

Solar Powering Your Community

Addressing Soft Costs and Barriers



About the SunShot Solar Outreach Partnership



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

About the SunShot Solar Outreach Partnership

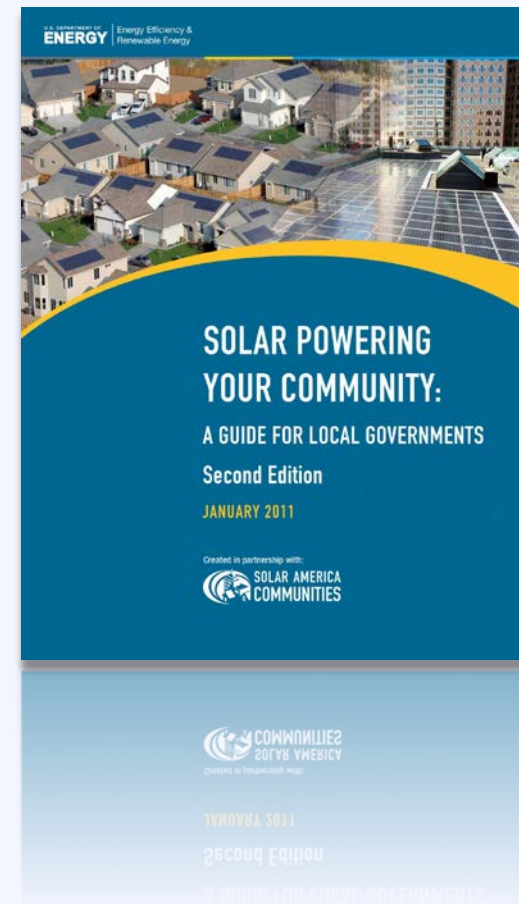
- Increase installed capacity of solar electricity in U.S. communities
- Streamline and standardize **permitting and interconnection processes**
- Improve **planning and zoning codes/regulations** for solar electric technologies
- Increase access to **solar financing options**

About the SunShot Solar Outreach Partnership

Resource Solar Powering Your Community Guide

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

www.energy.gov



About the SunShot Solar Outreach Partnership

Resource Sunshot Resource Center

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

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





Powered by

SunShot

U.S. Department of Energy

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Agenda

- | | |
|---------------|---|
| 08:40 – 09:00 | Introductions & Discussion |
| 09:00 – 09:50 | Creating a Regulatory Landscape for Solar |
| 09:50 – 10:00 | <i>Break</i> |
| 10:00 – 10:30 | Understanding Utility Regulations |
| 10:30 – 11:00 | Understanding Solar Financing |
| 11:00 – 11:30 | Installing Solar on Municipal Facilities |
| 11:30 – 11:40 | <i>Break</i> |
| 11:40 – 12:10 | Local Speaker |
| 12:10 – 12:30 | Next Steps for Solar in Region |

Agenda

08:40 – 09:00

Introductions & Discussion

09:00 – 09:50

Creating a Regulatory Landscape for Solar

09:50 – 10:00

Break

10:00 – 10:30

Understanding Utility Regulations

10:30 – 11:00

Understanding Solar Financing

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Installing Solar on Municipal Facilities

11:30 – 11:40

Break

11:40 – 12:10

Local Speaker

12:10 – 12:30

Next Steps for Solar in Region



Poll

Who's in the room?



Poll

What is your experience with solar?

