Solar Powering Your Community

Addressing Soft Costs and Barriers

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U.S. Department of Energy

Agenda

08:30 – 09:10	Introductions & Overview
09:10 – 09:40	Solar 101: The Local Solar Policy Environment
09:40 – 10:25	Understanding Solar Financing Options
10:25 – 10:35	*Break*
10:35 – 11:35	Panel of Local Experts
11:35 – 11:50	Panelist and Audience Discussion
11:50 – 12:00	Wrap Up and Closing Remarks
12:00	Boxed Lunch, Networking, Mini-Expo

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About the SunShot Solar Outreach Partnership

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

About the SunShot Solar Outreach Partnership

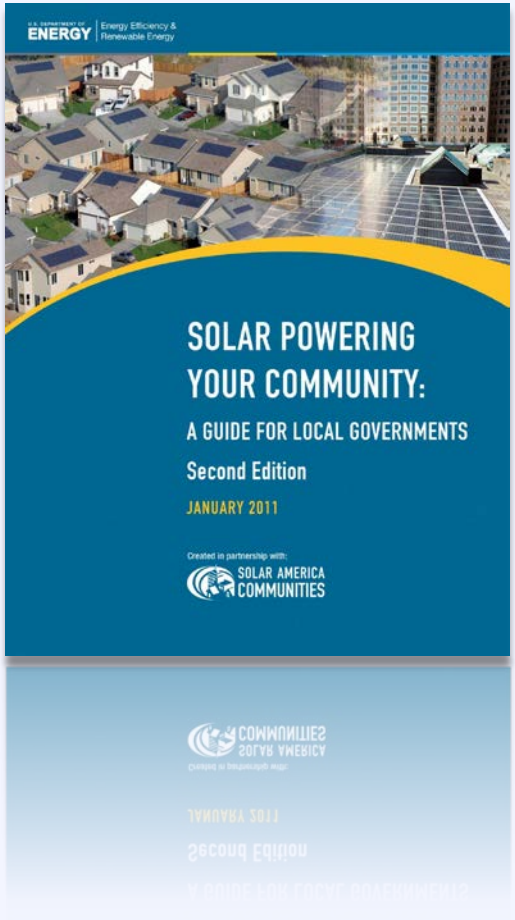
- Increase installed capacity of solar electricity in U.S. communities
- Streamline and standardize permitting and interconnection processes
- Improve planning and zoning codes/regulations for solar electric technologies
- Increase access to solar financing options

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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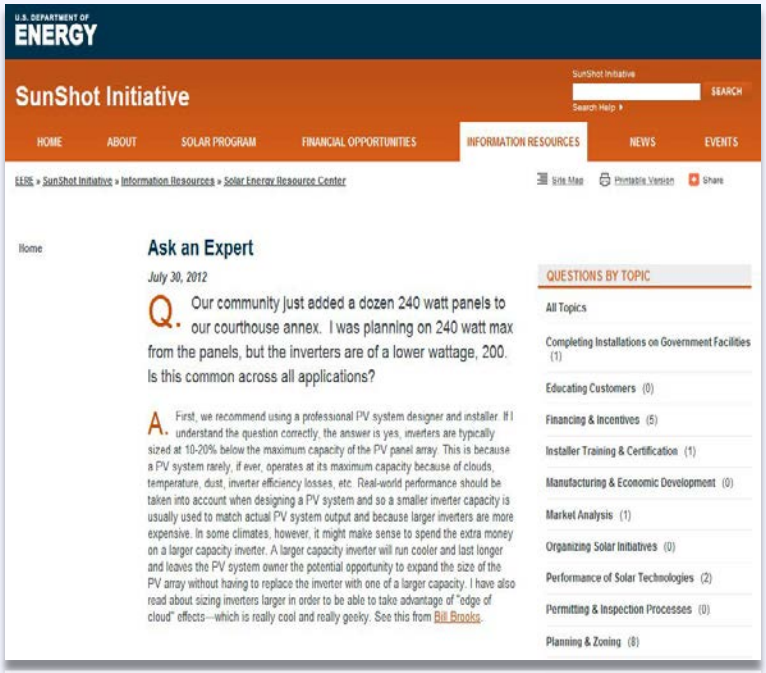
About the SunShot Solar Outreach Partnership

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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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

Explore benefits

and

Overcome barriers

Activity: Identifying Benefits

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

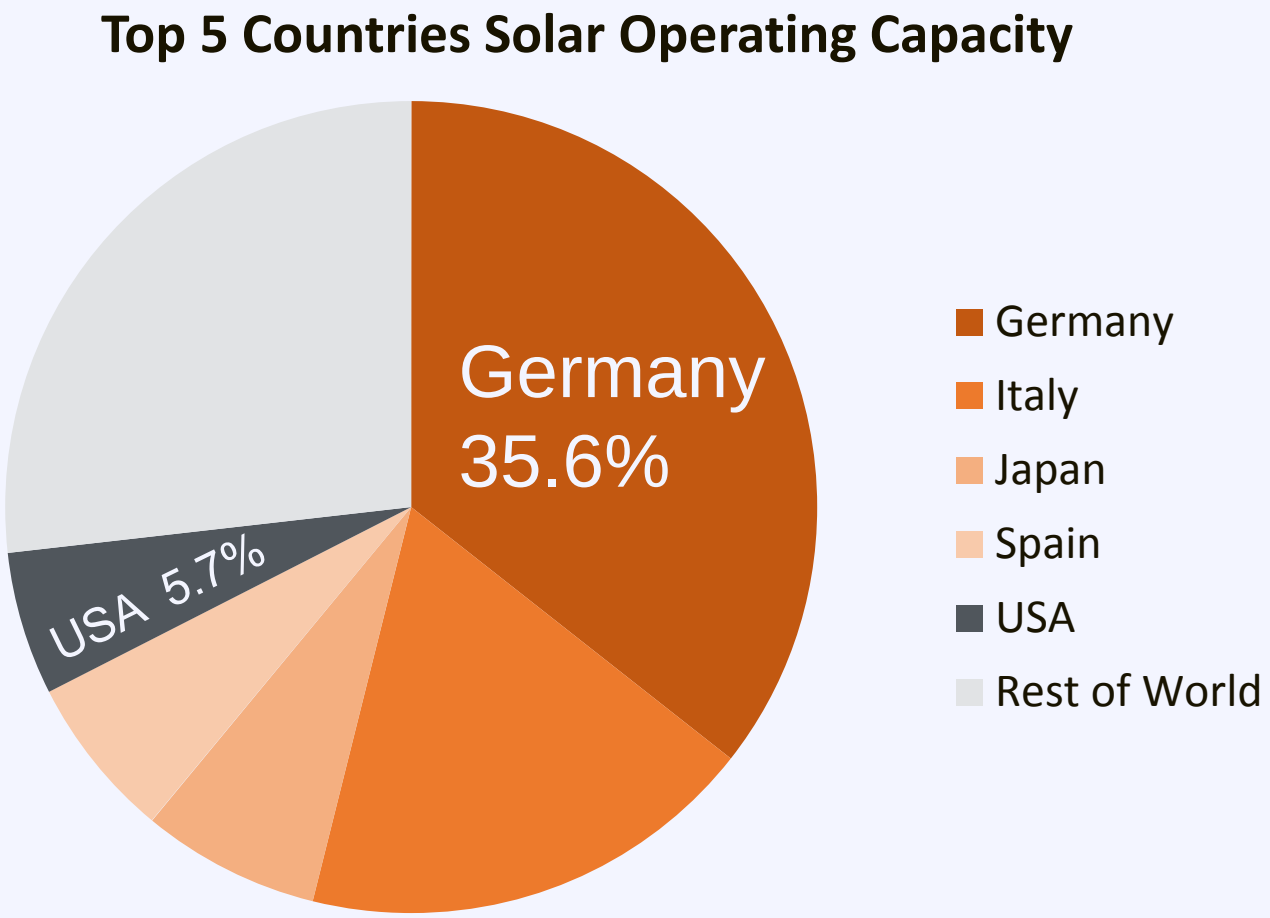
Right Now	During Session	After Break
		
Write answer on card	Compile results	Group discussion

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

Installed Capacity

Total installed solar capacity in the US

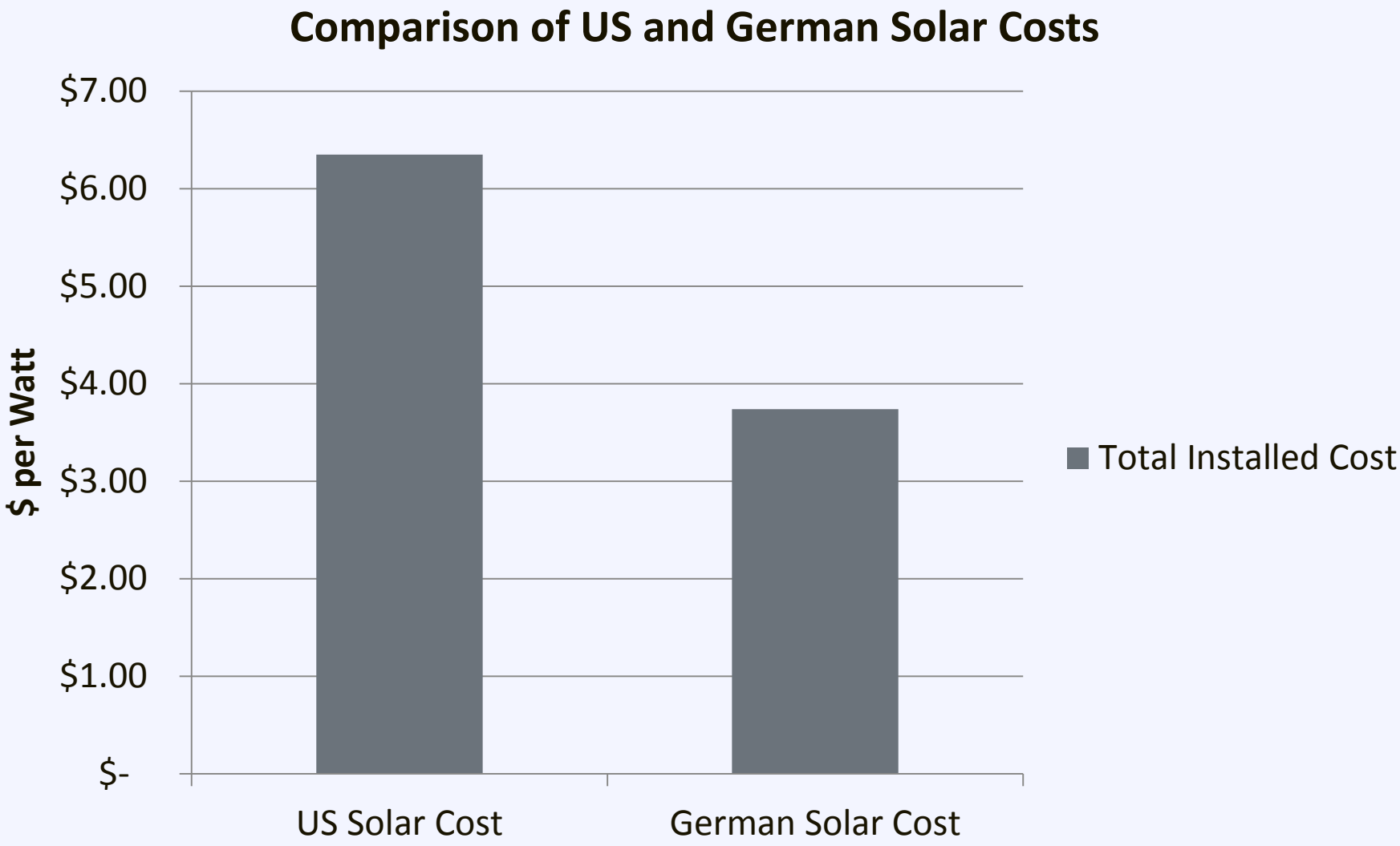
4 GW

Capacity installed in Germany in Dec 2011

4 GW

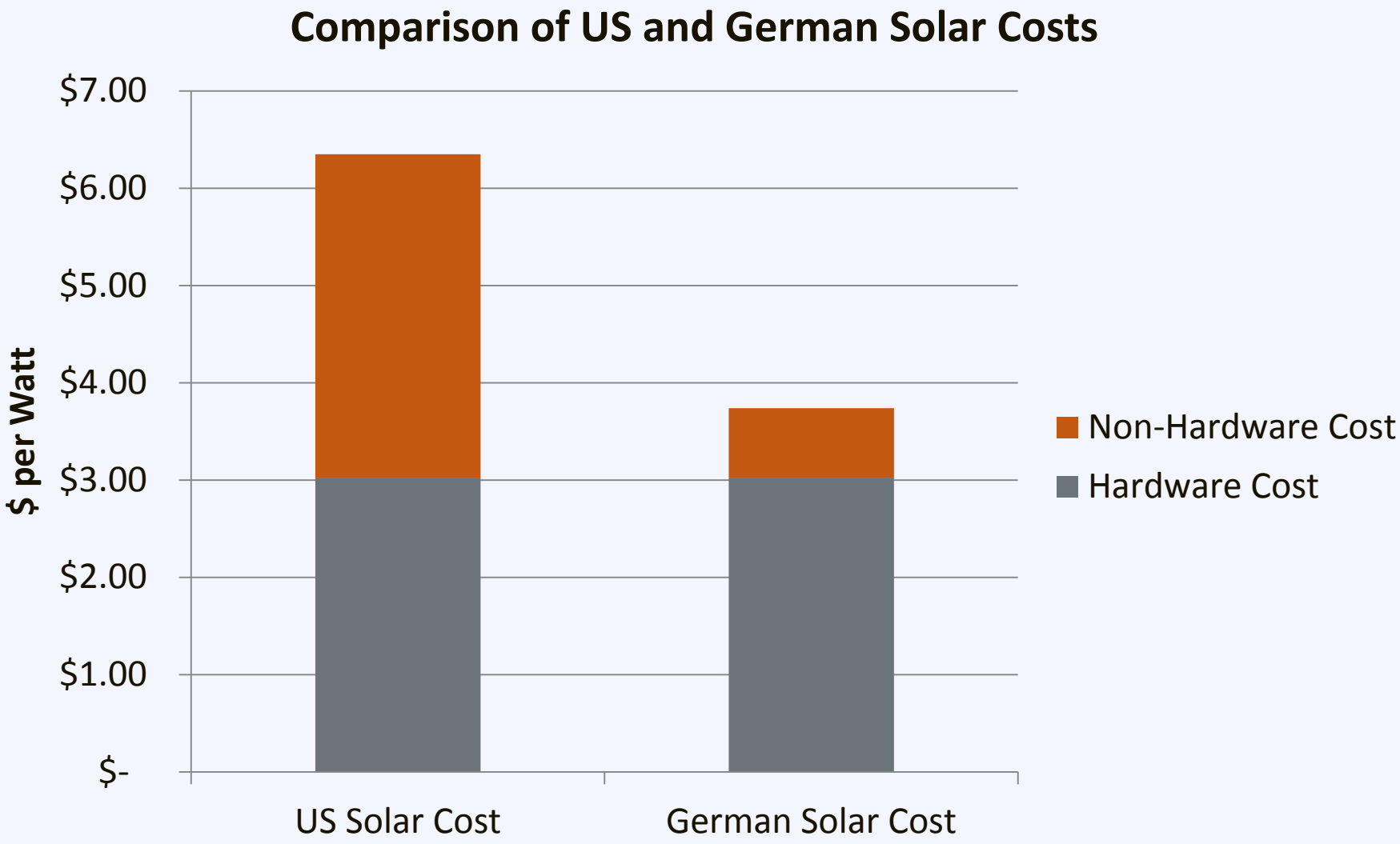
http://www.map.ren21.net/GSR/GSR2012.pdf

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)

The Cost of Solar in the US



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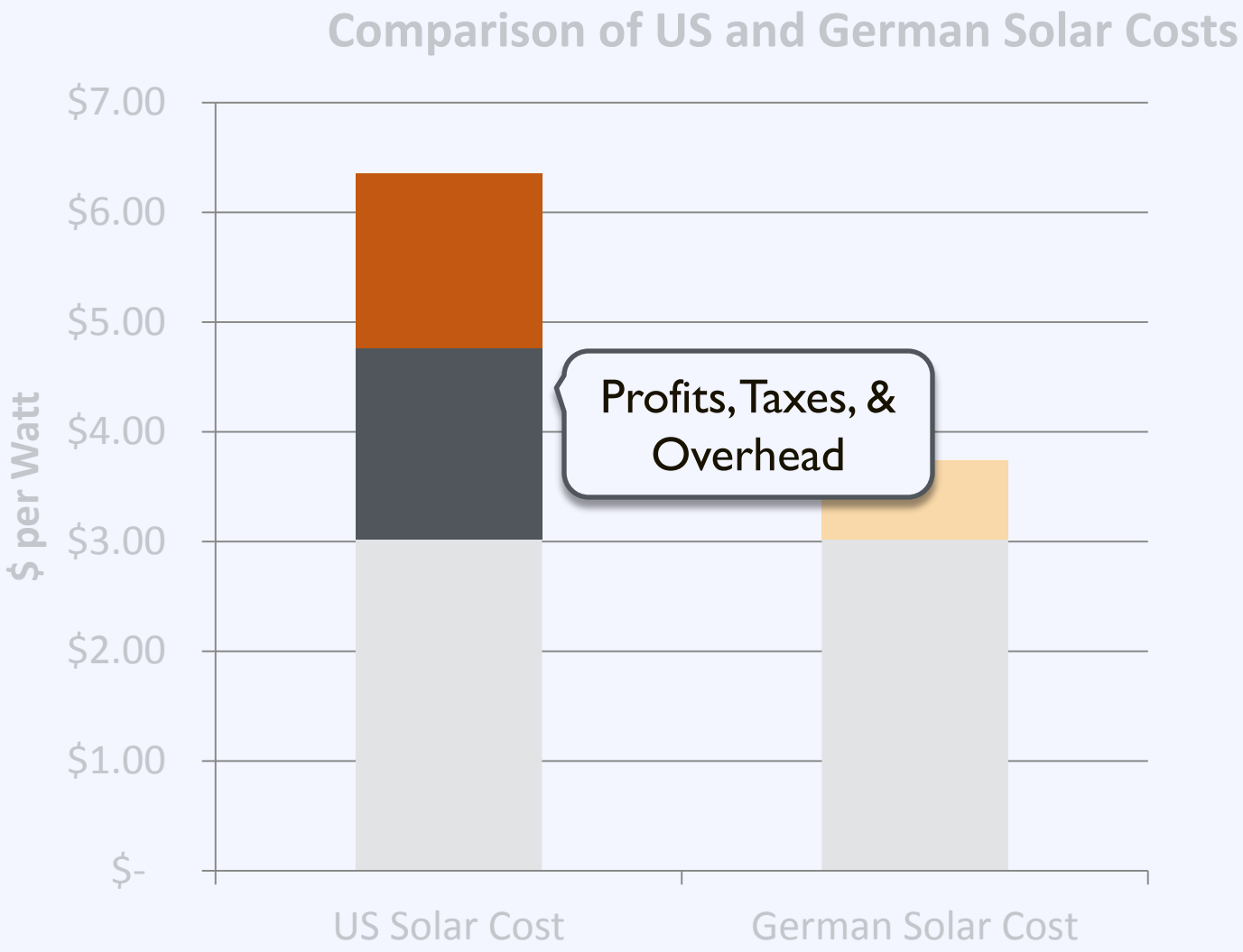

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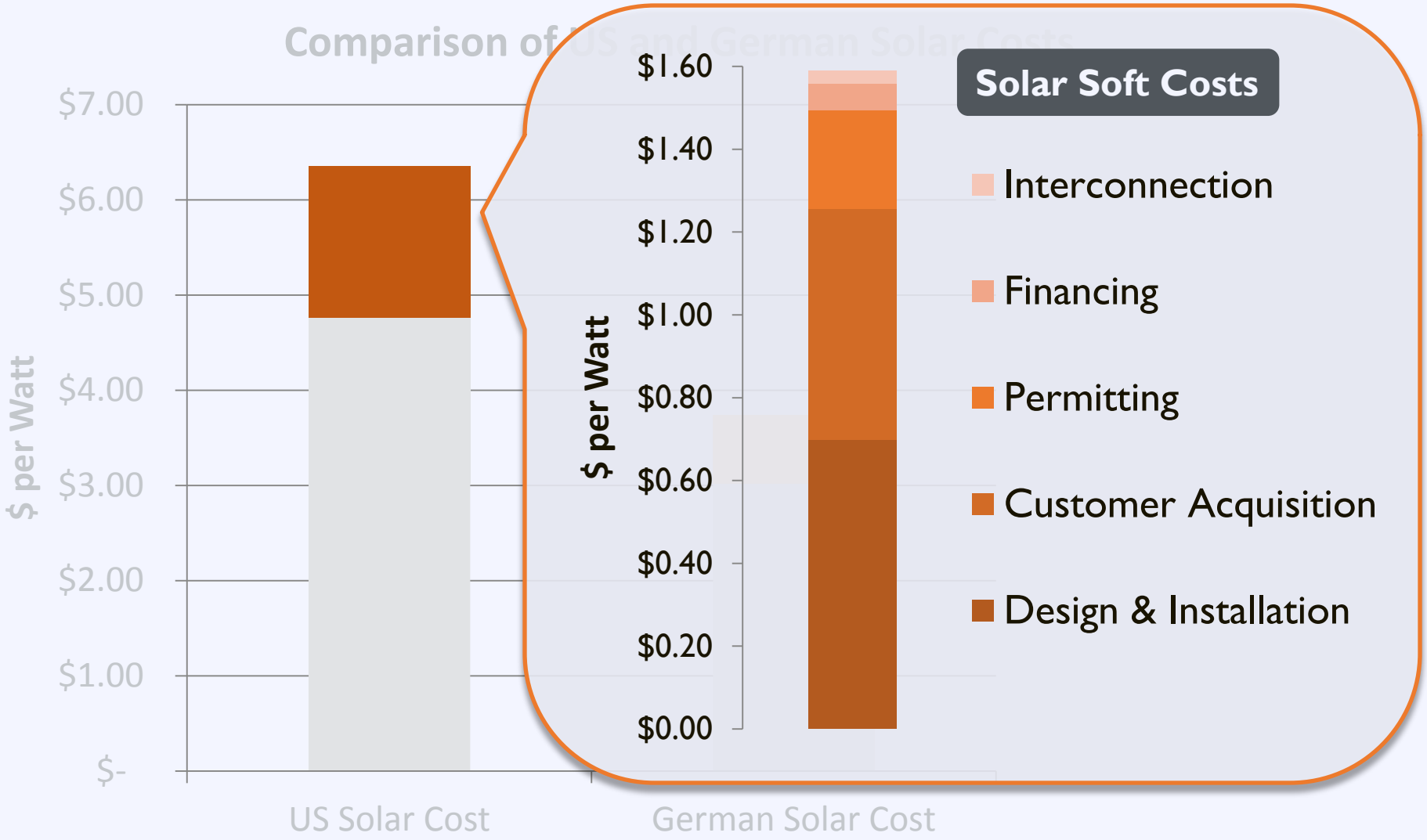

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Solar Technologies

Solar Photovoltaic (PV)

