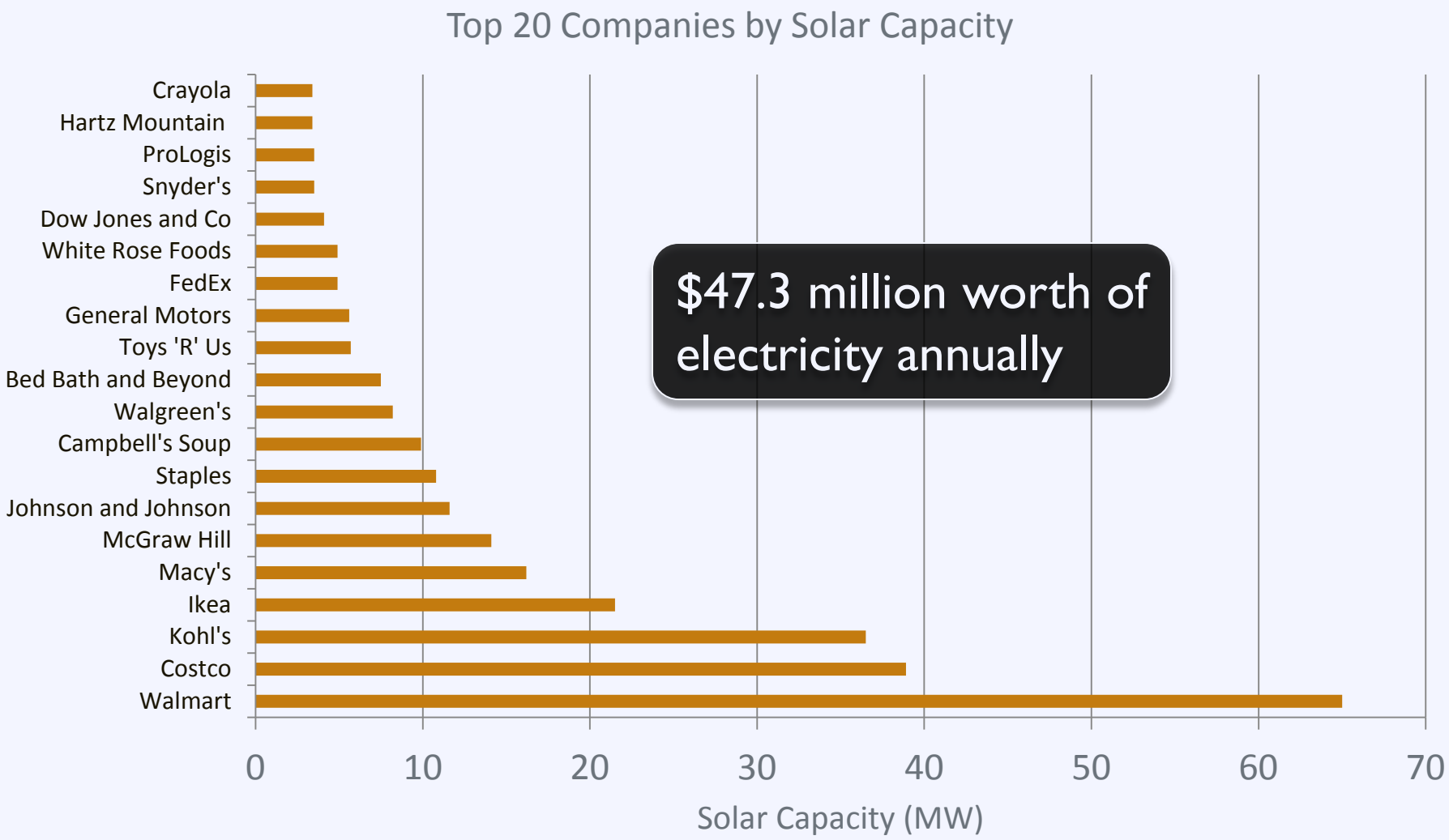
6 kW  = **$ 33,000** *added sale premium*

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

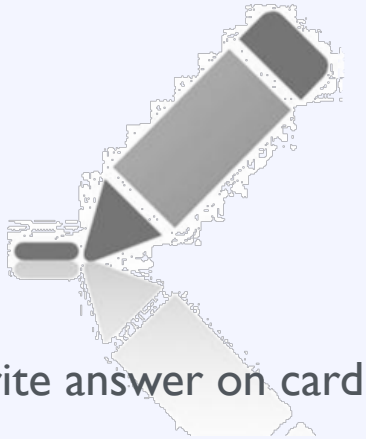
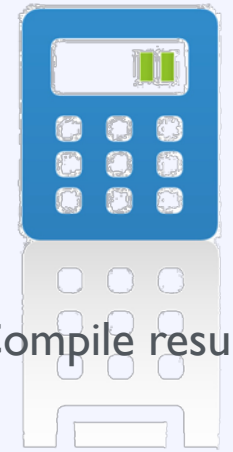
Source: Solar Energy Industries Association

# **Benefit:** Smart Investment for Government

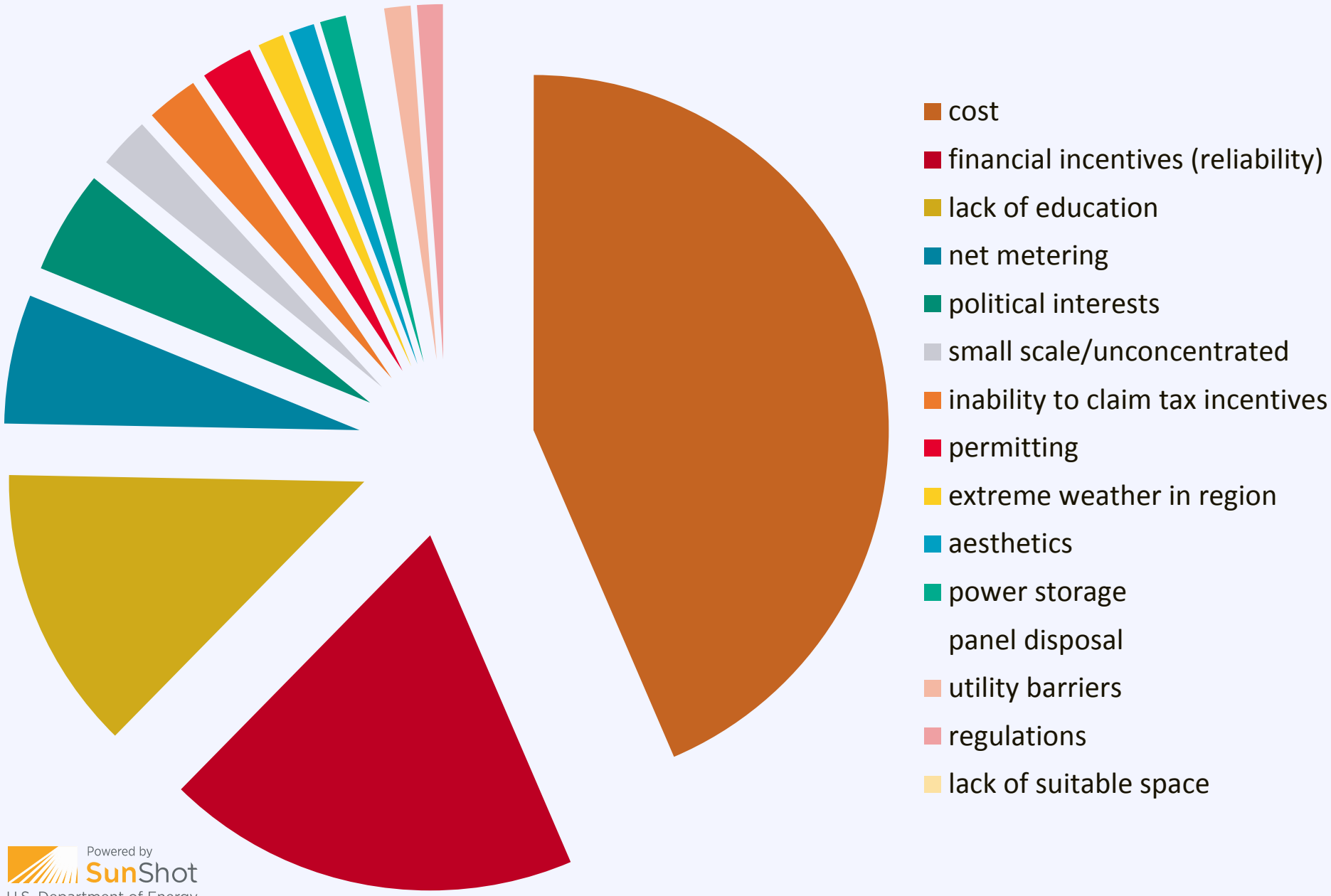
Source: Borrego Solar

# **Activity:** Addressing Barriers

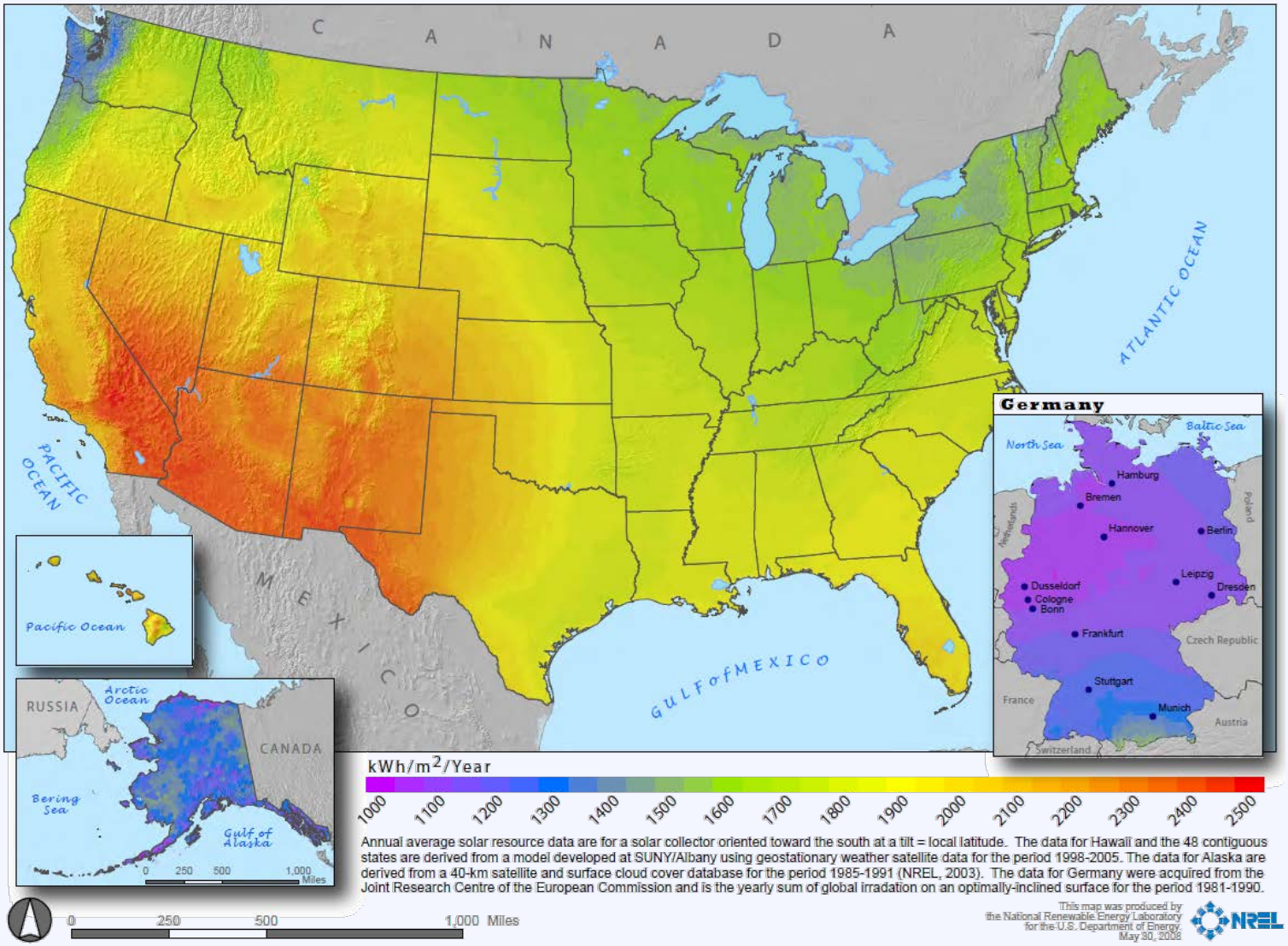
**What is the greatest barrier to solar adoption in your community? [Green Card]**

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

# Result of Barriers Poll



# **Fact:** Solar works across the US

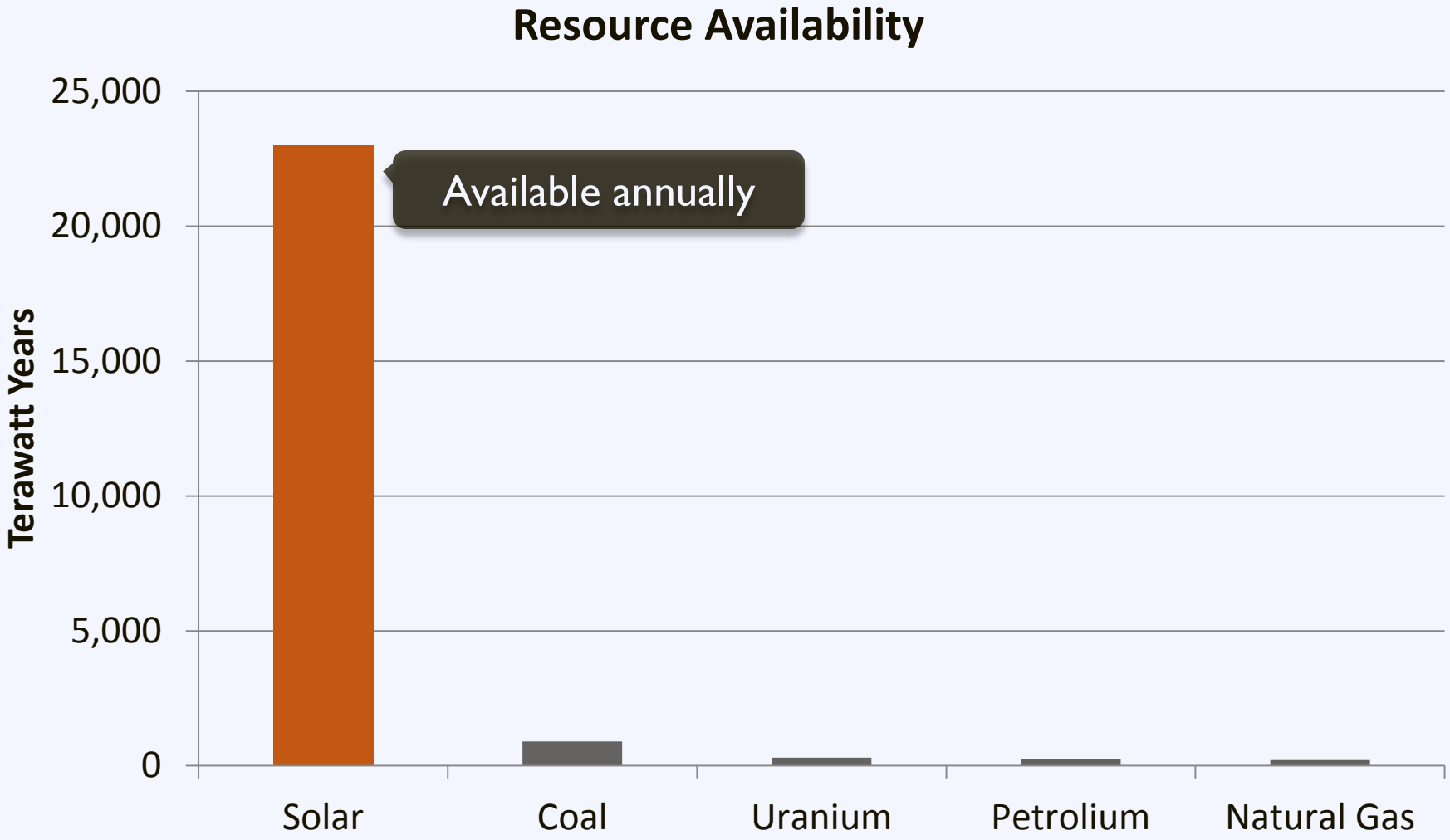



Annual average solar resource data are for a solar collector oriented toward the south at a tilt = local latitude. The data for Hawaii and the 48 contiguous states are derived from a model developed at SUNY/Albany using geostationary weather satellite data for the period 1998-2005. The data for Alaska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

Powered by SunShot U.S. Department of Energy

Source: National Renewable Energy Laboratory

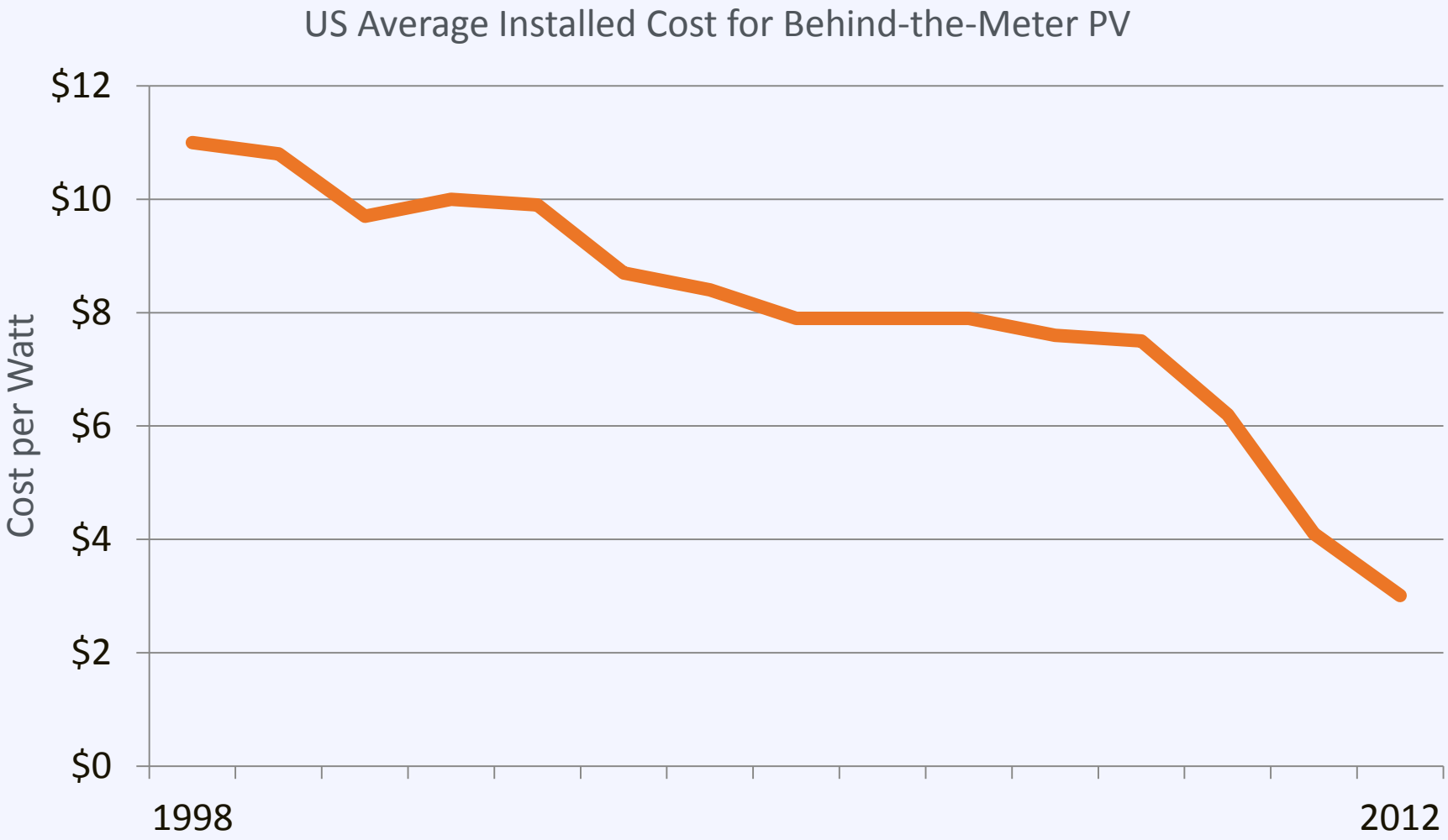
# **Fact:** Solar is a ubiquitous resource