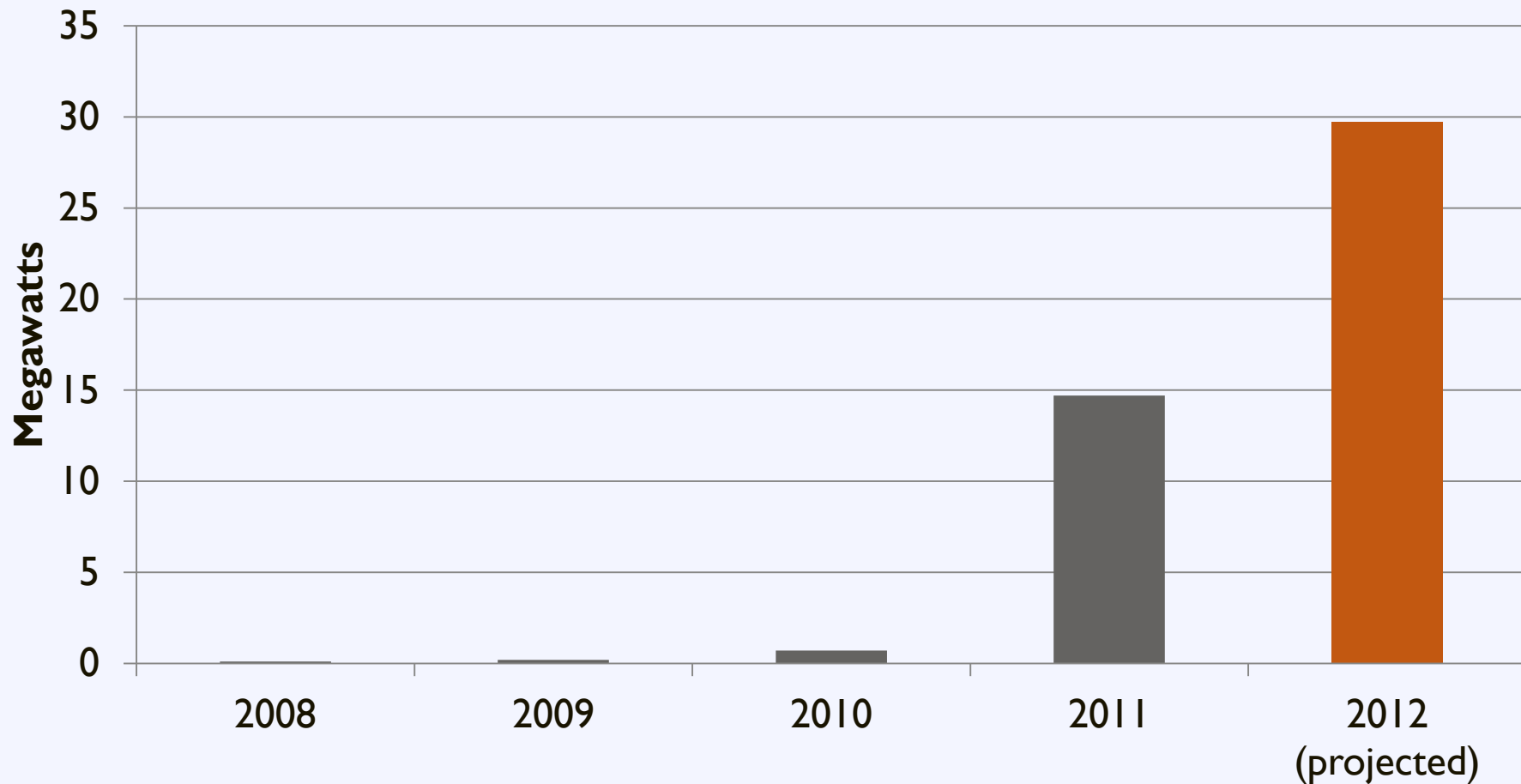


Workshop Goal

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

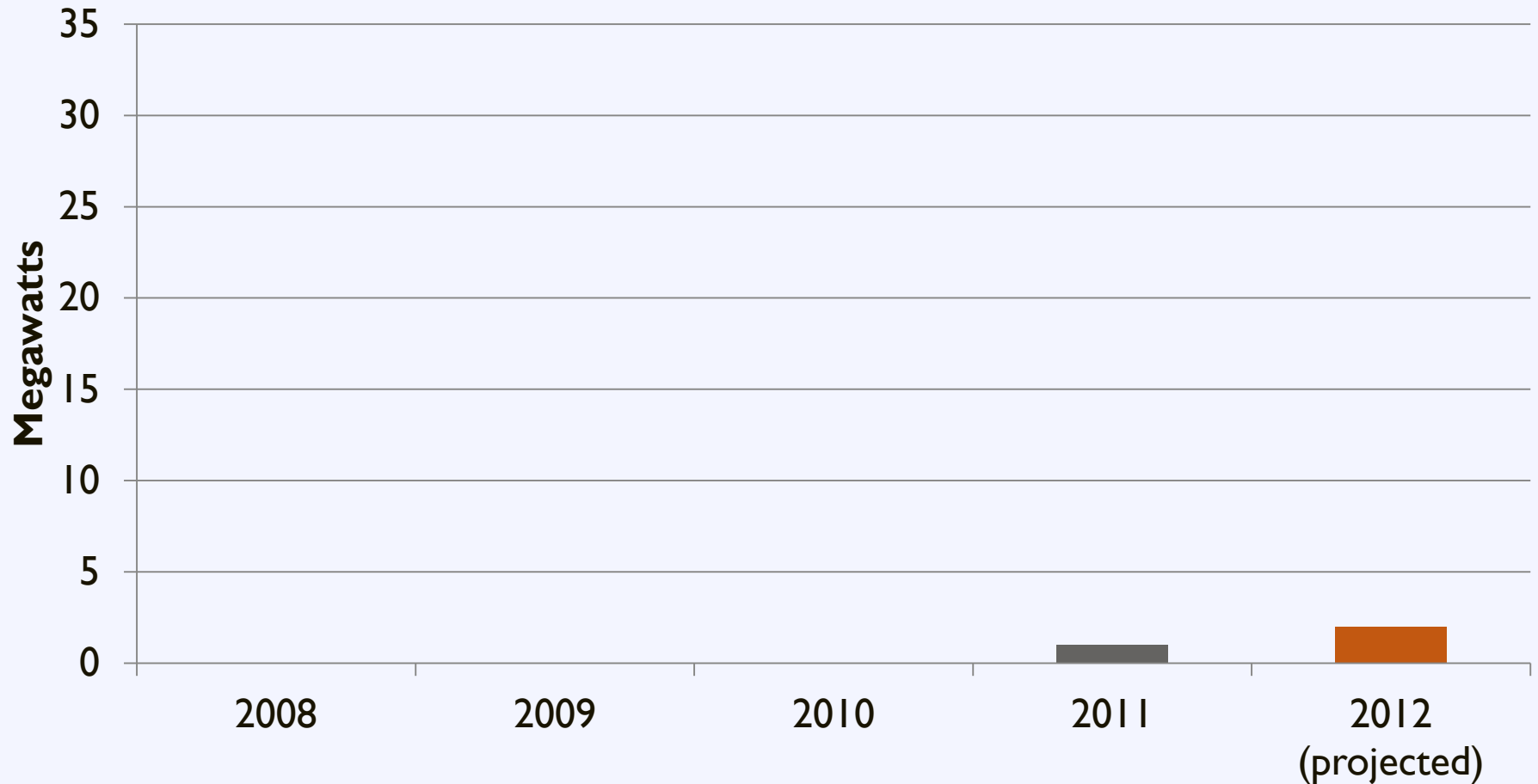
Missouri Solar PV Market

Cumulative Installed Capacity of Solar PV



Kansas Solar PV Market

Installed Capacity of Solar PV





Explore benefits

and

Overcome barriers



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



Activity: Addressing Barriers

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

Right Now



Write answer on card

During Session



Compile results

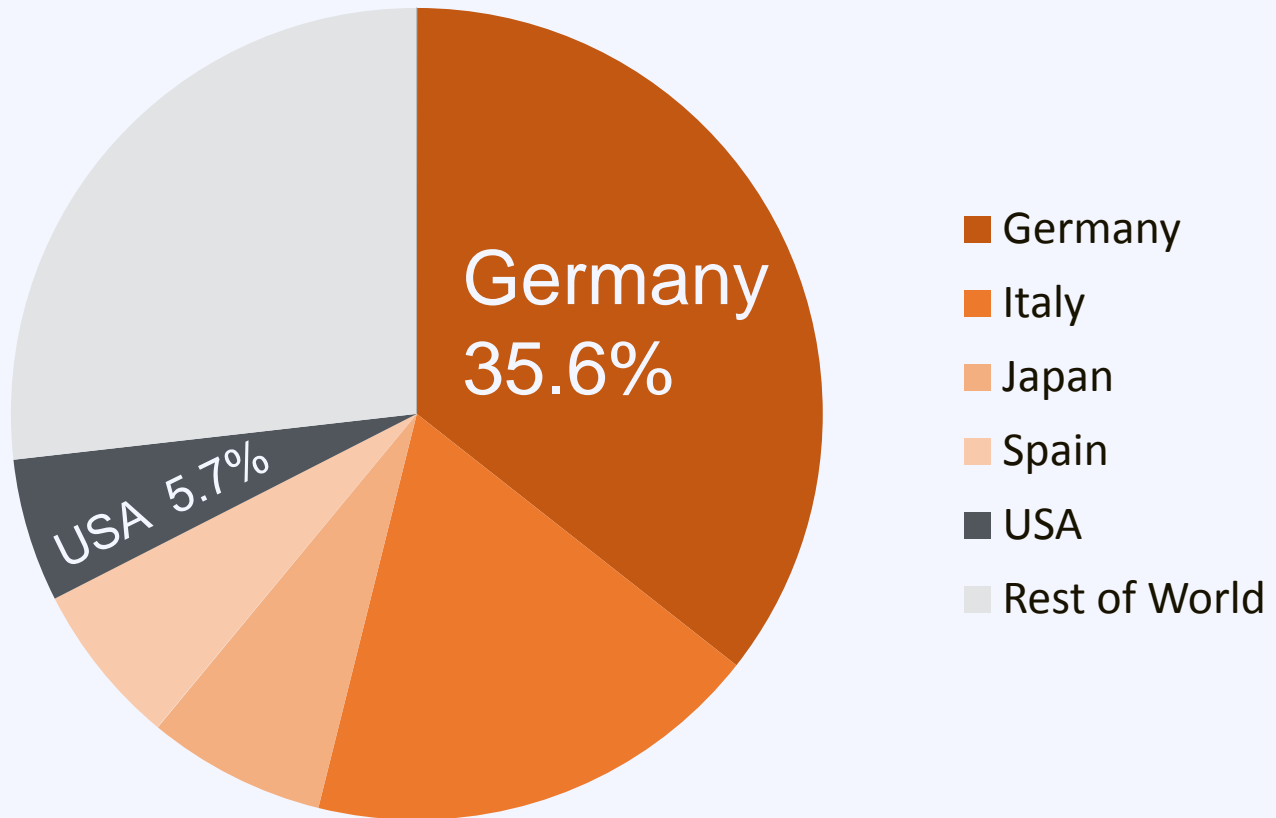
After Break



Group discussion

Installed Capacity

Top 5 Countries Solar Operating Capacity





Installed Capacity

Total installed solar capacity in the US

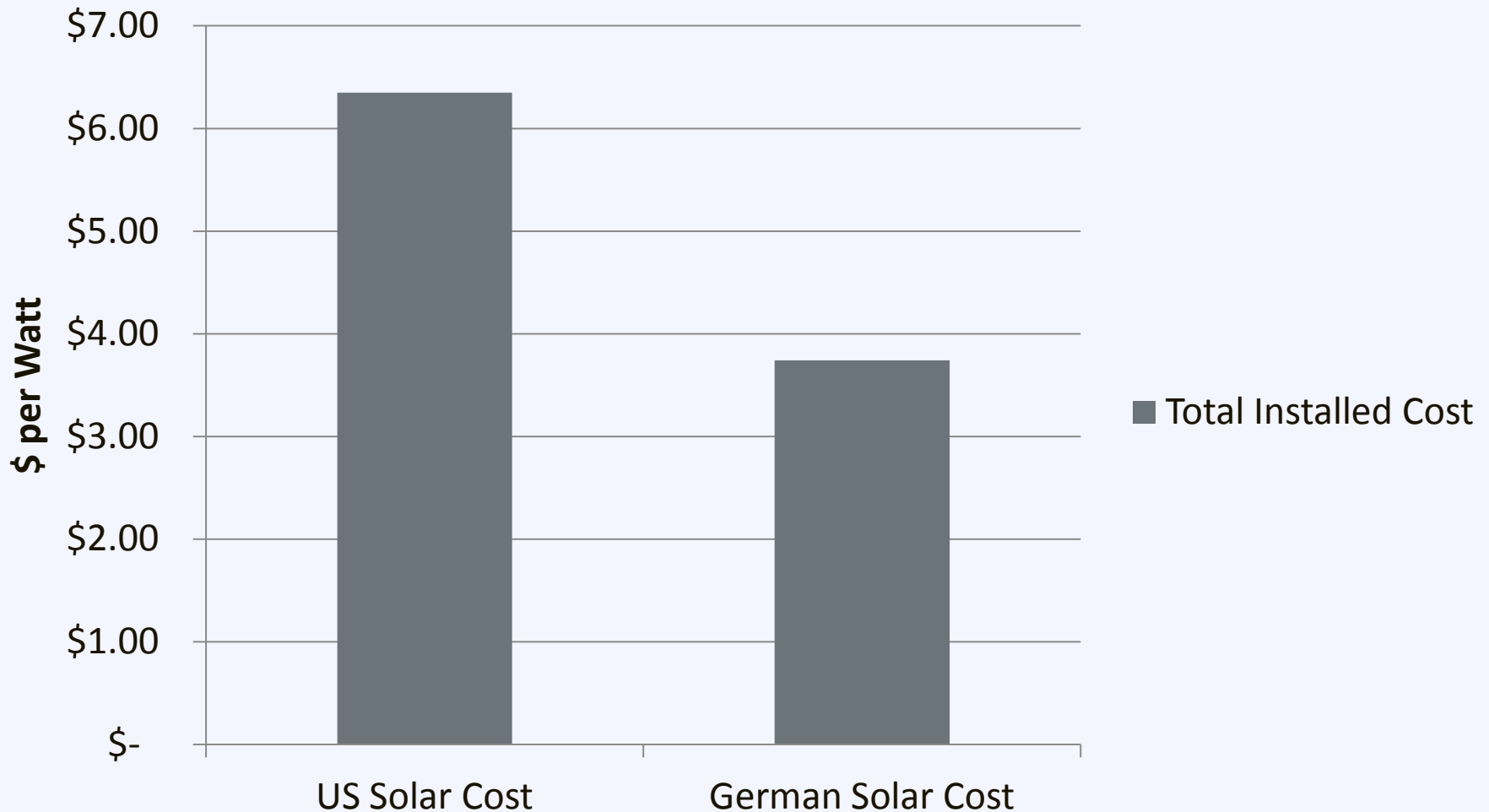
4 GW

Capacity installed in Germany in Dec 2011

4 GW

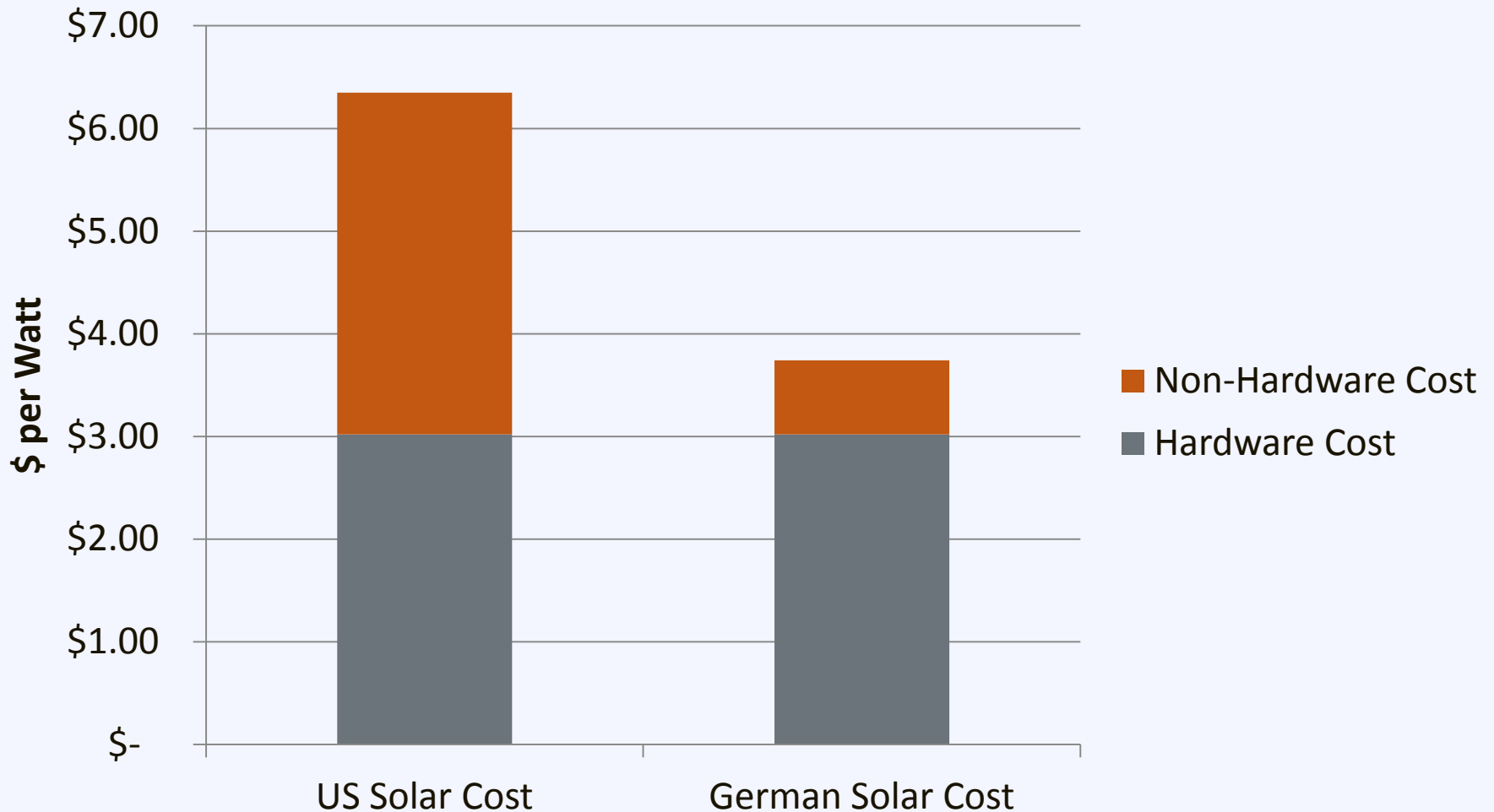
The Cost of Solar in the US

Comparison of US and German Solar Costs



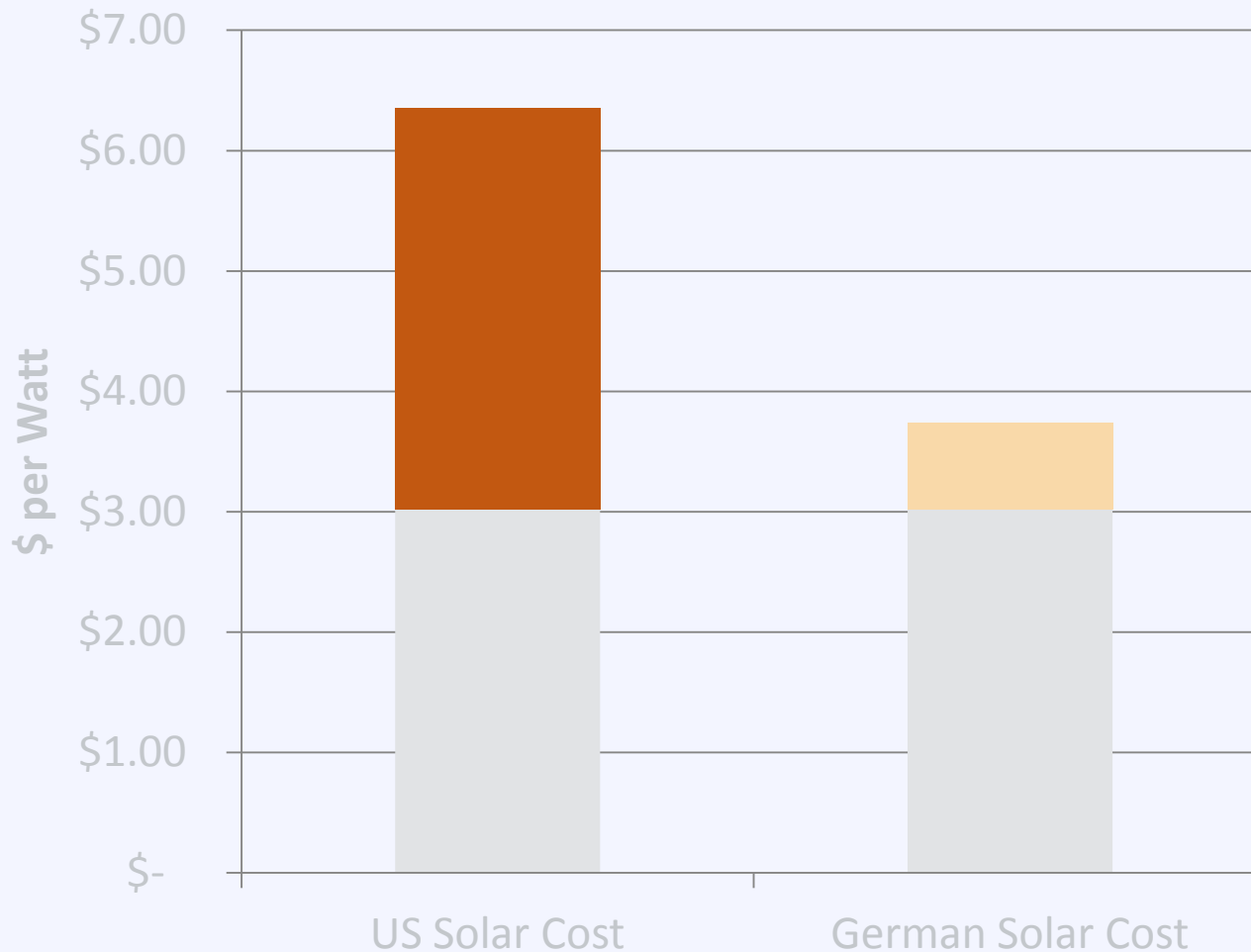
The Cost of Solar in the US

Comparison of US and German Solar Costs



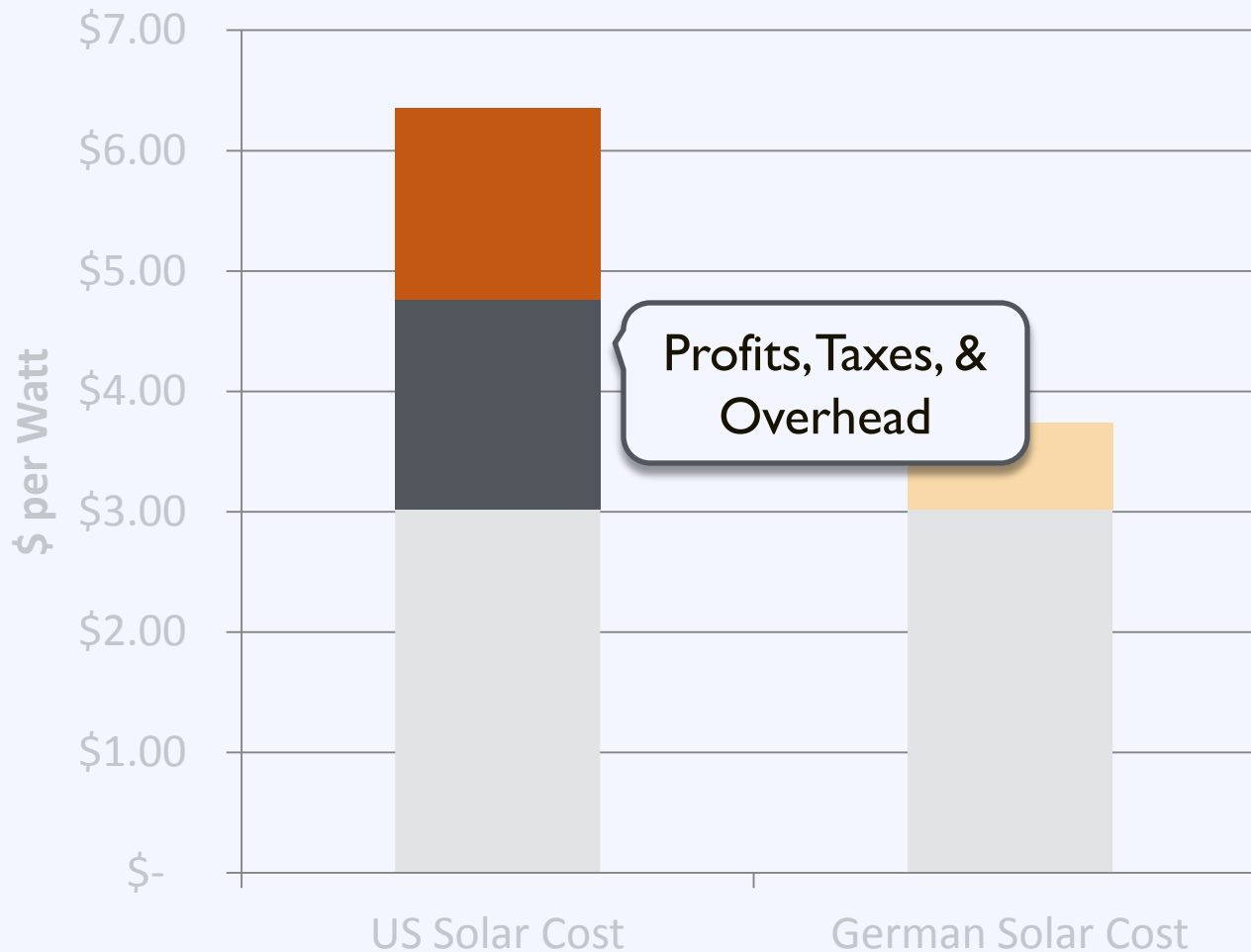
The Cost of Solar in the US

Comparison of US and German Solar Costs

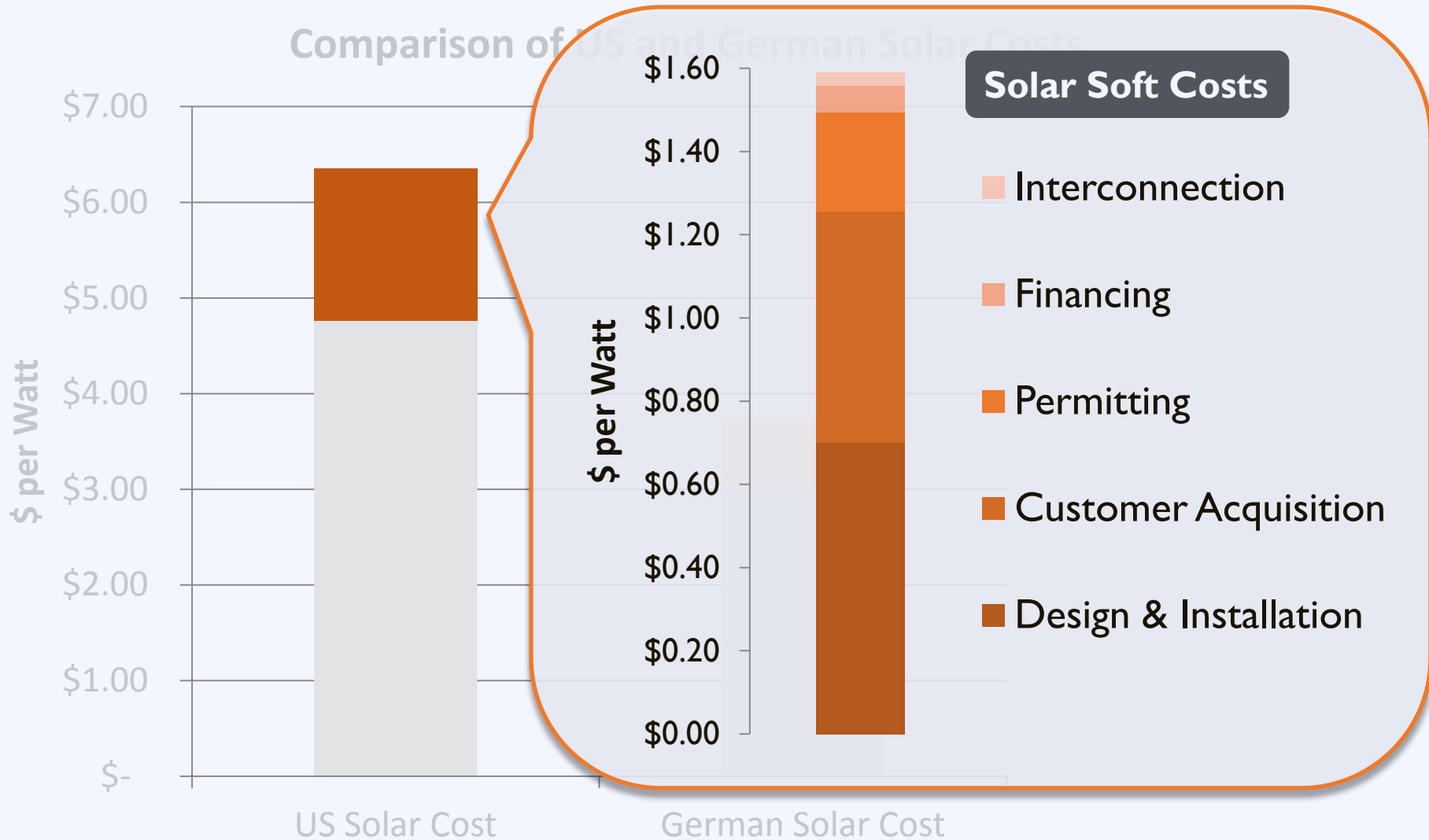


The Cost of Solar in the US

Comparison of US and German Solar Costs



The Cost of Solar in the US





Time to Installation



**New York City's
Goal**

100 days

from inception to completion



**Germany
Today**

8 days

from inception to completion



Germany's Success

Consistency and Transparency

through a

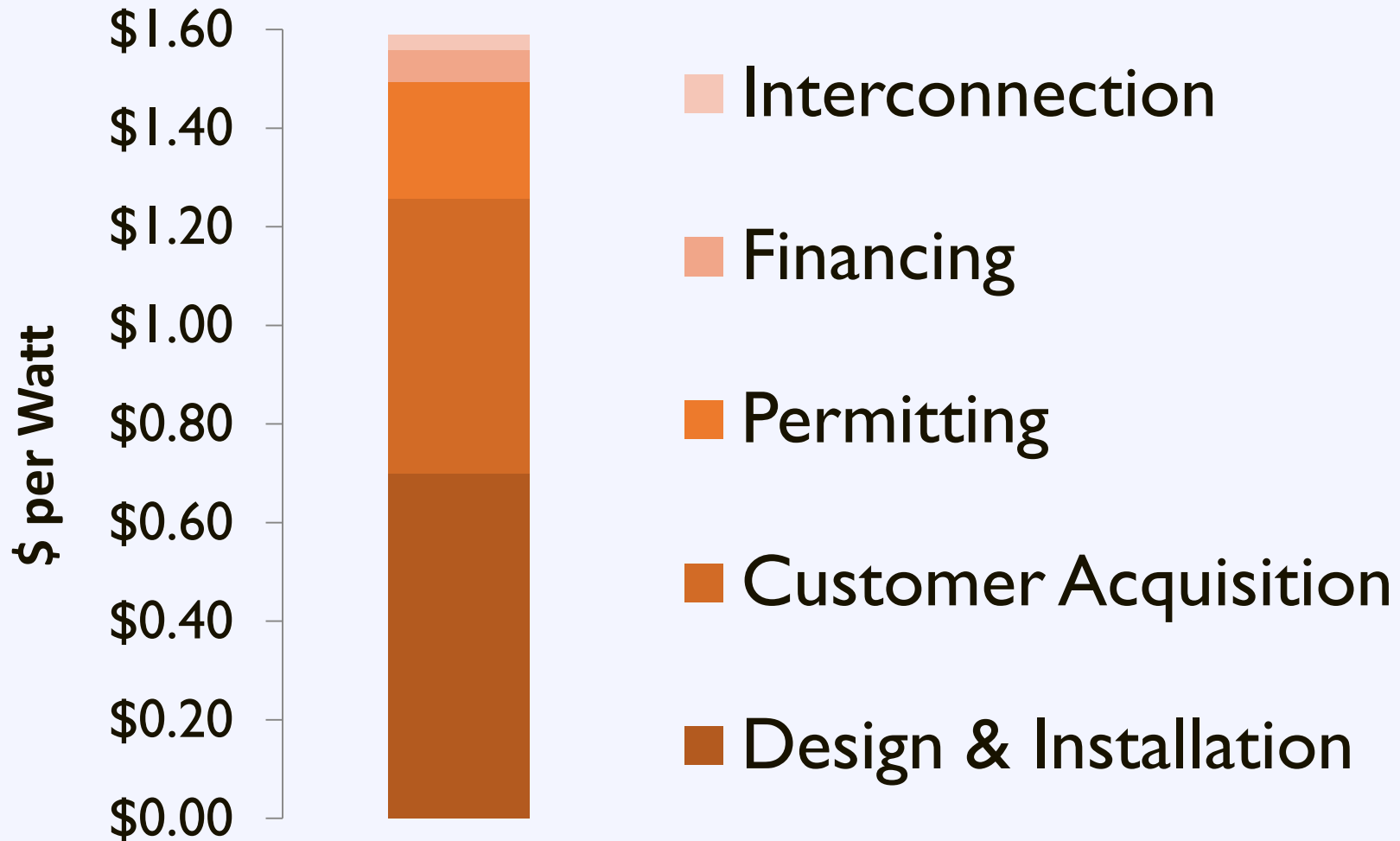
Standardized Processes



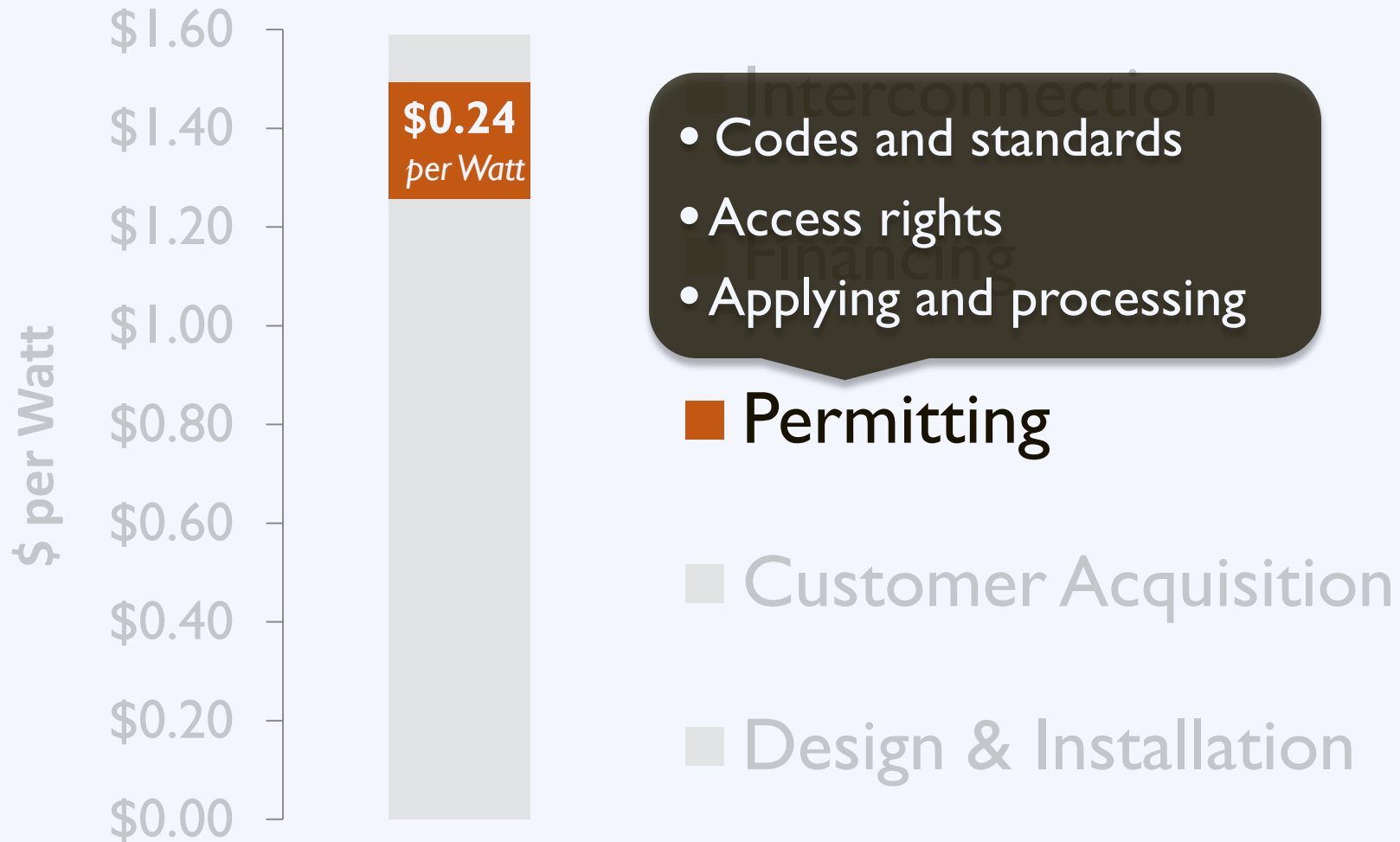
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Mitigate Soft Costs



Mitigate Soft Costs





Zoning Codes: Regulations

Section	Topics to Address
Permitted Uses	Primary vs. accessory
Dimensional Standards	<ul style="list-style-type: none">• Height• Lot coverage• Setbacks
Development Standards	<ul style="list-style-type: none">• Screening• Placement• Site Planning
Definitions	Types of solar systems

Zoning Codes: Small Scale Solar

Typical Requirements:

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

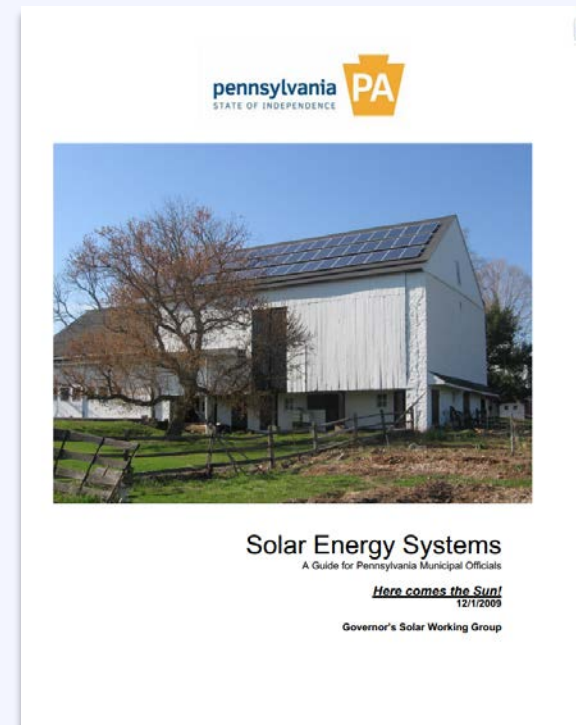


Zoning Code: Small Scale Solar

Resource Pennsylvania Model Ordinance

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

state.pa.us



Zoning Codes: Large Scale Solar

Typical Requirements:

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

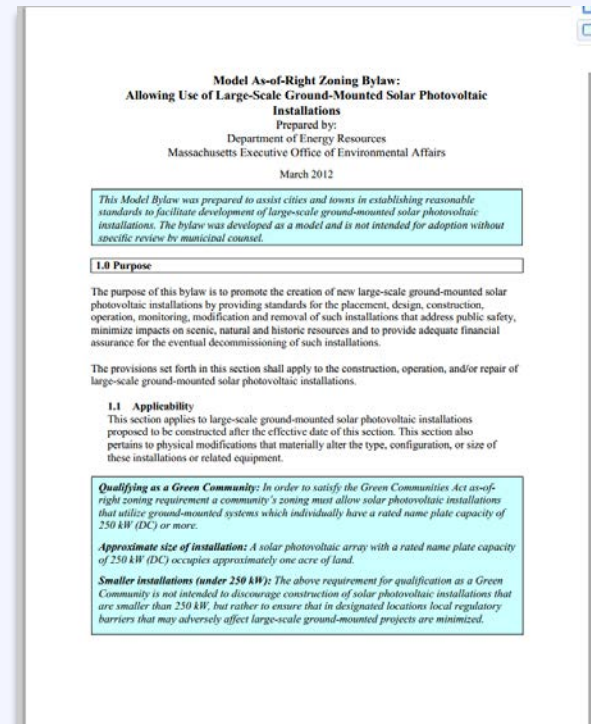


Zoning Code: Large Scale Solar

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





Solar Access

Solar Access Laws:

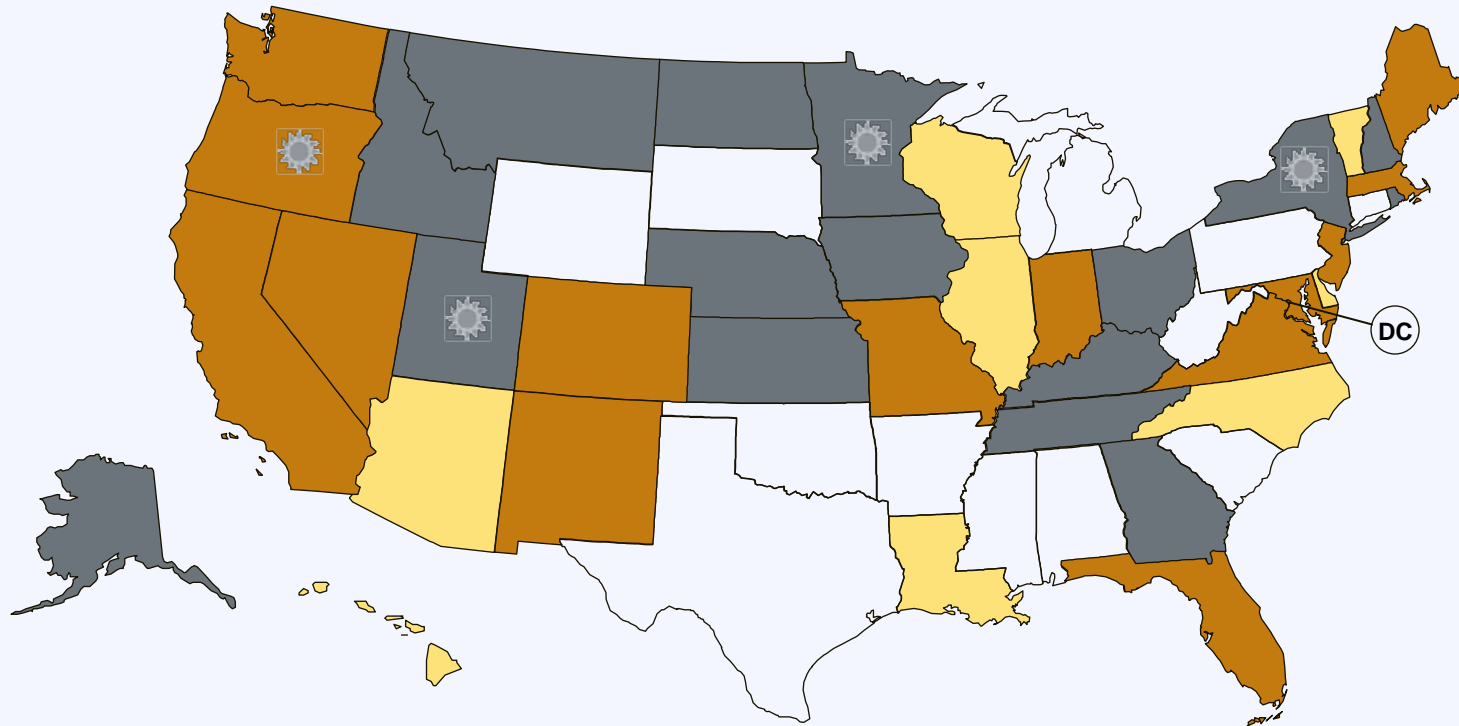
1. Increase the likelihood that properties will receive sunlight
2. Protect the rights of property owners to install solar
3. Reduce the risk that systems will be shaded after installation

Fontainebleau V. Eden Roc (1959)



A landowner does not have any legal right to the free flow of light and air across the adjoining land of his neighbor

Solar Access



-  Solar Easements Provision
-  Solar Rights Provision
-  Solar Easements and Solar Rights Provisions
-  Local option to create solar rights provision
-  U.S. Virgin Islands



Solar Easements: Kansas & Missouri

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



Solar Rights: Missouri

Missouri Statute 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: Missouri

James Babb

v.

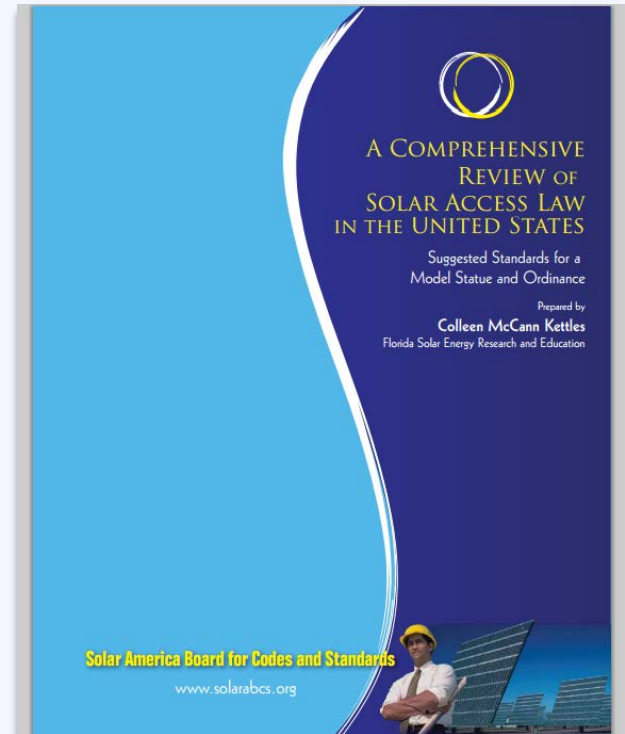
City of Clarkson Valley

Solar Access

Resource Solar ABCs

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

www.solarabcs.org





The Permitting Process: Challenges

18,000+ local jurisdictions
with unique permitting requirements

The Permitting Process: Challenges

Local permitting processes add on average

\$2,516

to the installation cost of residential PV

The Permitting Process: Challenges





Expedited Permitting

Solar Permitting Best Practices:

- ✓ Fair flat fees
- ✓ Electronic or over-the-counter issuance
- ✓ Standardized permit requirements
- ✓ Electronic materials



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

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

Solar America Board for Codes and Standards
Collaborate • Contribute • Transform

ABOUT US | CODES & STANDARDS | CURRENT ISSUES

Codes & Standards

The Solar America Board for Codes and Standards (Solar ABCs) collaborates and enhances the practice of developing, implementing, and disseminating solar codes and standards. The Solar ABCs provides formal coordination in the planning and revision of separate, though interrelated, solar codes and standards. We also provide access for stakeholders to participate with members of standards making bodies through working groups and research activities to set national priorities on technical issues. The Solar ABCs is a centralized repository for collection and dissemination of documents, regulations, and technical materials related to solar codes and standards.

The Solar ABCs creates a centralized home to facilitate photovoltaic (PV) market transformation by:

- Creating a forum that fosters generating consensus 'best practices' materials.
- Disseminating such materials to utilities, state and other regulating agencies.
- Answering code-related questions (technical or statutory in nature).
- Providing feedback on important related issues to DOE and government agencies.

Learn more about solar codes and standards development:

The below organizations all publish codes and standards for PV products and each organization has its own process to develop and publish standards.