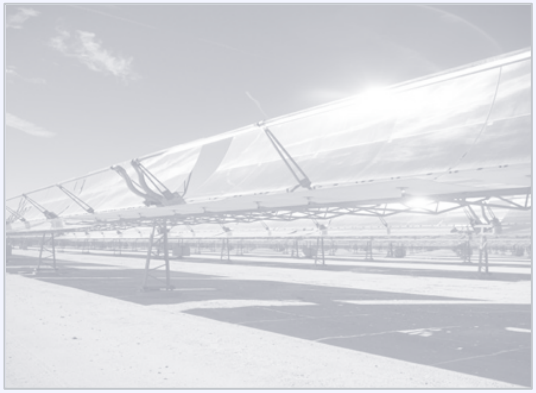
Solar Hot Water

Concentrated Solar Power

Solar Technologies

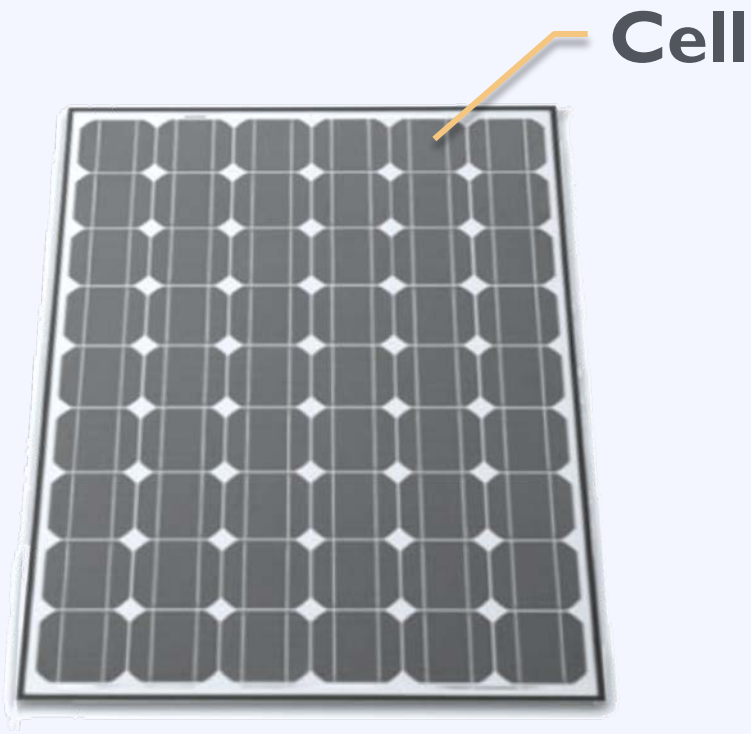
Solar Photovoltaic (PV)

Solar Hot Water



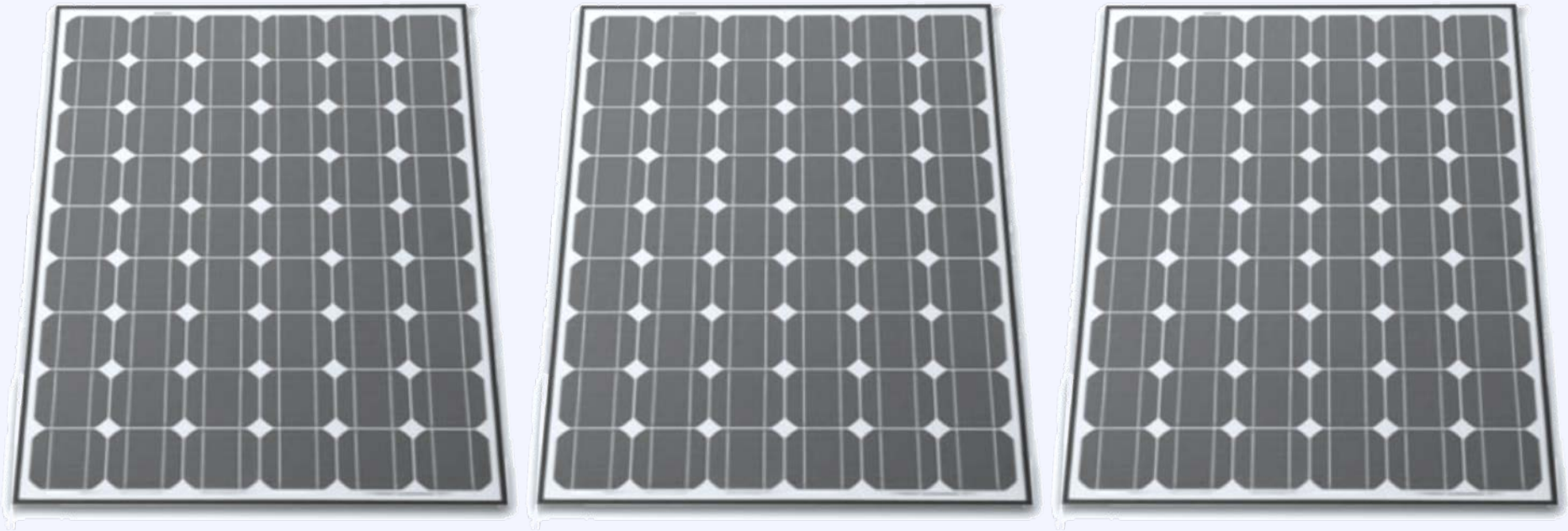
Concentrated Solar Power

Some Basic Terminology



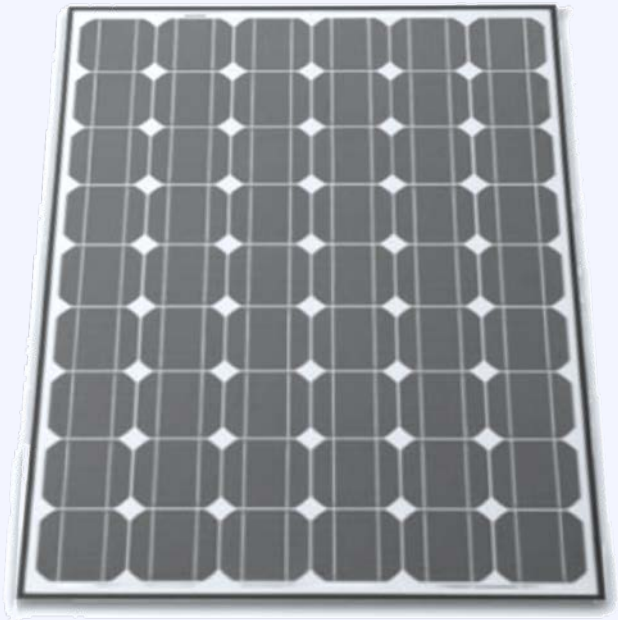
Panel / Module

Some Basic Terminology



Array

Some Basic Terminology



Capacity / Power

kilowatt (kW)

Production

Kilowatt-hour (kWh)

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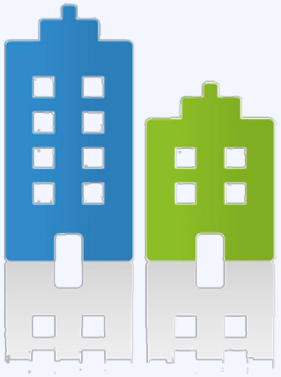
Some Basic Terminology

Residence
5 kW

Factory
1 MW+



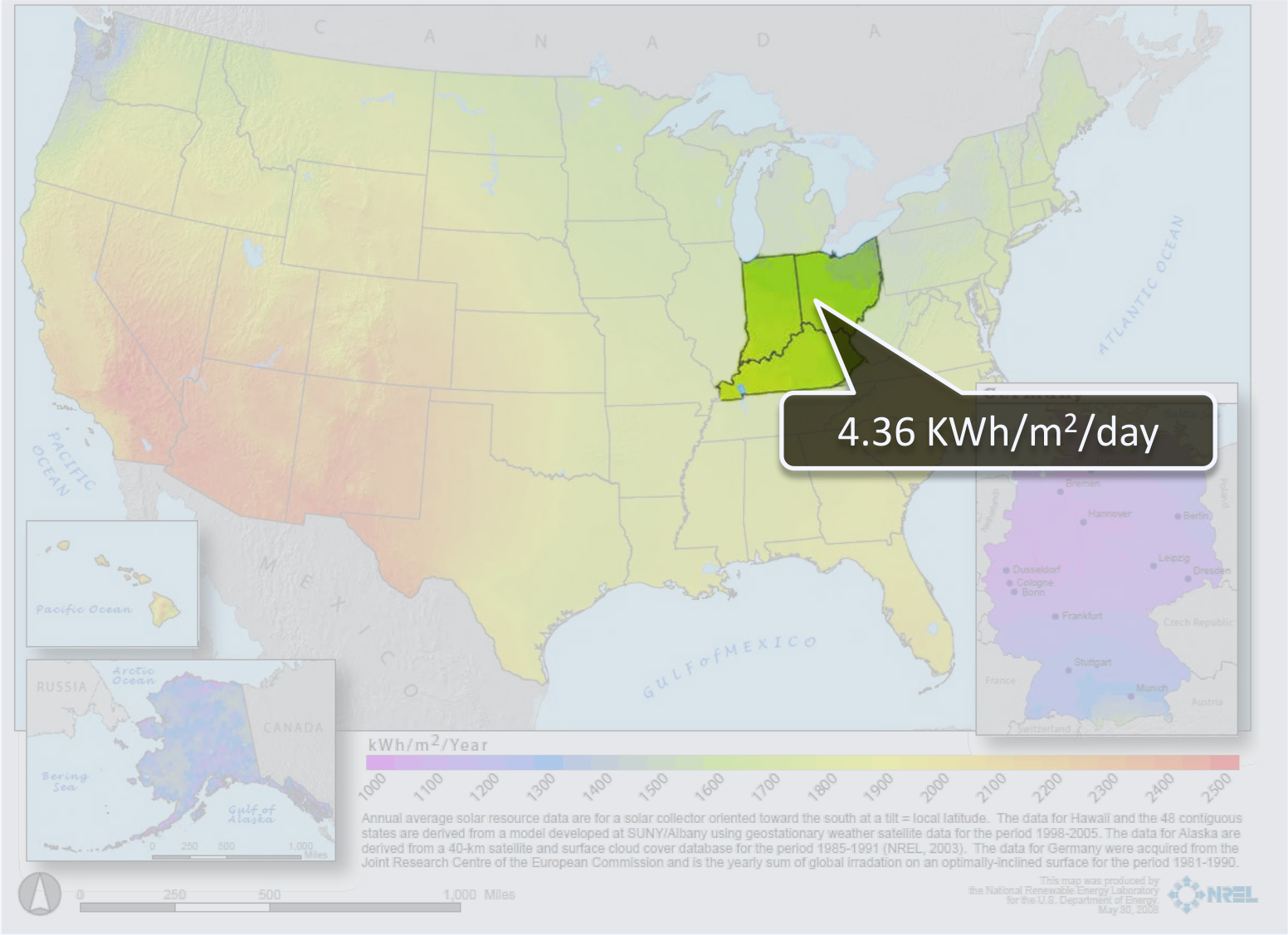
Office
50 – 500 kW

Utility
2 MW+

Benefits of Solar Energy

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

Fact: Solar works across the US



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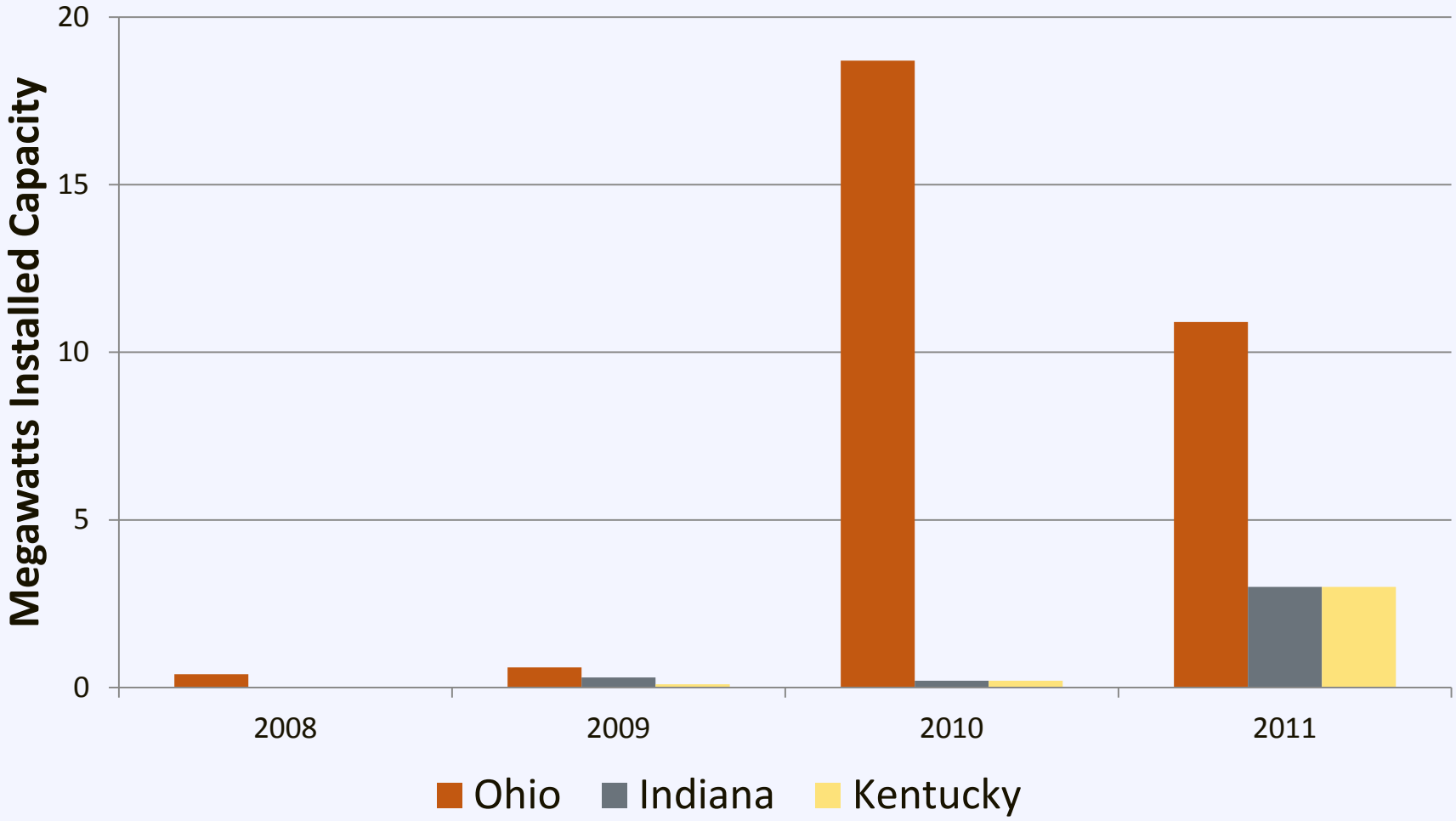
Source: National Renewable Energy Laboratory

Regional Solar Market



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Source: IREC

Comparison: Regional PV Financial Incentives

	Ohio	Kentucky	Indiana
Rebates	AEP Ohio: $1.50/W up to 50% of cost or $12k/$75k	-	IP&L Rebate: $2.00/W up to 19.9kW
State Grants	-	-	-
State Loans	ECO-Link; Energy Loan Fund	Revolving Loans for State Agencies	-
PACE Financing	Local Option	-	-
Prod. Incentives	SRECs	TVA Programs	IP&L Rate REP NIPSCO Feed-in Tariff
Corp. Tax Credits	-	$3.00/W; Max. $1,000	-
Pers. Tax Credits	-	$3.00/W; Max. $500	-
Prop. Tax Incentives	OAQDA Incentives; Commercial/ Utility Exemptions	-	Assessed value of PV system is exempt from Res/Com/Ind Prop. Tax

Ohio State Loan Programs

Energy Conservation for Ohioans (ECO-Link):

Offers homeowners reduced interest rates on loans for renewable energy or energy efficiency upgrades offered by participating banks; maximum incentive = 3% rate reduction for up to $50,000 and 7 years of the bank loan

Energy Loan Fund:

Offers public entities, manufacturers, and small businesses loans for RE and EE upgrades

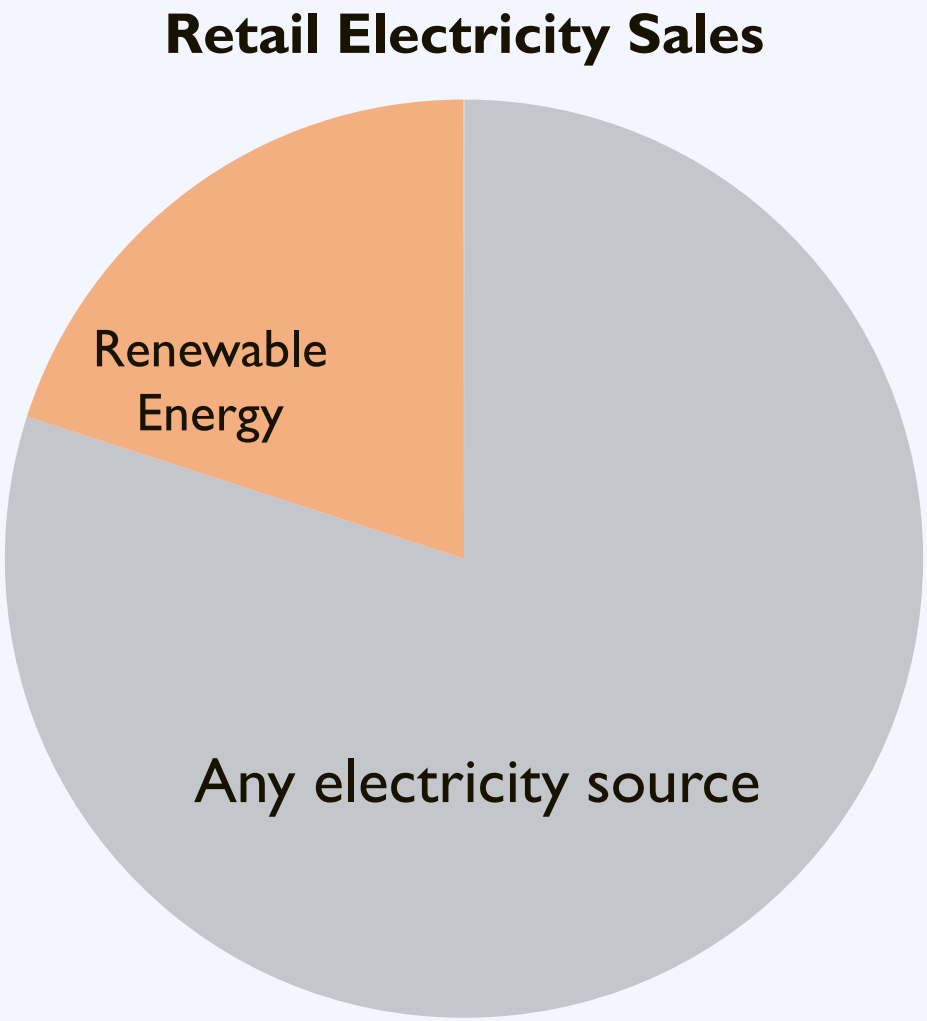
Public and nonprofit entities:

90% of project costs or $1 million

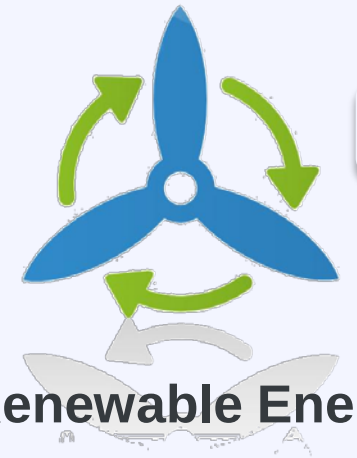
AEP Ohio: Solar Rebates

- Multi-Sector, esp. Residential, Commercial, Public, Nonprofit
- $1.50/W
- Max incentive: 50% of system costs up to $12,000 (Residential) or $75,000 (Non-residential)
- Net metering and Interconnection to AEP grid
- Surrender RECs (15 yrs.)

Renewable Portfolio Standard



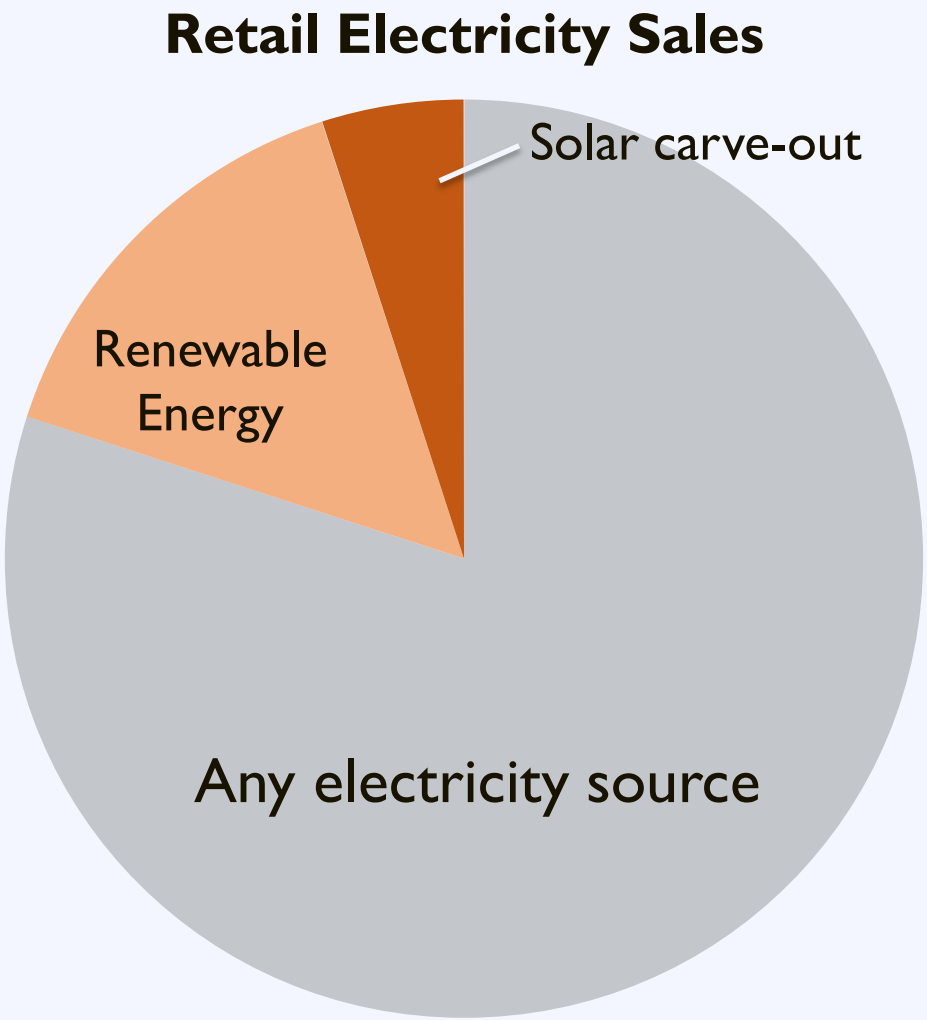
Renewable Portfolio Standard



Two revenue streams

e- REC

Renewable Portfolio Standard



Solar Renewable Energy Credits (SRECs)

Three Requirements:

RPS solar carve out

Unbundled, tradeable credits

Penalty for non-compliance

– solar alternative compliance payment (SACP)

Alternative Energy Portfolio Standard

- 12.5% from *renewables* by 2024 for IOUs and retail suppliers
- At least half of this renewable energy must be generated at facilities in Ohio
- 12.5% from *advanced energy* resources by 2024
- Solar carve-out of 0.5% of total electricity supply by 2024

