Solar Powering Your Community

Addressing Soft Costs and Barriers

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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

Agenda

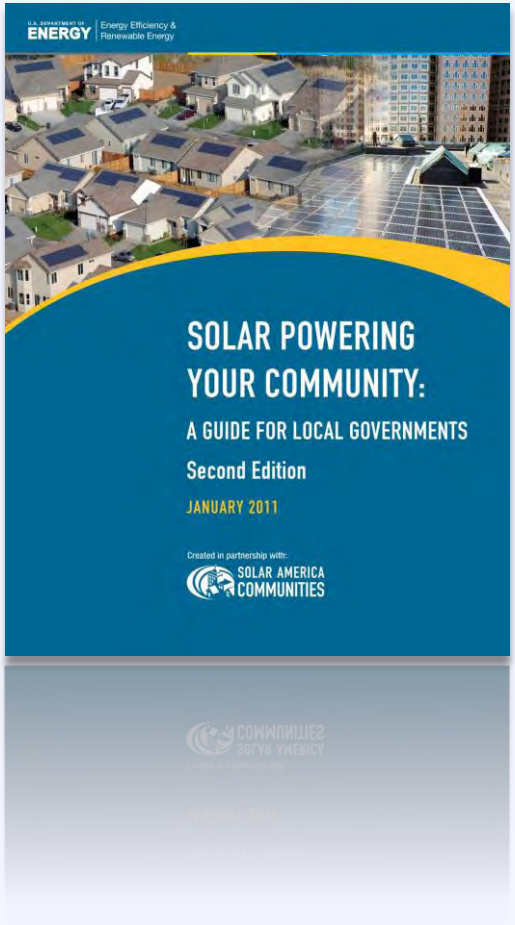
08:30 – 08:50	Introductions and Overview
08:50 – 09:25	Solar 101: Policy Environment and Economics
09:25 – 09:35	*Break*
09:35 – 09:55	Benefits and Barriers Activity
09:55 – 10:15	Creating a Solar Ready Community
10:15 – 11:00	Growing Your Local Solar Market
11:00 – 11:05	*Break*
11:05 – 12:15	Local Panel and Discussion; Closing Remarks

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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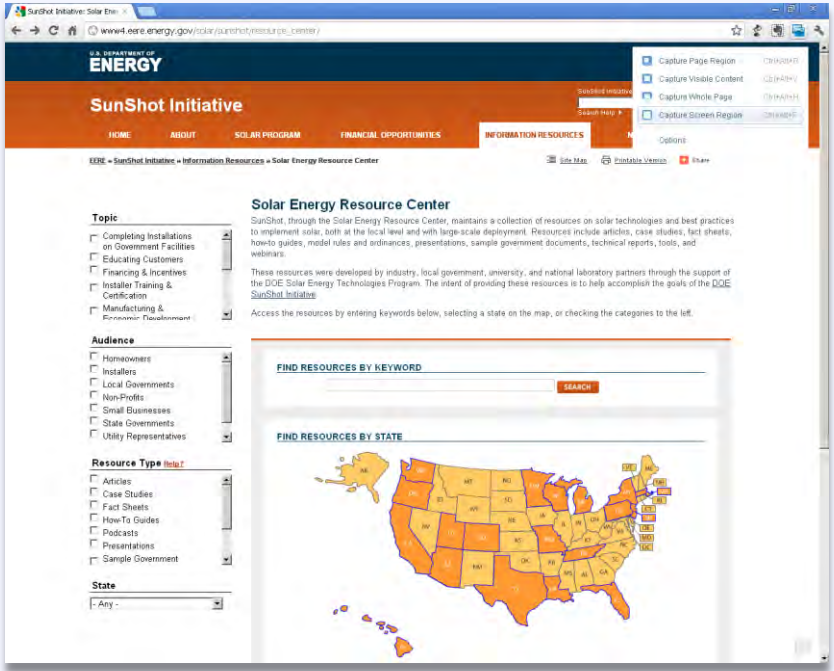
About the SunShot Solar Outreach Partnership

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

www.solaroutreach.org

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Poll

Who's in the room?

Poll

What is your experience with solar?

Solar Technologies

Solar Photovoltaic (PV)

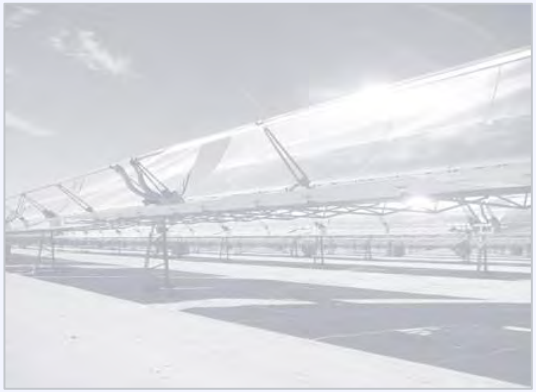
Solar Hot Water

Concentrated Solar Power

Solar Technologies

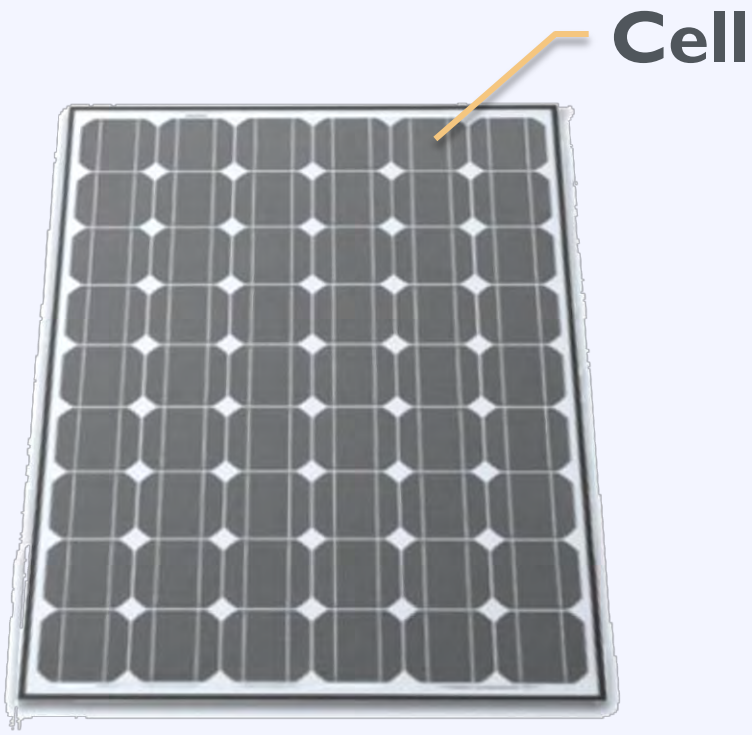
Solar Photovoltaic (PV)

Solar Hot Water

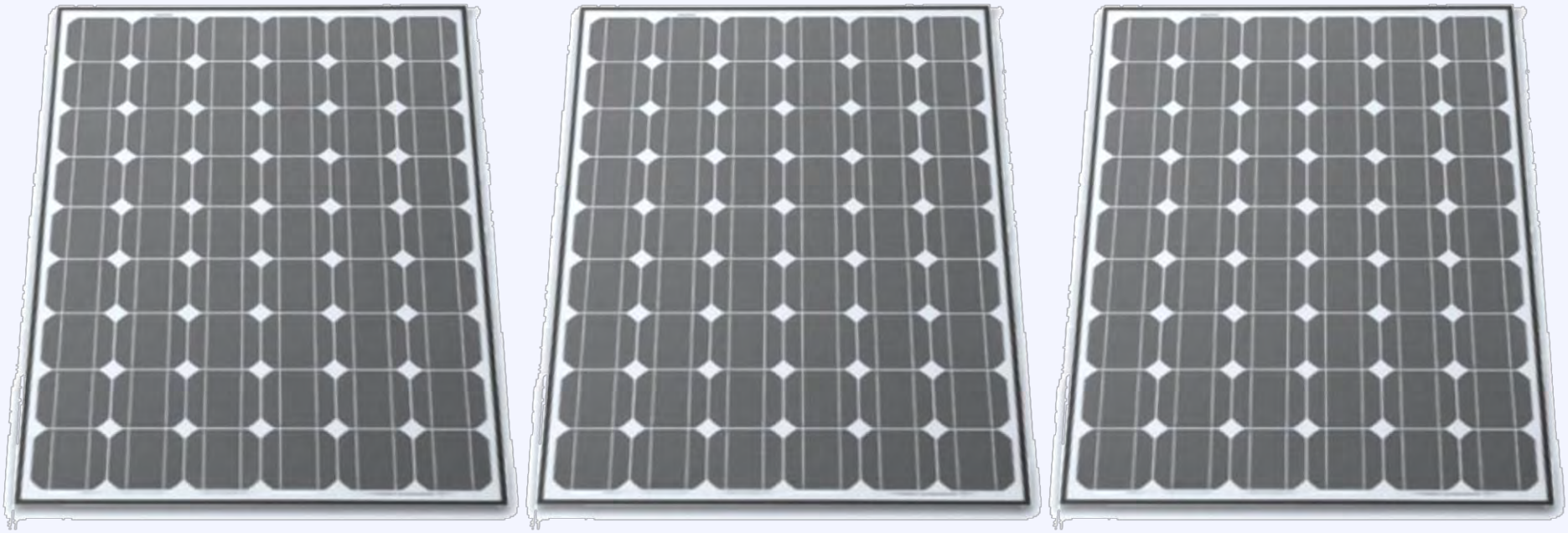


Concentrated Solar Power

Some Basic Terminology

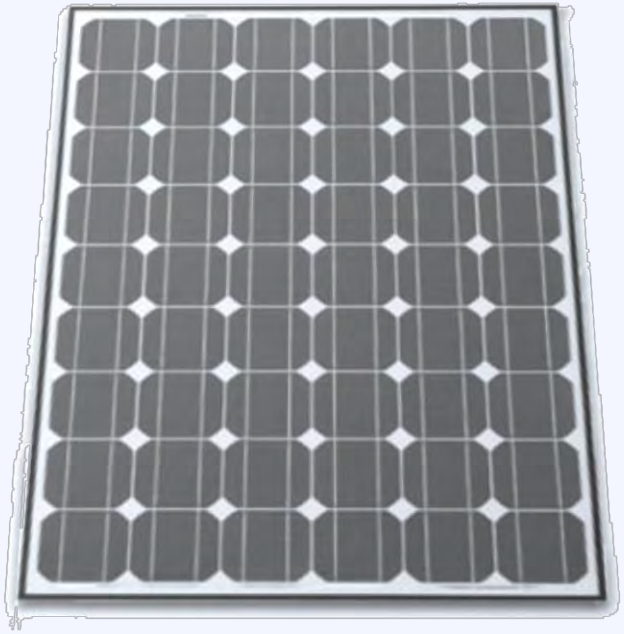


Some Basic Terminology



Array

Some Basic Terminology



Capacity / Power

kilowatt (kW)

Production

Kilowatt-hour (kWh)

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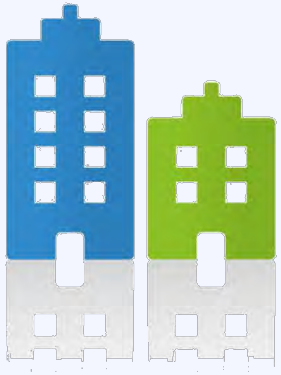
Some Basic Terminology

Residence
5 kW

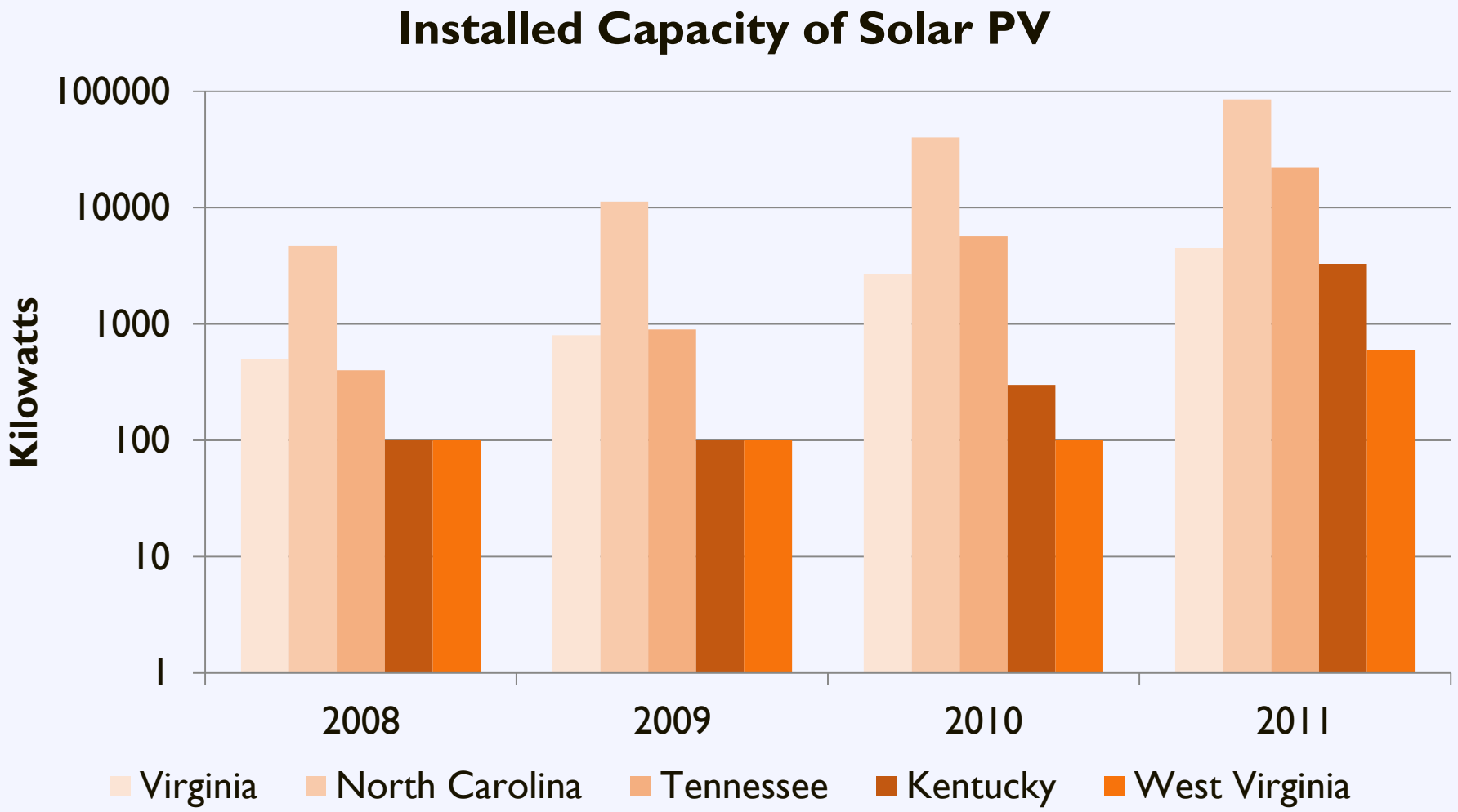
Factory
1 MW+



Office
50 – 500 kW

Utility
2 MW+

Virginia Solar Market



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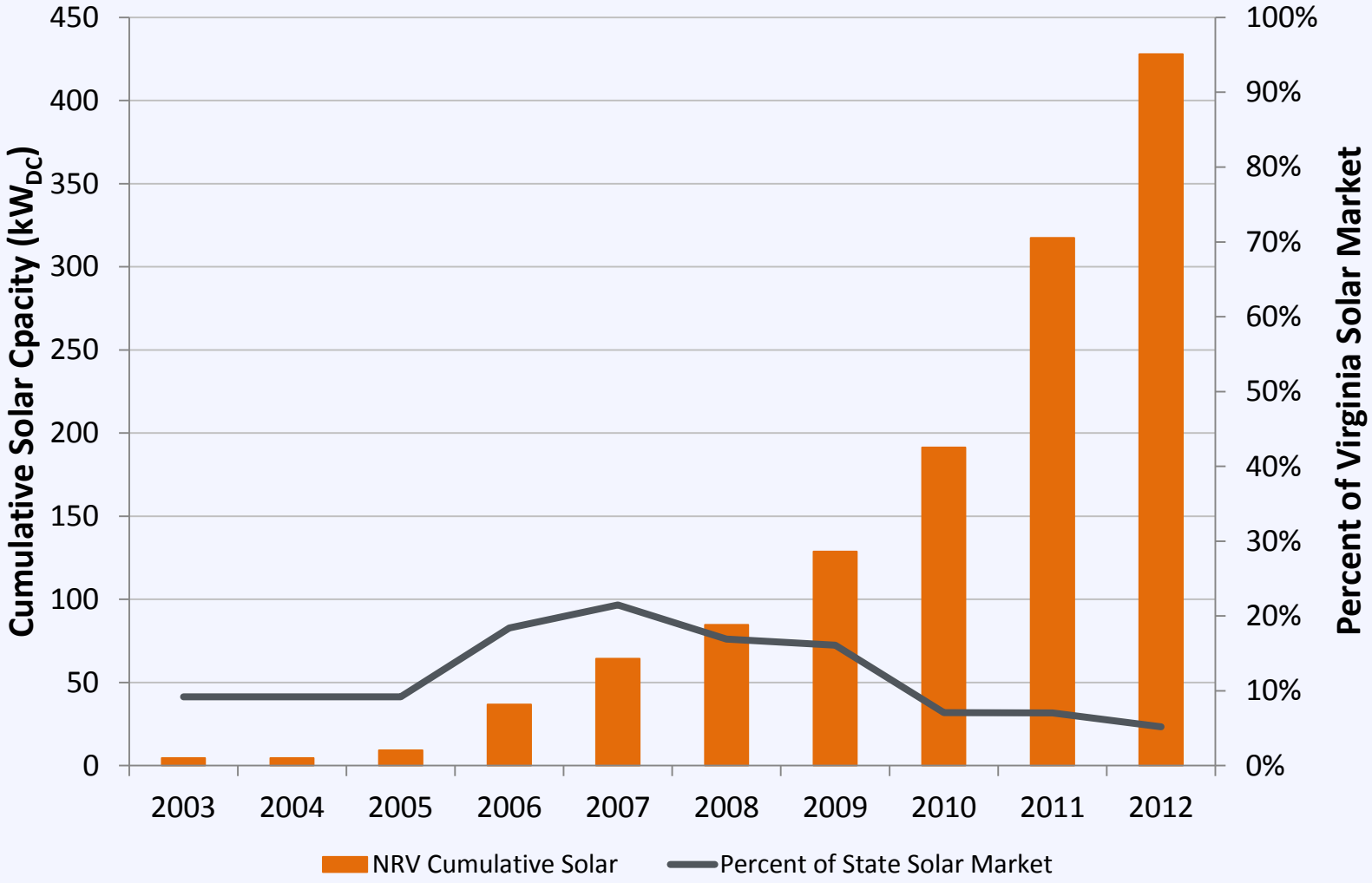
Source: IREC

NRV Solar PV Market



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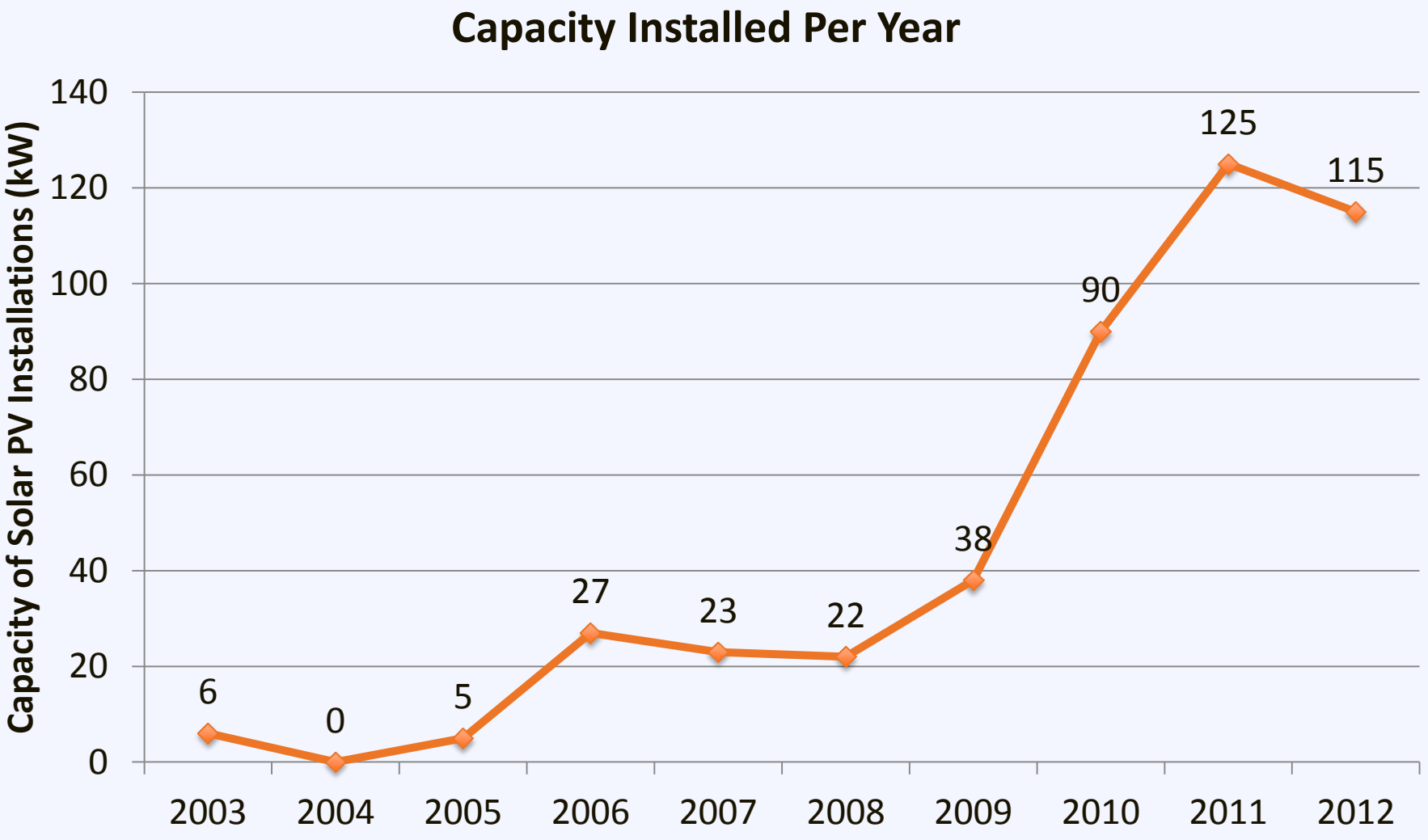
Source: IREC, John Randolph

NRV Solar PV Market



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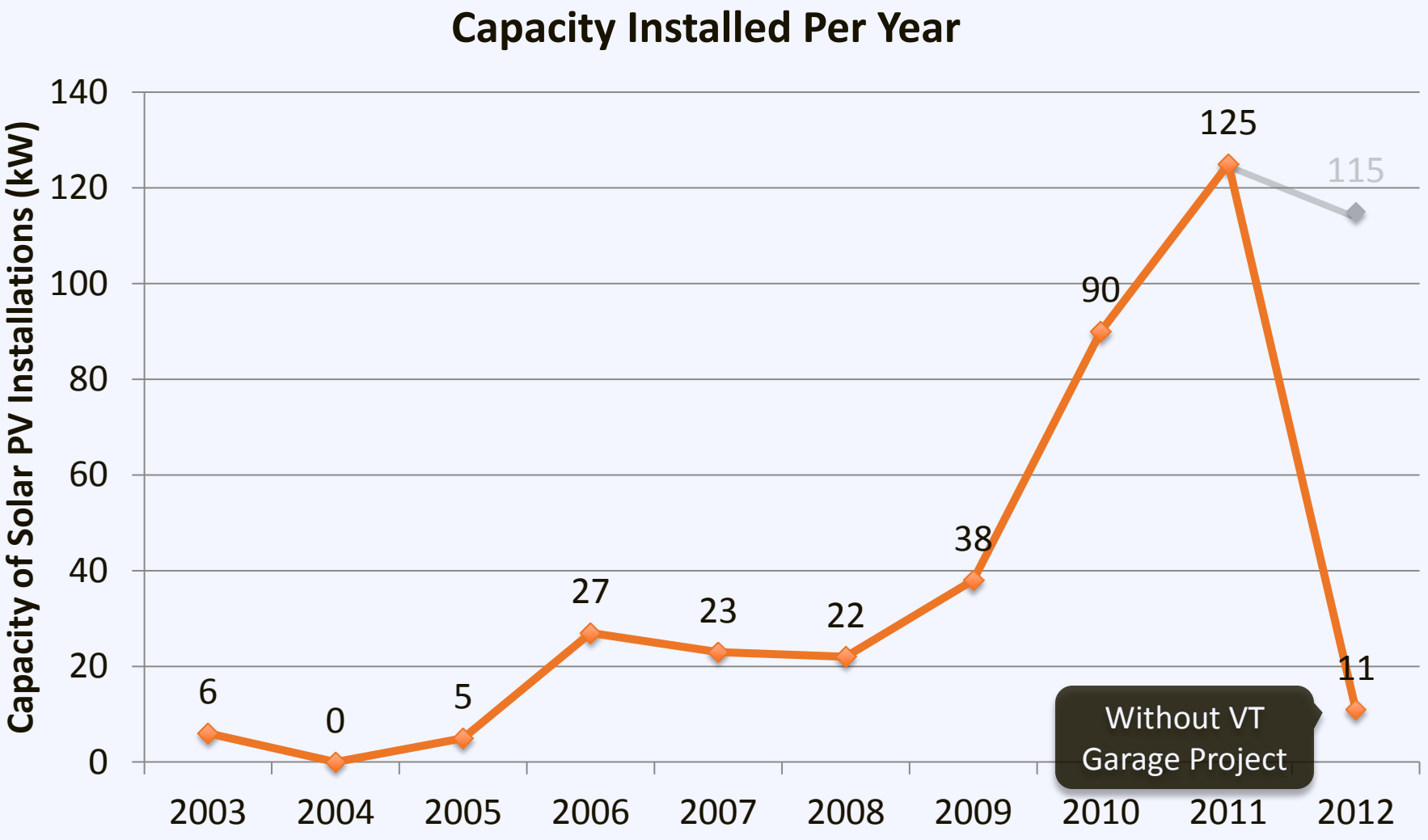
NRV Solar PV Market



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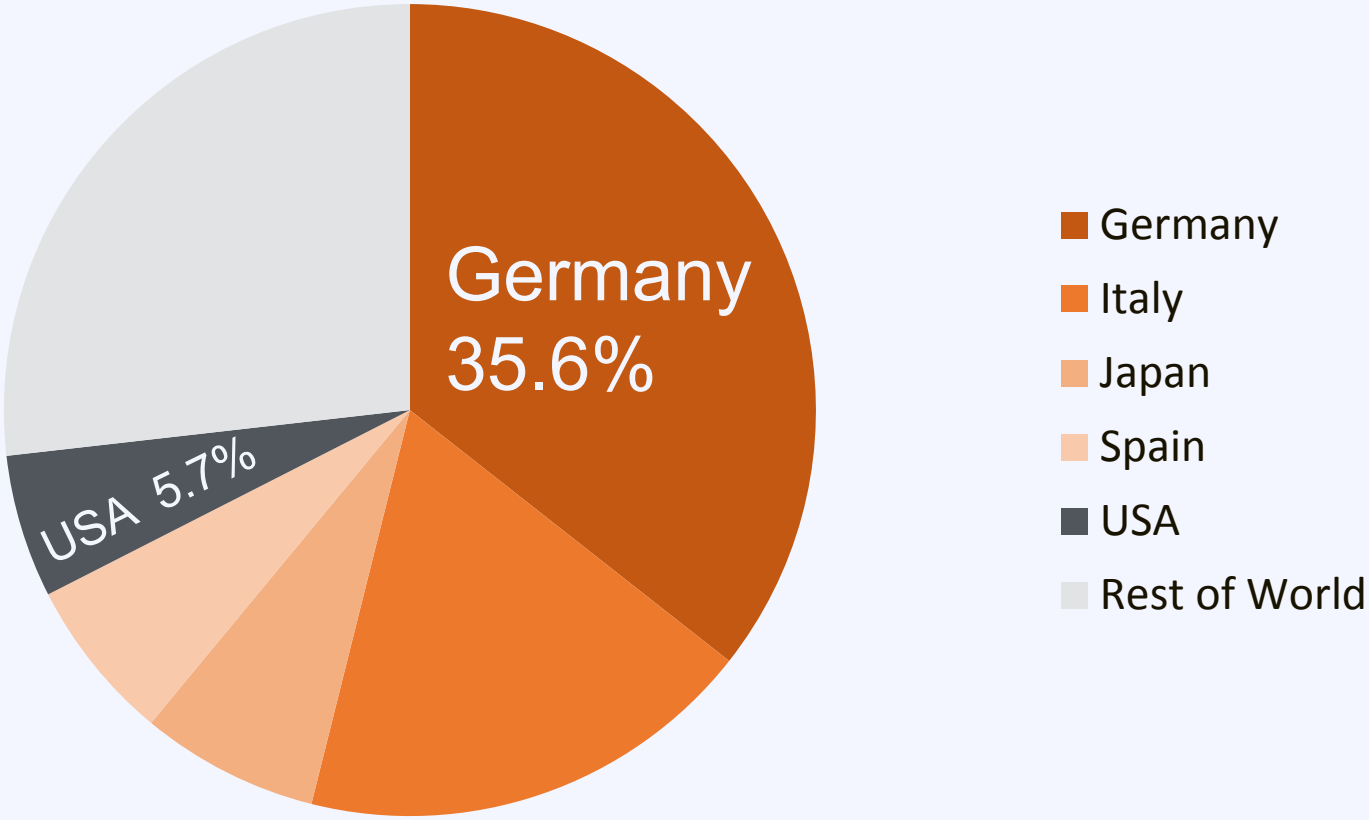
Installed Capacity

Top 5 Countries Solar Operating Capacity (2011)



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

Installed Capacity

Total installed solar capacity in the US

7.7 GW

Capacity installed in Germany in 2012 alone

7.6 GW

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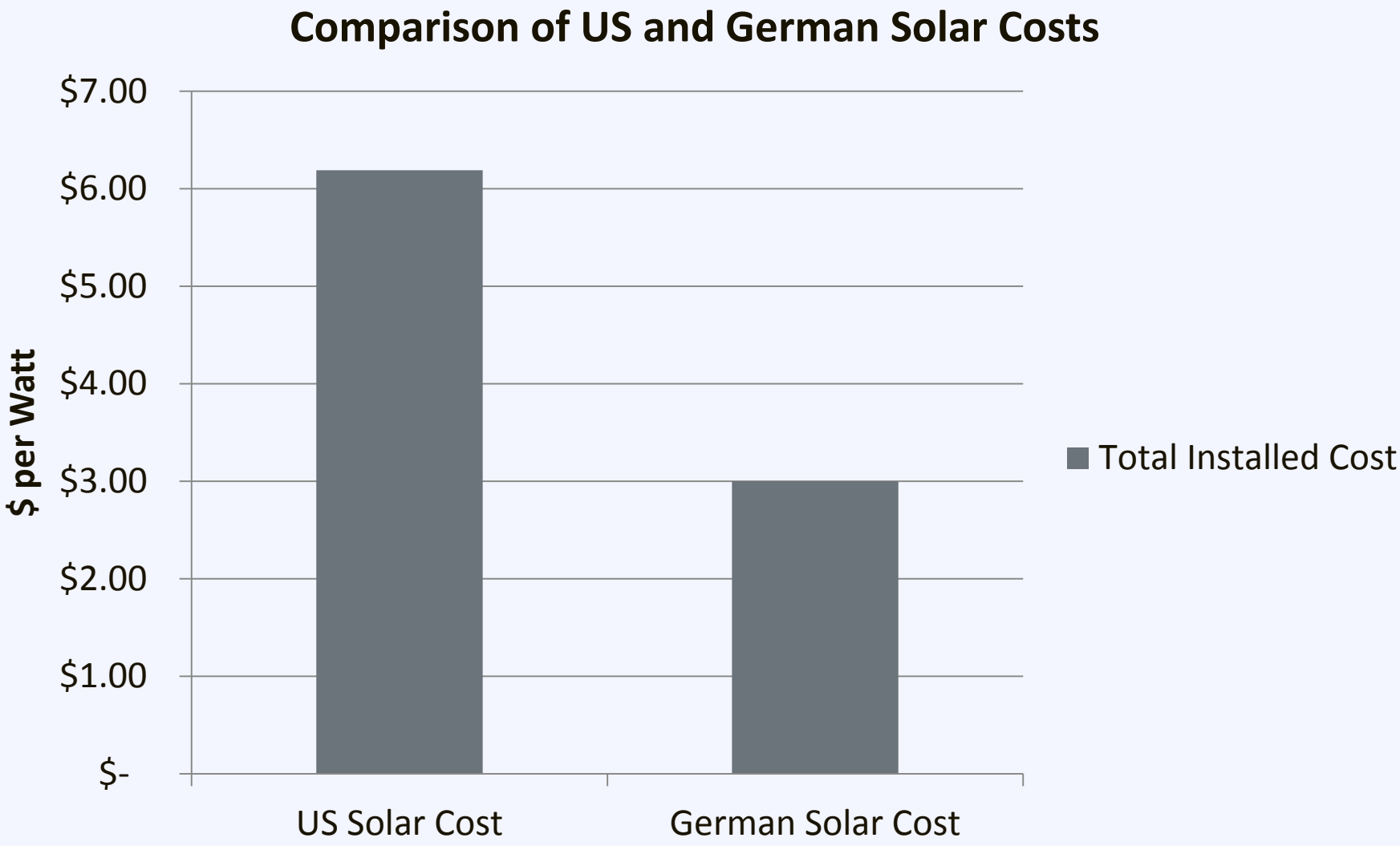
Source: (1) GTM Research/ Solar Energy Industries Association. *U.S. Solar Market Insight Report 2012 Year-in-Review*;
(2) www.erneuerbare-energien.de/fileadmin/Daten_EE/Dokumente__PDFs_/20130328_hgp_e_ppt_2012_fin_bf.pdf

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)

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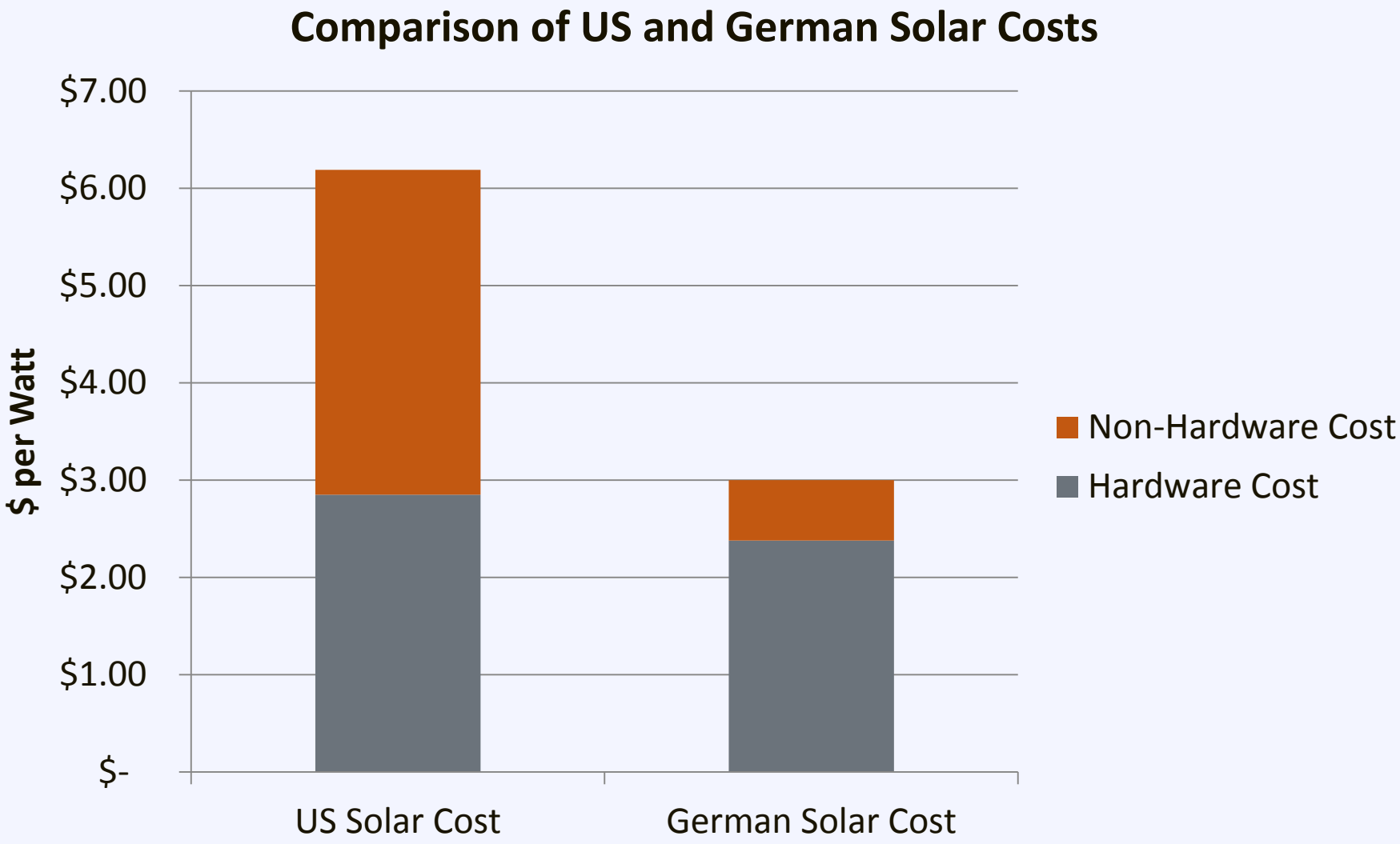

