Solar Powering Your Community

Addressing Soft Costs and Barriers

Powered by SunShot

U.S. Department of Energy

About the SunShot Solar Outreach Partnership

ICMA
Leaders at the Core of Better Communities

APA
American Planning Association
Making Great Communities Happen

NARC
Building Regional Communities
National Association of Regional Councils

ICLEI
Local Governments for Sustainability
USA

IREC
Interstate Renewable Energy Council

MEISTER
CONSULTANTS GROUP

NORTH CAROLINA
Solar Center

THE SOLAR FOUNDATION
Research and Education to Advance Solar Energy

SEPA
solar electric power association

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

About the SunShot Solar Outreach Partnership

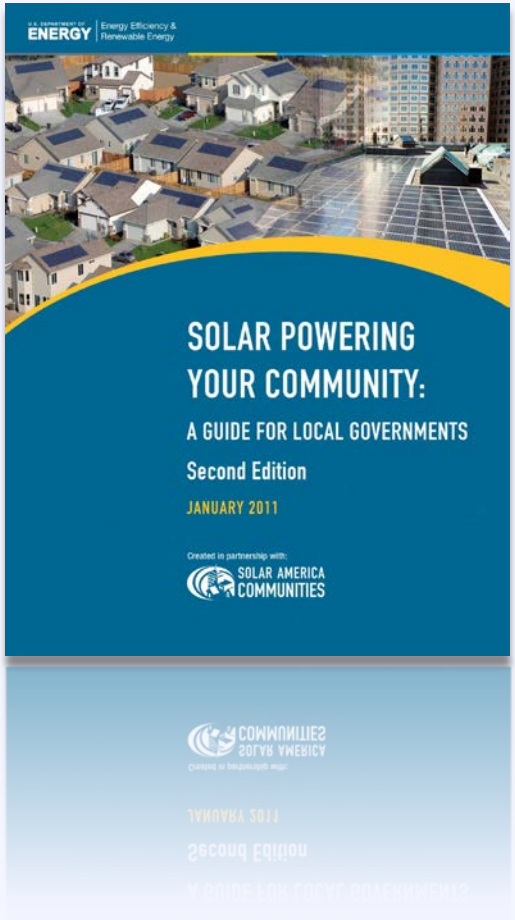
- Increase installed capacity of solar electricity in U.S. communities
- Streamline and standardize permitting and interconnection processes
- Improve planning and zoning codes/regulations for solar electric technologies
- Increase access to solar financing options

About the SunShot Solar Outreach Partnership

Resource **Solar Powering Your Community Guide**

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

www.energy.gov



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About the SunShot Solar Outreach Partnership

Resource Sunshot Resource Center

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

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

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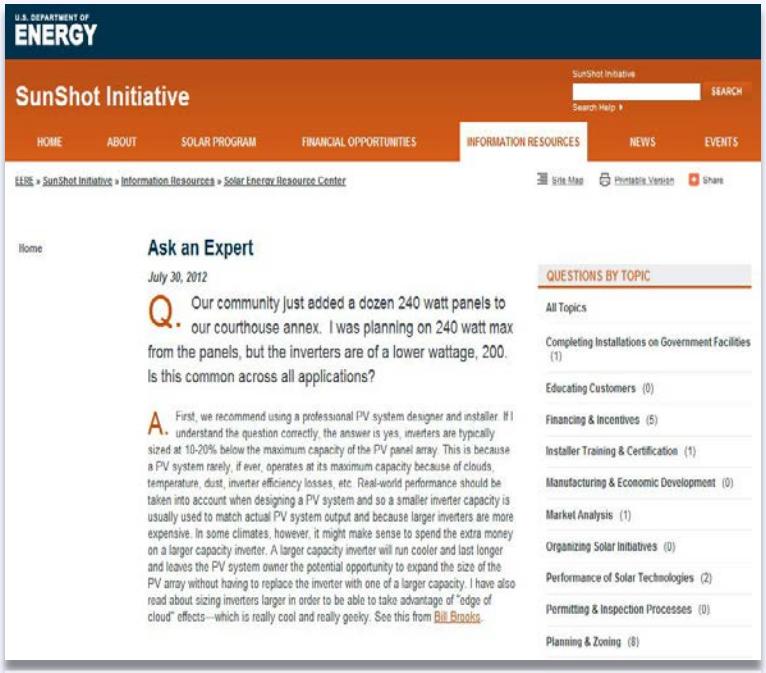
About the SunShot Solar Outreach Partnership

Technical Support

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



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

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

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(312) 786-6392

Agenda

08:40 – 09:00	Solar 101
08:50 – 09:20	Planning and Zoning for Solar
09:20 – 09:30	Streamlining the Permitting Process
09:30 – 09:40	*Break*
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Poll

Who's in the room?

Poll

What is your experience with solar?

Solar Technologies

Solar Photovoltaic (PV)

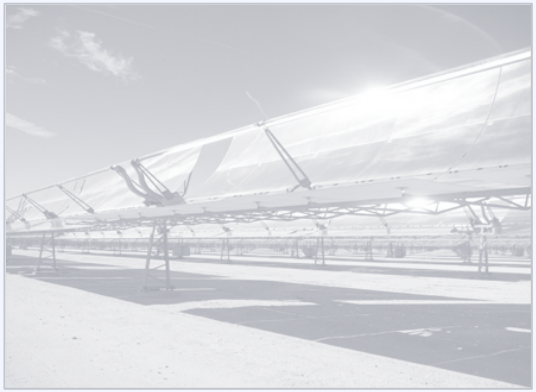
Solar Hot Water

Concentrated Solar Power

Solar Technologies

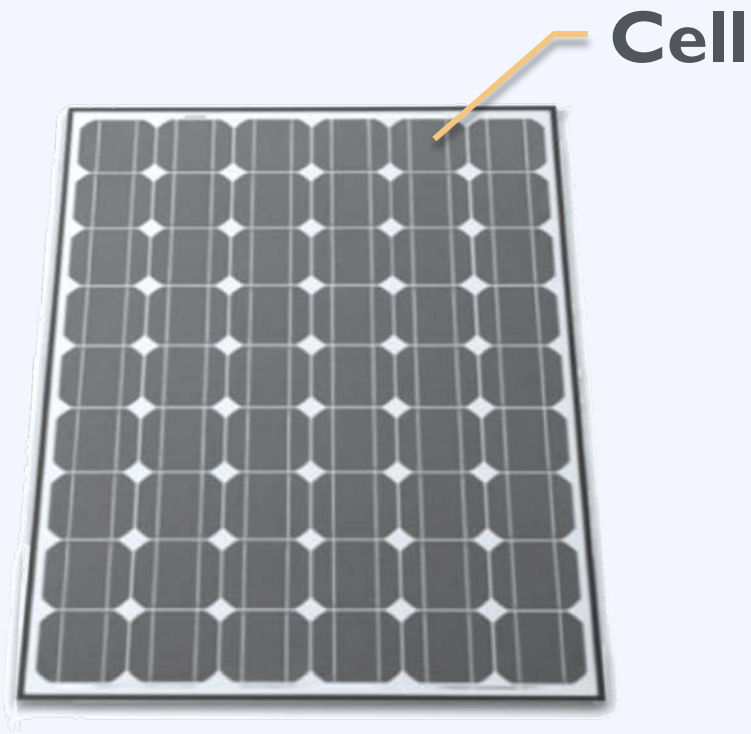
Solar Photovoltaic (PV)

Solar Hot Water

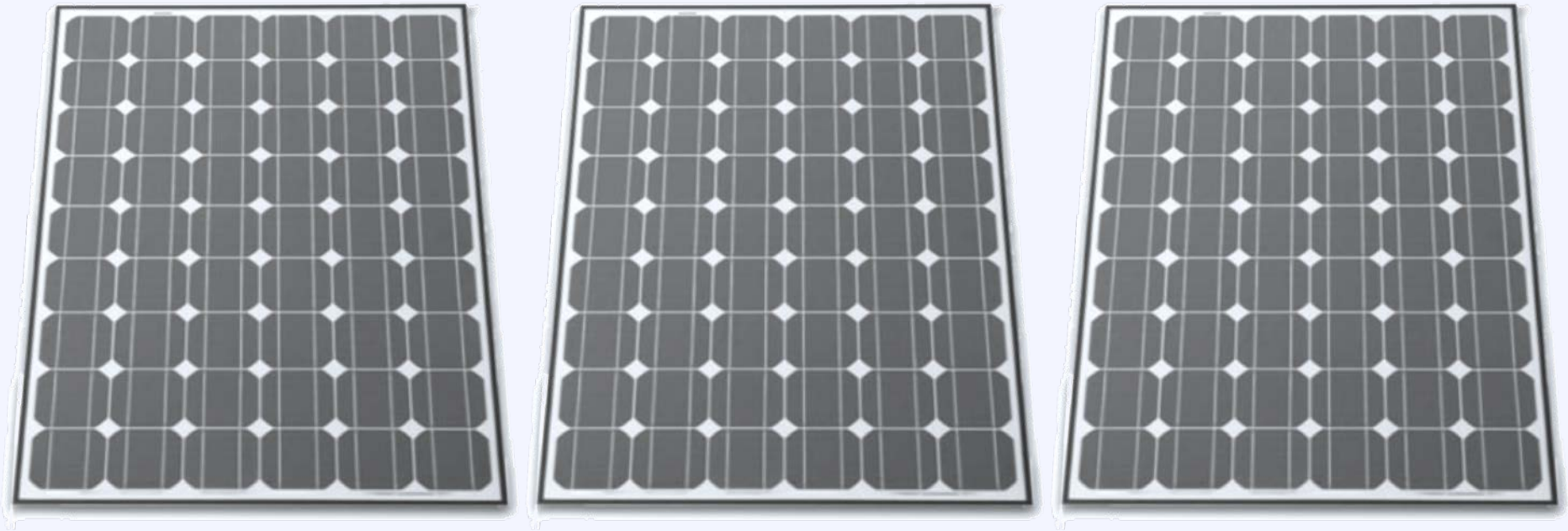


Concentrated Solar Power

Some Basic Terminology

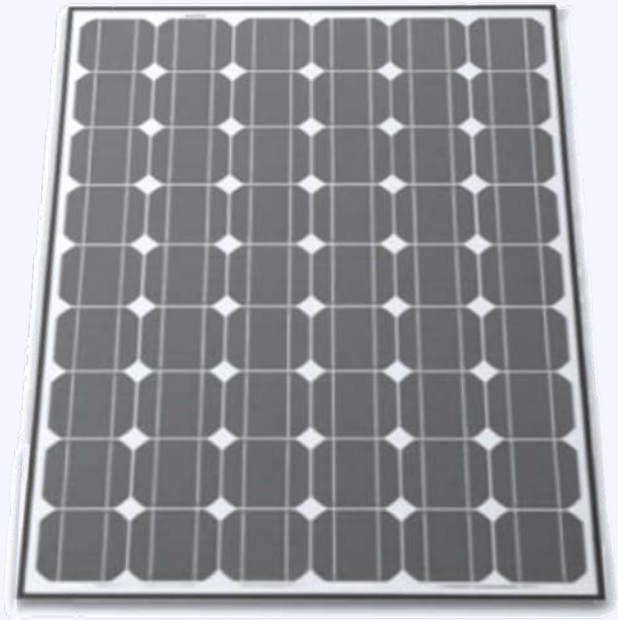


Some Basic Terminology



Array

Some Basic Terminology



Capacity / Power

kilowatt (kW)

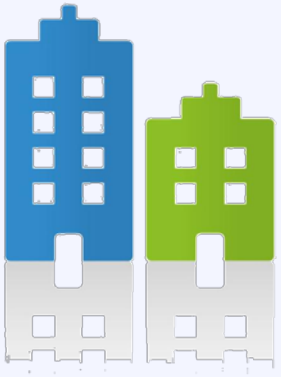
Production

Kilowatt-hour (kWh)

Some Basic Terminology

Residence
5 kW

Factory
1 MW+



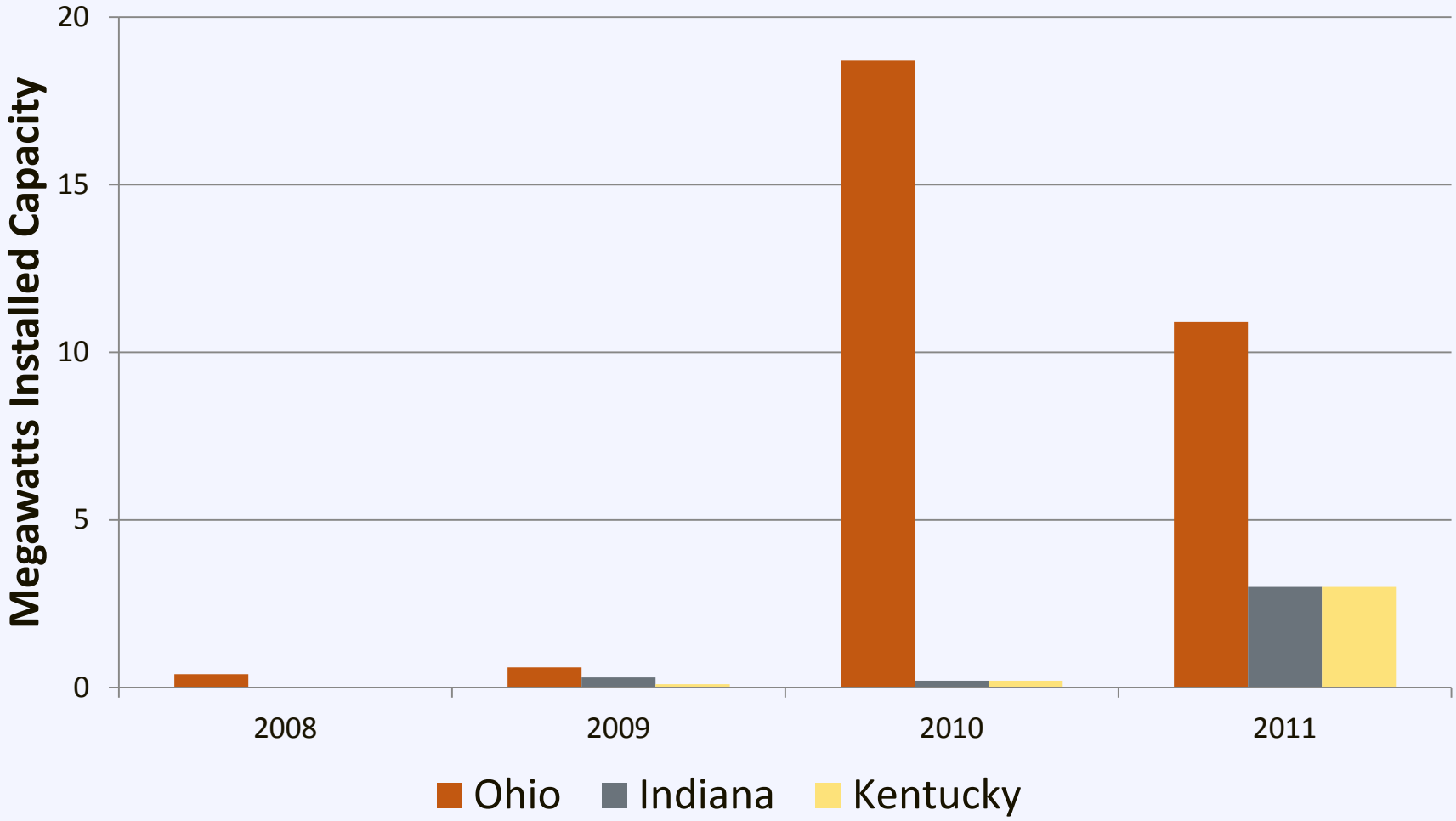
Office
50 – 500 kW

Utility
2 MW+

Workshop Goal

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

Regional Solar Market



Source: IREC

Explore benefits

and

Overcome barriers

Activity: Identifying Benefits

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

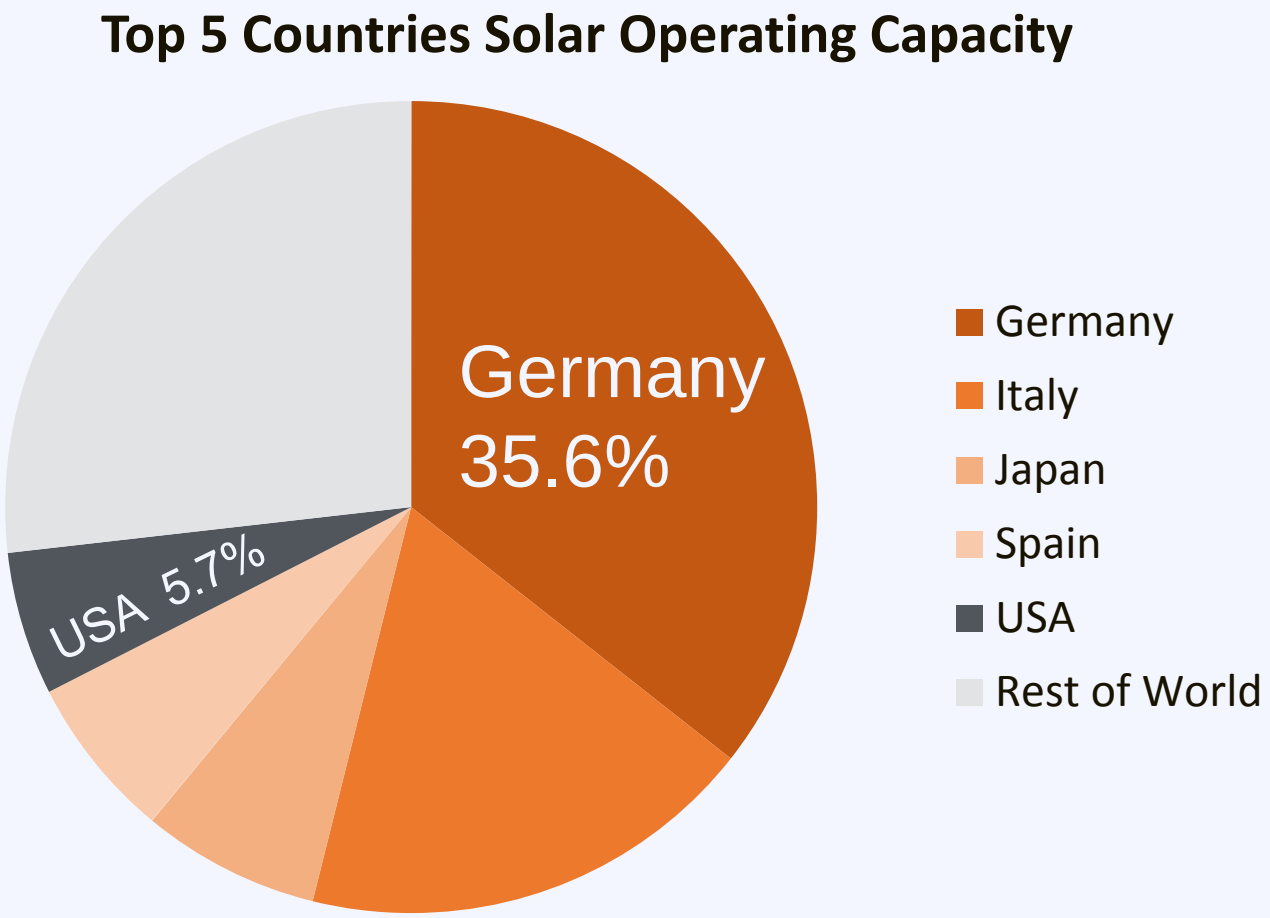
Right Now	During Session	After Break
		
Write answer on card	Compile results	Group discussion

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

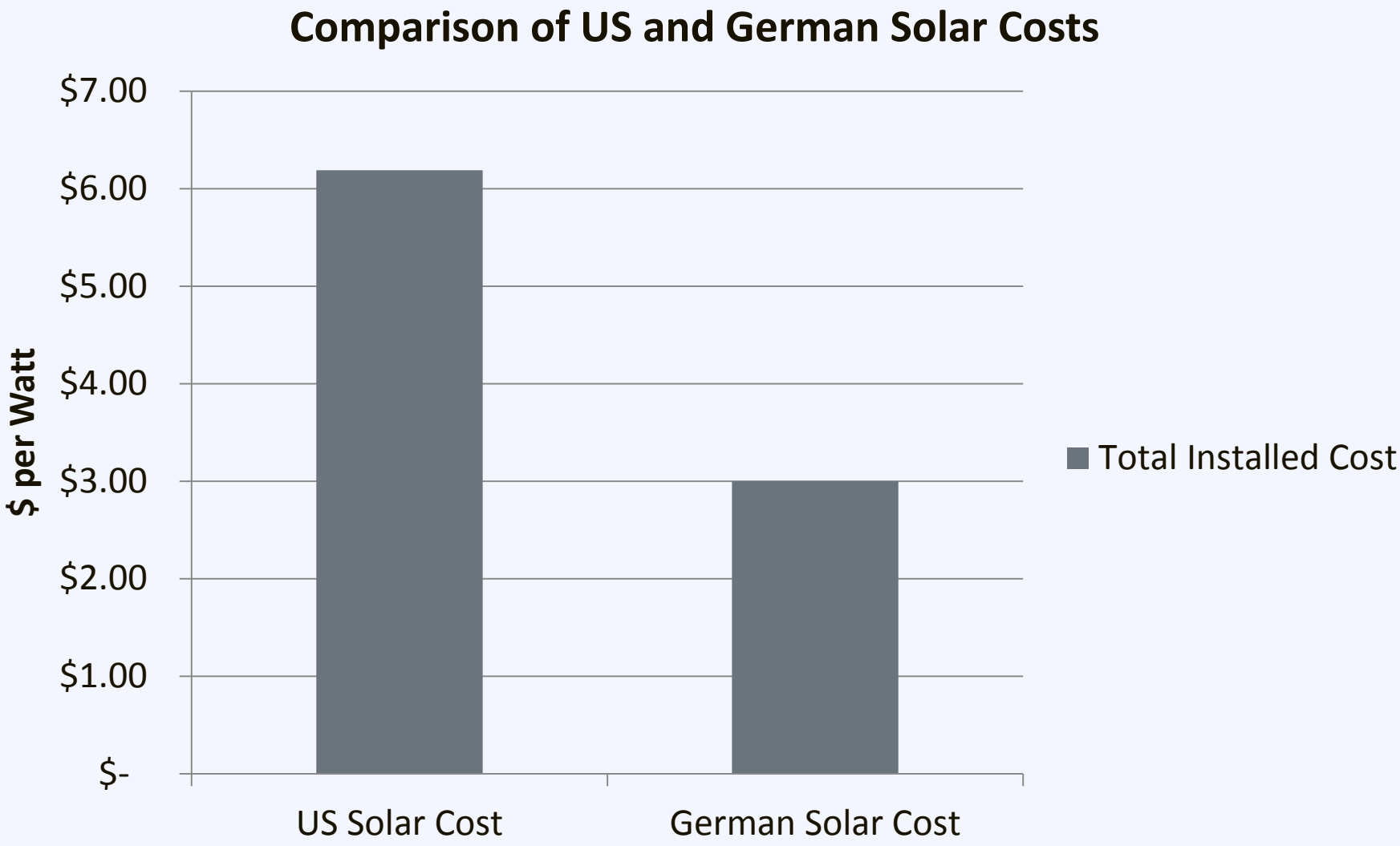
4 GW

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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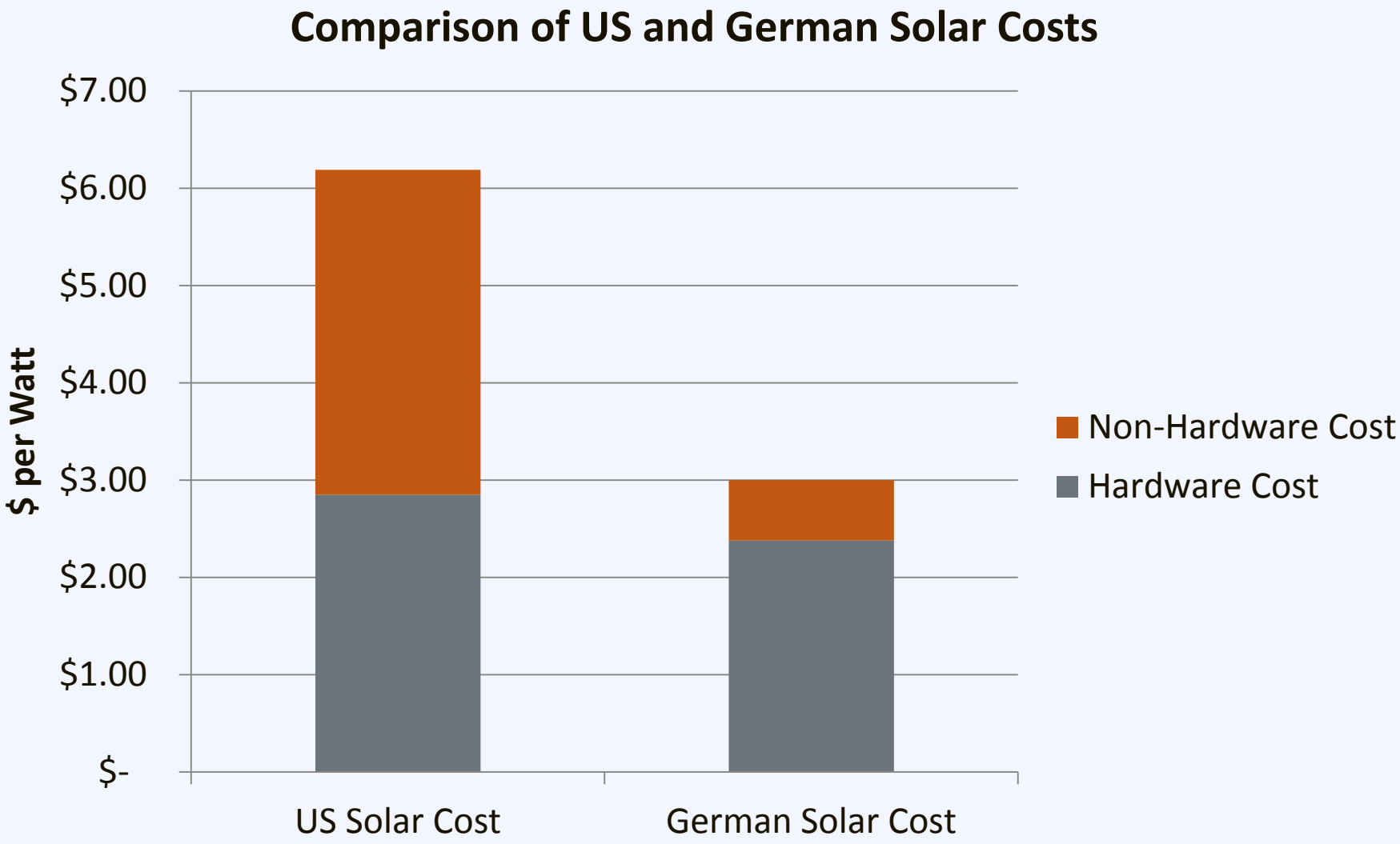