SRECs in Ohio

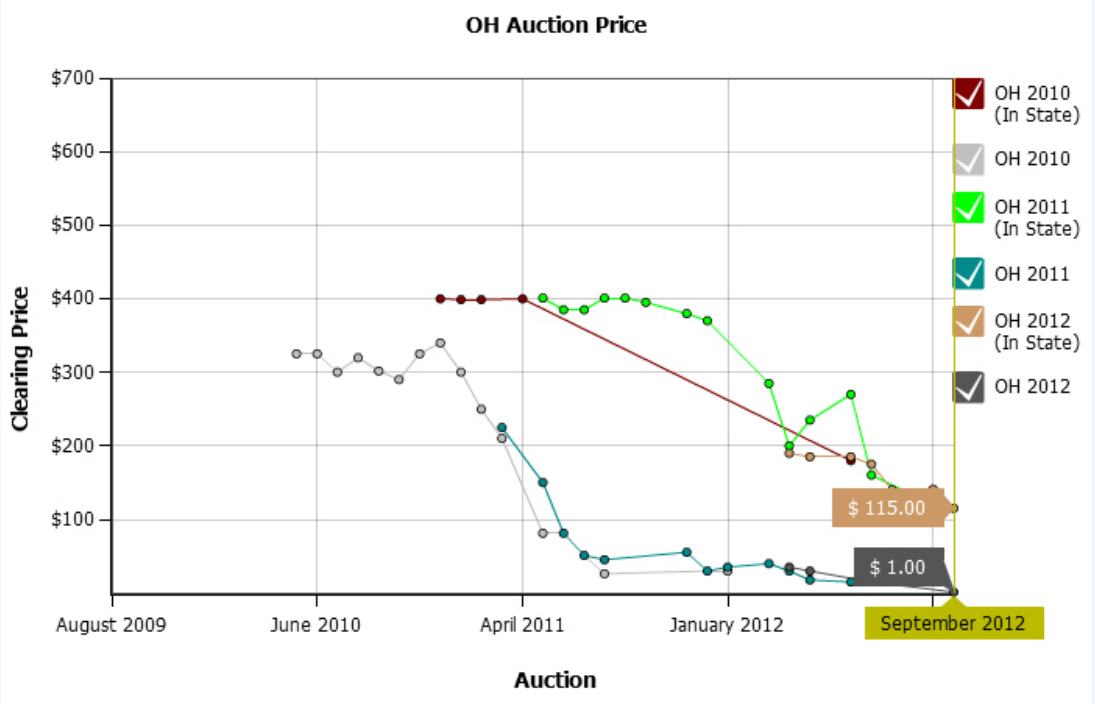
SACP: $350/MWh (2012 and 2013); declines by $50 bi-annually

Two Markets:

In-State (50%)

Out-of-State (50%)

PA, IN, KY, WV, MI



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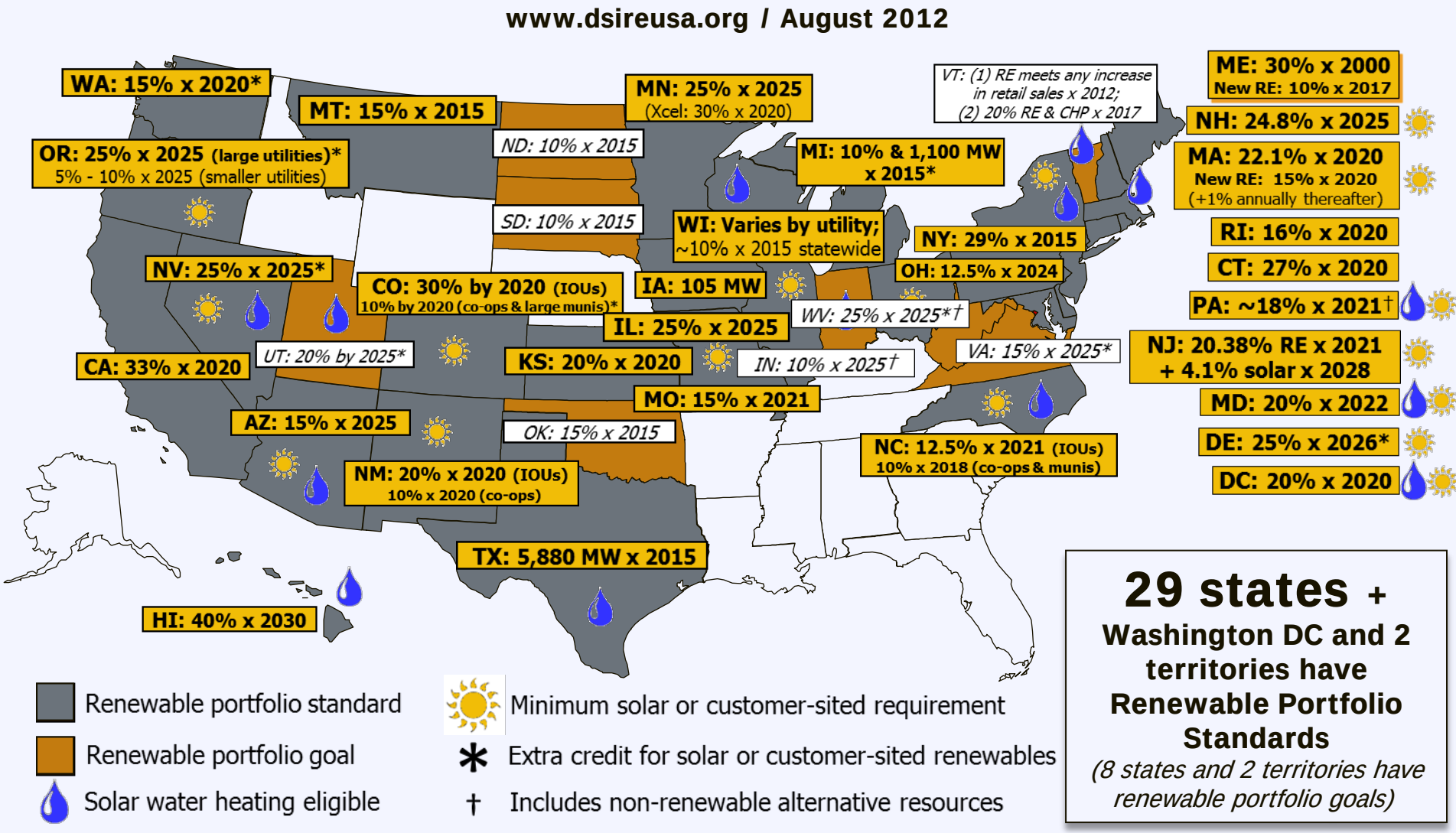

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Performance Incentives: IN

Indianapolis Power & Light
Rate Renewable Energy Production (REP)

15 year contract; $0.24/kWh (20 kW – 100 kW); $0.20/kWh (100 kW – 10 MW)

NIPSCO Feed-in Tariff:

15 year max. contract term; $0.30/kWh (10 kW or less); $0.26/kWh (10kW – 2 MW); 500 kW allocated for small scale solar (≤ 10 kW)

Performance Incentives: KY

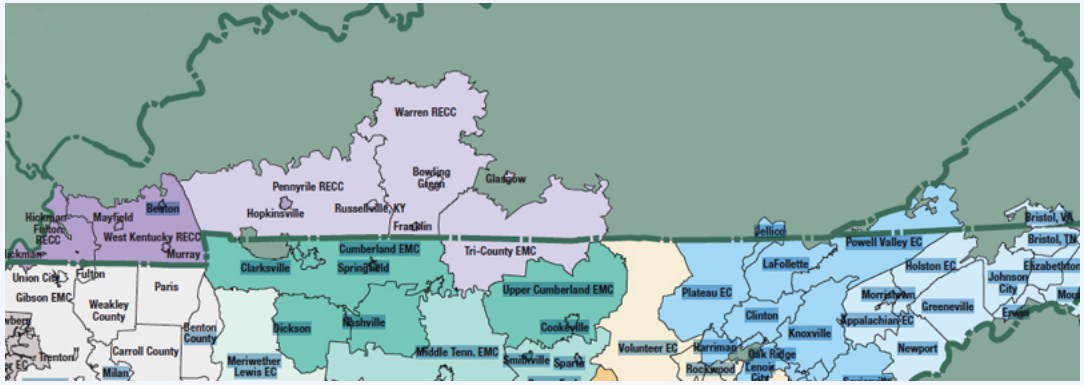
TVA Generation Partners:

Up to 50 kW; $1,000 + $0.12/kWh above retail;

10-yr. contract;

TVA Mid-Size Program Standard Offer:

50 kW – 20 MW; variable seasonal/TOD rates from $0.035/kWh - $0.16/kWh; Avg. $0.055/kWh (3% escalation);
10 to 20-yr. contract

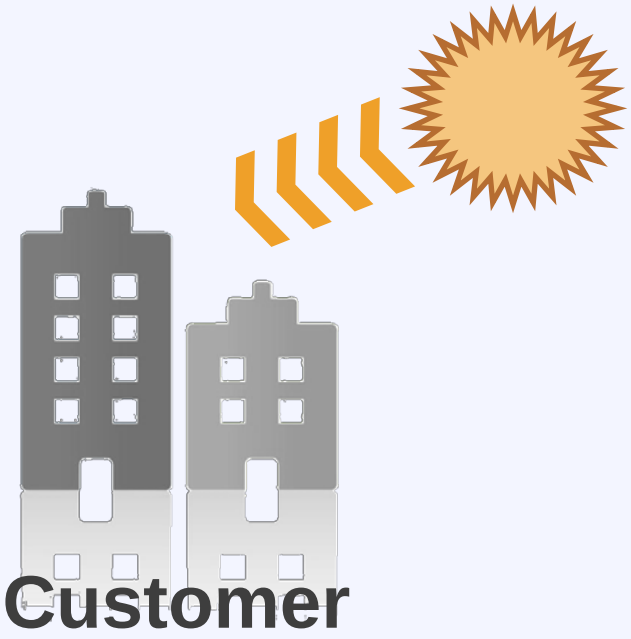


Net Metering

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

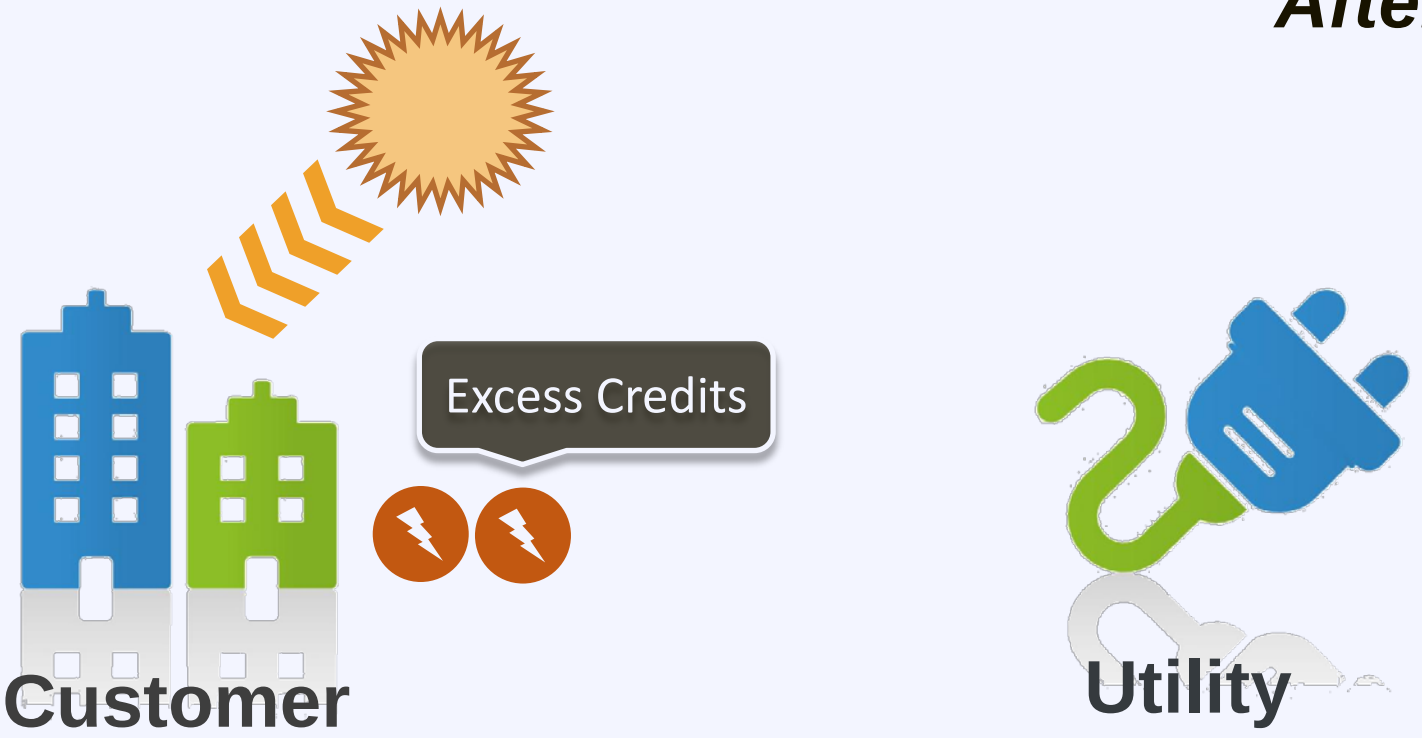
Net Metering: Overview

Morning



Net Metering: Overview

Afternoon



Net Metering: Overview

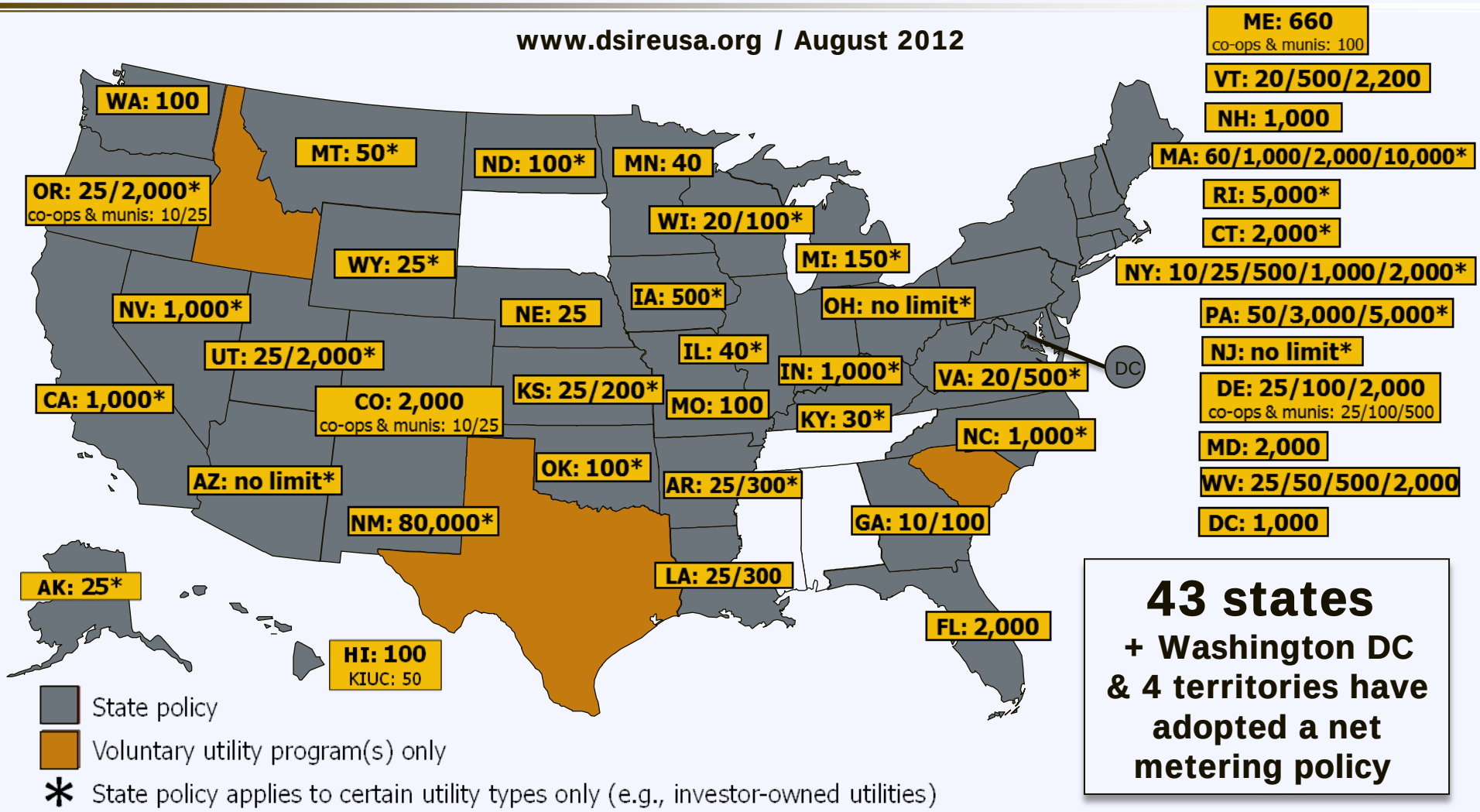
Night

Customer

Utility

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

Net Metering: State Policies



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

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

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Net Metering: Market Share

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

Powered by SunShot U.S. Department of Energy

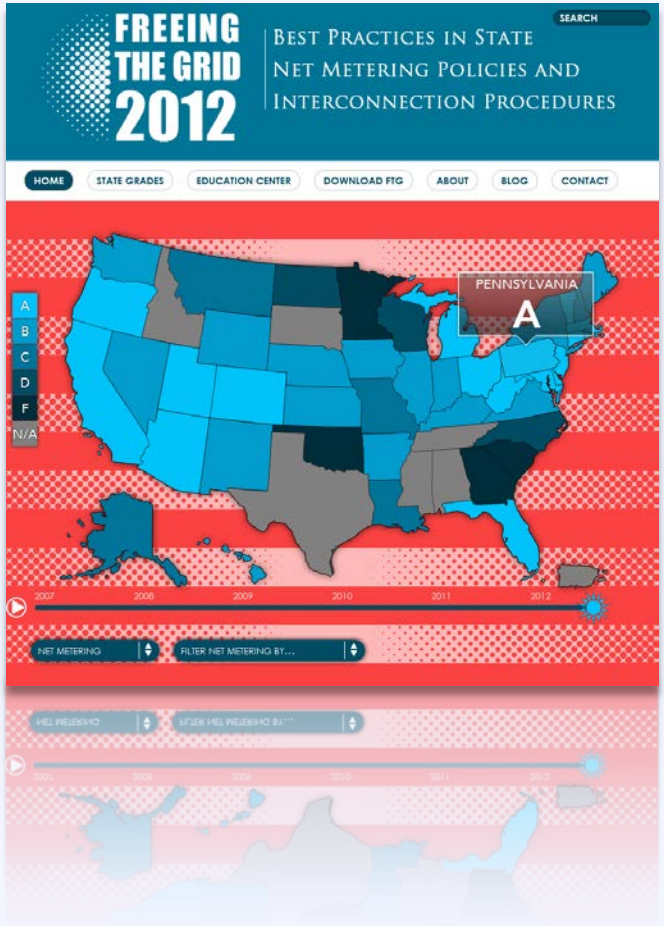
Source: IREC (http://www.irecusa.org/wp-content/uploads/IRECSolarMarketTrends-2012-web.pdf)

Net Metering: Resources

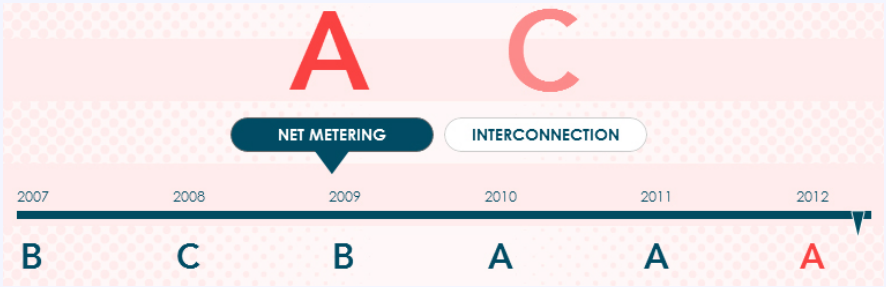
Resource **Freeing the Grid**

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

http://freeingthegrid.org/



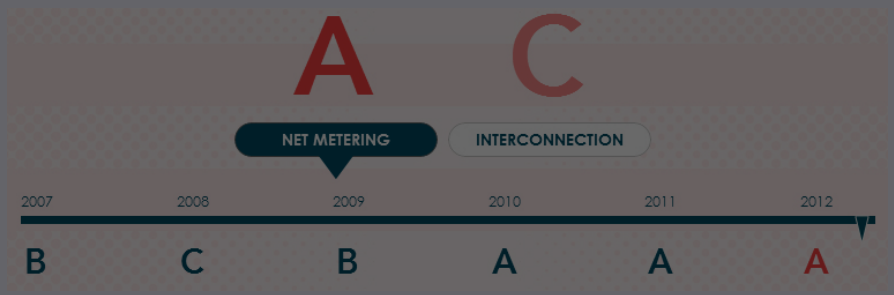
Net Metering: Ohio



Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Small Hydroelectric, Microturbines
Applicable Sectors:	Commercial, Industrial, Residential
Applicable Utilities:	Investor-owned utilities, competitive retail electric service providers
System Capacity Limit:	No limit specified (limit based on customer's load)
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	Credited to customer's next bill at unbundled generation rate; customer may request refund of excess at end of 12-month billing period
REC Ownership:	Not addressed
Meter Aggregation:	Not addressed

Source: Freeing the Grid

Net Metering: Ohio



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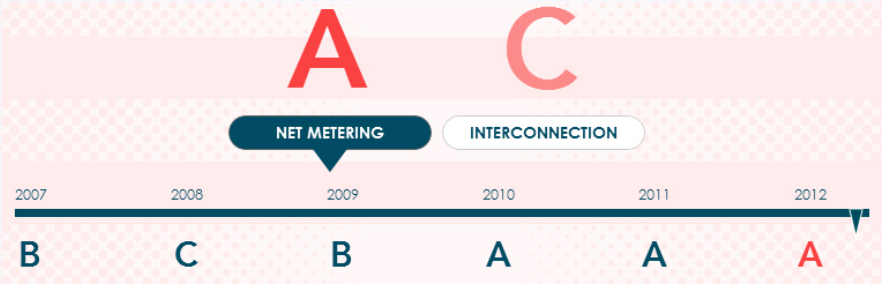

Recommendations:

- Credit Net Excess Generation at the retail rate and provide the option of indefinite rollover
- Adopt safe harbor language to protect customer-sited generators from extra and/or unanticipated fees
- Specify that RECs belong to the customer

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Small Hydroelectric, Microturbines
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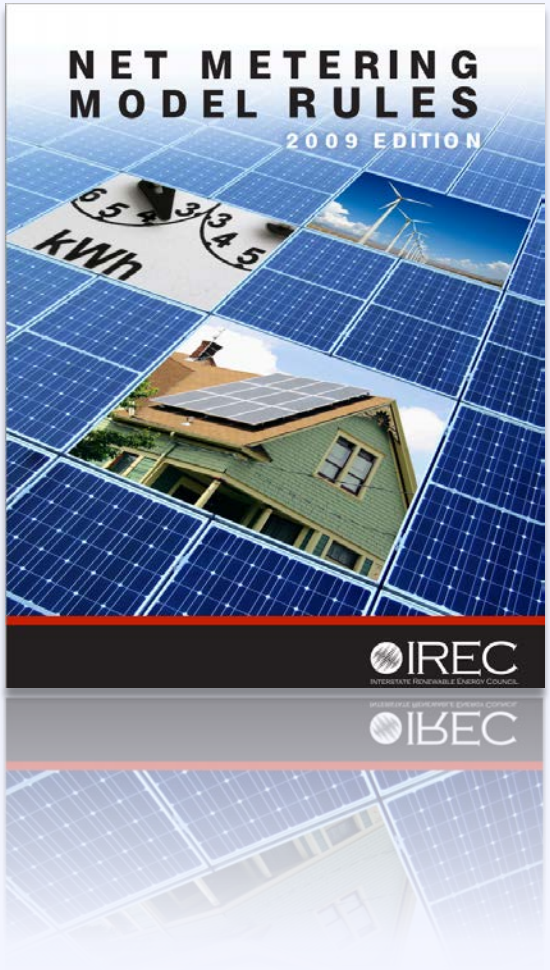
Net Metering: Resources