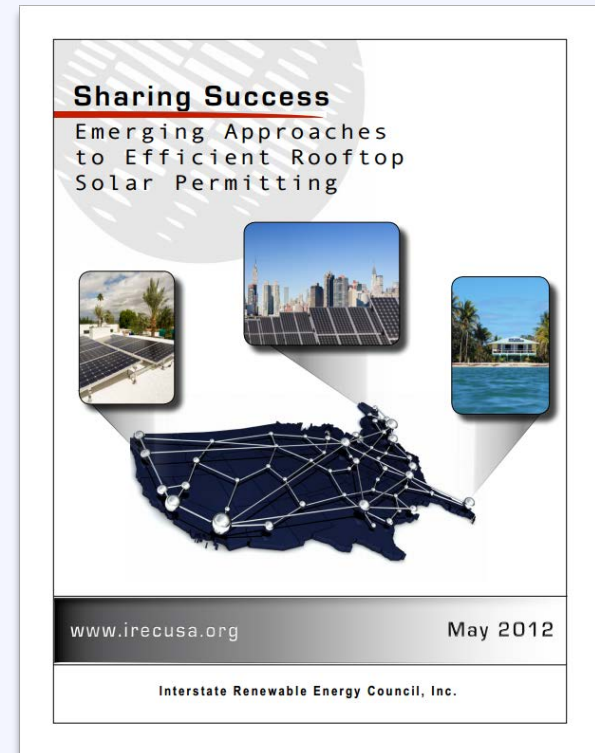
- [ASTM](#)
- [IAPMO Standards](#)
- [International Code Council](#)
- [International Electrotechnical Commission](#)
- [IEEE](#)
- [National Fire Protection Association](#)
- [SEMI](#)
- [Underwriters Laboratories](#)

Expedited Permitting

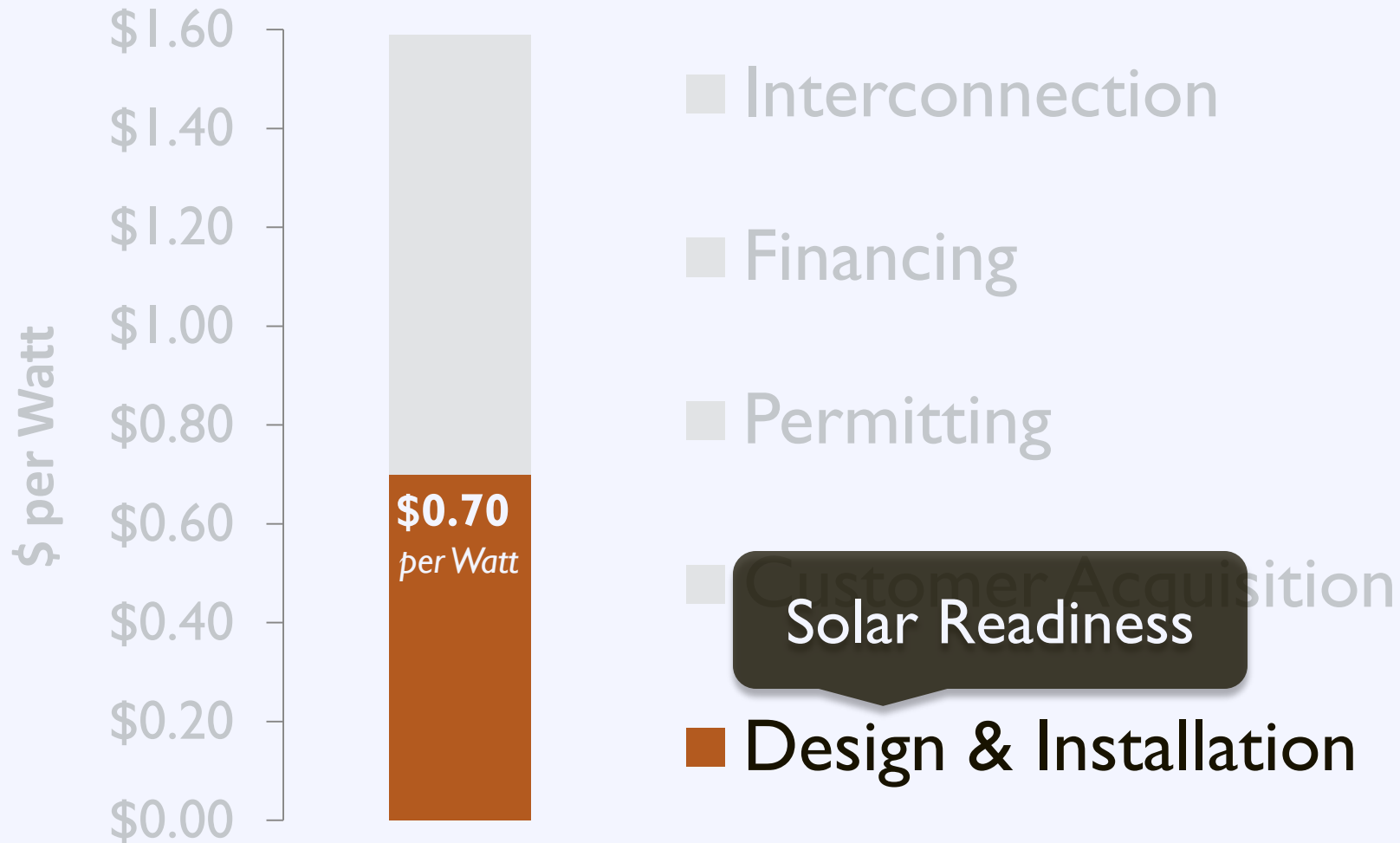
Resource Interstate Renewable Energy Council

Outlines emerging approaches to efficient rooftop solar permitting

www.irecusa.org



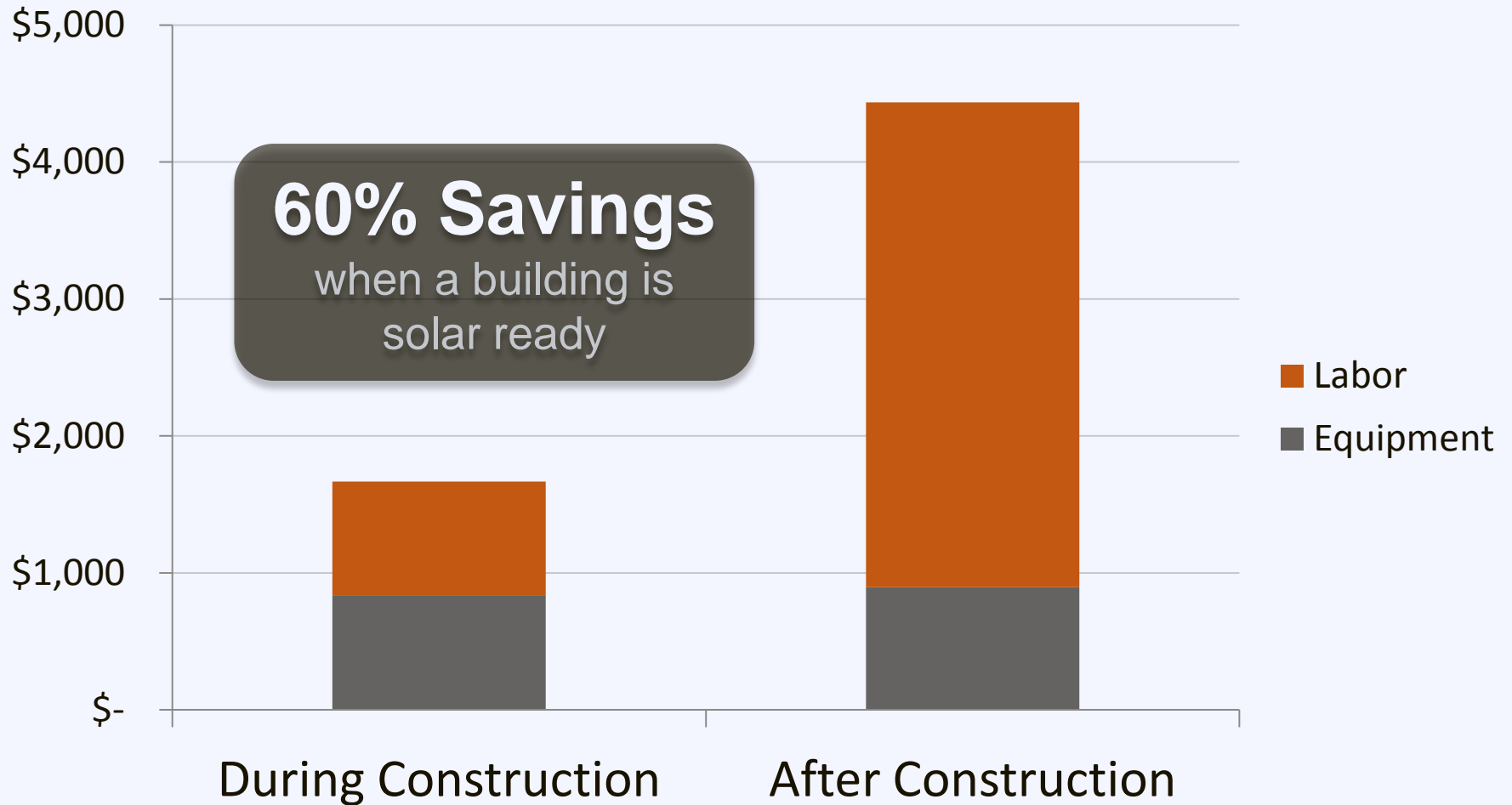
Mitigate Soft Costs



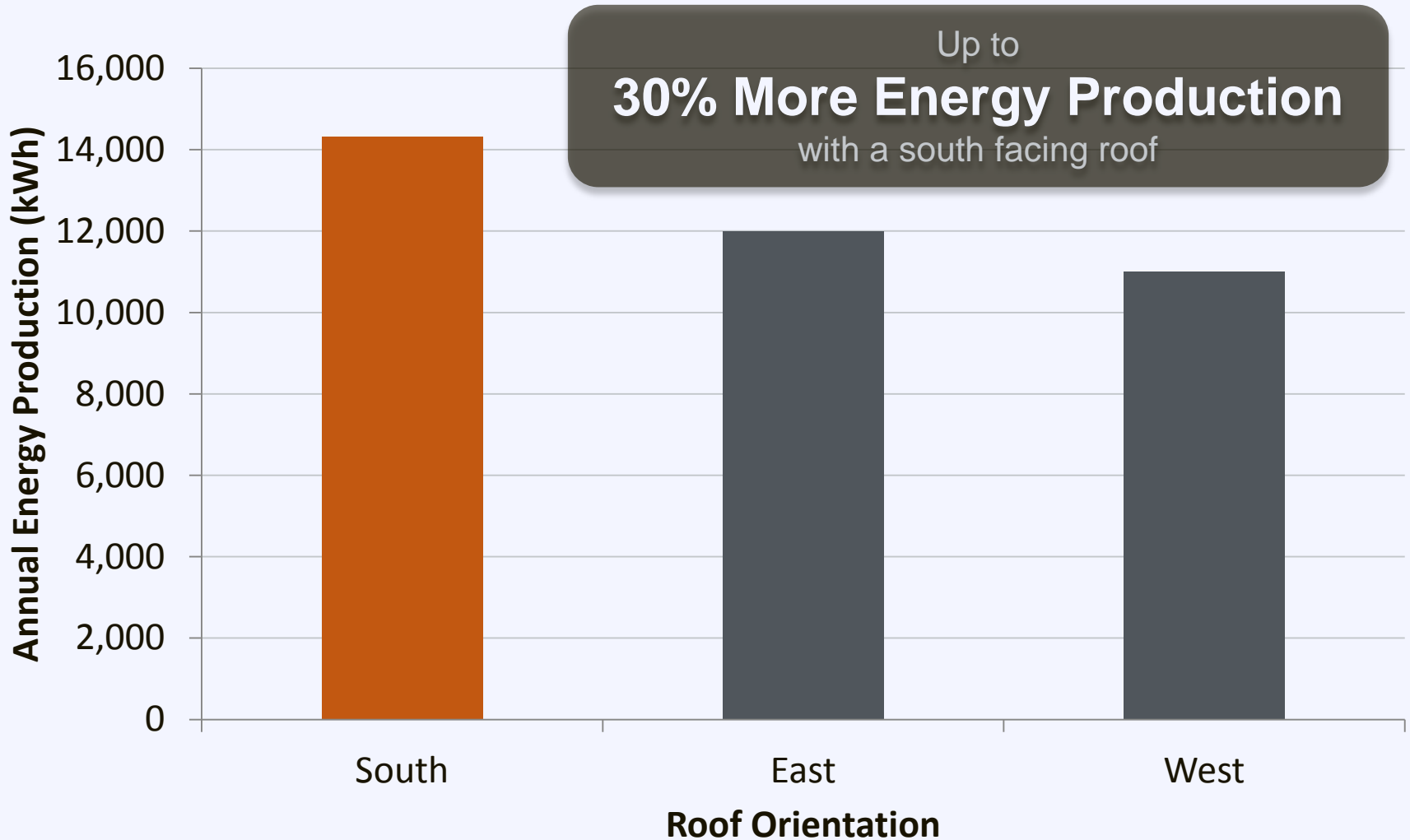
Solar Readiness

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

Solar Readiness



Solar Readiness





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



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

Solar Readiness

Resource NREL

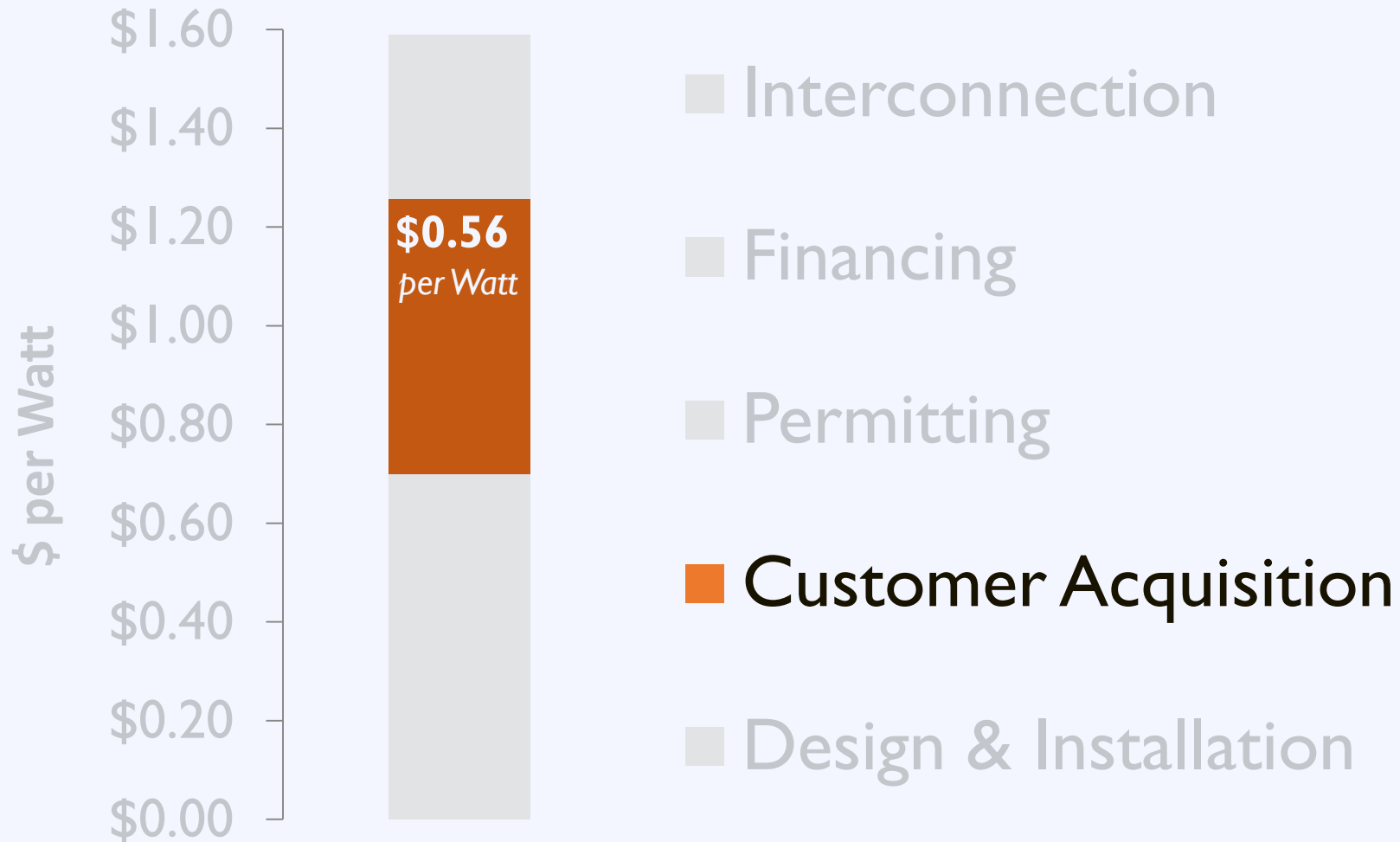
Creating a solar ready guide for buildings:

- Legislation
- Certification programs
- Stakeholder Education

www.nrel.gov



Mitigate Soft Costs



Customer Acquisition



Solarize
Group Purchasing

solarize portland →



Solarize: Advantages

Barriers

High upfront cost



Solutions

Group purchase

Complexity



Community outreach

Customer inertia



Limited-time offer

Solarize: Advantages

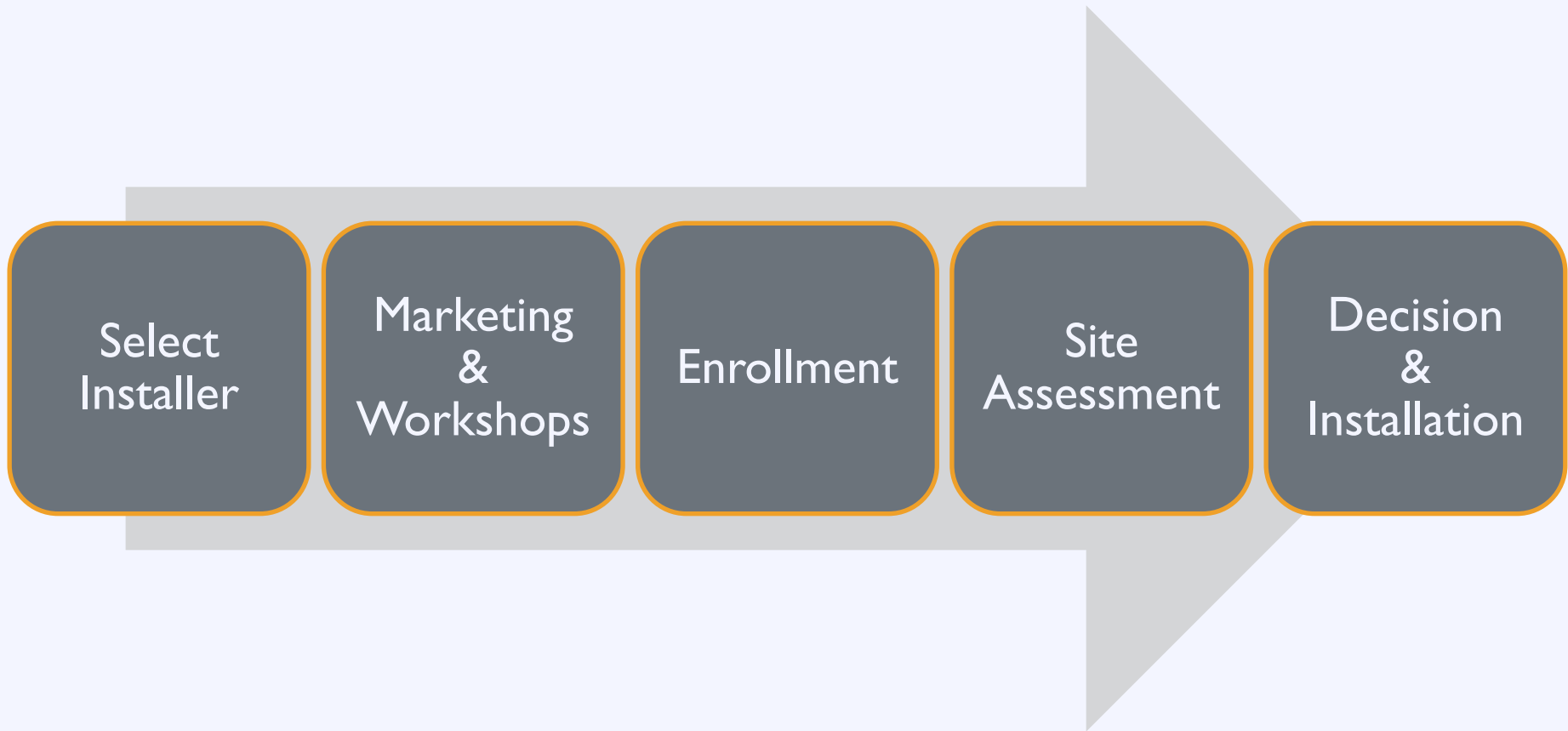
Benefits to Local Government:

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

Quick turn-around: 9 Months

Long-term impact: Sustainable ecosystem

Solarize: Process



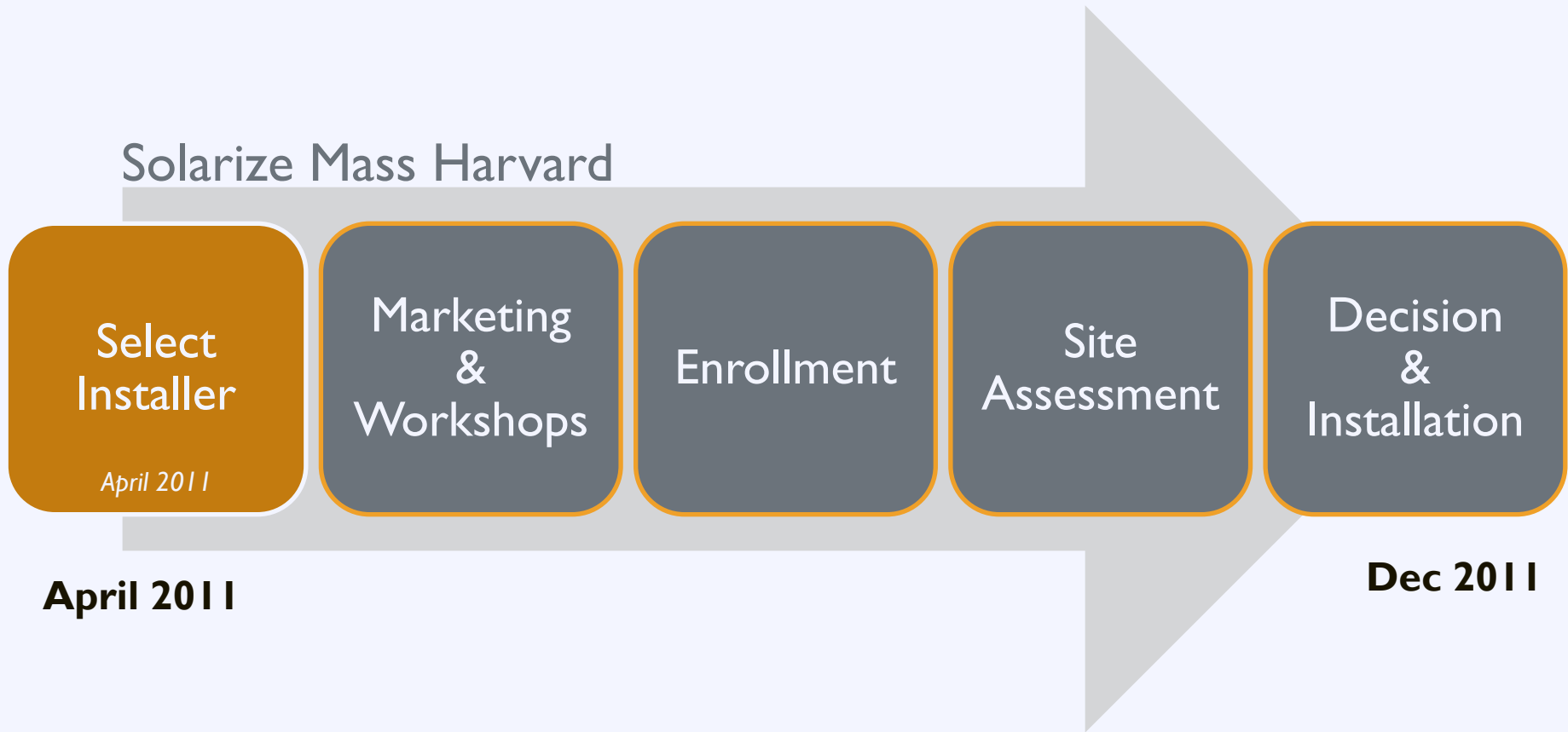
Solarize: Case Study



Harvard, Massachusetts
Population: 6,520

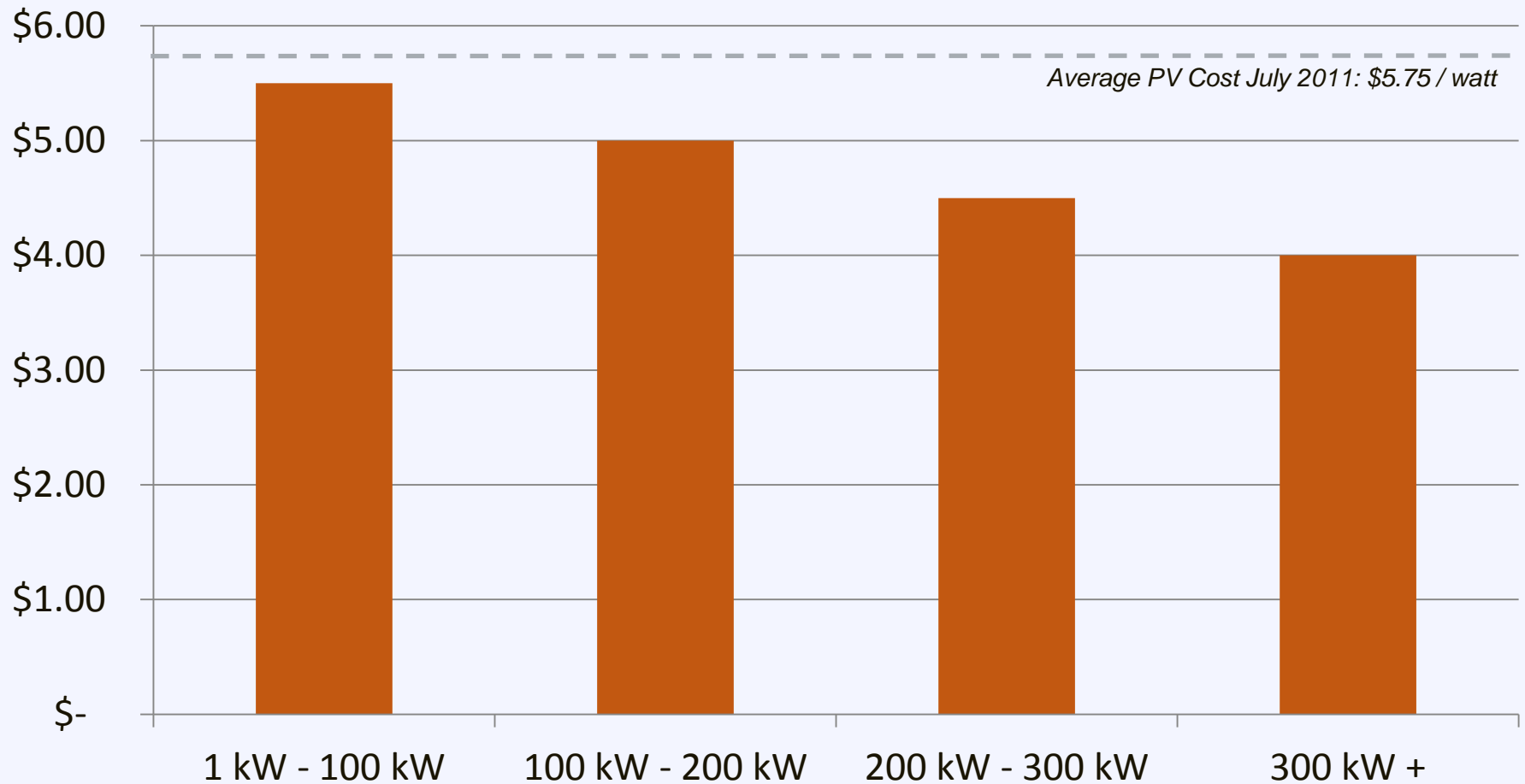
Solarize: Case Study

Solarize Mass Harvard



Group Purchasing

Harvard Mass Group Purchasing Tiers



Solarize: Case Study

Solarize Mass Harvard

Select
Installer

April 2011

Marketing
&
Workshops

May – July 2011

Enrollment

Site
Assessment

Decision
&
Installation

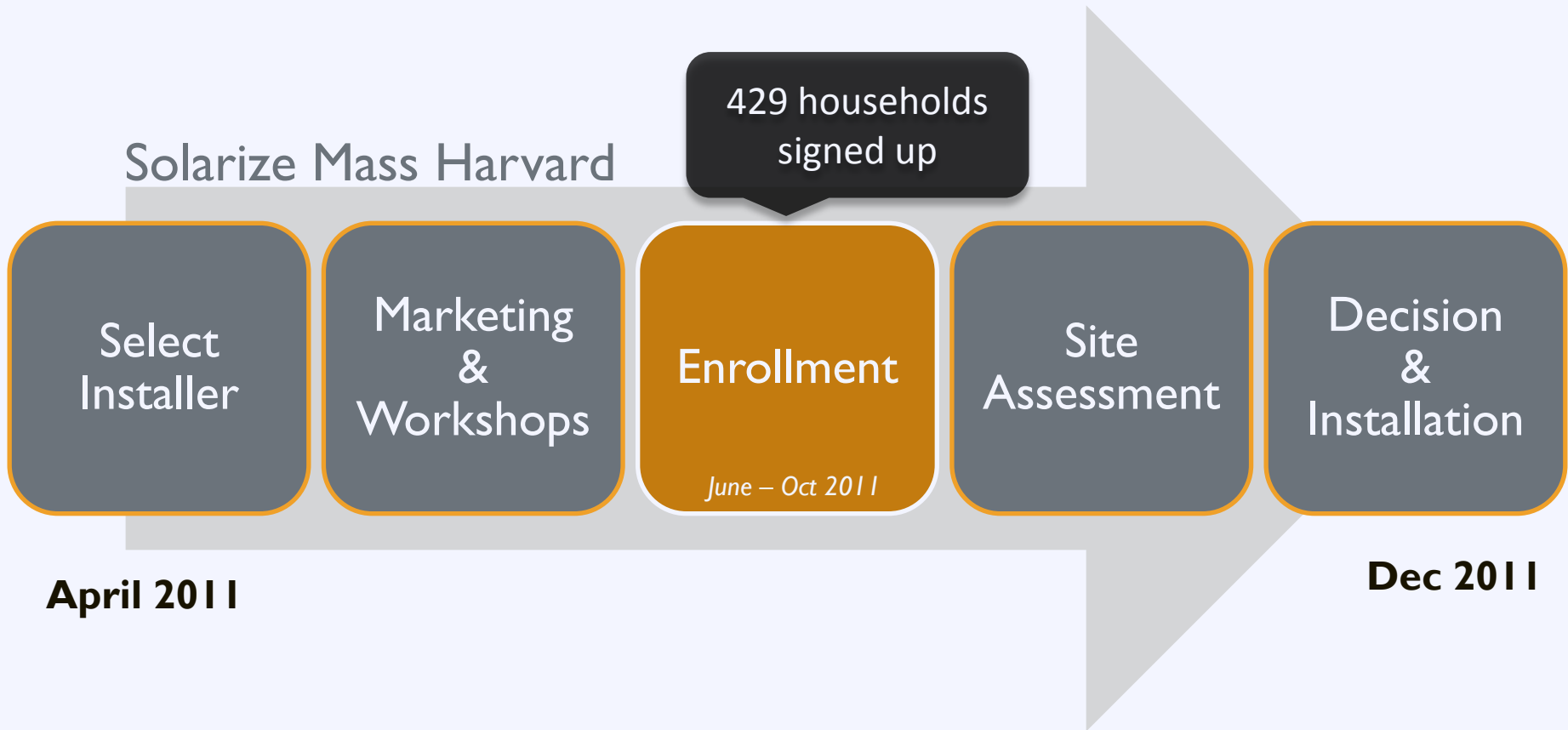
Dec 2011

Solarize: Case Study

Marketing Strategy:

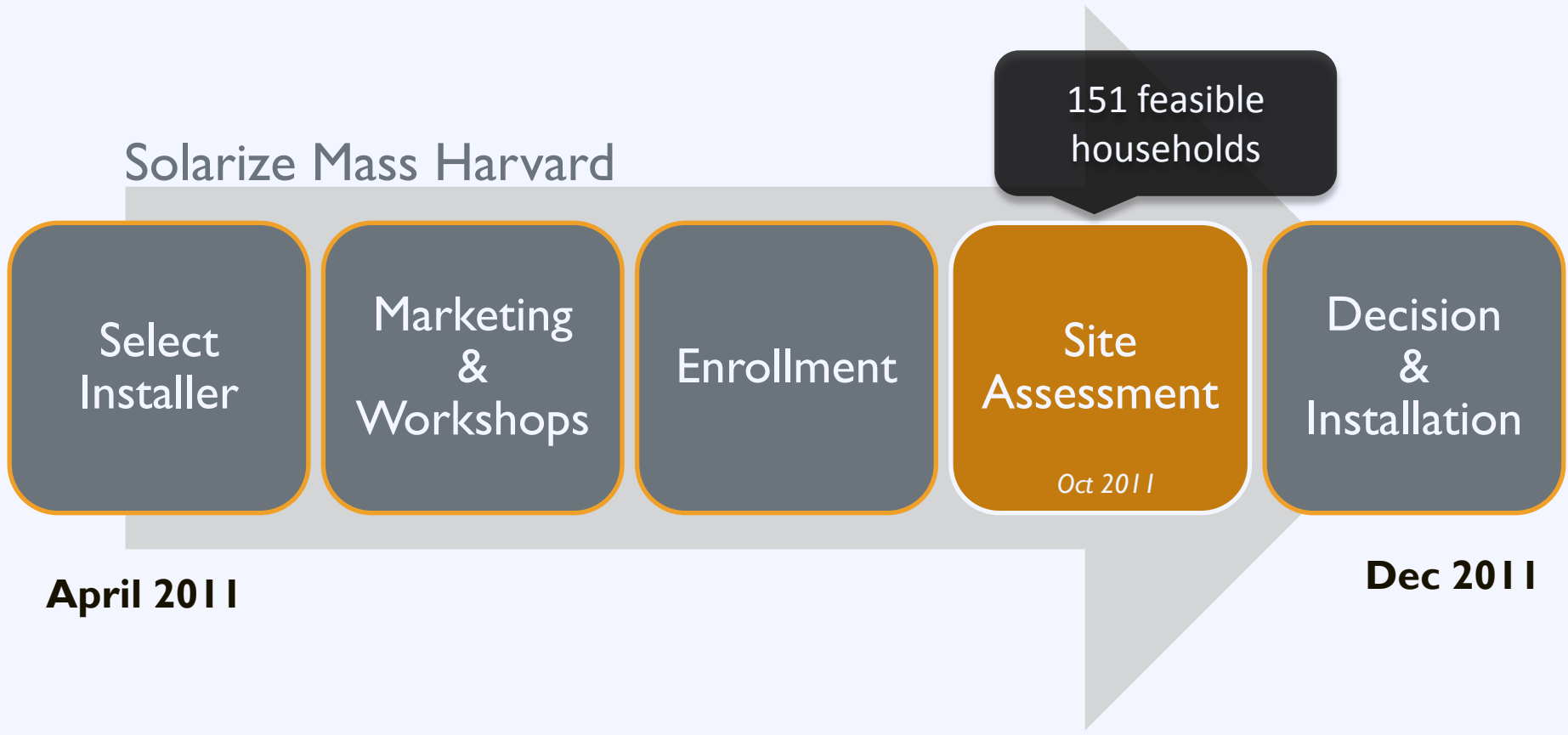
- Electronic survey of 1,100 households
- Email newsletters and direct mailings
- Float in July 4 parade
- Articles and advertisements in local newspaper
- Facebook page and online discussion board

Solarize: Case Study



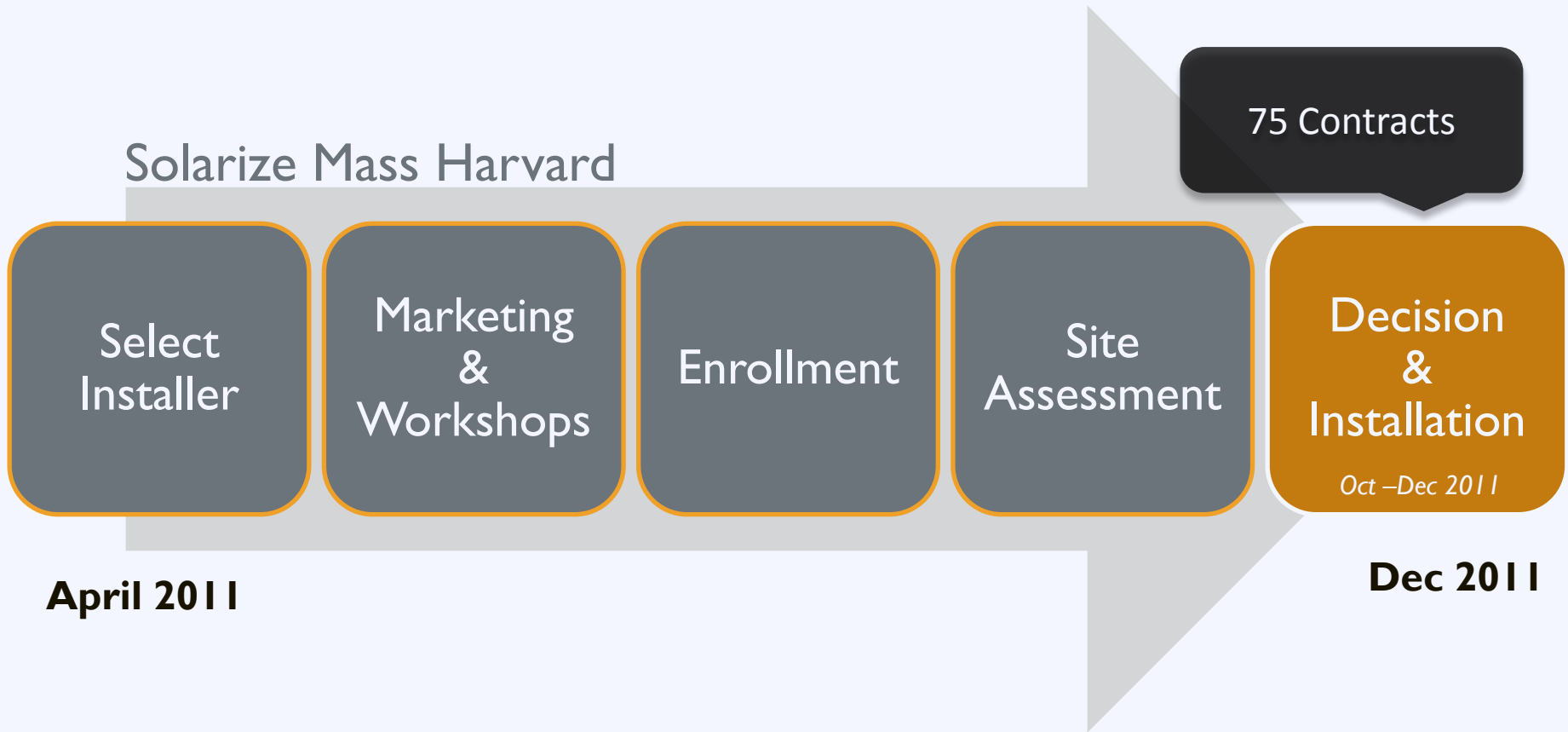
Solarize: Case Study

Solarize Mass Harvard



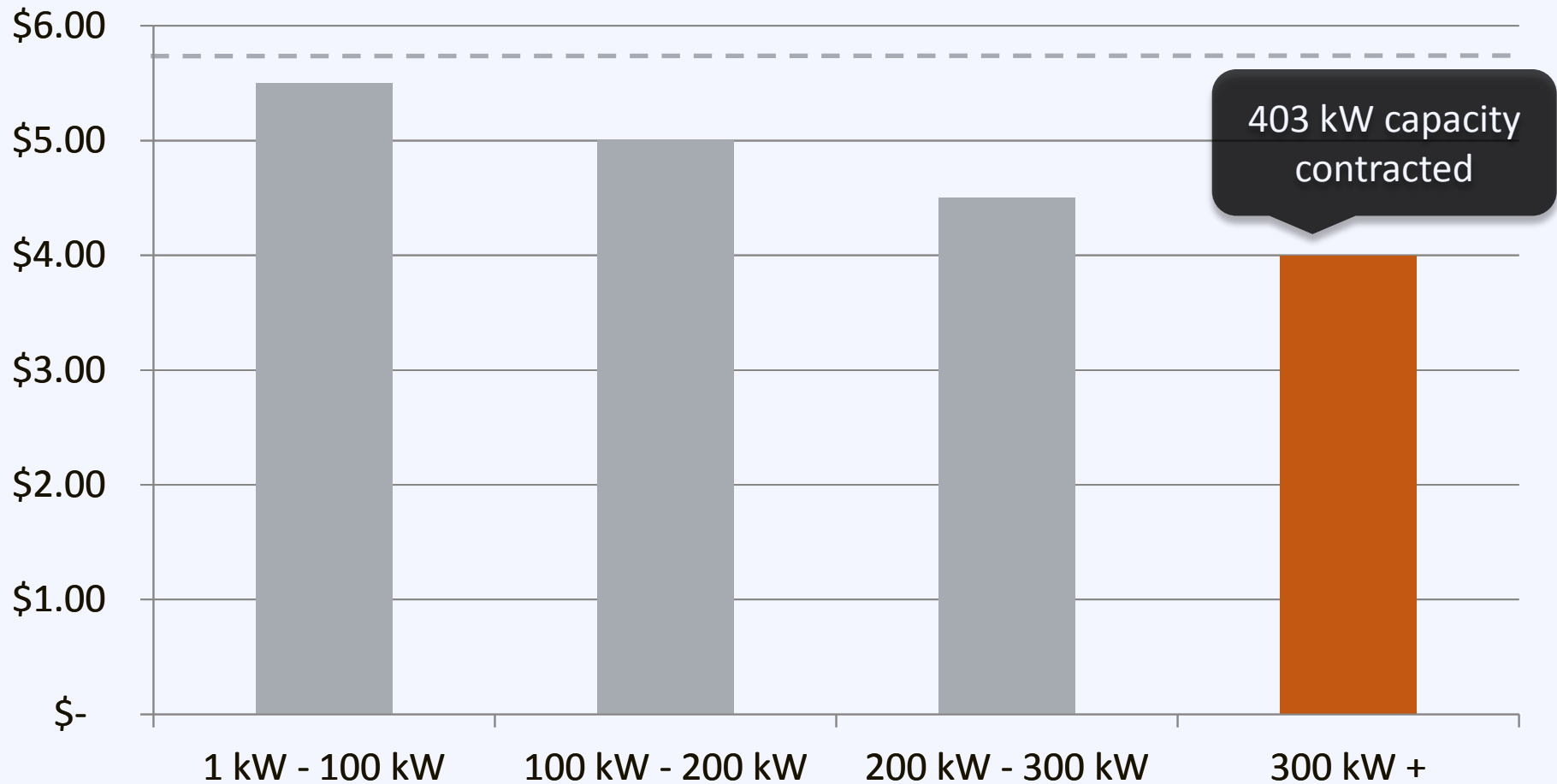
Solarize: Case Study

Solarize Mass Harvard



Group Purchasing

Harvard Mass Group Purchasing Tiers



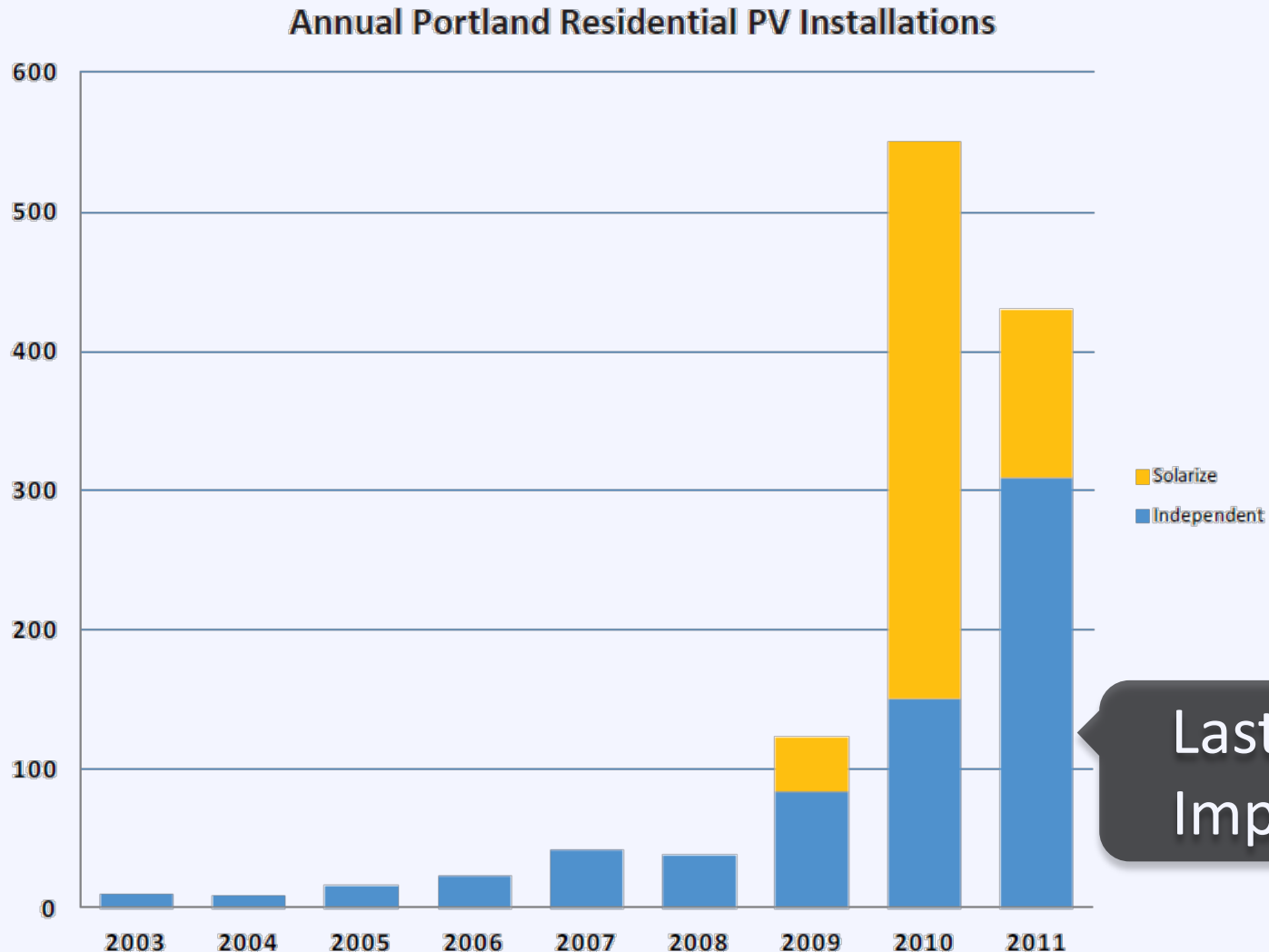
Solarize: Case Study

75 new installations totaling 403 kW

30% reduction in installation costs

575% increase in residential installations

Solarize: Lasting Impact

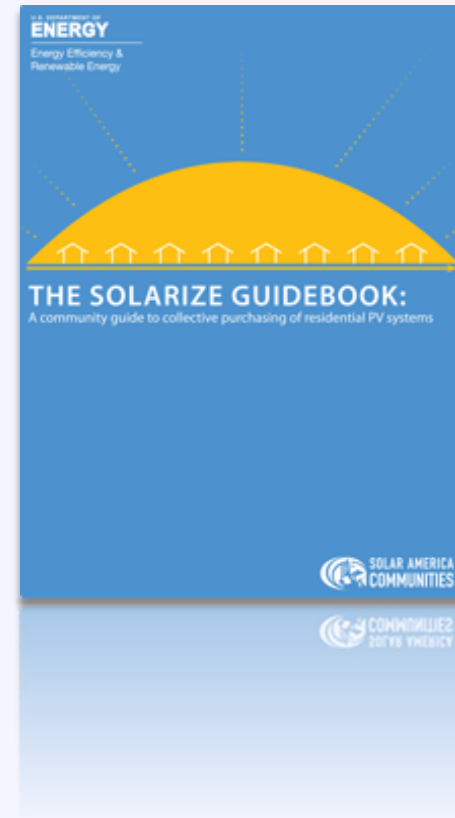


Solarize: Resources

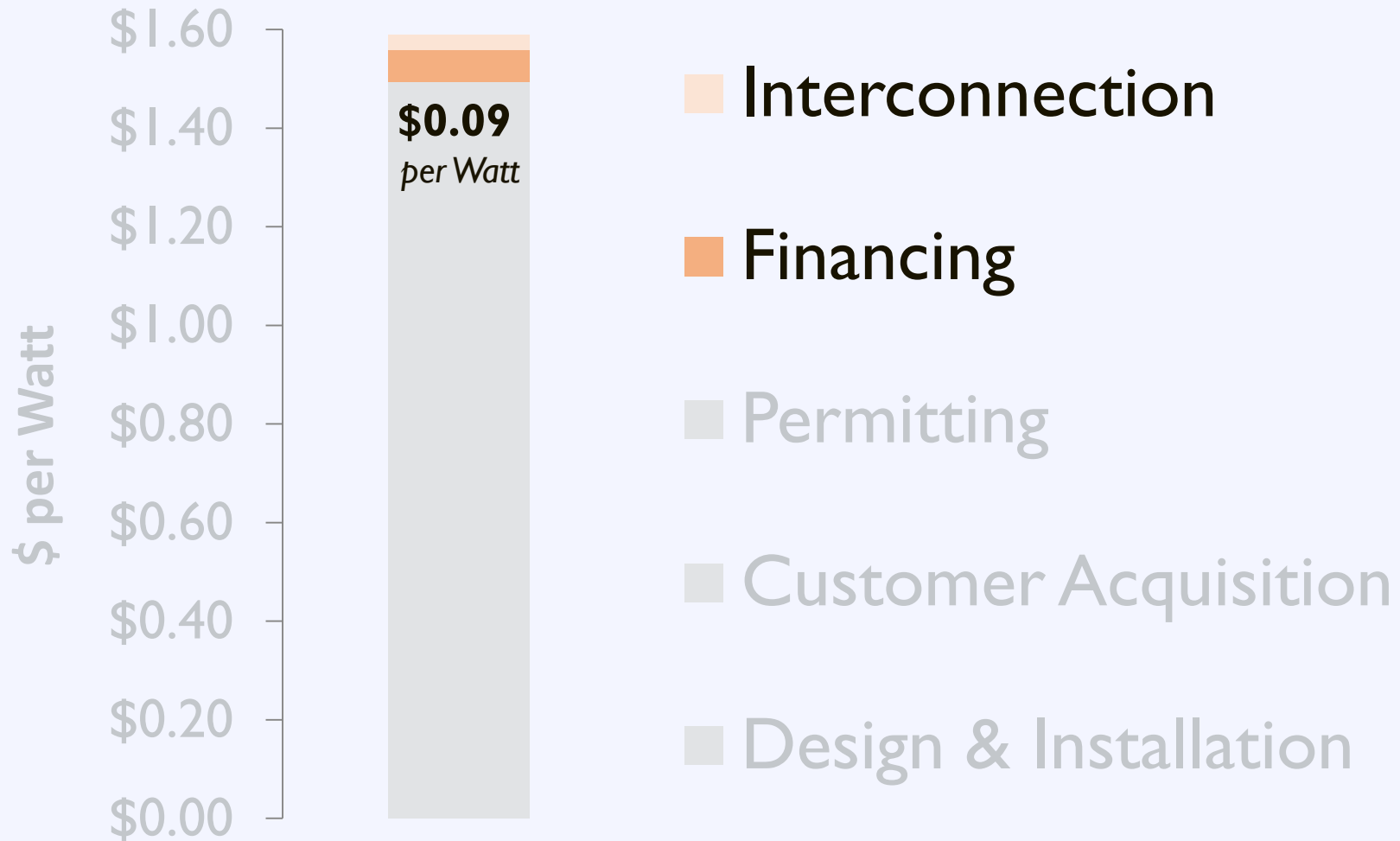
Resource The Solarize Guidebook

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

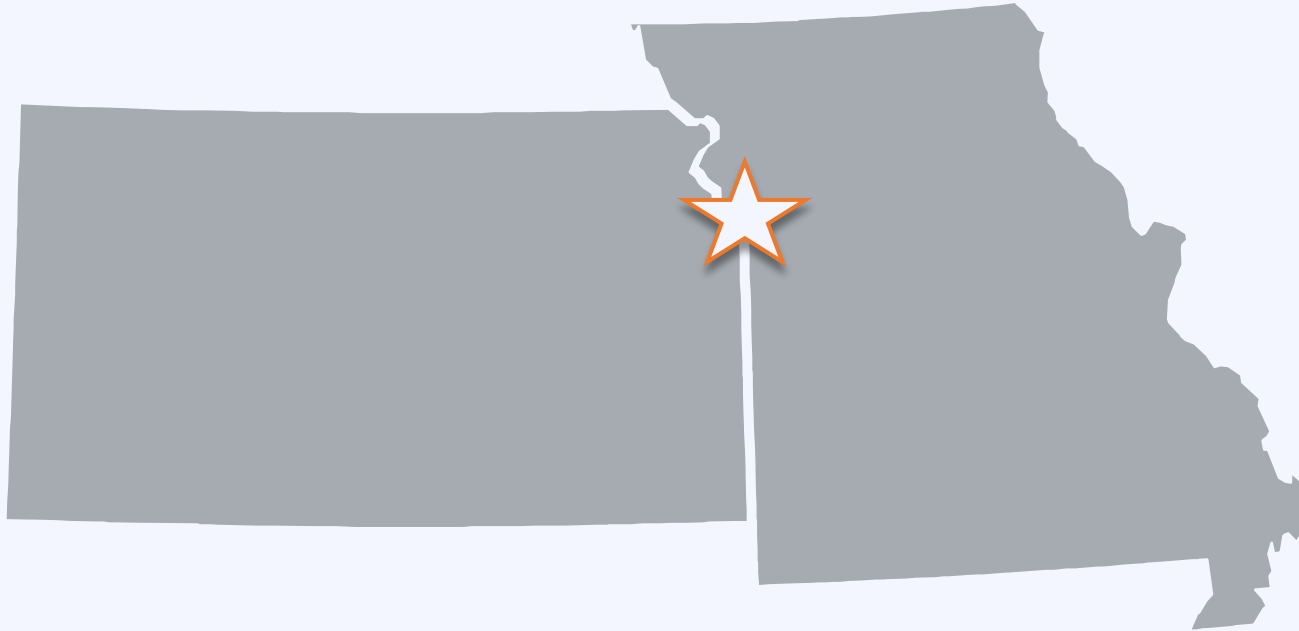
www.nrel.gov



Mitigate Soft Costs



Solar Ready Kansas City



Best Management Practices for Solar Installation Policy

Solar Ready Kansas City

Planning
Improvements

Process
Improvements

Best Management Practices for Solar Installation Policy

Solar Ready Kansas City

Planning
Improvements

Process
Improvements

Best Management Practices for Solar Installation Policy



Planning Improvements

Step 1: Solar Access and Education

- ✓ Adopt a solar access ordinance
- ✓ Provide tools to developers
- ✓ Educate homeowners

