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

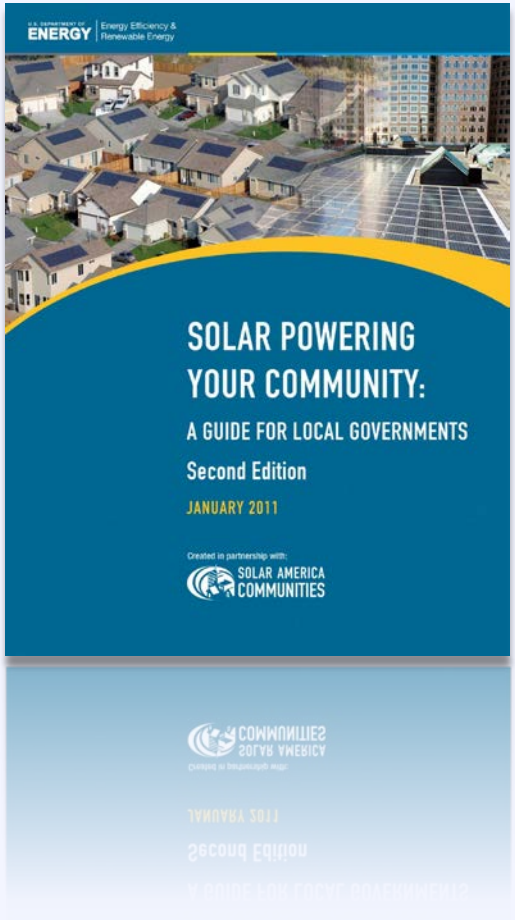
08:30 – 08:50	Introductions and Overview
08:50 – 09:25	Solar 101: Policy Environment and Economics
09:25 – 09:35	*Break*
09:35 – 09:55	Benefits and Barriers Activity
09:55 – 10:15	Creating a Solar Ready Community
10:15 – 11:00	Growing Your Local Solar Market
11:00 – 11:05	*Break*
11:05 – 12:15	Local 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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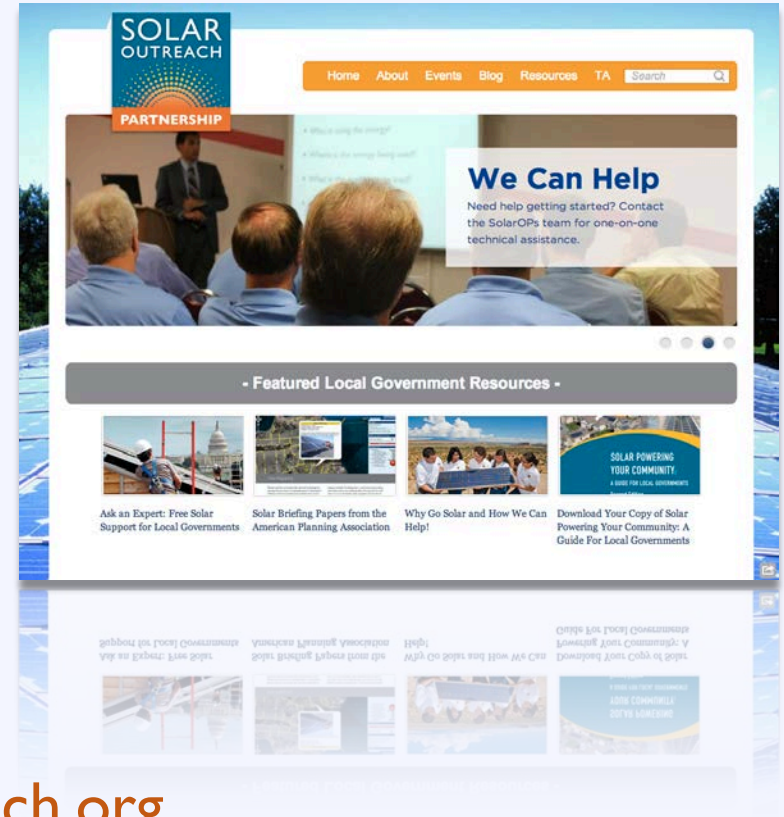
About the SunShot Solar Outreach Partnership

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)

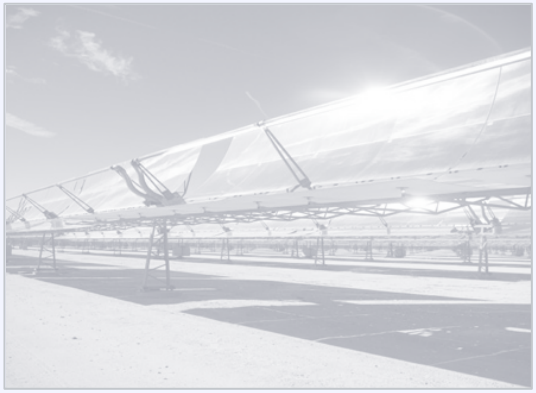
Solar Hot Water

Concentrated Solar Power

Solar Technologies

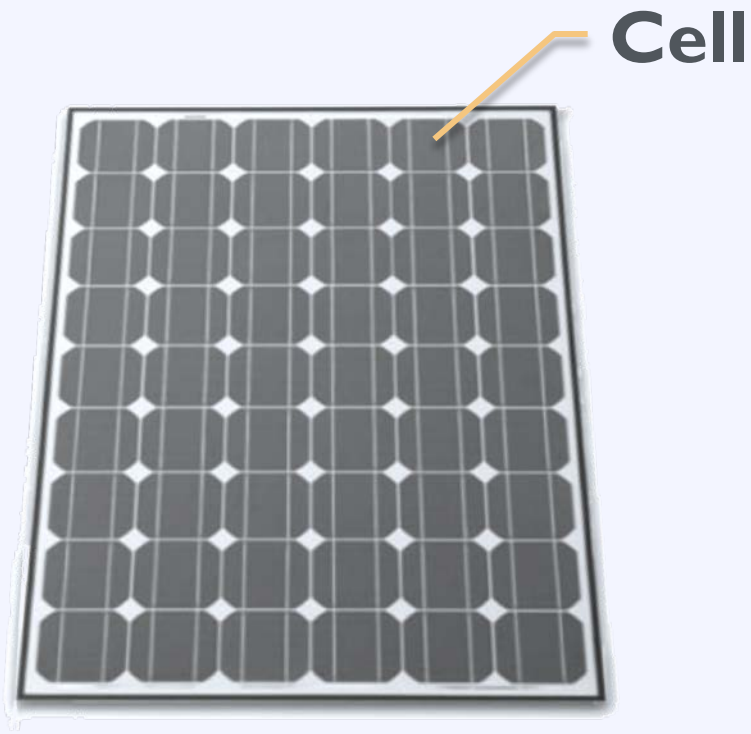
Solar Photovoltaic (PV)

Solar Hot Water



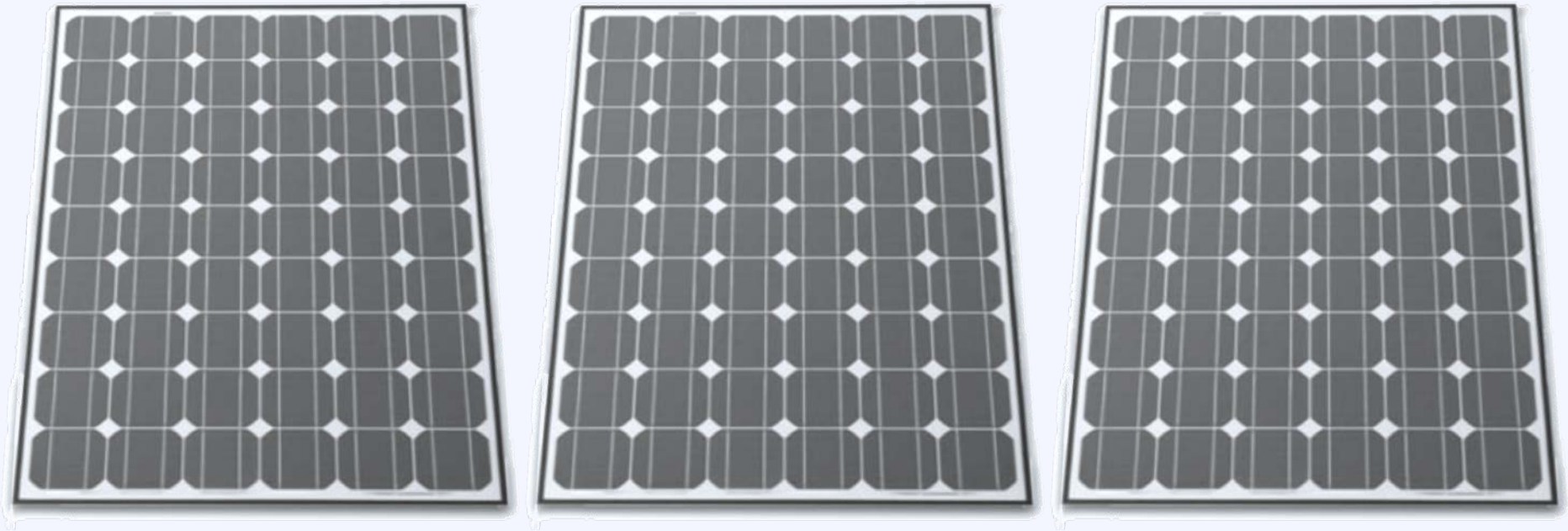
Concentrated Solar Power

Some Basic Terminology



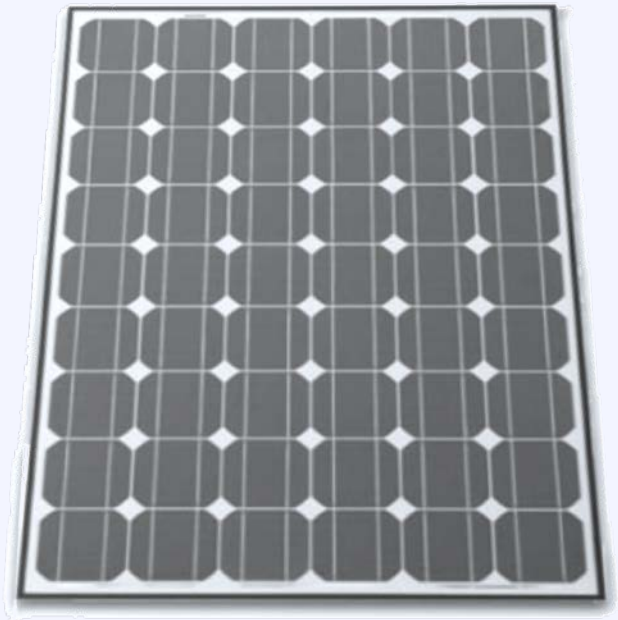
Panel / Module

Some Basic Terminology



Array

Some Basic Terminology



Capacity / Power

kilowatt (kW)

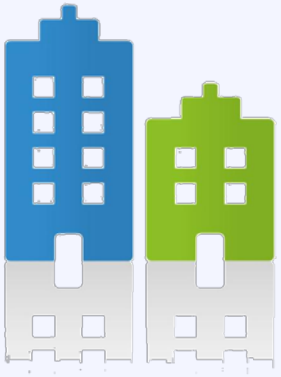
Production

Kilowatt-hour (kWh)

Some Basic Terminology

Residence
5 kW

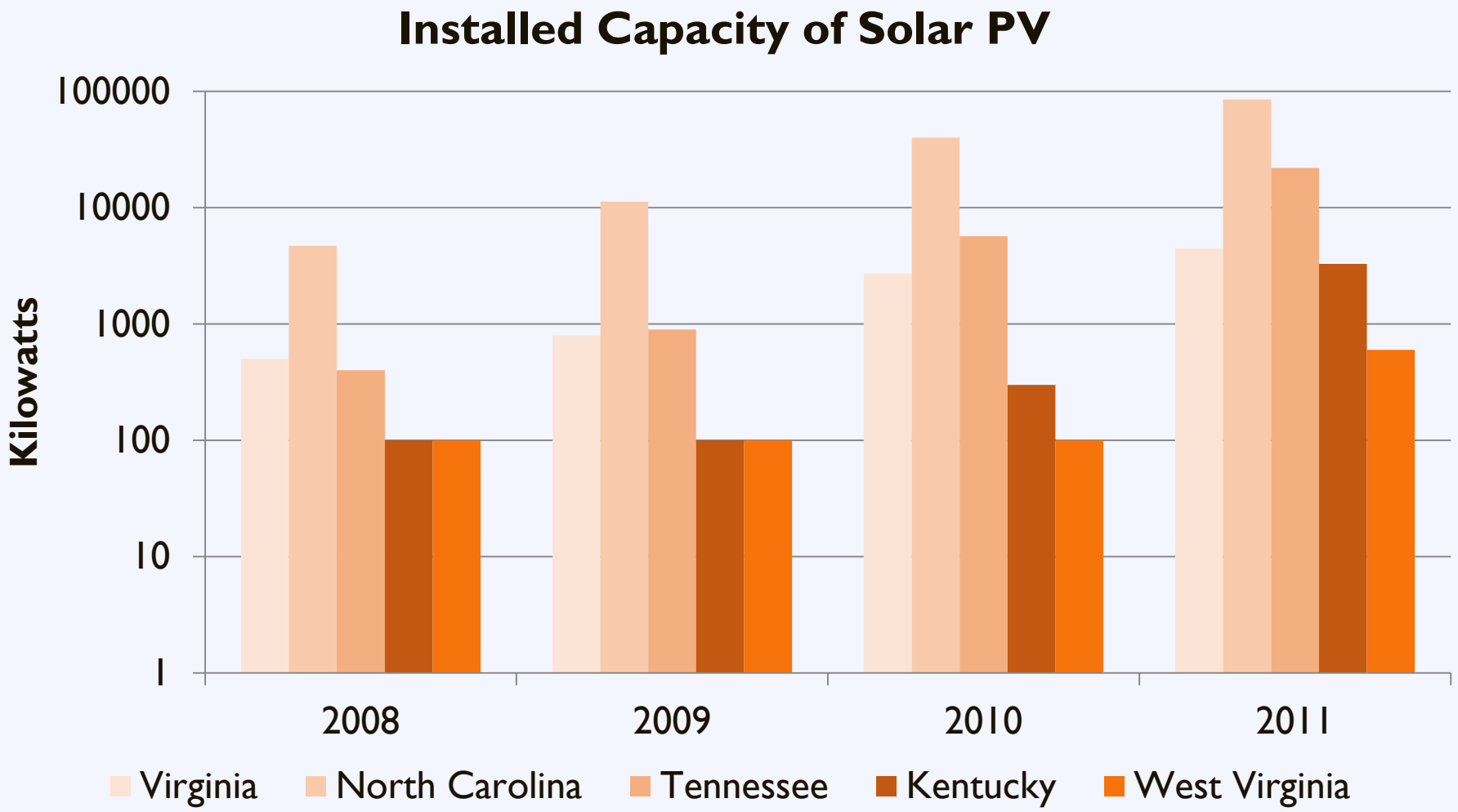
Factory
1 MW+



Office
50 – 500 kW

Utility
2 MW+

Virginia Solar Market



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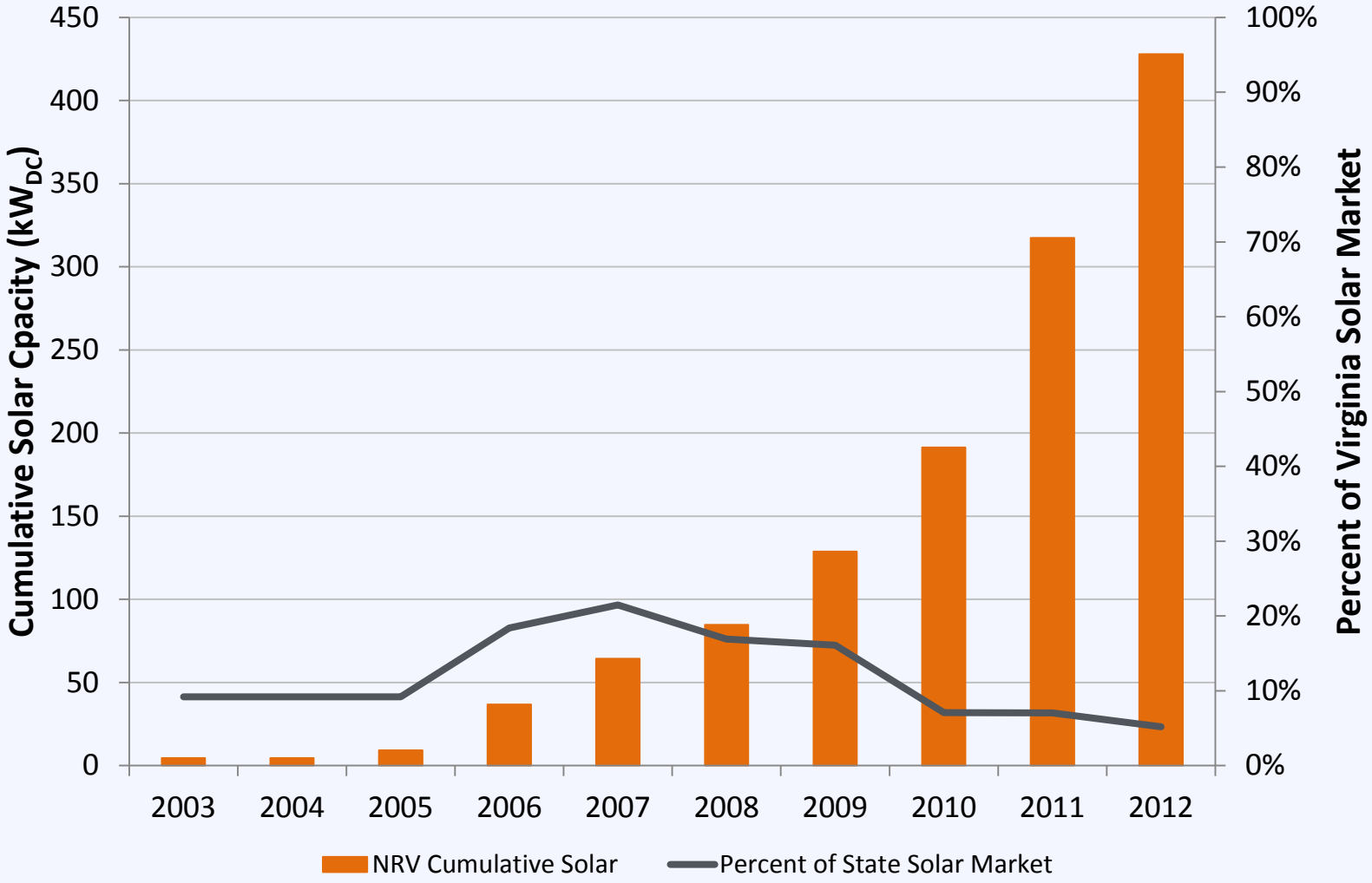
Source: IREC

NRV Solar PV Market



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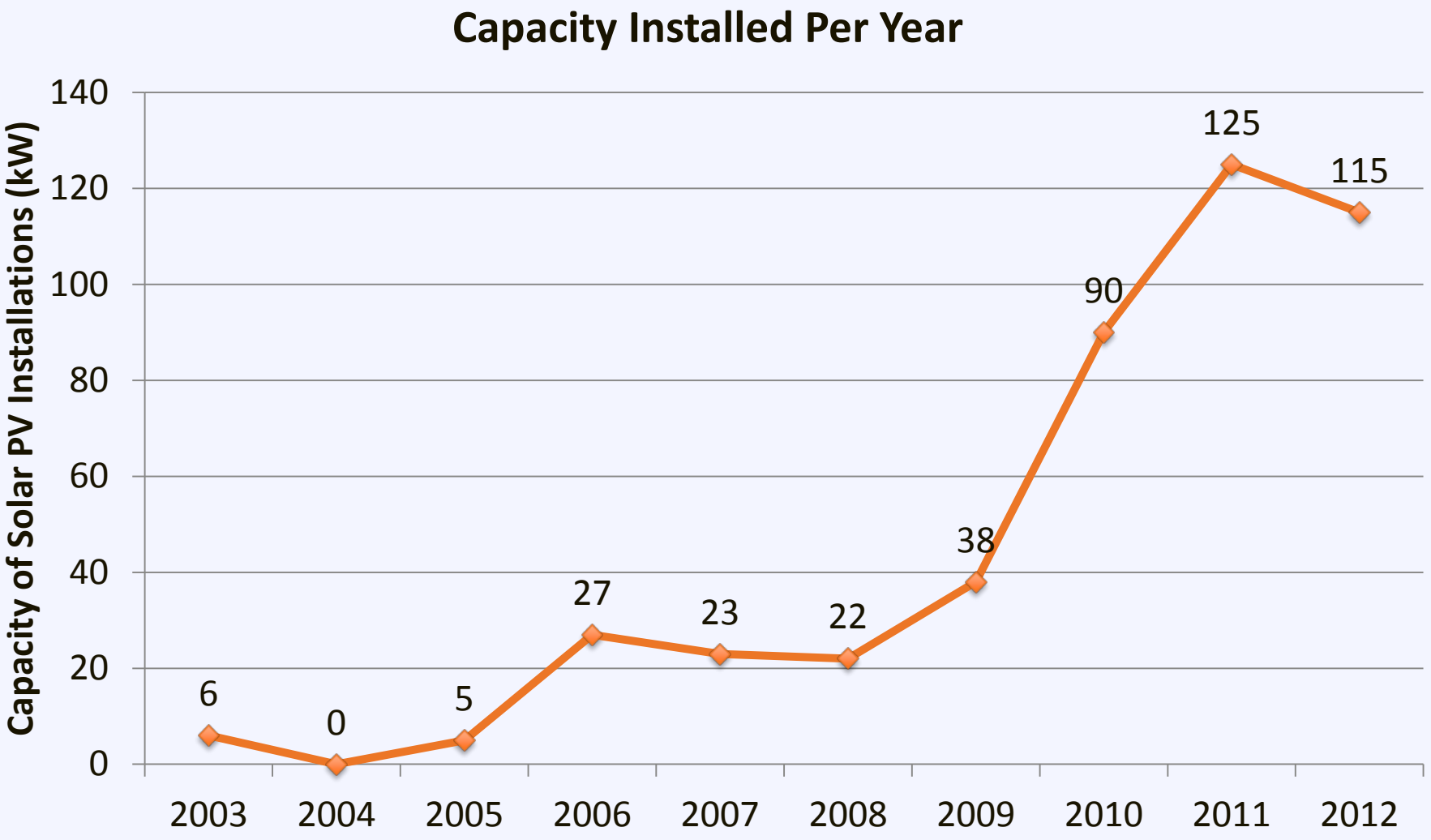
Source: IREC, John Randolph

NRV Solar PV Market



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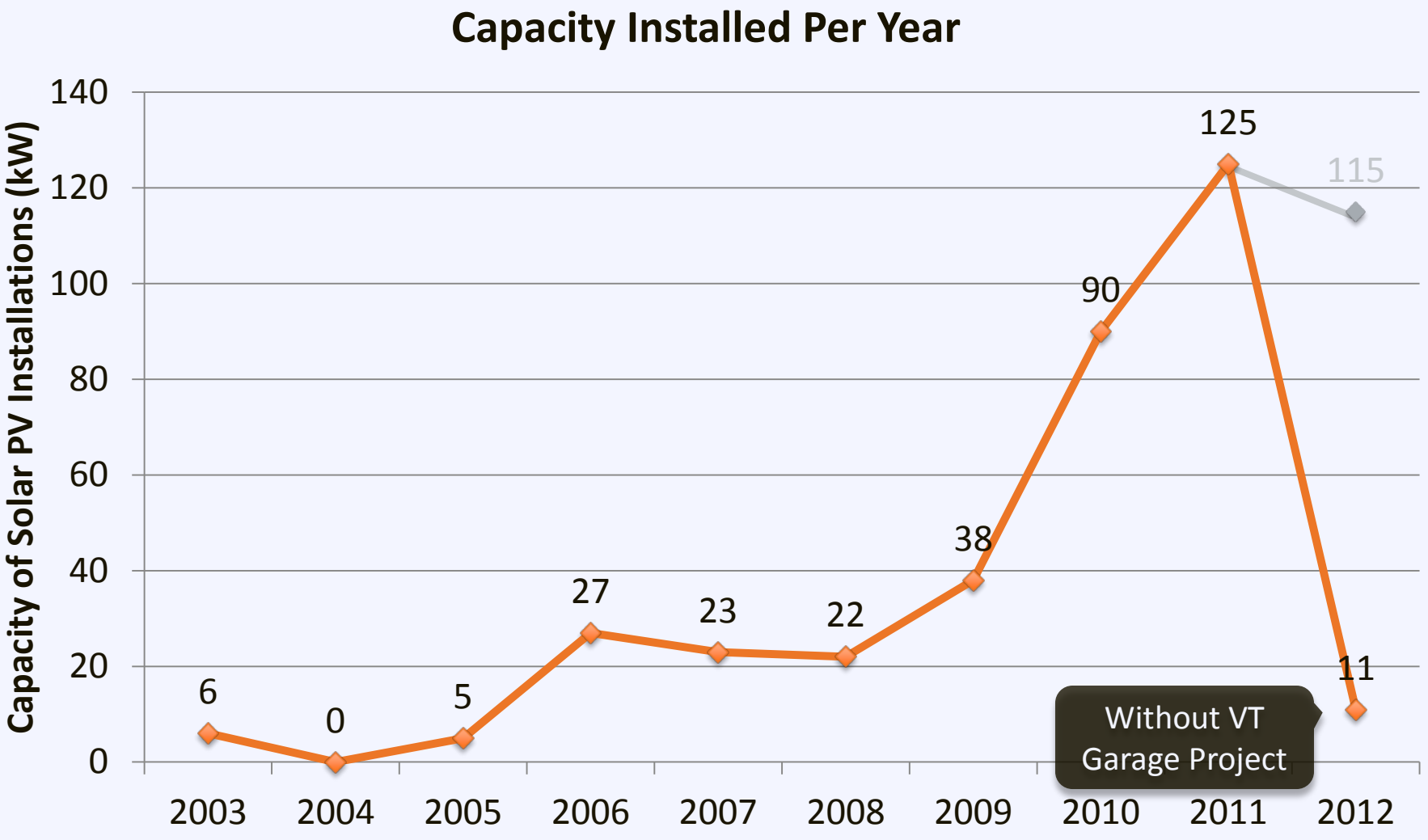
NRV Solar PV Market



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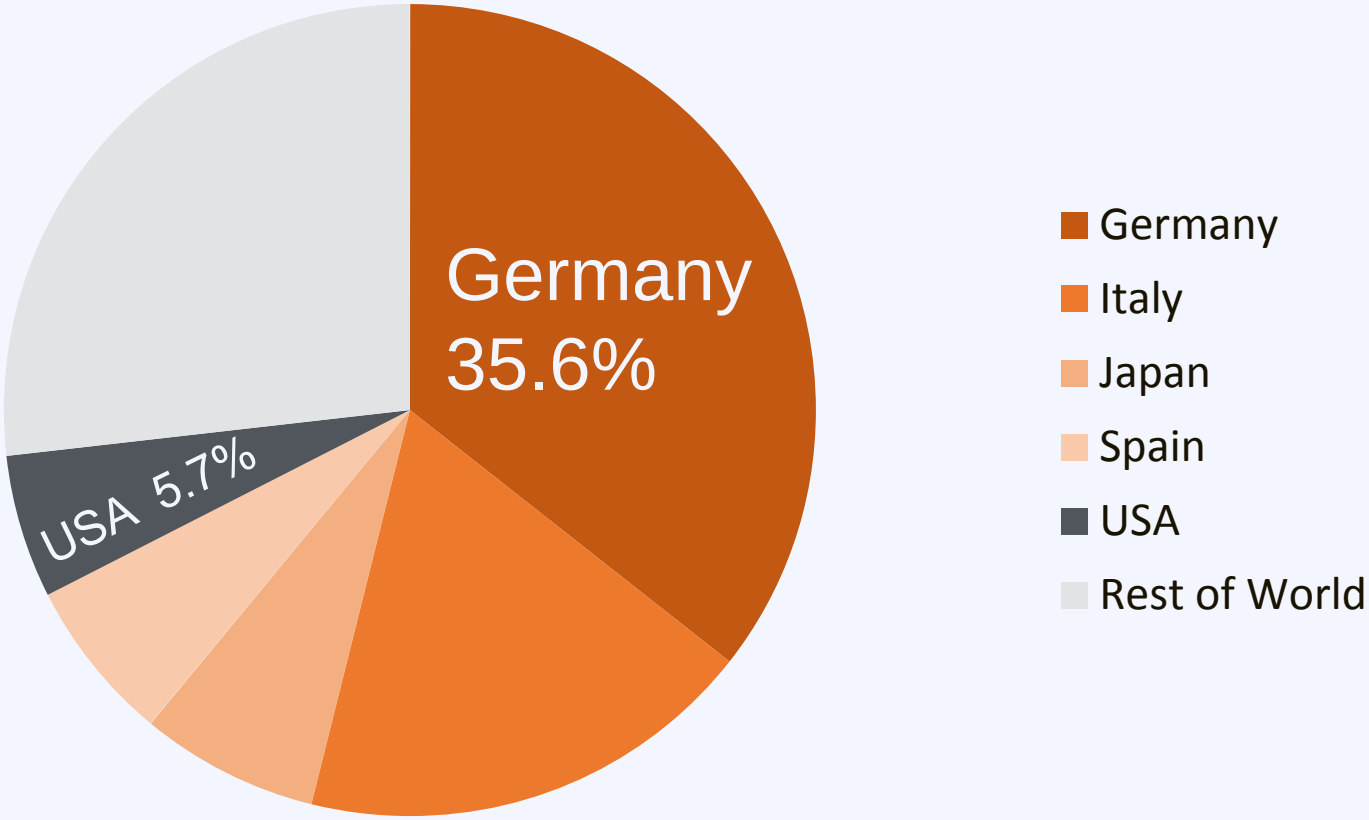
Installed Capacity

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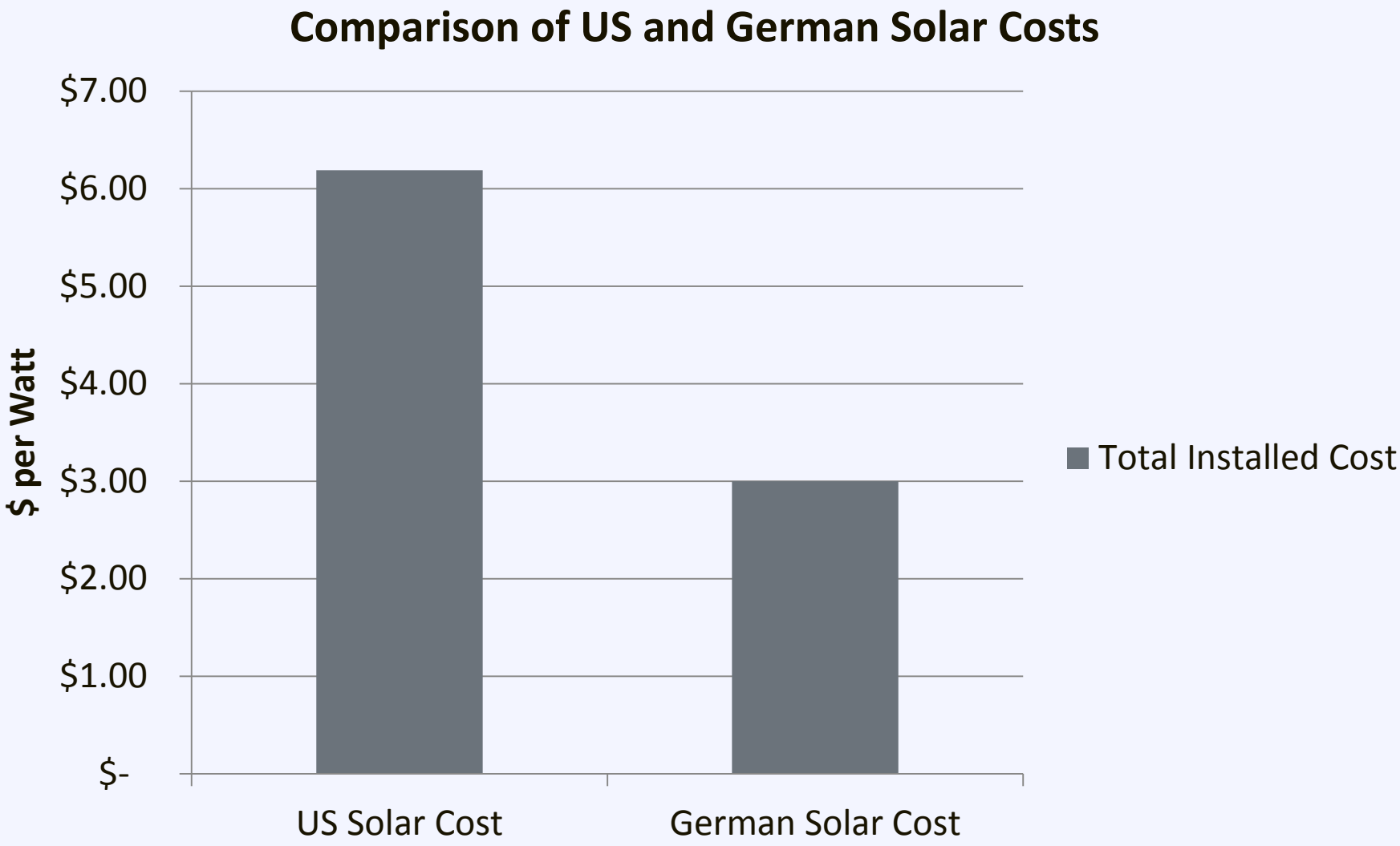
Source: (1) GTM Research/ Solar Energy Industries Association. *U.S. Solar Market Insight Report 2012 Year-in-Review*; (2) www.erneuerbare-energien.de/fileadmin/Daten_EE/Dokumente__PDFs_/20130328_hgp_e_ppt_2012_fin_bf.pdf

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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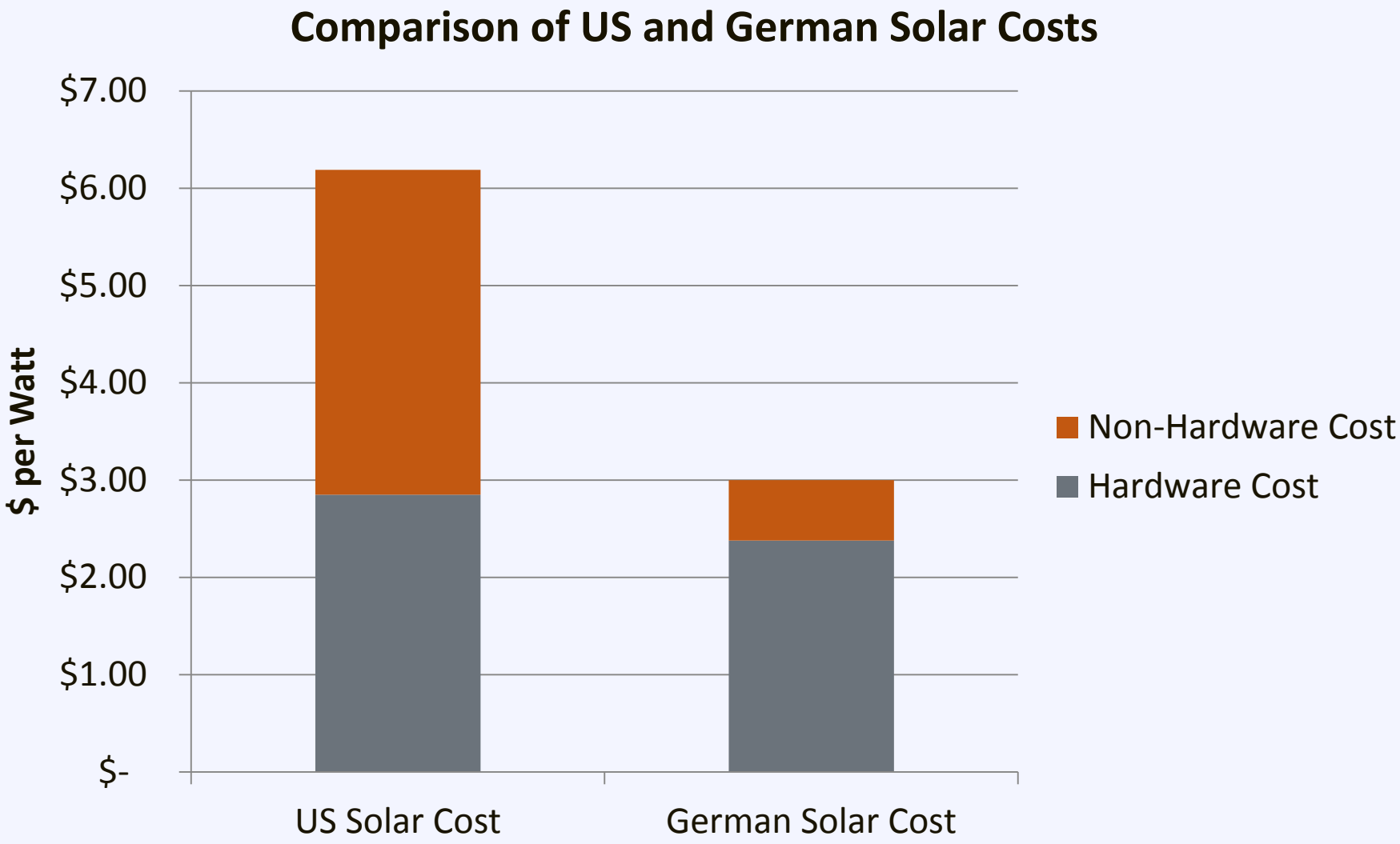

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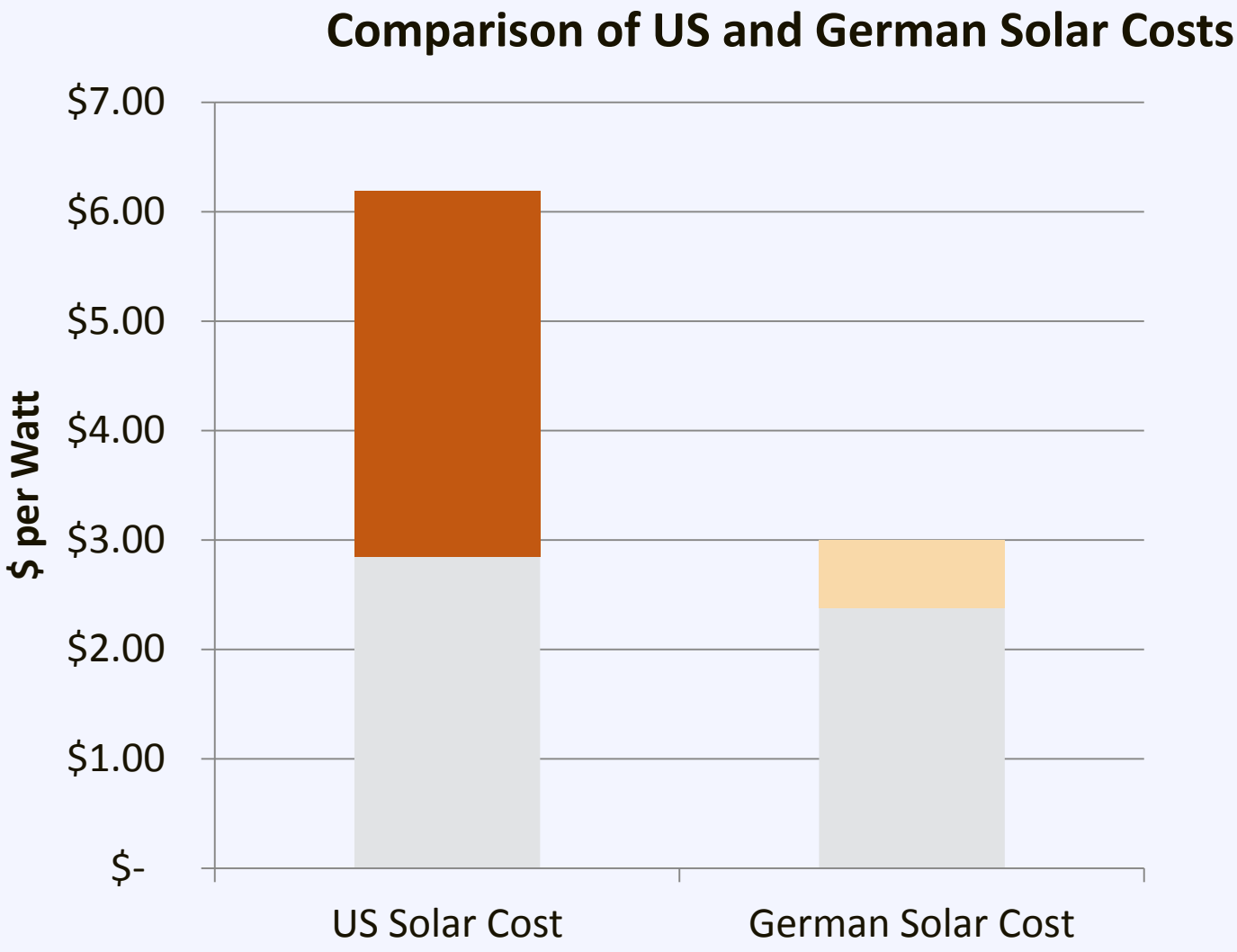

Source: NREL (http://ases.conference-services.net/resources/252/2859/pdf/SOLAR2012_0599_full%20paper.pdf) (http://www.nrel.gov/docs/fy12osti/53347.pdf) (http://www.nrel.gov/docs/fy12osti/54689.pdf)