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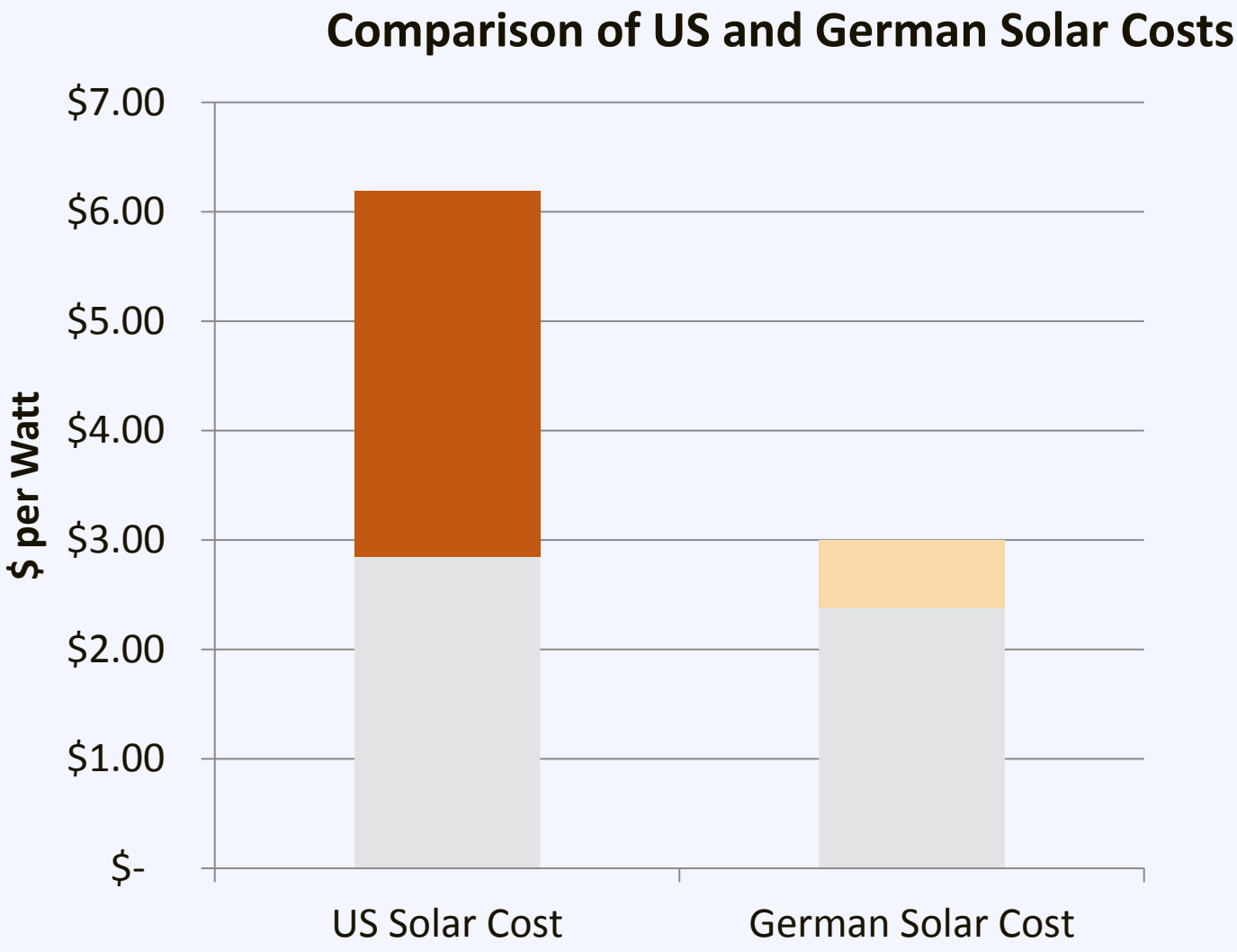

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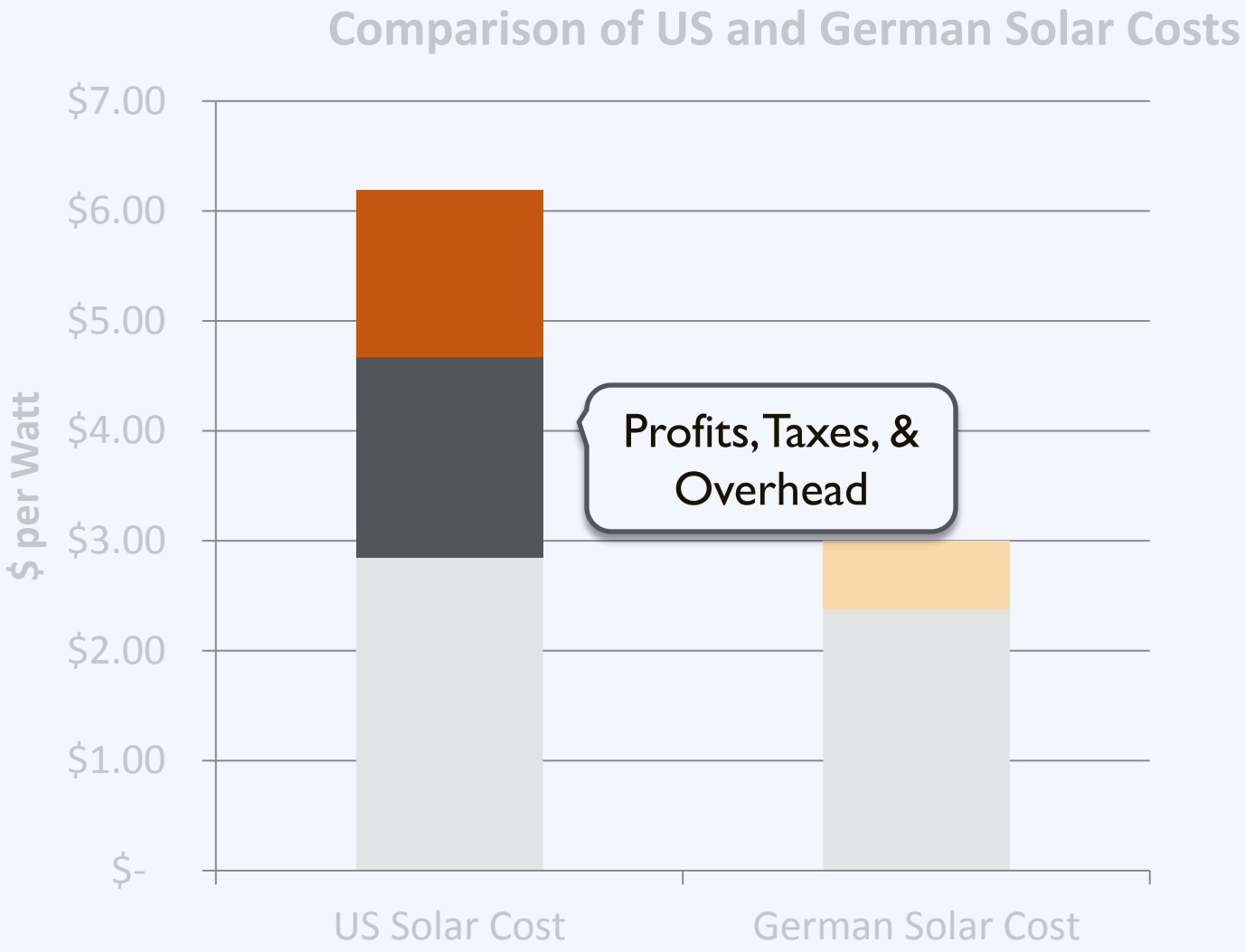

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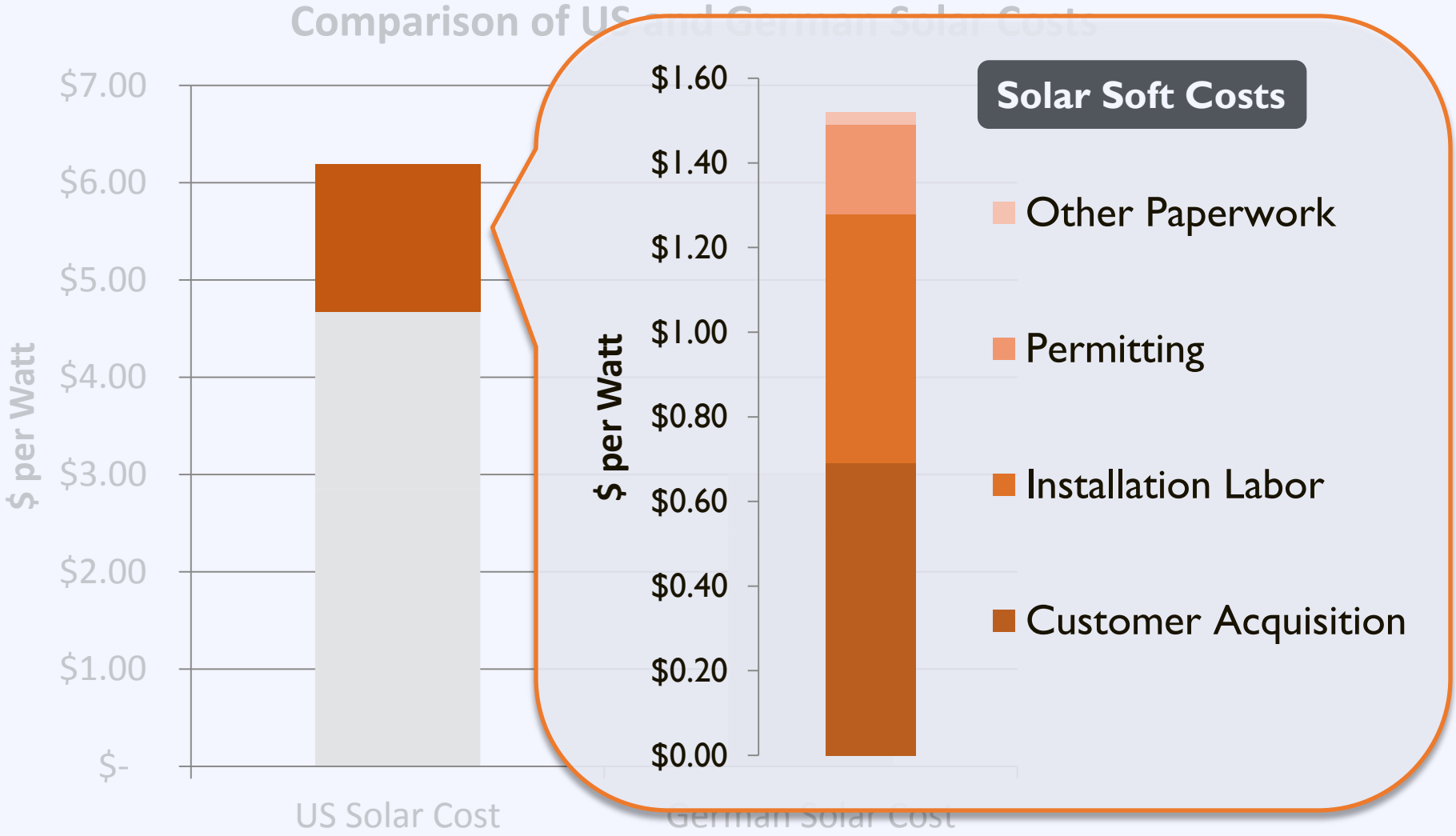
The Cost of Solar in the US



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Workshop Goal

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

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

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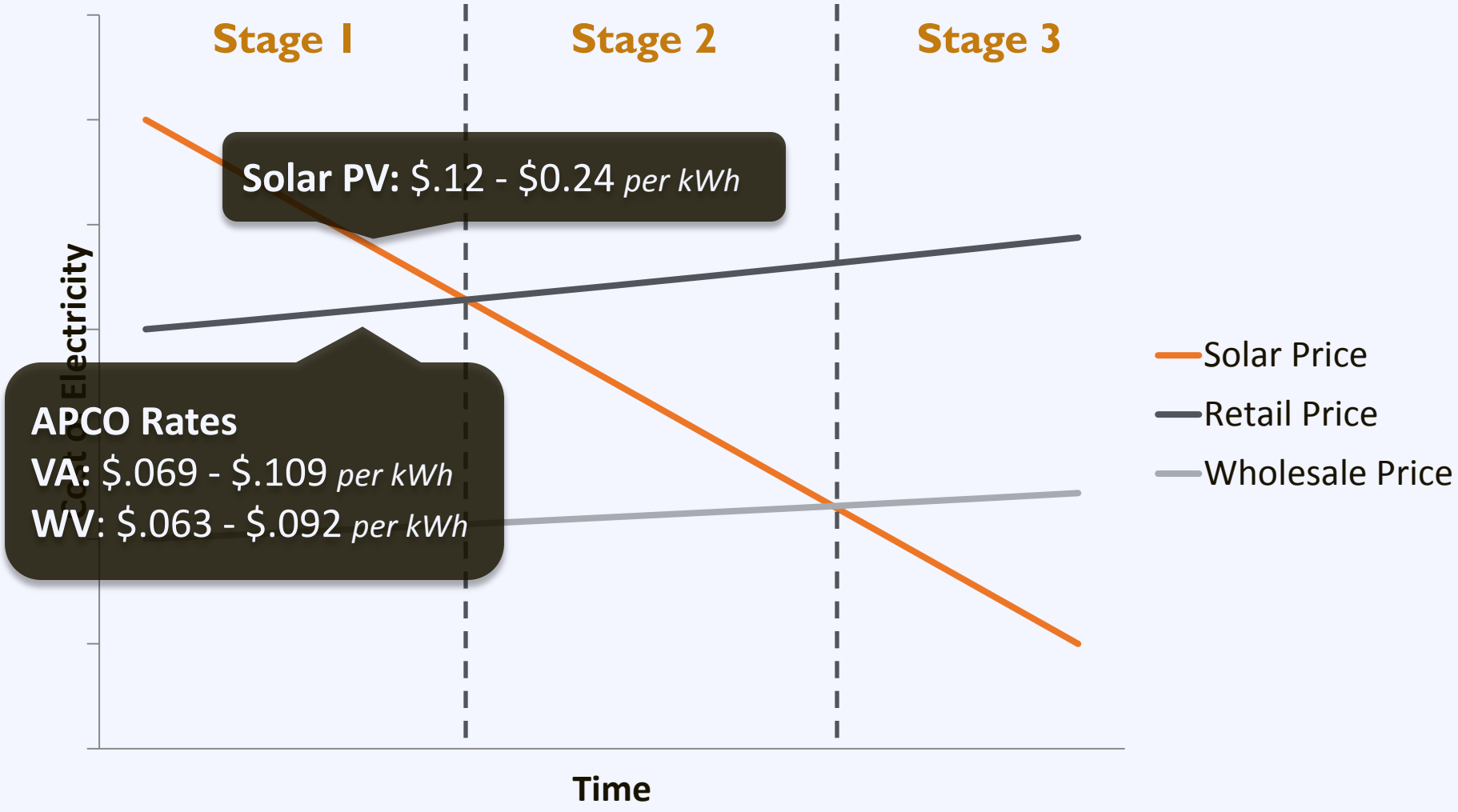
Utility Market: Stages



Source: Solar Electric Power Association

Who Regulates What?

State

- Utility Regulation
- Solar Access
- Property Taxes

Local

- Planning
- Zoning
- Permitting

Who Regulates What?

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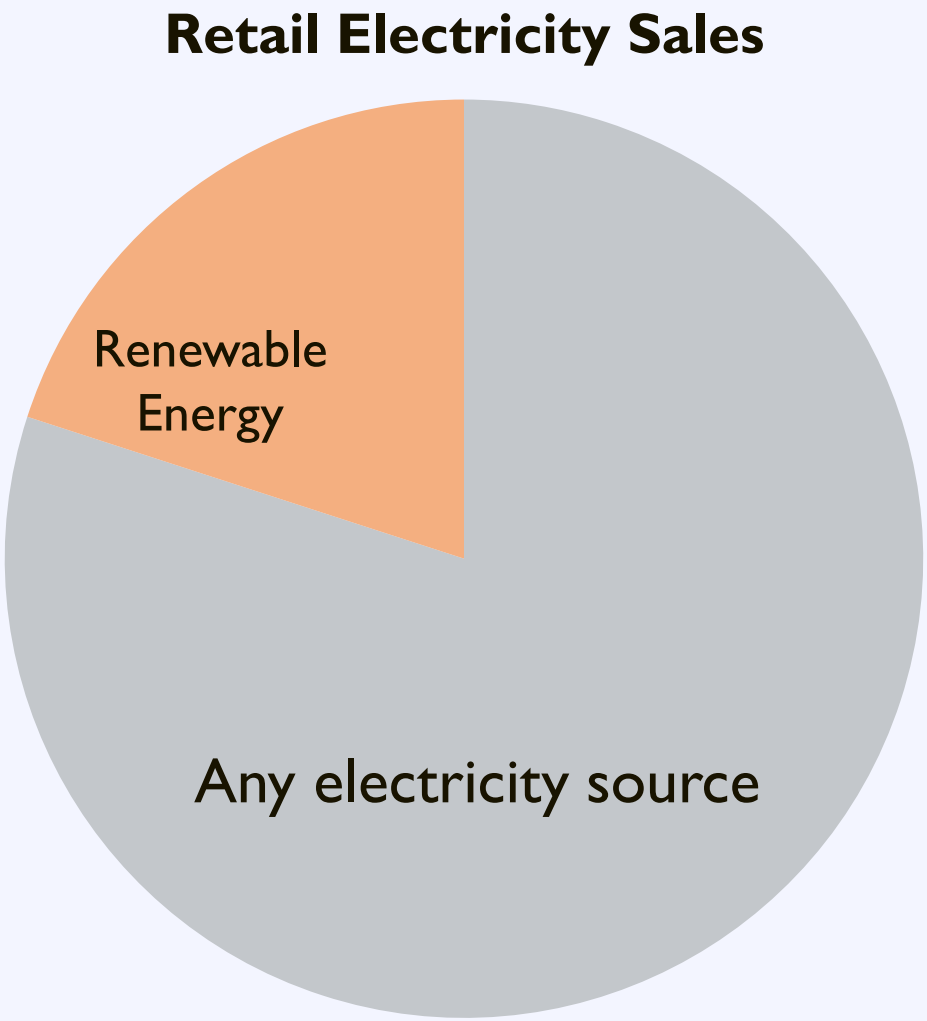
Renewable Portfolio Standard



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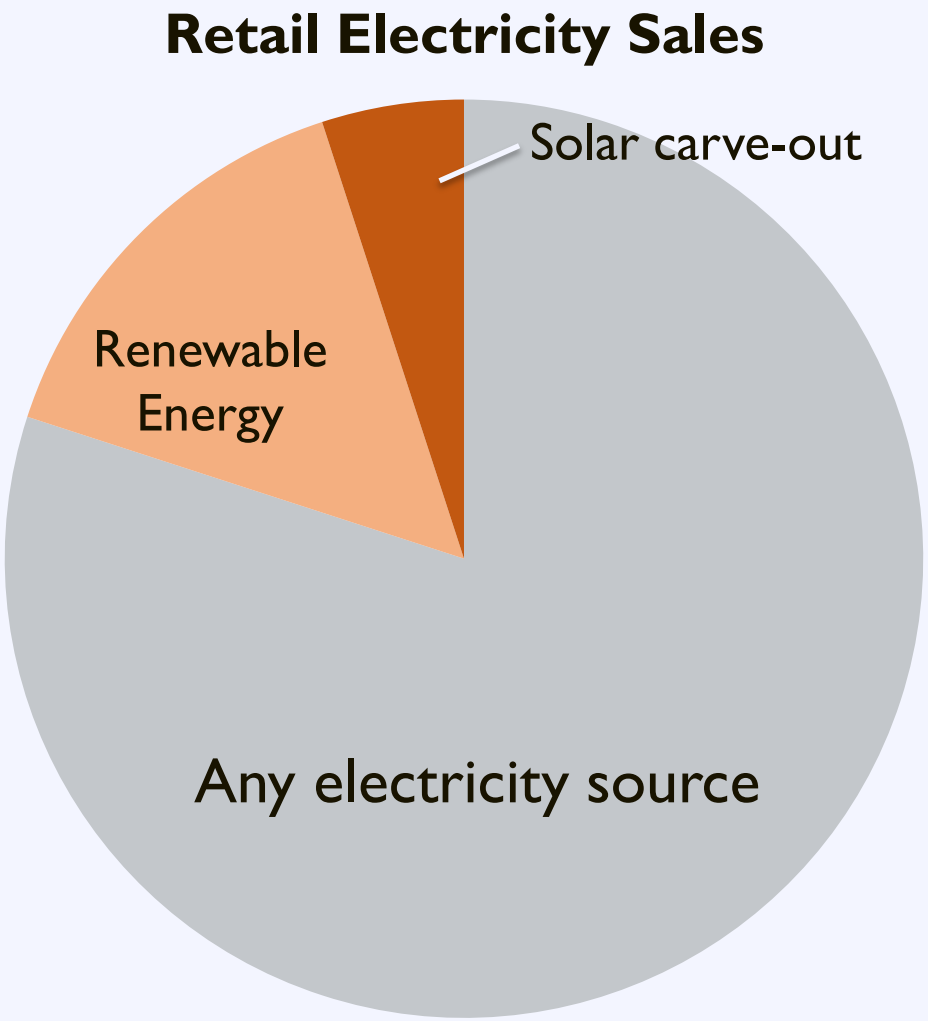
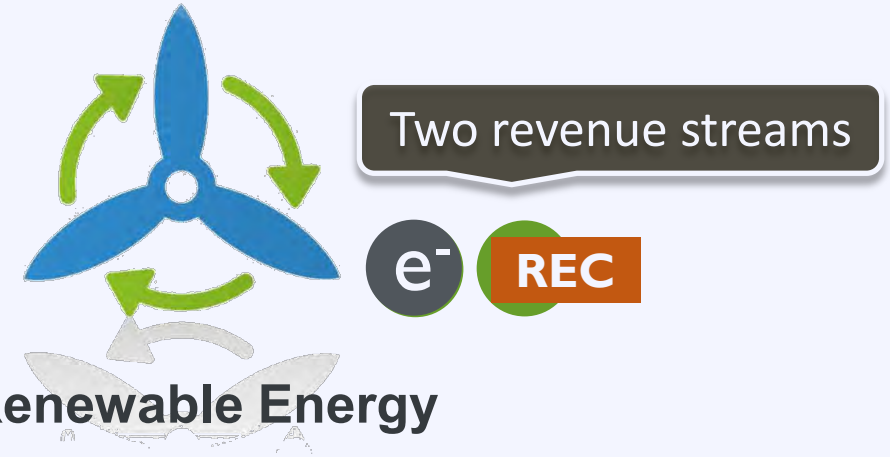
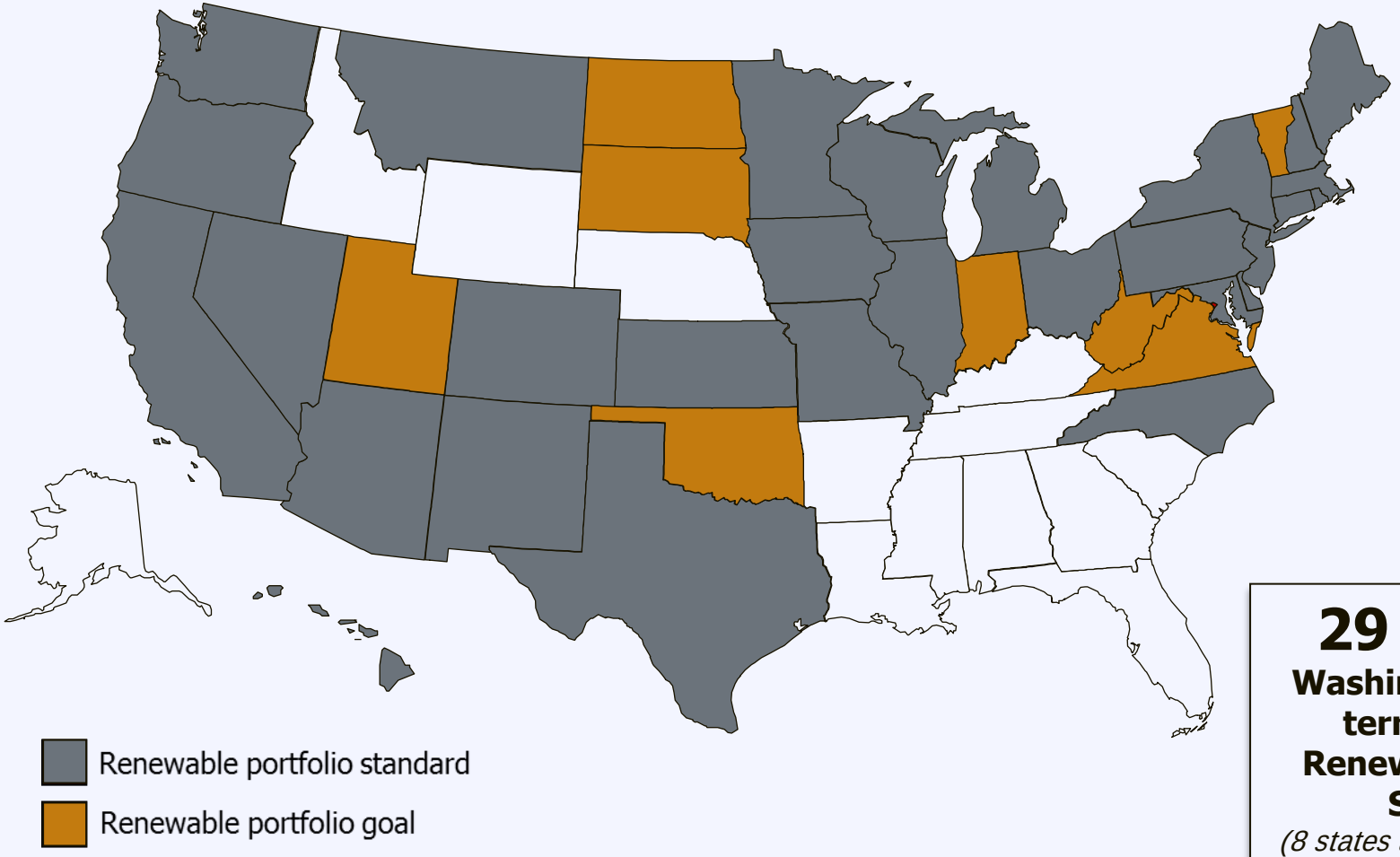


Renewable Portfolio Standard



Renewable Portfolio Standard

www.dsireusa.org / March 2013



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

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RPS: Virginia Overview

- *Voluntary* Renewable Energy Portfolio *Goal*
- 15% of 2007 sales by 2025
- No solar carve-out

- Virginia State Corporation Commission (SCC) allows participating utilities to recover program costs and offers a performance incentive (in the form of an increased rate of return) for each goal attained.

Source: DSIRE Solar
(http://www.dsireusa.org/solar/incentives/incentive.cfm?Incentive_Code=VA10R&re=1&ee=1)

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

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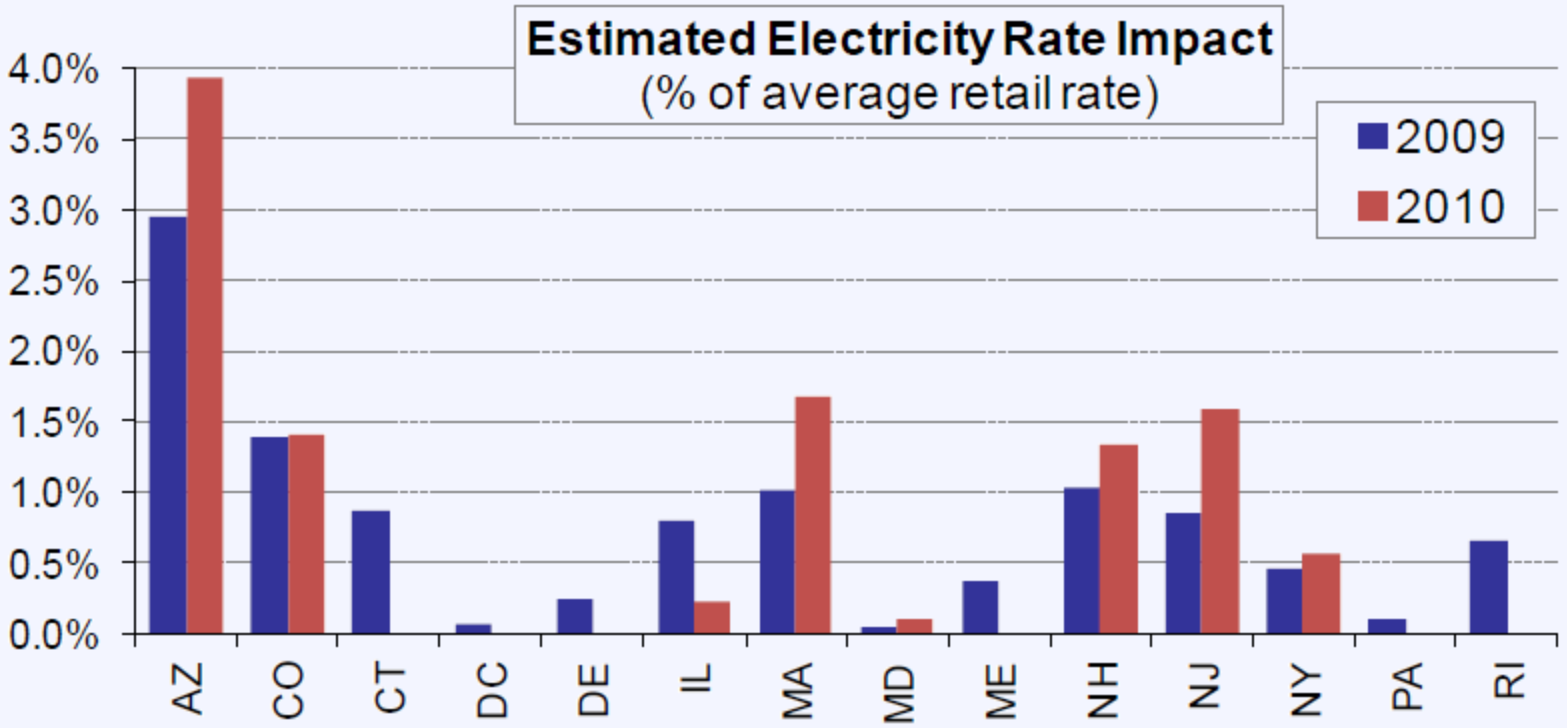
Source: DSIRE Solar (http://dsireusa.org/documents/summarymaps/Solar_DG_RPS_map.pdf); Solar Energy Industries Association/ GTM Research *Solar Market Insight 2012 Year-in-Review*

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).

