Solar Powering Your Community

Addressing Soft Costs and Barriers

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U.S. Department of Energy

About the SunShot Solar Outreach Partnership

The SunShot Solar Outreach Partnership (SolarOPs) is a U.S. Department of Energy (DOE) program designed to increase the use and integration of solar energy in communities across the US.

About the SunShot Solar Outreach Partnership

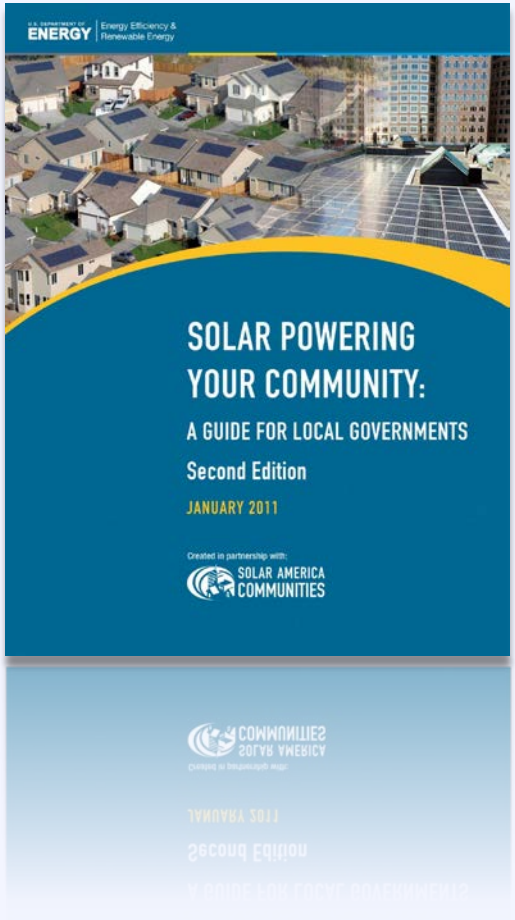
- Increase installed capacity of solar electricity in U.S. communities
- Streamline and standardize permitting and interconnection processes
- Improve planning and zoning codes/regulations for solar electric technologies
- Increase access to solar financing options

About the SunShot Solar Outreach Partnership

Resource **Solar Powering Your Community Guide**

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

www.energy.gov



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About the SunShot Solar Outreach Partnership

Resource Sunshot Resource Center

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

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

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Agenda

08:40 – 09:00	Solar 101
09:00 – 09:50	Creating a Regulatory Landscape for Solar
09:50 – 10:00	*Break*
10:00 – 10:20	Benefits and Barriers Activity
10:20 – 10:50	Understanding Utility Regulations
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11:30 – 12:00	Installing Solar on Municipal Facilities
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Poll

Who's in the room?

Poll

What is your experience with solar?

Solar Technologies

Solar Photovoltaic (PV)

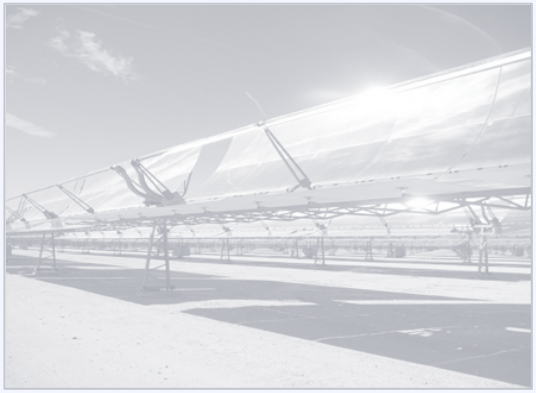
Solar Hot Water

Concentrated Solar Power

Solar Technologies

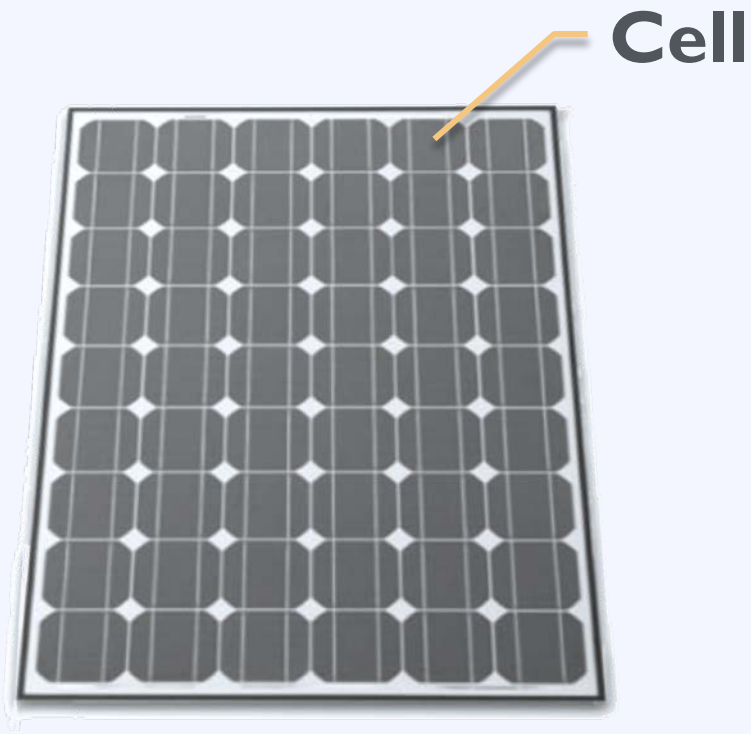
Solar Photovoltaic (PV)

Solar Hot Water



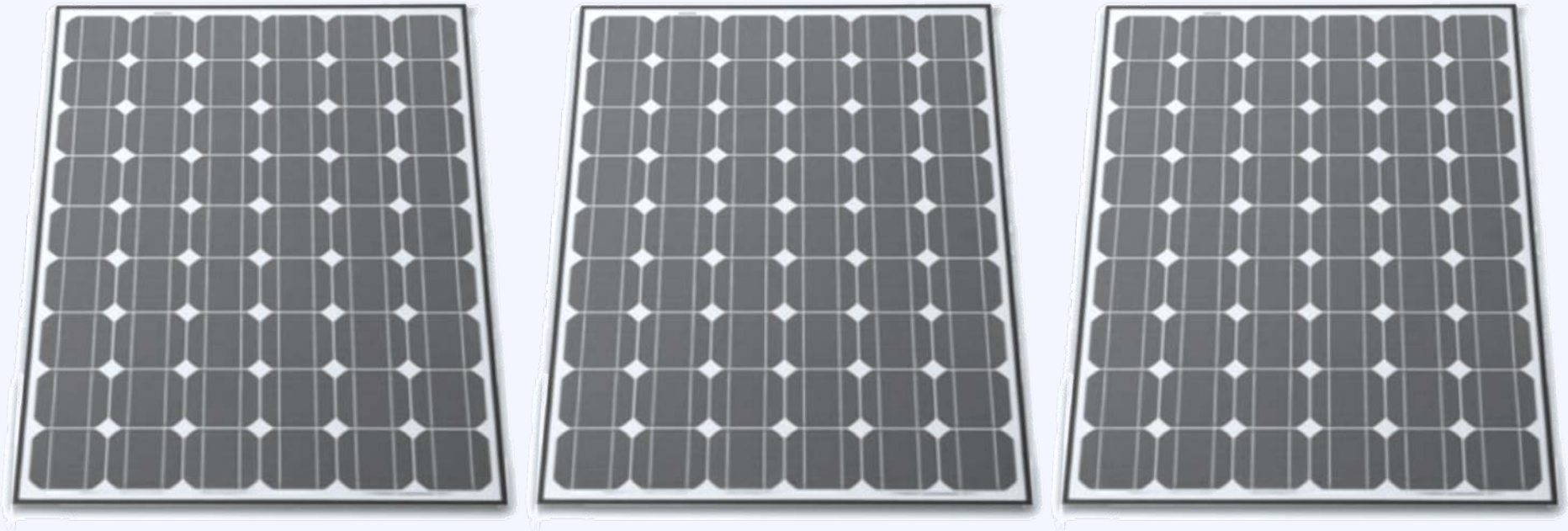
Concentrated Solar Power

Some Basic Terminology



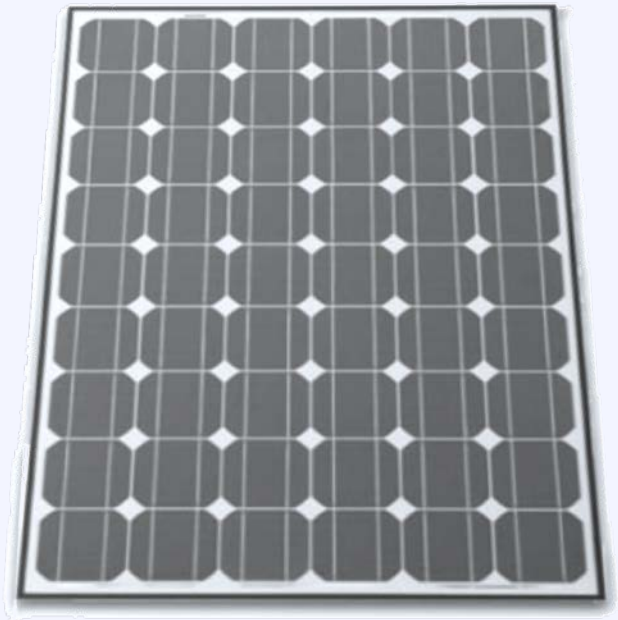
Panel / Module

Some Basic Terminology



Array

Some Basic Terminology



Capacity / Power

kilowatt (kW)

Production

Kilowatt-hour (kWh)

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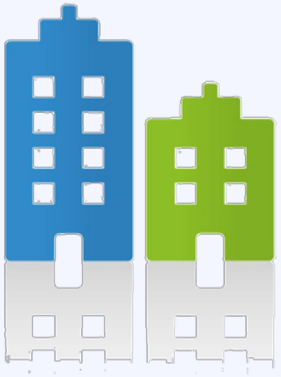
Some Basic Terminology

Residence
5 kW

Factory
1 MW+



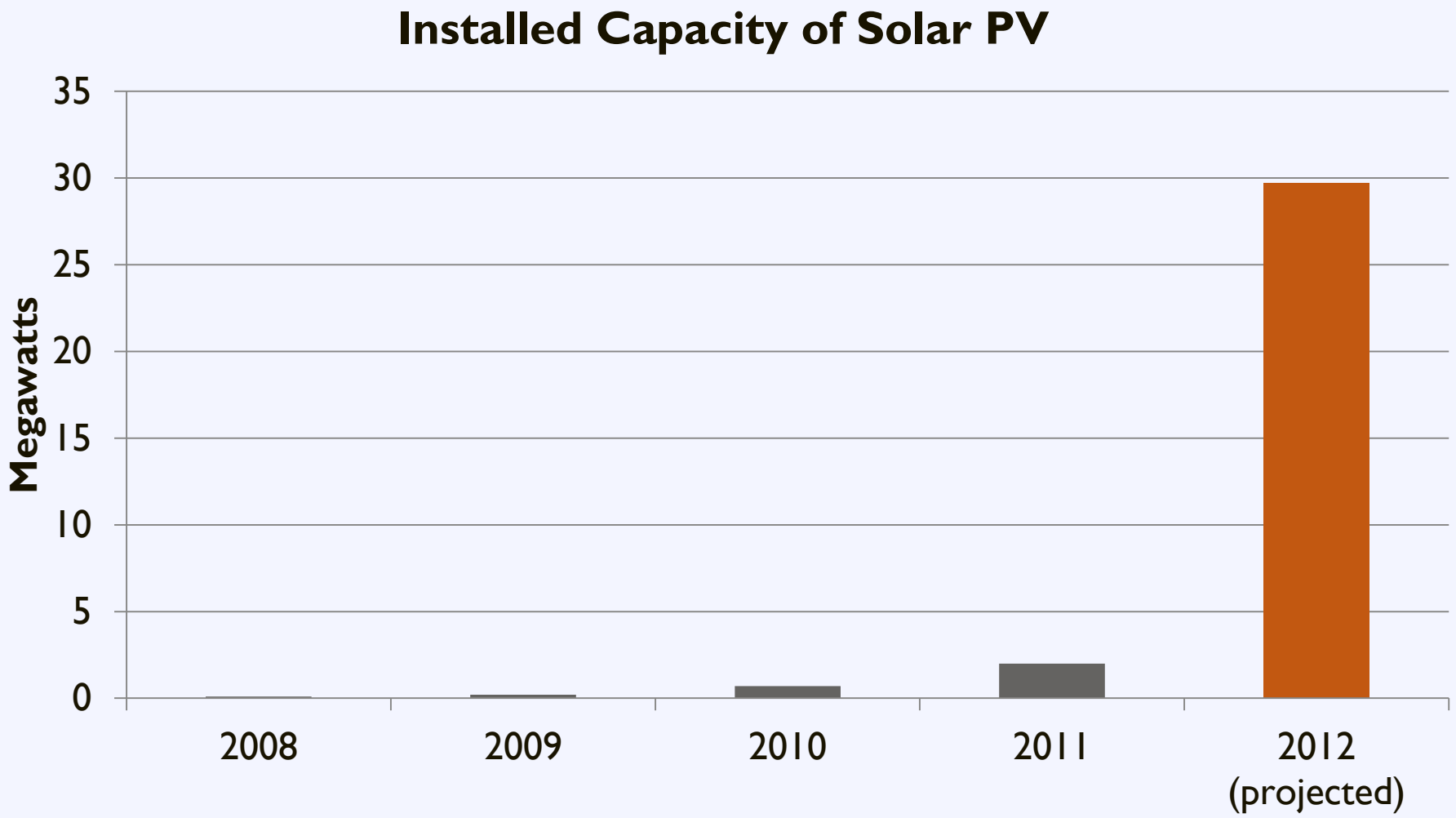
Office
50 – 500 kW

Utility
2 MW+

Workshop Goal

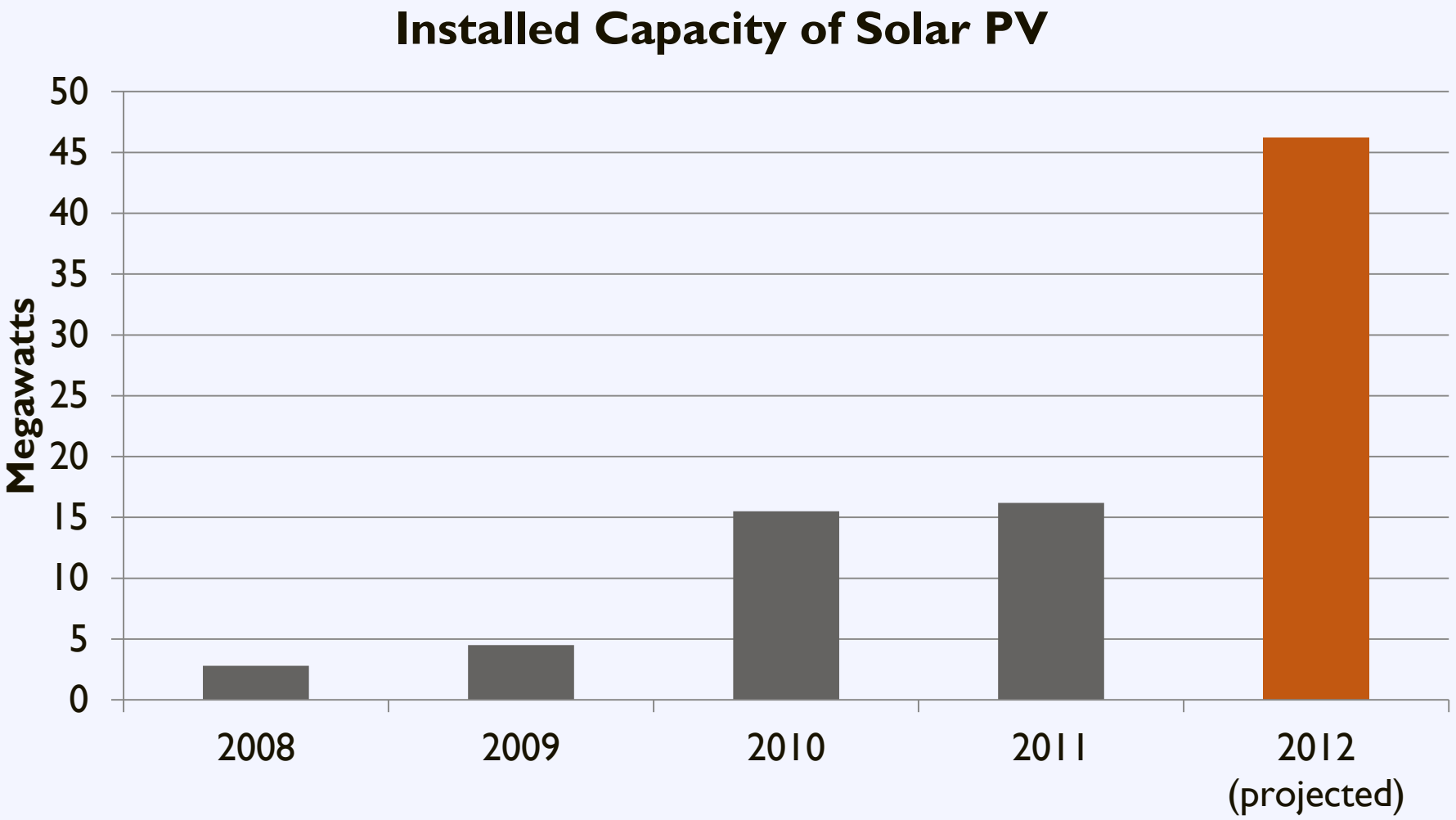
Enable local governments to replicate successful solar practices and expand local adoption of solar energy

Missouri Solar PV Market



Source: IREC, Photon Magazine

Illinois Solar PV Market



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Source: IREC, Photon Magazine

Explore benefits

and

Overcome barriers

Activity: Identifying Benefits

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

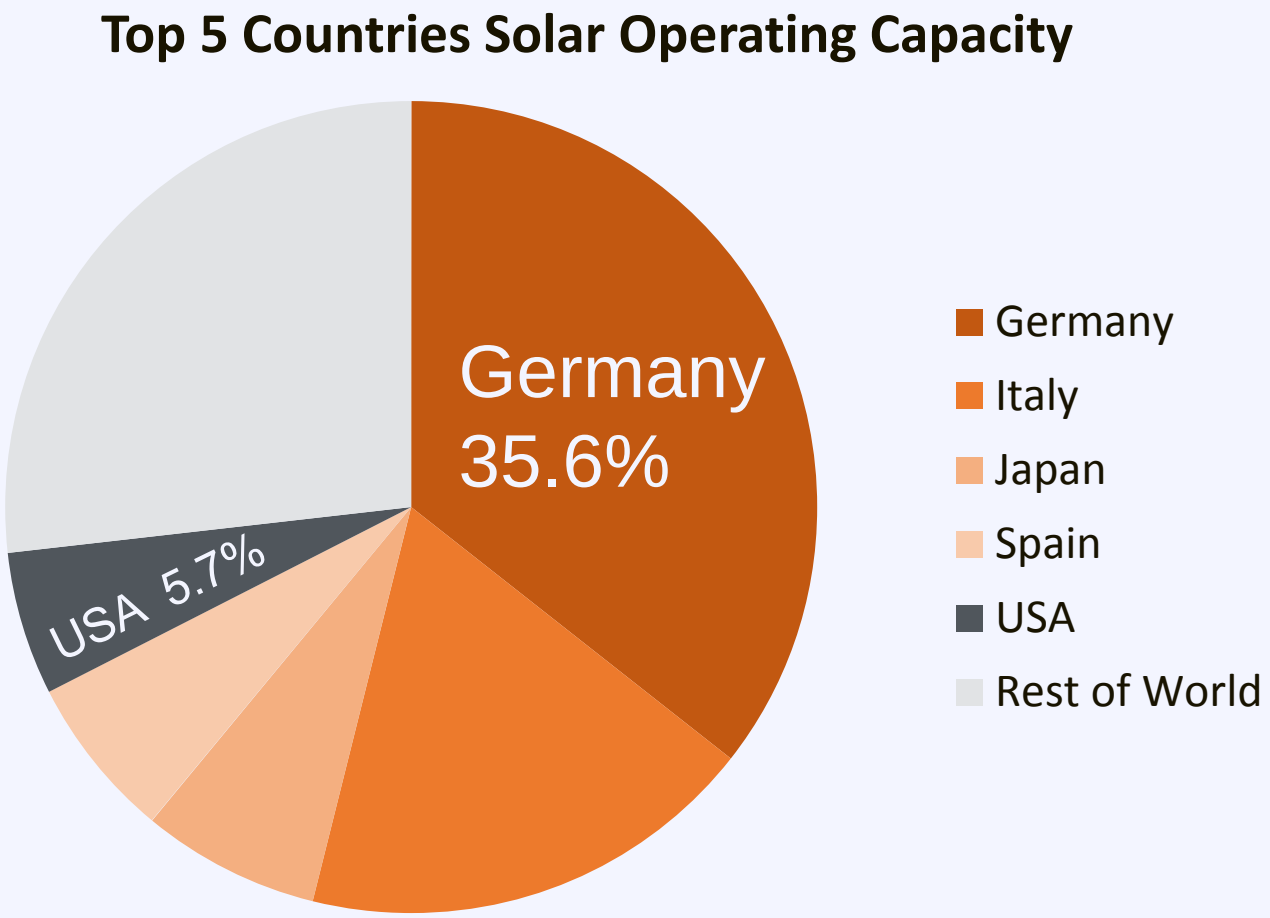
Right Now	During Session	After Break
		
Write answer on card	Compile results	Group discussion

Activity: Addressing Barriers

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

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

Installed Capacity



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U.S. Department of Energy

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

Installed Capacity

Total installed solar capacity in the US

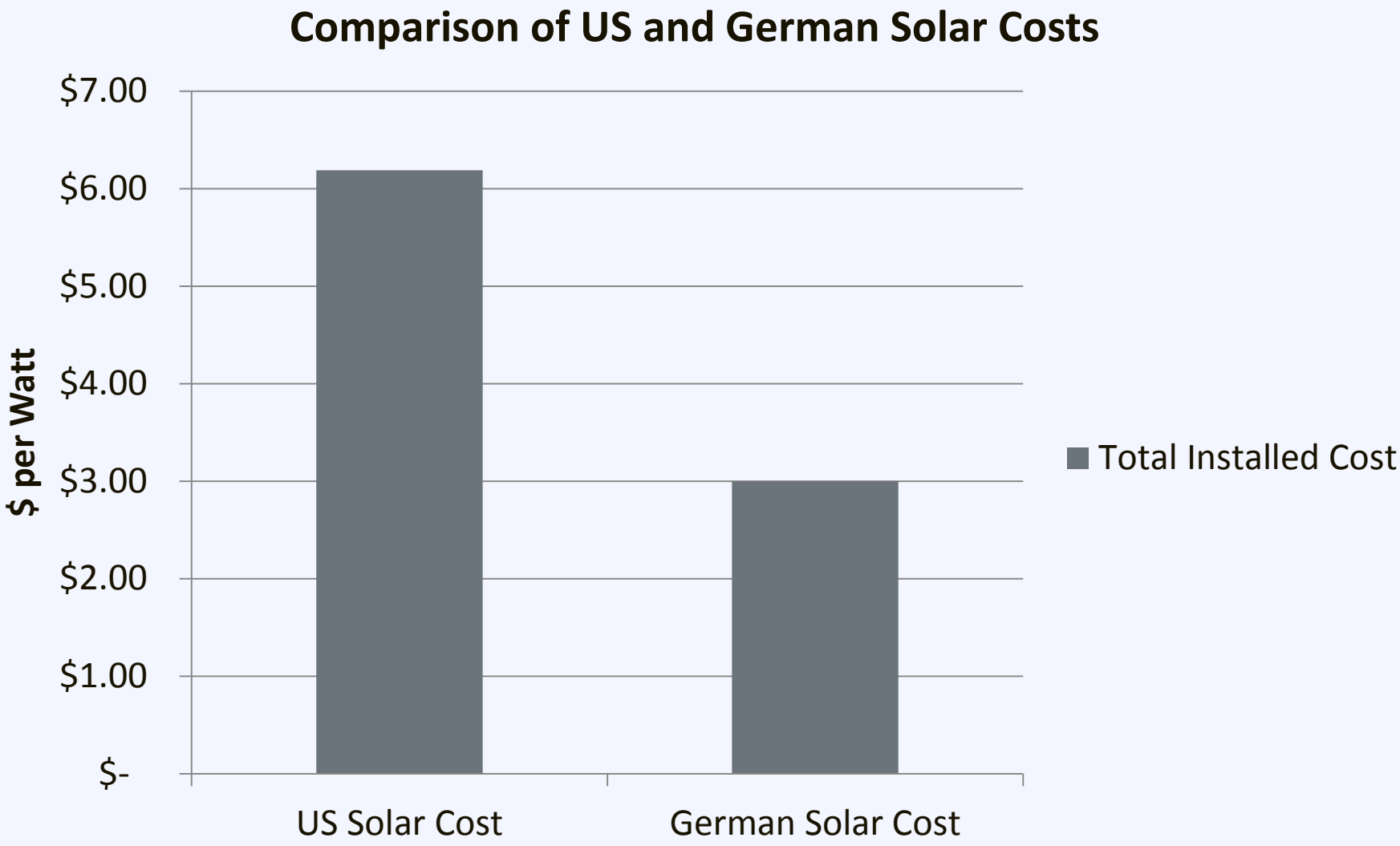
4 GW

Capacity installed in Germany in Dec 2011

4 GW

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

The Cost of Solar in the US



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

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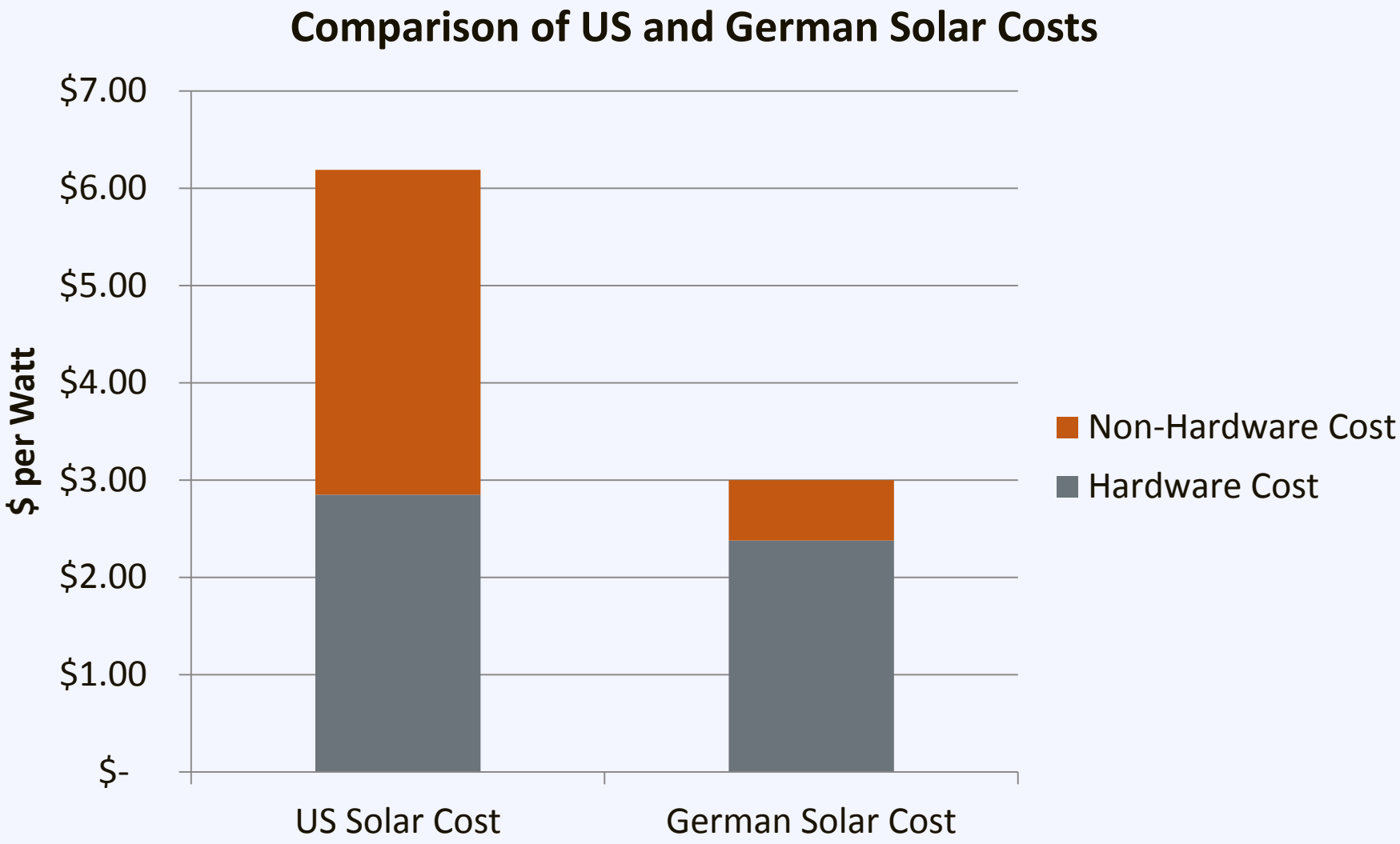

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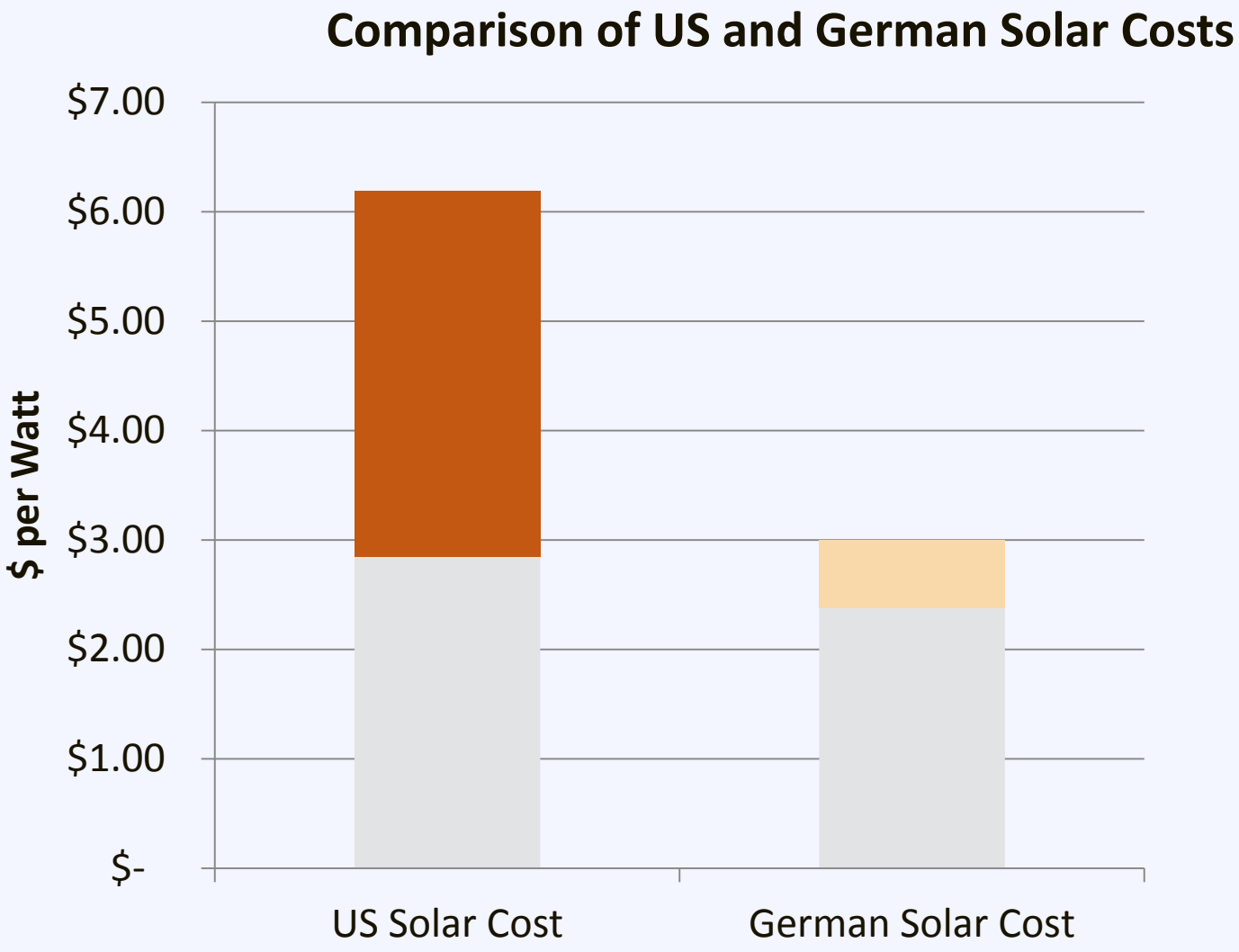

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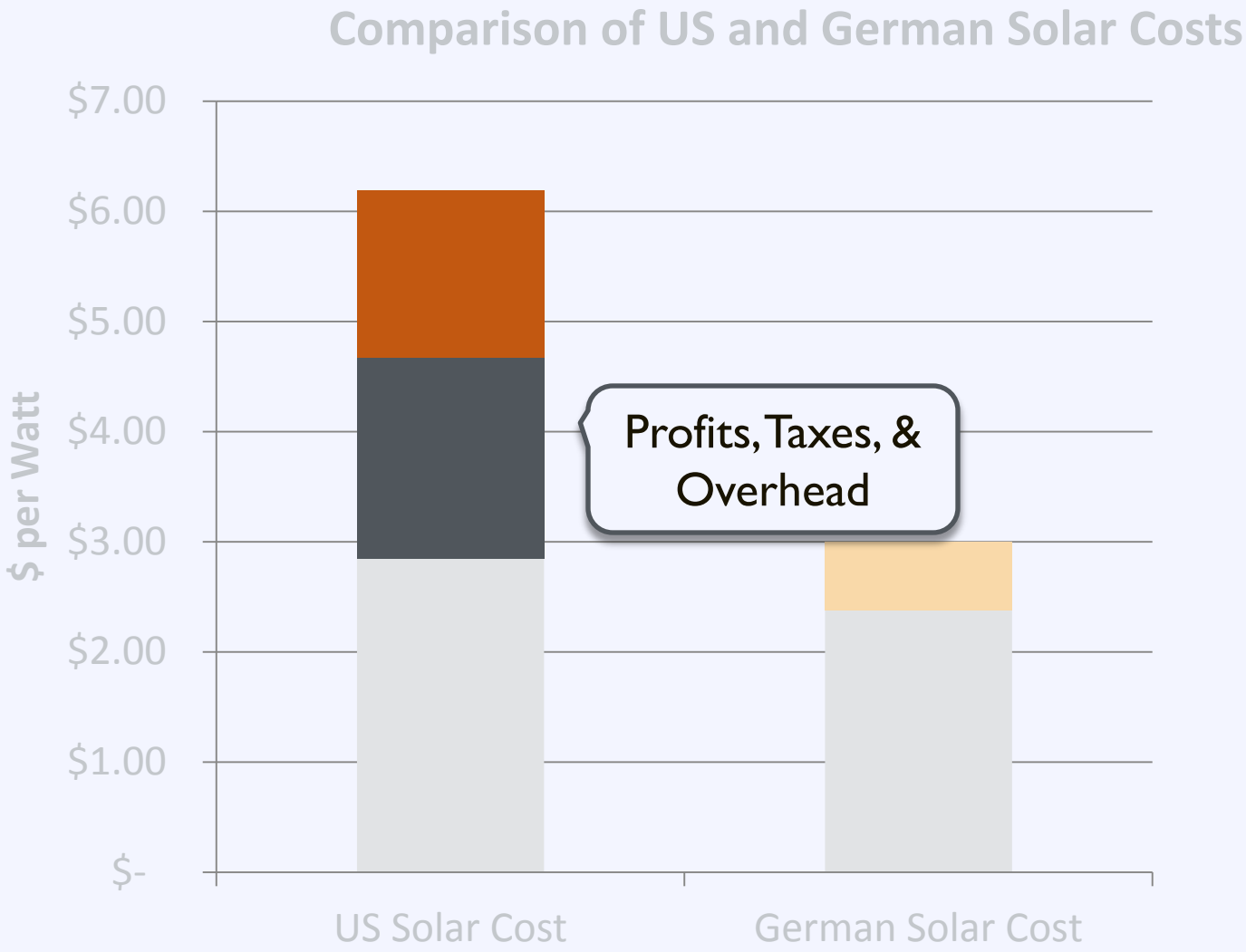