Powered by SunShot
U.S. Department of Energy

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

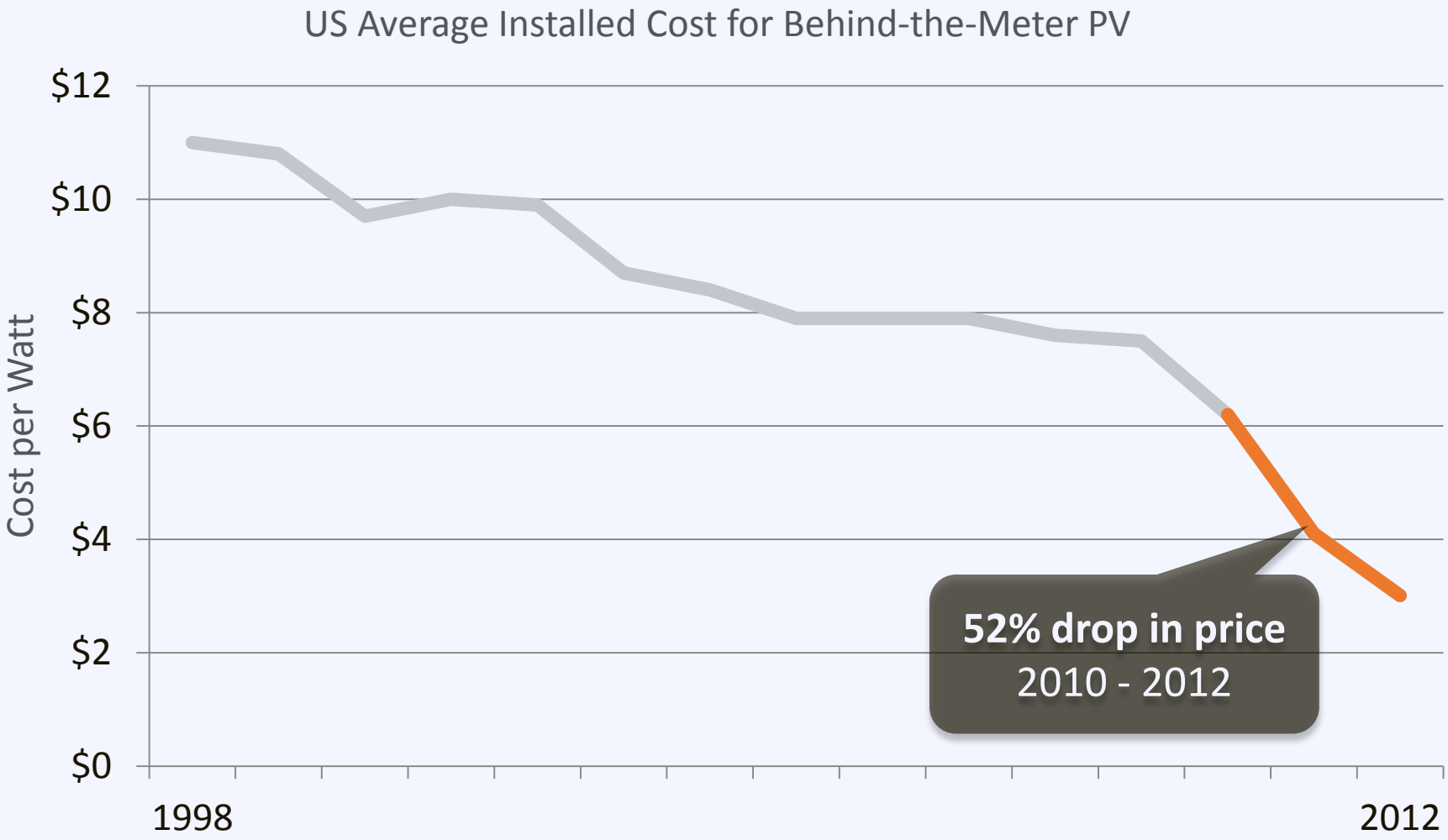
# **Fact:** Solar is cost competitive




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

Powered by SunShot U.S. Department of Energy

# **Fact:** Solar is cost competitive

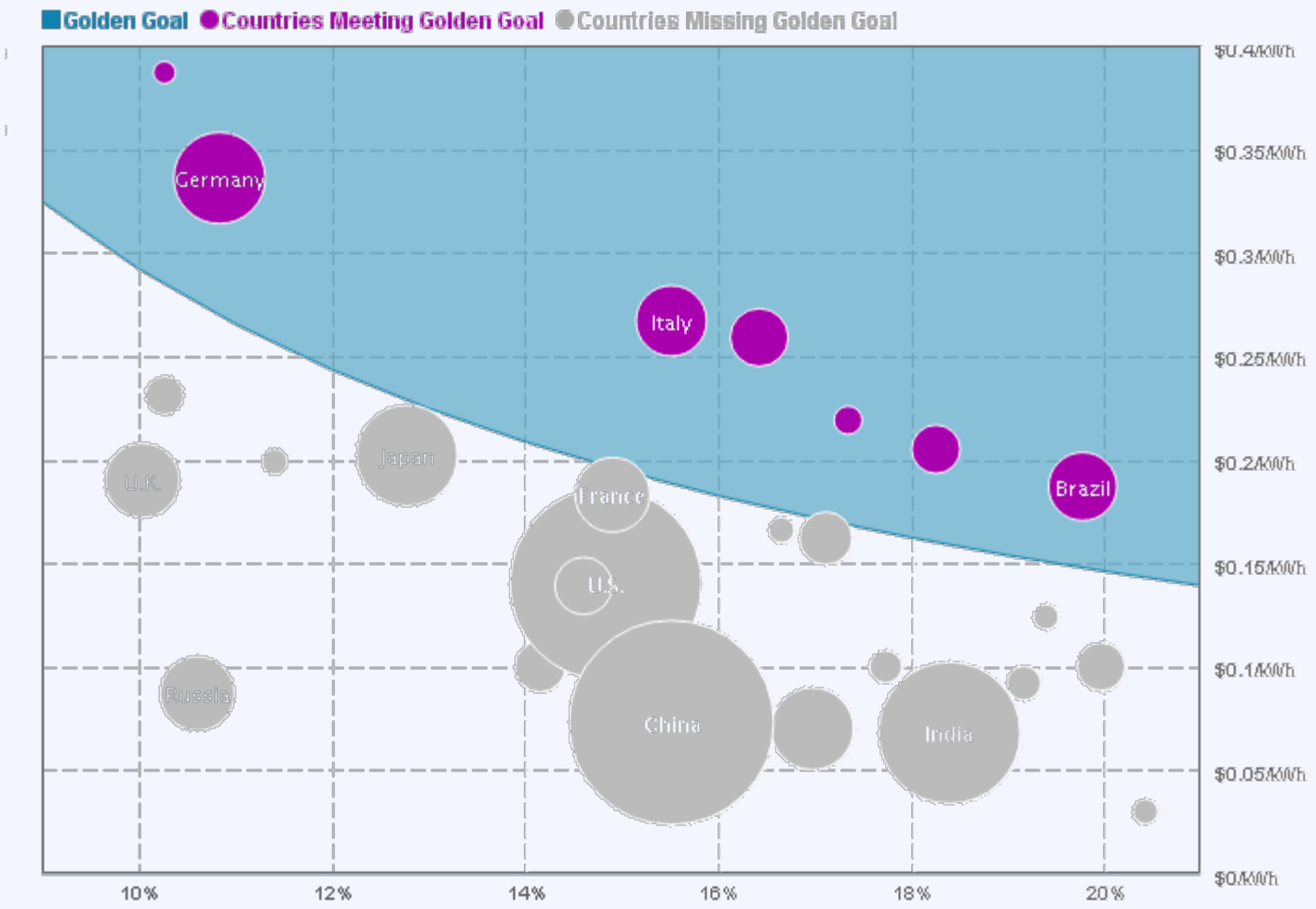



Tracking the Sun IV: The Installed Cost of Photovoltaics in the US from 1998-2010 (LBNL), SEIA/GTM Research *Solar Market Insight 2012 Year-in-Review.*