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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

Net Metering

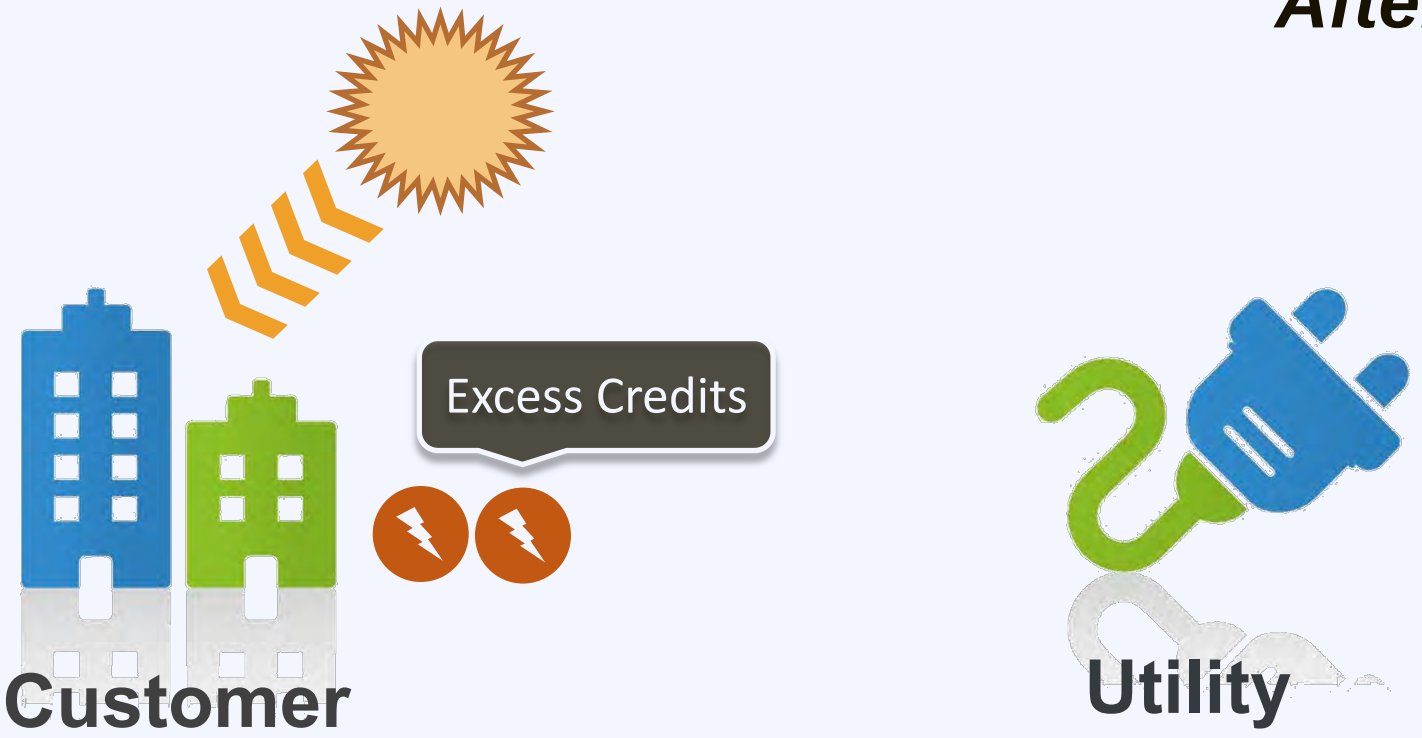
Net metering allows customers to export power to the grid during times of excess generation, and receive credits that can be applied to later electricity usage

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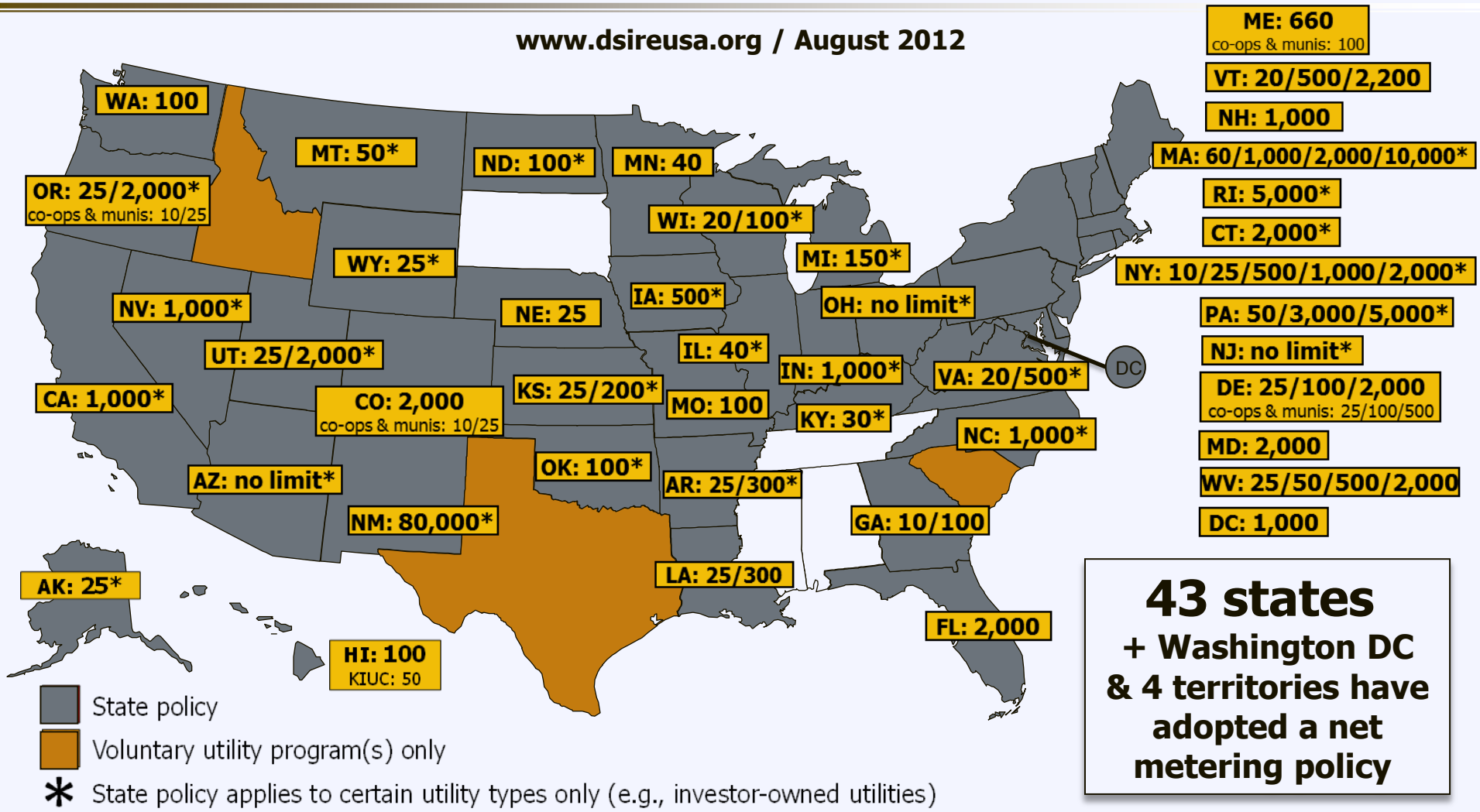
Source: IREC (http://www.irecusa.org/wp-content/uploads/IRECSolarMarketTrends-2012-web.pdf)

Net Metering: State Policies



43 states
+ Washington DC & 4 territories have adopted a net metering policy

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

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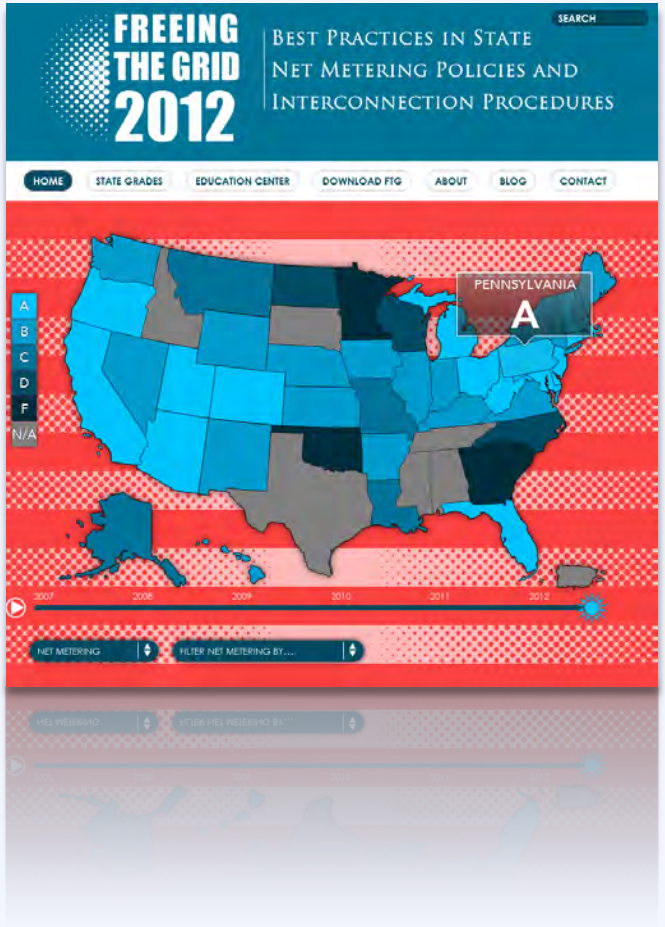
Net Metering: Resources

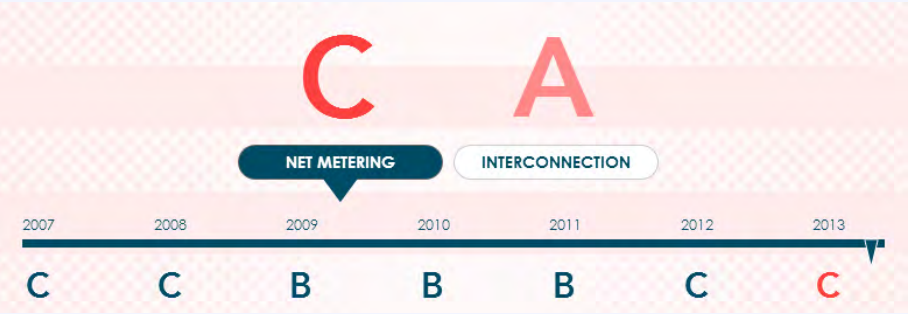
Resource **Freeing the Grid**

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

http://freeingthegrid.org/



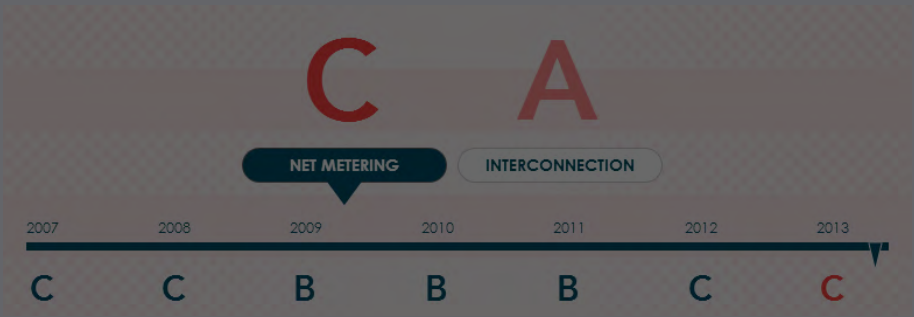
Net Metering: Virginia



Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Small Hydroelectric, Tidal Energy, Wave Energy
Applicable Sectors:	Commercial, Residential, Nonprofit, Schools, Local Government, State Government, Institutional
Applicable Utilities:	Investor-owned utilities; electric co-oops
System Capacity Limit:	500 kW for non-residential 10 kW (20 kW with standby charges) for residential
Aggregate Capacity Limit:	1% of utility's adjusted Virginia peak-load forecast for the previous year
Net Excess Generation:	Credited to customer's next bill at retail rate. After 12-month cycle, customer may opt to roll over credit indefinitely or to receive payment at avoided-cost rate
REC Ownership:	Customer owns RECs
Meter Aggregation:	Not addressed

Source: Freeing the Grid http://freeingthegrid.org/#state-grades/virginia

Net Metering: Virginia



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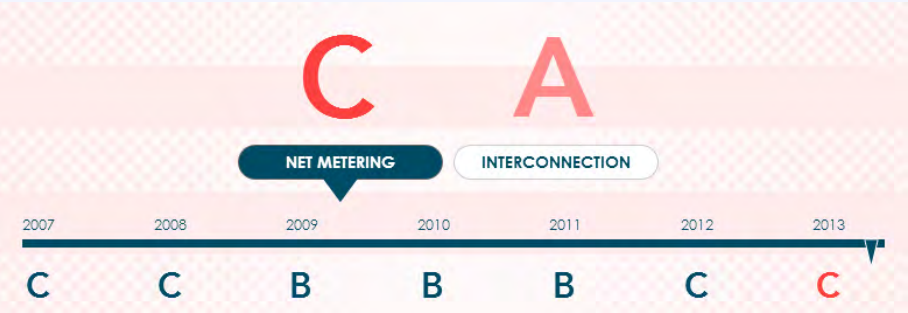

RECOMMENDATIONS:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Increase limit on overall enrollment to at least 5% of utility's peak capacity

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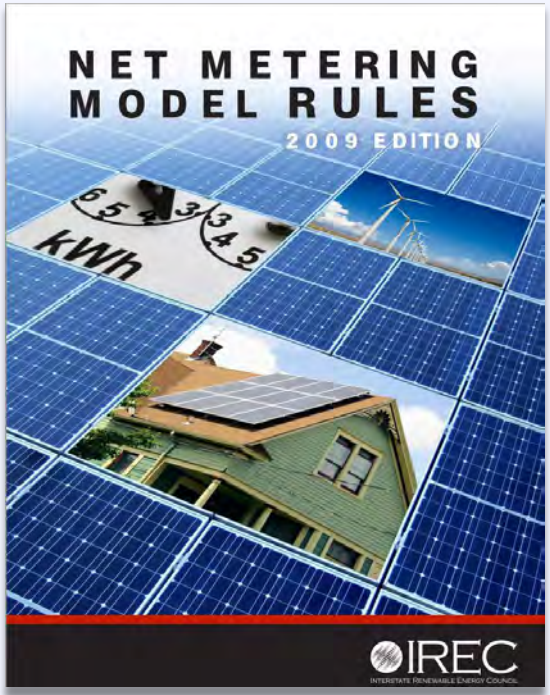
Net Metering: Resources

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



Who Regulates What?

State

- Utility Regulation
- Solar Access
- Property Taxes

Local

- Planning
- Zoning
- Permitting

Solar Access

Solar Access Laws:

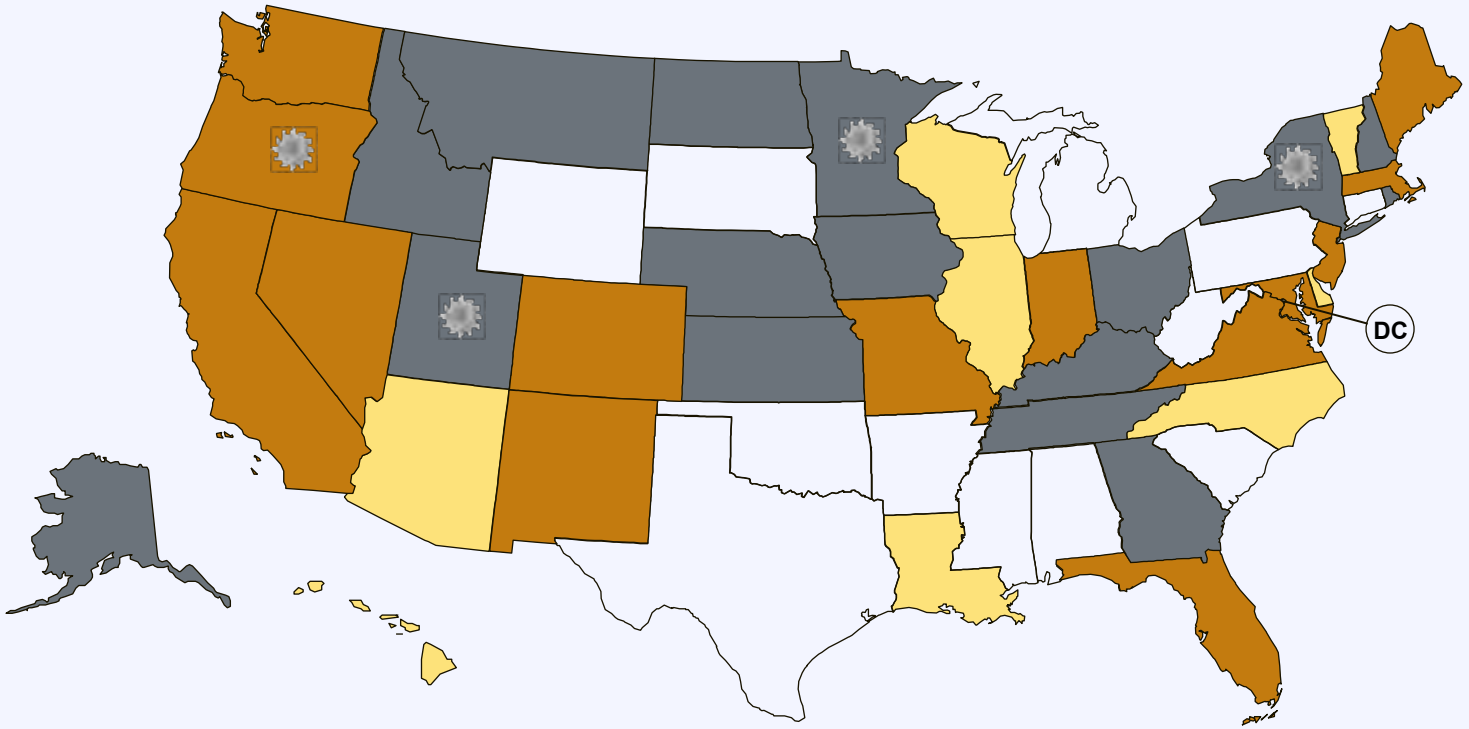
1. Increase the likelihood that properties will receive sunlight
2. Protect the rights of property owners to install solar
3. Reduce the risk that systems will be shaded after installation

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

Virginia Solar Access Law

Solar Rights:

Va. Code § 67-701. Covenants regarding solar power.

A. *Effective July 1, 2008, no community association shall prohibit an owner from installing or using a solar energy collection device on that owner's property. However, a community association may establish reasonable restrictions concerning the size, place, and manner of placement of such solar energy collection devices.*

B. *The community association may prohibit or restrict the installation of solar energy collection devices on the common elements or common area within the real estate development served by the community association…*

C. *This section shall not apply with respect to any provision of a restrictive covenant that restricts the installation of use of any solar collection device if such provision became effective prior to July 1, 2008.*

Virginia Solar Access Law

Solar Easements:

Va. Code § 55-353. Creation of solar easements.

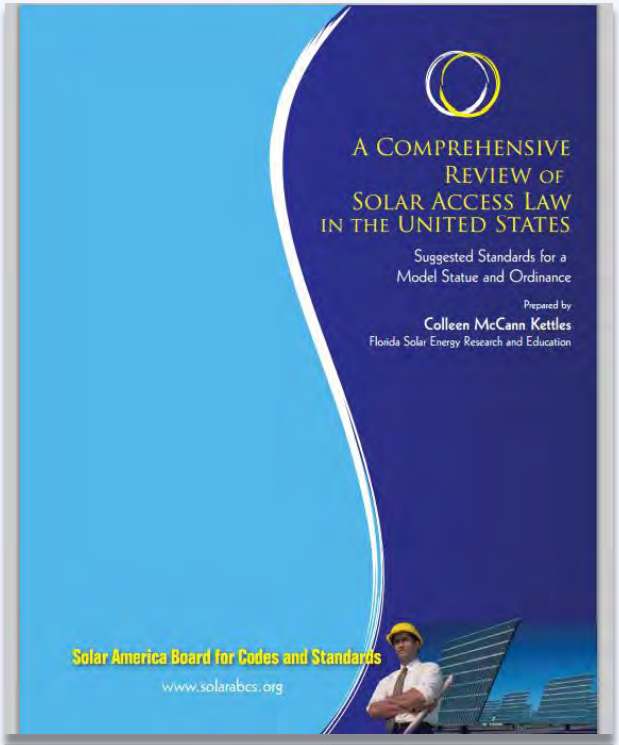
> *Any easement obtained for the purpose of exposure of solar energy equipment, facilities or devices shall be created in writing and shall be subject to the same conveyancing and instrument recording requirements as other easements.*

Solar Access

Resource **Solar ABCs**

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

www.solarabcs.org



Who Regulates What?

State

- Utility Regulation
- Solar Access
- Property Taxes

Local

- Planning
- Zoning
- Permitting

Property Tax Exemptions

Va. Code § 58.1-3661:

Creates a separate class of property for solar energy equipment. Provides a "local option" for the governing bodies of counties, cities, or towns to adopt an ordinance that fully or partially exempts this property from local taxation.

Detailed rules and requirements at
13 VAC 5-200-10. et seq.

Local Property Tax Ordinances

Definitions

State law defines the type of equipment covered

Authorization

Recognizes equipment as separate class of property and authorizes exemptions

Amount of Exemption

Up to 100%; to be claimed for no less than 5 years

Application

Residents in jurisdiction must file application, including project plans and specifications, to local building department

Local Property Tax Ordinances

Approval

Local building department certifies systems are covered by law and meet other requirements (e.g., conformance to state building code); transmits approved applications to local assessing officer

Assessment

Assessing officer determines the value of the system; must be no less than purchase and installation costs

Appeals

Decisions may be appealed to local board of building code appeals

Property Tax Exemptions

Town of Pulaski:

Exempts 50% of value of certified solar energy equipment from property tax for 5 years

(Code of Ordinances, § 78-1 et seq)

City of Roanoke:

Exempts 100% of value of certified solar energy equipment from property tax for 5 years

(City Code § 32-103.5 et seq)

City of Harrisonburg:

Exempts 100% of value of certified solar energy equipment from property tax for 20 years

(Code of General Ordinances, § 4-2-31)

Who Regulates What?

State

- Utility Regulation
- Solar Access
- Property Taxes

Local

- Planning
- Zoning
- Permitting

Q & A

Agenda

08:30 – 08:50	Introductions and Overview
08:50 – 09:25	Solar 101: Policy Environment and Economics
09:25 – 09:35	*Break*
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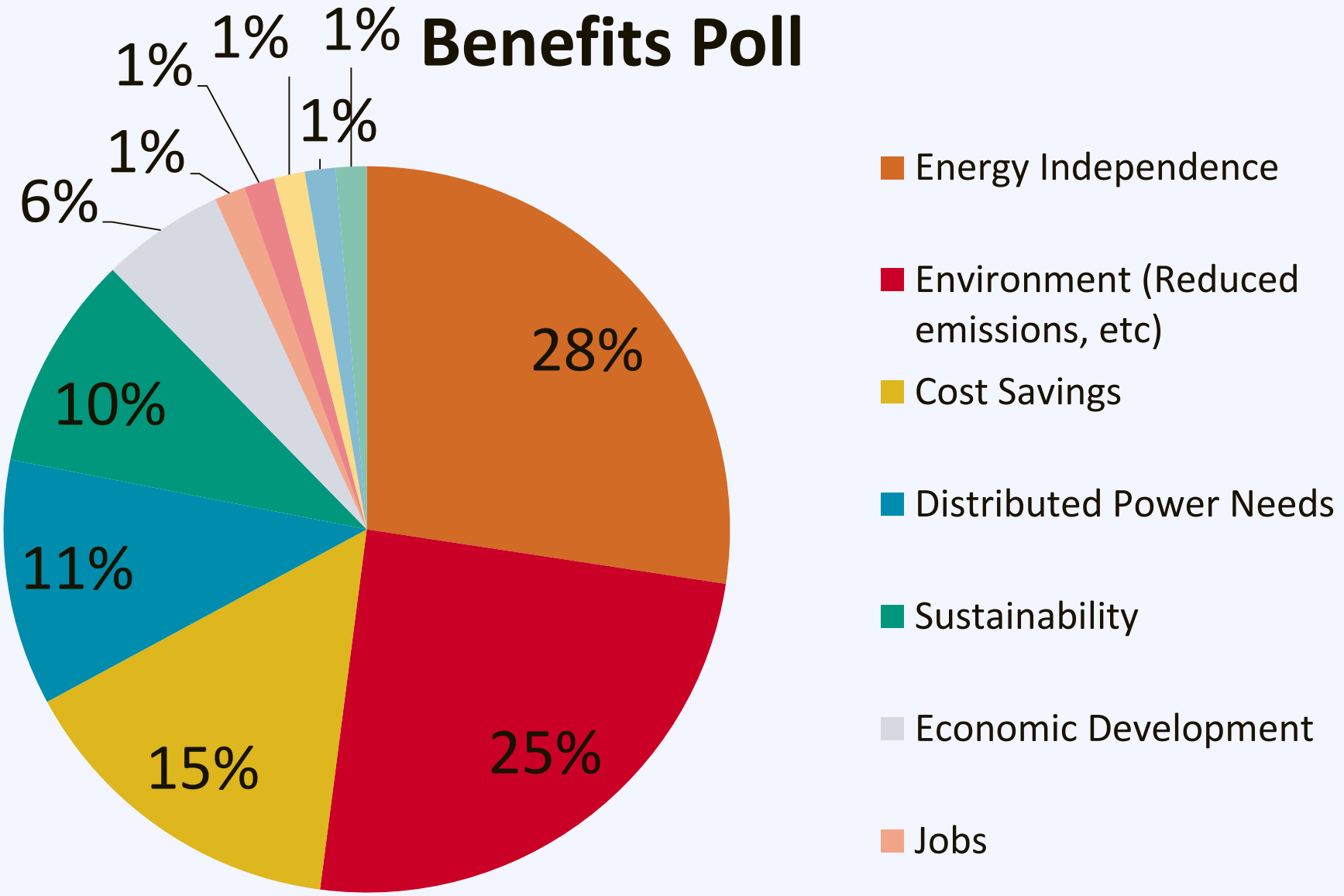
Activity: Identifying Benefits

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

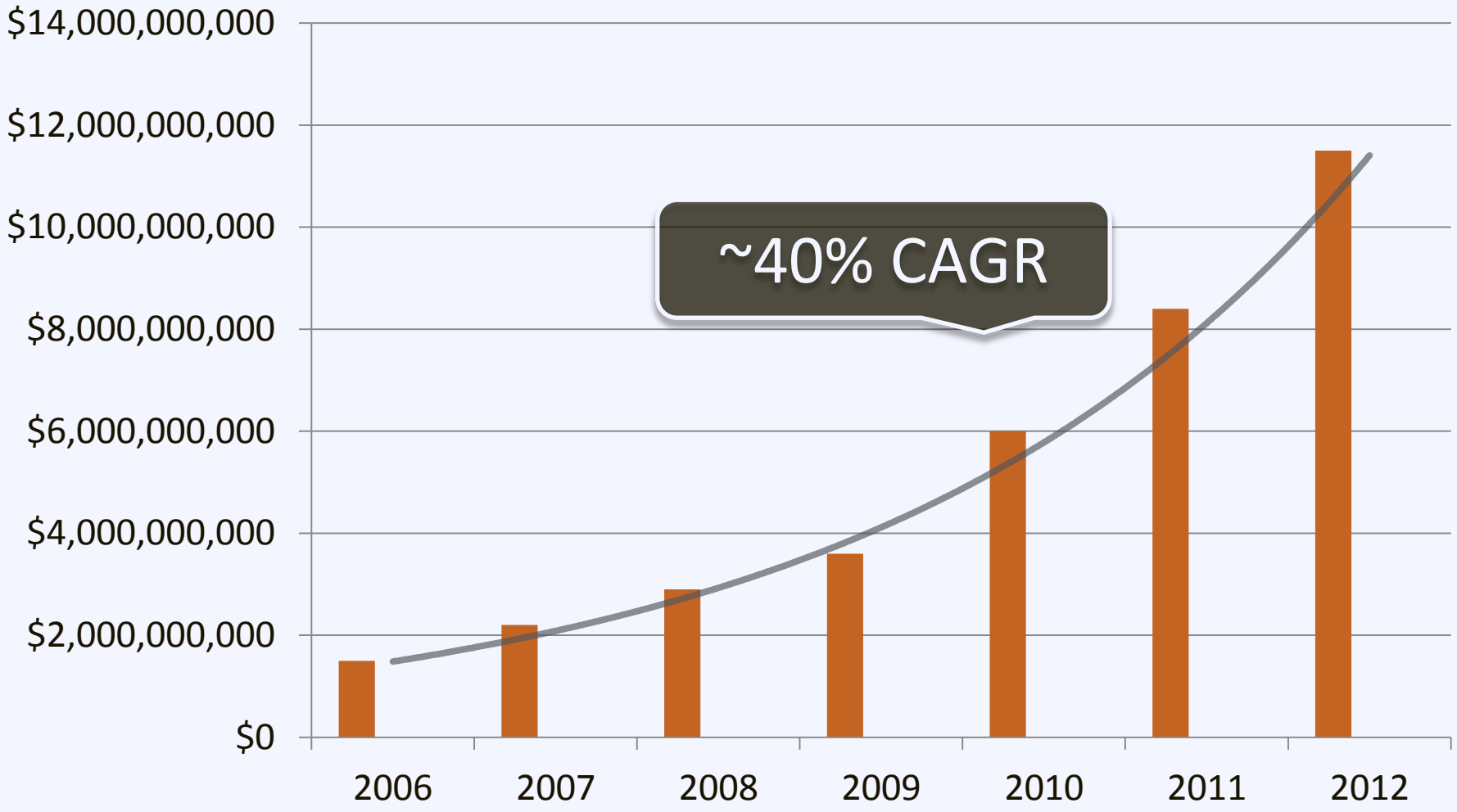
Benefits Poll



Benefits of Solar Energy

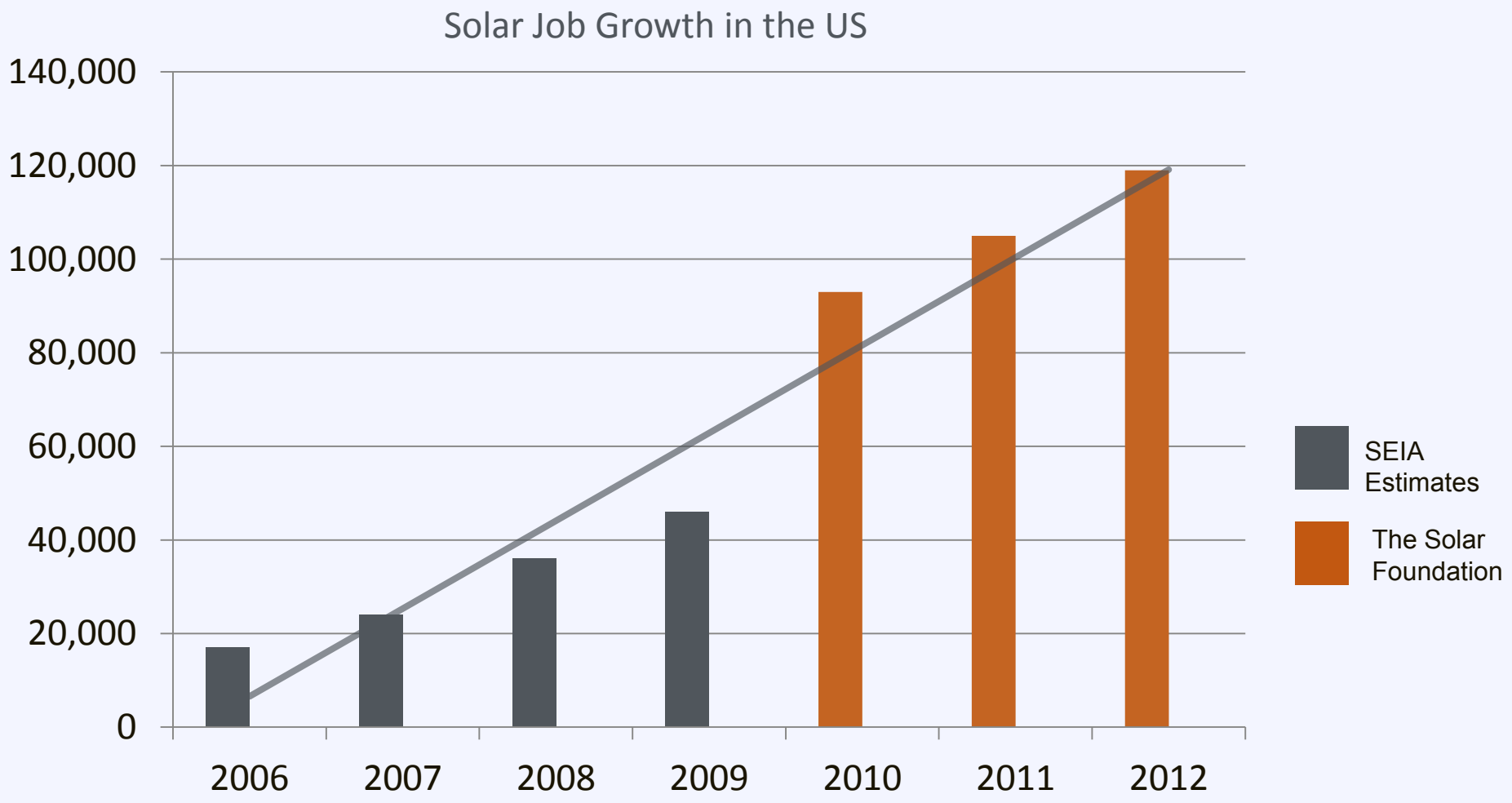
- Local economy growth
- Local jobs
- Energy independence
- Stabilizes price volatility
- Valuable to utilities
- Smart investment

Benefit: Economic Growth



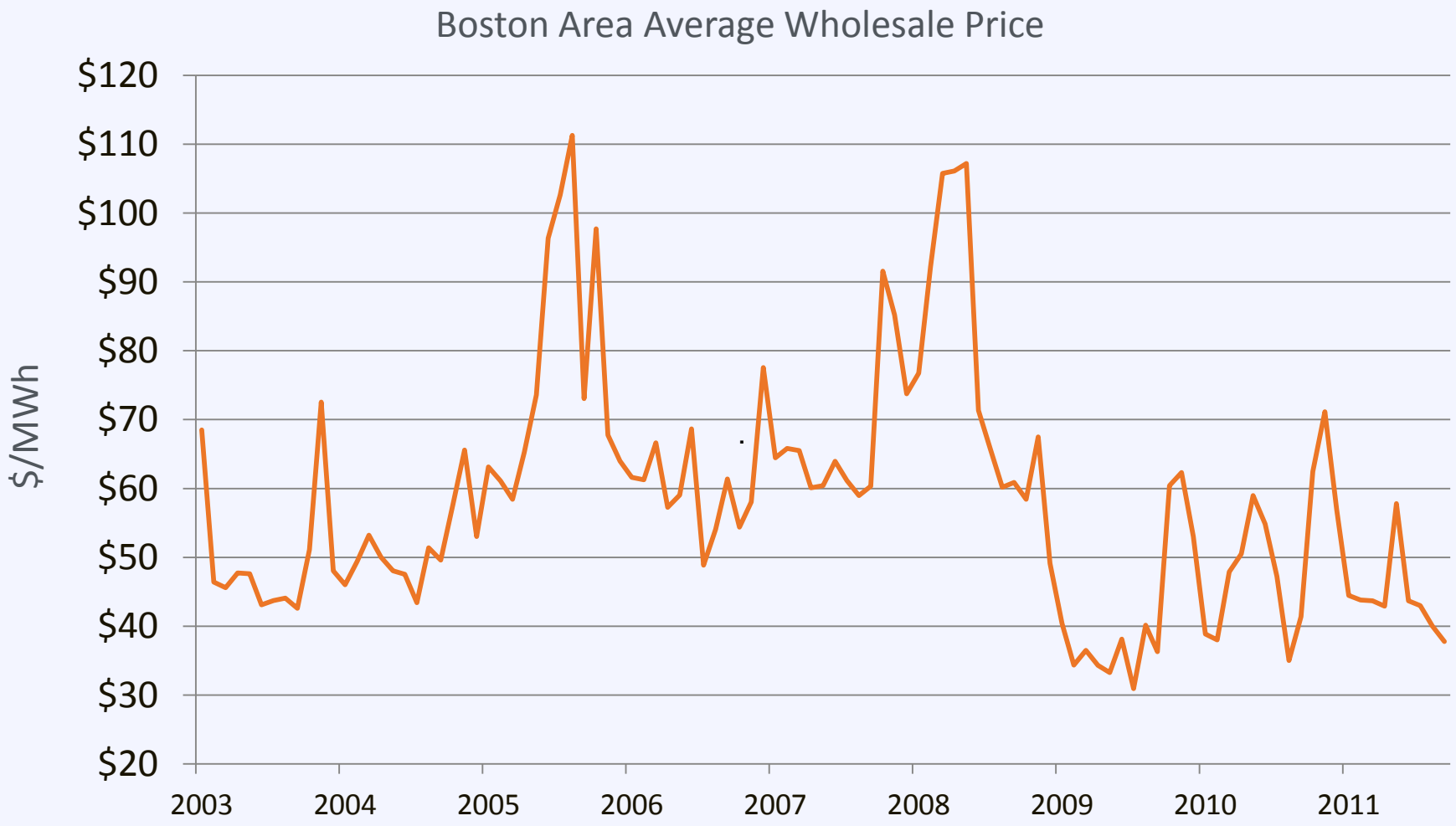
Source: SEIA/GTM Research – 2009/2010/2011/2012 Year in Review Report
http://www.seia.org/research-resources/us-solar-market-insight

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



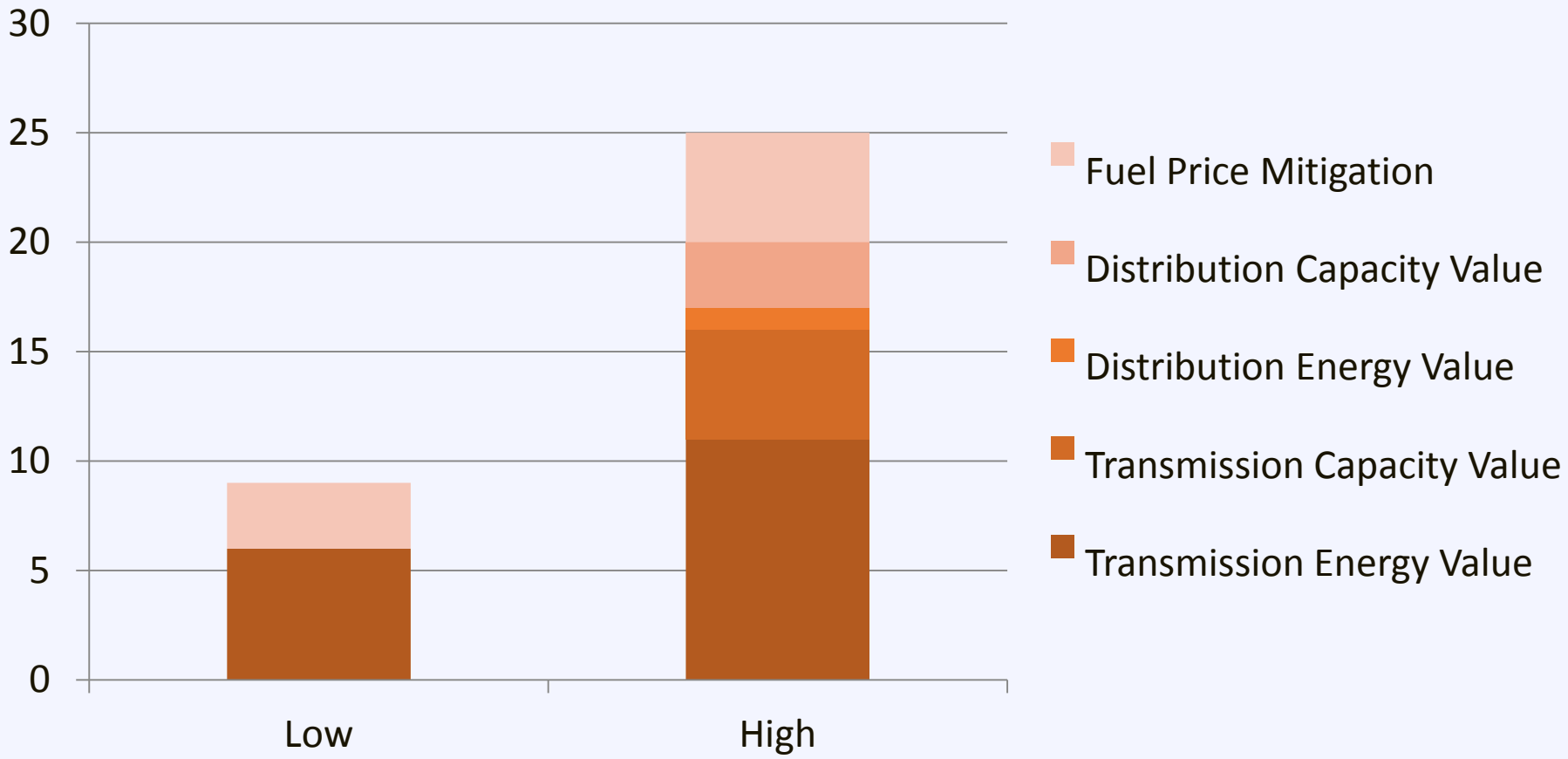
Source: NEPOOL

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

Benefits: Valuable to Utilities

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



Powered by SunShot U.S. Department of Energy

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

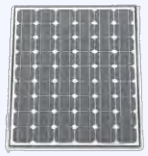
in surveyed California subdivisions

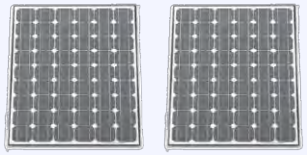
Powered by SunShot U.S. Department of Energy