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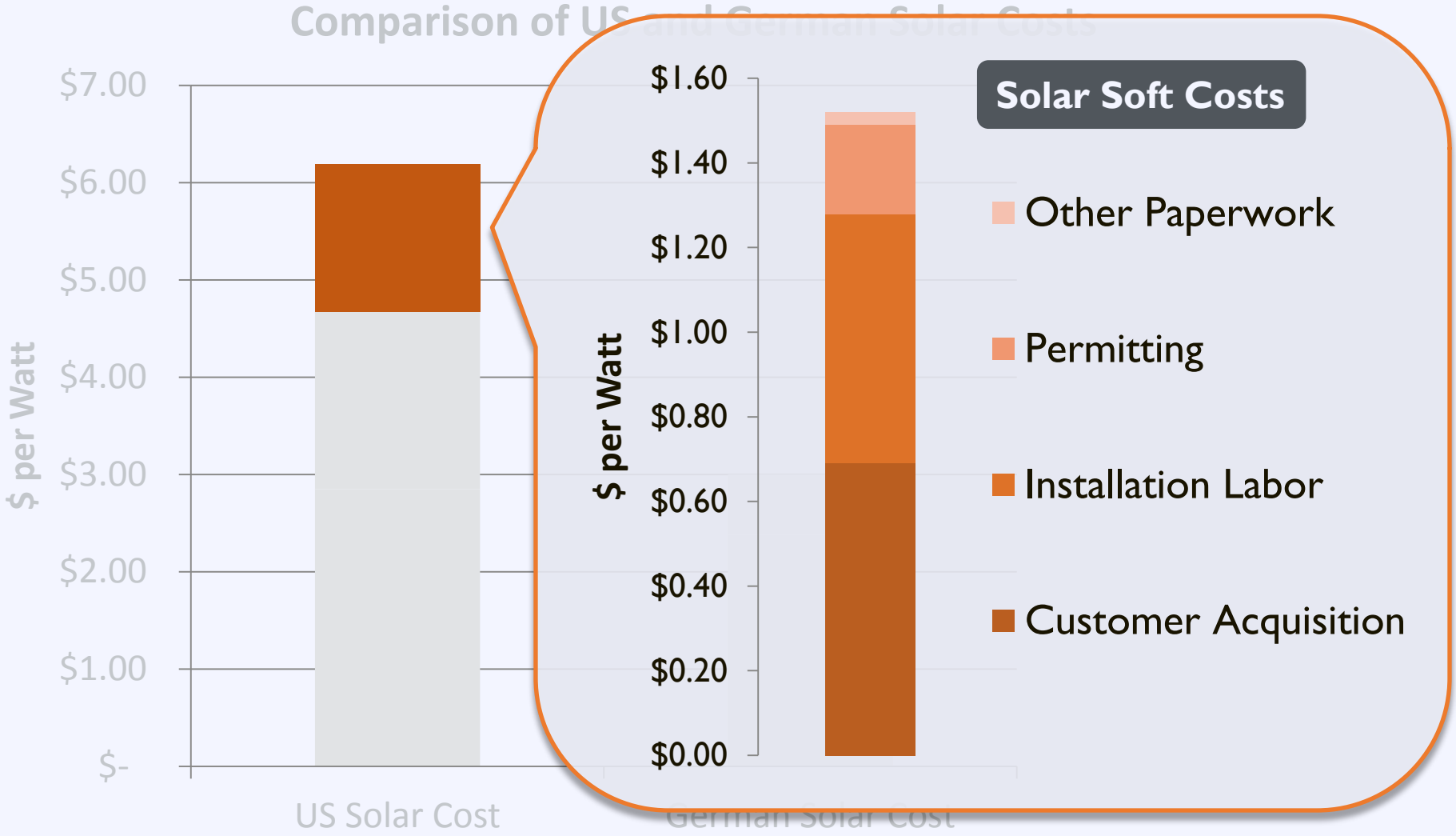

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The Permitting Process: Challenges

18,000+ local jurisdictions

with unique permitting requirements

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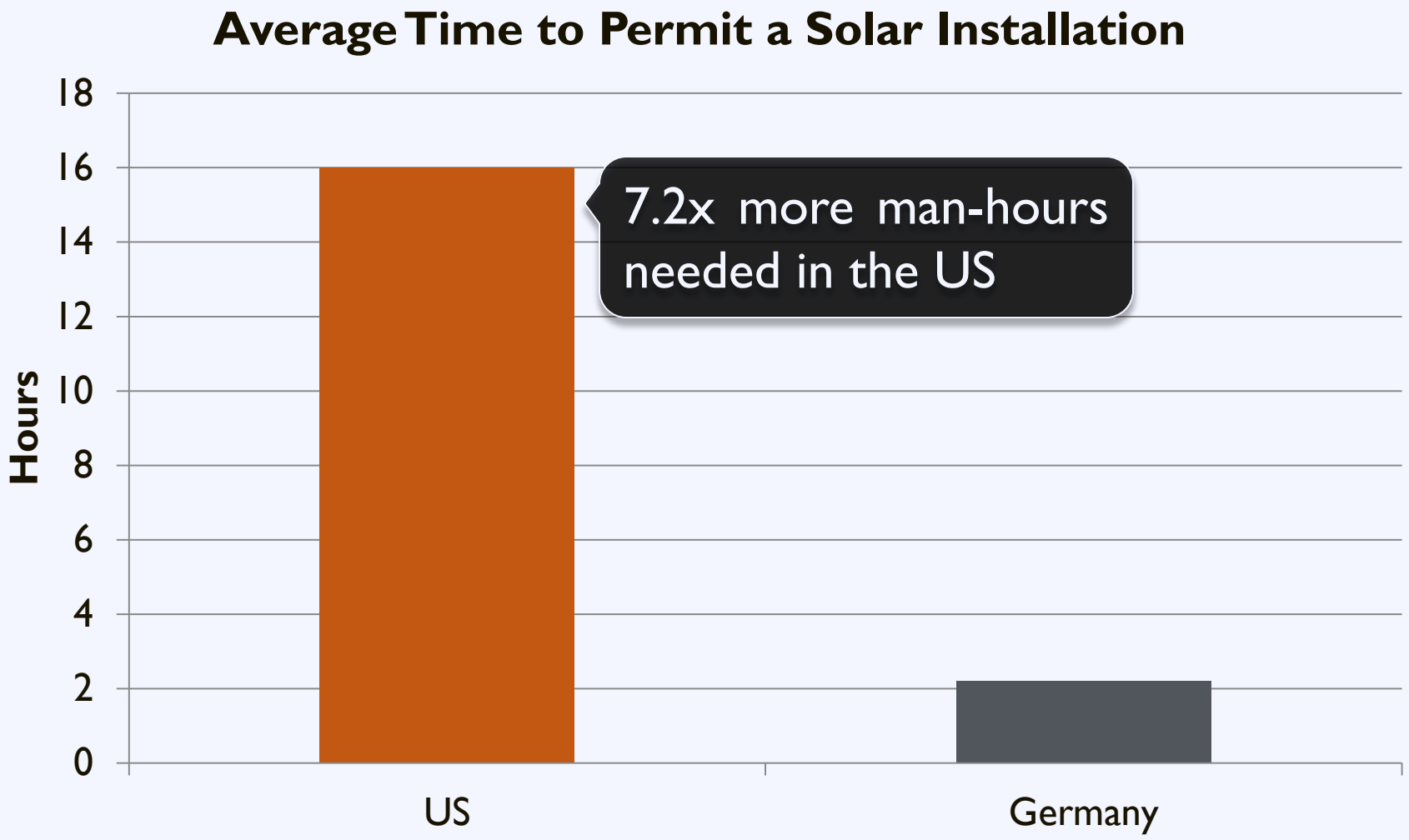
Source: http://www.nrel.gov/docs/fy12osti/54689.pdf

Time to Installation



Time to Installation

New York City's Goal

100 days

from inception to completion

Germany Today

8 days

from inception to completion

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Photon Magazine

Germany's Success

Consistency and Transparency

through

Standardized Processes

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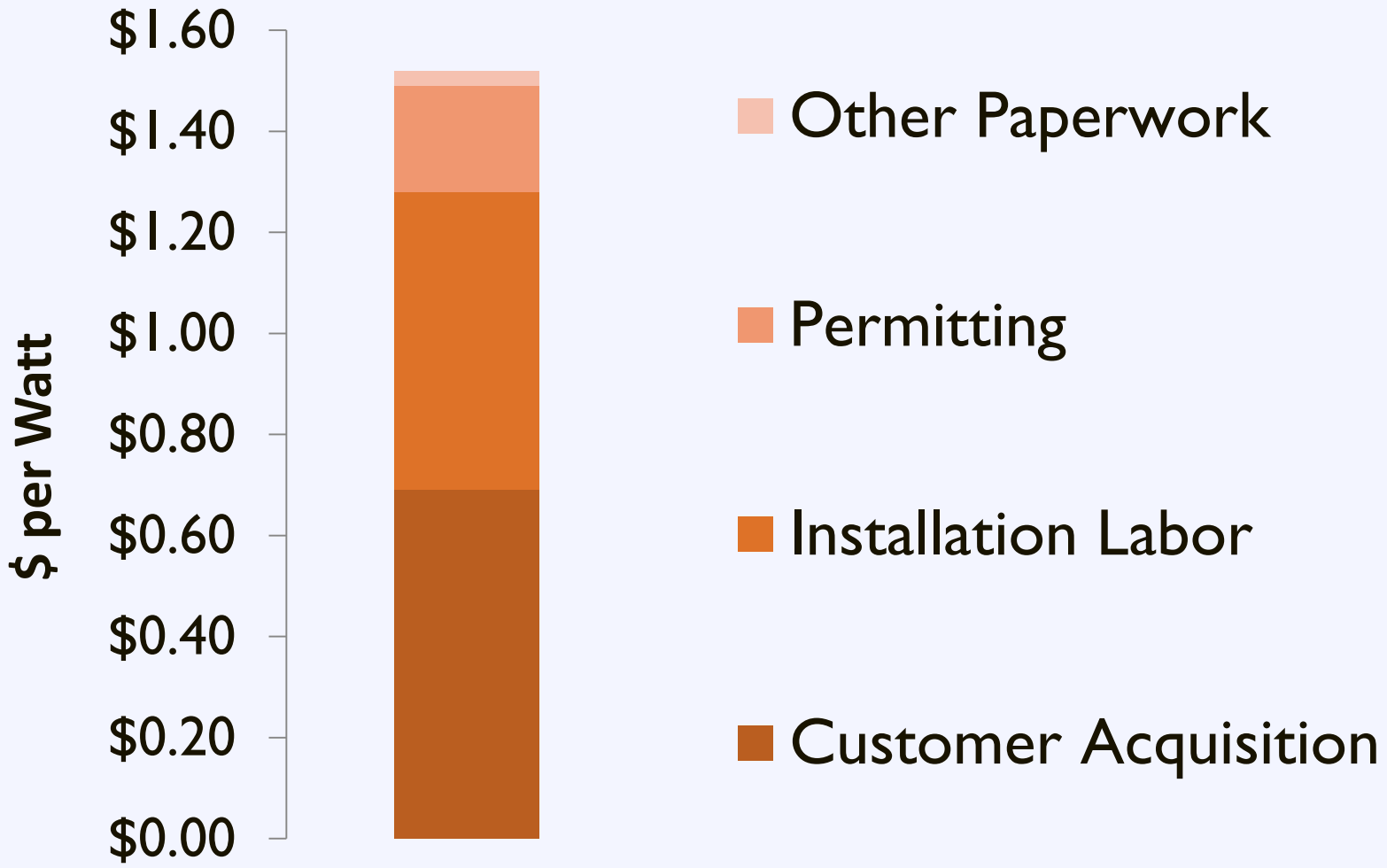
Mitigate Soft Costs



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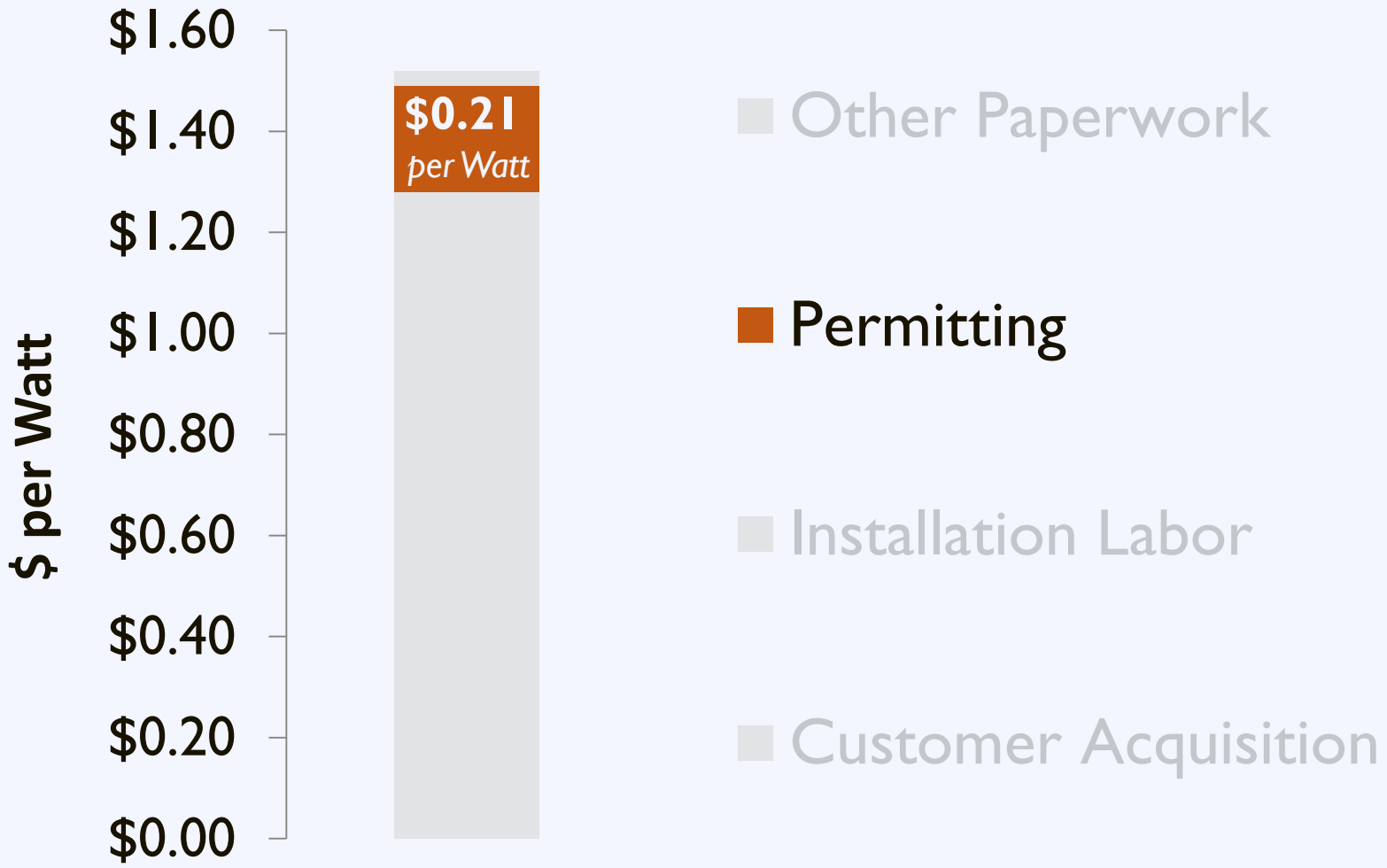
Mitigate Soft Costs



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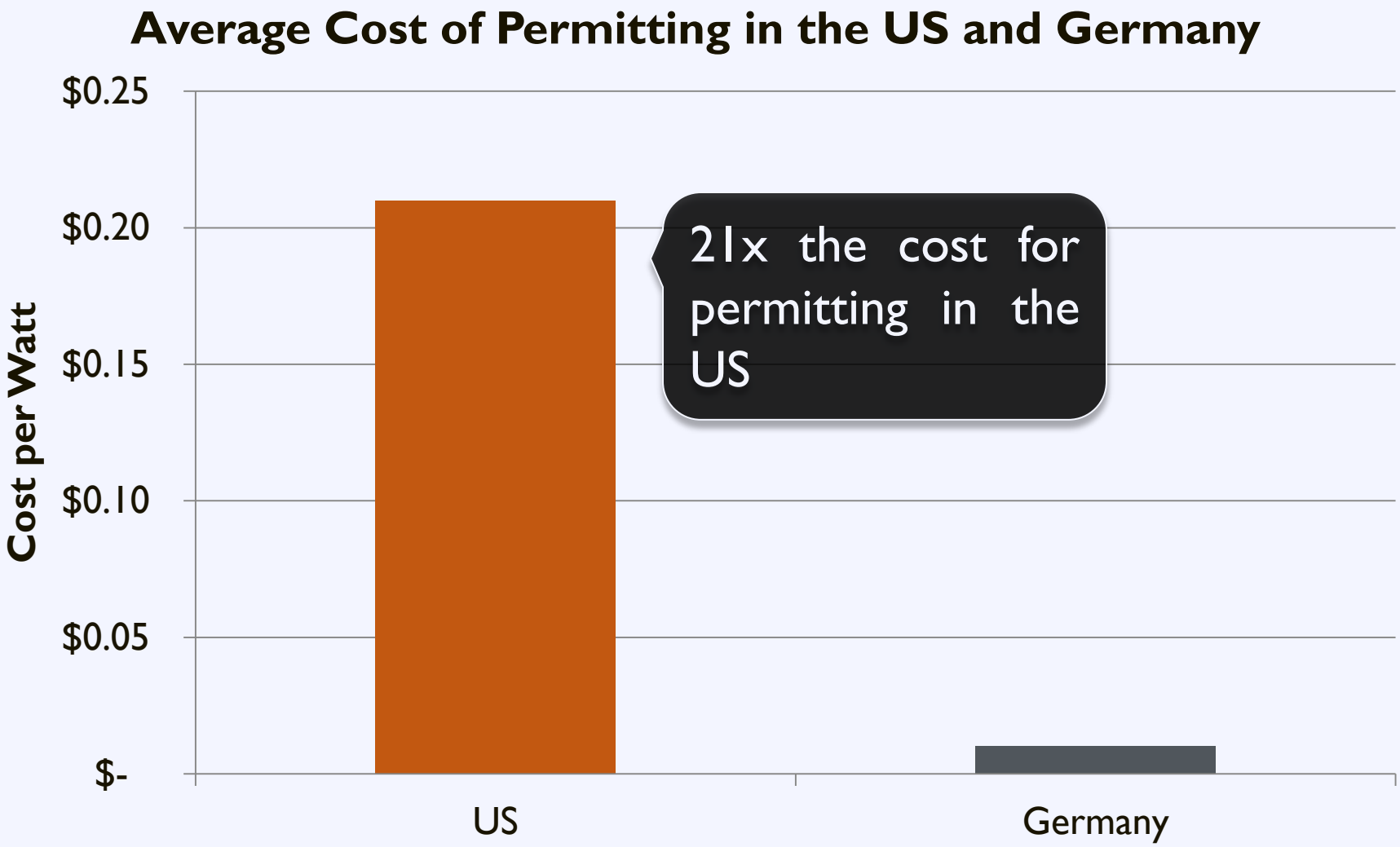
Source: NREL (http://www.nrel.gov/docs/fy12osti/54689.pdf)

Permitting Costs



Source: NREL, LBNL

Permitting

Remove barriers by:

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

Zoning Codes: Regulations

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

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U.S. Department of Energy

Source: American Planning Association

Zoning Codes: Small Scale Solar

Typical Requirements:

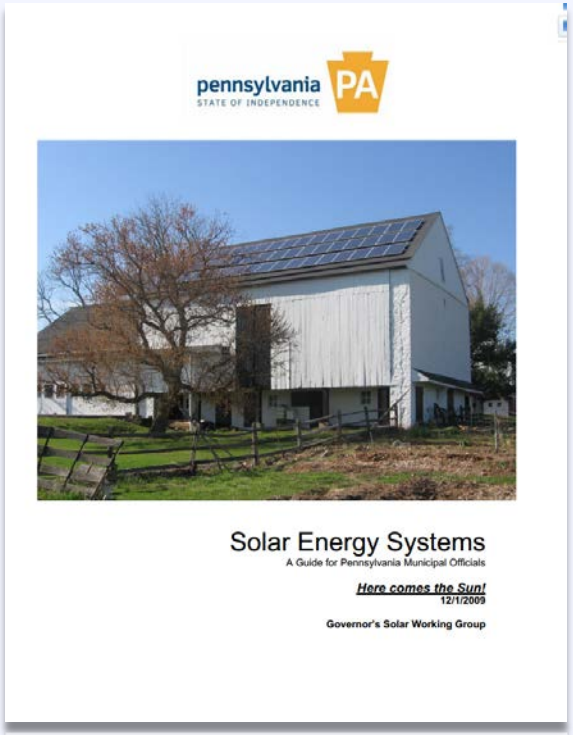
- Permitted as accessory use
- Minimize visibility if possible
- Requirements:
  - District height
  - Lot coverage
  - Setback

Zoning Code: Small Scale Solar

Resource **Pennsylvania Model Ordinance**

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

state.pa.us



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Zoning Codes: Large Scale Solar

Typical Requirements:

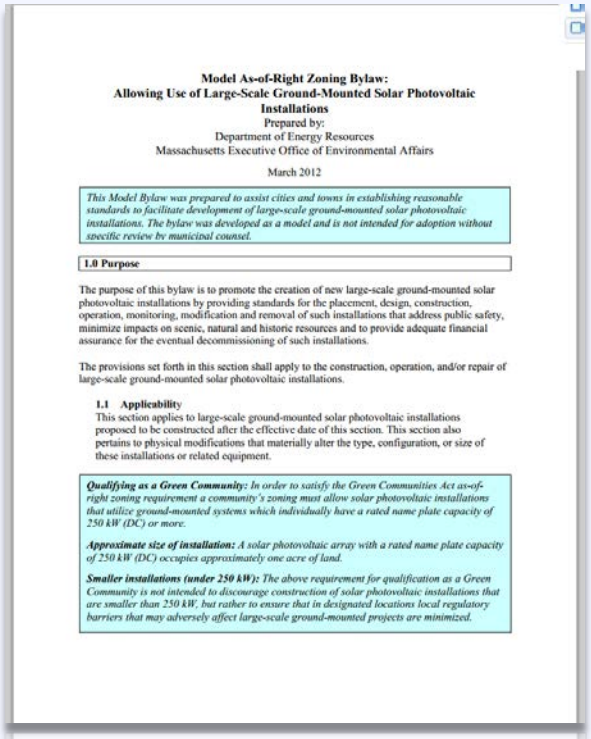
- Allowed for primary use in limited locations
- Requirements:
  - Height limits
  - Lot coverage
  - Setback
  - Fencing and Enclosure

Zoning Code: Large Scale Solar

Resource **Massachusetts Model Ordinance**

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

www.mass.gov



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

March 2012

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

1.0 Purpose

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

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

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

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

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

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

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Solar Access

Purpose of Solar Access Laws:

1. To increase the likelihood that properties will receive sunlight

2. To protect the rights of property owners to install solar

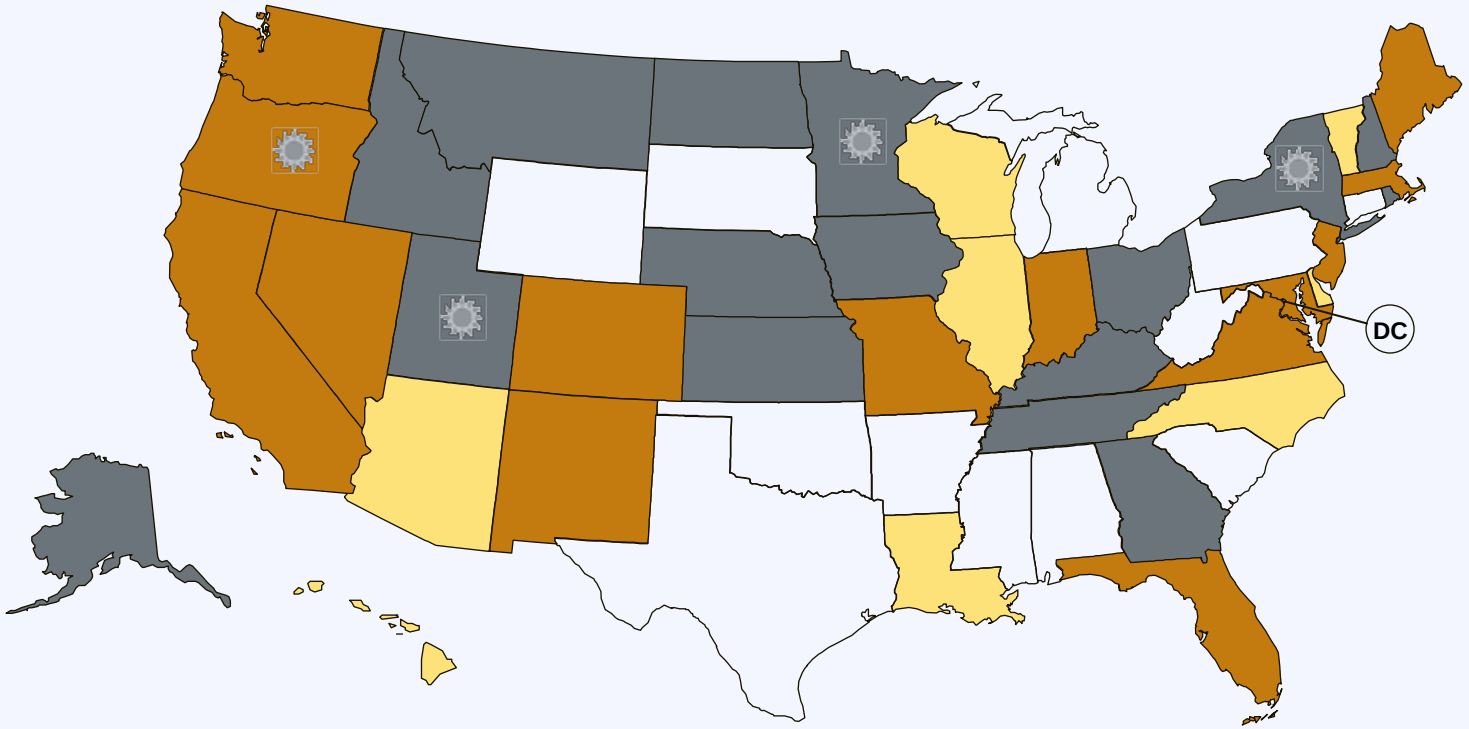
3. To reduce the risk that systems will be shaded after installation

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

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Source: DSIRE

Solar Easements: Missouri

Allows parties to voluntarily enter into solar easement contracts for the purpose of ensuring adequate exposure of a solar energy system

Source: Solar ABCs

Solar Rights: Missouri

Missouri Statue 442.012:

The right to utilize solar energy is a property right but eminent domain may not be used to obtain such property right.

Solar Rights: Illinois

1. Prevents restrictive covenants from prohibiting the installation of solar

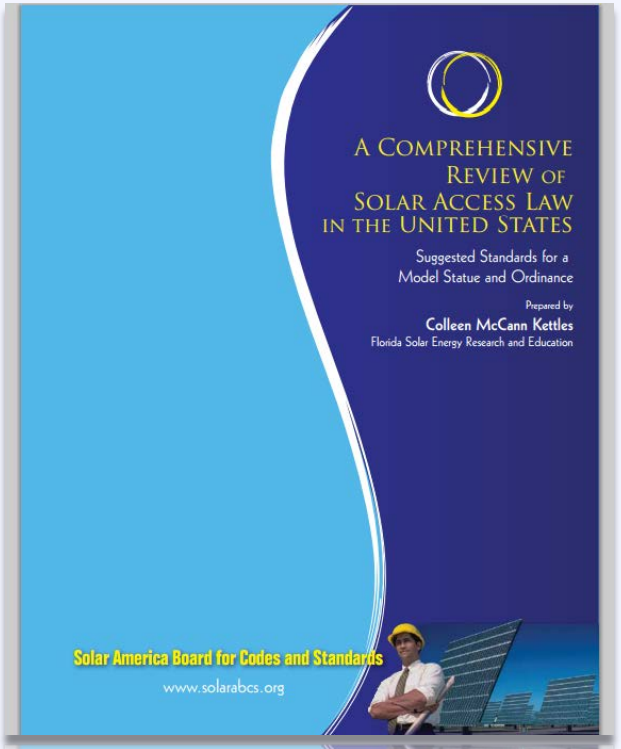
2. Requires HOAs, upon request, to adopt an energy policy statement regarding the architectural requirements of a solar installation

Solar Access

Resource **Solar ABCs**

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

www.solarabcs.org



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The Permitting Process: Challenges

18,000+ local jurisdictions

with unique permitting requirements

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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

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U.S. Department of Energy

Source: Vote Solar

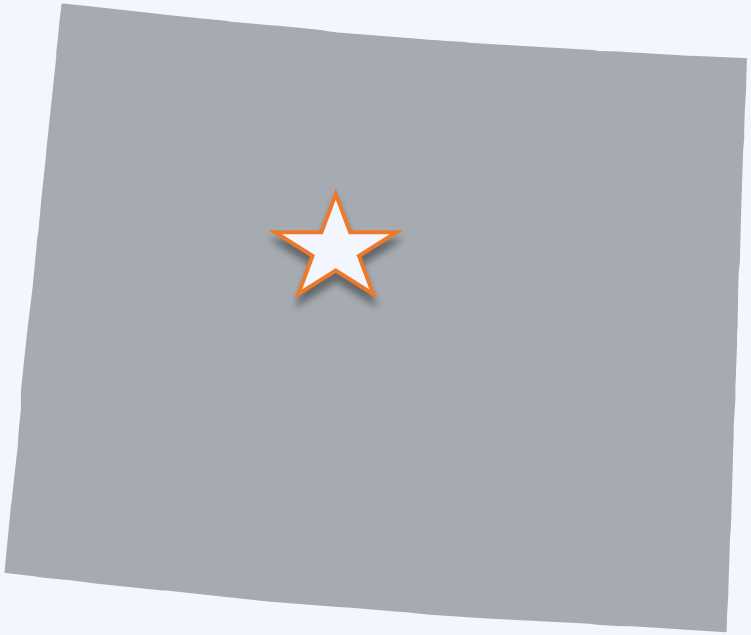
Expedited Permitting

Solar Permitting Best Practices:

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

Source: Vote Solar

Expedited Permitting: Case Study



Breckenridge, Colorado

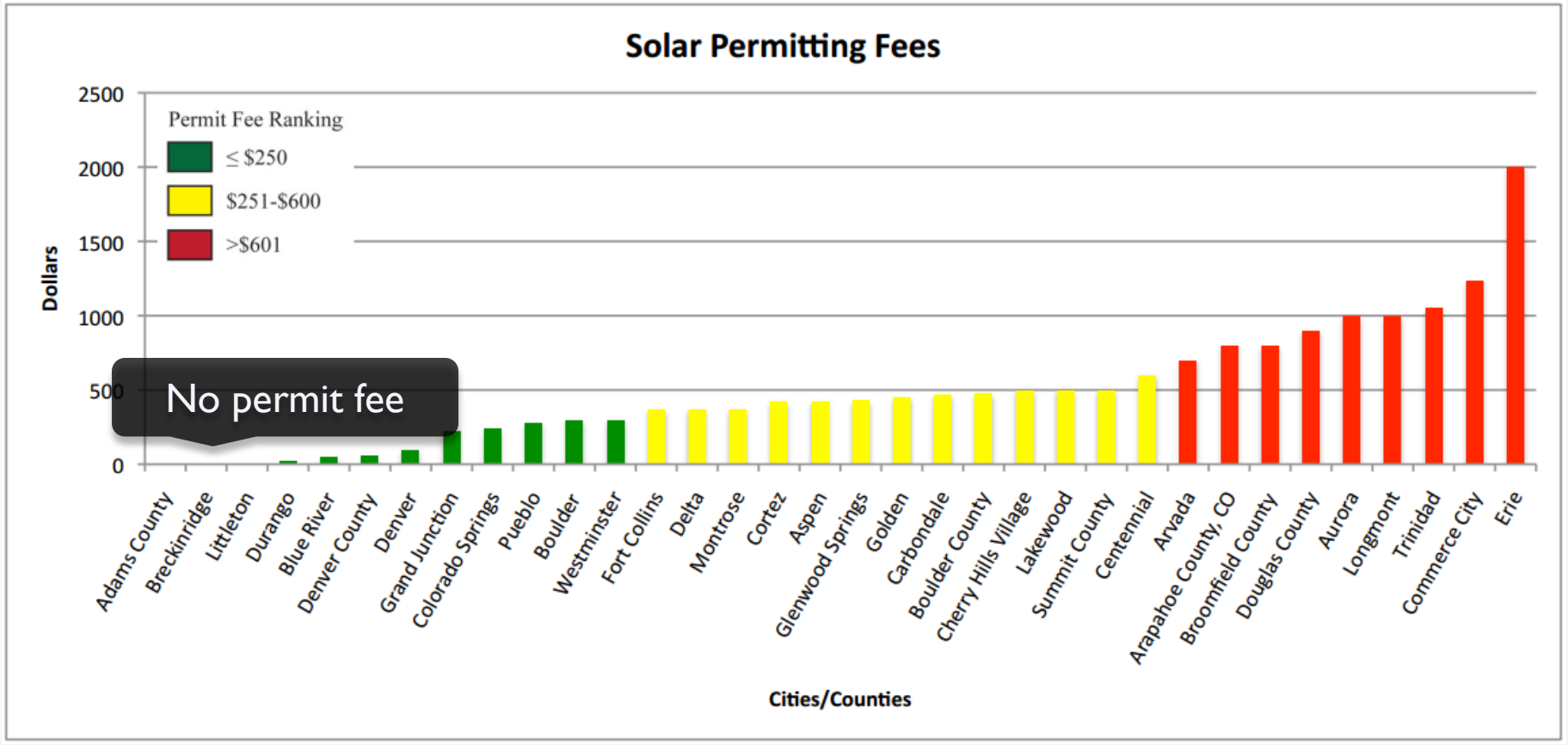
Population: 4,540

Powered by SunShot
U.S. Department of Energy

Source: Wikipedia

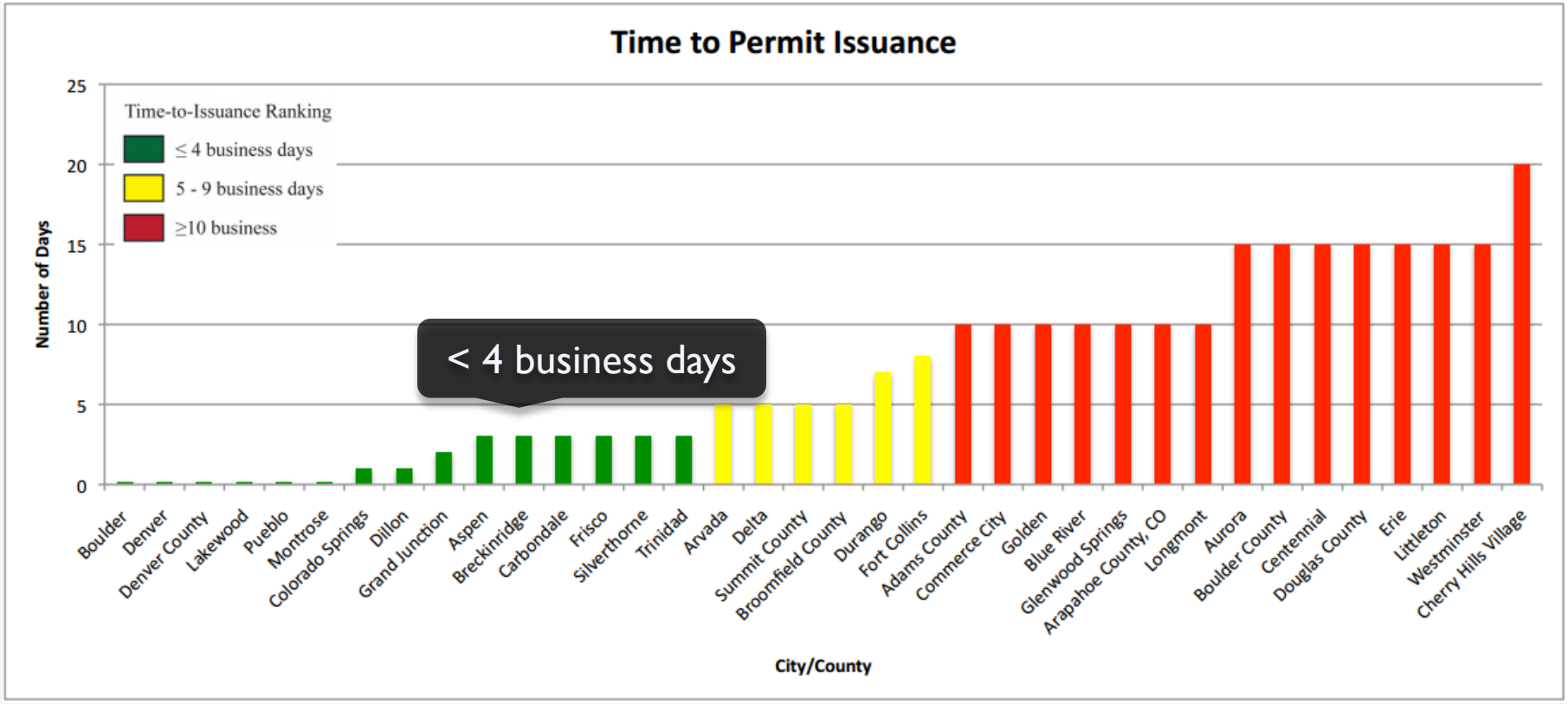
Expedited Permitting: Case Study

Breckenridge charges no fees to file for a solar permit



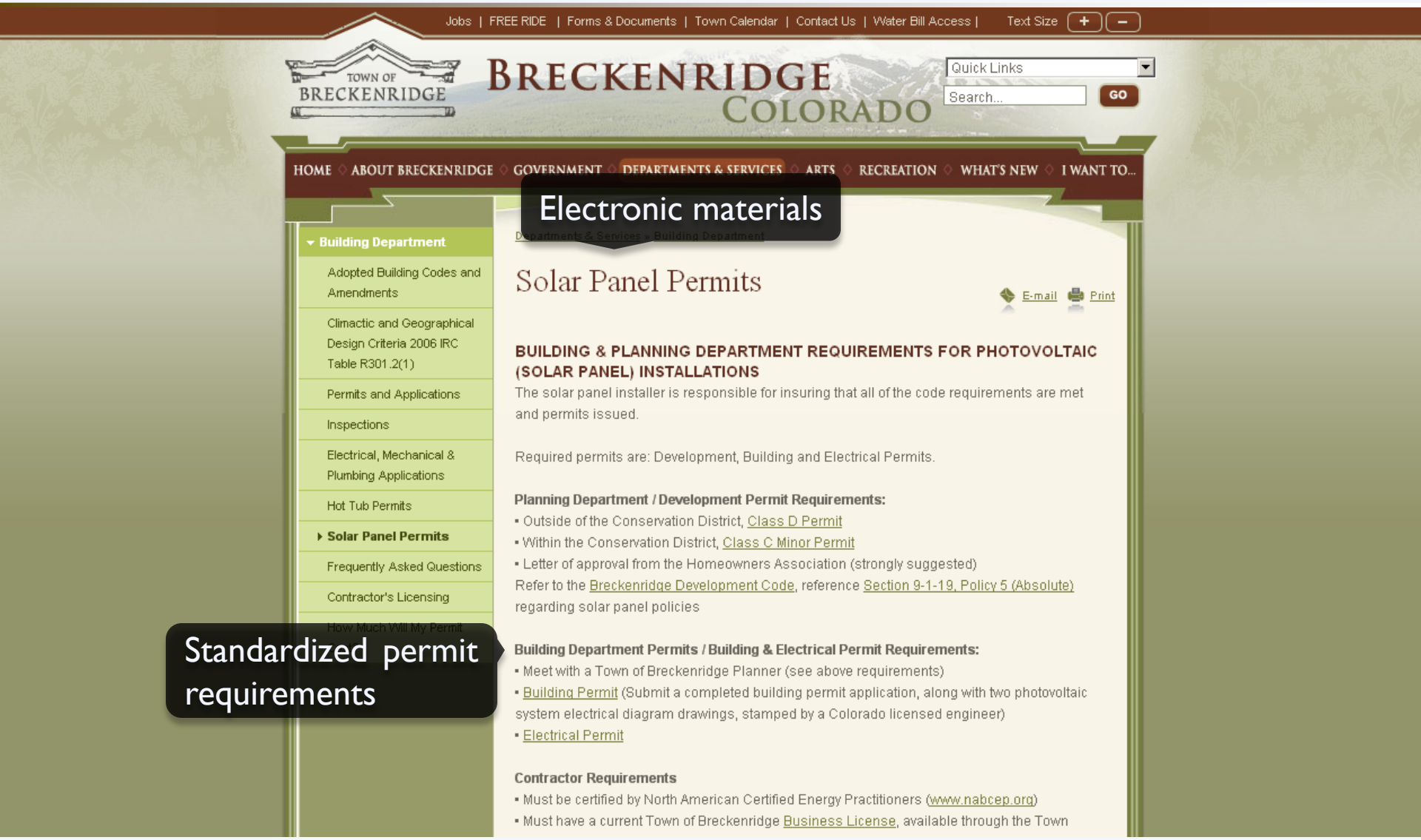
Expedited Permitting: Case Study

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



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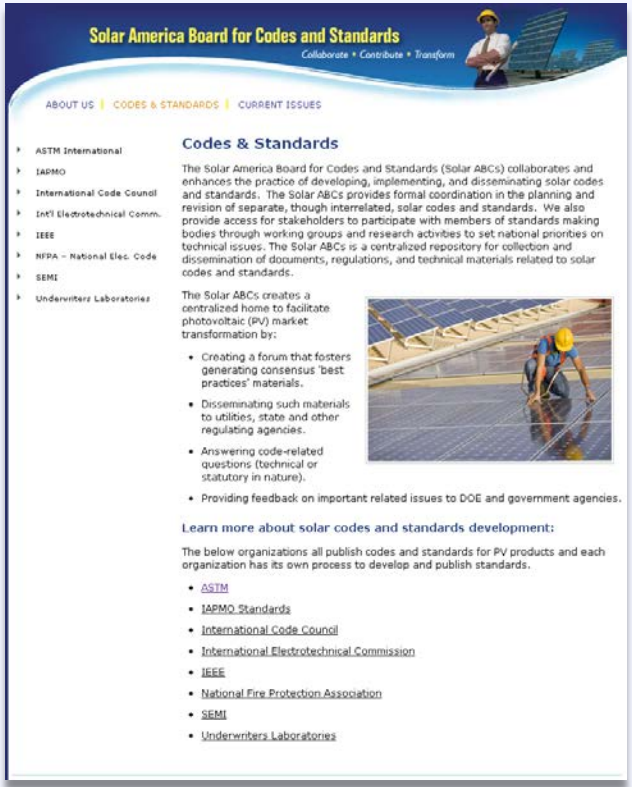
Source: Breckenridge, CO (http://www.townofbreckenridge.com/index.aspx?page=694)