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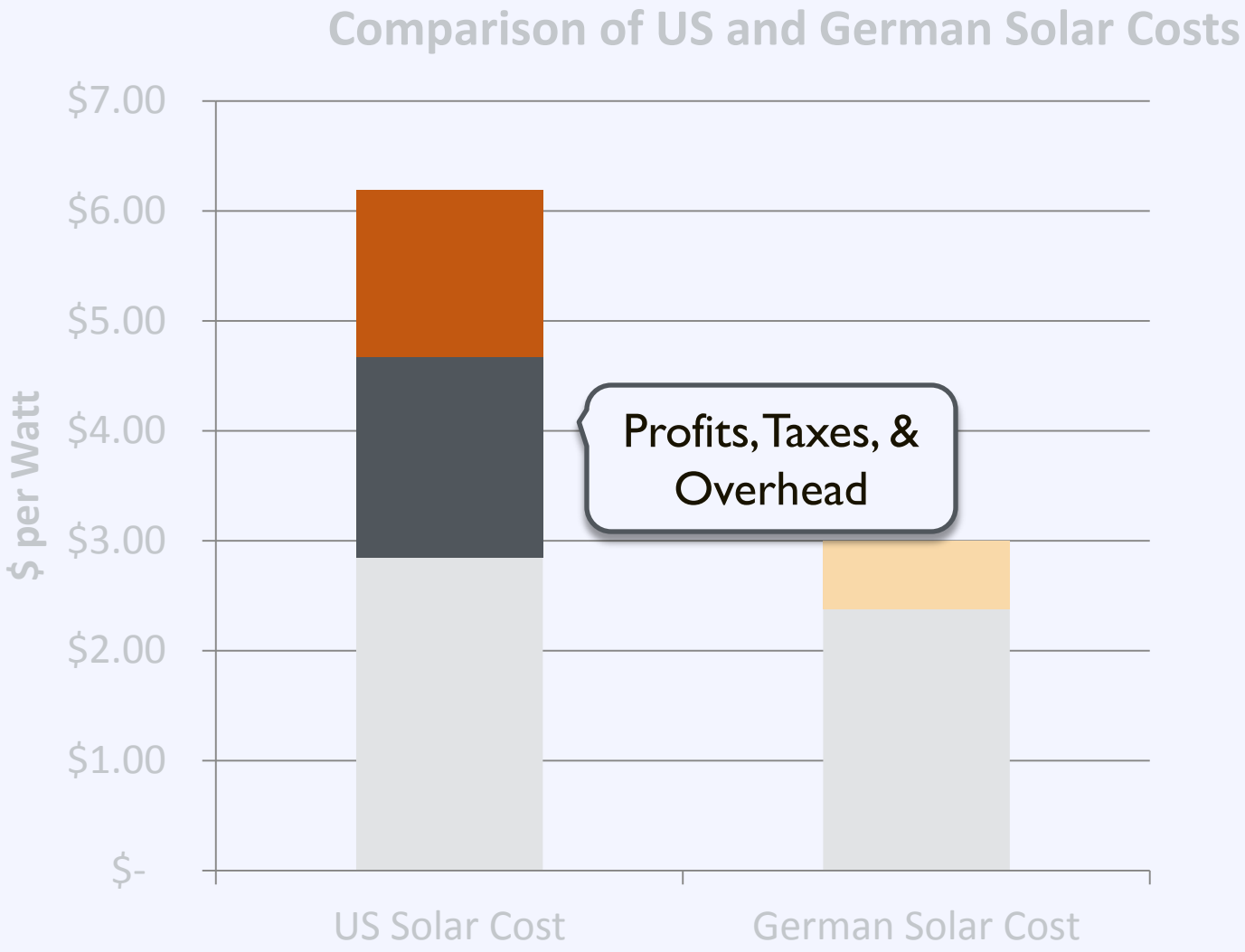

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Source: NREL (http://ases.conference-services.net/resources/252/2859/pdf/SOLAR2012_0599_full%20paper.pdf) (http://www.nrel.gov/docs/fy12osti/53347.pdf) (http://www.nrel.gov/docs/fy12osti/54689.pdf)

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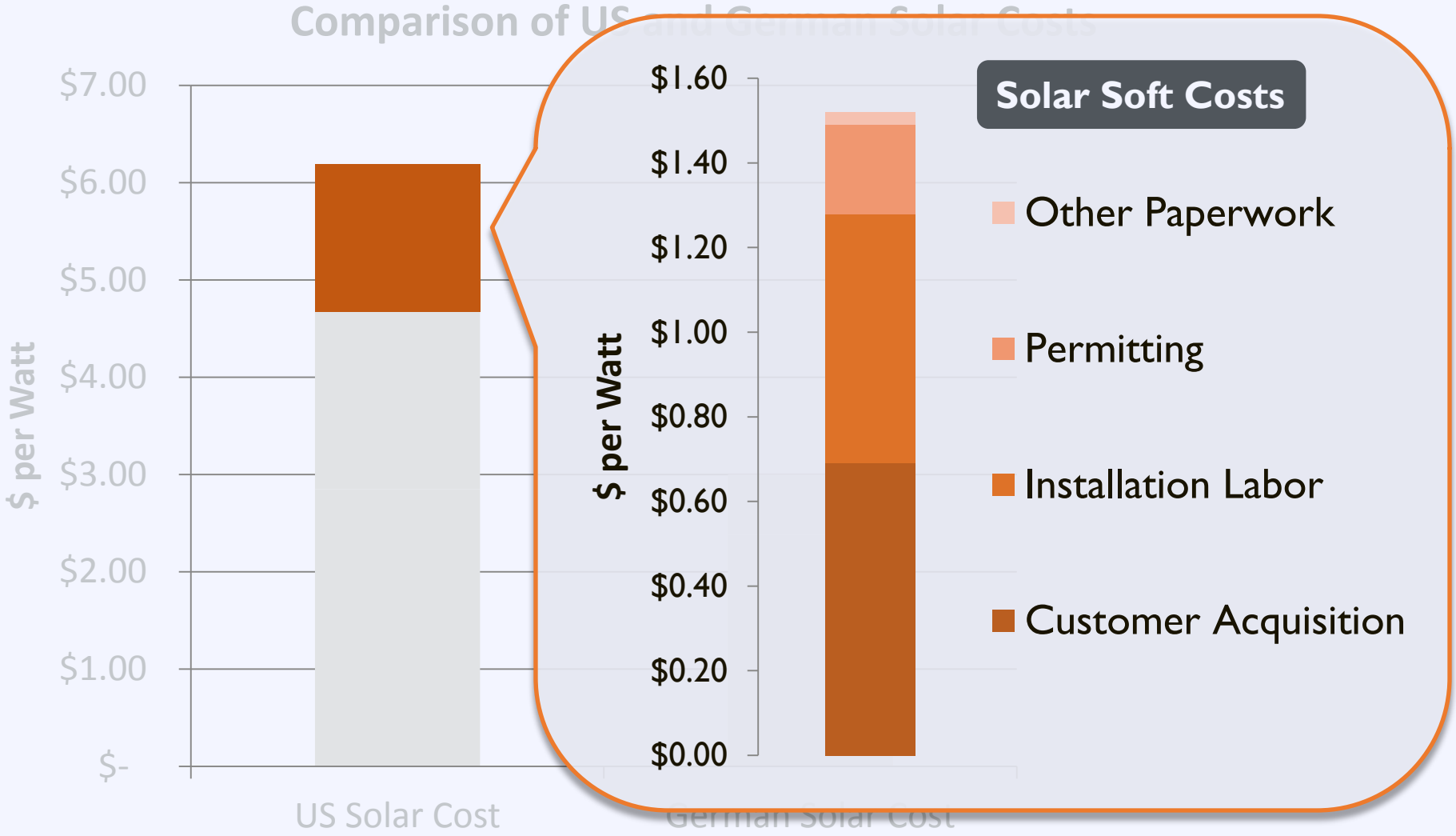

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Workshop Goal

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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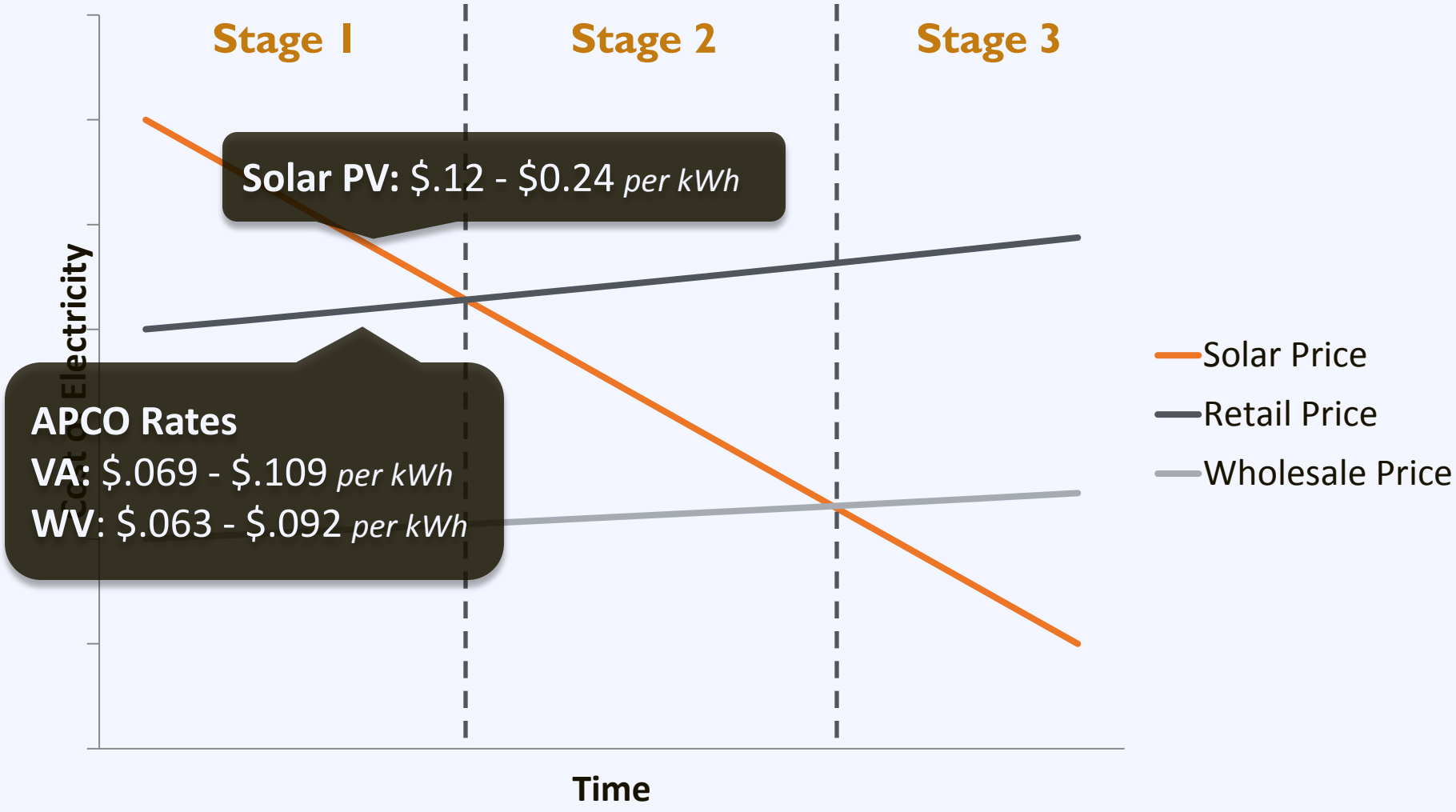
Utility Market: Stages



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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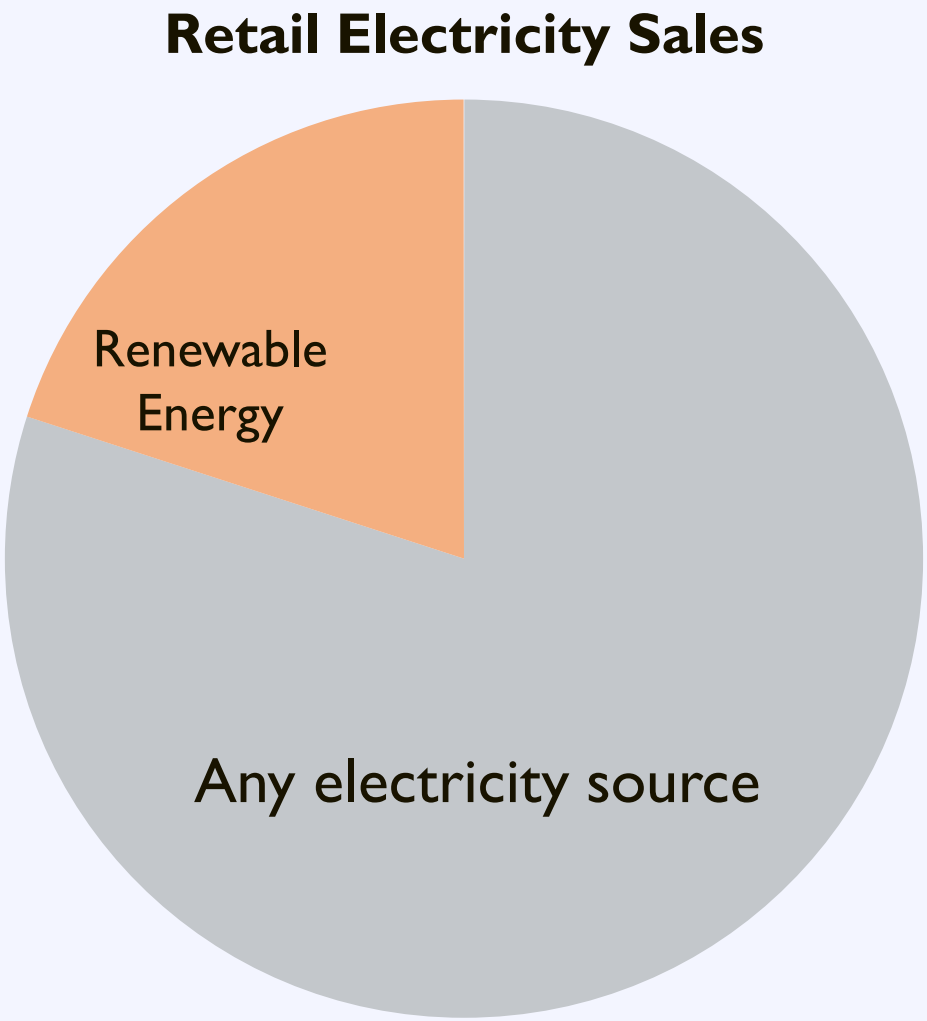
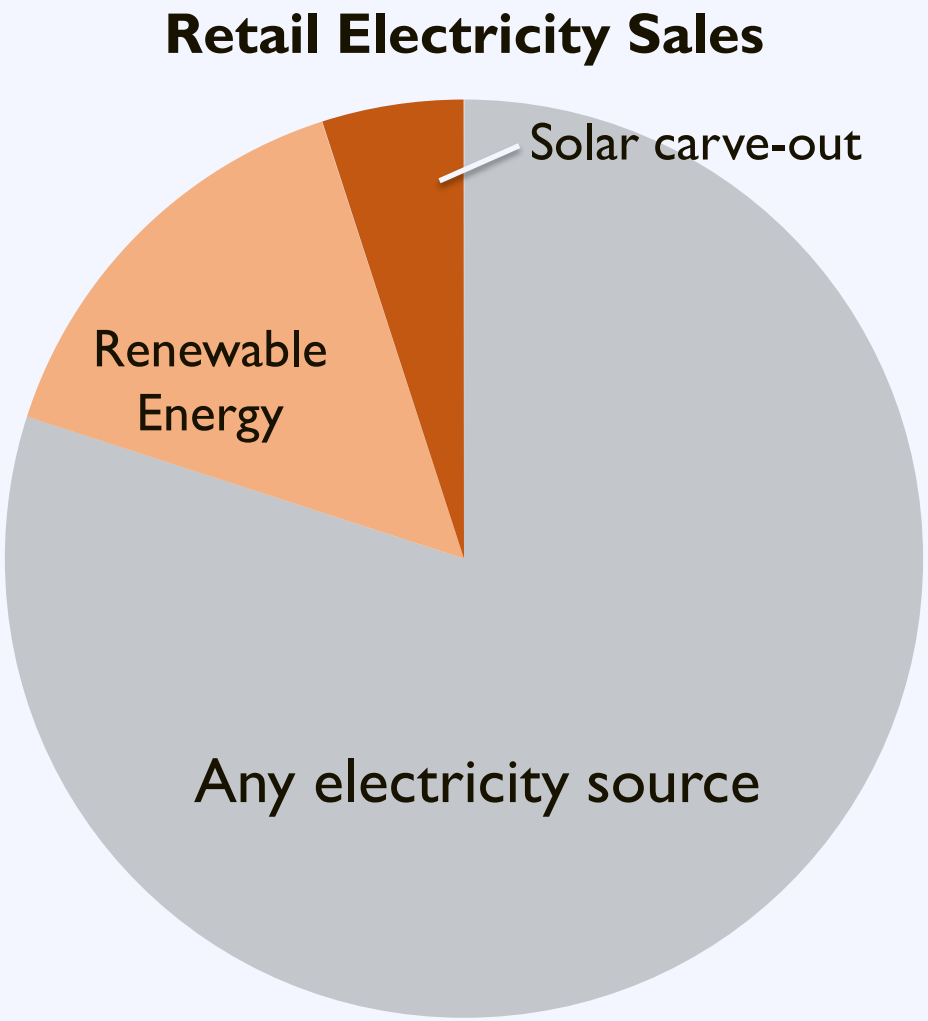
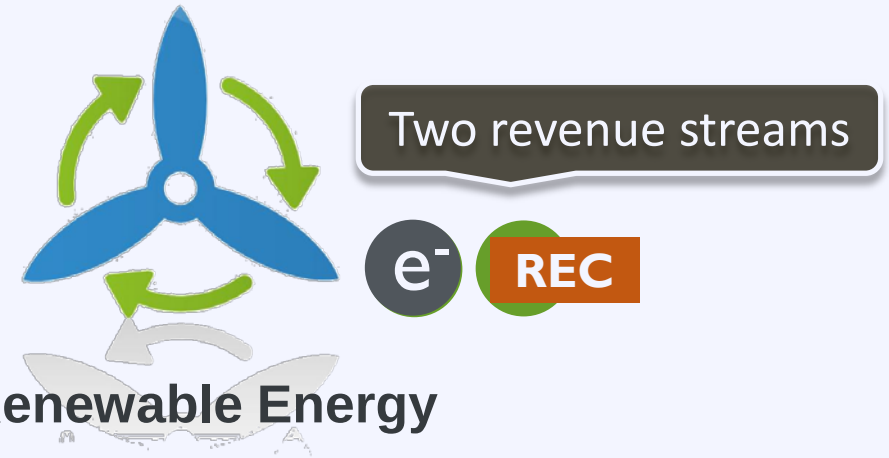
Renewable Portfolio Standard



Renewable Portfolio Standard

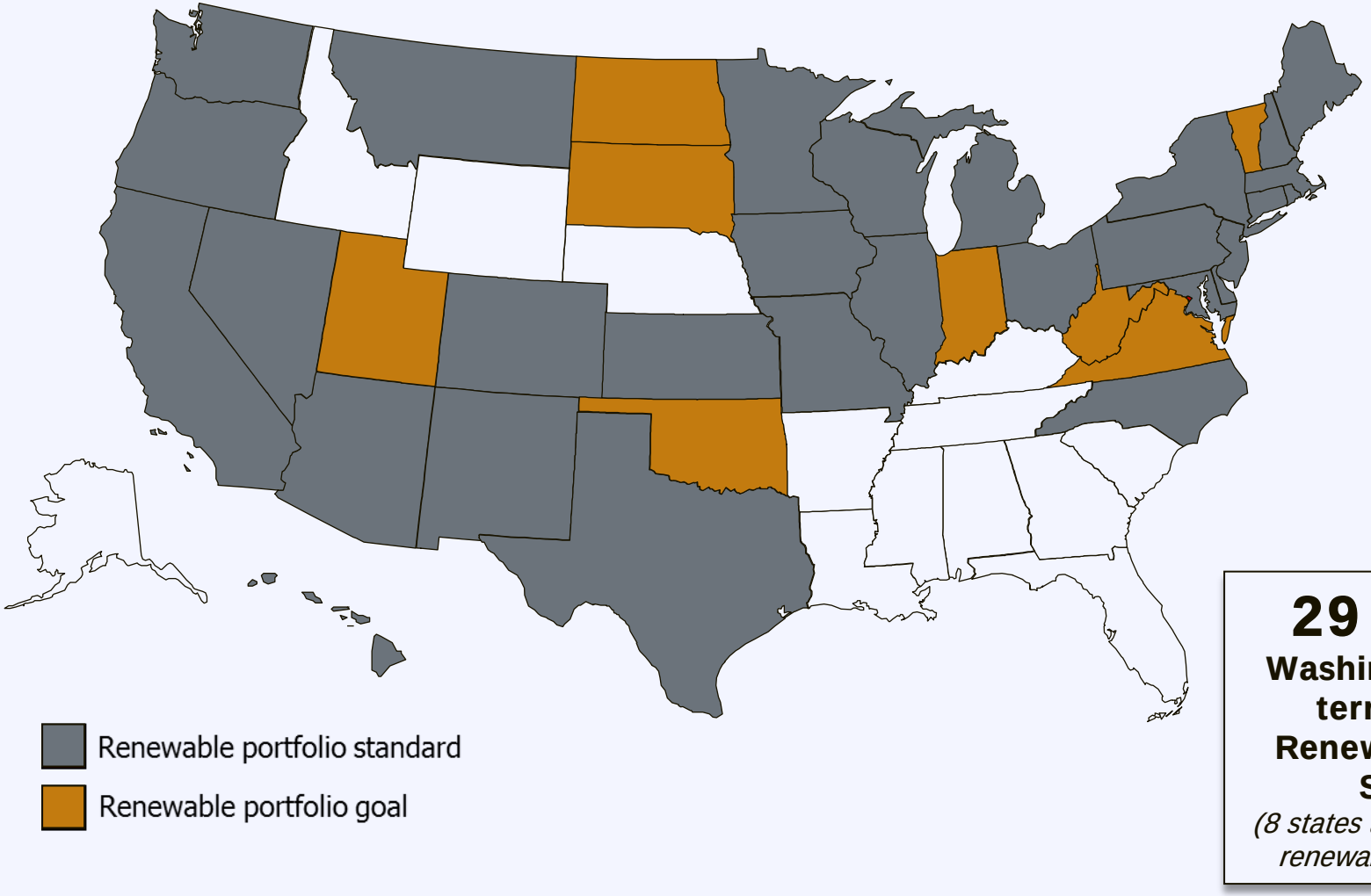


Renewable Portfolio Standard



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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U.S. Department of Energy

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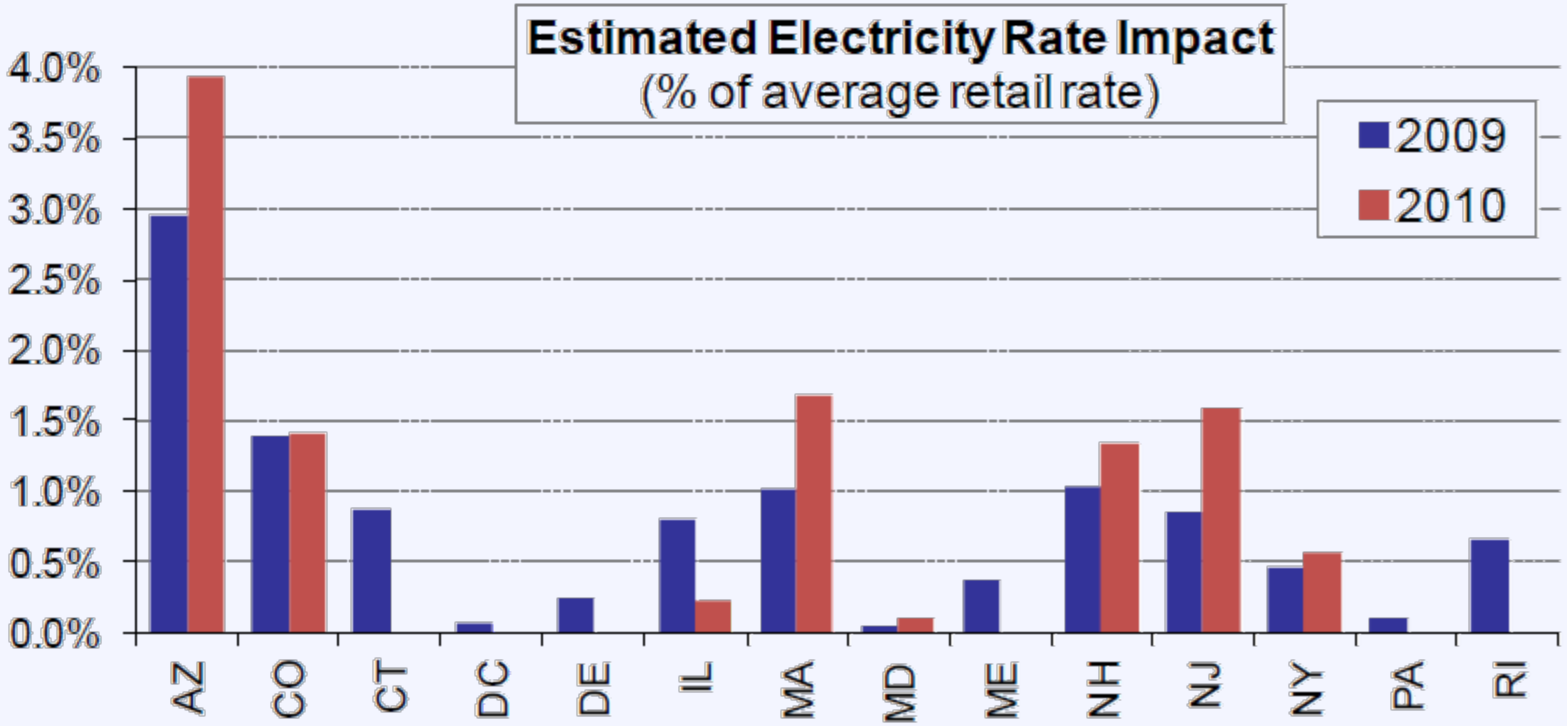
Source: DSIRE Solar (http://dsireusa.org/documents/summarymaps/Solar_DG_RPS_map.pdf); Solar Energy Industries Association/ GTM Research *Solar Market Insight 2012 Year-in-Review*

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).

Powered by SunShot U.S. Department of Energy

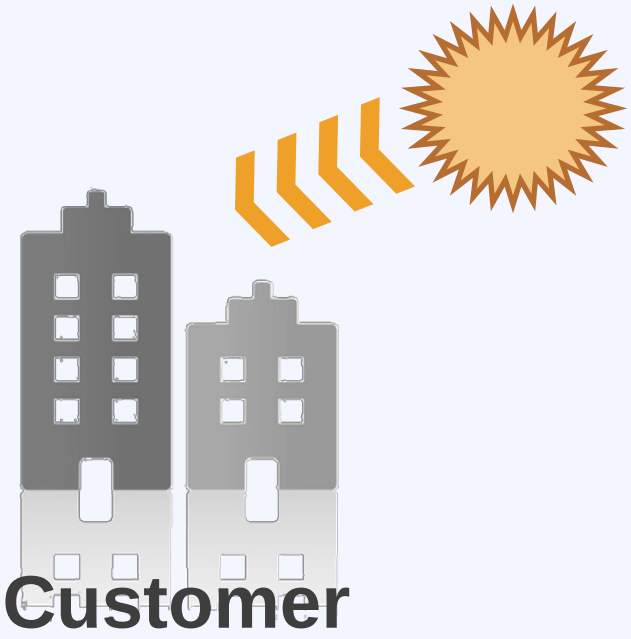
Source: Lawrence Berkeley National Laboratory. *Renewable Portfolio Standards in the United States: A Status Update*. December 2012. www.cleanenergystates.org/assets/2012-Files/RPS/RPS-SummitDec2012Barbose.pdf

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

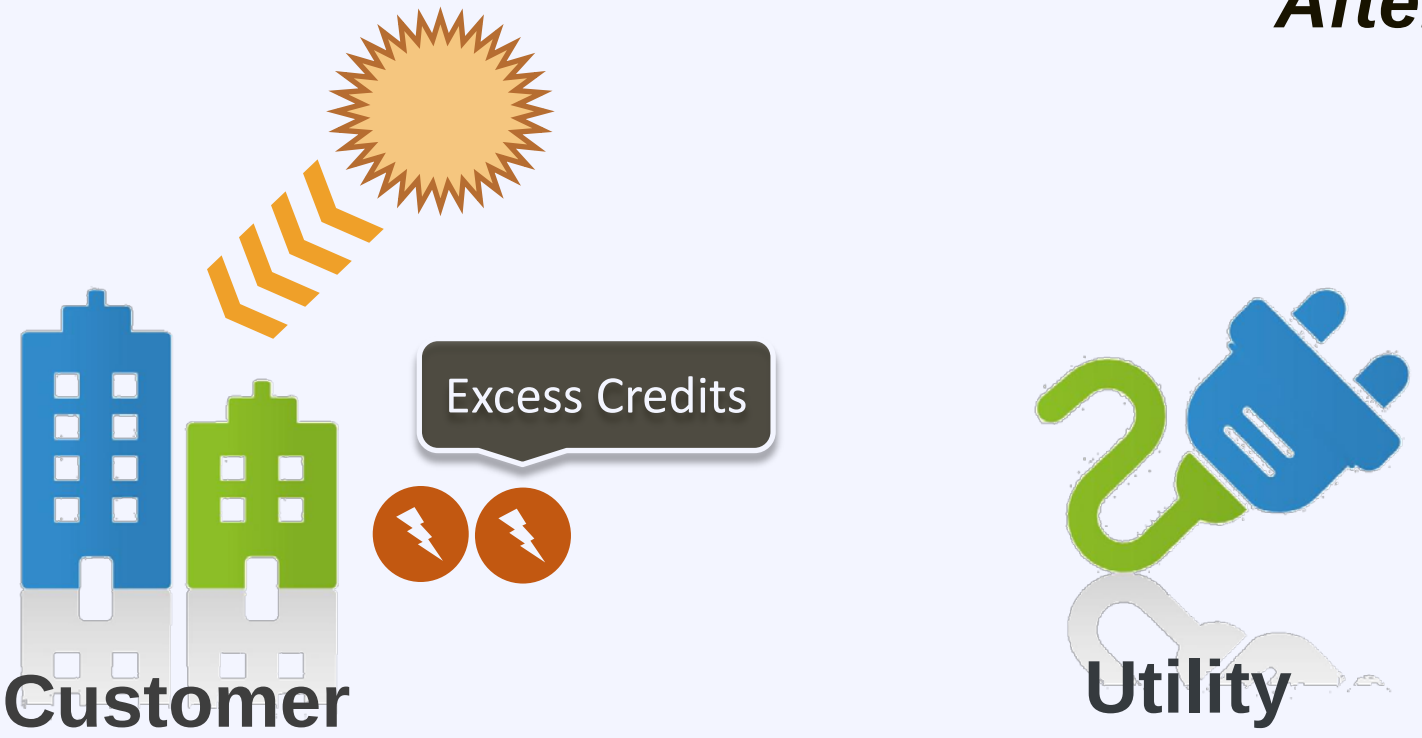
Net Metering: Overview

Morning



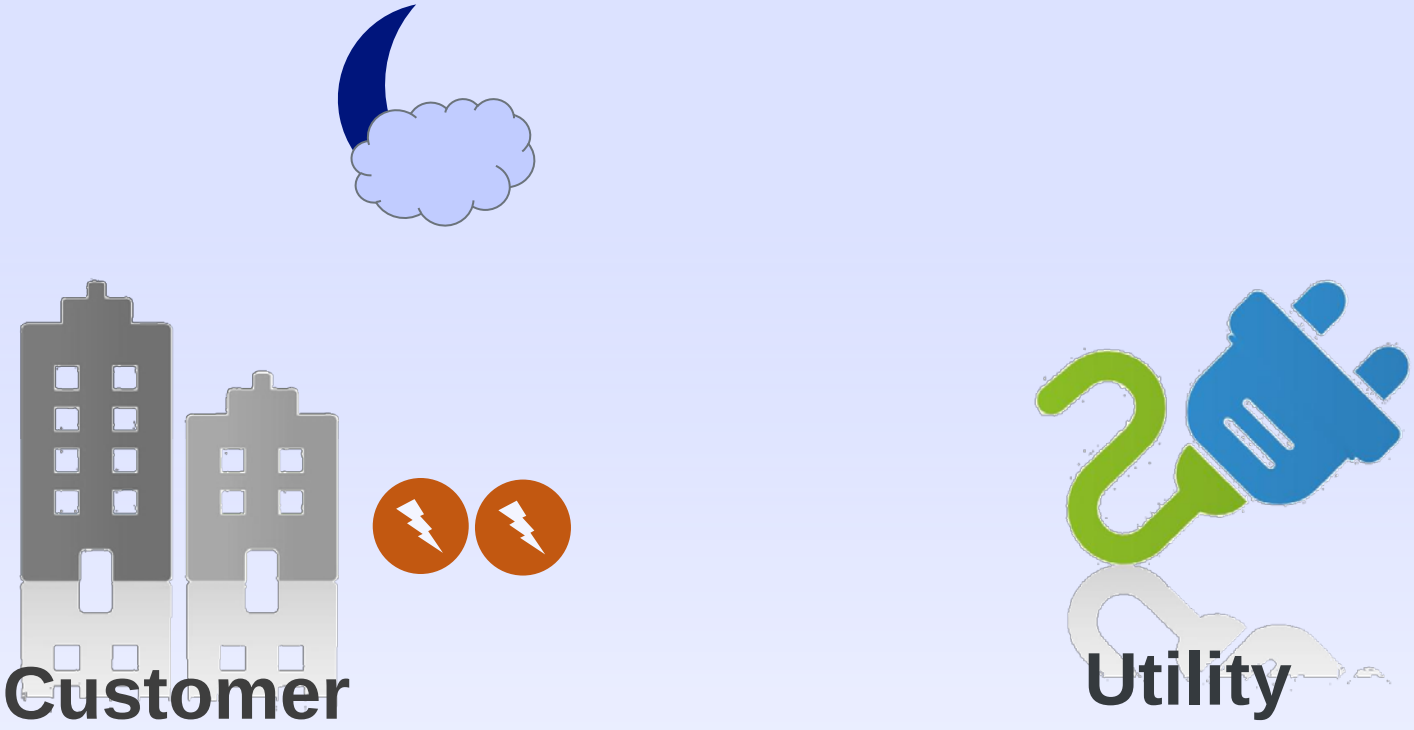
Net Metering: Overview

Afternoon



Net Metering: Overview

Night



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

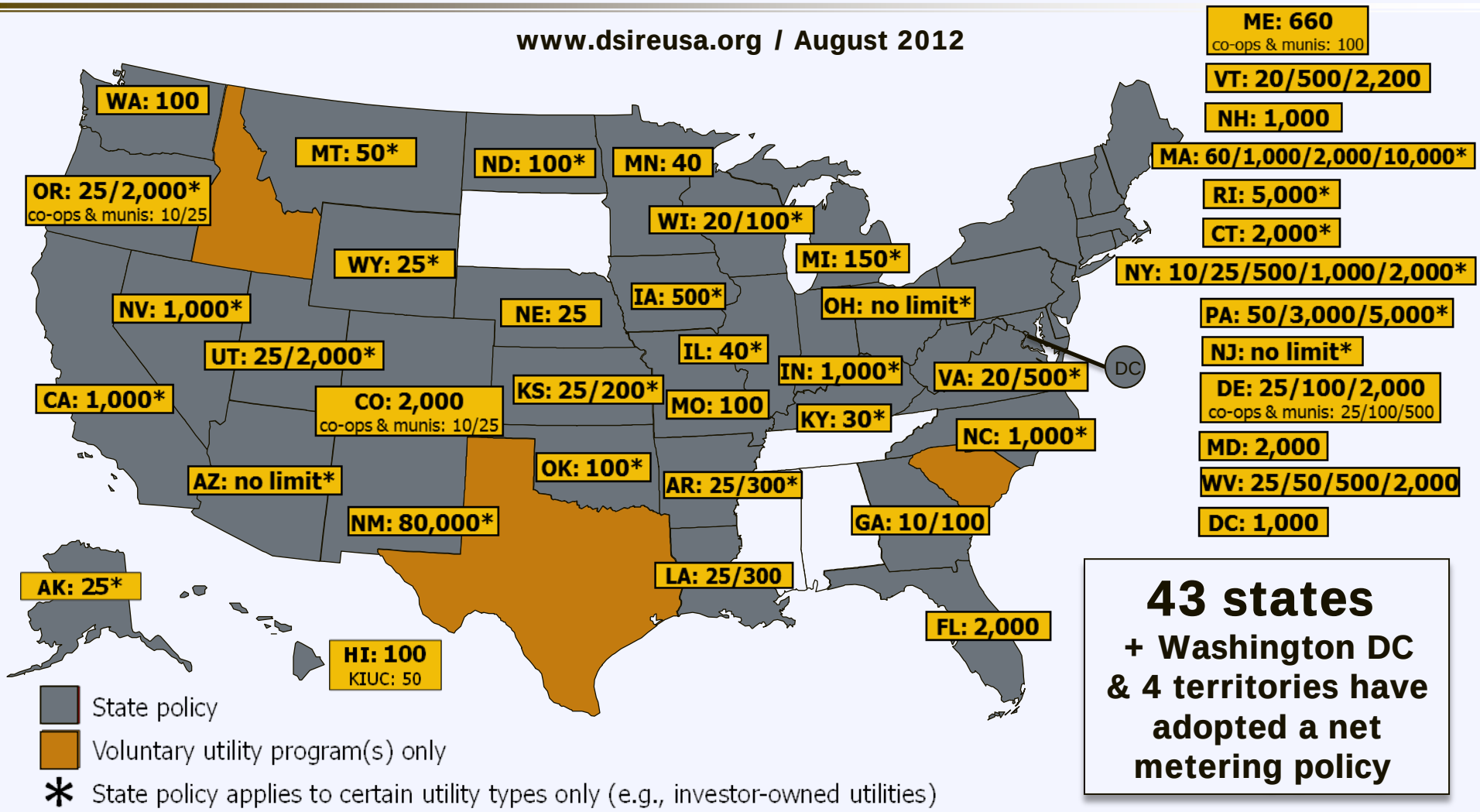
Net Metering: Market Share

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

Powered by SunShot U.S. Department of Energy

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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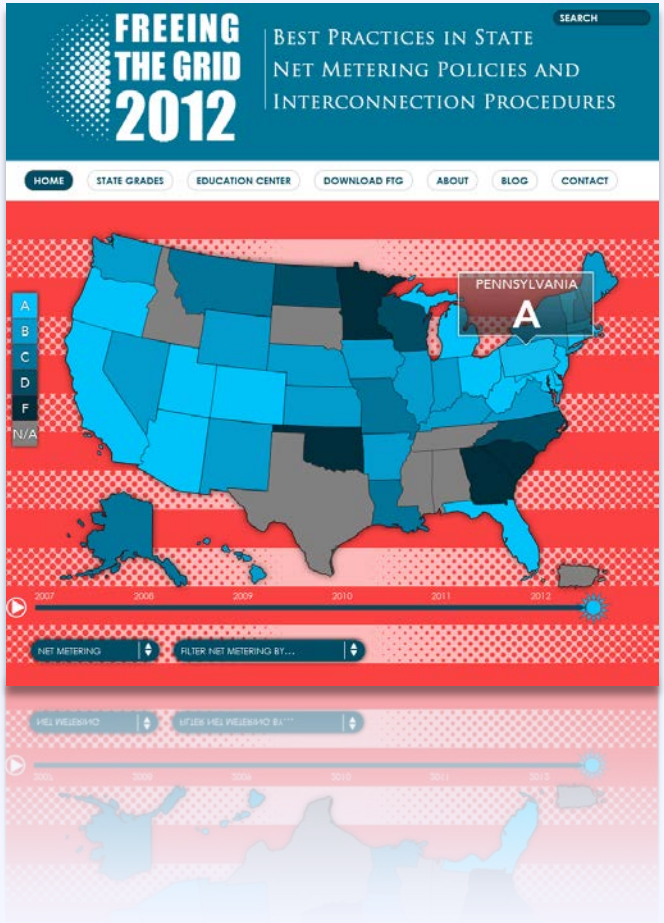
Net Metering: Resources

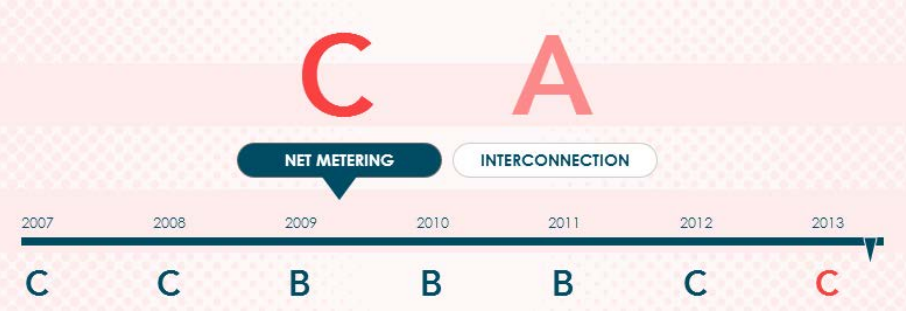
Resource **Freeing the Grid**

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

http://freeingthegrid.org/



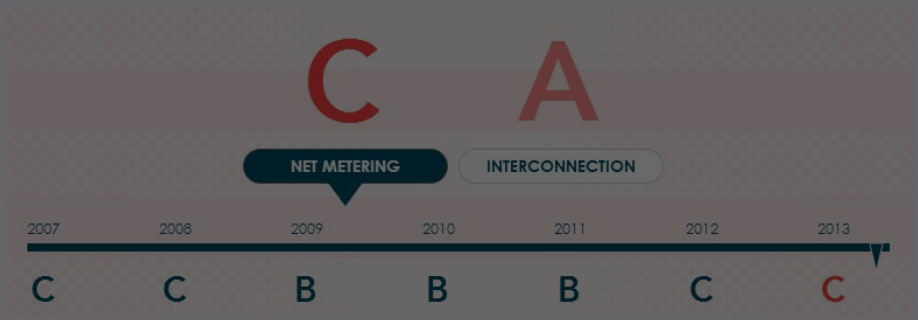
Net Metering: Virginia



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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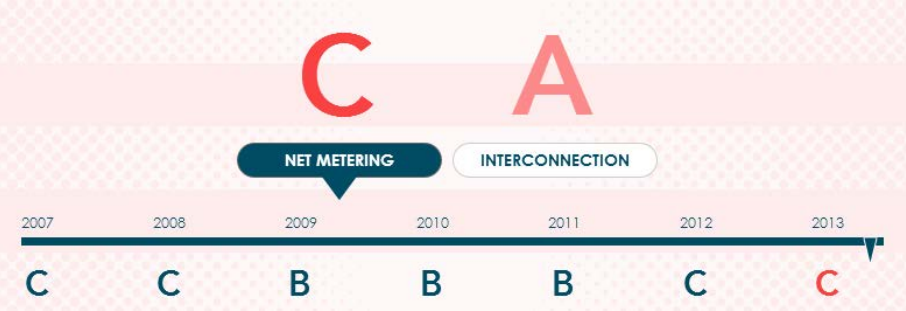

RECOMMENDATIONS:

- 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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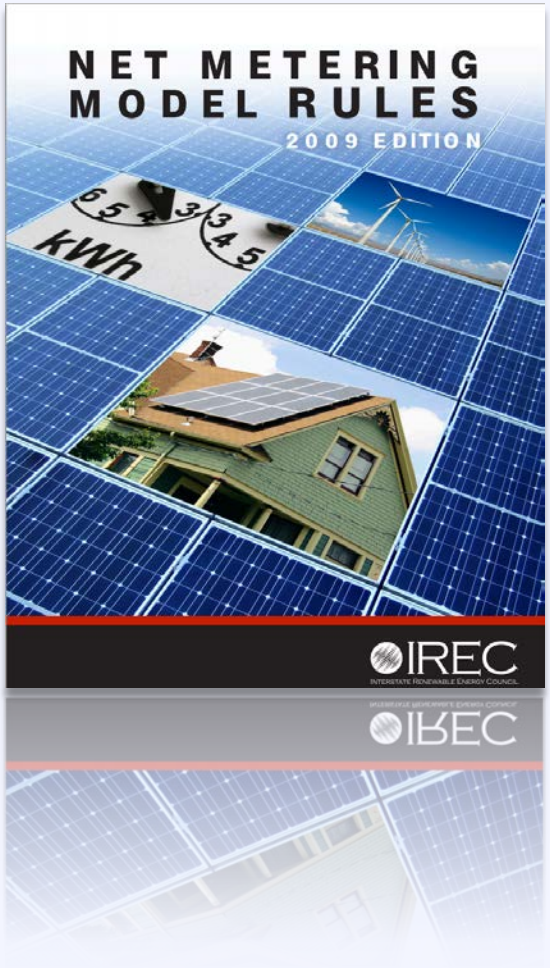
Net Metering: Resources

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:

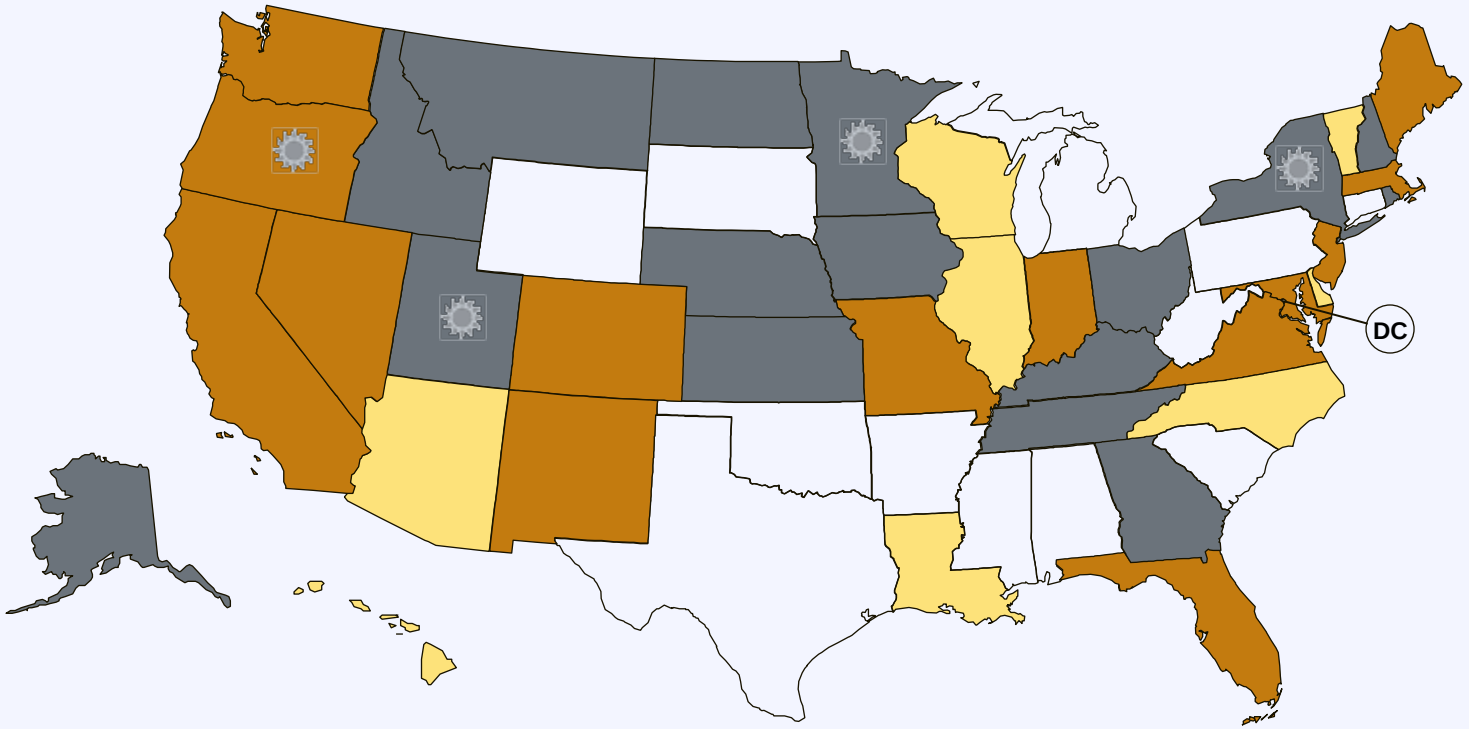
1. Increase the likelihood that properties will receive sunlight
2. Protect the rights of property owners to install solar
3. Reduce the risk that systems will be shaded after installation

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.