Planning Improvements

Step 2: Solar Readiness

- ✓ Develop a solar ready building checklist
- ✓ Adopt solar ready ordinance



Planning Improvements

Step 3: Engage Homeowner's Association

- ✓ Create incentives for adopting best practices

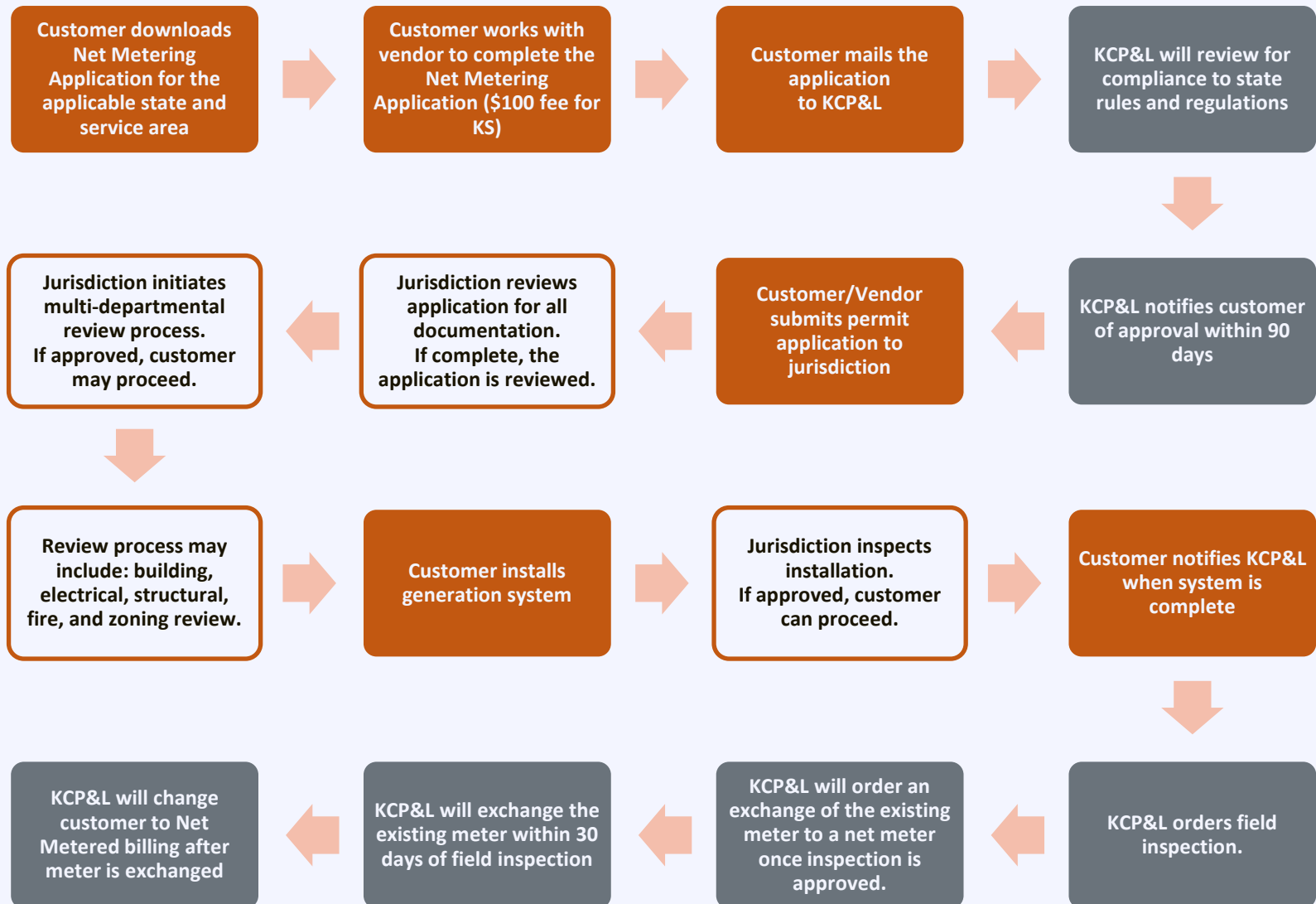
Solar Ready Kansas City

Planning
Improvements

Process
Improvements

**Best Management Practices for Solar
Installation Policy**

Current Process





Process Improvements

Step 1: Streamline permits

- ✓ Provide central information source
- ✓ Create permit checklist
- ✓ Develop criteria for standard installation



Process Improvements

Step 2: Permit fees & utility coordination

- ✓ Establish a fixed fee for residential applications
- ✓ Adopt permit fee calculator for larger projects
- ✓ Conduct joint inspections with local utility



Process Improvements

Step 3: Pre-qualify plans and installers

- ✓ Pre-qualify standard plans
- ✓ Pre-qualify installers

Q & A

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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]

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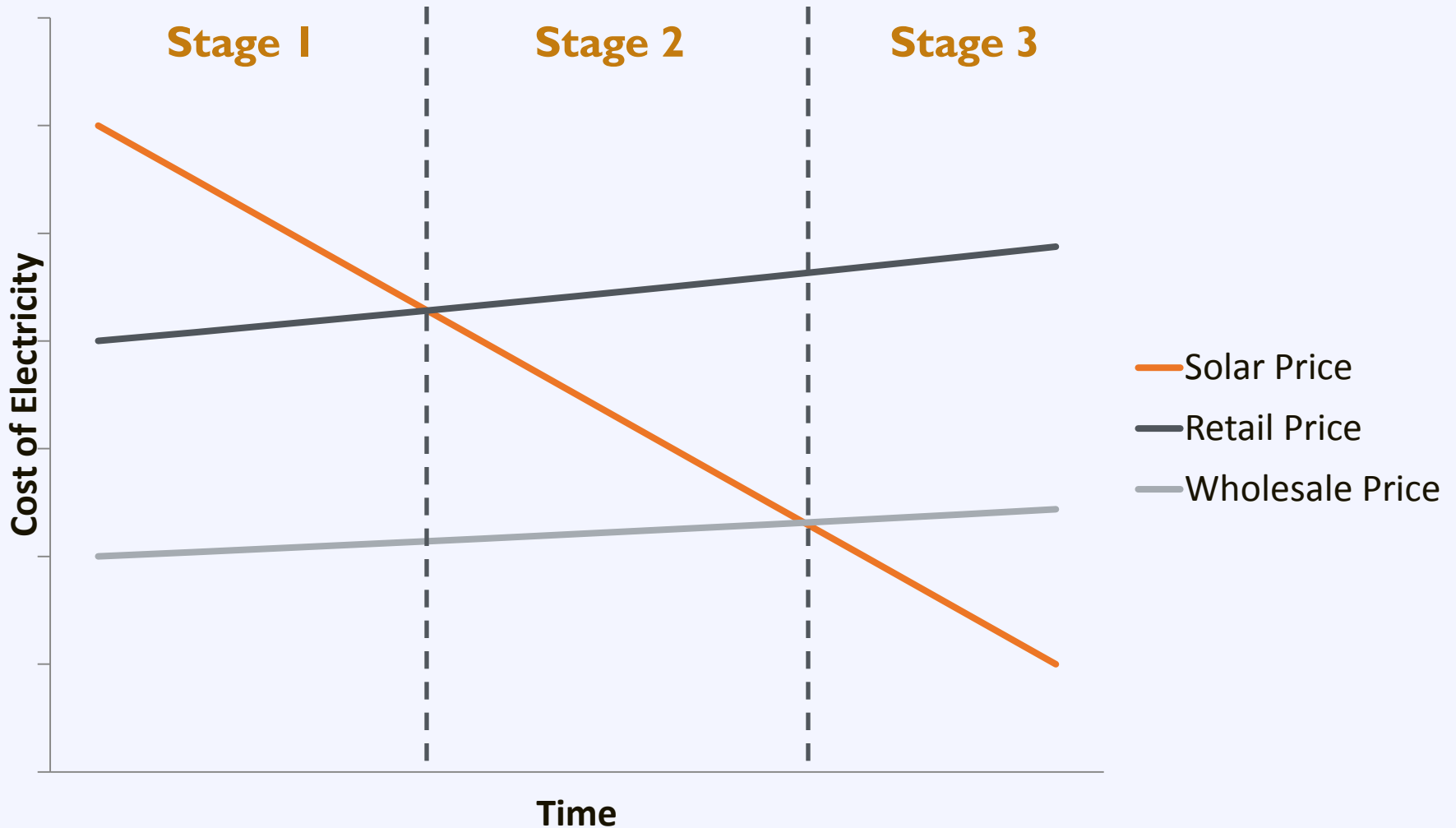
Electric Market Status (2010)

Retail Sales	Investor-Owned	Municipal	Rural Coops	TOTAL
Missouri	69.6%	13.0%	17.4%	86.1 M MWh
Kansas	66.5%	17.3%	16.2%	40.4 M MWh

# Customers	Investor-Owned	Municipal	Rural Coops	TOTAL
Missouri	62.6%	13.8%	23.6%	3,075,664
Kansas	64.2%	16.1%	19.7%	1,456,431

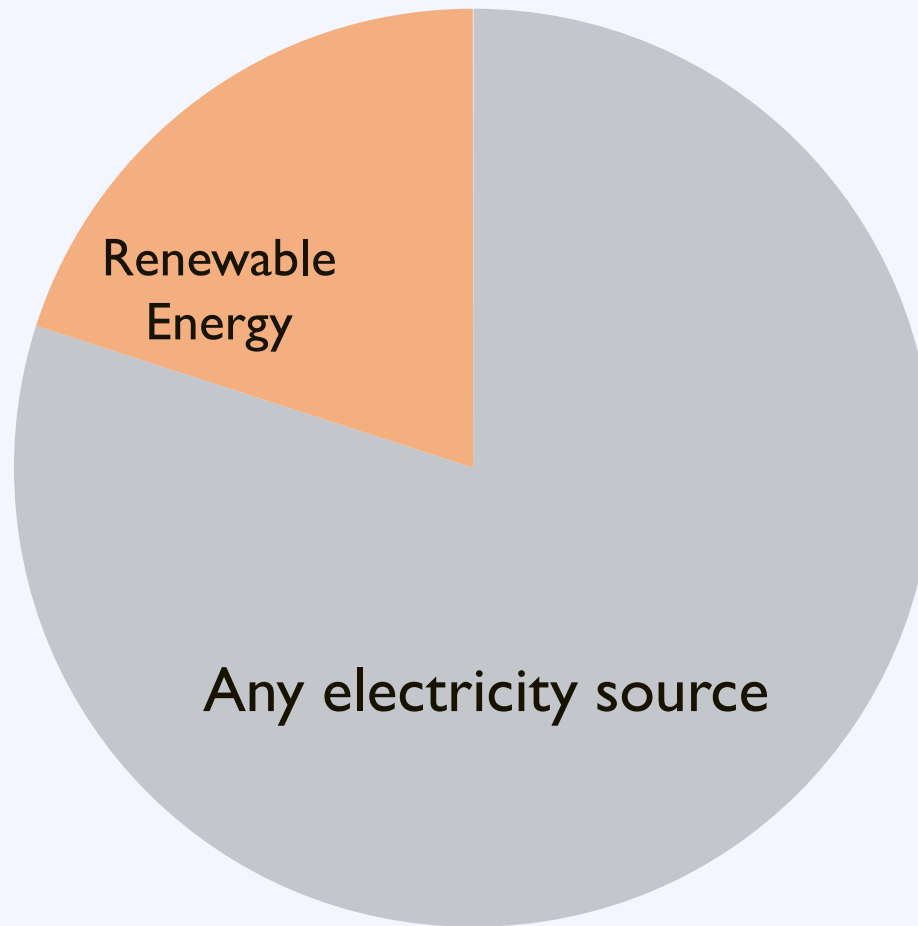
Prices	Investor-Owned	Municipal	Rural Coops	Average
Missouri	7.39¢/kWh	8.32¢/kWh	8.94¢/kWh	7.78¢/kWh
Kansas	8.04¢/kWh	7.97¢/kWh	10.04¢/kWh	8.35¢/kWh

Utility Market Stages



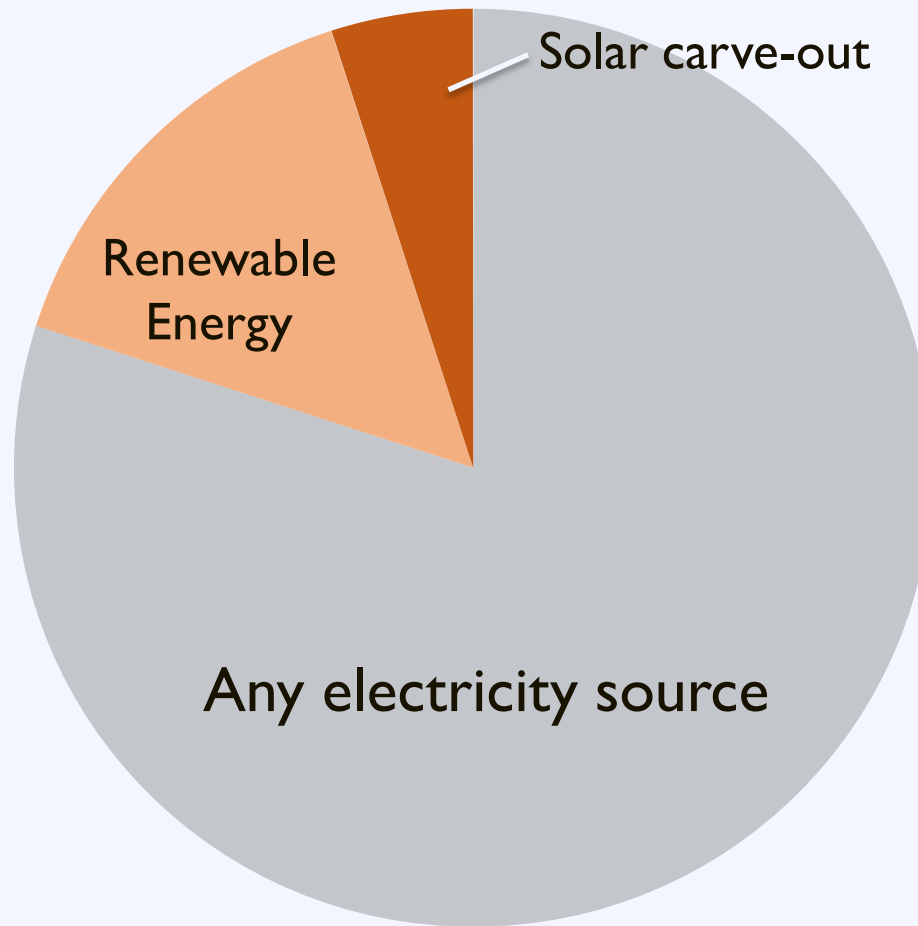
Renewable Portfolio Standard

Retail Electricity Sales

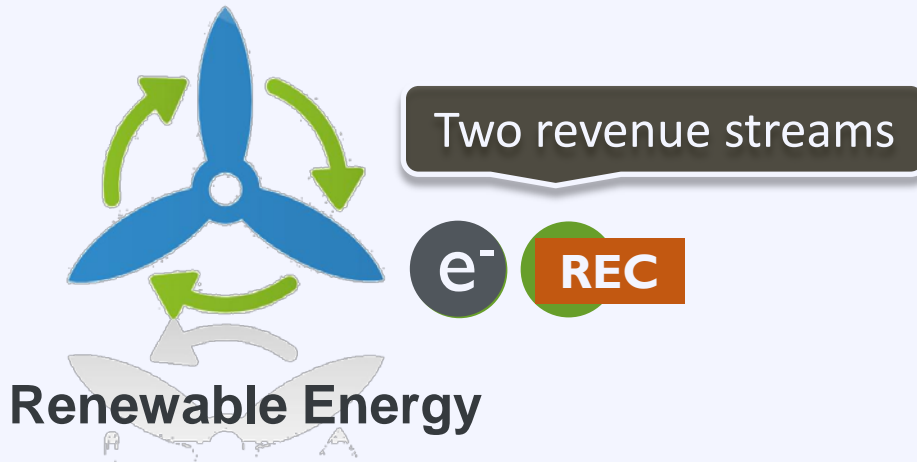


Renewable Portfolio Standard

Retail Electricity Sales

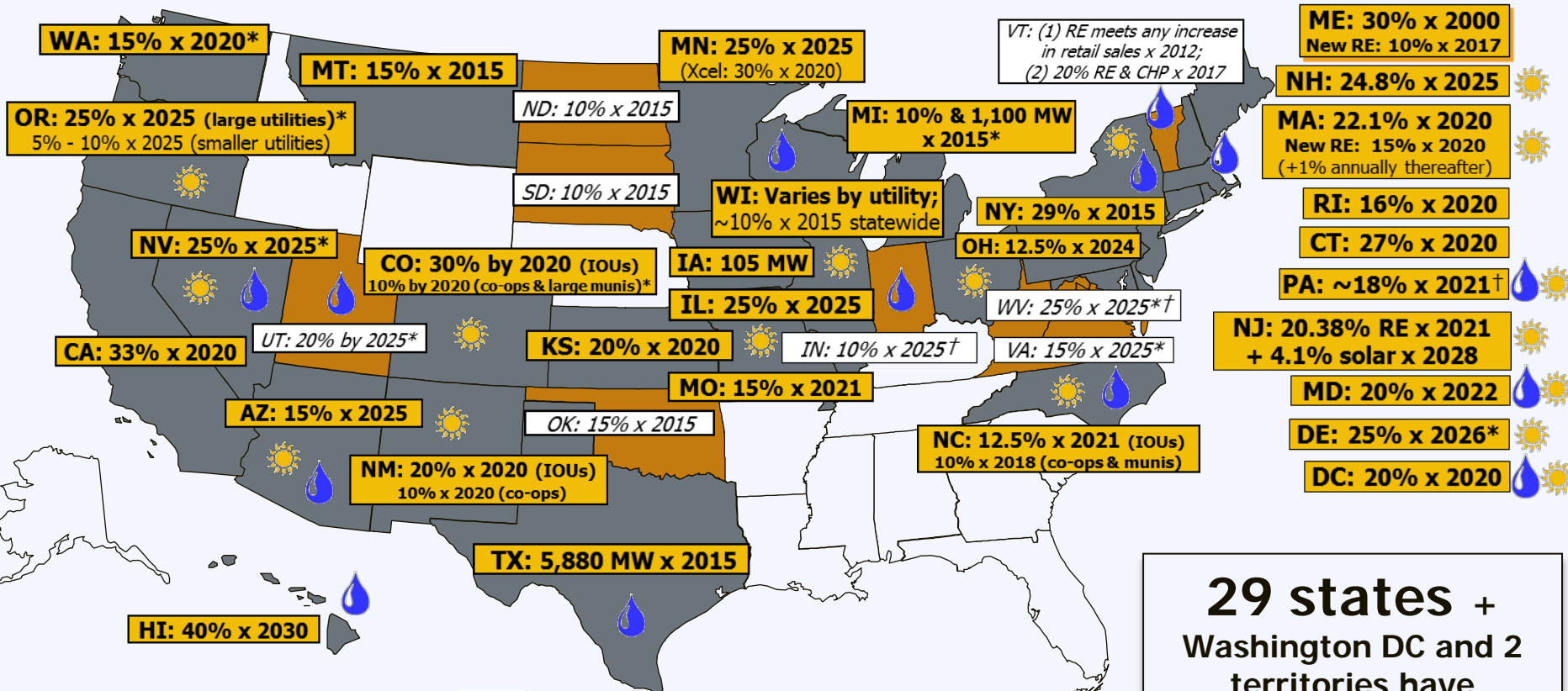


Renewable Portfolio Standard



Renewable Portfolio Standard

www.dsireusa.org / August 2012



- Renewable portfolio standard
- Renewable portfolio goal
- Solar water heating eligible
- Minimum solar or customer-sited requirement
- Extra credit for solar or customer-sited renewables
- Includes non-renewable alternative resources

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

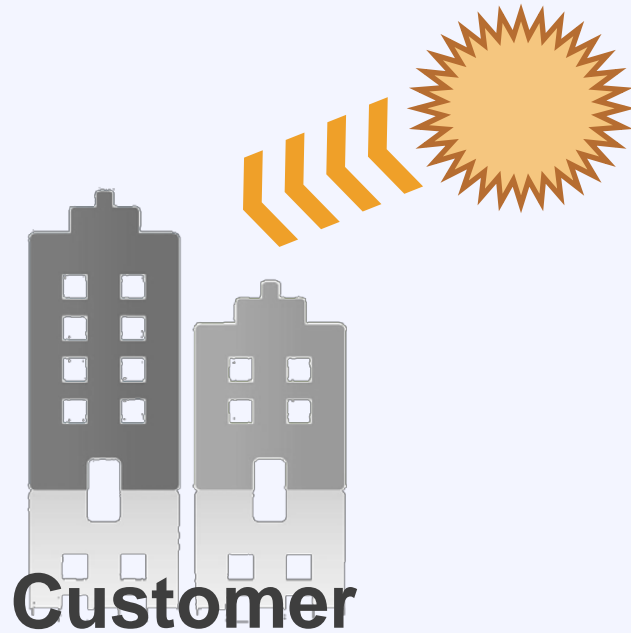


Net Metering

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

Net Metering: Overview

Morning



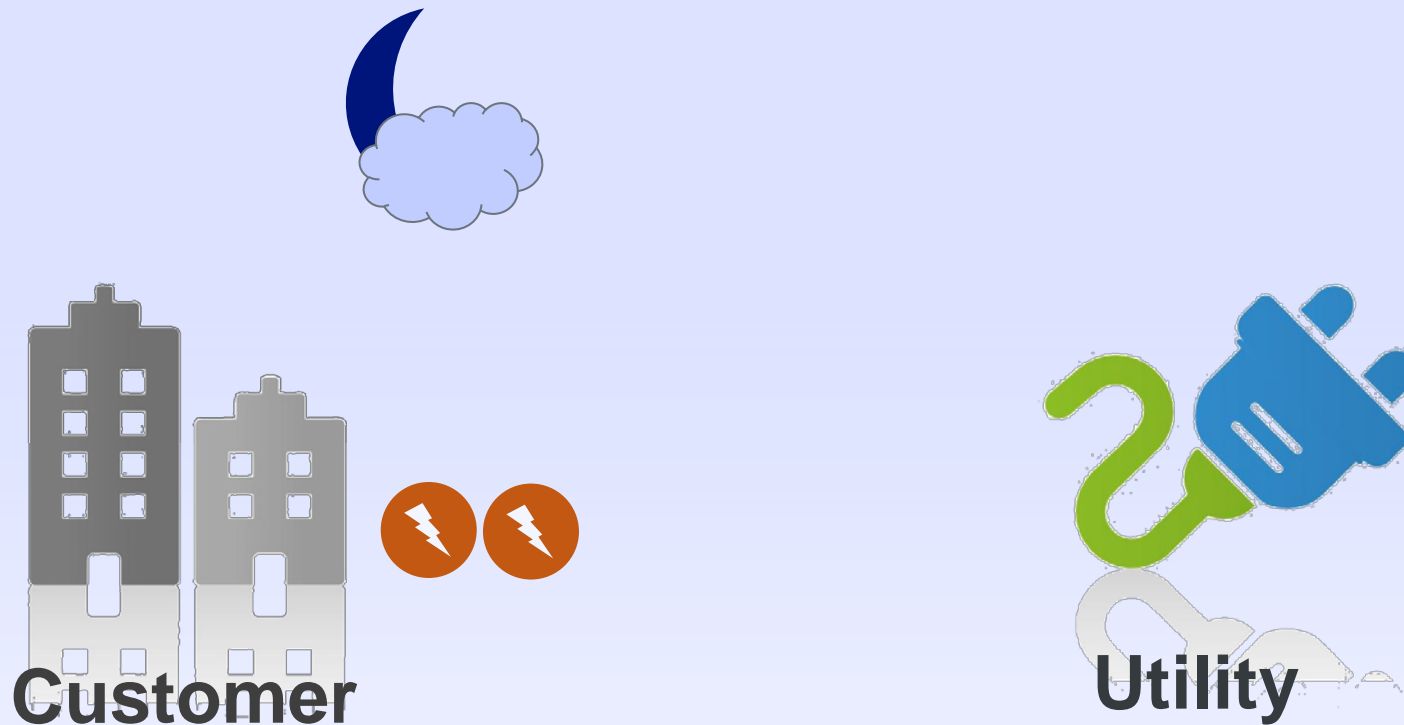
Net Metering: Overview

Afternoon



Net Metering: Overview

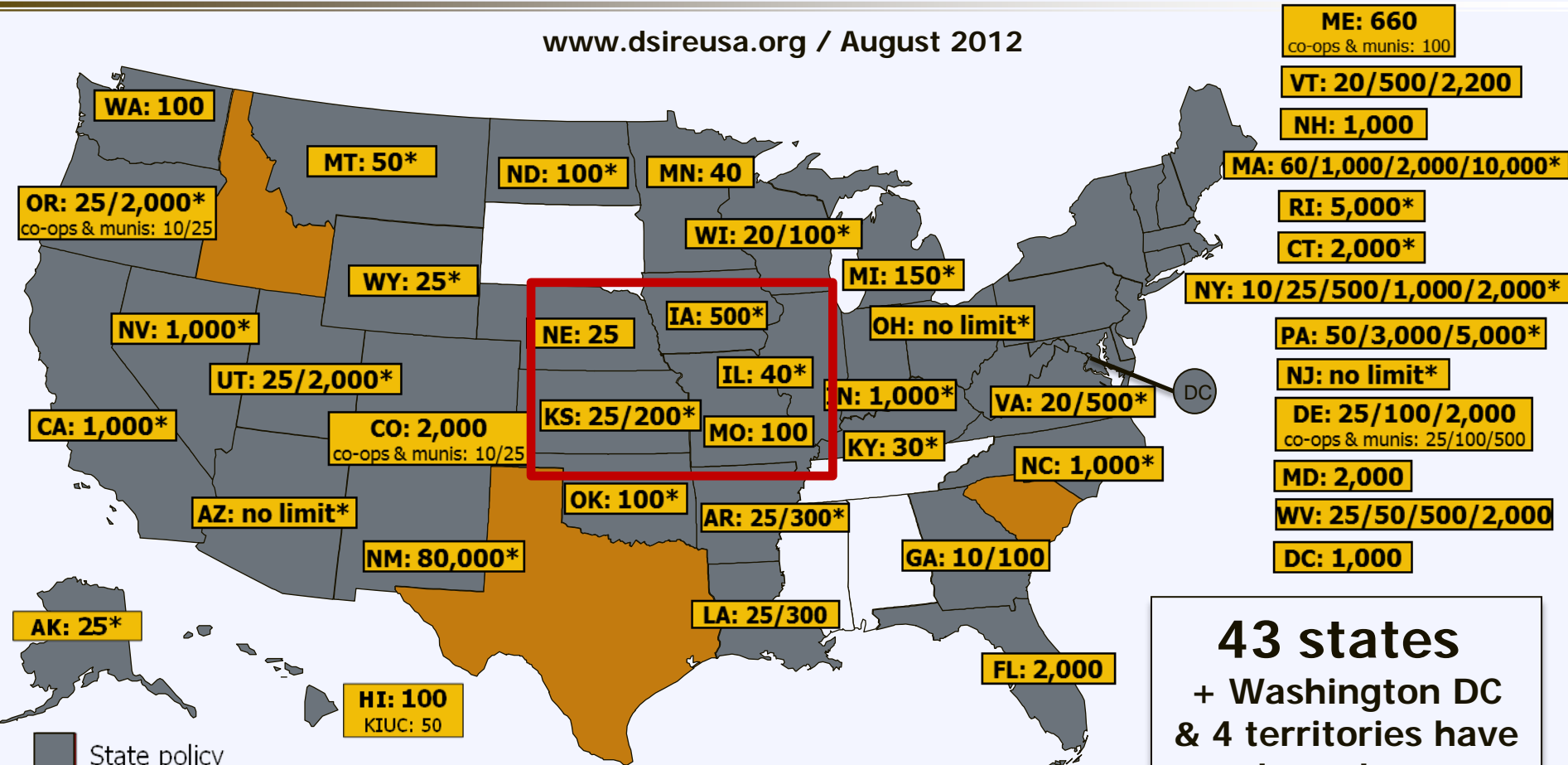
Night



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

Net Metering: State Policies

www.dsireusa.org / August 2012



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

- State policy
- Voluntary utility program(s) only
- *** State policy applies to certain utility types only (e.g., investor-owned utilities)

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.