Expedited Permitting

Resource **Solar ABCs**

Expedited Permitting:

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



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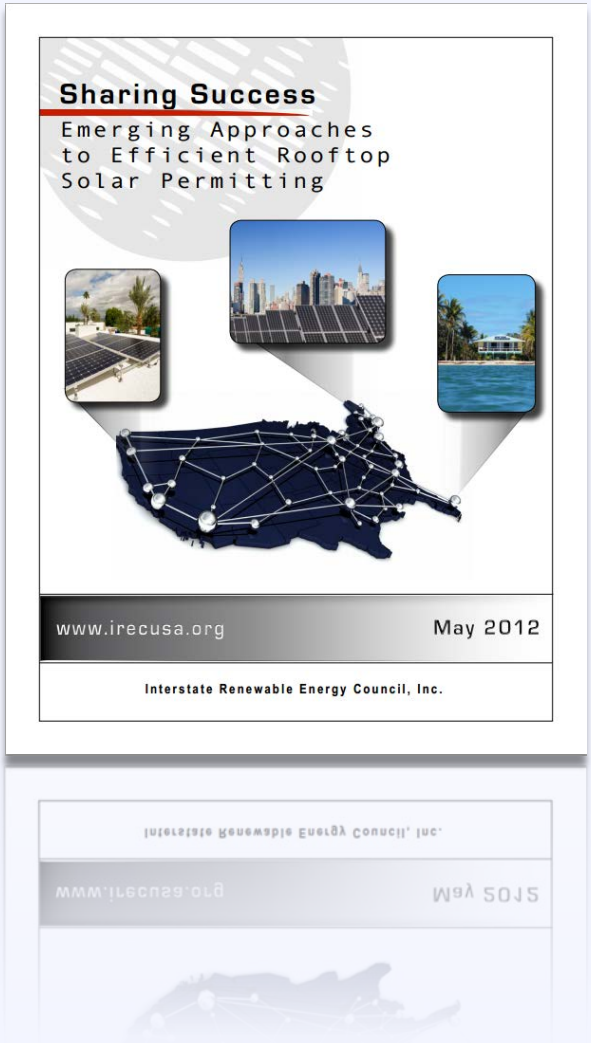
Expedited Permitting

Resource **Interstate Renewable Energy Council**

Outlines emerging approaches to efficient rooftop solar permitting

www.irecusa.org



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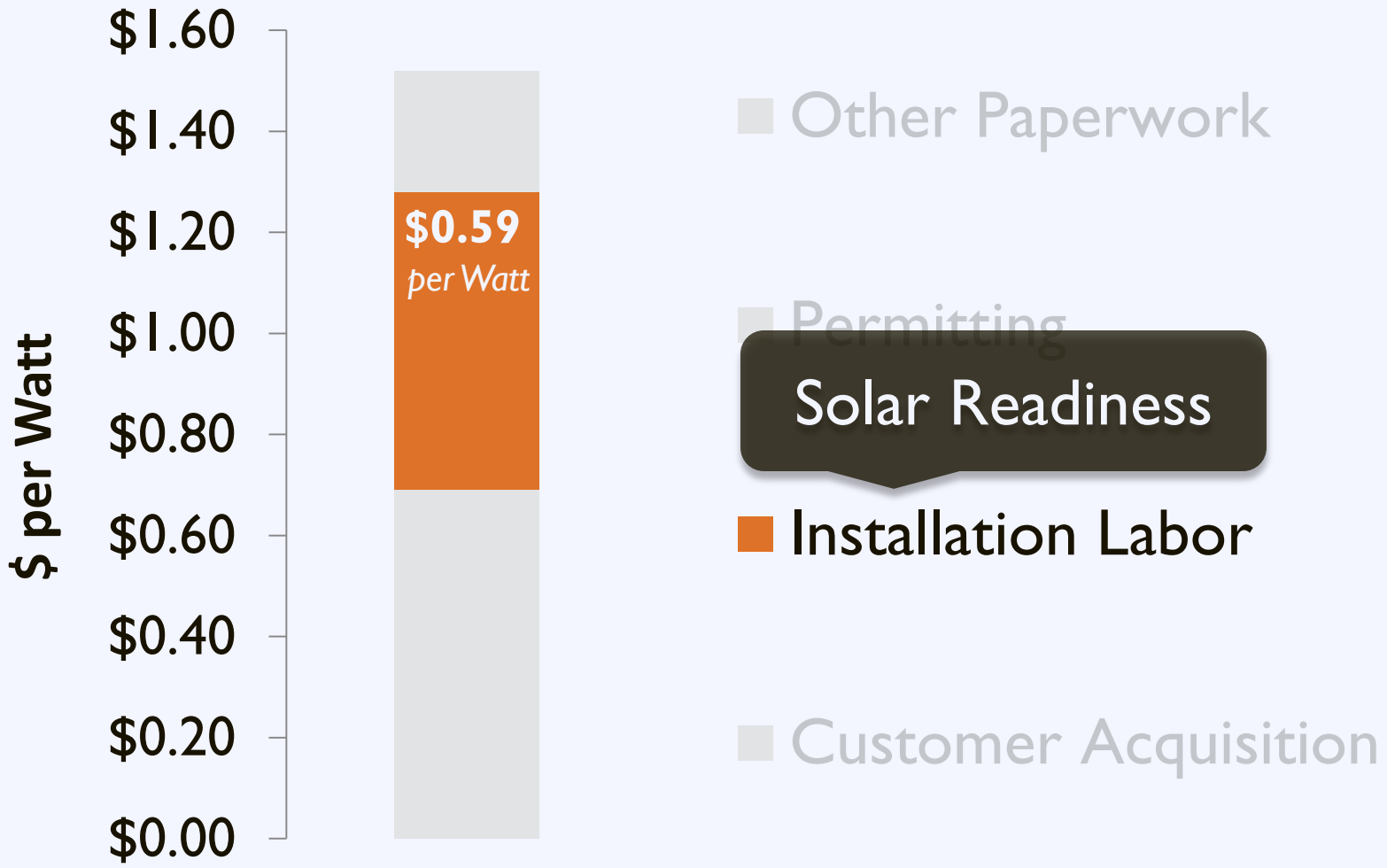
Mitigate Soft Costs



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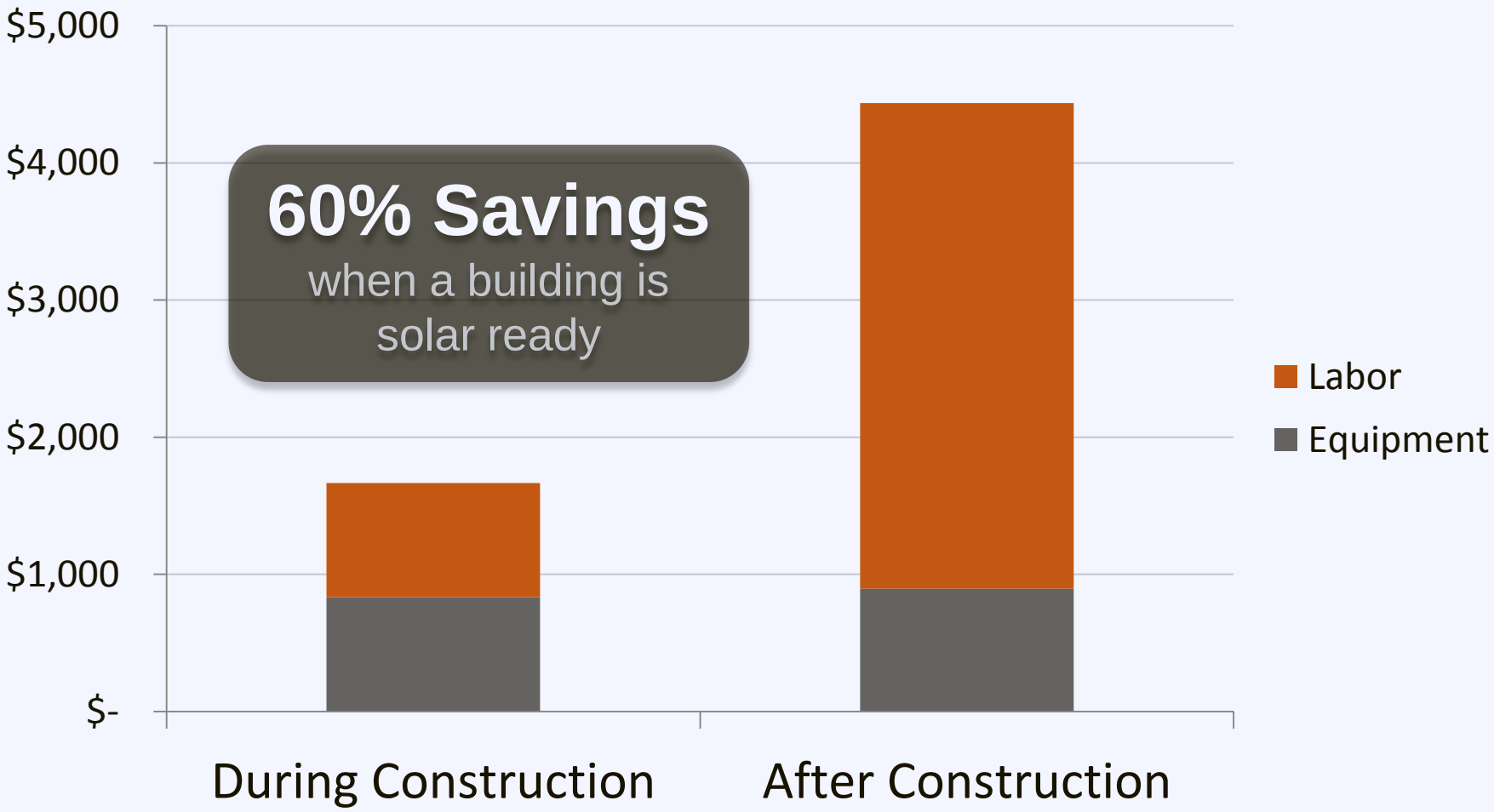
U.S. Department of Energy

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



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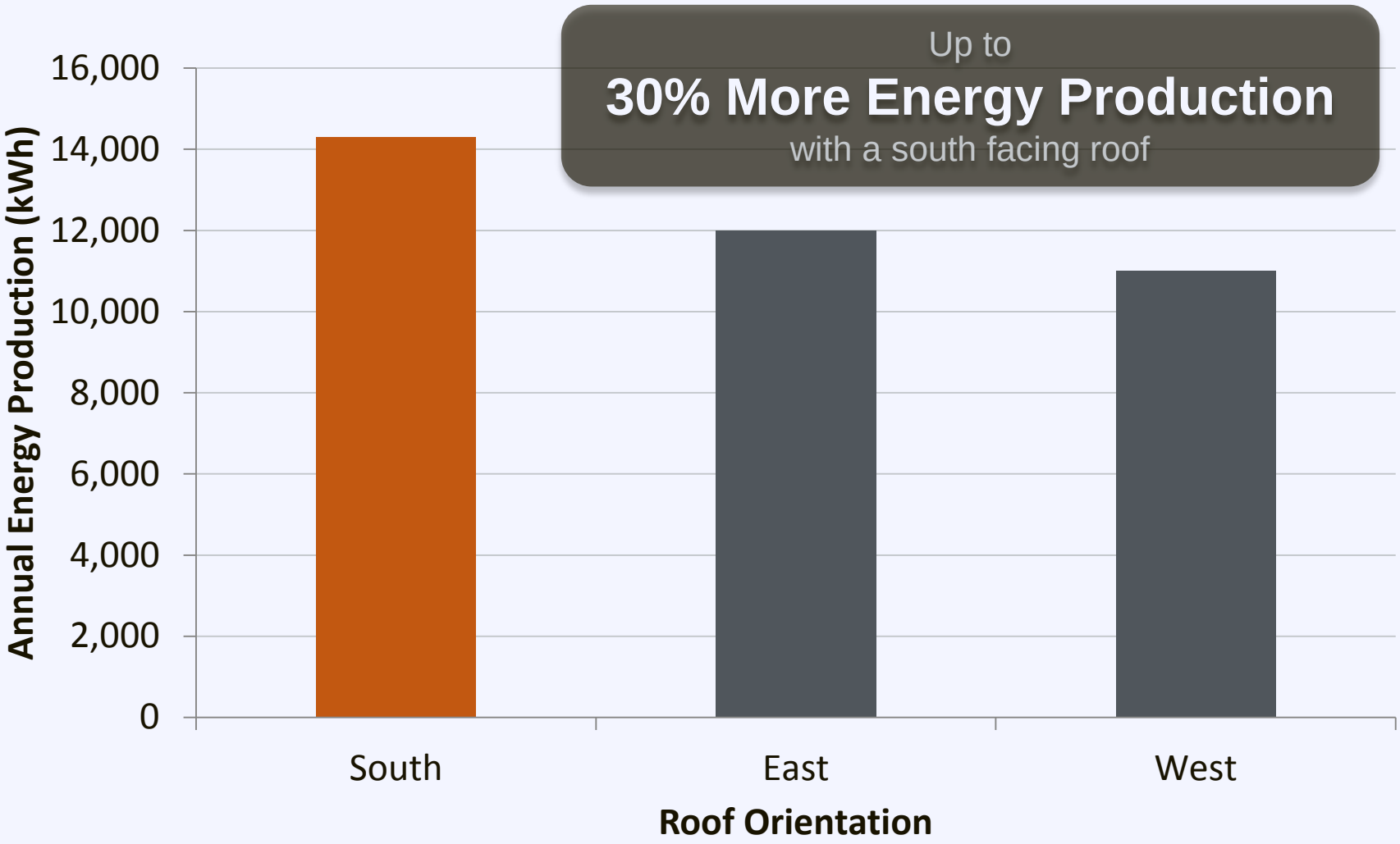
Source: Solar Ready: An Overview of Implementation Practices [Draft]. NREL, Feb. 18, 2011.

Solar Readiness



Powered by SunShot
U.S. Department of Energy

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

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: Case Study

Oro Valley, Arizona

Population: 40,195

Powered by SunShot
U.S. Department of Energy

Source: Wikipedia

Solar Readiness: Case Study

Oro Valley Requirements:

- Installation of conduit or sleeve for wiring
- A space near the service equipment to mount additional PV equipment
- Installation of a circuit breaker that can be back-fed from a PV system

Source: http://cms3.tucsonaz.gov/files/dsd/PV_Prep.pdf

Solar Readiness

Resource **NREL**

Creating a solar ready guide for buildings:

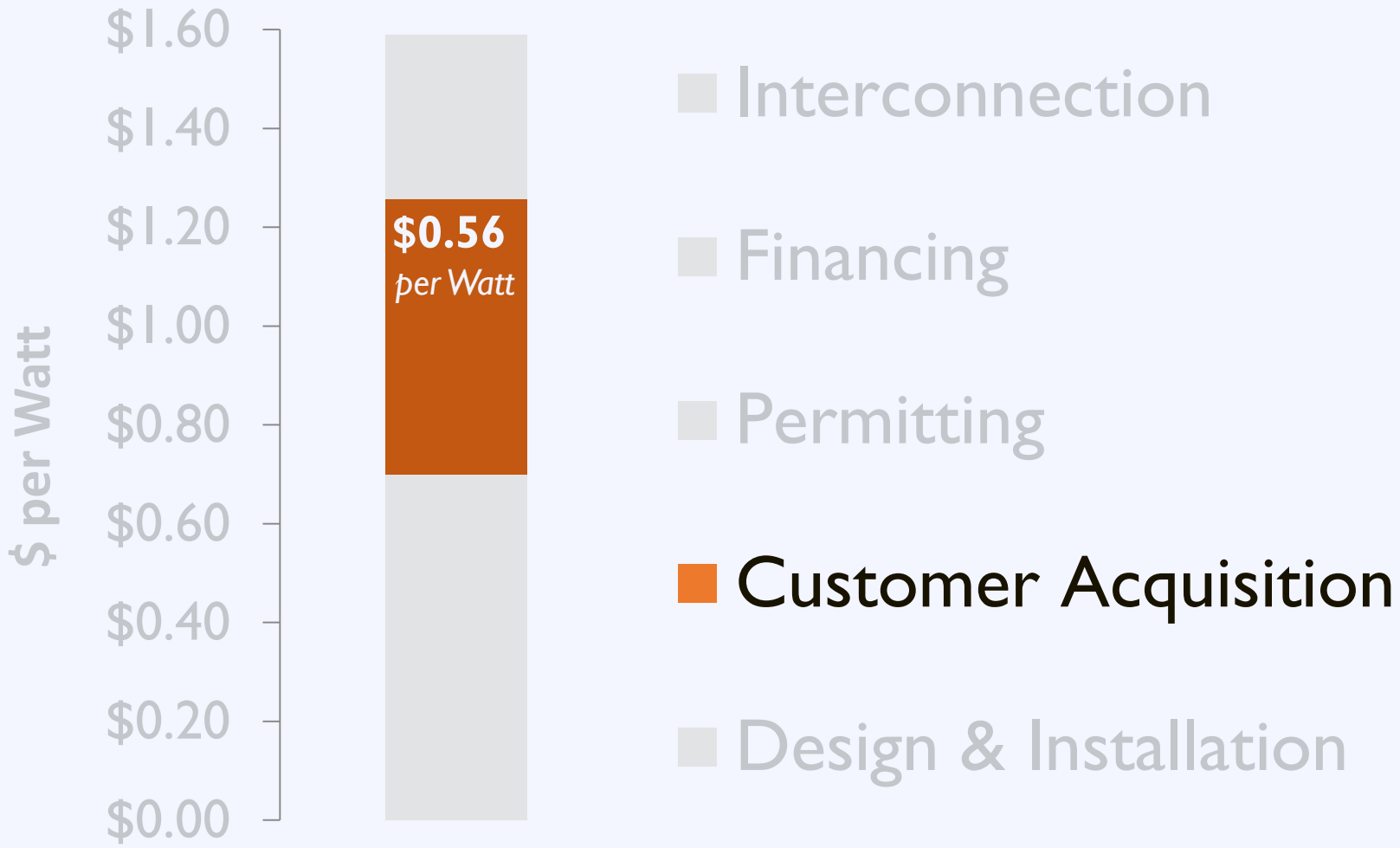
- Legislation
- Certification programs
- Stakeholder Education

www.nrel.gov

Powered by SunShot U.S. Department of Energy

Source: NREL

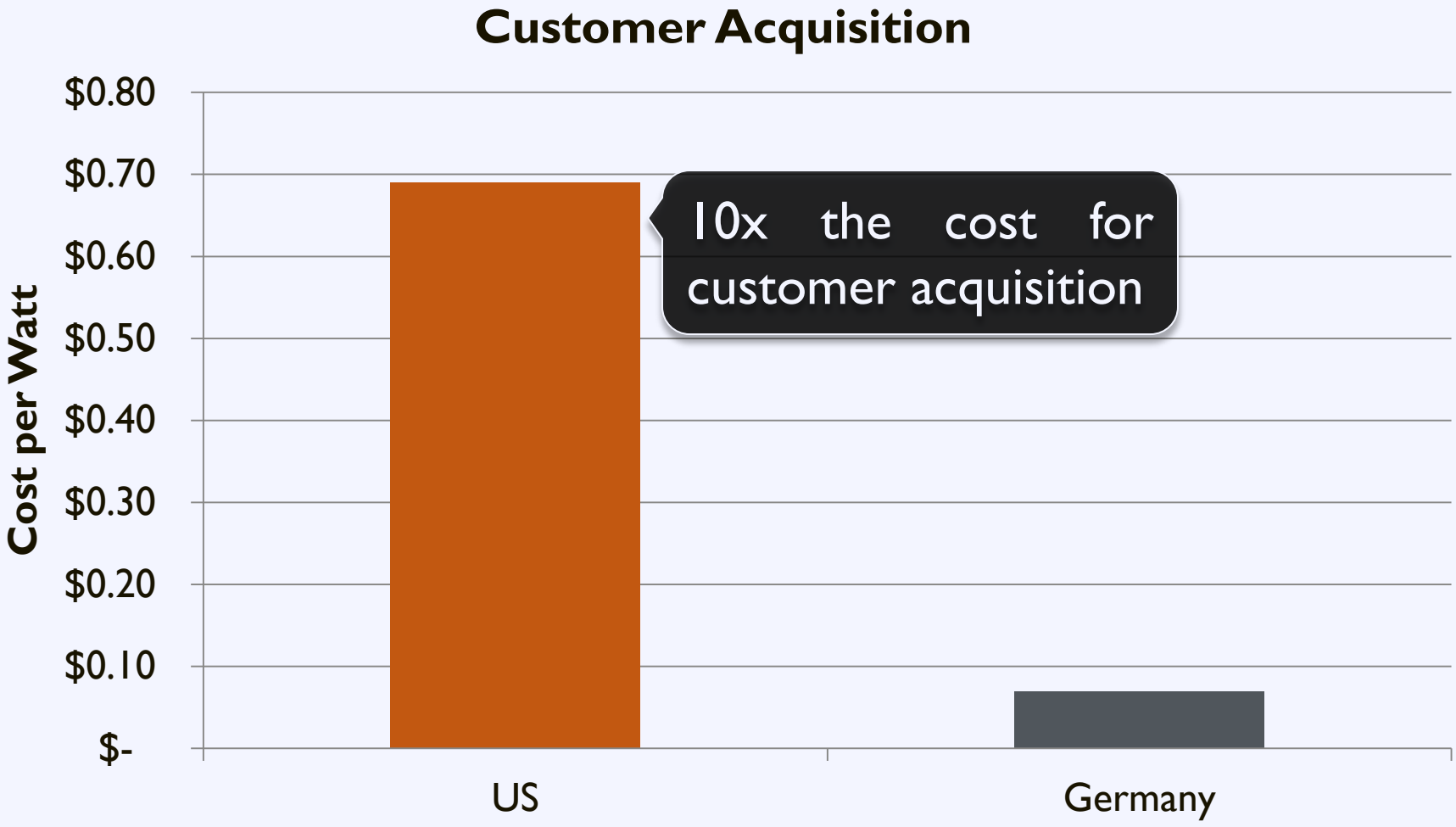
Mitigate Soft Costs



Powered by SunShot
U.S. Department of Energy

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

Customer Acquisition



Source: NREL, LBNL

Customer Acquisition

Solarize

Group Purchasing

Solarize: Advantages

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

Solarize: Advantages

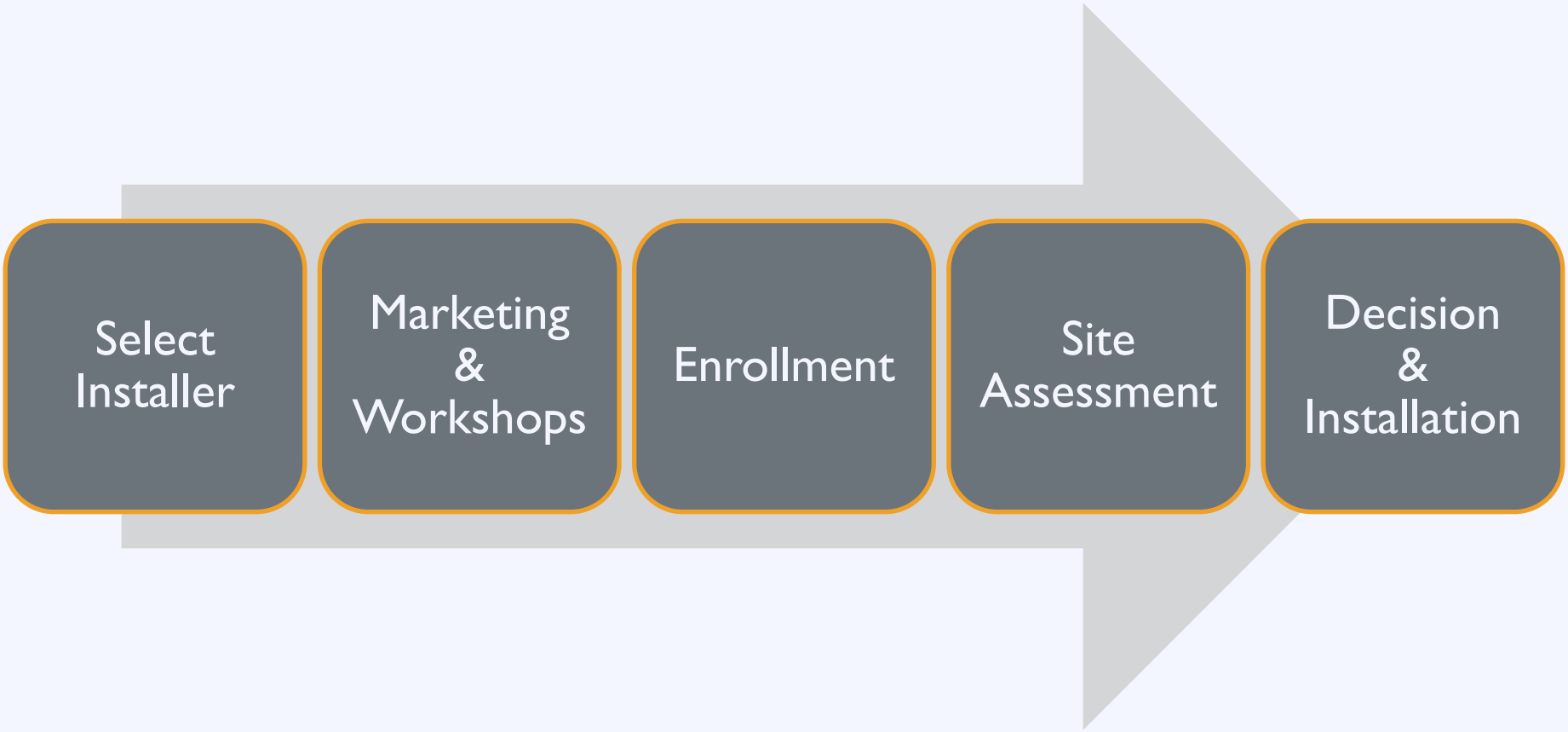
Benefits to Local Government:

Low upfront cost: $5,000 - $10,000 + Labor

Quick turn-around: 9 Months

Long-term impact: Sustainable ecosystem

Solarize: Process



Solarize: Case Study

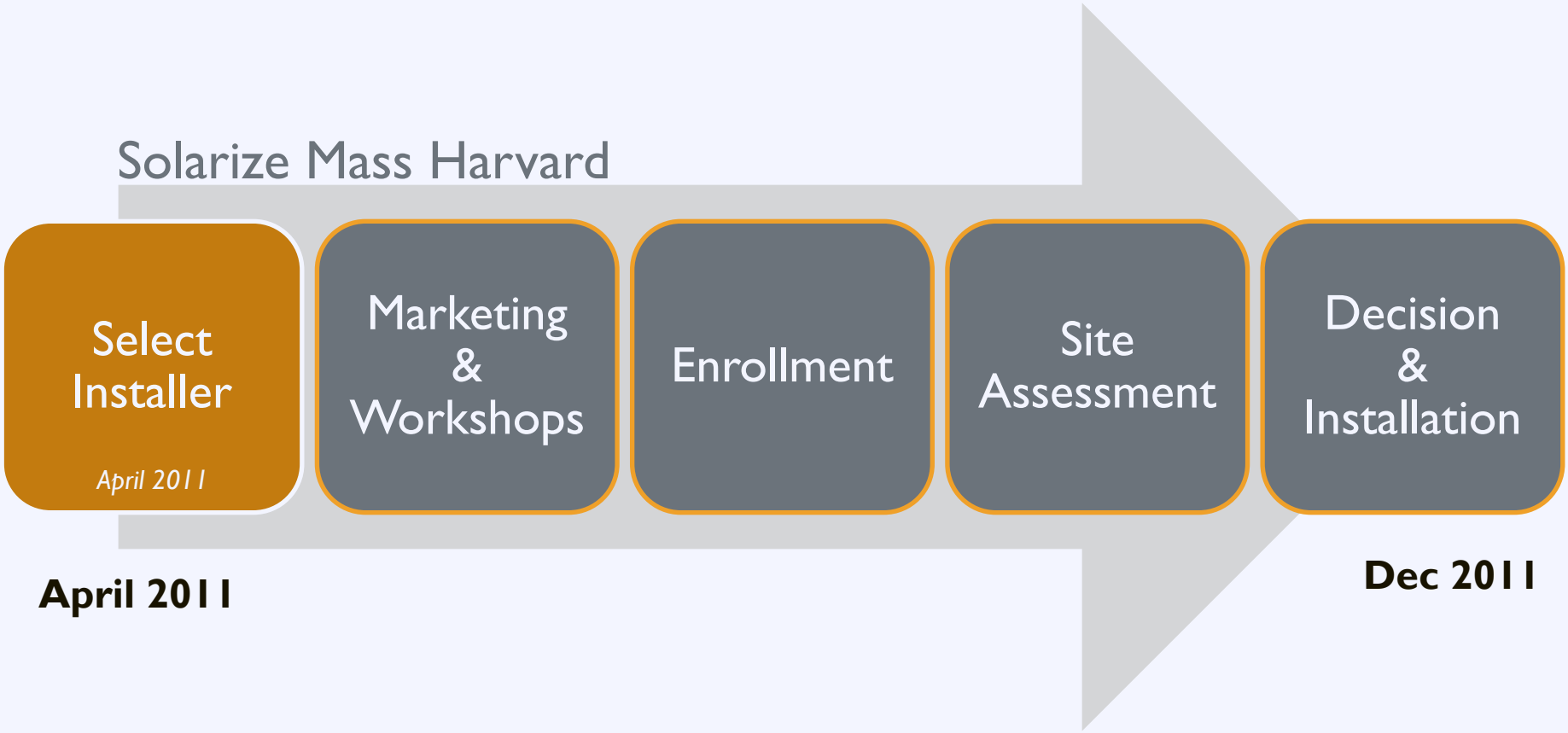
Harvard, Massachusetts

Population: 6,520

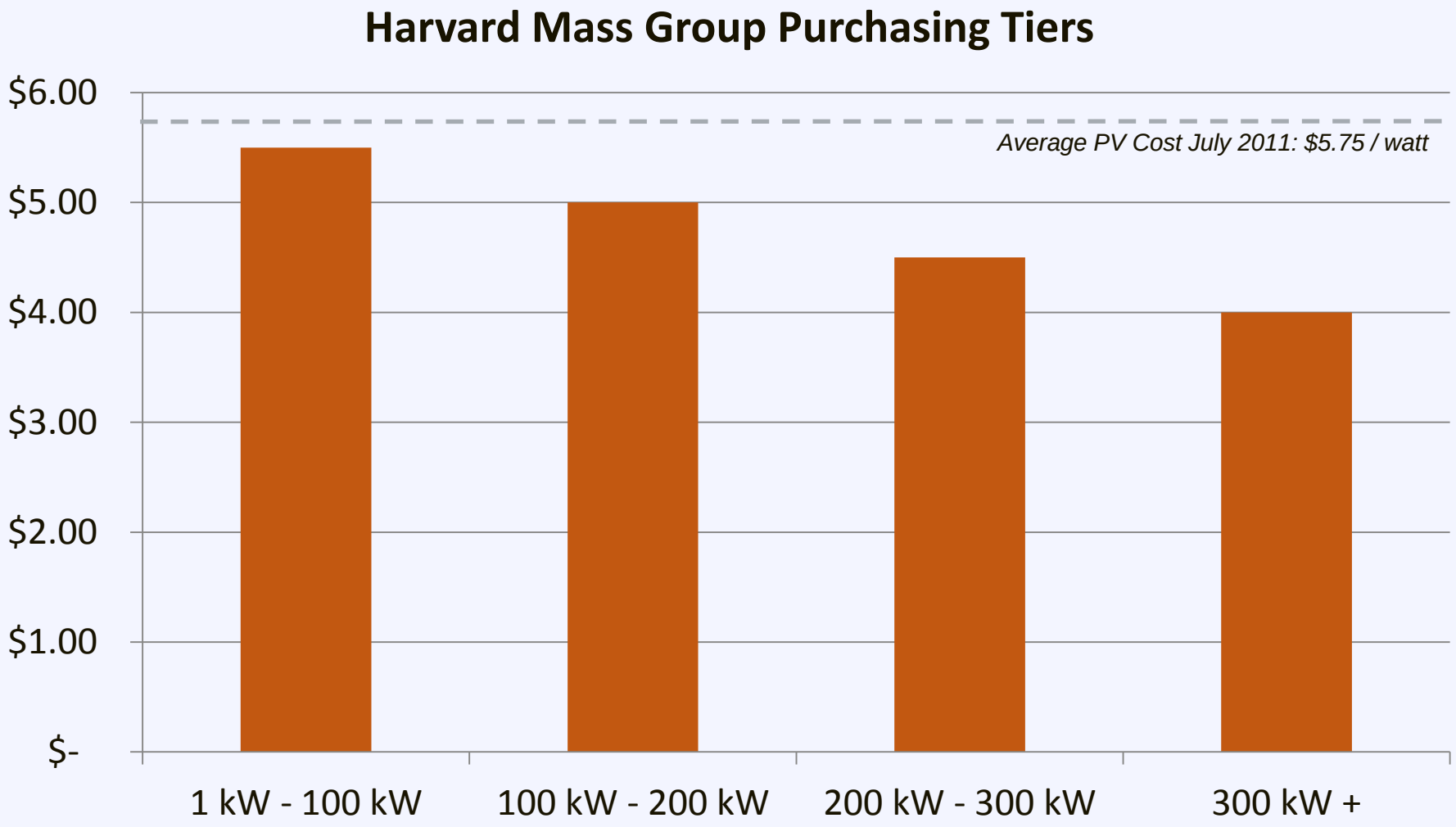
Powered by SunShot
U.S. Department of Energy