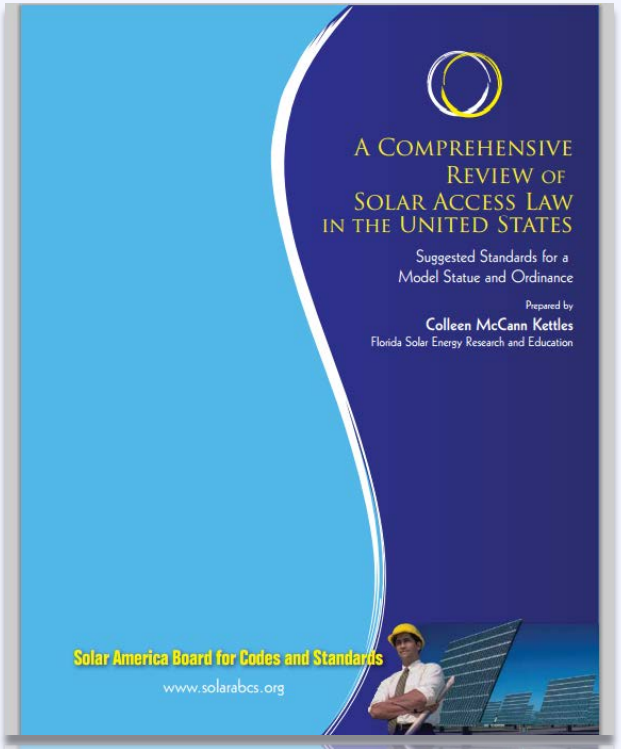
> *Any easement obtained for the purpose of exposure of solar energy equipment, facilities or devices shall be created in writing and shall be subject to the same conveyancing and instrument recording requirements as other easements.*

Solar Access

Resource **Solar ABCs**

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

www.solarabcs.org



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U.S. Department of Energy

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*
09:35 – 09:55	Benefits and Barriers Activity
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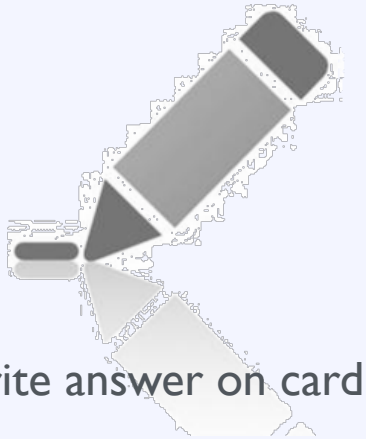
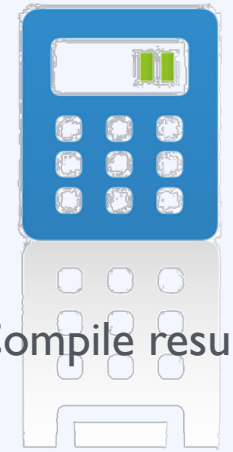
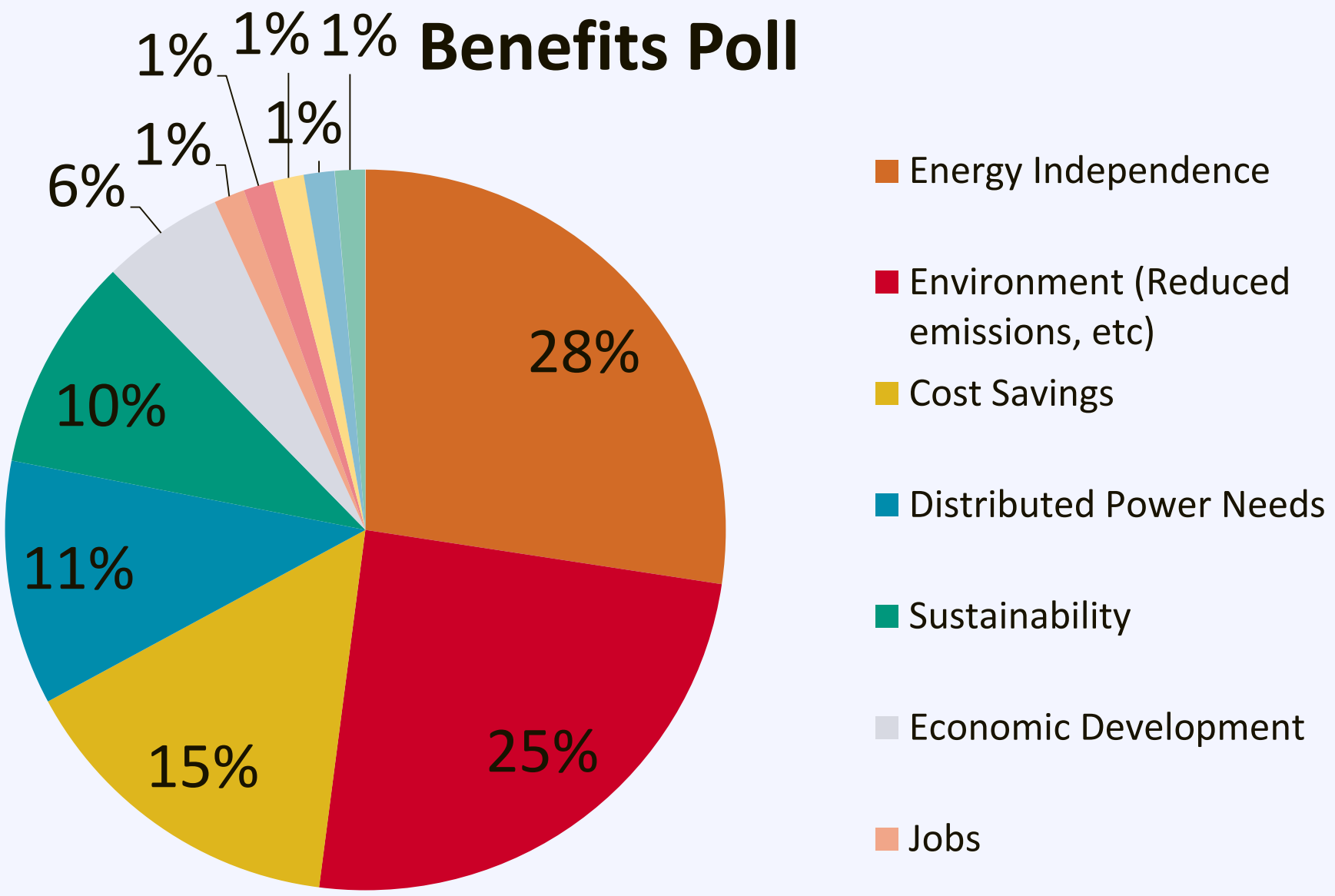
Activity: Identifying Benefits

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

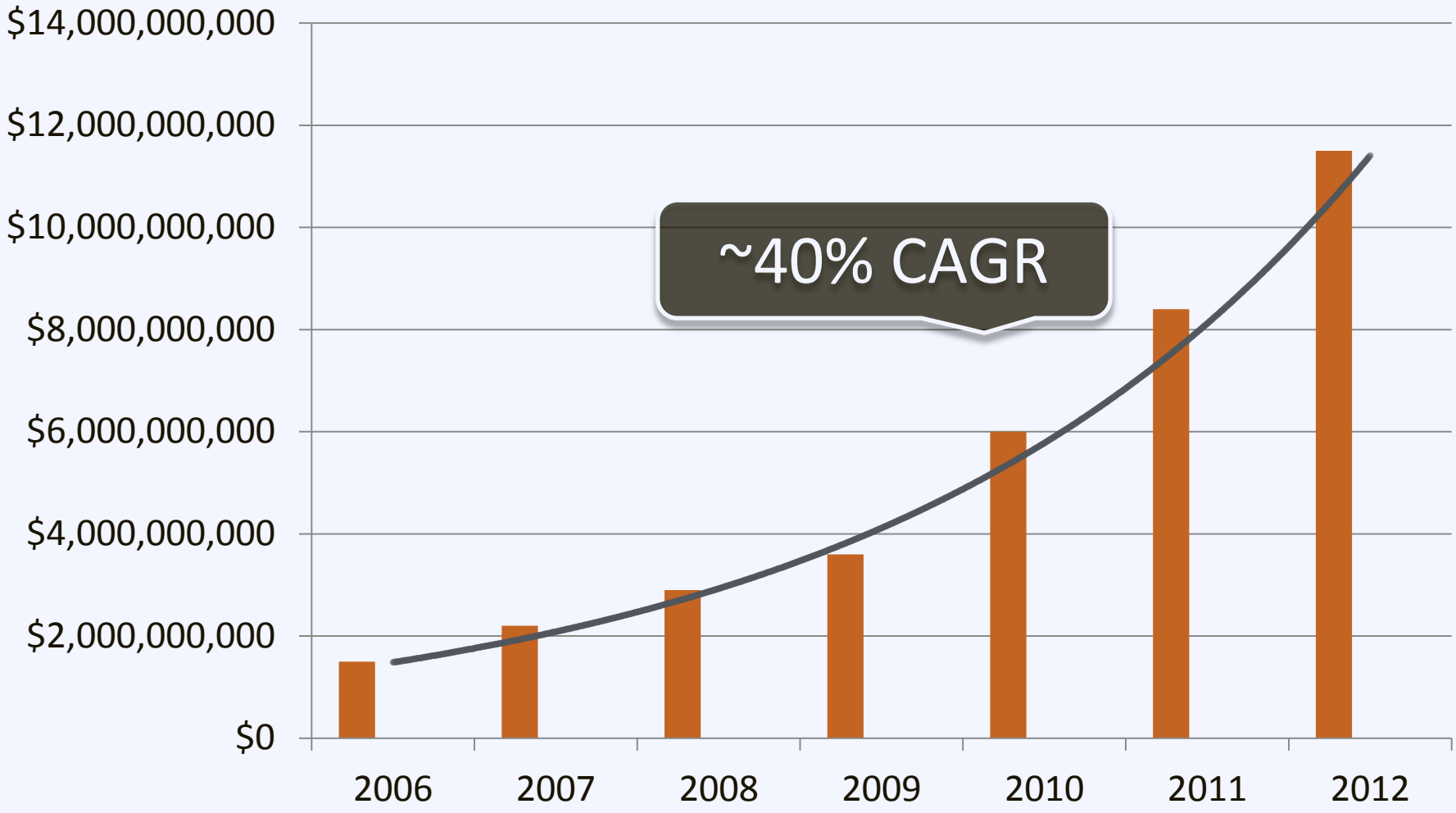
Benefits Poll



Benefits of Solar Energy

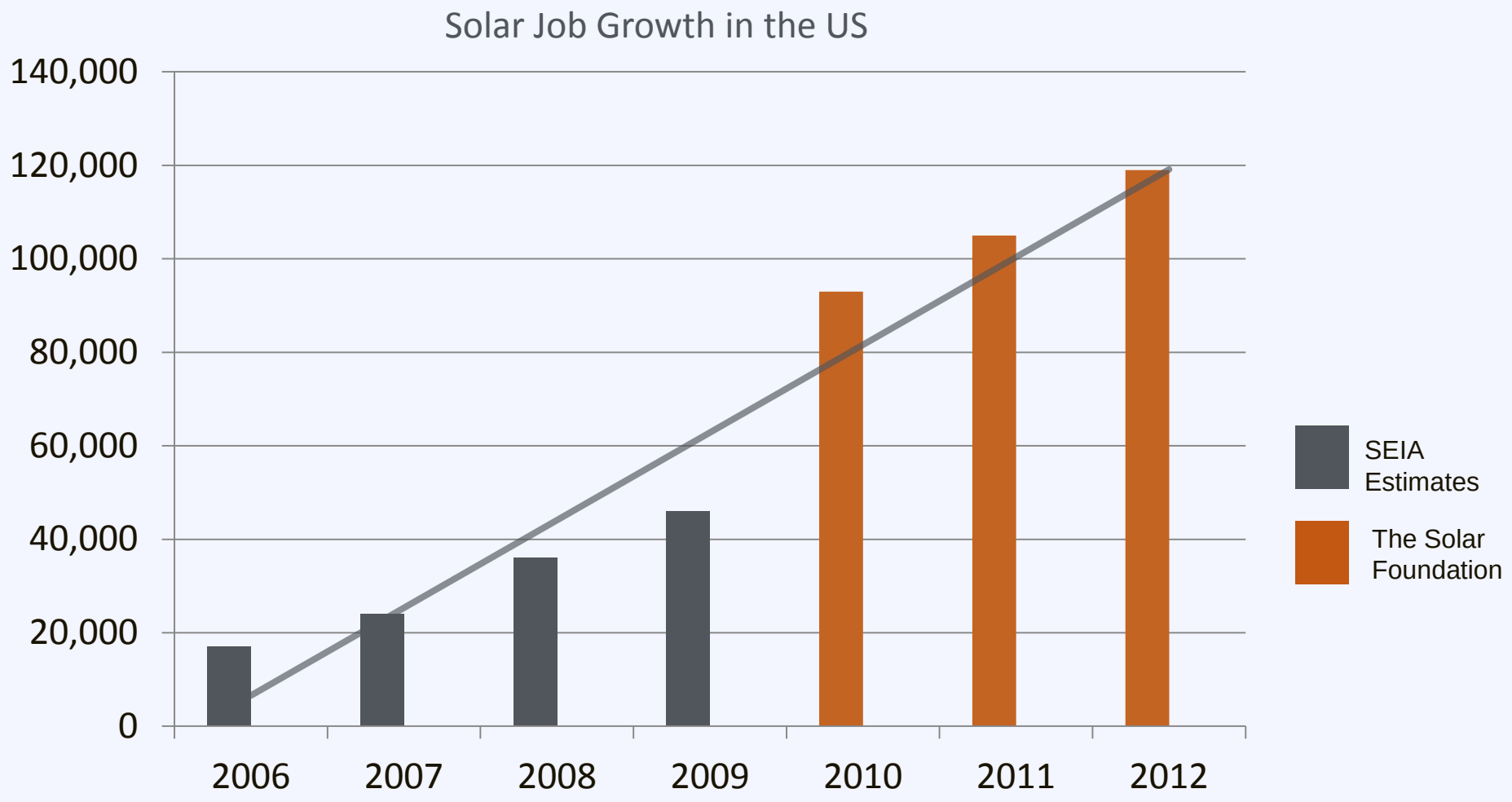
- Local economy growth
- Local jobs
- Energy independence
- Stabilizes price volatility
- Valuable to utilities
- Smart investment

Benefit: Economic Growth



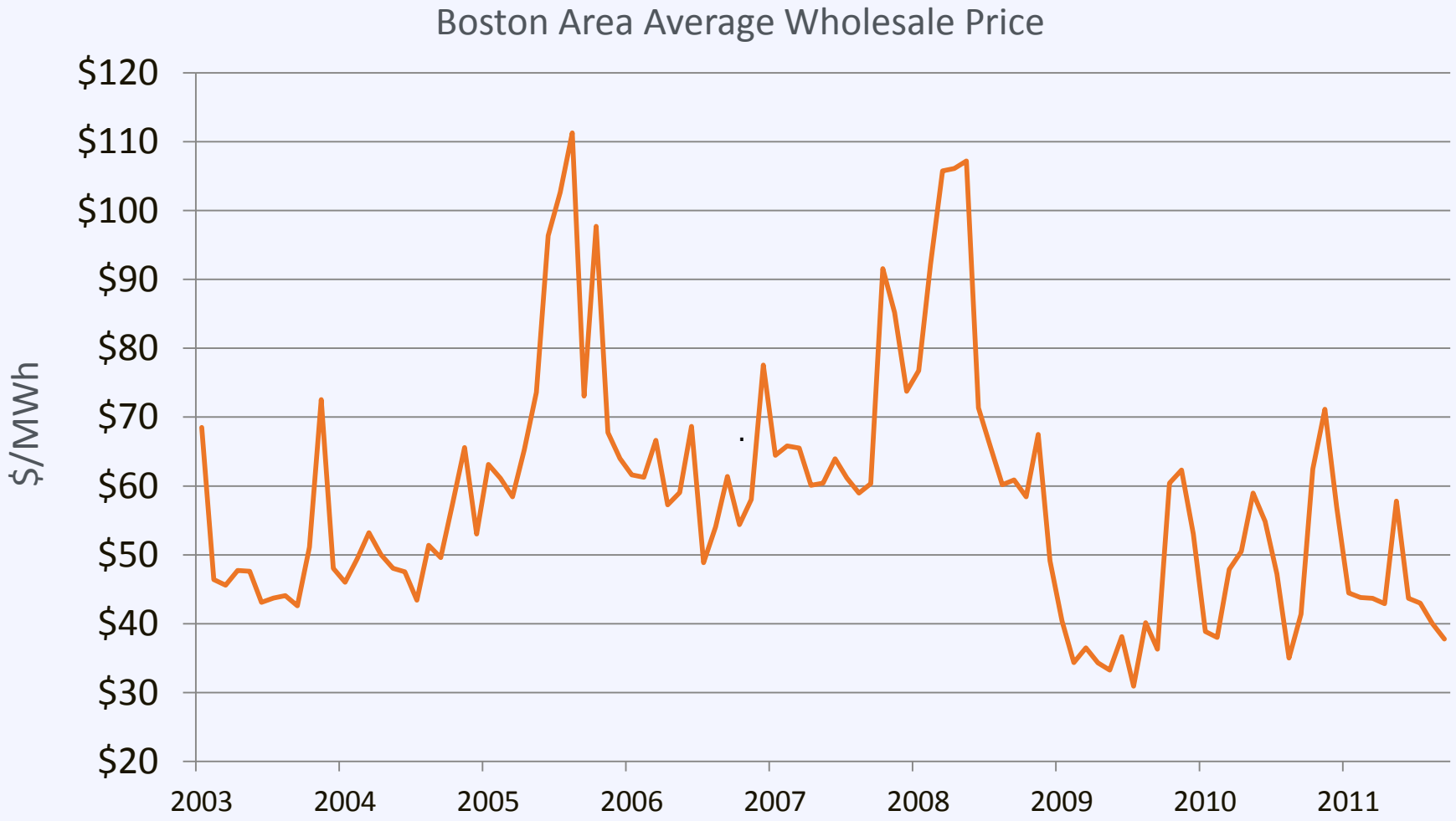
Source: SEIA/GTM Research – 2009/2010/2011/2012 Year in Review Report
http://www.seia.org/research-resources/us-solar-market-insight

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).

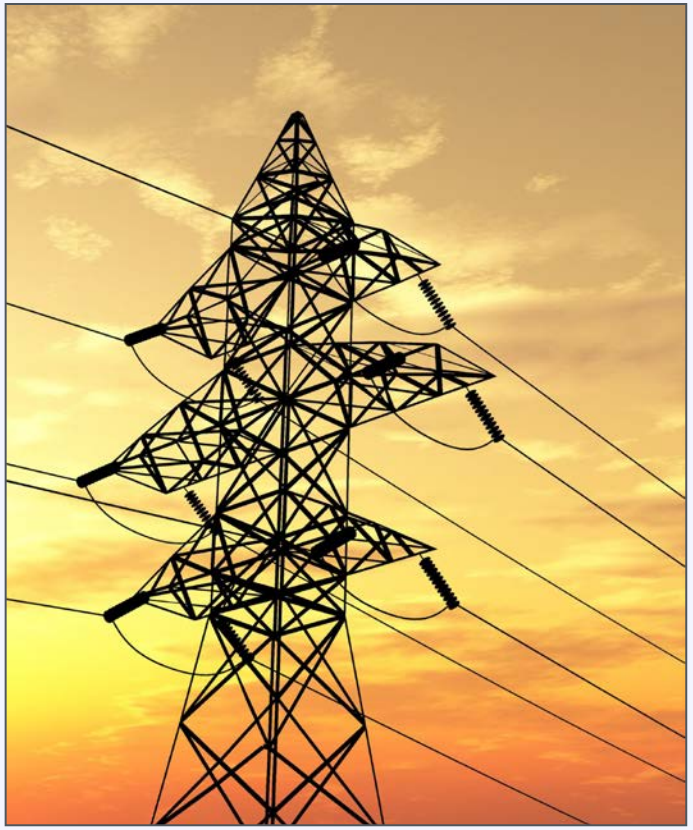
Benefit: Stabilize Energy Prices



Source: NEPOOL

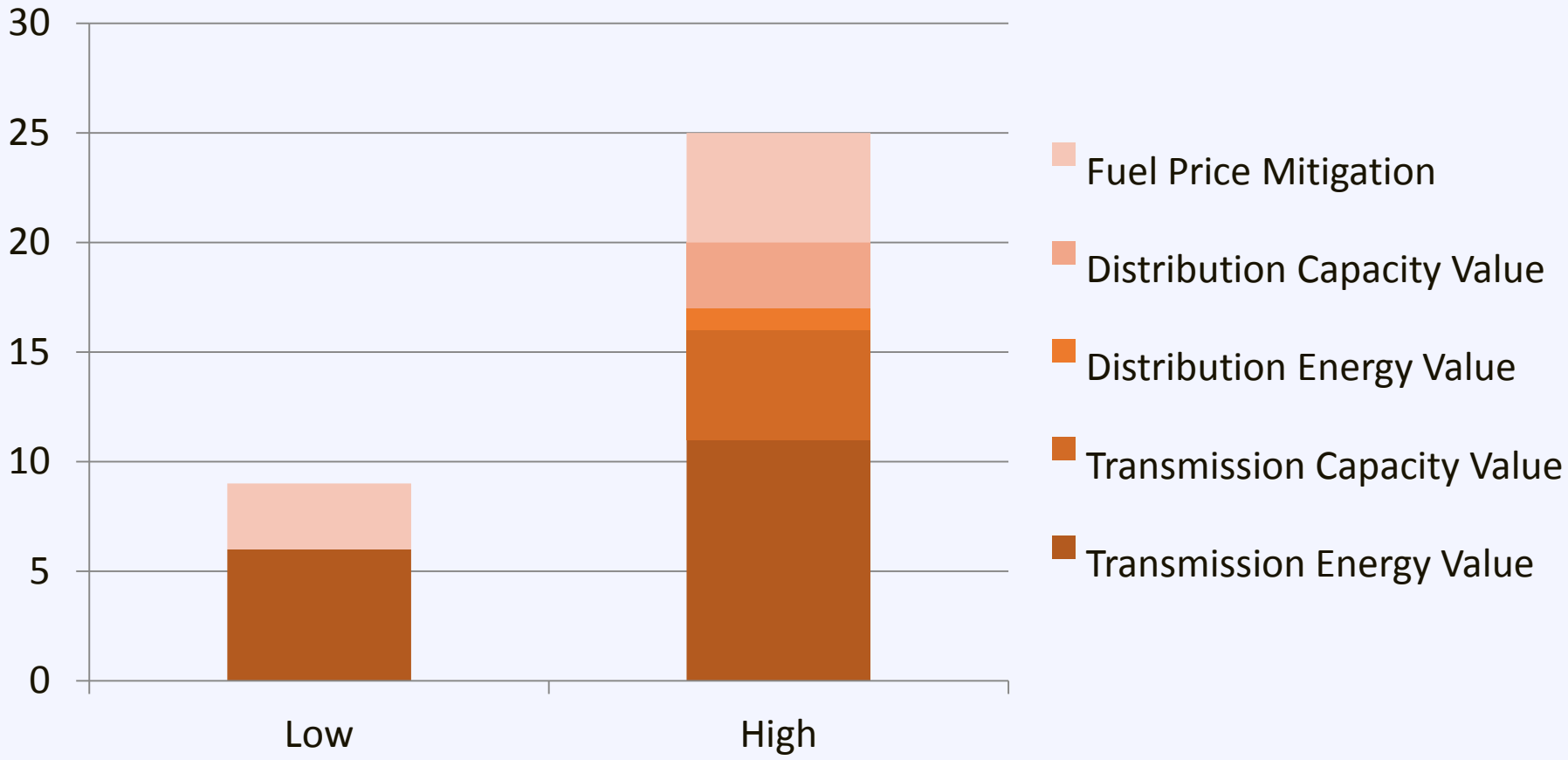
Benefits: Valuable to Utilities

- 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



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

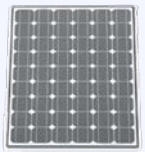
in surveyed California subdivisions

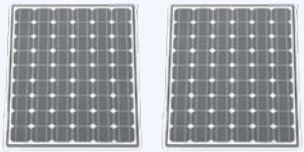
Powered by SunShot U.S. Department of Energy

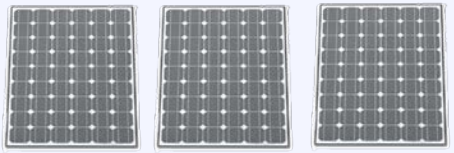
Source: http://www.nrel.gov/docs/fy07osti/38304-01.pdf

Benefit: Smart Investment for Homes

From SunRun:

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

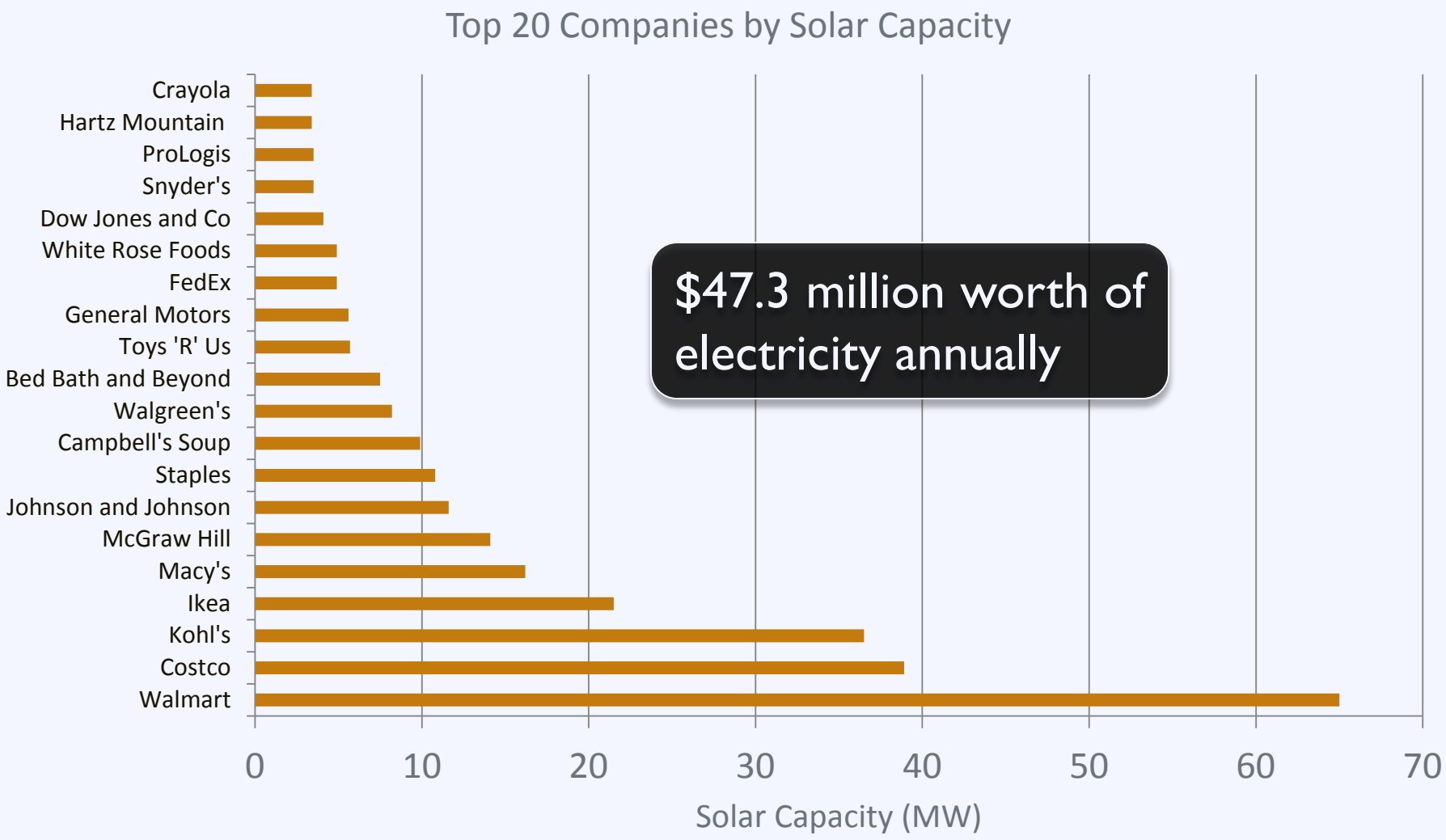
6 kW  = **$ 33,000** *added sale premium*

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

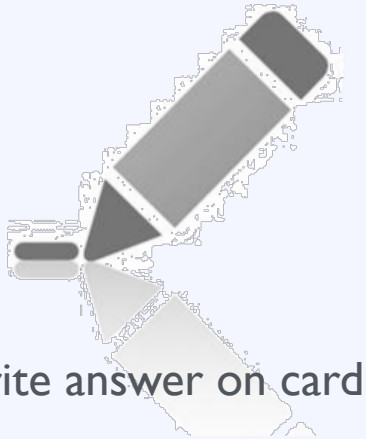
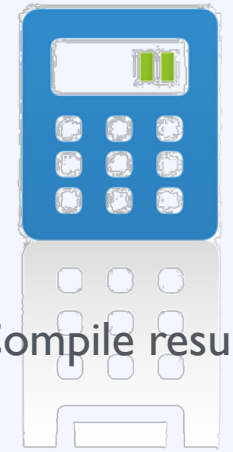
Source: Solar Energy Industries Association

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
		
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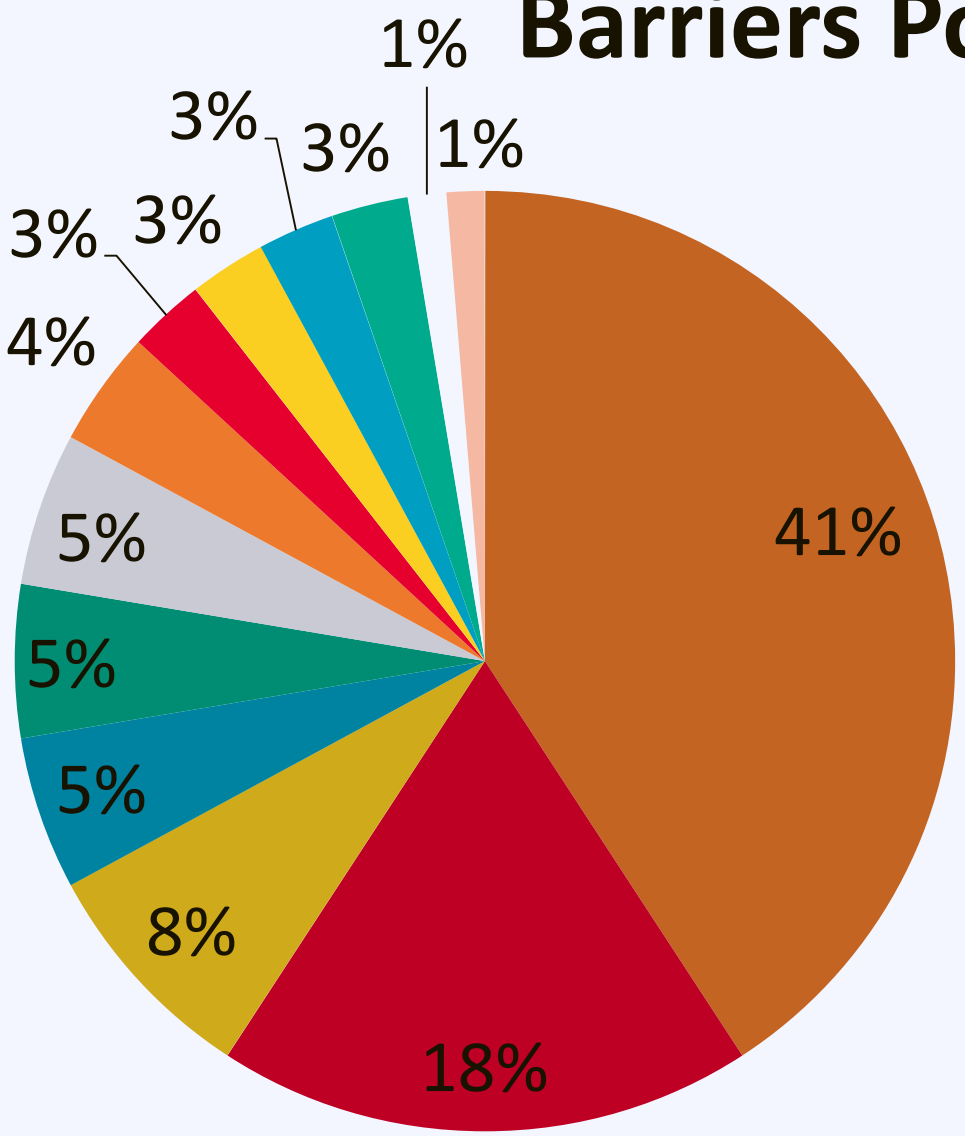
Barriers Poll

Barriers Poll



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

Some things you may hear…

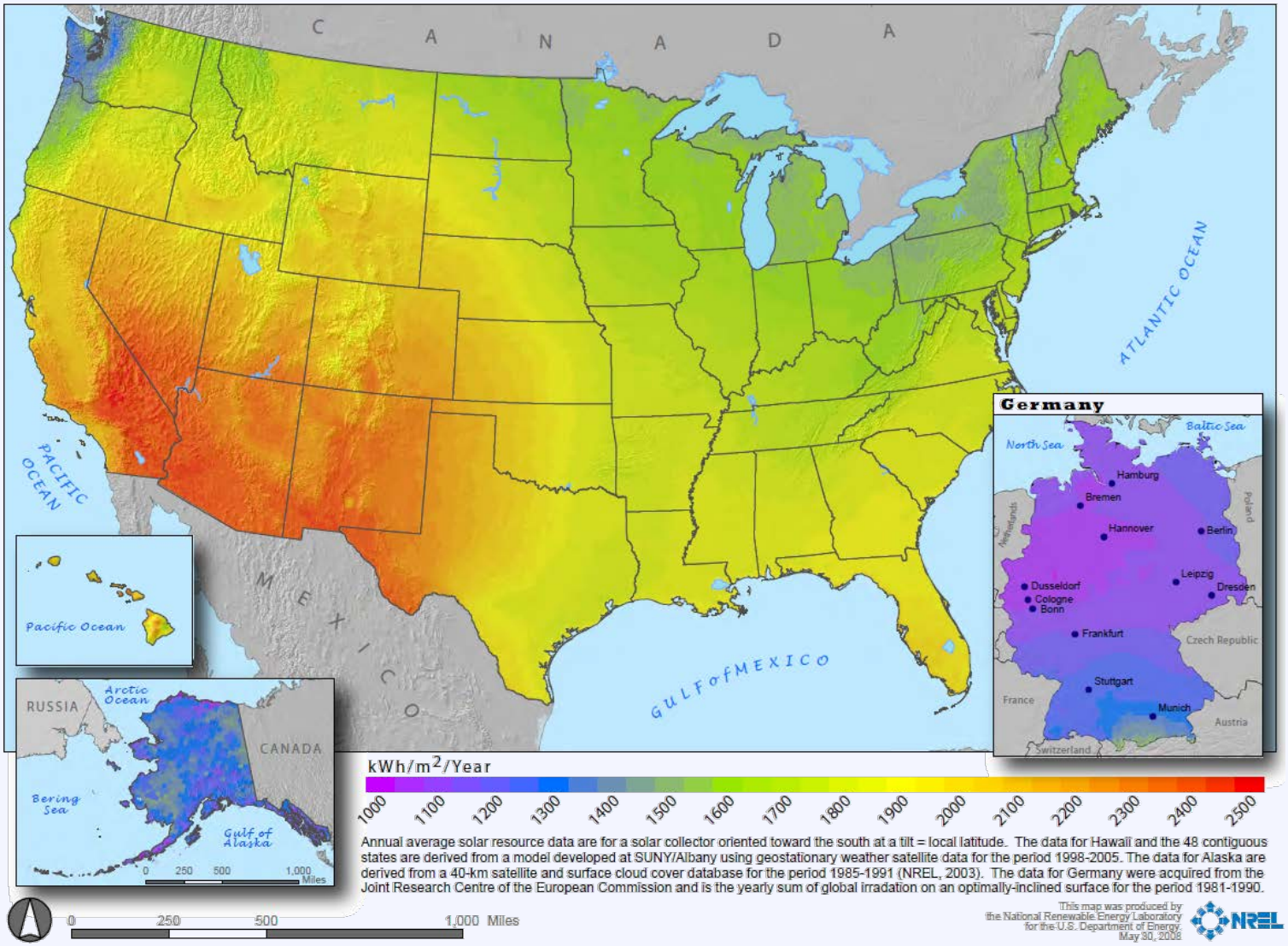
My area isn't sunny enough for solar

Going solar is too expensive

Solar is not ready to compete as a serious energy source

The government should not "pick winners and losers"