Powered by SunShot U.S. Department of Energy

# **Fact:** Solar is cost competitive

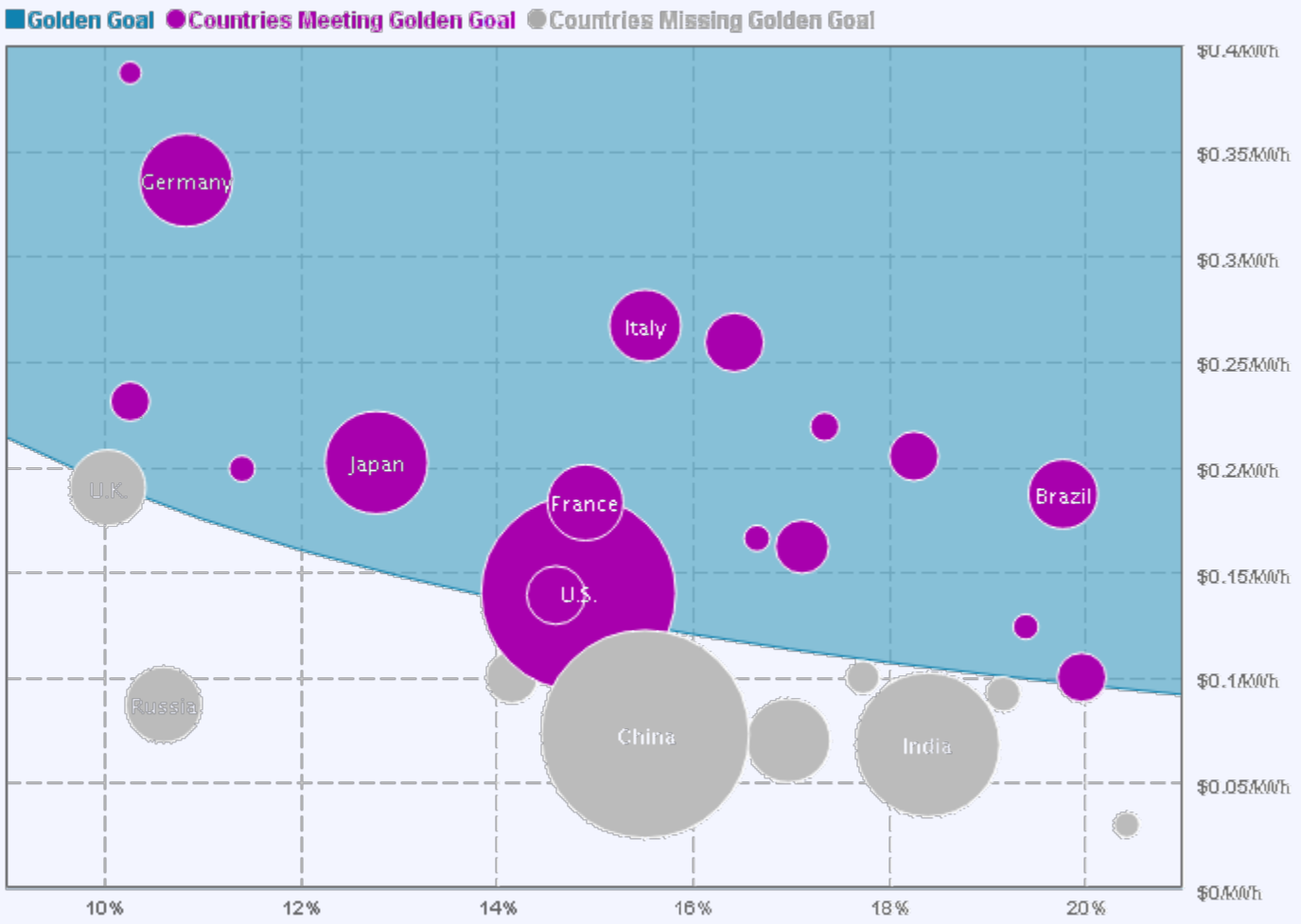
**2012**




Source: Bloomberg

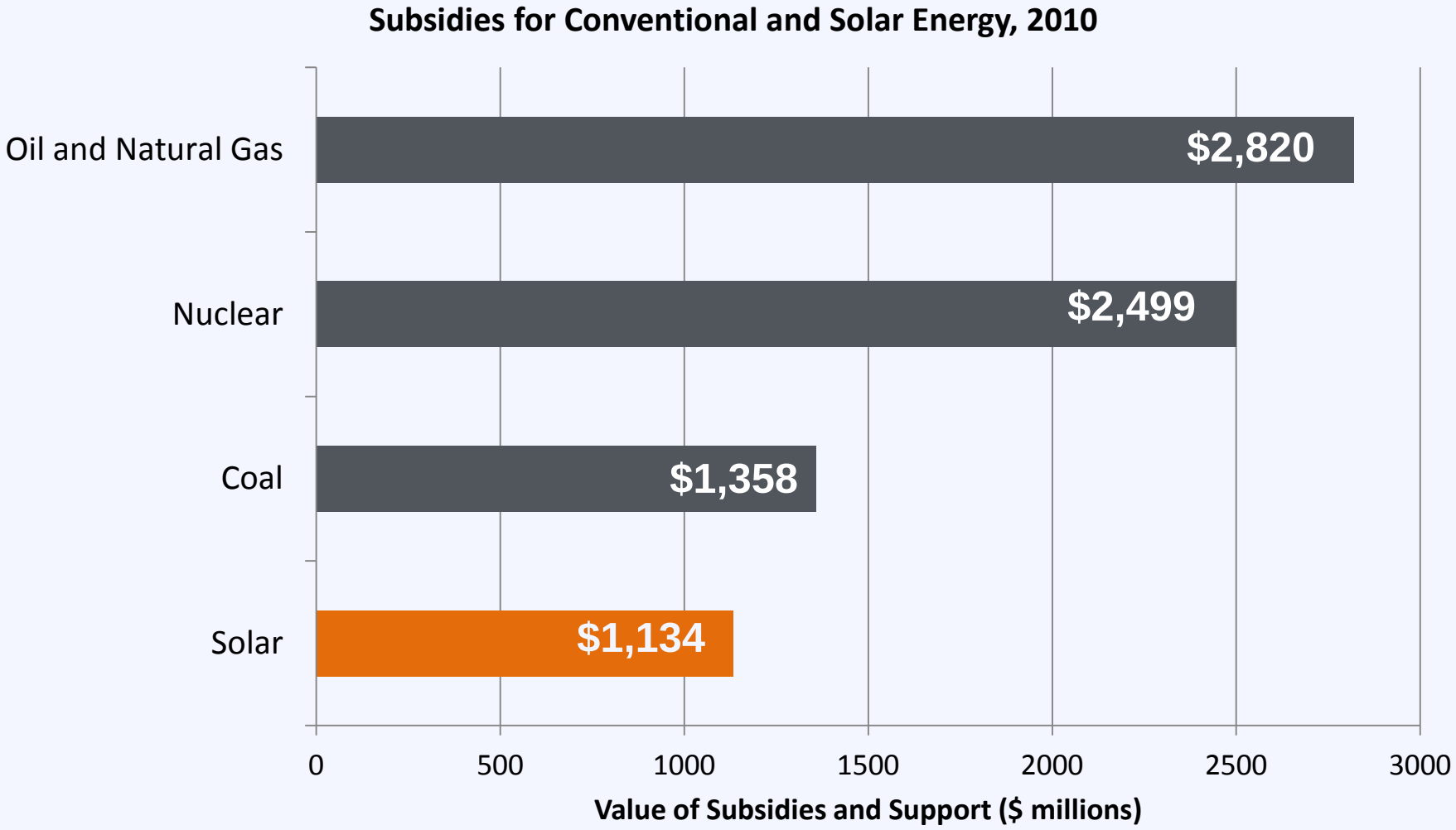
# **Fact:** Solar is cost competitive

**2020**



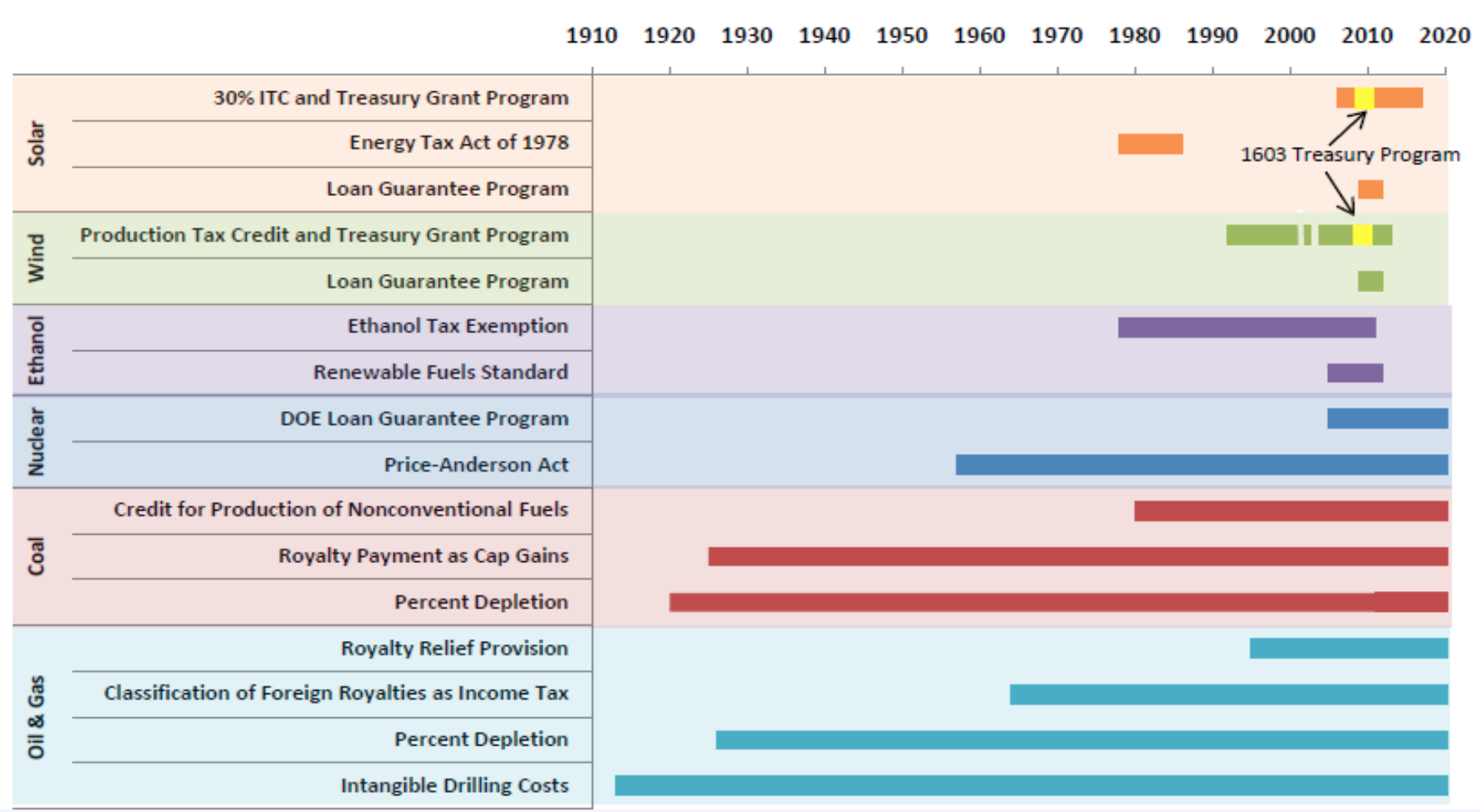

Source: Bloomberg

# Subsidies and Support



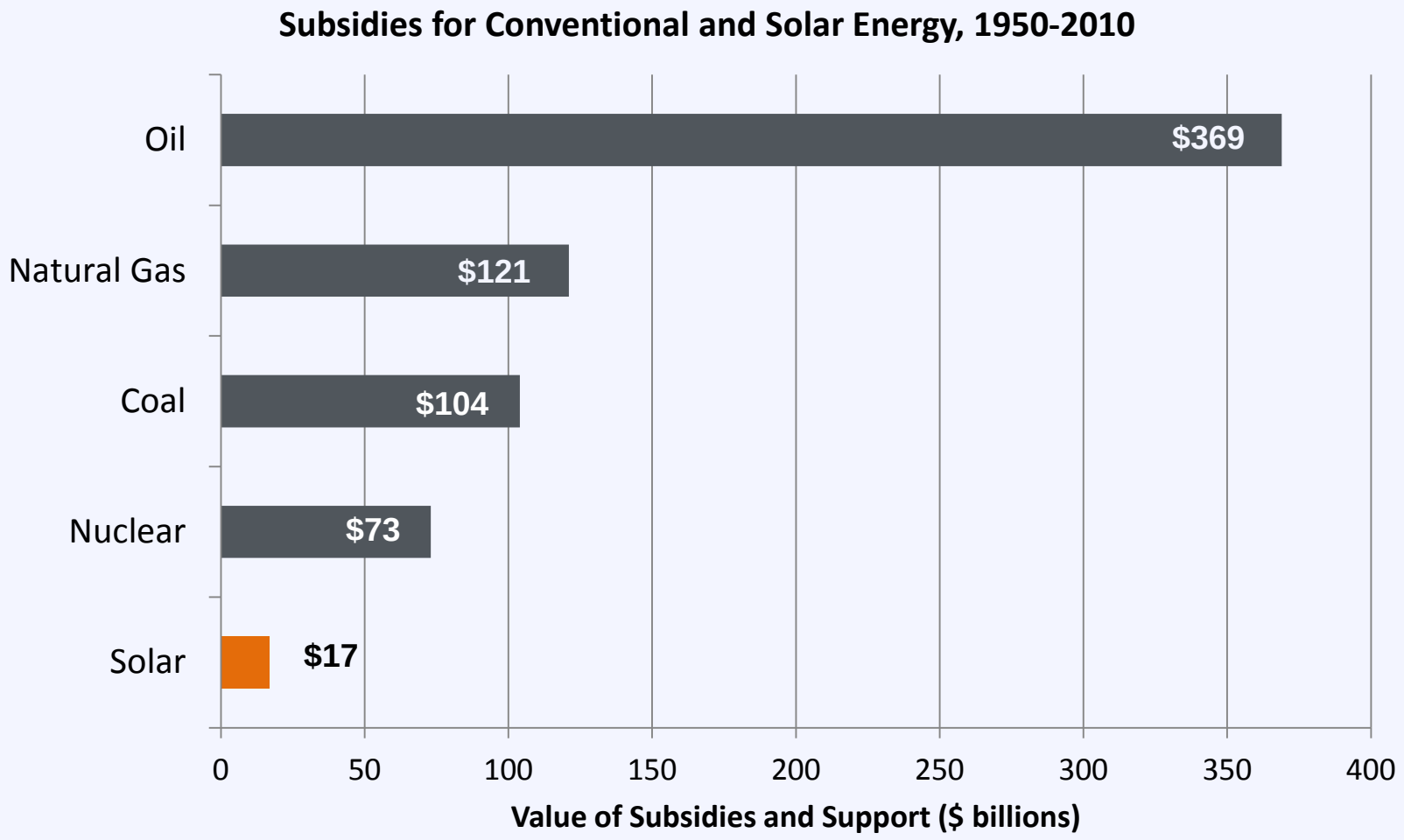

Source: U.S. Energy Information Administration. July 2011. *Direct Federal Interventions and Subsidies in Energy in Fiscal Year 2010*

# Subsidies and Support



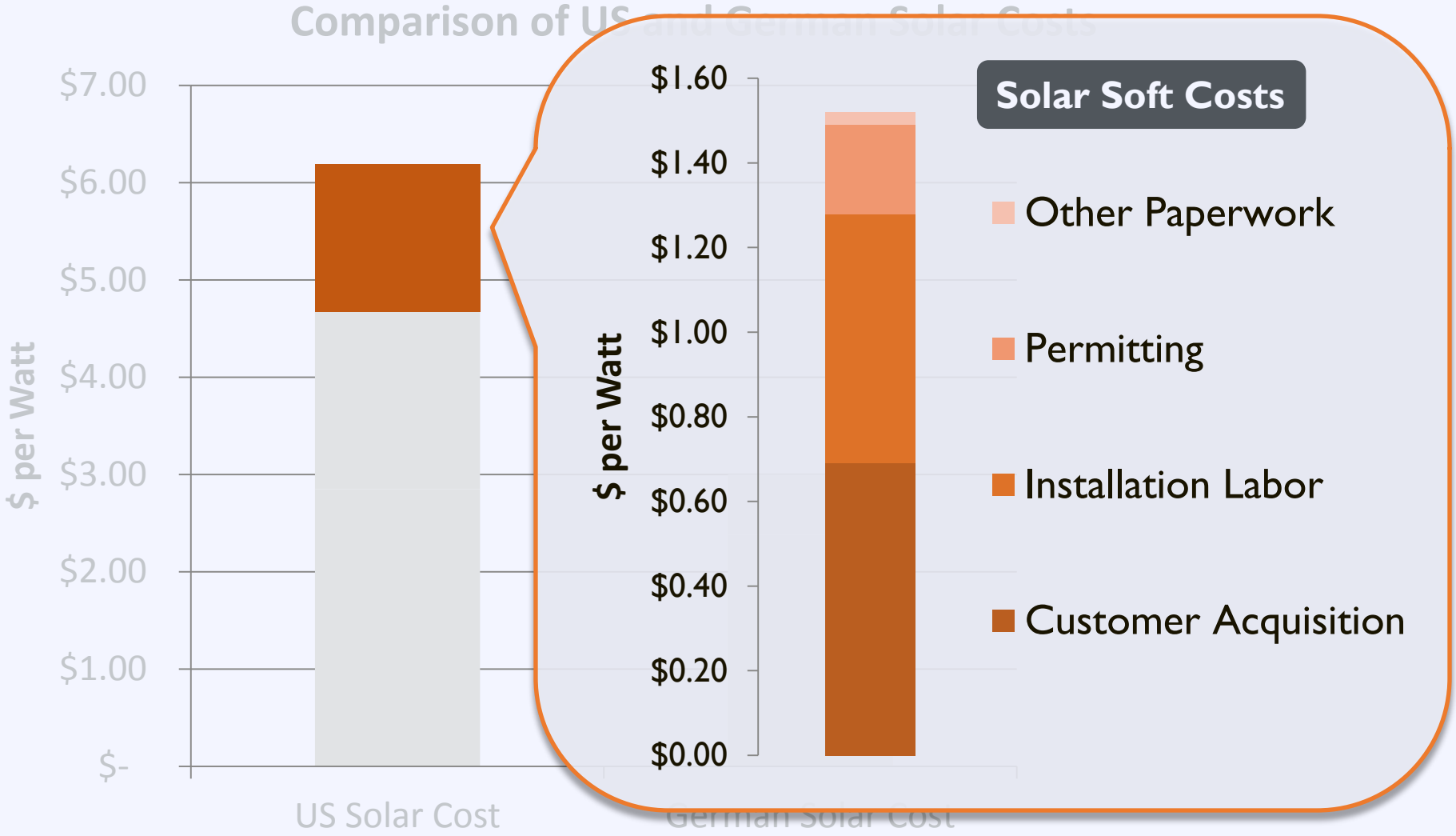

Source: SEIA, Federal Energy Incentives in the United States (2011), http://www.seia.org/galleries/pdf/Federal_Energy_Incentives_in_the_United_States.pdf

# 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 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)

Powered by SunShot U.S. Department of Energy

# Agenda

| | |
|---|---|
| 08:40 – 09:00 | Solar 101 for Communities |
| 09:00 – 09:30 | Understanding the Solar Regulatory Landscape |
| 09:30 – 09:45 | Permitting Solar Projects in Vermont |
| 09:45 – 09:55 | *Break* |
| 09:55 – 10:10 | Benefits and Barriers Activity |
| 10:10 – 10:40 | Introduction to Solar Project Finance |
| 10:40 – 11:00 | Growing Your Local Solar Market |
| 11:10 – 11:10 | *Break* |
| 11:10 – 12:15 | Regional Perspective: Panel of Local Speakers |

# The Solar Equation

## Cost

+ Installed Cost

+ Maintenance

- Direct Incentive

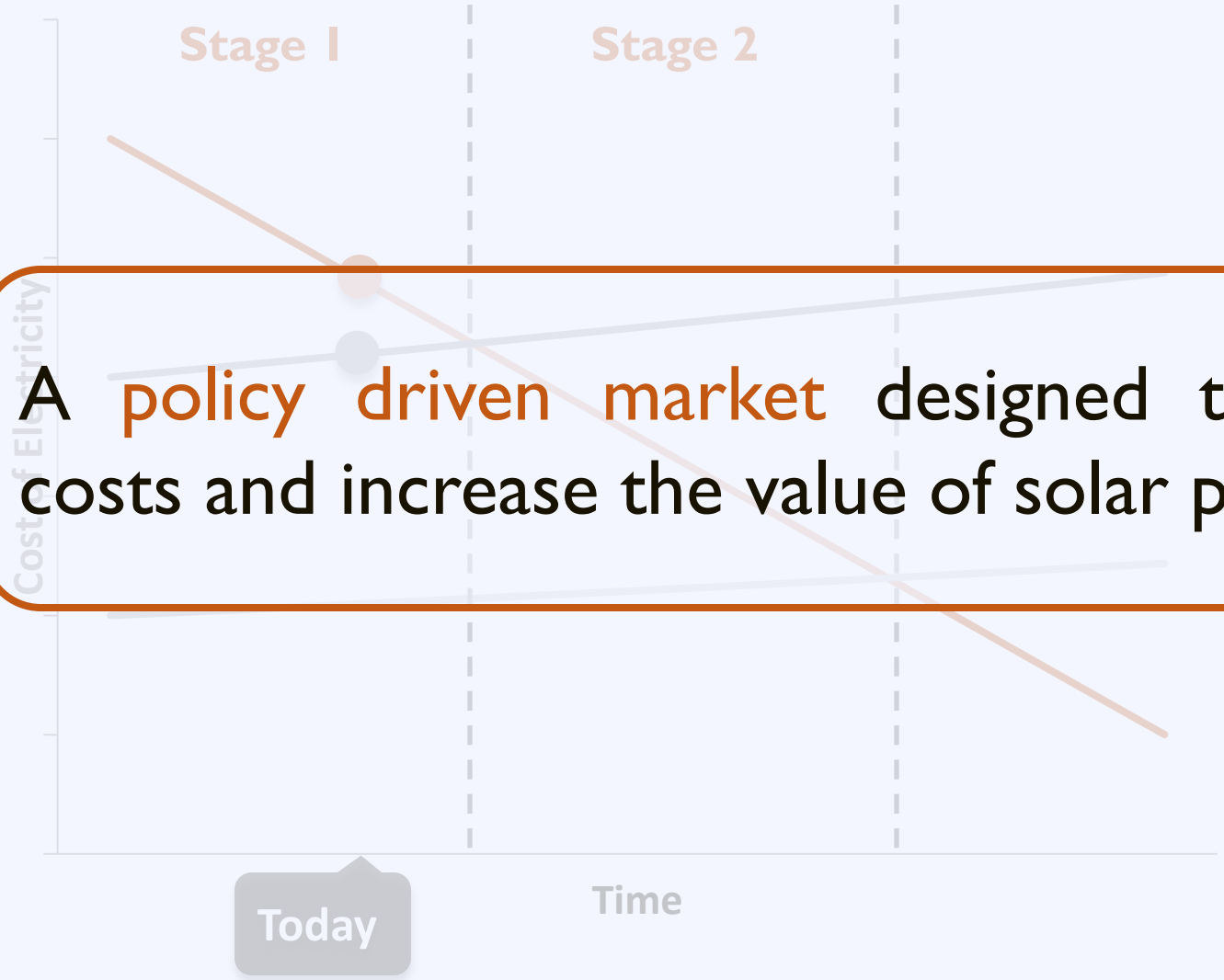
## Benefit

+ Avoided Energy Cost

+ Excess Generation

+ Performance Incentive

# **Solar Market:** Trends




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

Source: Solar Electric Power Association

# The Solar Equation

## Cost

+ Installed Cost

+ Maintenance

- Direct Incentive

## Benefit

+ Avoided Energy Cost

+ Excess Generation

+ Performance Incentive

# A Policy Driven Market

| | | | |
|---|---|---|---|
| **Federal** | Investment Tax Credit | Accelerated Depreciation | Qualified Energy Conservation Bond |
| **State & Utility** | Renewable Portfolio Standard | Net Metering/ Interconnection | Solar Access |
| | Permitting & Interconnection | Tax Credits & Exemptions | Direct Cash & Performance Incentives |
| **Local** | Solarize | Property Assessed Clean Energy | |

# Investment Tax Credit

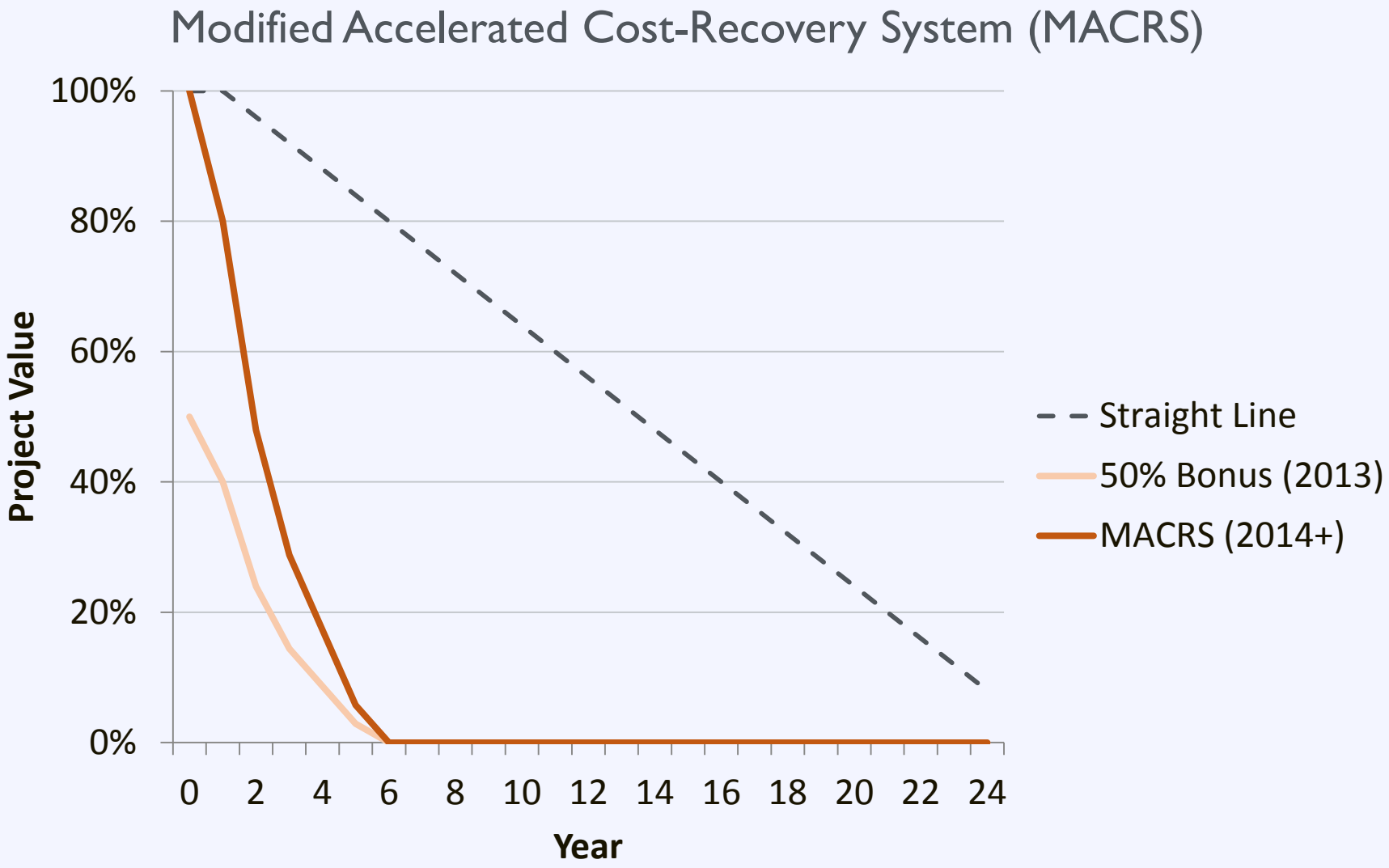
**Type:** Tax Credit

**Eligibility:** For-Profit Organization

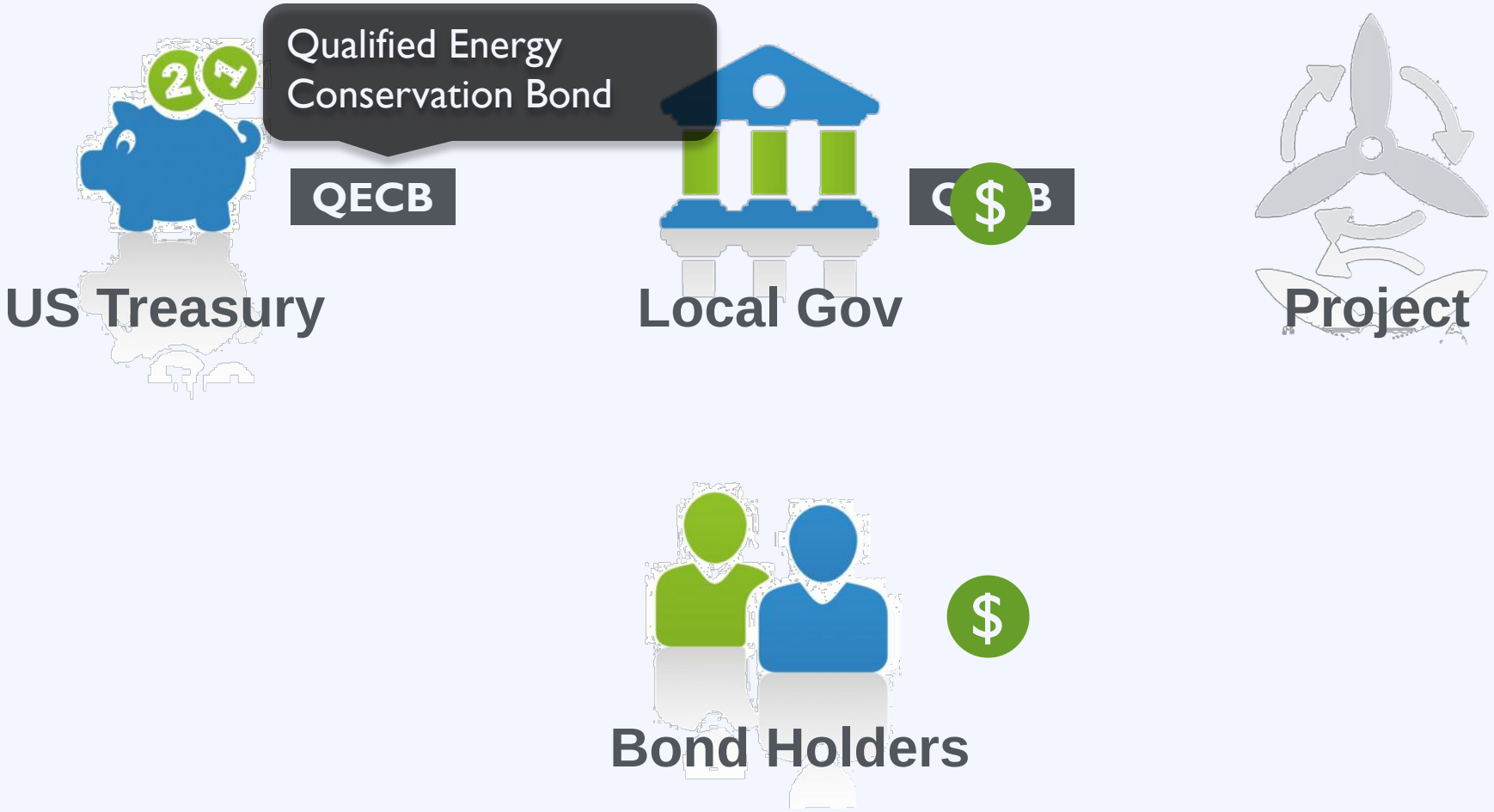
**Value:** 30% of the installation cost

**Availability:** Through 2016

# Accelerated Depreciation



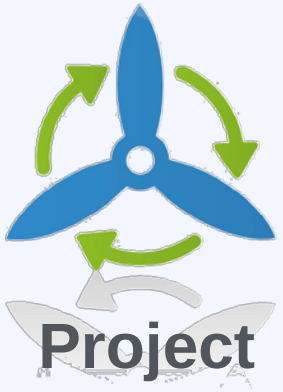
# Qualified Energy Conservation Bond



# Qualified Energy Conservation Bond

US Treasury


Local Gov



Project


Bond Holders

# A Policy Driven Market

| | | | |
|---|---|---|---|
| **Federal** | Investment Tax Credit | Accelerated Depreciation | Qualified Energy Conservation Bond |
| **State & Utility** | Renewable Portfolio Standard | Net Metering/ Interconnection | Solar Access |
| | Permitting & Interconnection | Tax Credits & Exemptions | Direct Cash & Performance Incentives |
| **Local** | Solarize | Property Assessed Clean Energy | |