Source: Wikipedia

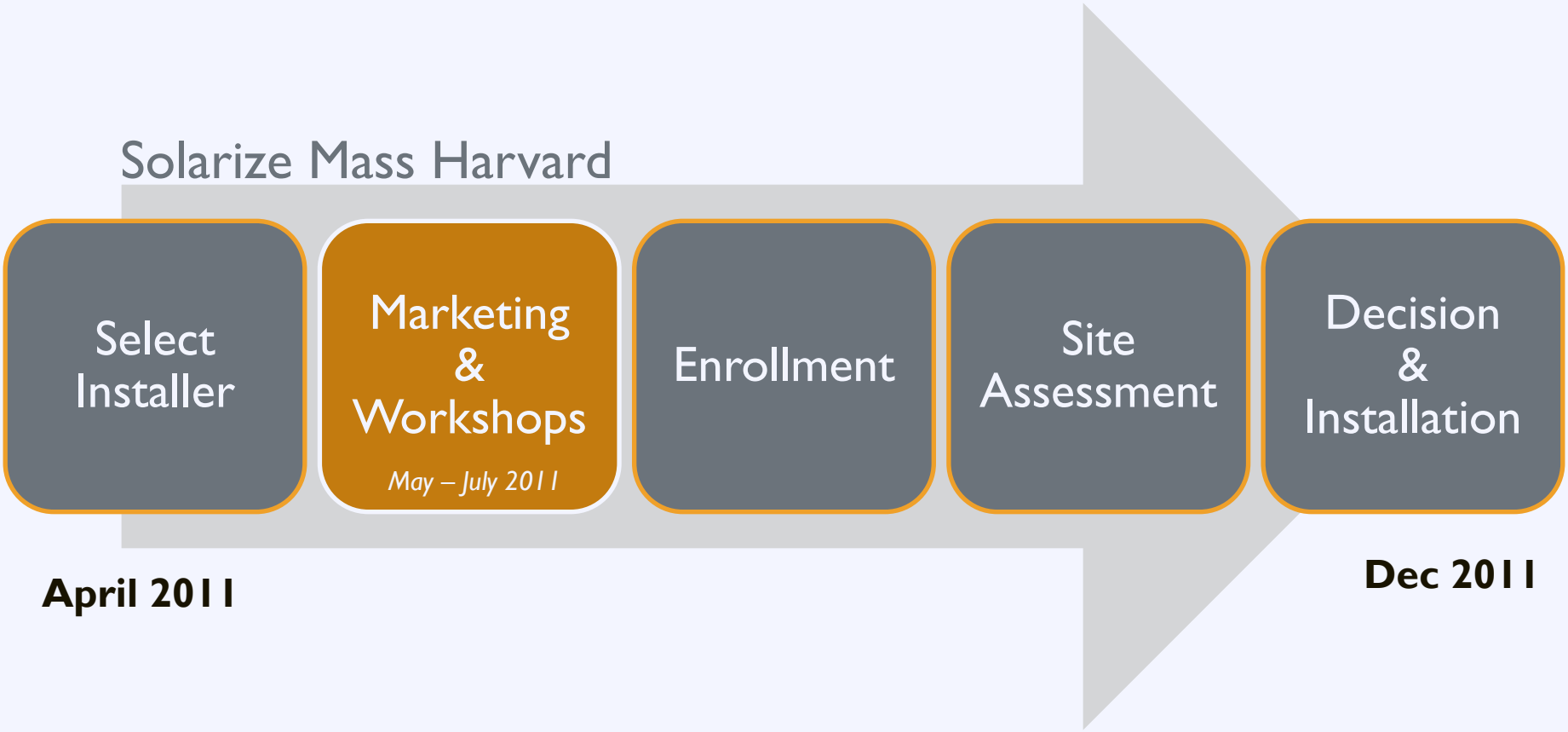
Solarize: Case Study



Group Purchasing



Solarize: Case Study



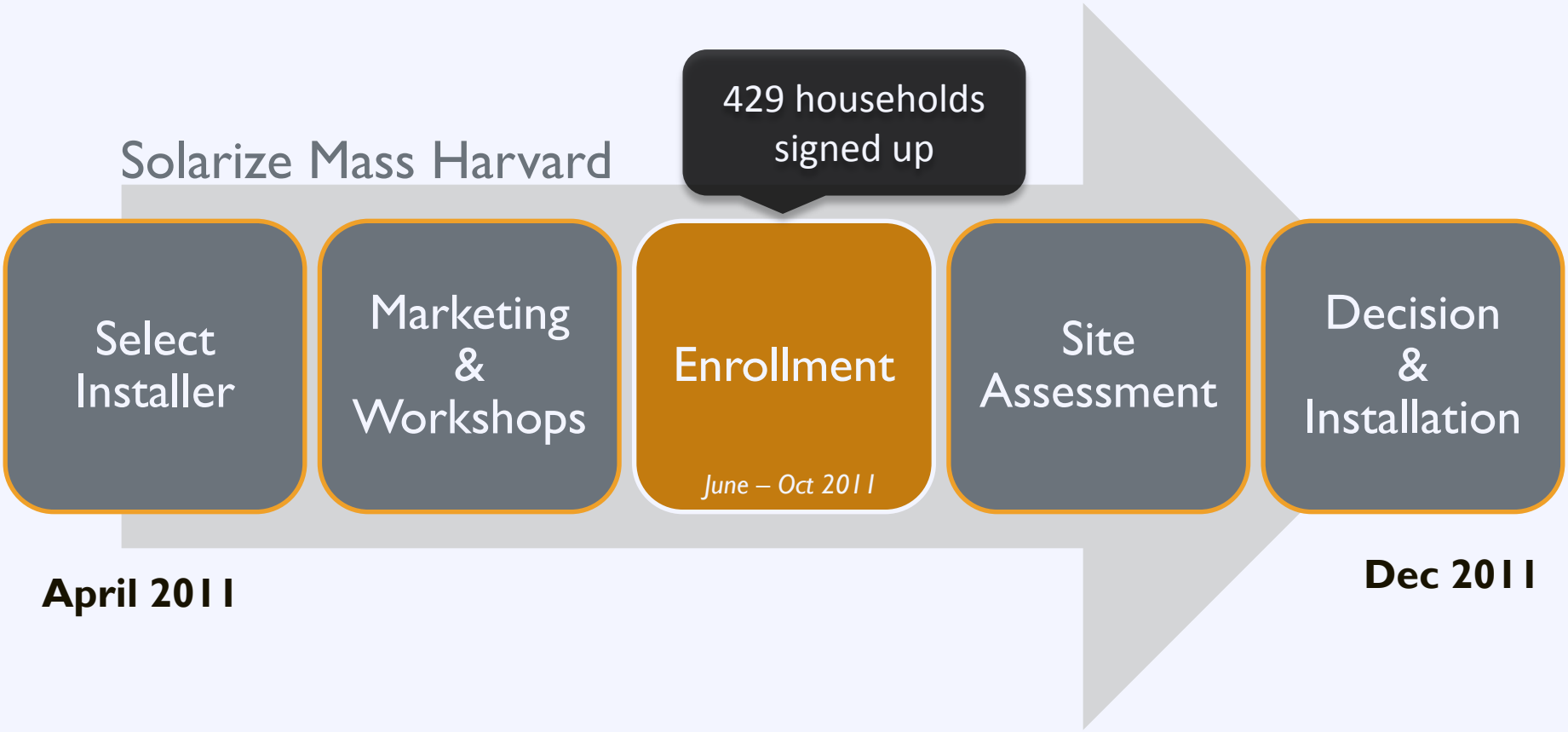
Solarize: Case Study

Marketing Strategy:

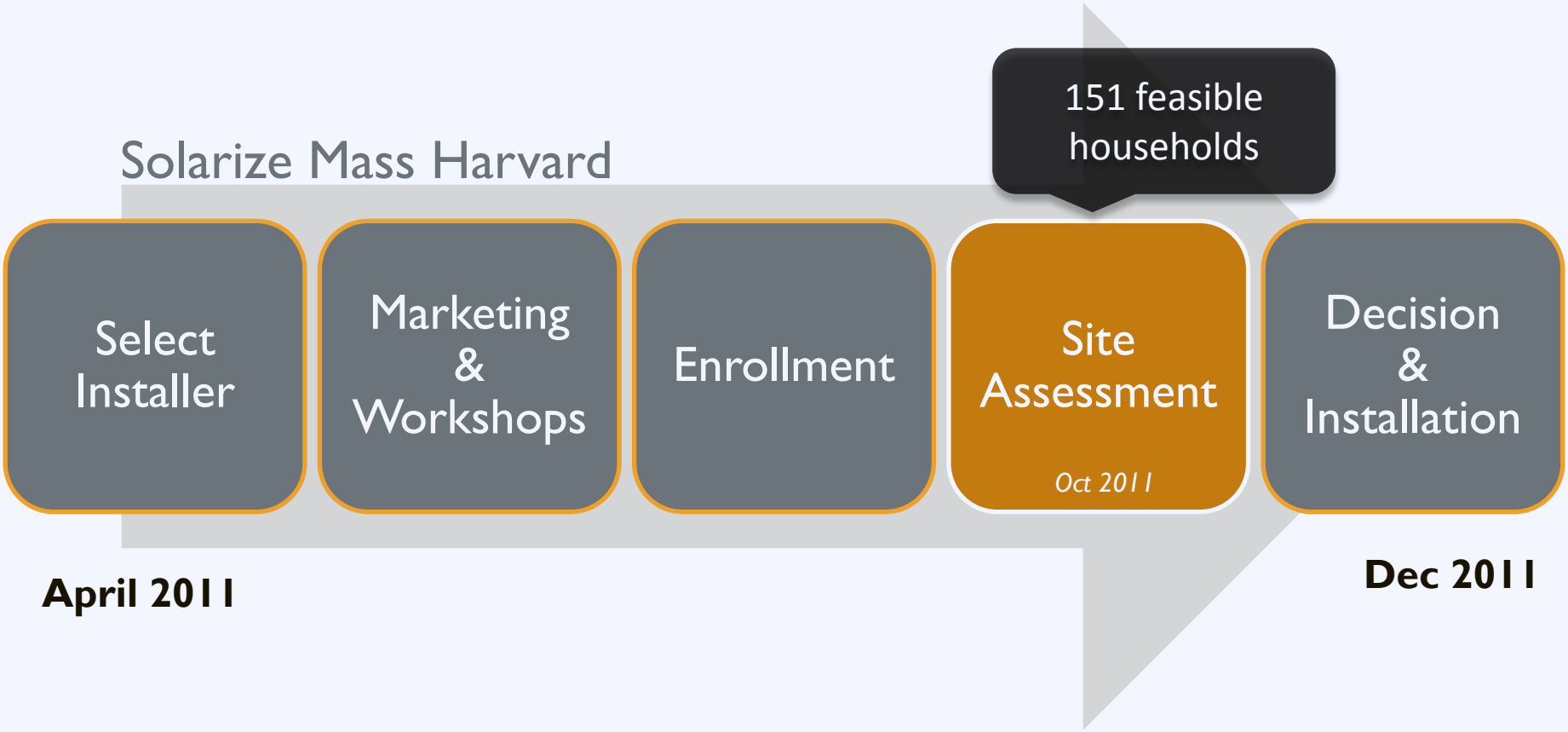
- Electronic survey of 1,100 households
- Email newsletters and direct mailings
- Float in July 4 parade
- Articles and advertisements in local newspaper
- Facebook page and online discussion board

Source: Vote Solar

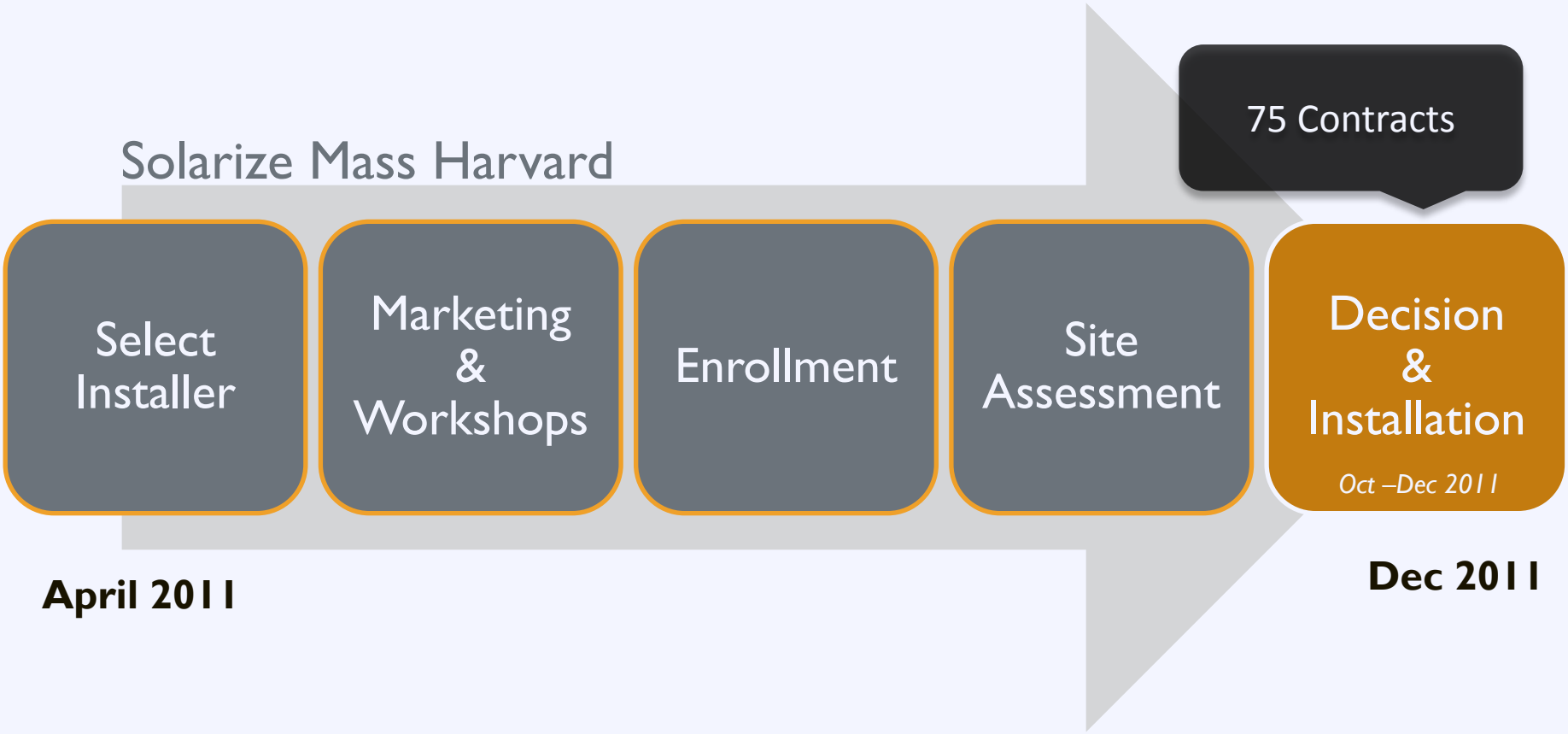
Solarize: Case Study



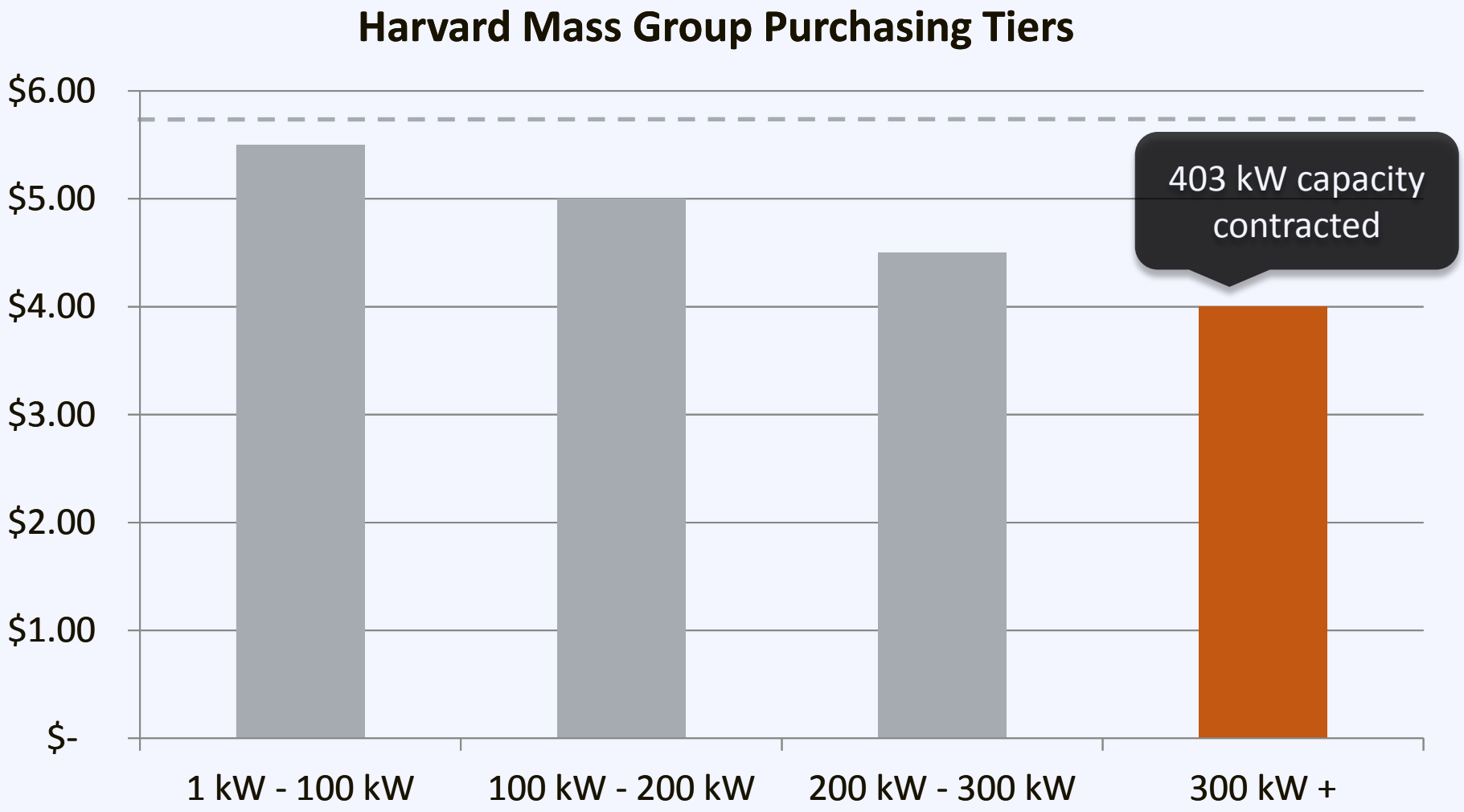
Solarize: Case Study



Solarize: Case Study



Group Purchasing



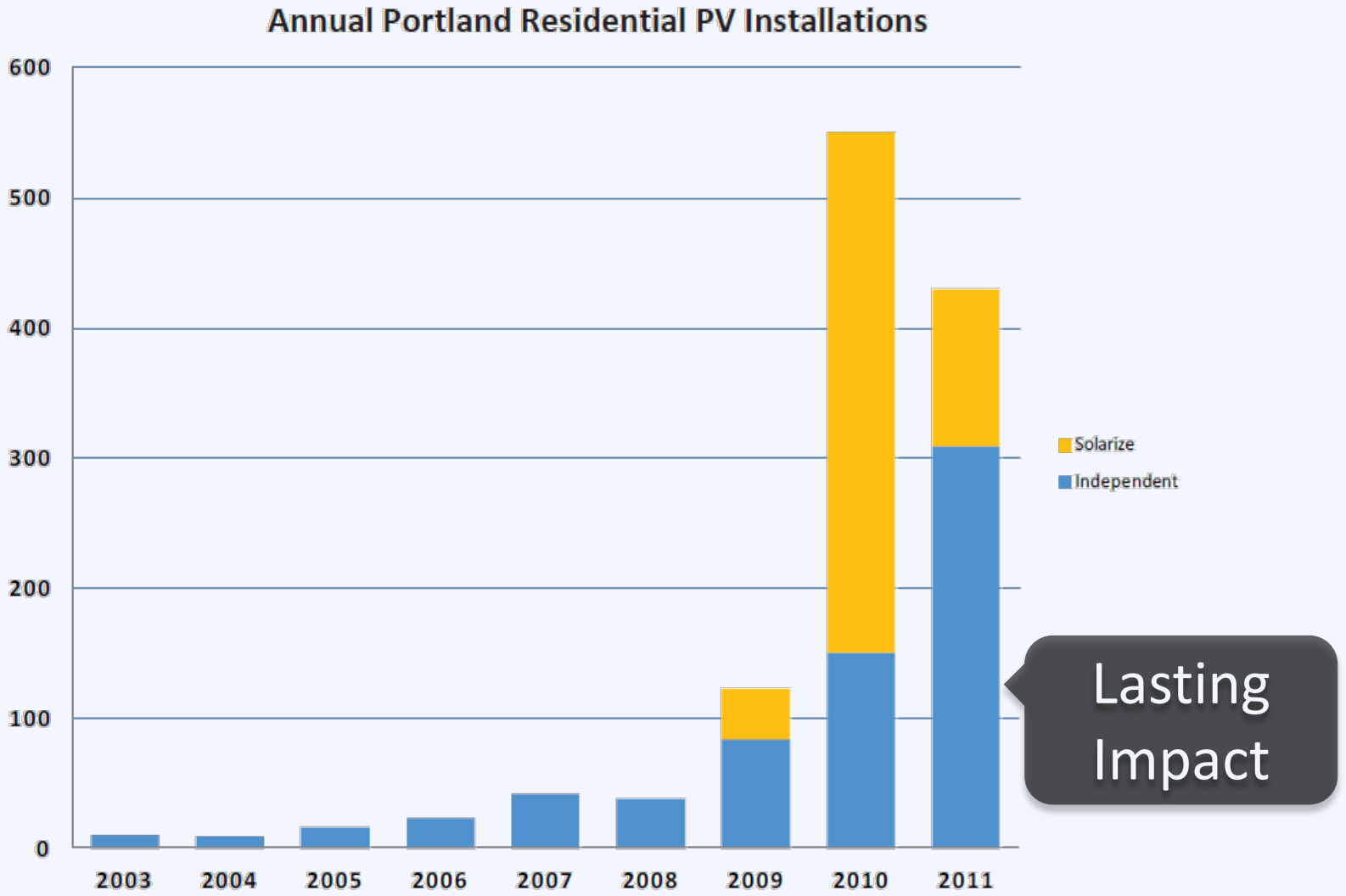
Solarize: Case Study

75 new installations totaling 403 kW

30% reduction in installation costs

575% increase in residential installations

Solarize: Lasting Impact



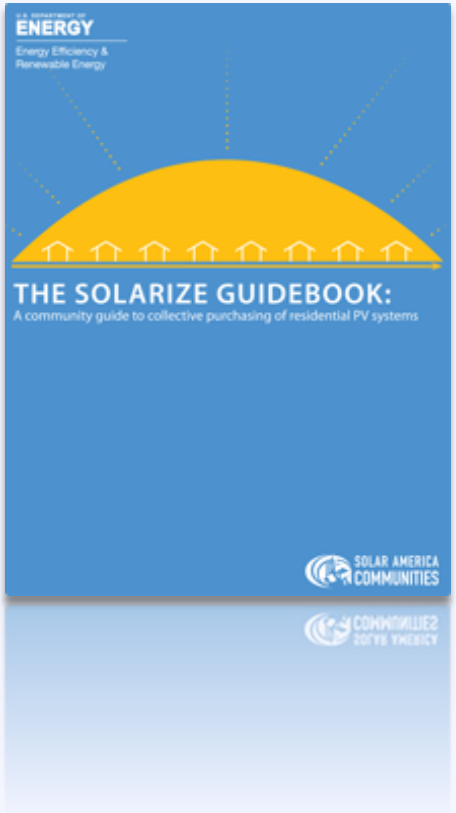
Source: NREL

Solarize: Resources

Resource **The Solarize Guidebook**

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

www.nrel.gov



Agenda

08:40 – 09:00	Solar 101
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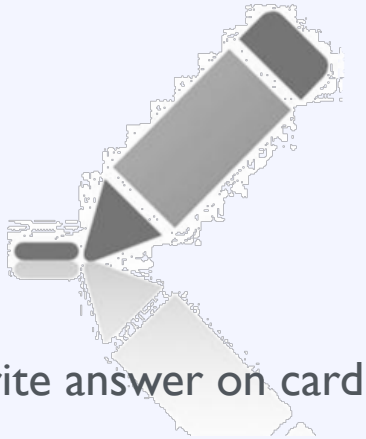
Activity: Identifying Benefits

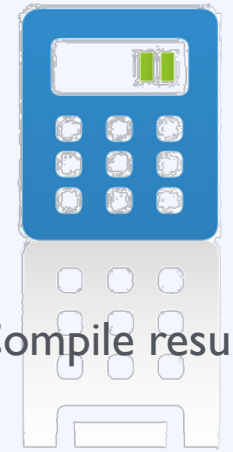
What is the greatest benefit solar can bring to your community? [Blue Card]

Right Now



Write answer on card

During Session

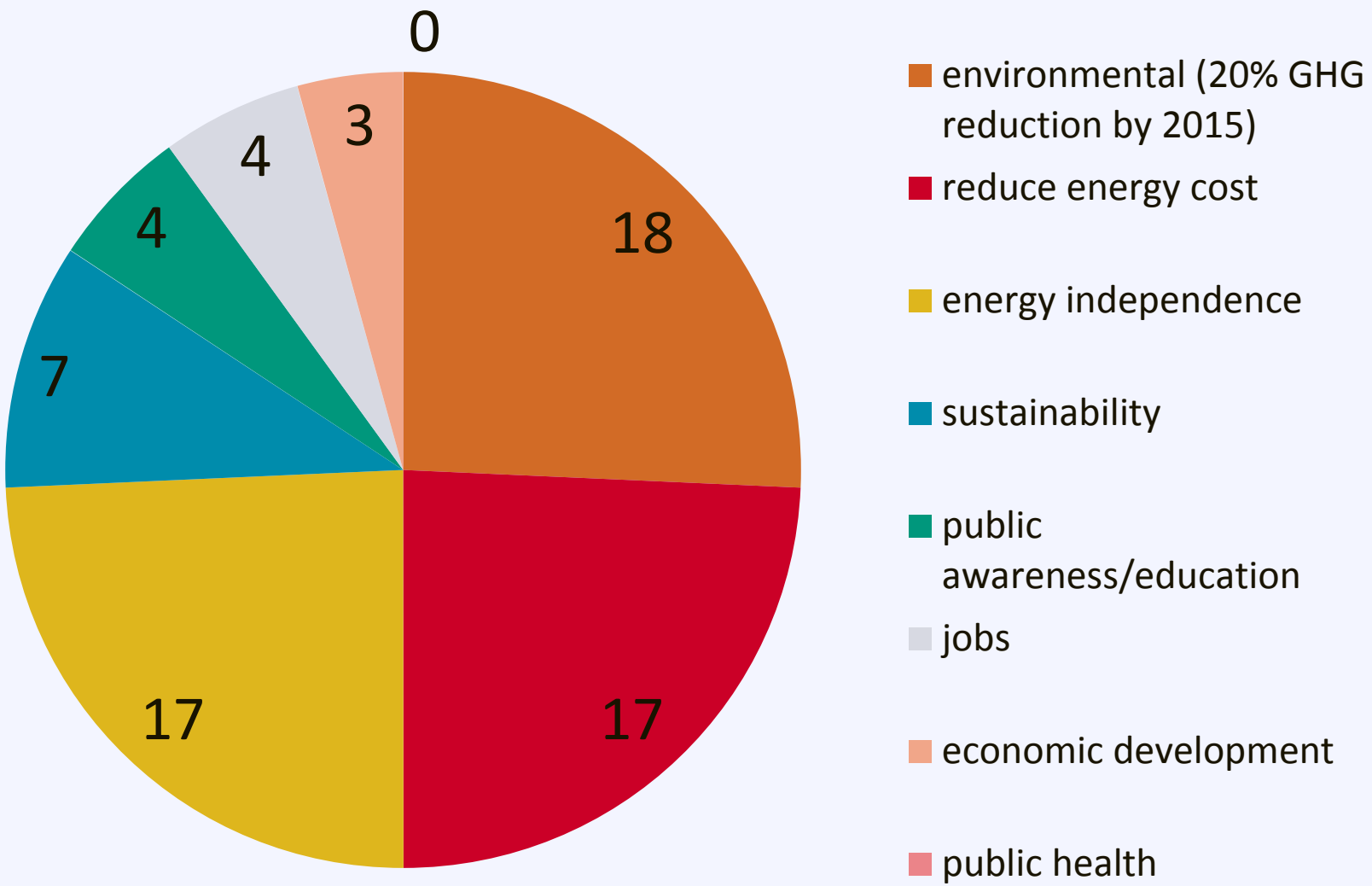


Compile results

After Break

Group discussion

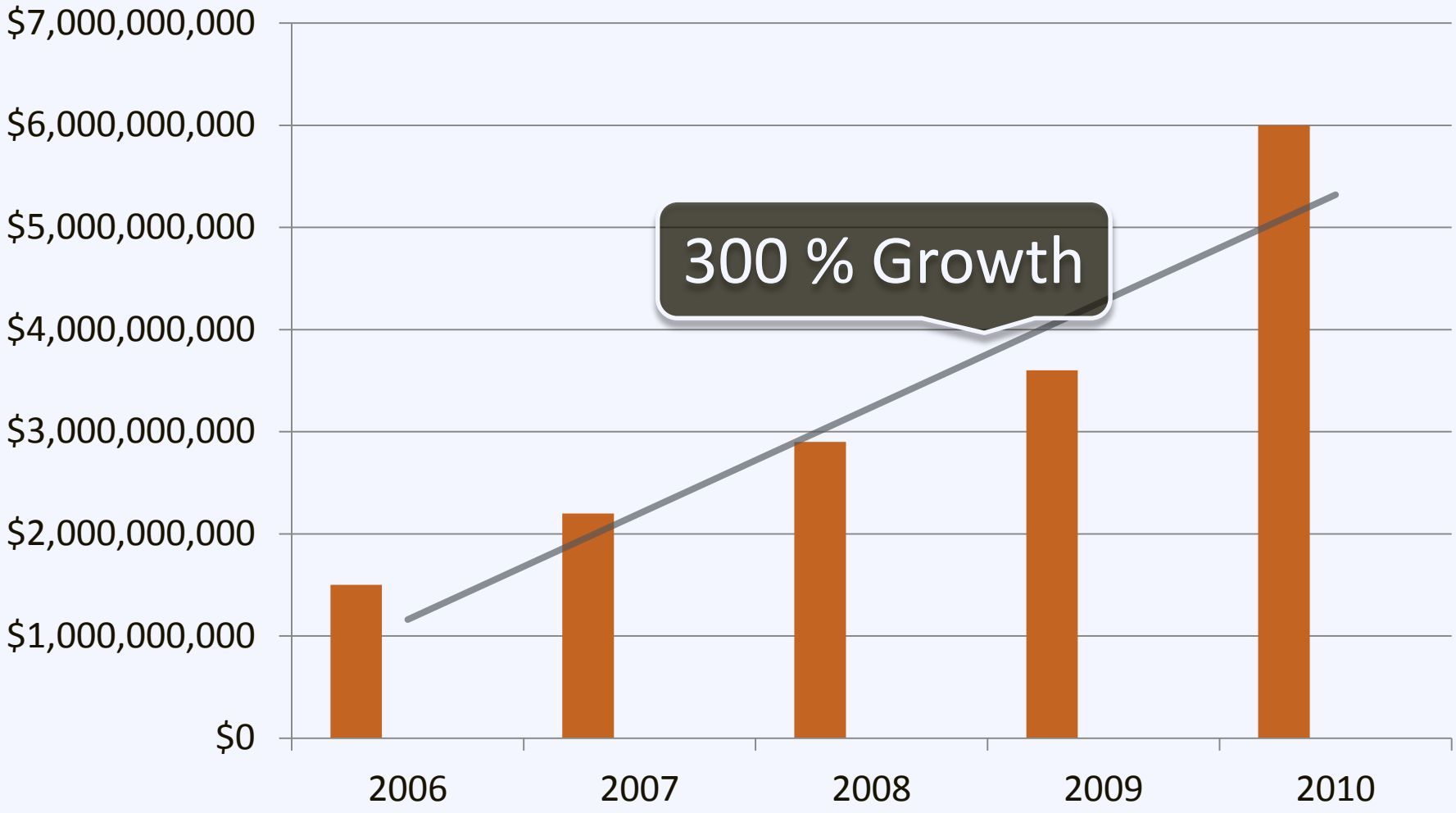
Survey of Benefits



Benefits of Solar Energy

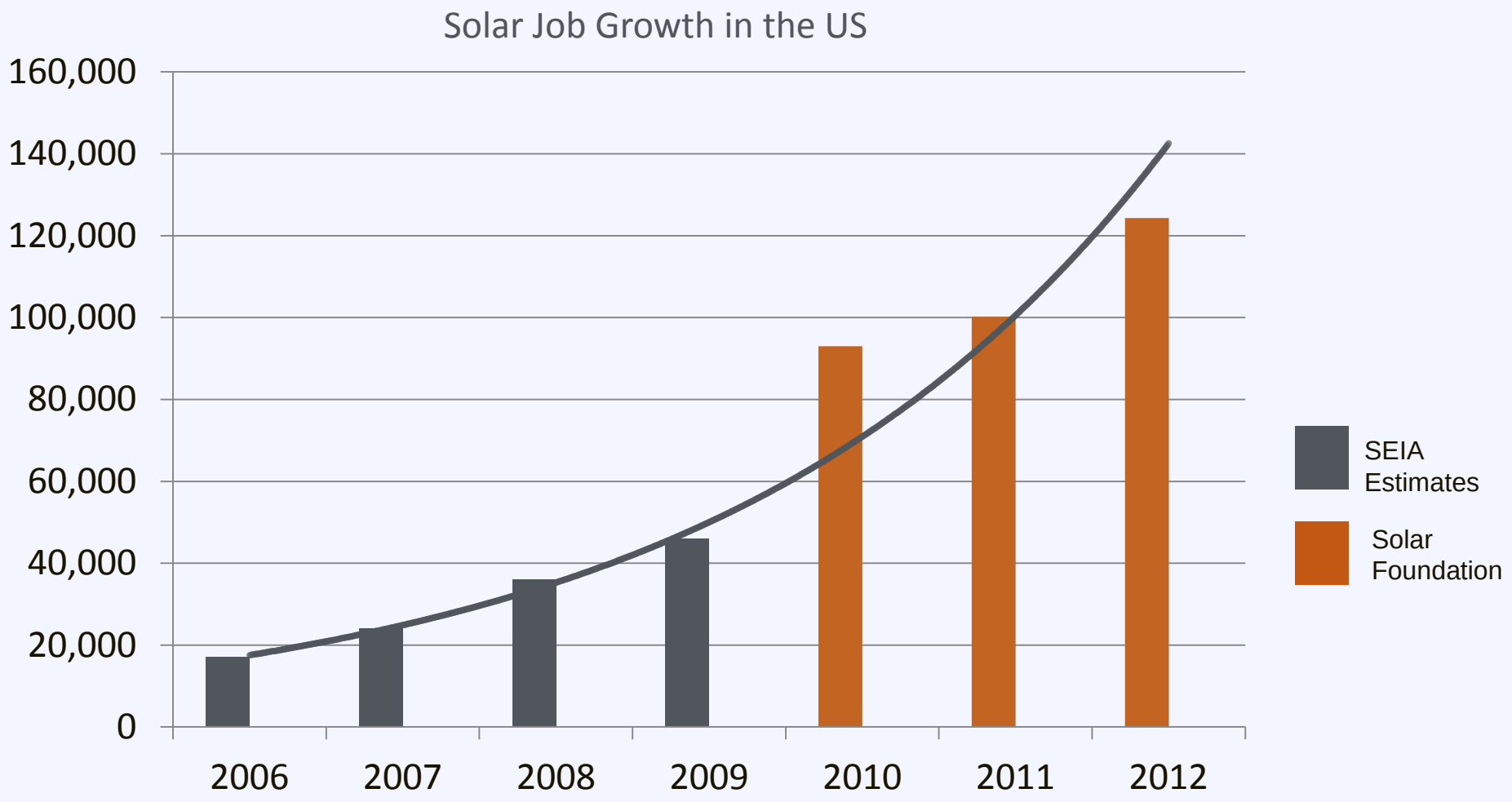
- Local economy growth
- Local jobs
- Energy independence
- Stabilizes price volatility
- Valuable to utilities
- Smart investment

Benefit: Economic Growth



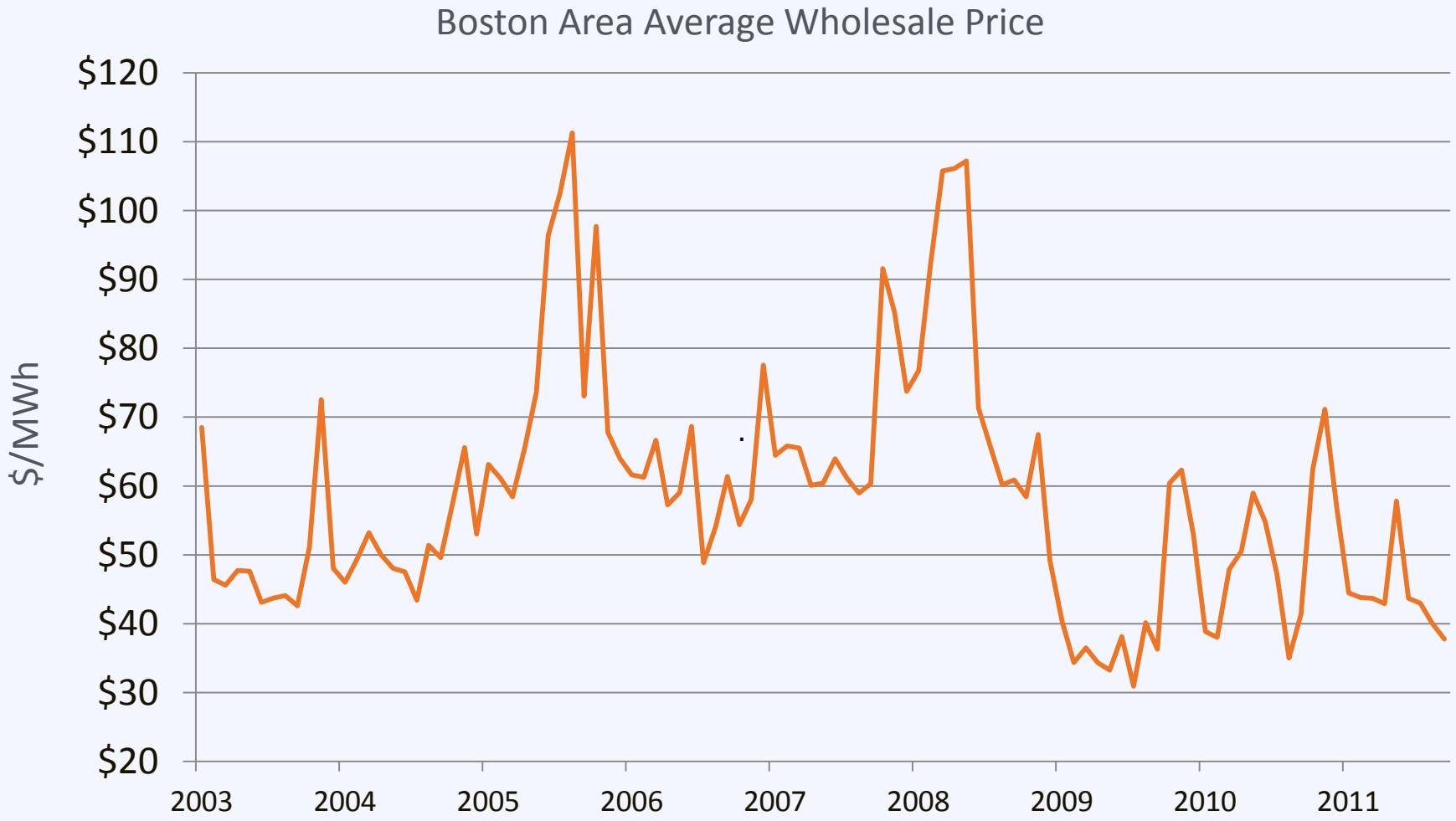
Source: SEIA/GTM Research - 2010 Year in Review Report http://www.seia.org/galleries/pdf/SMI-YIR-2010-ES.pdf SEIA/GTM Research- 2009 year in Review Supplemental Charts