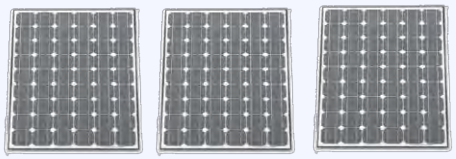
Source: http://www.nrel.gov/docs/fy07osti/38304-01.pdf

Benefit: Smart Investment for Homes

From SunRun:

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

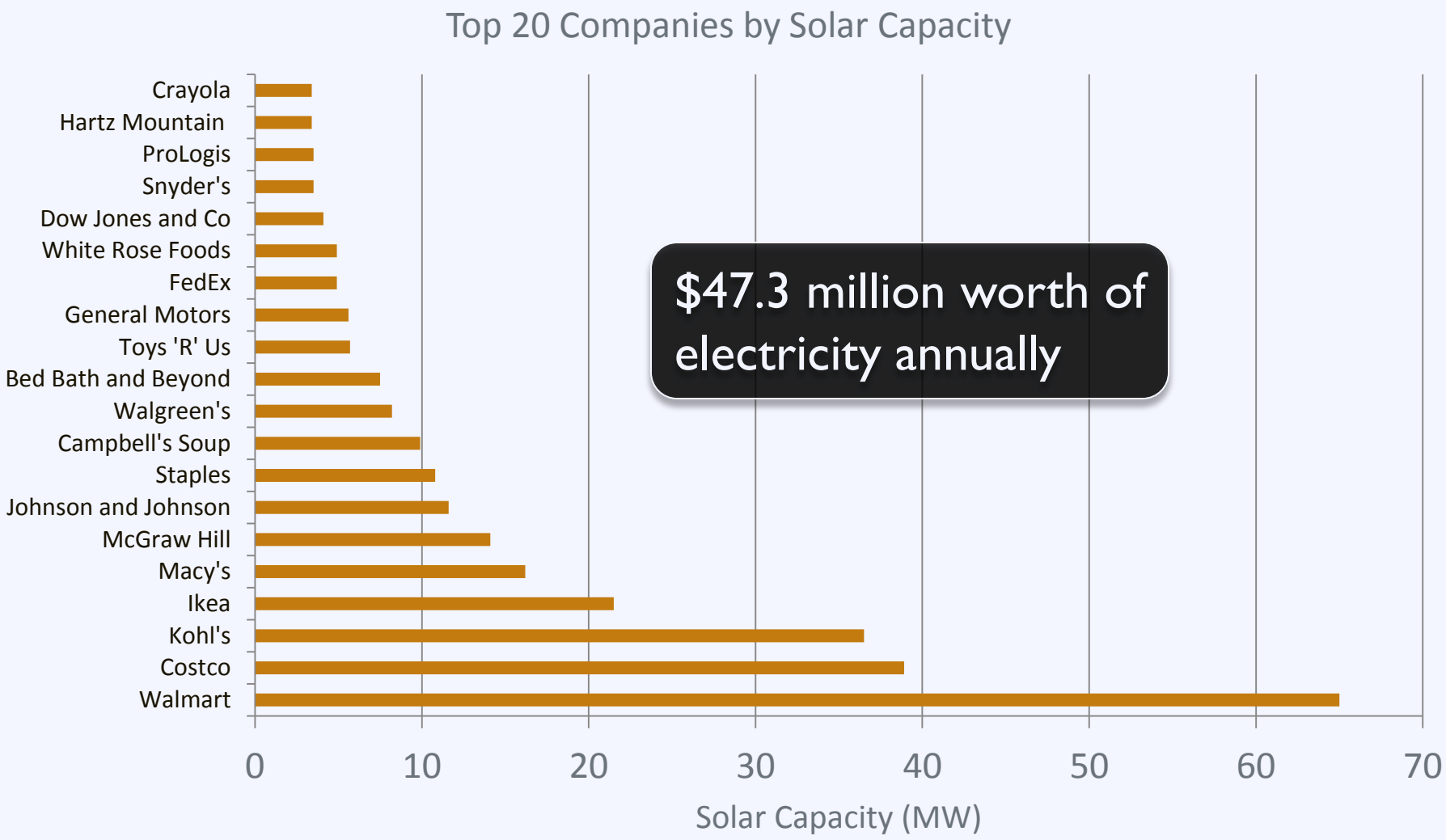
6 kW  = **$ 33,000** *added sale premium*

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

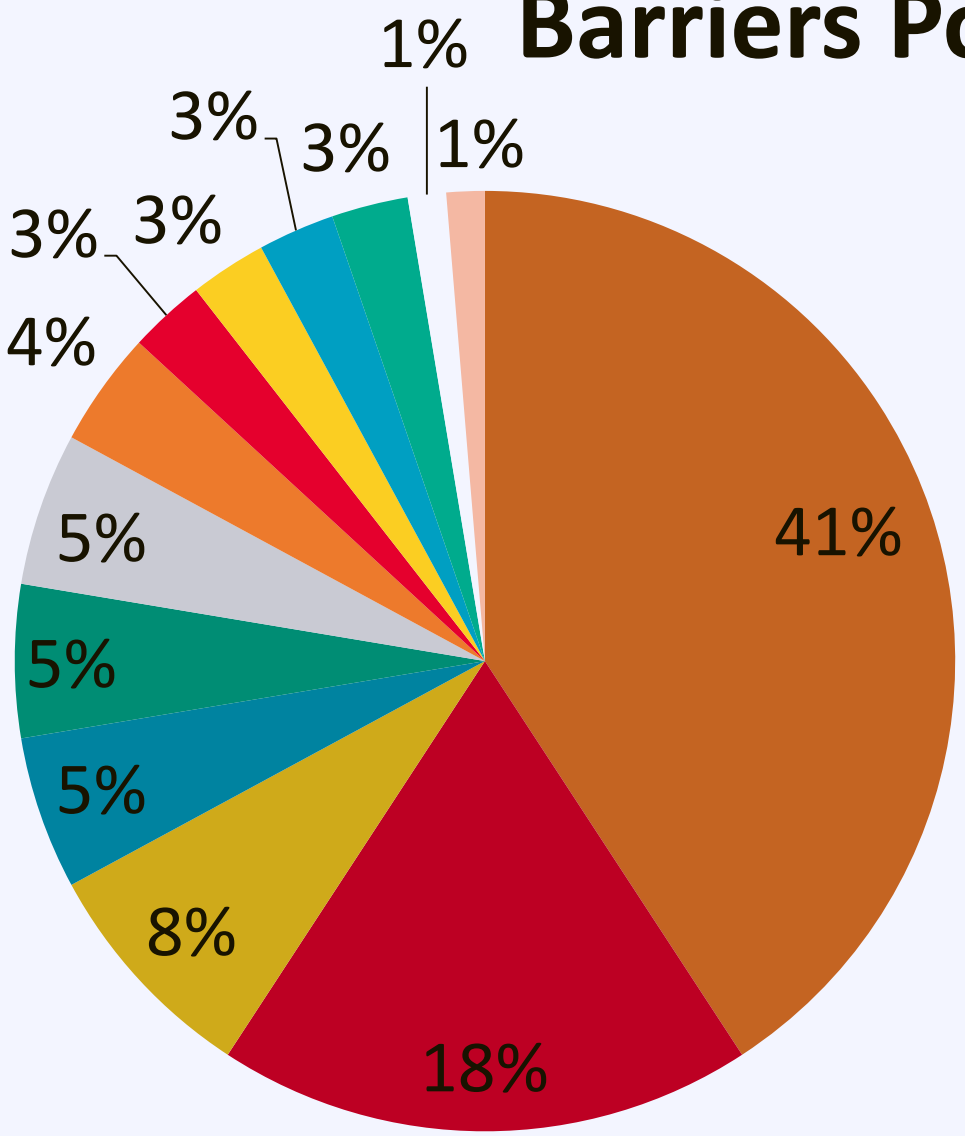
Activity: Addressing Barriers

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 Poll

Barriers Poll



- Cost
- Lack of Education
- Lack of financial Incentives
- Slow ROI
- Politics
- Low Cost of Fossil Fuels
- Permitting

Some things you may hear…

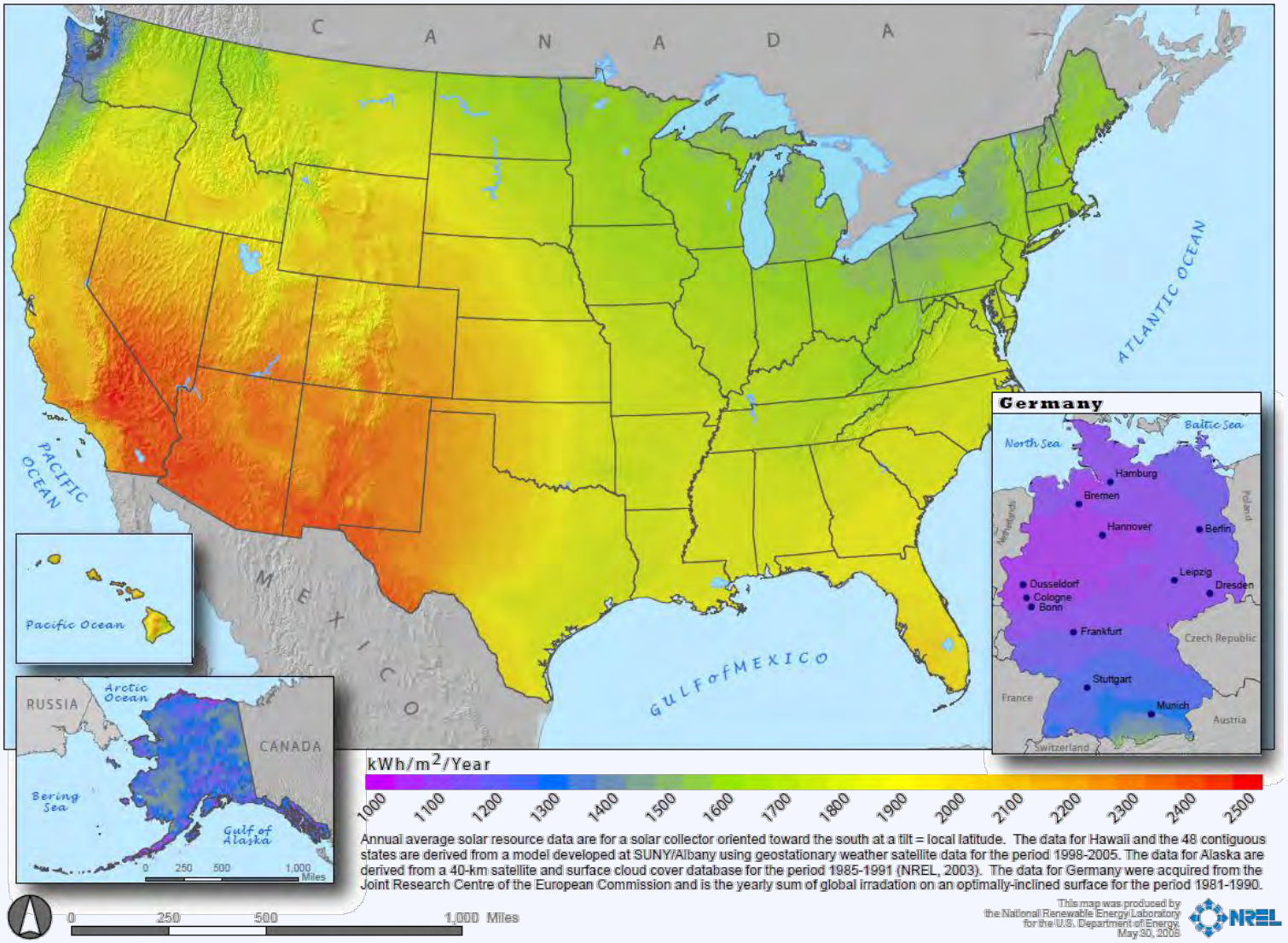
My area isn't sunny enough for solar

Going solar is too expensive

Solar is not ready to compete as a serious energy source

The government should not "pick winners and losers"

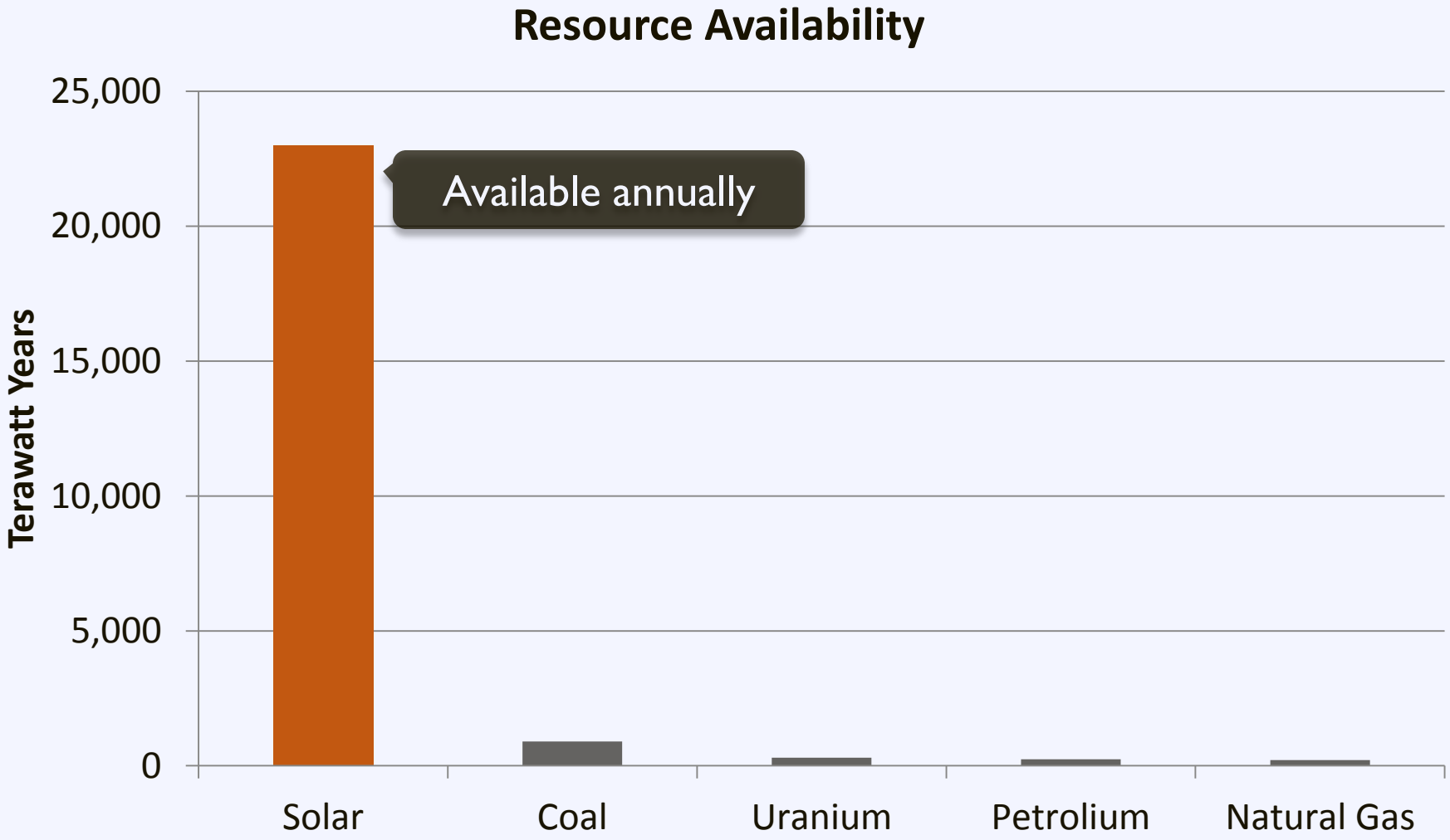
Fact: Solar works across the US



Powered by SunShot U.S. Department of Energy

Source: National Renewable Energy Laboratory

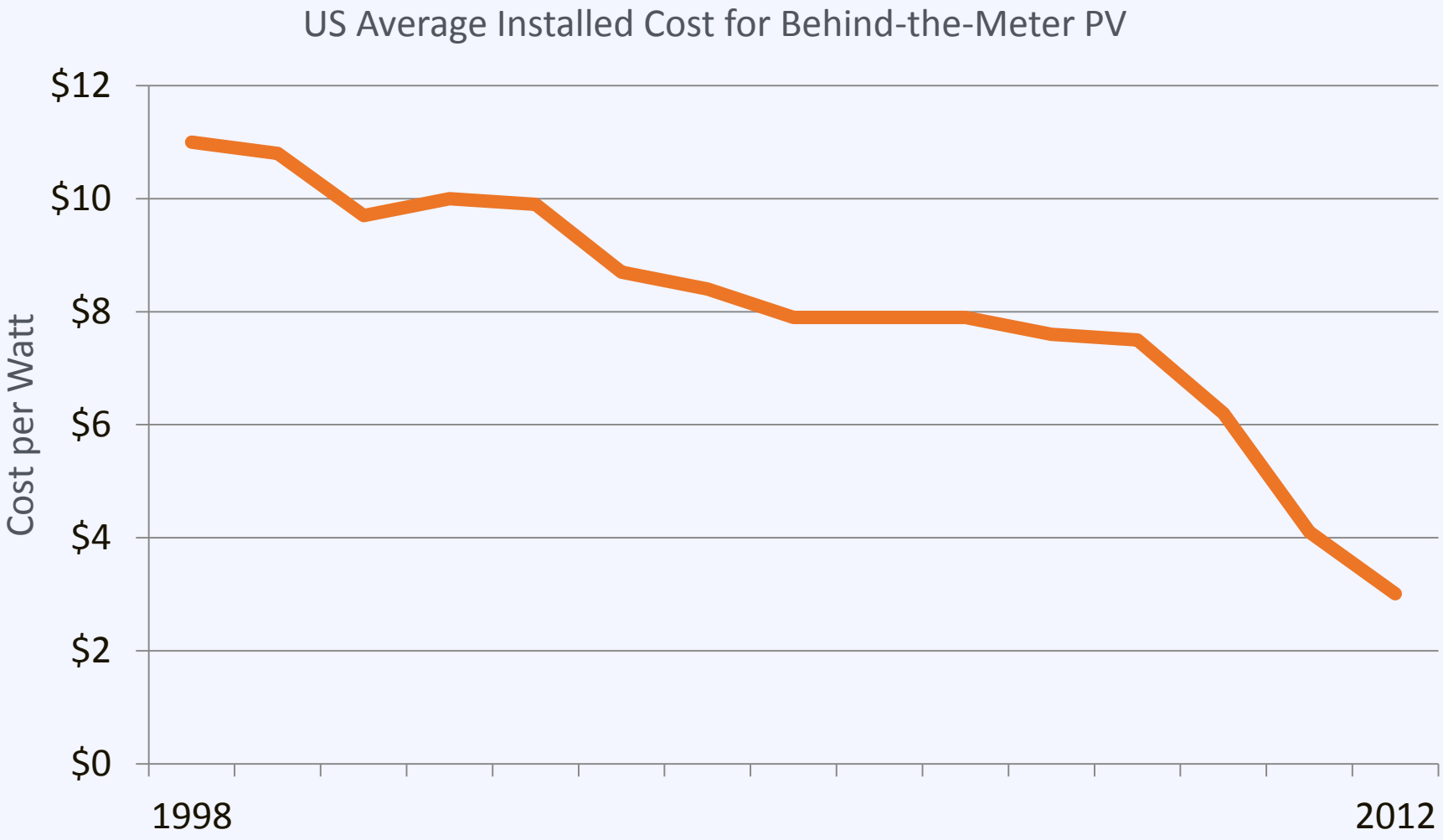
Fact: Solar is a ubiquitous resource



Powered by SunShot U.S. Department of Energy

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

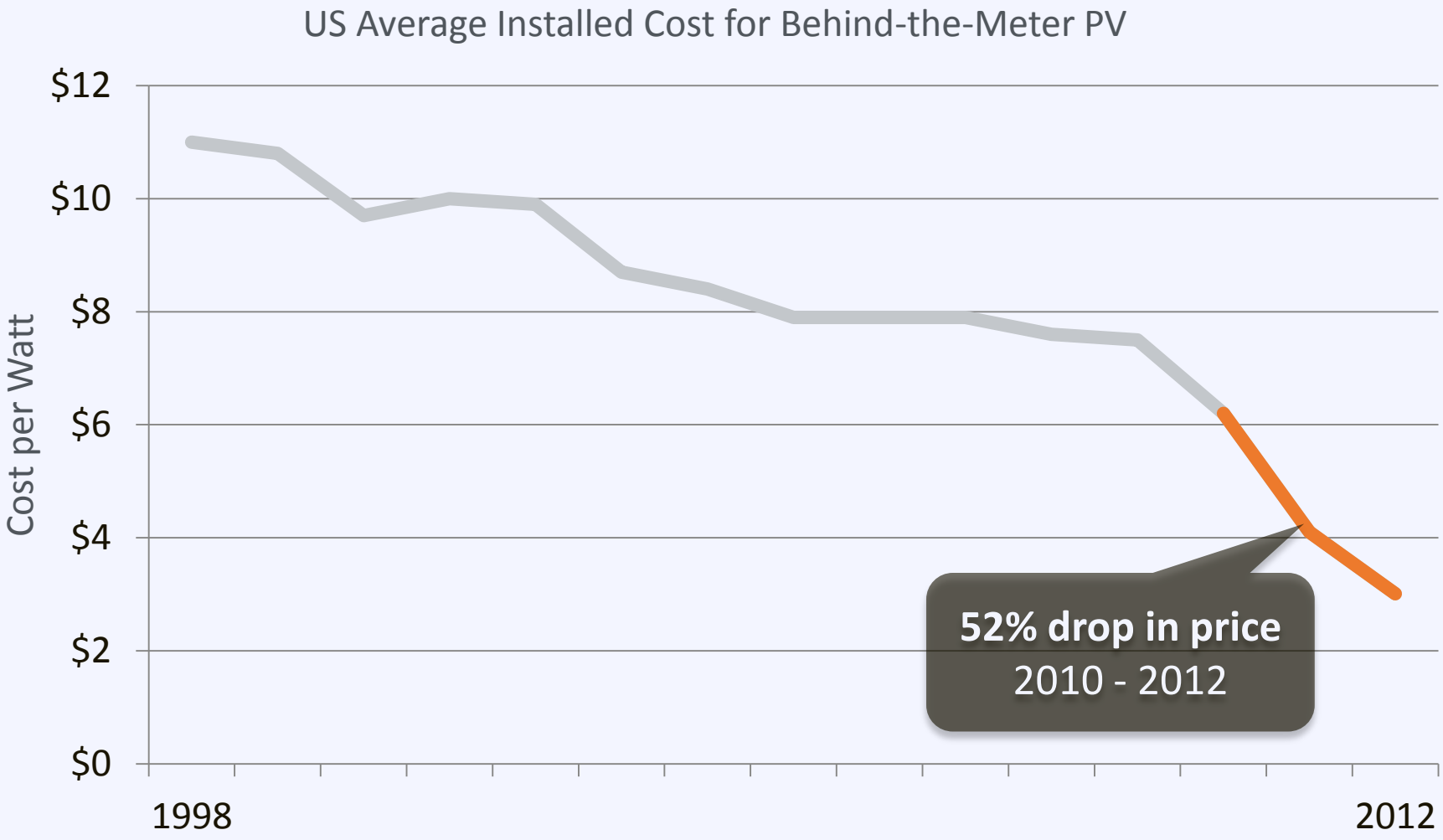
Fact: Solar is cost competitive



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



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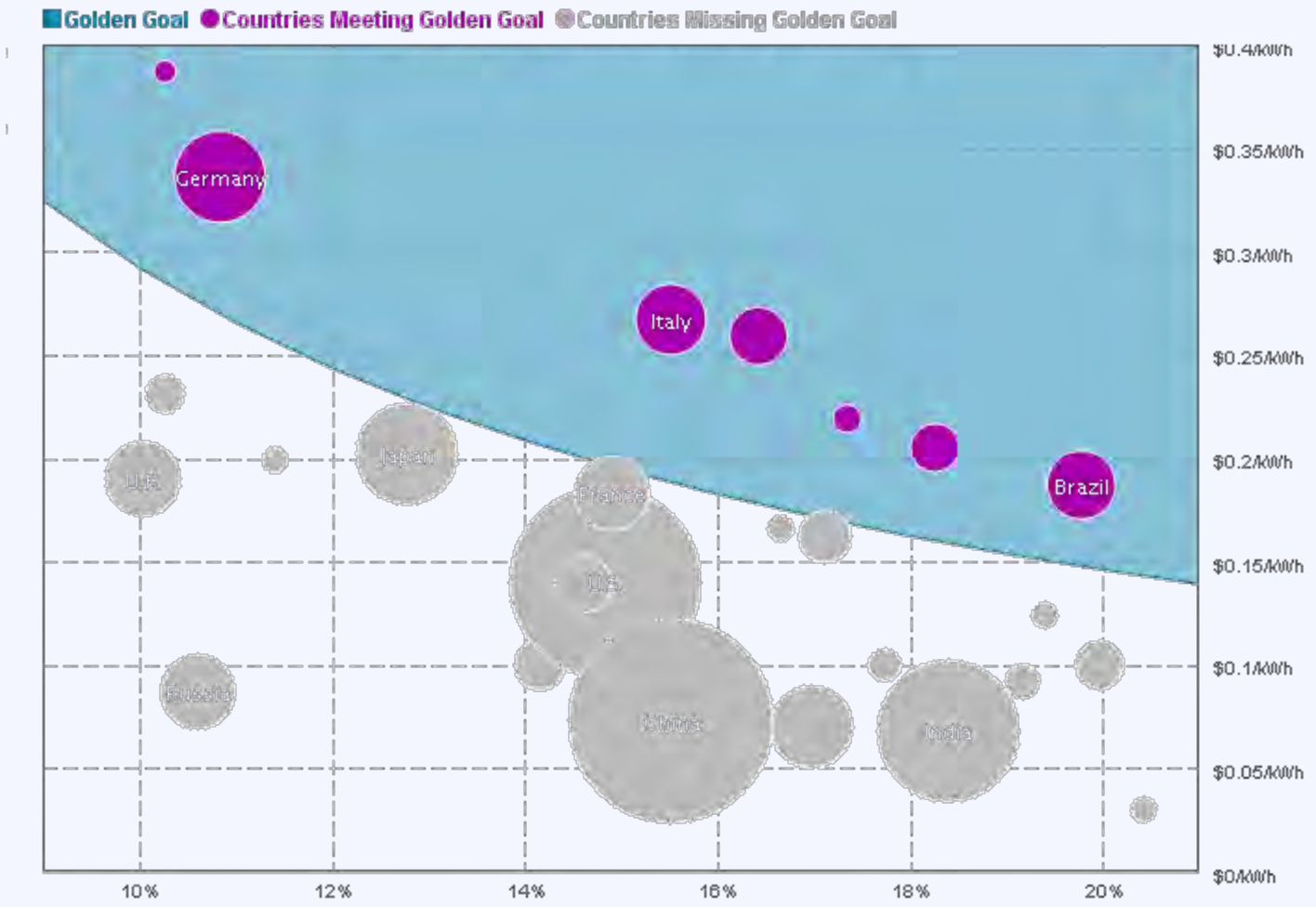
Powered by SunShot U.S. Department of Energy