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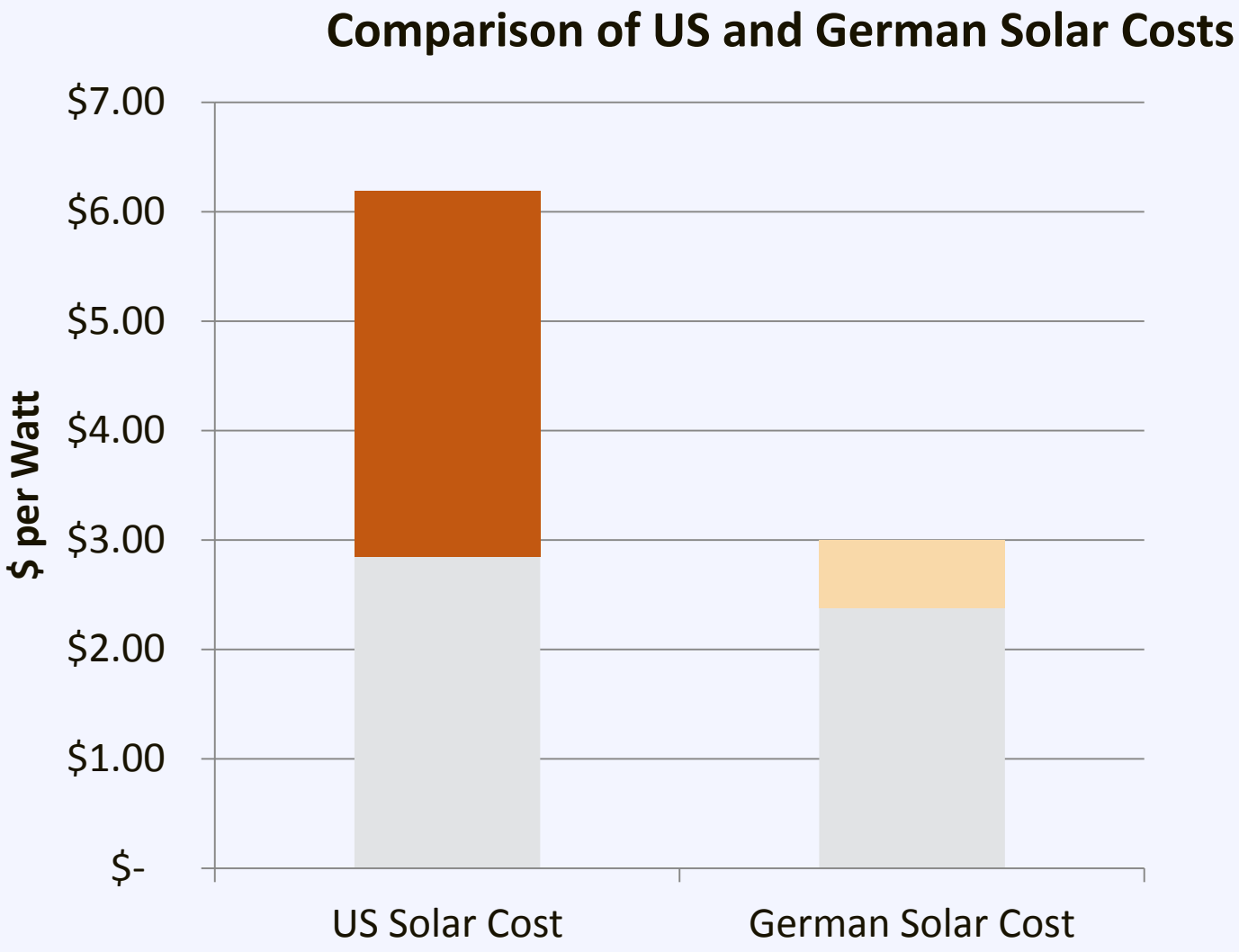

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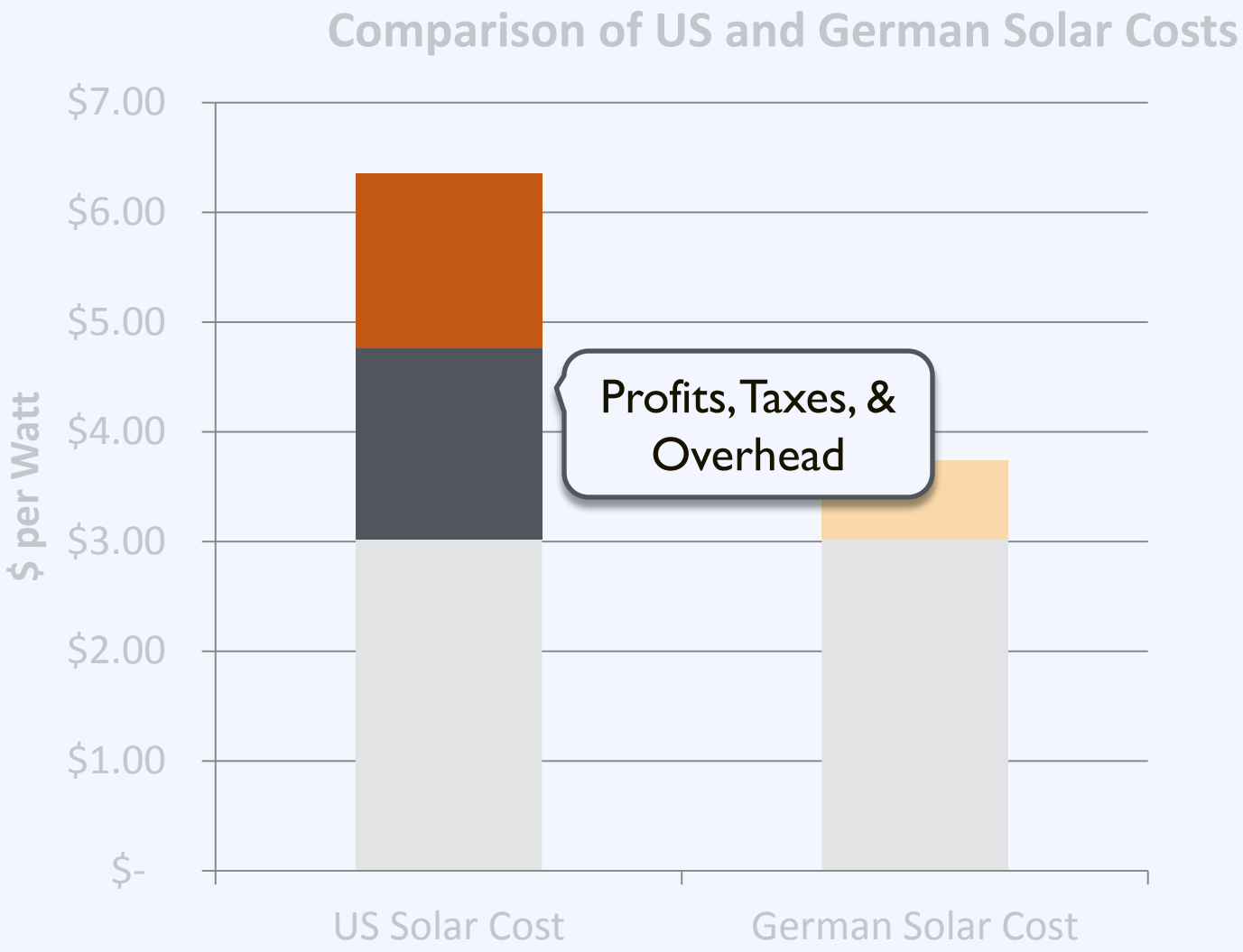

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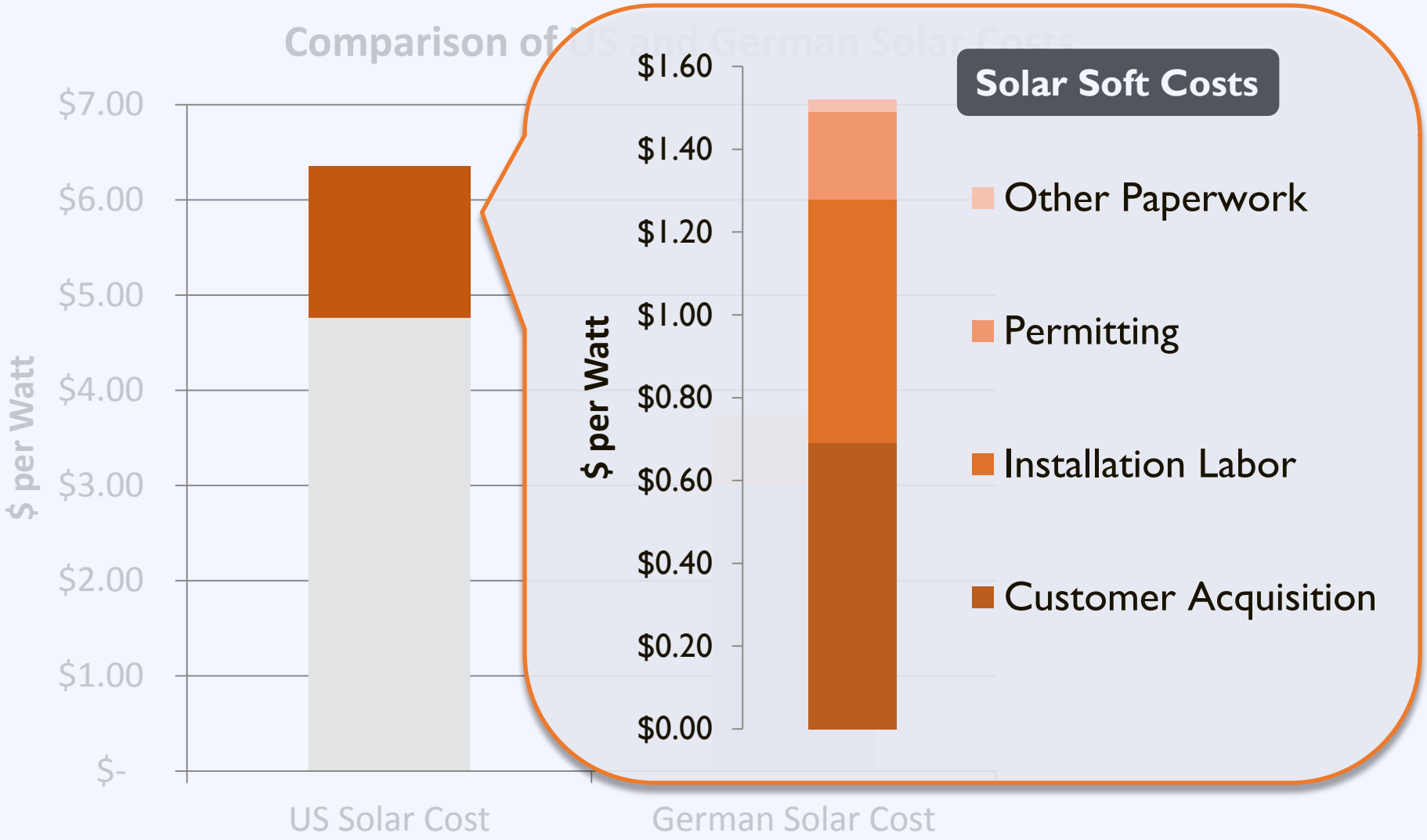

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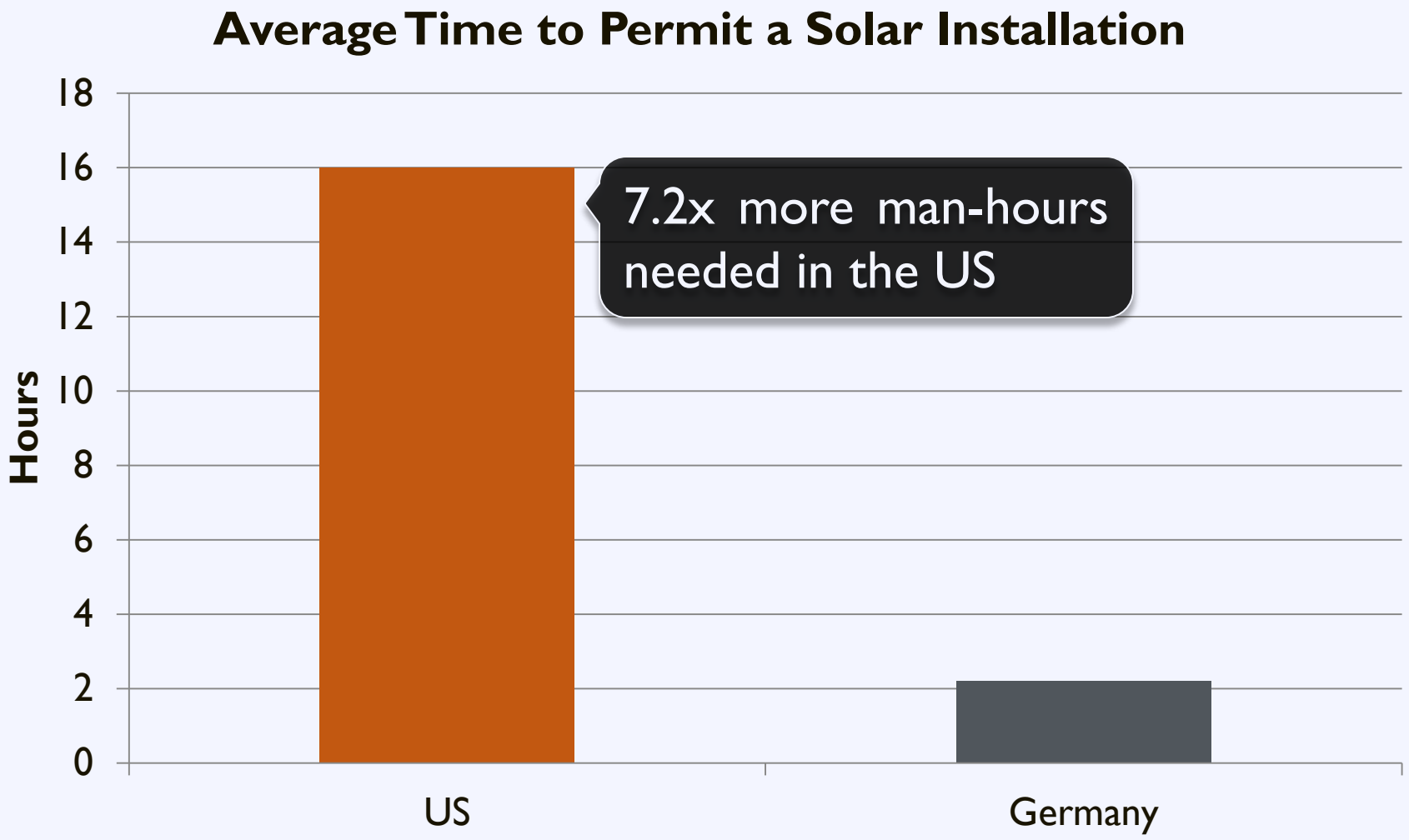
Source: NREL (http://ases.conference-services.net/resources/252/2859/pdf/SOLAR2012_0599_full%20paper.pdf) (http://www.nrel.gov/docs/fy12osti/53347.pdf) (http://www.nrel.gov/docs/fy12osti/54689.pdf)

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

Powered by SunShot U.S. Department of Energy

Photon Magazine

Germany's Success

Consistency and Transparency

through a

Standardized Processes

Regulatory Framework

Removing Barriers

Creating Incentives

Enacting Standards

Agenda

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Planning and Zoning for Solar

Strategic Points of Intervention

Visioning and long-range goal setting

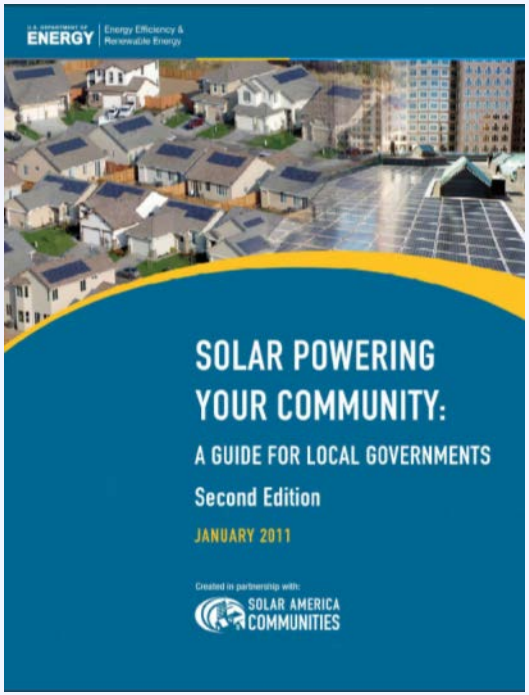
- Does solar play a role in the future vision for your community?
- How does solar connect to other goals such as greenhouse gas reduction targets or renewable energy portfolio standards?
- Opportunity to gage the level of awareness and support in the community.

Photo: NREL

Photo: www.solar.calfinder.com

Plan Making

- Comprehensive plans
- Sub-area plans
- Functional plans



Regulations and Incentives

- Zoning ordinances
- Subdivision ordinances or regulations
- Form based codes
- Planned unit development/ planned residential development ordinances
- Transit oriented development regulations and guidelines
- Historic district architectural or design guidelines
- Transfer of development rights
- Wetlands ordinances
- Tree ordinances

Development Work

Source: www.urbanmilwaukee.com

- Review and approval of development projects
- Public-private development and redevelopment projects
- Development agreements

Public Investment

Infrastructure

- Parking Meters
- Crosswalk Signals
- Street Lights
- Roads

Community Facilities

- Town/City Halls
- Libraries
- Schools
- Police & Fire Stations

Source: solaramericacommunities.gov

Source: NREL

Solar in the Comprehensive Plan

Solar in the Comprehensive Plan

Why focus on the Comprehensive Plan?

- Foundational policy document (vision, goals, objectives/policies ,and recommendations)
- Statutory priority given to comprehensive plans not necessarily given to other plans
- Sets the stage for how the community will maximize opportunities and minimize risks in public and private sector development
- Don't create silos – integrate recommendations from other types of plans in the comprehensive plan (identify synergies and conflicts with other local resources)

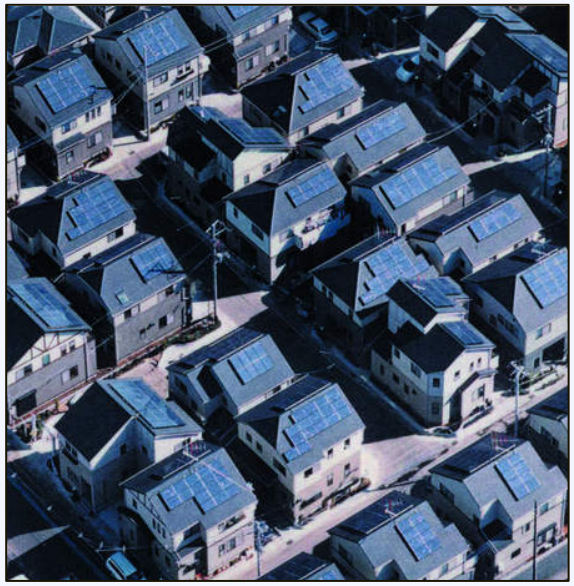
Solar in the Comprehensive Plan

- Existing Conditions
- Goals, Policies, & Objectives
- Action Steps
- Framework for Implementation
  - Standards, Policies, & Incentives
  - Future Public & Private Investment

Solar in Local Development Regulations

Why is this Important?

- Establish a framework for making decisions about solar
- Mitigate potential nuisances
- Create a safe harbor for property owners to use their solar resources
- Encourage solar energy investment and production in the community



Source: www.heatingoil.com

Regulatory Framework

Removing Barriers

↓

Creating Incentives

↓

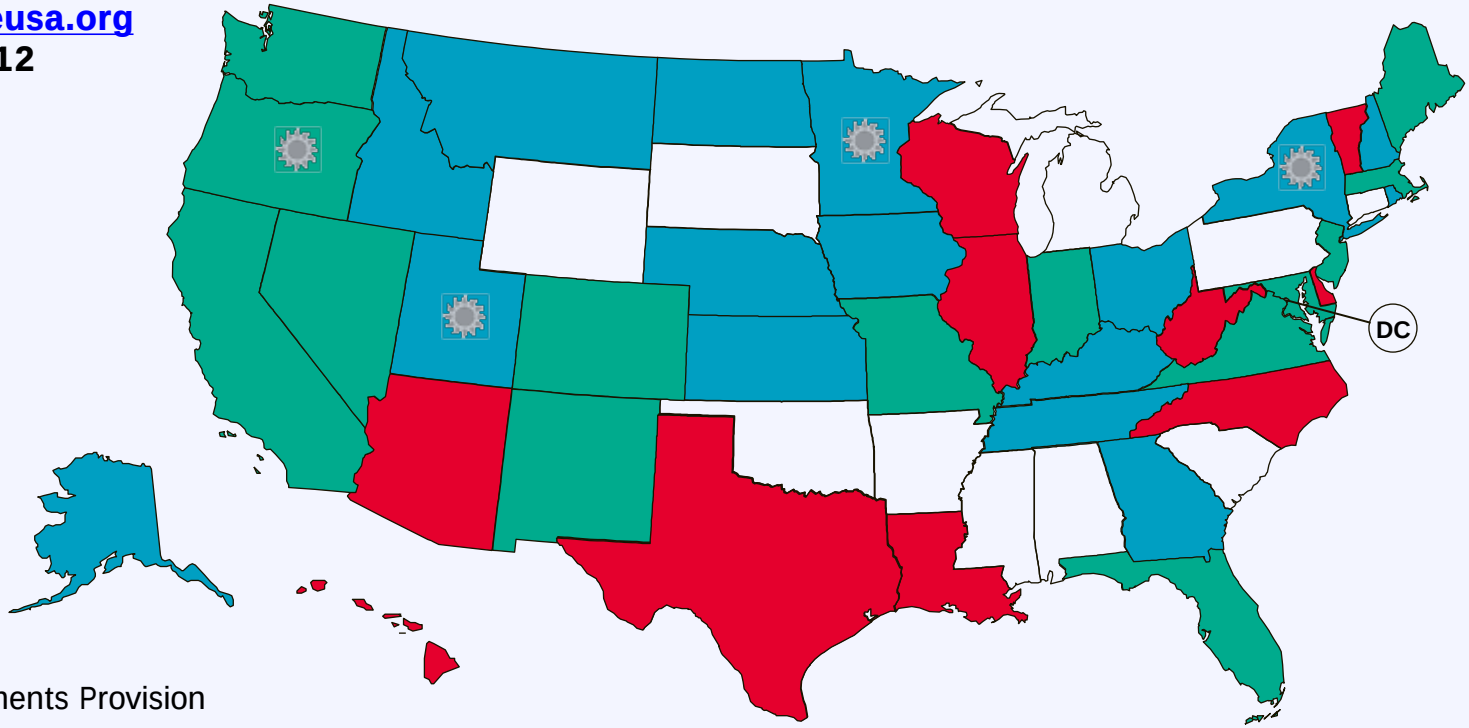
Enacting Standards

Removing Barriers

Removing Barriers

Solar Laws exist in 40 states and the USVI to prevent barriers and authorize incentives, but people are often unaware of their rights.

www.dsireusa.org
August 2012



Solar Easements Provision

Solar Rights Provision

Solar Easements and Solar Rights Provisions

Local option to create solar rights provision

U.S. Virgin Islands

Powered by SunShot
U.S. Department of Energy

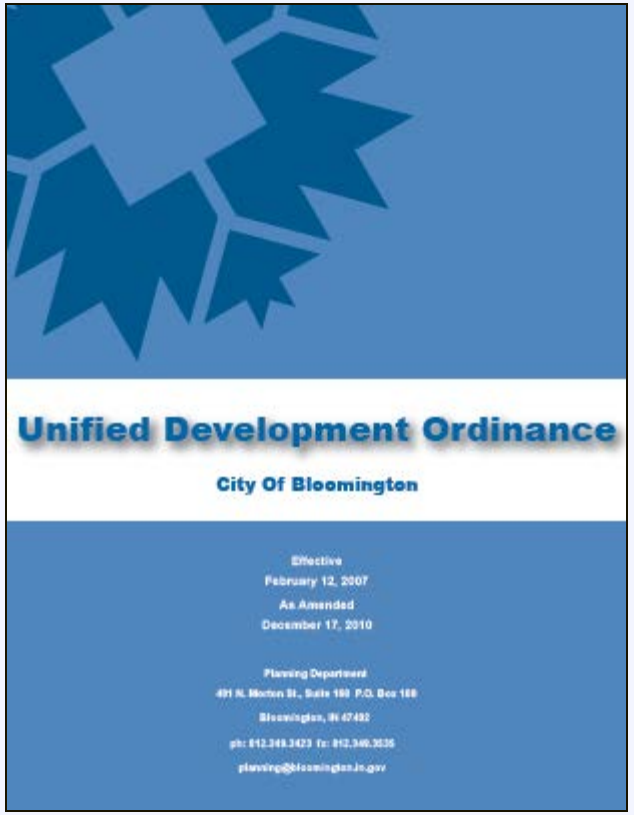
Removing Barriers

- Make solar a by-right accessory use
- Allow modest adjustments to regulations (e.g., setbacks) to allow applicants to meet solar access requirements
- Streamline the approval process and reduce permitting costs
- Craft exceptions to permit solar in special districts (e.g., historic districts)
- Adopt solar access laws

Creating Incentives

Creating Incentives

- Streamline Approval Process
- Reduce Permitting Costs
- Increase Flexibility on Other Standards in Exchange for the Incorporation of Solar



Source: City of Bloomington, Indiana

Enacting Standards

The Purpose of Standards

- Clarify what types of solar systems are allowed and where
- Mitigate potential nuisances associated with solar equipment (e.g. visual impacts, encroachment)
- Define and protect solar access

Basic Considerations

Zoning Code and Subdivision Regulations	
SECTION	**TOPICS TO ADDRESS**
Permitted Uses	Primary vs. accessory
Dimensional Standards	Height, lot coverage, setbacks
Development Standards	Screening, placement (on building or site), site planning for solar access (lot and building orientation)
Definitions	Types of solar systems, solar access, and related terminology

Additional Considerations

- Require solar-orientation for new development
- Require solar-ready development
- Solar access protections

CONSIDER CONTEXT

- Residential
- Non-residential
- New development
- Infill or redevelopment

Small-Scale Solar Energy Systems

Typical Requirements

- Small-scale solar energy systems permitted as accessory uses in defined districts
- Placement on side and back roof slopes encouraged
- Must meet district height, lot coverage, and setback requirements (some allow for exemptions through variance)

Source: Clarion Associates

Large-Scale Solar Energy Systems

Typical Requirements

- Defined as solar farms, solar power plants, or "major" solar facilities
- Allowed as primary use in very limited locations
- Height limits
- Lot coverage limits
- Fencing and enclosures

Source: Solar Thermal Magazine

Solar Access Ordinances

Typical Requirements

- Protection of solar access
- Minimize shade on adjoining properties through limits on
  - Building height and massing
  - Tree and landscaping placement
- Solar access easements

Trees Block Solar Panels, and a Feud Ends in Court

Jim Wilson/The New York Times

Under a California law, a criminal court ruled that these redwood trees cast too much shade on Mark Vargas's solar panels.

By FELICITY BARRINGER
Published: April 7, 2008

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PRINT
SINGLE PAGE
REPRINTS

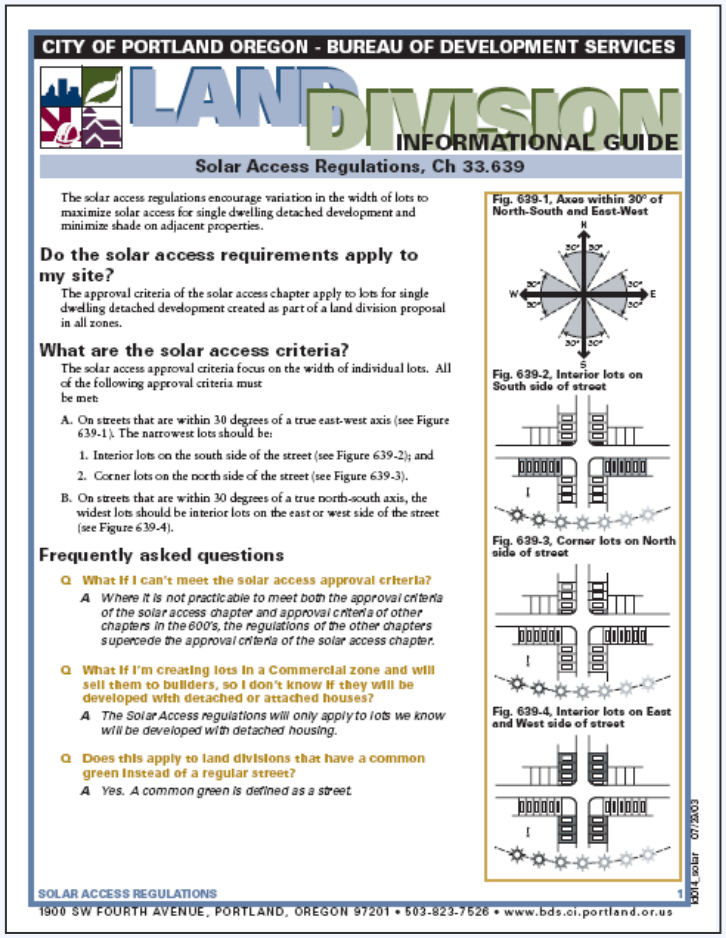
SUNNYVALE, Calif. — Call it an eco-parable: one Prius-driving couple takes pride in their eight redwoods, the first of them planted over a decade ago. Their electric-car-driving neighbors take pride in their rooftop solar panels, installed five years after the first trees were

Source: New York TImes

Solar Siting Ordinances

Typical Requirements

- Minimum number of lots must be "Solar-Oriented Lots"
- Flexible setbacks to maximize solar access
- Streets designed to maximize solar access



CITY OF PORTLAND OREGON - BUREAU OF DEVELOPMENT SERVICES

LAND DIVISION INFORMATIONAL GUIDE

Solar Access Regulations, Ch 33.639

The solar access regulations encourage variation in the width of lots to maximize solar access for single dwelling detached development and minimize shade on adjacent properties.