Benefit: Job Growth



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

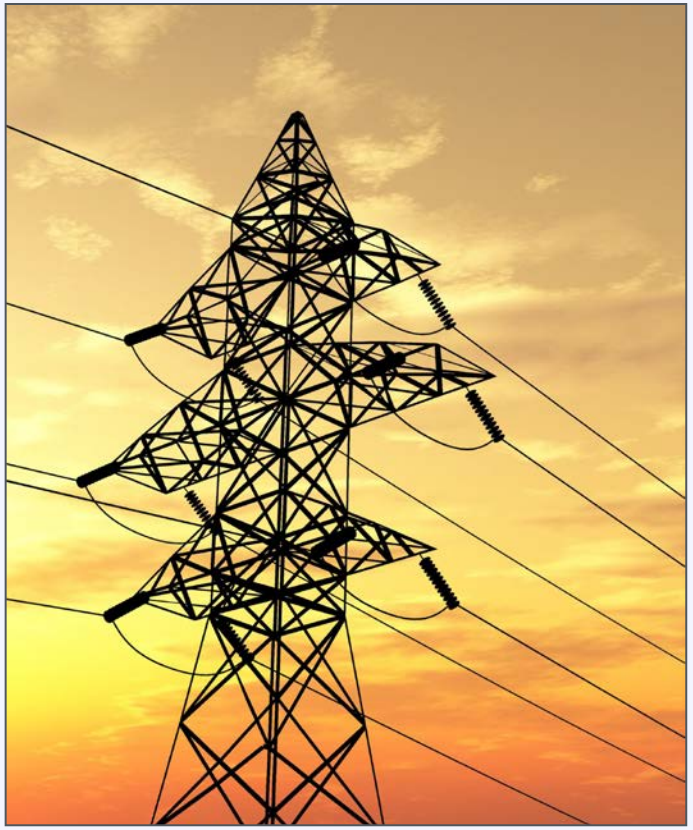
Benefit: Stabilize Energy Prices



Source: NEPOOL

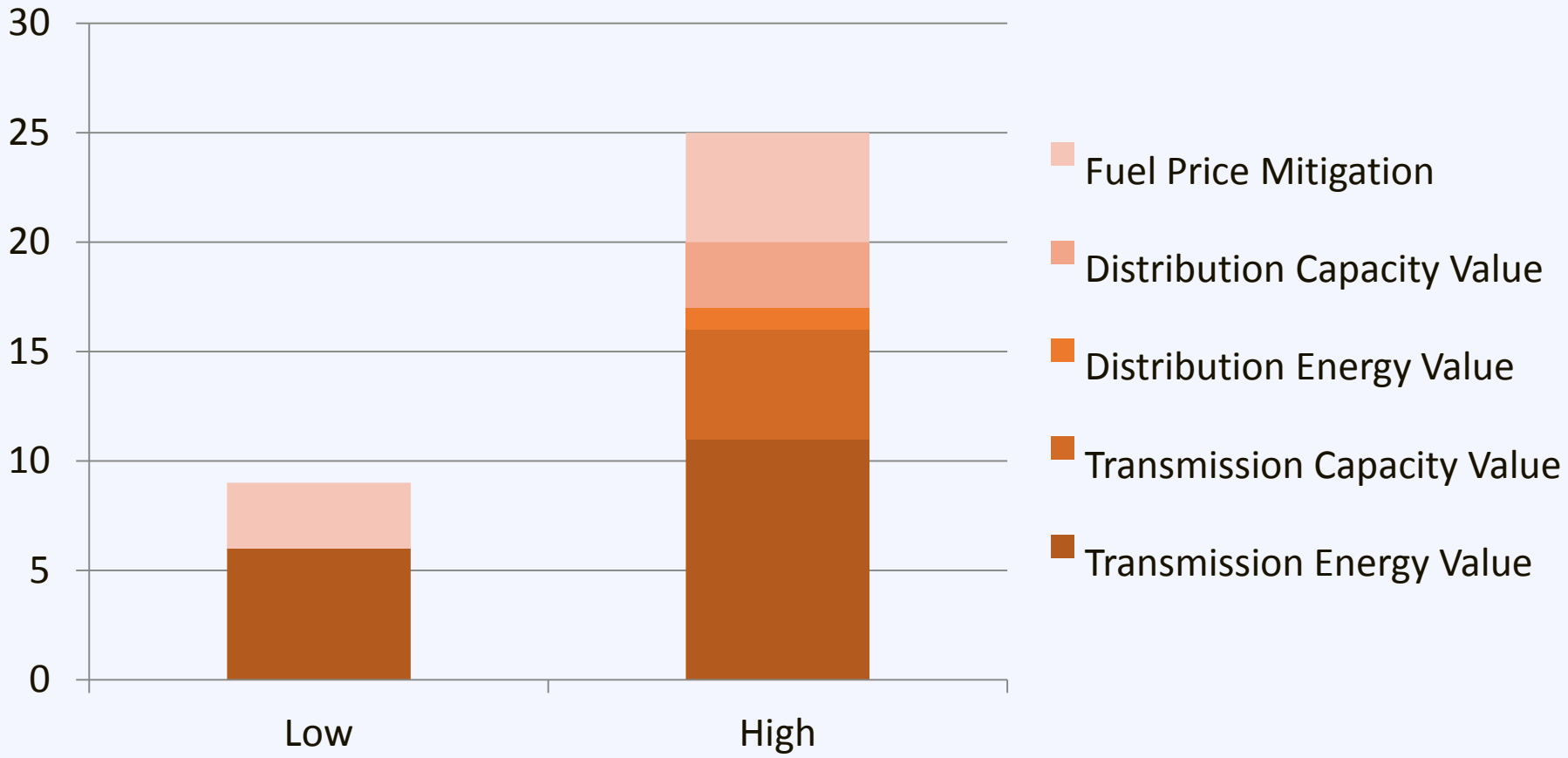
Benefits: Valuable to Utilities

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



Benefits: Valuable to Utilities

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



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

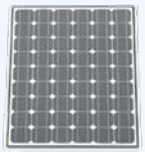
in surveyed California subdivisions

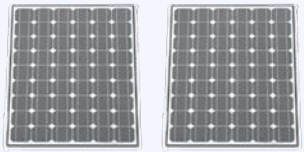
Powered by SunShot U.S. Department of Energy

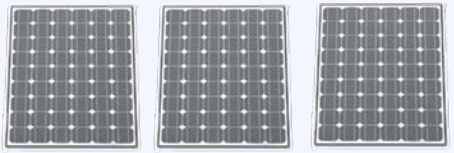
Source: http://www.nrel.gov/docs/fy07osti/38304-01.pdf

Benefit: Smart Investment for Homes

From SunRun:

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

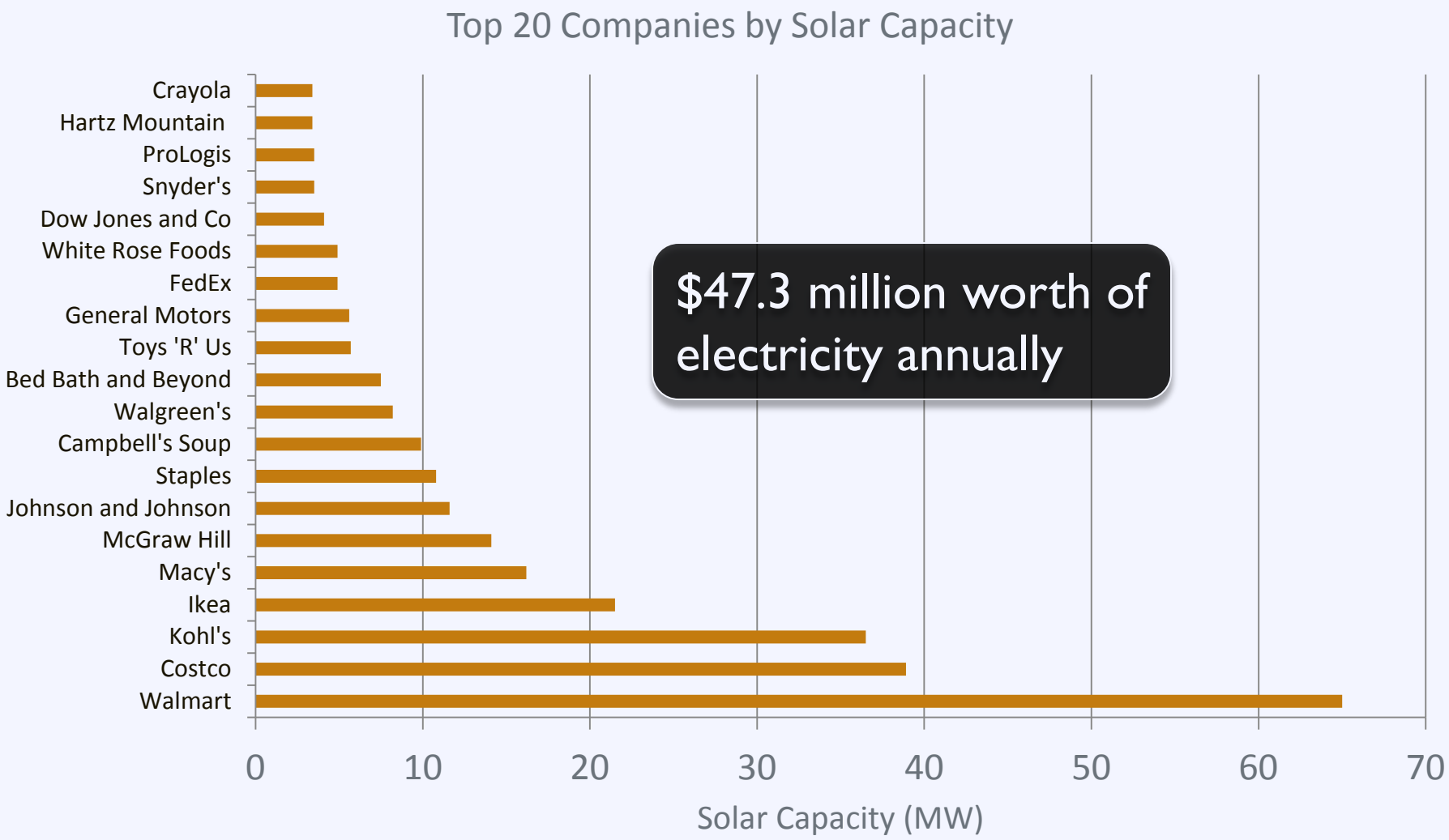
6 kW  = **$ 33,000** *added sale premium*

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

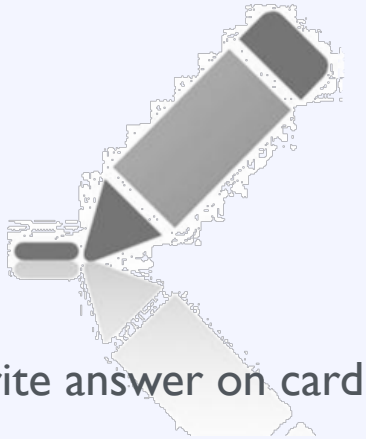
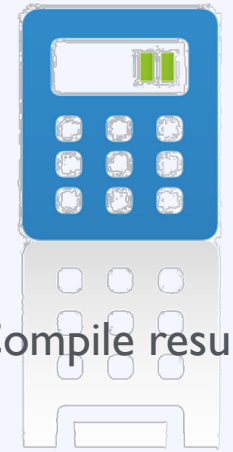
Source: Solar Energy Industries Association

Benefit: Smart Investment for Government

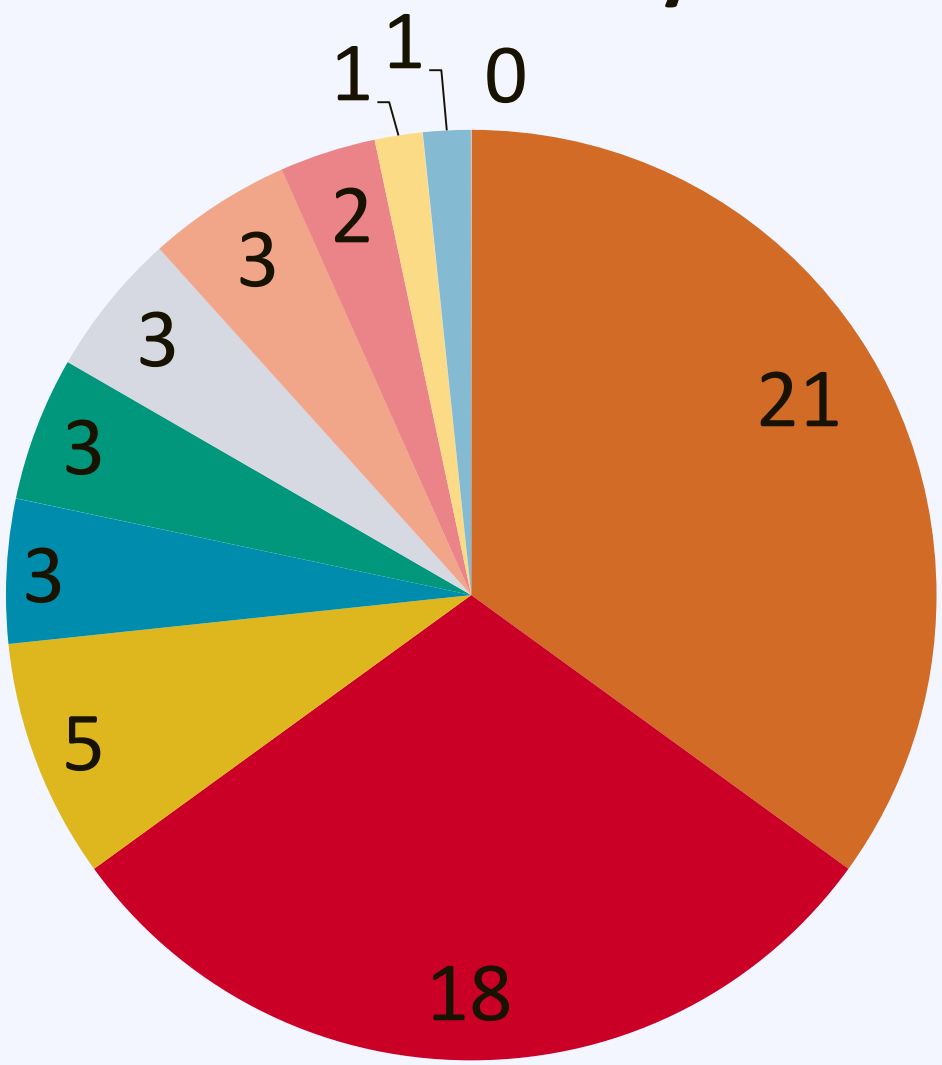
Source: Borrego Solar

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

Survey of Barriers



- lack of information/education
- cost
- aesthetics
- ROI
- policy environment
- zoning
- tree preservation
- political support
- permitting
- historic preservation
- utility

Some things you may hear…

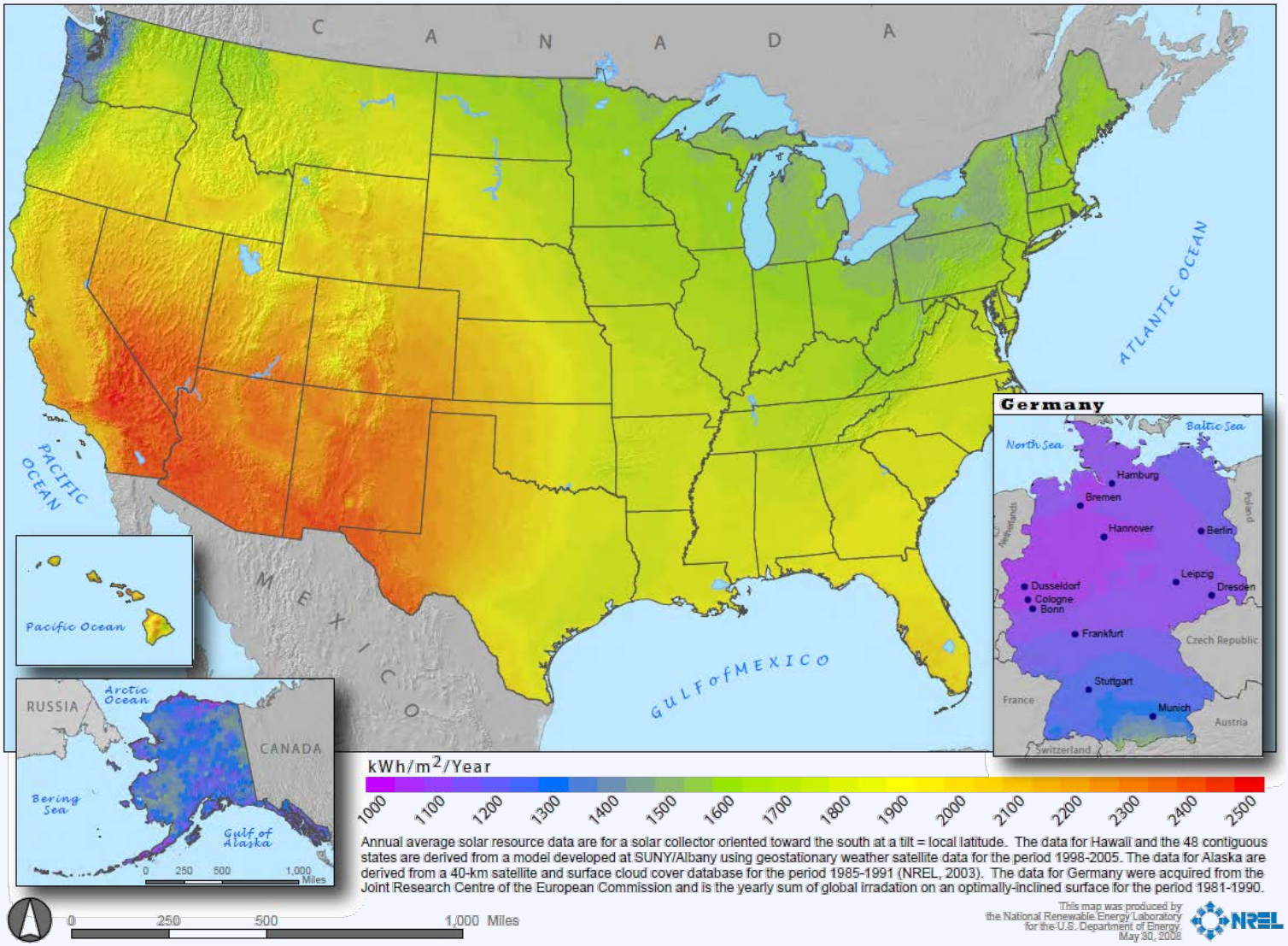
My area isn't sunny enough for solar

Going solar is too expensive

Solar is not ready to compete as a serious energy source

The government should not "pick winners and losers"

Fact: Solar works across the US

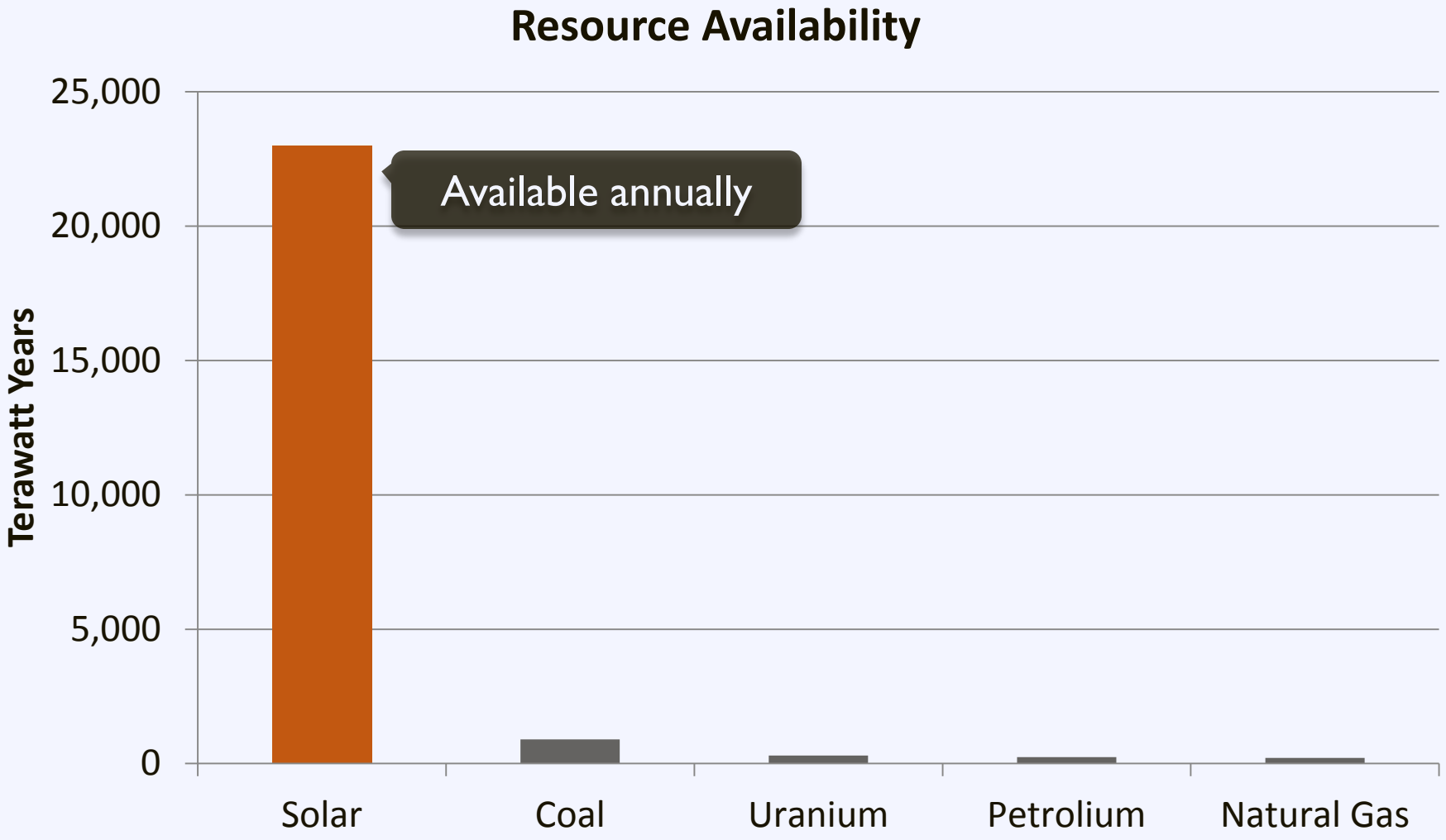


Annual average solar resource data are for a solar collector oriented toward the south at a tilt = local latitude. The data for Hawaii and the 48 contiguous states are derived from a model developed at SUNY/Albany using geostationary weather satellite data for the period 1998-2005. The data for Alaska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

Powered by SunShot U.S. Department of Energy

Source: National Renewable Energy Laboratory

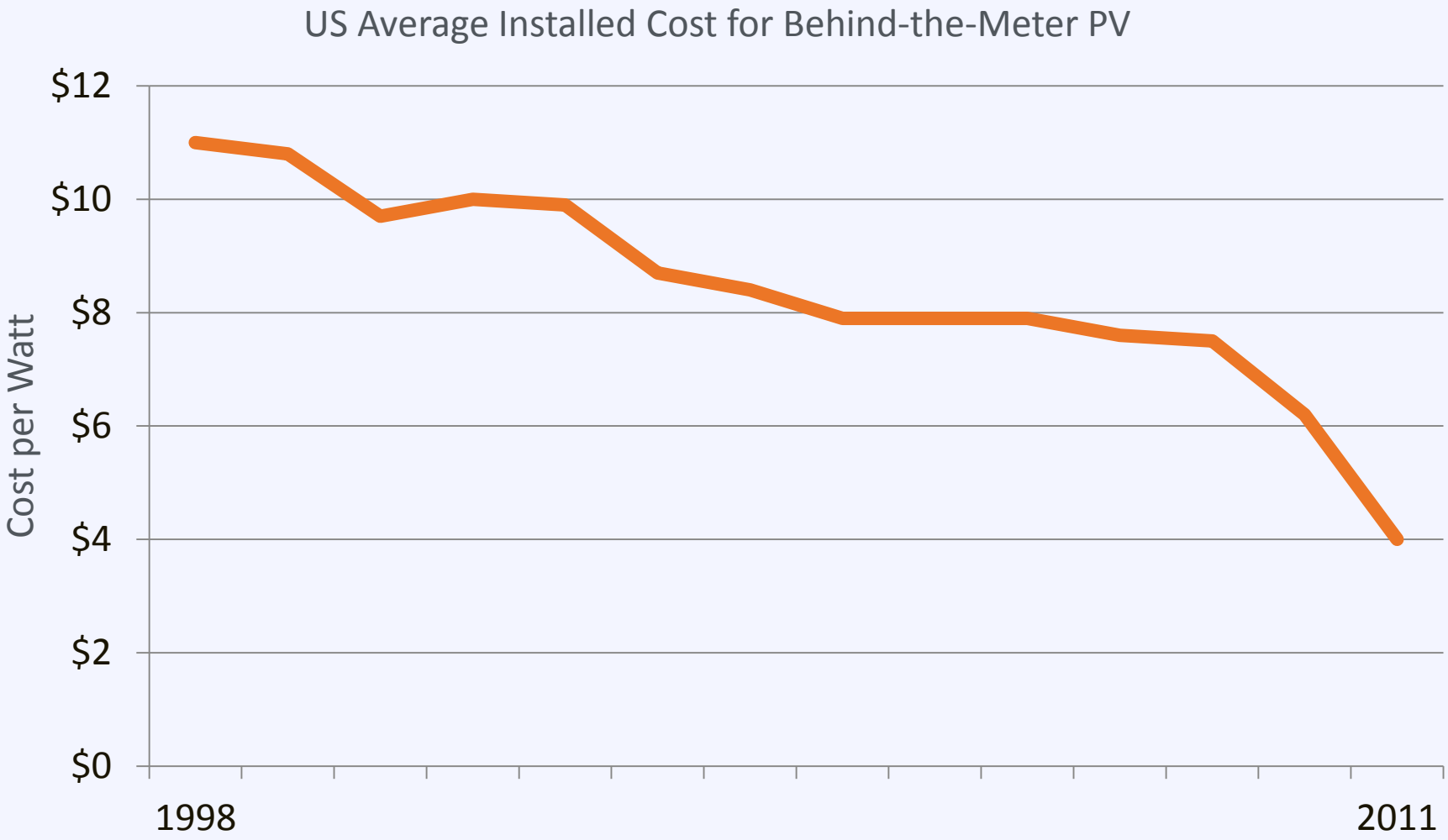
Fact: Solar is a ubiquitous resource



Powered by SunShot U.S. Department of Energy

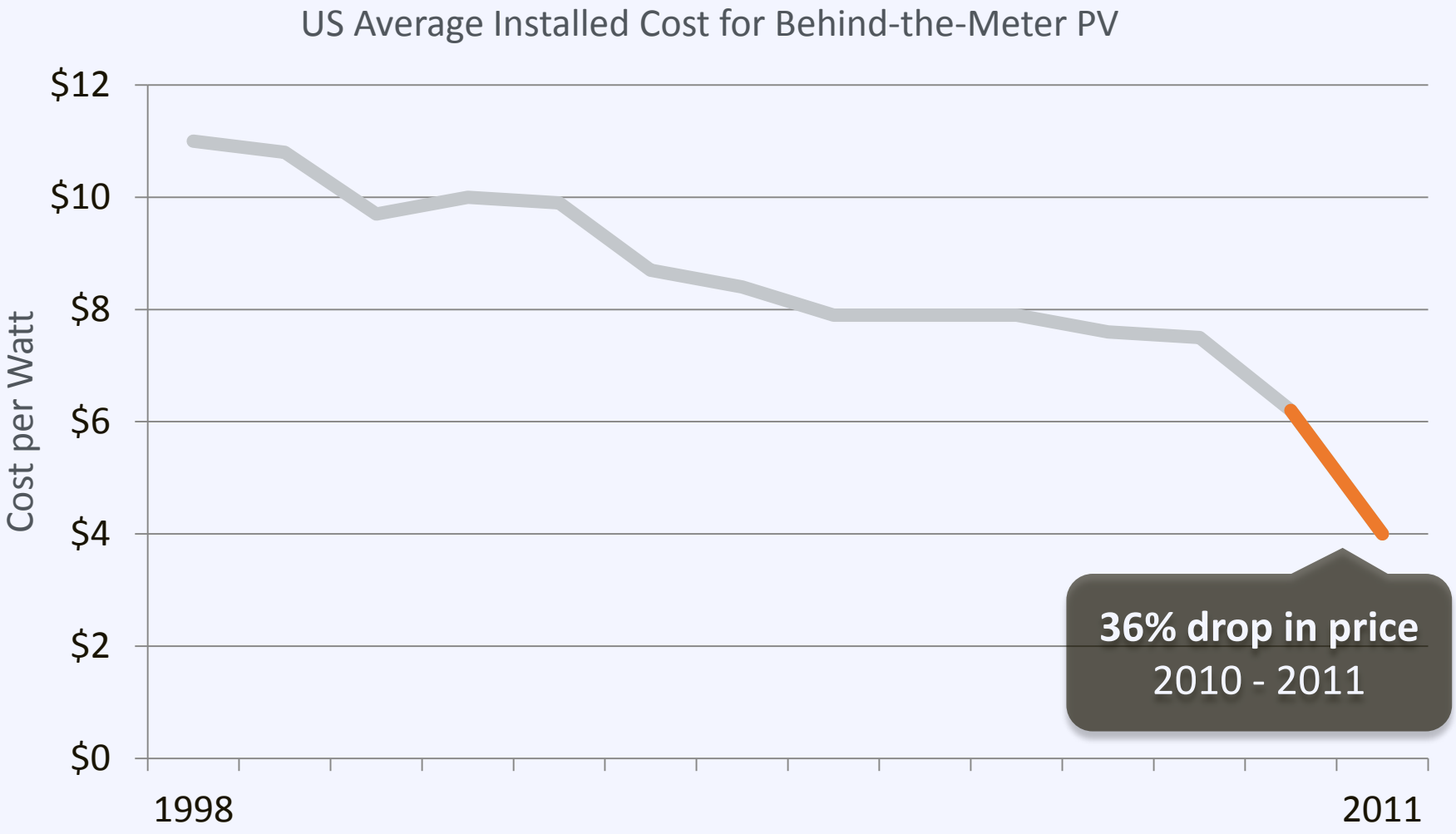
Source: Perez & Perez. 2009. *A fundamental look at energy reserves for the planet.*

Fact: Solar is cost competitive



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

Fact: Solar is cost competitive



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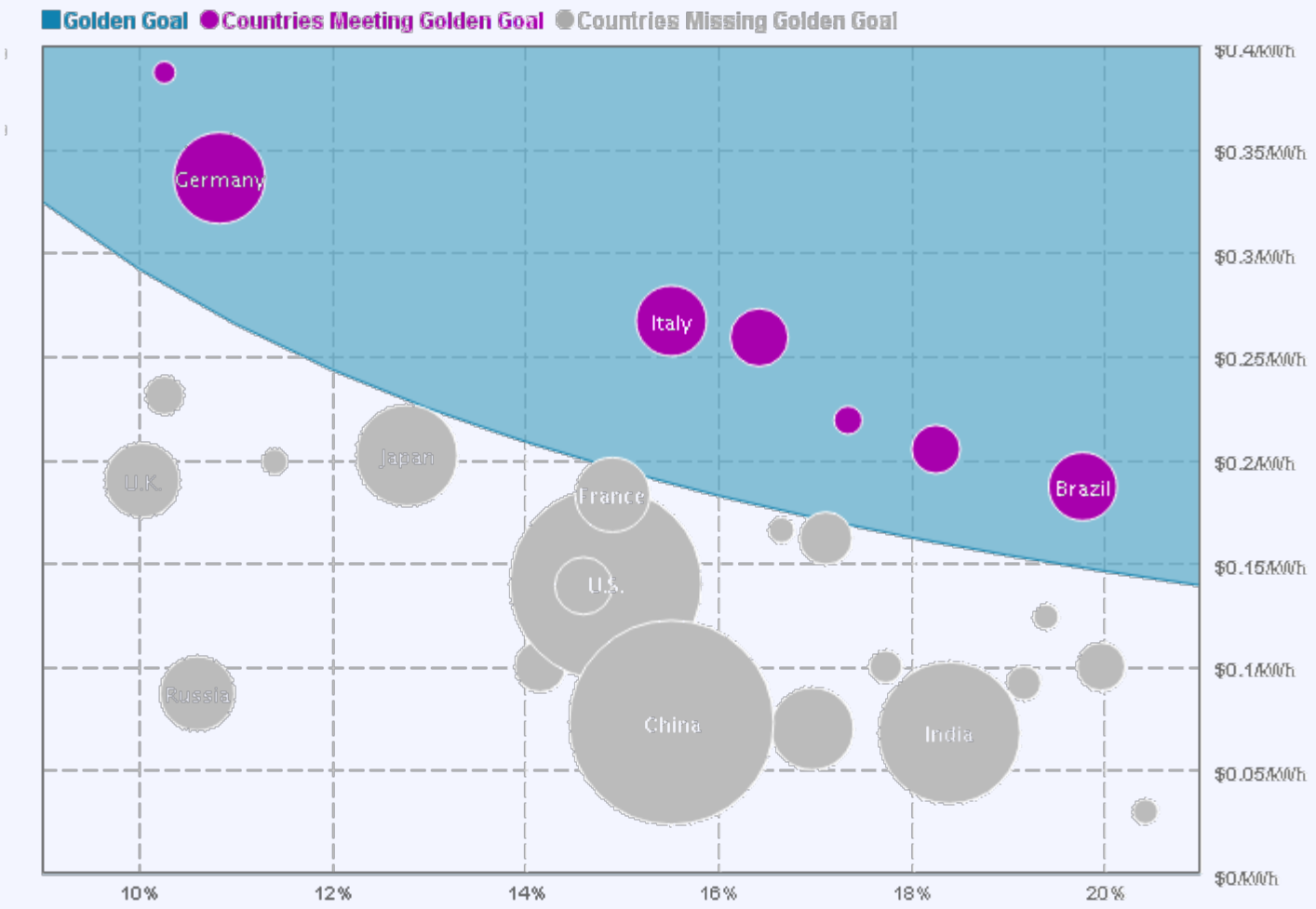
Powered by SunShot U.S. Department of Energy