Net Metering: Market Share

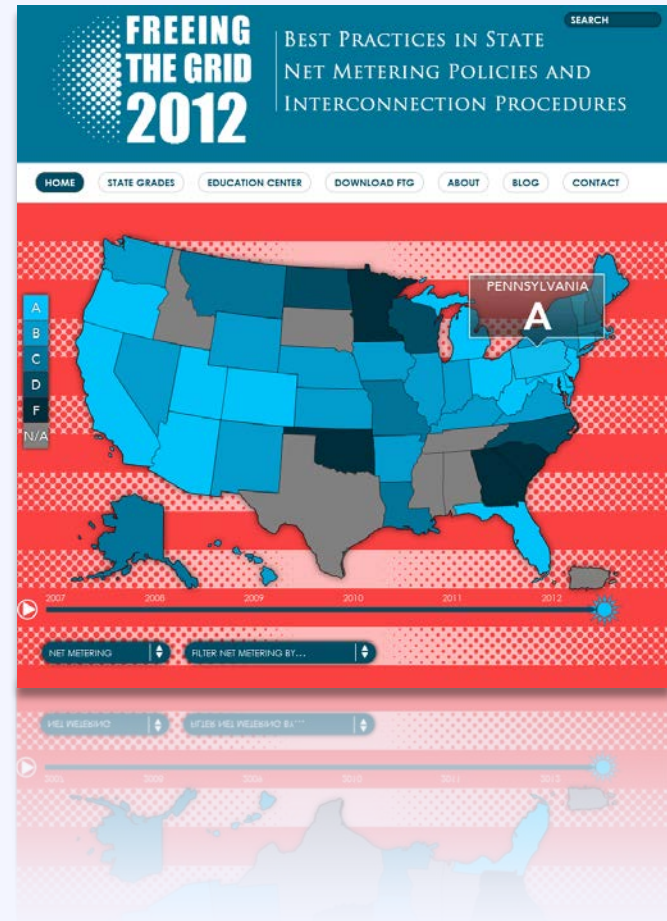
More than **93%** of distributed
PV Installations are net-metered

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

Net Metering				
C	C	C	C	C
2007	2008	2009	2010	2011

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

Net Metering: Missouri

Net Metering				
C	C	C	C	C
2007	2008	2009	2010	2011

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

Net Metering: Missouri

Net Metering				
C	C	C	C	C
2007	2008	2009	2010	2011

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Credit net excess generation at the retail rate

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
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Meter Aggregation:	Not addressed

Net Metering: Kansas

Net Metering				
-	-	B	B	B
2007	2008	2009	2010	2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Small Hydroelectric, Fuel Cells using Renewable Fuels
Applicable Sectors:	Commercial, Industrial, Residential, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	200 kW for non-residential; 25 kW for residential
Aggregate Capacity Limit:	1% of utility's peak demand during previous year
Net Excess Generation:	Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle
REC Ownership:	Utility owns RECs
Meter Aggregation:	Not addressed

Net Metering: Kansas

Net Metering				
-	-	B	B	B
2007	2008	2009	2010	2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Small Hydroelectric, Fuel Cells using Renewable Fuels
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REC Ownership:	Utility owns RECs
Meter Aggregation:	Not addressed

Net Metering: Kansas

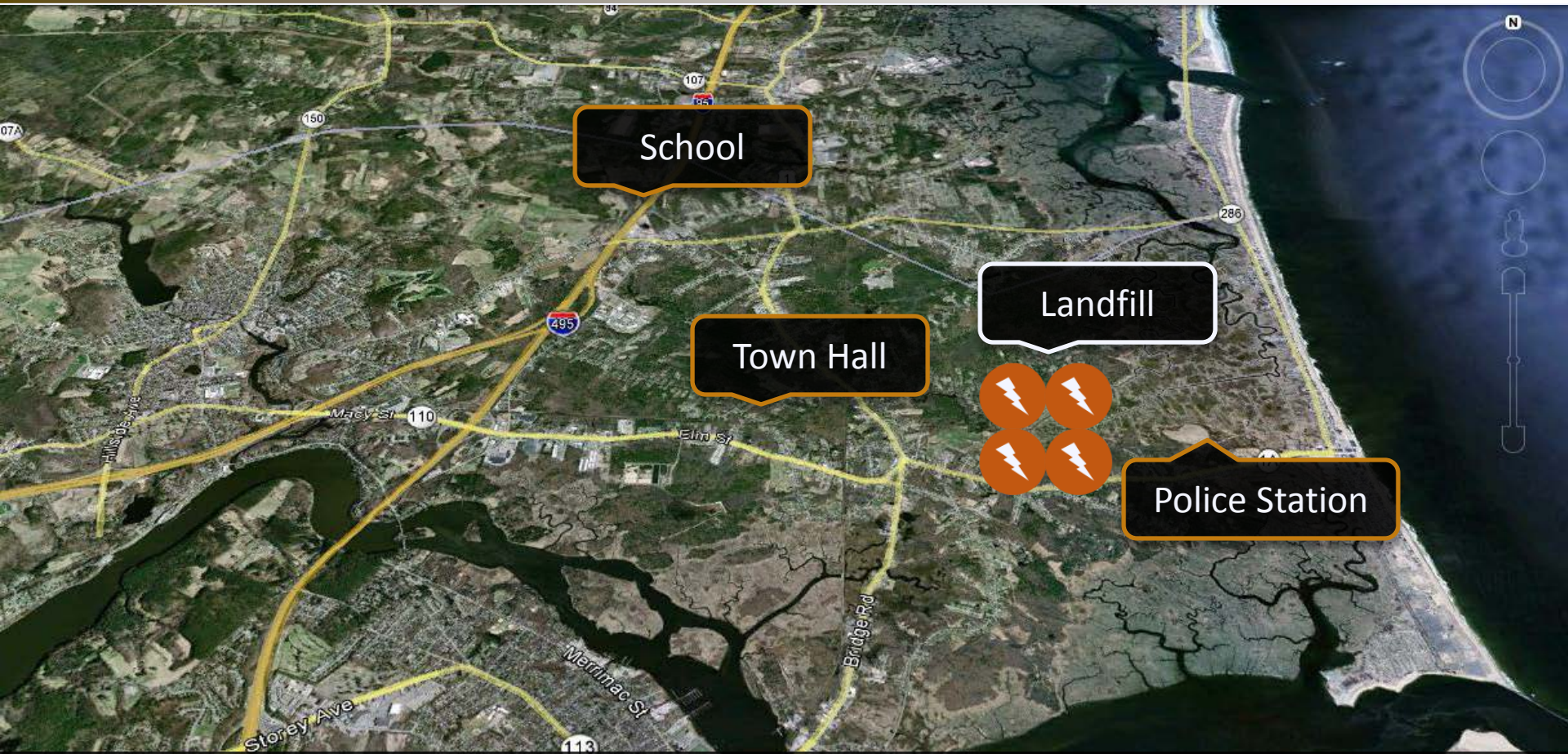
Net Metering				
-	-	B	B	B
2007	2008	2009	2010	2011

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Expand net-metering to all utilities

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Small Hydroelectric, Fuel Cells using Renewable Fuels
Applicable Sectors:	Commercial, Industrial, Residential, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
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Aggregate Capacity Limit:	1% of utility's peak demand during previous year
Net Excess Generation:	Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle
REC Ownership:	Utility owns RECs
Meter Aggregation:	Not addressed

Net Metering: Virtual



No direct connection necessary

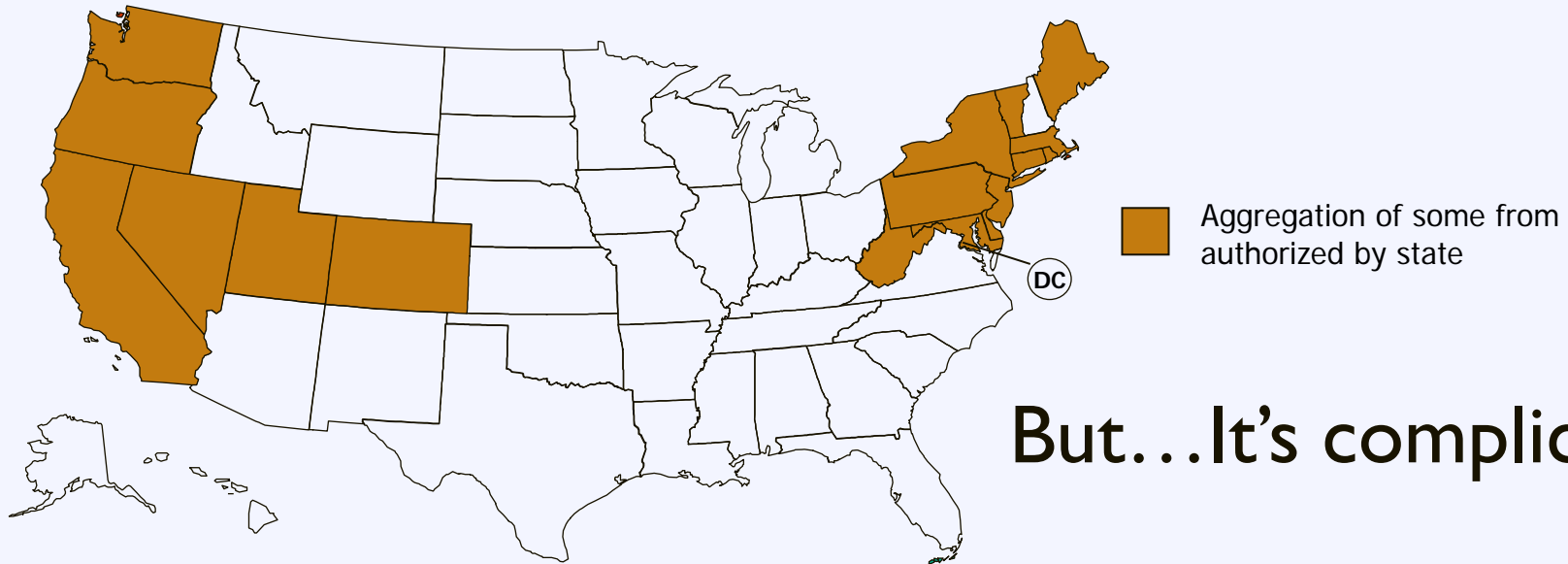
Image: MassGIS, Commonwealth of Massachusetts EOE
Data: SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2012 Google

Google earth

Date: 4/9/2008 1992 lat: 42.841484 lon: -70.875865 elev: 21 ft

Eye alt: 25725 ft

Net Metering: Meter Aggregation



But...It's complicated

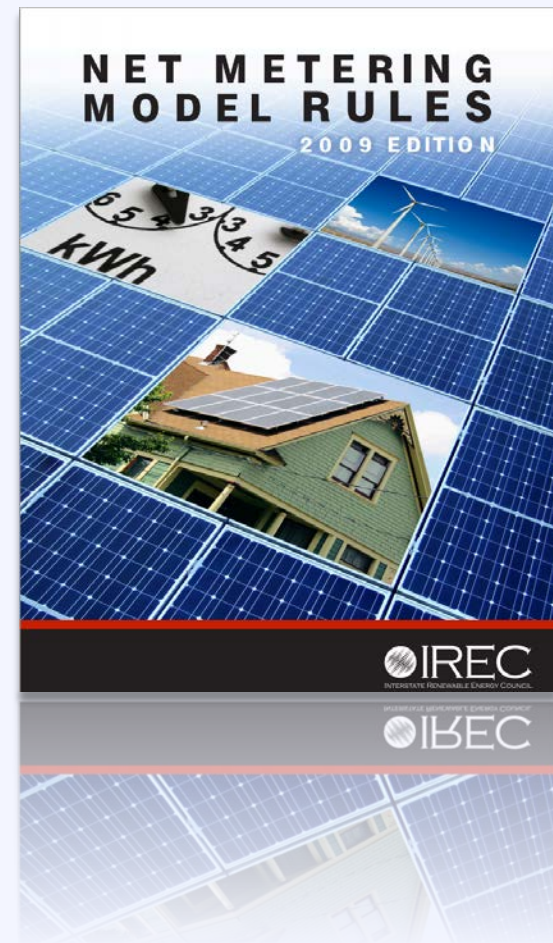
- Ownership requirements
- Contiguous vs. non-contiguous properties
- Multiple customers
- Multiple generators
- Modified system/aggregate system size limits
- Rollover rates
- Distance limitations
- Number of accounts
- How to address accounts on different tariffs

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



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)

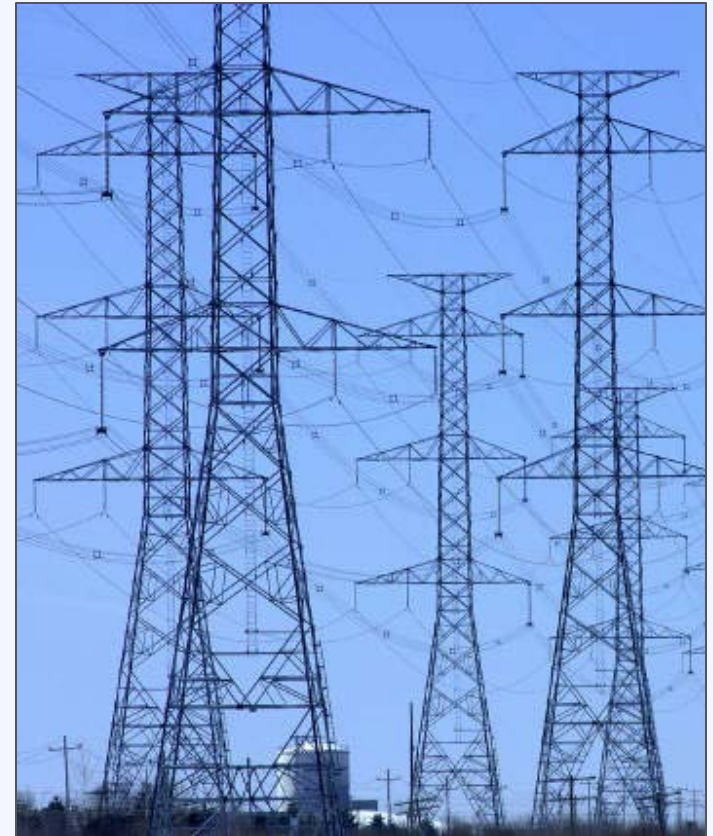
2012: 43 States & DC have adopted interconnection standards

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



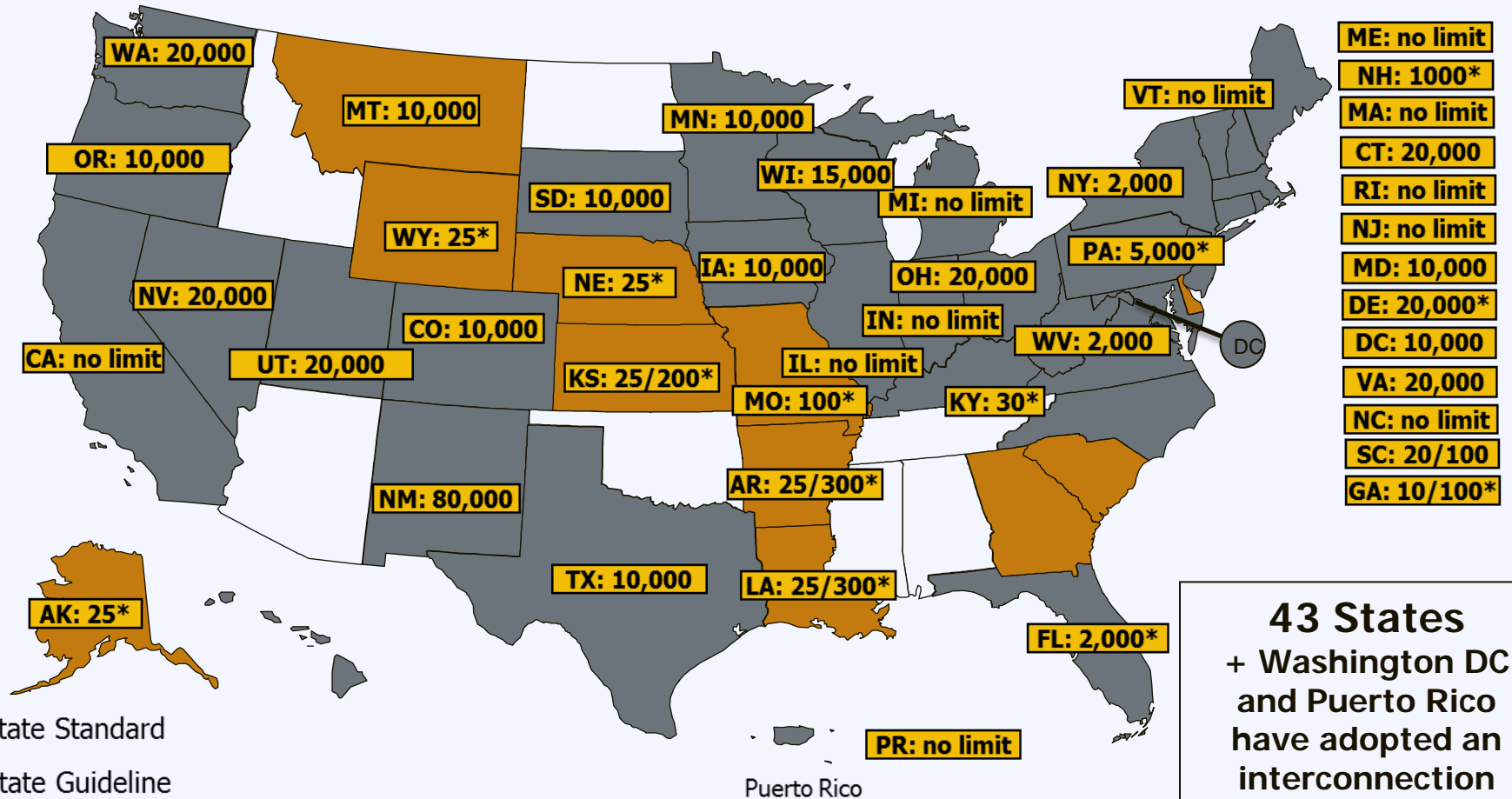
Interconnection: Best Practices

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



Interconnection: State Policies

www.dsireusa.org / August 2012



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.

Interconnection: Missouri

Interconnection

F 2007	F 2008	F 2009	– 2010	– 2011
-----------	-----------	-----------	-----------	-----------

Recommendations:

- Adopt IREC's model interconnection procedures

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

Interconnection: Kansas

Interconnection				
-	-	F	-	-
2007	2008	2009	2010	2011

Recommendations:

- Adopt IREC's model interconnection procedures

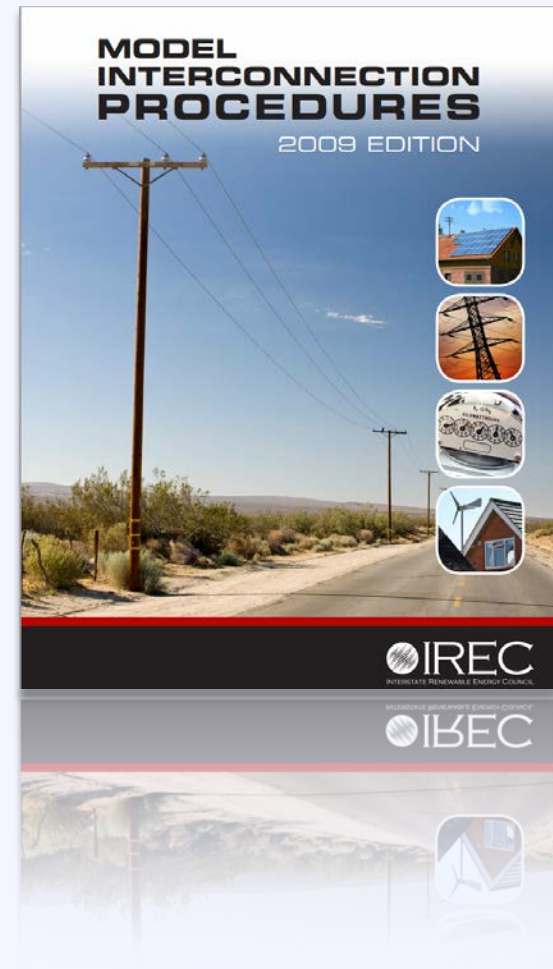
Eligible Renewable/Other Technologies:	-
Applicable Sectors:	-
Applicable Utilities:	-
System Capacity Limit:	-
Standard Agreement:	-
Insurance Requirements:	-
External Disconnect Switch:	-
Net Metering Required:	-

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



Q & A

Agenda

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Understanding Solar Financing

**Direct Cash
Incentives**

RPS/SRECs

Rebates

PBIs/FITs

Financing

3rd Party
Ownership

Bulk
Purchasing

PACE

**Other
Incentives**

Loans

Community
Shared Solar

Property &
Sales Taxes

Understanding Solar Financing

**Direct Cash
Incentives**

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**Other
Incentives**

Loans

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Sales Taxes

Comparison: PV Financial Incentives

Kansas		
-	State Rebates	-
-	State Grants	-
✓	State Loans	≤ \$30,000 (R, C)
-	PACE Financing	-
-	Prod. Incentives	-
-	Corp. Tax Credits	-
-	Pers. Tax Credits	-
✓	Prop. Tax Incentives	All sectors , on-site use

Missouri		
✓	State Rebates	\$2.00 /W
-	State Grants	-
✓	State Loans	Competitive (govt, schools)
✓	PACE Financing	Local Option
✓	Prod. Incentives	Utilities
-	Corp. Tax Credits	-
-	Pers. Tax Credits	-
✓	Prop. Tax Incentives	Optional abatement, utility scale

Missouri Solar Rebates

- \$2.00 per W
- \$50,000 Max.
- Up to 100 kW
- KCP&L: \$1.3M in 2011
- Ameren: \$2.96M for 2011





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





SRECs in Missouri

Ameren Standard Offer:

\$50 (2012) for 5 or 10 years; limited to 100 kW or less; lump sum for 10 kW or less; \$2M annually (fully committed for 2012)

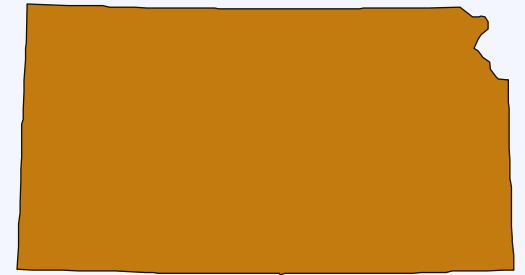
KCP&L Standard Offer:

Coming Soon?

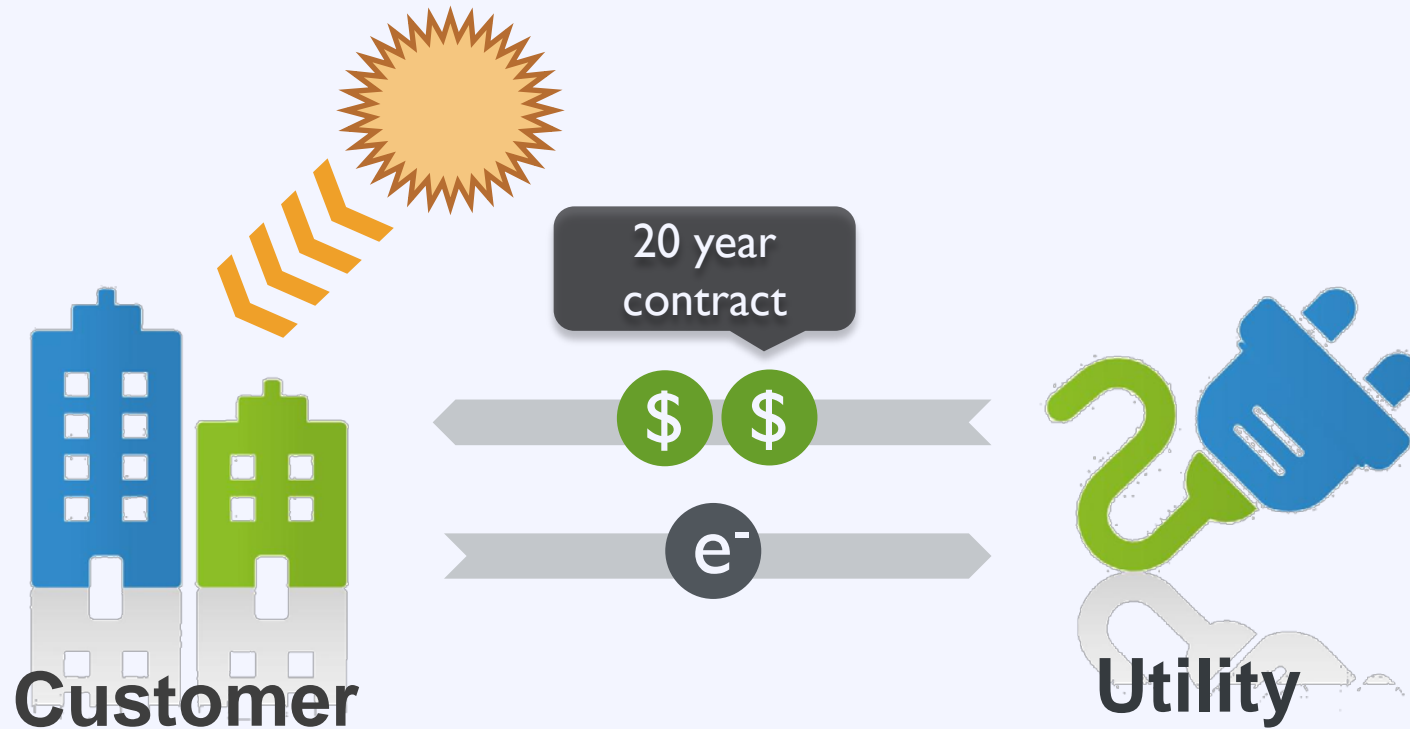


RPS: Kansas Overview

- 20% peak-demand capacity by 2020
- No solar carve-out
- No defined alternative compliance payment or penalties
- No geographic/eligibility limitations
- Formulaic approach to translate RECs (MWh) into capacity (MW)



What is a Feed in Tariff?