Do the solar access requirements apply to my site?

The approval criteria of the solar access chapter apply to lots for single dwelling detached development created as part of a land division proposal in all zones.

What are the solar access criteria?

The solar access approval criteria focus on the width of individual lots. All of the following approval criteria must be met:

A. On streets that are within 30 degrees of a true east-west axis (see Figure 639-1), the narrowest lots should be:

1. Interior lots on the south side of the street (see Figure 639-2); and
2. Corner lots on the north side of the street (see Figure 639-3).

B. On streets that are within 30 degrees of a true north-south axis, the widest lots should be interior lots on the east or west side of the street (see Figure 639-4).

Frequently asked questions

Q What if I can't meet the solar access approval criteria?

A Where it is not practicable to meet both the approval criteria of the solar access chapter and approval criteria of other chapters in the 600's, the regulations of the other chapters supercede the approval criteria of the solar access chapter.

Q What if I'm creating lots in a Commercial zone and will sell them to builders, so I don't know if they will be developed with detached or attached houses?

A The Solar Access regulations will only apply to lots we know will be developed with detached housing.

Q Does this apply to land divisions that have a common green instead of a regular street?

A Yes. A common green is defined as a street.

Fig. 639-1, Axes within 30° of North-South and East-West

Fig. 639-2, Interior lots on South side of street

Fig. 639-3, Corner lots on North side of street

Fig. 639-4, Interior lots on East and West side of street

SOLAR ACCESS REGULATIONS 1

1900 SW FOURTH AVENUE, PORTLAND, OREGON 97201 • 503-823-7526 • www.bds.ci.portland.or.us

Source: www.**portland**online.com

Solar Ready Homes

Typical Requirements

- Structural/roof specifications
- Solar "stub-ins" required for new homes to support future photovoltaic panel or solar hot water heater installation
- Installation of PV Conduit or hot water pipes required on south, east, or west-facing roofs

Source: www.correctsolarinstallation.com

Resources

Resources

Project Website – FAQ Page

Frequently Asked Questions

Planning and Zoning for Solar Energy

How do other communities encourage the use of solar energy systems through their comprehensive plans?

The local comprehensive plan presents a future vision of the physical, social, and economic characteristics of an entire city or county, and it specifies goals and policies intended to implement that vision. Because it is the most expansive official policy statement of a city council or county board, it is an ideal tool to support the deployment of solar energy systems on both public and private property.

There are two primary mechanisms by which comprehensive plans can support solar energy system deployment: (1) documenting the solar resource and (2) articulating policies to guide decision making.

First, comprehensive plans can provide information about the solar resource available in different parts of the community. This may be in the form a solar resource map showing which areas receive the most sunlight annually, or it may be a text description of site characteristics that maximize solar potential.

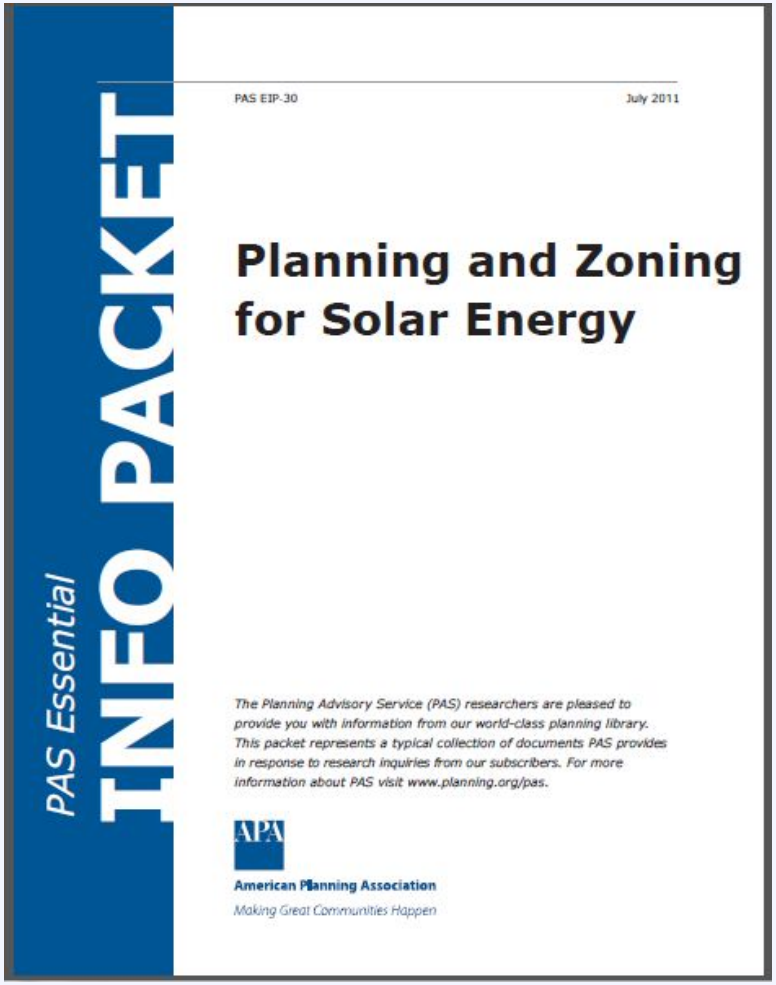
Second, comprehensive plans can articulate specific policies to guide decision making about solar energy system deployment on public and private land. These policies may address solar access protection, street and building orientation, or preferential locations for new solar energy systems.

Examples from PAS Essential Info Packet 30: Planning and Zoning for Solar Energy

- Fort Collins (Colorado), City of. 2011. City Plan. Environmental Health: Energy.
- Jackson (Oregon), County of. 2007. Jackson County Comprehensive Plan. Section 11, Energy Conservation.
- Greensburg (Kansas), City of. 2008. Greensburg Sustainable Comprehensive Plan. Housing; Future Land Use and Policy.
- Owensboro Metropolitan Planning Commission. 2007. Comprehensive Plan for Owensboro, Whitesville, Daviess County, Kentucky. Section 710. Climate and Solar Access.
- Pinal (Arizona), County of. 2009. We Create Our Future: Pinal County Comprehensive Plan. Chapter 7, Environmental Stewardship – Energy.
- Pleasanton (California), City of. 2009. General Plan 2005–2025. Energy Element.
- Shakopee (Minnesota), City of. 2009. Comprehensive Plan 2030. 12, Solar Access.
- Victoria (Minnesota), City of. 2010. 2030 Comprehensive Plan Update. Part II.L.1, Plan Elements – Special Resources – Solar Access Protection. Prepared by TKDA, St. Paul, Minn.

http://www.planning.org/research/solar/faq.htm

Essential Information Packet



http://www.planning.org/pas/infopackets/open/eip30.htm

Customized Research Assistance

- Available to anyone with a question related to planning for solar energy
- Provided through PAS Inquiry Answer Service
- Submit questions to pas@planning.org with subject line "Solar Energy Inquiry"

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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

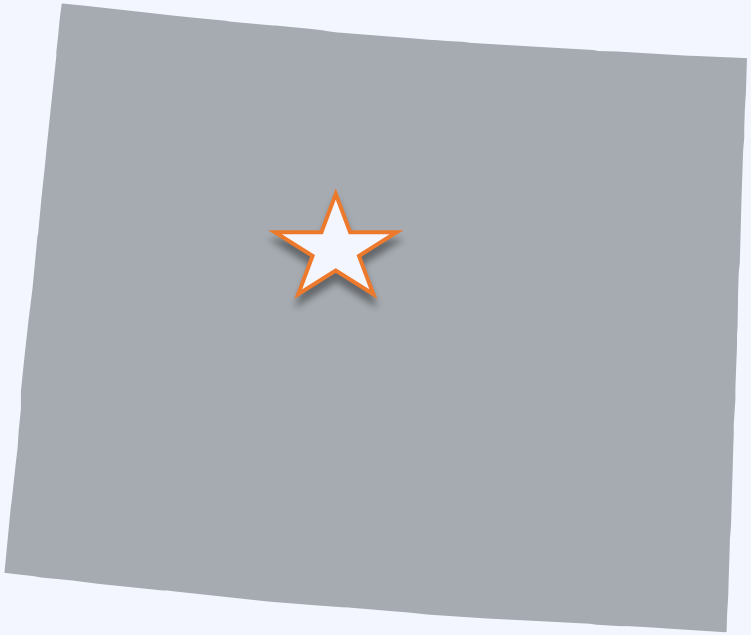
Expedited Permitting

Solar Permitting Best Practices:

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

Source: Vote Solar

Expedited Permitting: Case Study



Breckenridge, Colorado

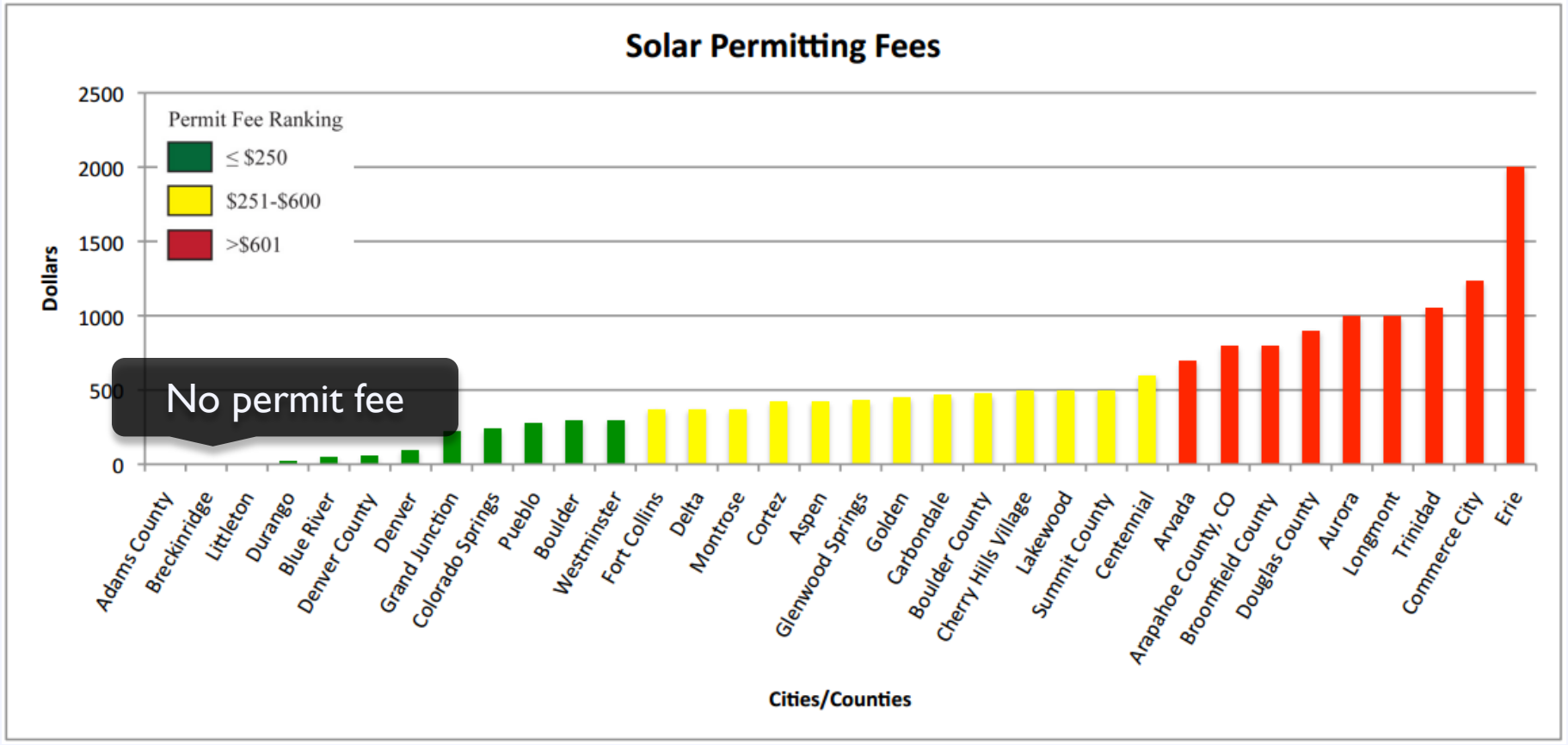
Population: 4,540

Powered by SunShot
U.S. Department of Energy

Source: Wikipedia

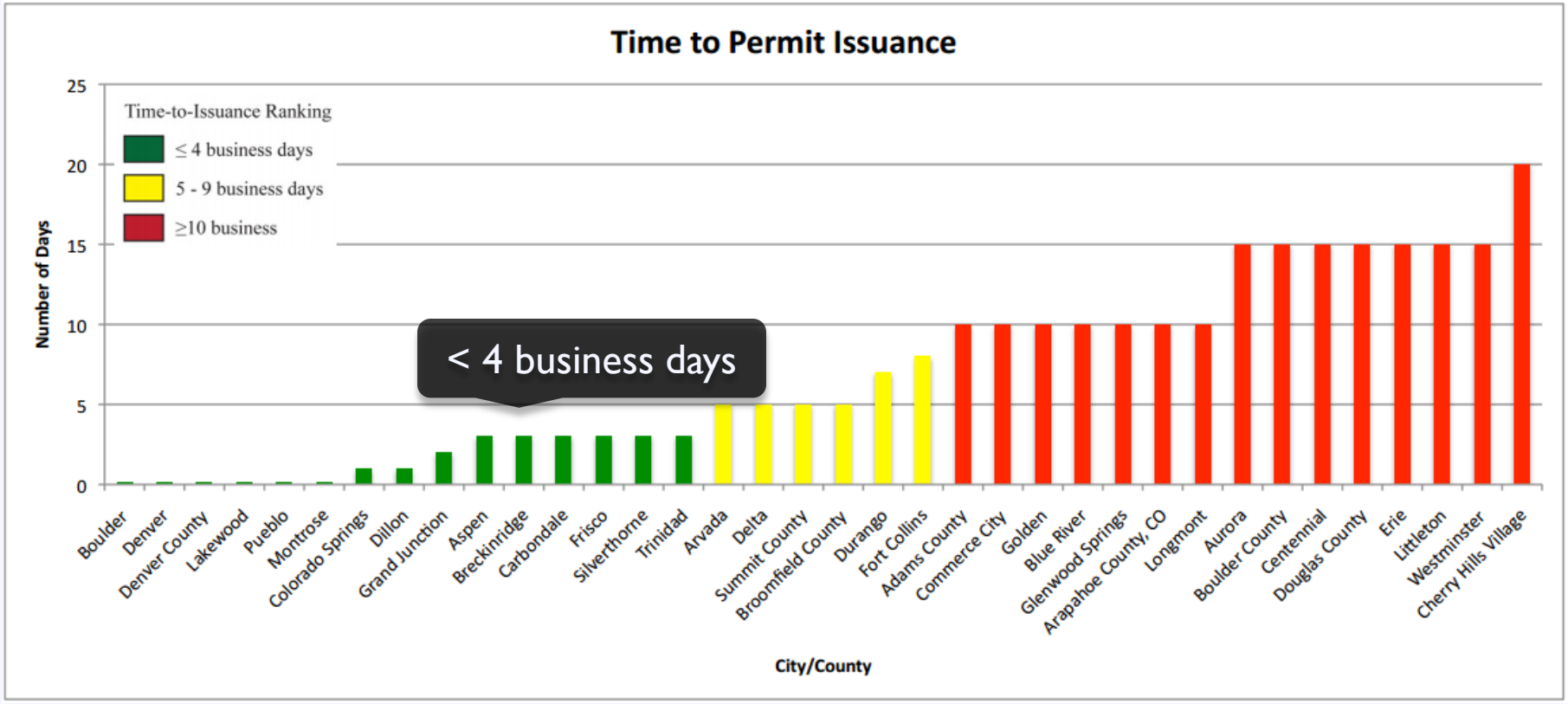
Expedited Permitting: Case Study

Breckenridge charges no fees to file for a solar permit



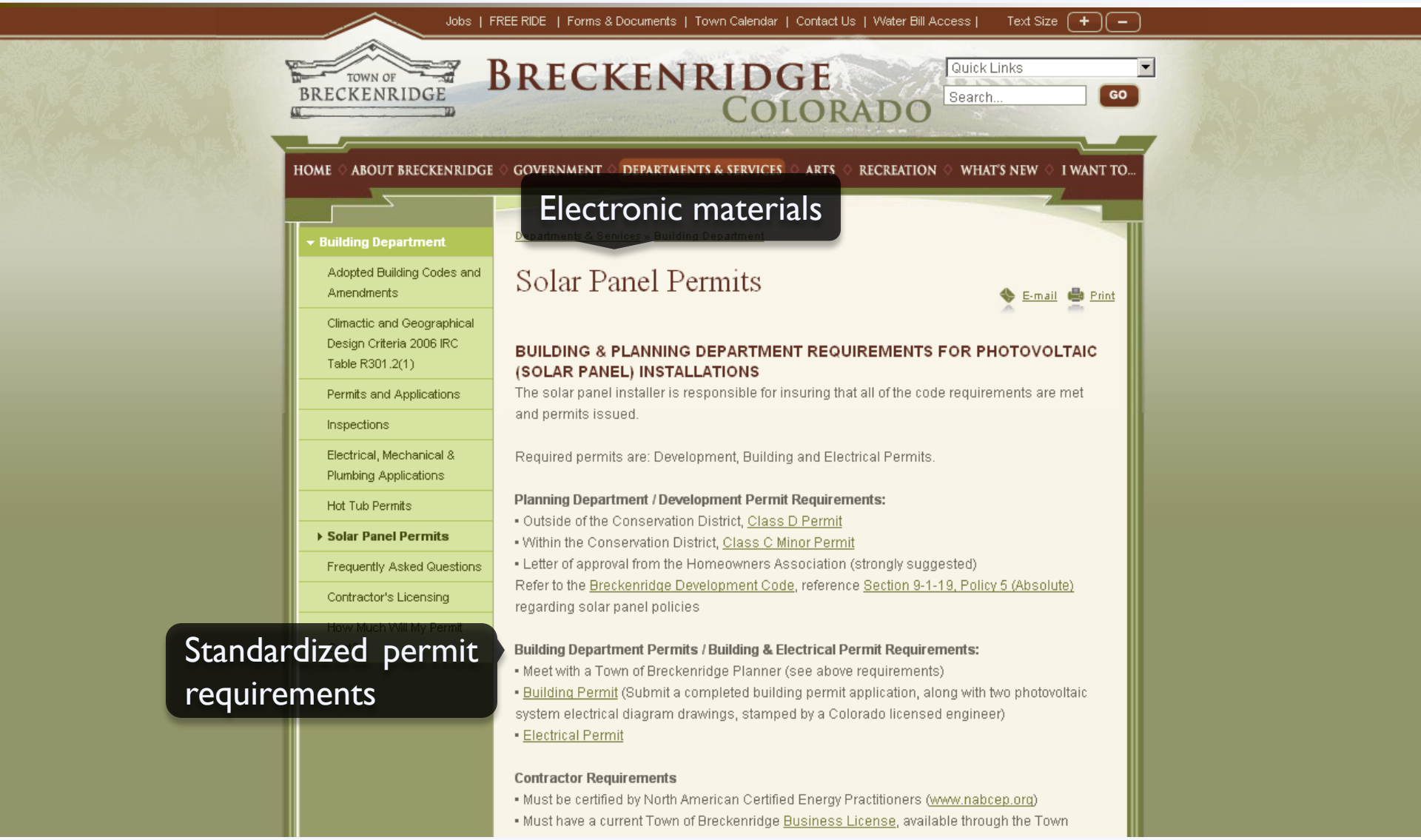
Expedited Permitting: Case Study

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

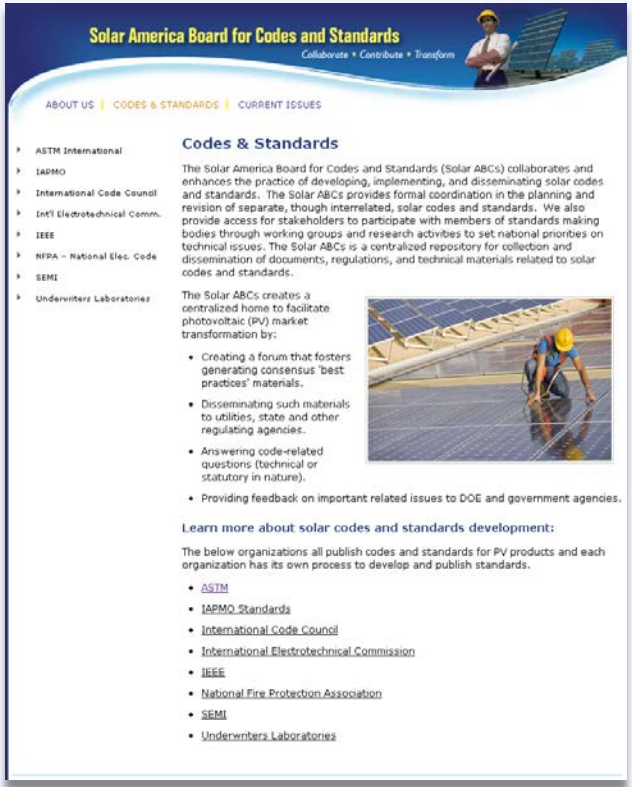
Source: Breckenridge, CO (http://www.townofbreckenridge.com/index.aspx?page=694)

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



Powered by SunShot
U.S. Department of Energy

Expedited Permitting: Application

SOLAR PV SYSTEM INSTALLATIONS WITH AN ELECTRICAL PERMIT ONLY

If the Licensed Electrical Contractor can commit to meeting the following installation conditions, limitations and requirements in the installation of the solar PV system, the Department will waive the requirement for a separate building permit and allow the electrical permit to apply to the full installation.

A separate building permit application with construction plans must be obtained if the following conditions and requirements cannot be met or the Electrical Contractor performing the electrical installation is not willing to accept responsibility for the structural installation of the system.

Conditions:

- Installation must be on the roof of a one- or two-family dwelling.
- Installation may not occur on roof systems comprised of engineered trusses. These systems will require building permits
- Property is not designated historical by the Philadelphia Historical Commission.
- Electrical Contractor must agree to accept responsibility for the structural installation of the roof-top equipment.
- If the contractor finds the installation cannot meet these requirements, a separate building permit must be obtained.

Installation Limitations and Requirements

- Equipment weighs less than 5 pounds per square foot (psf).
- Equipment imposes less than 45 psf point load in any location.
- The height of the system is less than 18 inches above the adjacent roof.
- A three (3) foot clearance must be provided around all equipment.
- Installation includes a pre-engineered ballasted or mounting structure with attachments both designed for a wind load of 90 mph.
- The equipment must be installed as per manufacturer's instructions.

Source: City of Philadelphia, Department of Licenses and Inspections (http://www.phila.gov/green/PDFs/Streamlined%20Solar%20Standards.pdf)

Expedited Permitting: Application

Electrical Permit Limitations and Requirements

Specifically, the system must be 10kW or less, be composed of four or less series strings, and have a total inverter capacity of less then 13.44kW, with all materials, devices and equipment labeled and listed by a certified testing agency.

Solar PV system electrical permit applications must include the following information:

- Detailed riser diagrams
- Conduit and wiring details
- Grounding detail
- Electrical service information
- Module information
- Inverter information

Electrical Permits

Systems that meet the electrical limitations detailed above may be eligible for a streamlined permit review. For more specific information on the electrical permit requirements above, please see our *"Permit Checklist for Solar PV Systems."*

Zoning Requirements

Solar PV systems installed on the roof of a one- or two- family dwelling do not require a zoning permit.

Application Process

When Licensed Electrical Contractors apply for a permit related to the electrical work required to properly install a solar PV system on one or two family dwellings, they may agree to meet the conditions, limitations and requirements of the Building Code established in this **Solar PV Installation Standard**.

This agreement to meet the limitations and requirements above must be noted in the "Brief Description of Work" field on a standard electrical permit application and the application signed by the Electrical Contractor.