Fact: Solar is cost competitive

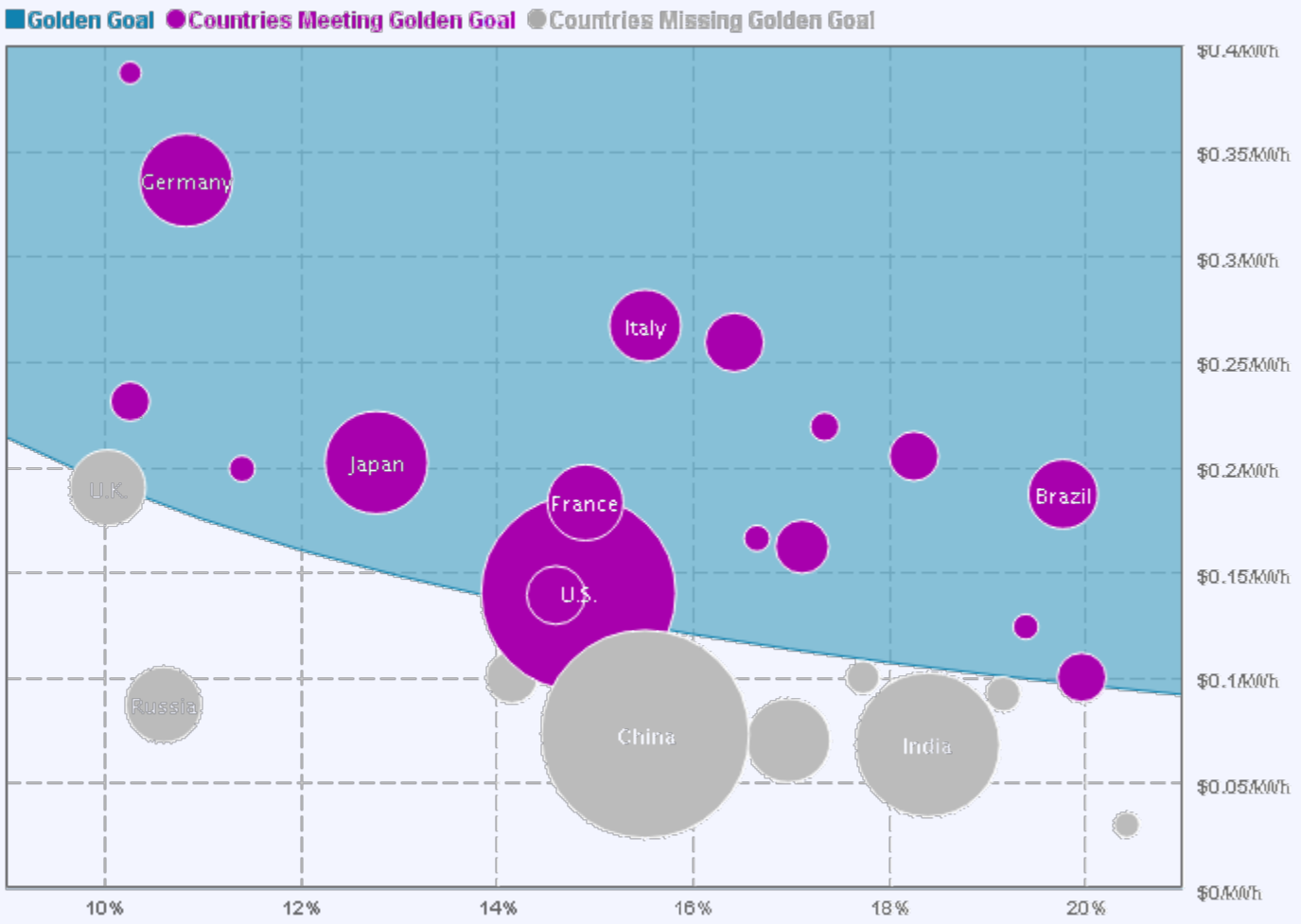
2012



Source: Bloomberg

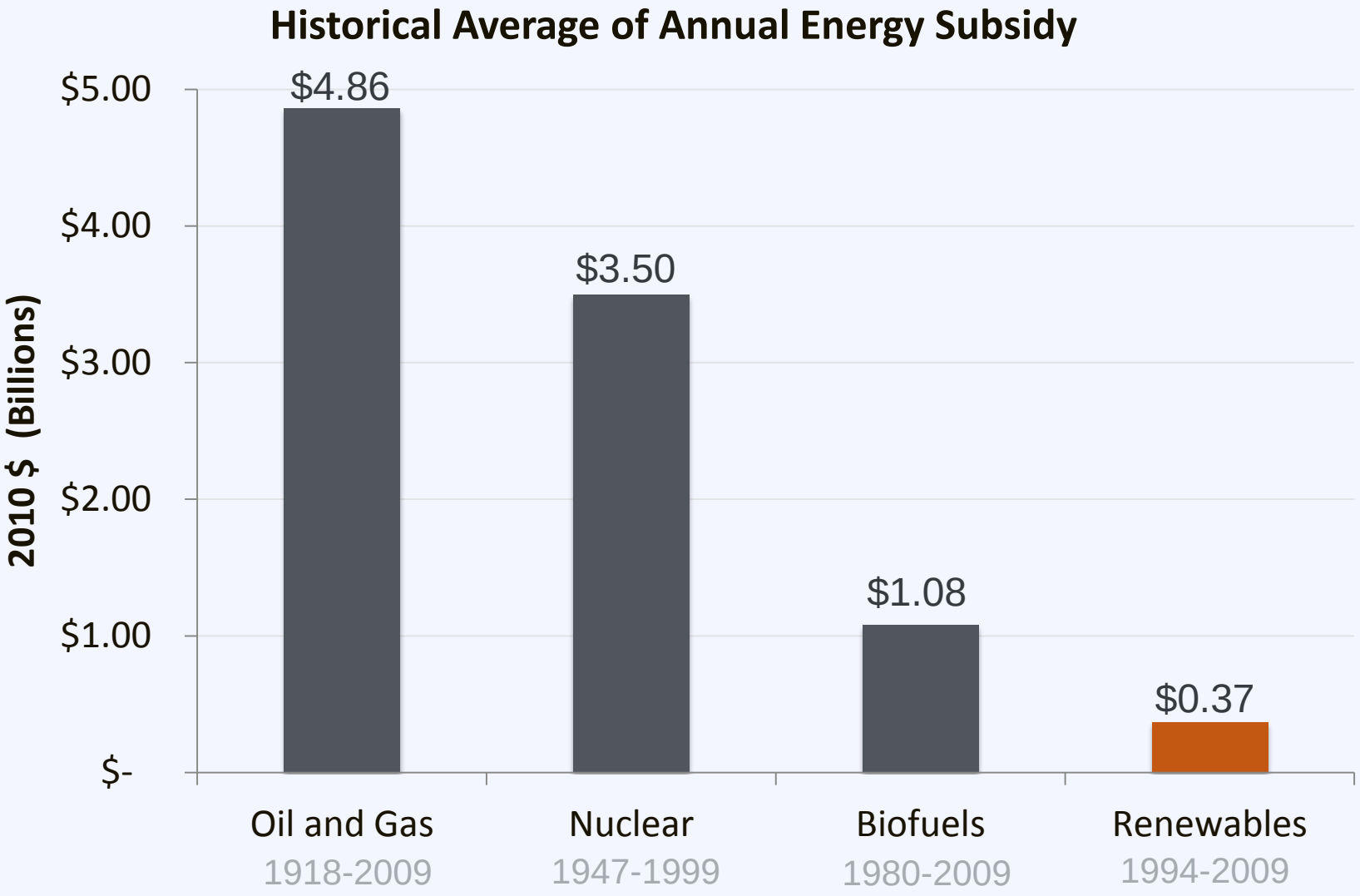
Fact: Solar is cost competitive

2020



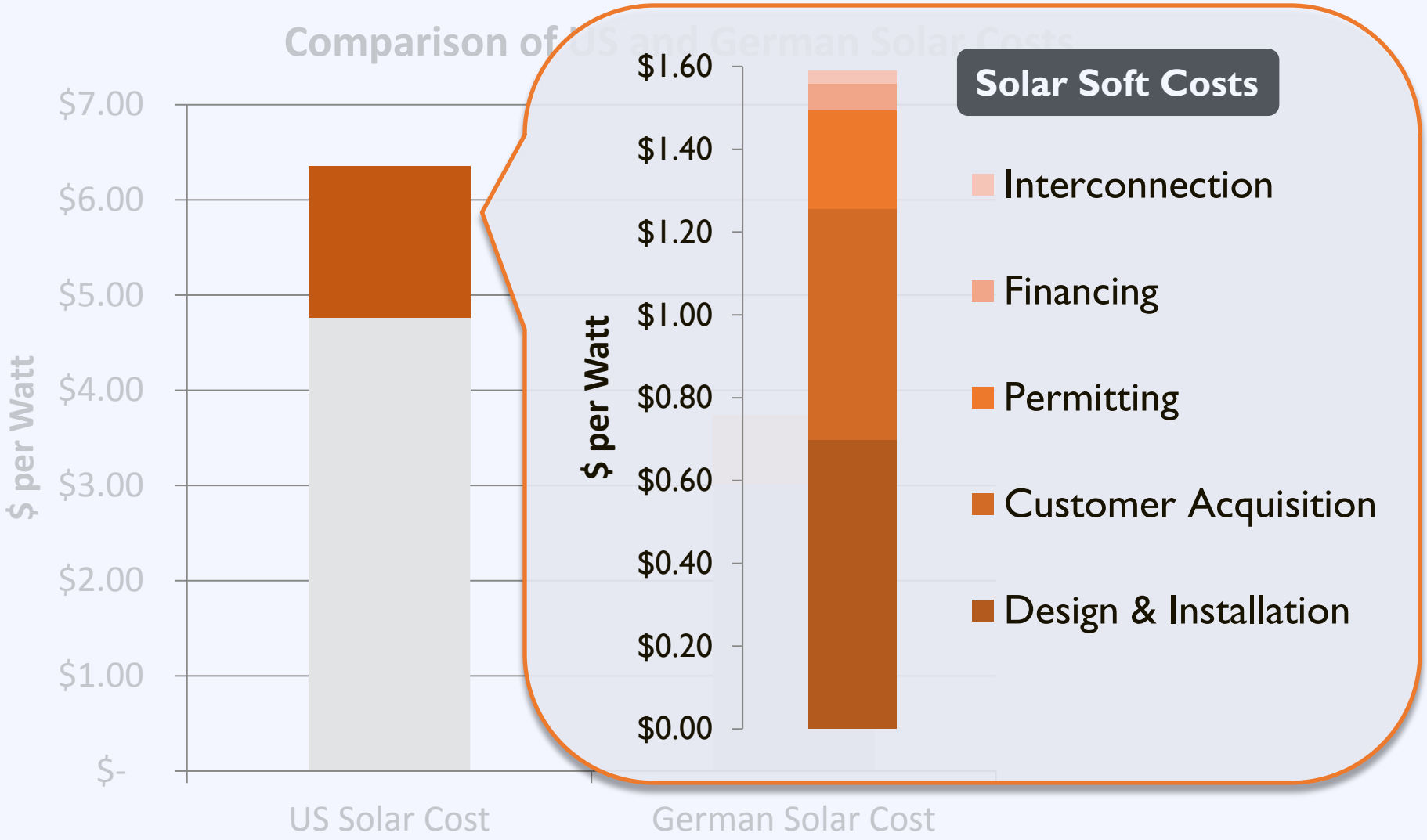
Source: Bloomberg

Fact: All energy is subsidized



Sources: DBL Investors

Barriers Still Exist



Powered by SunShot U.S. Department of Energy

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

Q & A

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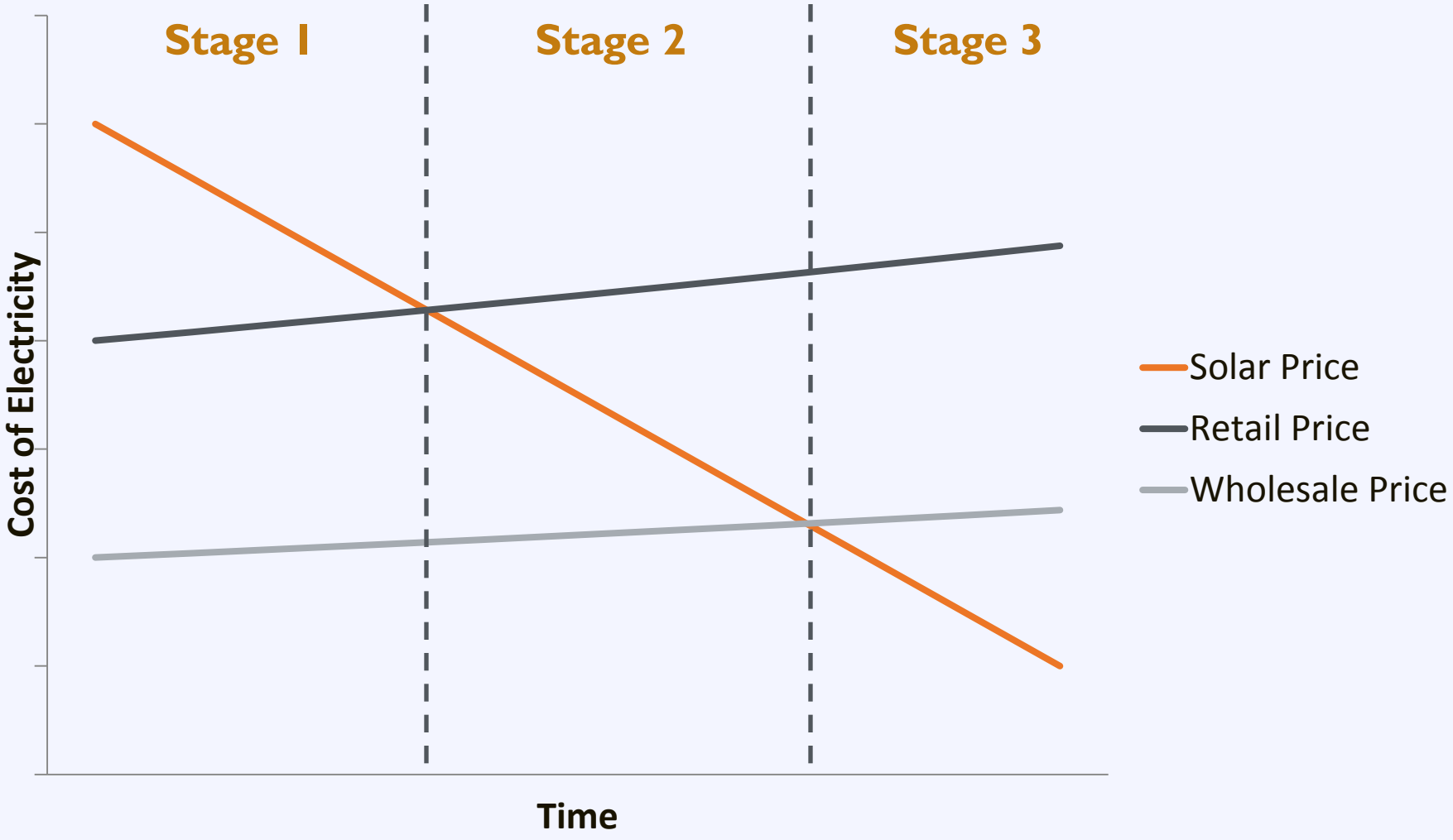
Utility Market Stages



Source: Solar Electric Power Association

Electric Market Status (2010)

Retail Sales	Investor-Owned	Municipal	Rural Coops	TOTAL
Missouri	69.6%	13.0%	17.4%	86.1 M MWh
Illinois	83%	8.9%	8.1%	77.4 M MWh

# Customers	Investor-Owned	Municipal	Rural Coops	TOTAL
Missouri	62.6%	13.8%	23.6%	3,075,664
Illinois	89.9%	4.8%	5.3%	5,567,194

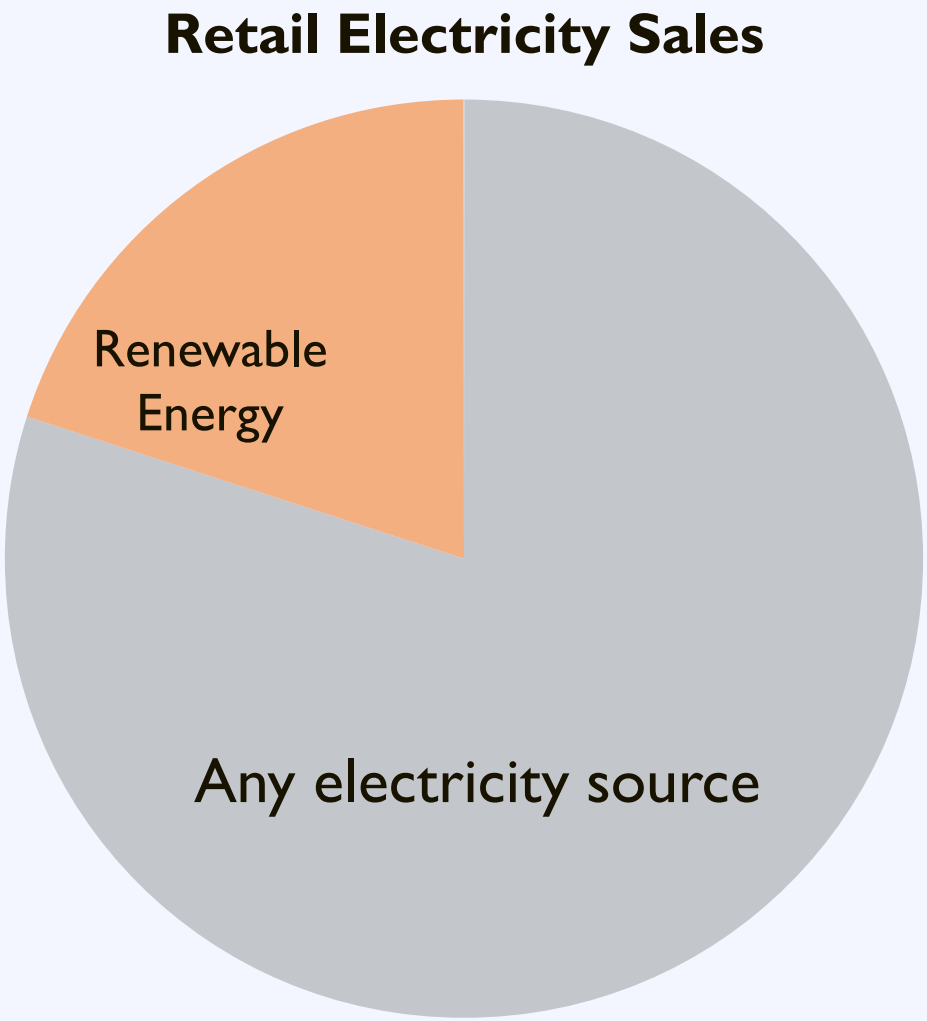
Prices	Investor-Owned	Municipal	Rural Coops	Average
Missouri	7.39¢/kWh	8.32¢/kWh	8.94¢/kWh	7.78¢/kWh
Illinois	9.93¢/kWh	9.58¢/kWh	11.48¢/kWh	10.31¢/kWh

Average U.S. Retail Electric Rate: 9.83 ¢/kWh

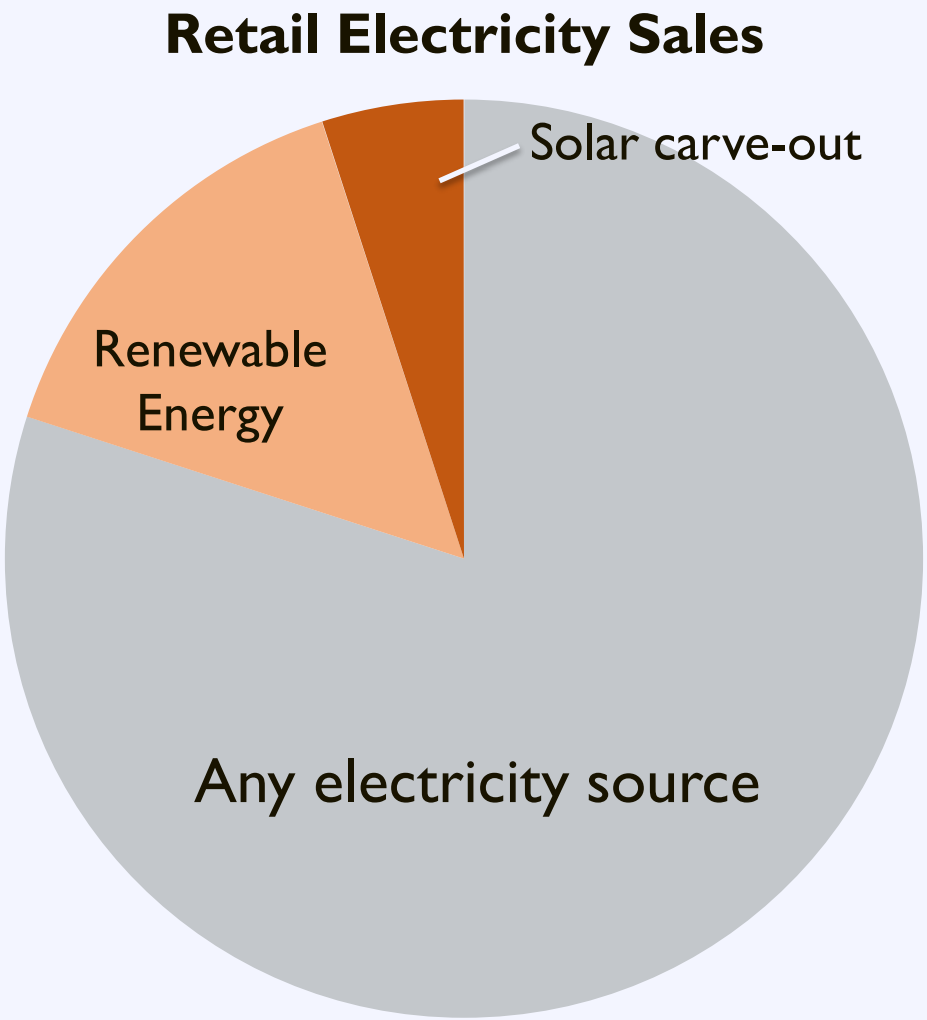
Powered by SunShot U.S. Department of Energy

Source: US Energy Information Administration

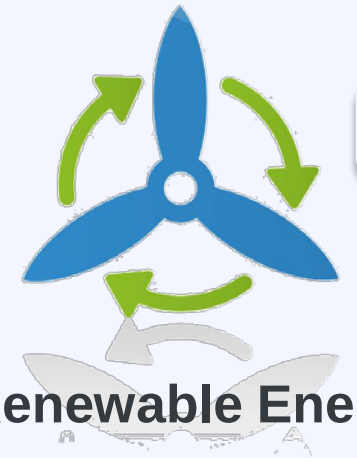
Renewable Portfolio Standard



Renewable Portfolio Standard



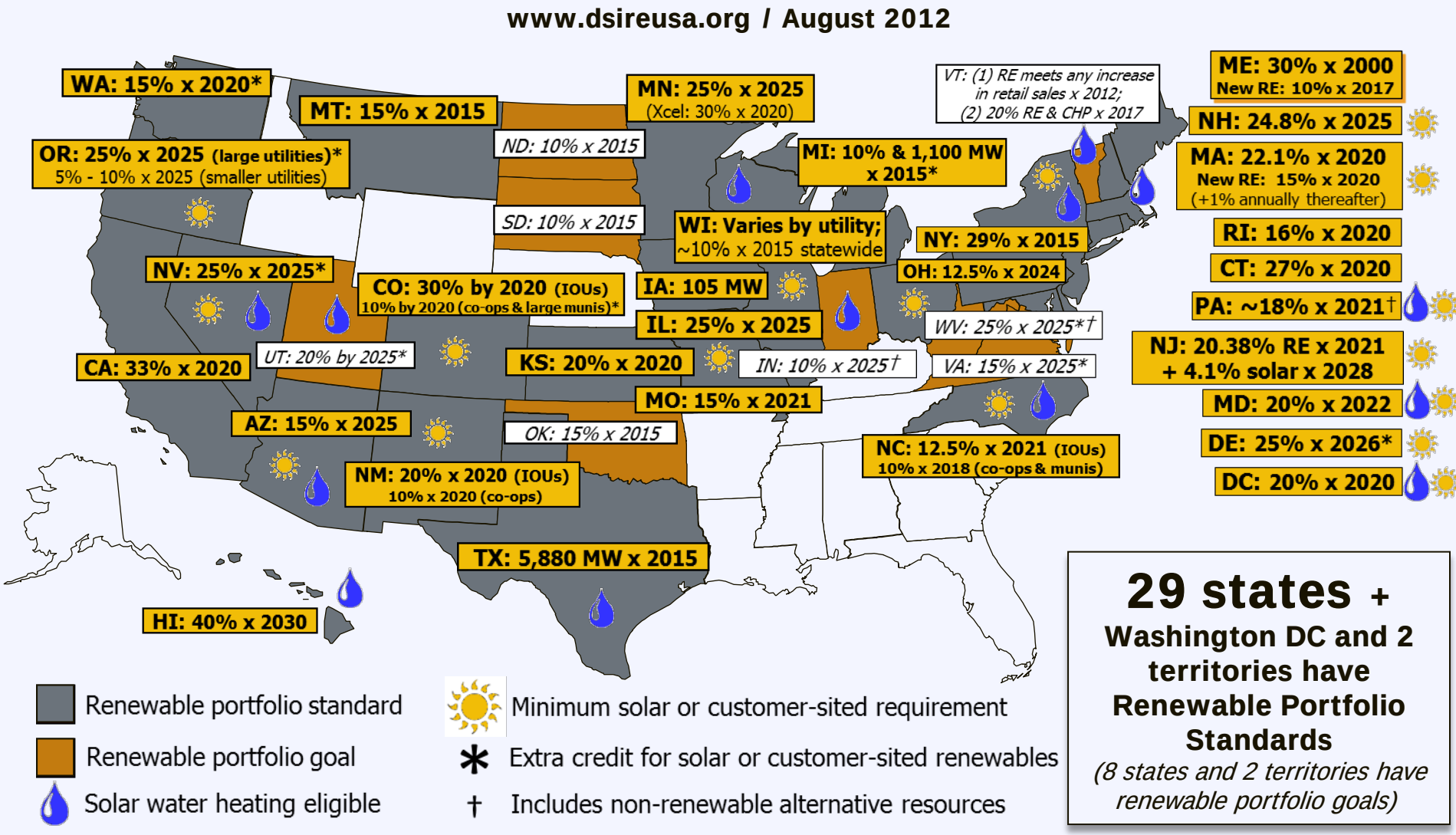
Renewable Portfolio Standard



Two revenue streams

e- REC

Renewable Portfolio Standard



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

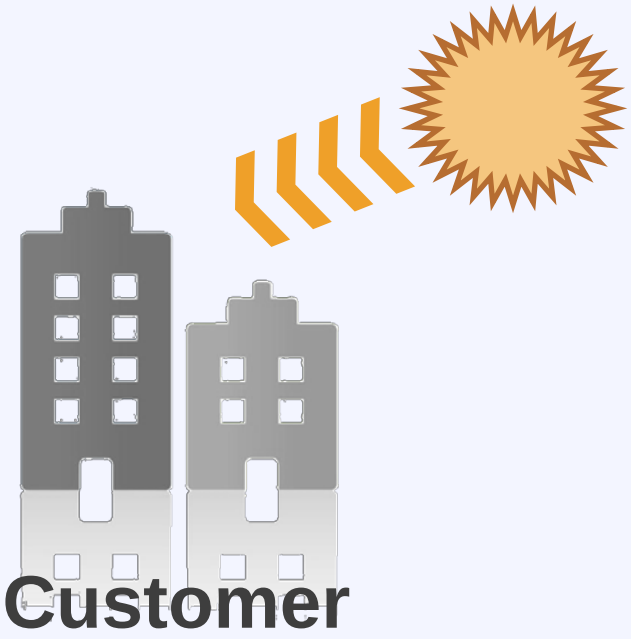
Powered by SunShot
U.S. Department of Energy

Net Metering

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

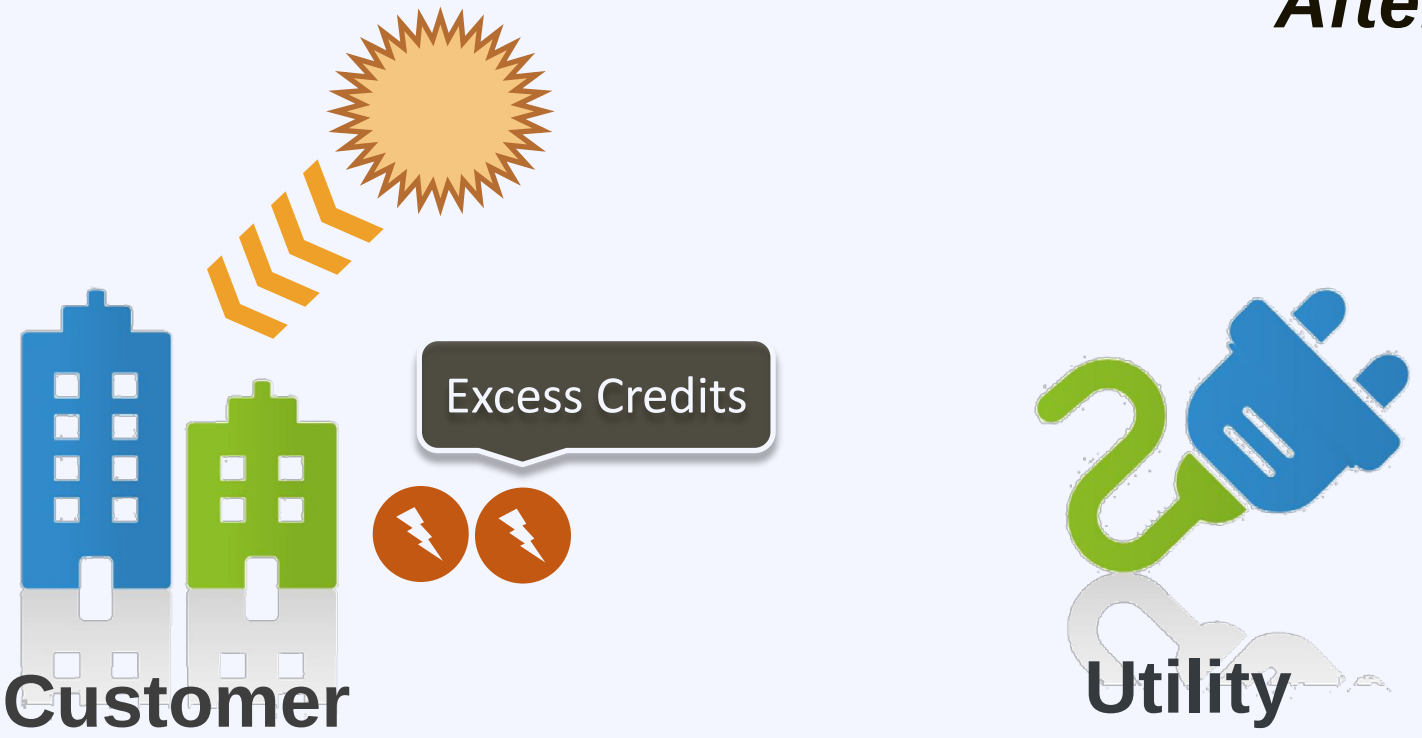
Net Metering: Overview

Morning



Net Metering: Overview

Afternoon



Net Metering: Overview

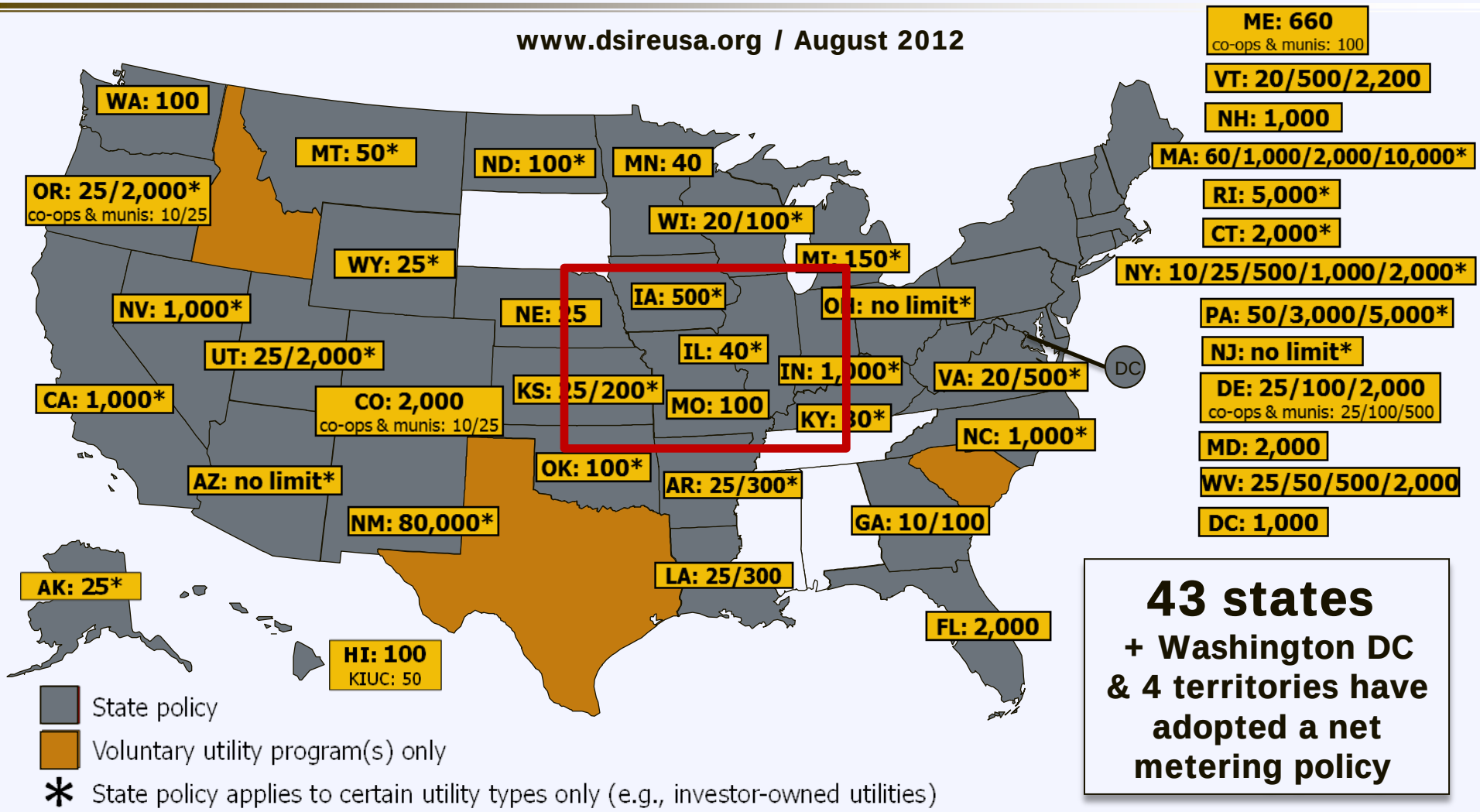
Night

Customer

Utility

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

Net Metering: 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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U.S. Department of Energy

Net Metering: Market Share

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

Powered by SunShot U.S. Department of Energy

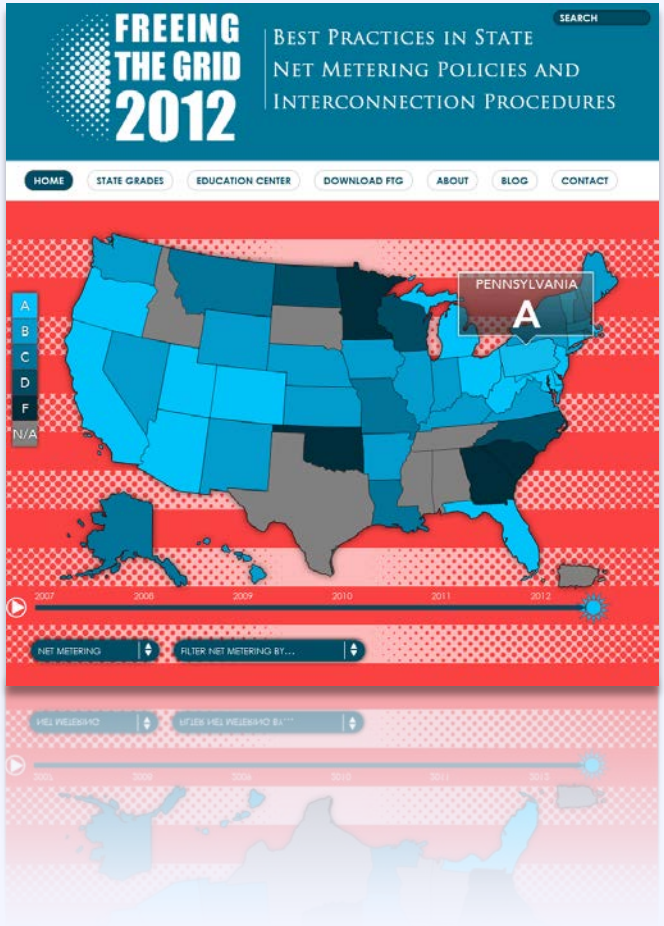
Source: IREC (http://www.irecusa.org/wp-content/uploads/IRECSolarMarketTrends-2012-web.pdf)

Net Metering: Resources

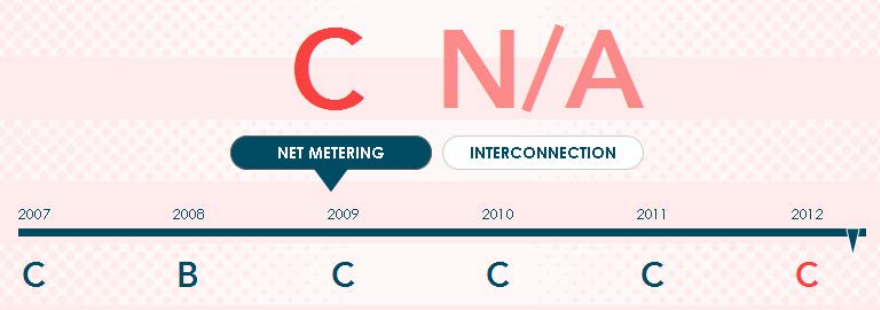
Resource **Freeing the Grid**

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

http://freeingthegrid.org/



Net Metering: Missouri



Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Hydroelectric, Small Hydroelectric, Fuel Cells using Renewable Fuels
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	All utilities
System Capacity Limit:	100 kW
Aggregate Capacity Limit:	5% of utility's single-hour peak load during previous year
Net Excess Generation:	Credited to customer's next bill at avoided-cost rate; granted to utility at end of 12-month period
REC Ownership:	Not addressed
Meter Aggregation:	Not addressed

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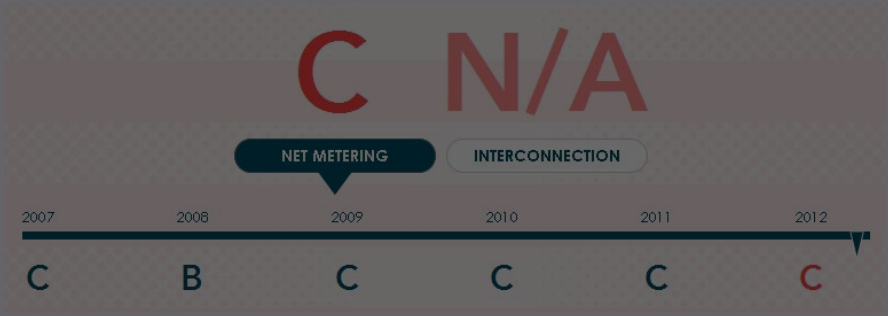
Source: Freeing the Grid

Net Metering: Missouri



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Net Excess Generation:	**Credited to customer's next bill at avoided-cost rate; granted to utility at end of 12-month period**
REC Ownership:	Not addressed
Meter Aggregation:	**Not addressed**

Source: Freeing the Grid

Net Metering: Virtual

No direct connection necessary

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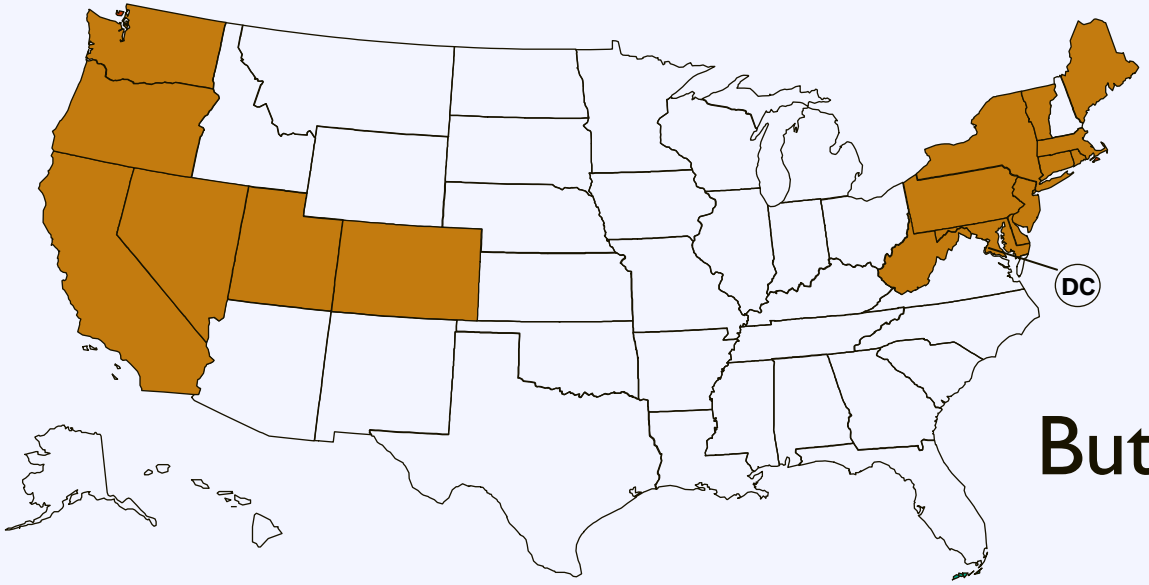
U.S. Department of Energy