Resource **Interstate Renewable Energy Council**

IREC developed its model rules in an effort to capture best practices in state net metering policies.

www.irecusa.org



Interconnection

5,000+ utilities

with unique interconnection procedures

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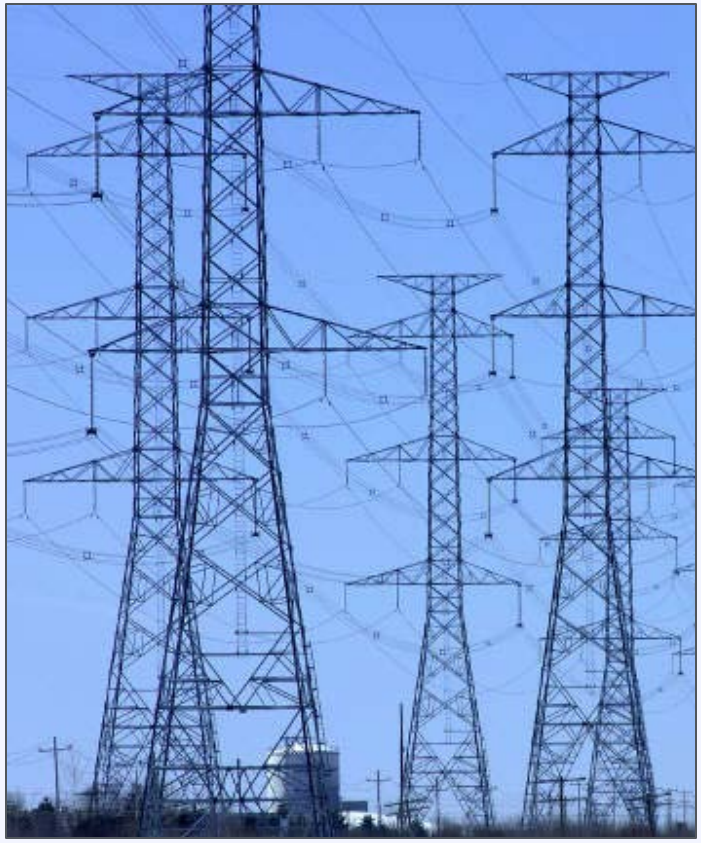
U.S. Department of Energy

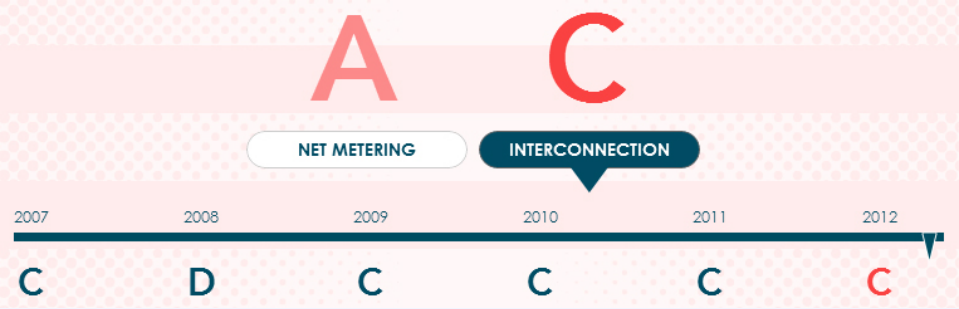
Source: NREL (http://www.nrel.gov/docs/fy12osti/54689.pdf

Interconnection: Best Practices

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



Interconnection: Ohio



Recommendations:

- Remove requirements for redundant external disconnect switch
- Expand interconnection procedures to all utilities (i.e., munis and co-ops)

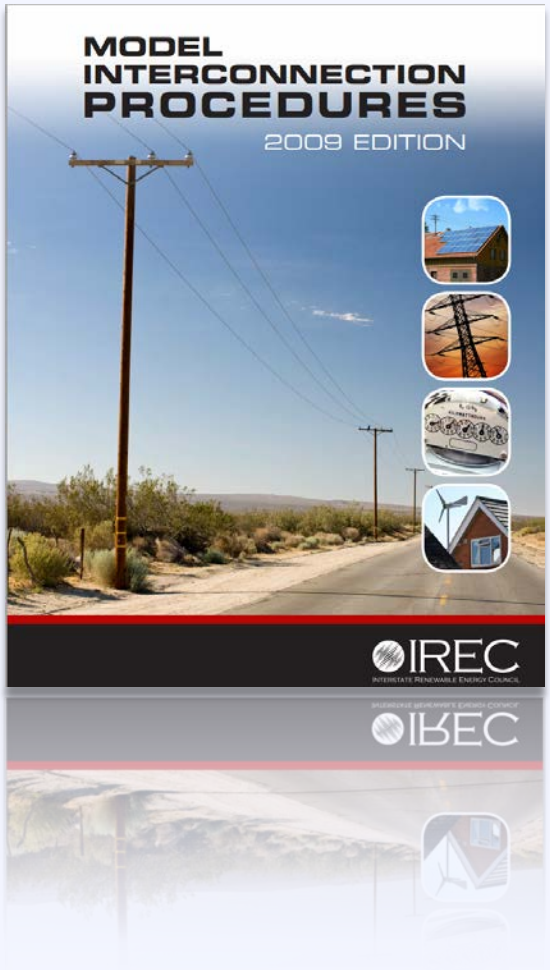
Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Microturbines, Other Distributed Generation Technologies
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	20 MW
Standard Agreement:	Yes
Insurance Requirements:	Additional liability insurance not required
External Disconnect Switch:	Required
Net Metering Required	No

Interconnection: Resources

Resource **Interstate Renewable Energy Council**

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

www.irecusa.org



PV and Property Taxes

Ohio Air Quality Development Authority Air-Quality Improvement Tax Incentives

Qualifying projects (including PV) financed through OAQDA bonds or notes can receive a 100% exemption from personal and real property taxes

Qualified Energy Property Tax Exemptions:

Systems ≤ 250 kW exempt from utility real and property taxes

Systems > 250 kW also exempt, but requires payment in lieu of taxes of $7,000/MW

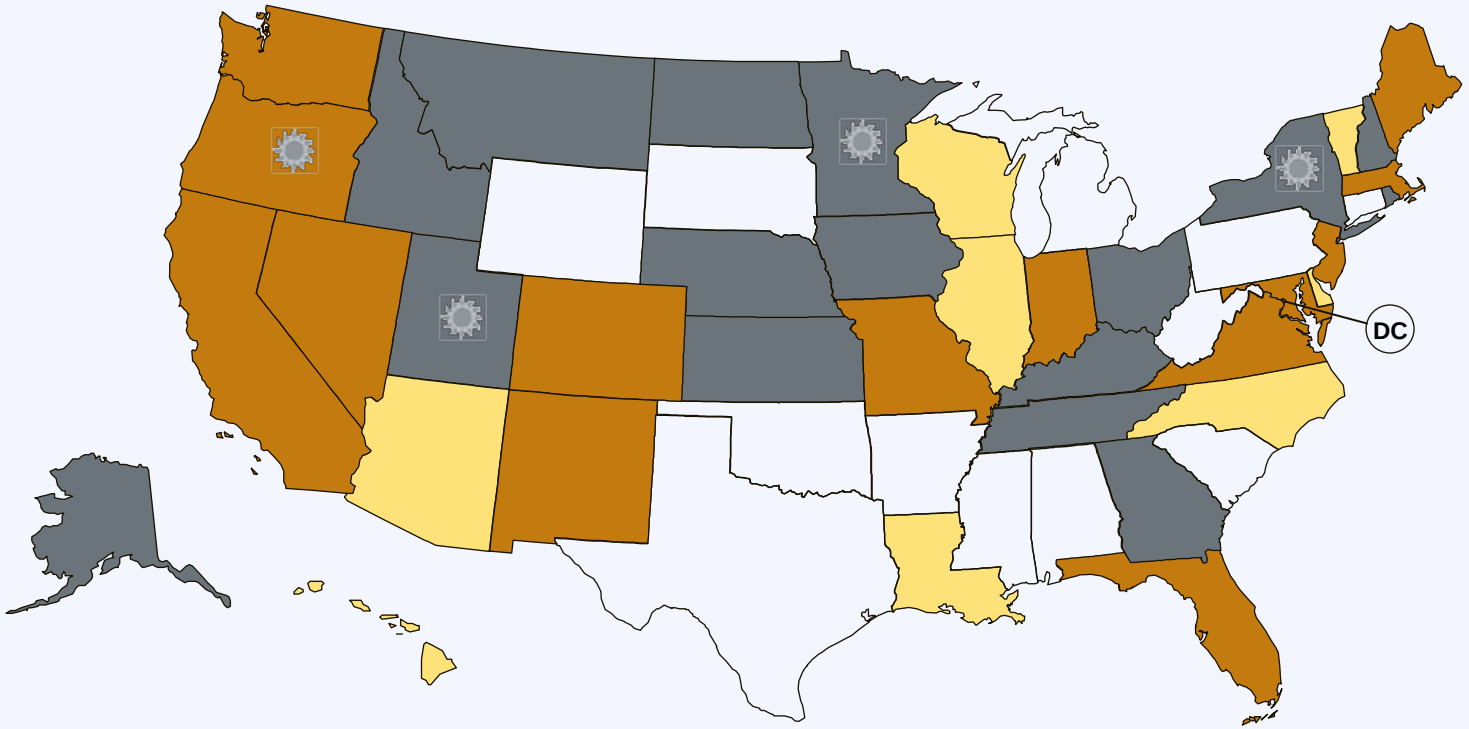
Applies to facilities that generate electricity for **sale to 3rd parties**

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

Solar Access



Solar Easements Provision

Solar Rights Provision

Solar Easements and Solar Rights Provisions

U.S. Virgin Islands

Local option to create solar rights provision

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U.S. Department of Energy

Source: DSIRE

Solar Easements: Ohio

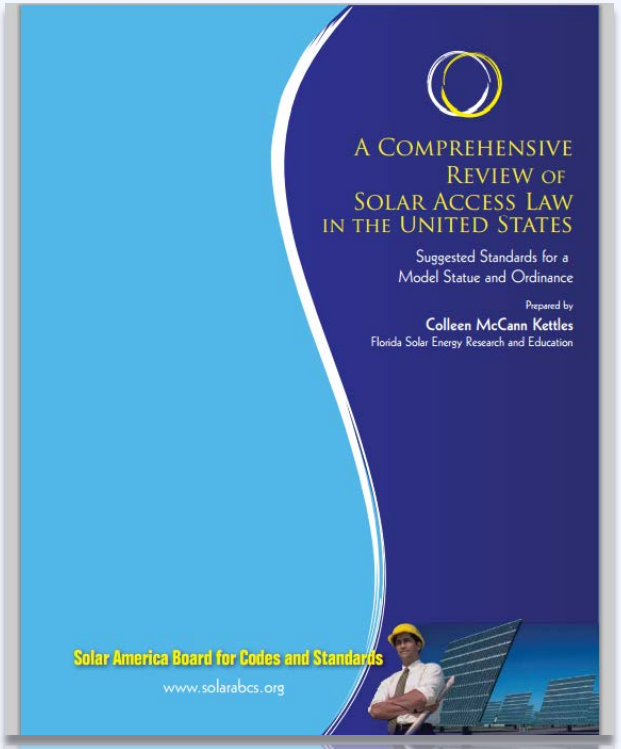
Ohio law allows property owners to create binding solar easements for the purpose of protecting and maintaining proper access to sunlight. Easements must be executed in writing and are subject to the same conveyance and recording requirements as other easements.

Solar Access

Resource **Solar ABCs**

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

www.solarabcs.org



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Q & A

Agenda

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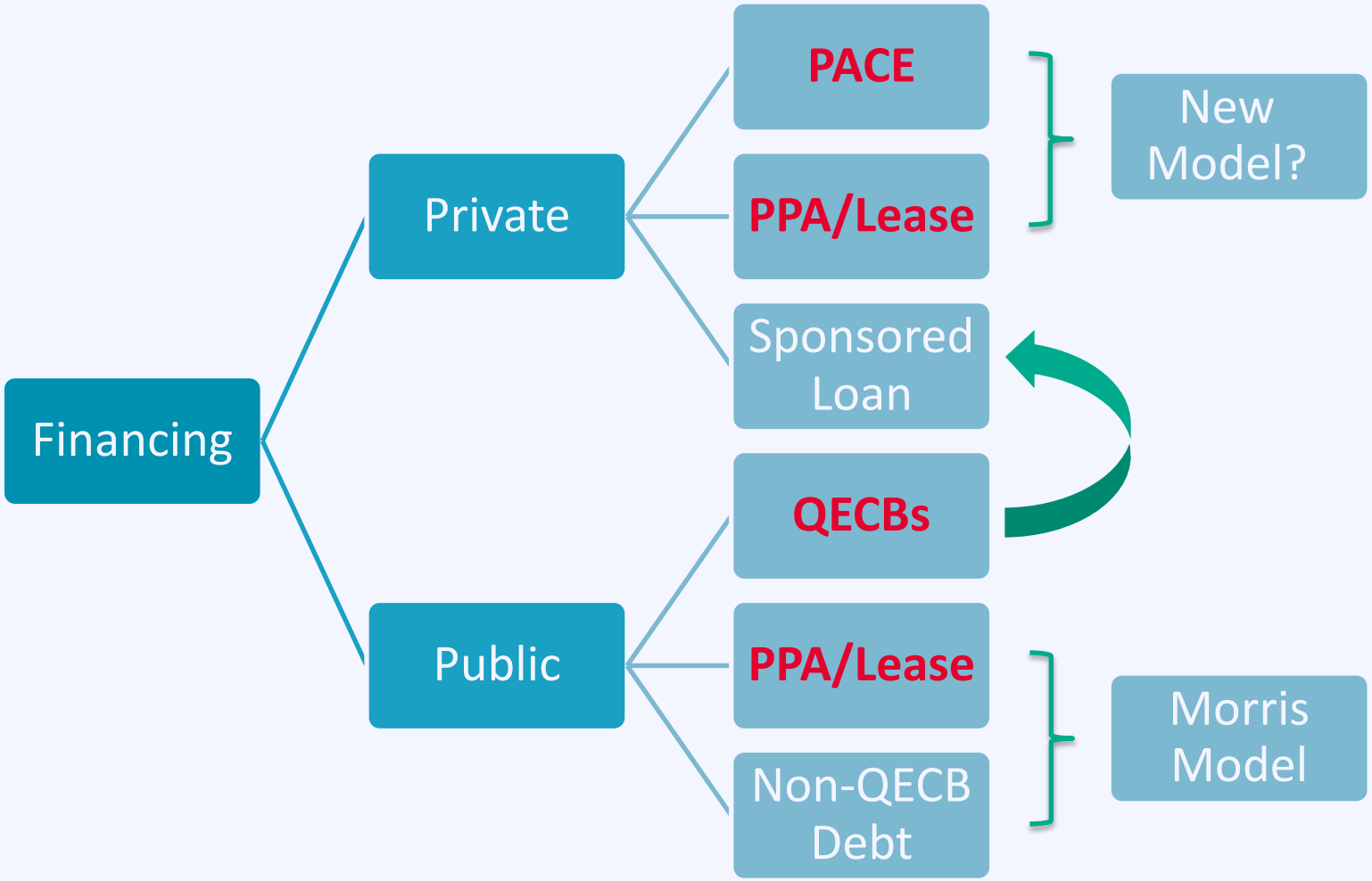
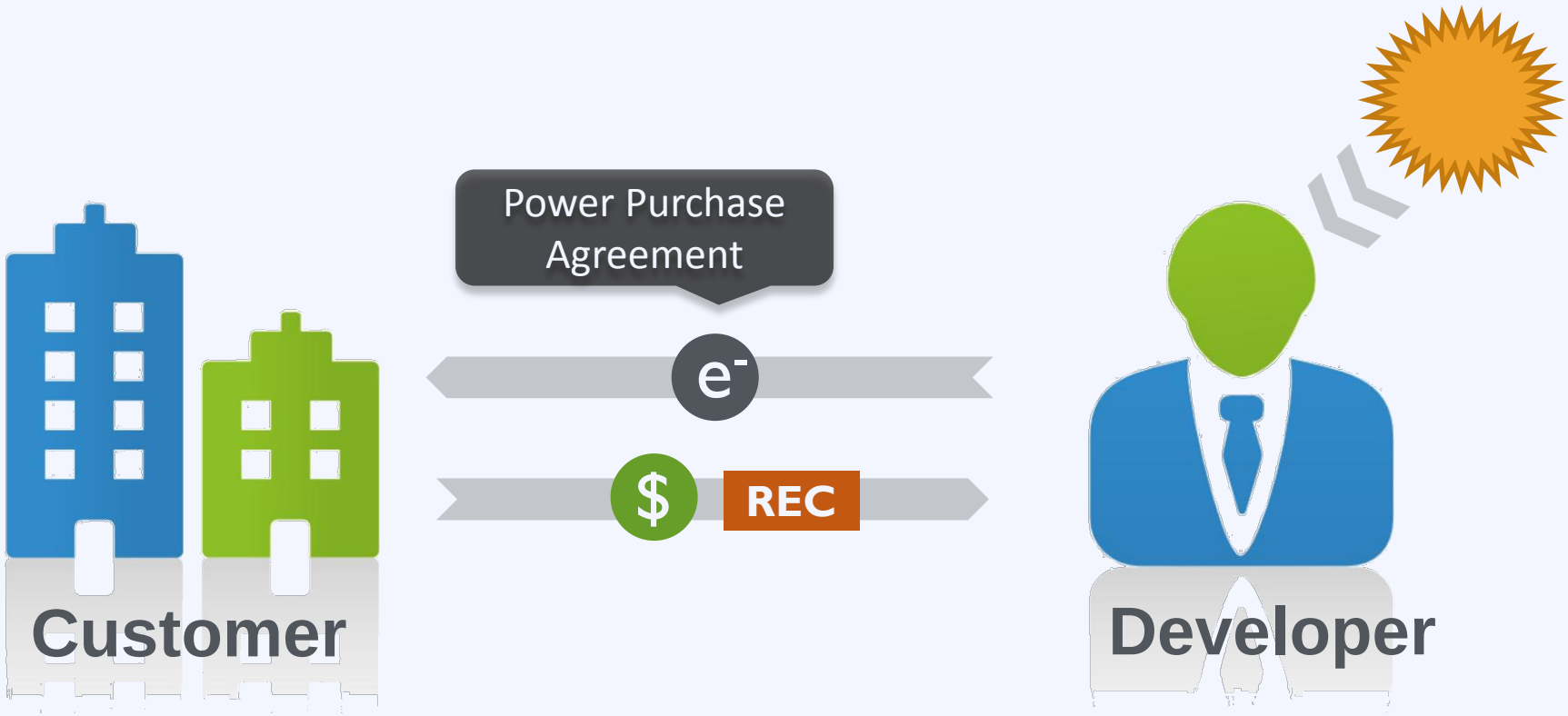
Understanding Solar Financing



Third Party Ownership



Third Party Ownership

Pros

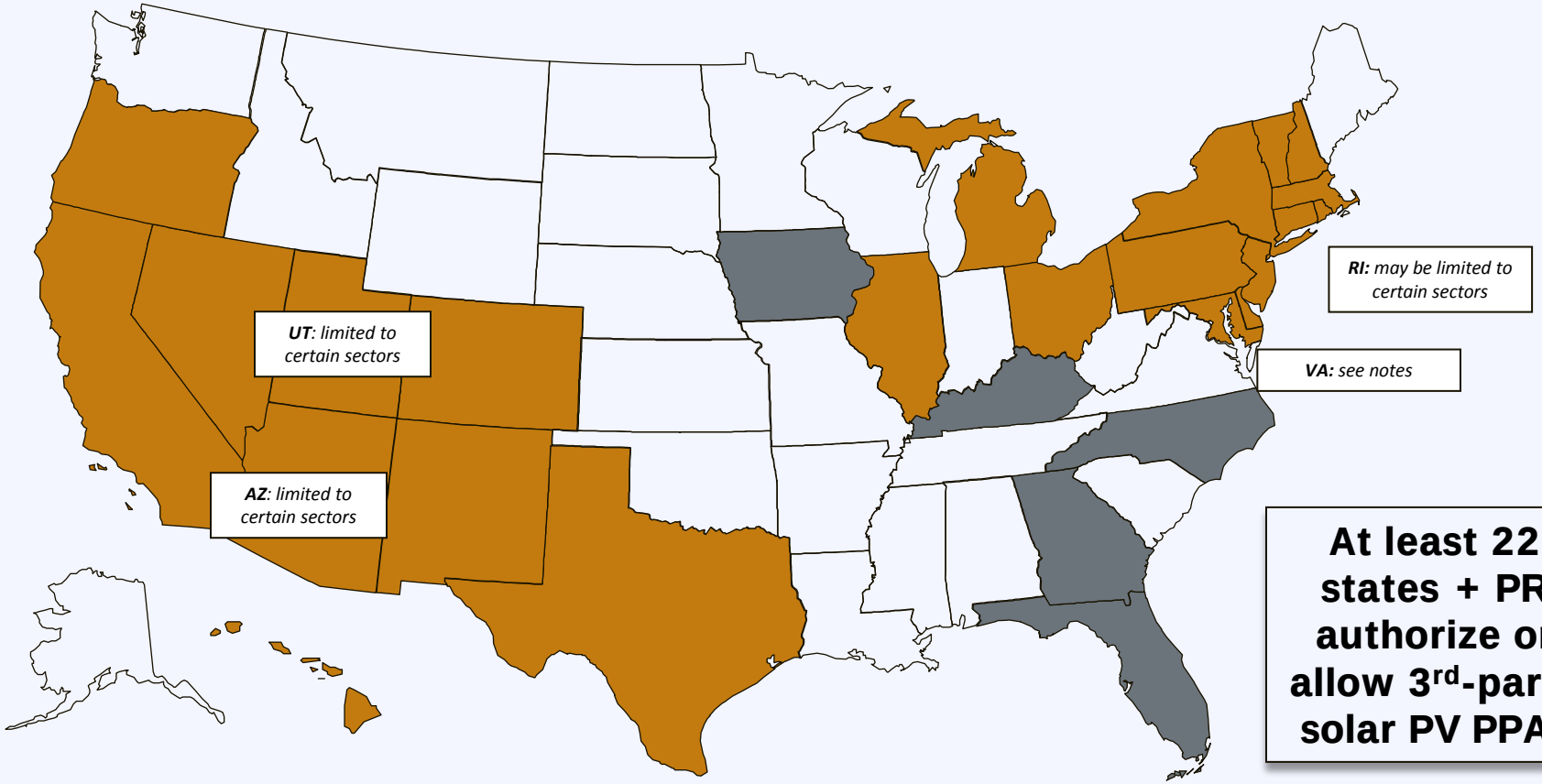
- No upfront cost
- No O&M costs
- Indirect access to tax incentives
- Predictable payments
- Low hassle factor

Cons

- Market electricity price risk
- Limited opportunity in some locations
- Limited project control
- Don't keep RECs

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

www.dsireusa.org / August 2012

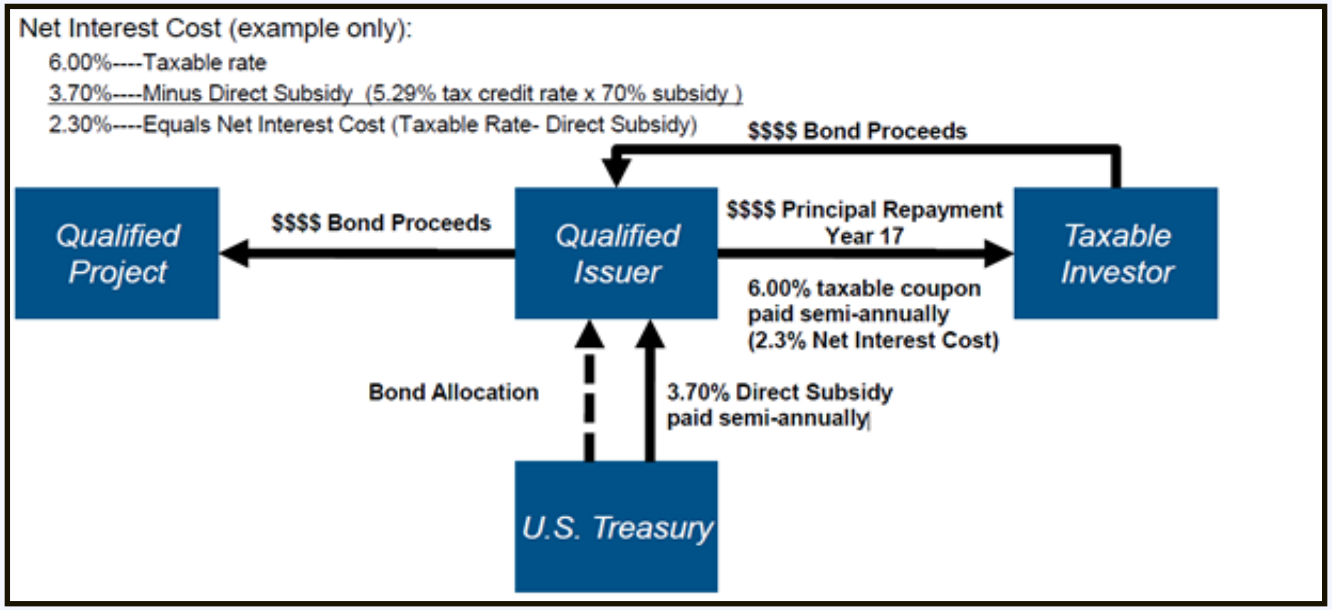


Note: This map is intended to serve as an unofficial guide; it does not constitute legal advice. Seek qualified legal expertise before making binding financial decisions related to a 3rd-party PPA. See following slides for additional important information and authority references.