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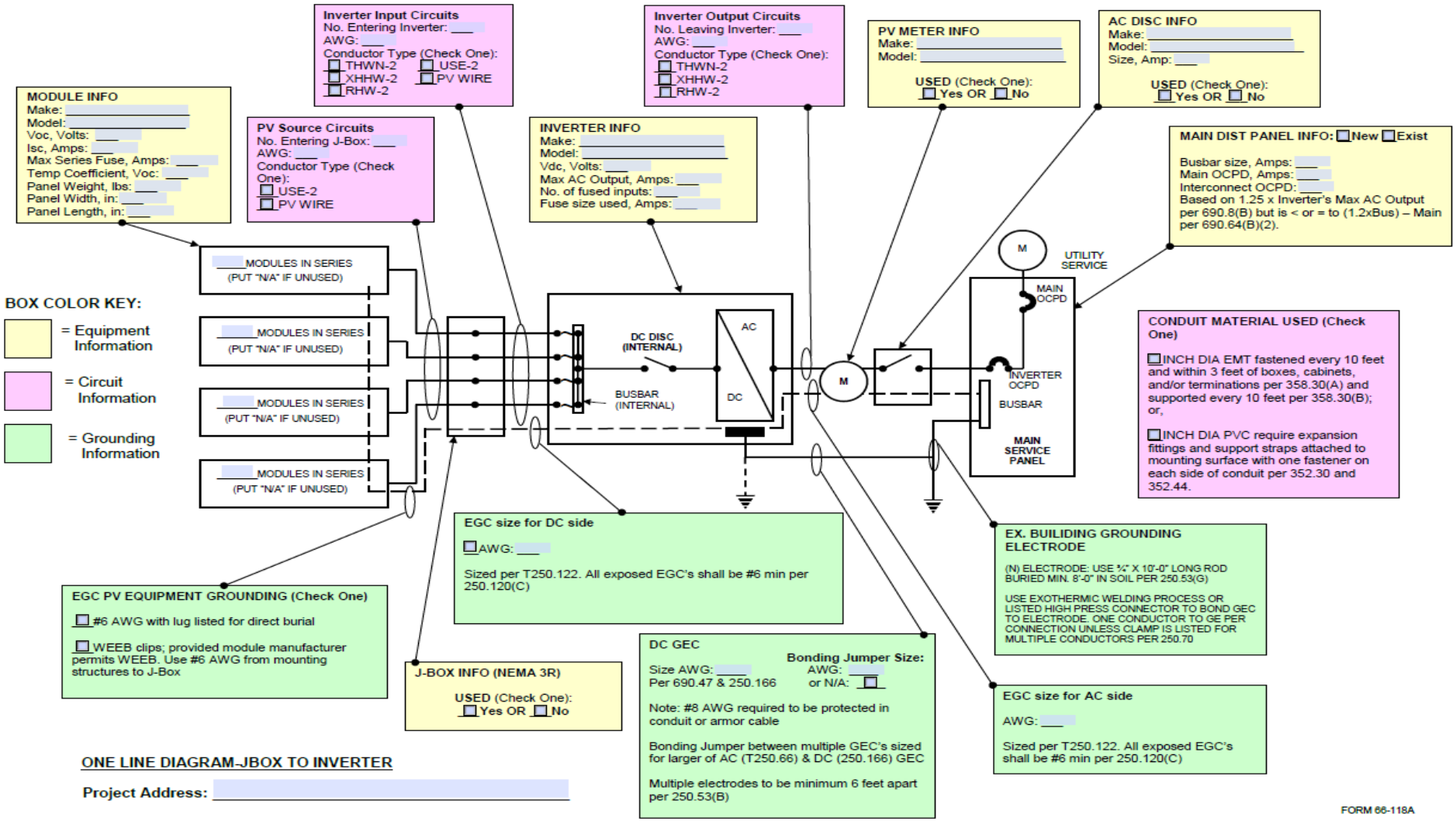
Source: City of Philadelphia, Department of Licenses and Inspections (http://www.phila.gov/green/PDFs/Streamlined%20Solar%20Standards.pdf)

Expedited Permitting: Application



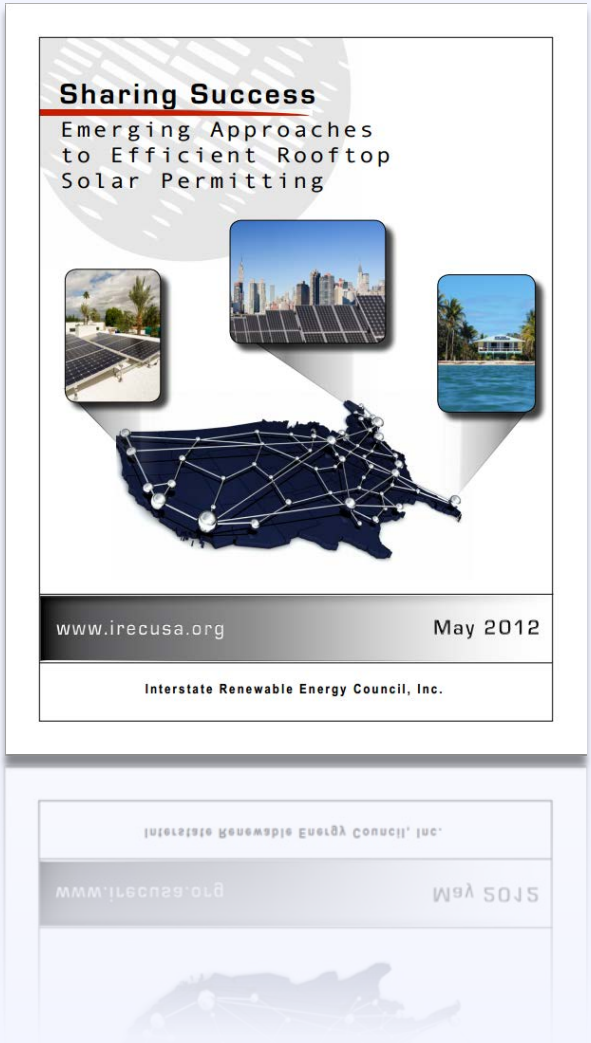
Source: City of Irvine, Department of Community Development (http://www.cityofirvine.org/cityhall/cd/buildingsafety/permit_processing_center/residential_photovoltaic_systems/default.asp)

Expedited Permitting

Resource **Interstate Renewable Energy Council**

Outlines emerging approaches to efficient rooftop solar permitting

www.irecusa.org



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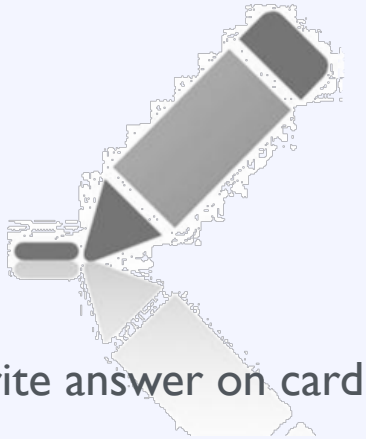
Activity: Identifying Benefits

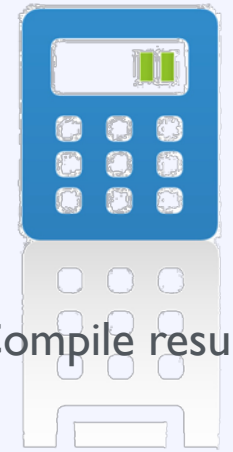
What is the greatest benefit solar can bring to your community? [Blue Card]

Right Now



Write answer on card

During Session



Compile results

After Break

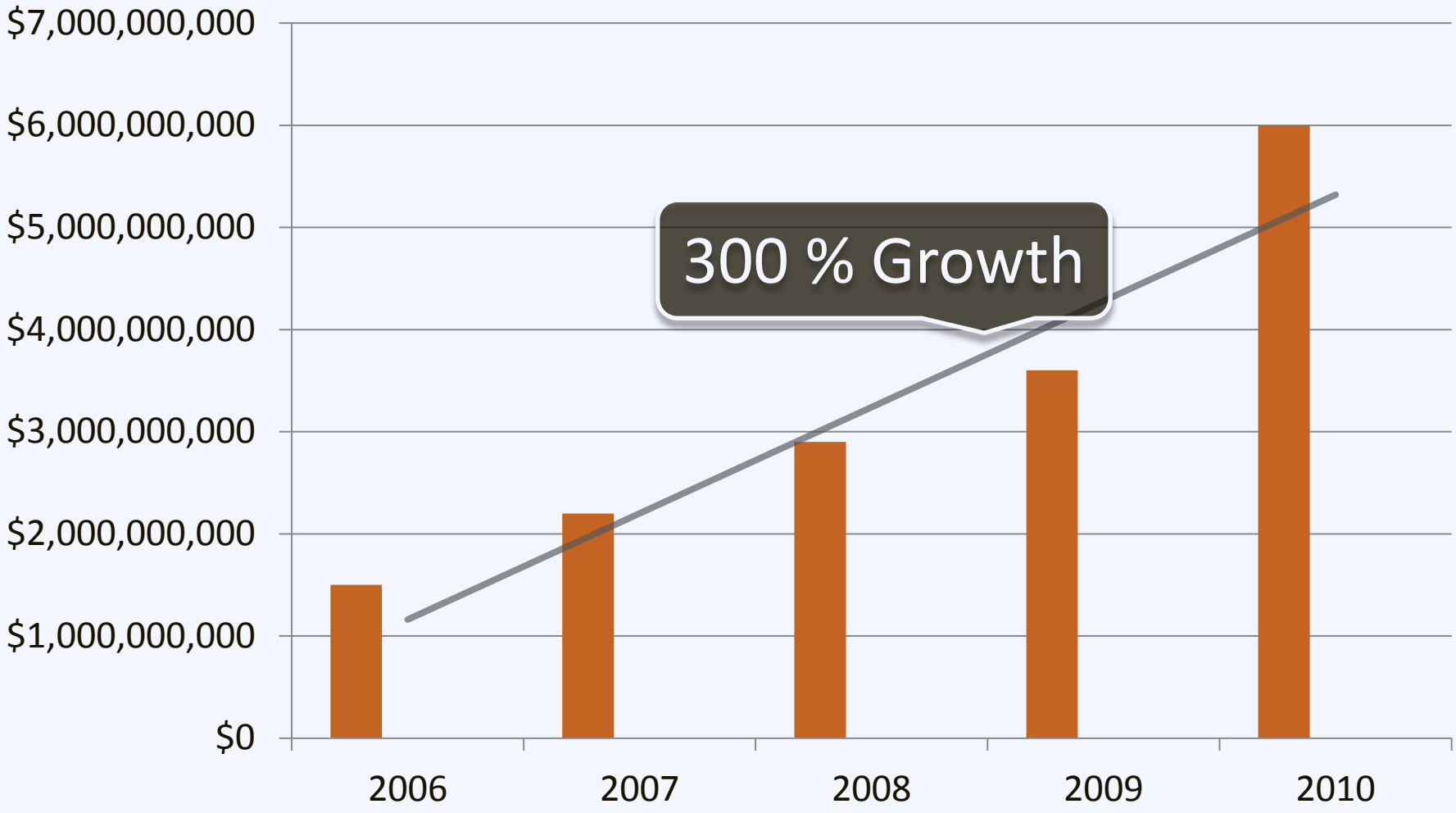
Group discussion

[Results from Survey]

Benefits of Solar Energy

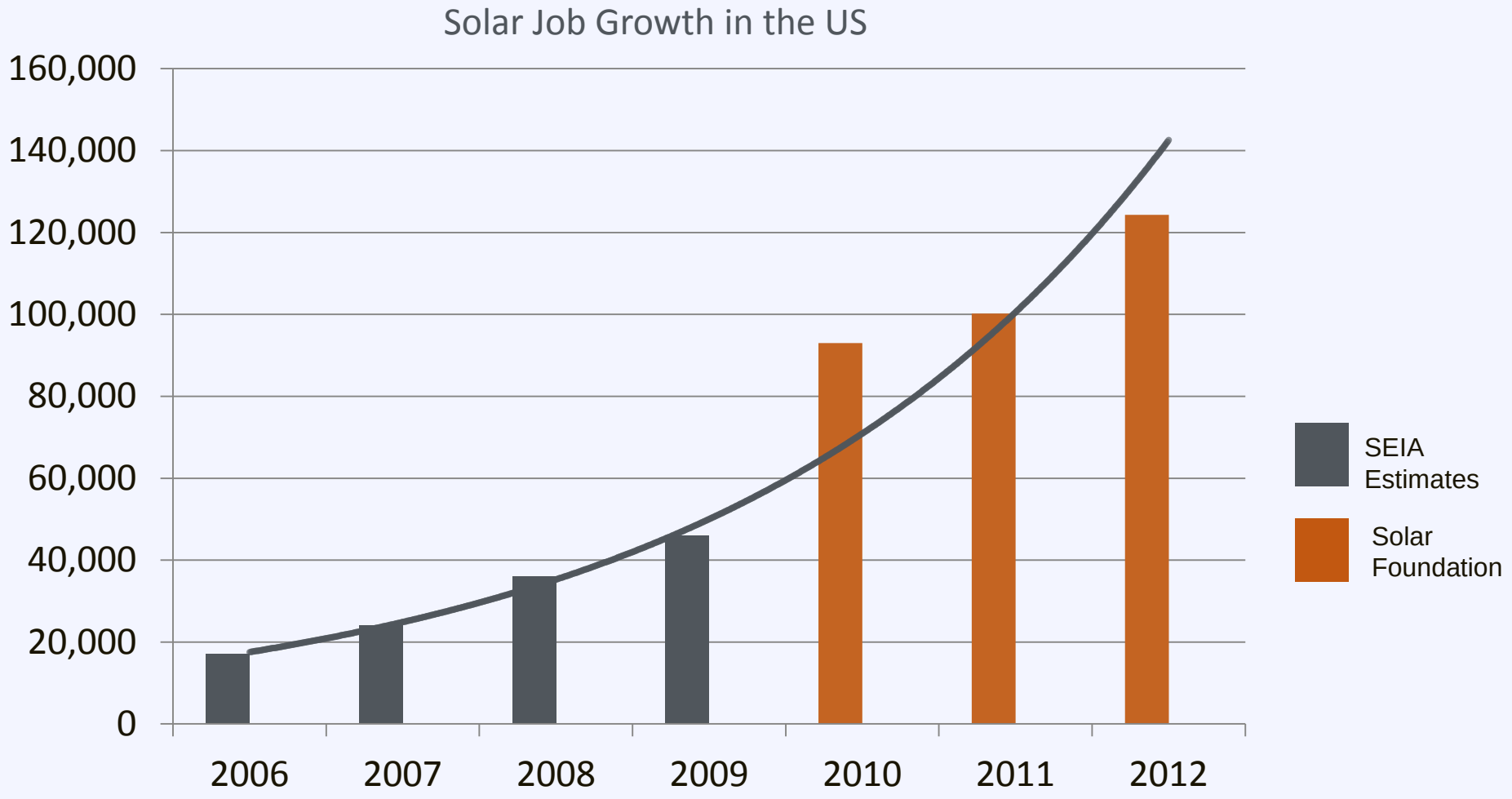
- Local economy growth
- Local jobs
- Energy independence
- Stabilizes price volatility
- Valuable to utilities
- Smart investment

Benefit: Economic Growth



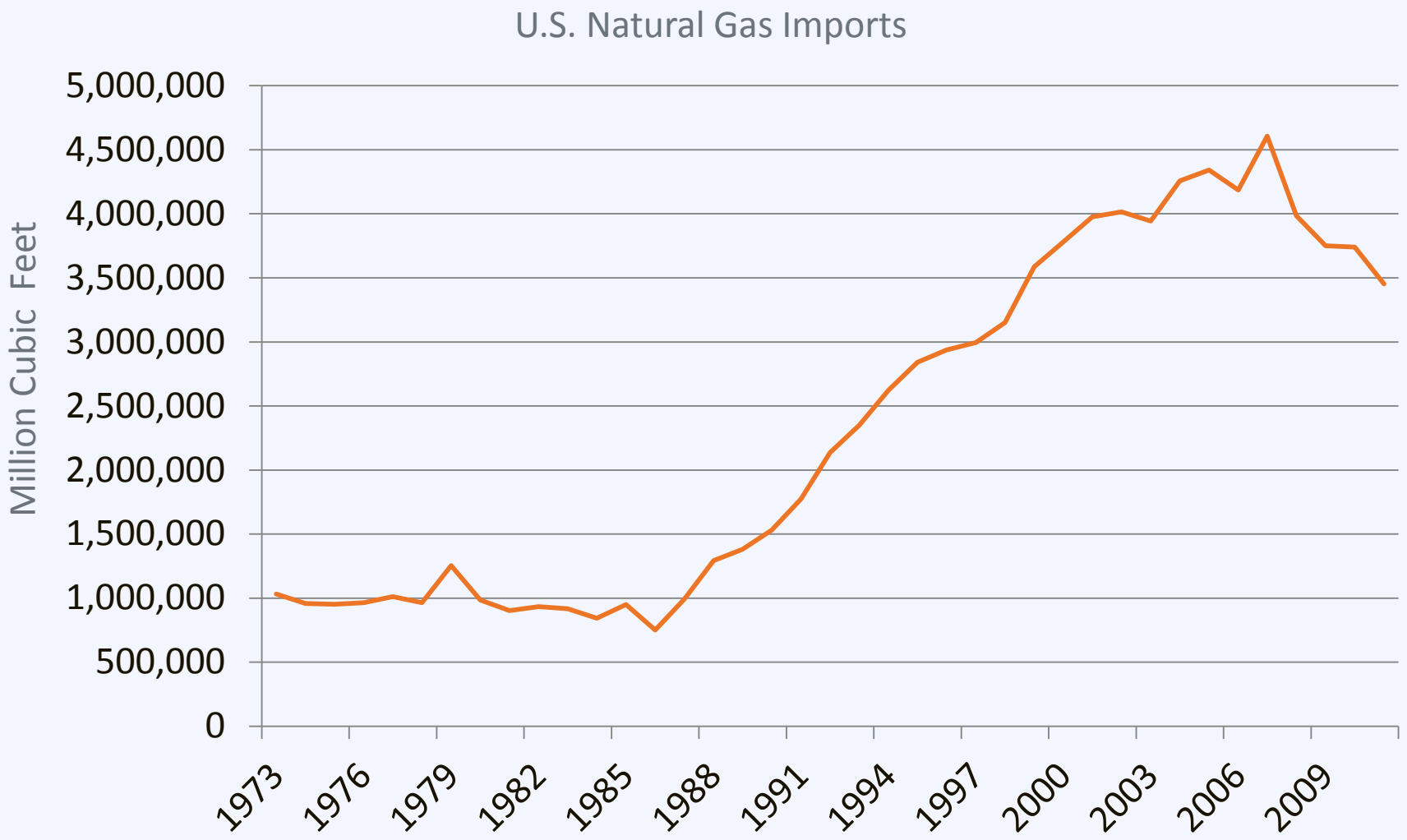
Source: SEIA/GTM Research - 2010 Year in Review Report http://www.seia.org/galleries/pdf/SMI-YIR-2010-ES.pdf SEIA/GTM Research- 2009 year in Review Supplemental Charts

Benefit: Job Growth



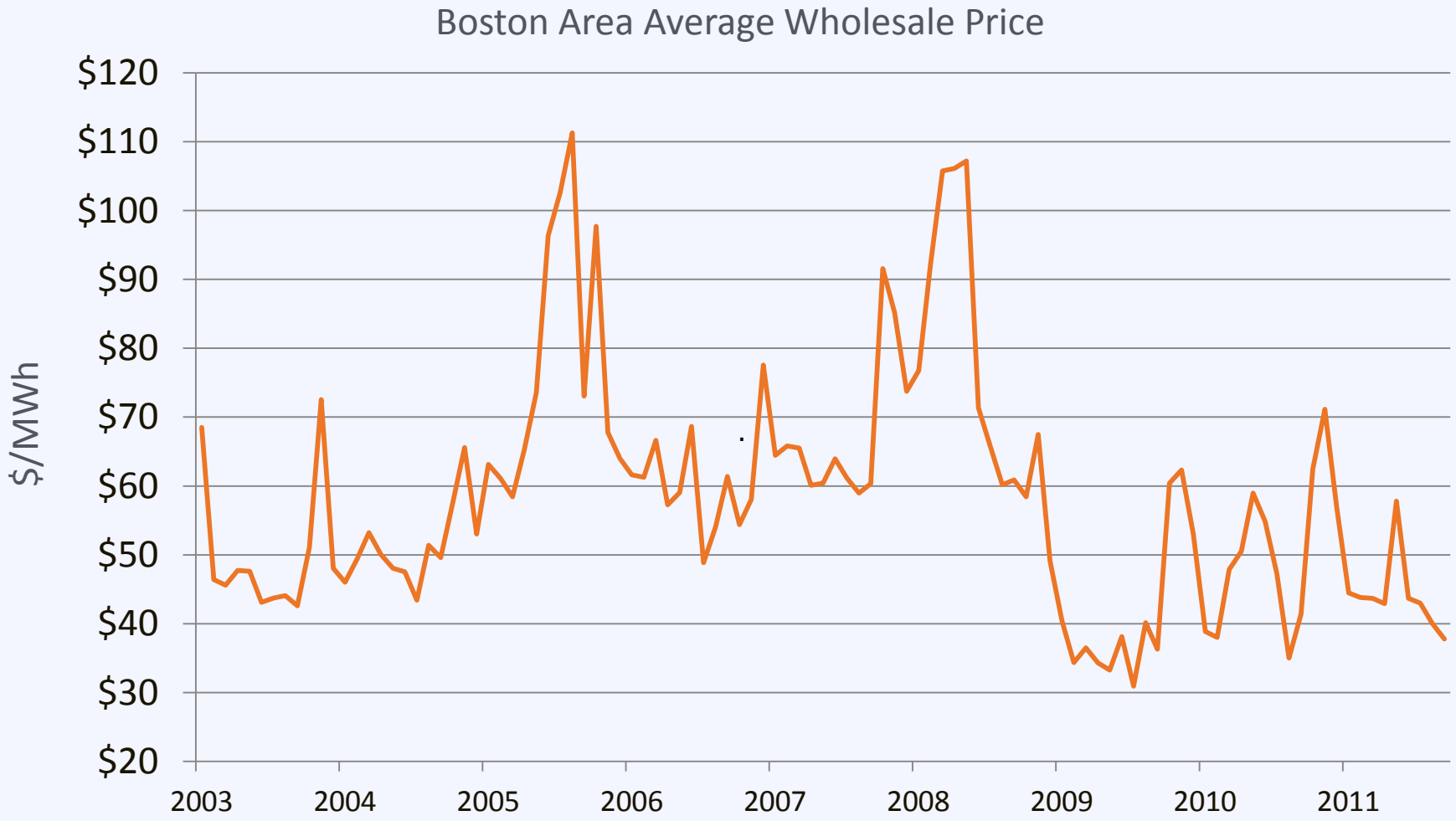
Source: SEIA Estimates (2006-2009), The Solar Foundation's National Solar Jobs Census 2010 (2010), The Solar Foundation's National Solar Jobs Census 2011 (2011-2012).

Benefit: Energy Independence



Source: EIA http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=mttimus2&f=a

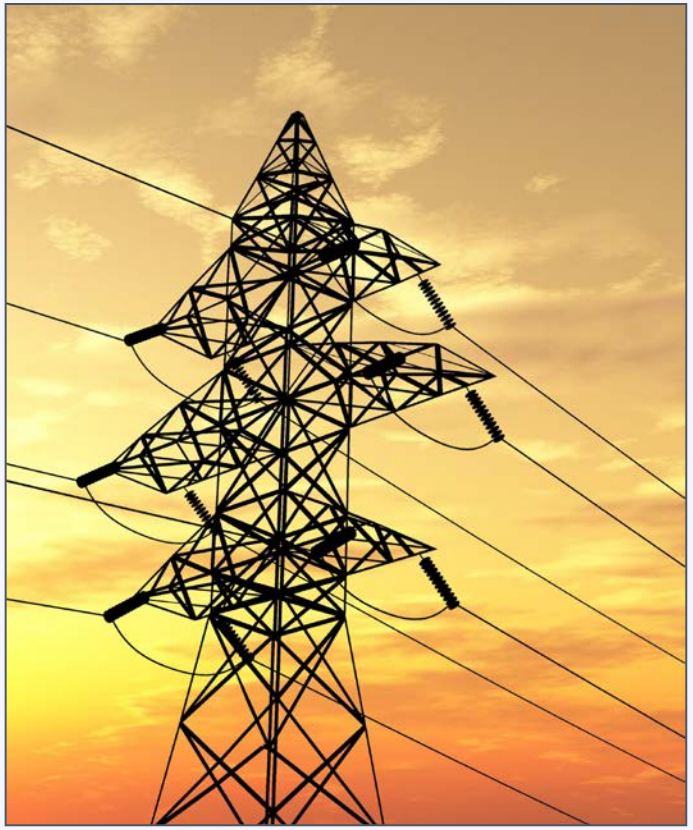
Benefit: Stabilize Energy Prices



Source: NEPOOL

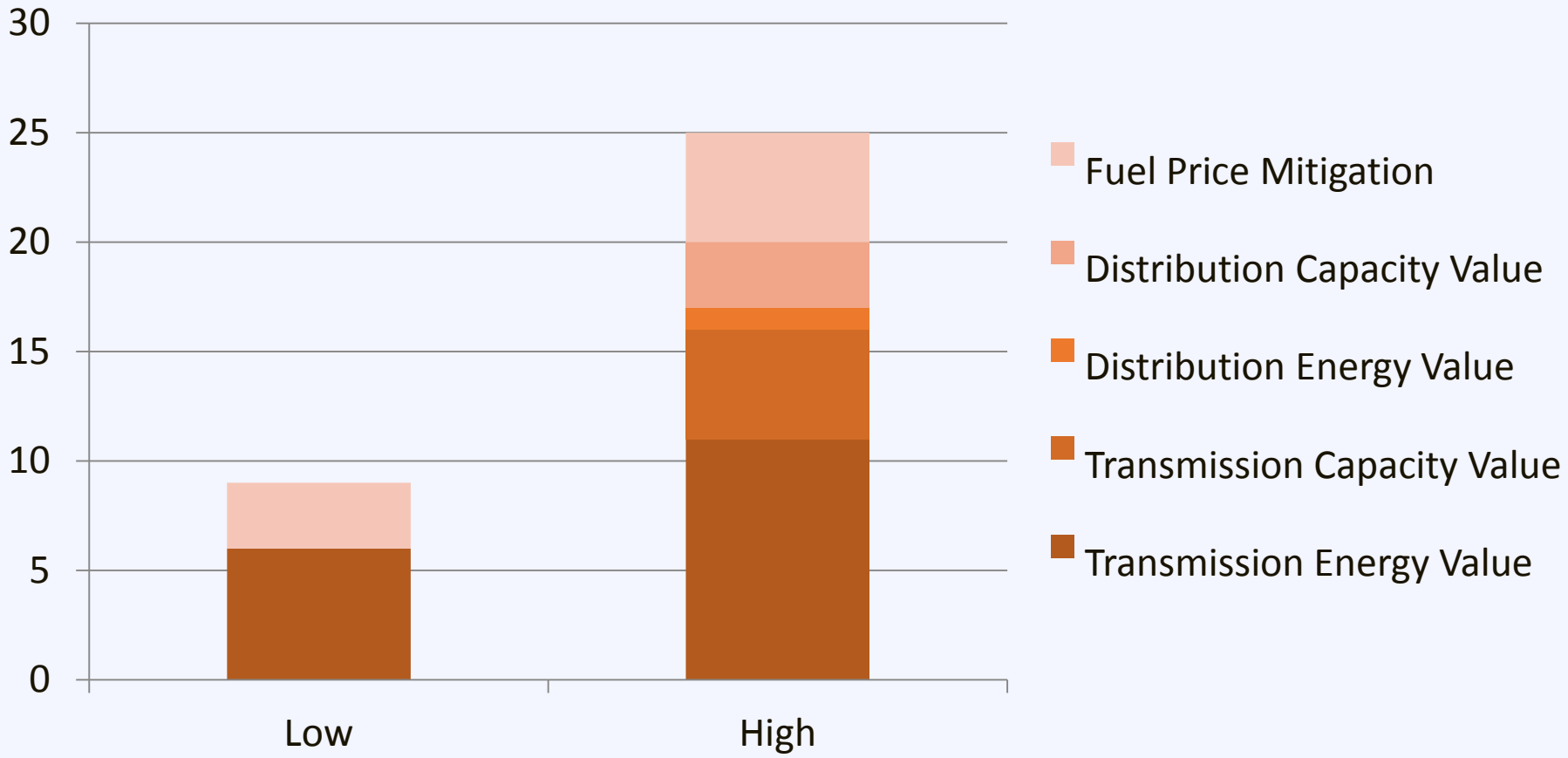
Benefits: Valuable to Utilities

- 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

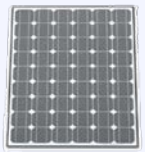
in surveyed California subdivisions

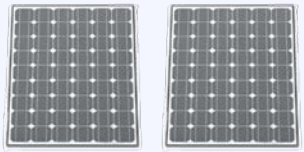
Powered by SunShot U.S. Department of Energy

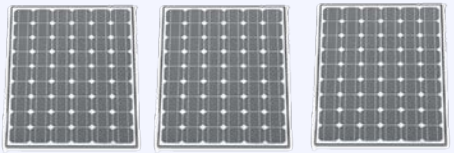
Source: http://www.nrel.gov/docs/fy07osti/38304-01.pdf

Benefit: Smart Investment for Homes

From SunRun:

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

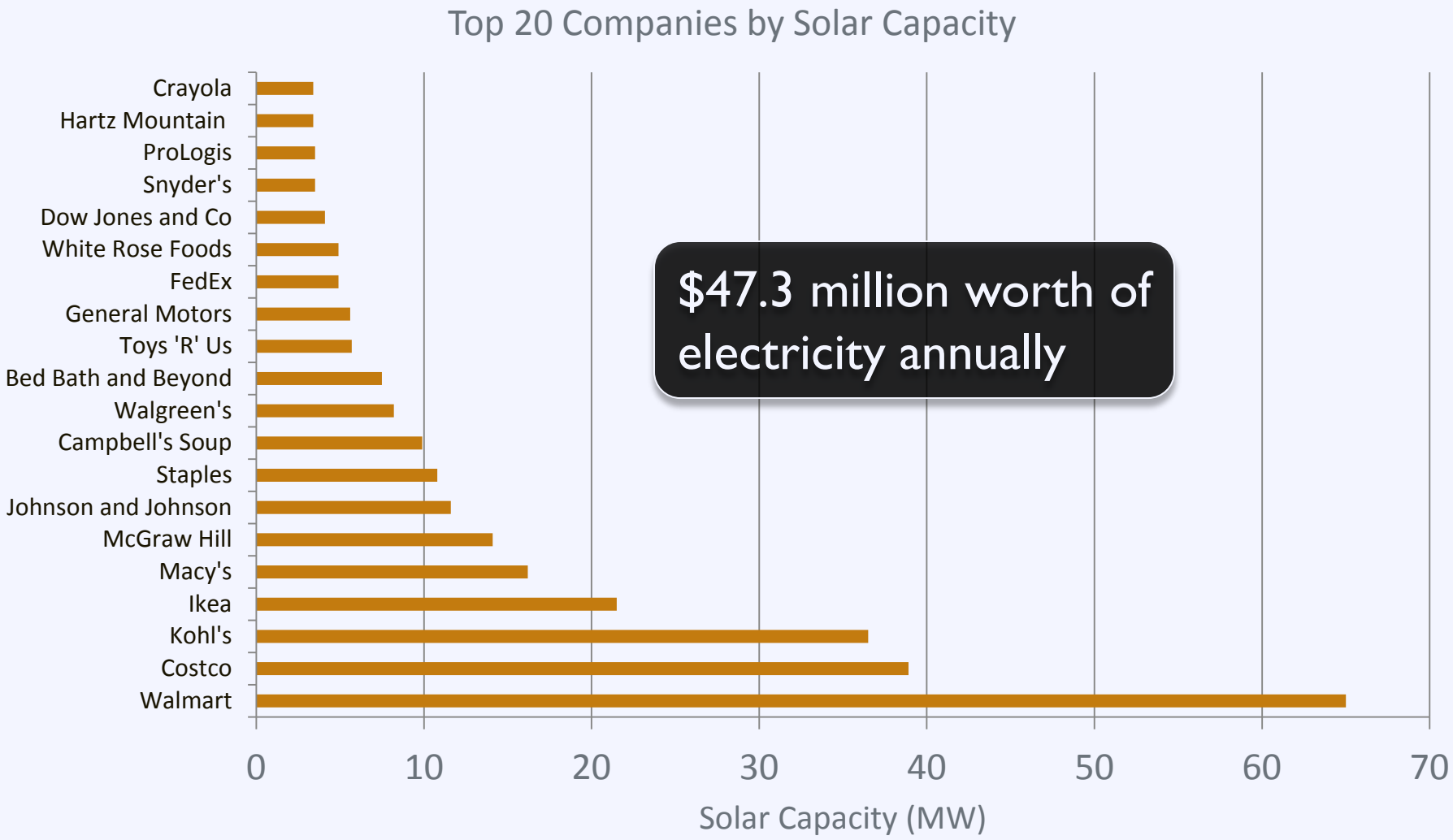
6 kW  = **$ 33,000** *added sale premium*

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

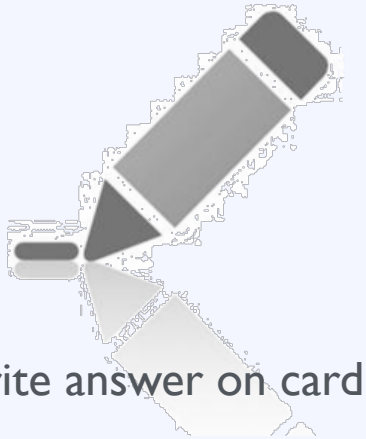
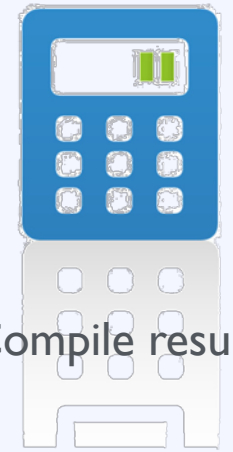
Source: Solar Energy Industries Association

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

[Results from Survey]

Some things you may hear…

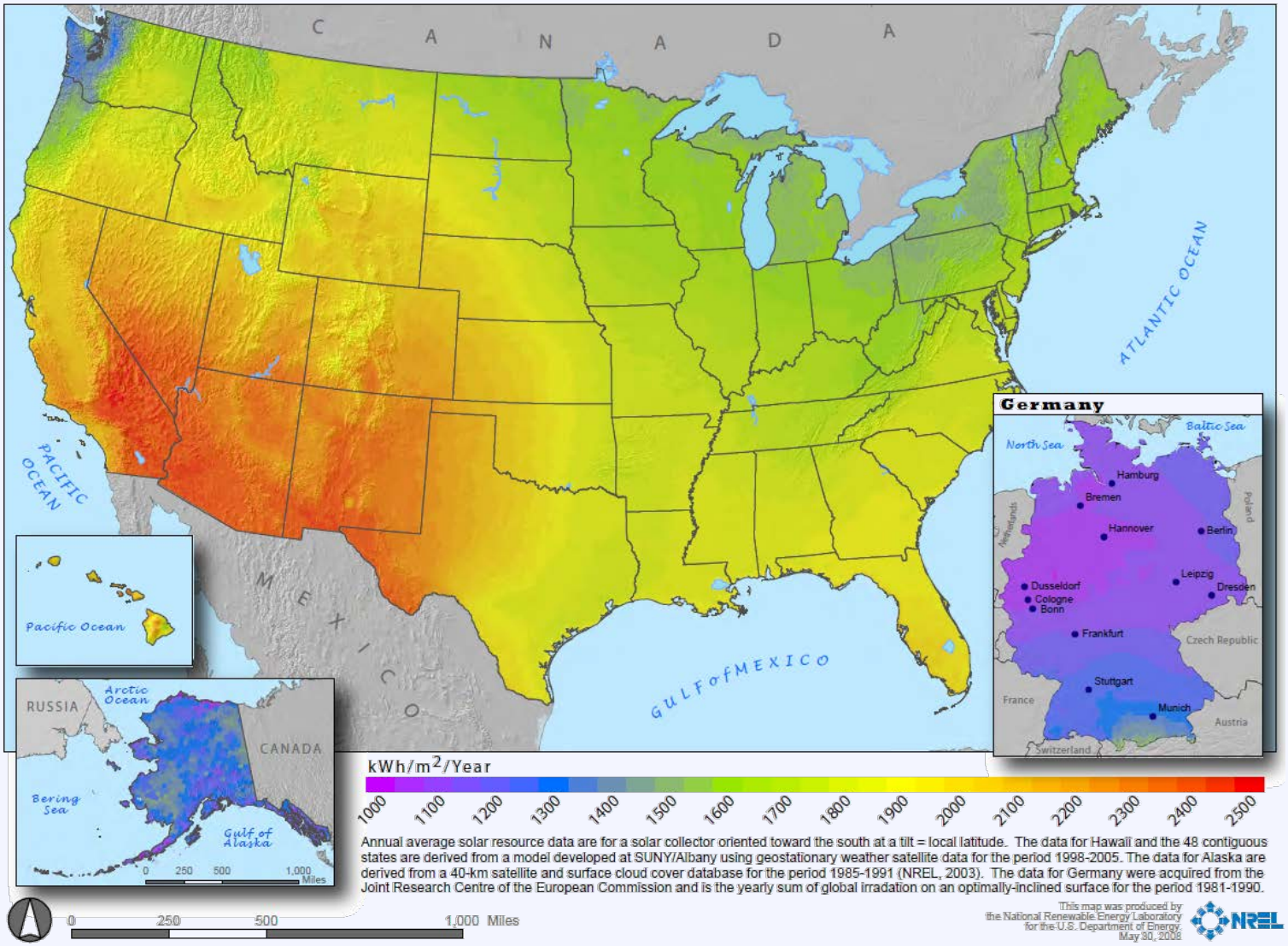
My area isn't sunny enough for solar

Going solar is too expensive

Solar is not ready to compete as a serious energy source

The government should not "pick winners and losers"

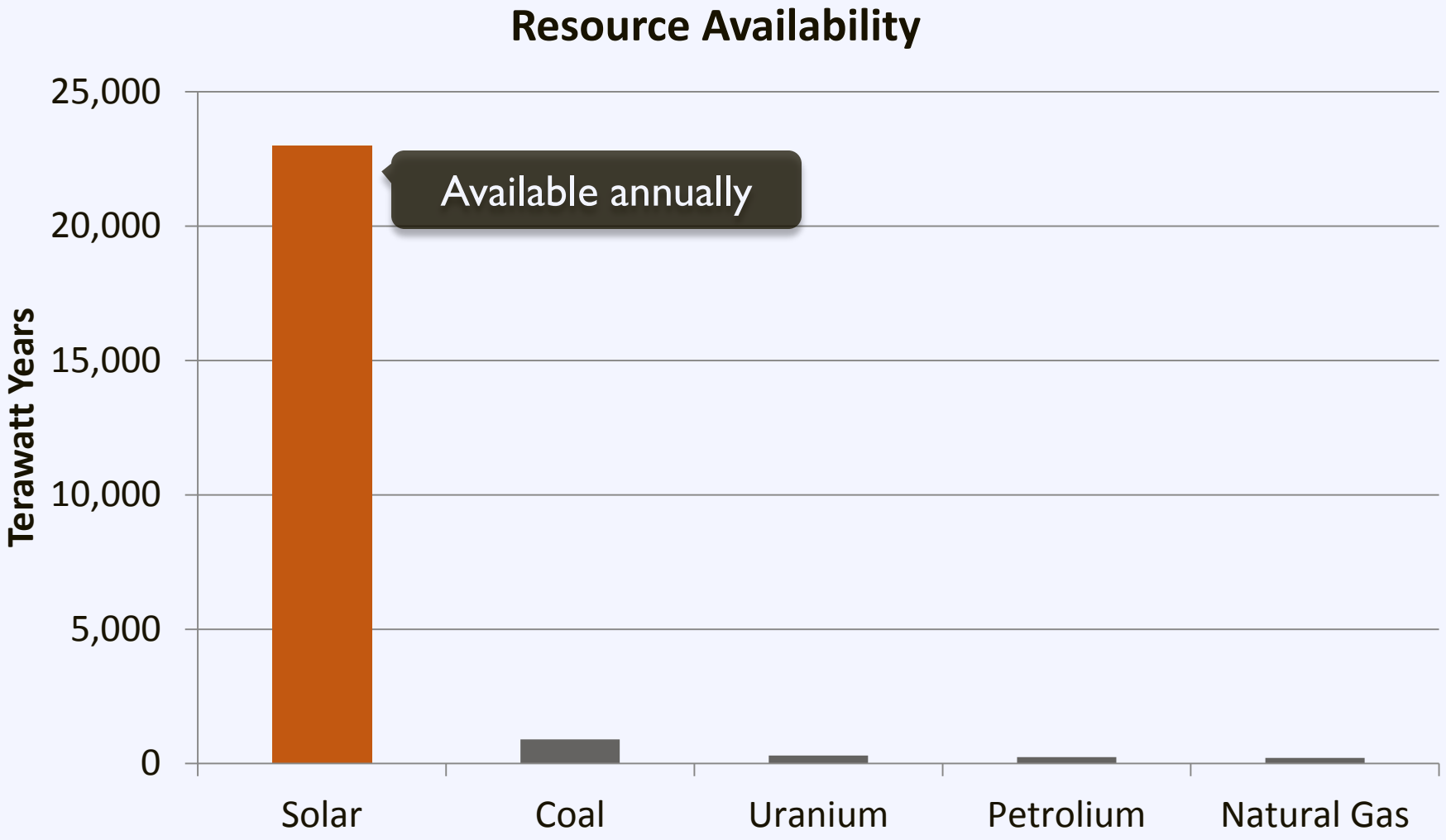
Fact: Solar works across the US



Powered by SunShot U.S. Department of Energy

Source: National Renewable Energy Laboratory

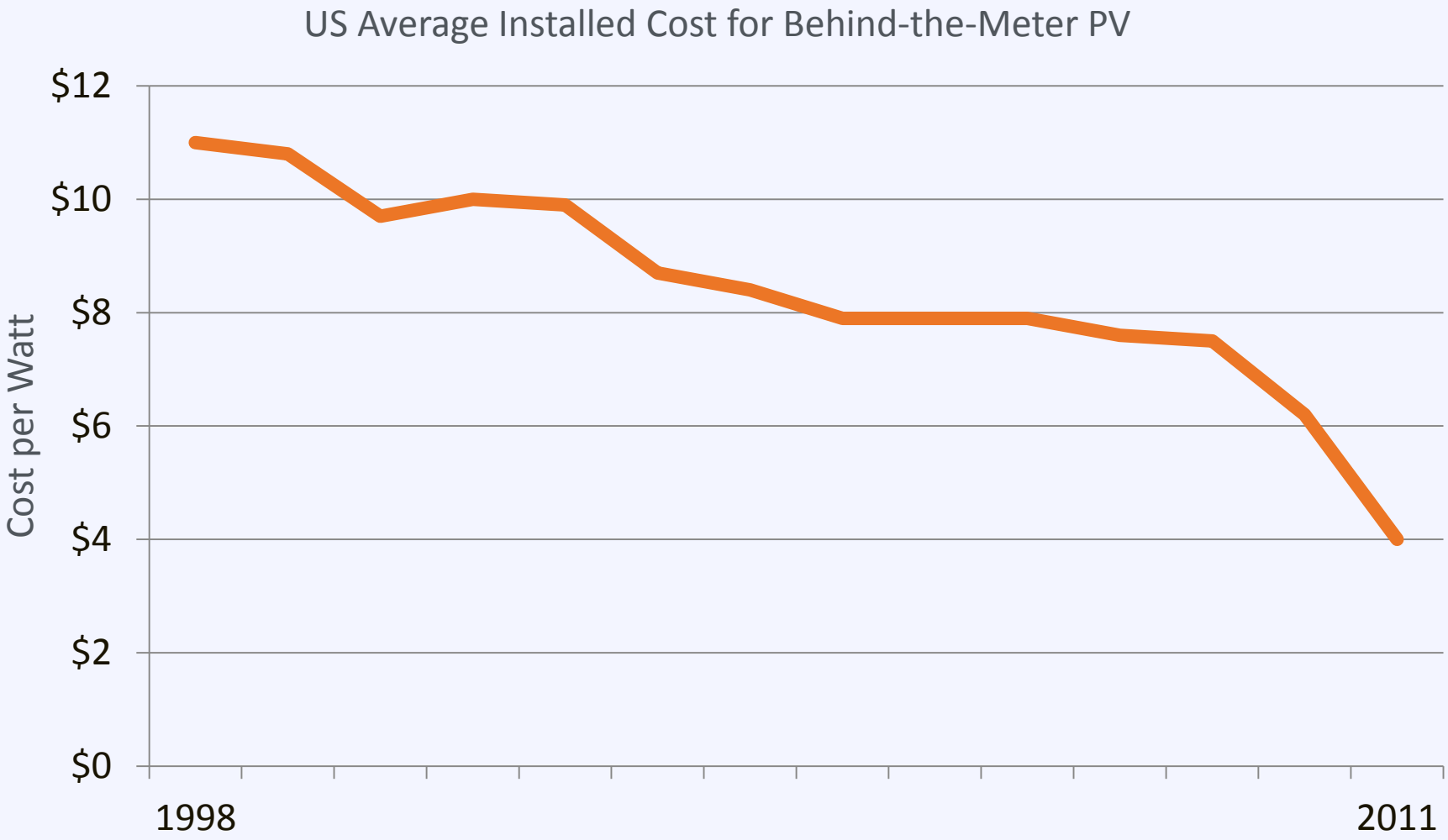
Fact: Solar is a ubiquitous resource



Powered by SunShot U.S. Department of Energy

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

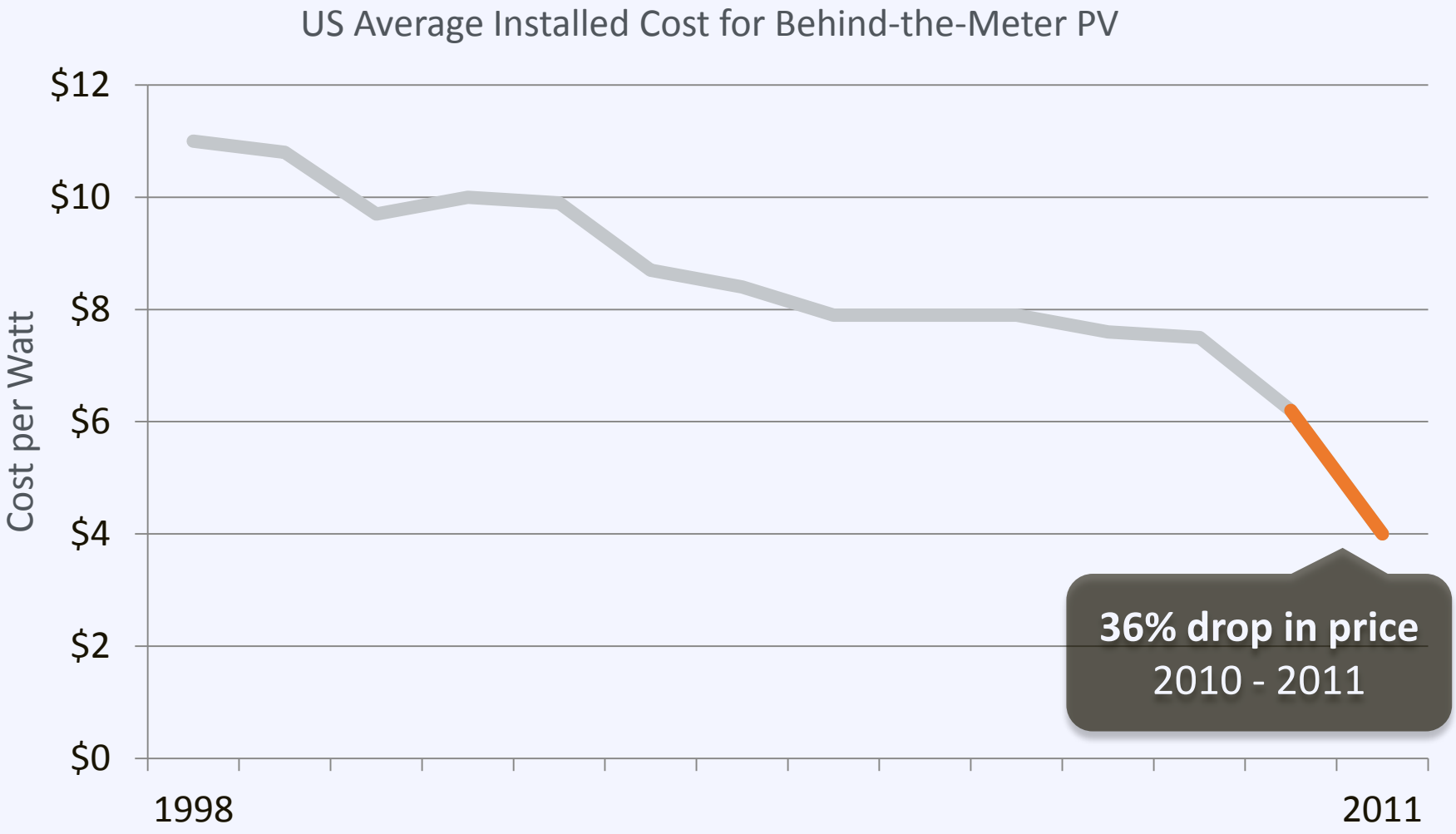
Fact: Solar is cost competitive



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

Powered by SunShot U.S. Department of Energy

Fact: Solar is cost competitive



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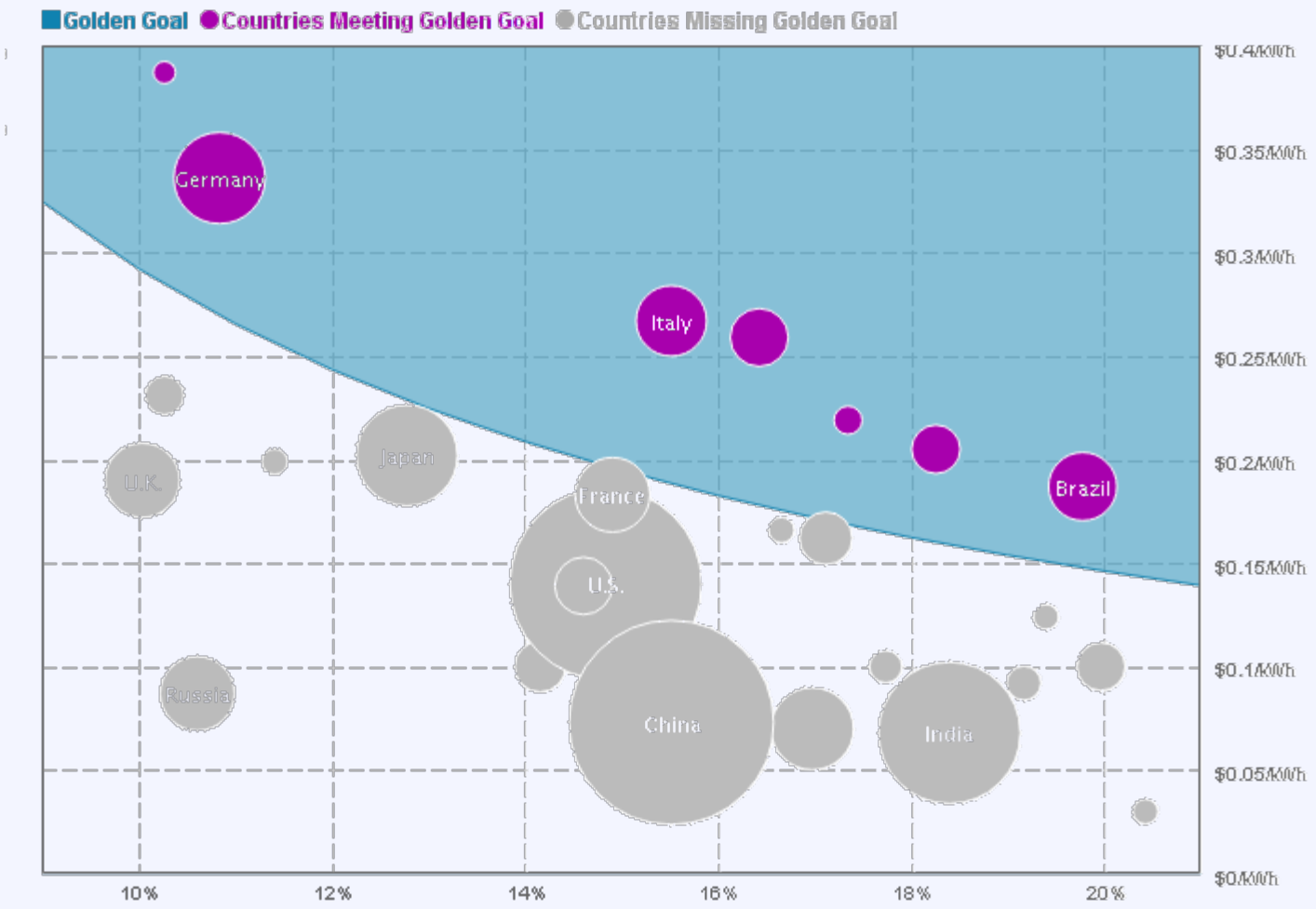
Powered by SunShot U.S. Department of Energy