Components of a Feed in Tariff

- Fixed price payment
- Long term contract
- Guaranteed power purchase
- Price based on generation cost



Understanding Solar Financing

Direct Cash
Incentives

RPS/SRECs

Rebates

PBIs/FITs

Financing

3rd Party
Ownership

Bulk
Purchasing

PACE

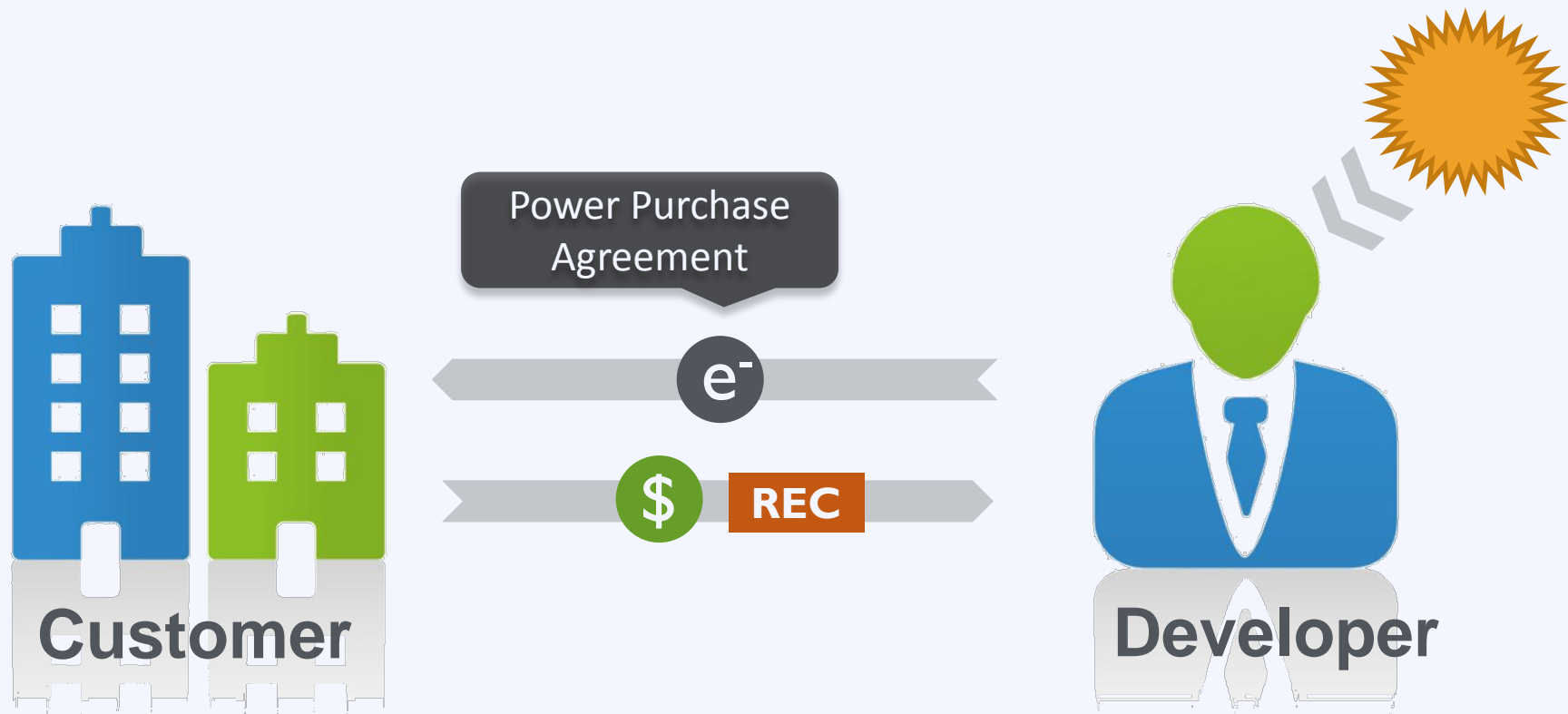
Other
Incentives

Loans

Community
Shared Solar

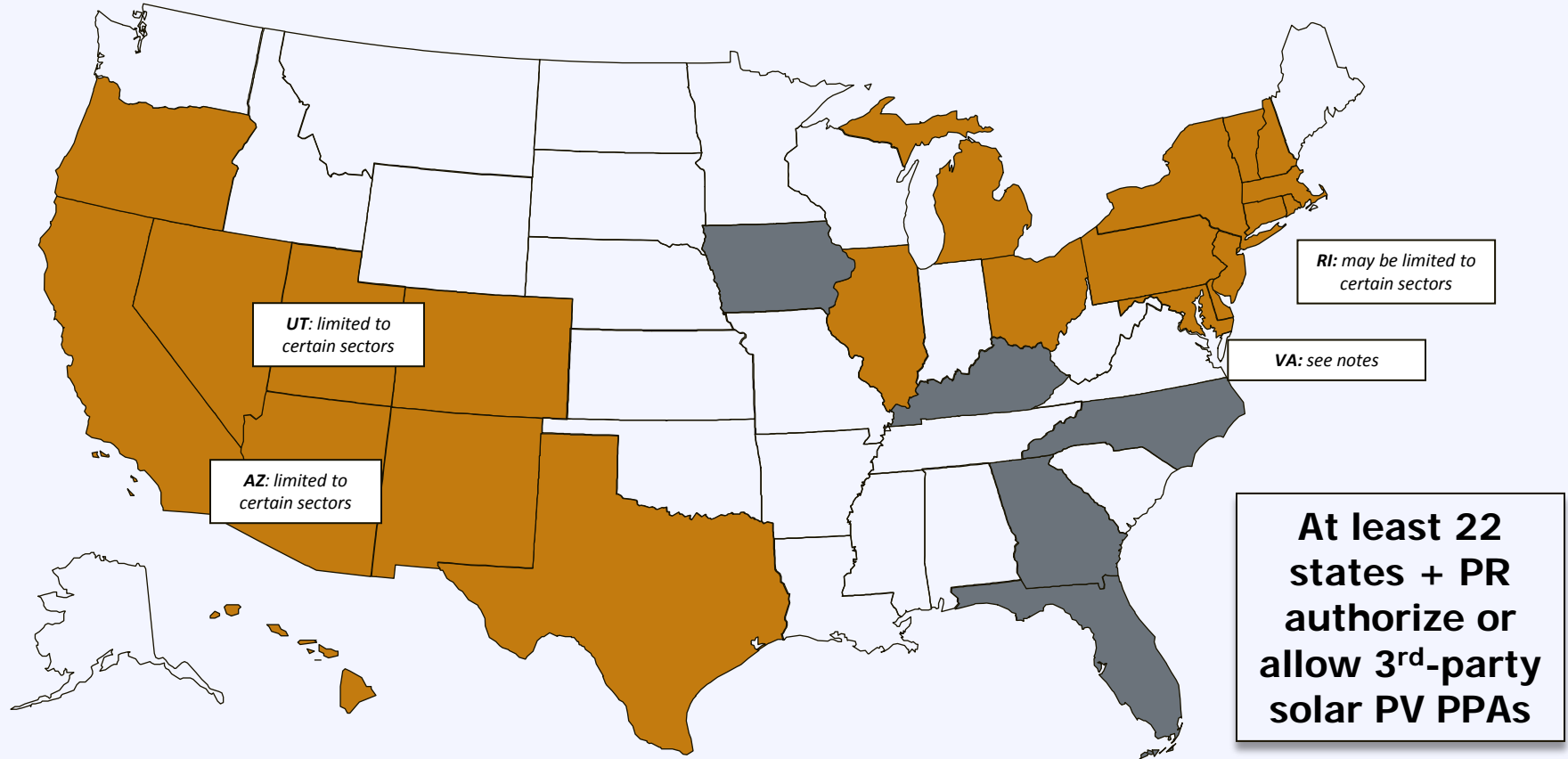
Property &
Sales Taxes





Third Party Ownership



3rd-Party Solar PV Power Purchase Agreements (PPAs)

www.dsireusa.org / August 2012



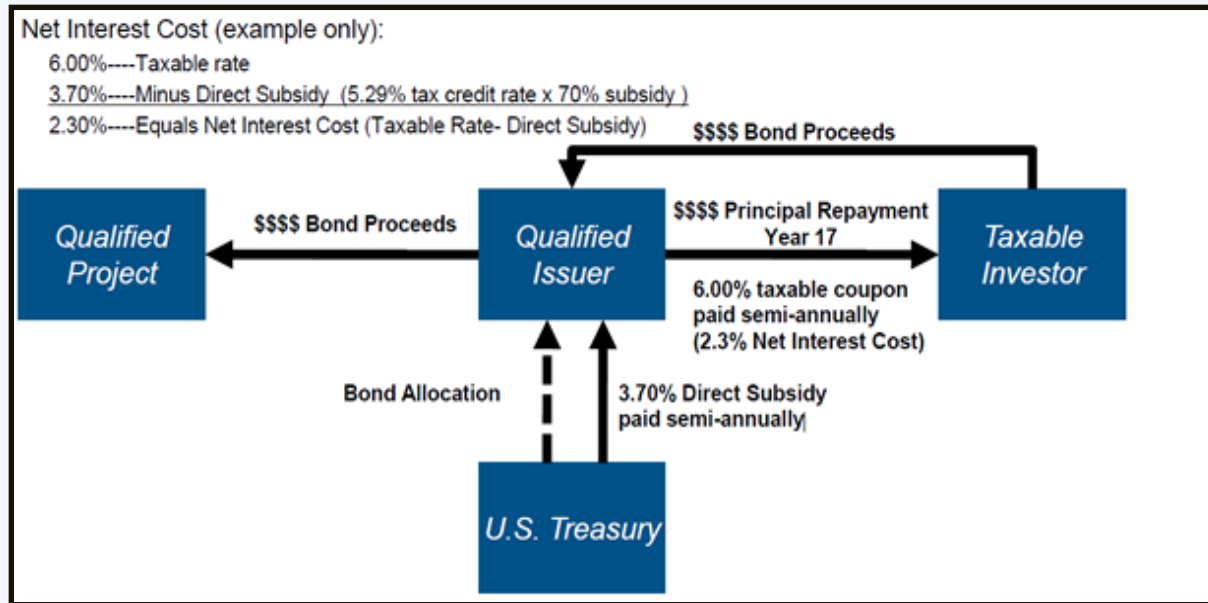
-  Authorized by state or otherwise currently in use, at least in certain jurisdictions within in the state
 -  Apparently disallowed by state or otherwise restricted by legal barriers
 -  Status unclear or unknown
-  Puerto Rico

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.

Qualified Energy Conservation Bonds

- What?
 - Tax credit or direct payment subsidy
- Why?
 - Subsidy lowers the effective cost of capital
- Relevance for Solar?
 - Financing public facilities (numerous)
 - “Green Community” programs (a few)
- How?
 - State allocation or automatic allocation

Qualified Energy Conservation Bonds



Local Examples:

- St. Louis County, MO - \$10.3 million residential energy efficiency loan program
- City of Lawrence, KS - \$8.7 million hydro project, bundled with other bonds

Group Purchasing

- Many people come together to purchase solar equipment and installation services in bulk
- Economies of scale = lower price per watt

SunShares
Go Solar with Group Buying Power

 georgetownenergy.com
HELPING WASHINGTON DC GO SOLAR



solarize portland

Property Assessed Clean Energy

City creates type of land-secured financing district or similar legal mechanism (a special assessment district)



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



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



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



Local Examples: Jefferson City, Cole County, others coming soon? (see <http://www.mocefillc.com/>)

Understanding Solar Financing

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Financing: Attractive Loan Options

- Limited options in both Missouri and Kansas
- Local governments and utilities can develop loan programs:
 - direct loans (e.g., revolving loan fund)
 - loans through private lenders (e.g., credit enhancement)
- Benefits and drawbacks exist for both approaches
- The goal is to increase **access** to financing or induce **additional** improvements
- Various funding options exist



Community Shared Solar



Property & Sales Tax Exemptions

- Property tax exemption in Kansas for customer-sited facilities
- Limited information available in Missouri on property tax assessment
- “Renewable Energy Generation Zones” authorized in Missouri (abatements of at least 50% for 10 years if adopted)
- 4.225% state sales tax in Missouri, plus local
- 6.3% state sales in Kansas, plus local