Fact: Solar is cost competitive

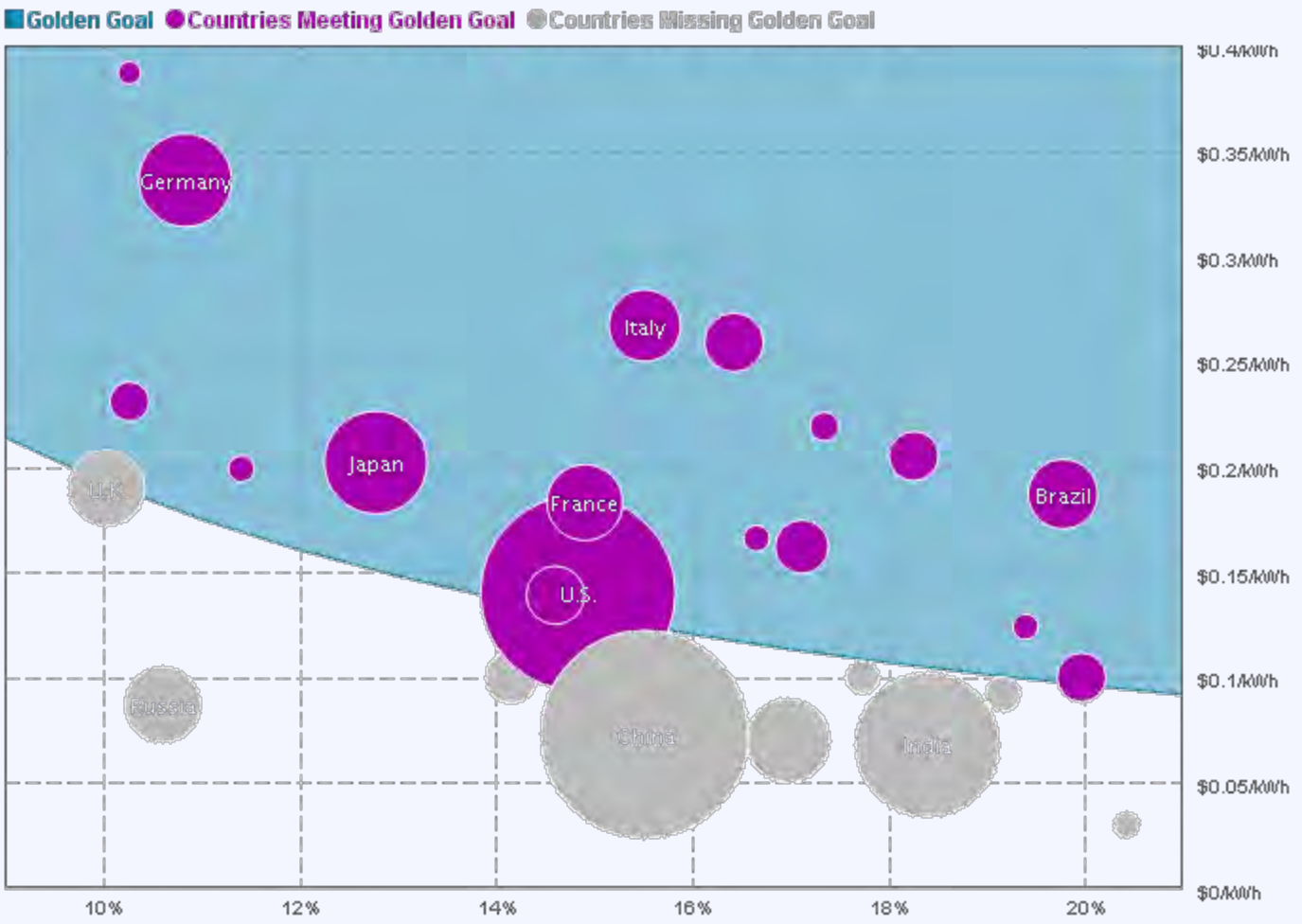
2012



Source: Bloomberg

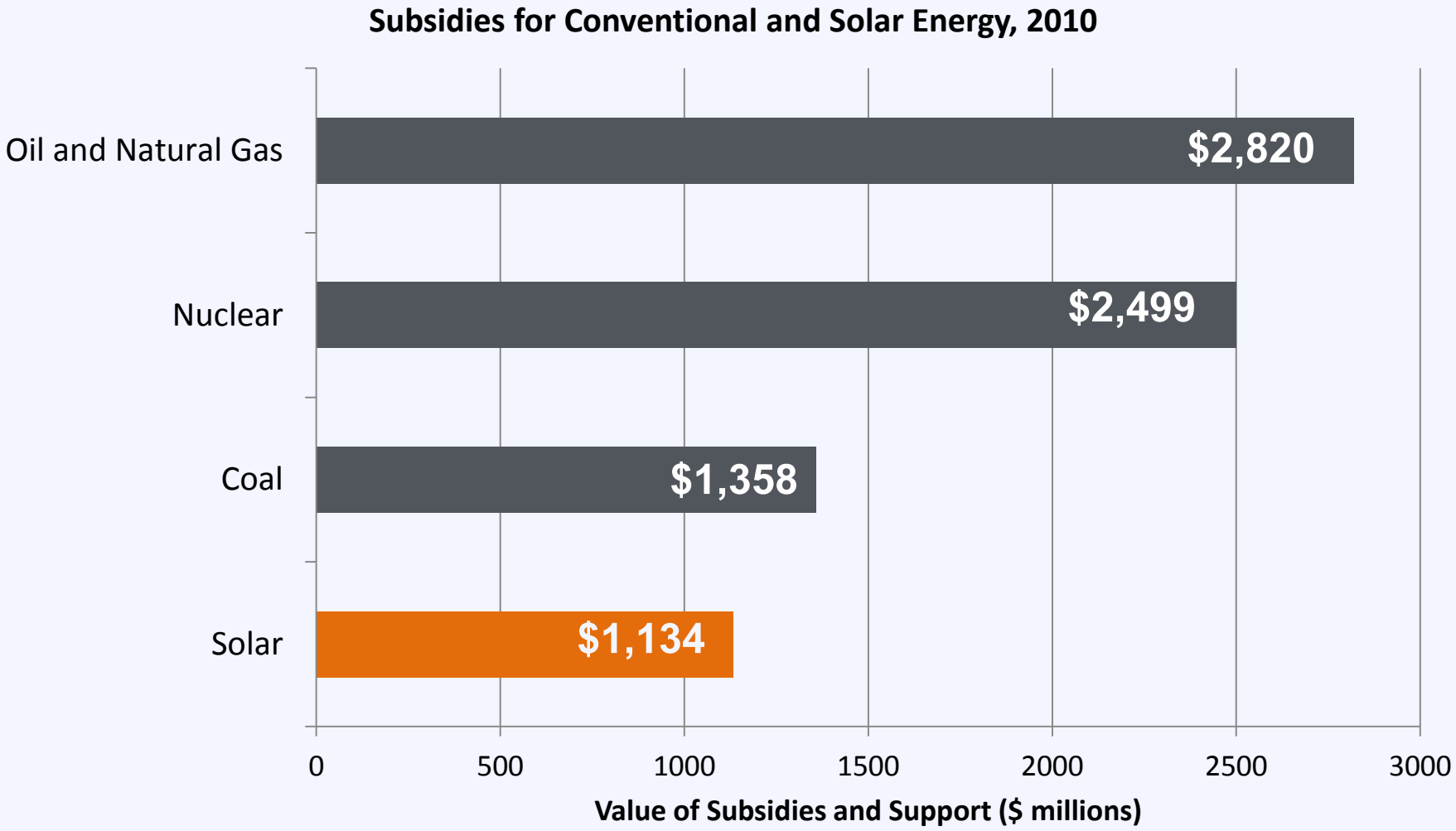
Fact: Solar is cost competitive

2020



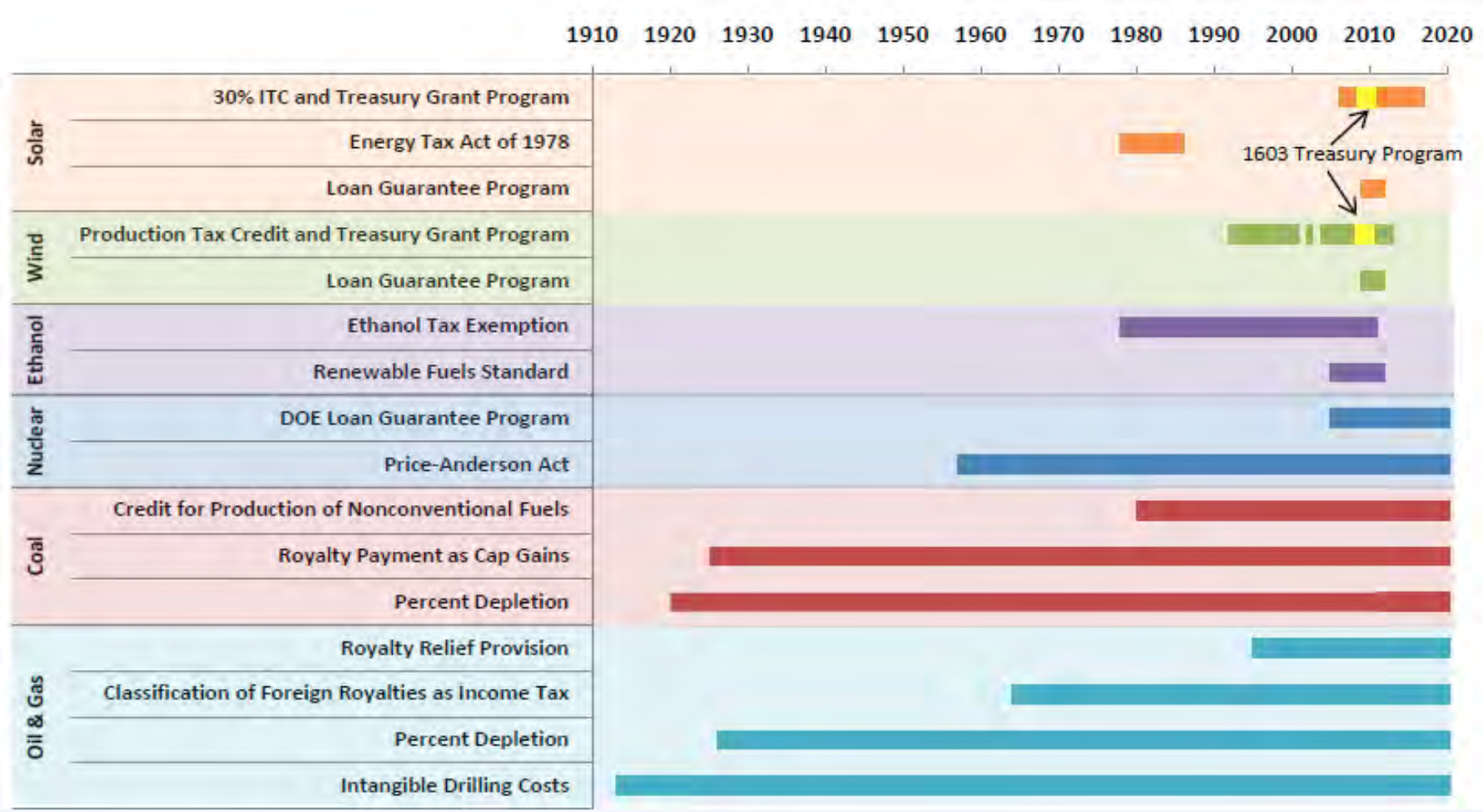
Source: Bloomberg

Subsidies and Support



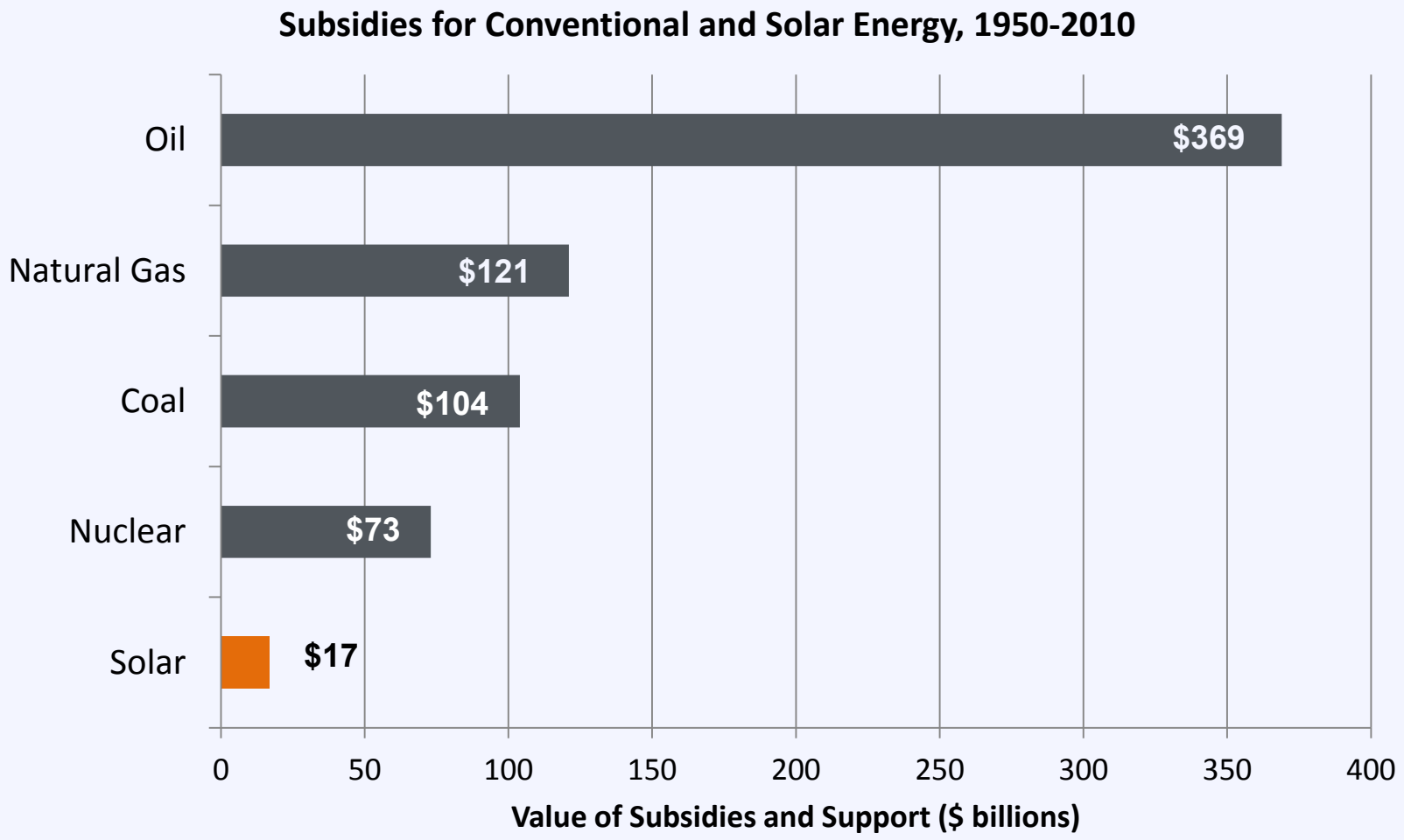
Source: U.S. Energy Information Administration. July 2011. *Direct Federal Interventions and Subsidies in Energy in Fiscal Year 2010*

Subsidies and Support



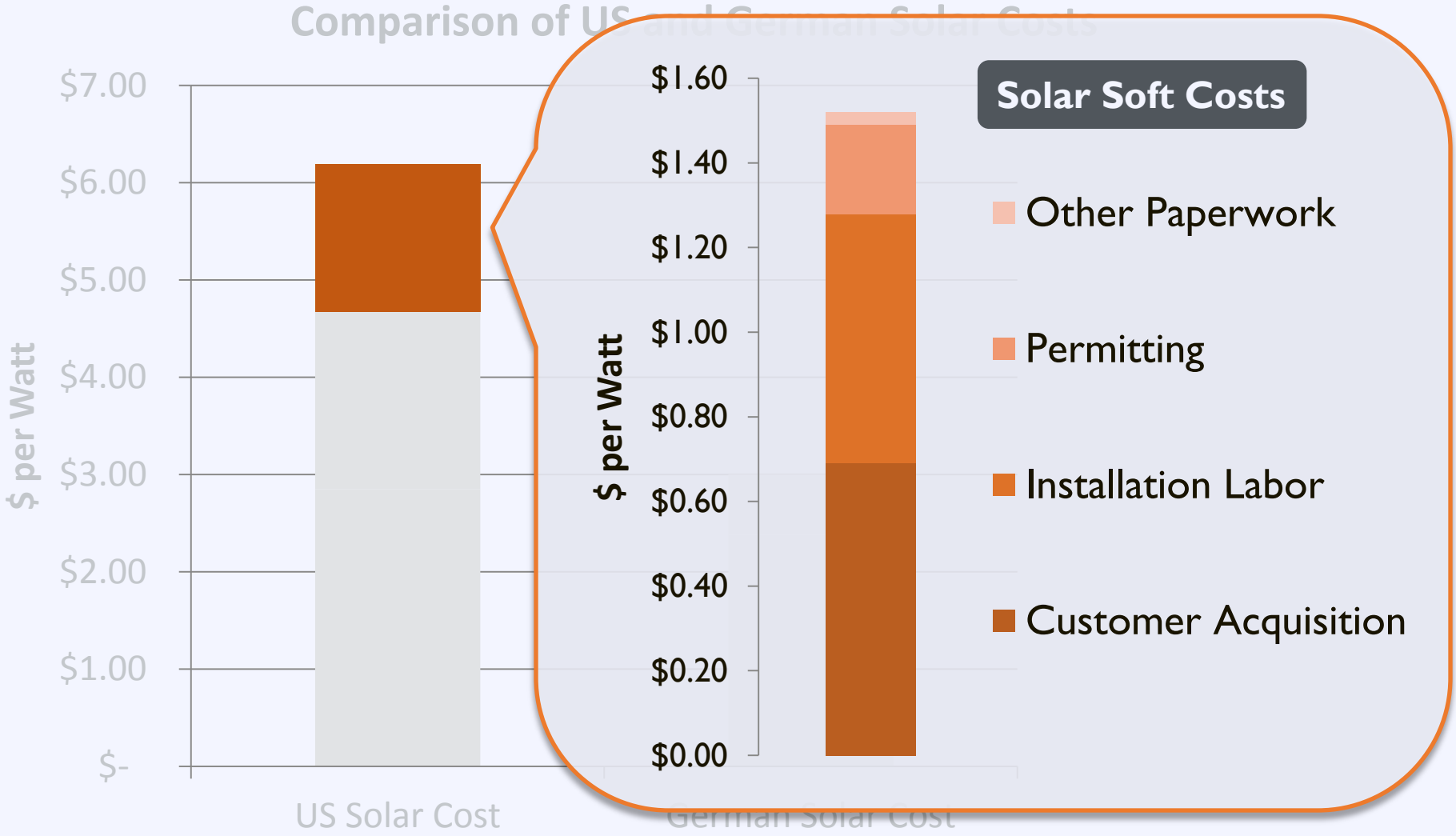
Source: SEIA, Federal Energy Incentives in the United States (2011), http://www.seia.org/galleries/pdf/Federal_Energy_Incentives_in_the_United_States.pdf

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



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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)

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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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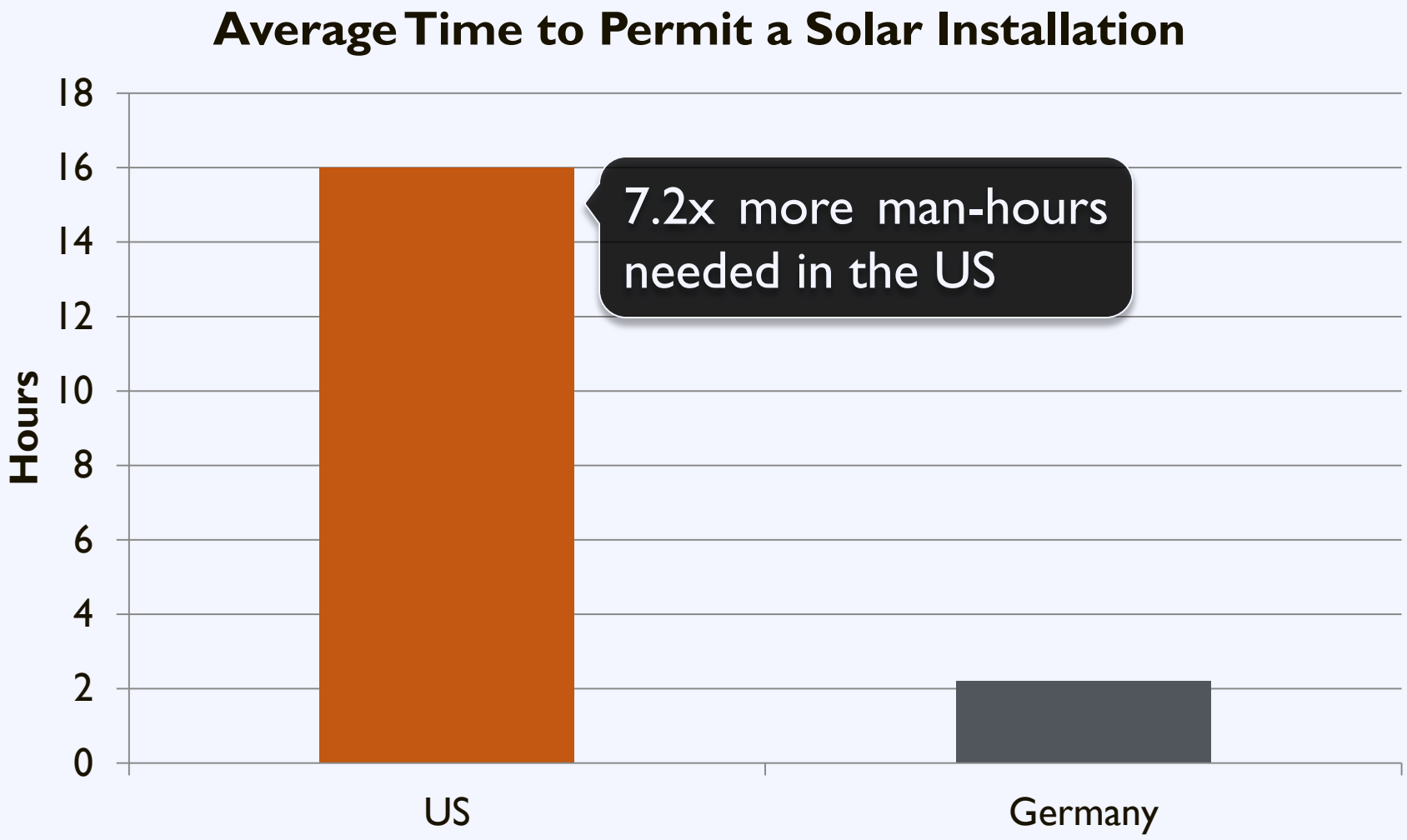
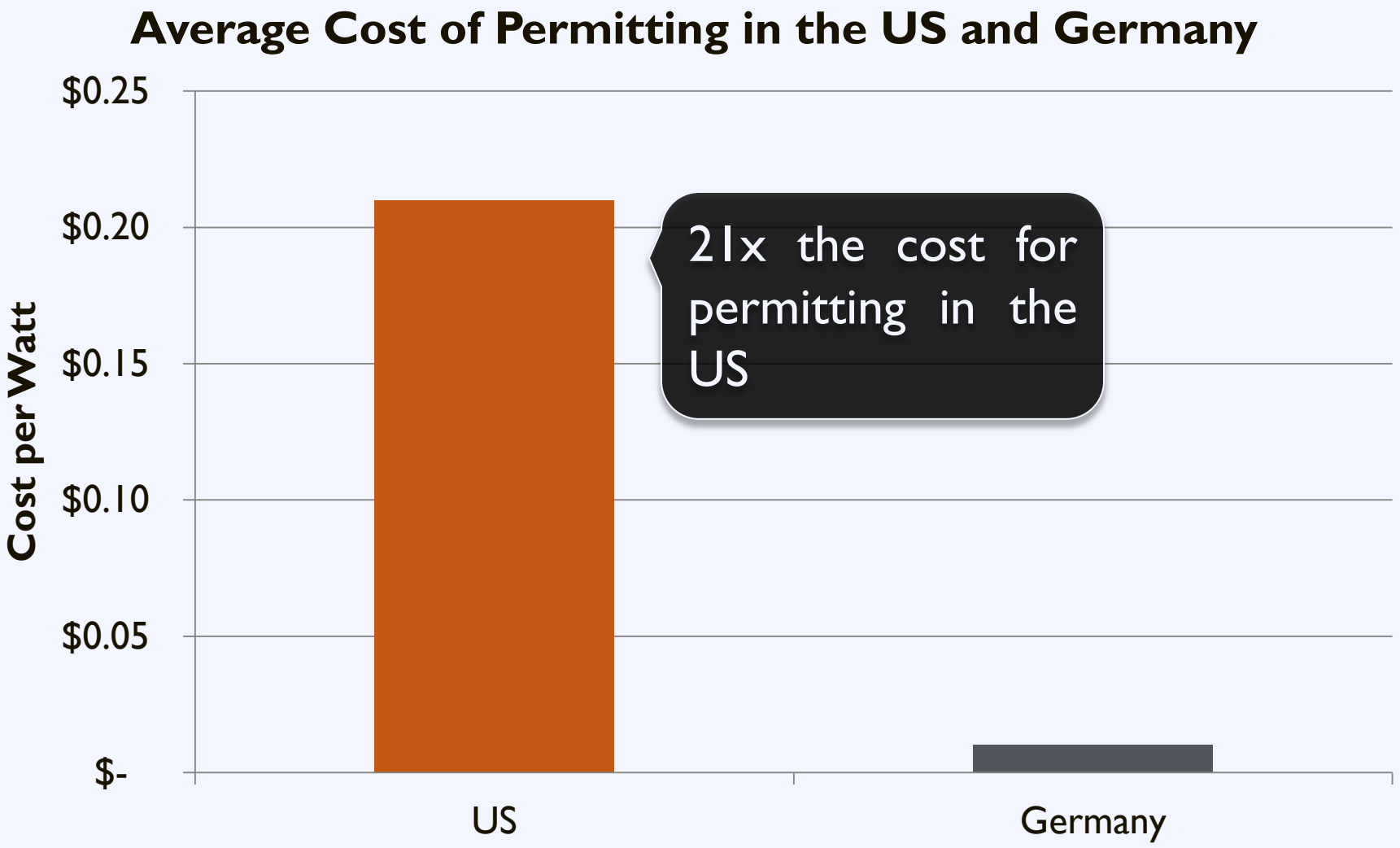
Photon Magazine

Time to Installation



Permitting Costs



Source: NREL, LBNL

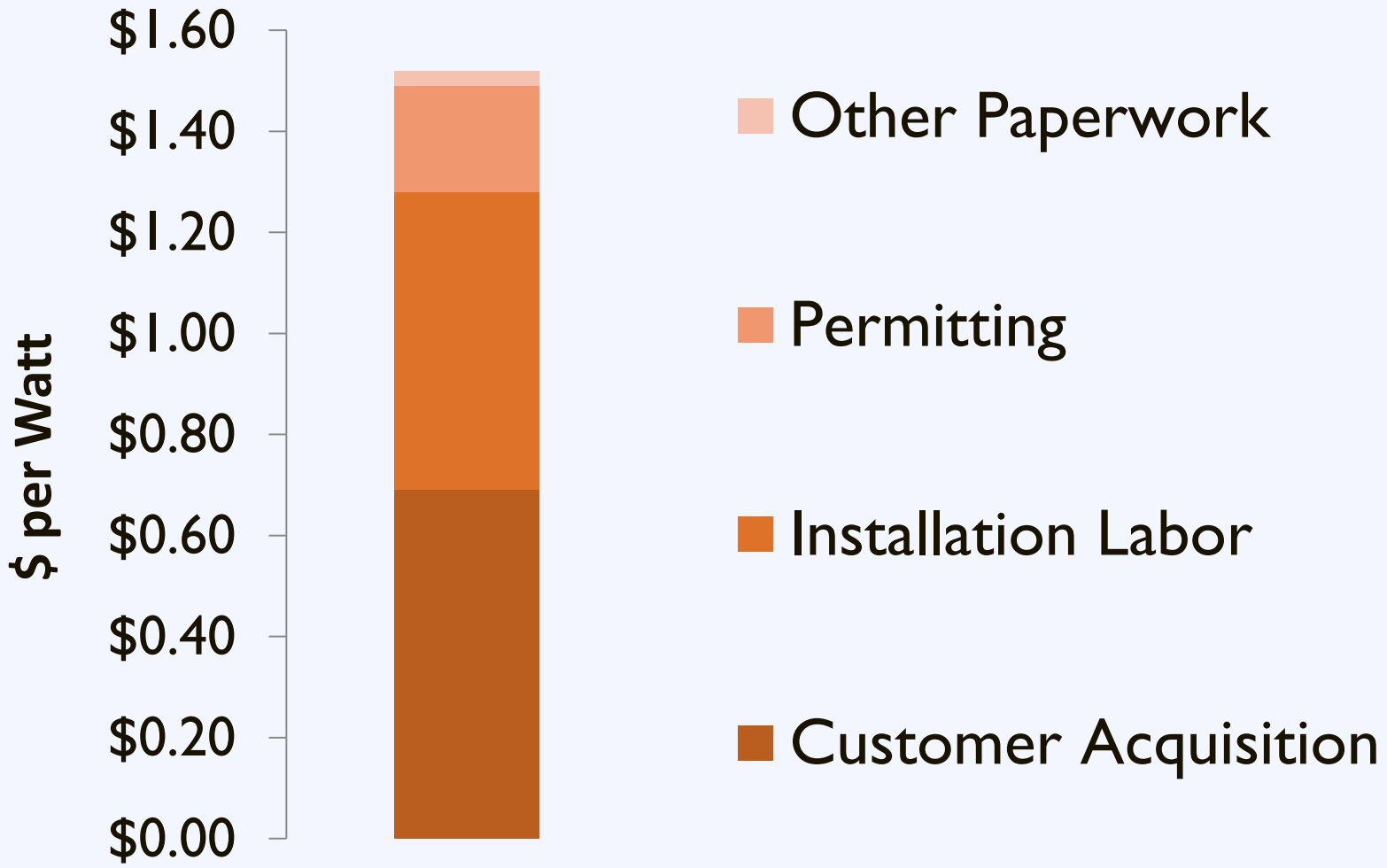
Germany's Success

Consistency and Transparency

through

Standardized Processes

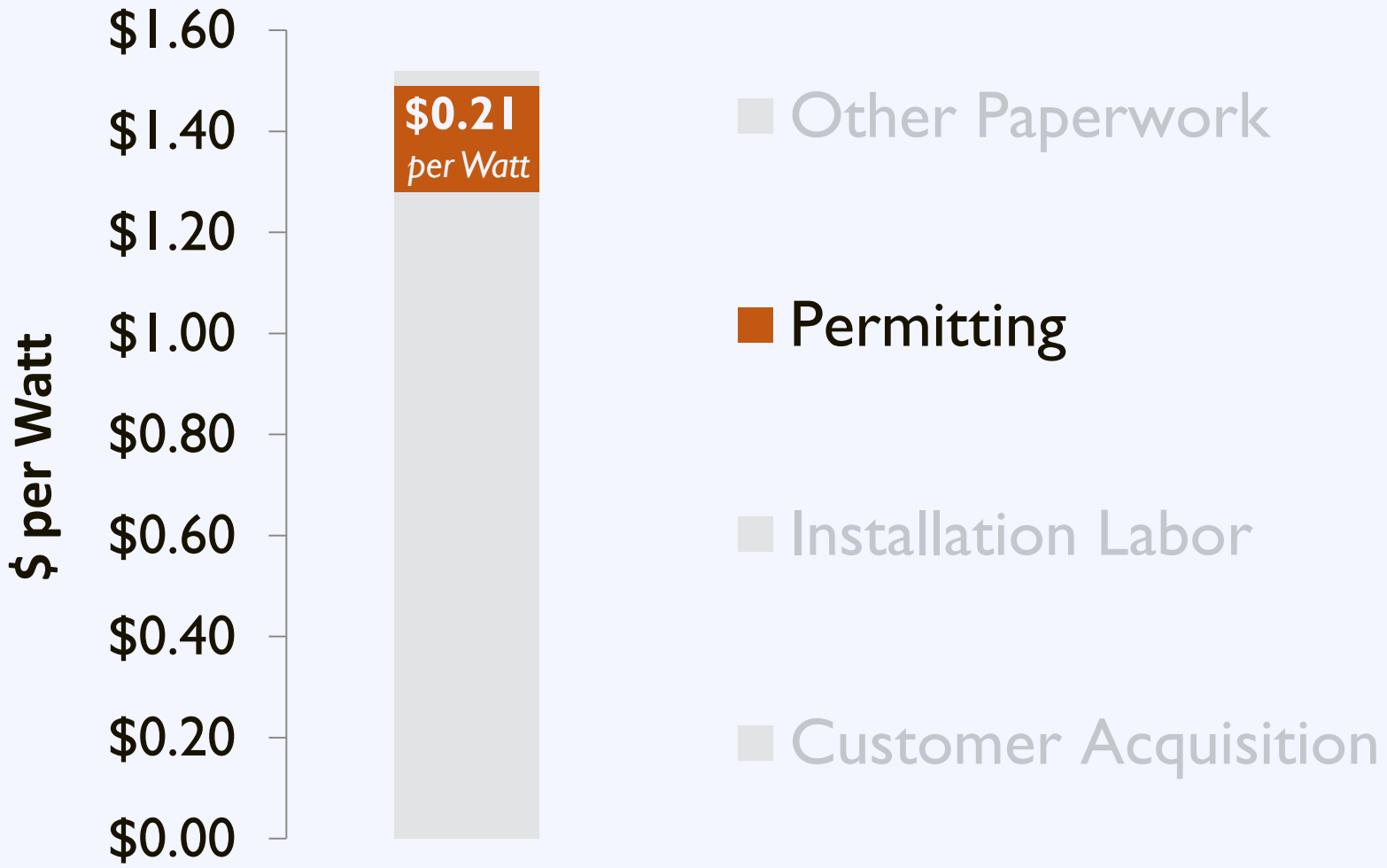
Mitigate Soft Costs



Powered by SunShot
U.S. Department of Energy

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

Mitigate Soft Costs



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

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
- Streamline the permitting process

Zoning Code: Solar Framework

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

Powered by SunShot
U.S. Department of Energy

Source: American Planning Association

Zoning Codes: Small Scale Solar

Typical Requirements:

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

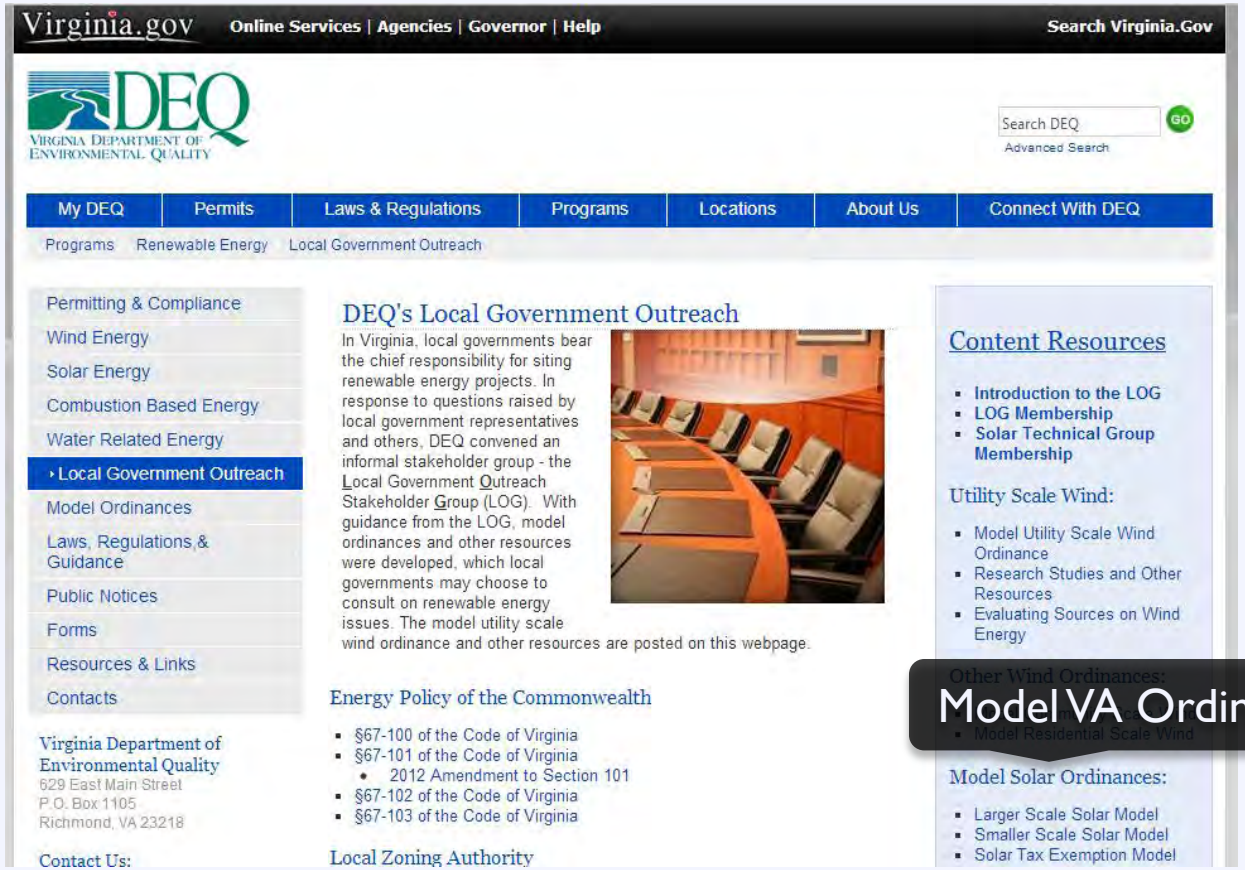
Zoning Codes: Large Scale Solar

Typical Requirements:

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

Zoning Code: Model Ordinances

Resource Virginia Department of Environmental Quality



www.deq.state.va.us/Programs/RenewableEnergy/LocalGovernmentOutreach.aspx

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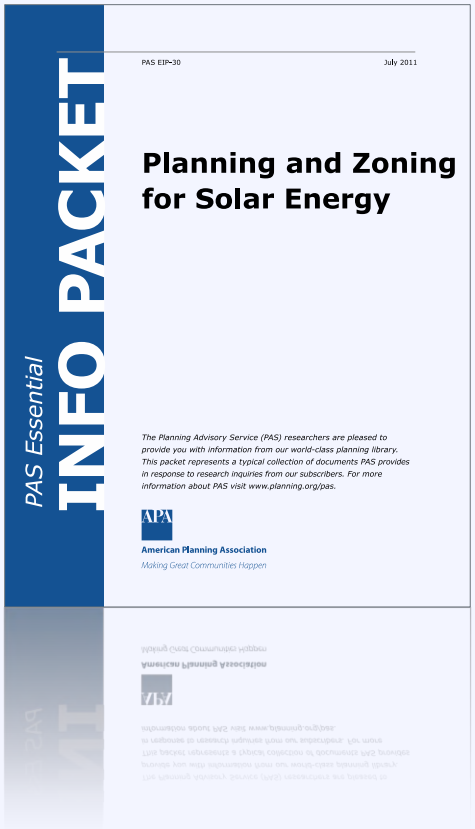
Zoning Code: Model Ordinances

Resource **Planning and Zoning for Solar Energy**

This Essential Info Packet provides a number of articles and guidebooks to help planners plan for solar in their communities.