Fact: Solar is cost competitive

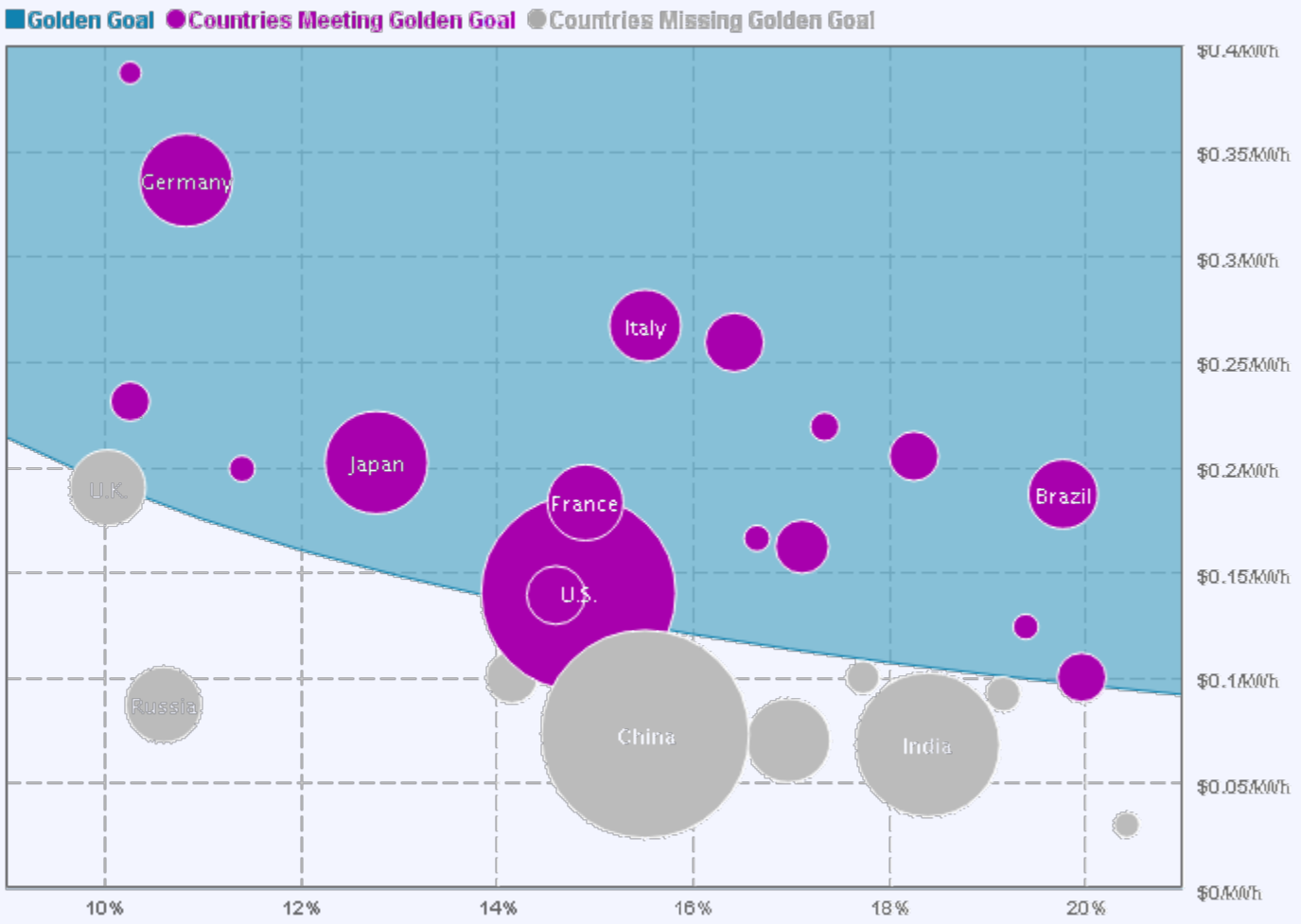
2012



Source: Bloomberg

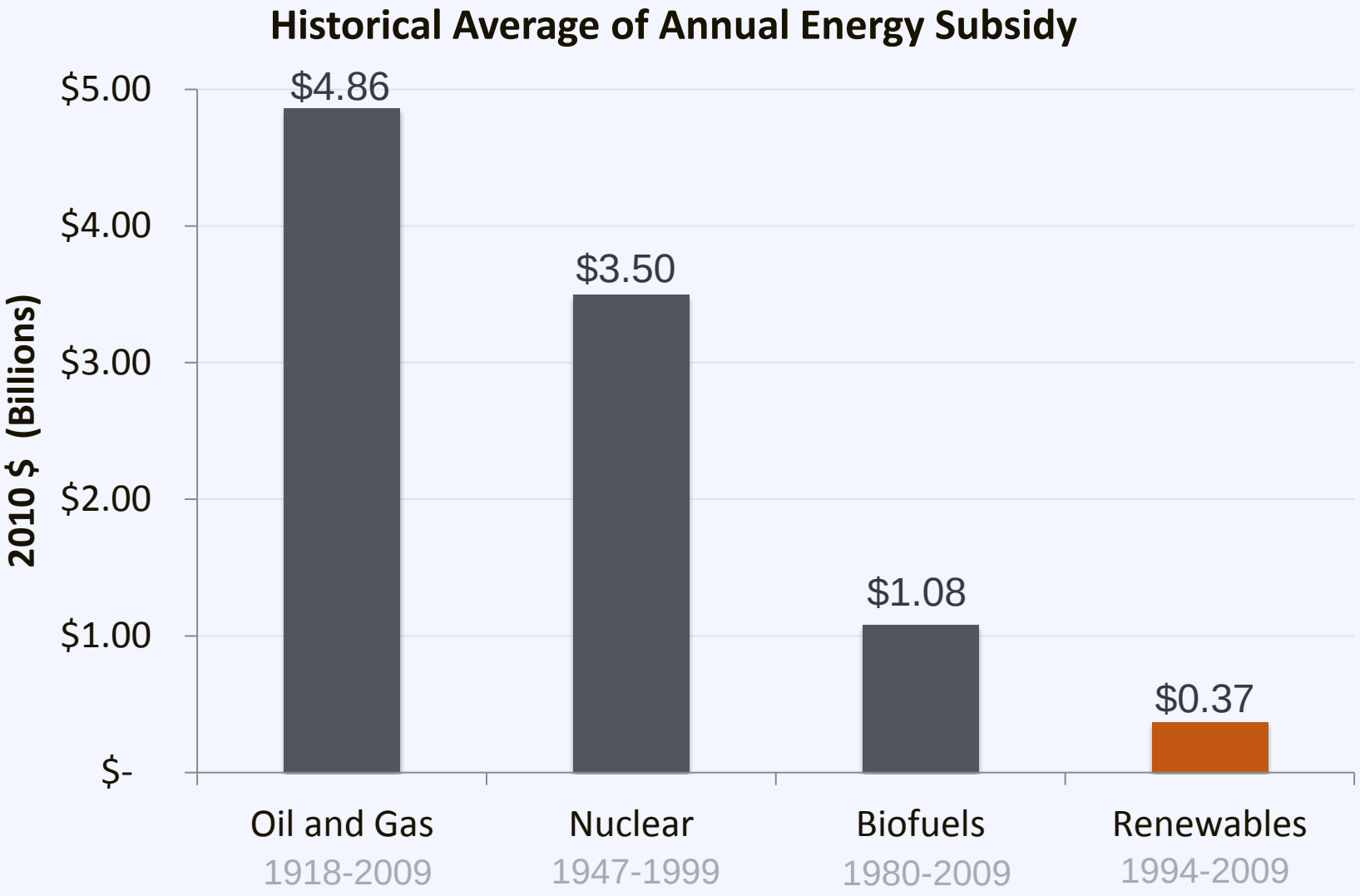
Fact: Solar is cost competitive

2020



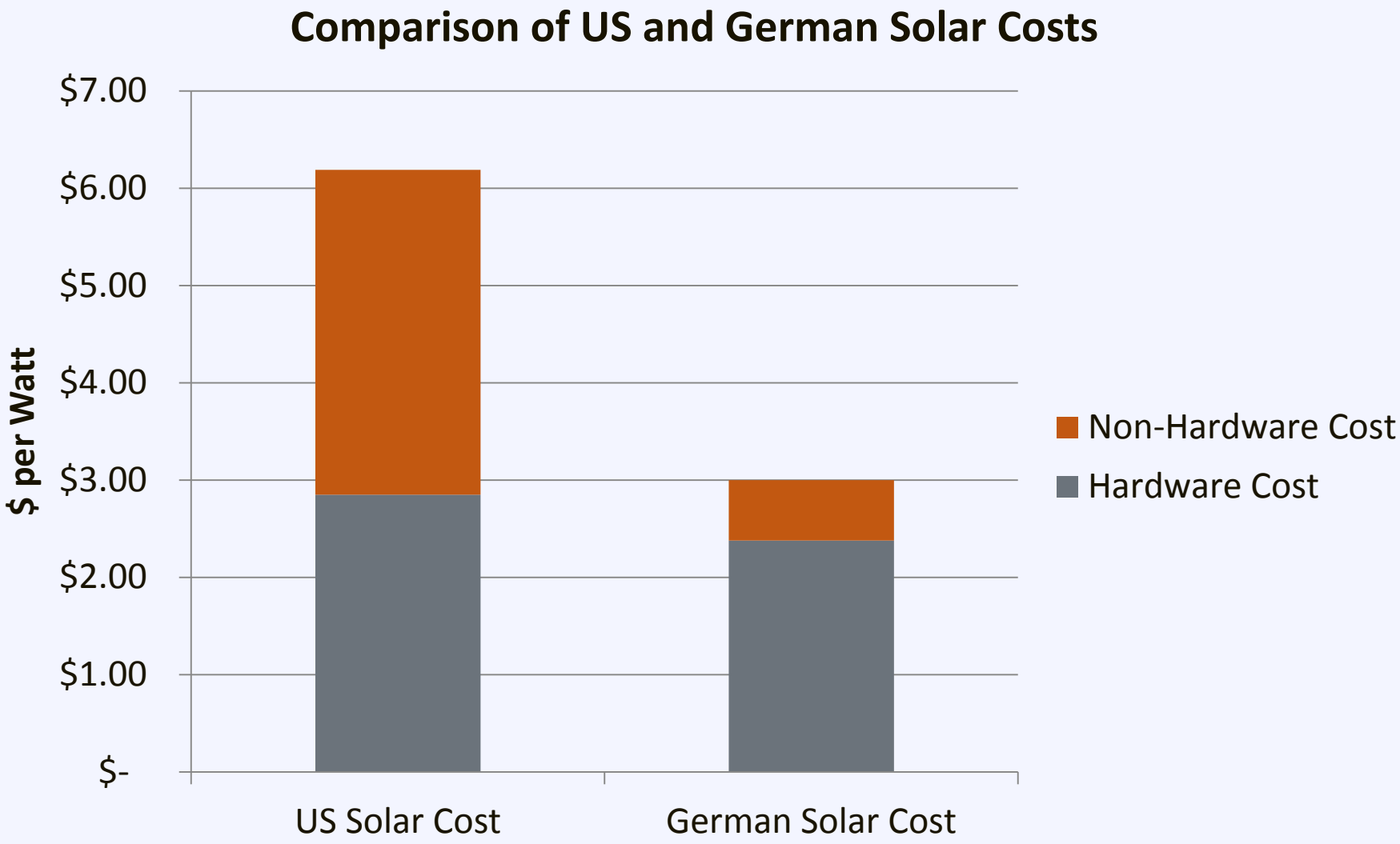
Source: Bloomberg

Fact: All energy is subsidized



Sources: DBL Investors

Barriers Still Exist



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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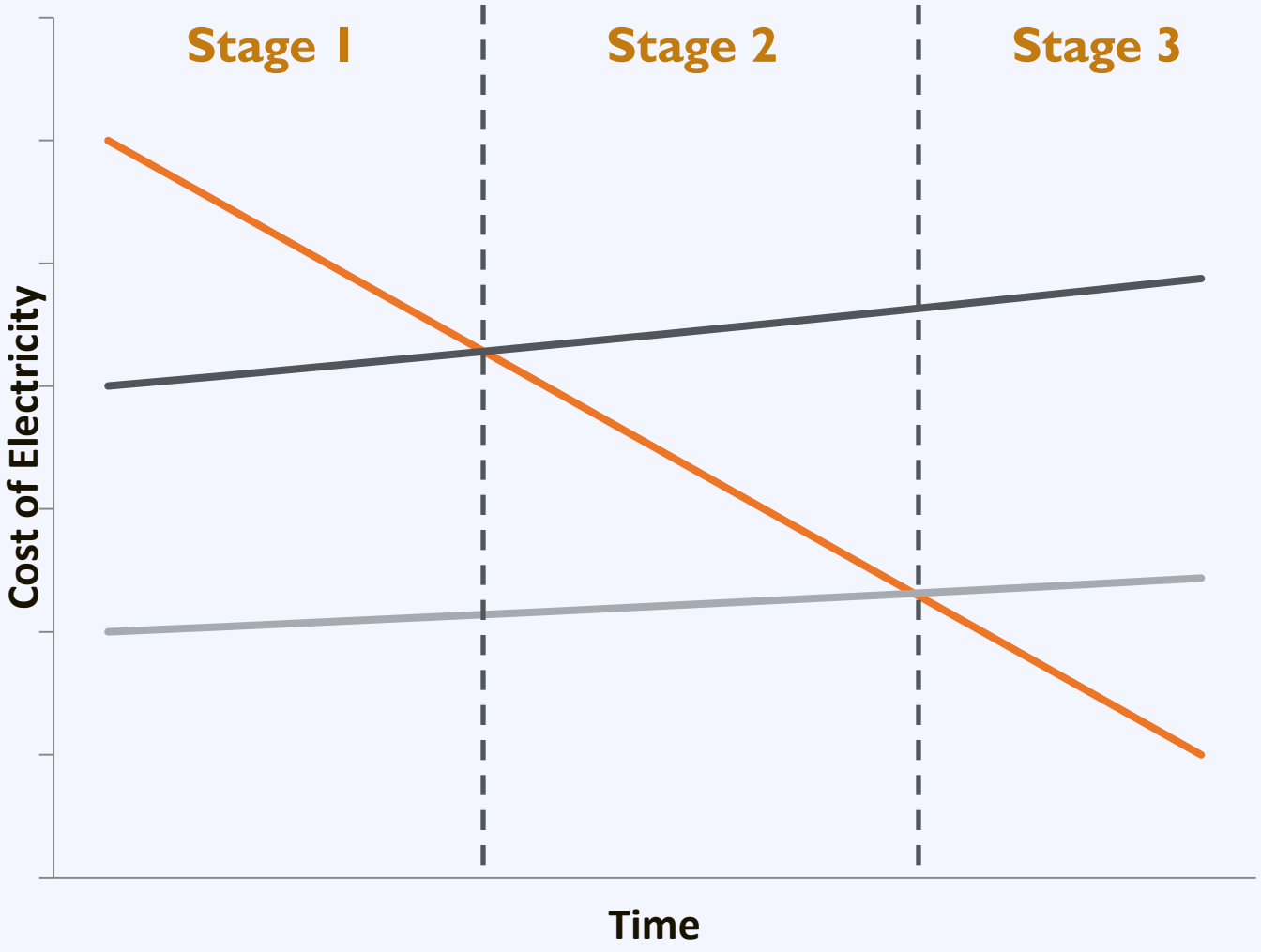
Utility Market Stages



Source: Solar Electric Power Association

Electric Market Status (2010)

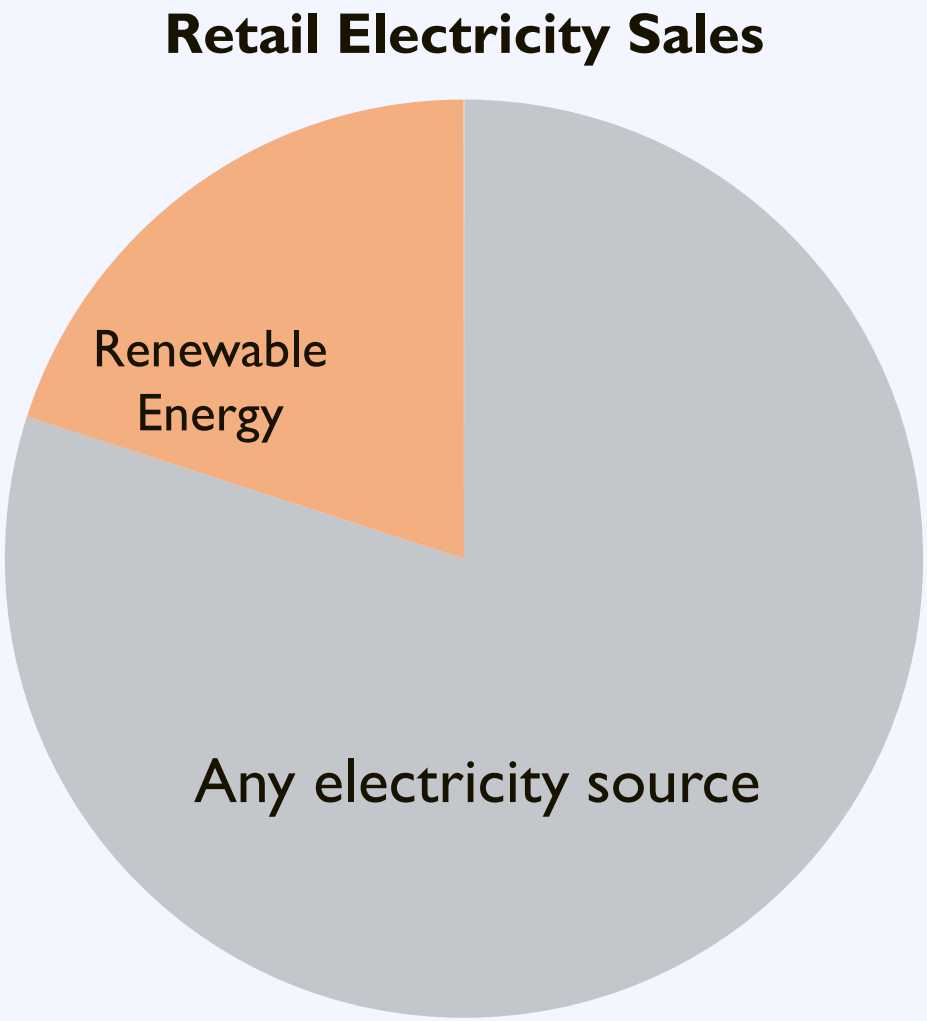
Retail Sales	Investor-Owned	Municipal	Rural Coops	TOTAL
Indiana	80.4%	7.4%	12.2%	105.5 M MWh
Ohio	88.3%	6.6%	5.1%	152.2 M MWh
Kentucky	55.8%	8.9%	35.3%	75.7 M MWh

# Customers	Investor-Owned	Municipal	Rural Coops	TOTAL
Indiana	74.3%	8.4%	17.3%	3,106,396
Ohio	86.1%	6.9%	7.0%	5,442,501
Kentucky	54.5%	9.3%	36.2%	2,230,399

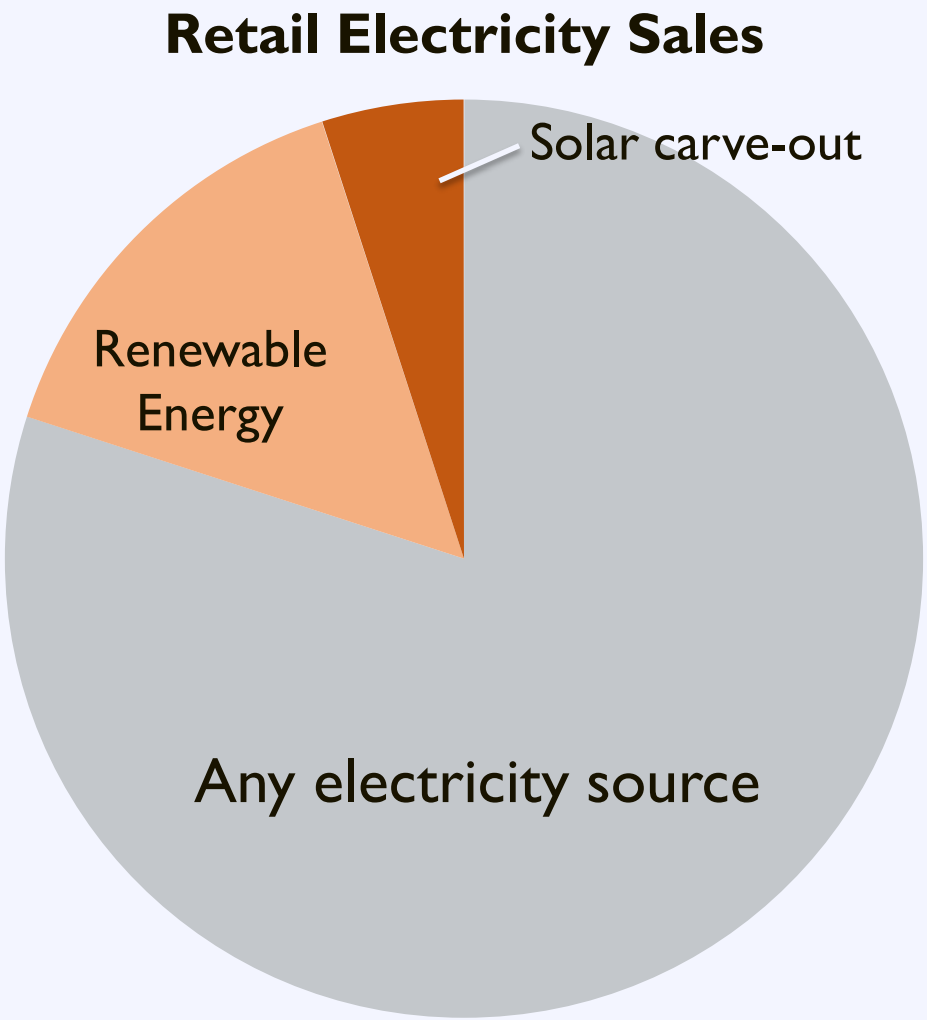
Prices	Investor-Owned	Municipal	Rural Coops	Average
Indiana	7.54¢/kWh	8. 7¢/kWh	10.21¢/kWh	8.05¢/kWh
Ohio	9.70¢/kWh	9.66¢/kWh	10.45¢/kWh	9.75¢/kWh
Kentucky	7.07¢/kWh	7.95¢/kWh	8.65¢/kWh	7.73¢/kWh

Source: US Energy Information Administration

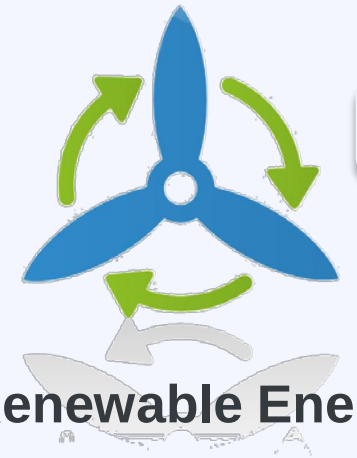
Renewable Portfolio Standard



Renewable Portfolio Standard



Renewable Portfolio Standard

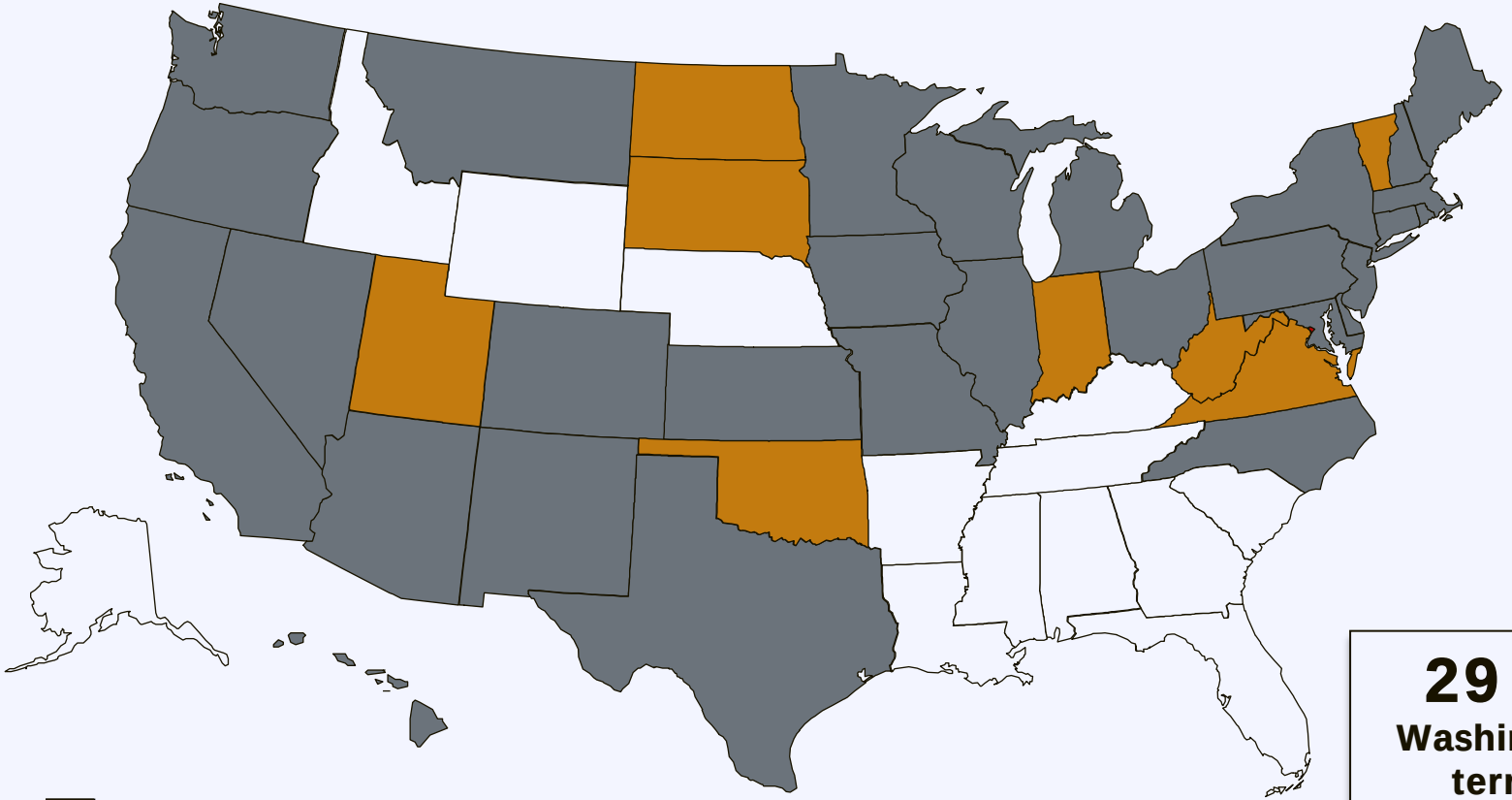


Two revenue streams

e- REC

Renewable Portfolio Standard

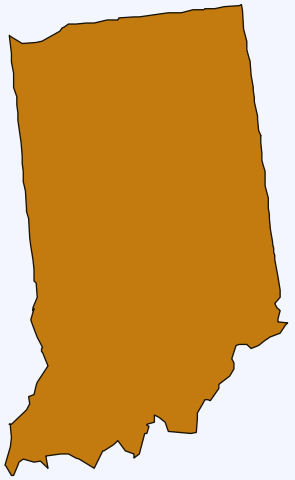
www.dsireusa.org / August 2012



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

Powered by SunShot
U.S. Department of Energy

RPS: Indiana Overview



- Clean Energy Portfolio *Goal*
- 10% of 2010 sales from clean energy by 2025
- No solar carve-out
- Indiana Utility Regulatory Commission (IURC) allows participating utilities to receive incentives to cover the cost of these projects

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

Solar Renewable Energy Credits (SRECs)

Three Requirements:

RPS solar carve out

Unbundled, tradeable credits

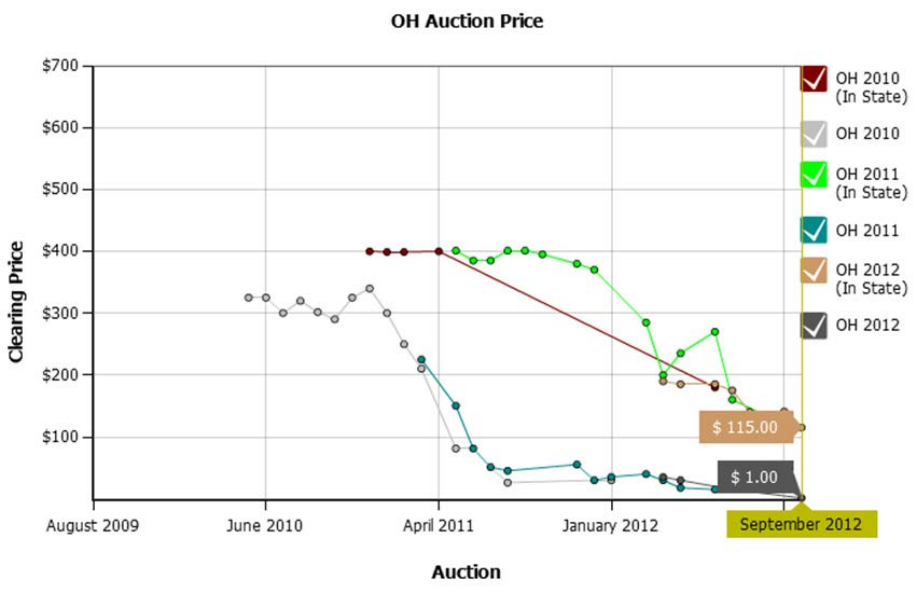
Penalty for non-compliance

– solar alternative compliance payment (SACP)

SRECs in Indiana

As there is no solar carve-out, Indiana lacks a viable SREC market.

However, system owners may be eligible to participate in the OH SREC market.