Q & A

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Process

Decide on
Ownership
Structure

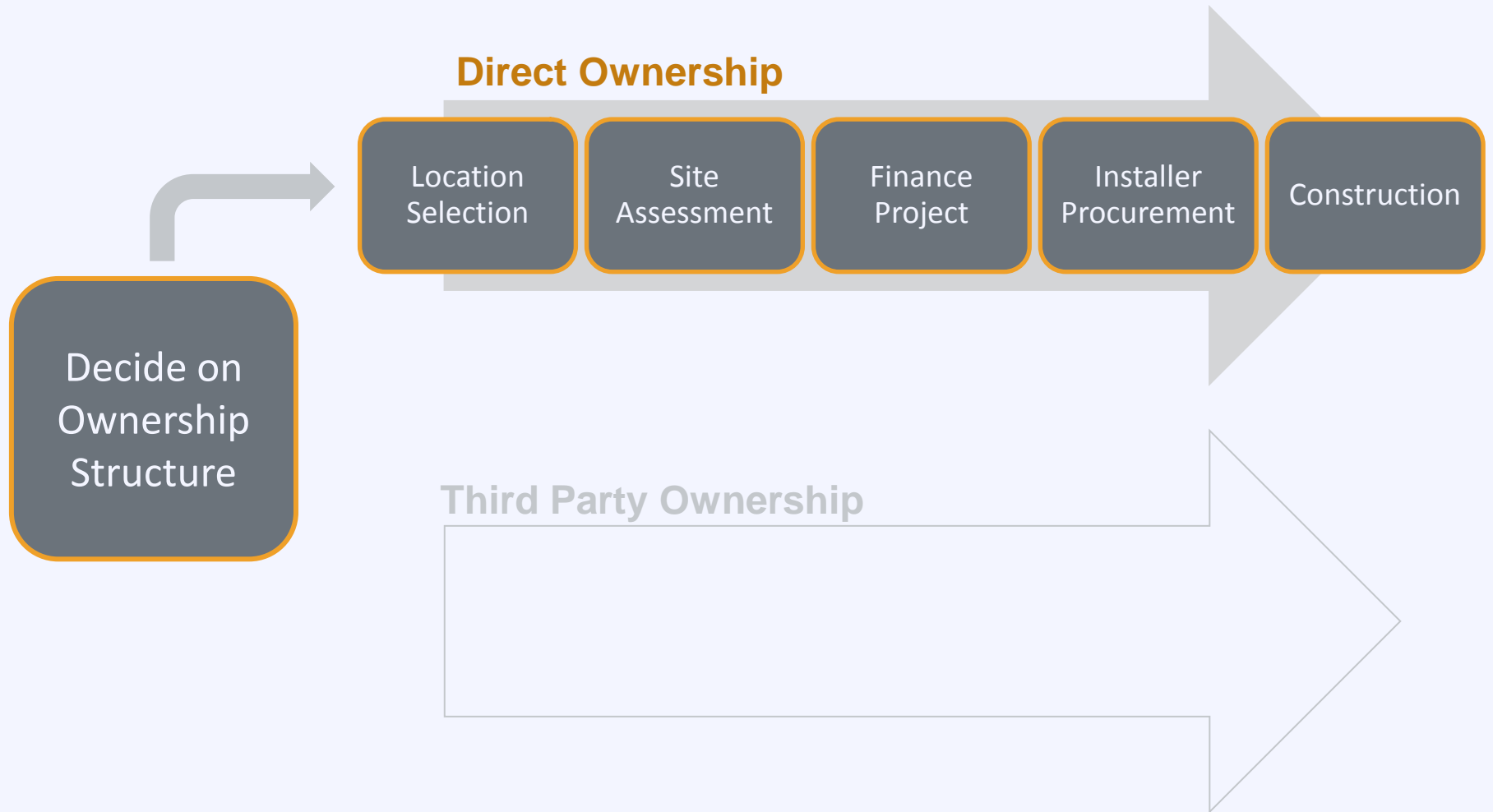
Option 1: Direct Ownership

Option 2: Third Party Ownership

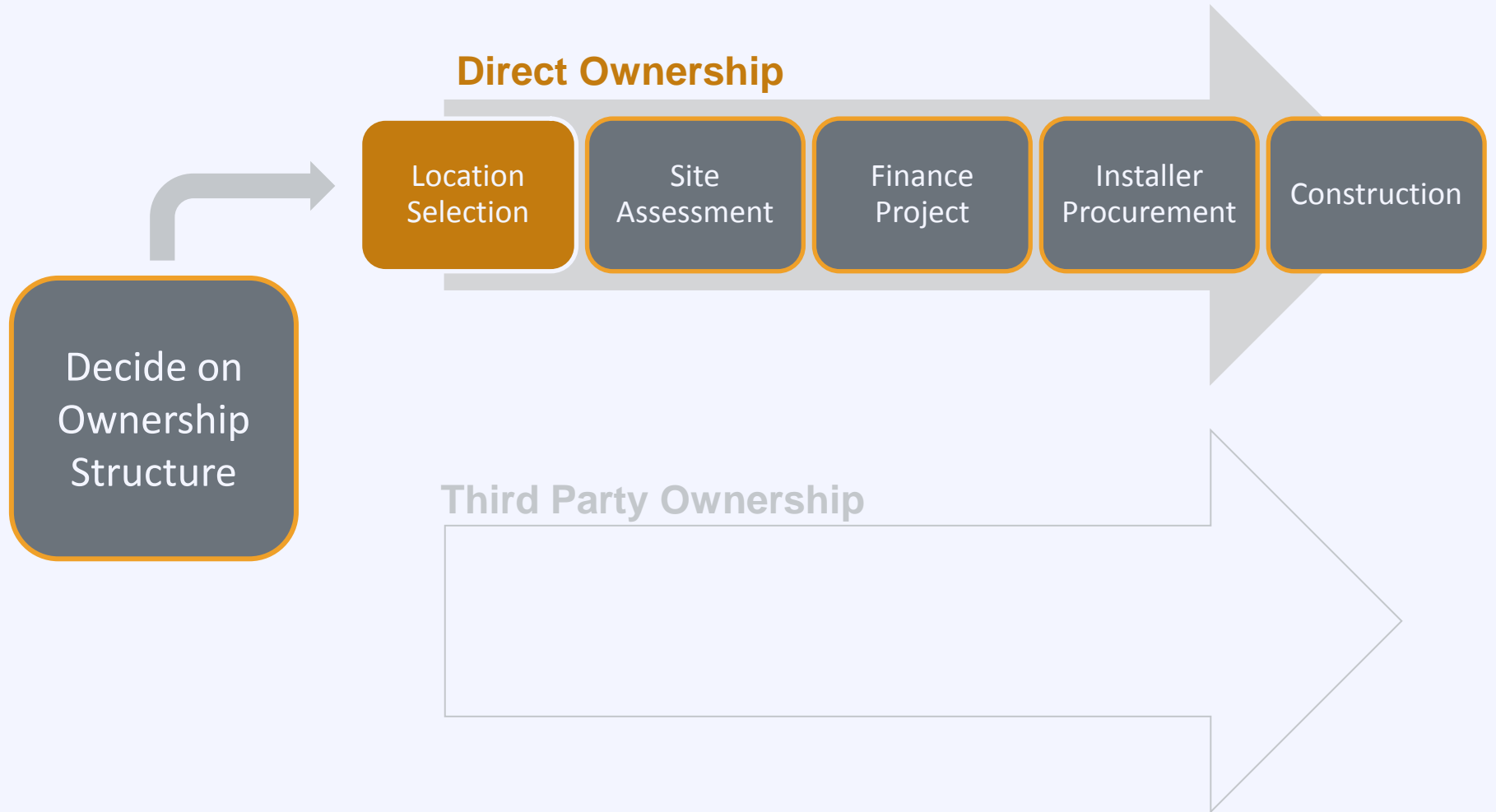
Ownership Structure Decision

- 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



Process



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 I: Location Selection

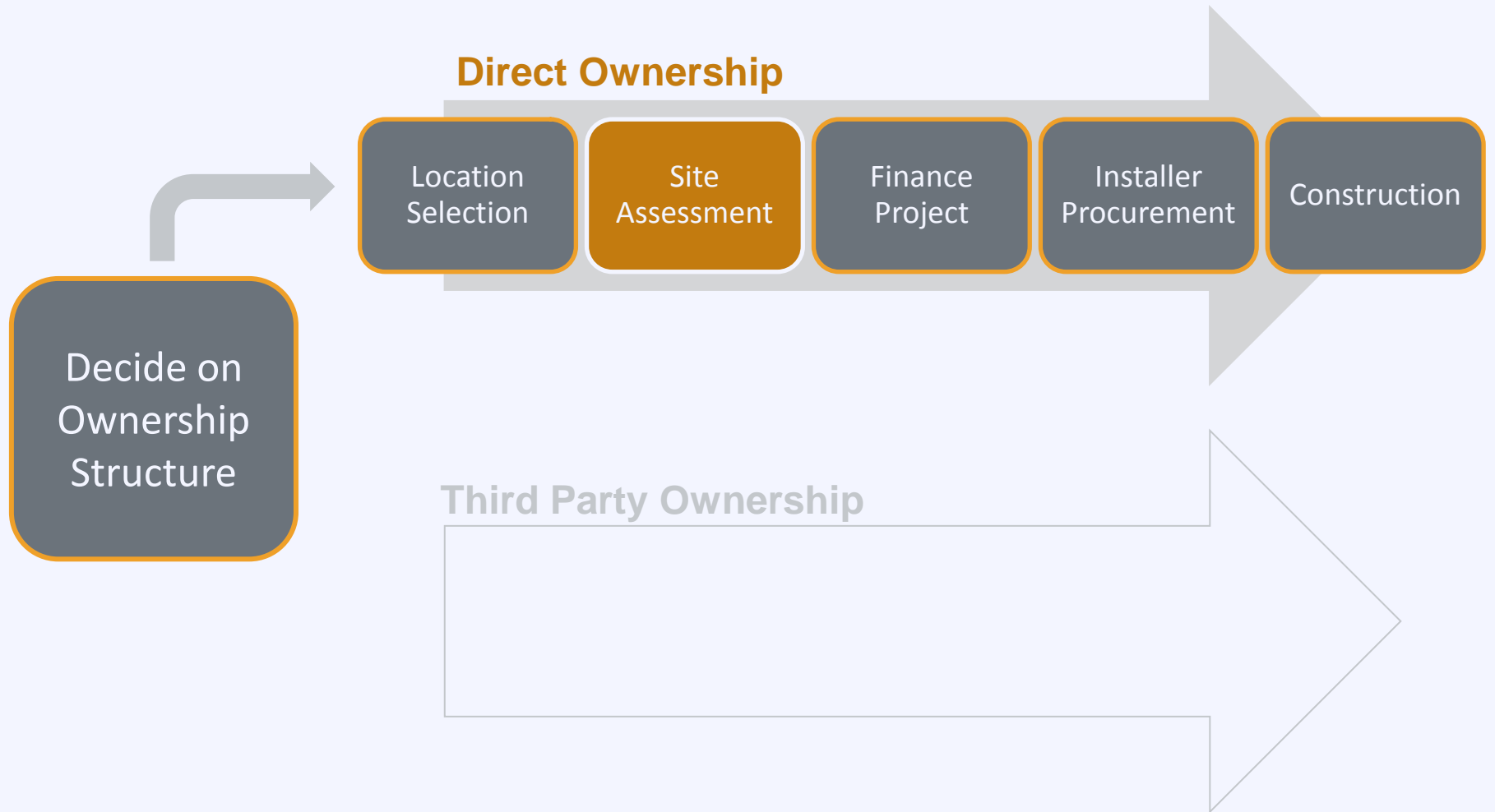


Rooftop



Ground

Process



Step 2: Site Assessment

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

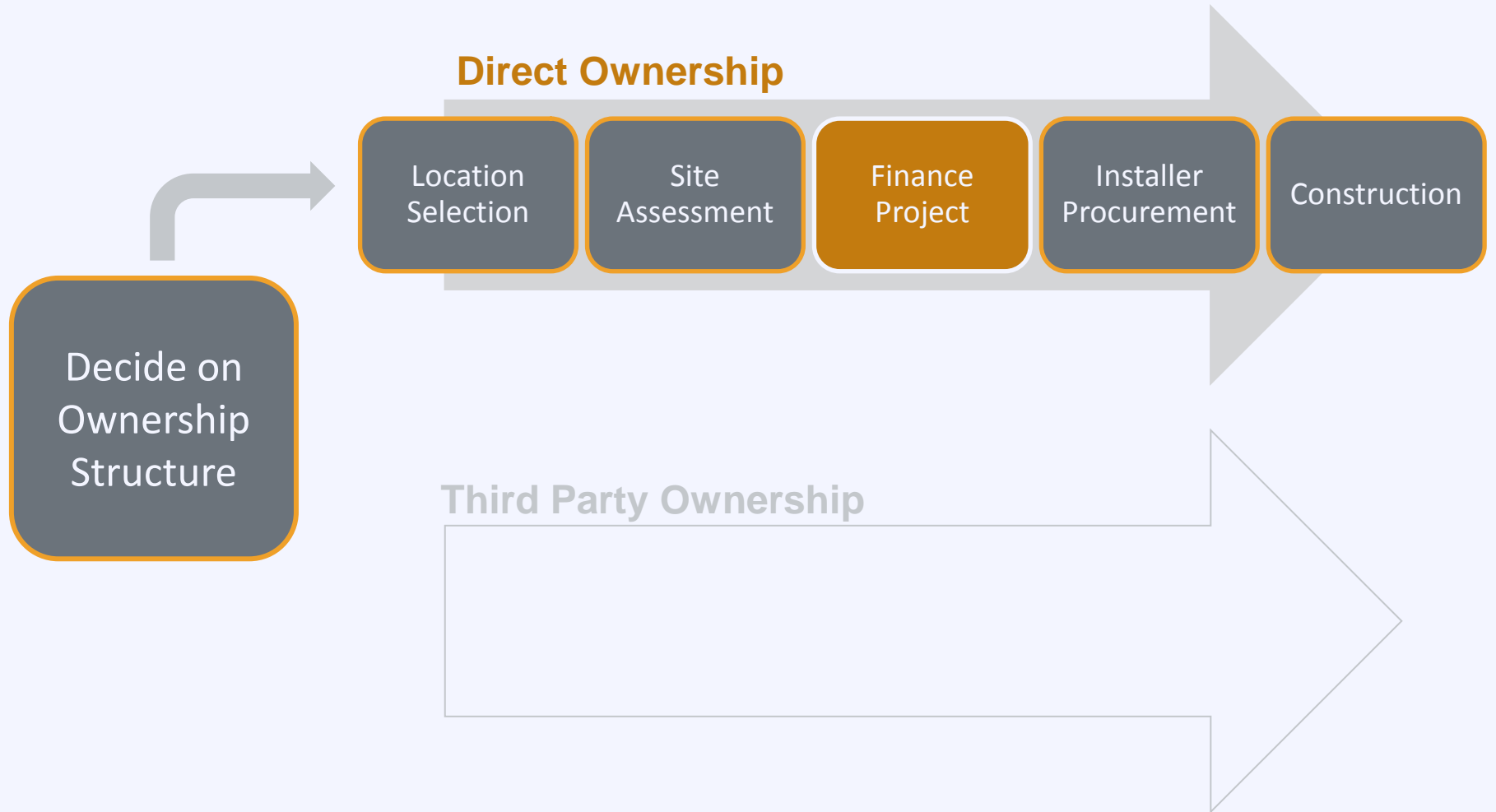


Step 2: Site Assessment

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



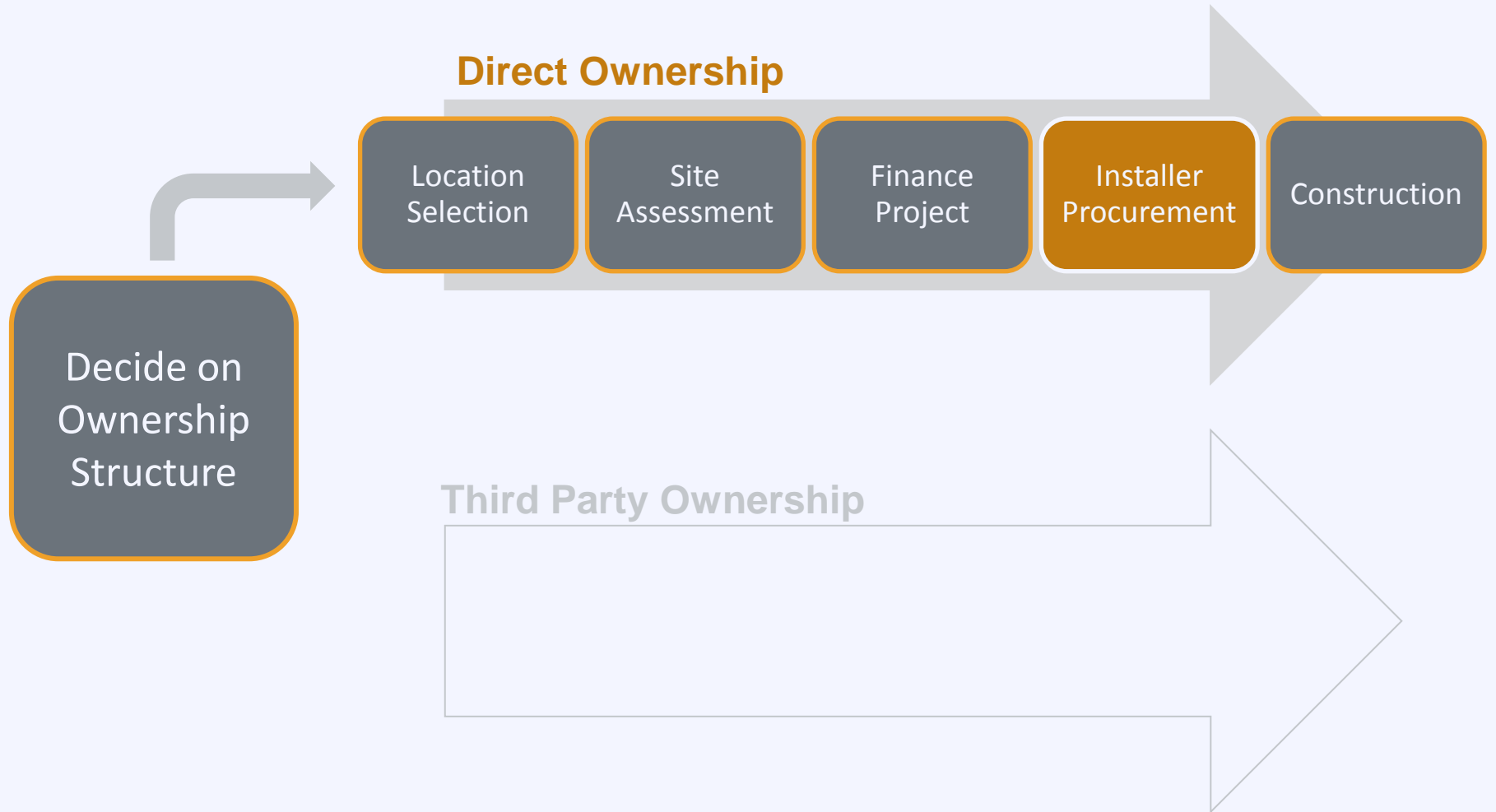
Process



Step 3: Finance Project

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

Process

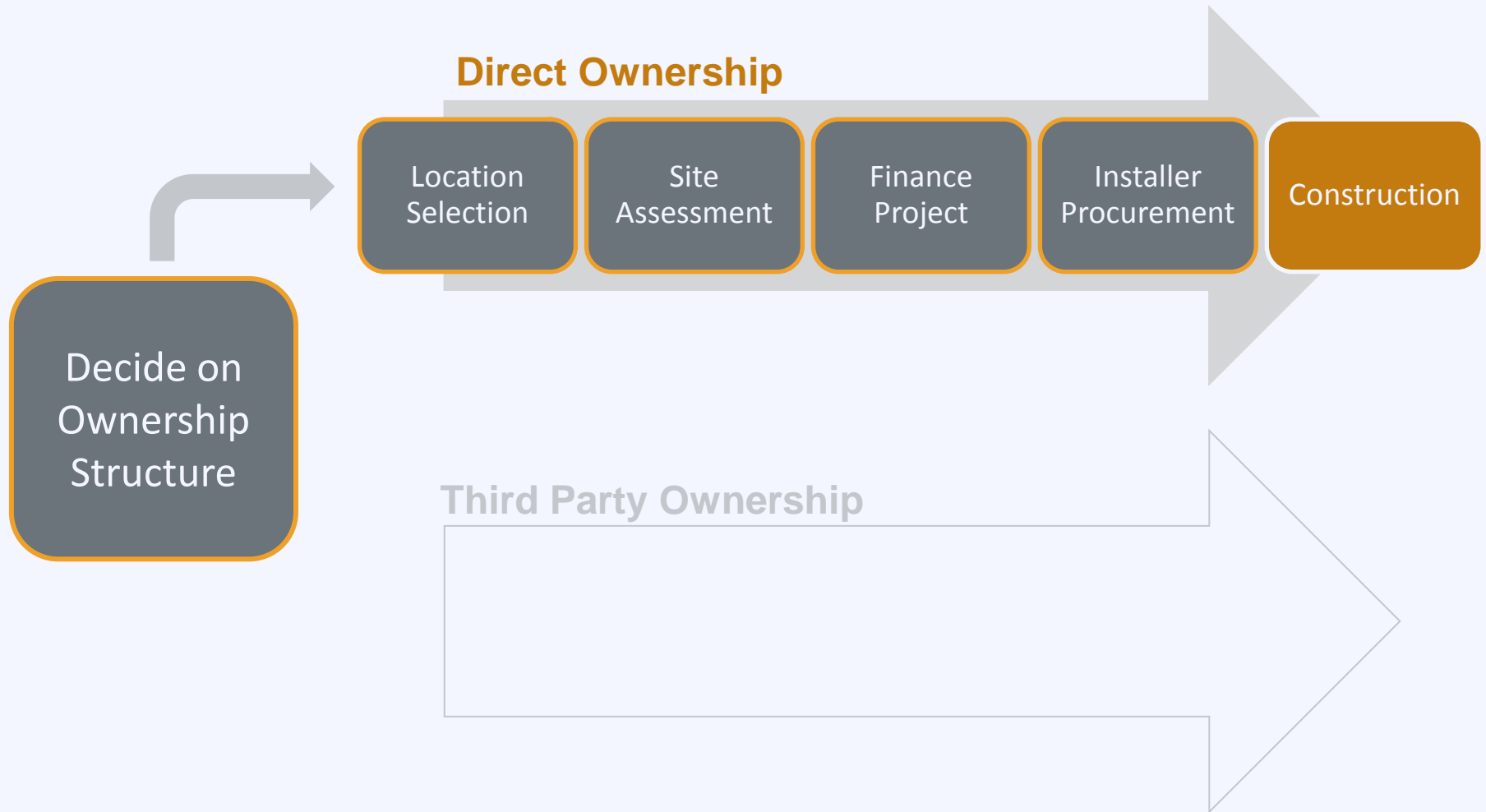


Step 4: Installer Procurement

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



Direct Ownership

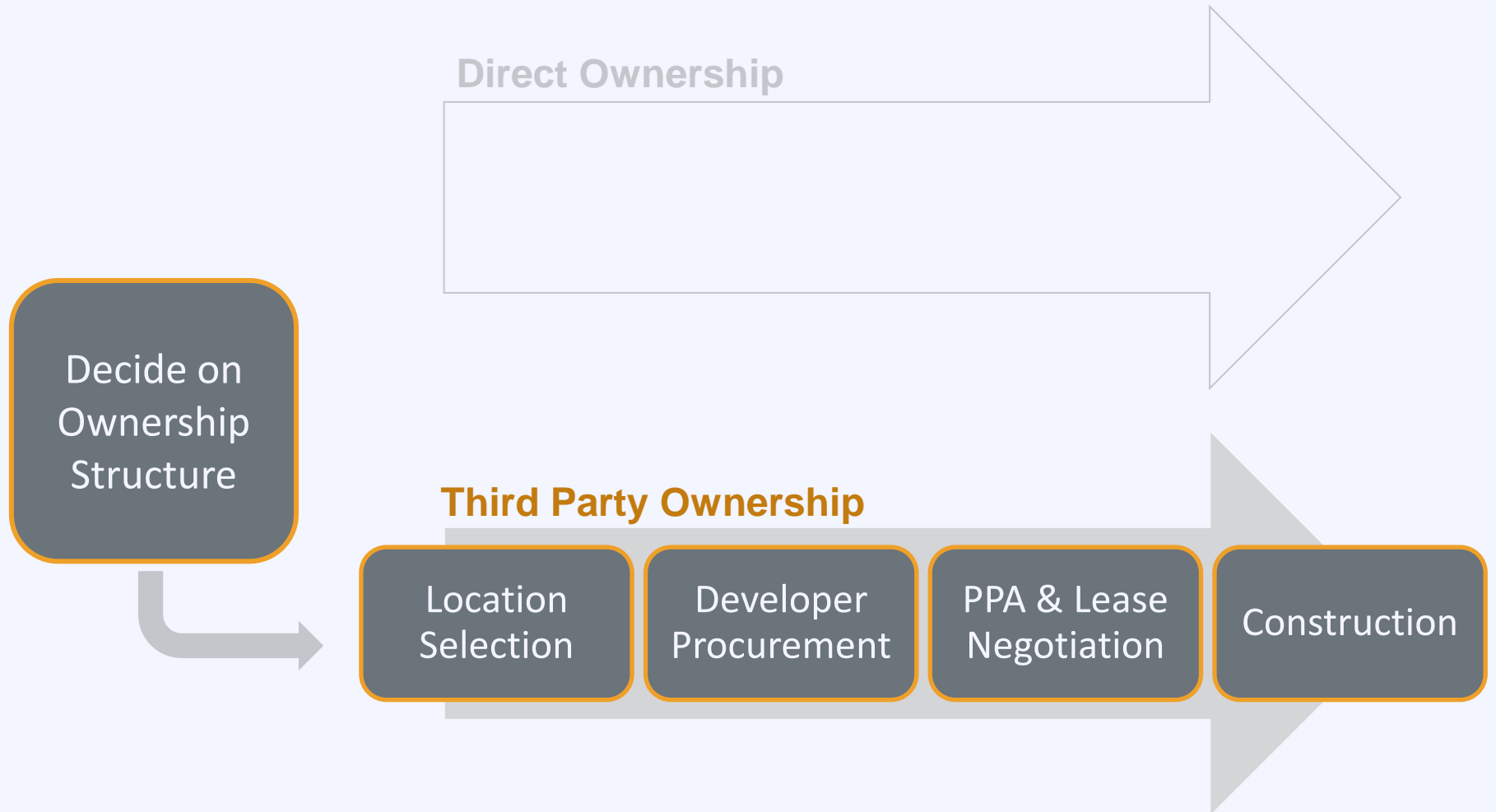
Pros

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

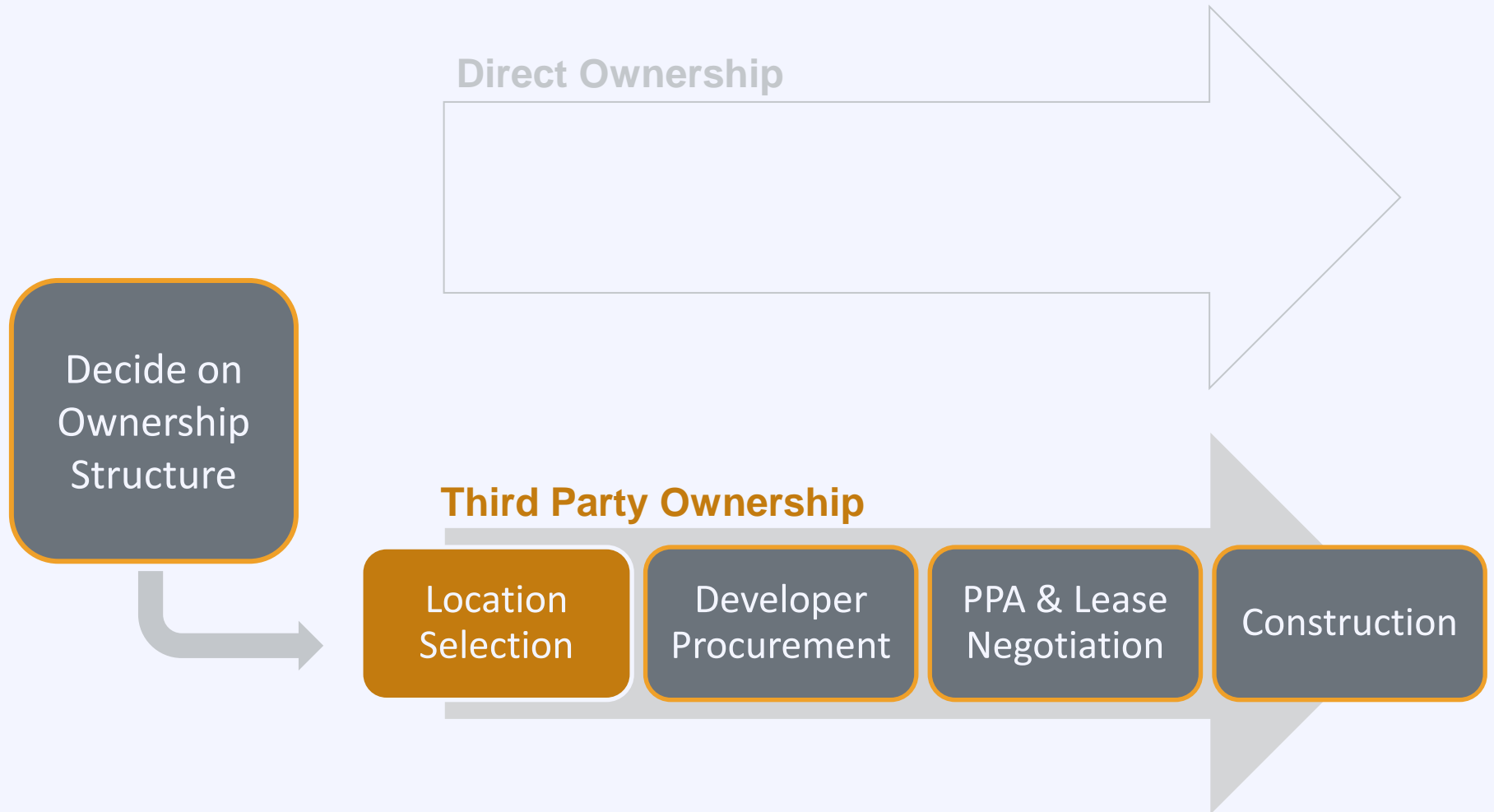
Cons

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

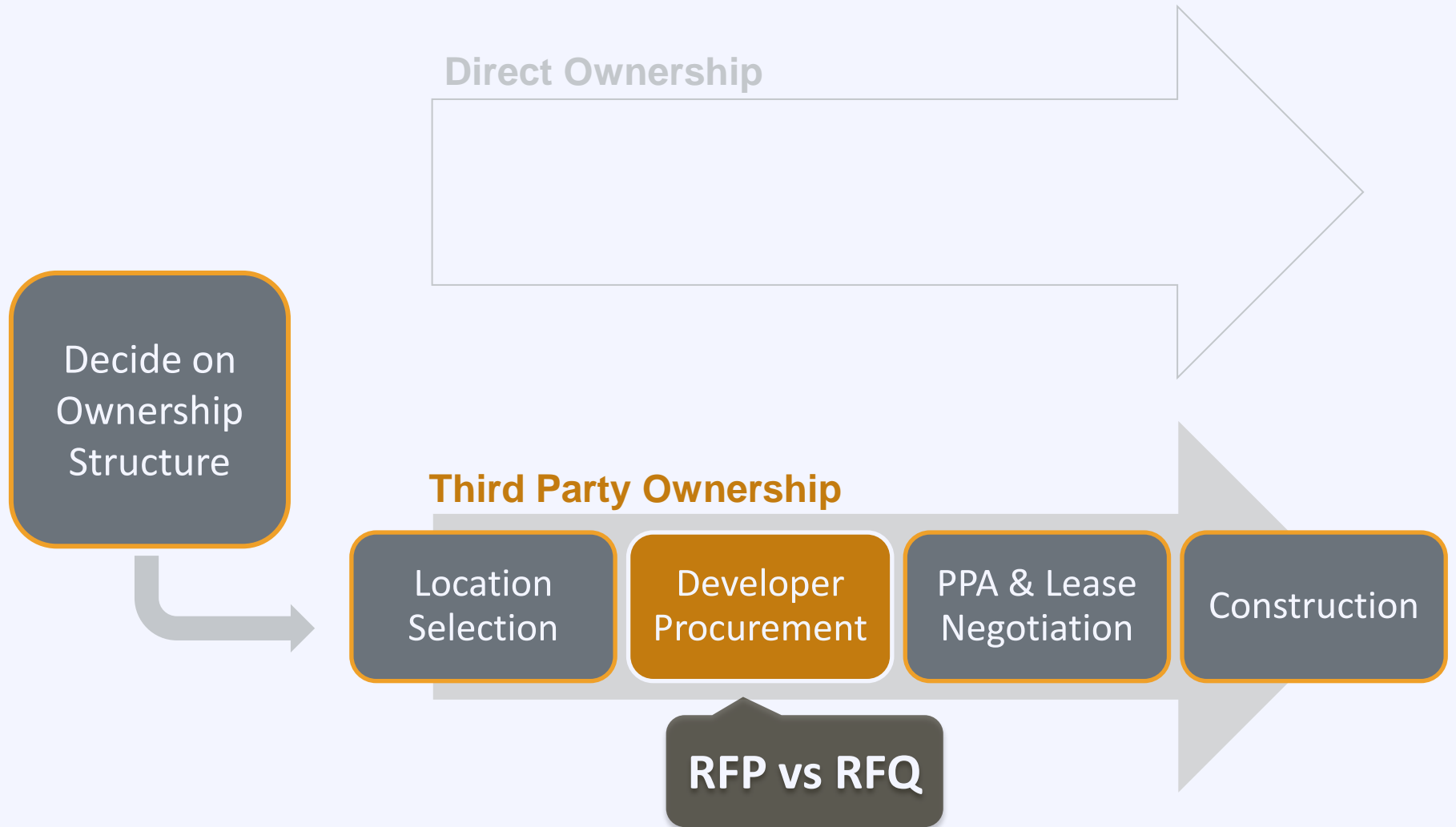
Process



Process



Process





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



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

Process

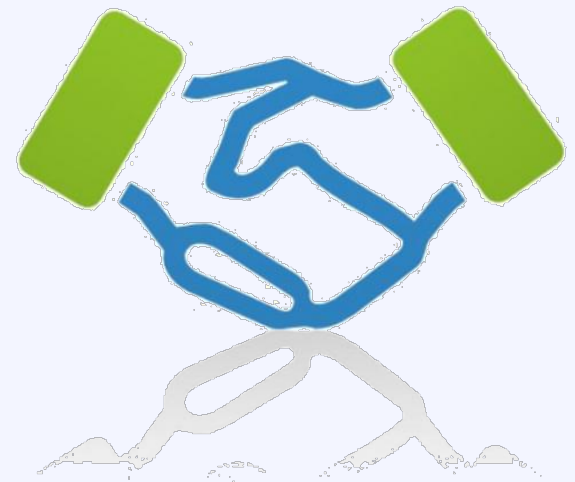




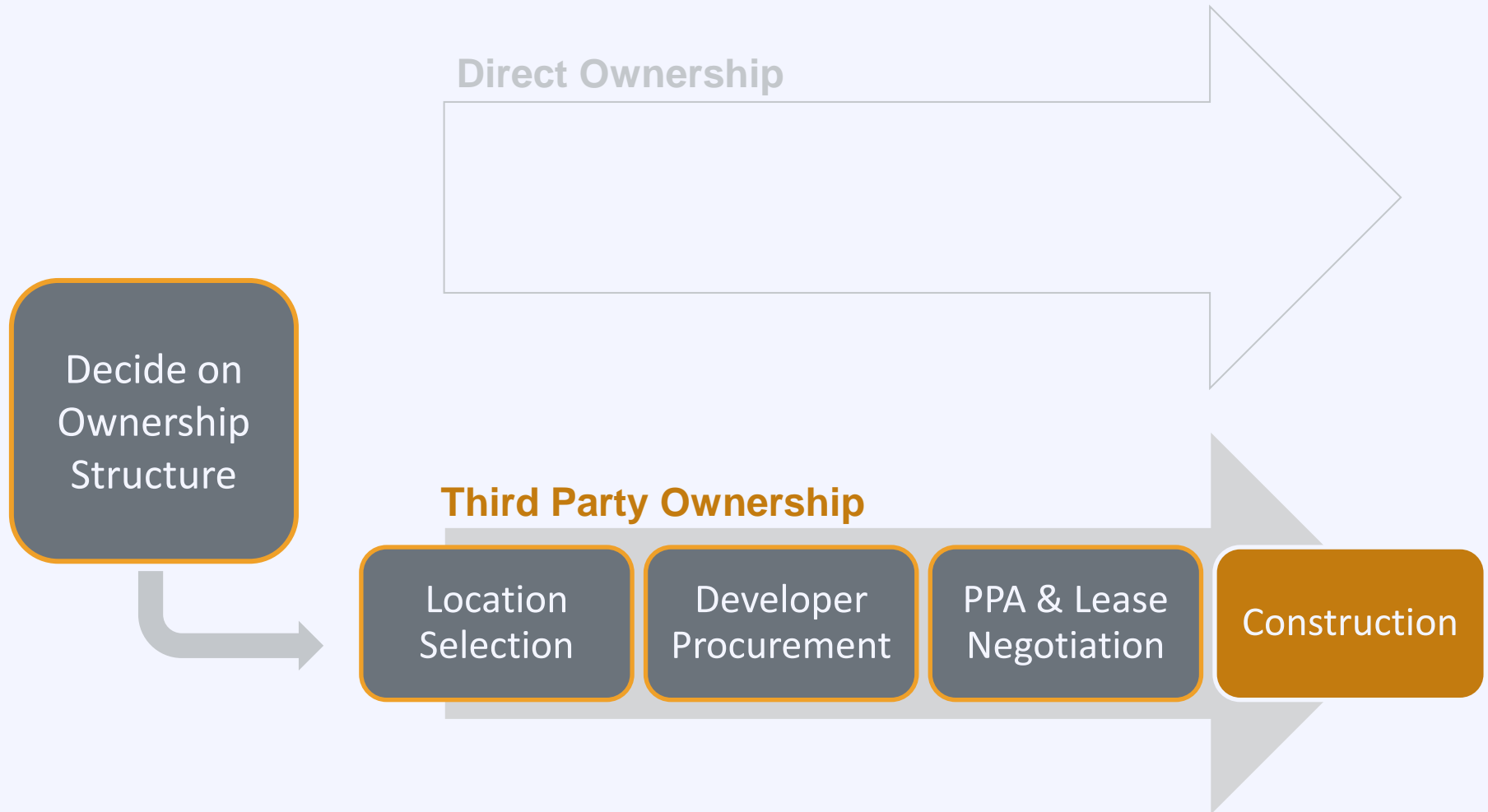
Step 3: Contract Negotiation

Negotiation points:

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



Process



Third Party Ownership

Pros

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

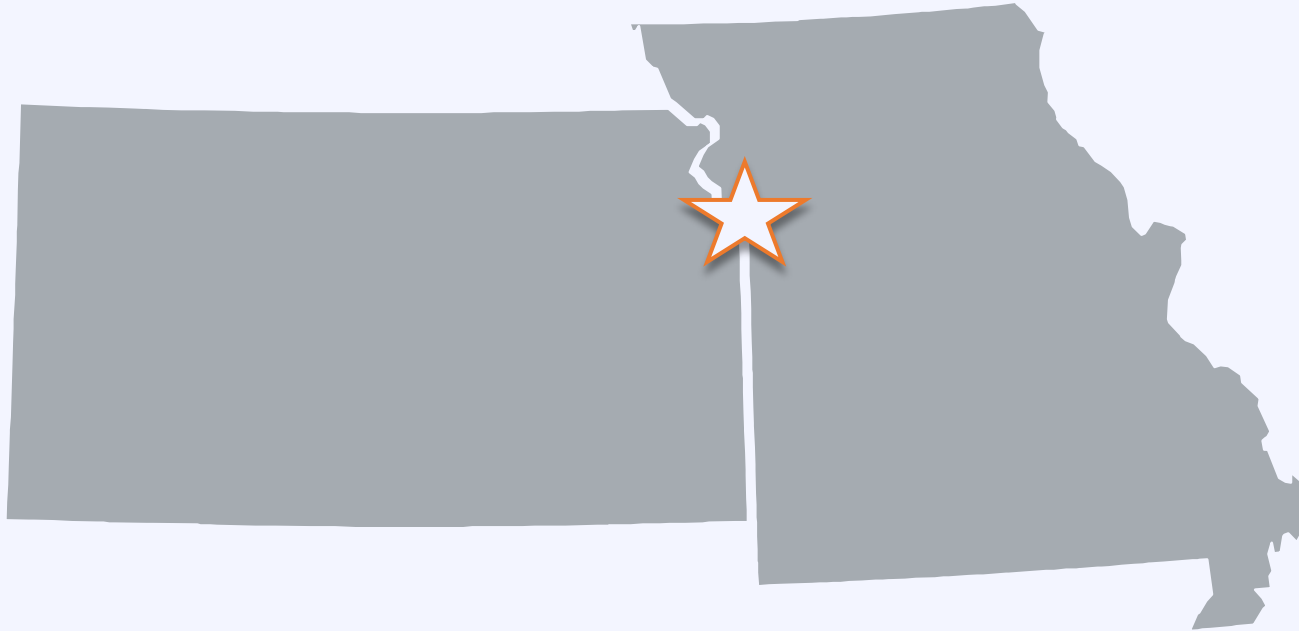
Cons

- 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

Case Study: Kansas City



The City will lease 40 – 80 rooftop grid connected 25 kW solar PV installations

Case Study: Kansas City



Q & A

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Activity: Addressing Barriers

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

Right Now



Write answer on card

During Session



Compile results

After Break



Group discussion

[Results from Survey]

Agenda

- | | |
|----------------------|---|
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Activity: Next Steps

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

Q & A



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