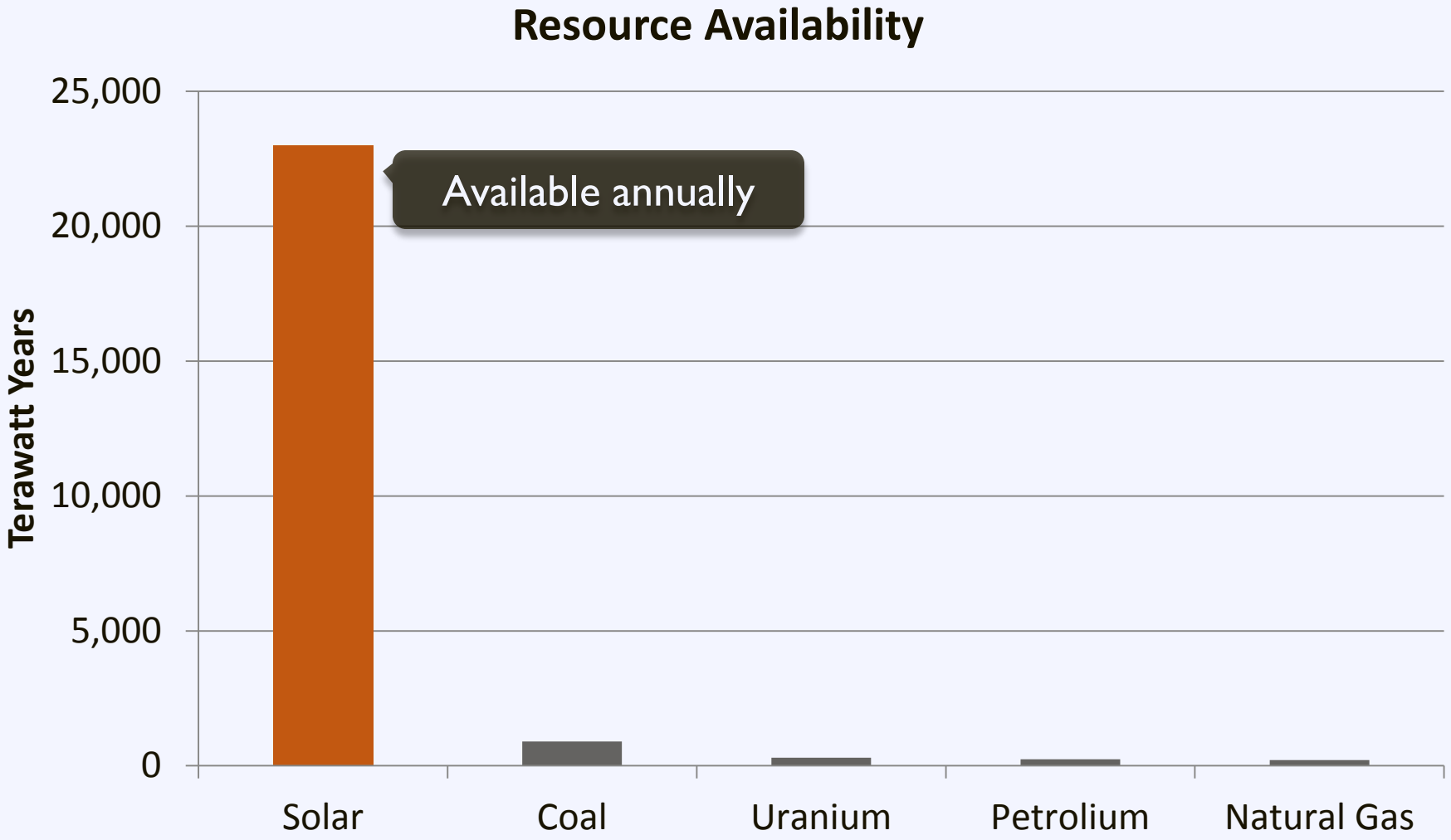
Fact: Solar works across the US



Powered by SunShot U.S. Department of Energy

Source: National Renewable Energy Laboratory

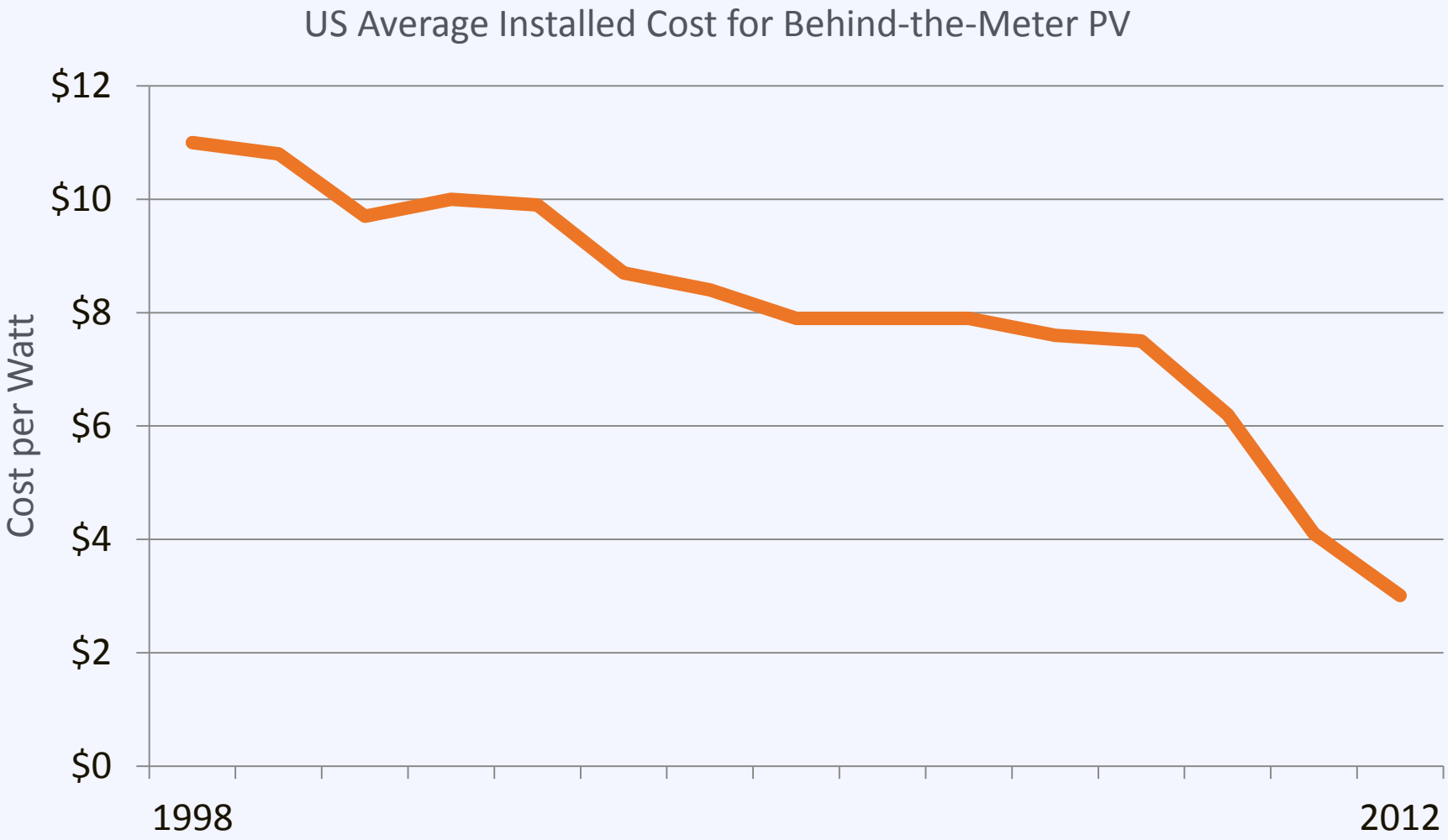
Fact: Solar is a ubiquitous resource



Powered by SunShot
U.S. Department of Energy

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

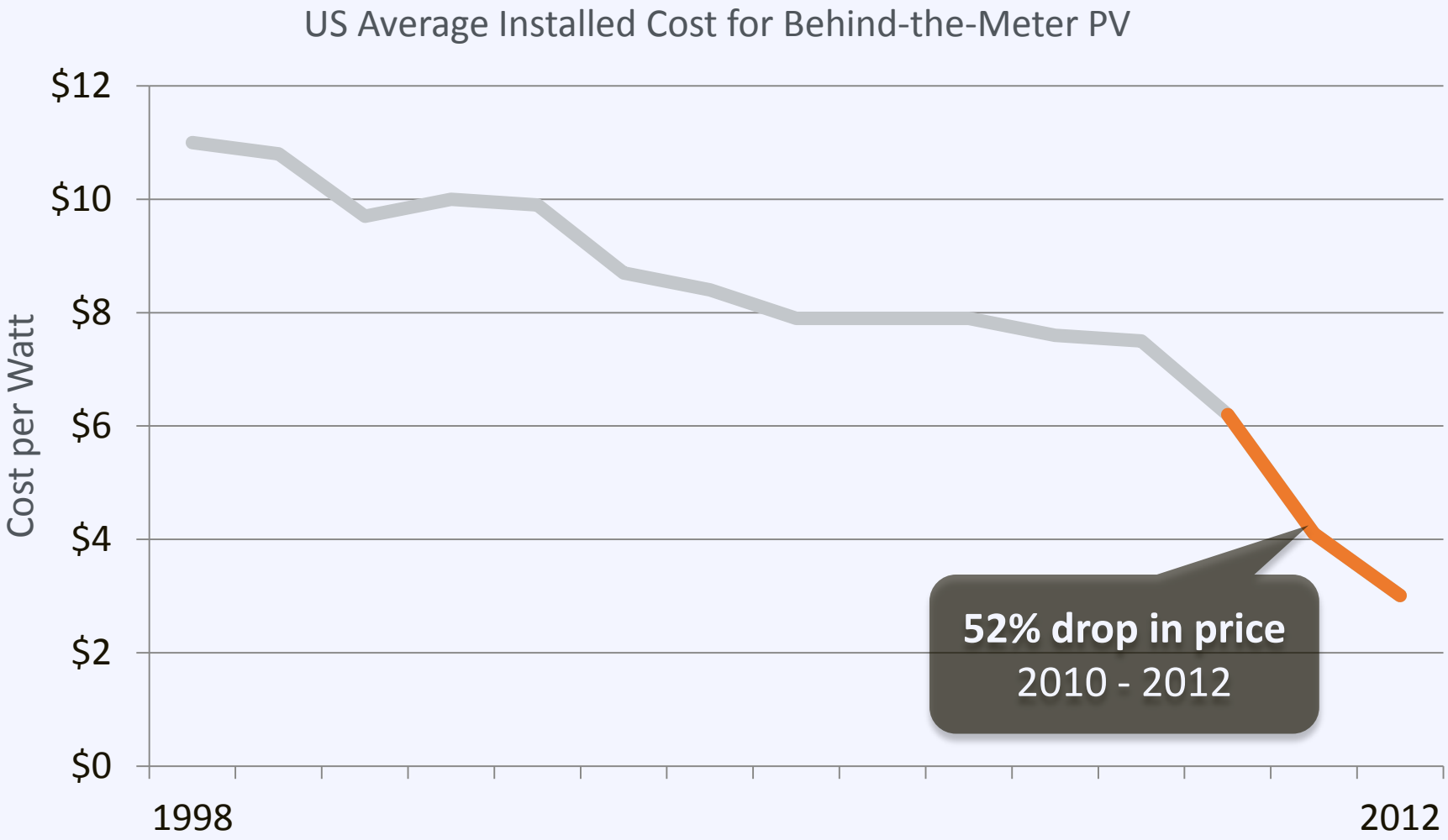
Fact: Solar is cost competitive



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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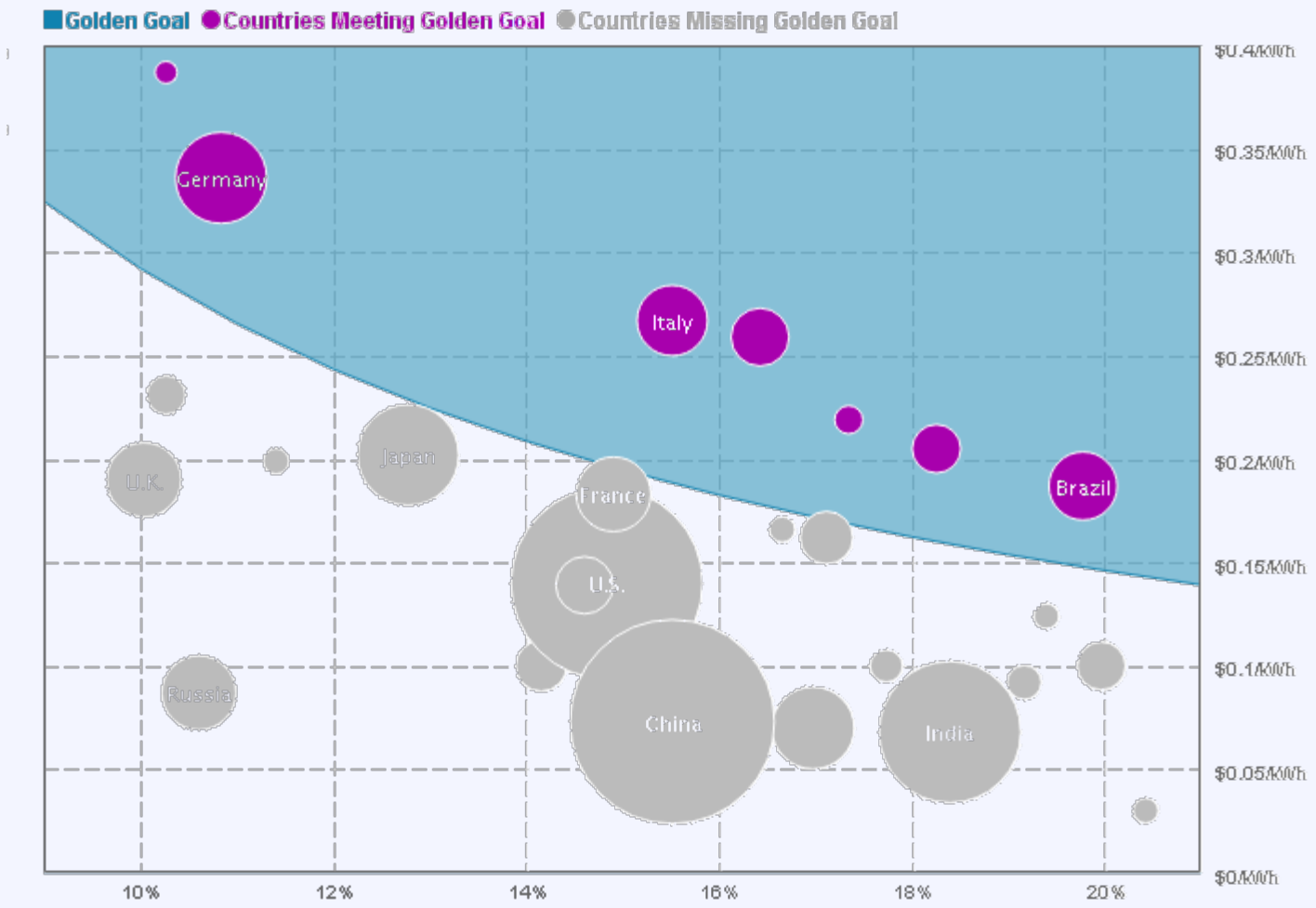
Powered by SunShot U.S. Department of Energy

Fact: Solar is cost competitive

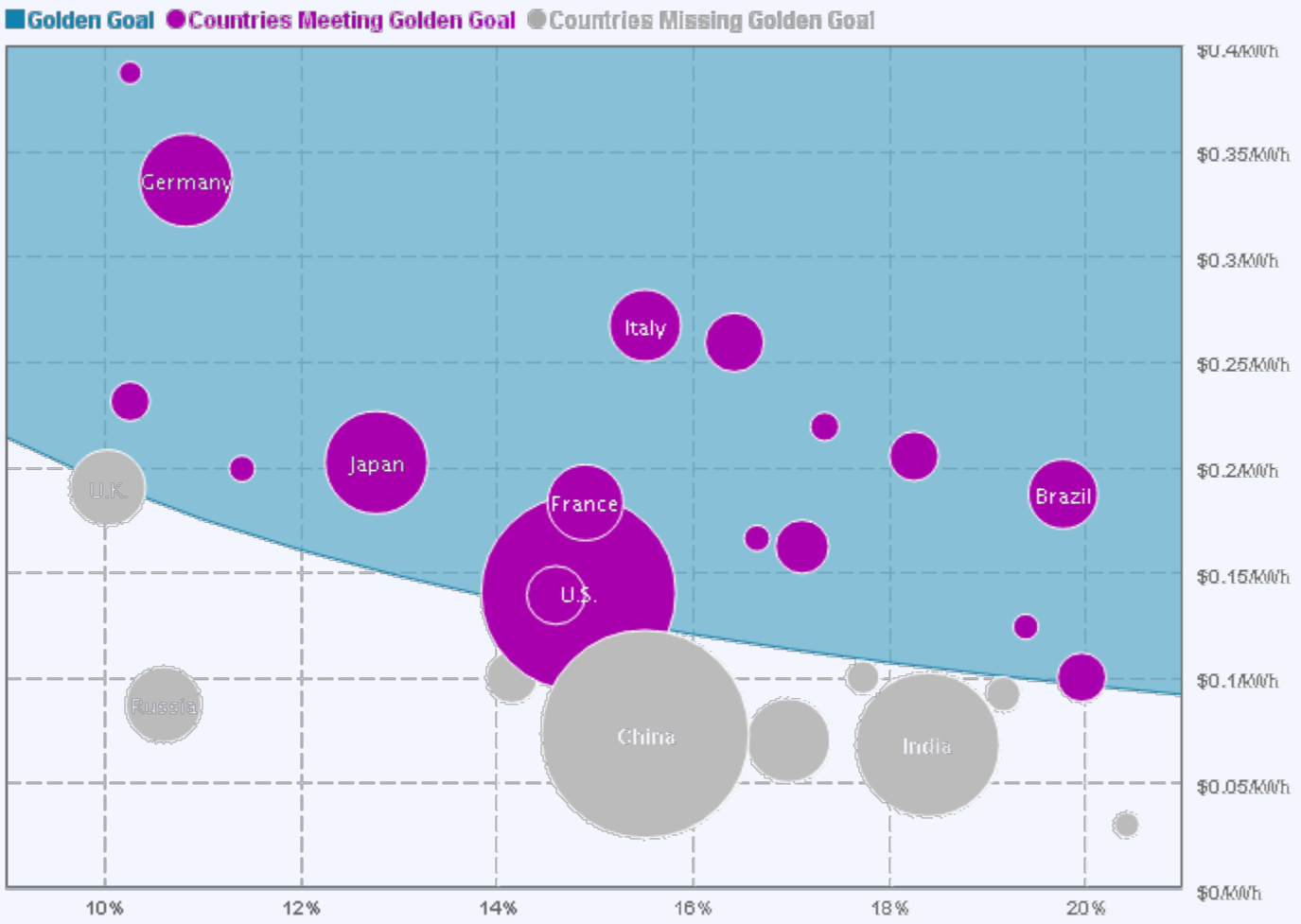
2012



Source: Bloomberg

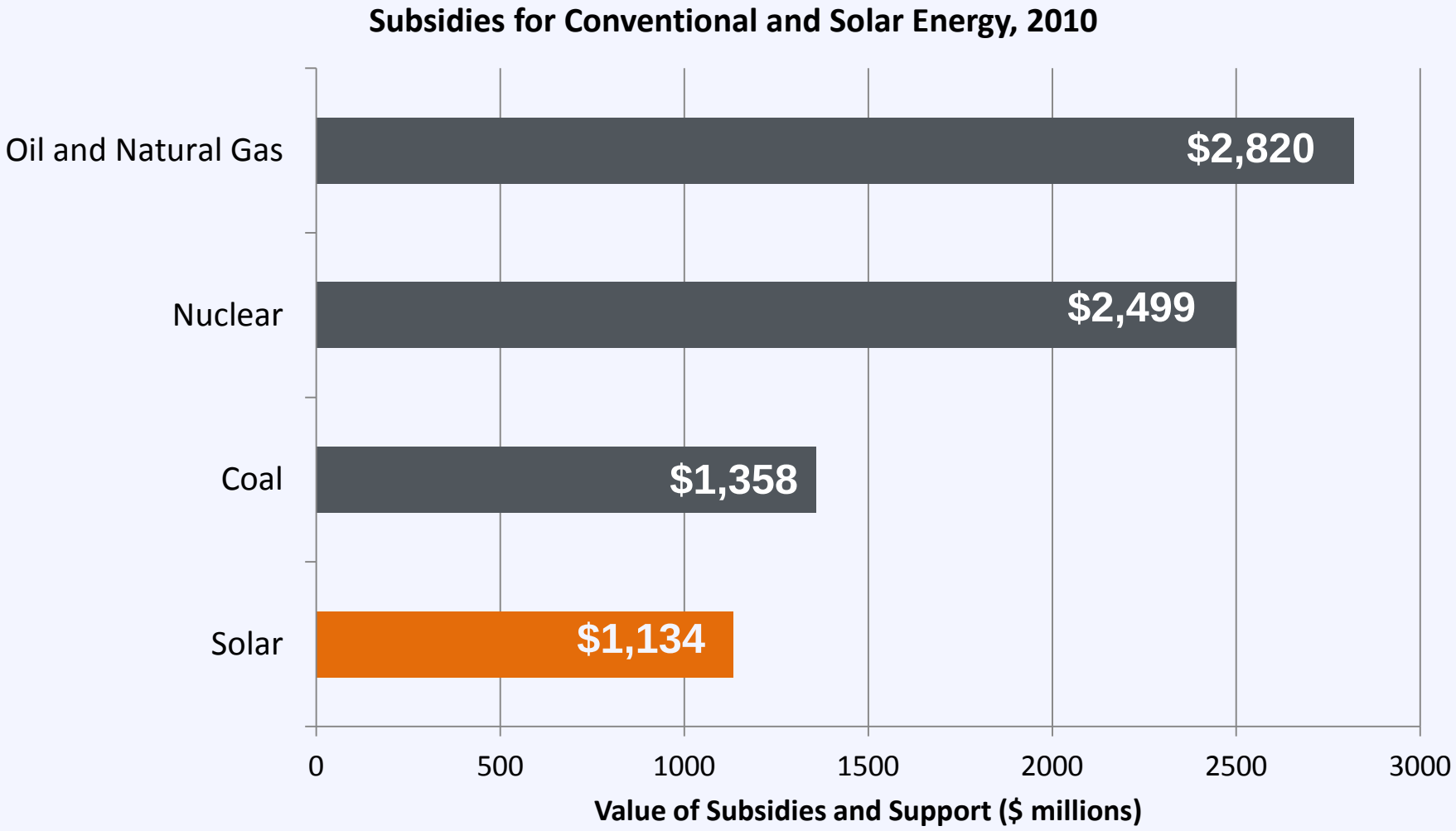
Fact: Solar is cost competitive

2020



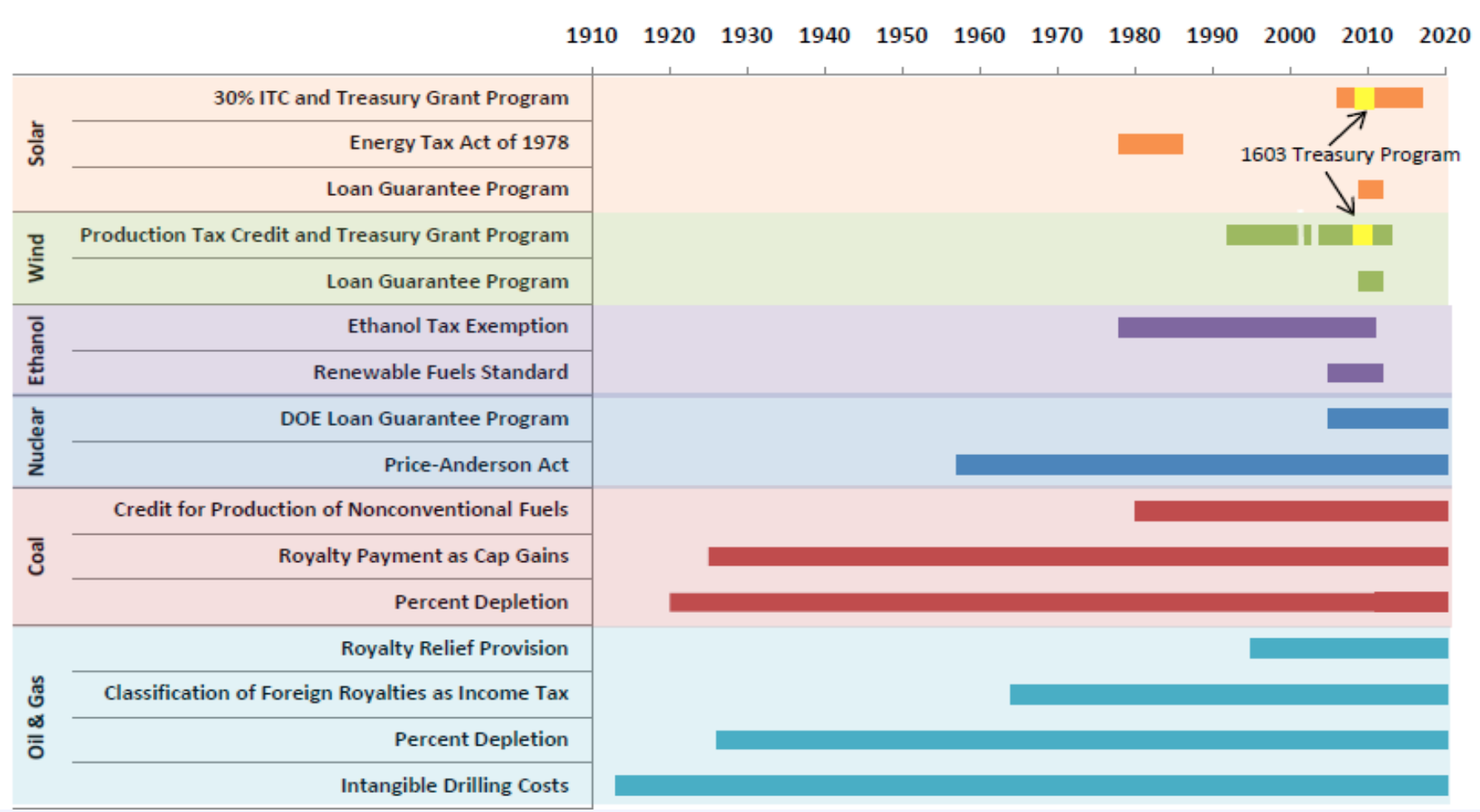
Source: Bloomberg

Subsidies and Support



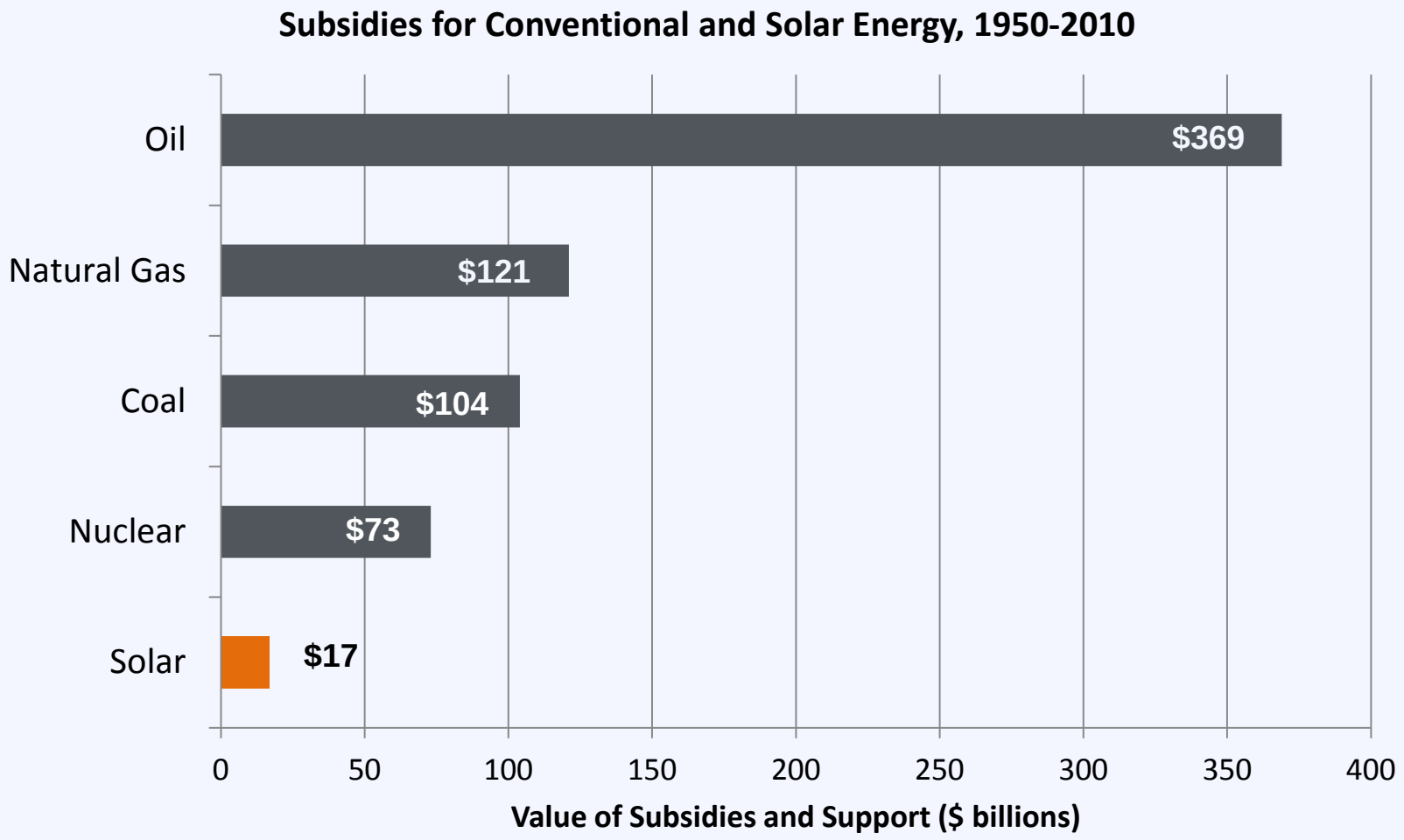
Source: U.S. Energy Information Administration. July 2011. *Direct Federal Interventions and Subsidies in Energy in Fiscal Year 2010*

Subsidies and Support



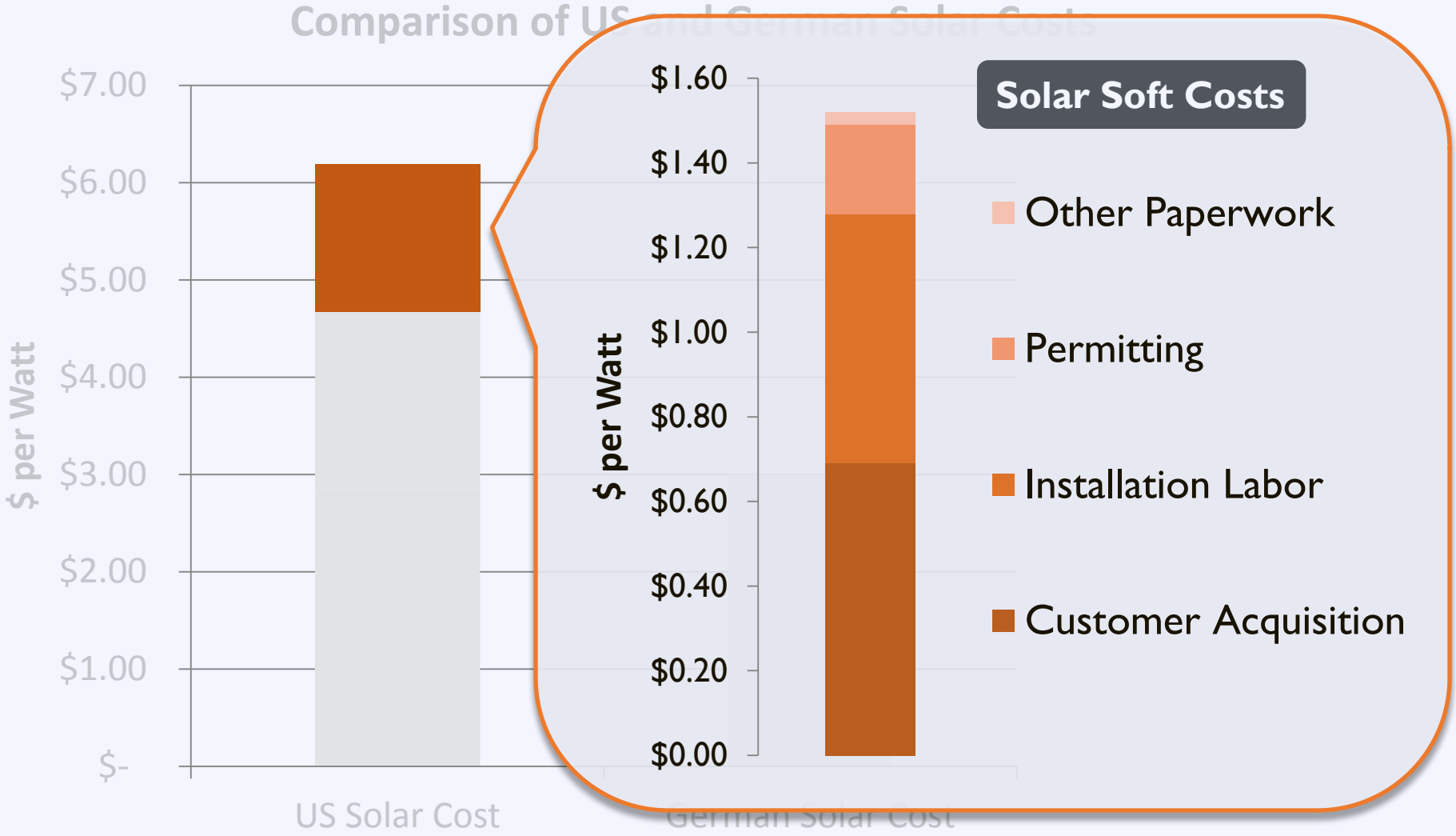
Source: SEIA, Federal Energy Incentives in the United States (2011), http://www.seia.org/galleries/pdf/Federal_Energy_Incentives_in_the_United_States.pdf

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



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)

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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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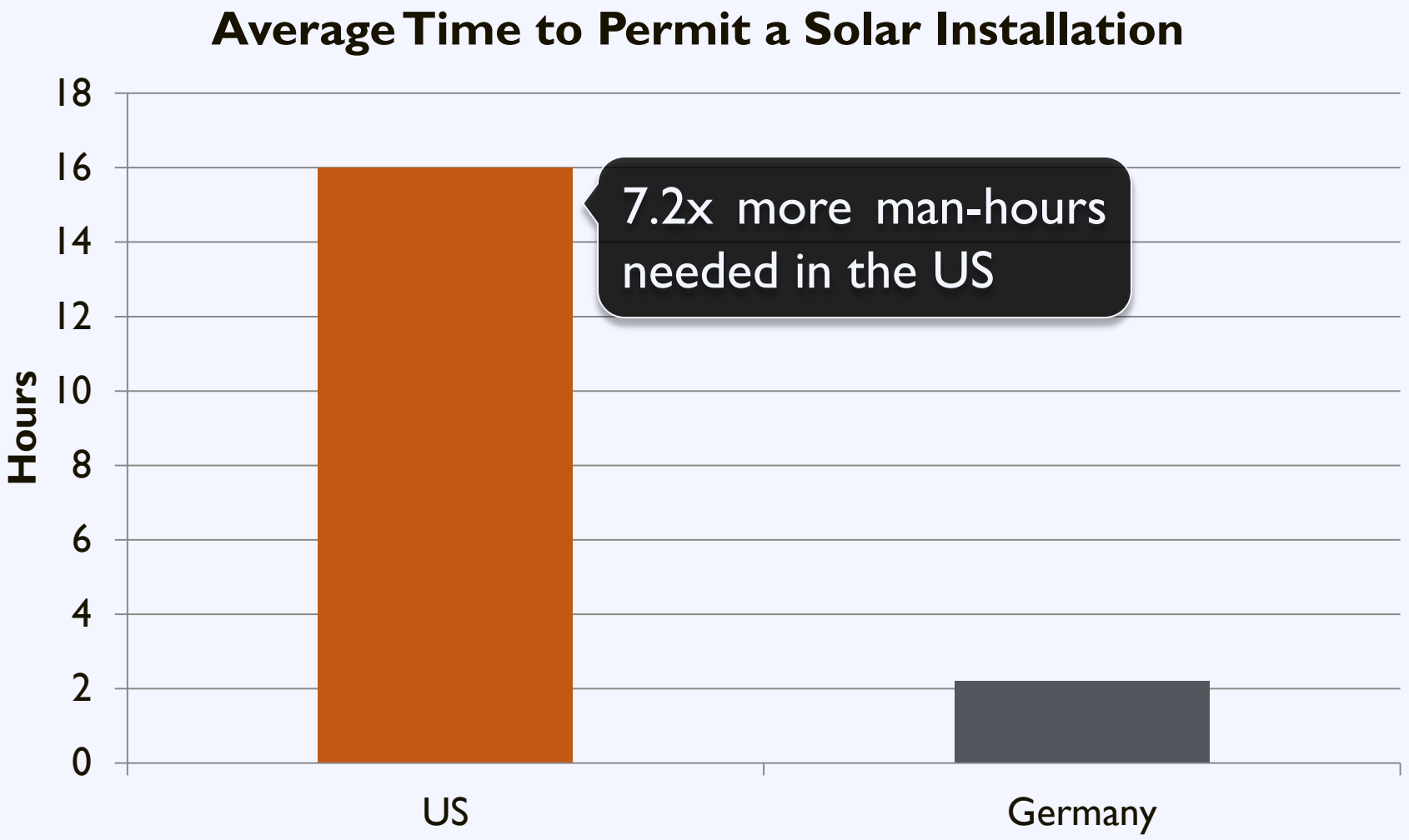
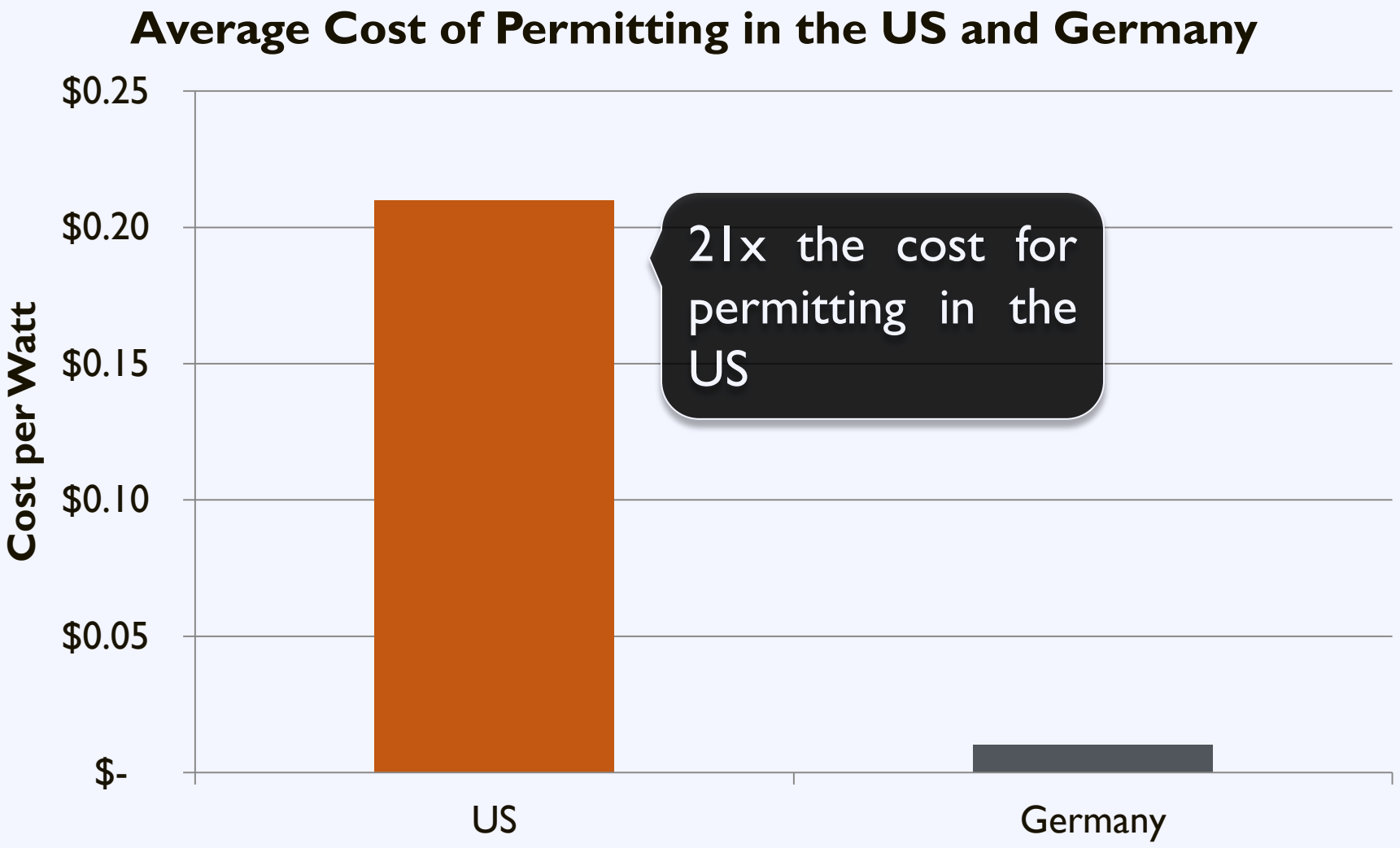
Photon Magazine