planning.org/research/solar

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U.S. Department of Energy

The Permitting Process: Challenges

18,000+ local jurisdictions

with unique permitting requirements

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U.S. Department of Energy

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

Powered by SunShot
U.S. Department of Energy

Source: Vote Solar

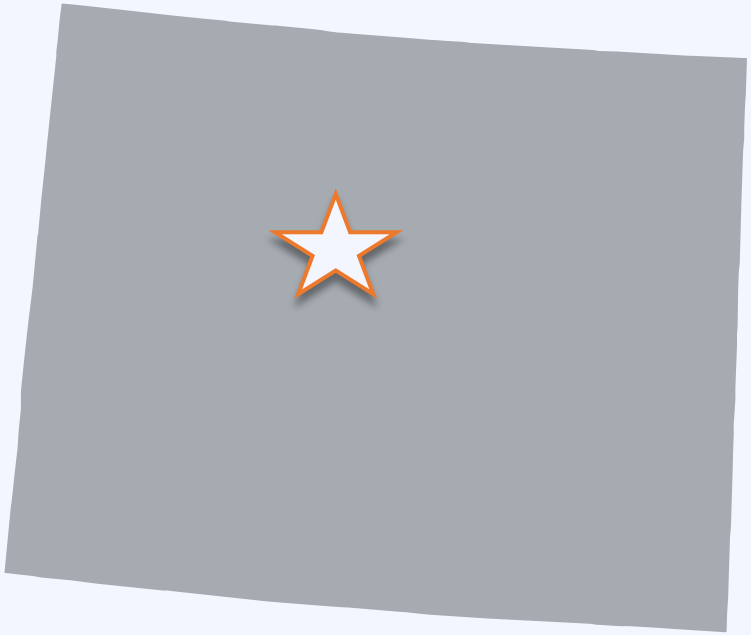
Expedited Permitting

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

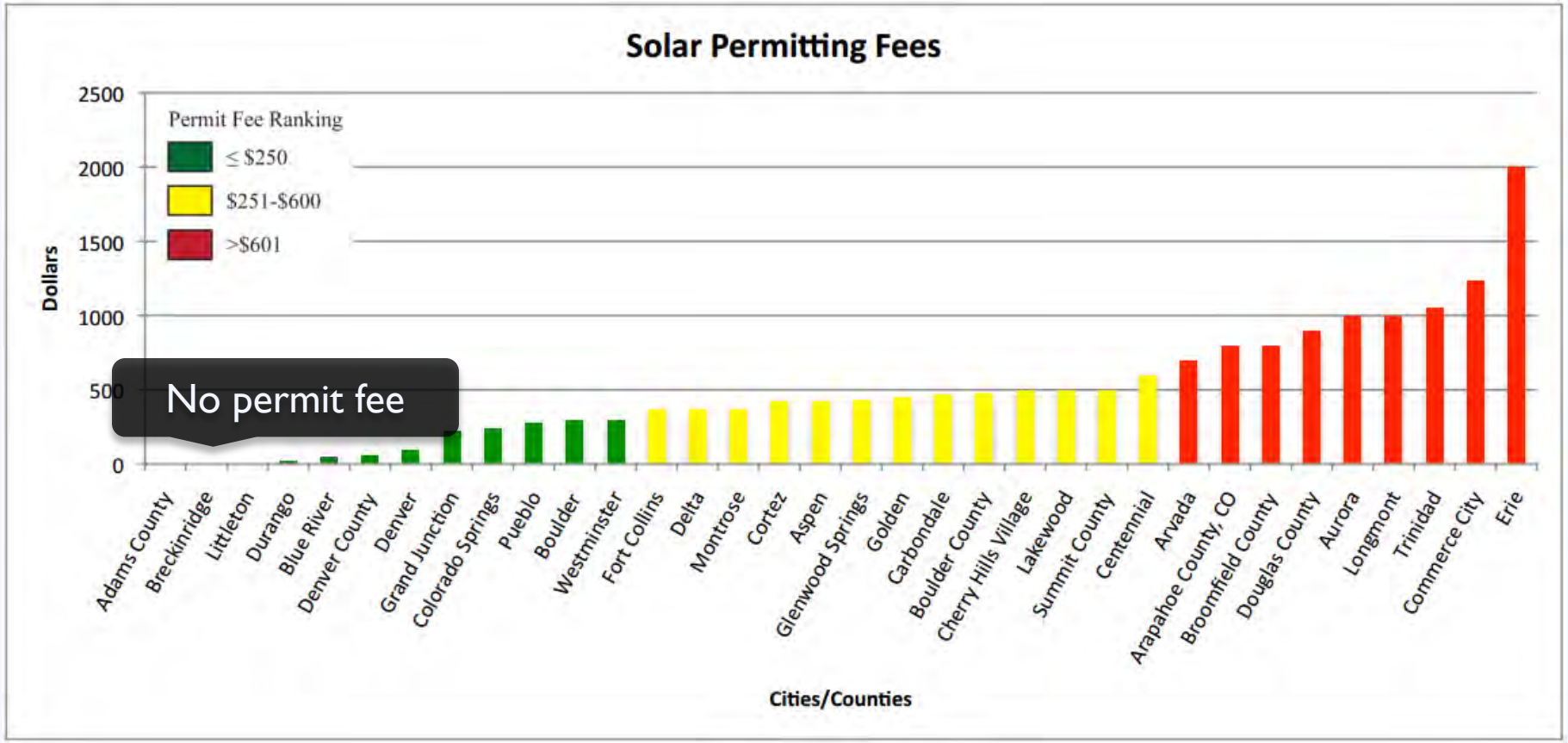
Population: 4,540

Powered by SunShot
U.S. Department of Energy

Source: Wikipedia

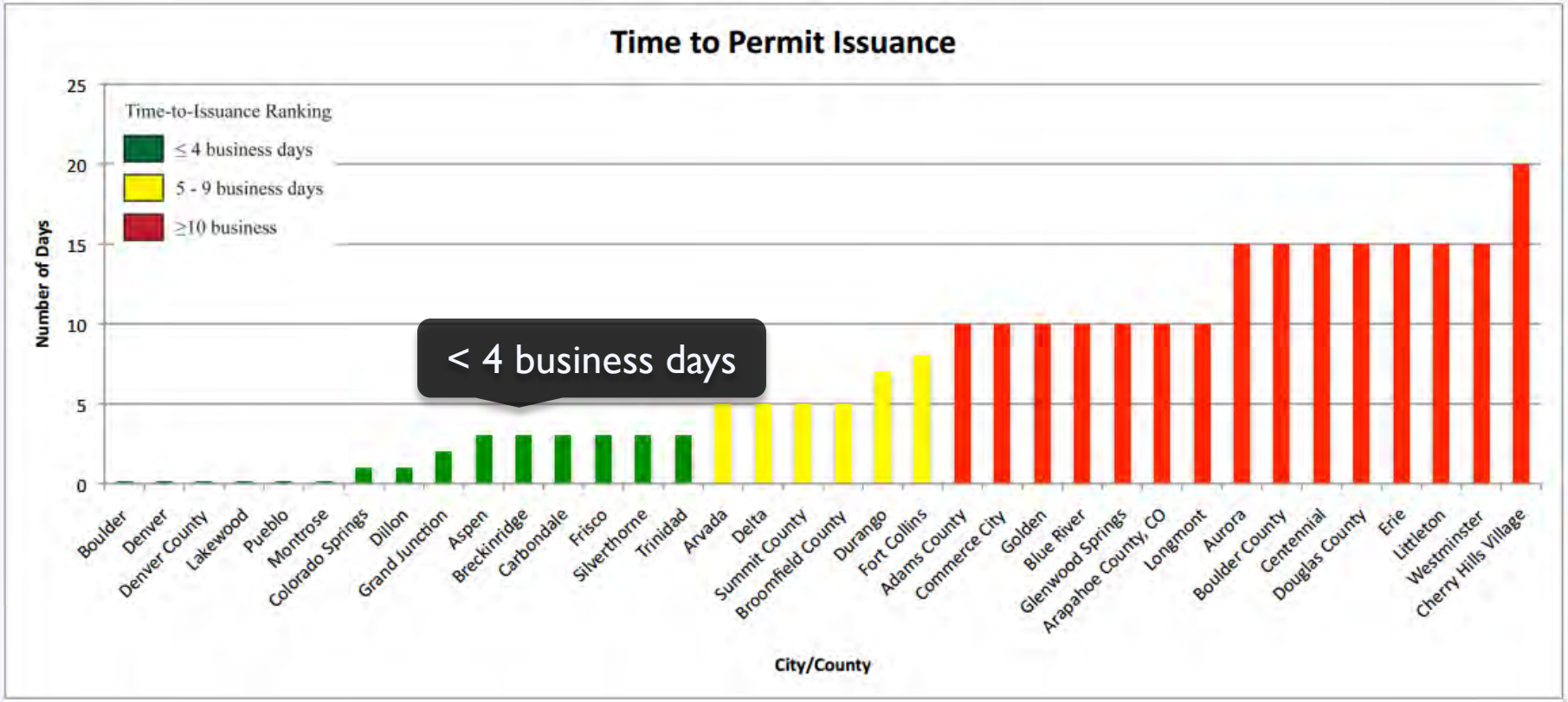
Expedited Permitting: Case Study

Breckenridge charges no fees to file for a solar permit



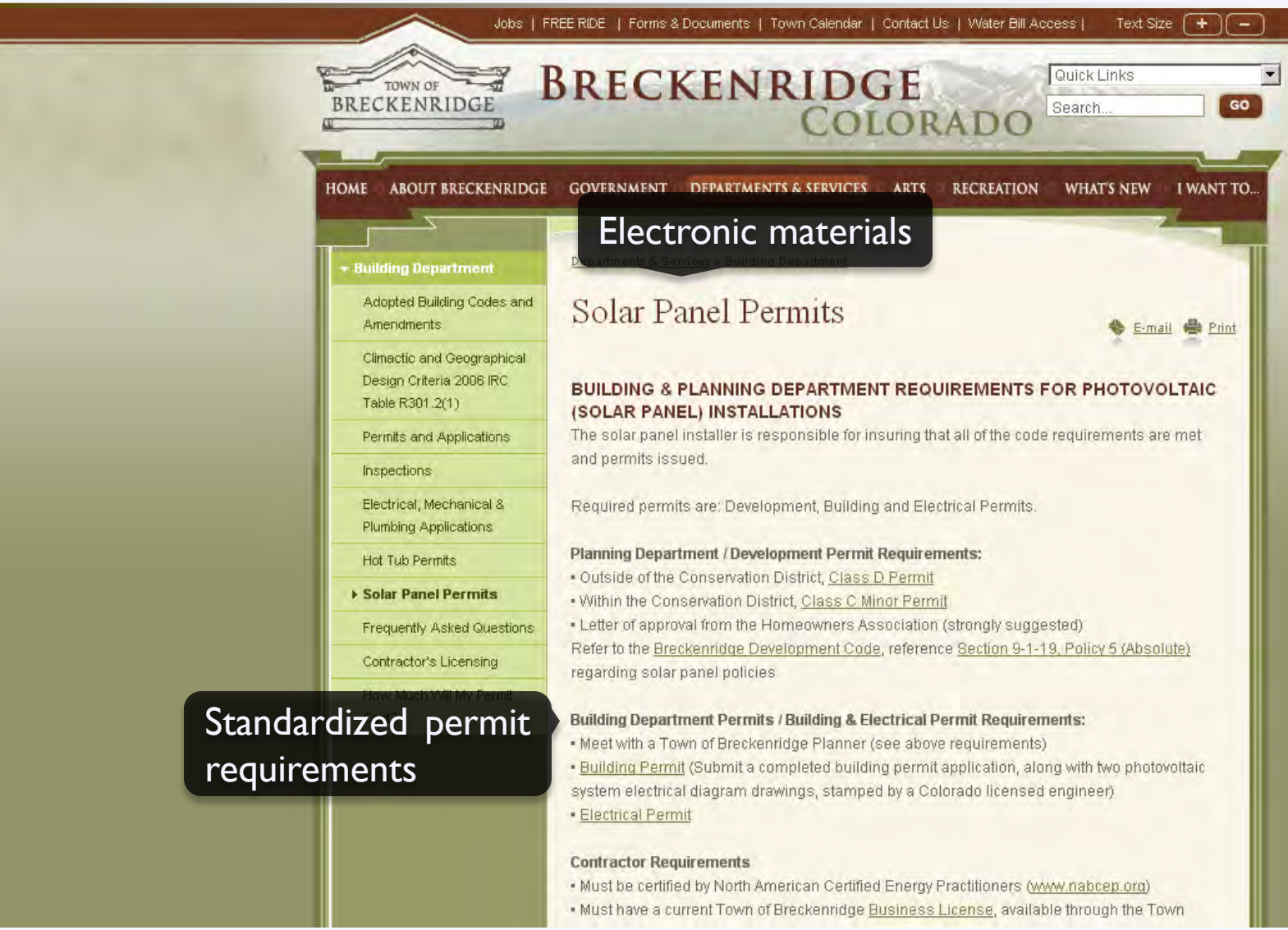
Expedited Permitting: Case Study

Breckenridge offers a short turn around time for solar permits



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

Expedited Permitting: Case Study



Powered by SunShot
U.S. Department of Energy

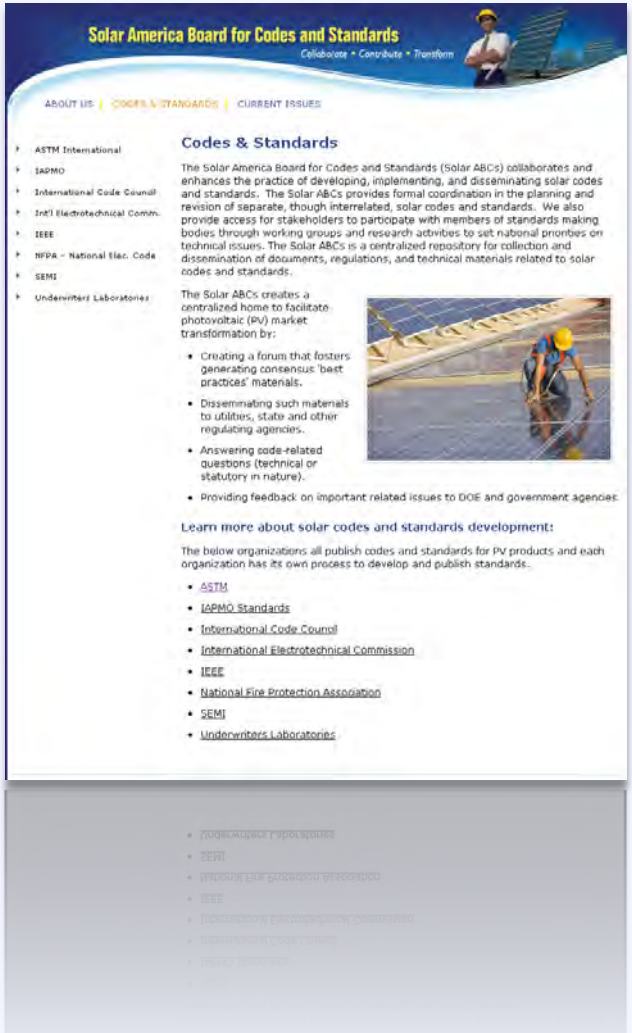
Source: Breckenridge, CO (http://www.townofbreckenridge.com/index.aspx?page=694)

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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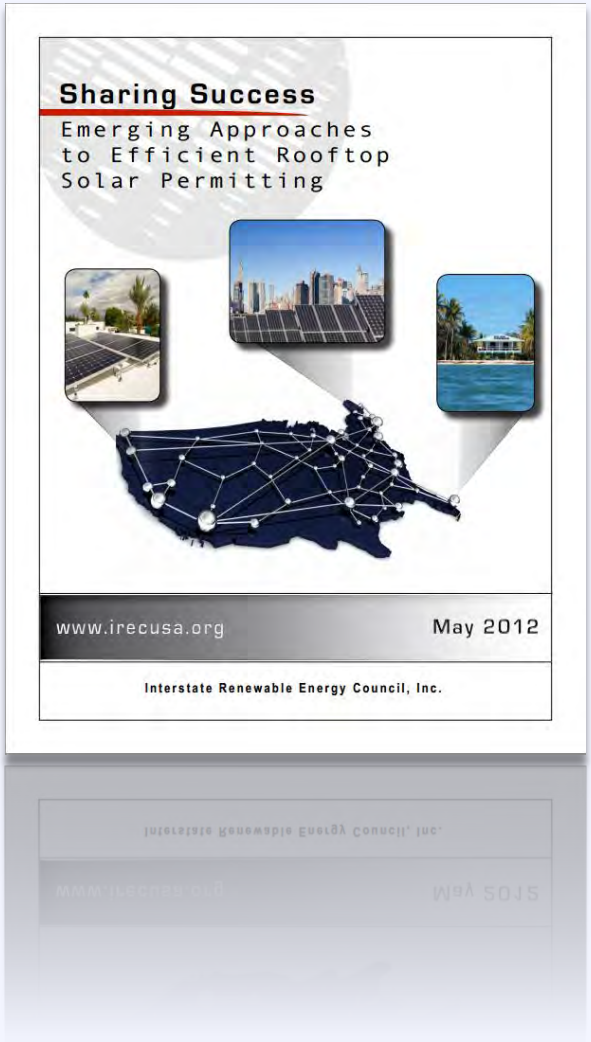
U.S. Department of Energy

Expedited Permitting

Resource **Interstate Renewable Energy Council**

Outlines emerging approaches to efficient rooftop solar permitting

www.irecusa.org



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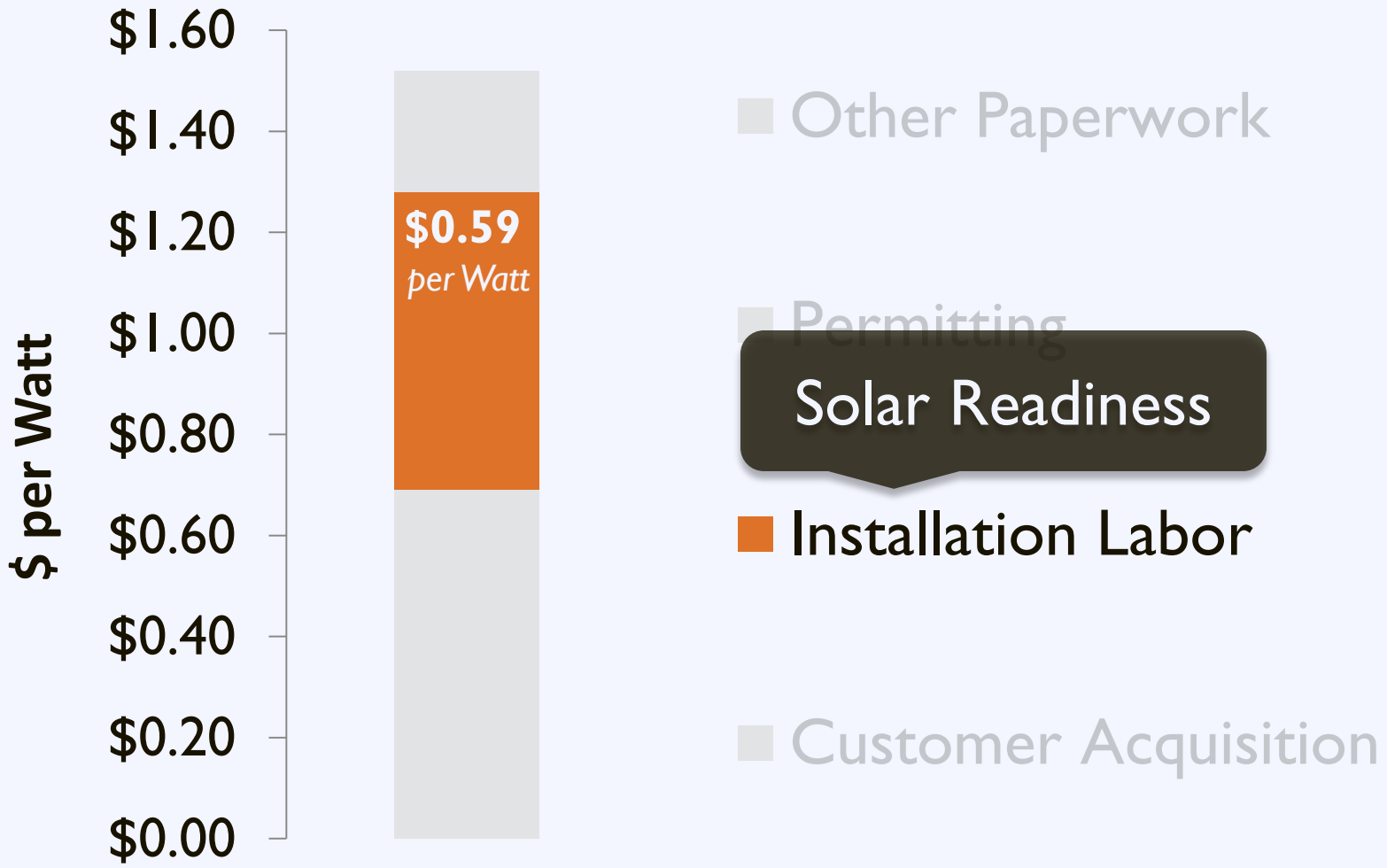
U.S. Department of Energy

Mitigate Soft Costs



Powered by SunShot
U.S. Department of Energy

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

Solar Readiness

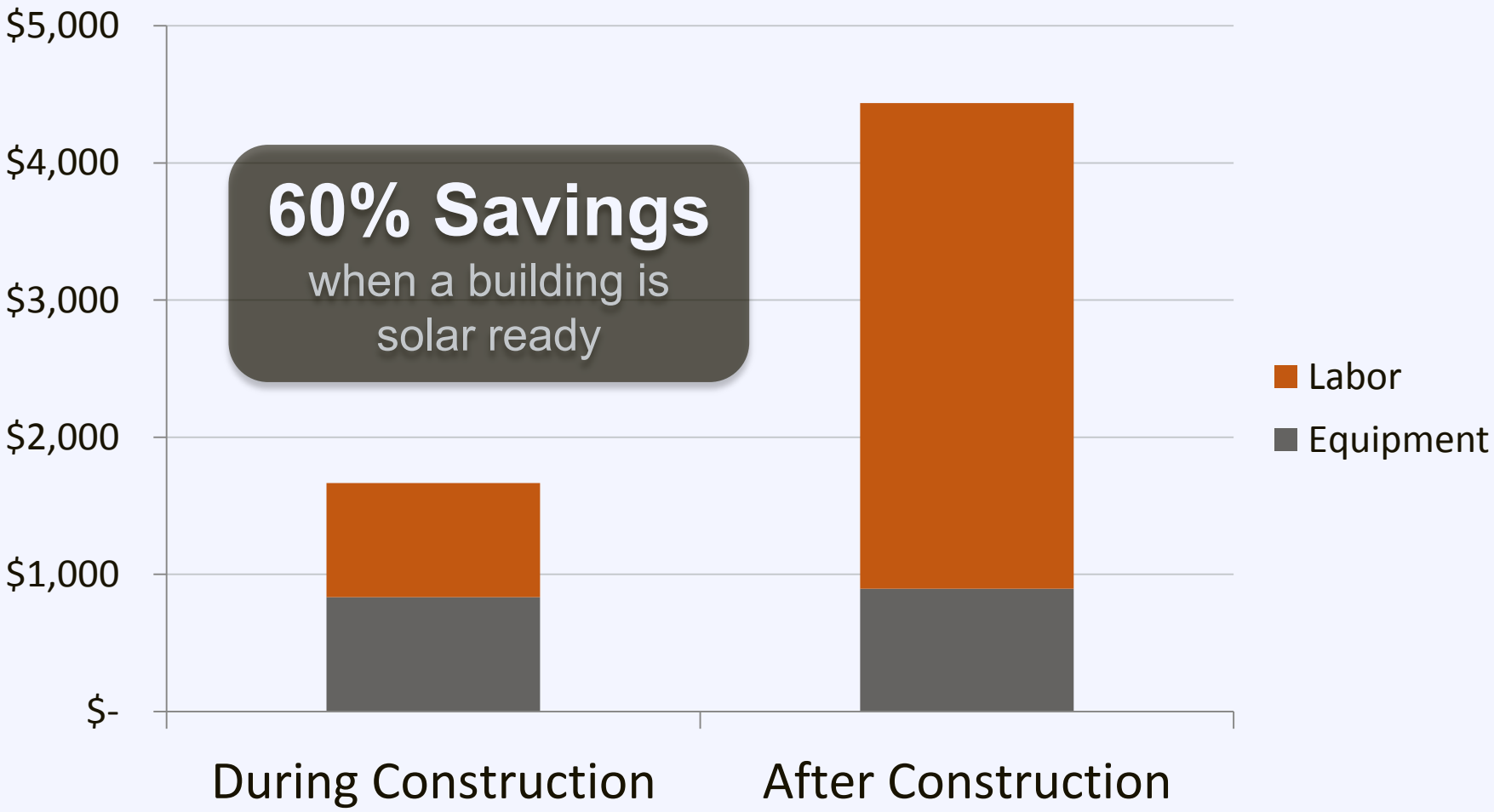
Creating solar-ready guidelines and promoting energy efficiency at the outset can help make future solar installations easier and more cost effective.

Solar Readiness

Require builders to:

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

Solar Readiness



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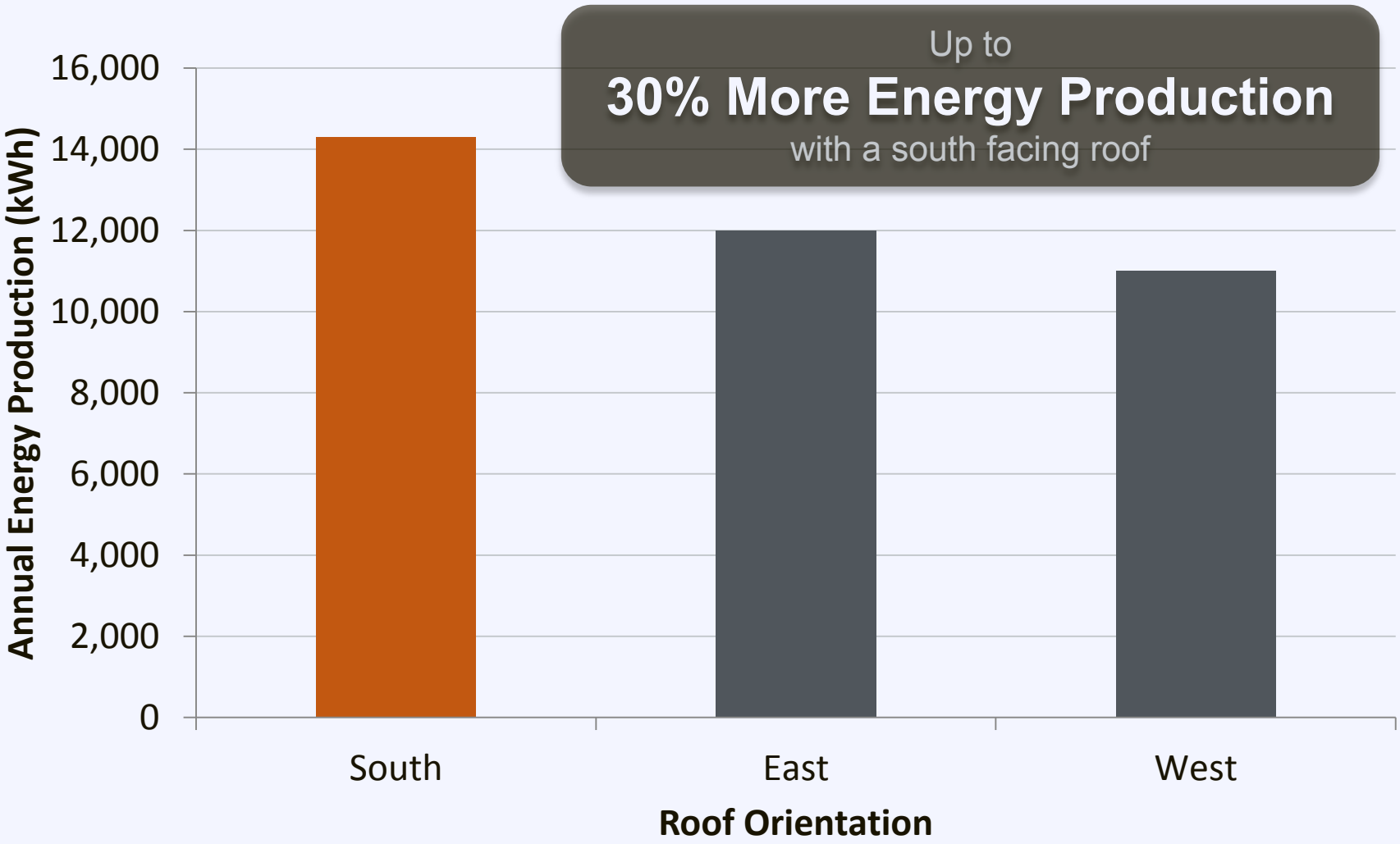
Source: Solar Ready: An Overview of Implementation Practices [Draft]. NREL, Feb. 18, 2011.

Solar Readiness



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U.S. Department of Energy

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

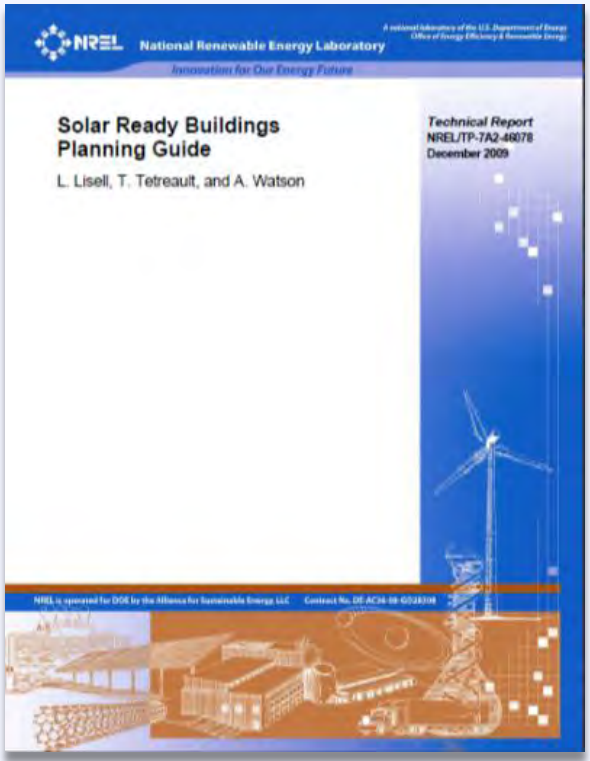
Solar Readiness

Resource **NREL**

Creating a solar ready guide for buildings:

- Legislation
- Certification programs
- Stakeholder Education

www.nrel.gov



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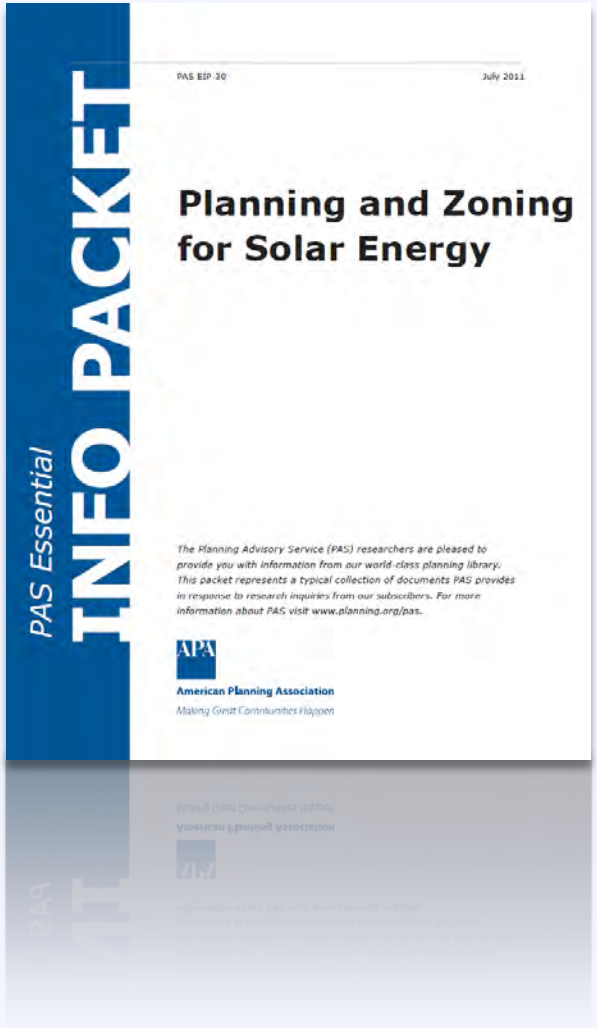
Source: NREL

Solar Readiness Model Ordinance

Resource **American Planning Association**

Includes references to ordinances requiring solar-ready homes in select communities.

www.planning.org/research/solar



Source: APA

Q & A

Agenda

08:30 – 08:50	Introductions and Overview
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11:05 – 12:15	Local Panel and Discussion; Closing Remarks

- Costs and Revenue
- Solar Project Finance
- Local Solar Programs

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The Solar Equation

Cost

+ Installed Cost

+ Maintenance

- Direct Incentive

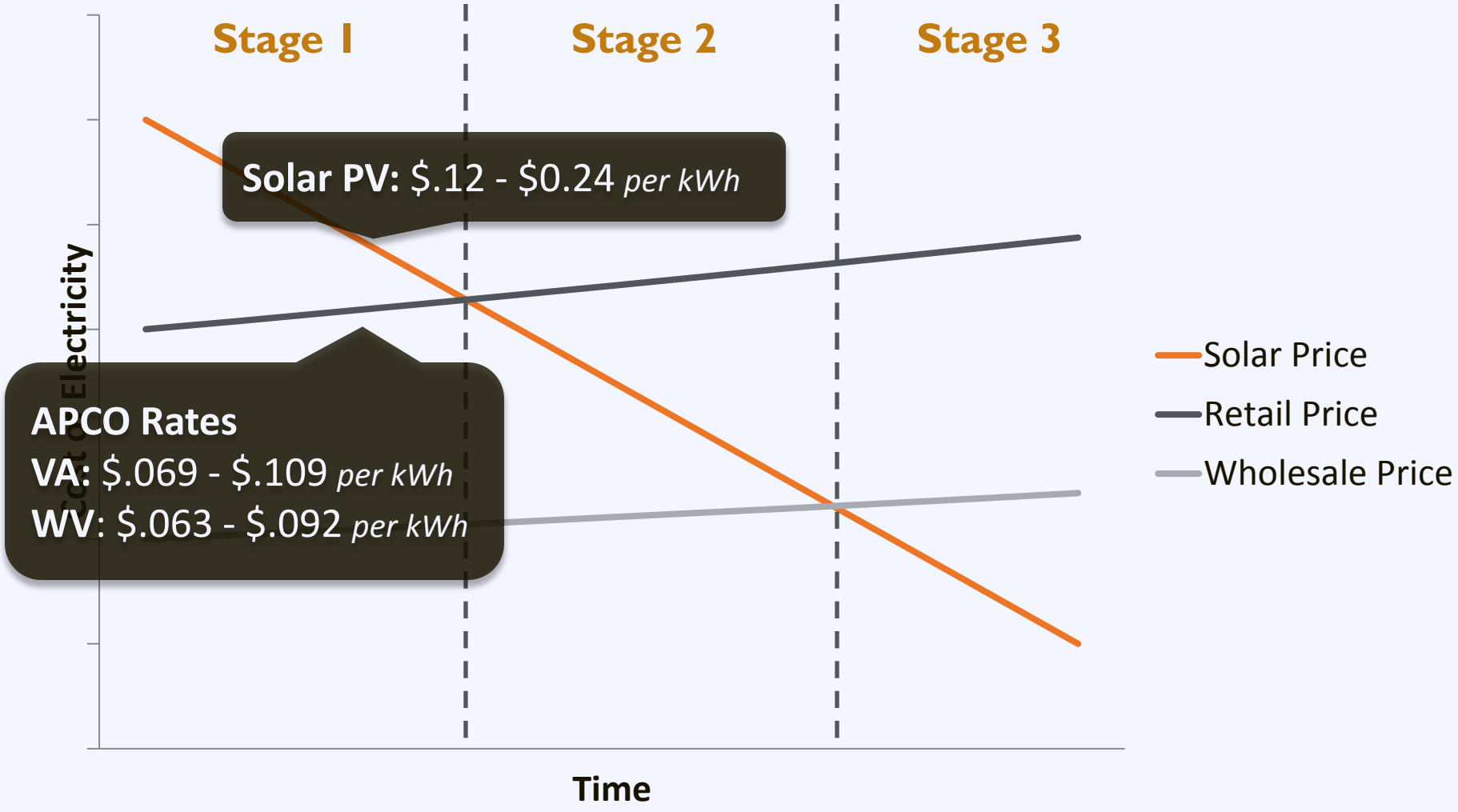
Benefit

+ Avoided Energy Cost

+ Excess Generation

+ Performance Incentive

Utility Market: Stages



Source: Solar Electric Power Association

Incentives

Federal	Investment Tax Credit	Accelerated Depreciation	QECBs
State	Pooled Financing Program		
Utility	**TVA** Green Power Provider	**TVA** Renewable Standard Offer	**Dominion** Solar Purchase Program

Incentives

Federal	Investment Tax Credit	Accelerated Depreciation	QECBs
State	Pooled Financing Program		
Utility	**TVA** Green Power Provider	**TVA** Renewable Standard Offer	**Dominion** Solar Purchase Program