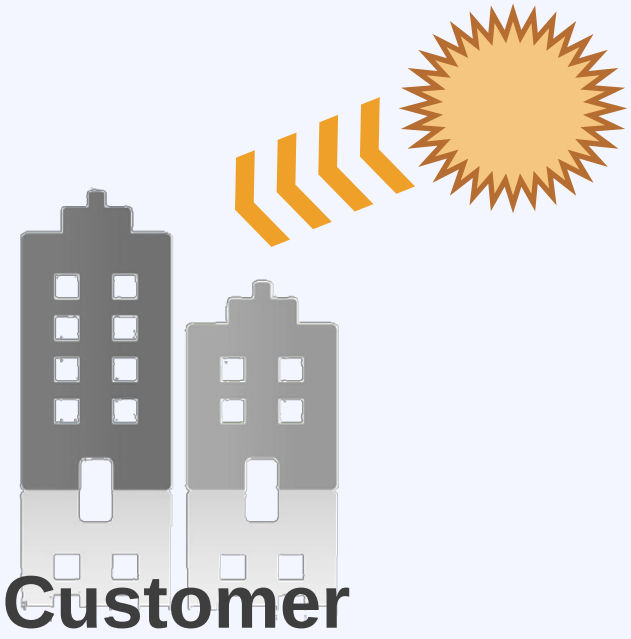


Net Metering

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

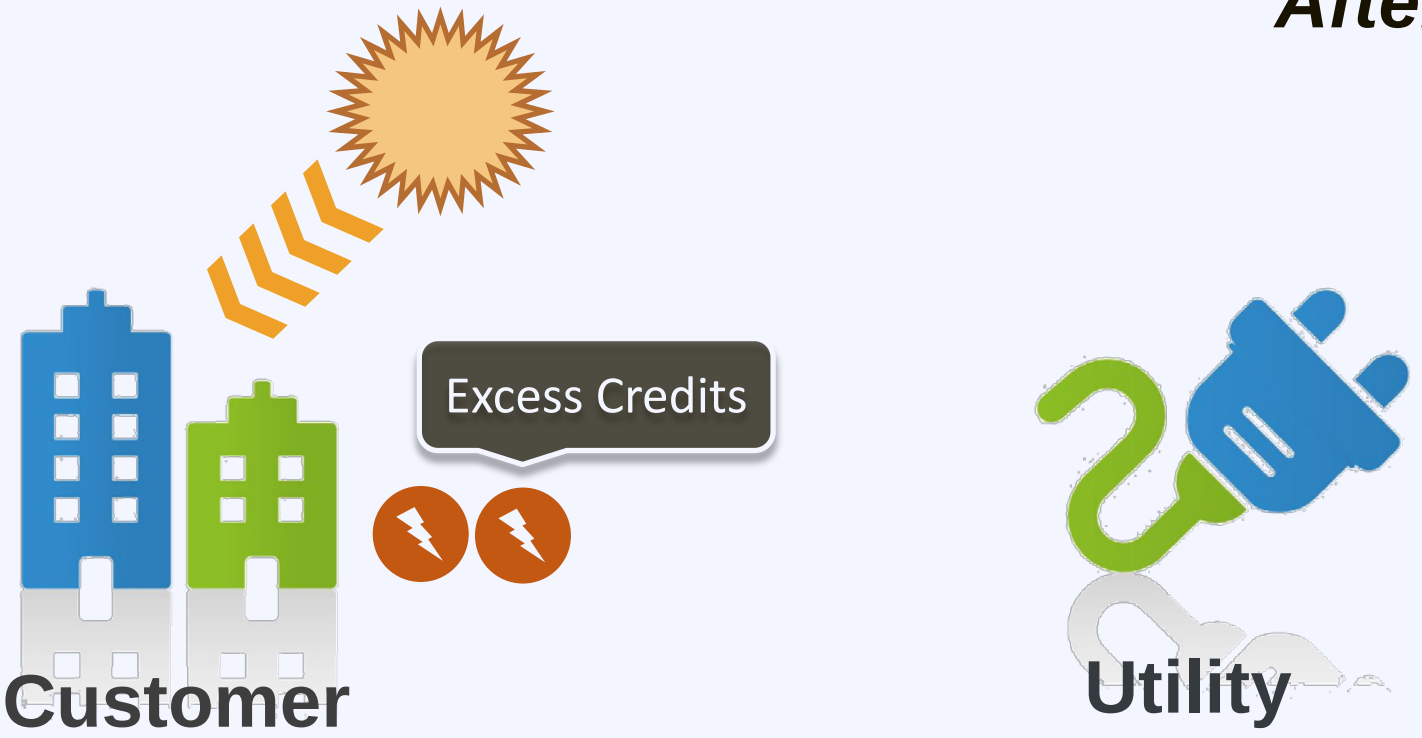
Net Metering: Overview

Morning



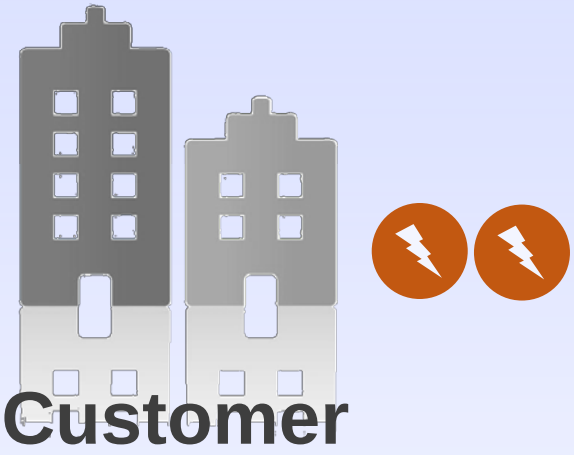
Net Metering: Overview

Afternoon



Net Metering: Overview

Night



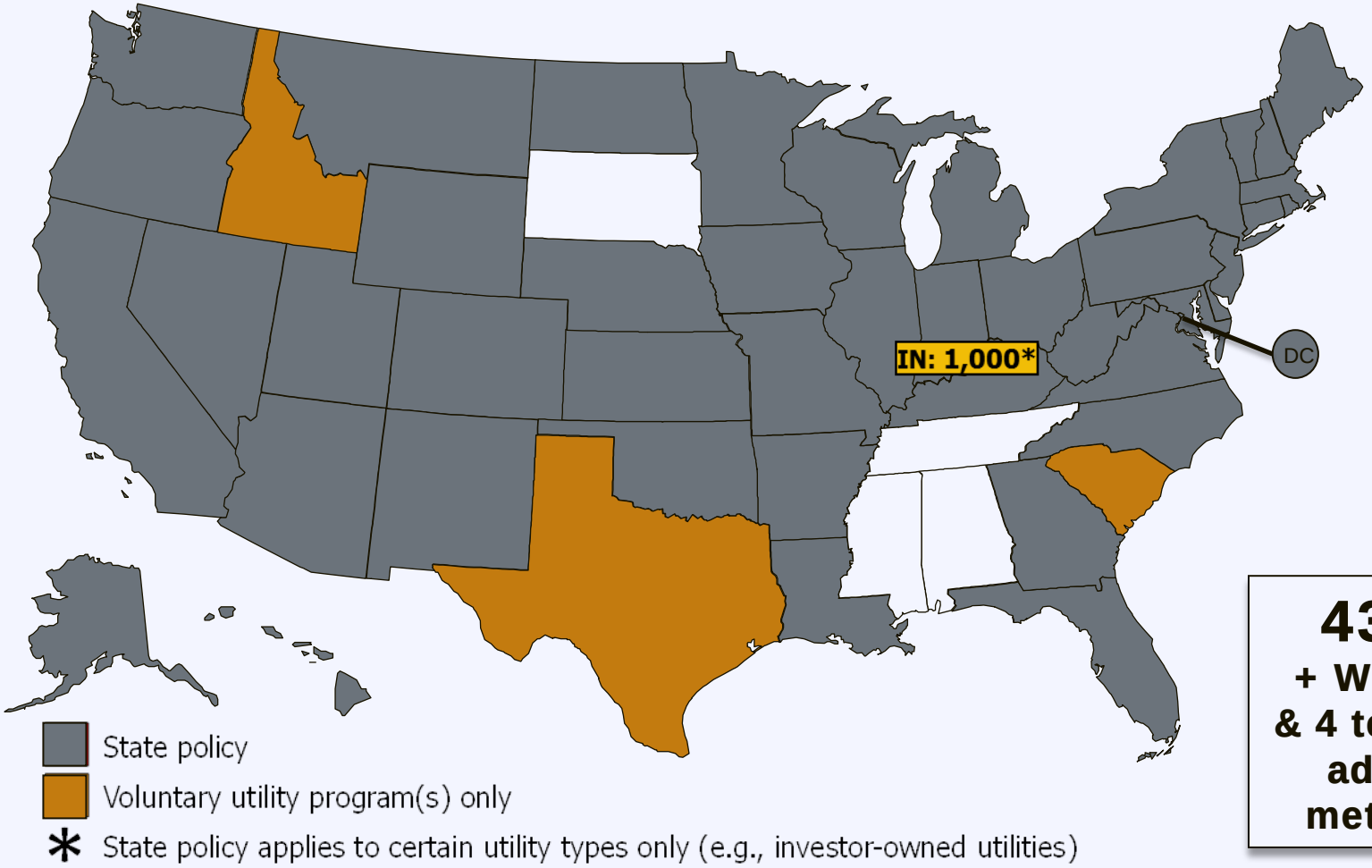
Customer

Utility

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

Net Metering: State Policies

www.dsireusa.org / August 2012



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

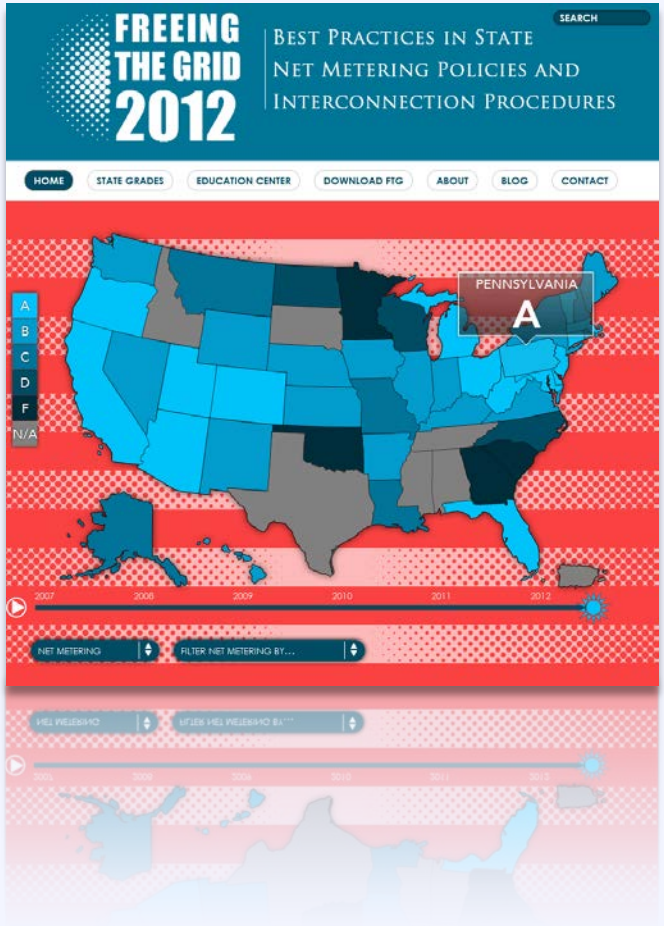
Source: IREC (http://www.irecusa.org/wp-content/uploads/IRECSolarMarketTrends-2012-web.pdf)

Net Metering: Resources

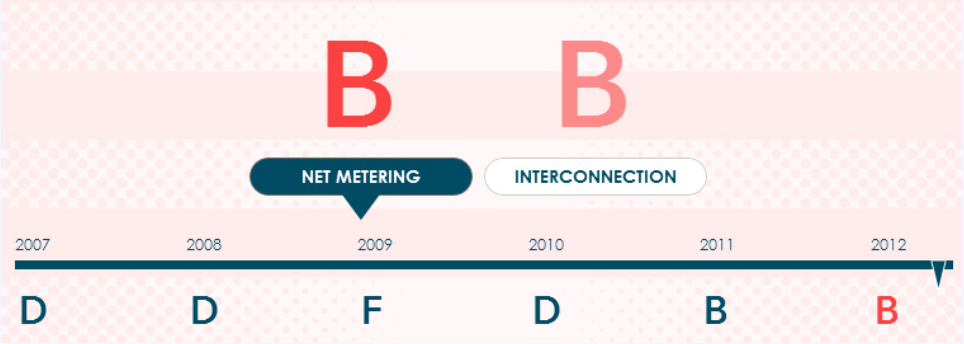
Resource **Freeing the Grid**

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

http://freeingthegrid.org/



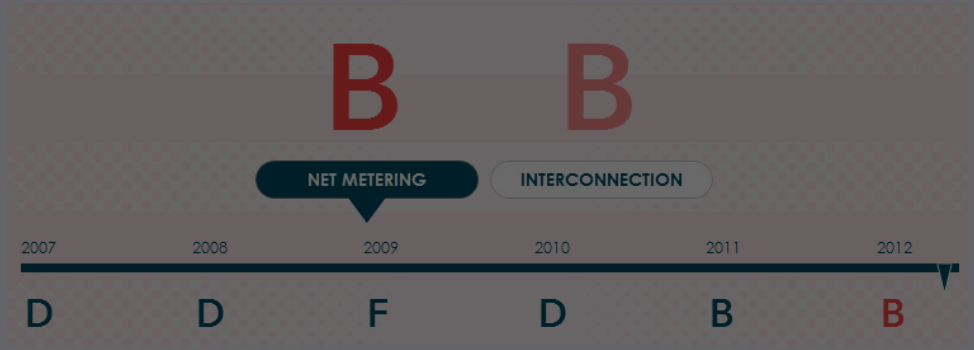
Net Metering: Indiana



Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Fuel Cells, Hydrogen, Small Hydroelectric, Fuel Cells using Renewable Fuels
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Multi-Family Residential, Low-Income Residential, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	1 MW
Aggregate Capacity Limit:	1% of utility's most recent peak summer load
Net Excess Generation:	Credited to customer's next bill at retail rate; carries over indefinitely
REC Ownership:	Not addressed
Meter Aggregation:	Not addressed

Source: Freeing the Grid

Net Metering: Indiana



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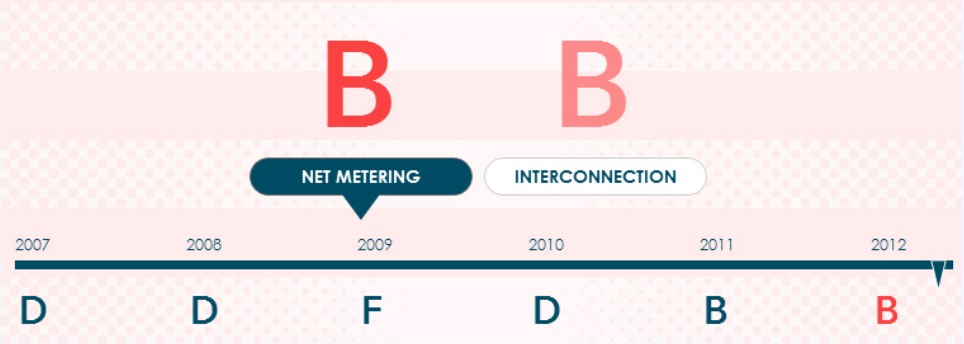
Source: Freeing the Grid

Net Metering: Indiana



RECOMMENDATIONS:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Increase capacity to at least 5% of a utility's peak demand
- Adopt safe harbor language to protect customer-sited generators from extra and/or unanticipated fees
- Expand net metering to all utilities

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Source: Freeing the Grid

Net Metering: Virtual

No direct connection necessary

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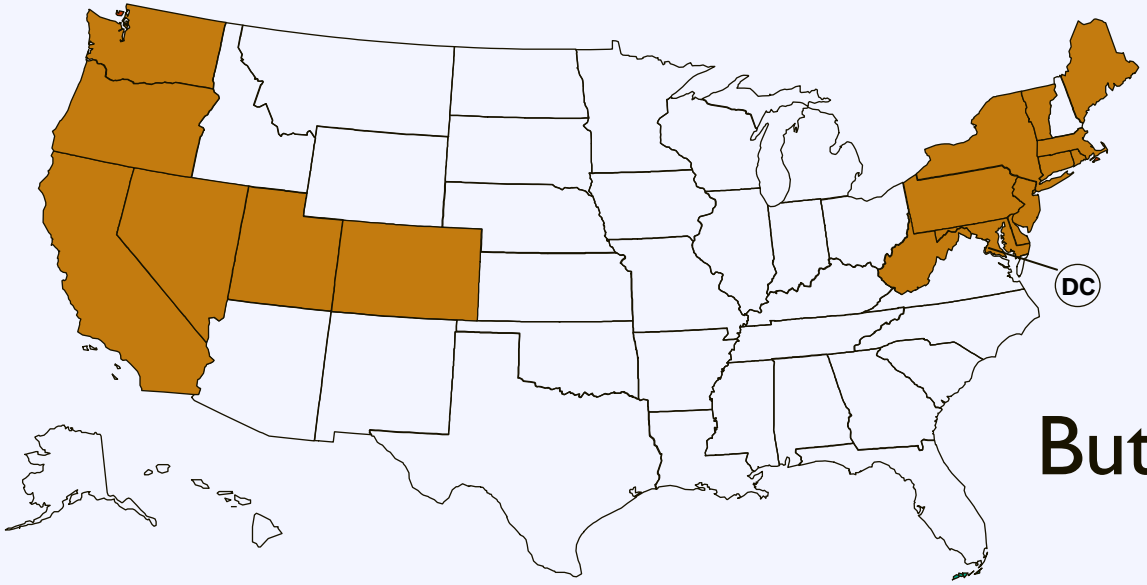
U.S. Department of Energy

Net Metering: Meter Aggregation



But…It's complicated

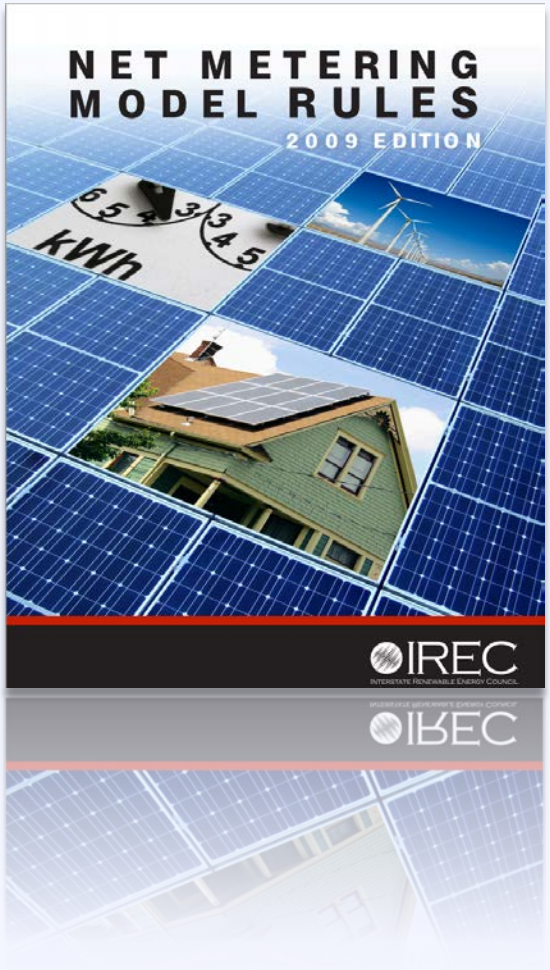
- Ownership requirements
- Contiguous vs. non-contiguous properties
- Multiple customers
- Multiple generators
- Modified system/aggregate system size limits
- Rollover rates
- Distance limitations
- Number of accounts
- How to address accounts on different tariffs

Net Metering: 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

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U.S. Department of Energy

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

Interconnection: Background

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

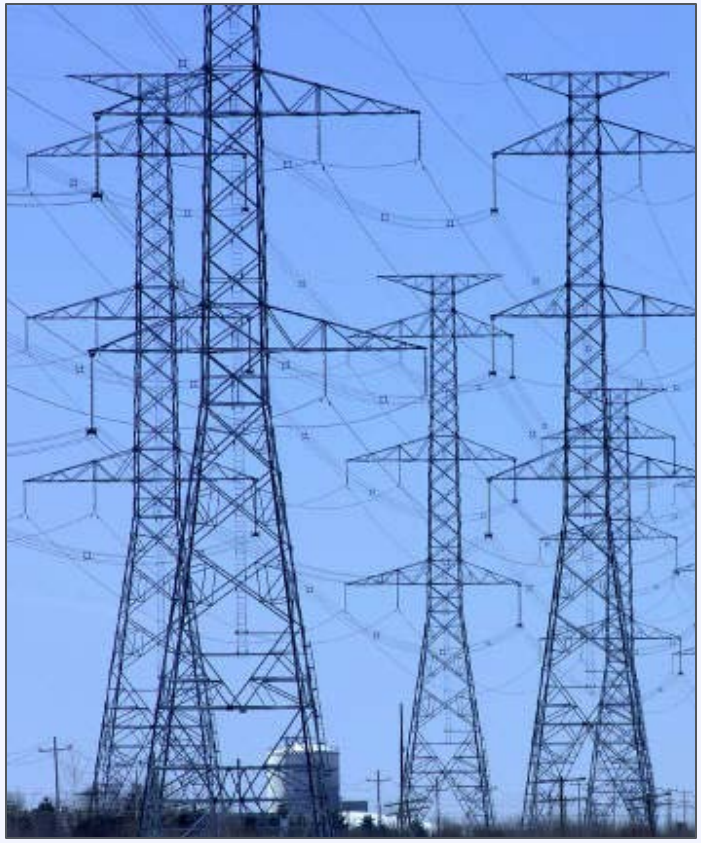
2005: Congress requires state regulator authorities to consider an interconnection standard (IEEE 1547)

2012: 43 States & DC have adopted interconnection standards

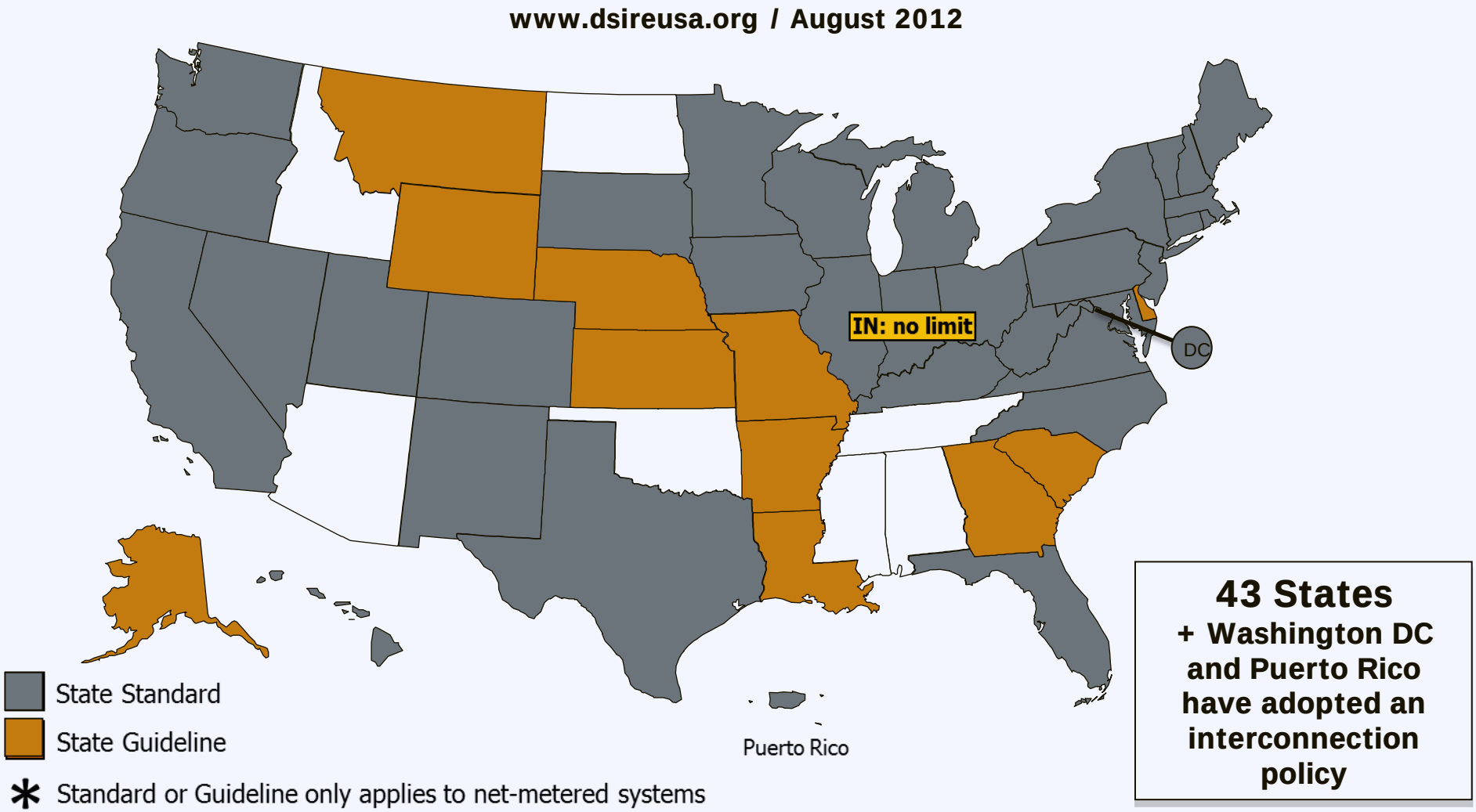
- CA Rule 21
- FERC SGIP
- MADRI Procedures
- IREC Procedures

Interconnection: Best Practices

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



Interconnection: State Policies



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

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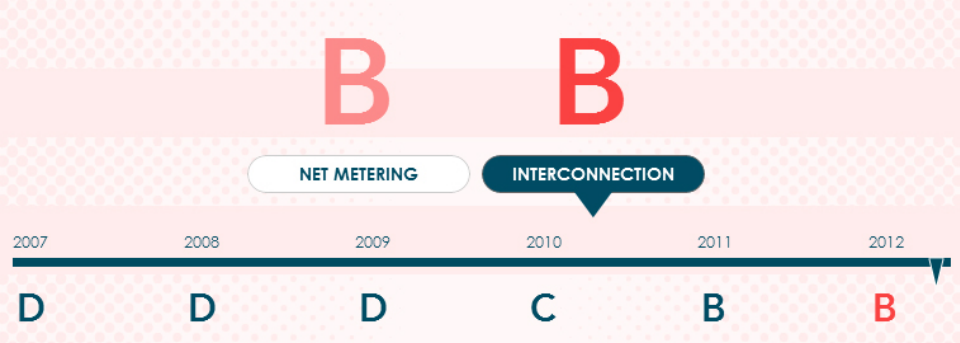
U.S. Department of Energy

Interconnection: Indiana



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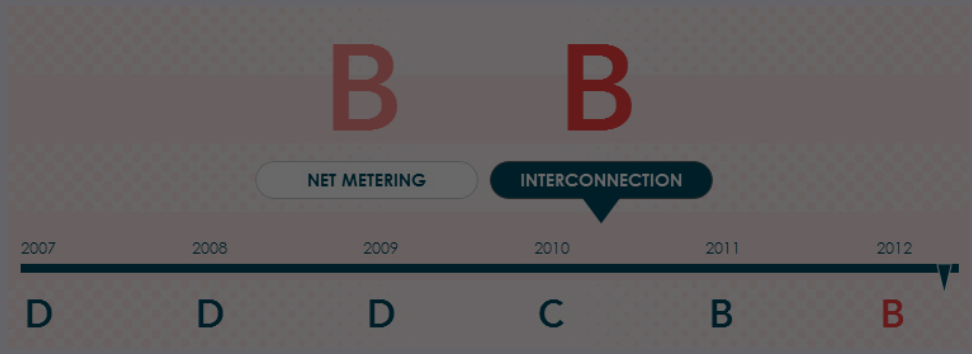
Applicable Utilities:	Investor-owned utilities, regulated municipal utilities, regulated electric cooperatives
System Capacity Limit:	No limit specified
Standard Agreement:	Yes
Insurance Requirements:	Amount specified by IURC for net-metered systems; not specified for other systems
External Disconnect Switch:	Utility's discretion
Net Metering Required	No

Source: Freeing the Grid

Interconnection: Indiana



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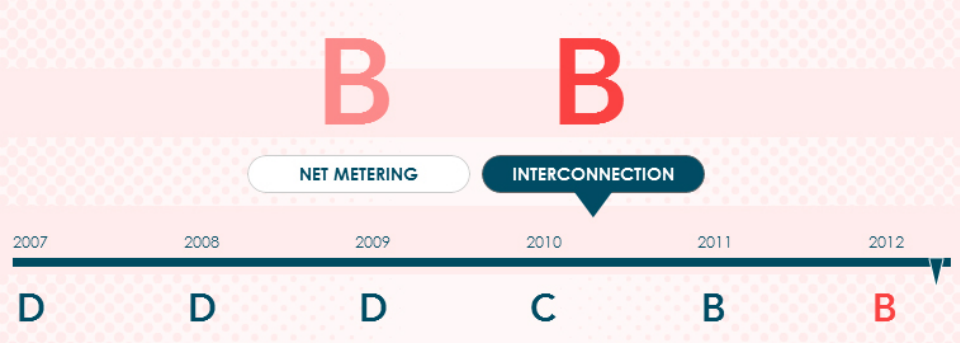

Recommendations:

- Prohibit utility's discretion for redundant external disconnect switch

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Fuel Cells using Renewable Fuels, Microturbines, Other Distributed Generation Technologies
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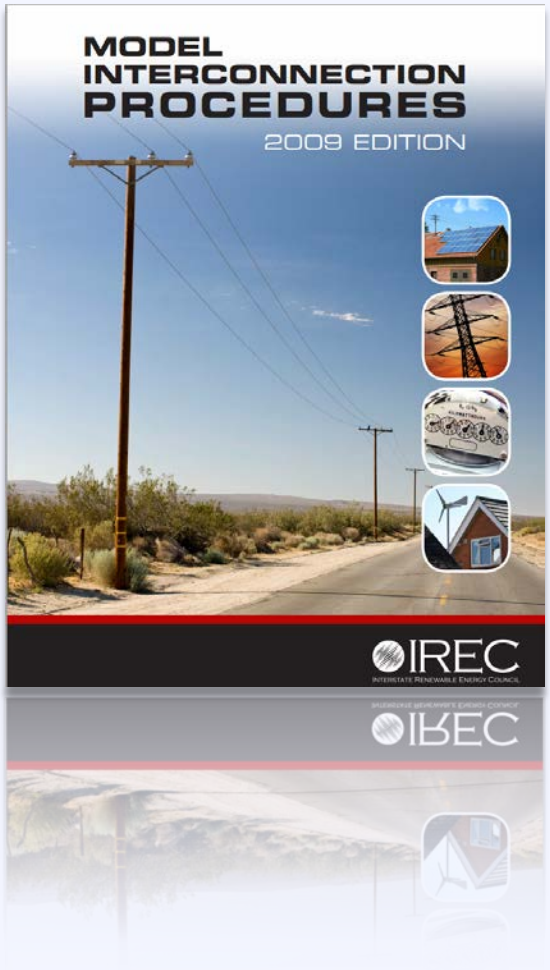
www.irecusa.org