Time to Installation



Permitting Costs



Source: NREL, LBNL

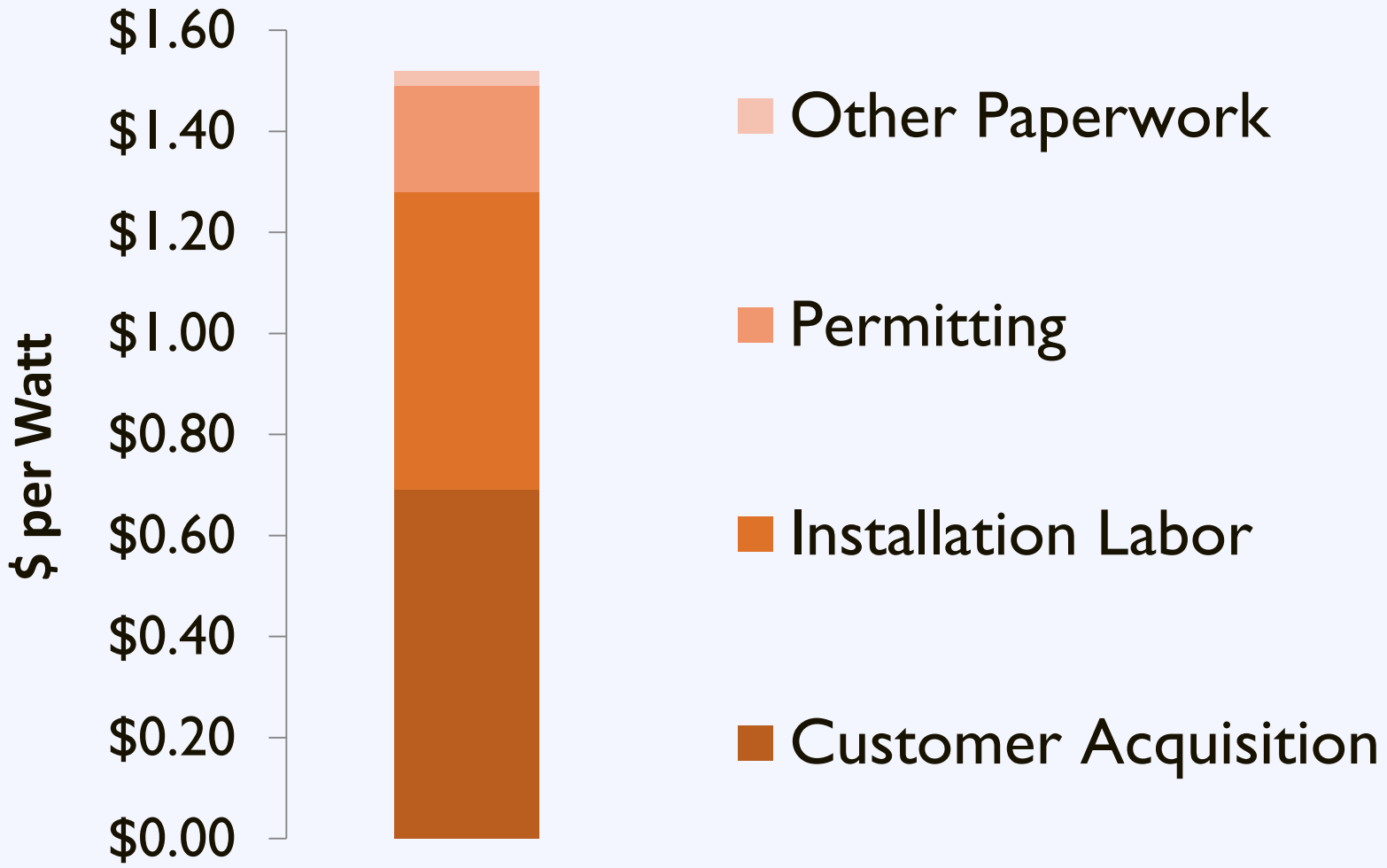
Germany's Success

Consistency and Transparency

through

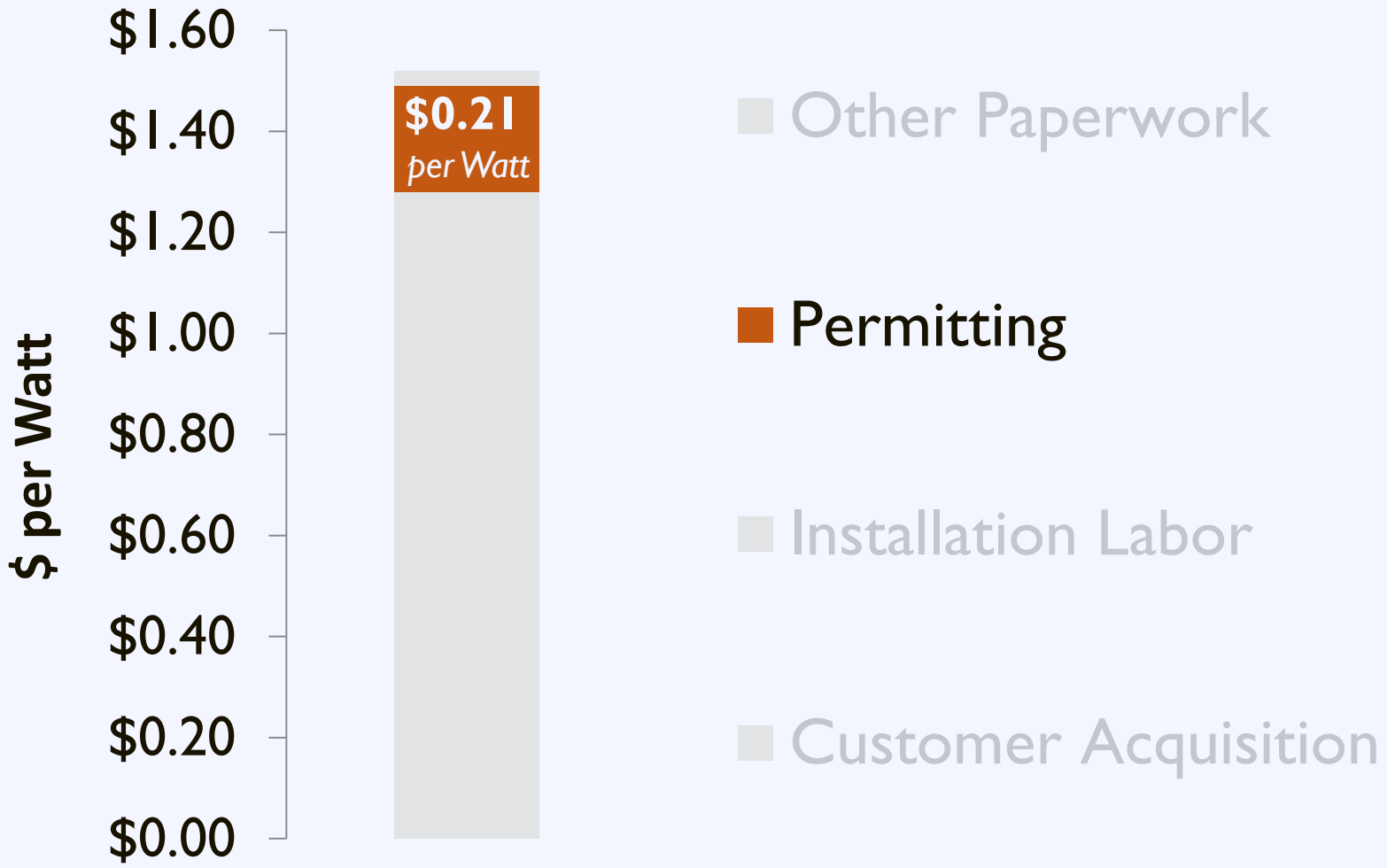
Standardized Processes

Mitigate Soft Costs



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)

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

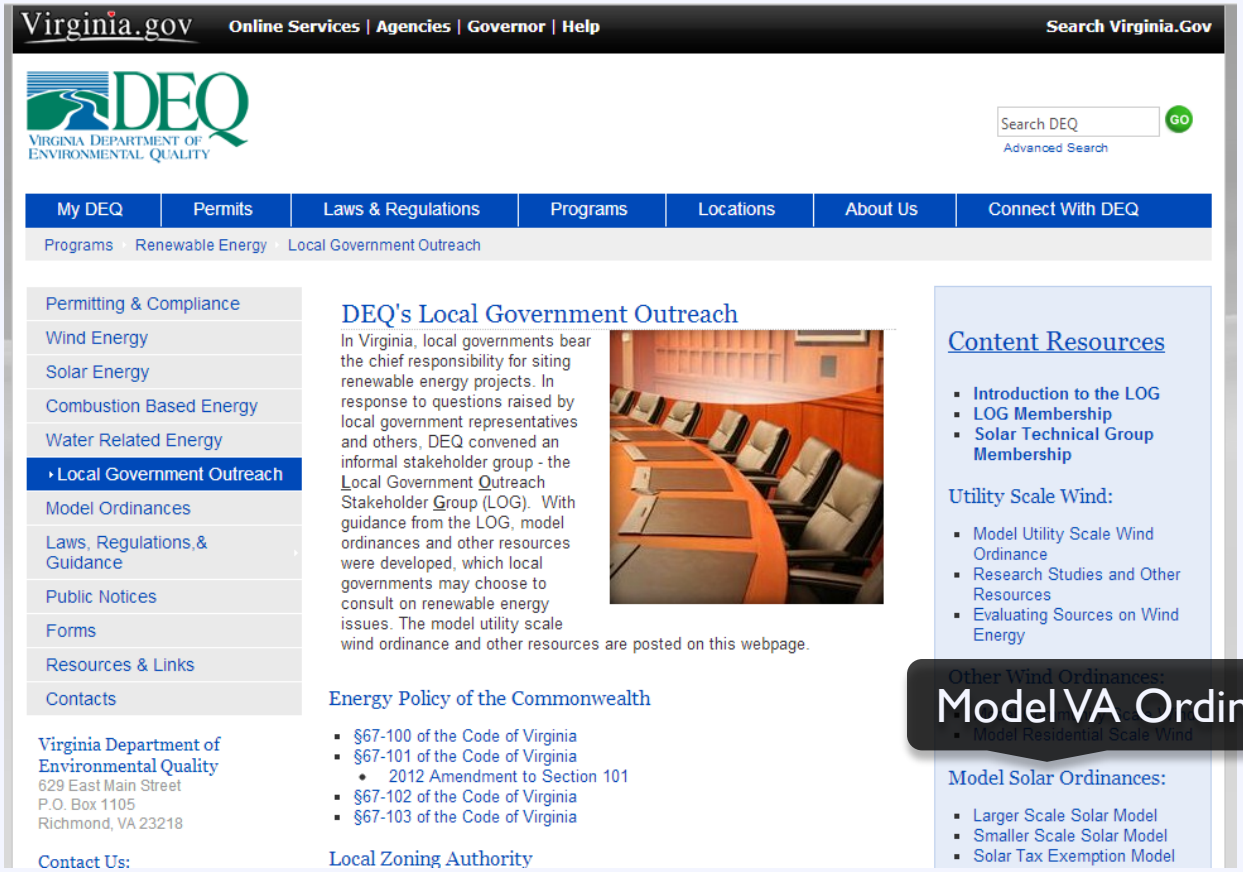
Zoning Codes: Large Scale Solar

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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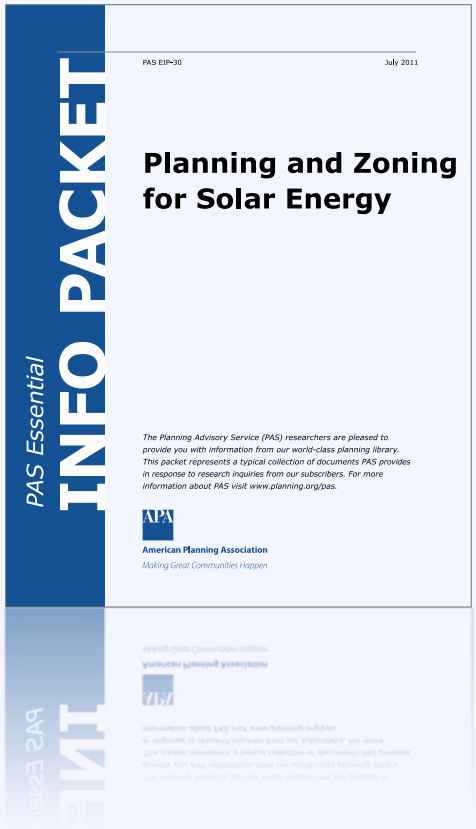
U.S. Department of Energy

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

Powered by SunShot
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

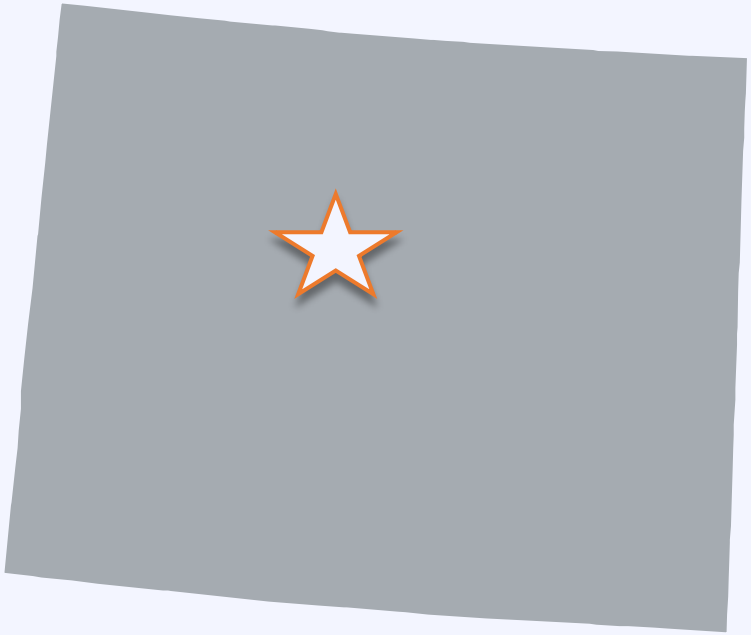
Solar Permitting Best Practices:

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

Powered by SunShot
U.S. Department of Energy

Source: Vote Solar

Expedited Permitting: Case Study



Breckenridge, Colorado

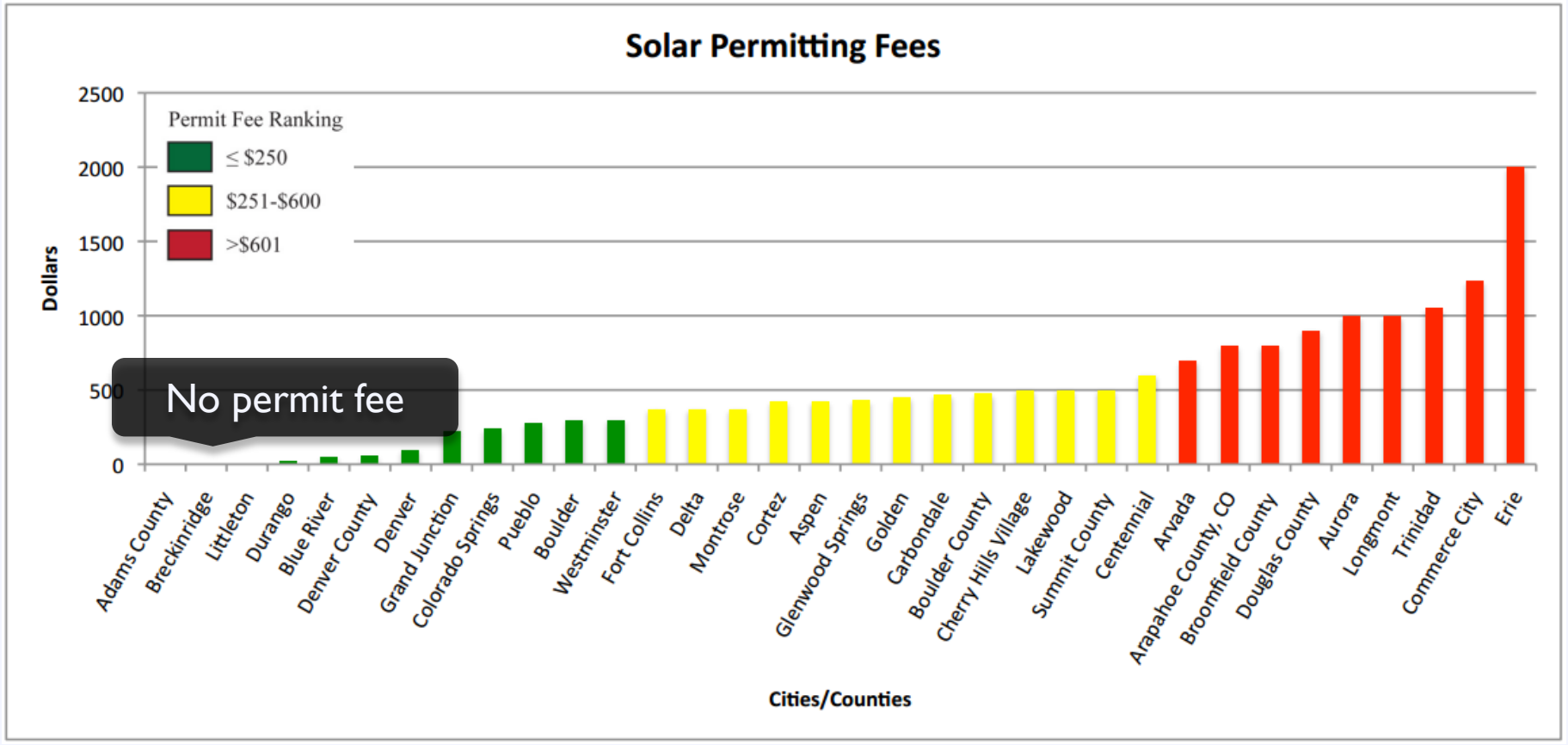
Population: 4,540

Powered by SunShot
U.S. Department of Energy

Source: Wikipedia

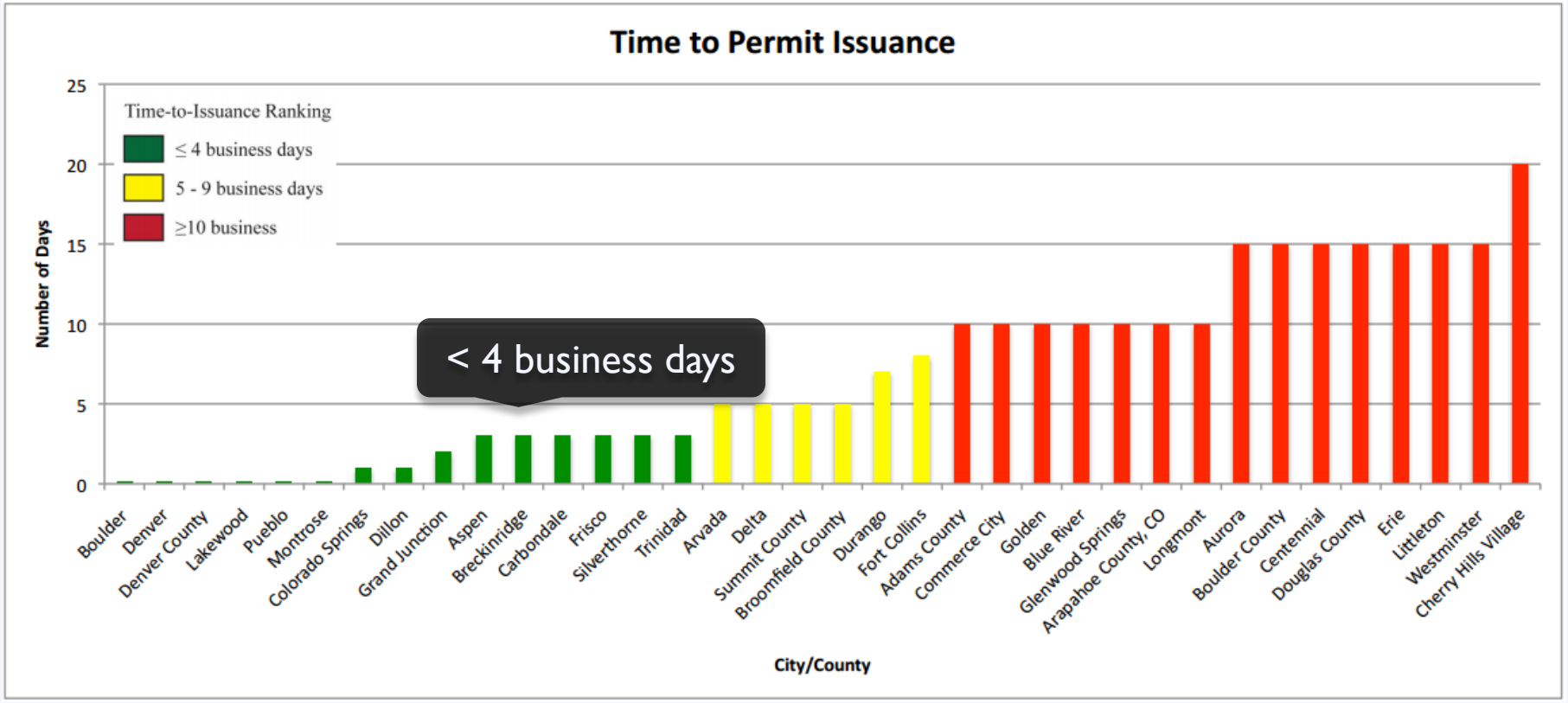
Expedited Permitting: Case Study

Breckenridge charges no fees to file for a solar permit



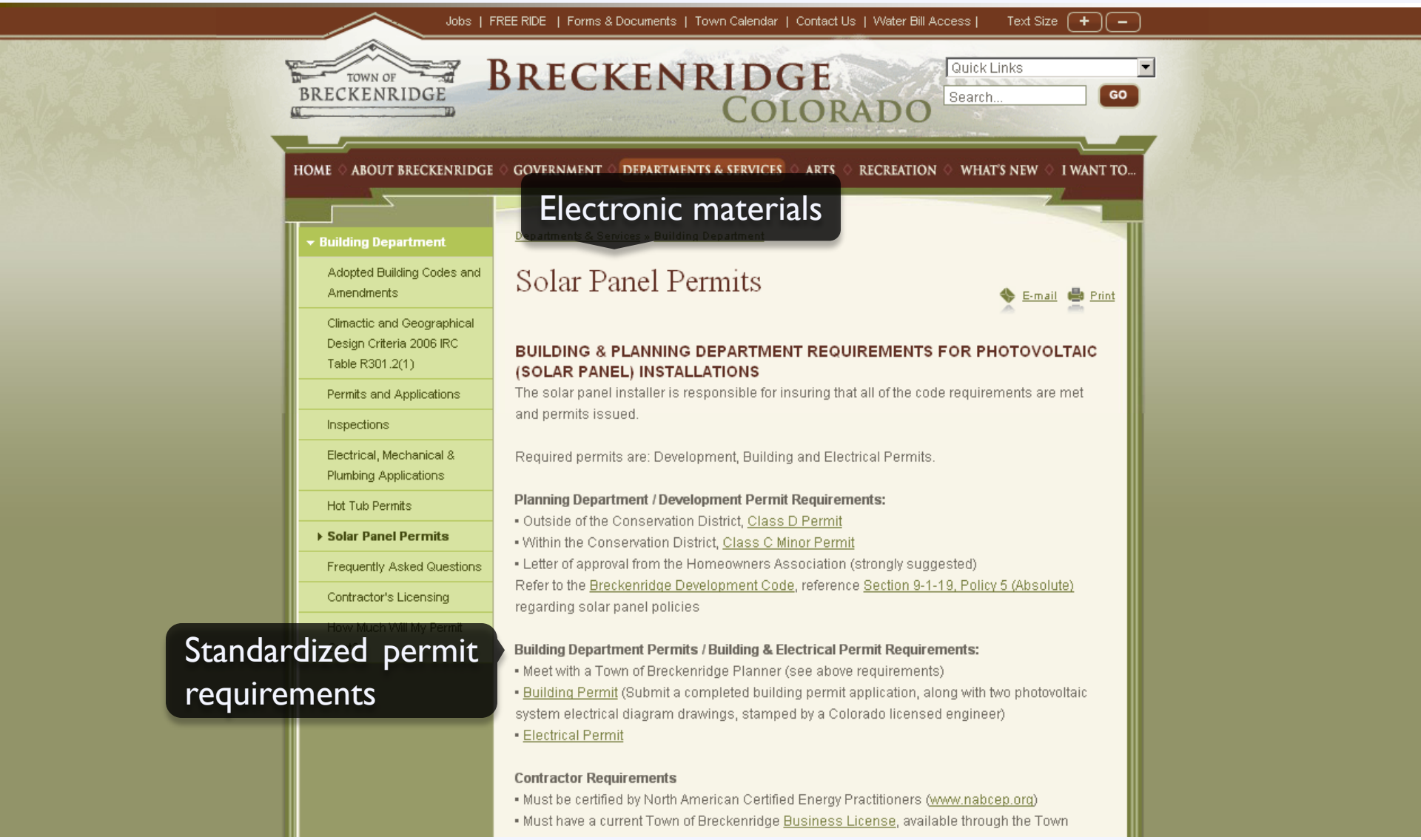
Expedited Permitting: Case Study

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

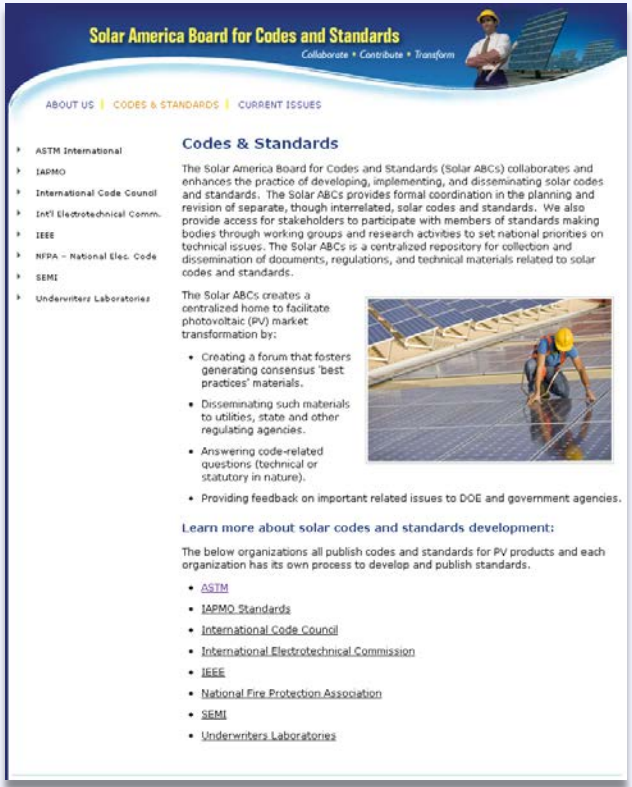
Source: Breckenridge, CO (http://www.townofbreckenridge.com/index.aspx?page=694)

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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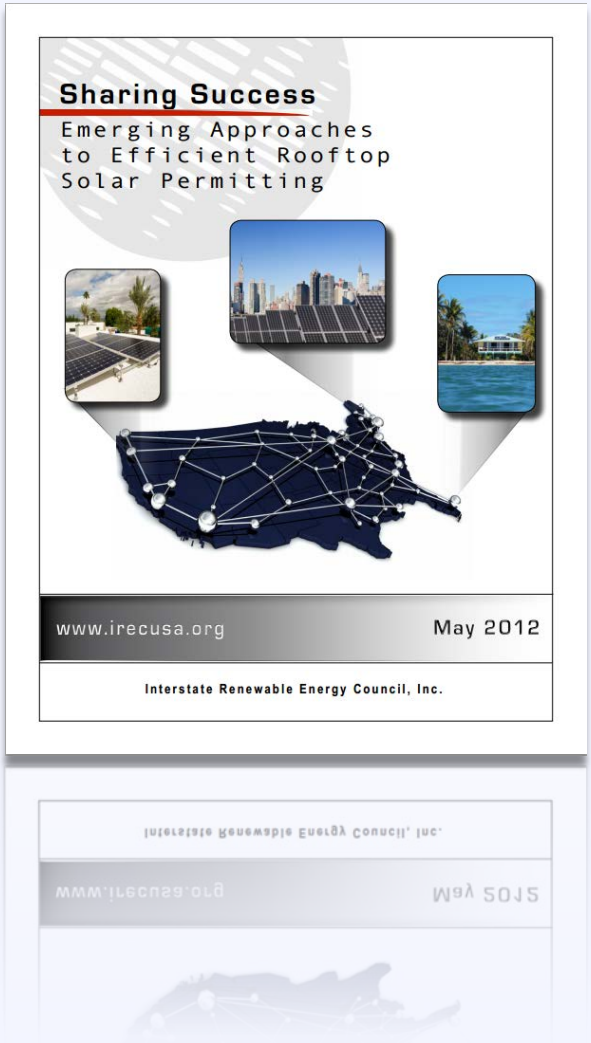
U.S. Department of Energy

Expedited Permitting

Resource **Interstate Renewable Energy Council**

Outlines emerging approaches to efficient rooftop solar permitting

www.irecusa.org



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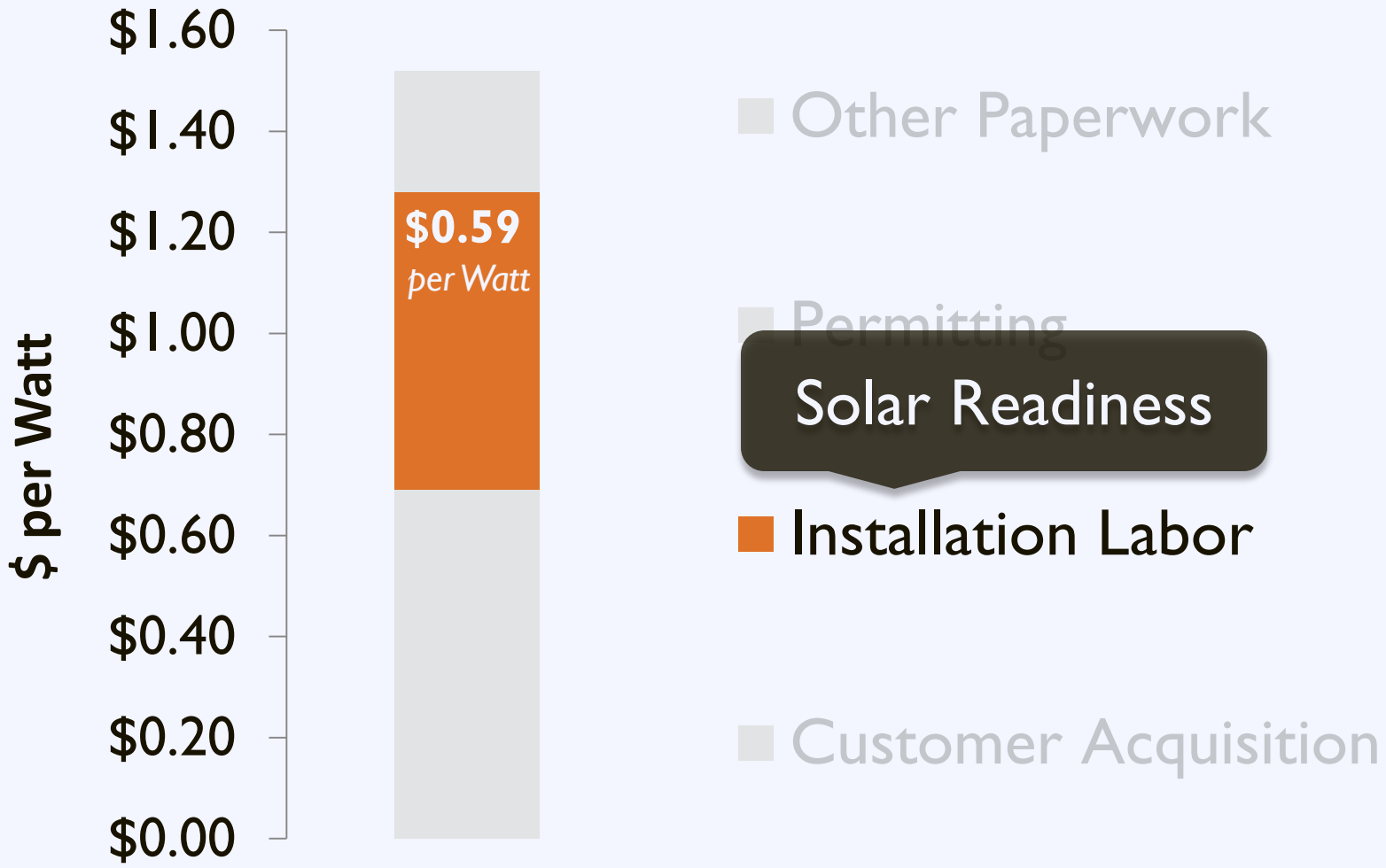
Mitigate Soft Costs



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

Solar Readiness

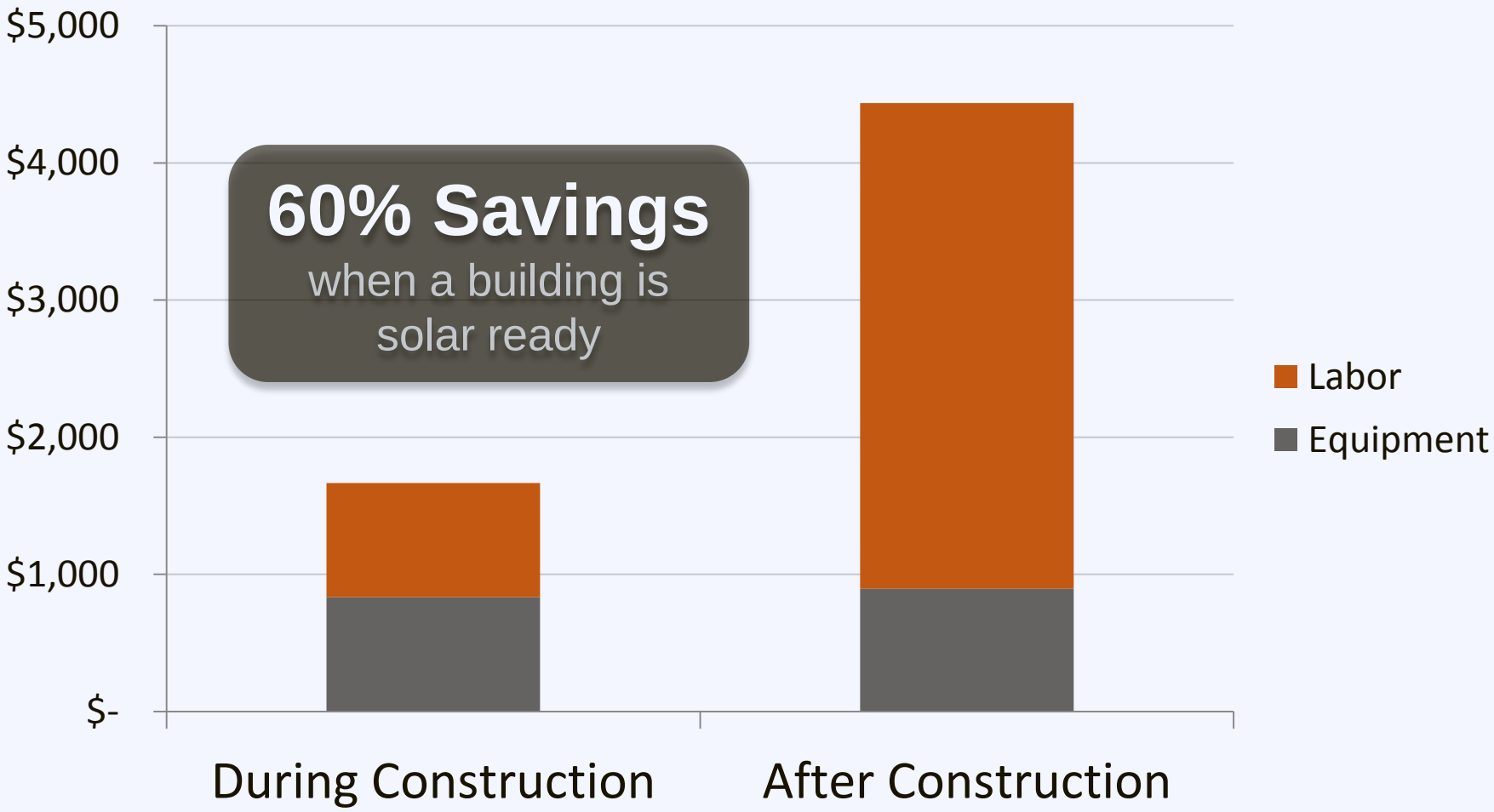
Creating solar-ready guidelines and promoting energy efficiency at the outset can help make future solar installations easier and more cost effective.

Solar Readiness

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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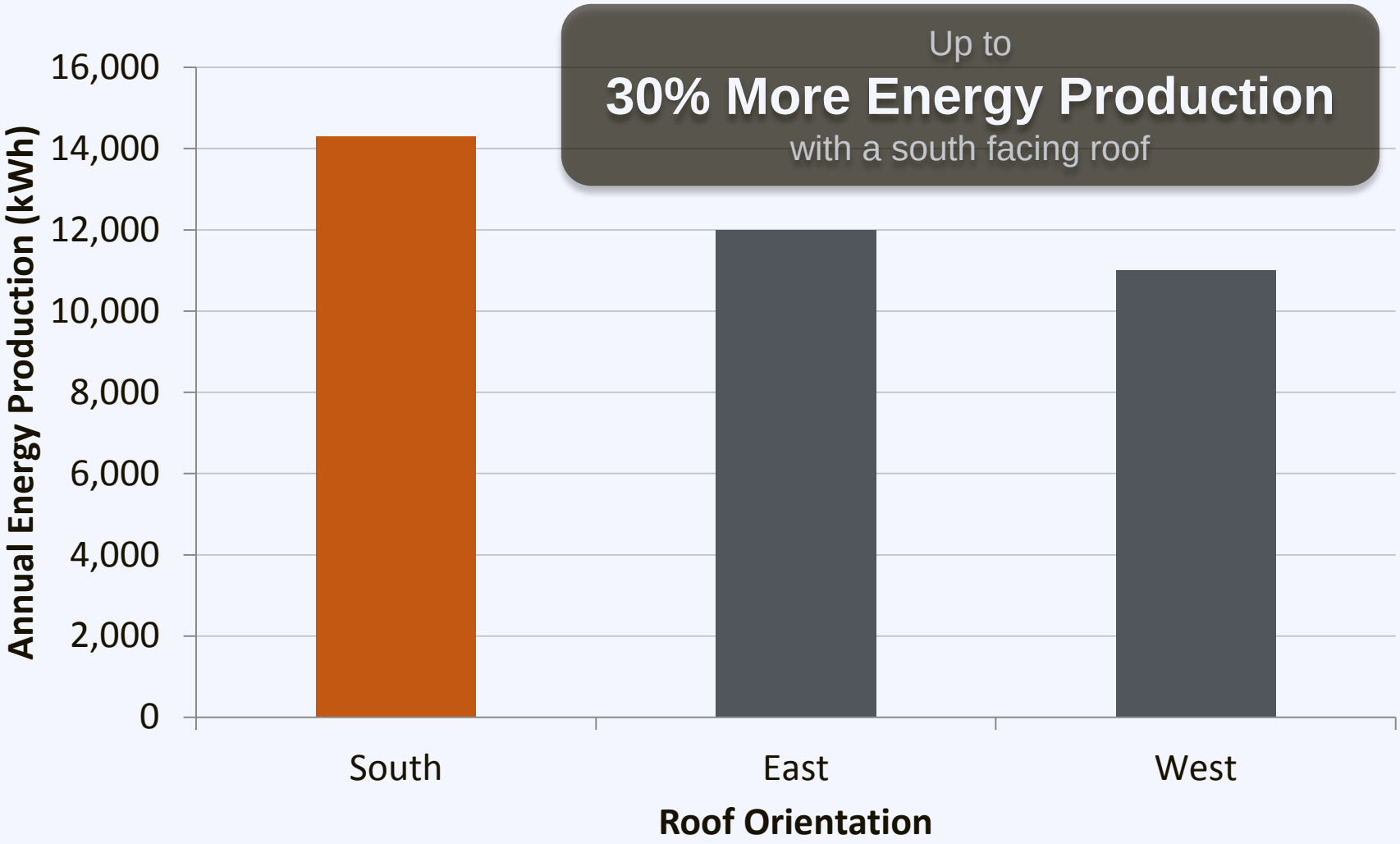
U.S. Department of Energy

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

Powered by SunShot U.S. Department of Energy

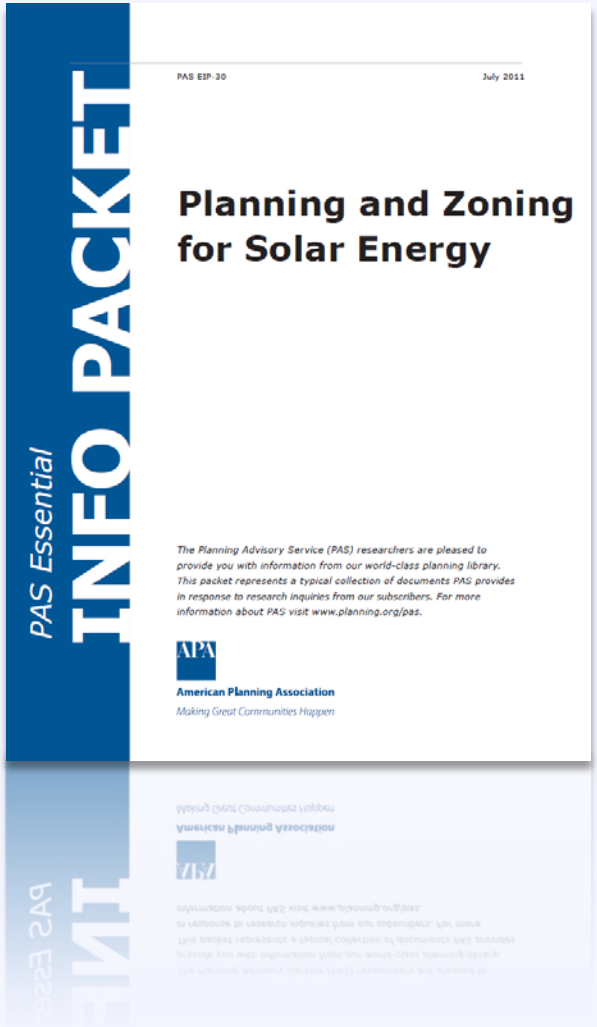
Source: NREL

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
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