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???

- Kentucky: Allocation mostly gone ($3M left)
- Ohio: 11 issuances to date ($95M left)
- Indiana: 2 issuances to date ($8.4M in state allocation remaining)

Powered by SunShot U.S. Department of Energy

Source: National Association of State Energy State Energy Officials: State Financing Energy Resources.

Property Assessed Clean Energy

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

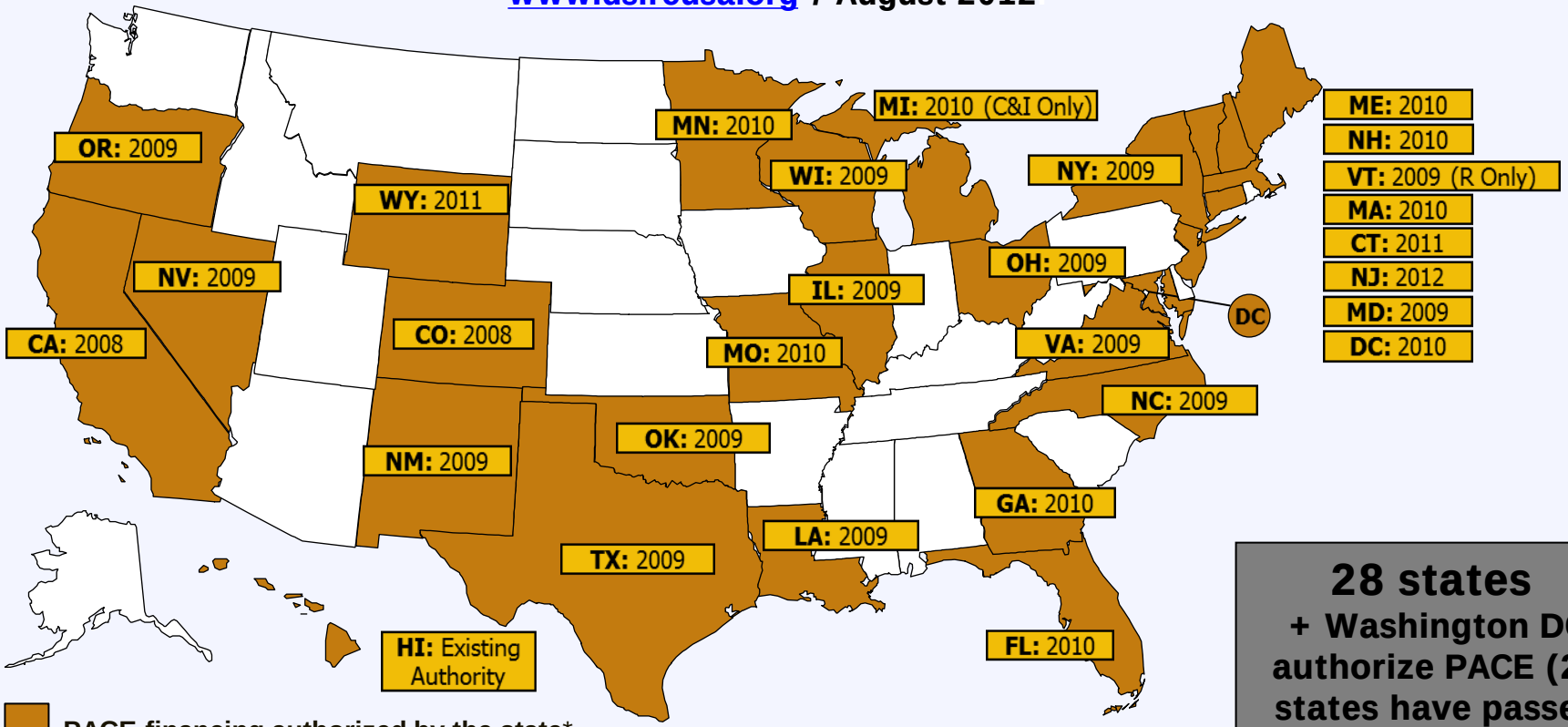
Property owners voluntarily sign-up for financing and make energy improvements

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)

Property Assessed Clean Energy

www.dsireusa.org / August 2012



PACE financing authorized by the state*

*The Federal Housing Financing Agency (FHFA) issued a statement in July 2010 concerning the senior lien status associated with most PACE programs. In response to the FHFA statement, most local PACE programs have been suspended until further clarification is provided.

28 states
+ Washington DC authorize PACE (27 states have passed legislation and HI permits it based on existing law).

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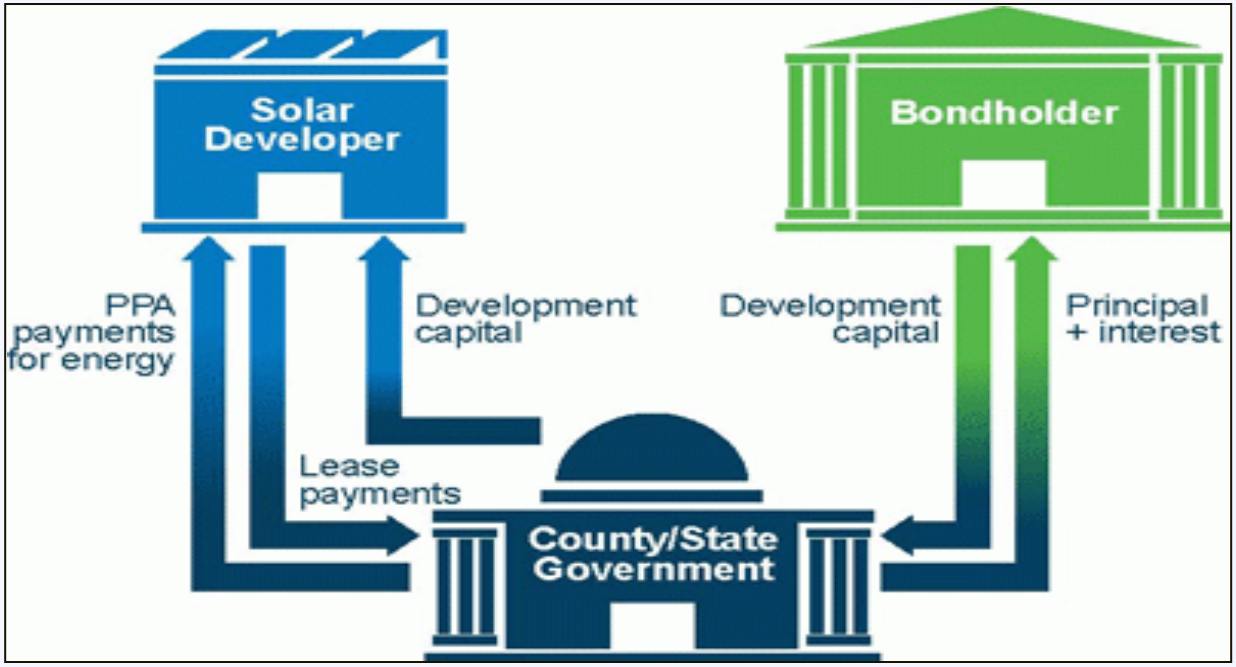
U.S. Department of Energy

Innovative: Morris Model

Public Debt + PPA = **MORRIS MODEL**



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

Replication of Morris Model

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

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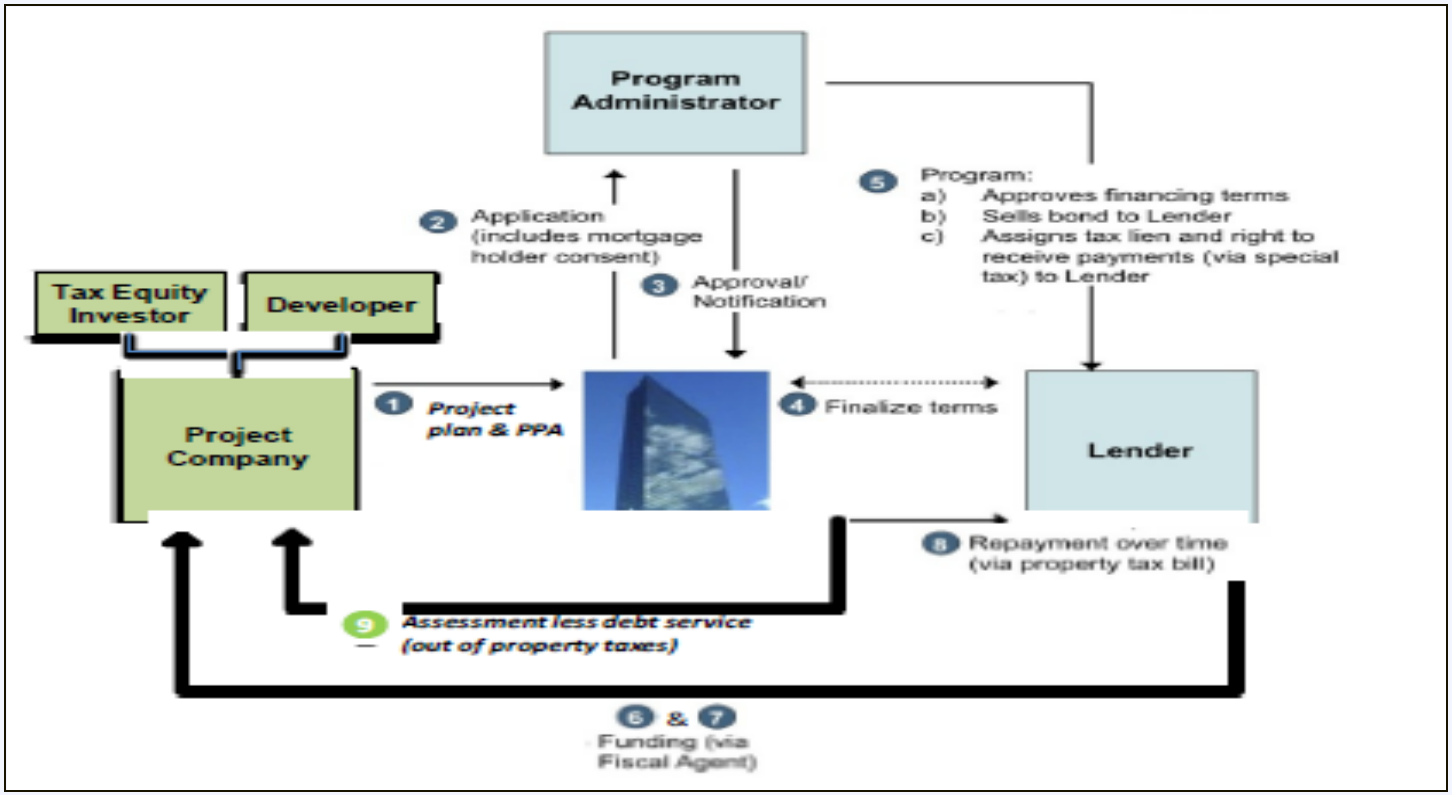
U.S. Department of Energy

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

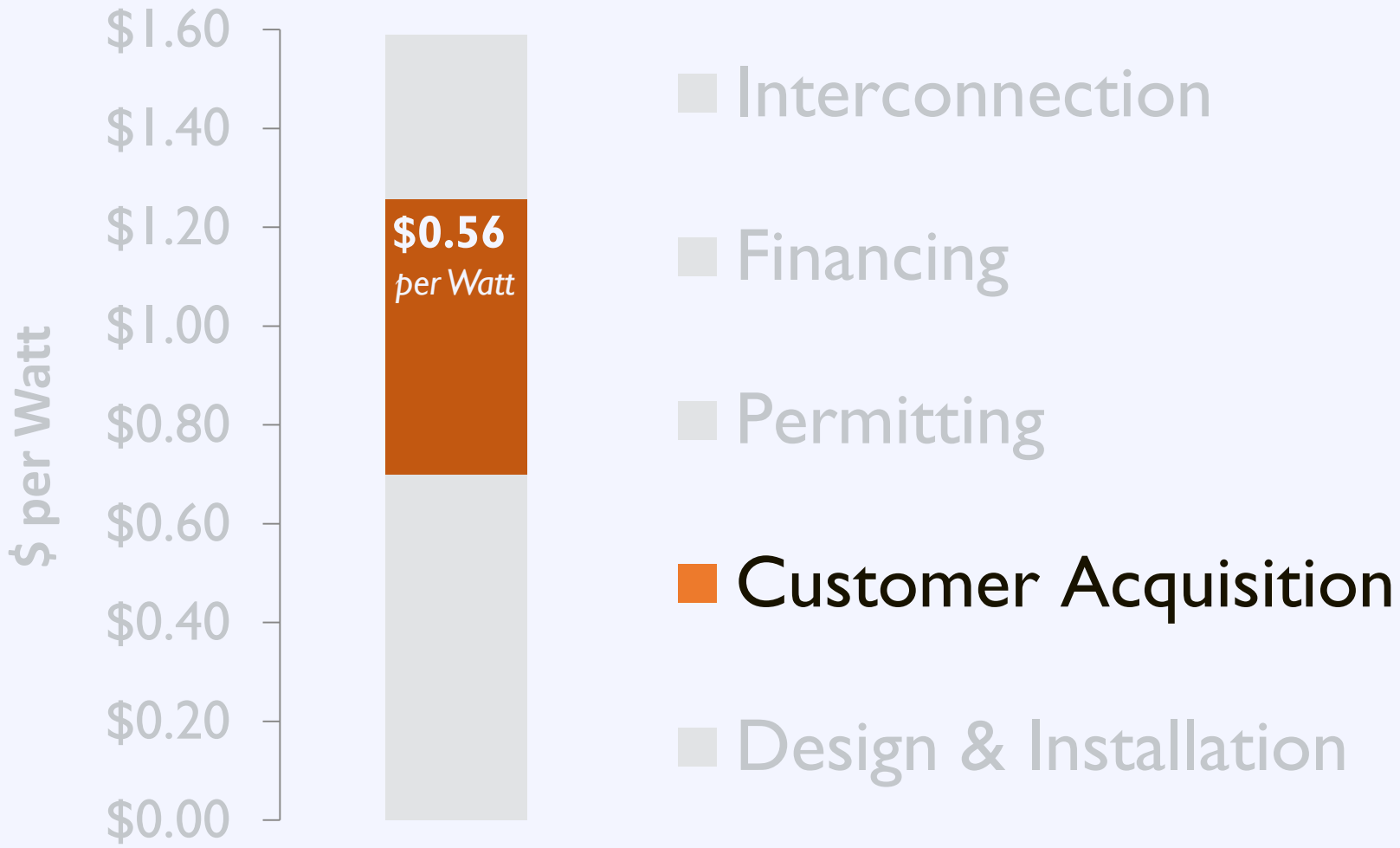
Innovative: PACE + PPA

PACE + PPA = **Untested**



Source. Vote Solar. 2012. Commercial Scale Solar Financing – PACE and Third-Party Ownership

Mitigate Soft Costs



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U.S. Department of Energy

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

Customer Acquisition

Solarize

Group Purchasing

Solarize: Advantages

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

Solarize: Advantages

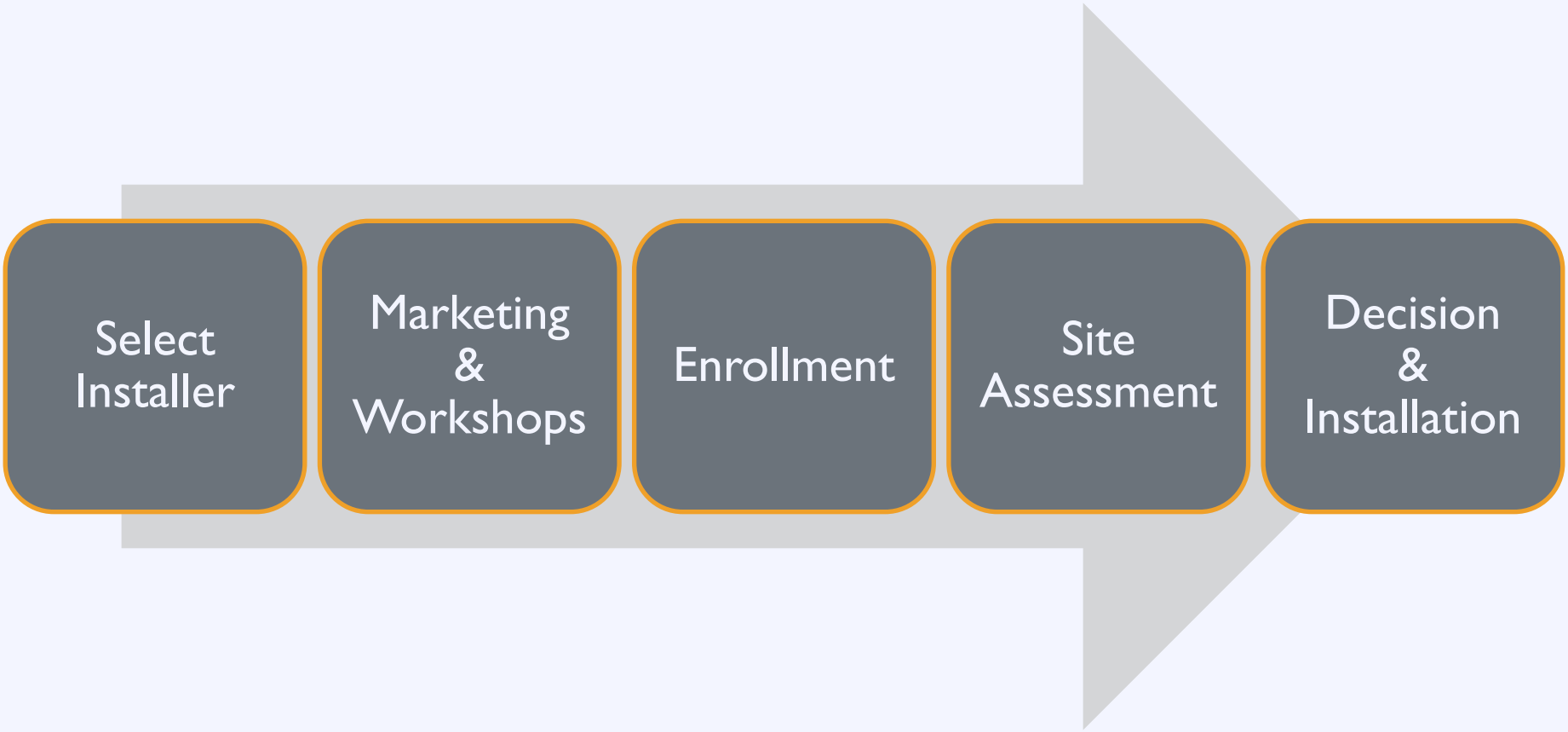
Benefits to Local Government:

Low implementation cost: $10,000 - $20,000

Quick turn-around: 9 Months

Long-term impact: Sustainable ecosystem

Solarize: Process



Solarize: Case Study

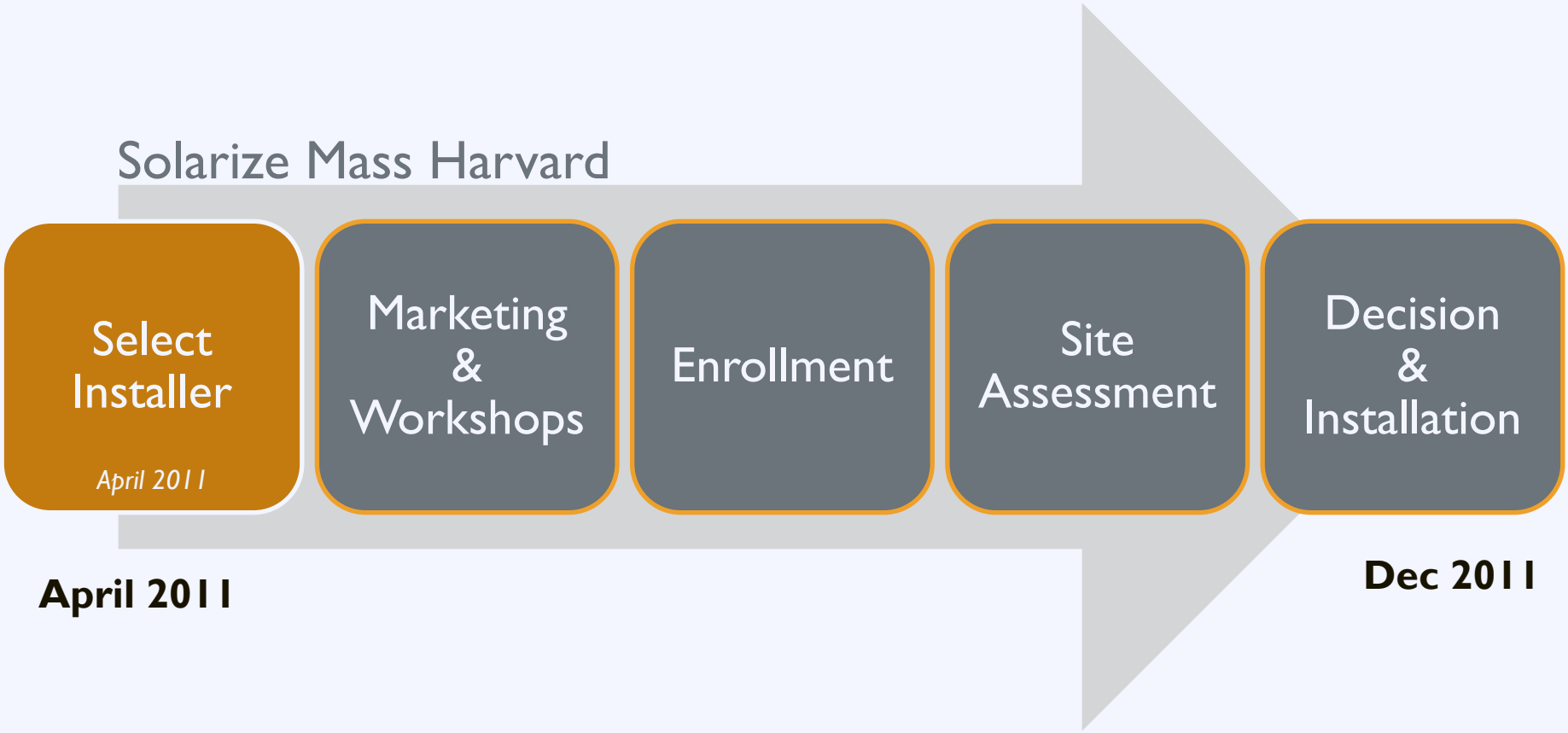
Harvard, Massachusetts

Population: 6,520

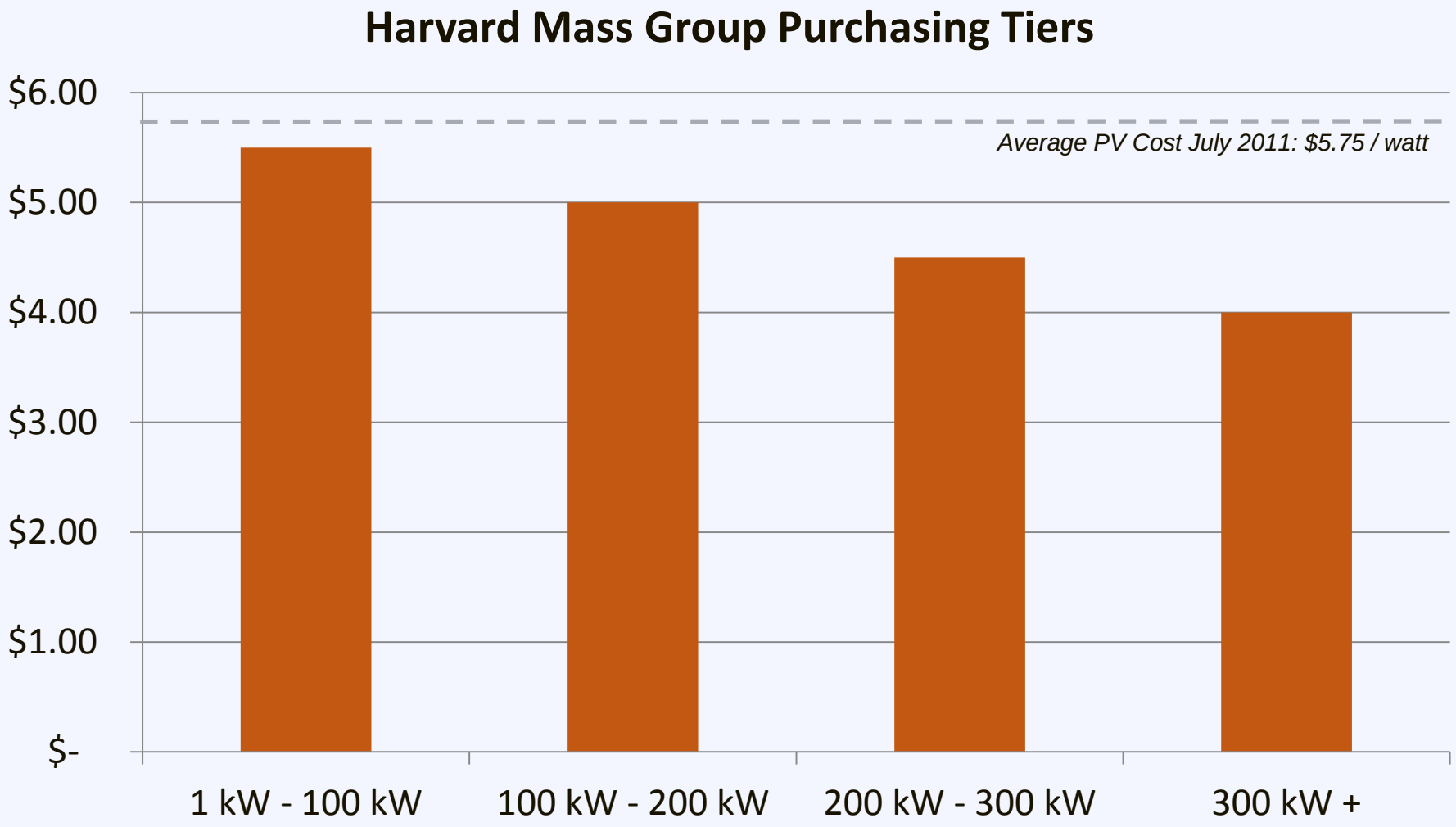
Powered by SunShot
U.S. Department of Energy

Source: Wikipedia

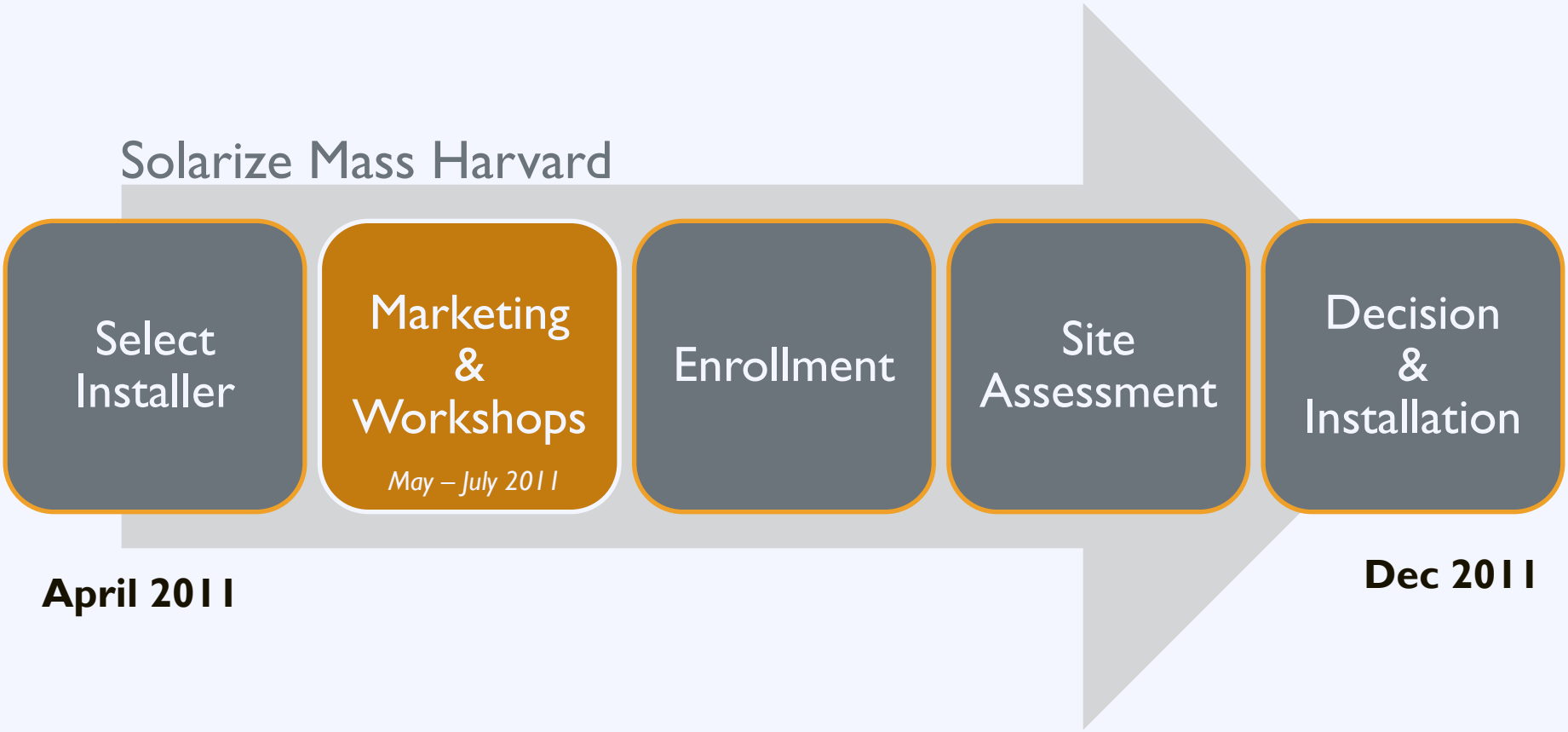
Solarize: Case Study



Group Purchasing



Solarize: Case Study



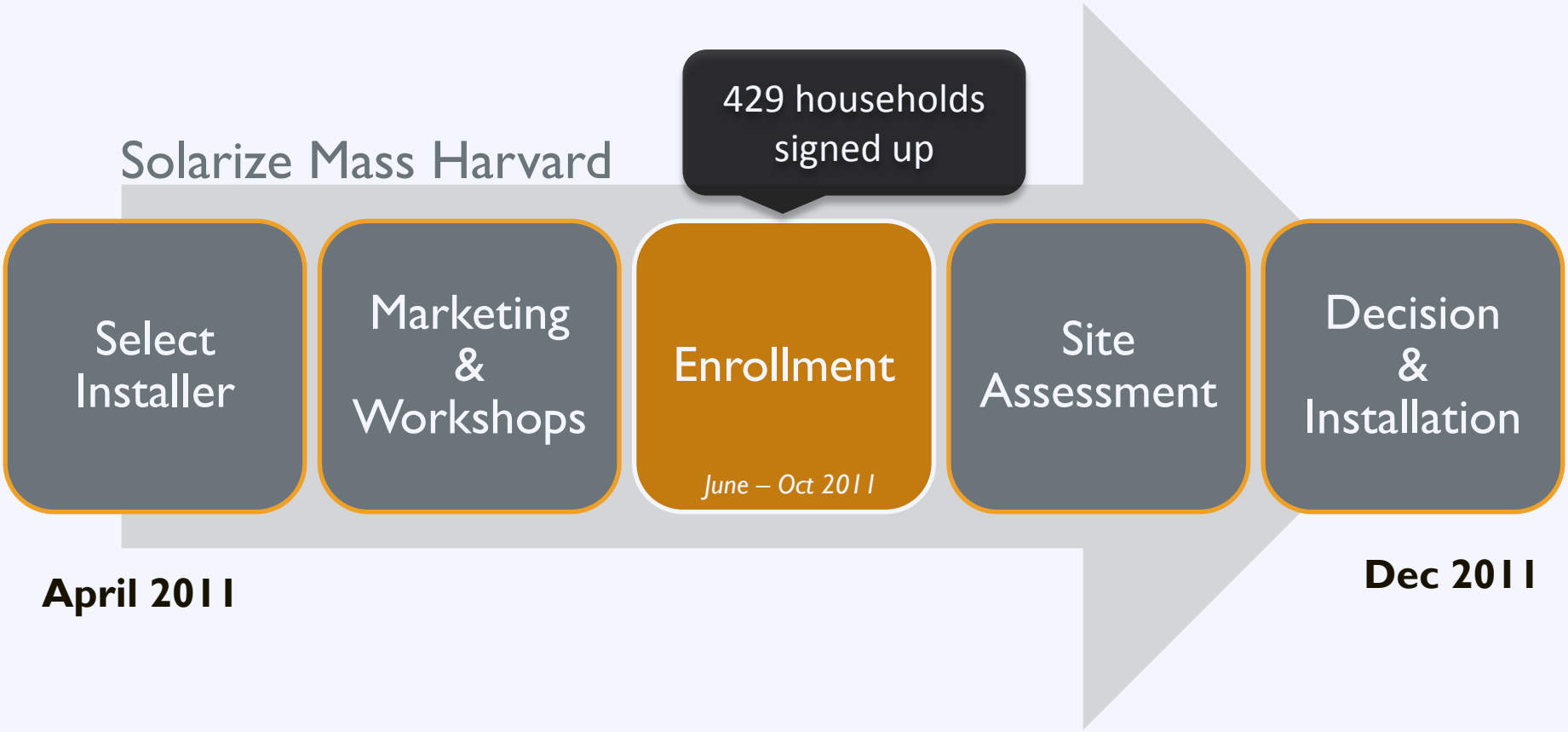
Solarize: Case Study

Marketing Strategy:

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

Source: Vote Solar

Solarize: Case Study



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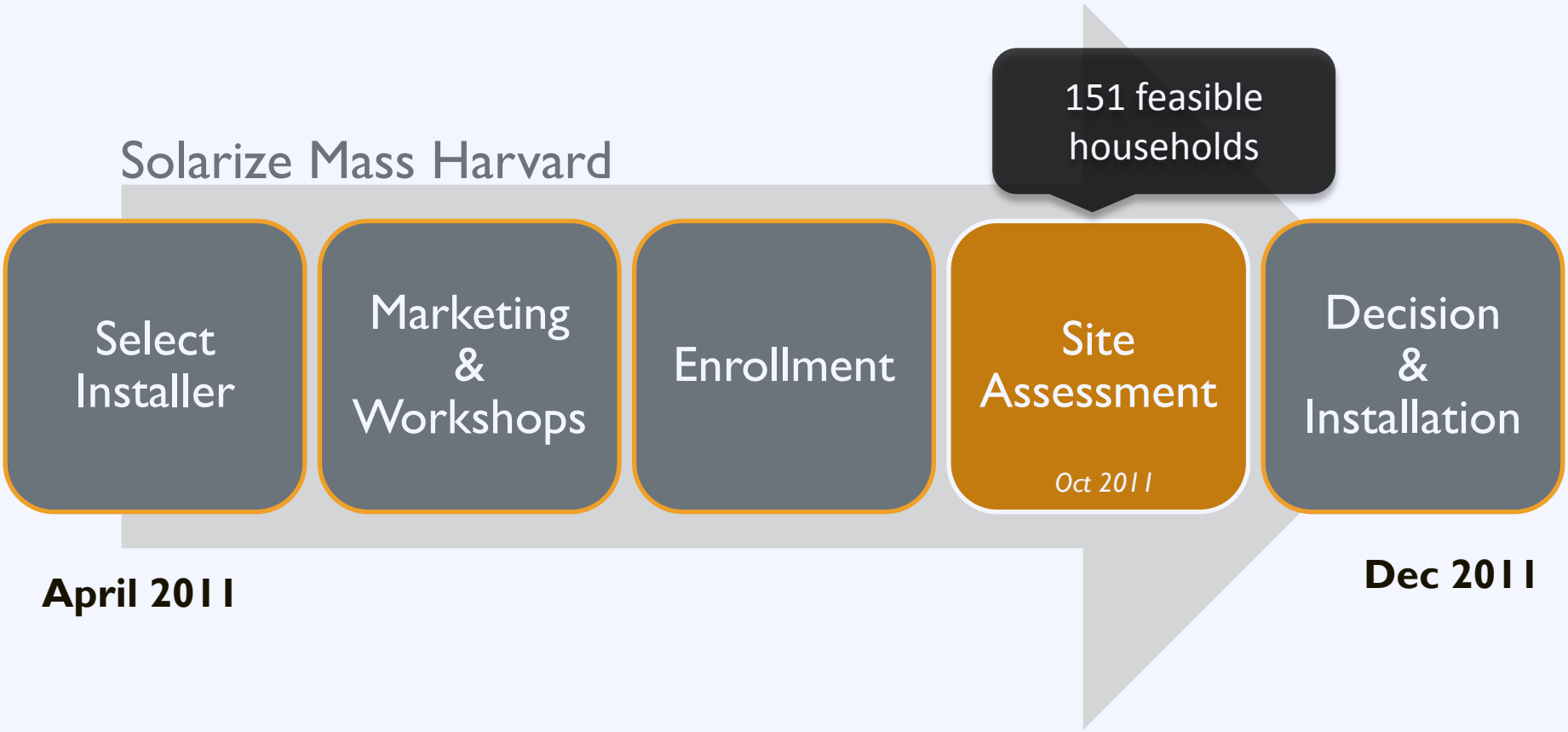

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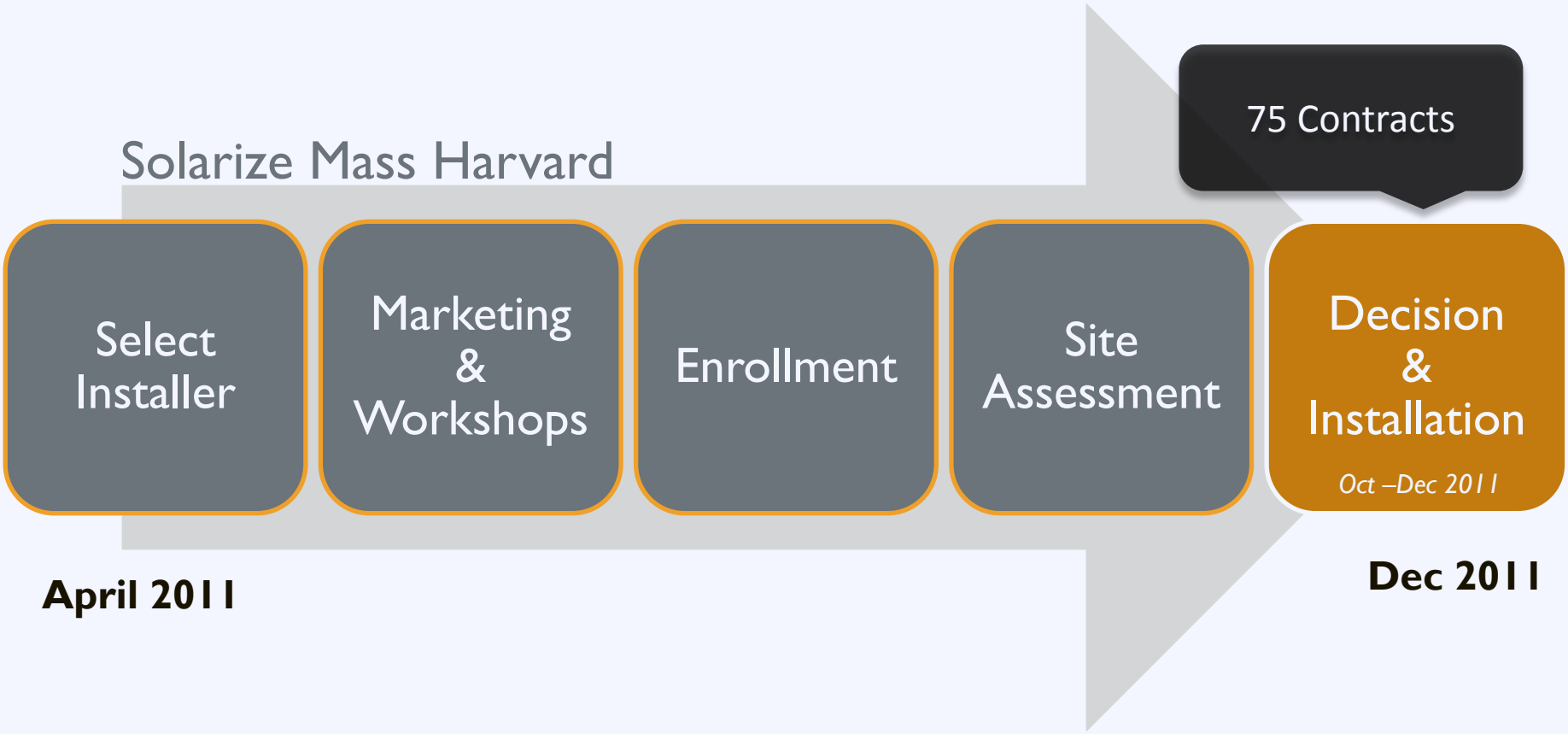
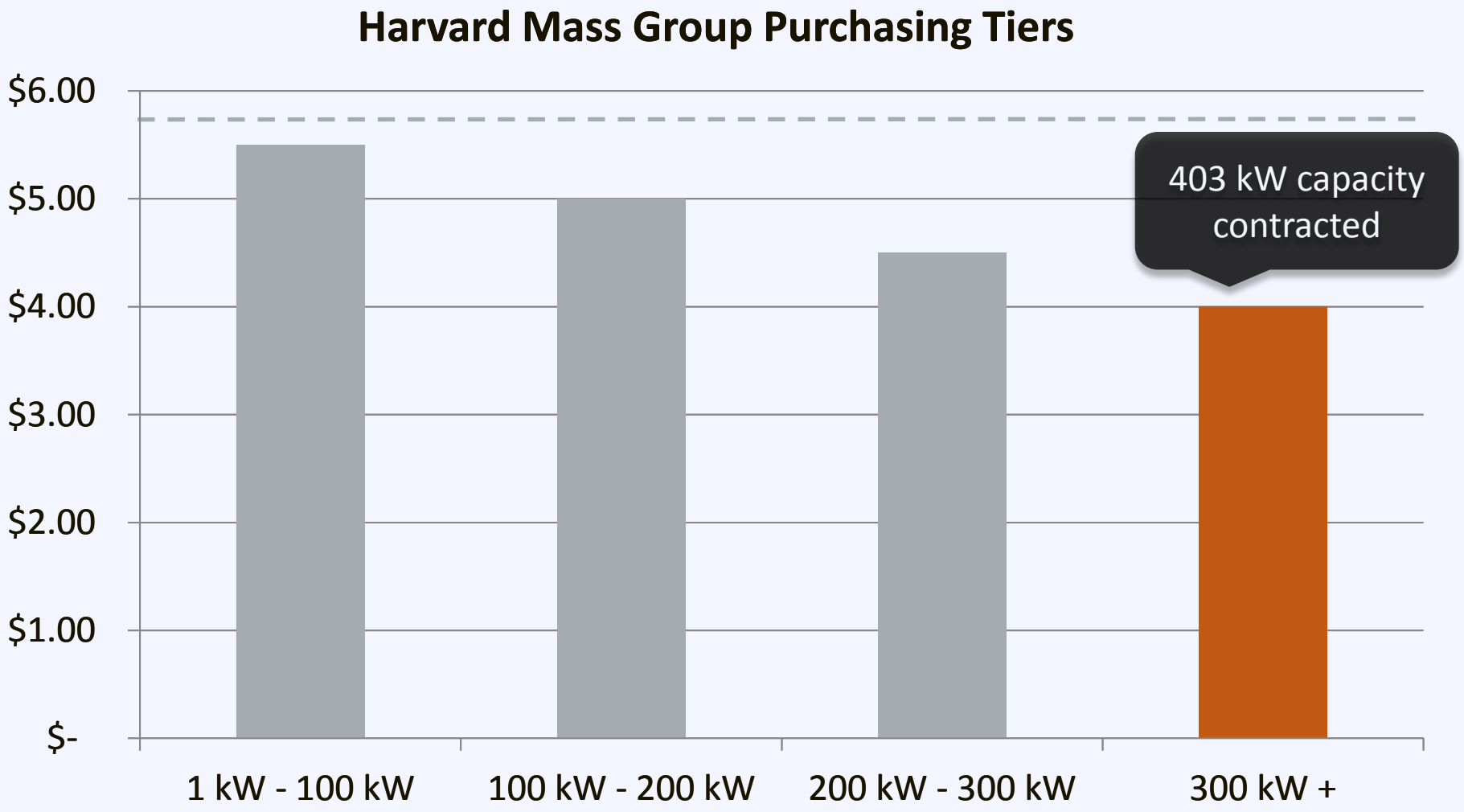