Agenda

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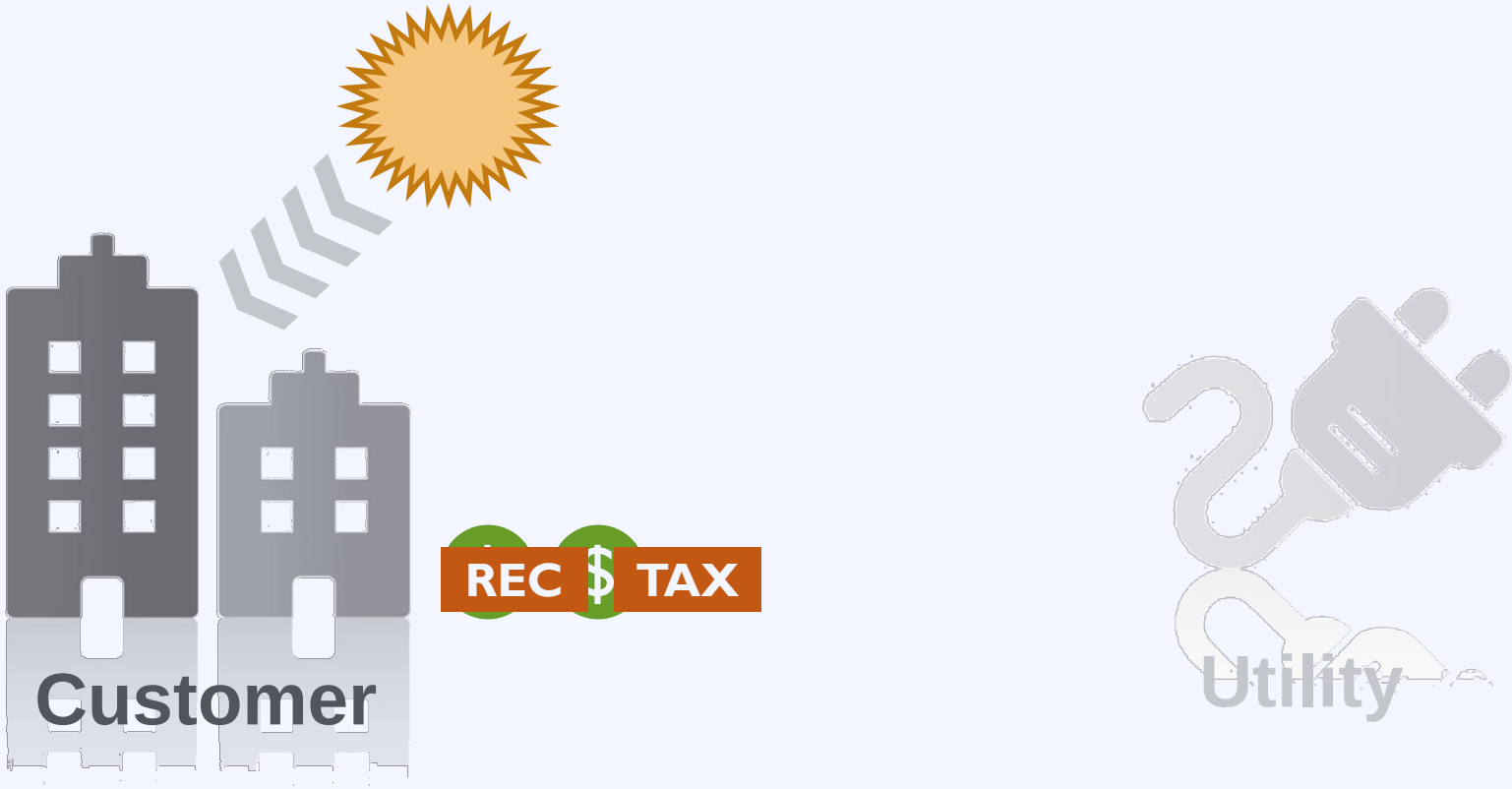
Ownership Options

Direct Ownership

Third-Party Ownership

Direct Ownership



Direct Ownership

Cost

+ Installed Cost

+ Maintenance

- Direct Incentive

Benefit

+ Avoided Energy Cost

+ Excess Generation

+ Performance Incentive

Direct Ownership

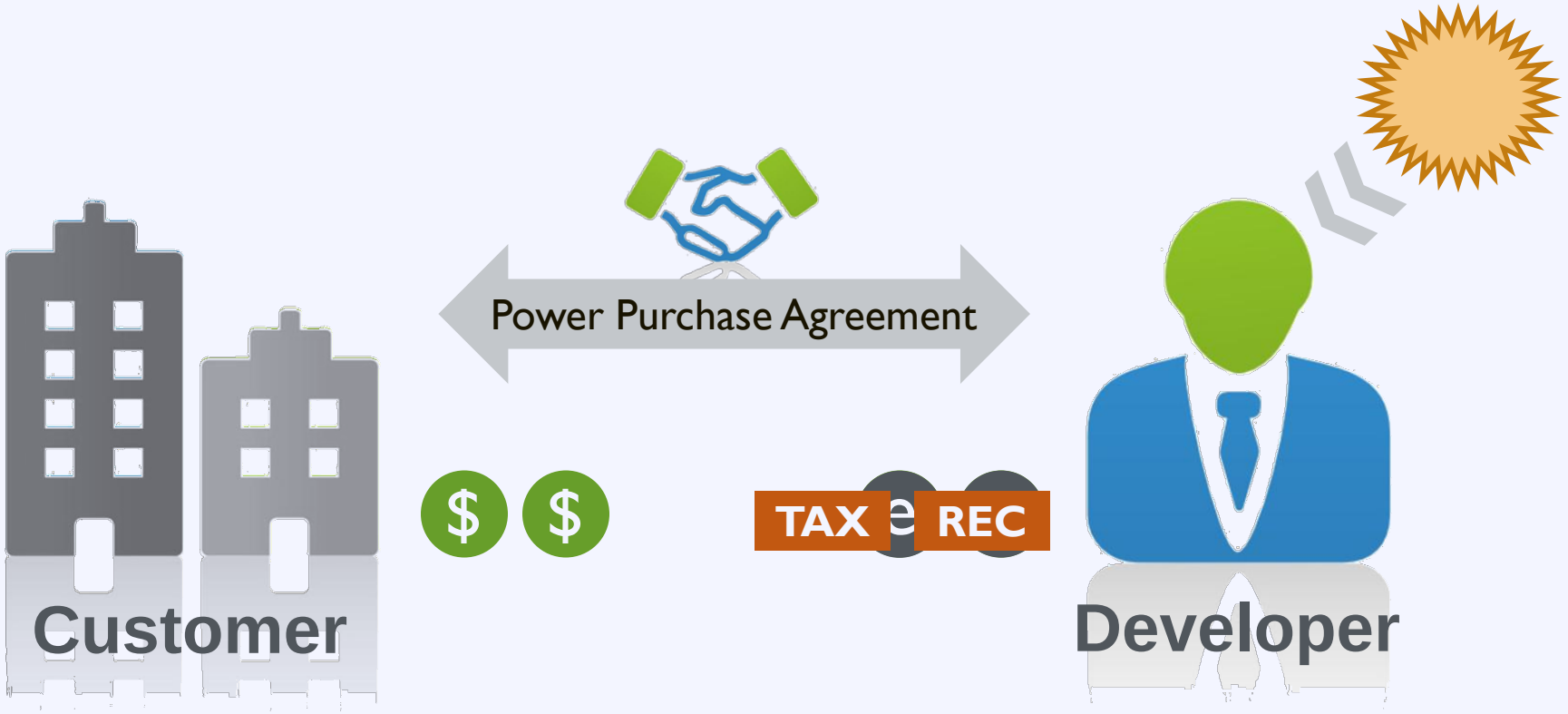
Local Government

REC

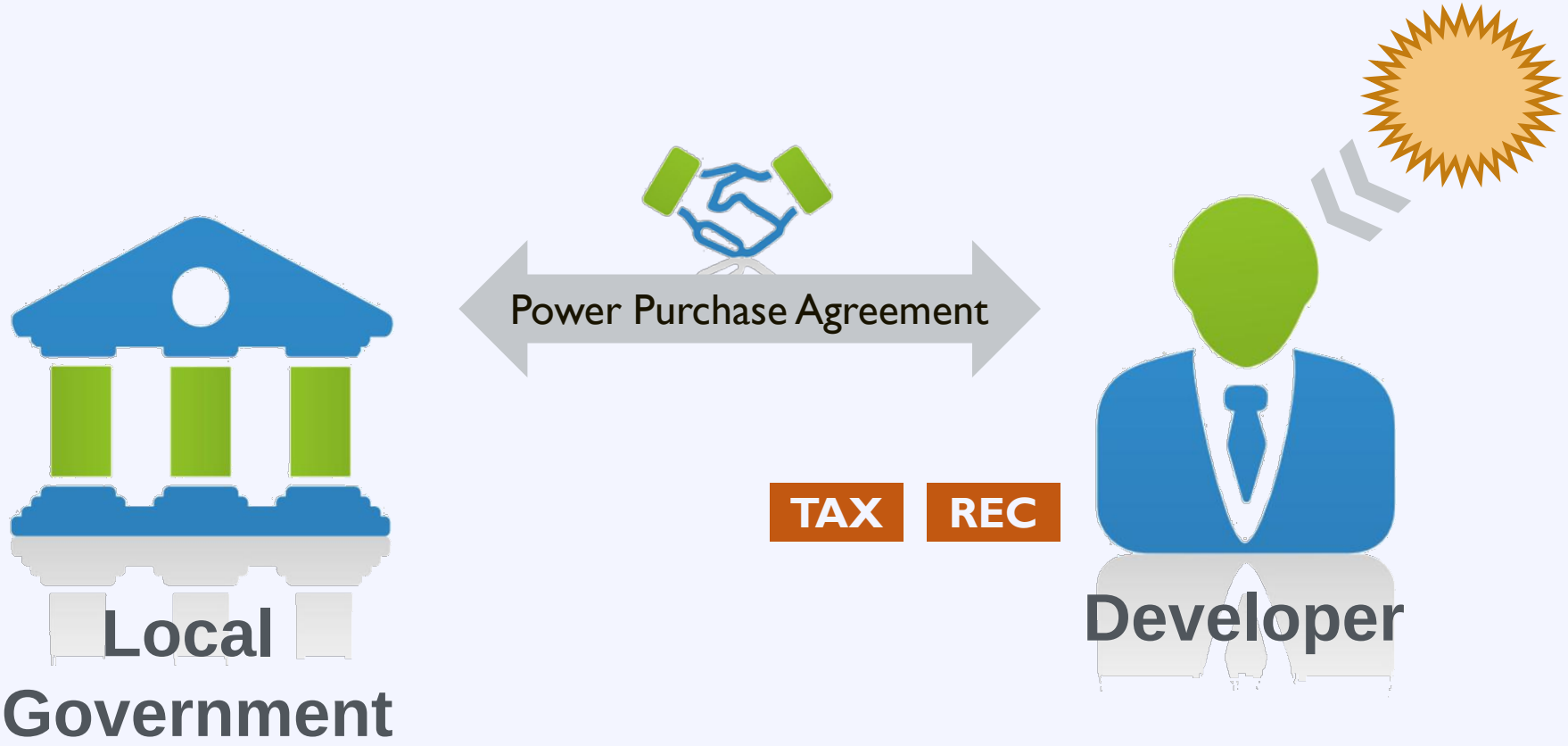
~~TAX~~

Utility

Third Party Ownership



Third Party Ownership



Third Party Ownership

Cost

+ PPA or Lease Rate

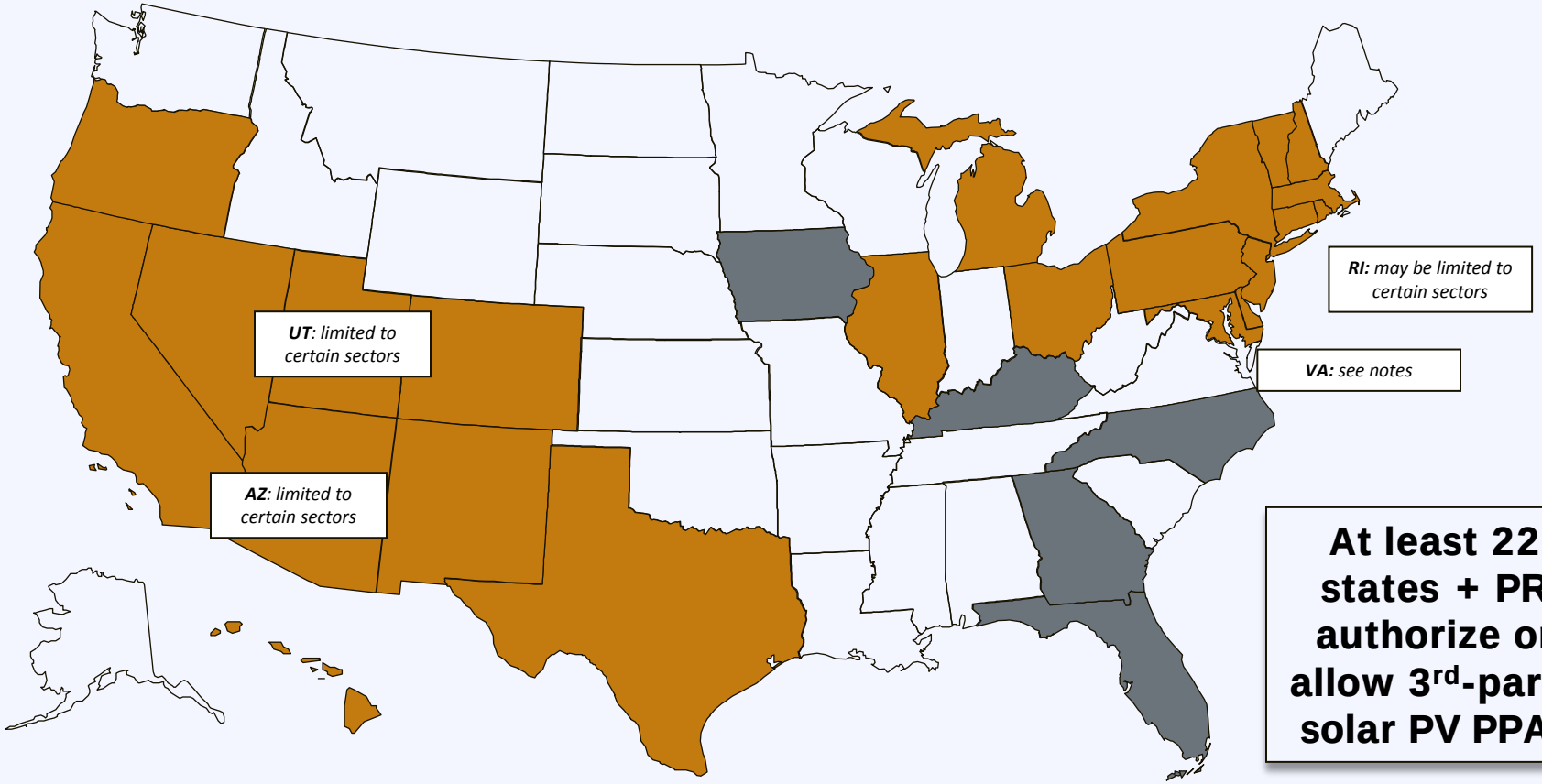
Benefit

+ 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 Clean Energy Bonds	
State	Clean Energy Credits	Sales Tax Exemption	Property Tax Exemption
Utility	**IPL** Feed in Tariff	**IPL** Rebate	**NIPSCO** Feed in Tariff

Incentives

Federal	Investment Tax Credit	Qualified Conservation Energy Bonds	
State	Clean Energy Credits	Sales Tax Exemption	Property Tax Exemption
Utility	**IPL** Feed in Tariff	**IPL** Rebate	**NIPSCO** Feed in Tariff

Incentives: Federal

Investment Tax Credit

Type: Tax Credit

Eligibility: For-Profit Organization

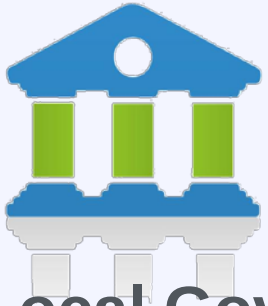
Value: 30% of the installation cost

Availability: Through 2016

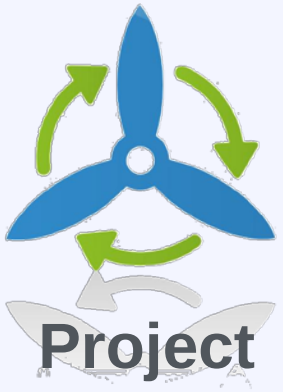
Incentives: Federal

Incentives: Federal

US Treasury



Local Gov



Project

QCEB

Community

Incentives

Federal	Investment Tax Credit	Qualified Clean Energy Bonds	
State	Clean Energy Credits	Sales Tax Exemption	Property Tax Exemption
Utility	**IPL** Feed in Tariff	**IPL** Rebate	**NIPSCO** Feed in Tariff

Incentives: State

Clean Energy Credits

Type: Performance Based Incentive

Eligibility: Everyone

Value: Unknown

Availability: Starting 2013

Incentives: State

Sales Tax Exemption

Type: Tax Exemption

Covers: Equipment & Machinery *

Value: 100% of the sales tax

** While there is an explicit exemption for wind energy systems, it is unclear if this exemption applies to solar as well*

Source: DSIRE, Laura Arnold

Incentives: State

Property Tax Exemption

Type: Tax Exemption

Value: Installation market value

Availability: Starting January 2012

Source: DSIRE

Incentives

Federal	Investment Tax Credit	Qualified Clean Energy Bonds	
State	Clean Energy Credits	Sales Tax Exemption	Property Tax Exemption
Utility	**IPL** Feed in Tariff	**IPL** Rebate	**NIPSCO** Feed in Tariff

Incentives: Utility

IPL Rebate

Type: Direct Cash Incentive

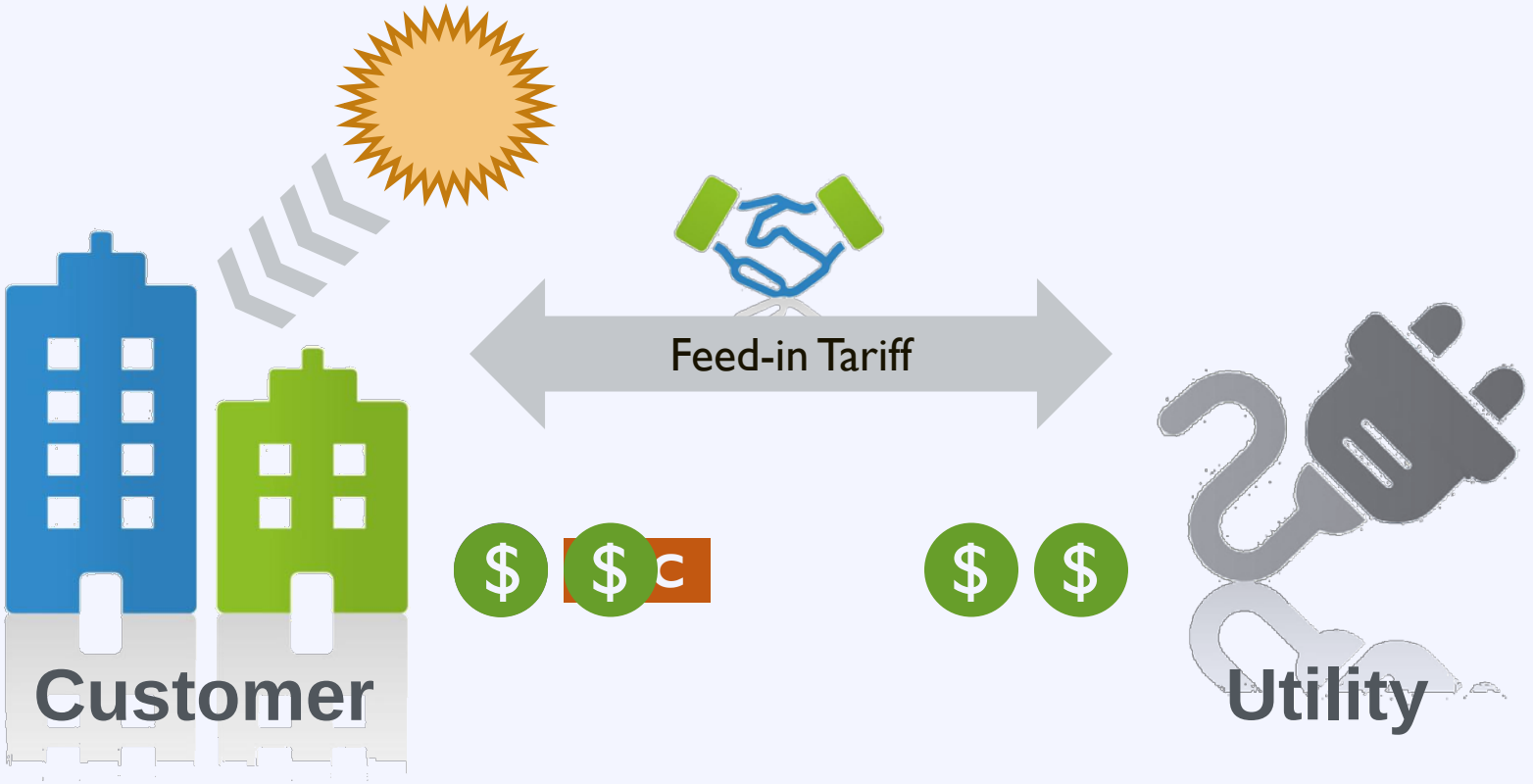
Value: $2 per Watt for projects 1 – 19.9 kW

Budget: $200,000

Availability: Through 2013

Source: DSIRE

Feed in Tariff



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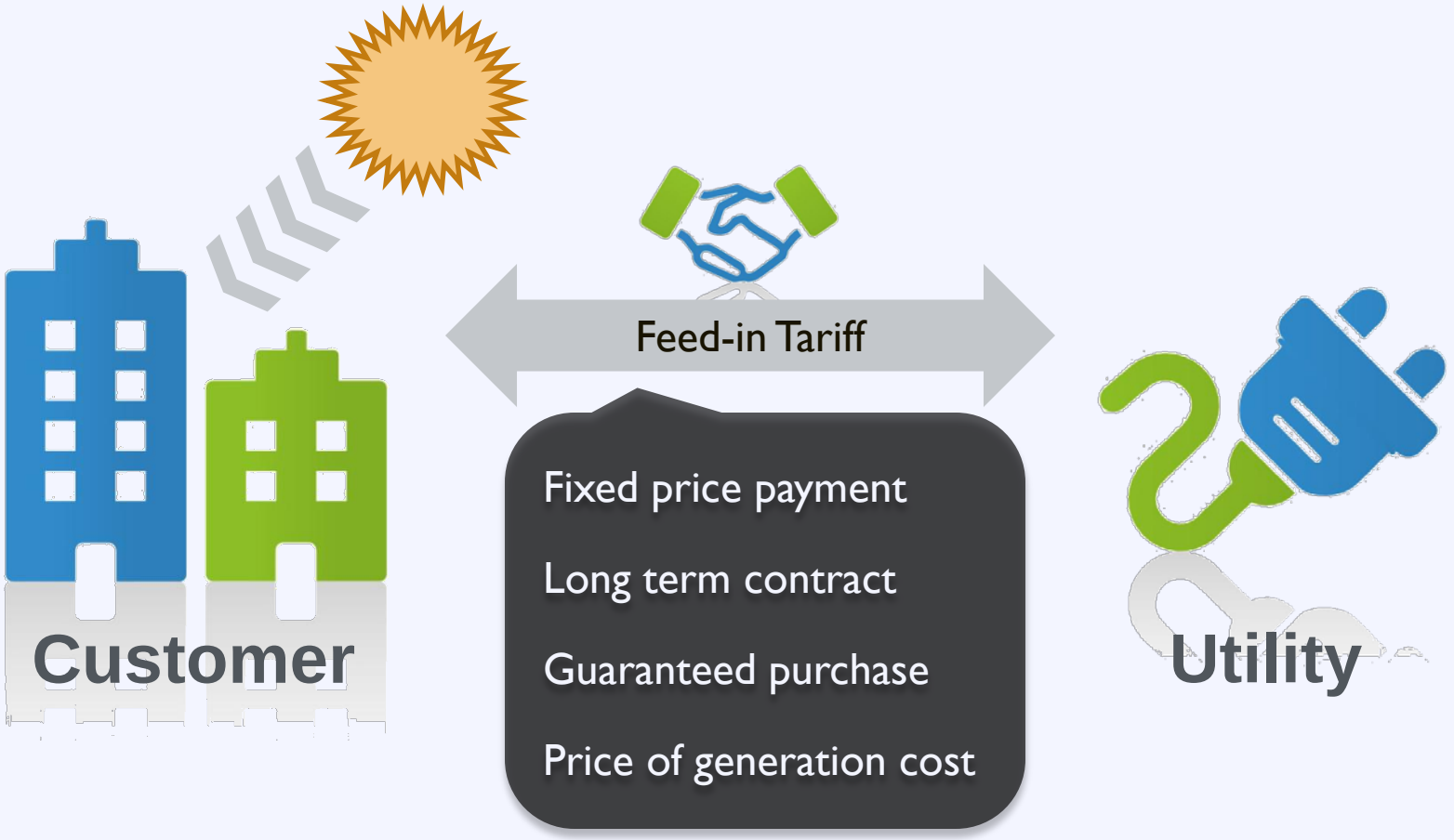

Incentives: Utility

IPL Feed-in Tariff (REP)

Term: 15 Years

Value: 20 – 100 kW = $0.24 / kWh

100 kW – 1 MW = $0.20 / kWh

**Note: 30% is priced through a reverse auction*

Limit: Up to 153,000 MWh per year

Sign Up Deadline: October 1, 2012

Source: DSIRE

Incentives: Utility

NIPSCO Feed-in Tariff

Term: 15 Years

Value: Up to10 kW = $0.30 / kWh + 2% Escalator

10 kW – 2 MW = $0.26 / kWh + 2% Escalator

Limit: 30 MW

Availability: Through 2013

Source: DSIRE

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John Hazlett

Director of Sustainability

City of Indianapolis

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U.S. Department of Energy

Laura Arnold

President

Indiana Distributed Energy Alliance

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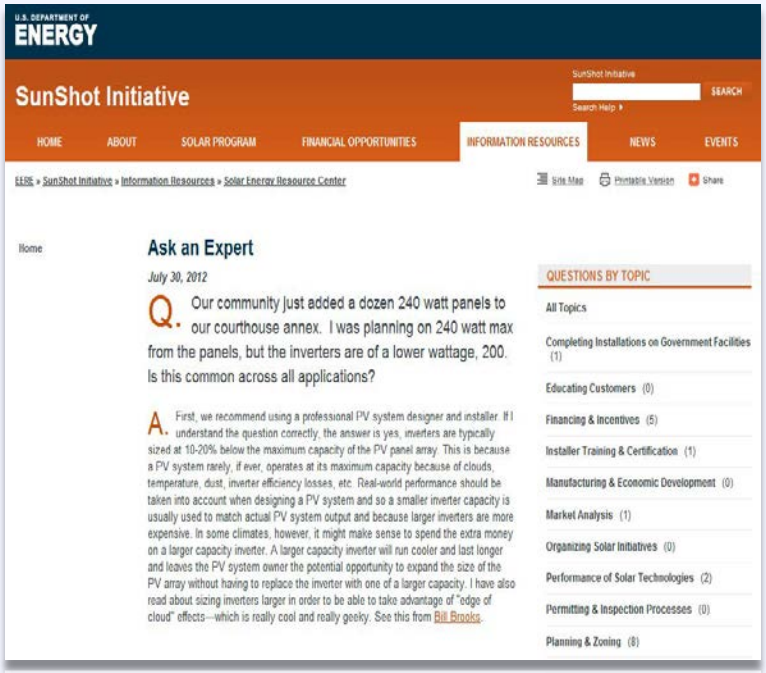
Activity: Next Steps

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

About the SunShot Solar Outreach Partnership

Technical Support

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



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

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

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U.S. Department of Energy

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