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

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U.S. Department of Energy

The Solar Equation

Cost

+ Installed Cost

+ Maintenance

- Direct Incentive

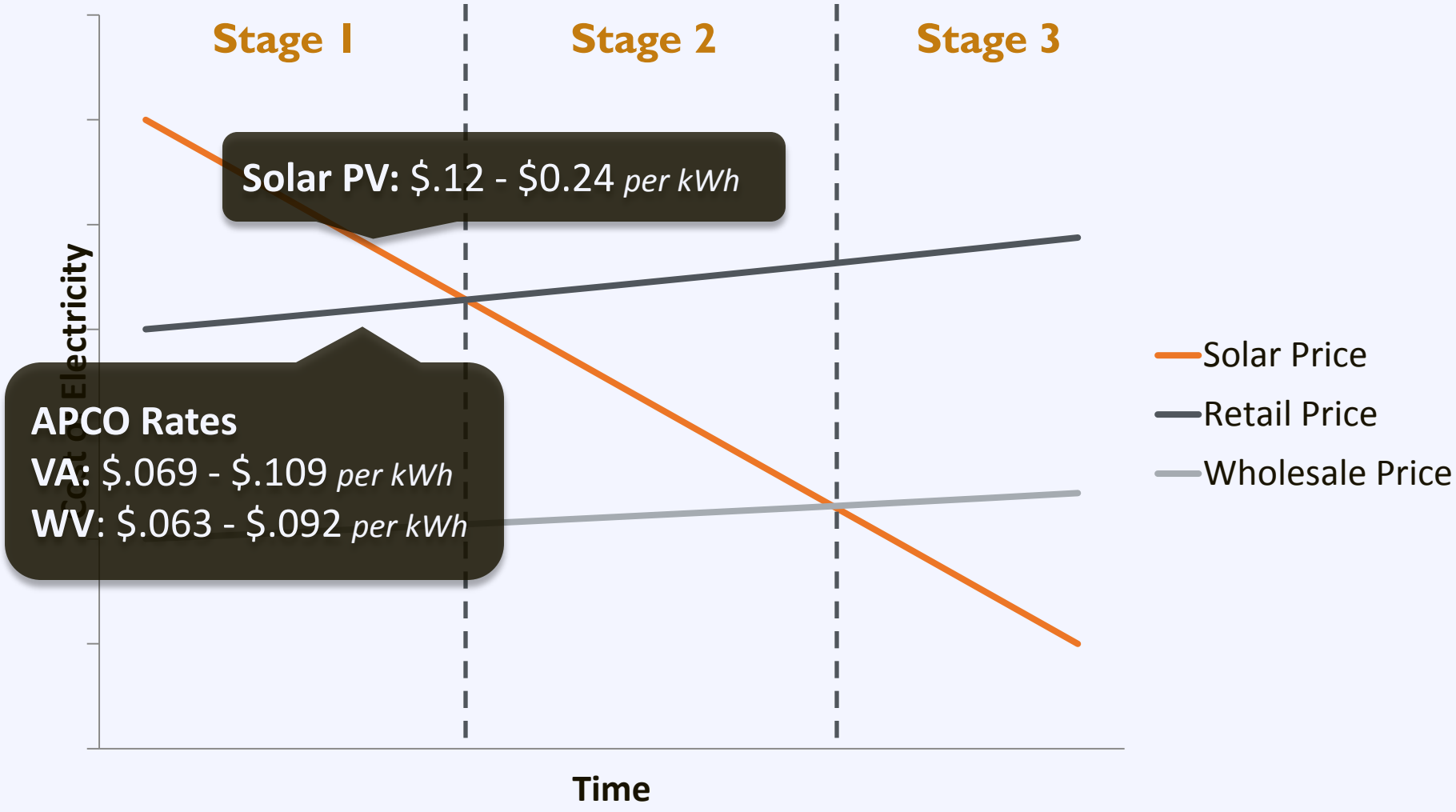
Benefit

+ Avoided Energy Cost

+ Excess Generation

+ Performance Incentive

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

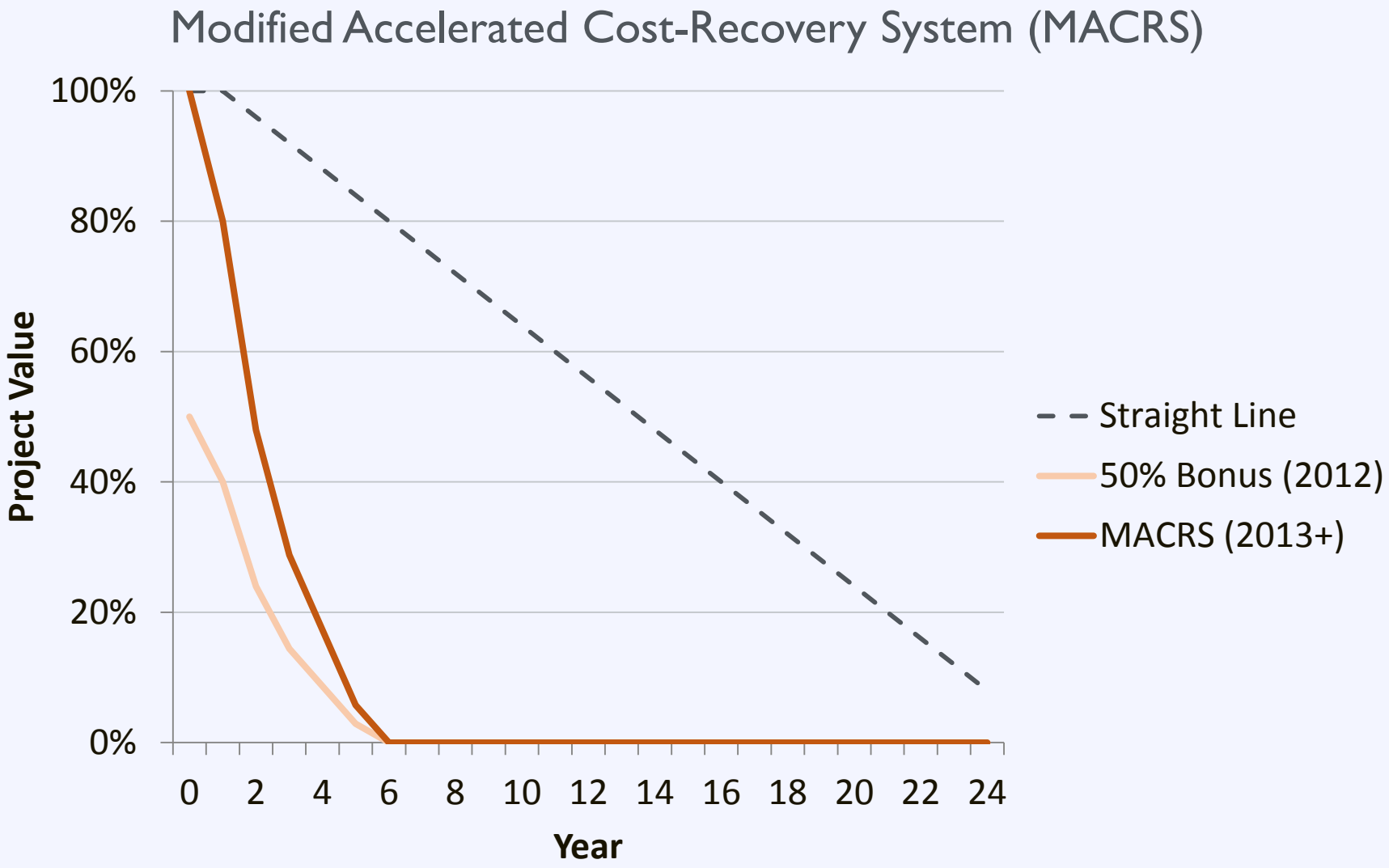
Type: Tax Credit

Eligibility: For-Profit Organization

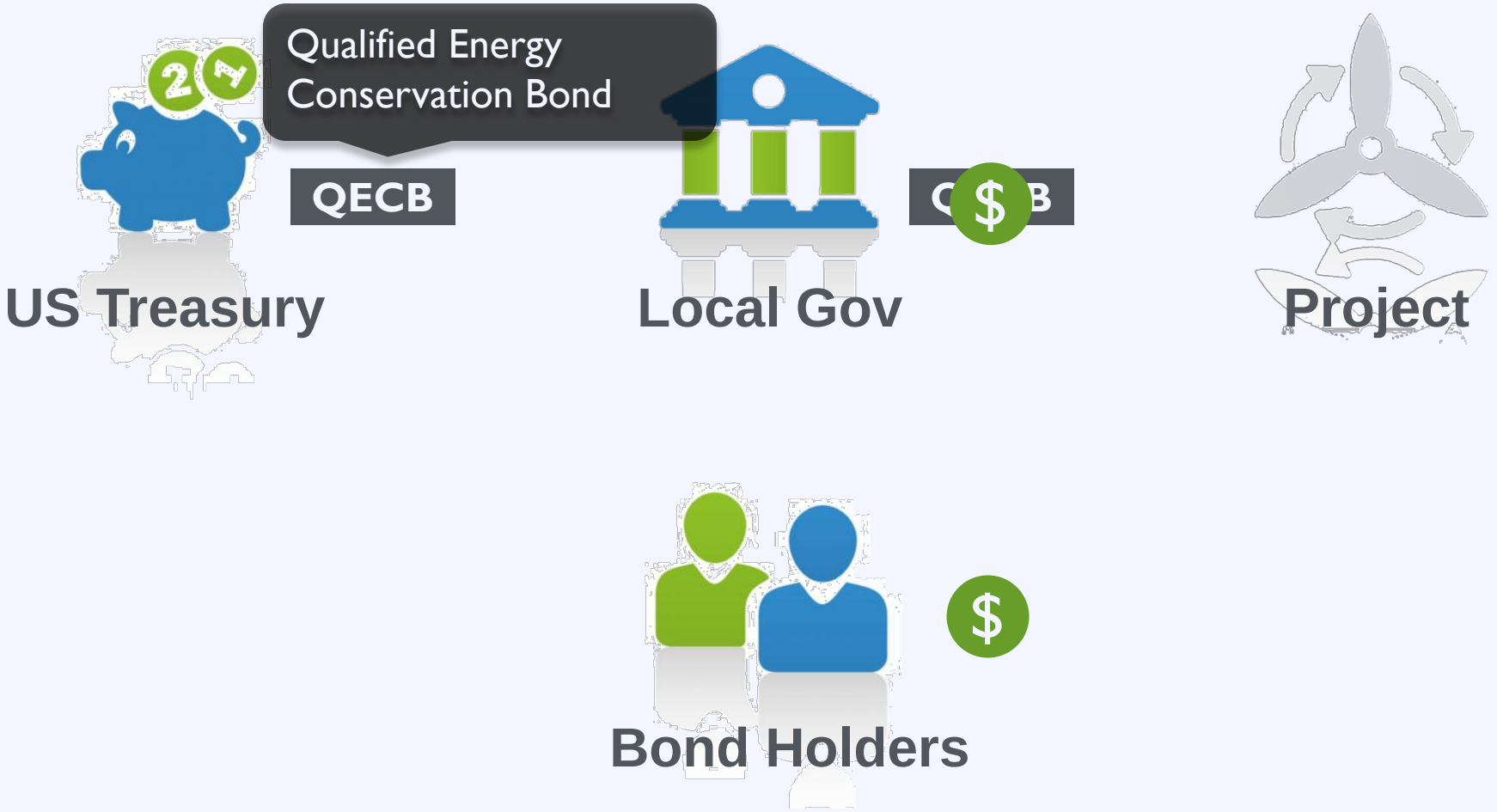
Value: 30% of the installation cost

Availability: Through 2016

Accelerated Depreciation



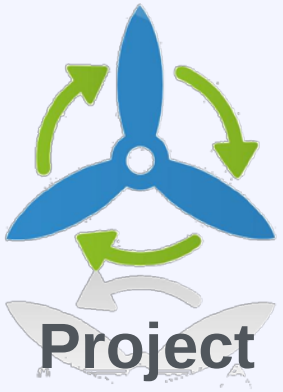
Qualified Energy Conservation Bond



Qualified Energy Conservation Bond

US Treasury

Local Gov



Project

Bond Holders

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

Powered by SunShot U.S. Department of Energy

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

Powered by SunShot U.S. Department of Energy

Source: John Randolph, May 2013

Ownership Options

Direct Ownership

Third-Party Ownership

Direct Ownership

Direct Ownership

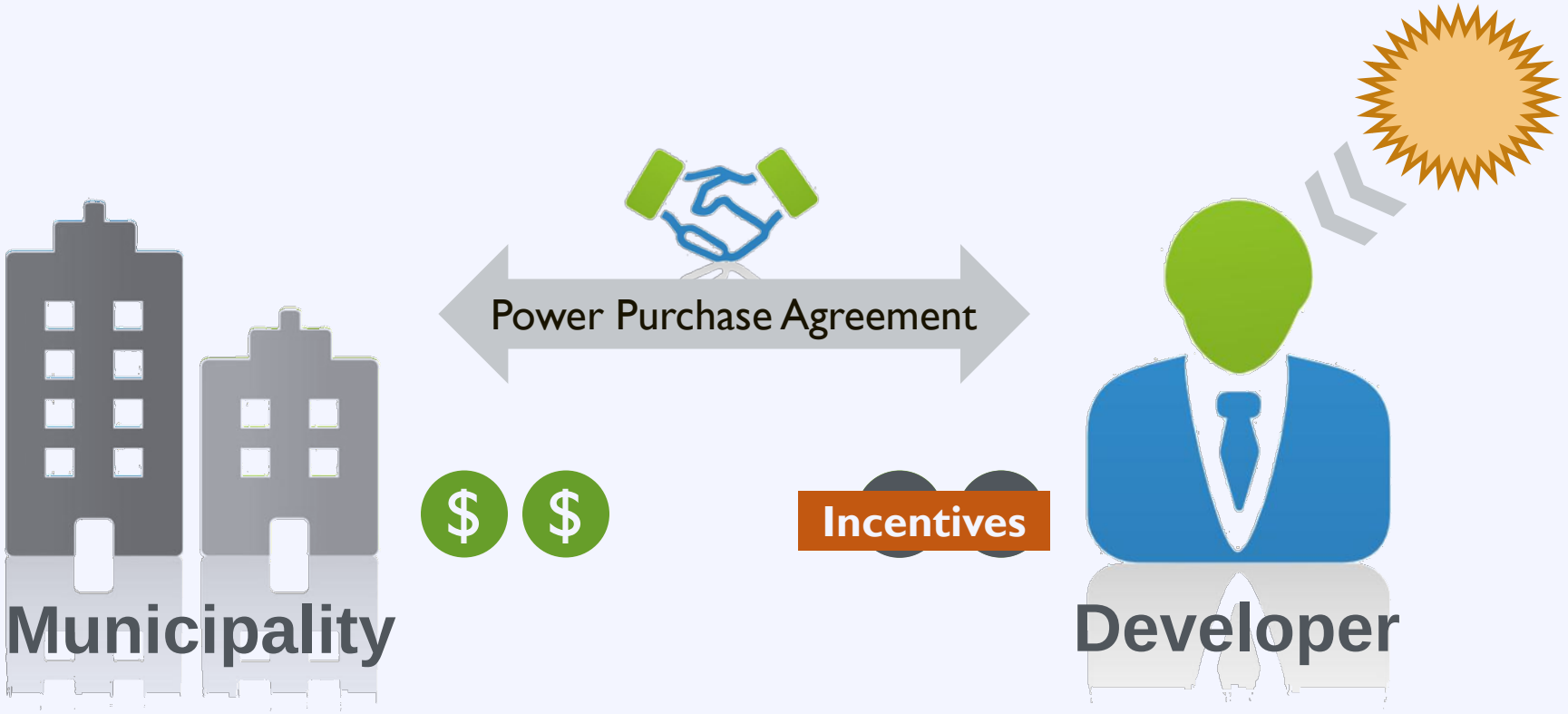
Pros

- 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

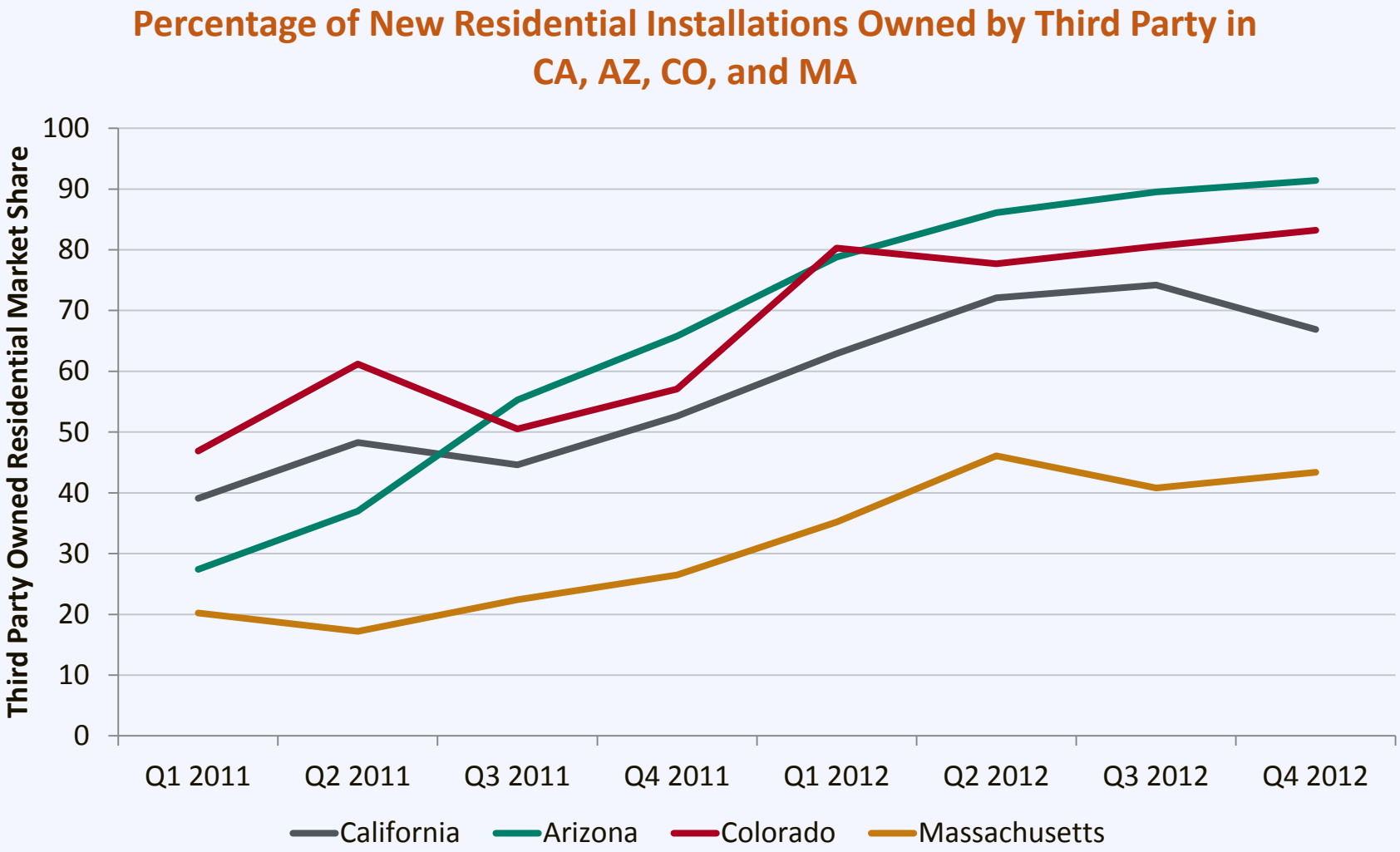
Pros

- 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

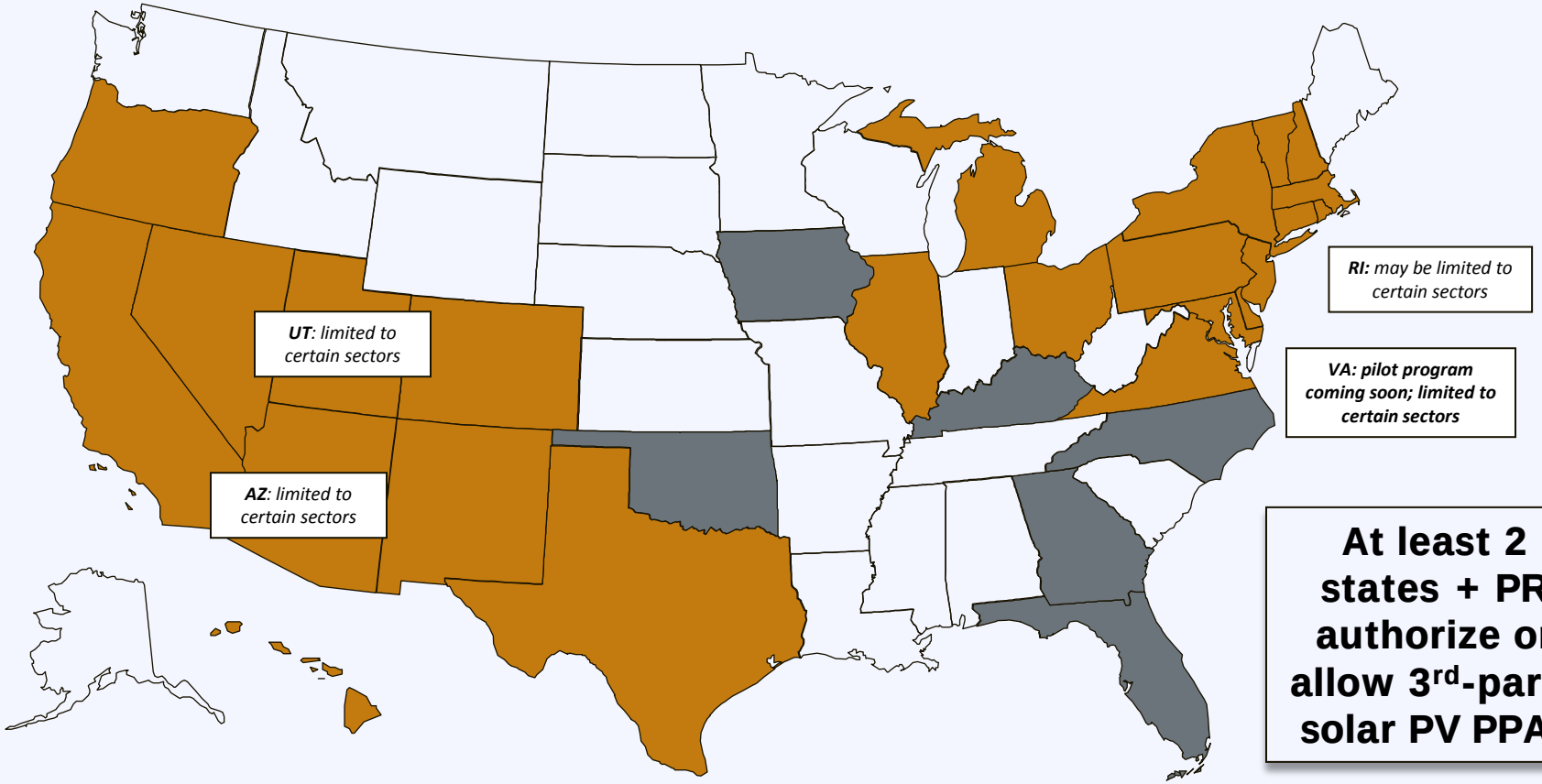


Powered by SunShot U.S. Department of Energy

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.

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

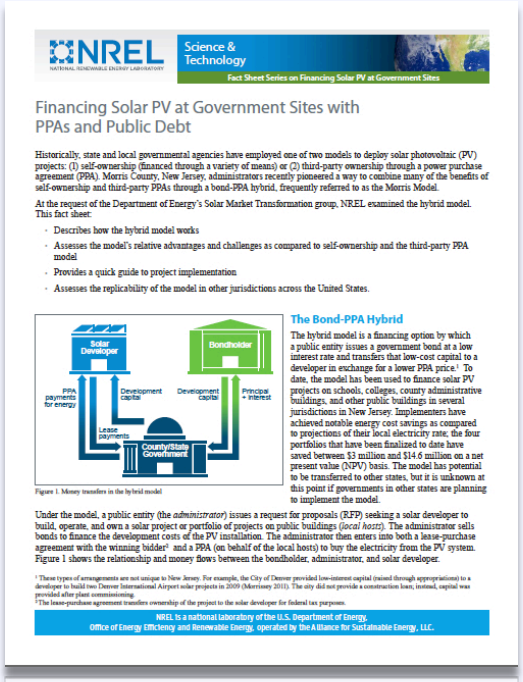
Bond-PPA Hybrid: Resources

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, 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.

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.

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U.S. Department of Energy

Programs to Grow your Solar Market

Solarize

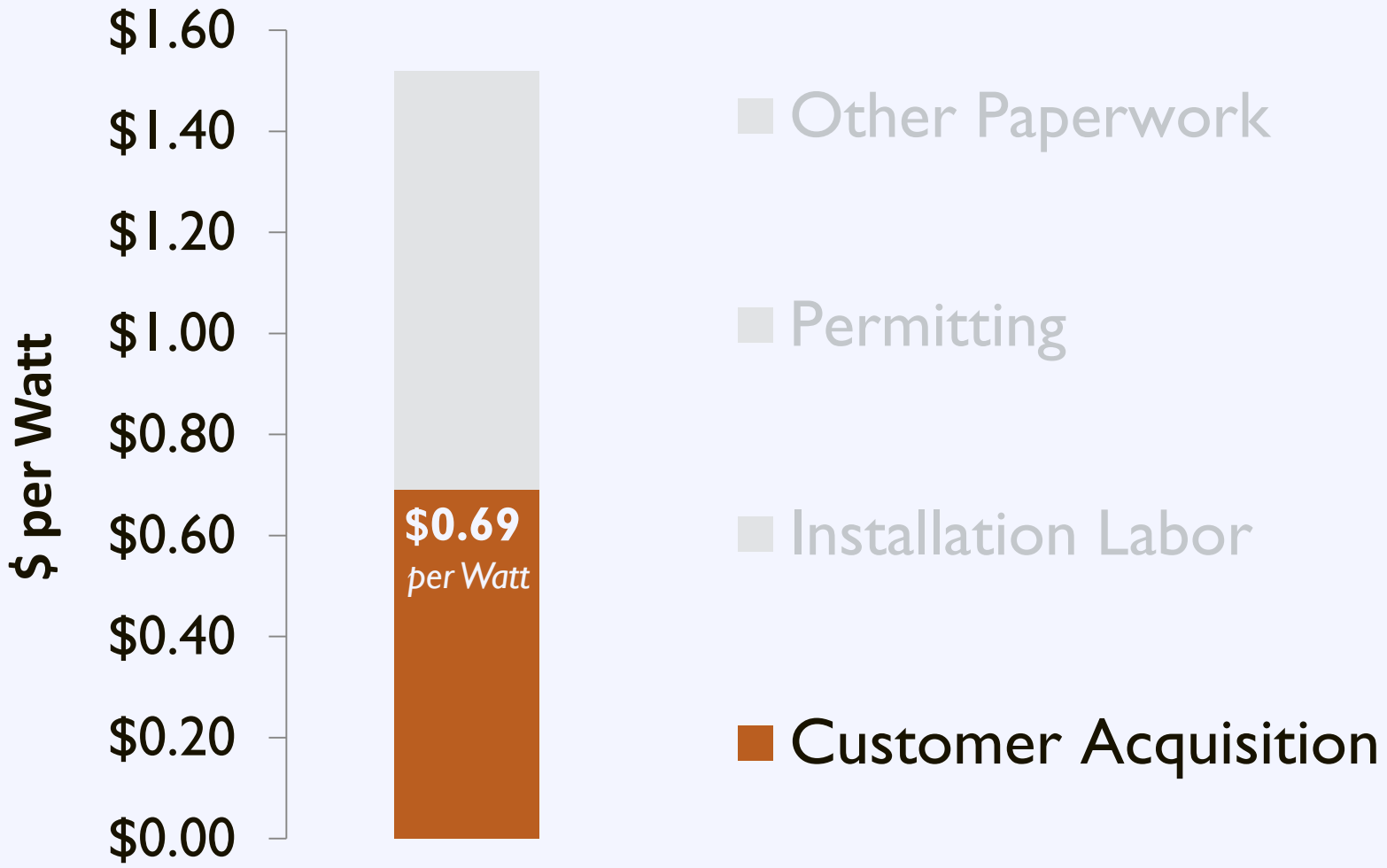
PACE

Solarize

Solarize

Group Purchasing

Solarize: Mitigate Soft Costs

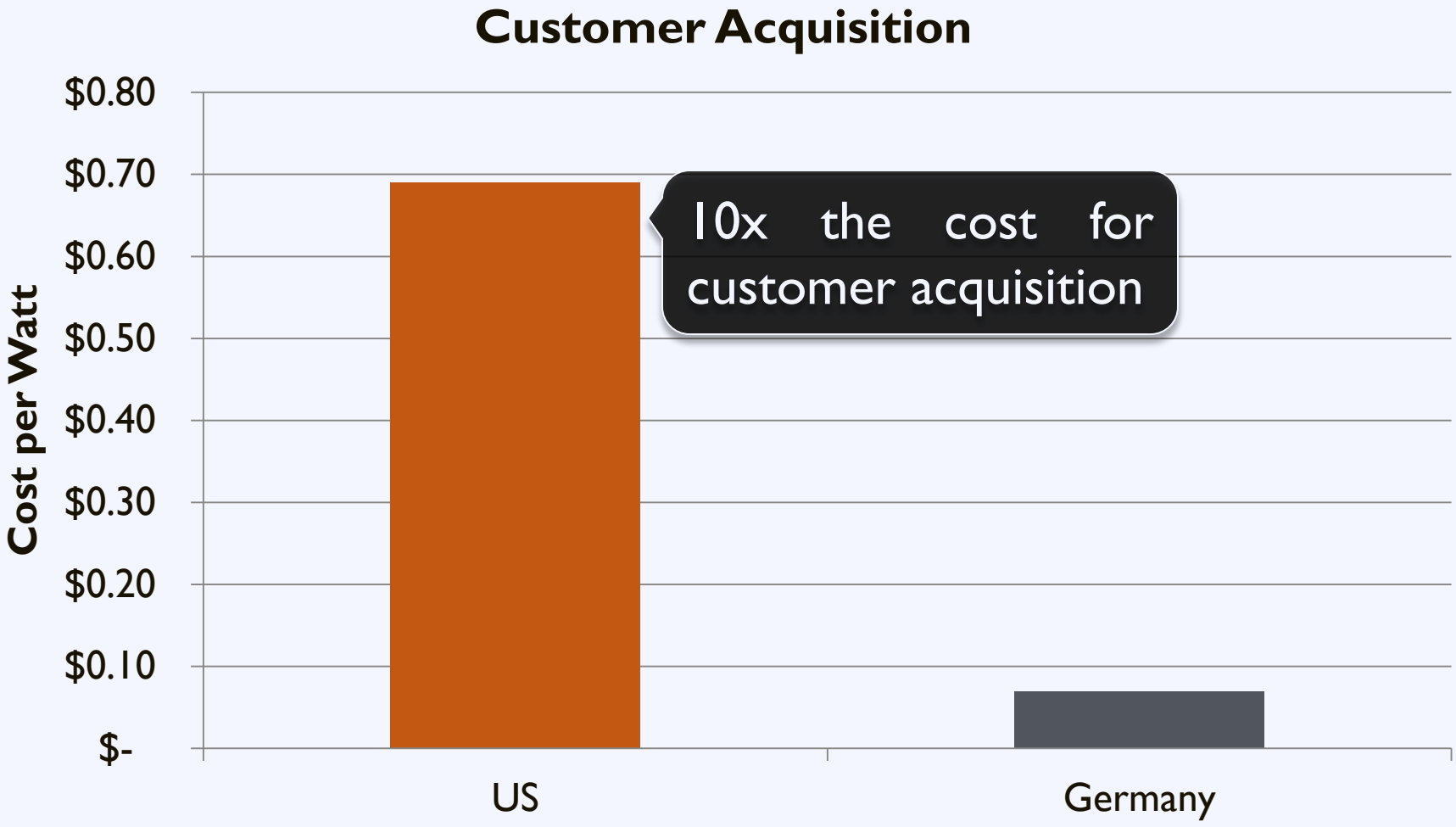


Source: NREL (http://www.nrel.gov/docs/fy12osti/54689.pdf)

Solarize: Advantages

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

Solarize: Advantages



Source: NREL, LBNL

Solarize: Advantages

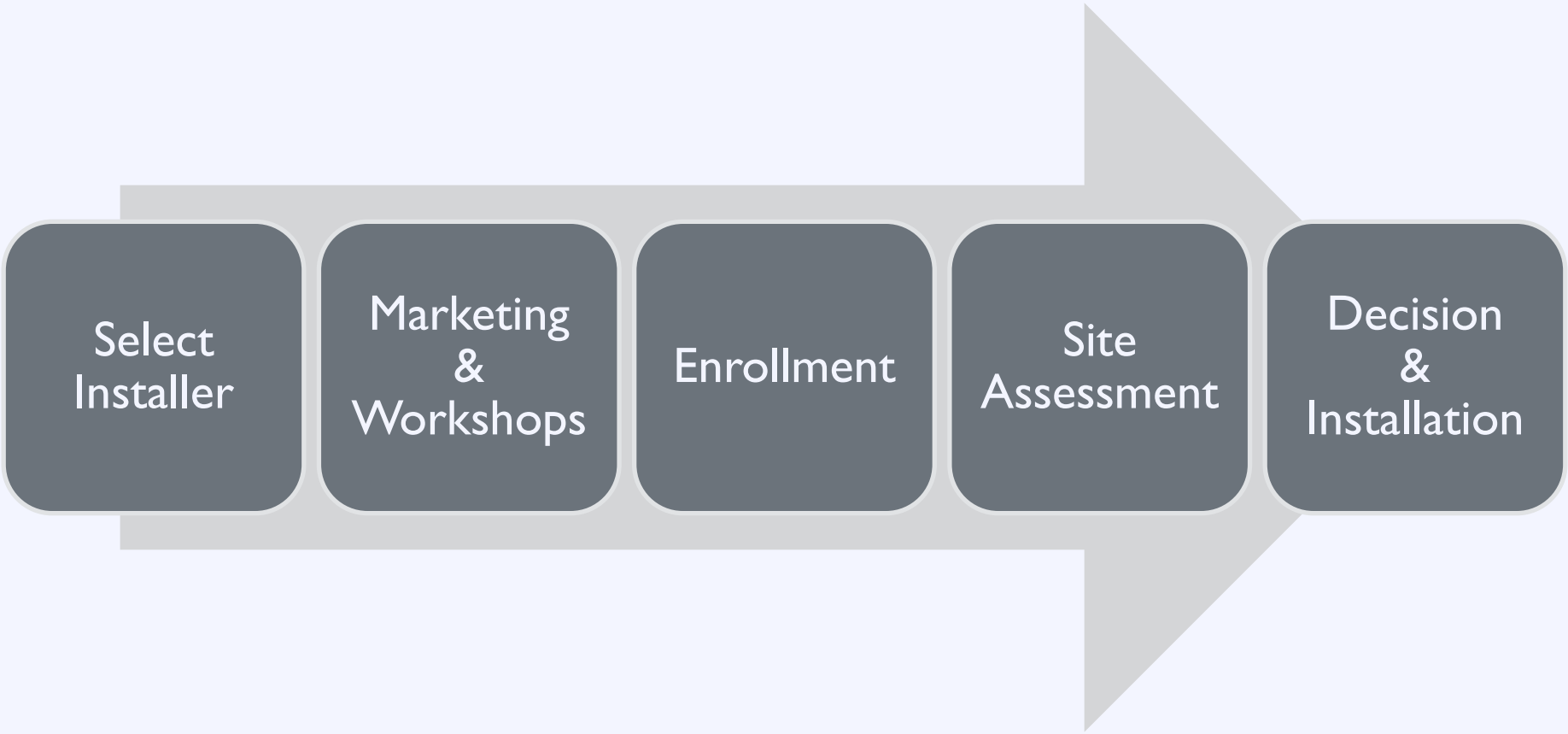
Benefits to Local Government:

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

Quick turn-around: 9 Months

Long-term impact: Sustainable ecosystem

Solarize: Process



Solarize: Case Study

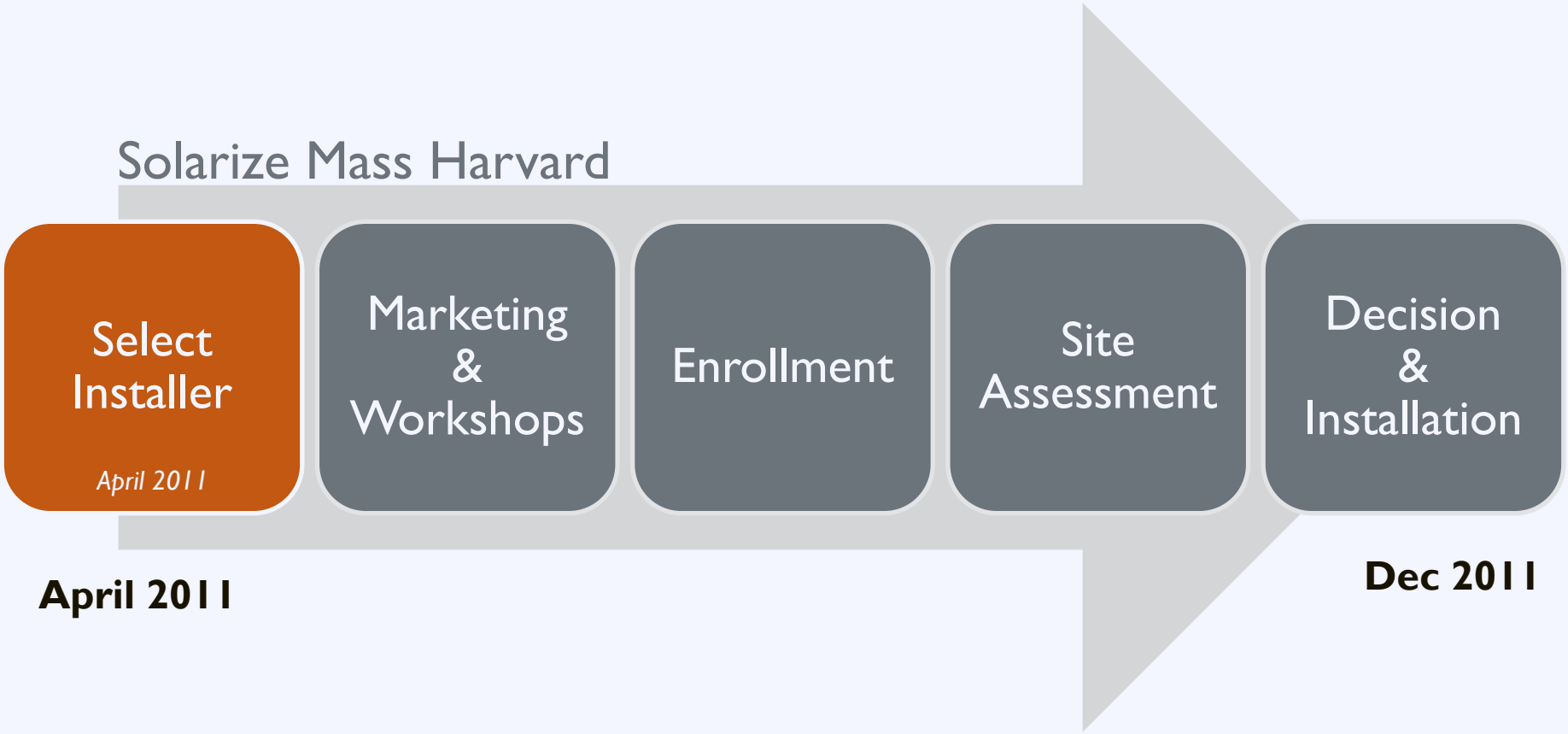
Harvard, Massachusetts

Population: 6,520

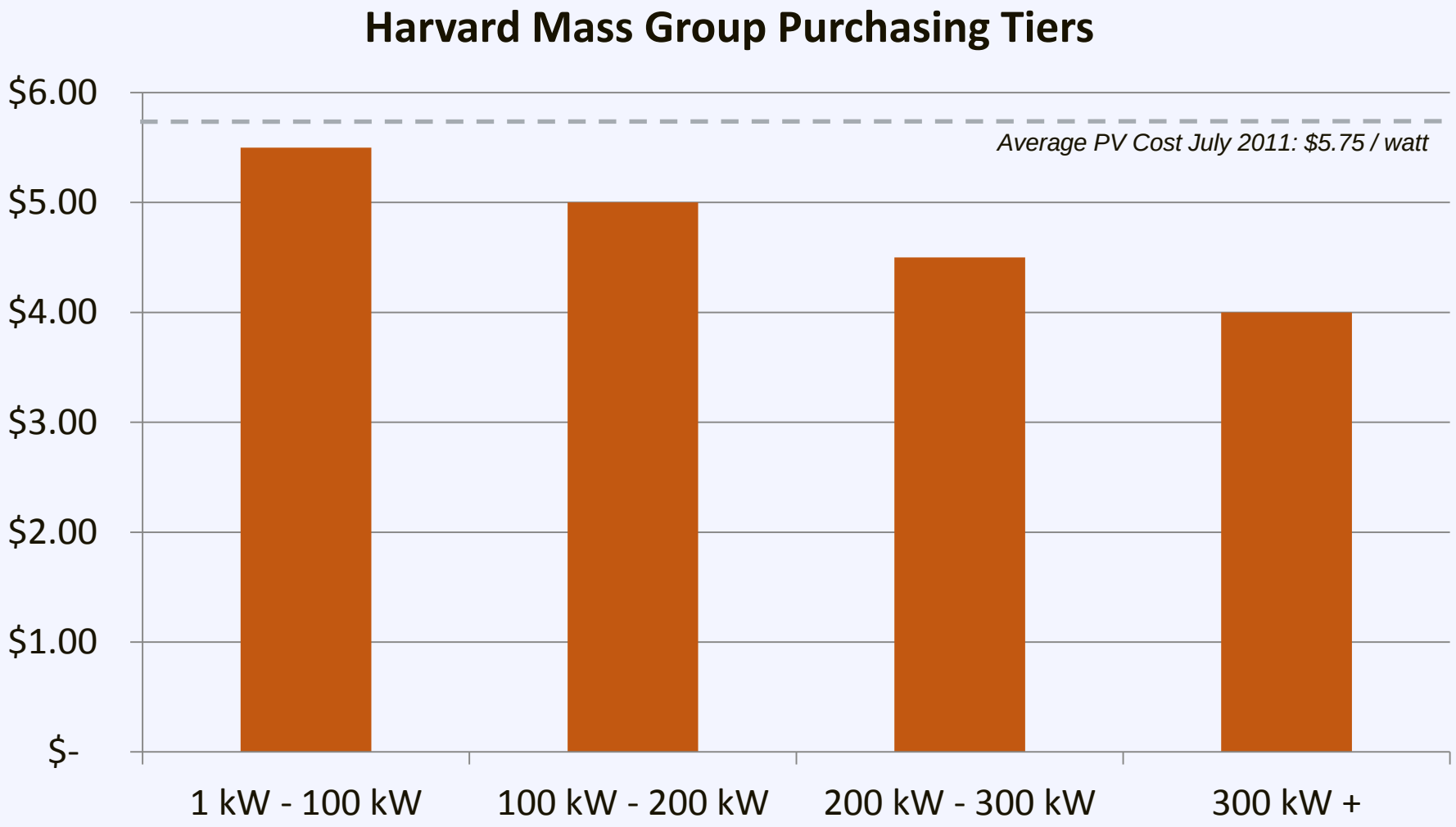
Powered by SunShot
U.S. Department of Energy