Powered by SunShot
U.S. Department of Energy

# Performance-Based Incentives

# Green Mountain Power – Solar GMP

**Type:** Solar PV

**Eligibility: All** Solar PV systems receiving service on a net metering tariff

**Value:** 6 cents/kWh on top of net metering credit

**Requirements:** Adherence to NM rules

# Standard Offer Program – SPEED Resources

**Type/Eligibility:** All SPEED-eligible resources (see next page)

**Value:** Varies by Resource (see next page)

**Availability:** 127.5 MW total program budget (see following pages for allocations)

# Standard Offer Program – SPEED Resources

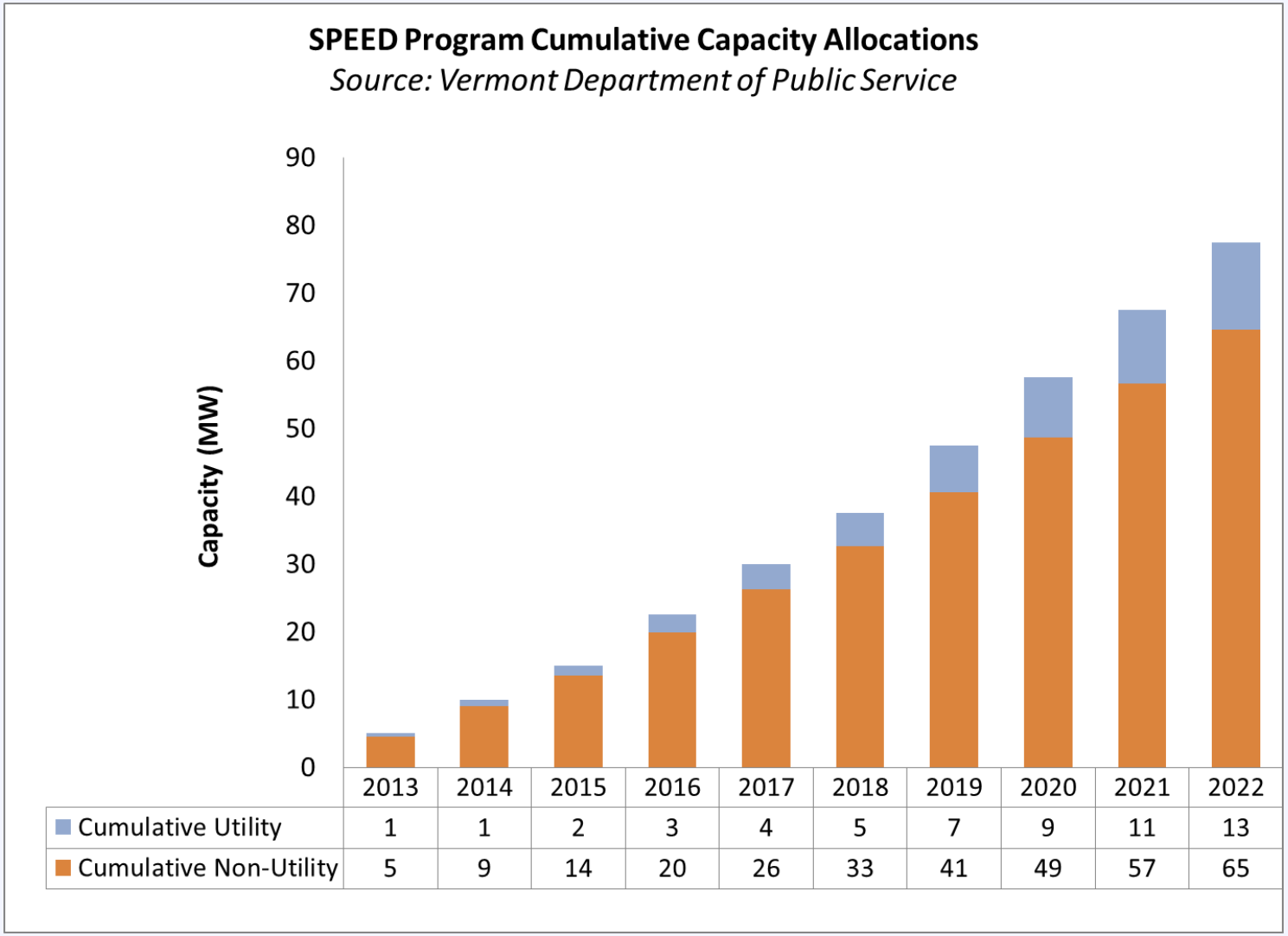
**Avoided-Cost Schedule for Standard-Offer Projects ($/kWh)**

| | Biomass | Farm Methane | Hydroelectric | Landfill Gas | Wind >100 kW | Wind ≤ 100 kW | Solar PV |
|---|---|---|---|---|---|---|---|
| Levelized | 0.125 | 0.141 | 0.123 | 0.090 | 0.118 | 0.253 | 0.257 for 25 years |
| Year 1 | 0.121 | 0.136 | 0.119 | 0.087 | 0.113 | 0.245 | |
| Year 2 | 0.121 | 0.137 | 0.119 | 0.087 | 0.113 | 0.246 | |
| Year 3 | 0.122 | 0.137 | 0.120 | 0.088 | 0.114 | 0.247 | |
| Year 4 | 0.123 | 0.138 | 0.121 | 0.089 | 0.114 | 0.249 | |
| Year 5 | 0.124 | 0.139 | 0.121 | 0.089 | 0.115 | 0.250 | |
| Year 6 | 0.125 | 0.139 | 0.122 | 0.090 | 0.115 | 0.251 | |
| Year 7 | 0.126 | 0.140 | 0.122 | 0.091 | 0.116 | 0.252 | |
| Year 8 | 0.127 | 0.141 | 0.123 | 0.091 | 0.117 | 0.254 | |
| Year 9 | 0.128 | 0.142 | 0.124 | 0.092 | 0.117 | 0.255 | |
| Year 10 | 0.129 | 0.142 | 0.124 | 0.093 | 0.118 | 0.256 | |
| Year 11 | 0.130 | 0.143 | 0.125 | 0.093 | 0.118 | 0.258 | |
| Year 12 | 0.131 | 0.144 | 0.126 | 0.094 | 0.119 | 0.259 | |
| Year 13 | 0.132 | 0.145 | 0.126 | 0.095 | 0.120 | 0.260 | |
| Year 14 | 0.133 | 0.145 | 0.127 | 0.096 | 0.120 | 0.262 | |
| Year 15 | 0.135 | 0.146 | 0.128 | 0.097 | 0.121 | 0.263 | |
| Year 16 | 0.136 | 0.147 | 0.128 | NA | 0.122 | 0.265 | |
| Year 17 | 0.137 | 0.148 | 0.129 | NA | 0.122 | 0.266 | |
| Year 18 | 0.138 | 0.149 | 0.130 | NA | 0.123 | 0.268 | |
| Year 19 | 0.140 | 0.149 | 0.131 | NA | 0.124 | 0.269 | |
| Year 20 | 0.141 | 0.150 | 0.131 | NA | 0.124 | 0.271 | |



Source: vermontspeed.com and DSIRE

# Standard Offer Program – SPEED Resources




| | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|---|---|---|---|---|
| Cumulative Utility | 1 | 1 | 2 | 3 | 4 | 5 | 7 | 9 | 11 | 13 |
| Cumulative Non-Utility | 5 | 9 | 14 | 20 | 26 | 33 | 41 | 49 | 57 | 65 |

# Tax Incentives

# Corporate Tax Credit

**Type:** All technologies eligible for Federal ITC

**Eligibility:** Taxpayers with a corporate tax liability

**Value:** 7.2% of the purchase price for non-solar, fuel cells and small wind in place before 2017, 2.4% for solar in 2017 and after.

**Carryforward Option?:** Yes, 5 years

# Local Option Property Tax Exemption

**Type:** Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels

**Eligibility:** Up to Local Jurisdiction

**Value:** Up to 100% of municipal property tax bill (state property taxes still apply)

# Solar-Specific Property Tax Exemption

**Type:** Solar PV

**Eligibility:** All solar PV systems

**Value:** 100% exemption for systems under 10kW, for all systems >10kW, tax liability capped at $4/system kW

# Sales Tax Exemption

**Type:** Solar Water Heat, Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, CHP/Cogeneration, Anaerobic Digestion, Fuel Cells using Renewable Fuels

**Eligibility:** All purchasers of systems listed above

**Value:** 100% of sales tax assessed upon purchase

# State Rebates

# Small-Scale Renewable Energy Incentive Program

**Type/Eligibility:** Solar Water Heat, Photovoltaics, Wind, Hydroelectric, Solar Pool Heating, Small Hydroelectric

**Eligibility/Value:** Varies by System Type (for more please visit http://www.dsireusa.org/solar/incentives/incentive.cfm?Incentive_Code=VT17F&re=1&ee=1

**2013 Budget Round:** $2M

**Expiration:** 2014

Powered by SunShot
U.S. Department of Energy

# Clean Energy Development Fund (CEDF)

**Renewable System Types:** Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Solar PV, Wind, Biomass, Geothermal Electric, Fuel Cells, Geothermal Heat Pumps, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels

**Eligibility/Value:** Varies by System Type (for more please visit http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=VT06R&re=0&ee=0)

**Budget :** $3M in 2013. Initially, funds were provided by Entergy in a settlement with the state Department of Public Service.

**Expiration:** Under a 2012 law, a maximum of $3M in CEDF funds are now only renewed by appropriations from the General Fund if the Fund is not running a deficit.

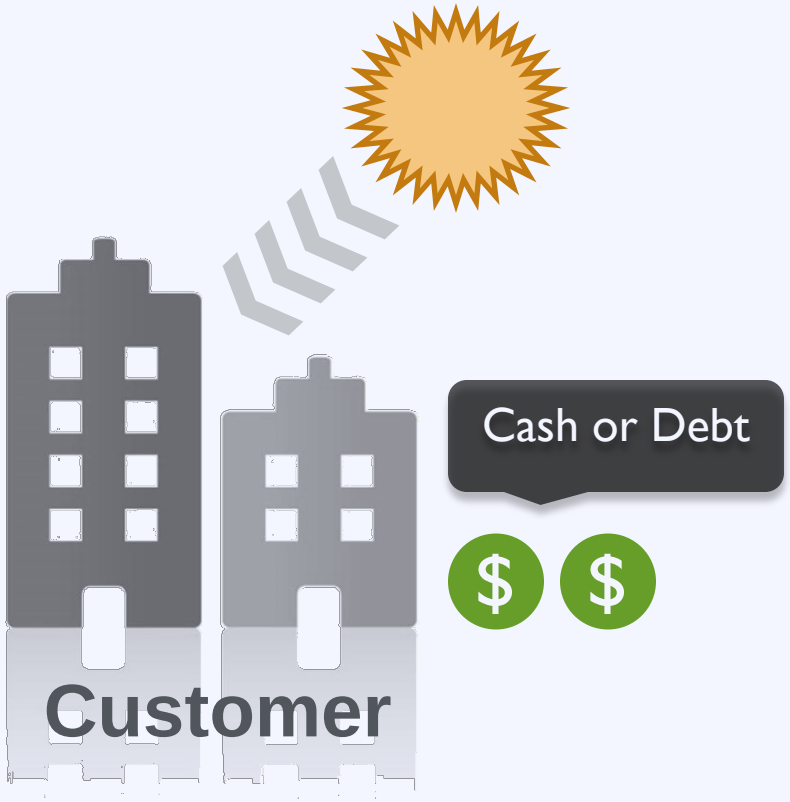
# Ownership Options

Direct Ownership

Third-Party Ownership

Community Ownership

# Direct Ownership



# Direct Ownership

## Benefits

- Low – cost electricity
- REC revenue
- Utilize cheap debt
  - Bonds
  - Low interest loans

## Drawbacks

- Large upfront cost
- Long term management
- Can't take tax benefits
- Development risk
- Performance risk

# A Variation on Direct Ownership: Energy Service Performance Contracting

## Benefits

- Low – cost electricity
- REC revenue
- Utilize cheap debt
  - Bonds
  - Low interest loans

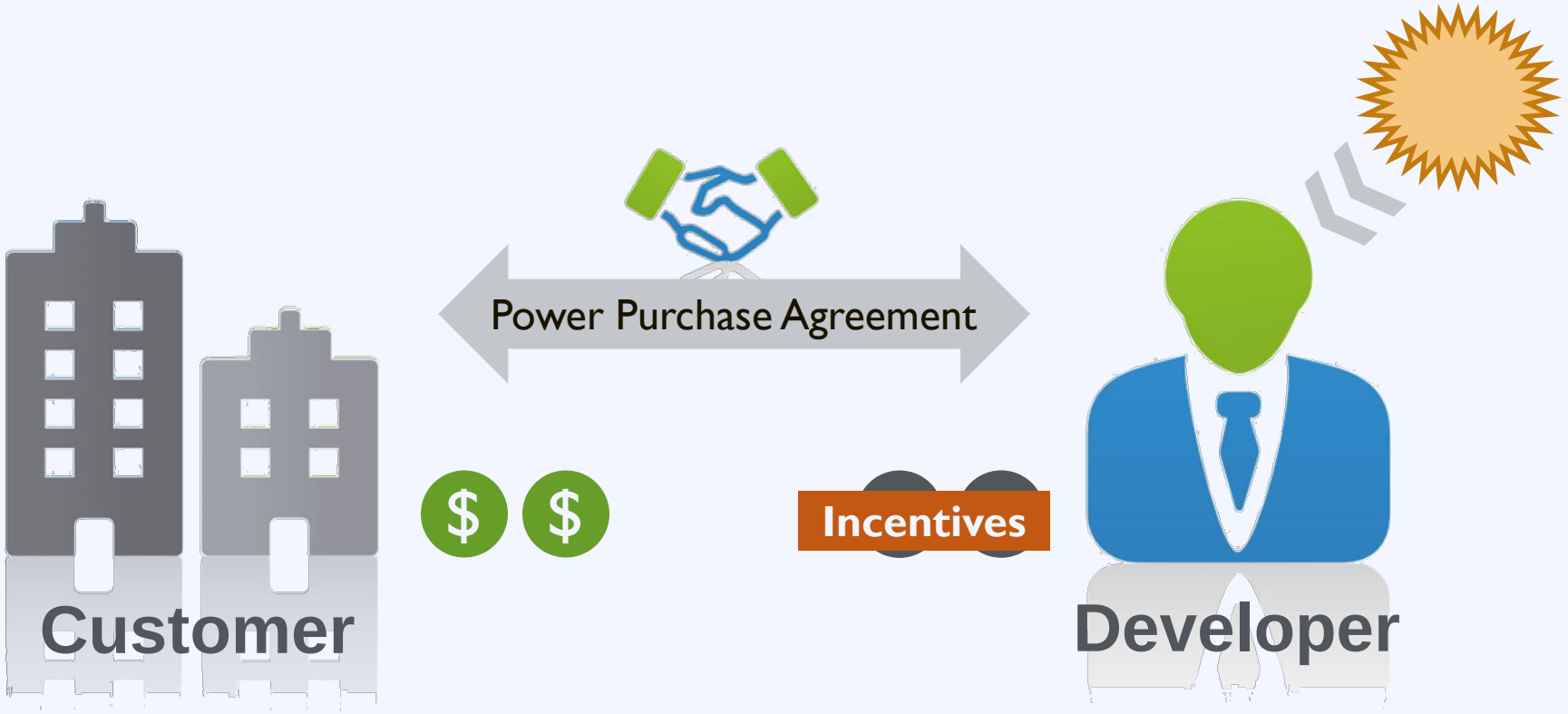
## Drawbacks

- Large upfront cost
- Long term management
- Can't take tax benefits
- Development risk
- Performance risk

# A Variation on Direct Ownership: Energy Service Performance Contracting

- How it works
  - Energy services company (ESCO) sells an interested customer a package of energy efficiency measures (lighting, HVAC, etc.)
  - Package can include measures with both rapid and slower payback periods
  - The ESCO guarantees a certain level of electric bill savings for the customer backed up by the efficiency measures.
- What Role Can Solar Play in a Performance Contract?
  - Solar PV can act as an energy efficiency measure.
  - PV, as a longer-payback energy efficiency measure, can be offered as part of a package of longer- and shorter-payback ESCO-offered incentives that saves larger customers money.
- Could also be offered as a bundled 3rd party PPA