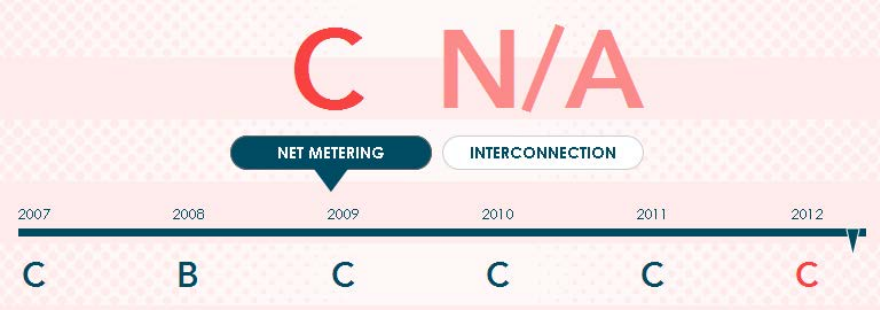
Net Metering: Meter Aggregation



But…It's complicated

- Ownership requirements
- Contiguous vs. non-contiguous properties
- Multiple customers
- Multiple generators
- Modified system/aggregate system size limits
- Rollover rates
- Distance limitations
- Number of accounts
- How to address accounts on different tariffs

Net Metering: Missouri



RECOMMENDATIONS:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Credit net excess generation at the retail rate and provide the option of indefinite rollover

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Hydroelectric, Small Hydroelectric, Fuel Cells using Renewable Fuels
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	All utilities
System Capacity Limit:	100 kW
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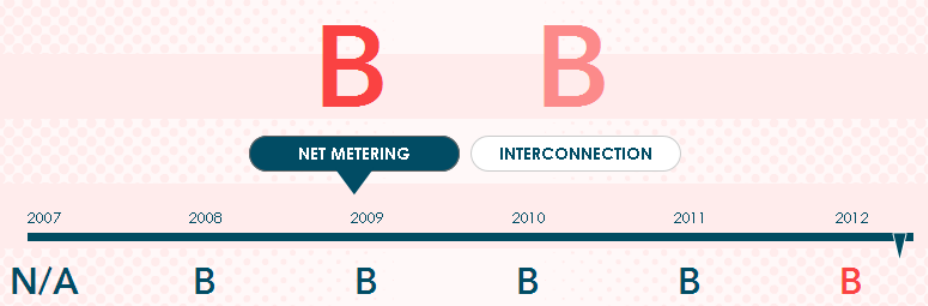
Meter Aggregation:	Not addressed

Source: Freeing the Grid

Net Metering: Illinois

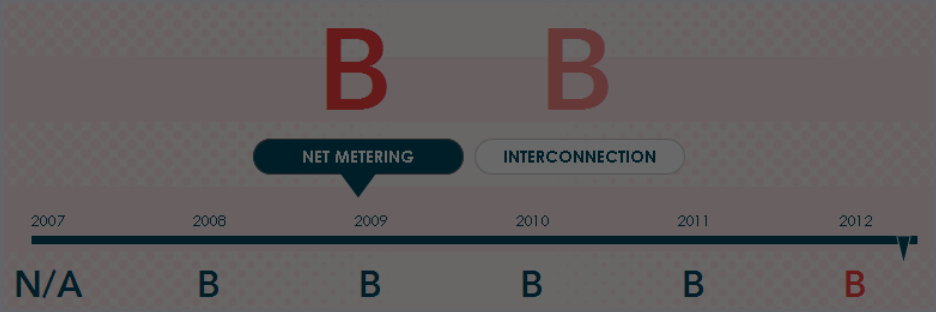


Eligible Renewable/Other Technologies:	Photovoltaics, Wind, Biomass, Hydroelectric, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels, Microturbines
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities, alternative retail electric suppliers
System Capacity Limit:	100 kW
Aggregate Capacity Limit:	5% of utility's peak demand
Net Excess Generation:	Credited to customer's next bill at retail rate; granted to utility at end of reconciliation period
REC Ownership:	Customer owns RECs
Meter Aggregation:	Not addressed

Powered by SunShot
U.S. Department of Energy

Source: Freeing the Grid

Net Metering: Illinois



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Source: Freeing the Grid

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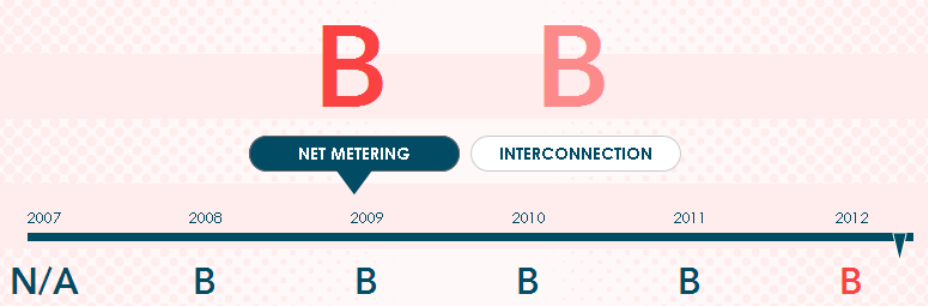

RECOMMENDATIONS:

- Remove system size limitations to allow customers to meet all on-site energy needs

Eligible Renewable/Other Technologies:	Photovoltaics, Wind, Biomass, Hydroelectric, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels, Microturbines
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REC Ownership:	Customer owns RECs
Meter Aggregation:	Not addressed

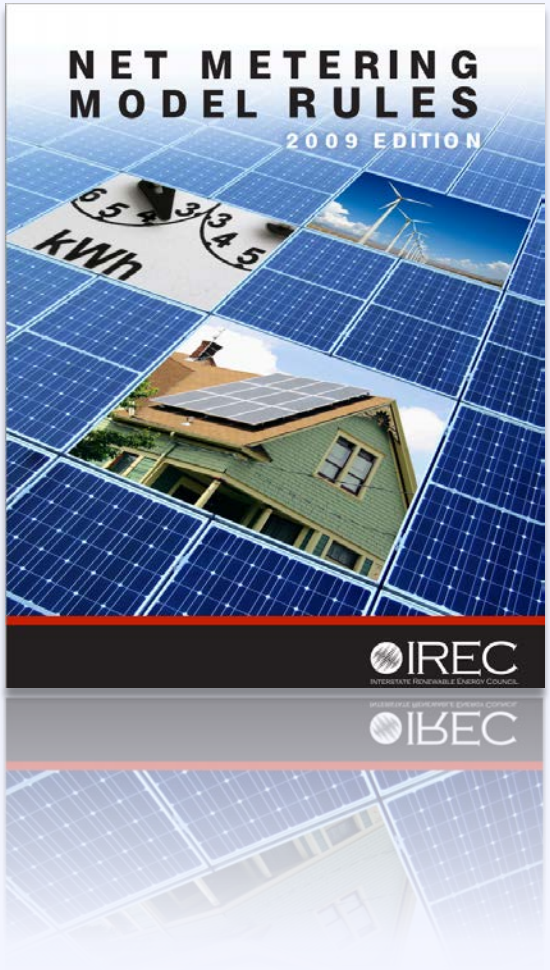
Source: Freeing the Grid

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



Interconnection

5,000+ utilities

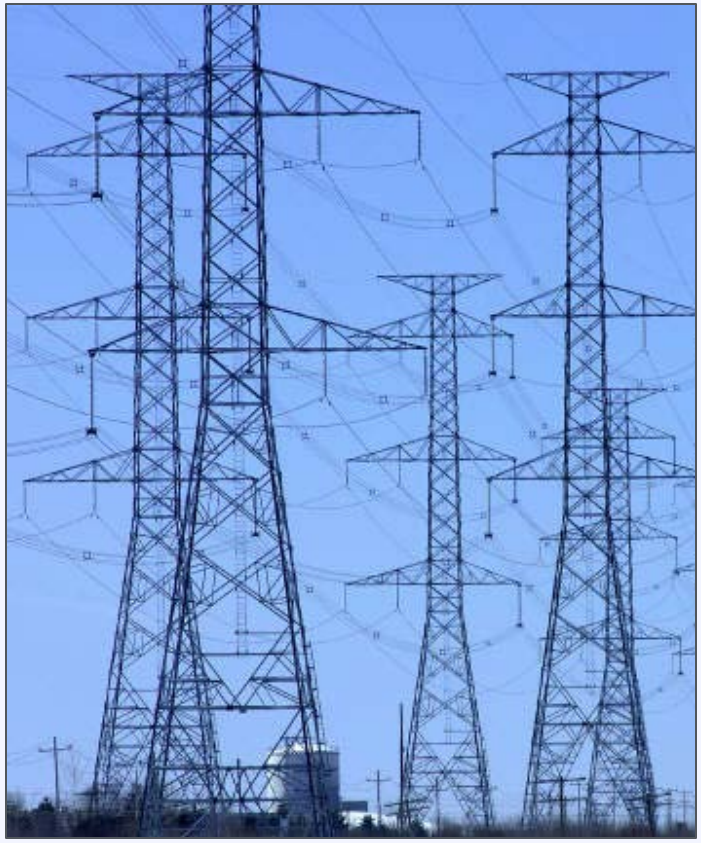
with unique interconnection procedures

Powered by SunShot
U.S. Department of Energy

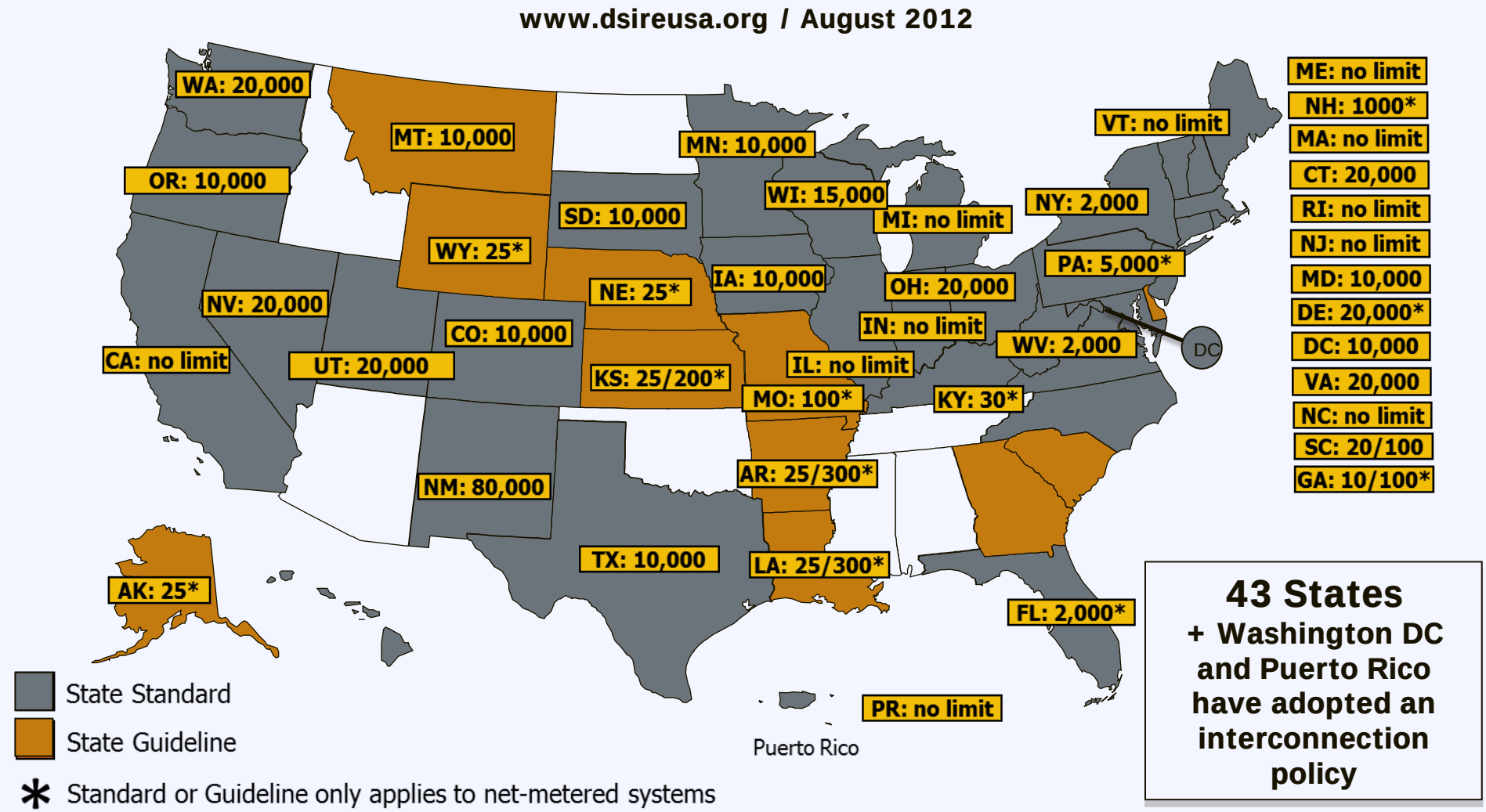
Source: NREL (http://www.nrel.gov/docs/fy12osti/54689.pdf

Interconnection: Best Practices

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



Interconnection: State Policies



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

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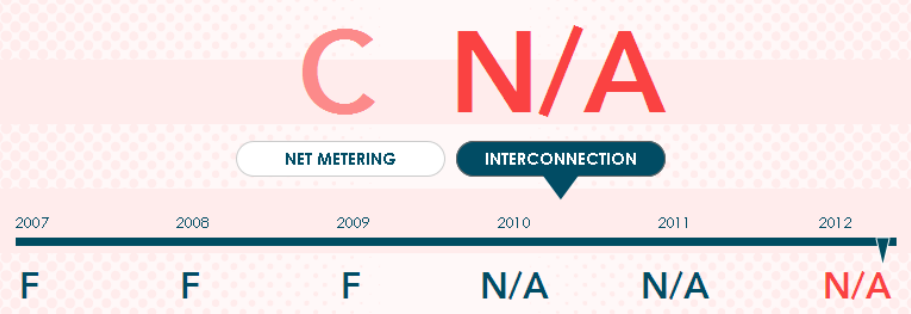
U.S. Department of Energy

Interconnection: Missouri

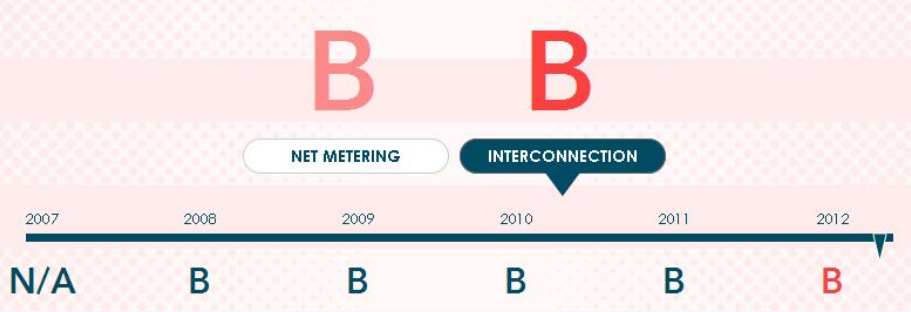


Recommendations:

- Adopt IREC's model interconnection procedures

Eligible Renewable/Other Technologies:	N/A
Applicable Sectors:	N/A
Applicable Utilities:	N/A
System Capacity Limit:	N/A
Standard Agreement:	N/A
Insurance Requirements:	N/A
External Disconnect Switch:	N/A
Net Metering Required:	N/A

Interconnection: Illinois



Recommendations:

- Expand interconnection procedures to all utilities (i.e., munis and co-ops)
- Prohibit utilities' discretion for external disconnect switch

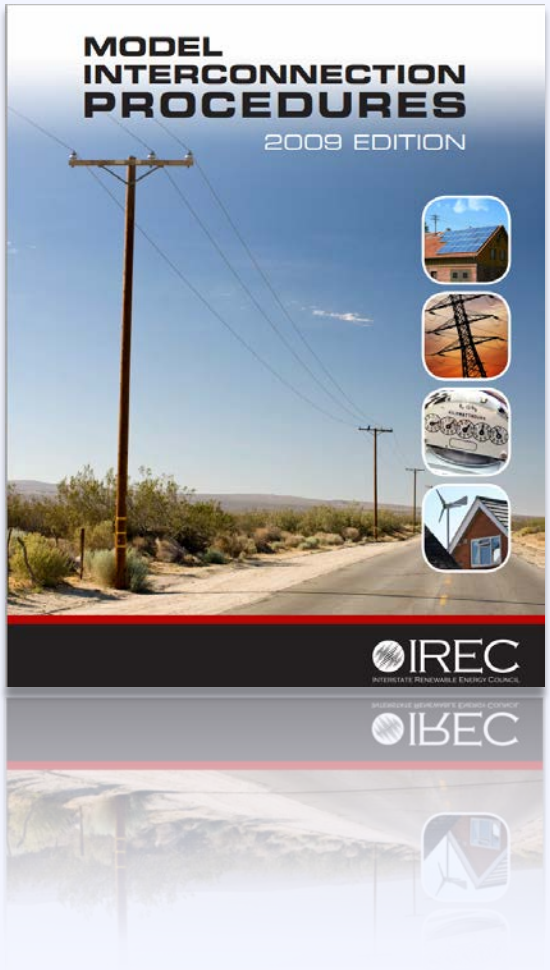
Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Microturbines, Other Distributed Generation and Storage Technologies
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	No limit specified
Standard Agreement:	Yes
Insurance Requirements:	Vary by system size and/or type; levels established by commission | Requirement to add the utility as an additional insured contained in standard agreement
External Disconnect Switch:	Required
Net Metering Required:	No

Interconnection: Resources

Resource **Interstate Renewable Energy Council**

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

www.irecusa.org



Agenda

08:40 – 09:00	Solar 101
09:00 – 09:50	Creating a Regulatory Landscape for Solar
09:50 – 10:00	*Break*
10:00 – 10:20	Benefits and Barriers Activity
10:20 – 10:50	Understanding Utility Regulations
10:50 – 11:20	Understanding Solar Financing
11:20 – 11:30	*Break*
11:30 – 12:00	Installing Solar on Municipal Facilities
12:00 – 12:10	Next Steps for Solar in Region

Ownership Options

Direct Ownership

Third-Party Ownership

Direct Ownership

Direct Ownership

Cost

+ Installed Cost

+ Maintenance

- Direct Incentive

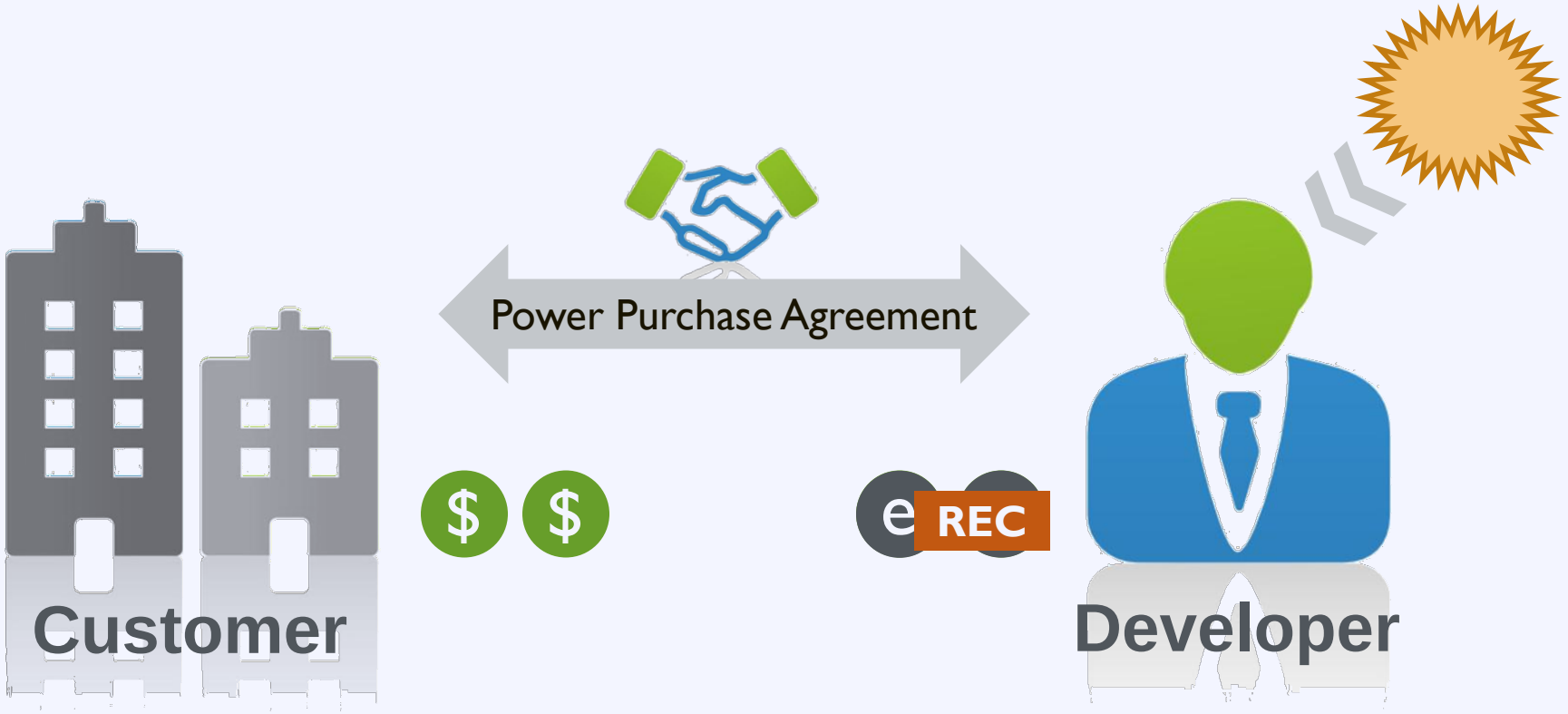
Benefit

+ Avoided Energy Cost

+ Excess Generation

+ Performance Incentive

Third Party Ownership



Third Party Ownership

Cost

+ PPA or Lease Rate

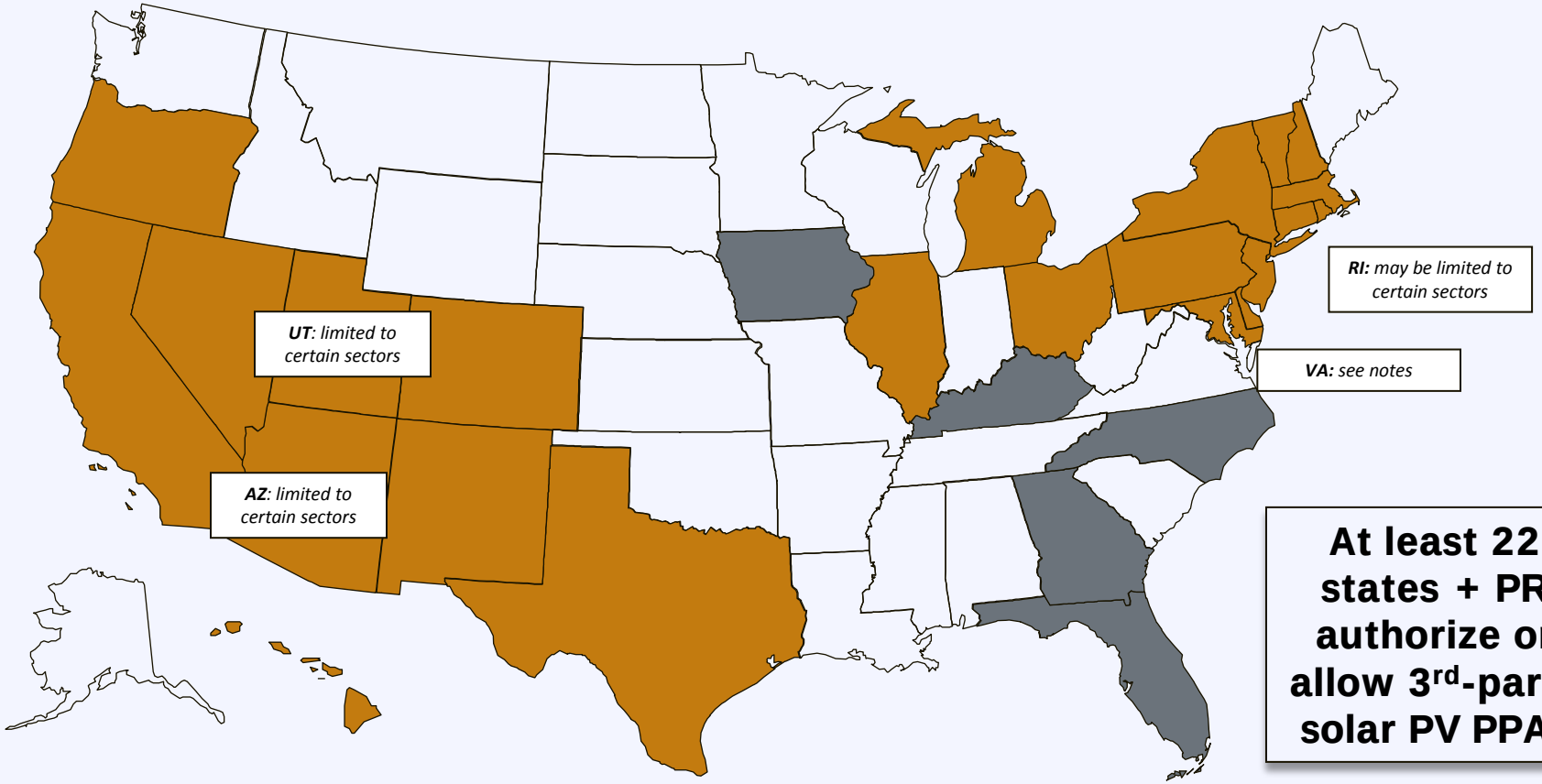
Benefit

+ Avoided Energy Cost

+ Excess Generation

Third Party Ownership: State Policy

www.dsireusa.org / August 2012



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

Incentives

Federal	Investment Tax Credit	Qualified Energy Conservation Bonds	
State	Rebates/PBI	Loans	Property Tax Incentives
Utility	**Ameren MO, CW&L, KCP&L, CWLP** Rebate	**Ameren MO** PBI	

Incentives

Federal	Investment Tax Credit	Qualified Energy Conservation Bonds	
State	Rebates/PBI	Loans	Property Tax Incentives
Utility	Ameren MO, CW&L, KCP&L, CWLP Rebate	Ameren MO PBI	

Incentives: Federal

Investment Tax Credit

Type: Tax Credit

Eligibility: For-Profit Organization

Value: 30% of the installation cost

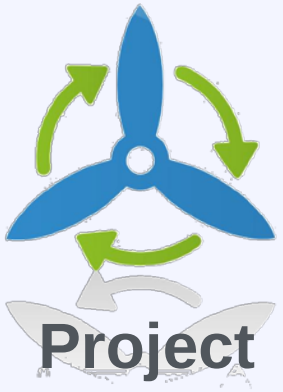
Availability: Through 2016

Incentives: Federal

Incentives: Federal

US Treasury

Local Gov



Project

QECB

Community

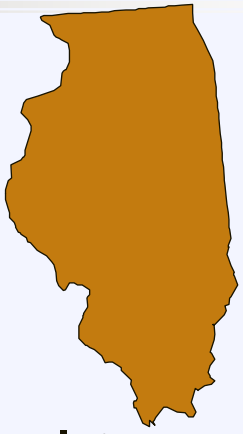
Incentives

Federal	Investment Tax Credit	Qualified Energy Conservation Bonds	
State	Rebates/PBI	Loans	Property Tax Incentives
Utility	Ameren MO, CW&L, KCP&L, CWLP Rebate	Ameren MO PBI	

RPS: Missouri Overview

- 15% renewables by 2021
- Solar carve-out of 0.3% by 2021
- Some opportunities for SREC sales
- No defined alternative compliance payment (2X REC market value)
- No geographic/eligibility limitations, subject of a possible further ballot initiative

RPS: Illinois Overview



- 25% renewables by 2025
- Solar carve-out of 1.5% by 2015
- Alternative compliance payment or penalties vary, and are the same for all technologies (there is not a solar-specific ACP)
- Resources must be procured in-state unless deemed cost prohibitive, then resources can be procured from adjoining states.

Incentives: State

Solar Rebates

- Missouri:
  - No state-wide rebates
- Illinois:
  - Residential and commercial: $1.50/watt or 25% of costs
  - Public sector and non-profit: $2.60/watt or 40% of costs
  - $10,000 Max
  - Total incentive from additional programs plus rebate cannot exceed 75% of the project cost (including the Federal Individual Tax Credit)

Incentives: State

Illinois Performance-based Incentive

- Renewable Energy Credit Aggregation Program (RECAP)
  - Annual program; requires a yearly application
  - First come, first-served
  - PV systems must be located in Illinois, be legally grid connected
  - Production must be tracked on a monthly/quarterly basis
  - Participants must be members of the Illinois Solar Energy Association, either as regular members for residential accounts, or business members for commercial accounts

Incentives: State

Loan Programs

- Missouri Revolving Loan Fund:
  - Based on projected energy savings from energy efficiency upgrades, which result in monetary savings that are used to repay the loan
  - Repayment based on individual projects, not to exceed 10 years
  - Loans amounts limited to $1 million
- Illinois Green Energy Loan
  - Loan amounts range from $10,000 to $10 million
  - Illinois State Treasurer's Office subsidizes rate reduction for eligible projects
  - Projects must meet one of four criteria:
    1. Participation in a state or utility administered efficiency program (ComEd, Ameren, or Dept of Commerce and Economic Opportunity)
    2. Have a contract with an Energy Service Company (commonly referred to as ESCO)
    3. Have a LEED Certified Professional working on the project with the intent to pursue LEED Certification
    4. Have a plan to install renewable energy system

Incentives: State

Property Tax Incentives

- Missouri
  - Tax abatements available in Renewable Energy Generation Zones
  - Minimum 50% property tax abatement for 10-25 years for improvements made to real property in an Enhanced Enterprise Zone
  - Local governments can award up to a 100% property tax abatement for up to 25 years if the facility has created and maintained at least 50 jobs averaging at least 35 hours a week
- Illinois
  - Special assessment of solar energy systems for property-tax purposes
  - Solar energy equipment is valued at no more than a conventional energy system

Incentives

Federal	Investment Tax Credit	Qualified Energy Conservation Bonds	
State	Rebates/PBI	Loans	Property Tax Incentives
Utility	**Ameren MO, CW&L, KCP&L, CWLP** Rebate	**Ameren MO** PBI	

Incentives: Utility

Rebates

- Ameren Missouri
  - All Customers
  - $2.00/Watt; $50,000 Max
  - Up to 100 kW
- Columbia Water & Light
  - All Customers
  - $500/kW; $5,000 Max
  - Up 10 10 kW
  - Utility keeps the RECs
- City Water, Light & Power (CWLP)-Springfield, IL
  - Residential, Commercial Customers
  - $1,500/Watt; $15,000 Max
  - Up to 25 kW
- Kansas City Power & Light (KCP&L)
  - Residential, Commercial Customers
  - $2.00/Watt; $50,000 Max
  - Up to 25 kW

Incentives: Utility

Performance-based Incentive (PBI)

Ameren Missouri

- Utility purchases solar renewable energy credits (SRECs) from qualified projects
- $50/SREC; 1 SREC = 1 MWh
- Projects < 10 kW receive one-time lump payment
  - Based on anticipated number of SRECs generated over 10 year period
- Projects 10 kW-100 kW receive 5 year contract, paid once annually
- 2012 funds exhausted ; 2013 funds TBD

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Process

Decide on Ownership Structure

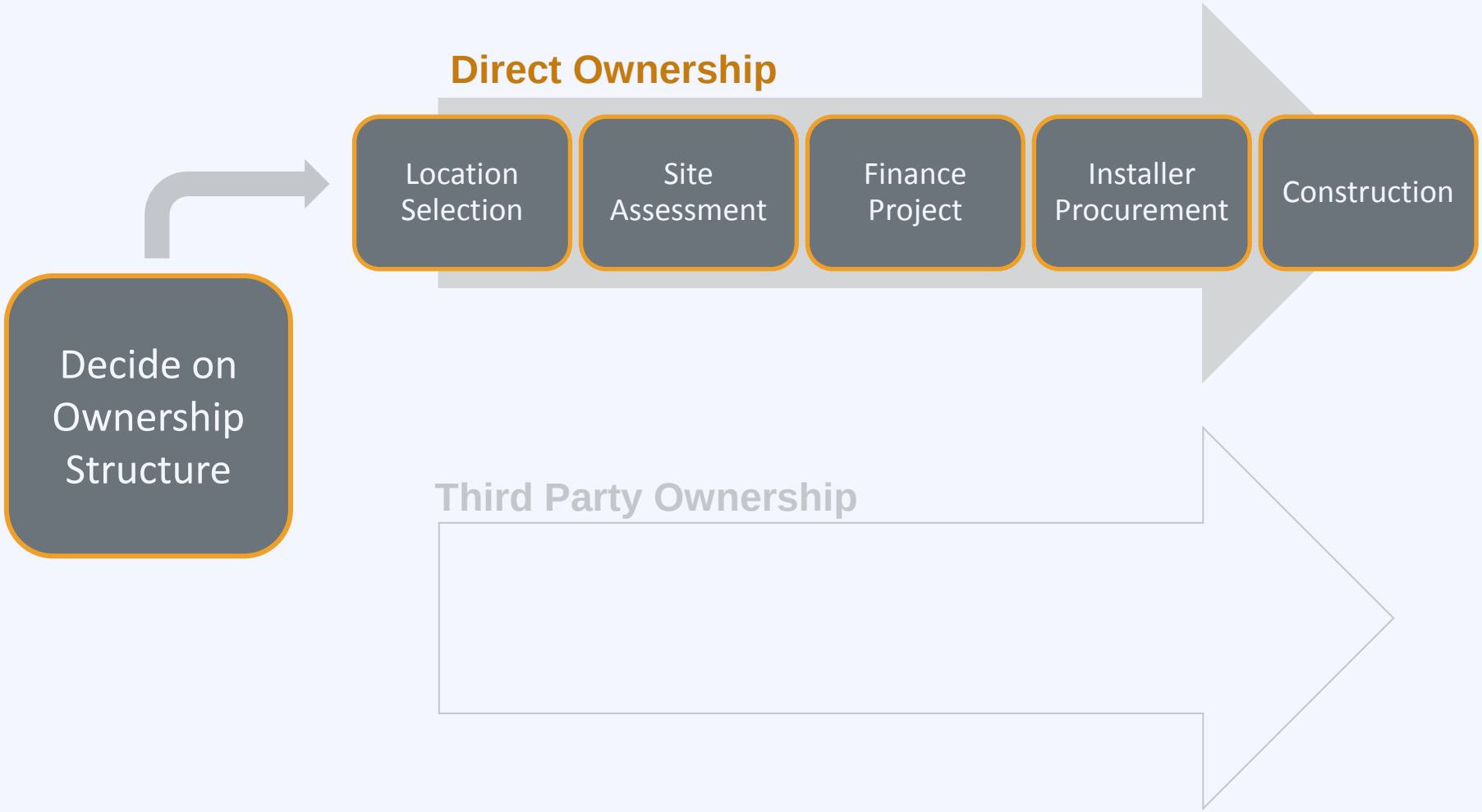
Option 1: Direct Ownership

Option 2: Third Party Ownership

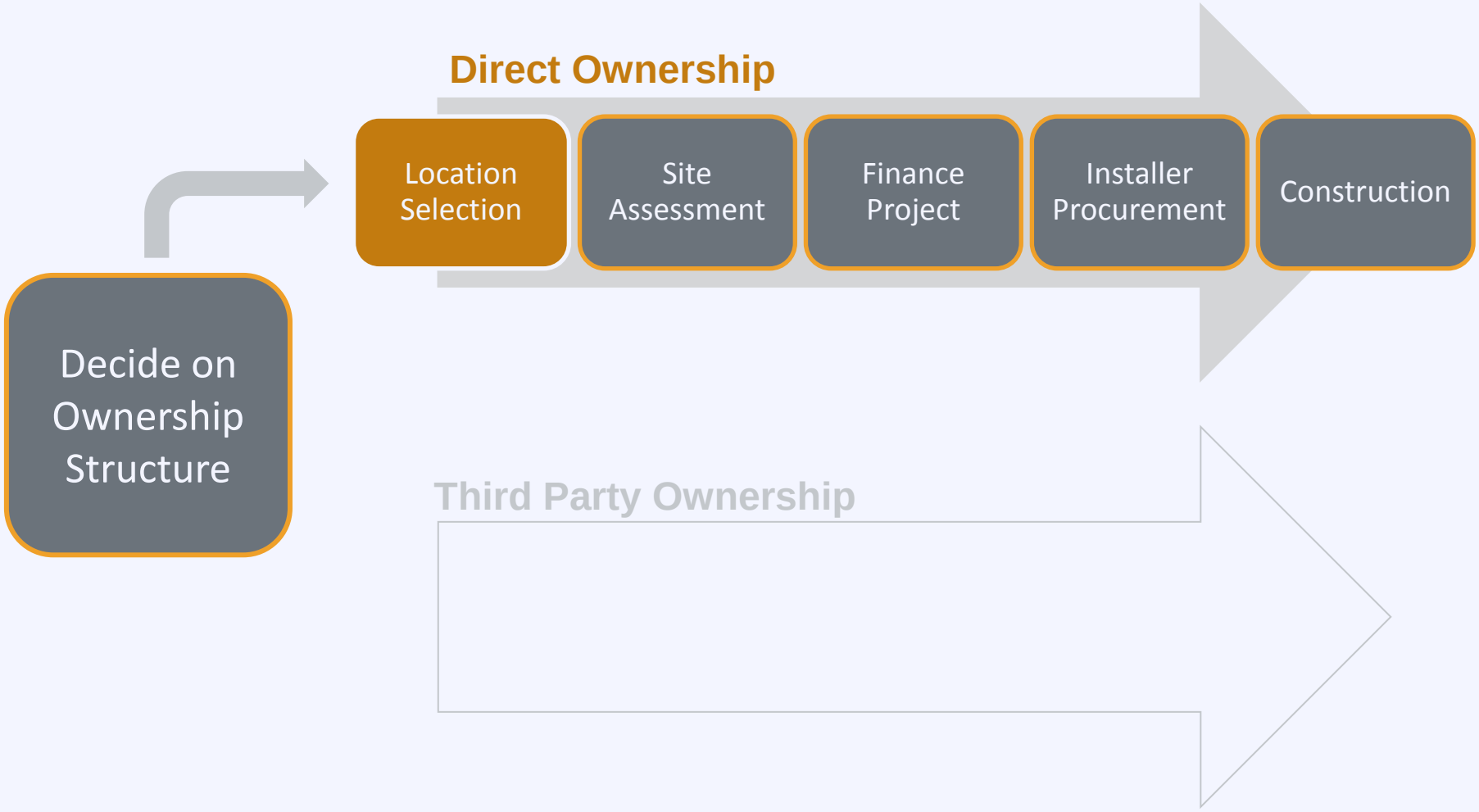
Ownership Structure Decision

- Are you a taxpaying entity?
- Do you have access to financing or available cash?
- How does this compare to other opportunities?
- Can you enter into long-term contracts?
- Do you want to own the system?
- Do you have a municipal utility?
- Do you need the RECs for compliance?