Source: Wikipedia

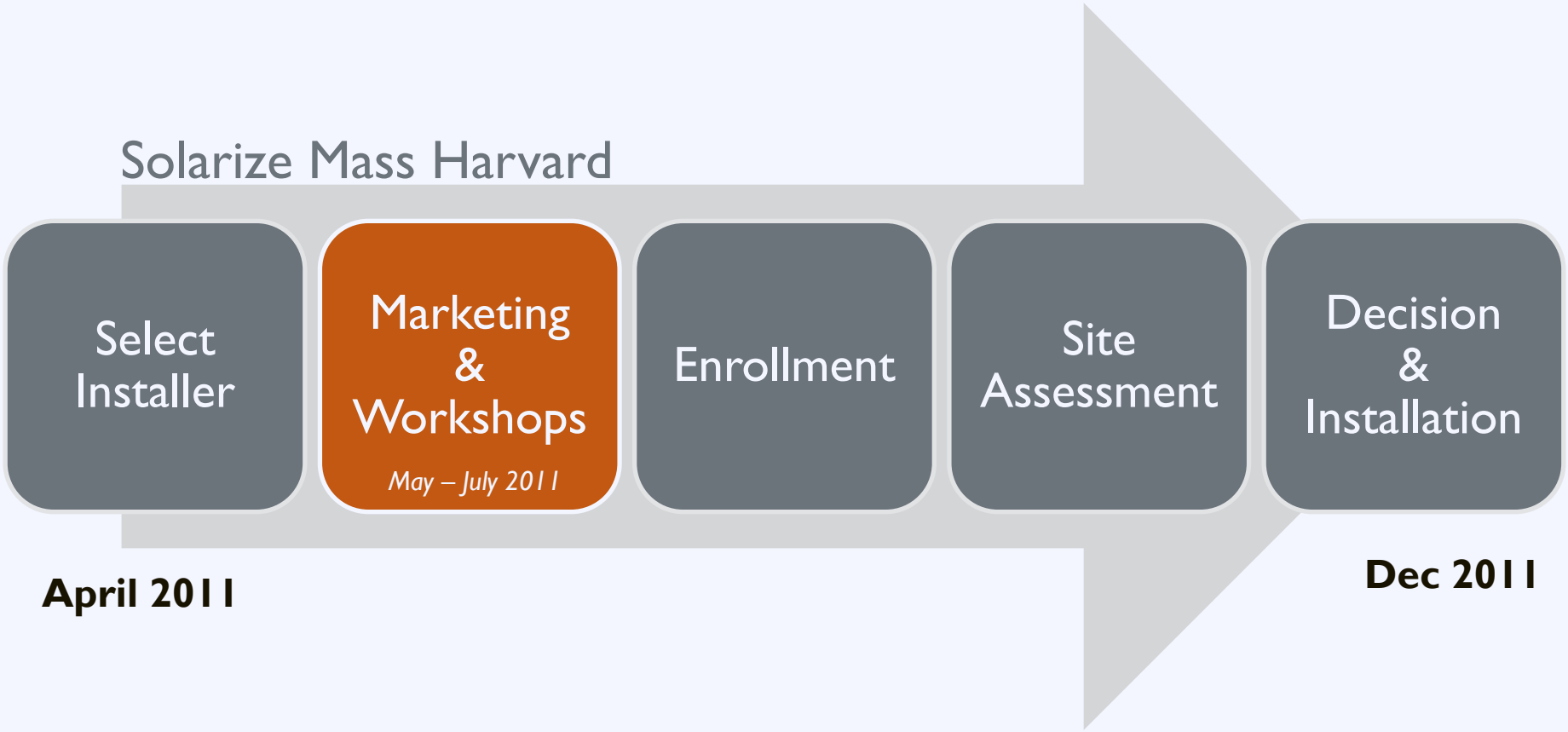
Solarize: Case Study



Group Purchasing



Solarize: Case Study



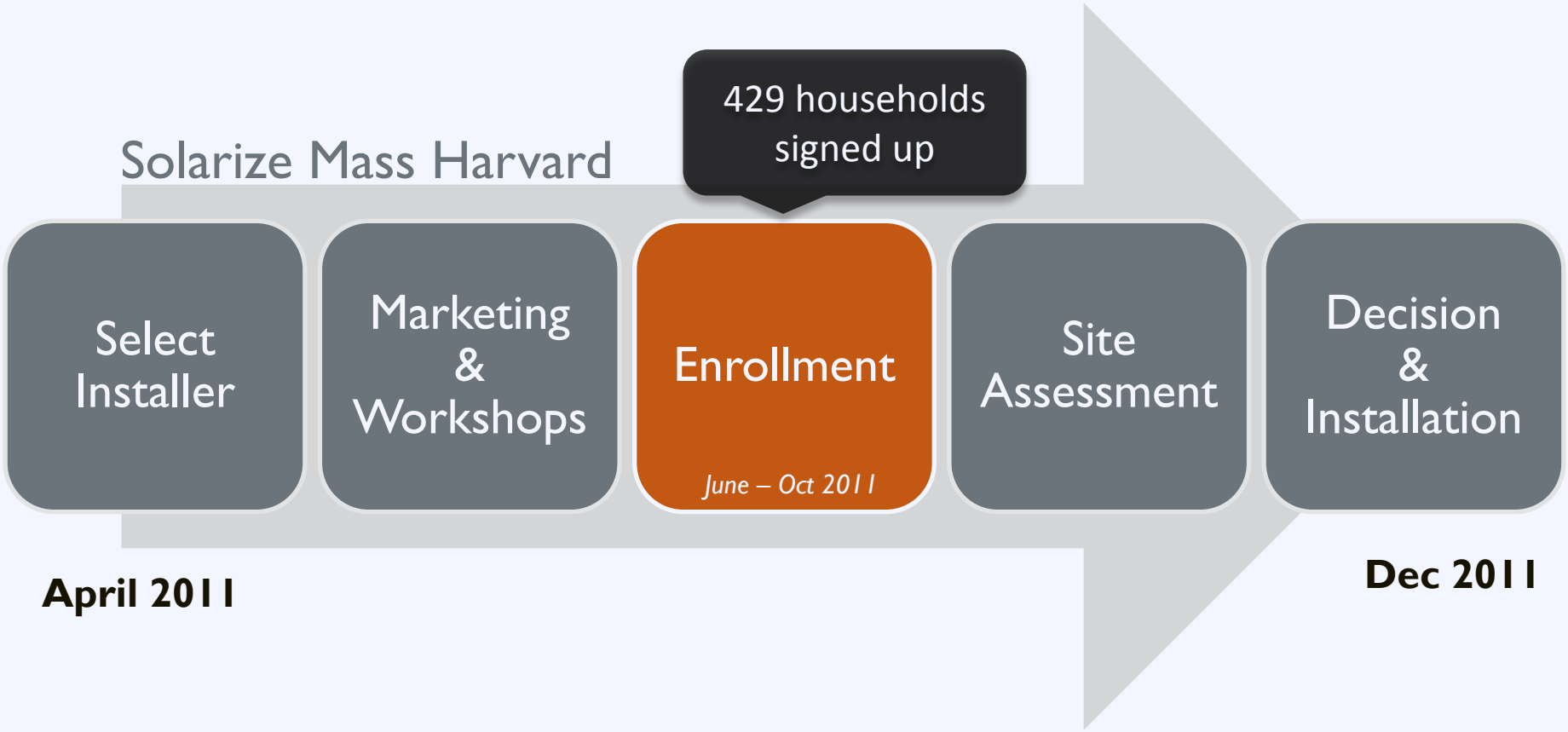
Solarize: Case Study

Marketing Strategy:

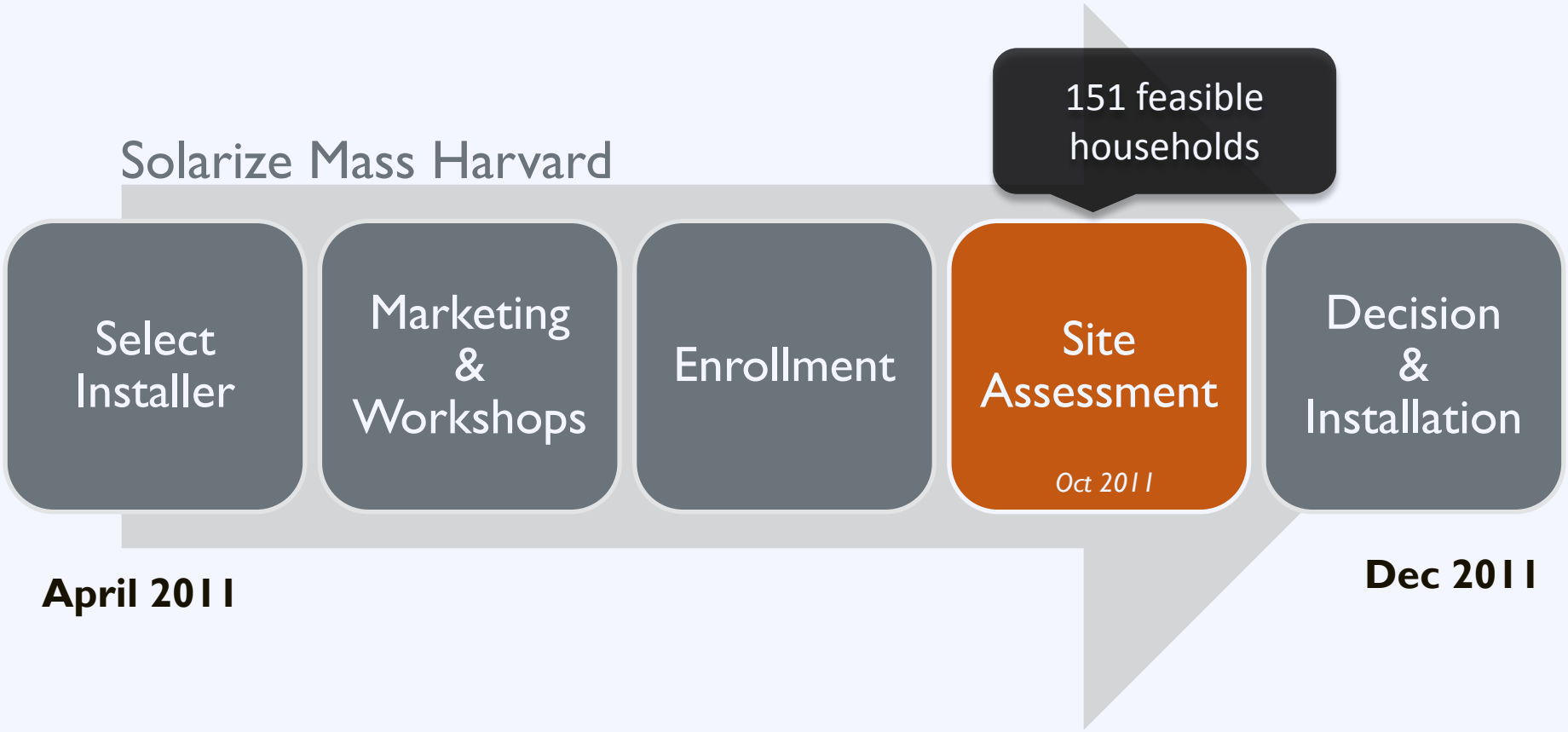
- Electronic survey of 1,100 households
- Email newsletters and direct mailings
- Float in July 4 parade
- Articles and advertisements in local newspaper
- Facebook page and online discussion board

Source: Vote Solar

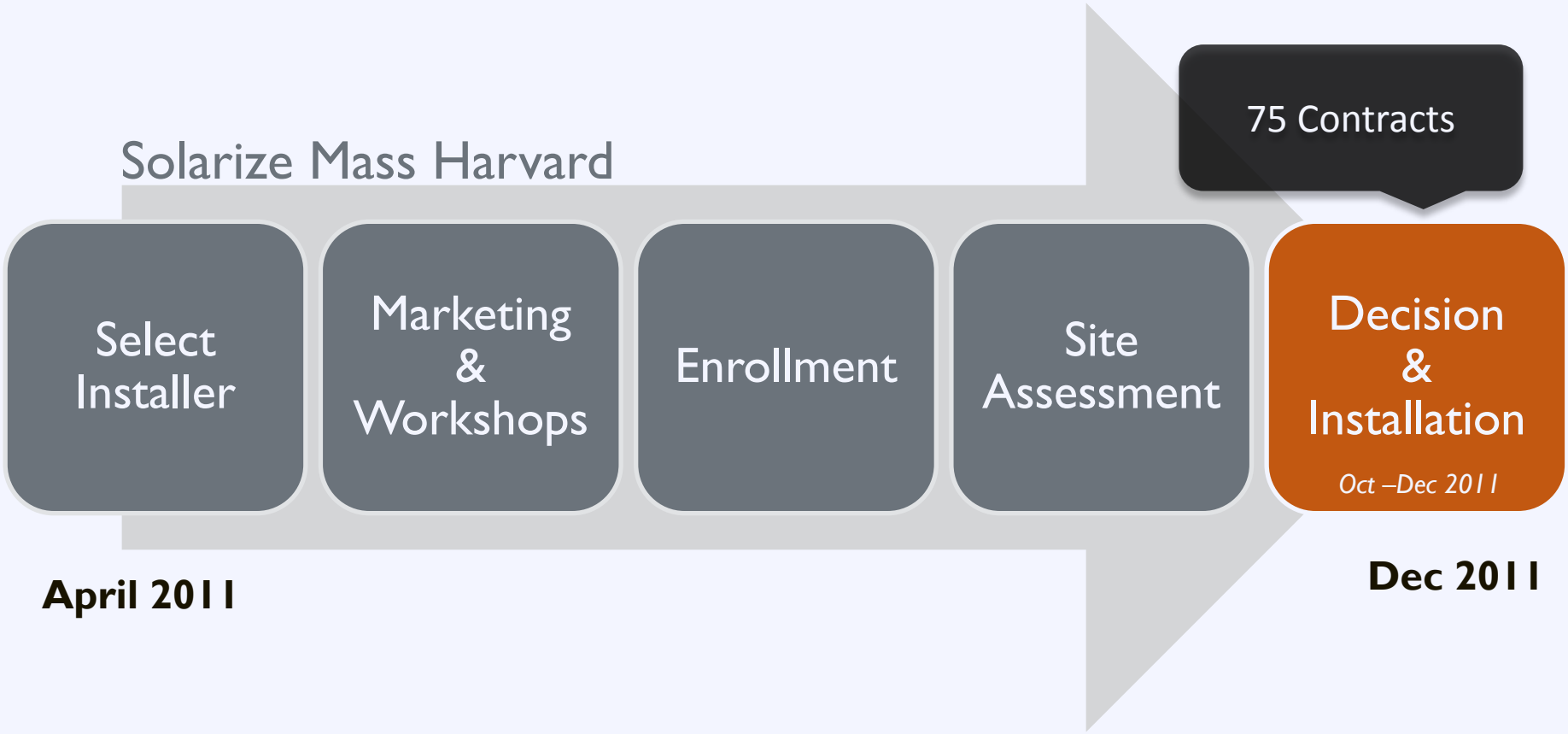
Solarize: Case Study



Solarize: Case Study



Solarize: Case Study



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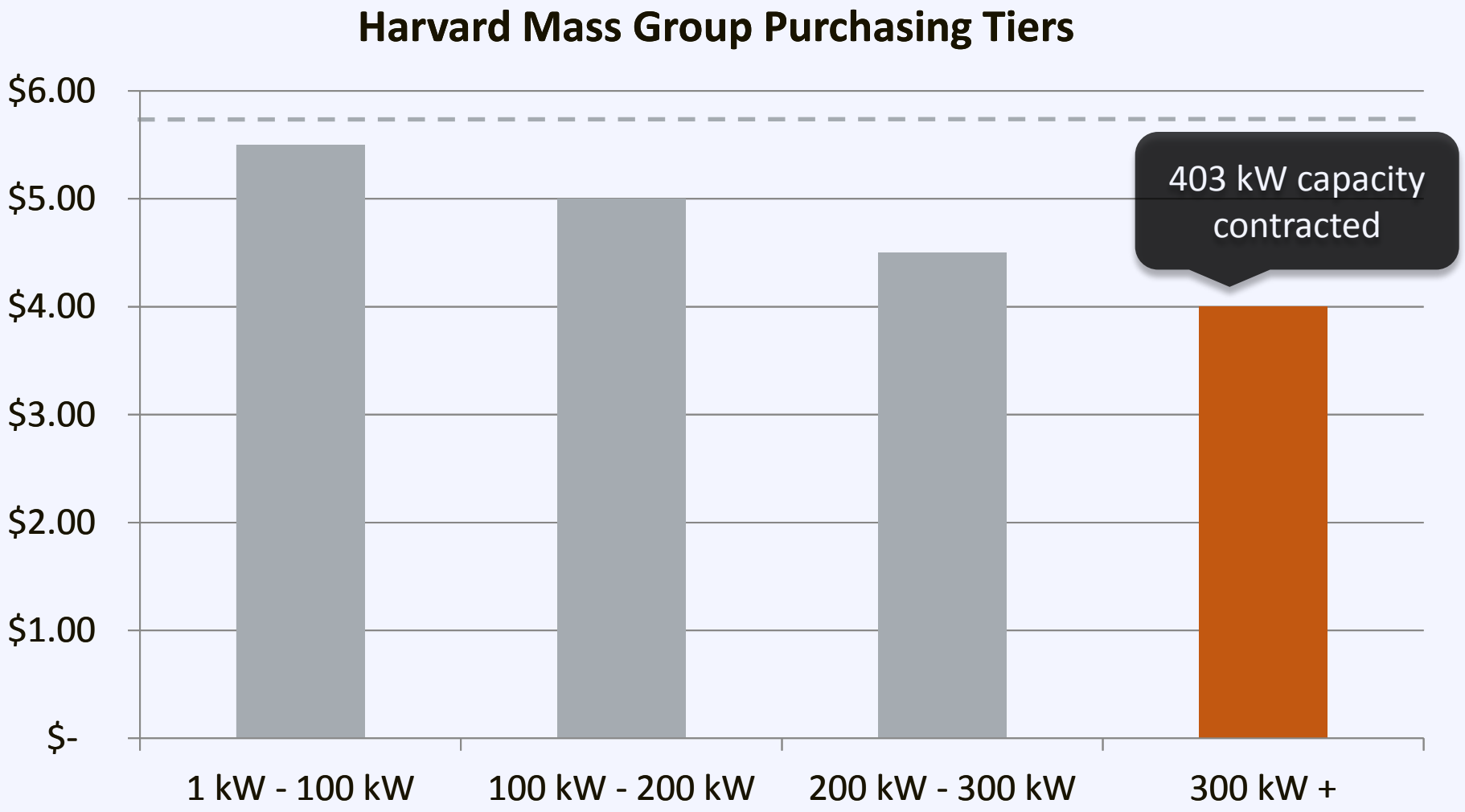


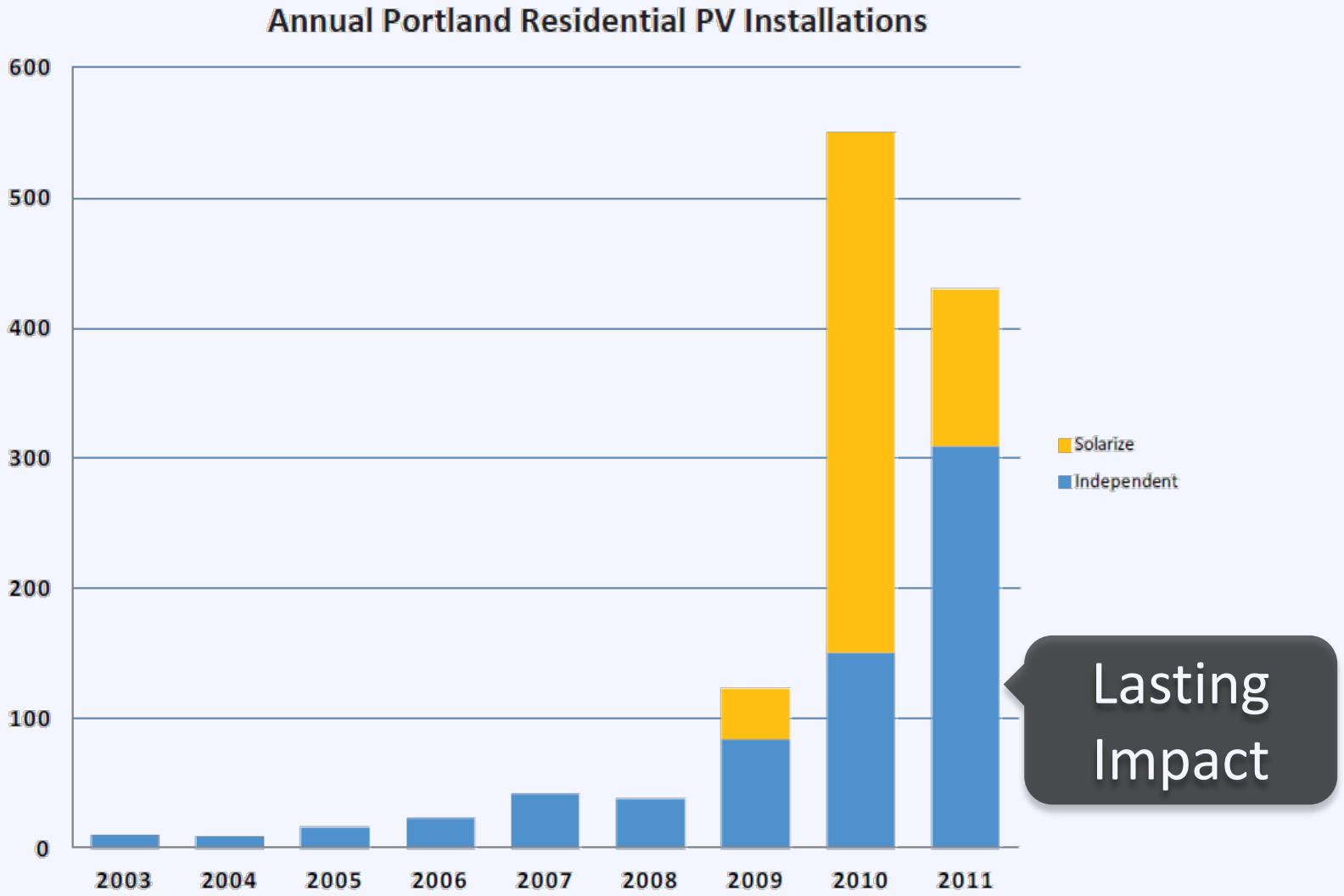
Solarize: Case Study

75 new installations totaling 403 kW

30% reduction in installation costs

575% increase in residential installations

Solarize: Lasting Impact



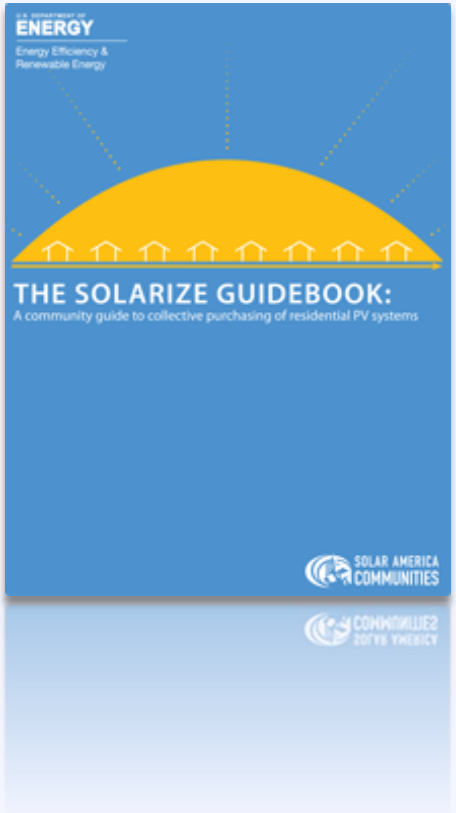
Source: NREL

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

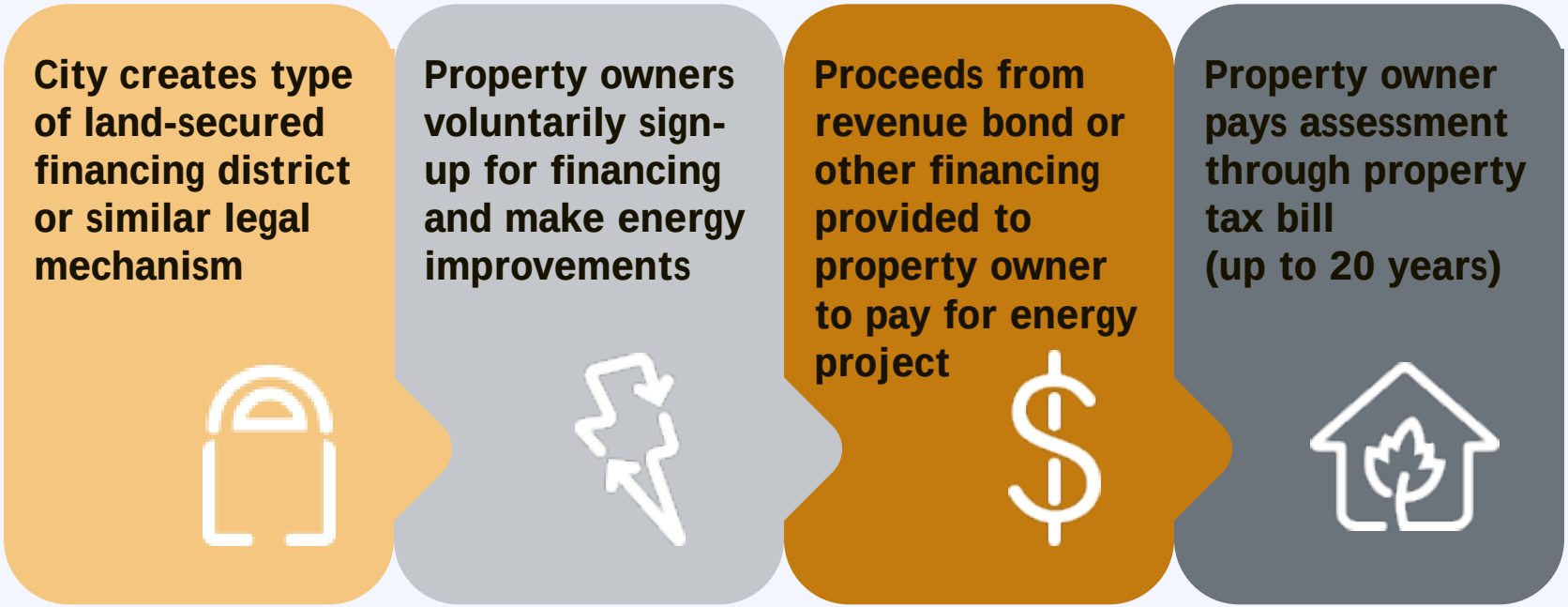


Property Assessed Clean Energy

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



Powered by SunShot U.S. Department of Energy

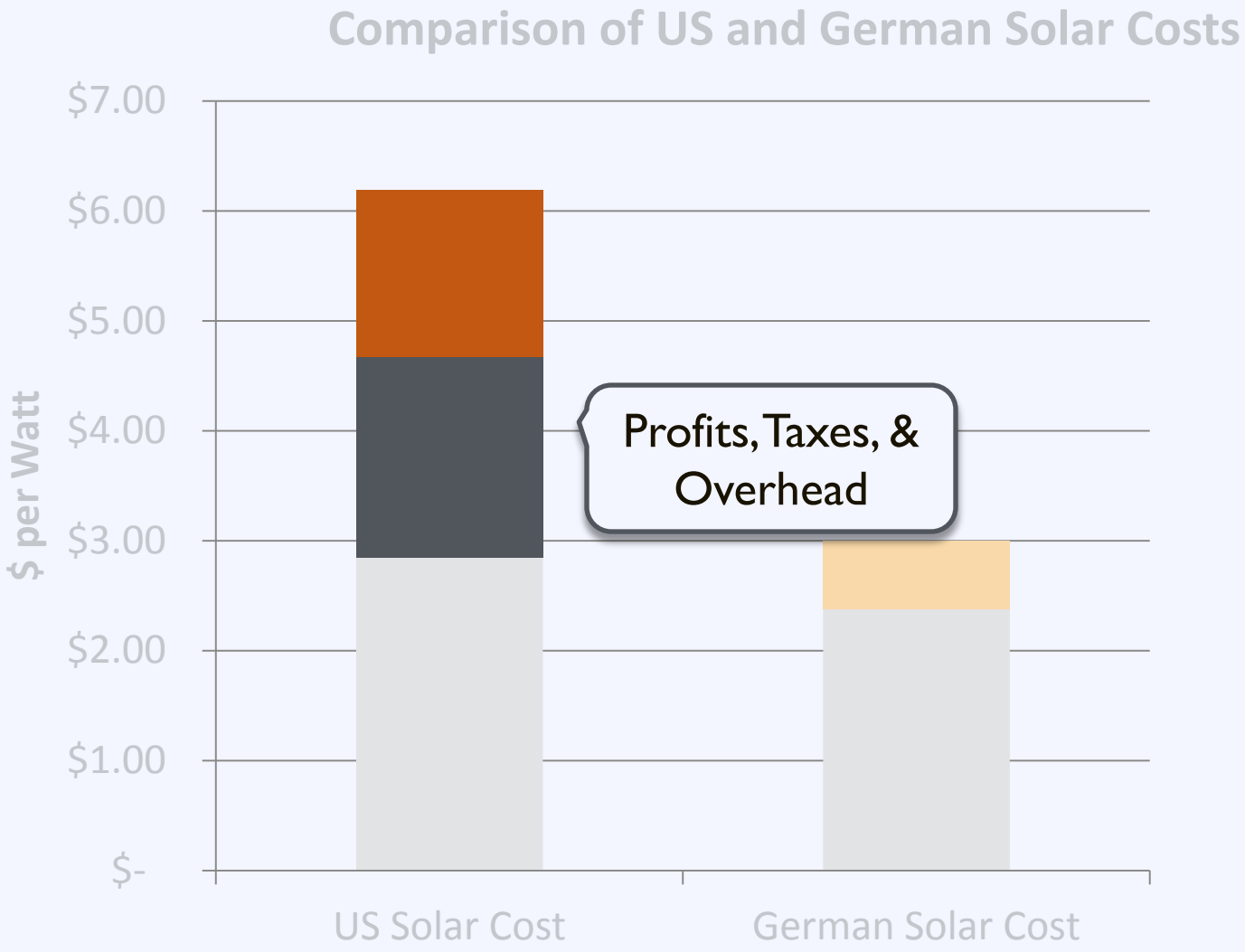
Source: Department of Energy

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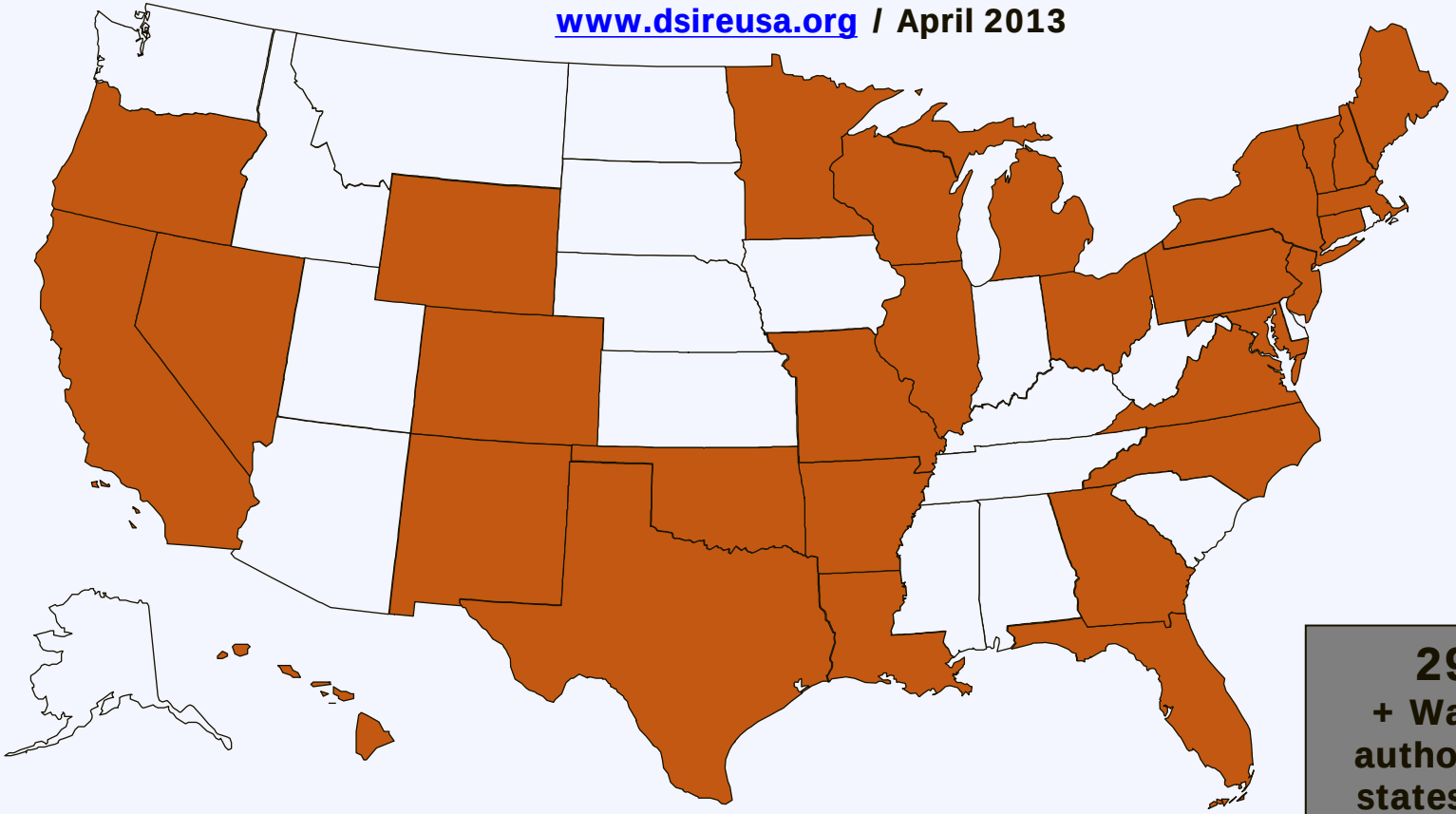
Source: NREL (http://ases.conference-services.net/resources/252/2859/pdf/SOLAR2012_0599_full%20paper.pdf) (http://www.nrel.gov/docs/fy12osti/53347.pdf) (http://www.nrel.gov/docs/fy12osti/54689.pdf)

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).

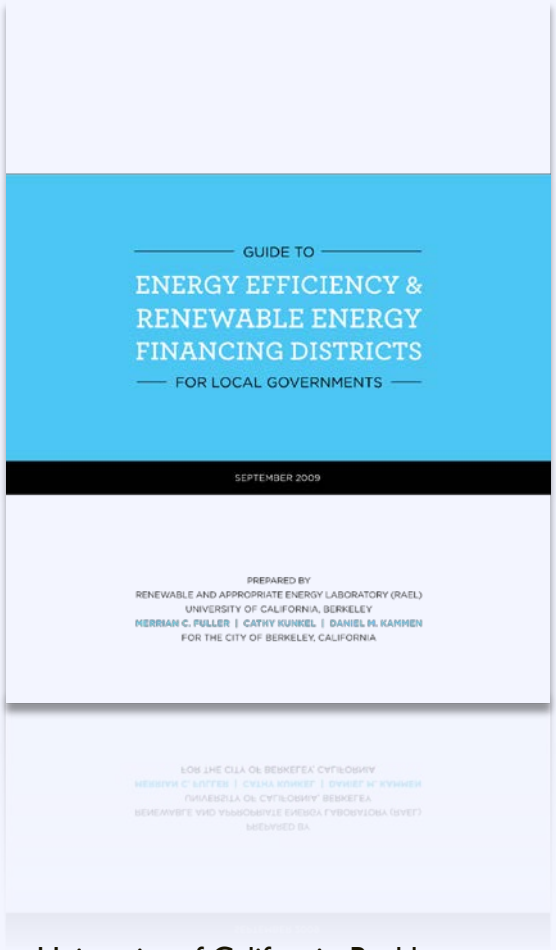
Powered by SunShot
U.S. Department of Energy

Source: DSIRE

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

Agenda

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08:50 – 09:35	Solar 101: Policy Environment and Economics
09:35 – 09:45	*Break*
09:45 – 10:05	Benefits and Barriers Activity
10:05 – 10:25	Creating a Solar Ready Community
10:25 – 11:00	Understanding Solar Financing
11:00 – 11:05	*Break*
11:05 – 12:15	Local Panel and Discussion; Closing Remarks

Agenda

08:30 – 08:50	Introductions and Overview
08:50 – 09:35	Solar 101: Policy Environment and Economics
09:35 – 09:45	*Break*
09:45 – 10:05	Benefits and Barriers Activity
10:05 – 10:25	Creating a Solar Ready Community
10:25 – 11:00	Understanding Solar Financing
11:00 – 11:05	*Break*
11:05 – 12:15	Local Panel and Discussion; Closing Remarks

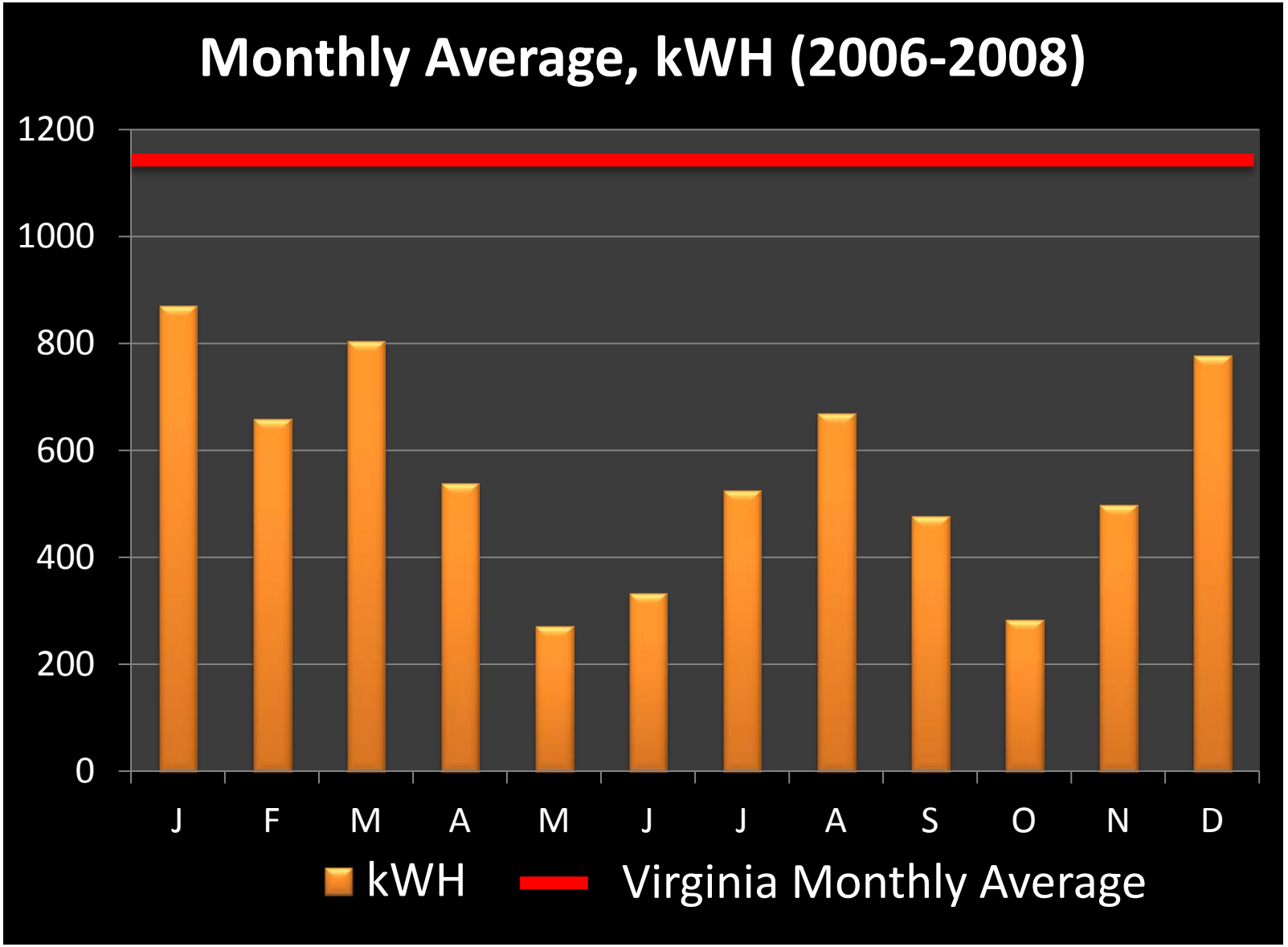

807

Low-hanging fruit first…

2008

Planning ahead…

2008


Monthly Average, kWH (2006-2008)
1200
1000
800
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J
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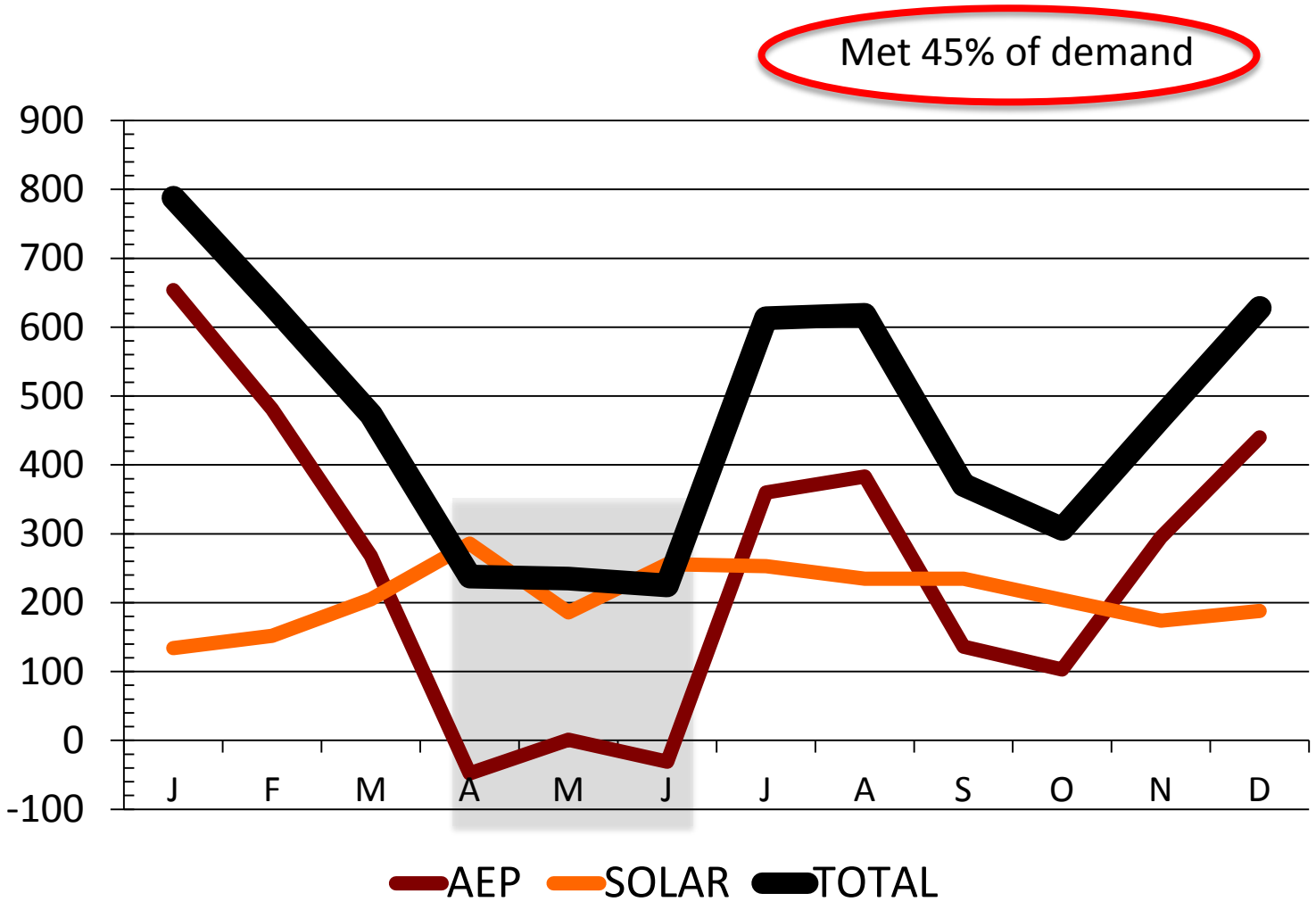
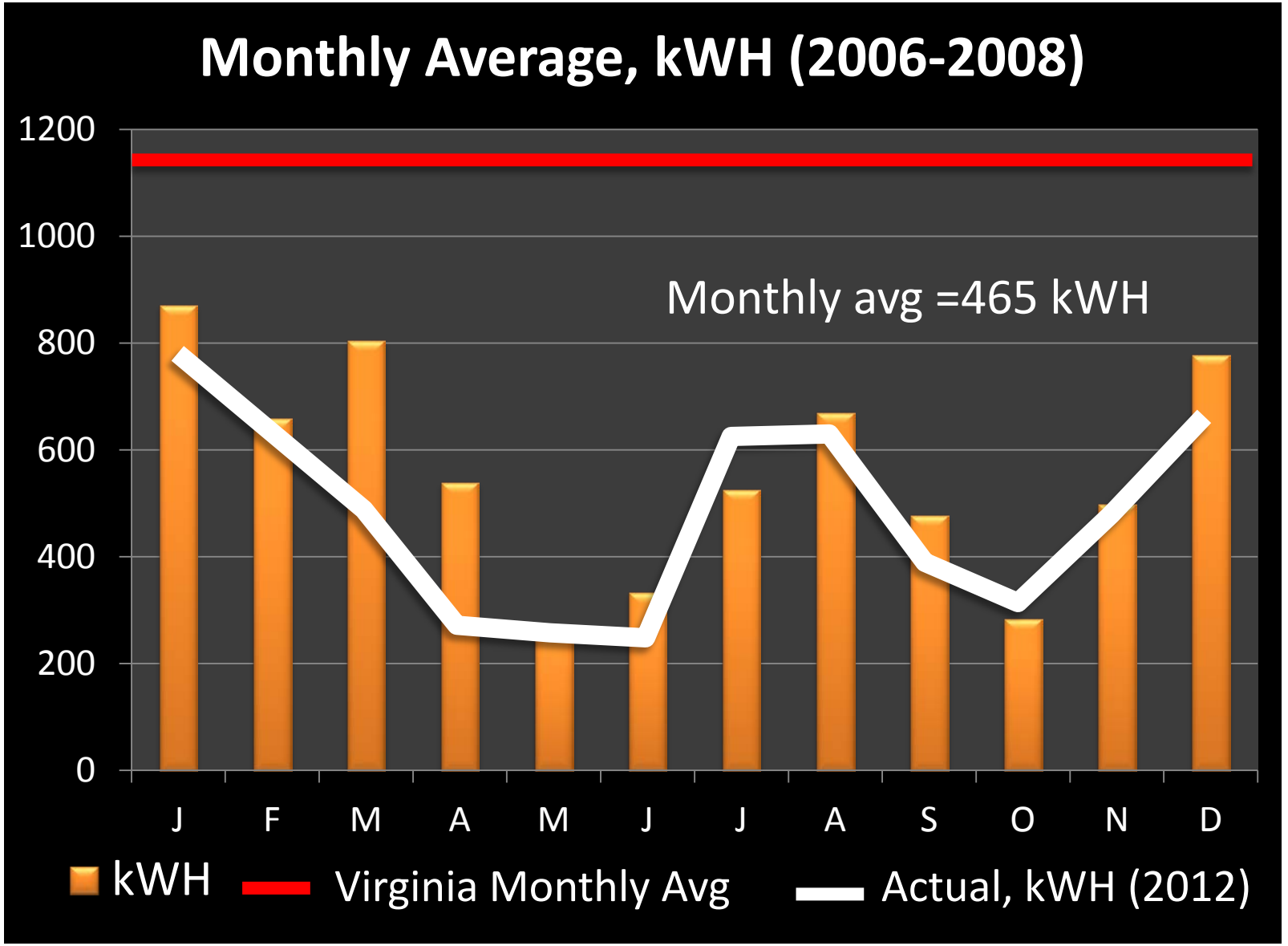
O
N
D
kWH
Virginia Monthly Average