# Third Party Ownership



# Third Party Ownership

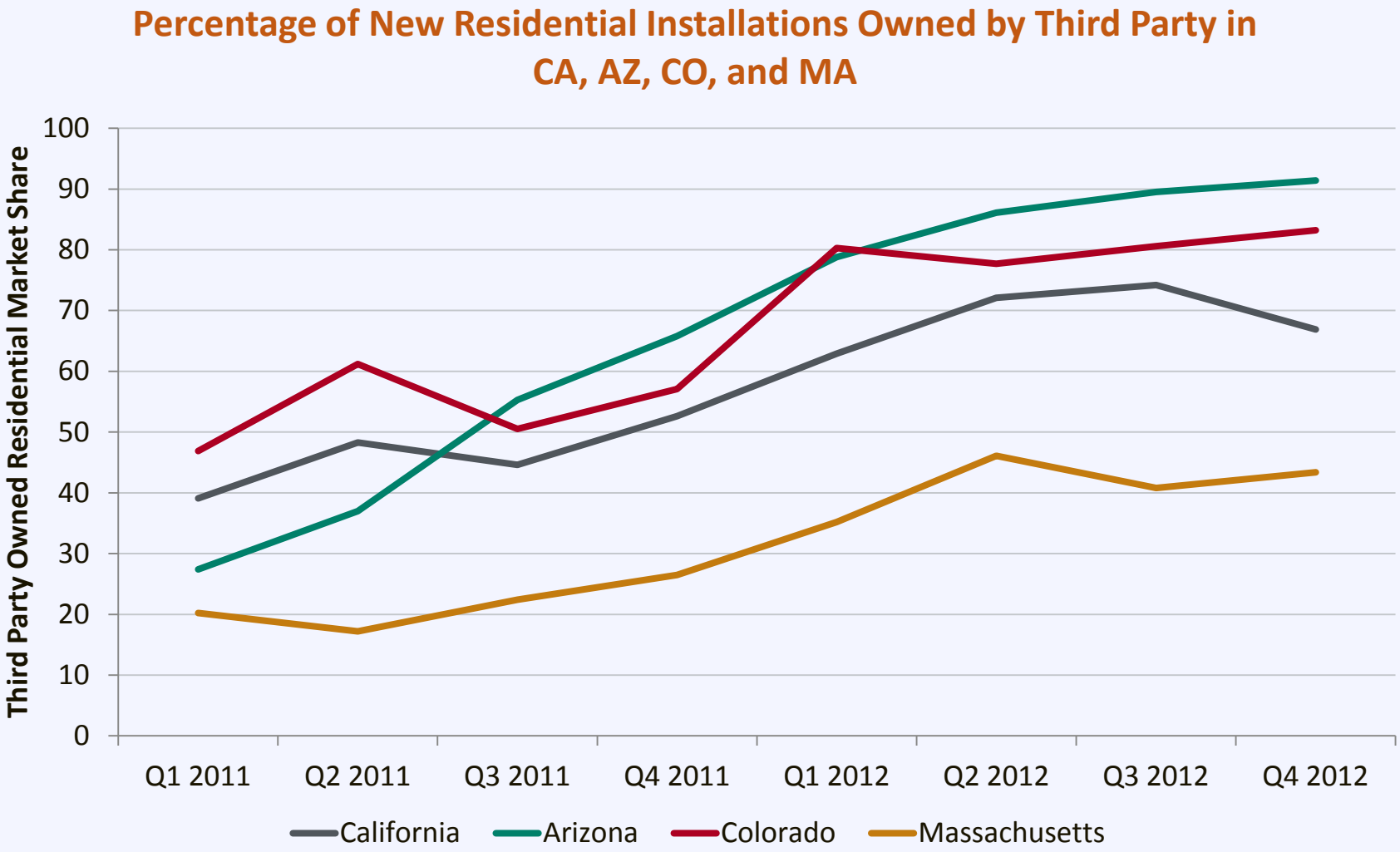
## Benefits

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

## Drawbacks

- Don't keep RECs
- Higher ROI for investor
- Can't use bonds
- Not available in all states

# PPA Adoption

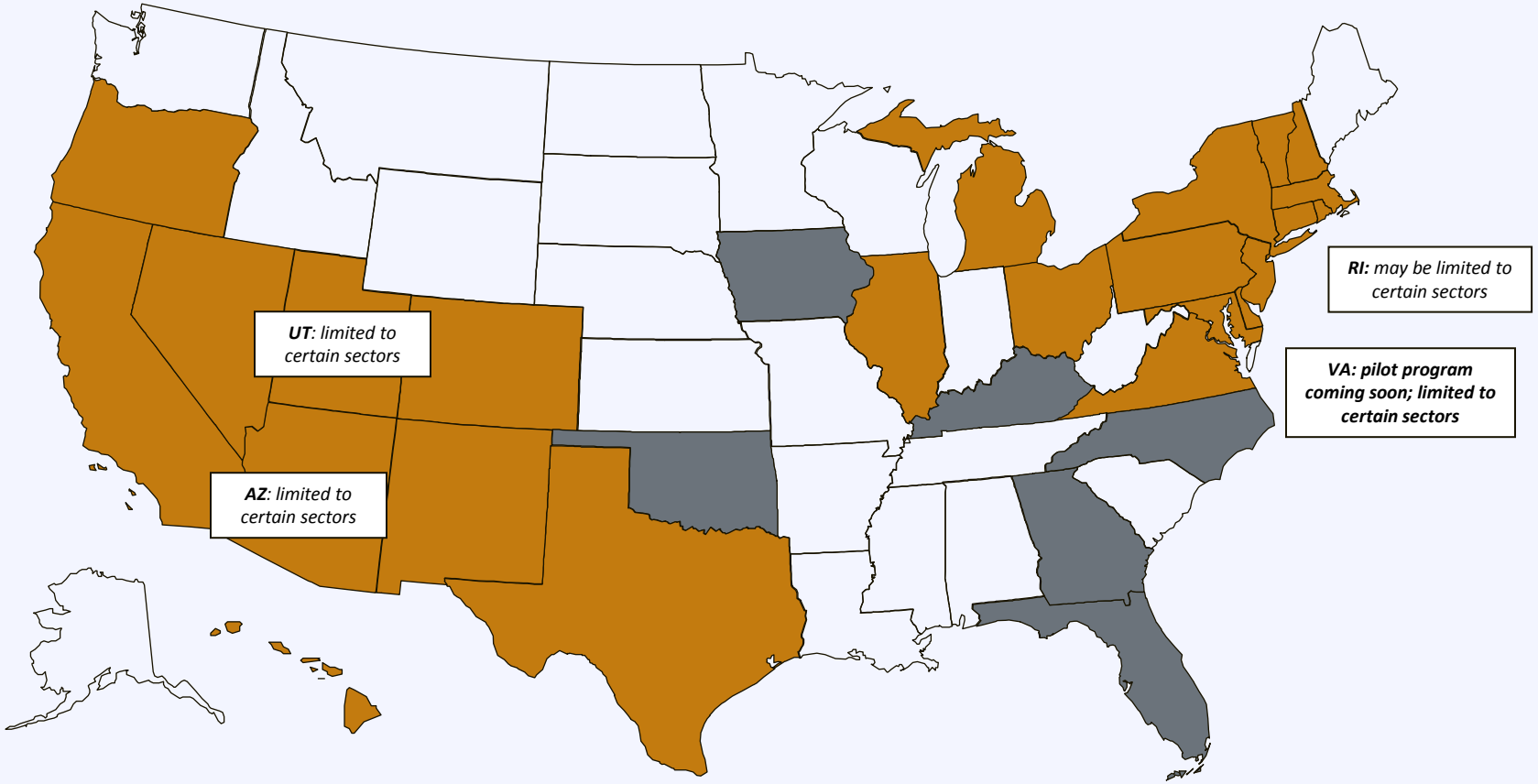



Powered by SunShot
U.S. Department of Energy

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

# **Third Party Ownership:** State Policy

**www.dsireusa.org / February 2013**




*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.*

# Bond-PPA Hybrid

A financing option by which a public entity issues a government bond at a low interest rate and transfers that low-cost capital to a developer in exchange for a lower PPA price.



Source: NREL . 2011. Financing Solar PV at Government Sites with PPAs and Public Debt

# Bond-PPA Hybrid

## Benefits

- No upfront cost
- No O&M costs
- Can use bonds
- Predictable payments
- Tax benefits

## Drawbacks

- Don't keep RECs
- Higher transaction cost

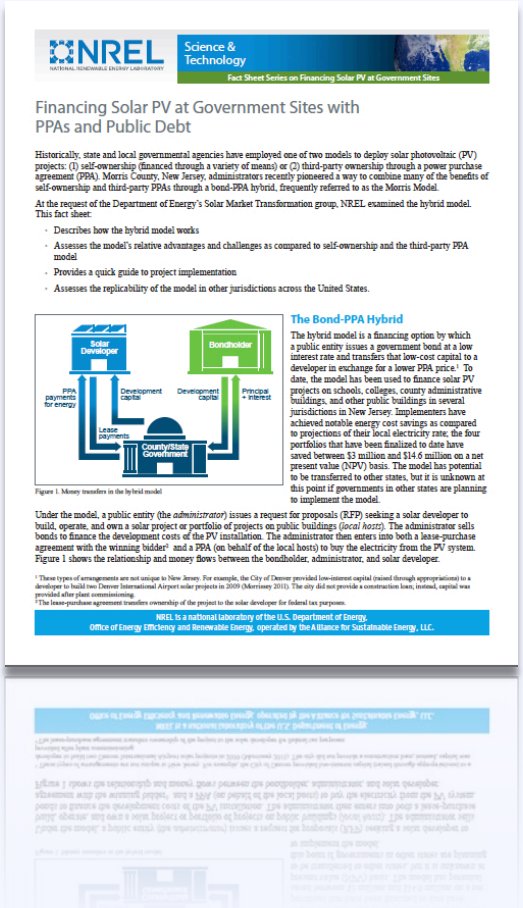
# **Bond-PPA Hybrid:** Resources

**Resource**

## Financing Solar PV at Government Sites with PPAs and Public Debt

A fact sheet on how the hybrid bond-PPA model works.

www.nrel.gov



NREL Science & Technology

Fact Sheet Series on Financing Solar PV at Government Sites

Financing Solar PV at Government Sites with PPAs and Public Debt

Historically, state and local governmental agencies have employed one of two models to deploy solar photovoltaic (PV) projects: (1) self-ownership (financed through a variety of means) or (2) third-party ownership through a power purchase agreement (PPA). Morris County, New Jersey, administrator recently pioneered a way to combine many of the benefits of self-ownership and third-party PPAs through a bond-PPA hybrid, frequently referred to as the Morris Model.

At the request of the Department of Energy's Solar Market Transformation group, NREL examined the hybrid model. This fact sheet:

- Describes how the hybrid model works
- Assesses the model's relative advantages and challenges as compared to self-ownership and the third-party PPA model
- Provides a quick guide to project implementation
- Assesses the replicability of the model in other jurisdictions across the United States.

The Bond-PPA Hybrid

The hybrid model is a financing option by which a public entity issues a government bond at a low interest rate and transfers that low-cost capital to a developer in exchange for a lower PPA price.[1] To date, the model has been used to finance solar PV projects on schools, colleges, county administrative buildings, and other public buildings in several jurisdictions in New Jersey. Implementers have achieved notable energy cost savings as compared to projections of their local electricity rate; the four portfolios that have been finalized to date have saved between $3 million and $14.6 million on a net present value (NPV) basis. The model has potential to be transferred to other states, but it is unknown at this point if governments in other states are planning to implement the model.

Solar Developer
Bondholder
PPA payments for energy
Development capital
Development capital
Principal + interest
Lease payments
County/State Government

Figure 1. Money transfers in the hybrid model

Under the model, a public entity (the *administrator*) issues a request for proposals (RFP) seeking a solar developer to build, operate, and own a solar project or portfolio of projects on public buildings (*local hosts*). The administrator sells bonds to finance the development costs of the PV installation. The administrator then enters into both a lease-purchase agreement with the winning bidder[2] and a PPA (on behalf of the local hosts) to buy the electricity from the PV system. Figure 1 shows the relationship and money flows between the bondholder, administrator, and solar developer.

[1] These types of arrangements are not unique to New Jersey. For example, the City of Denver provided low-interest capital (raised through appropriations) to a developer to build two Denver International Airport solar projects in 2009 (Morrissey 2011). The city did not provide a construction loan; instead, capital was provided after plant commissioning.
[2] The lease-purchase agreement transfers ownership of the project to the solar developer for federal tax purposes.

NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

Powered by SunShot
U.S. Department of Energy

# Agenda

| | |
|---|---|
| 08:40 – 09:00 | Solar 101 for Communities |
| 09:00 – 09:30 | Understanding the Solar Regulatory Landscape |
| 09:30 – 09:45 | Permitting Solar Projects in Vermont |
| 09:45 – 09:55 | *Break* |
| 09:55 – 10:10 | Benefits and Barriers Activity |
| 10:10 – 10:40 | Introduction to Solar Project Finance |
| 10:40 – 11:00 | Growing Your Local Solar Market |
| 11:10 – 11:10 | *Break* |
| 11:10 – 12:15 | Regional Perspective: Panel of Local Speakers |

# A Policy Driven Market

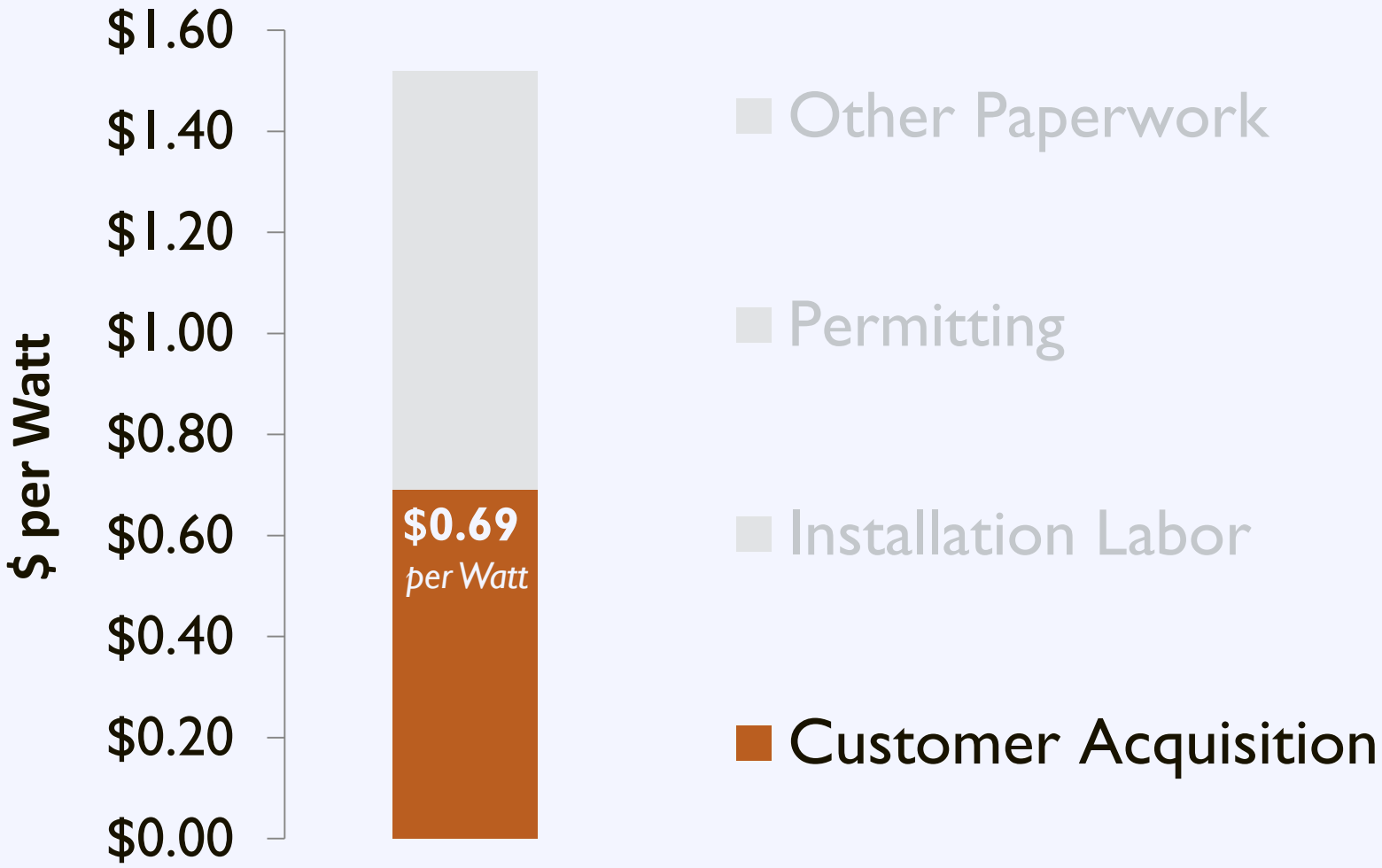
| | | | |
|---|---|---|---|
| **Federal** | Investment Tax Credit | Accelerated Depreciation | Qualified Energy Conservation Bond |
| **State & Utility** | Renewable Portfolio Standard | Net Metering | Solar Access |
| | Permitting & Interconnection | Tax Credits & Exemptions | Direct Cash & Performance Incentives |
| **Local** | Solarize | Property Assessed Clean Energy | |