Group Purchasing



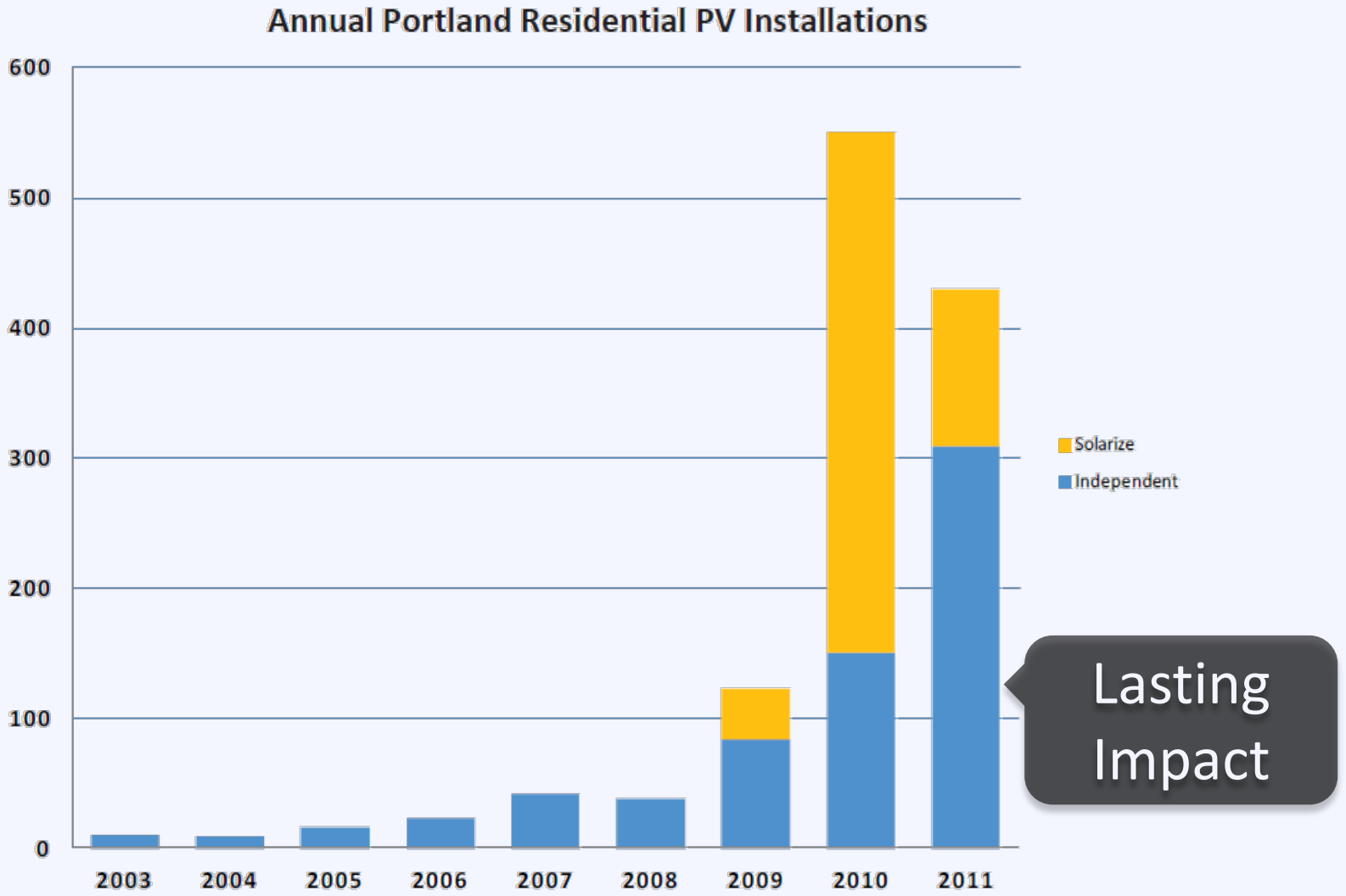
Solarize: Case Study

75 new installations totaling 403 kW

30% reduction in installation costs

575% increase in residential installations

Solarize: Lasting Impact



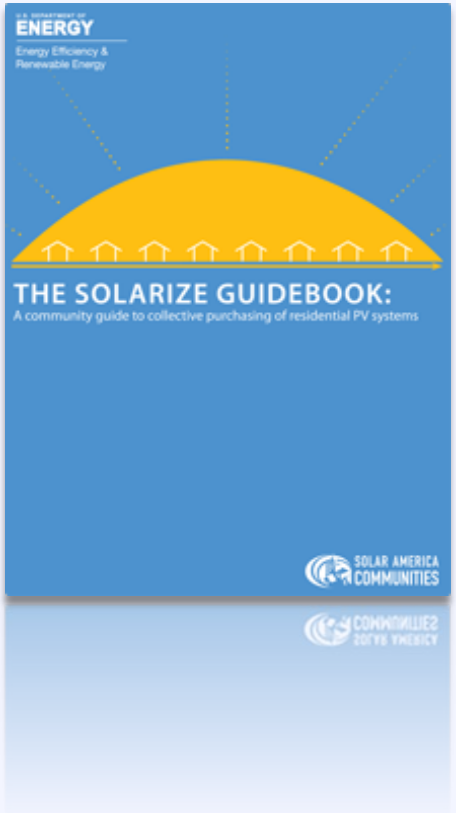
Source: NREL

Solarize: Resources

Resource **The Solarize Guidebook**

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

www.nrel.gov



Q & A

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- Local Expert presenter

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Justin Barnes

NC Solar Center / DSIRE

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(919) 513 - 0792

Philip Haddix

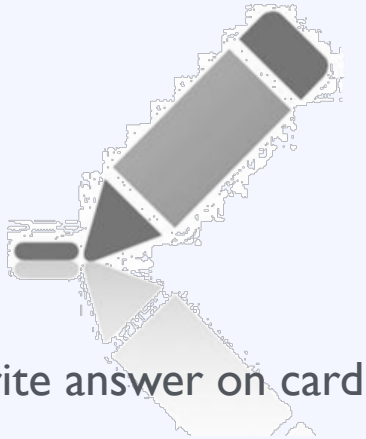
The Solar Foundation

phaddix@solarfound.org

Activity: Identifying Benefits

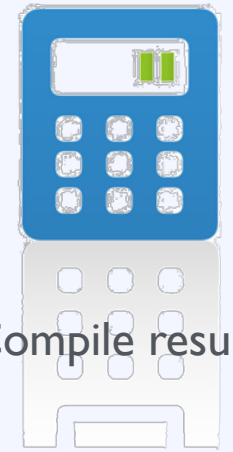
What is the greatest benefit solar can bring to your community? [Blue Card]

Right Now



Write answer on card

During Session

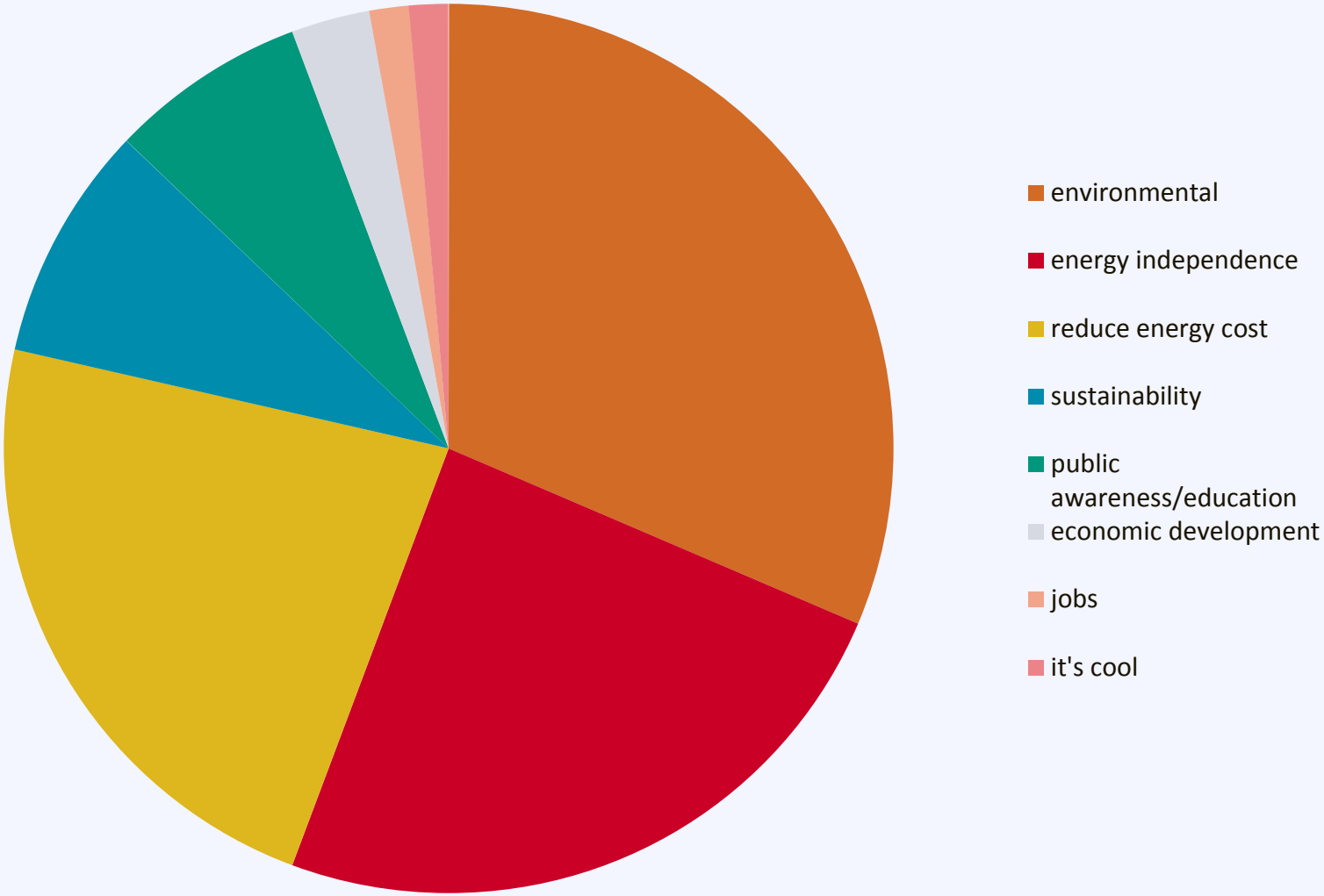


Compile results

After Break

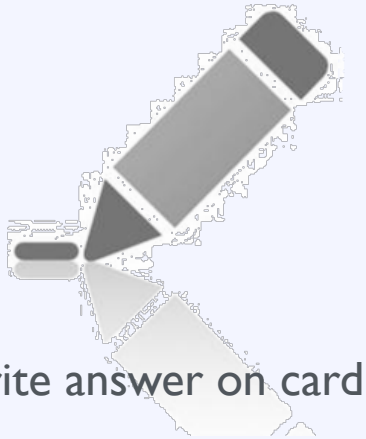
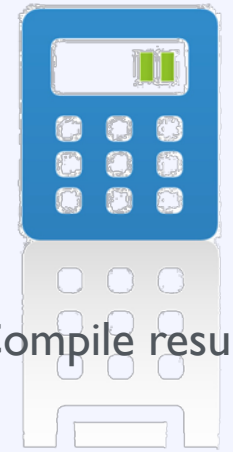
Group discussion

[Results from Survey]

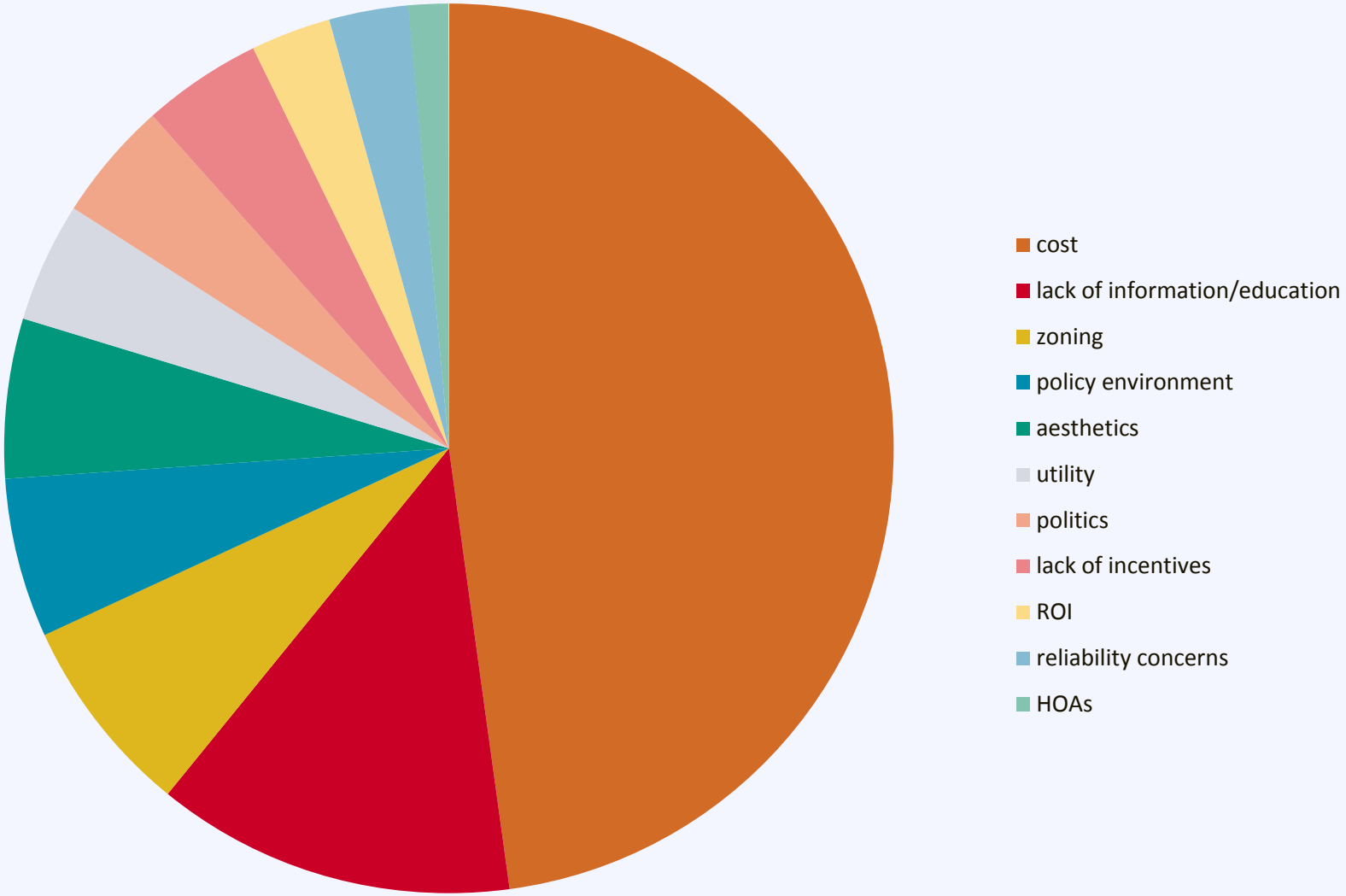


Activity: Addressing Barriers

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]



Activity: Next Steps

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

Net Metering: Virtual

No direct connection necessary

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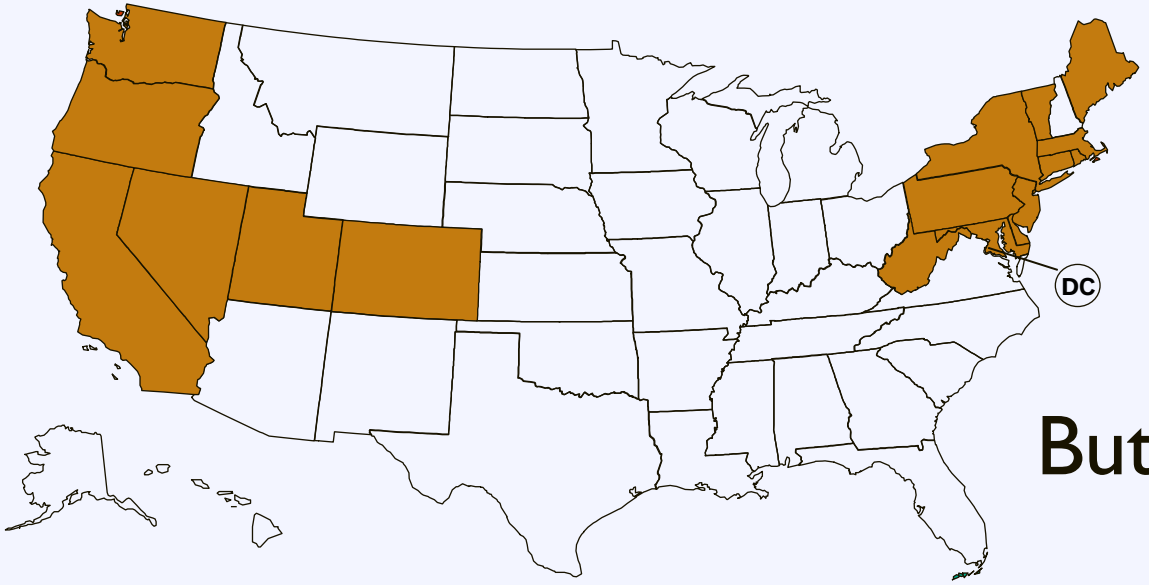
U.S. Department of Energy