Investment Tax Credit

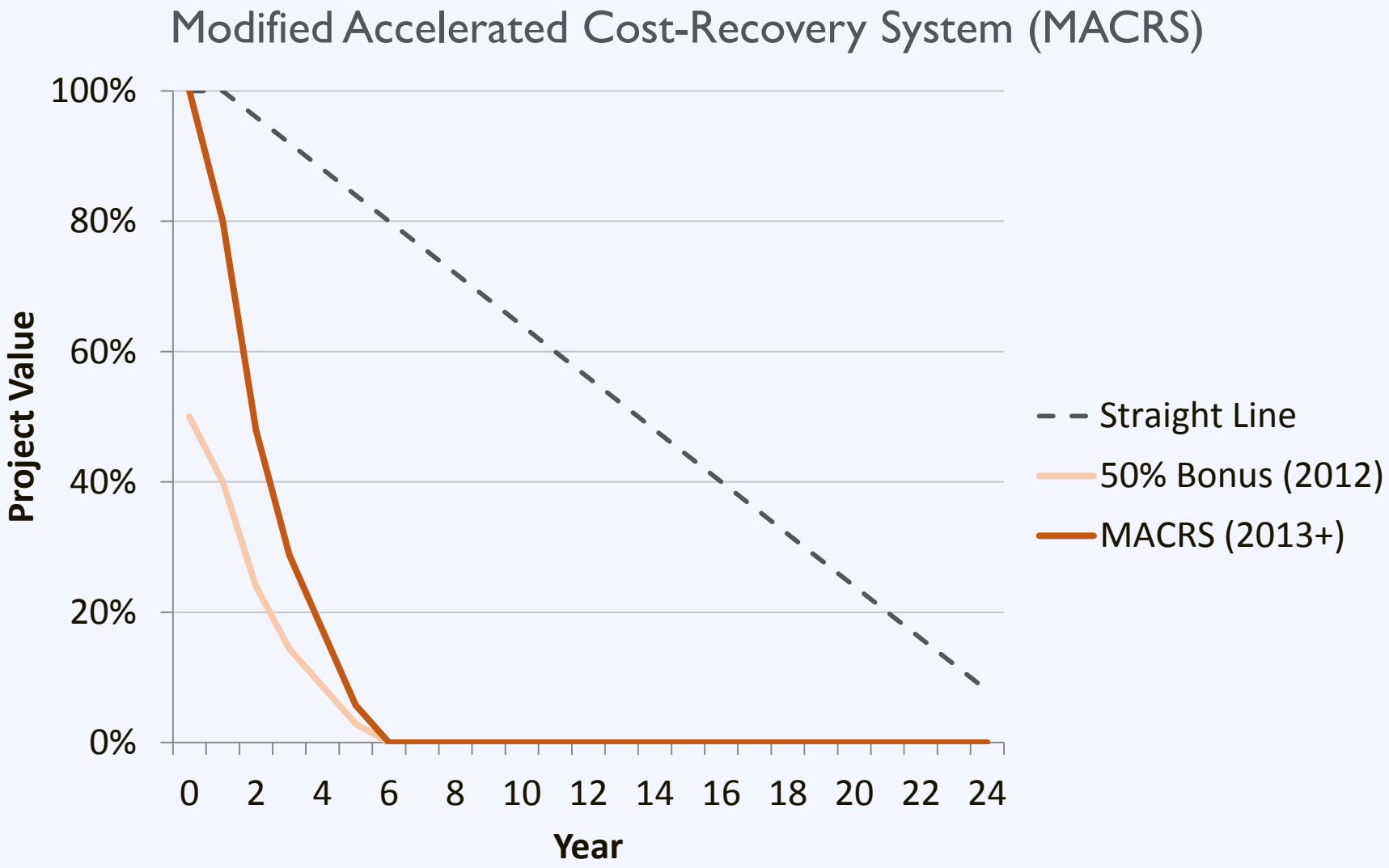
Type: Tax Credit

Eligibility: For-Profit Organization

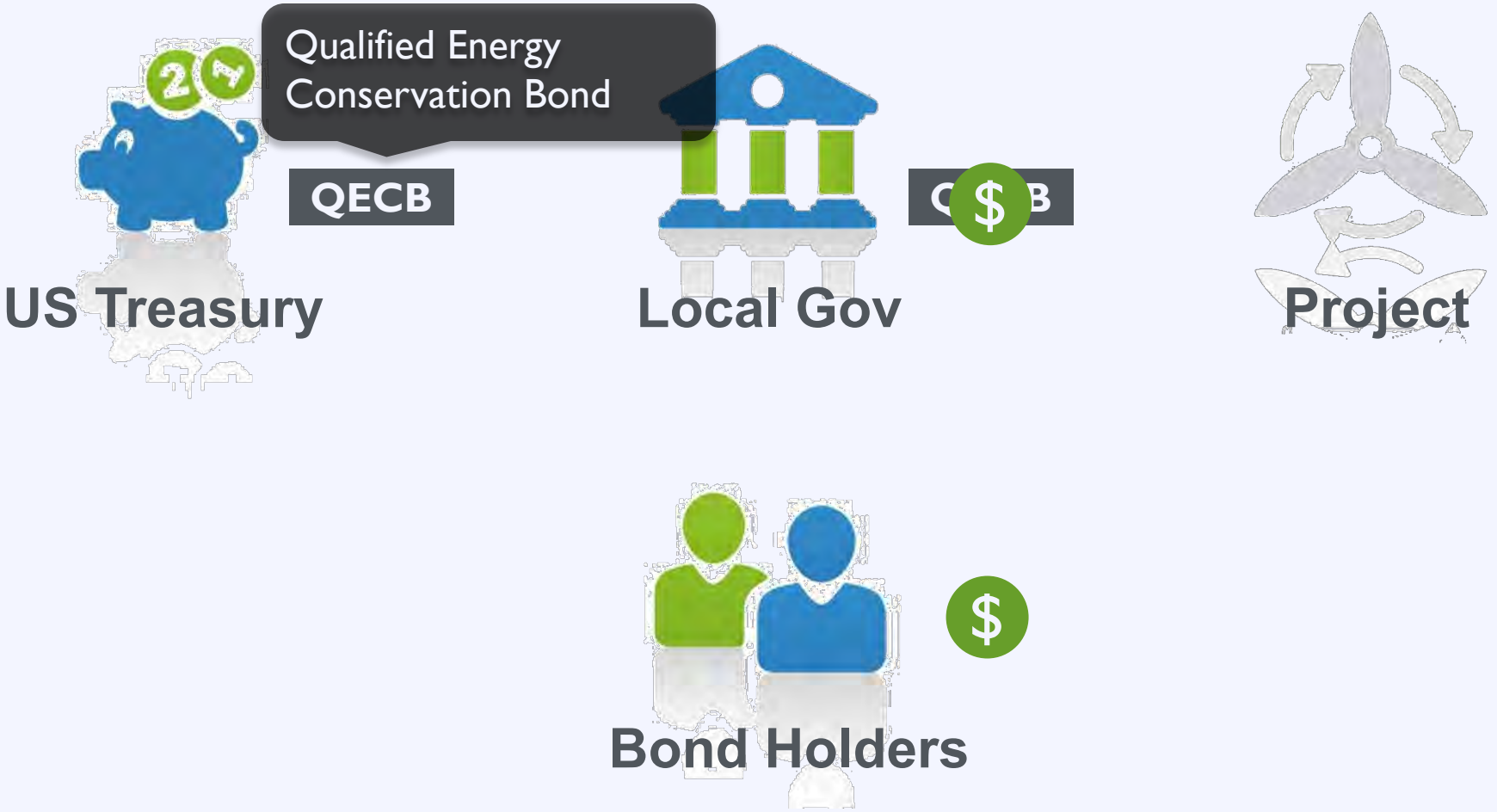
Value: 30% of the installation cost

Availability: Through 2016

Accelerated Depreciation



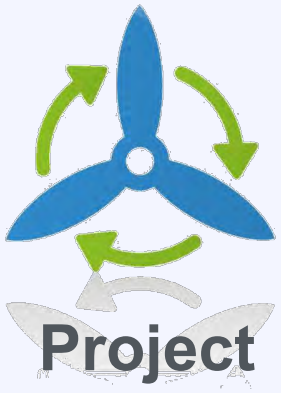
Qualified Energy Conservation Bond



Qualified Energy Conservation Bond

US Treasury

Local Gov



Project

QECB

Bond Holders

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Incentives

Federal	Investment Tax Credit	Accelerated Depreciation	QECBs
State	Pooled Financing Program		
Utility	**TVA** Green Power Provider	**TVA** Renewable Standard Offer	**Dominion** Solar Purchase Program

Pooled Financing Program

VRA Virginia Resources Authority

Program Details:

- $2 billion since 2003
- Minimum size of $750,000
- Loan terms up to 30 years
- AAA/AA interest rates

Incentives

Federal

Investment Tax Credit

Accelerated Depreciation

QECBs

State

Pooled Financing Program

Utility

TVA

Green Power Provider

TVA

Renewable Standard Offer

Dominion

Solar Purchase Program

Dominion: Solar Purchase Program

Dominion: Solar Purchase Program

Program Details:

- Begin accepting applications on June 20, 2013
- 5 Year "demonstration" period
- Limited to 3 MW total capacity
- Funded by the Green Power Program
- 2 meter setup required - $2.90 Fee

Project Economics

	Maryland 2013	DC 2013	SW VA 2013
Installed Cost $ per Watt	$4.50	$5.00	$3.50
Simple Payback	8.8 Years	6.4 Years	17.1 Years
ROI	11.4 %	15.7 %	5.8 %
LCOE $ per kWh	$0.156	$0.180	$0.131

System Overview:

- 5 kW system
- 25 year life
- 0.7%/Y module degradation

Financial Assumptions:

- Payback & ROI: No debt
- LCOE: 5 Year loan @ 5%
- 2% annual rate increase

Incentives:

- 30% ITC included
- MD: 5Y REC @ $130/MWh
- DC: 5Y REC @ $250/MWh

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Source: John Randolph, May 2013

Project Economics

	Maryland 2013	DC 2013	SW VA 2013	SW VA @ $3/W	SW VA @ $2/W
Installed Cost $ per Watt	$4.50	$5.00	$3.50	$3.00	$2.00
Simple Payback	8.8 Years	6.4 Years	17.1 Years	14.8 Years	9.8 Years
ROI	11.4 %	15.7 %	5.8 %	6.8 %	10.2 %
LCOE $ per kWh	$0.156	$0.180	$0.131	$0.112	$0.075

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Source: John Randolph, May 2013

Ownership Options

Direct Ownership

Third-Party Ownership

Direct Ownership

Direct Ownership

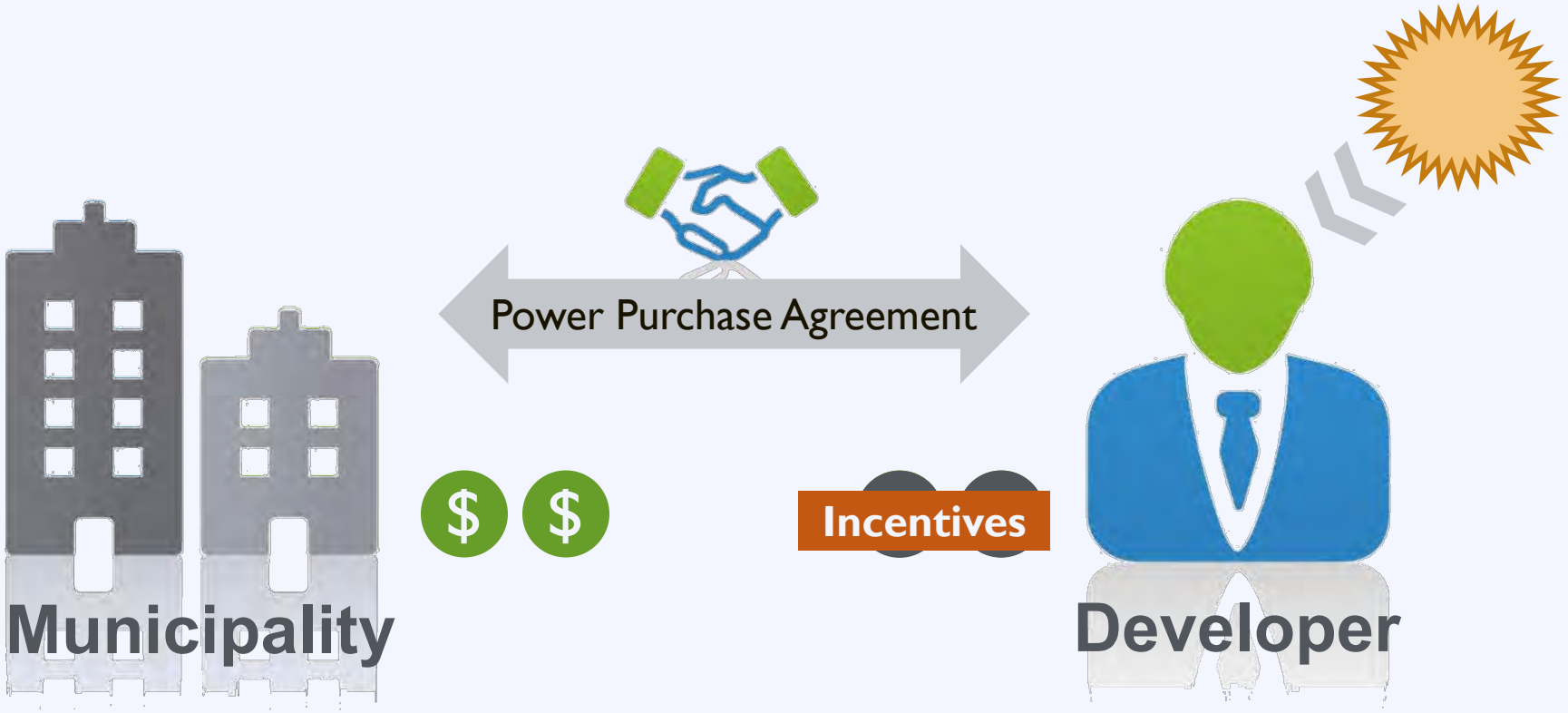
Pros

- Low – cost electricity
- REC revenue
- Utilize cheap bond money

Cons

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

Third Party Ownership



Third Party Ownership

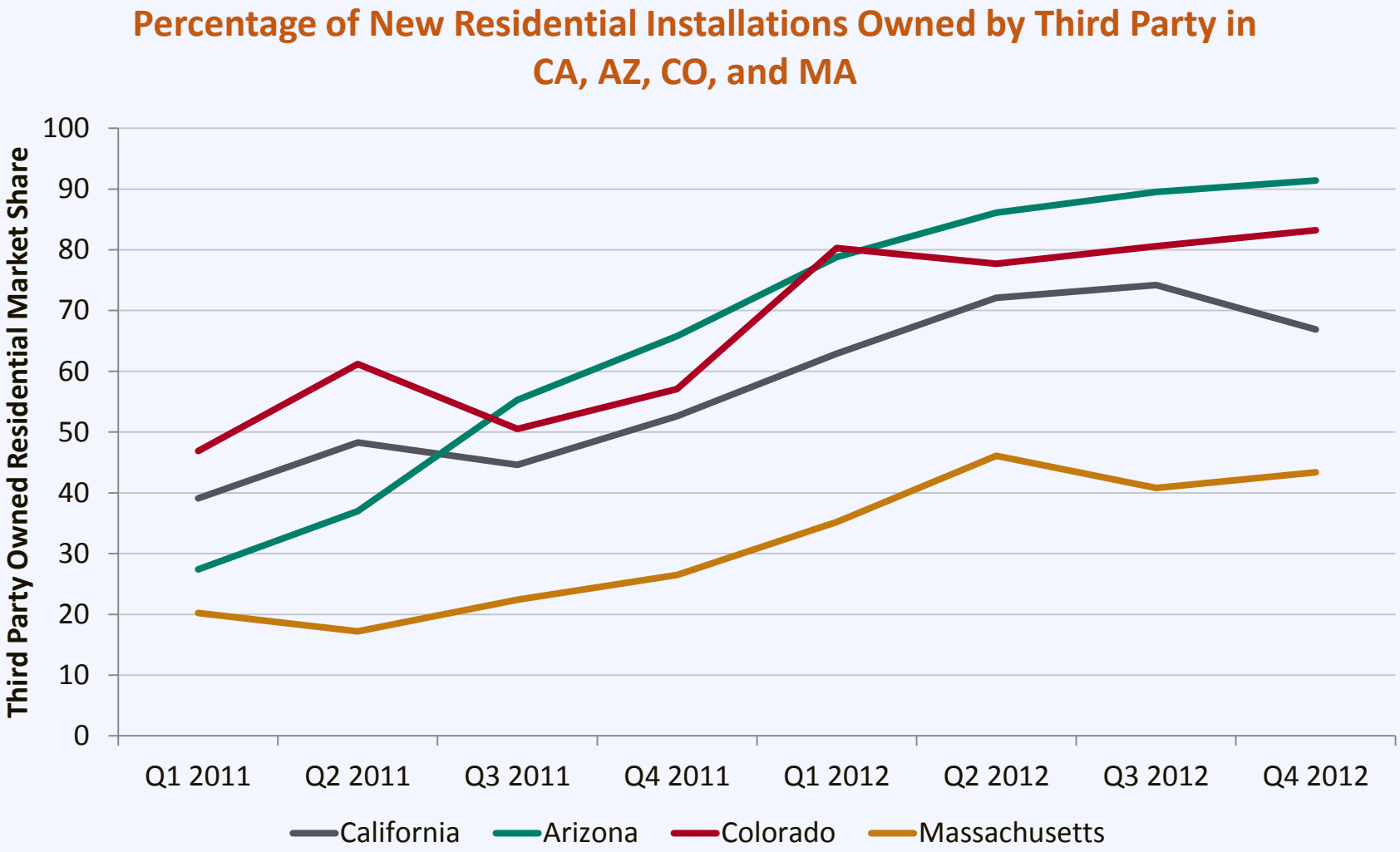
Pros

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

Cons

- Don't keep RECs
- Can't use bonds

Benefits of PPAs



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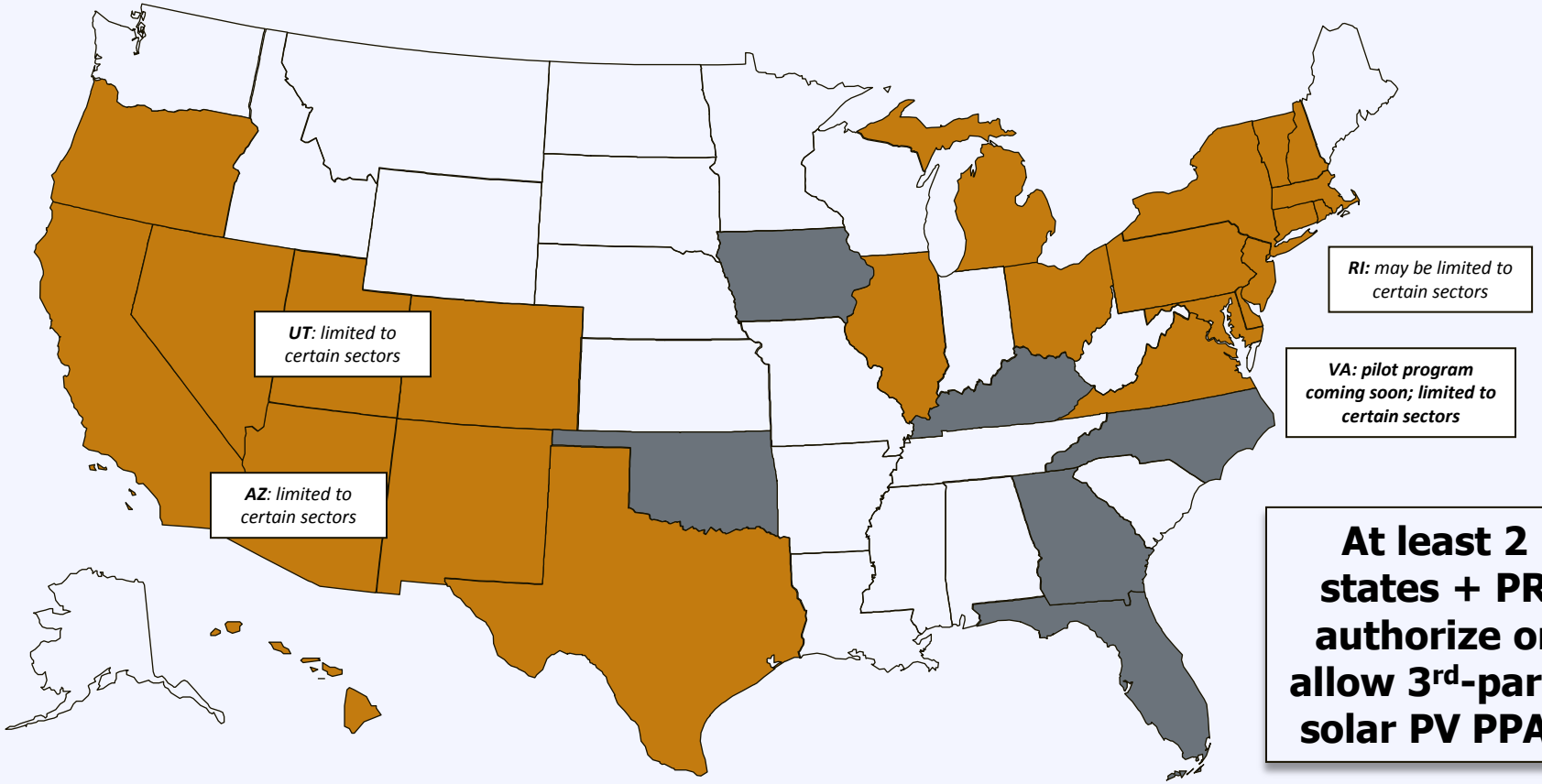
Source: GTM Research/ Solar Energy Industries Association, *U.S. Solar Market Insight 2012 Year-in-Review*

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.

PPAs In Virginia: History

Aug 2011: Washington & Lee University enters PPA agreement

Fall 2011: Dominion sends cease and desist letters

Code of Virginia §56-577(A)(5):

"(i)ndividual retail customers…shall be permitted to **purchase electric energy provided 100 percent from renewable energy** from any supplier of electric energy licensed to sell retail electric energy within the Commonwealth…and to continue purchasing renewable energy pursuant to the terms of a (PPA)"

PPAs In Virginia: History

Aug 2011: Washington & Lee University enters PPA agreement

- Dominion territory only
- Solar and wind
- 50 kW – 1 MW projects (N/A for tax exempt entities)
- 50 MW cap
- Not required to provide 100% of customer's energy

Mar 2013: Pilot PPA program authorized (HB 2234)

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

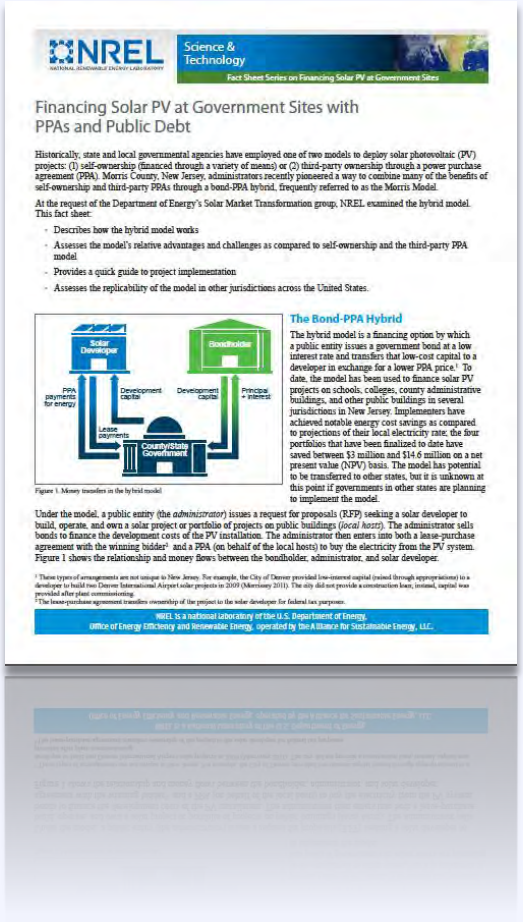
Bond-PPA Hybrid: Resources

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, administrators 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.

Figure 1. Money transfers in the hybrid model

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.

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.

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U.S. Department of Energy

Programs to Grow your Solar Market

Solarize

PACE

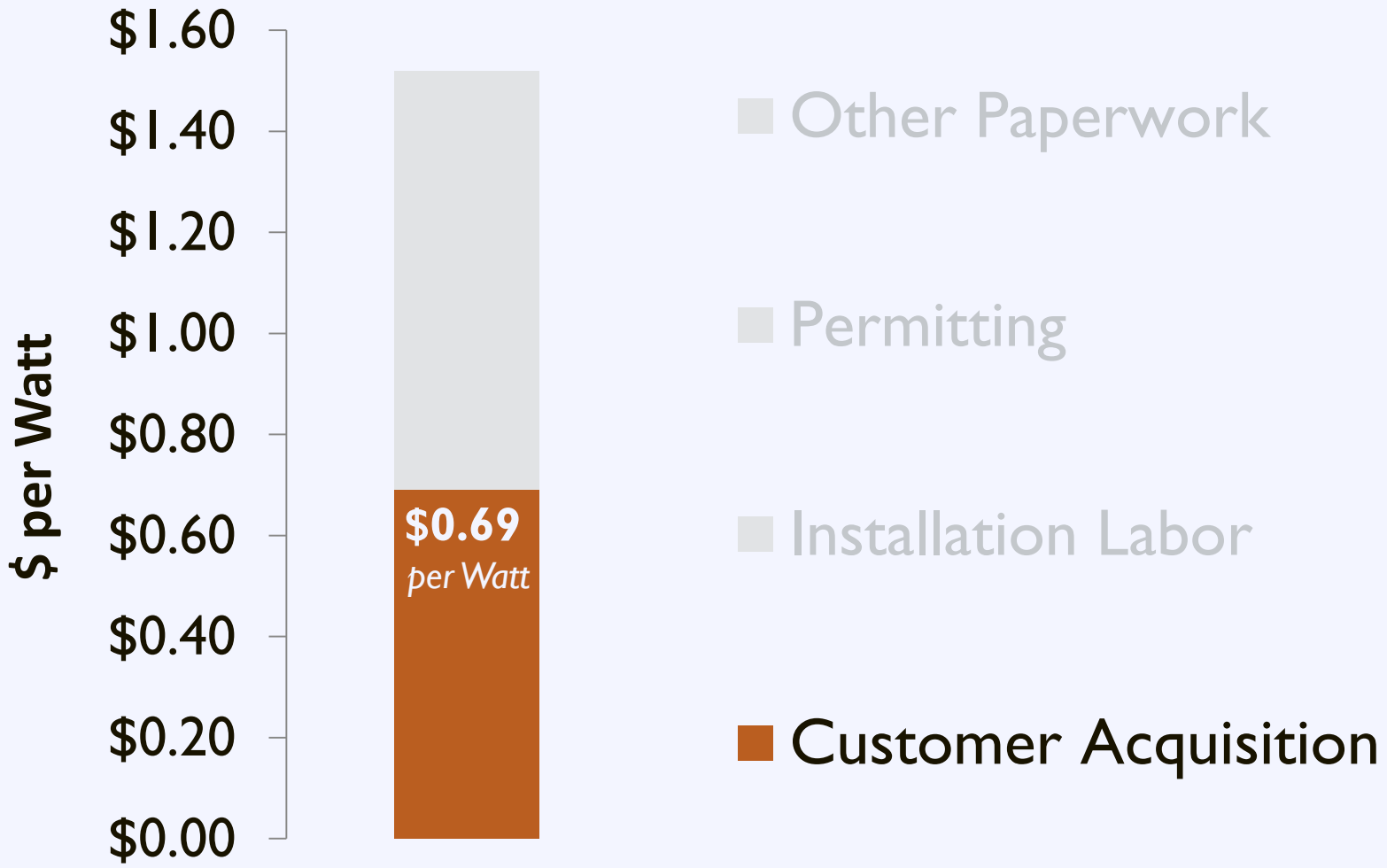
Solarize

Solarize

Group Purchasing

solarize portland

Solarize: Mitigate Soft Costs



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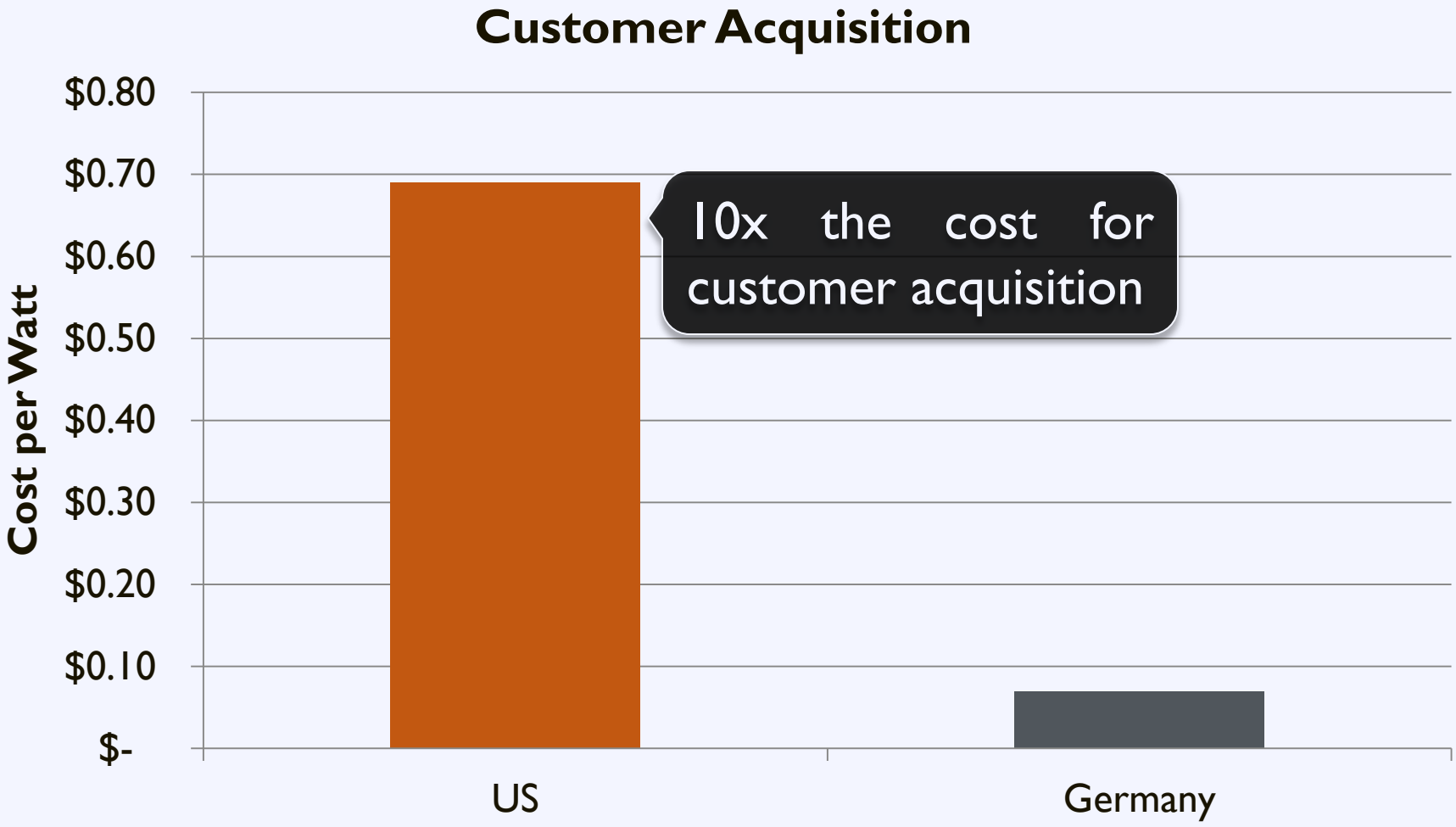
Source: NREL (http://www.nrel.gov/docs/fy12osti/54689.pdf)

Solarize: Advantages

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

Solarize: Advantages



Source: NREL, LBNL

Solarize: Advantages

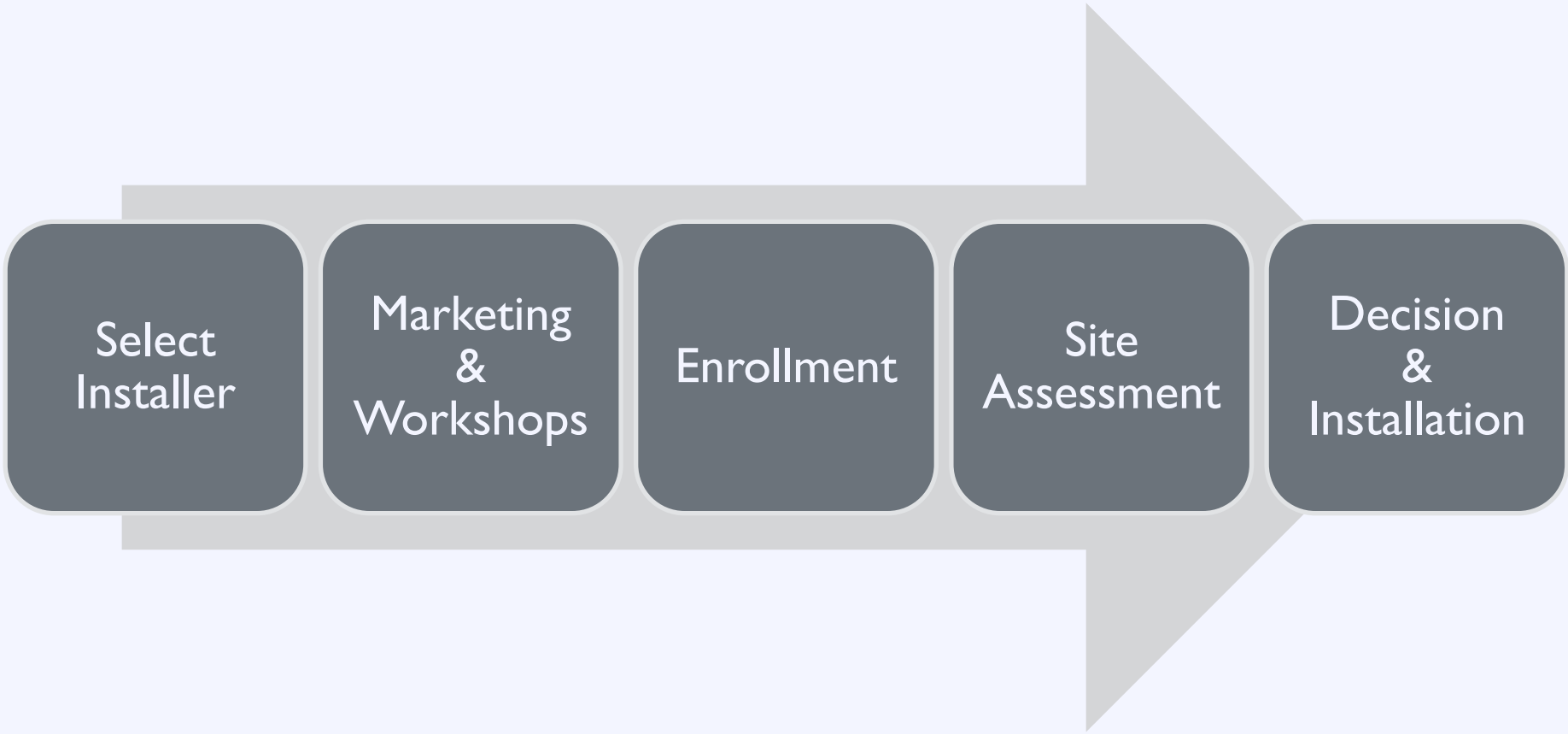
Benefits to Local Government:

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

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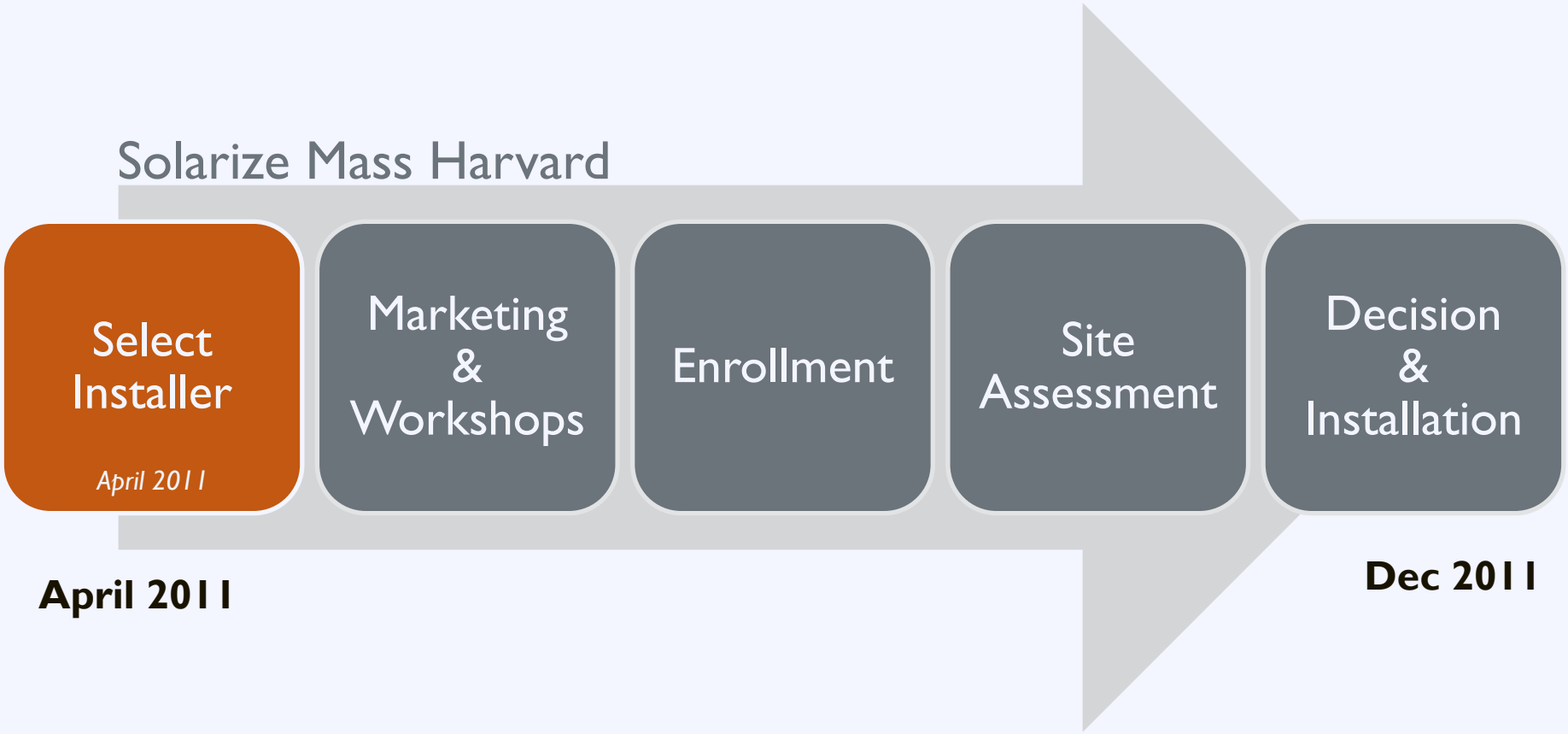
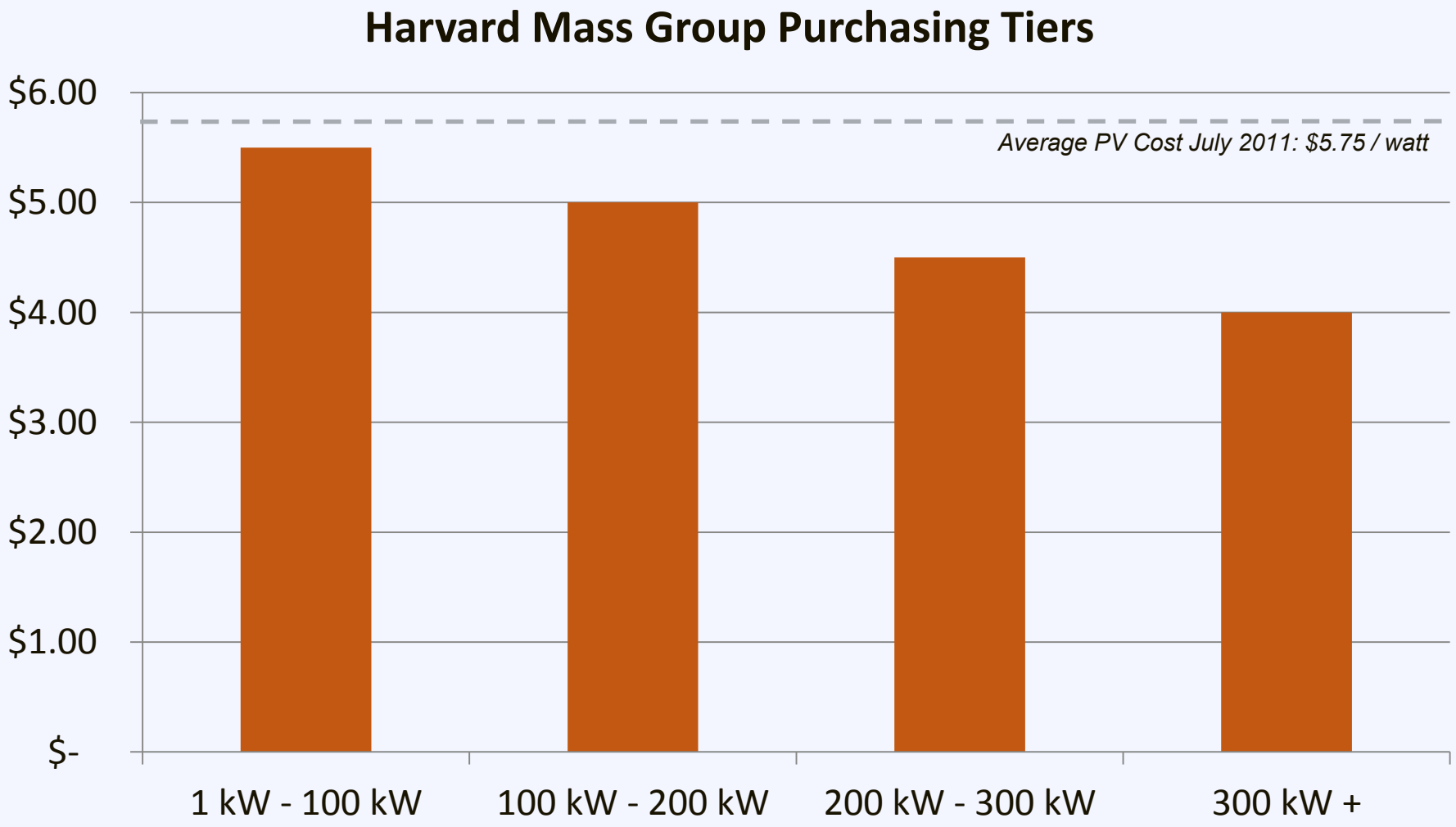
U.S. Department of Energy