# Solarize


**Solarize**

Group Purchasing


# **Solarize:** Mitigate Soft Costs



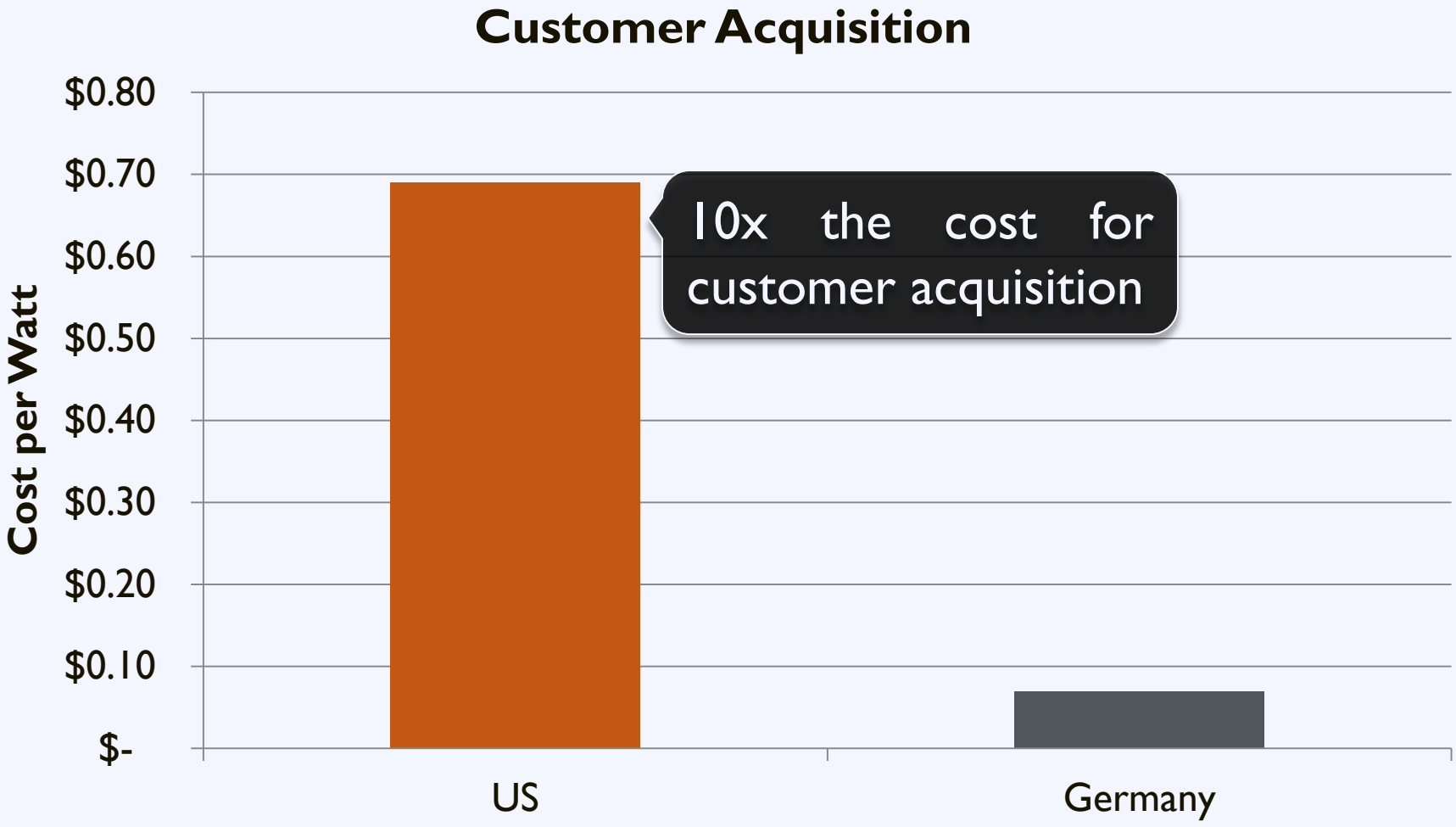

Powered by SunShot
U.S. Department of Energy

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

# **Solarize:** Advantages

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

# **Solarize:** Advantages




Source: NREL, LBNL

# **Solarize:** Advantages

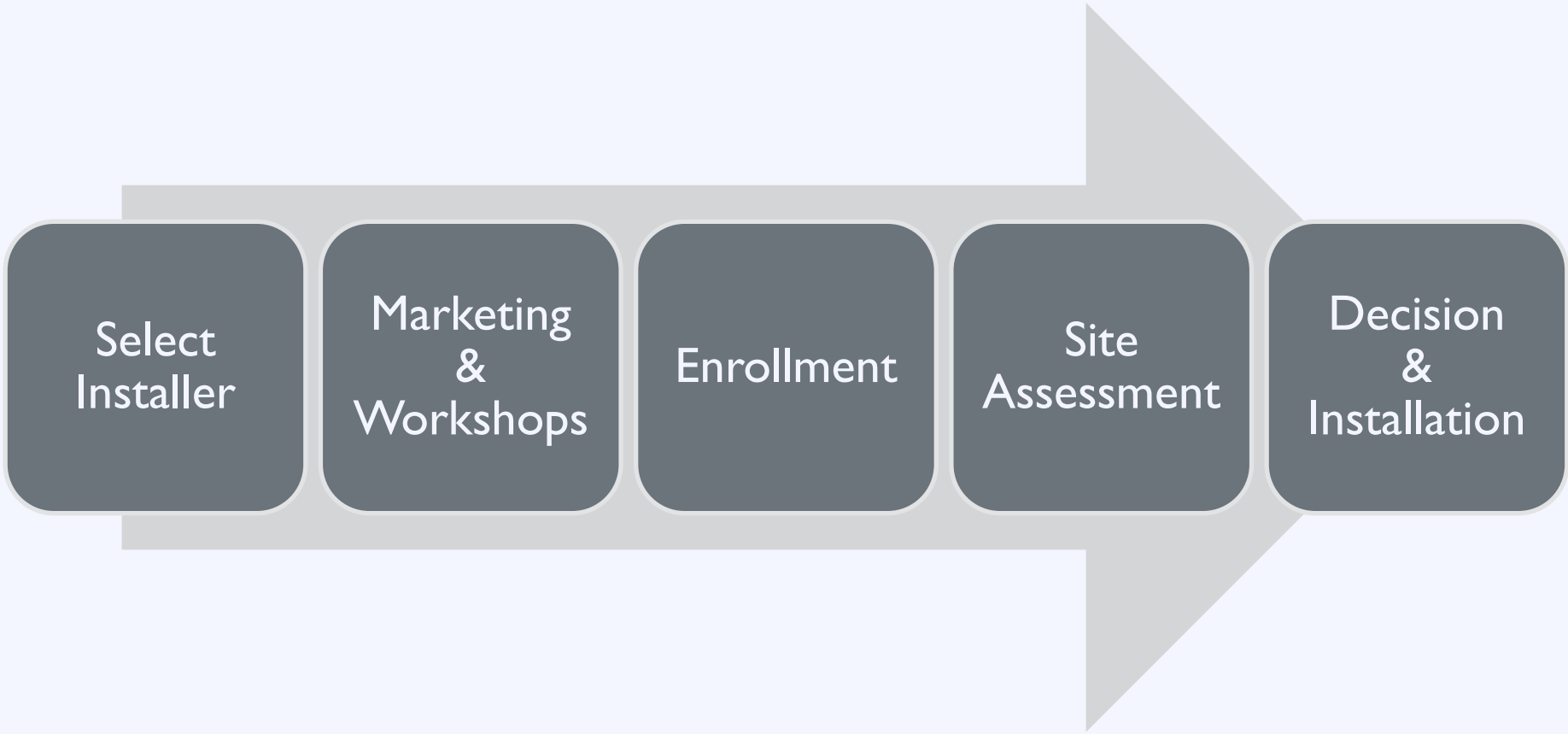
## Benefits to Local Government:

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

Quick turn-around: 9 Months

Long-term impact: Sustainable ecosystem

# **Solarize:** Process



# **Solarize:** Case Study

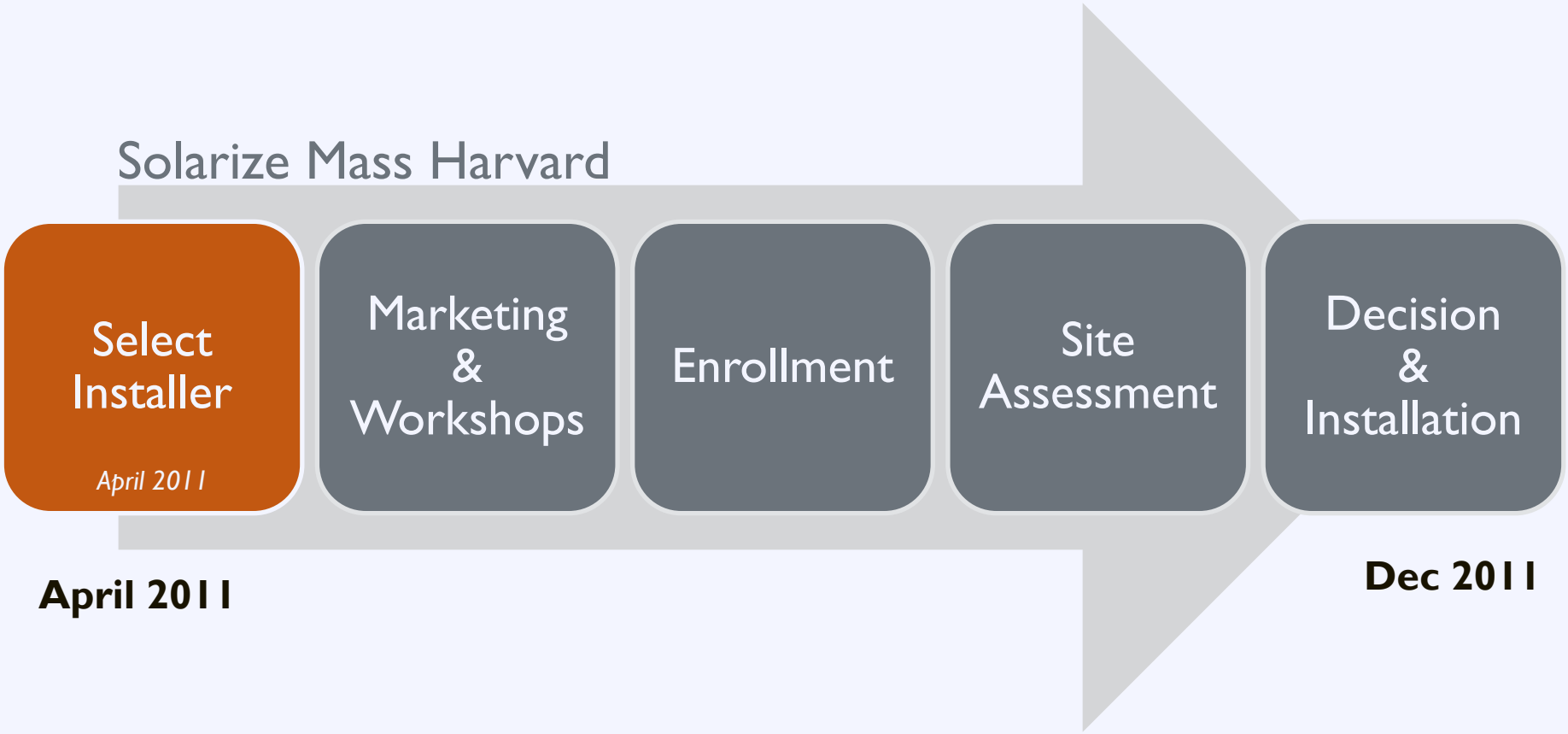
## Harvard, Massachusetts

Population: 6,520

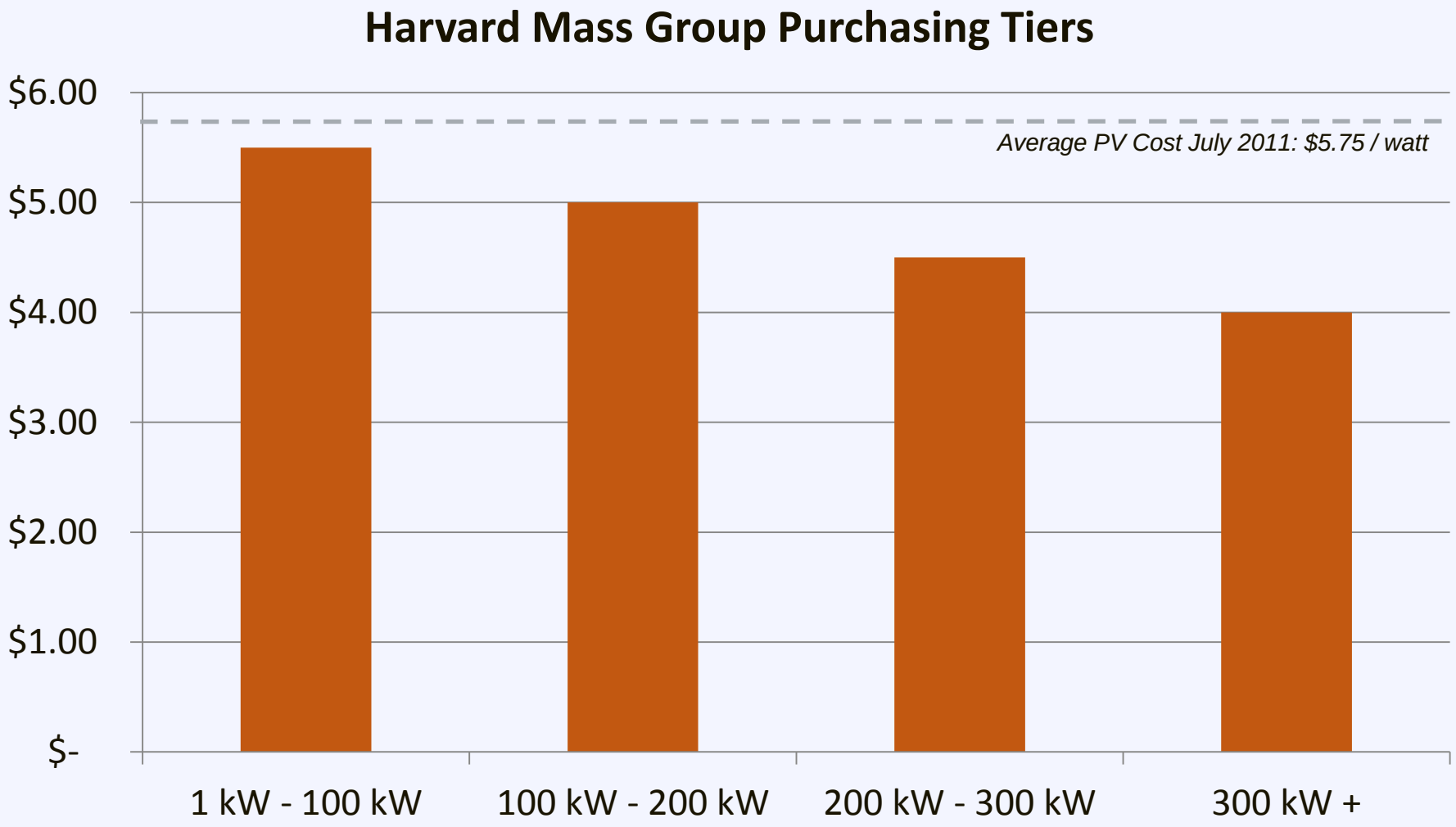
Powered by SunShot
U.S. Department of Energy

Source: Wikipedia

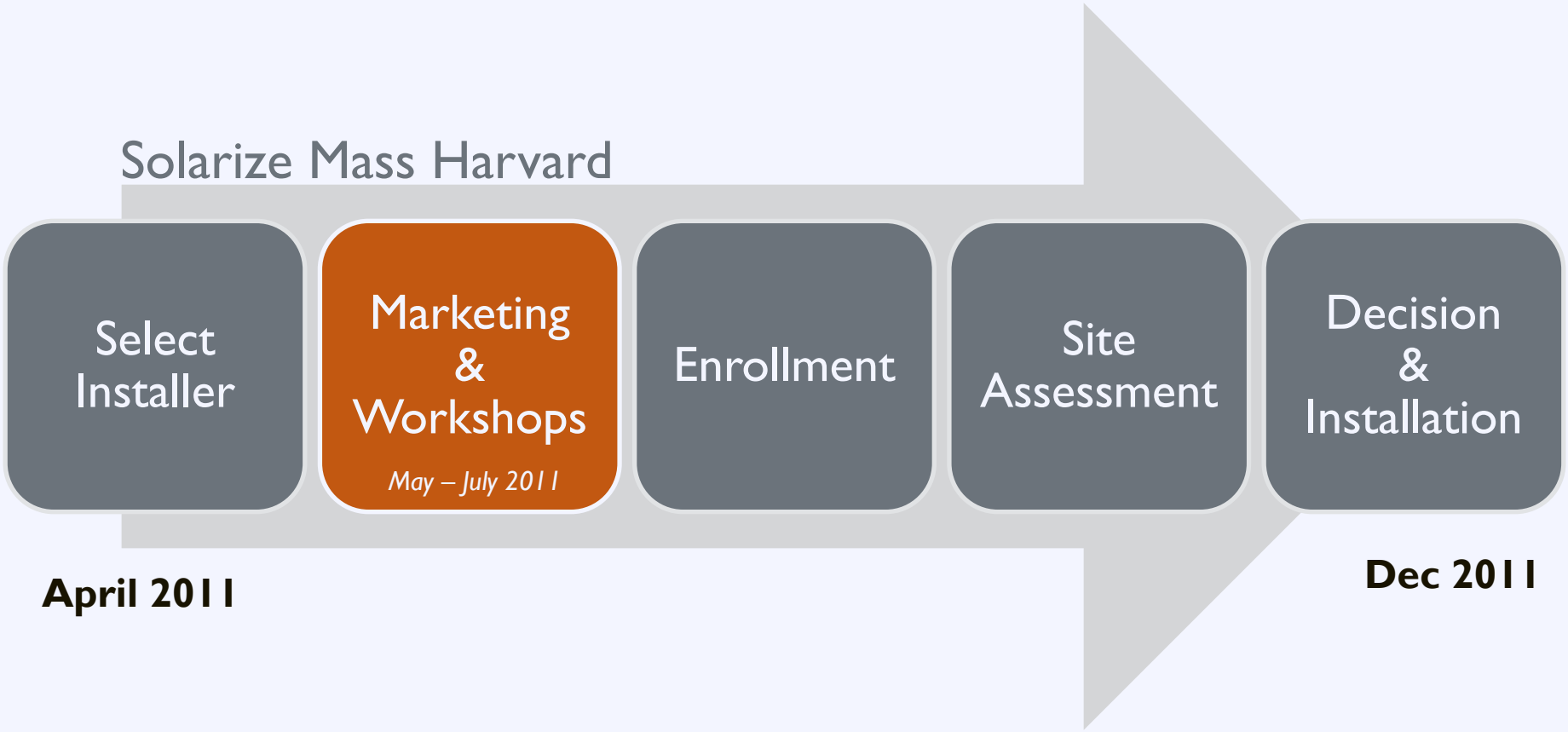
# **Solarize:** Case Study



# Group Purchasing



# **Solarize:** Case Study



# **Solarize:** Case Study

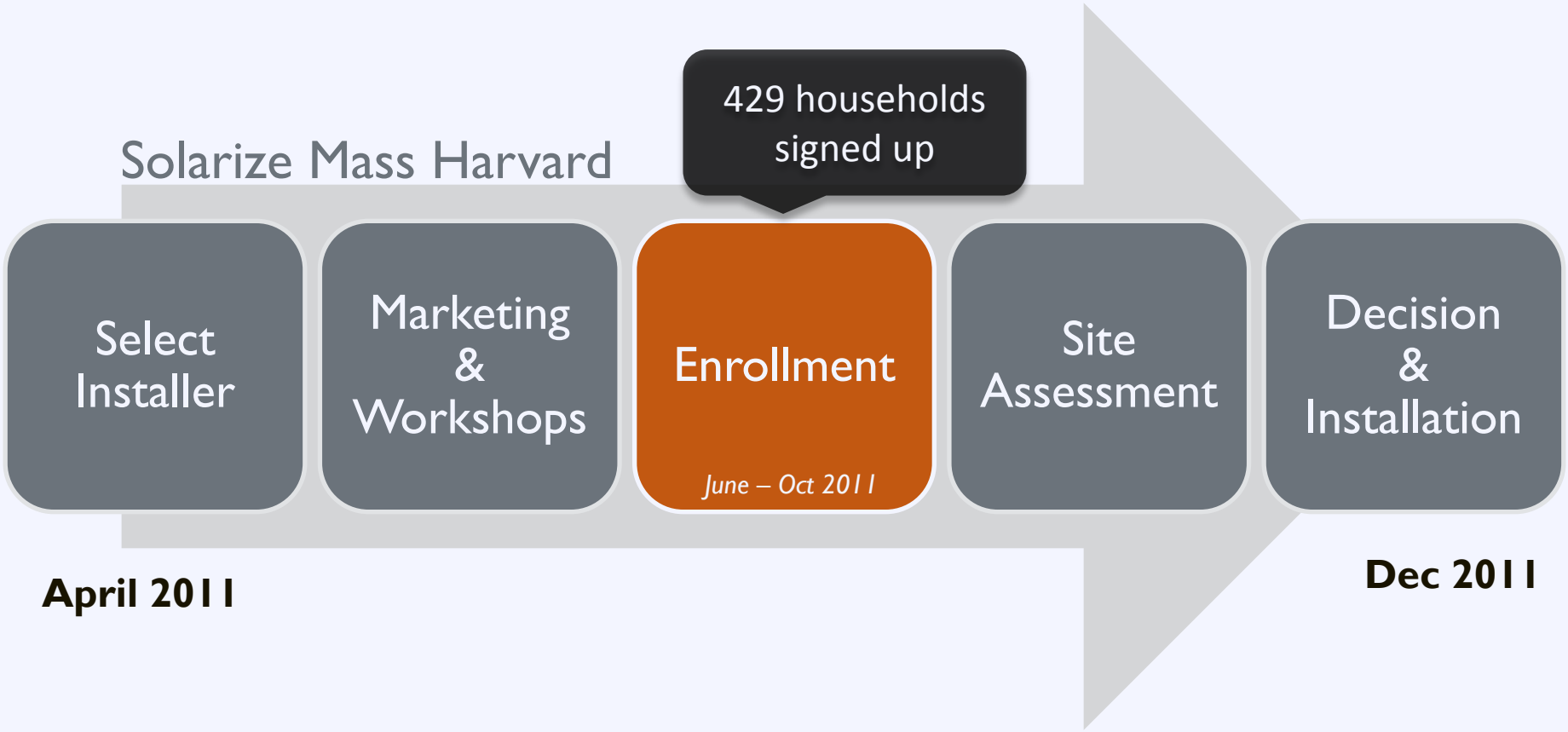
## Marketing Strategy:

- 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

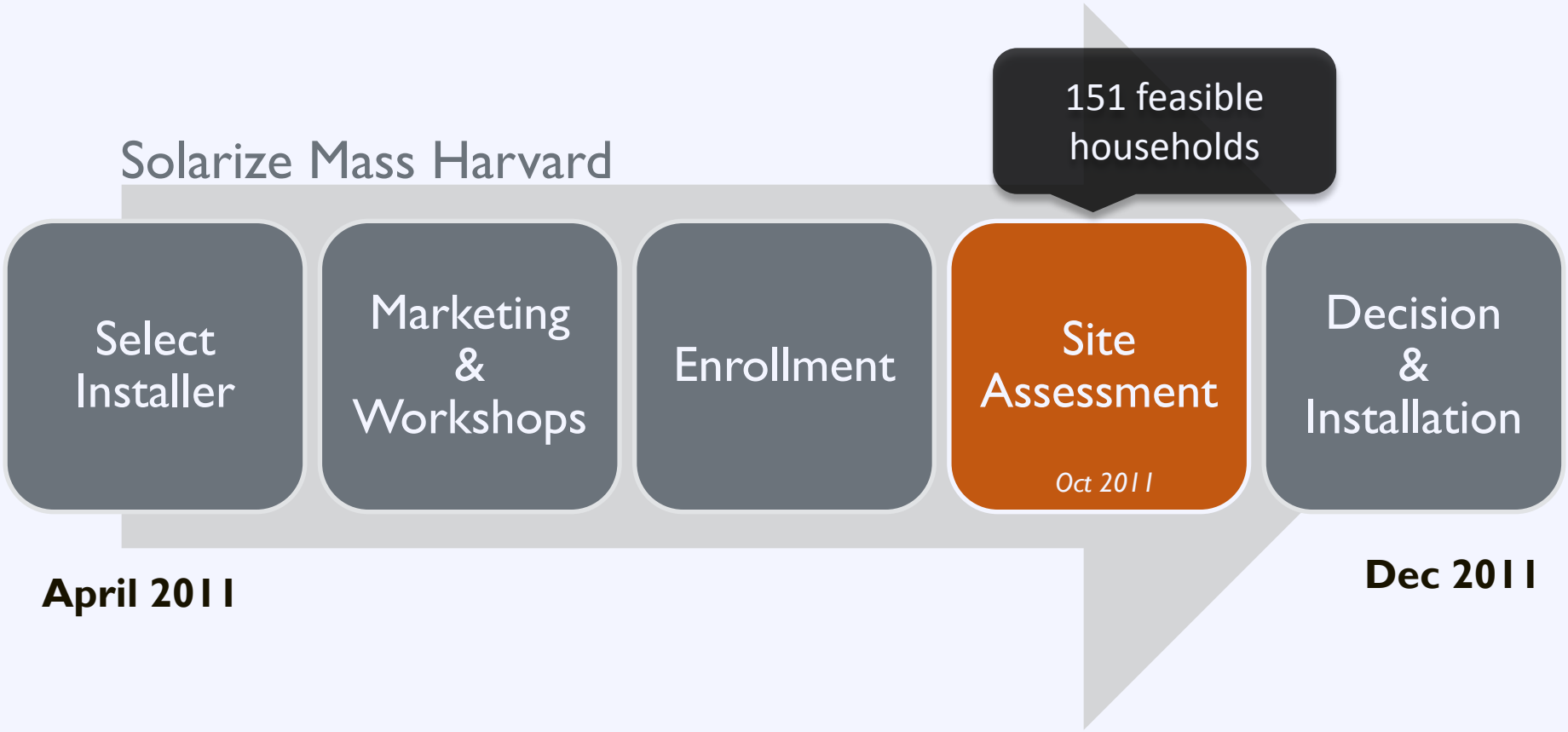


Source: Vote Solar

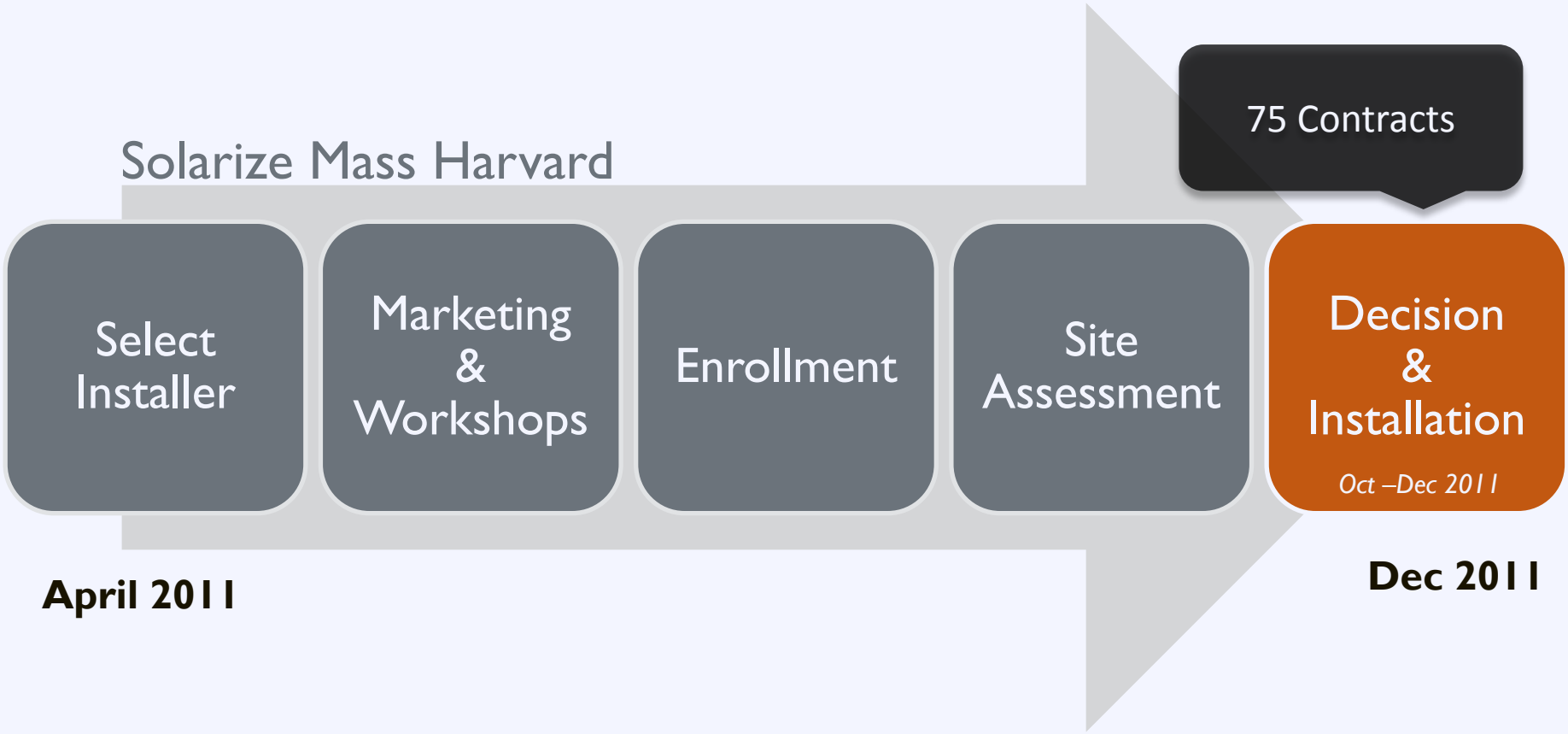
# **Solarize:** Case Study



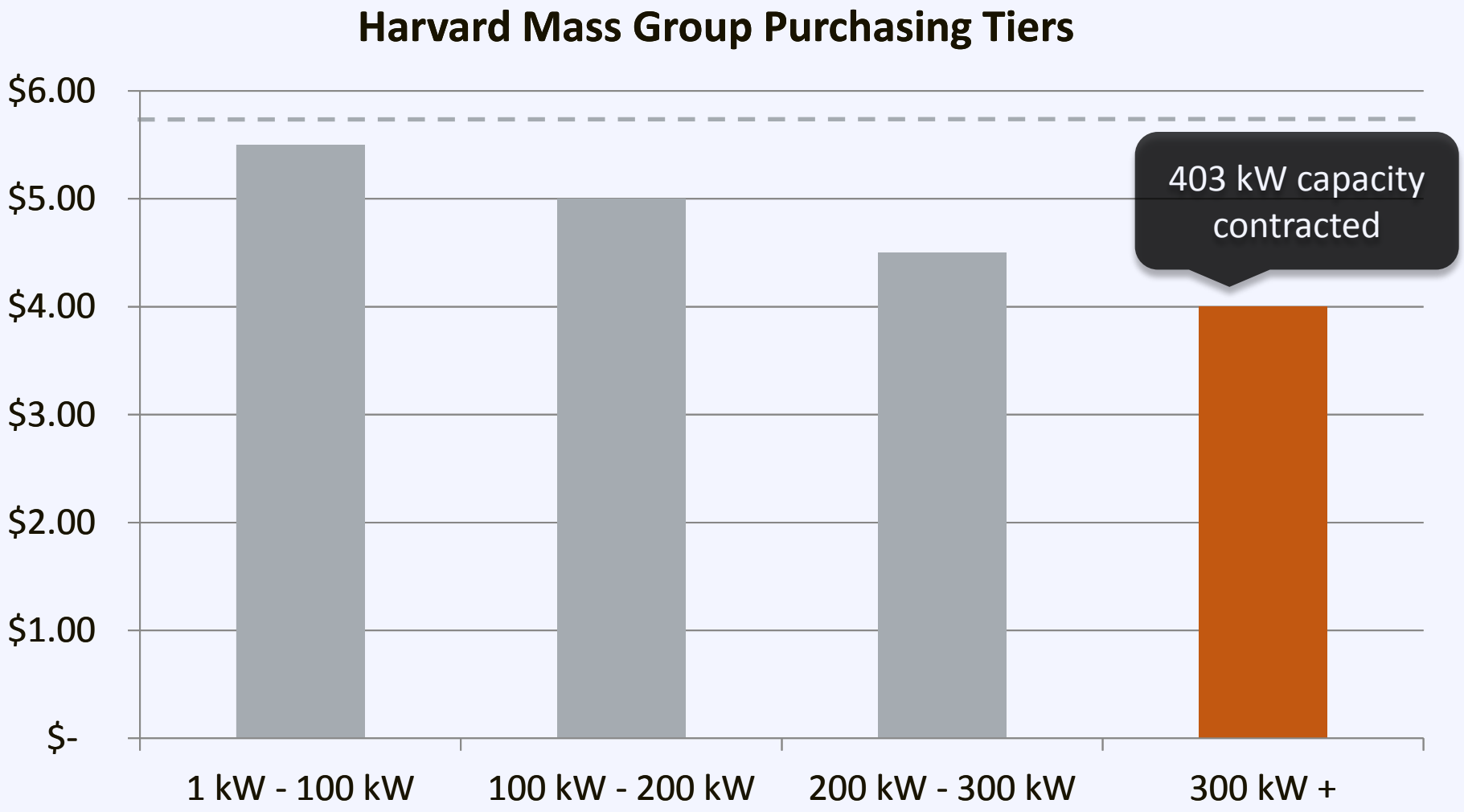
# **Solarize:** Case Study



# **Solarize:** Case Study



# Group Purchasing



# **Solarize:** Case Study

75 new installations totaling 403 kW

30% reduction in installation costs

575% increase in residential installations

# **Solarize:** Lasting Impact

A household is

**0.78%** more likely to adopt solar

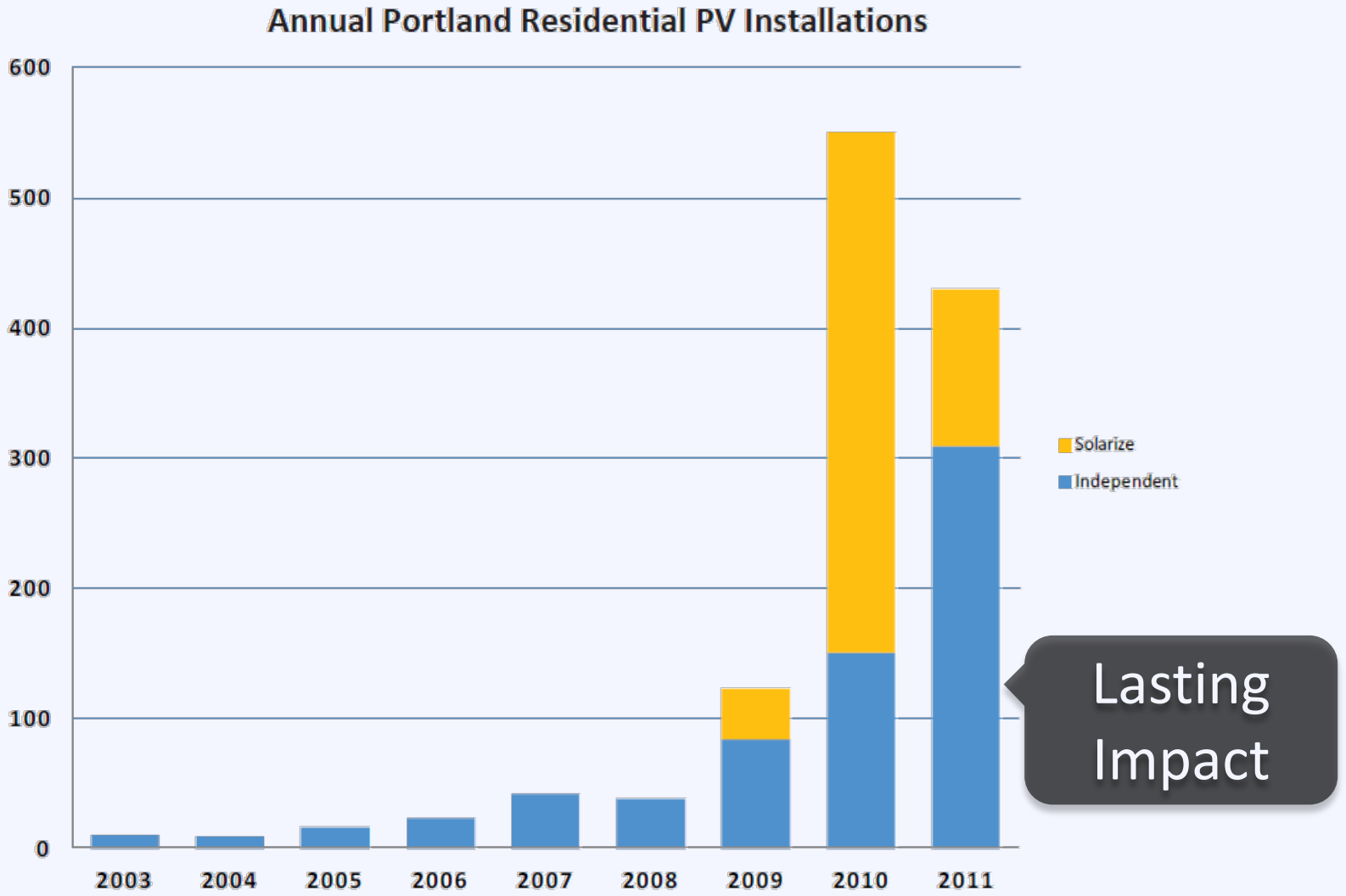
*for*

each additional installation in their zip code

Powered by SunShot
U.S. Department of Energy

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

# **Solarize:** Lasting Impact



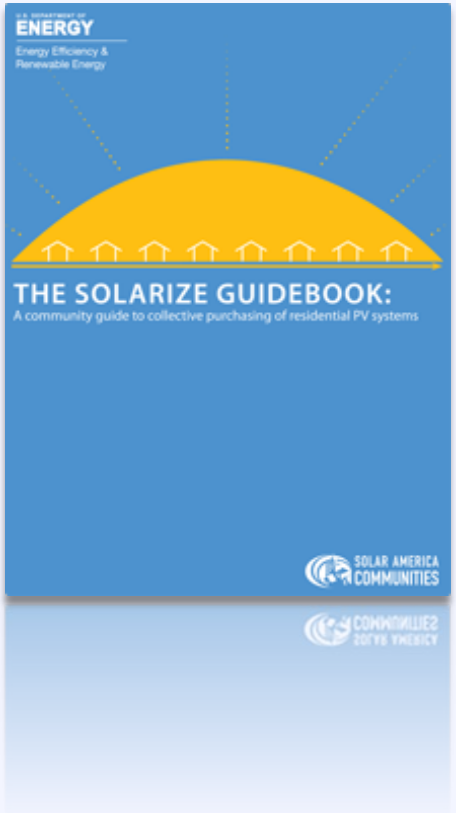

Source: NREL

# **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



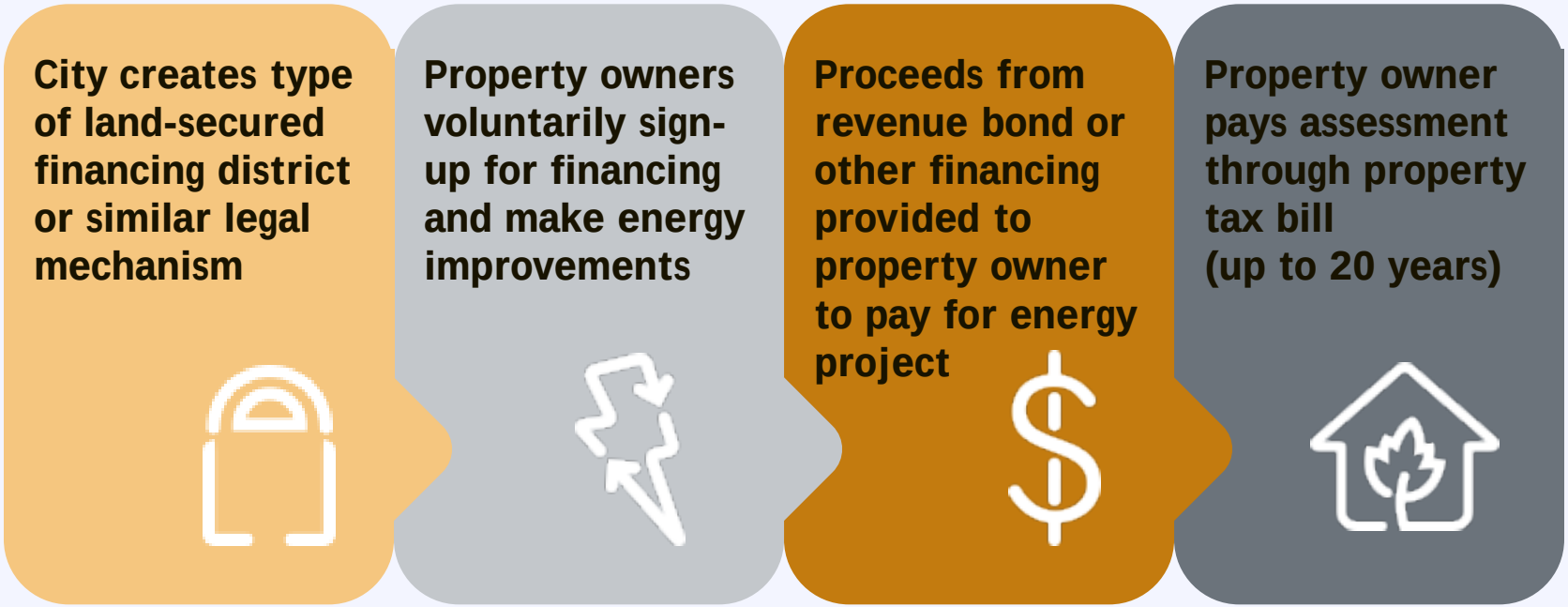
# Property Assessed Clean Energy

The local government finances the up-front costs of the energy investment, which is repaid through a special property tax assessment.