Goals vs. Finances

Panel No	kW, Derated	Insolation	Avg Generation	Avg Usage	% Met
8	1.32	4.22	5.57	16.87	33%
10	1.65	4.22	6.96	16.87	41%
12	1.98	4.22	8.36	16.87	50%
14	2.31	4.22	9.75	16.87	58%

Actual kWH consumption, 2012




Monthly Average, kWH (2006-2008)
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Monthly avg =465 kWH
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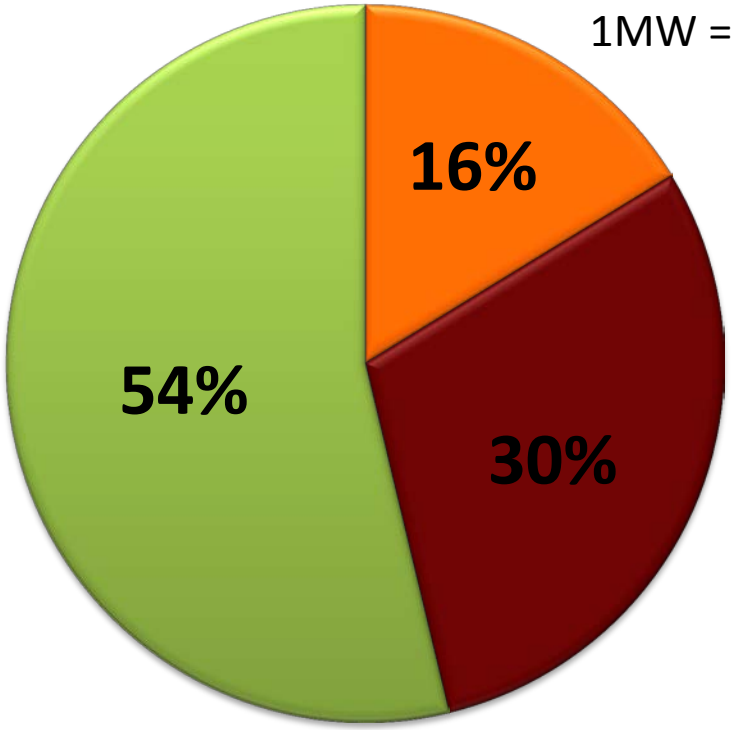
kWH
Virginia Monthly Avg
Actual, kWH (2012)

Financing

5-Year Contract - SolSystems
1MW =$200



DOE Sunshot Solar Outreach Workshop

Virginia Tech May 23, 2013

BASELINESOLAR

Baseline Solar Solutions
Blacksburg, VA
www.baselinesolar.com

Baseline Solar Solutions

www.baselinesolar.com

- Custom design and installation
- Commercial and residential
- Fully licensed and insured
- Service existing systems

Baseline Solar Solutions

Virginia Tech parking garage: 102 kW

PV array (3.1 kW)

- SolarWorld (USA)
- 126 x 260 watts ea

- SunnyBoy 3000-US

- Flush mount
- Energy monitor

Production

- 346 kWh / mo (annual avg)
- 4,152 kWh / yr

- 36+% offset (940 kWh/mo avg - USEIA)

- 25 yr warranty on panels
- 10 yr warranty on inverter

Costs / Savings

	$12,480	$4.00/w
	<$3,744>	30% fed tax credit
net cost:	$8,736	$2.80/w
	<$19,576>	utility bill savings ($0.11/kWh, increasing 5%/yr)
net savings:	***$10,840***	

DEQ's Renewable Energy Program: *SOLAR*

Carol C. Wampler
Department of Environmental Quality
Richmond, Virginia

DOE Sunshot Solar Outreach Workshop

Virginia Tech
May 23, 2013

DEQ's 3 Areas of Solar Emphasis

DEQ

- Regulation
- Model Ordinances
- Informal Stakeholder Collaboration

Permit by Rule Solar Regulations

Effective July 18, 2012

Major Features: Solar PBR

- PBR: Requirements set forth "up front" in regulation
- Applicant successfully completes requirements = DEQ approval within 90 days
- Applies to projects >5 MW rated capacity
- Exemptions for projects on existing buildings, parking lots, etc.
- Addresses primarily wildlife & historic resources impacts

Where to find Solar PBR?

Regulation and Agency Guidance Posted on DEQ's Website:

http://www.deq.virginia.gov/Programs/RenewableEnergy/SolarEnergy.aspx

MODEL ORDINANCES

- Developed by stakeholders on DEQ's *Local Government Outreach Group (LOG)*
- Chaired by DEQ's Director David Paylor
- Posted on DEQ's Website:

http://www.deq.virginia.gov/Programs/RenewableEnergy/LocalGovernmentOutreach.aspx

- Suggested resources for local governments & citizens

Informal Collaborative Group

- ***Small Solar Working Group*** being convened by DEQ at request of stakeholders
- DEQ's role: encourage & facilitate collaborative efforts by stakeholders on solar development issues
- Steering Committee: Scott Sklar, Bill Murray, Tony Smith, Ivy Main, Mike Healy, Joe Lerch
- Tentative Issues:
  - Education & Outreach
  - Legislative Ideas
  - Non-Jurisdictional Market

Another state agency: Dept. of Mines, Minerals, & Energy

- Al Christopher
  Ken Jurman
  http://www.dmme.virginia.gov/DE/SolarPower.shtml

Your Support & Input Are Welcome

Carol Wampler
carol.wampler@deq.virginia.gov
804-698-4579

Solar PV Development Programs

Power Purchase Agreements (PPAs)

Commercial Financing & Leasing

May 2013

200kW Bristol Demolition Landfill Project - PPA

819 MAGE PowerTec® Plus 240watt Polycrystalline Solar Modules

- 30 Year Production Warranty: 80% Power Guarantee; 90% 1st 12 Years

21 SMA Sunny Boy Inverters w/ Online Communications

- 10 Manufacturer Warranty w/ 5 and 10 Year Extended Warranty Options

Approximately 10,000ft² for Ground Mount Installation

Blountville, TN

Project Summary

- System Owner: EcoLogical Energy Leasing
- EPC: EcoLogical Energy Systems
- Type of Install: Ground Mount
- Est. Prod. 1st Yr: 263,576kWh *(NREL-pvwatts)*
- 1st Yr Revenue: $55,350.96 *(w/ GPP premium)*

ECOLOGICAL ENERGY SYSTEMS

Project Agreement Summary

- Lease: $500/month = $6,000/year
- Residual Income: $0.02/kWh 1st 10 Years

  $0.01/kWh remaining contract
- Terms: 13 Years = $146,529.76
- Option: 12 Years = $103,629.12
- **EEL provides site maintenance and complete system insurance coverage.*

ECO LOGICAL ENERGY SYSTEMS

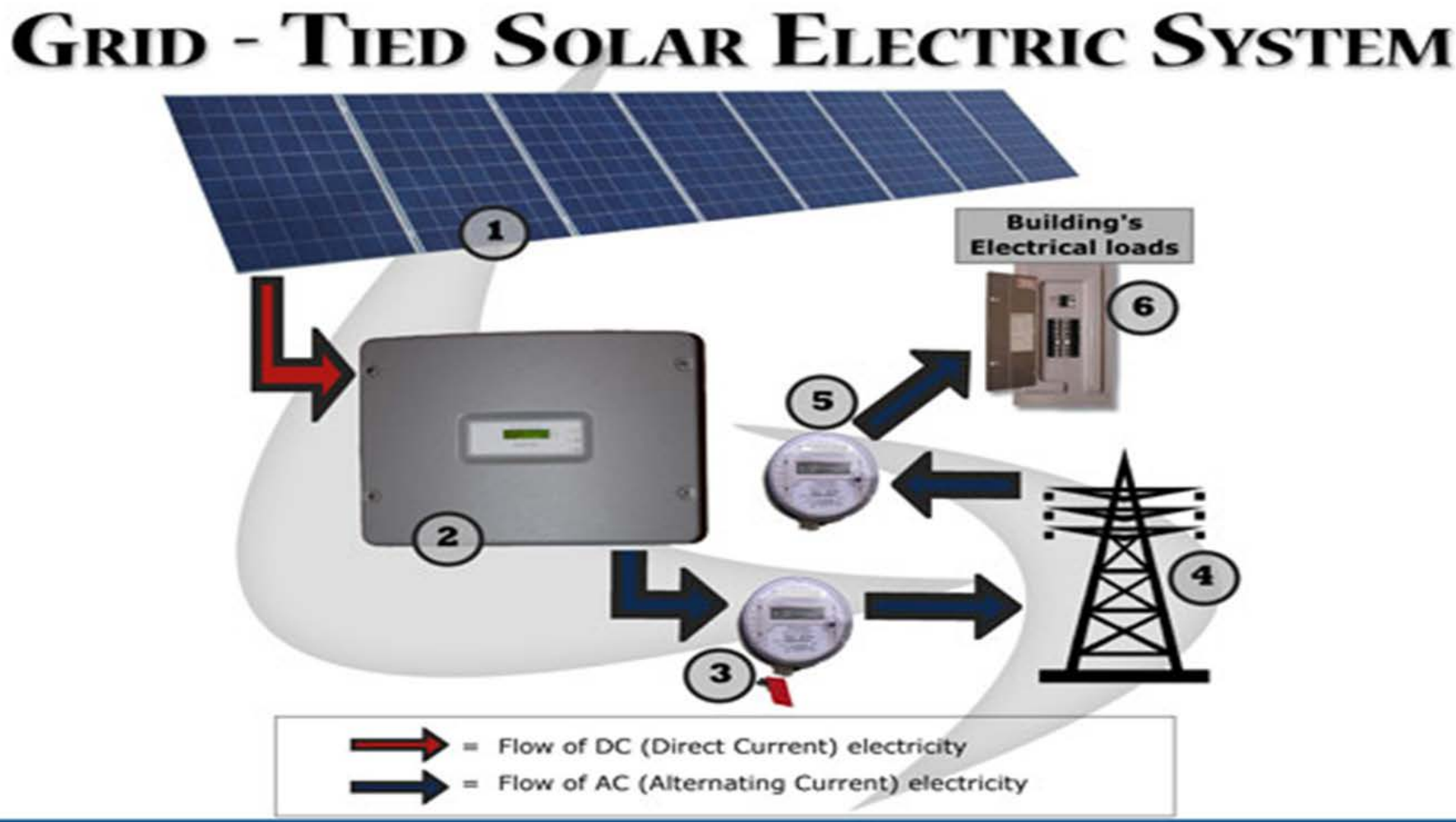
Tennessee Valley Authority

- Generation Partners *(2004 – 3rd Q 2012)*
  - Paid $0.12/kWh Premium for Solar, $0.03/kWh for other renewables

- Green Power Providers
  - Reduced premium for solar to $0.09/kWh
  - Load requirement for systems >10kW
  - NABCEP requirement

ECOLOGICAL ENERGY SYSTEMS

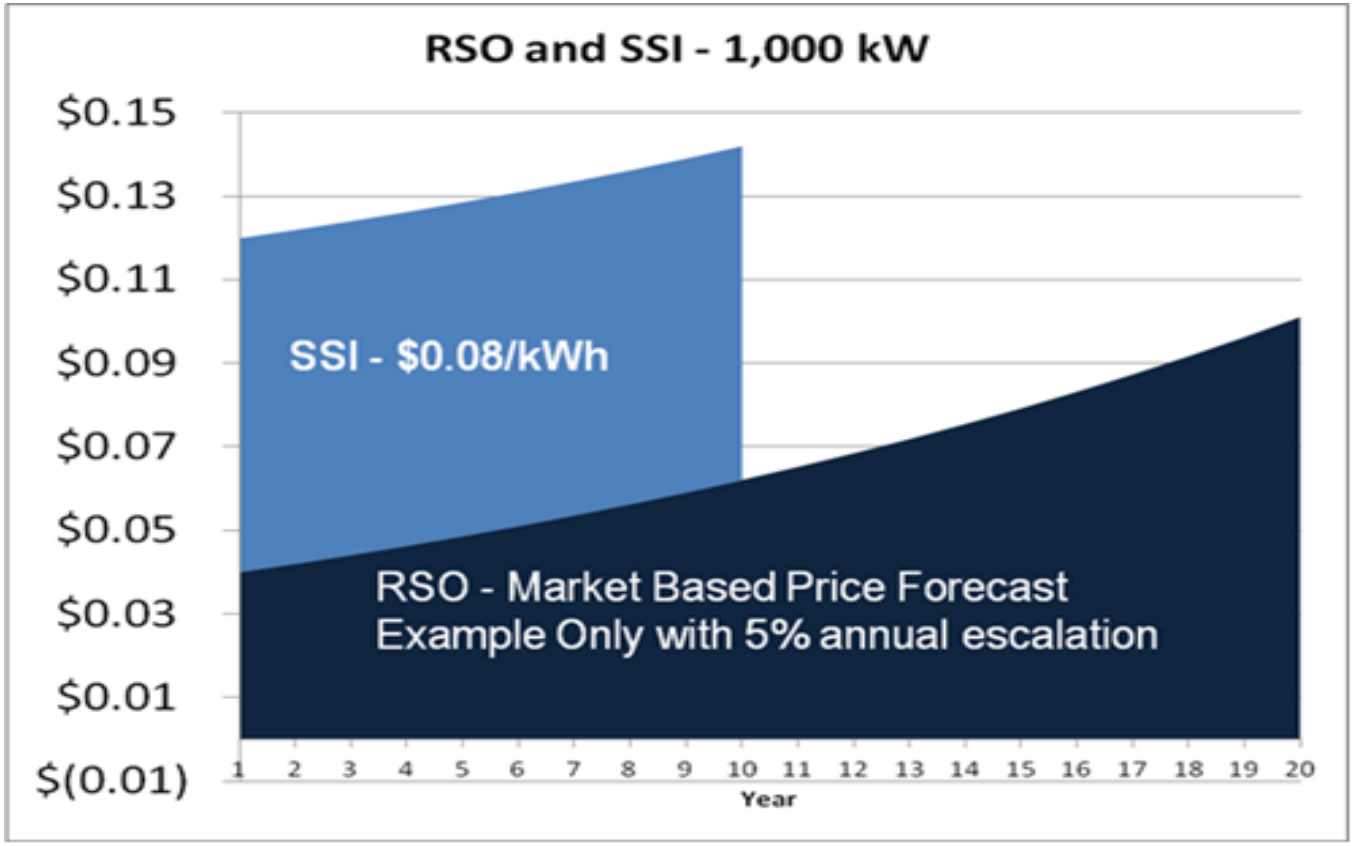
TVA's Dual Metering



TVA Renewable Program

Renewable Standard Offer – 20 Years w/ 5% Inflation Factor

Solar Solutions Initiative – 10 Years Premium added to RSO Rate



ECO LOGICAL ENERGY SYSTEMS

1 MW Financial Analysis Summary

Turnkey System (Installed) Cost:	$2,590,000.00 - $2.59/watt
Est. System Production 1st Year:	1,420,945kWh = $163,408.68
Current Annual Electrical Cost:	1,733,333kWh = $157,733.30
30% Federal ITC:	$777,000.27
1st Year Depreciation Bonus:	$475.524.00
System Return After Year 1:	$1,415,932.70 = 54.7%
System Complete Return:	6 Years

Utility Compensation Assumptions:

Retail Rate: $0.091/kWh; Avg. RSO Rate: $0.035/kWh (20yrs); SSI Premium: $0.08/kWh (10yrs)

Actual results can not be guranteed. Please consult your tax professional, specifically concerning tax credits and passive income limitations.

Cash incentives/rebates received from state/local gov't or utilities are subject to IRS taxation

ECO LOGICAL ENERGY SYSTEMS

Environmental Benefits

Annual Environmental Impact

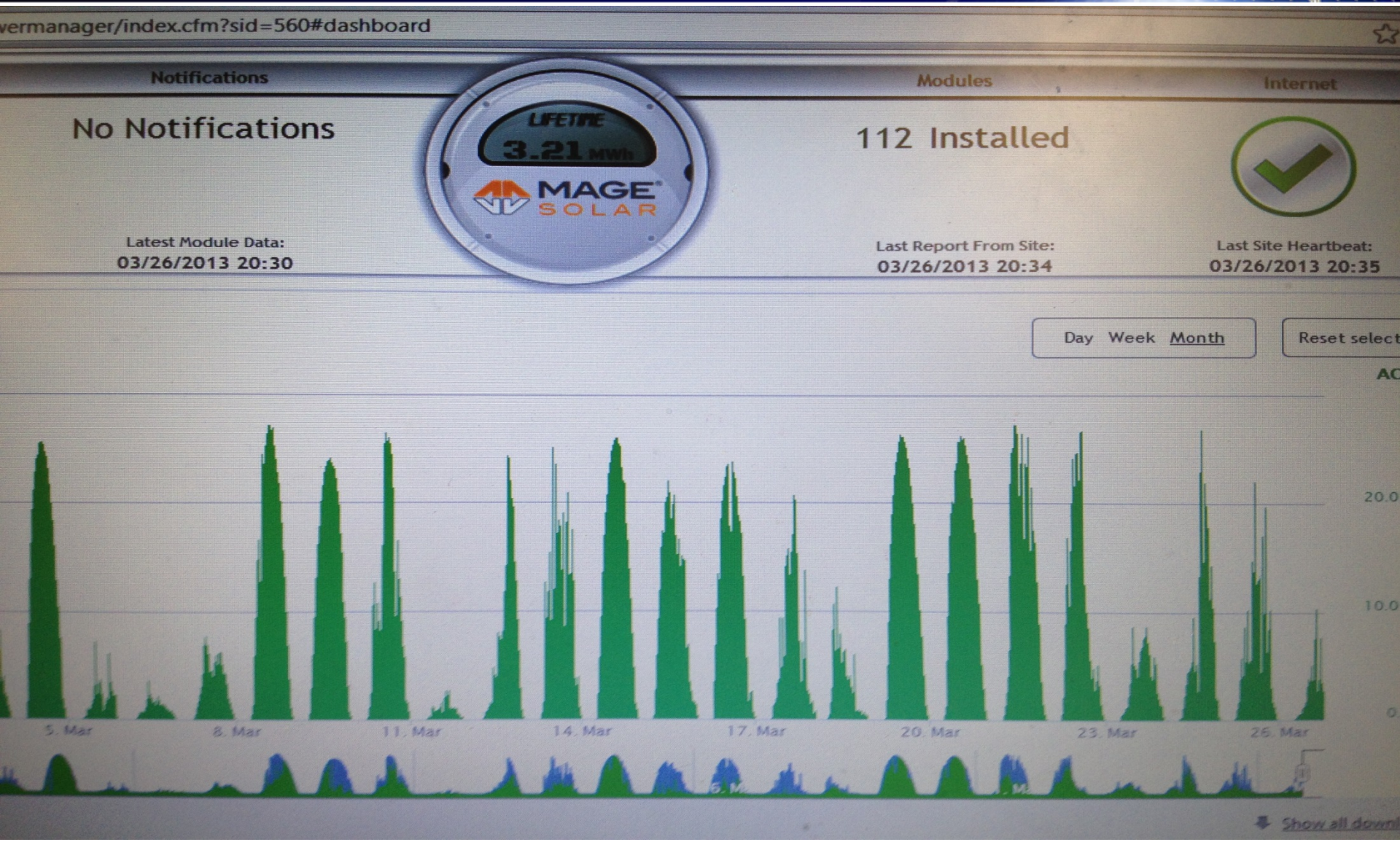
- Annual CO2 Offset: 10,913 Metric Tons
- Equivalent to offsetting: Annual Emissions from 2,274 Cars
- Enough Electricity: To Offset Emissions 1,634 Homes Annually
- Carbon Sequestered by: 8,945 Acres of Forests Annually

Leveraging Green

- Ribbon Cutting, Press Releases
- Access to Online Monitoring: Publish on Website/Kiosk
- Attract Green Customers, Retain Conscientious Staff/Employees

ECO LOGICAL ENERGY SYSTEMS

Snapshot: Online Communications



Capital Lease Project

Consultant:	Ecological Energy Systems
Type of installation:	Carport financed through Capital Lease
Current Rate Plan:	SCE Non-TOU GS2
Ending Rate Plan:	TOU-GS2-R (Option R) : see slide #10
Module manufacturer:	*MAGE SOLAR USA, based in Dublin, Georgia
Solar Modules:	1344 x 250 MAGE Solar Plus 250/6ML
System Size:	336 kWp
Est. Production Yr.1:	481,892 kWh
Utility bill offset:	83%

ECOLOGICAL ENERGY SYSTEMS

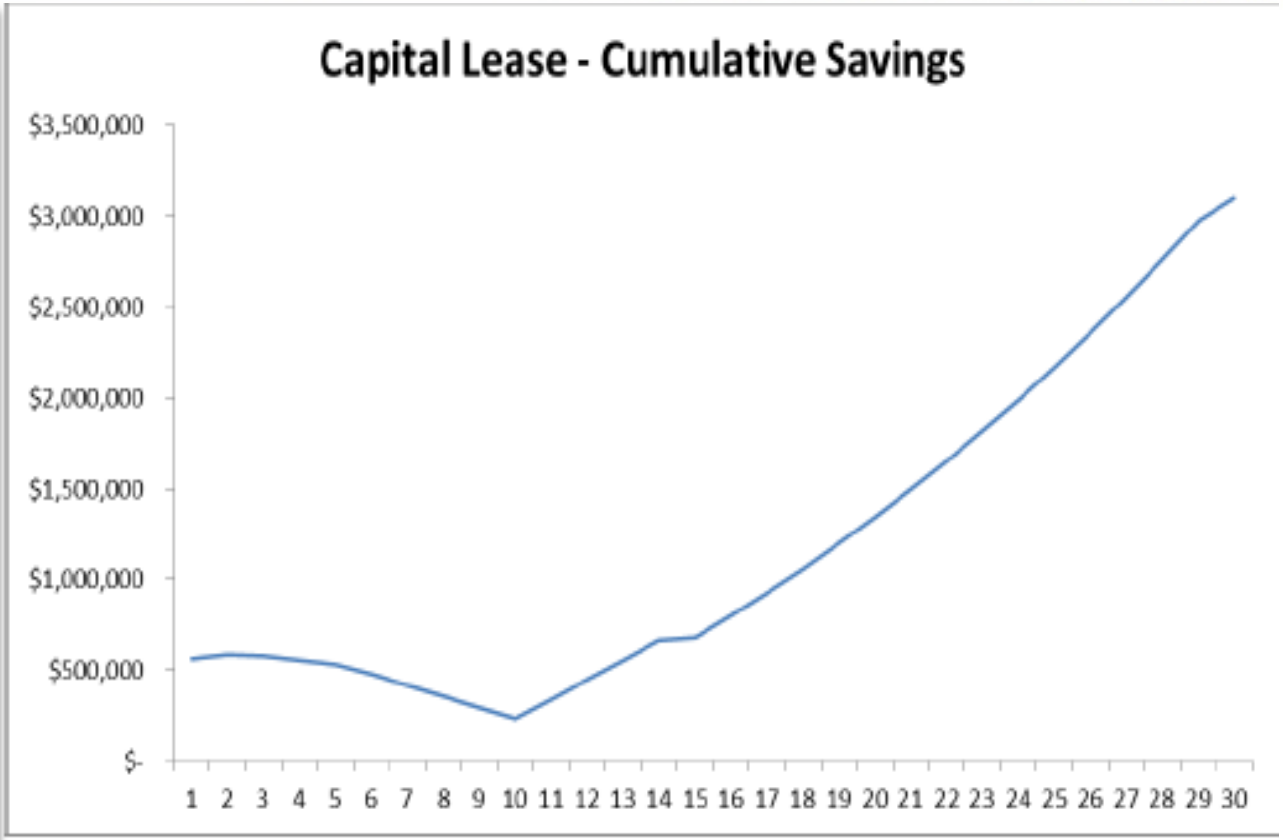
Project Summary

Gross Cost	$1,290,000
PBI Rebate (Pre-Tax)	*($76,336)
Federal Tax Credit	*($387,000)
Net Cost (Pre-Depreciation)	$853,382
Total Depreciation	*($497,811)
Net Cost	**$355,571**

ECO LOGICAL ENERGY SYSTEMS

Capital Lease Economics

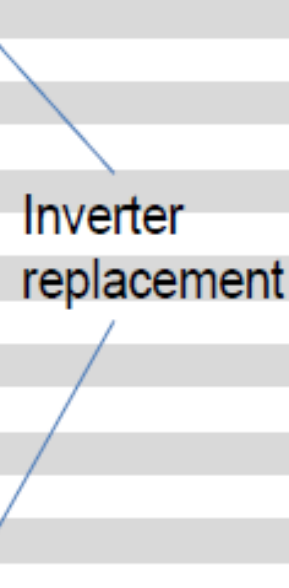
Capital Lease Summary	
Monthly Payment	$13,841
Investment Value	$1,290,000
Assumed Rate	5.25 %
Term	10 yr.
30 yr savings	**$3,074,244**
Year 1 Savings	**$561,063**
End of term Purchase Price	**$101.00**
Upfront Capital	**$0.00**



- Bank pays for 100% of system (customer makes set lease payments);
- Customer utilizes available tax benefits;
- Customer receives utility savings and rebates

ECO LOGICAL ENERGY SYSTEMS

Yr.	Bill Before solar	Utility Savings	Bill After Solar	SCE PBI Rebate	Lease Payments	O&M	Capital Cost	ITC	Federal Depr.	State Depr.	Interest Deduction	Annual Savings	Cumulative Savings	% Saving
1	$ 79,125	$ 65,459	$ 13,666	$ 15,421	$ (166,088)	$ (3,360)	$ -	$ 387,000	$230,265	$ 9,503	$ 22,863	$ 561,063	$ 561,063	709.1%
2	83,082	68,388	14,693	15,343	(166,088)	(3,461)			61,404	9,503	26,151	11,242	572,305	13.5%
3	87,236	71,449	15,787	15,267	(166,088)	(3,565)			36,842	9,503	23,783	(12,809)	559,497	-14.7%
4	91,598	74,646	16,952	15,190	(166,088)	(3,672)			22,105	9,503	21,255	(27,059)	532,438	-29.5%
5	96,178	77,986	18,191	15,114	(166,088)	(3,782)			22,105	9,503	18,559	(26,601)	505,837	-27.7%
6	100,986	81,476	19,510		(166,088)	(3,895)			11,053	9,503	15,682	(52,269)	453,568	-51.8%
7	106,036	85,122	20,913		(166,088)	(4,012)				9,503	12,612	(62,862)	390,705	-59.3%
8	111,337	88,932	22,406		(166,088)	(4,132)				9,503	9,336	(62,449)	328,256	-56.1%
9	116,904	92,911	23,993		(166,088)	(4,256)				9,503	5,841	(62,088)	266,168	-53.1%
10	122,750	97,069	25,680		(166,088)	(4,384)				9,503	2,112	(61,787)	204,381	-50.3%
11	128,887	101,413	27,474			(4,516)				9,503		106,400	310,781	82.6%
12	135,331	105,951	29,380			(4,651)				9,503		110,803	421,585	81.9%
13	142,098	110,693	31,405			(4,791)						105,902	527,487	74.5%
14	149,203	115,646	33,557			(4,934)						110,712	638,198	74.2%
15	156,663	120,821	35,842			(5,082)	(101,561)					14,178	652,376	9.0%
16	164,496	126,228	38,268			(5,235)						120,993	773,369	73.6%
17	172,721	131,877	40,844			(5,392)						126,485	899,854	73.2%
18	181,357	137,778	43,579			(5,554)						132,225	1,032,079	72.9%
19	190,425	143,944	46,481			(5,720)						138,224	1,170,302	72.6%
20	199,946	150,385	49,561			(5,892)						144,493	1,314,796	72.3%
21	209,943	157,115	52,829			(6,069)						151,046	1,465,842	71.9%
22	220,441	164,146	56,295			(6,251)						157,895	1,623,737	71.6%
23	231,463	171,491	59,971			(6,438)						165,053	1,788,791	71.3%
24	243,036	179,166	63,870			(6,631)						172,534	1,961,325	71.0%
25	255,188	187,183	68,004			(6,830)						180,353	2,141,678	70.7%
26	267,947	195,560	72,387			(6,898)						188,661	2,330,339	70.4%
27	281,344	204,311	77,033			(6,967)						197,344	2,527,683	70.1%
28	295,412	213,454	81,958			(7,037)						206,417	2,734,099	69.9%
29	310,182	223,006	87,176			(7,108)						215,898	2,949,998	69.6%
30	325,691	232,986	92,706			(7,179)	(101,561)					124,246	3,074,244	38.1%



Local Financing Experience

	20 Year Amorization @ 4.75% - Commercial Real Estate Secured					
Amount Financed	**Estimated Payment**	**Est. MOD Balance**	**New Payment**	**System Size**	**kWh Production**	**Energy Credits $**
$200,000	$1,293	$140,000	$934	65kW	8,085	$889.35
$500,000	$3,232	$350,000	$2,334	150kW	18,657	$2,052.45
$1,000,000	$6,463	$700,000	$4,667	350kW	43,537	$4,789.05

*Factors additional down payment made when ITC is realized.

*Does not factor in potential bonus depreciation.

ECOLOGICAL ENERGY SYSTEMS

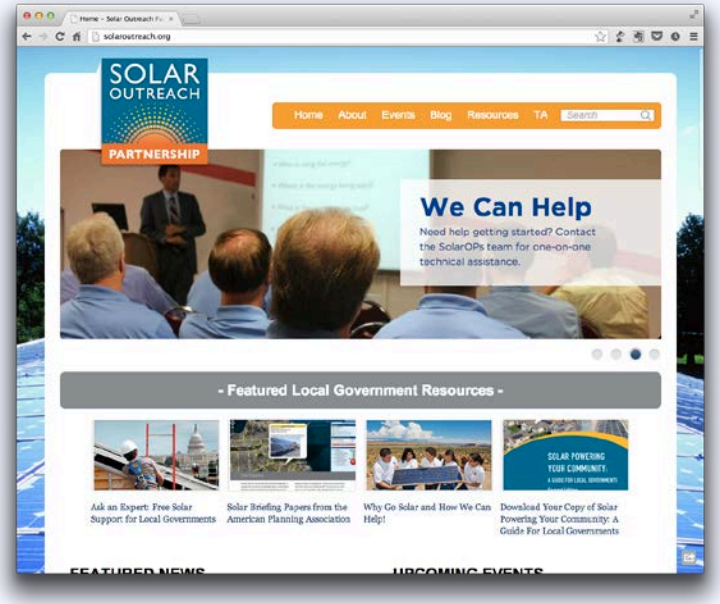
Activity: Next Steps

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

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U.S. Department of Energy

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The Solar Foundation

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Appendix

TVA: Renewable Energy Programs

500 W – 50 kW Green Power Providers

50 kW – 20 MW Standard Offer Program

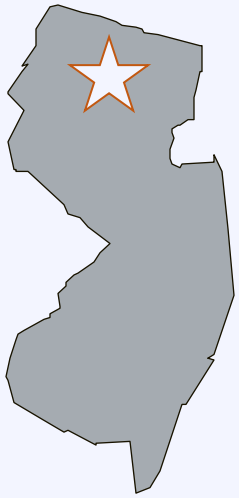
TVA: Renewable Energy Programs

Typical State Solar Policies:

- Renewable Portfolio Standard
- Renewable Energy Credits
- Net Metering
- Interconnection Standards

As a federal entity, TVA is not regulated by the state

Bond-PPA Hybrid

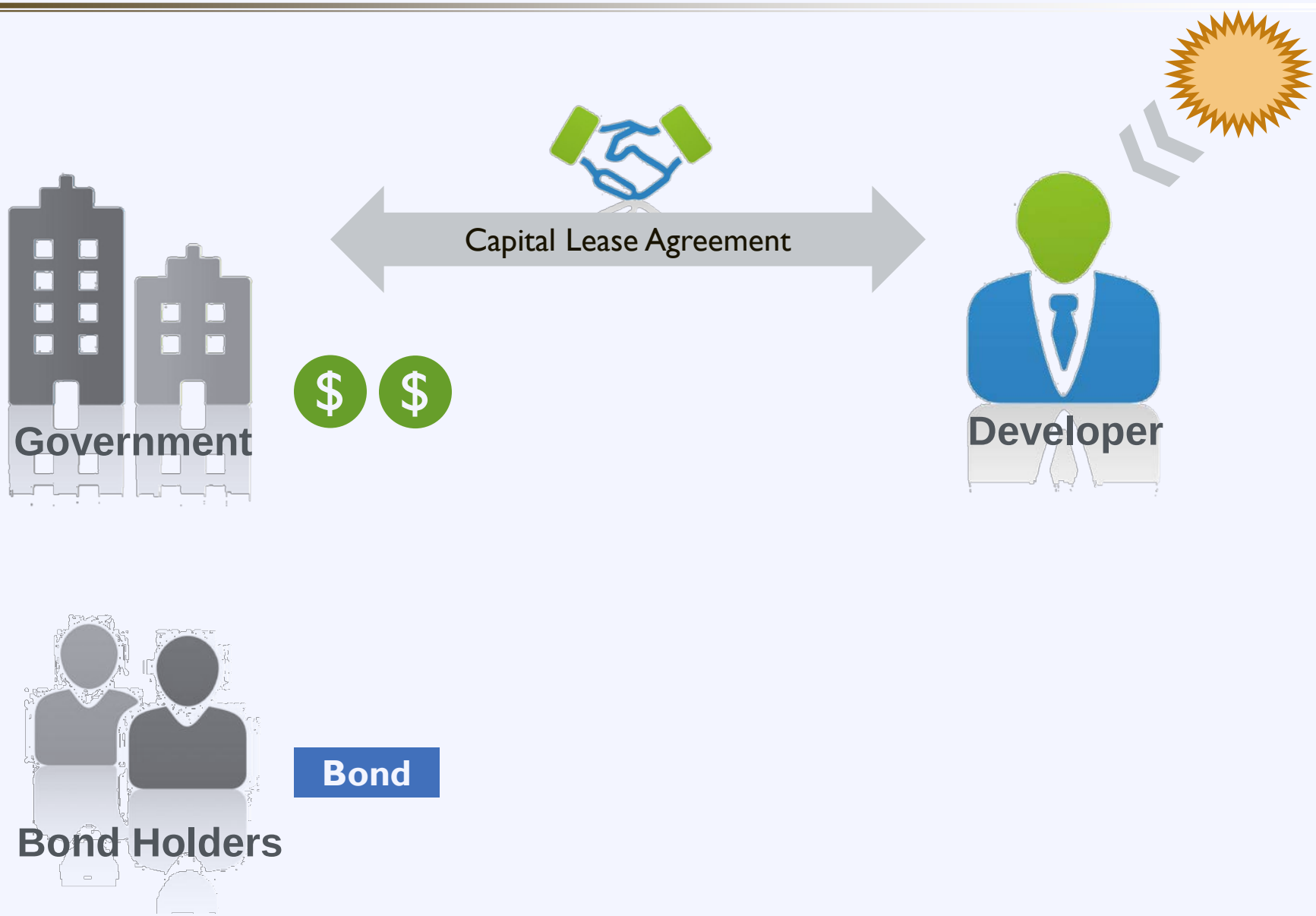


Morris County, New Jersey

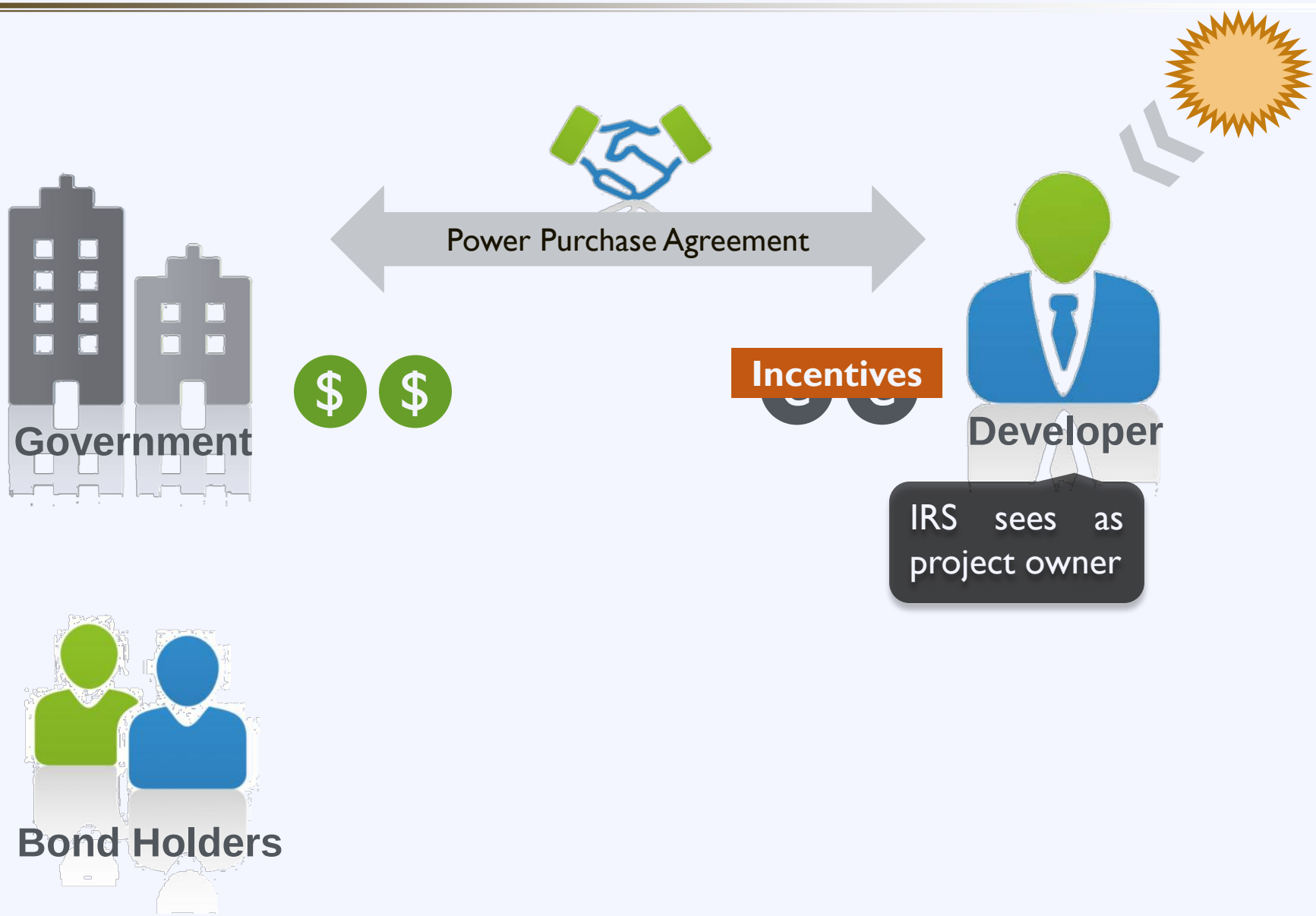
Population: 492,276

Bond-PPA Hybrid

Bond-PPA Hybrid



Bond-PPA Hybrid



Bond-PPA Hybrid

Pros

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

Cons

- Don't keep RECs

Replication of "Morris Model"

- Legality of PPA Model
- Laws Governing Public Contracts
- Laws Governing Bonding
- Laws Governing Procurement

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U.S. Department of Energy

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