Process


Direct Ownership
Location Selection
Site Assessment
Finance Project
Installer Procurement
Construction
Decide on Ownership Structure
Third Party Ownership

Process


Direct Ownership
Location Selection
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Step 1: Location Selection

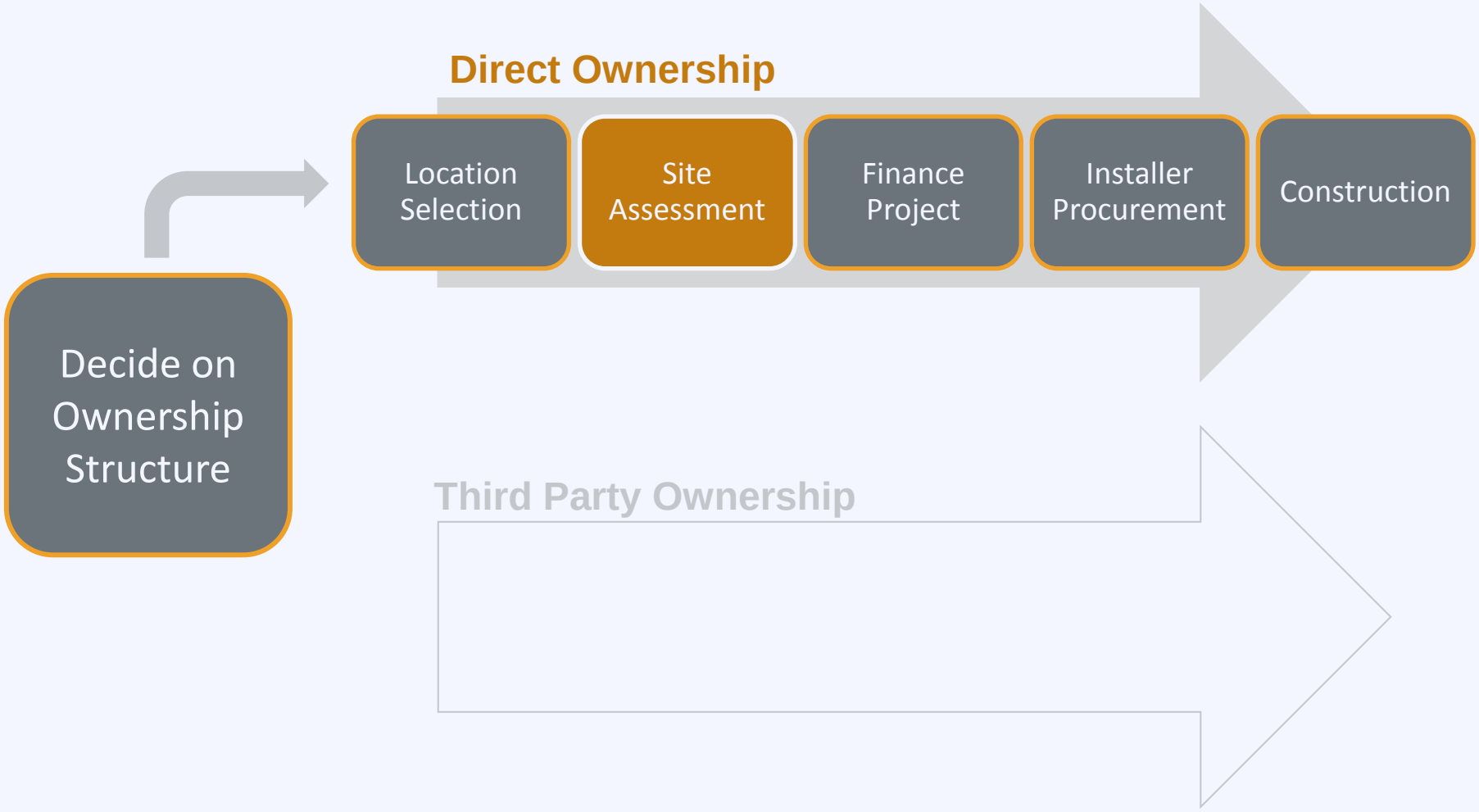
- Who is using the energy?
- Where is the energy being used?
- What is the user's energy load?
- What is the user's energy cost?

Step 1: Location Selection

Rooftop

Ground

Process


Direct Ownership
Location Selection
Site Assessment
Finance Project
Installer Procurement
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Decide on Ownership Structure
Third Party Ownership

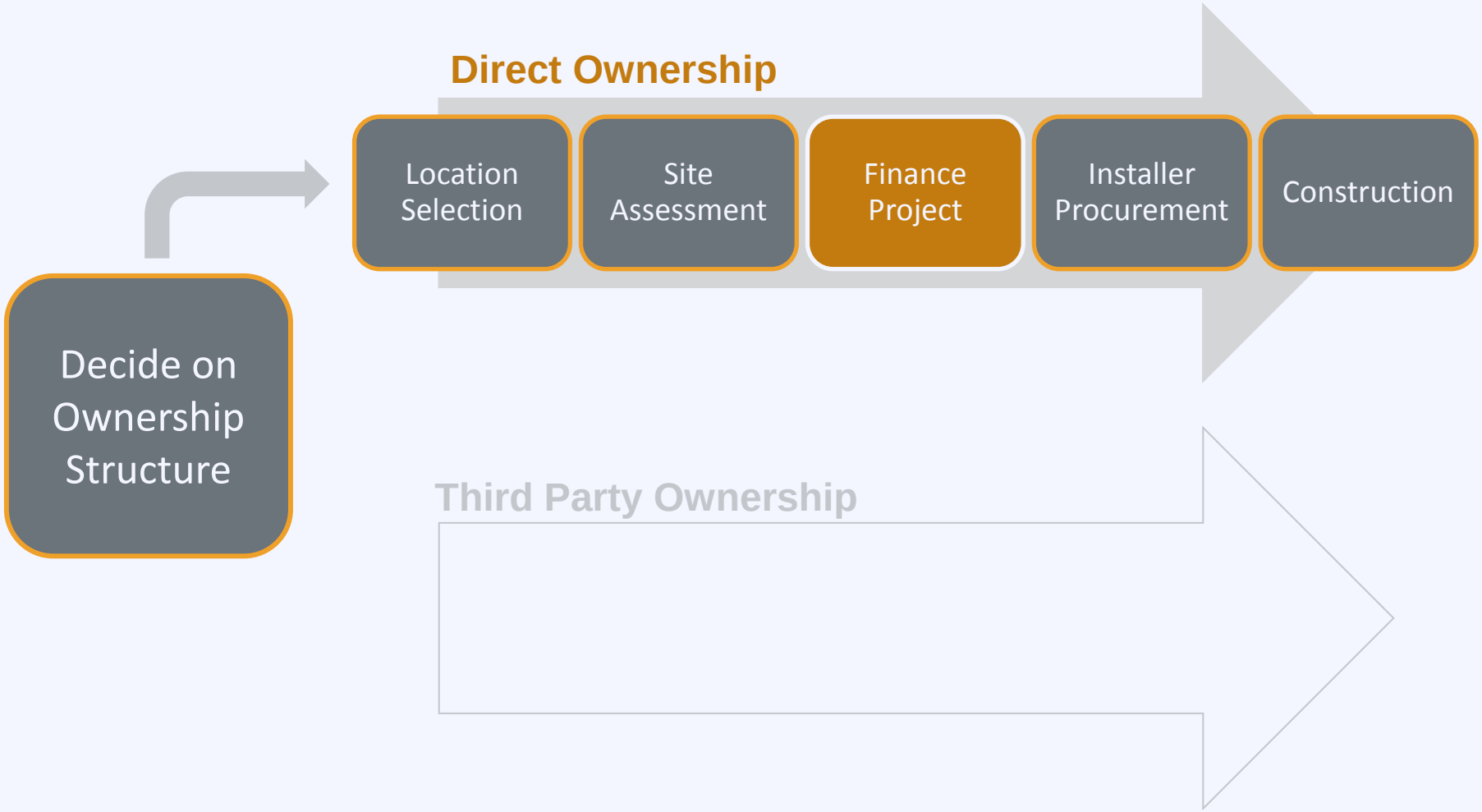
Step 2: Site Assessment

- Solar Access Rights
- Interconnection
- Wind loading
- Roof age, type, & warranty
- Electrical configuration
- Slope, Shading and orientation

Step 2: Site Assessment

- Usable acreage
- Slope
- Distance to transmission lines
- Distance to graded roads
- Conservation areas

Process


Direct Ownership
Location Selection
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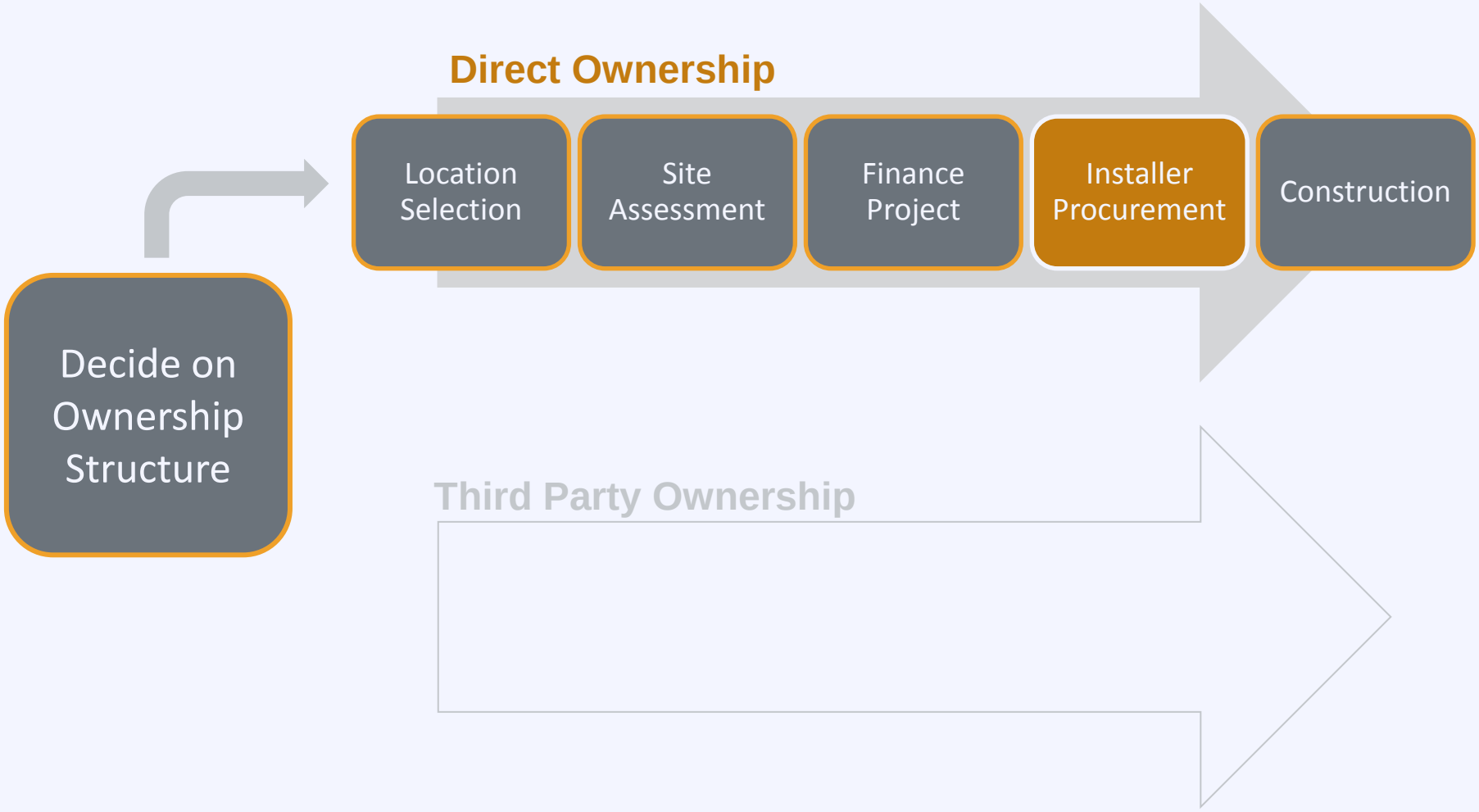
Construction
Decide on Ownership Structure
Third Party Ownership

Step 3: Finance Project

- Direct purchase
- Grant financed
- ESCO/performance contracting
- Loans
- Bonds

Process


Direct Ownership
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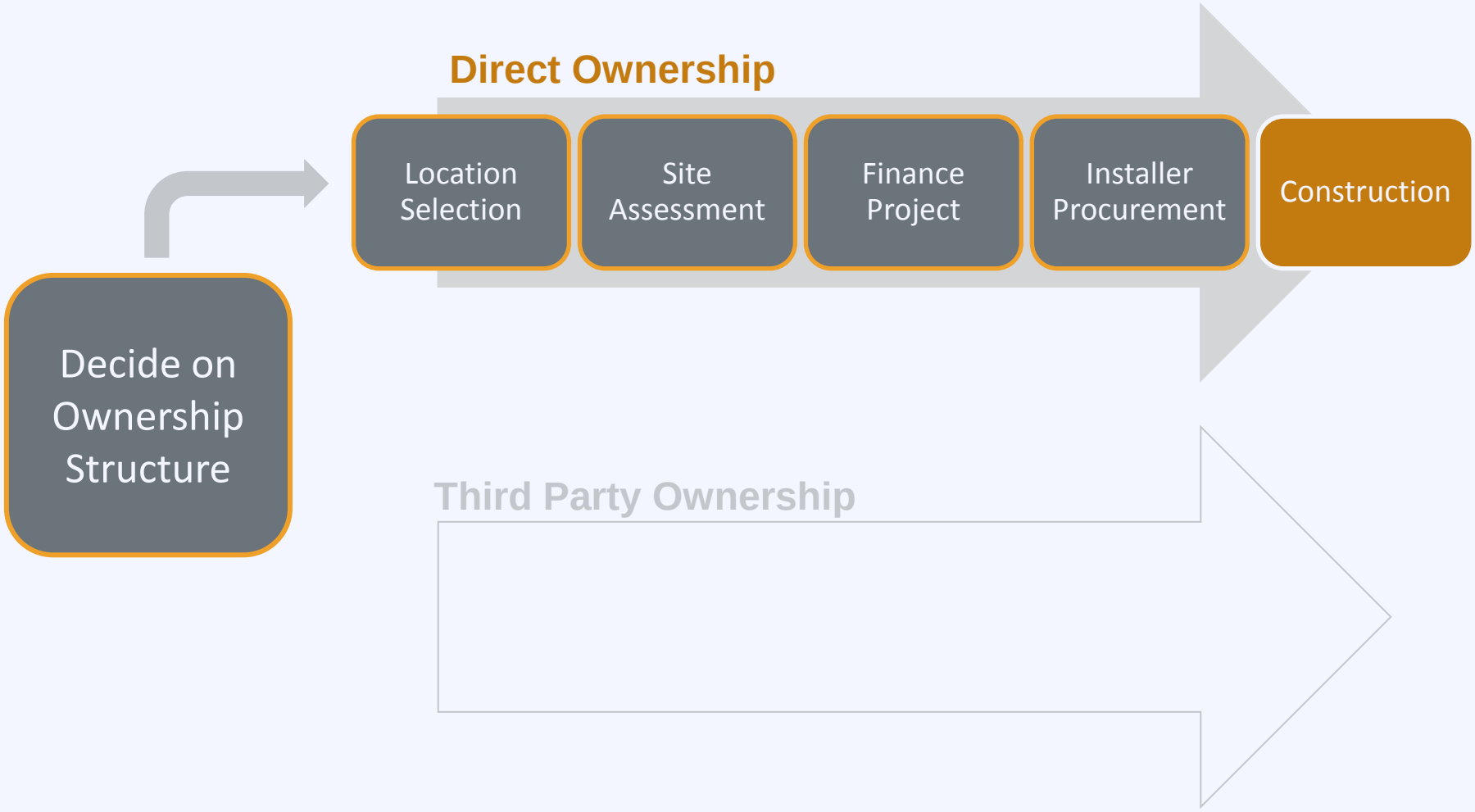
Step 4: Installer Procurement

EPC = Engineer, Procure, Construct

- Designs the project
- Completes necessary permitting requirements
- Works with the utility to file for interconnection
- Assists in procuring components
- Applies for incentives
- Manages project construction

Process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Direct Ownership

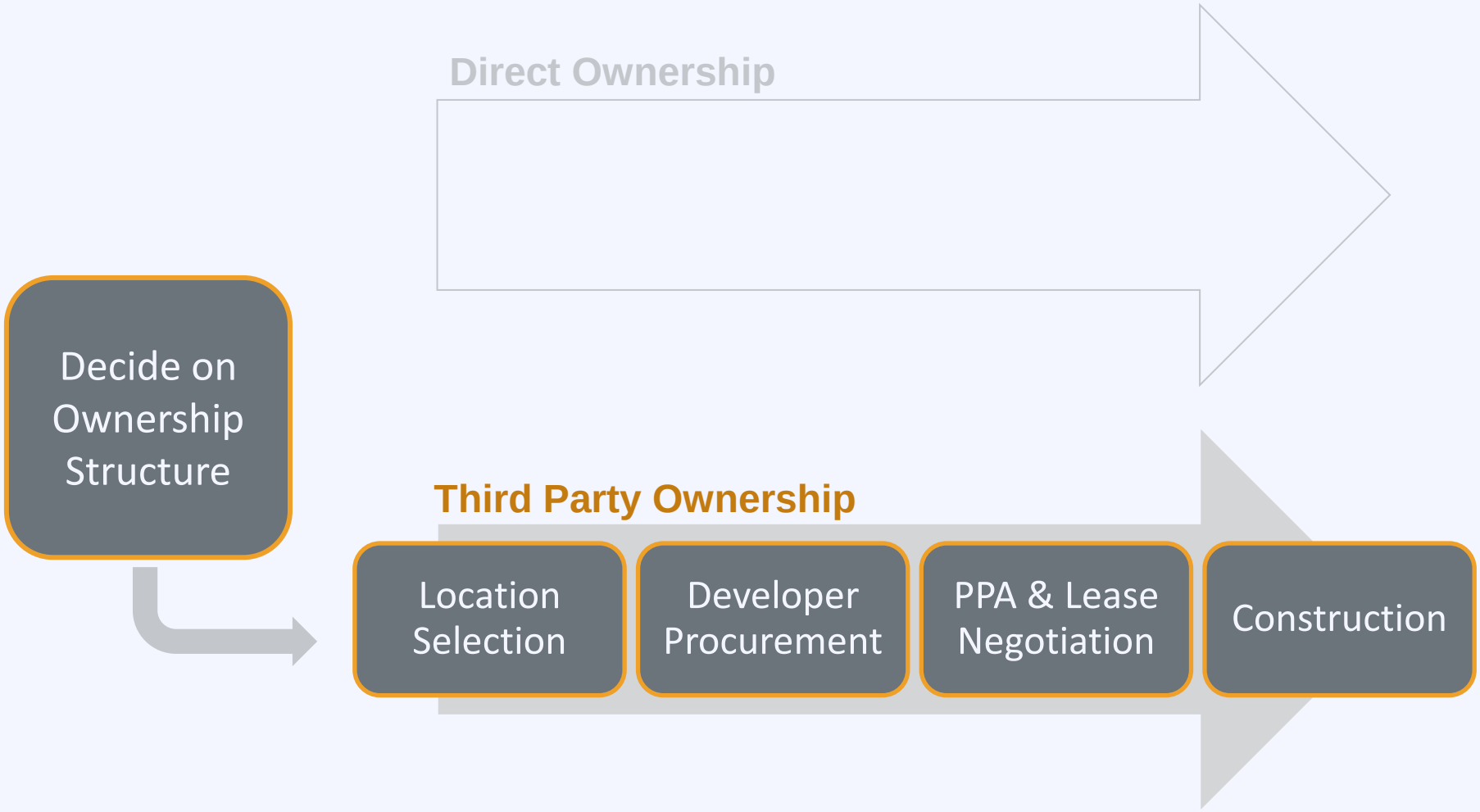
Pros

- Low – cost electricity
- REC revenue
- Maximize underutilized spaces

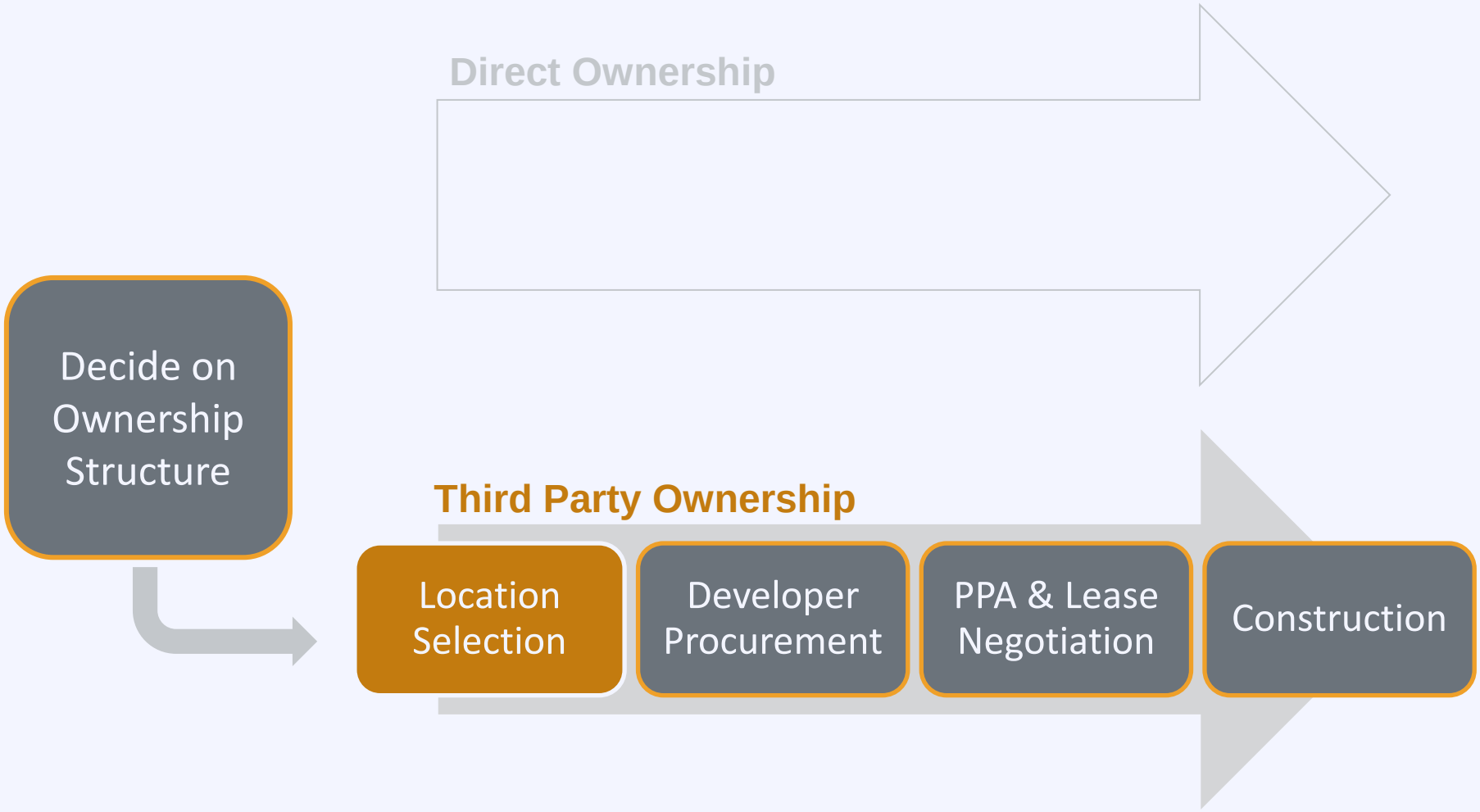
Cons

- Large upfront cost
- Long term management
- Can't take all incentives
- Development risk
- Performance risk

Process


Direct Ownership
Decide on Ownership Structure
Third Party Ownership
Location Selection
Developer Procurement
PPA & Lease Negotiation
Construction

Process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RFP vs RFQ

Step 2: Developer Procurement

Avoid Five Common Pitfalls:

- RFP/RFQ specifications are too restrictive or too unstructured
- Competing measures of system efficiency
- Finding sufficient number of qualified bidders
- Lack of effective O&M program
- Lack of strong monitoring program

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U.S. Department of Energy

Source: NREL Webinar "Procuring and Implementing Solar Projects on Public Buildings: How to Avoid Common Pitfalls" December 8, 2010

Step 2: Developer Procurement

In Santa Clara County, CA, nine municipalities collaboratively bid out 47 sites. Benefits include:

50% savings in administrative costs

10-15% reduction in energy cost

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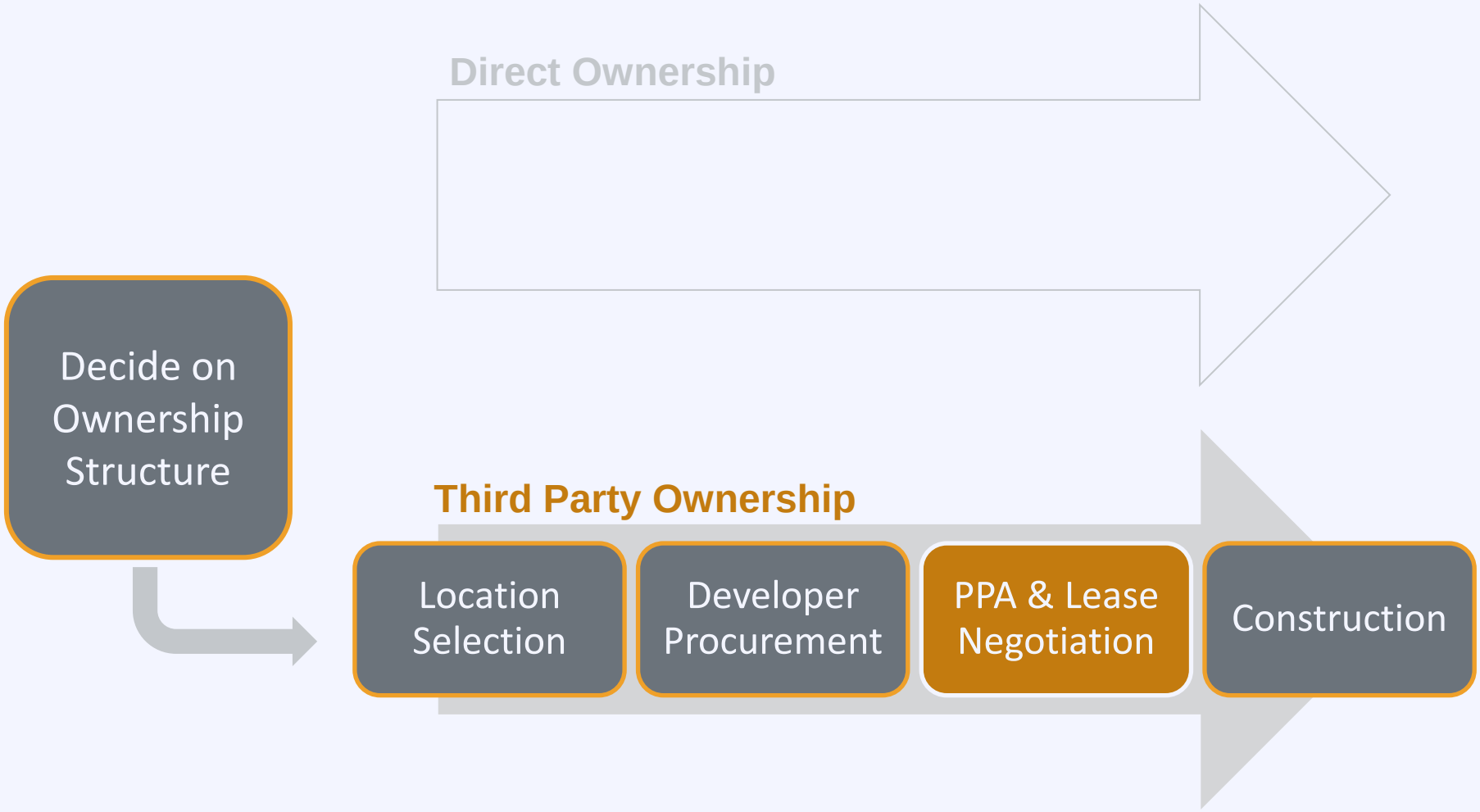
Source: NREL Webinar "Procuring and Implementing Solar Projects on Public Buildings: How to Avoid Common Pitfalls" December 8, 2010

Process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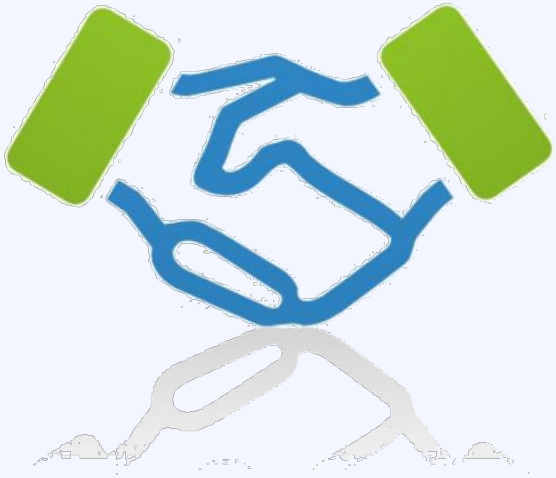
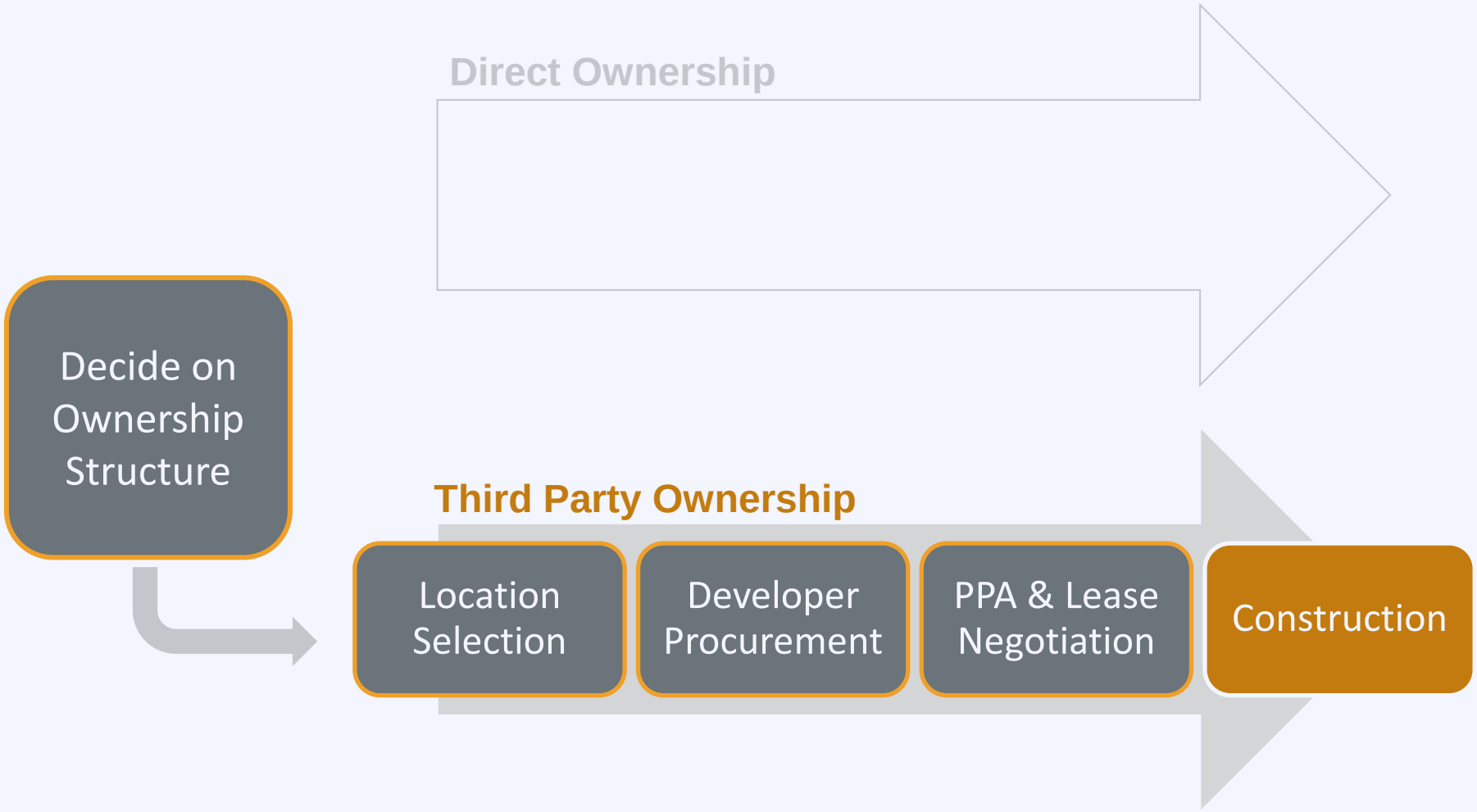
Step 3: Contract Negotiation

Negotiation points:

- Fixed or floating electricity price
- Price escalator
- Contract term length
- Property taxes
- Liability
- Performance guarantee
- Regulatory risk



Process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Third Party Ownership

Pros

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

Cons

- Market electricity price risk
- Limited opportunity in PA
- Don't keep RECs

Factors PPA Providers Look For

- States that allow PPA providers to operate without being regulated as utility
- State financial incentives – tax credit or rebate
- REC market
- Good net metering and interconnection
- PPA providers allowed to net meter

Brockton Brightfields
Type of Site: Remediated Landfill
Location: Brockton, MA

Size of PV system: 425 kW
Photo credit: AECOM

COLT Transload Facility
Type of Site: Rooftop
Location: Columbia, MO

Size of PV system: 360 kW
Photo credit: Columbia Water & Lig

Exelon City Solar
Type of Site: Remediated Industrial Brownfield
Location: Chicago, IL

Size of PV system: 10 MW
Photo credit: Exelon

Agenda

08:40 – 09:00	Solar 101
09:00 – 09:50	Creating a Regulatory Landscape for Solar
09:50 – 10:00	*Break*
10:00 – 10:20	Benefits and Barriers Activity
10:20 – 10:50	Understanding Utility Regulations
10:50 – 11:20	Understanding Solar Financing
11:20 – 11:30	*Break*
11:30 – 12:00	Installing Solar on Municipal Facilities
12:00 – 12:10	Next Steps for Solar in Region

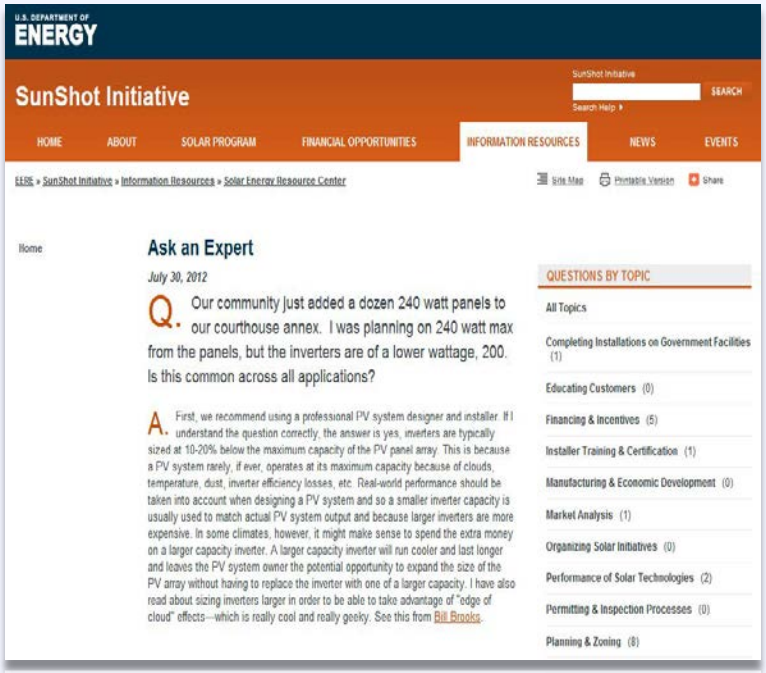
Activity: Next Steps

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

About the SunShot Solar Outreach Partnership

Technical Support

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



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

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

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Q & A

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