Powered by SunShot U.S. Department of Energy

Source: Department of Energy

# Property Assessed Clean Energy




Powered by SunShot
U.S. Department of Energy

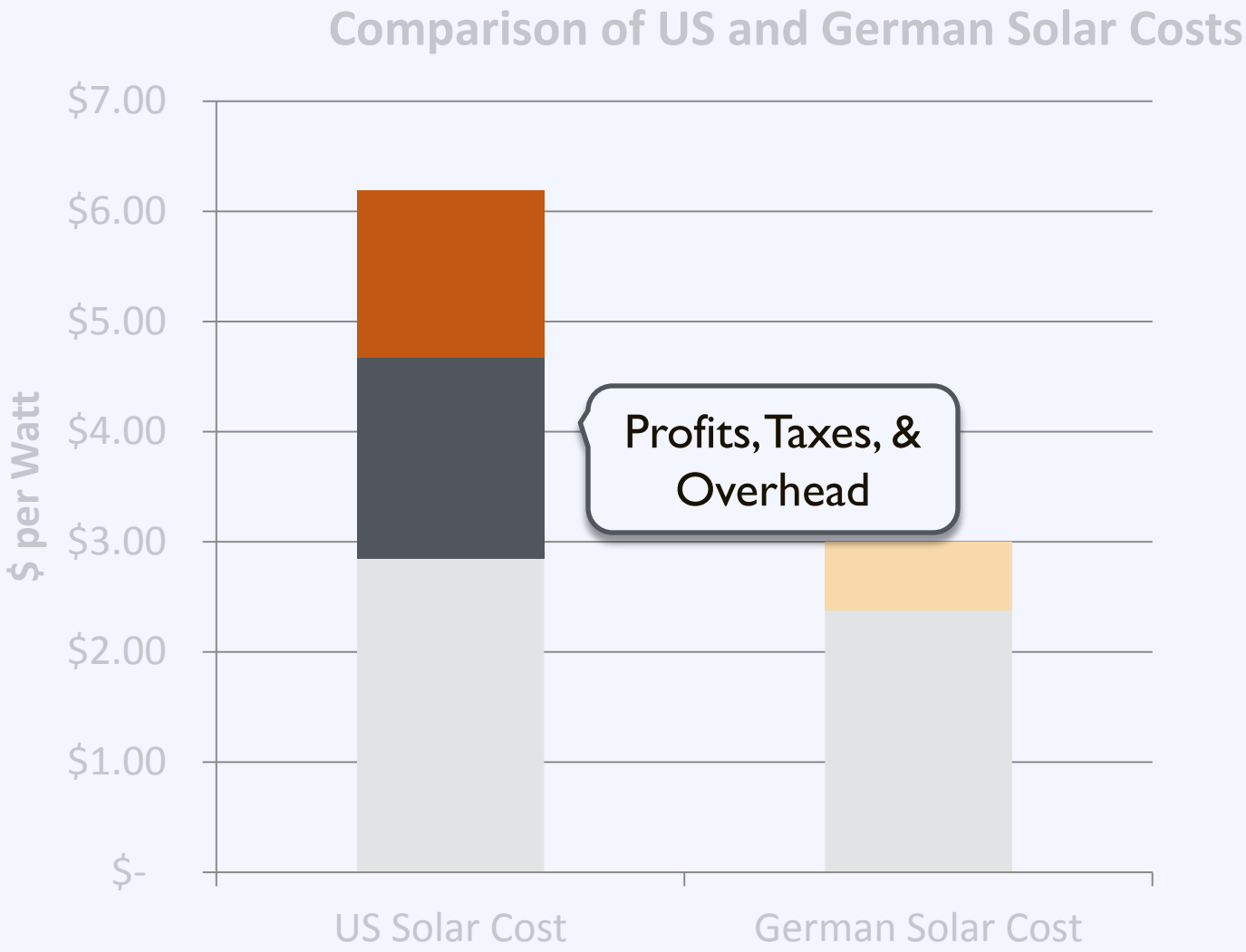
Source: Department of Energy

# Property Assessed Clean Energy

## Advantages Over Conventional Loan:

- Longer (20 year) term
- Repayment transfers with ownership
- Low interest rates
- Interest is tax deductible
- Lower transaction costs

# The Cost of Solar in the US

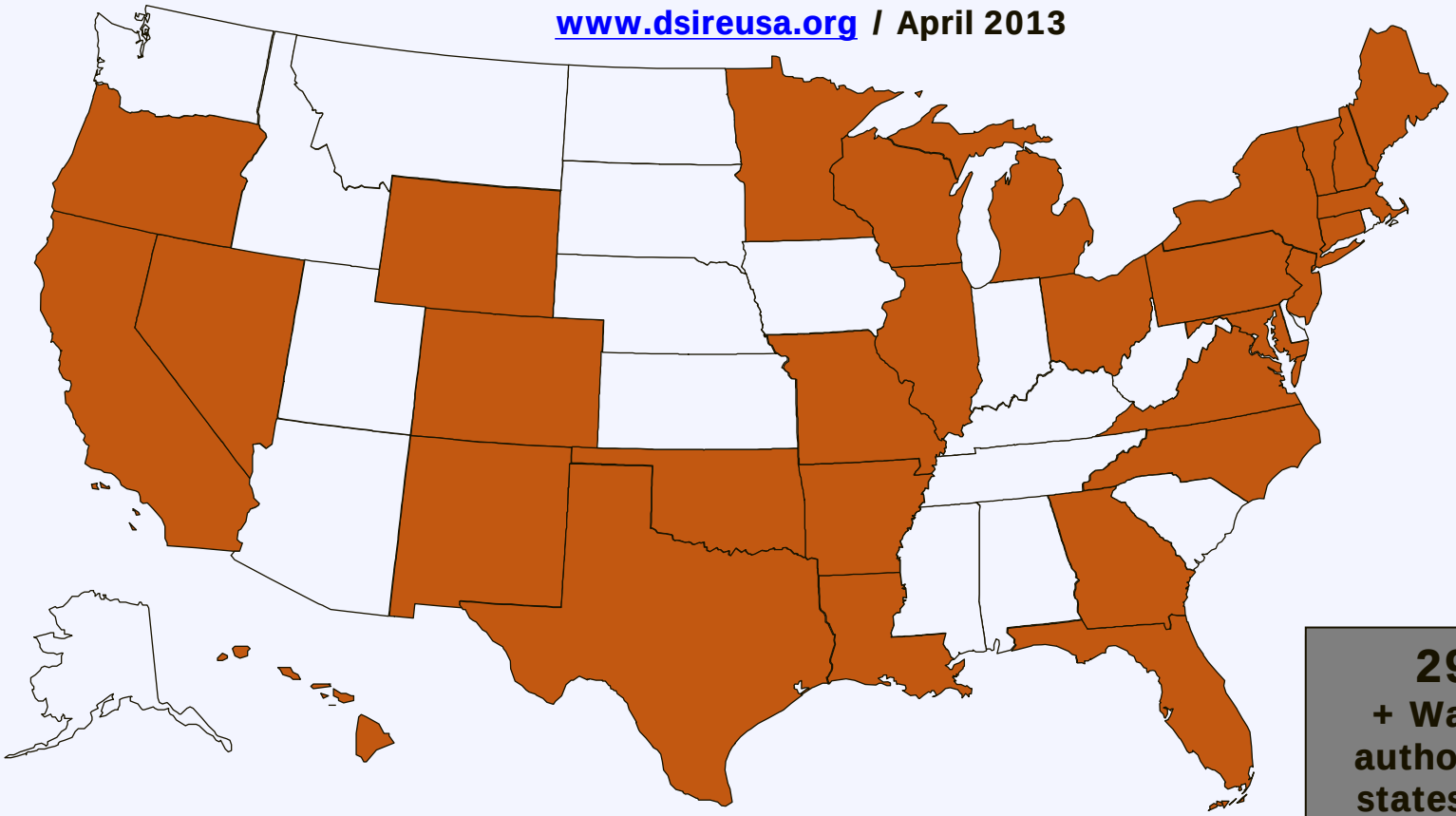



Powered by SunShot U.S. Department of Energy

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)

# Property Assessed Clean Energy

www.dsireusa.org / April 2013



PACE financing authorized by the state*

**29 states,**
**+ Washington DC, authorize PACE (27 states have passed legislation and HI permits it based on existing law).**

Powered by SunShot
U.S. Department of Energy

Source: DSIRE

# PACE in Vermont

# PACE: Vermont

**City creates type of land-secured financing district or similar legal mechanism**



## 45 Communities have adopted PACE

| | | | |
|---|---|---|---|
| Albany | East Montpelier | Monkton | Thetford |
| Barre City | Ferrisburg | Montpelier | Turnbridge |
| Brattleboro | Glover | Newport Town | Vershire |
| Bristol | Halifax | Norwich | Waitsfield |
| Brookfield | Hartford | Plainfield | Westford |
| Burlington | Hartland | Putney | Westminster |
| Calais | Hinesburg | Randolph | Weybridge |
| Cavendish | Hyde Park | Richmond | Woodstock |
| Corrnith | Manchester | Ripton | |
| Cornwall | Marlboro | Salisbury | |
| Craftsbury | Marshfield | Sharon | |
| Dorset | Middlebury | Strafford | |

Powered by SunShot
U.S. Department of Energy

Source: Department of Energy

# **PACE:** History in Vermont

**2009** State enables local governments to create PACE financing districts

**2010** FHFA objects to senior lien status and advises Fannie & Freddie to halt purchase of mortgages with PACE assessments

**2011** State defines PACE lien as subordinate to existing liens and first mortgages



Source: Database of State Incentives for Renewables and Effiiency

# **PACE:** Vermont Details

## Funding Limits:

- 15% of assessed value of the property
- Capped at $30,000
- Total funding plus outstanding mortgages cannot exceed 90% of the assessed value



Source: Efficiency Vermont

# **PACE:** Vermont Details

## Term Details:

- Terms can be 10, 15, or 20 years
- When the property is sold the obligation stays with the property



Source: Efficiency Vermont

# **PACE:** Vermont Details

## Participant Details:

- Participant must own the property
- There cannot be any outstanding debts on the property
- Debt to income ratio must be less than 41%

Powered by SunShot U.S. Department of Energy

Source: Efficiency Vermont

# **PACE:** Vermont Details

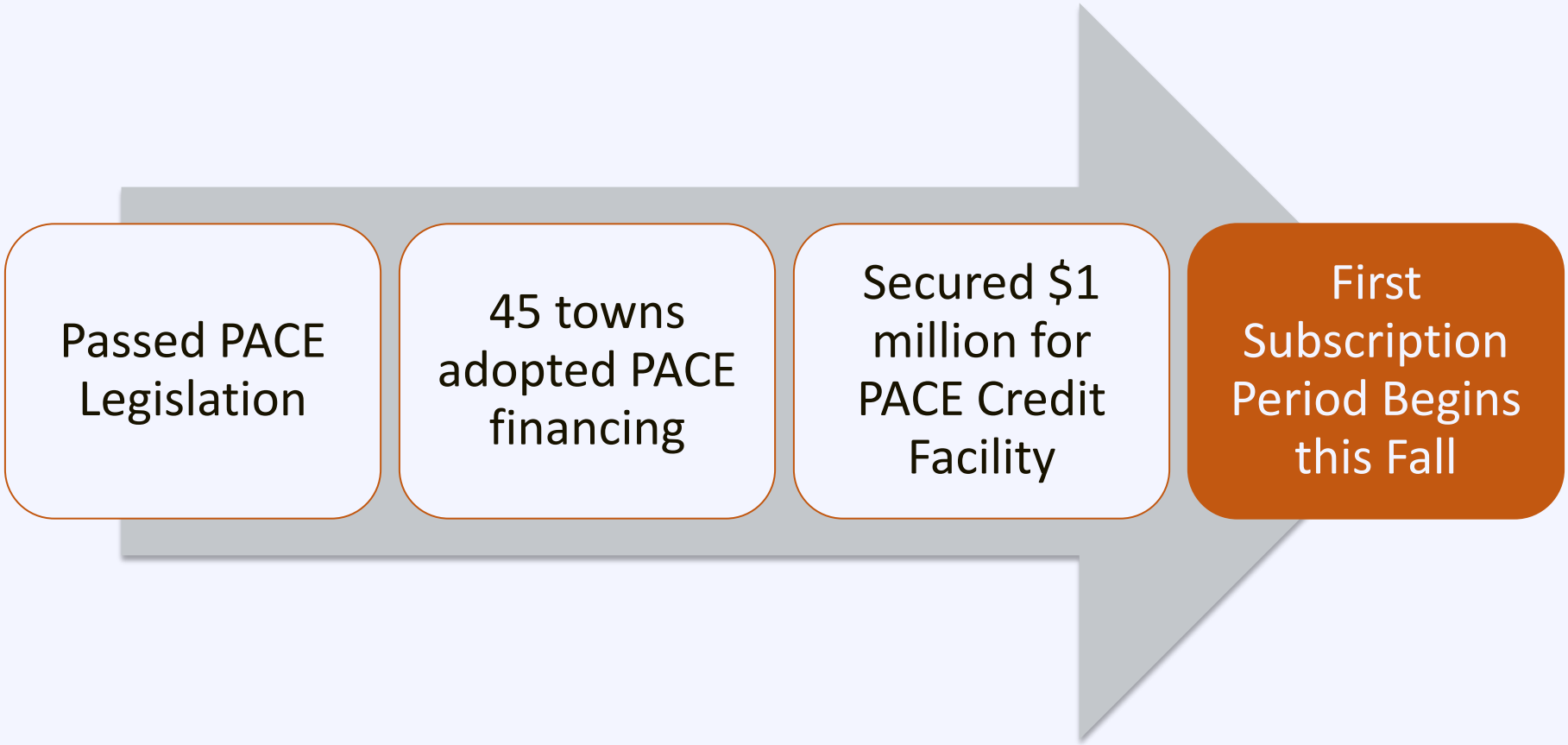
## Program Administration and cost:

- Administered by the Vermont Energy Investment Corporation
- Participants pay one time fee of 2% of assessment for loan loss reserve fund
- Non-participating property owners have no obligation to pay for any program costs



Source: Efficiency Vermont

# PACE: Vermont Program Status

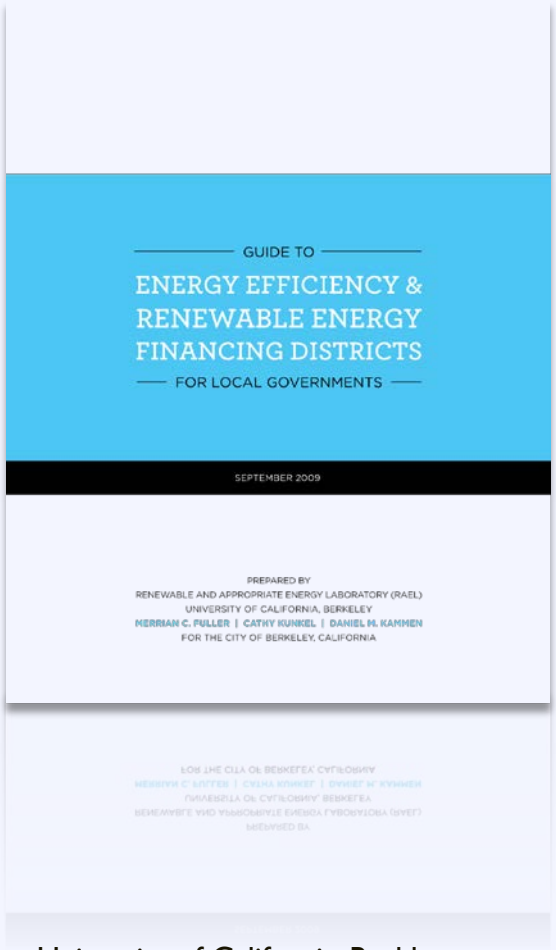



Source: Efficiency Vermont

# PACE: Resources

**Resource** **PACE How to Guide for Local Governments**

This report is designed for local government officials in getting a PACE program established in their region.




rael.berkley.edu

Powered by SunShot U.S. Department of Energy

Source: Renewable and Appropriate Energy Laboratory, University of California, Berkley

# Q & A

# Agenda

| | |
|---|---|
| 08:40 – 09:00 | Solar 101 for Communities |
| 09:00 – 09:30 | Understanding the Solar Regulatory Landscape |
| 09:30 – 09:45 | Permitting Solar Projects in Vermont |
| 09:45 – 09:55 | *Break* |
| 09:55 – 10:10 | Benefits and Barriers Activity |
| 10:10 – 10:40 | Introduction to Solar Project Finance |
| 10:40 – 11:00 | Growing Your Local Solar Market |
| 11:00 – 11:10 | *Break* |
| 11:10 – 12:15 | Regional Perspective: Panel of Local Speakers |

# Agenda

| | |
|---|---|
| 08:40 – 09:00 | Solar 101 for Communities |
| 09:00 – 09:30 | Understanding the Solar Regulatory Landscape |
| 09:30 – 09:45 | Permitting Solar Projects in Vermont |
| 09:45 – 09:55 | *Break* |
| 09:55 – 10:10 | Benefits and Barriers Activity |
| 10:10 – 10:40 | Introduction to Solar Project Finance |
| 10:40 – 11:00 | Growing Your Local Solar Market |
| 11:00 – 11:10 | *Break* |
| 11:10 – 12:15 | Regional Perspective: Panel of Local Speakers |

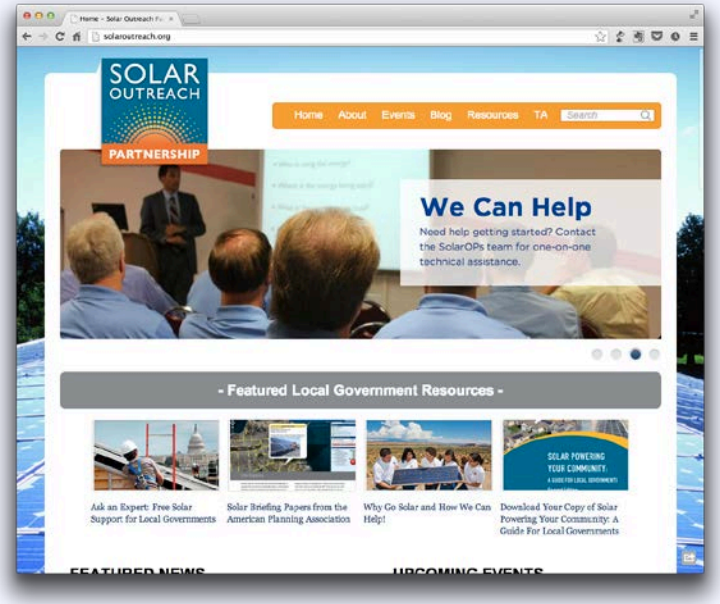
# **Activity:** Next Steps

**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




www.solaroutreach.org

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

Powered by SunShot
U.S. Department of Energy

Powered by SunShot

U.S. Department of Energy


**Jayson Uppal**

Meister Consultants Group

jayson.uppal@mc-group.com

(617) 209 -1990

**Jim Kennerly**

NC Solar Center

jdkenne2@ncsu.edu

(919) 513 - 0792