Source: Wikipedia

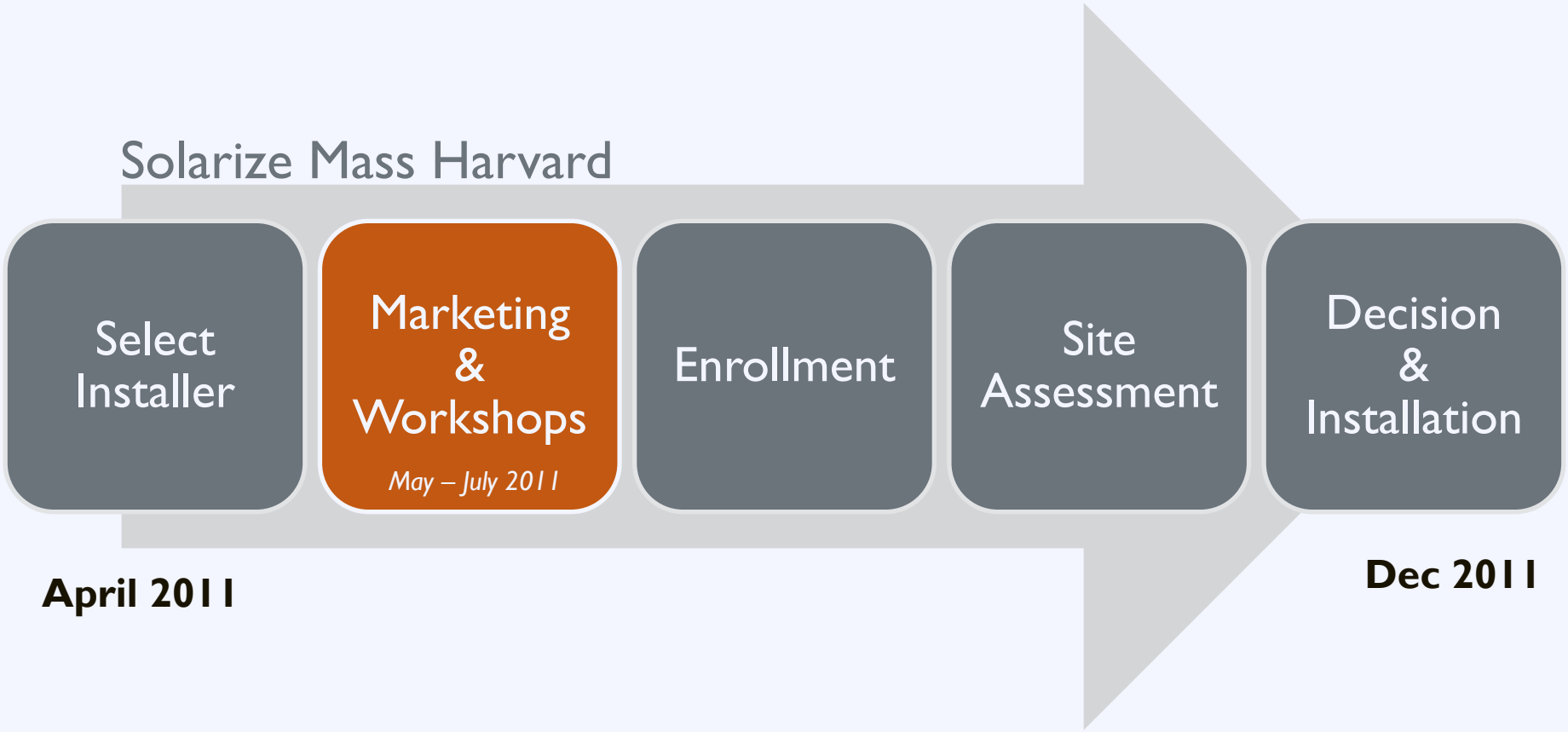
Solarize: Case Study



Group Purchasing



Solarize: Case Study



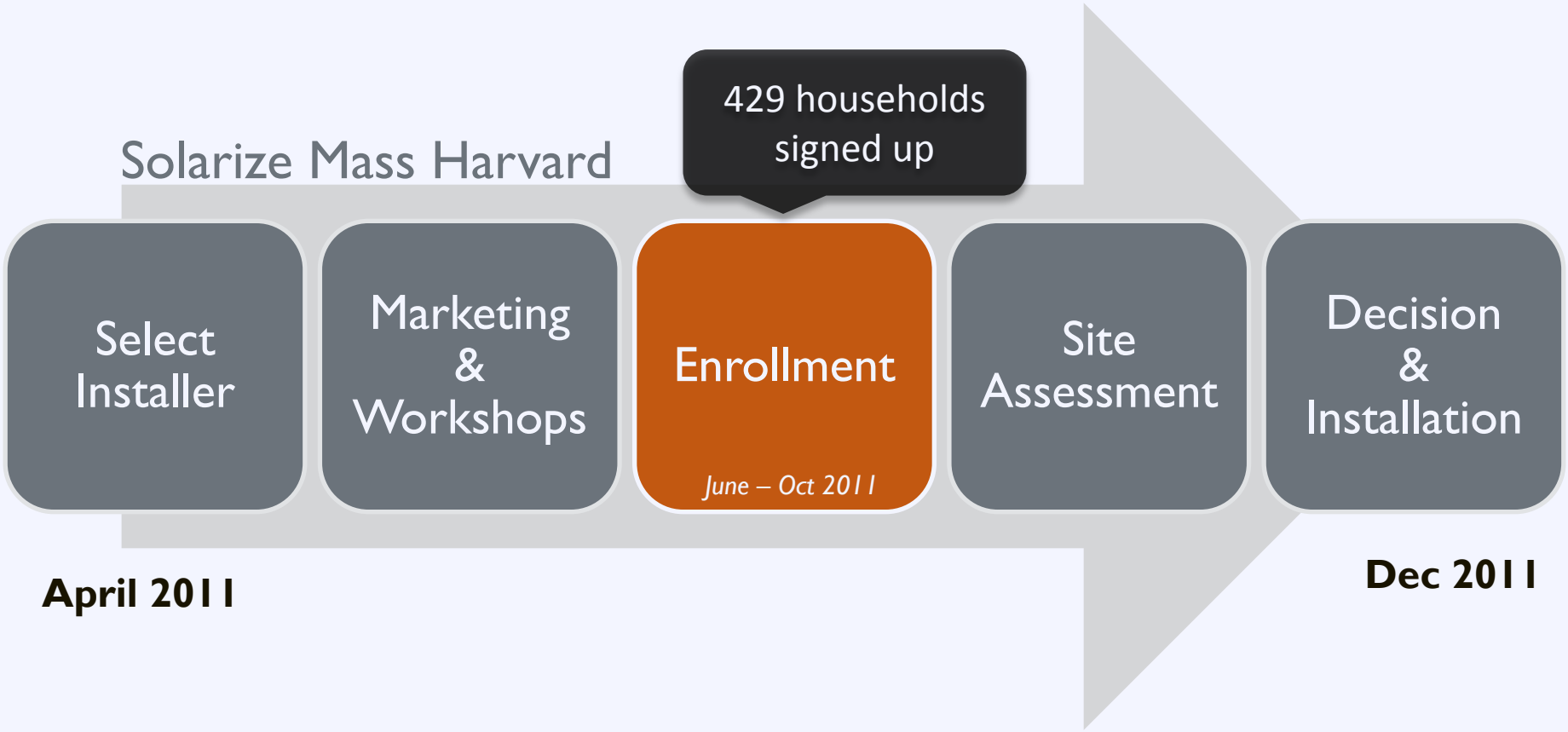
Solarize: Case Study

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



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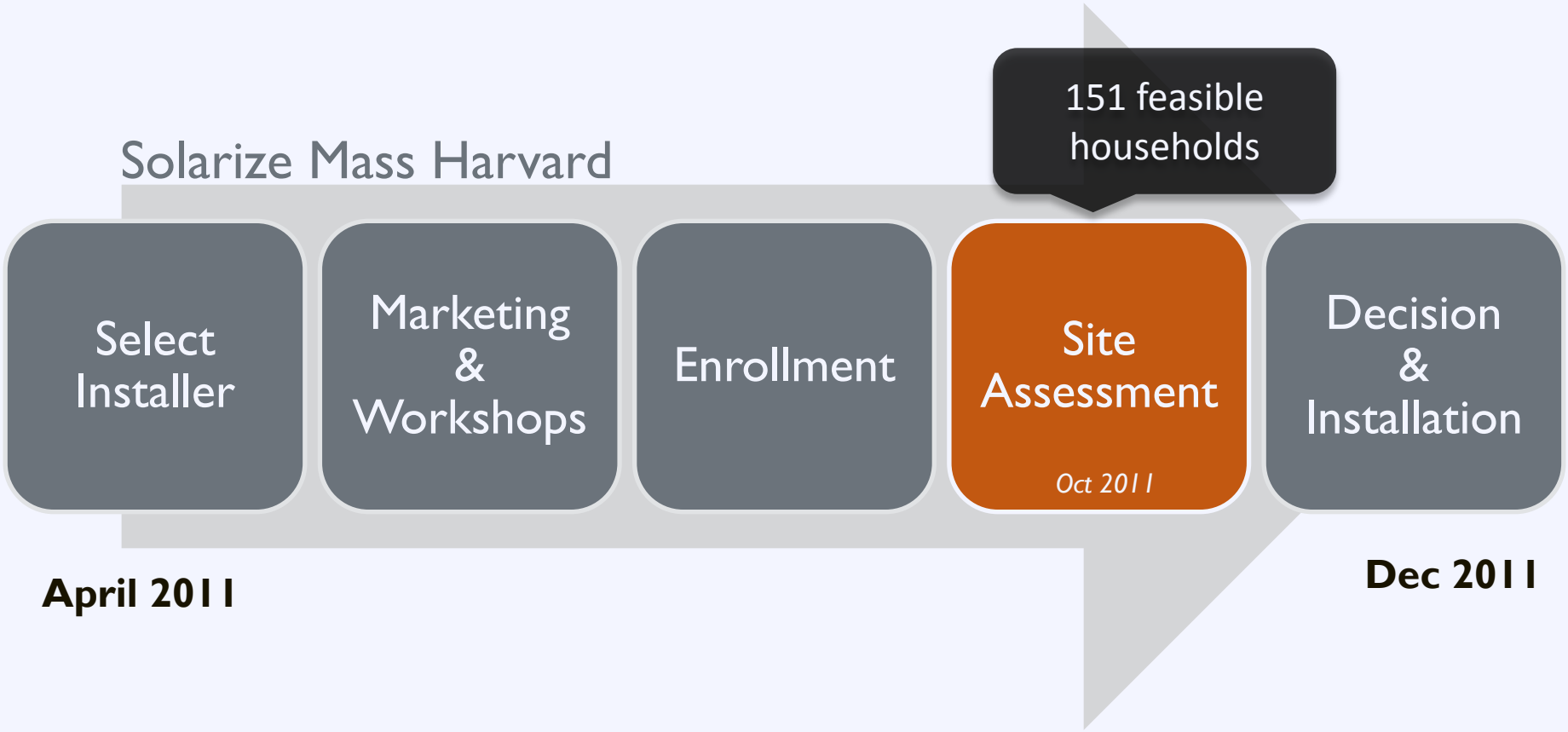

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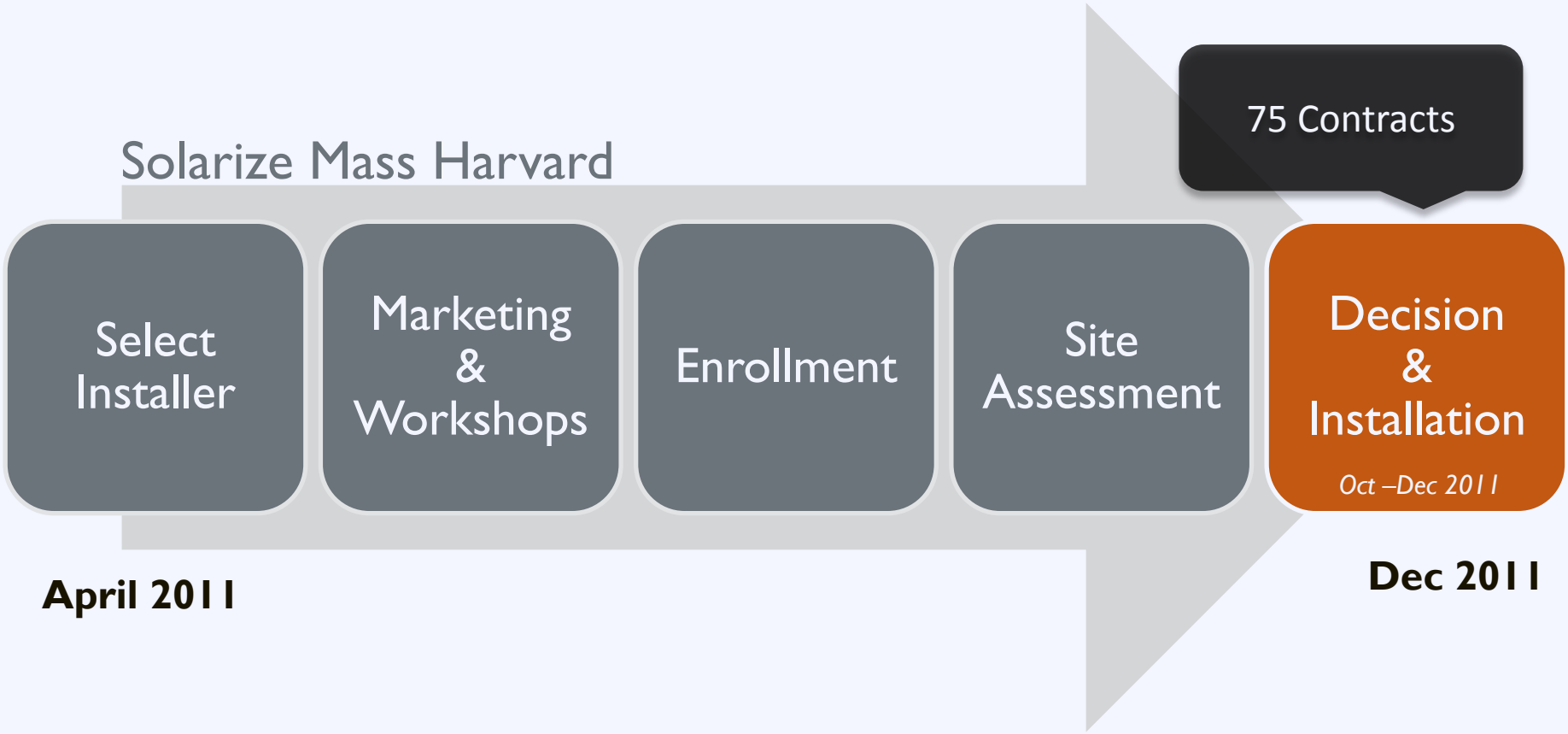

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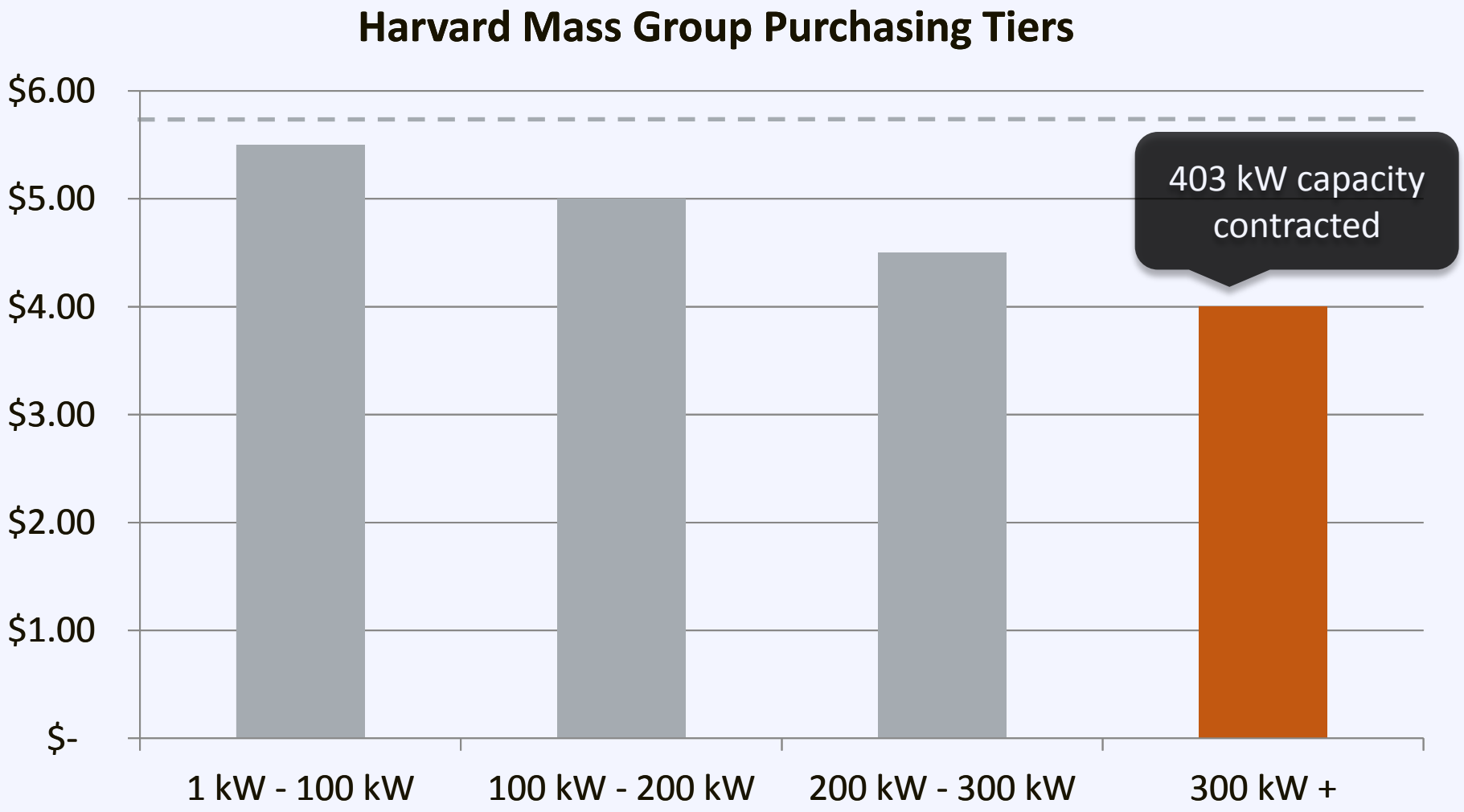


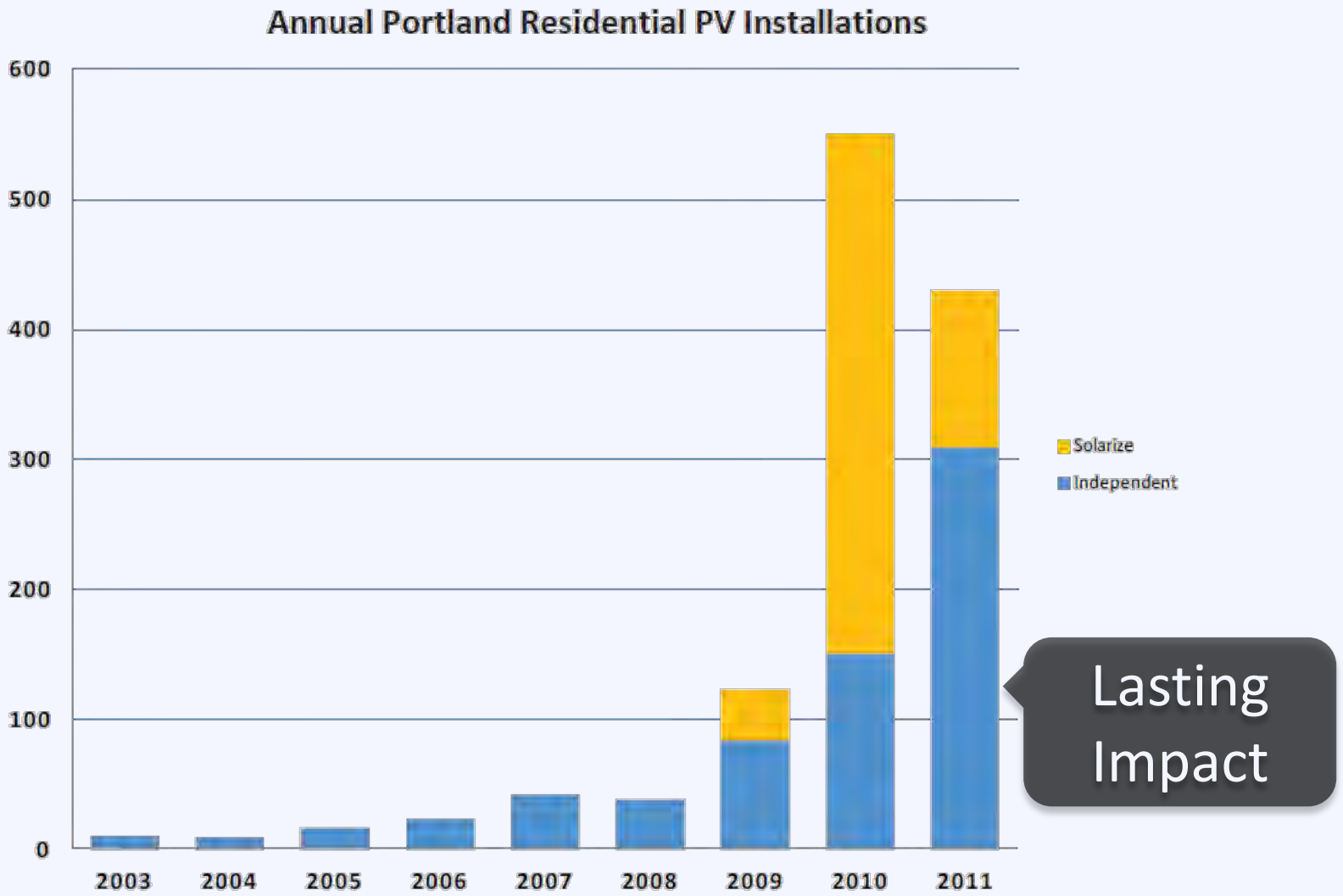
Solarize: Case Study

75 new installations totaling 403 kW

30% reduction in installation costs

575% increase in residential installations

Solarize: Lasting Impact



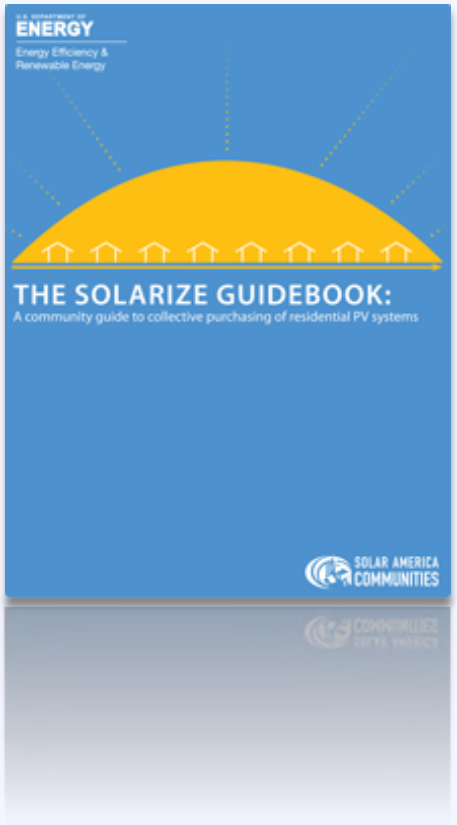
Source: NREL

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



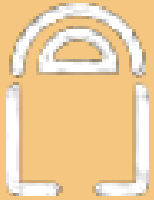
Property Assessed Clean Energy

The local government finances the up-front costs of the energy investment, either directly or as an intermediary for private investors. The property owner repays the loan over an extended period (10 to 20 years) through a special property tax assessment.

Source: Department of Energy

Property Assessed Clean Energy

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



Property owners voluntarily sign-up for financing and make energy improvements

Proceeds from revenue bond or other financing provided to property owner to pay for energy project

Property owner pays assessment through property tax bill (up to 20 years)

Powered by SunShot
U.S. Department of Energy

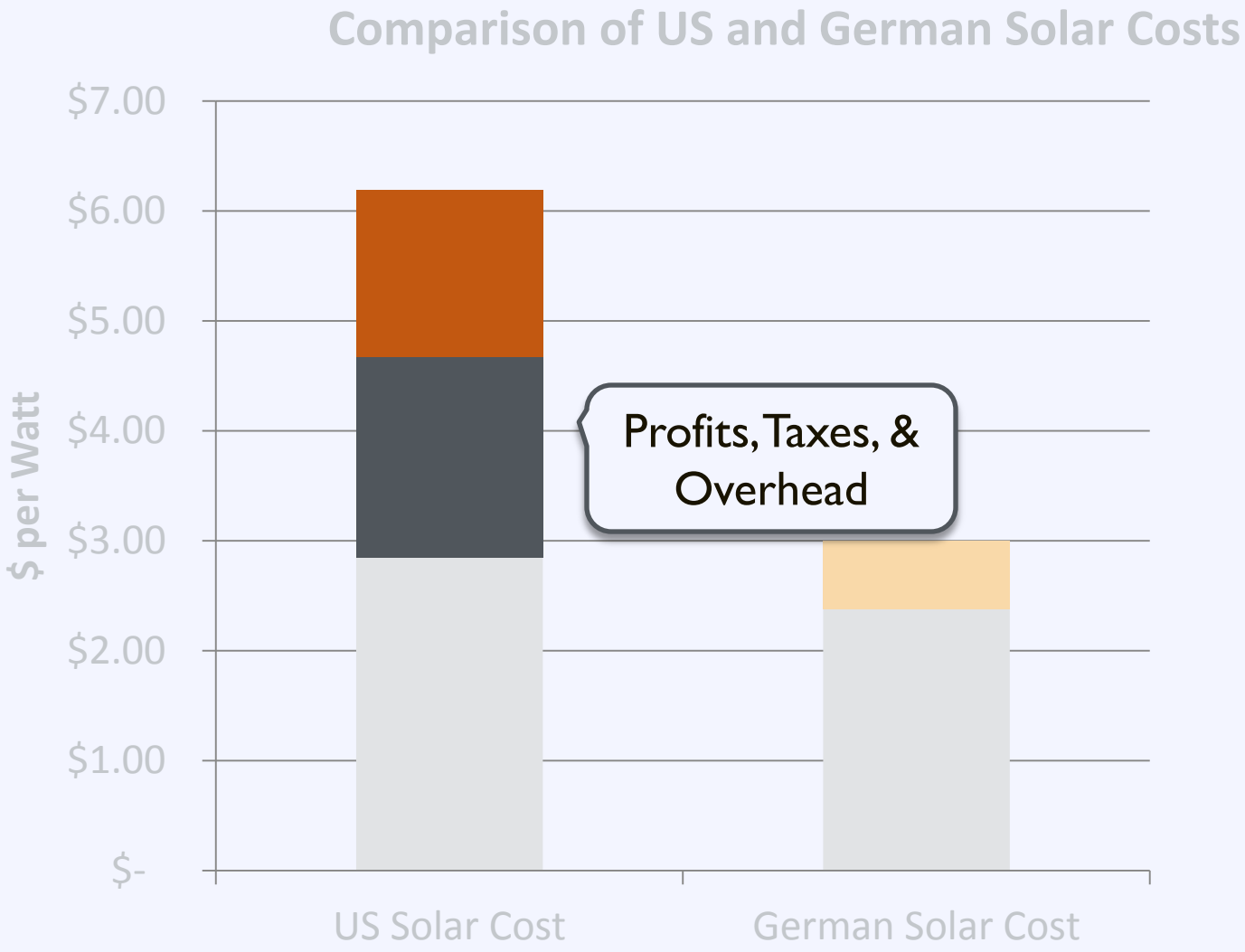
Source: Department of Energy

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



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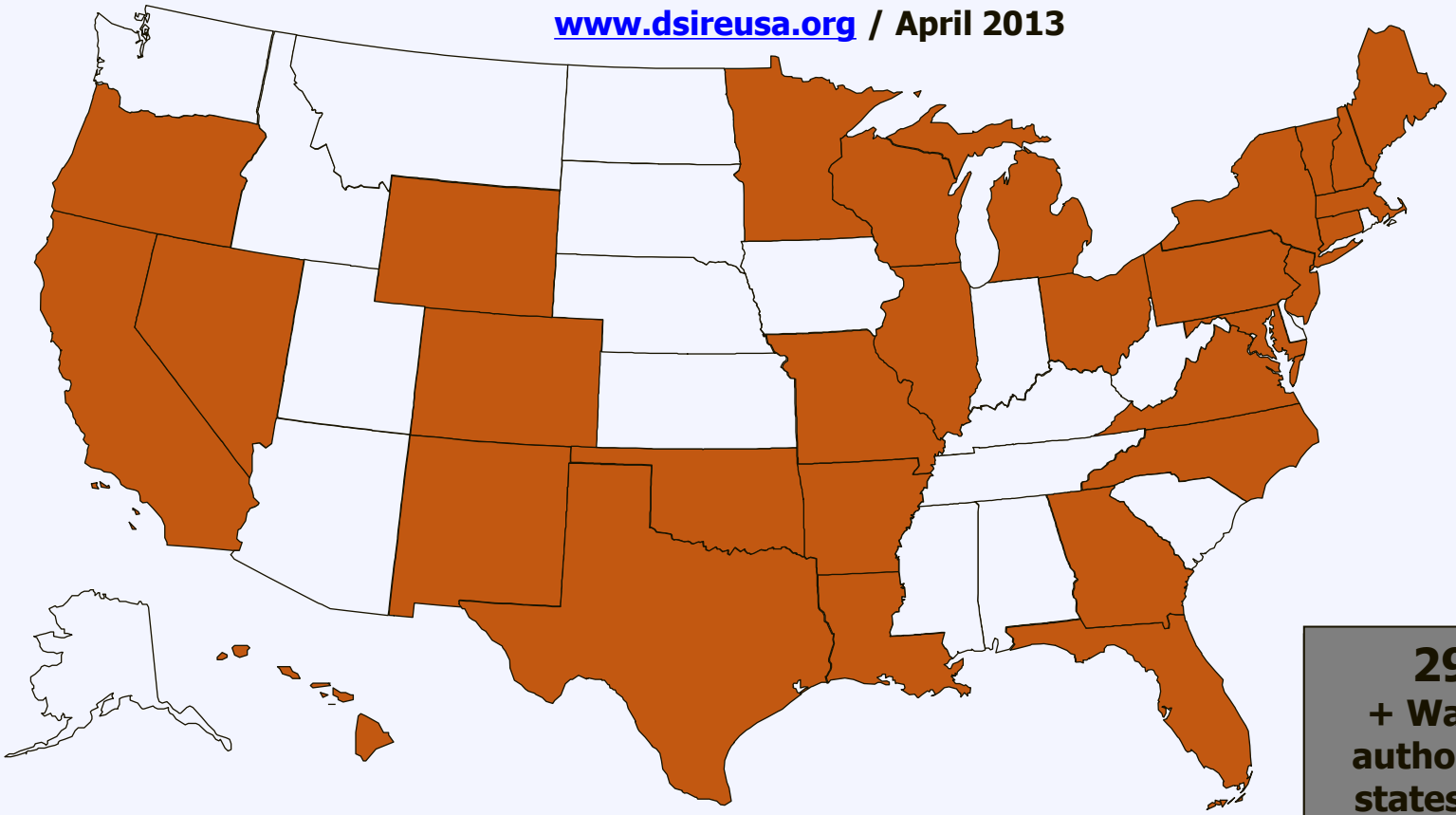
Source: NREL (http://ases.conference-services.net/resources/252/2859/pdf/SOLAR2012_0599_full%20paper.pdf) (http://www.nrel.gov/docs/fy12osti/53347.pdf) (http://www.nrel.gov/docs/fy12osti/54689.pdf)

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).

Source: DSIRE

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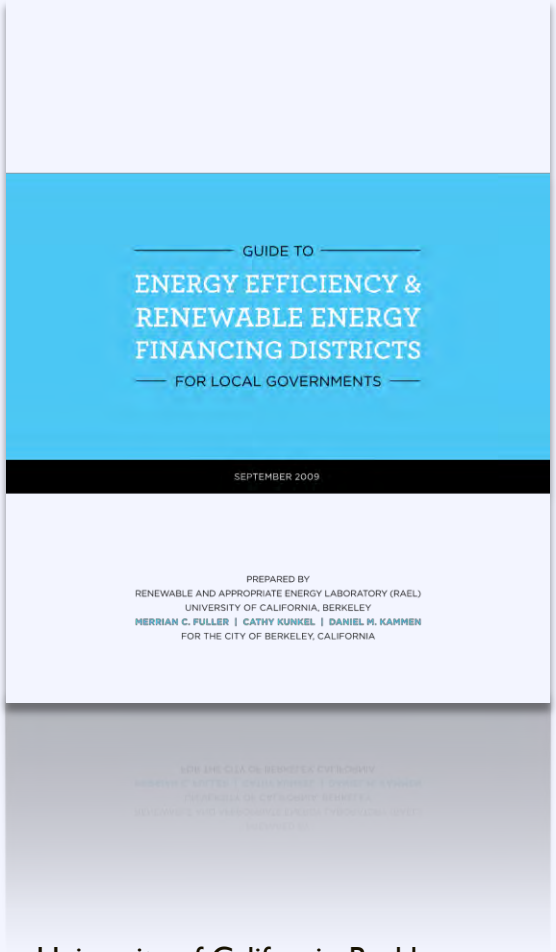
PACE: Resources

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

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

Q & A

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