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

Process

Decide on Ownership Structure

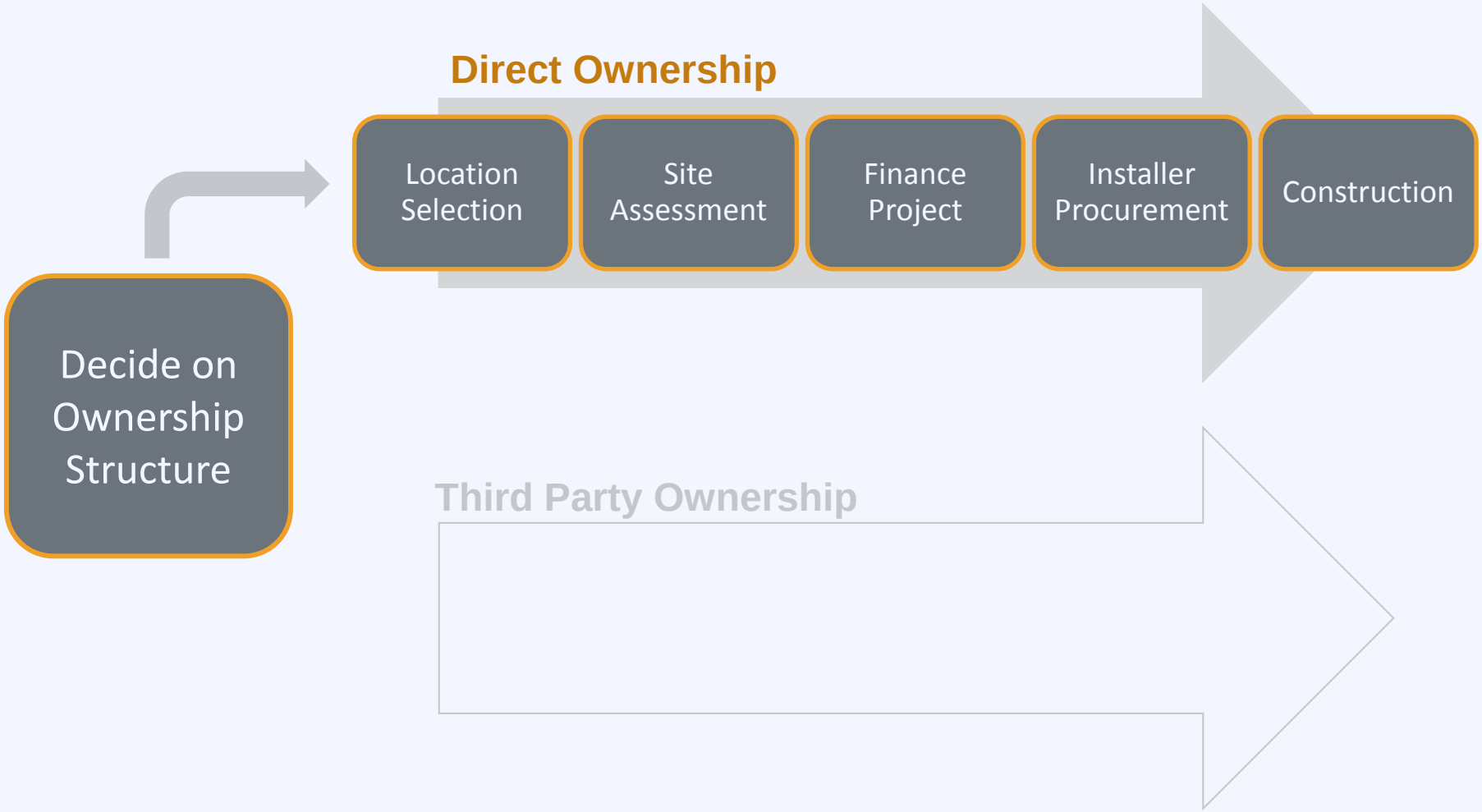
Option 1: Direct Ownership

Option 2: Third Party Ownership

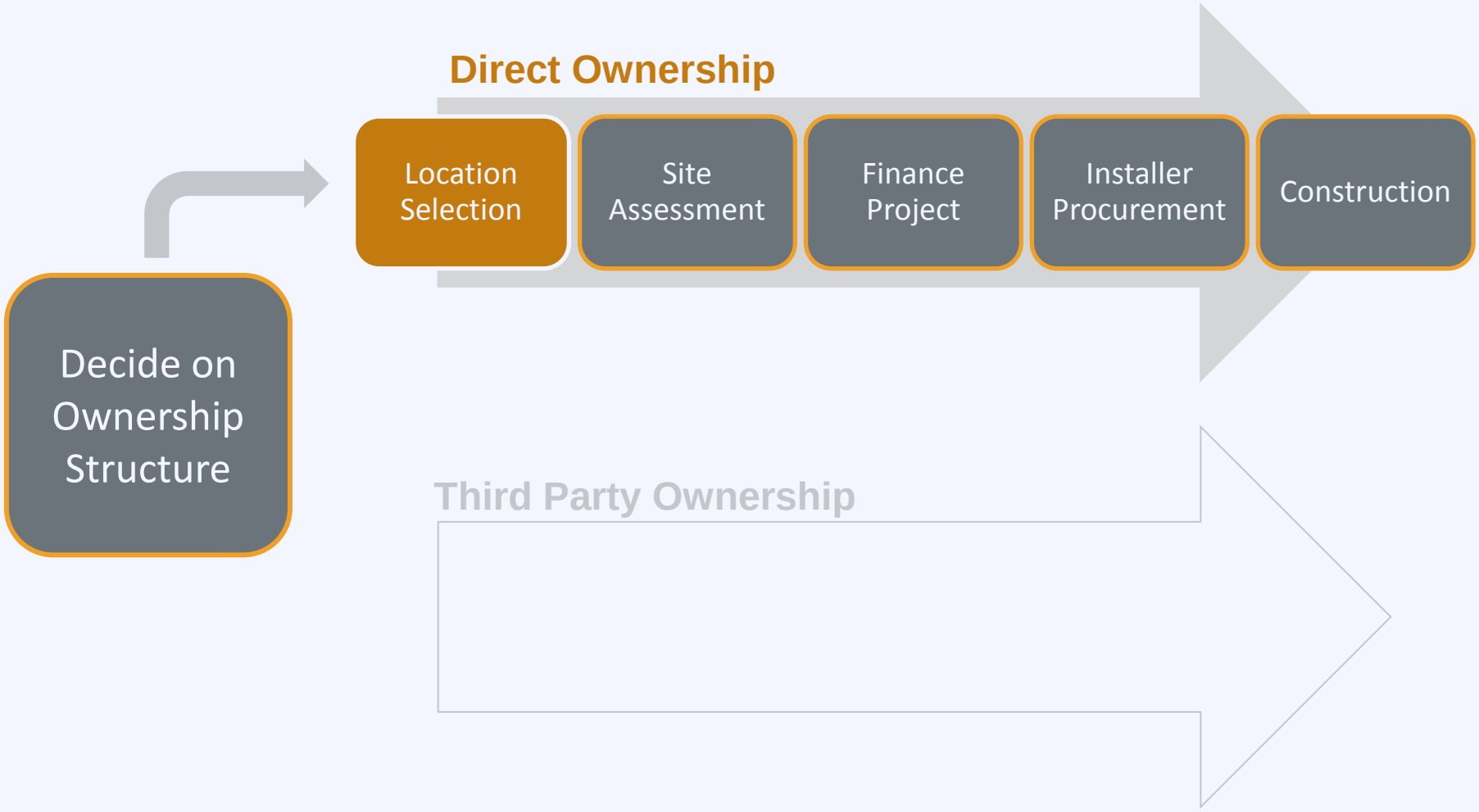
Ownership Structure Decision

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

Process


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

Process


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

Step 1: Location Selection

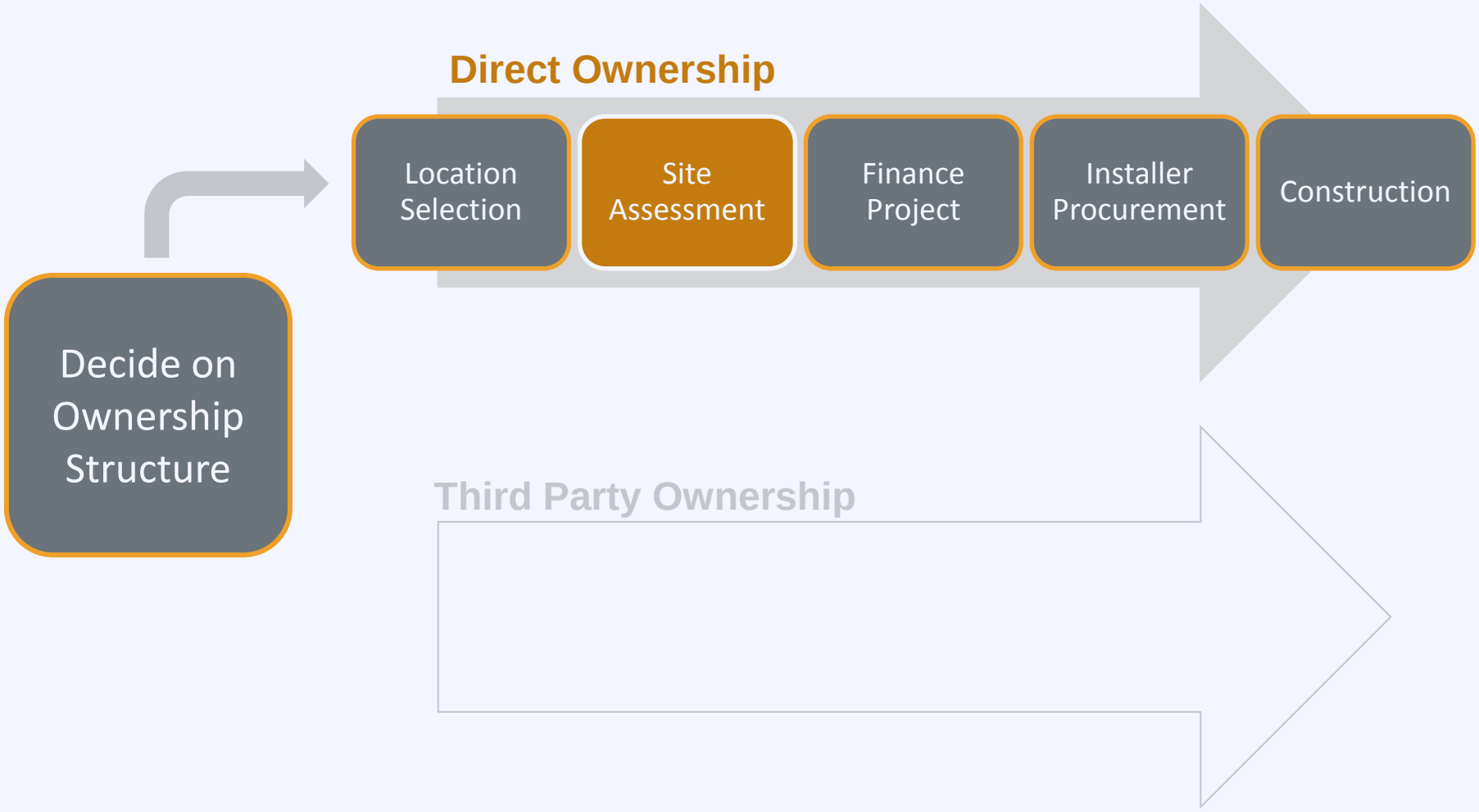
- Who is using the energy?
- Where is the energy being used?
- What is the user's energy load?
- What is the user's energy cost?

Step 1: Location Selection

Rooftop

Ground

Process


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

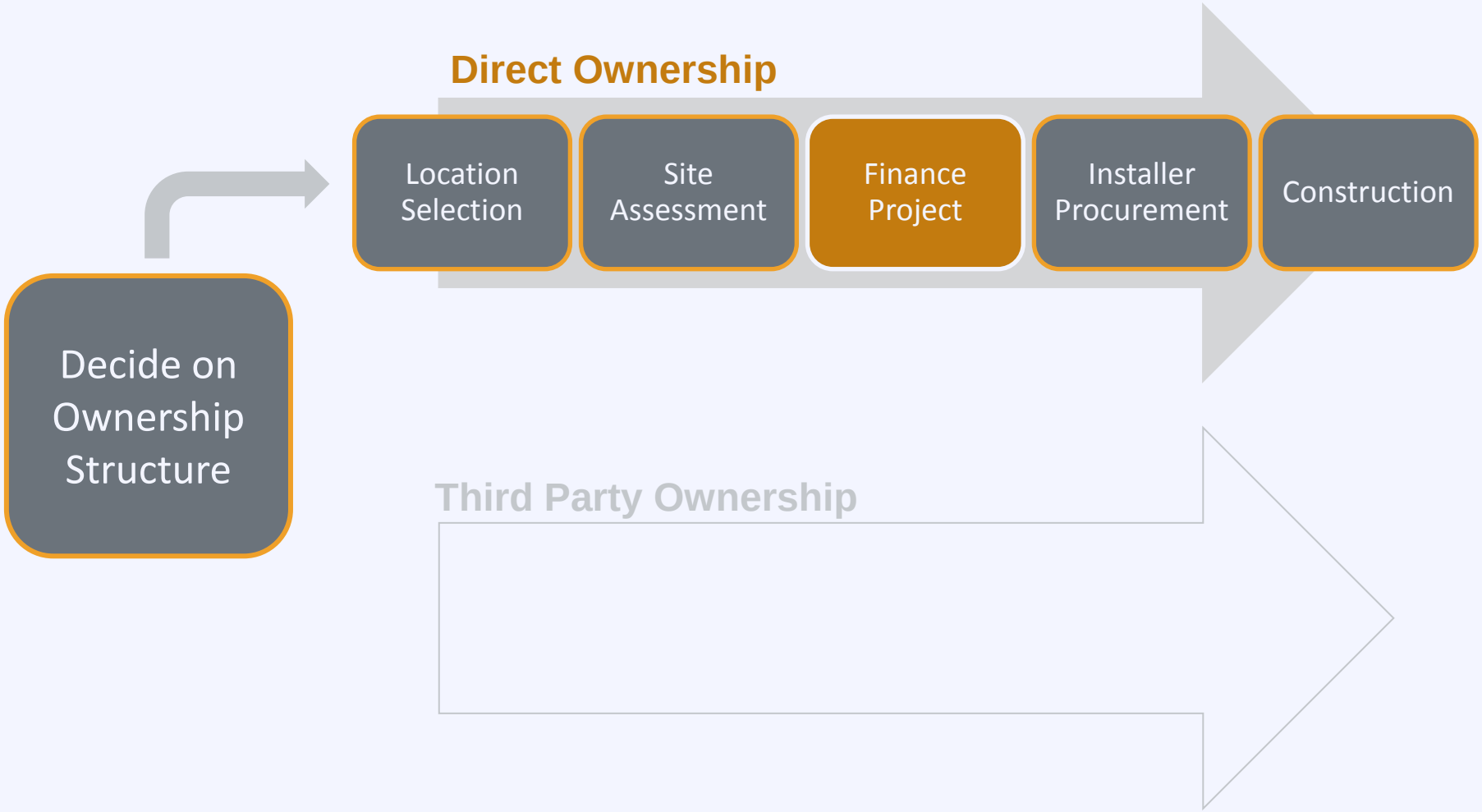
Step 2: Site Assessment

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

Step 2: Site Assessment

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

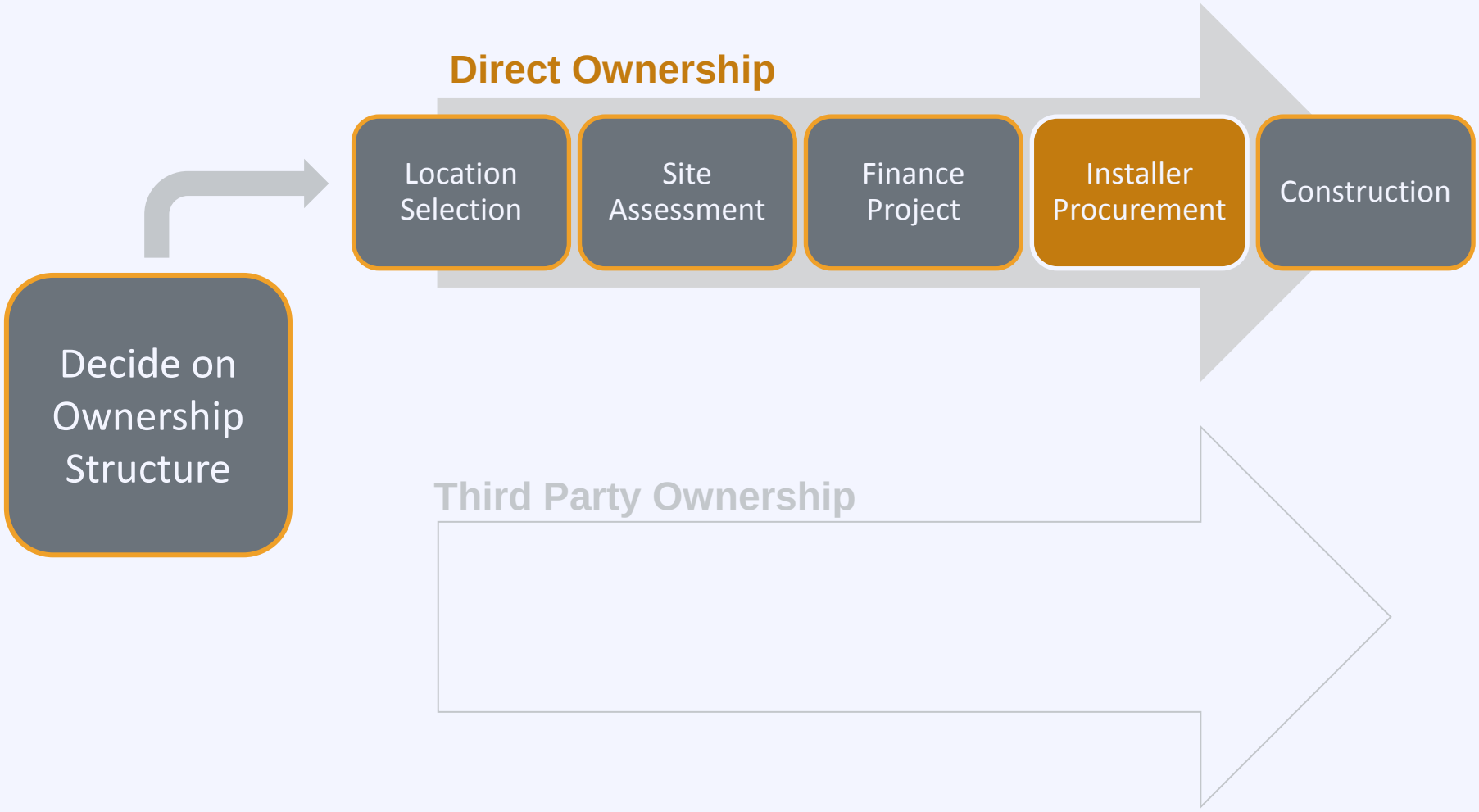
Process


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

Step 3: Finance Project

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

Process

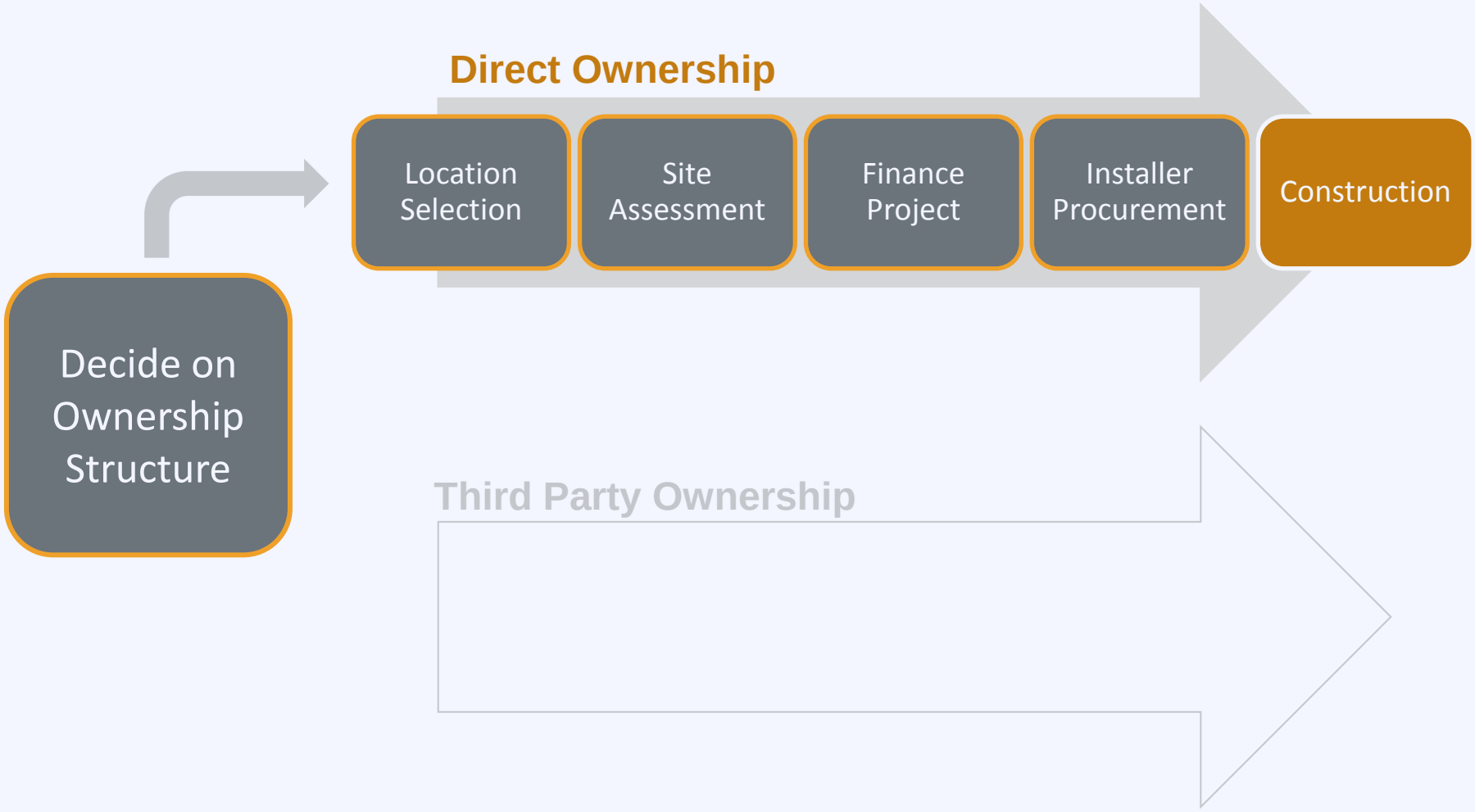

Direct Ownership
Location Selection
Site Assessment
Finance Project
Installer Procurement
Construction
Decide on Ownership Structure
Third Party Ownership

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

Direct Ownership

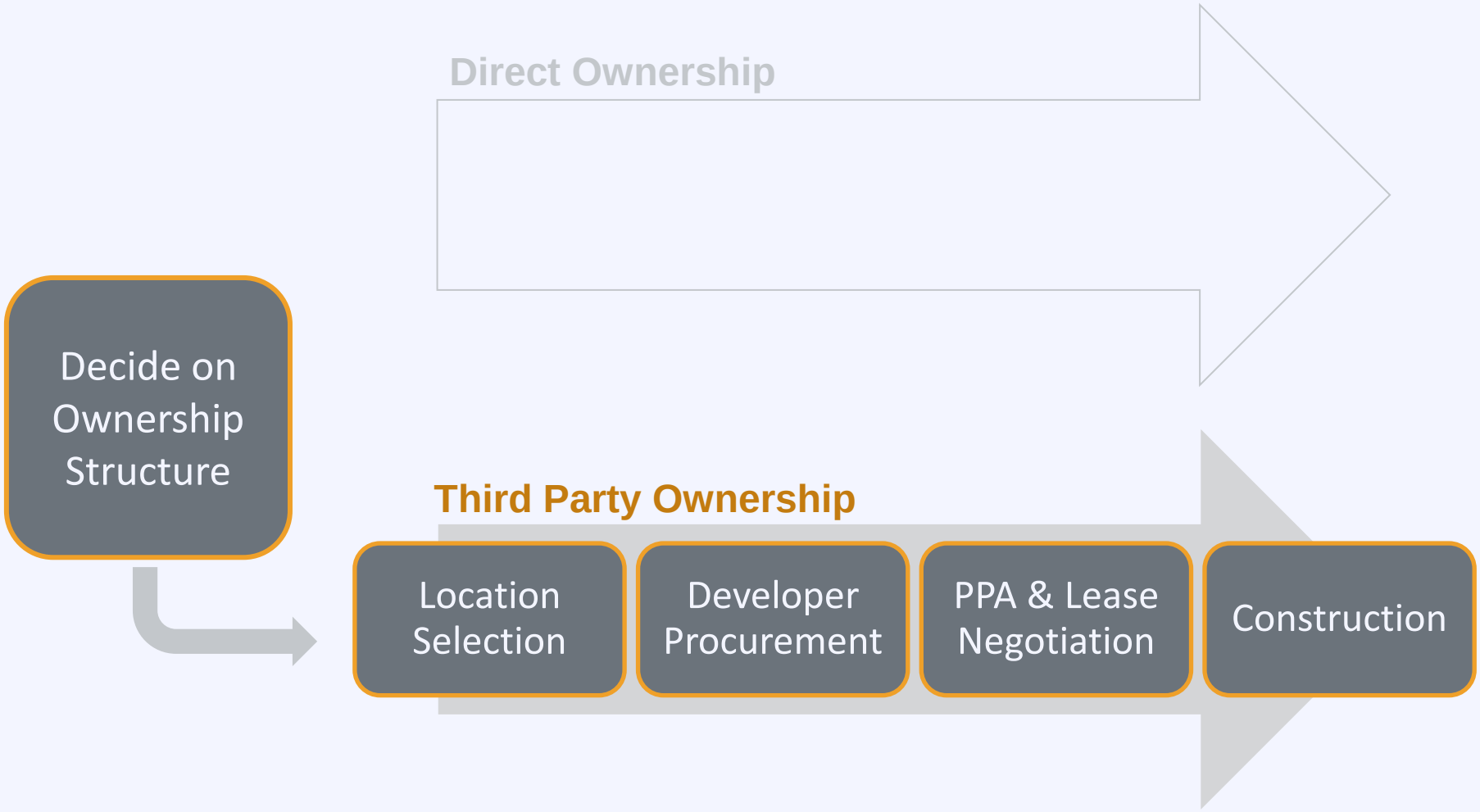
Pros

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

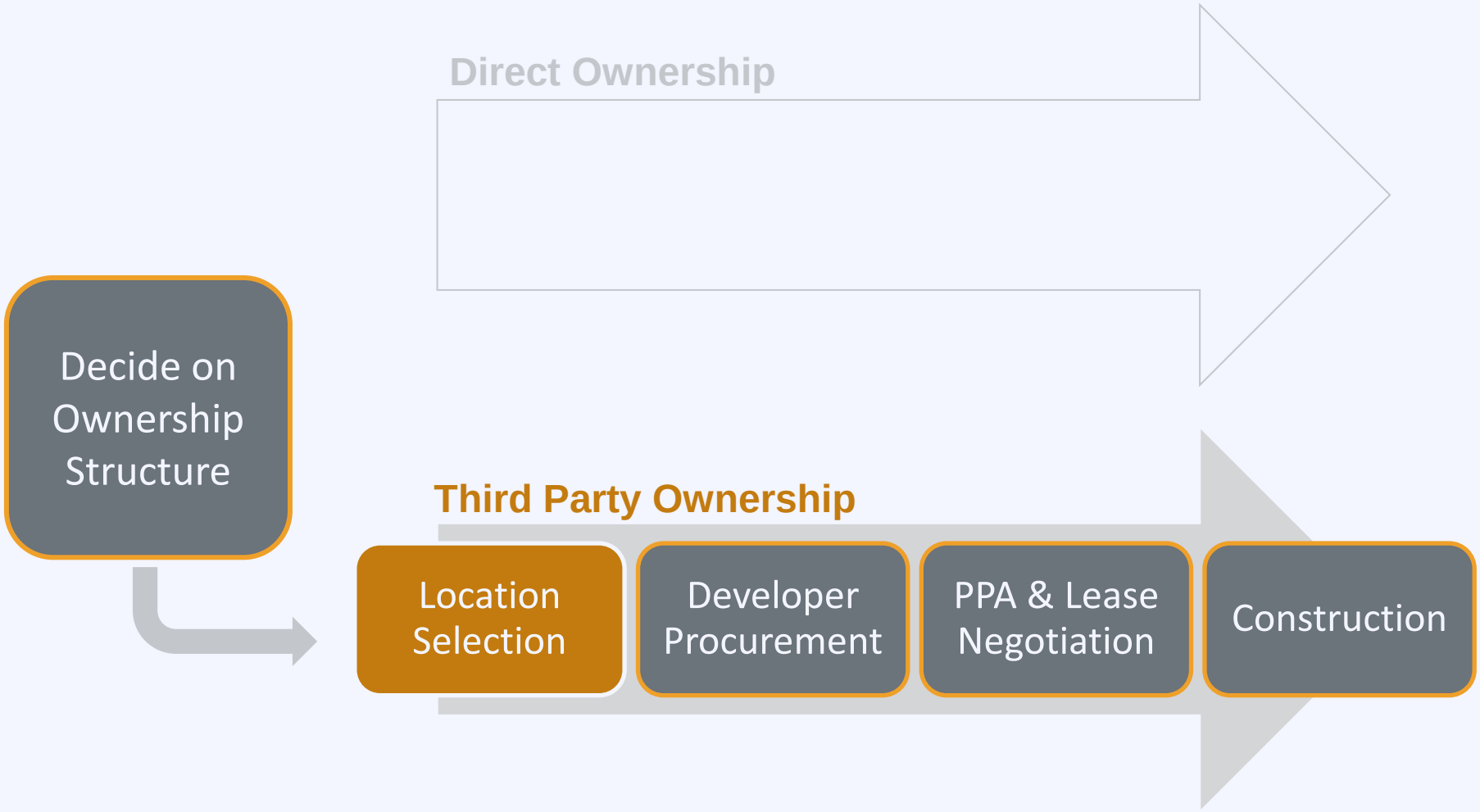
Cons

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

Process


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

Process


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

Process


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

Step 2: Developer Procurement

Avoid Five Common Pitfalls:

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

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U.S. Department of Energy

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

Step 2: Developer Procurement

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

50% savings in administrative costs

10-15% reduction in energy cost

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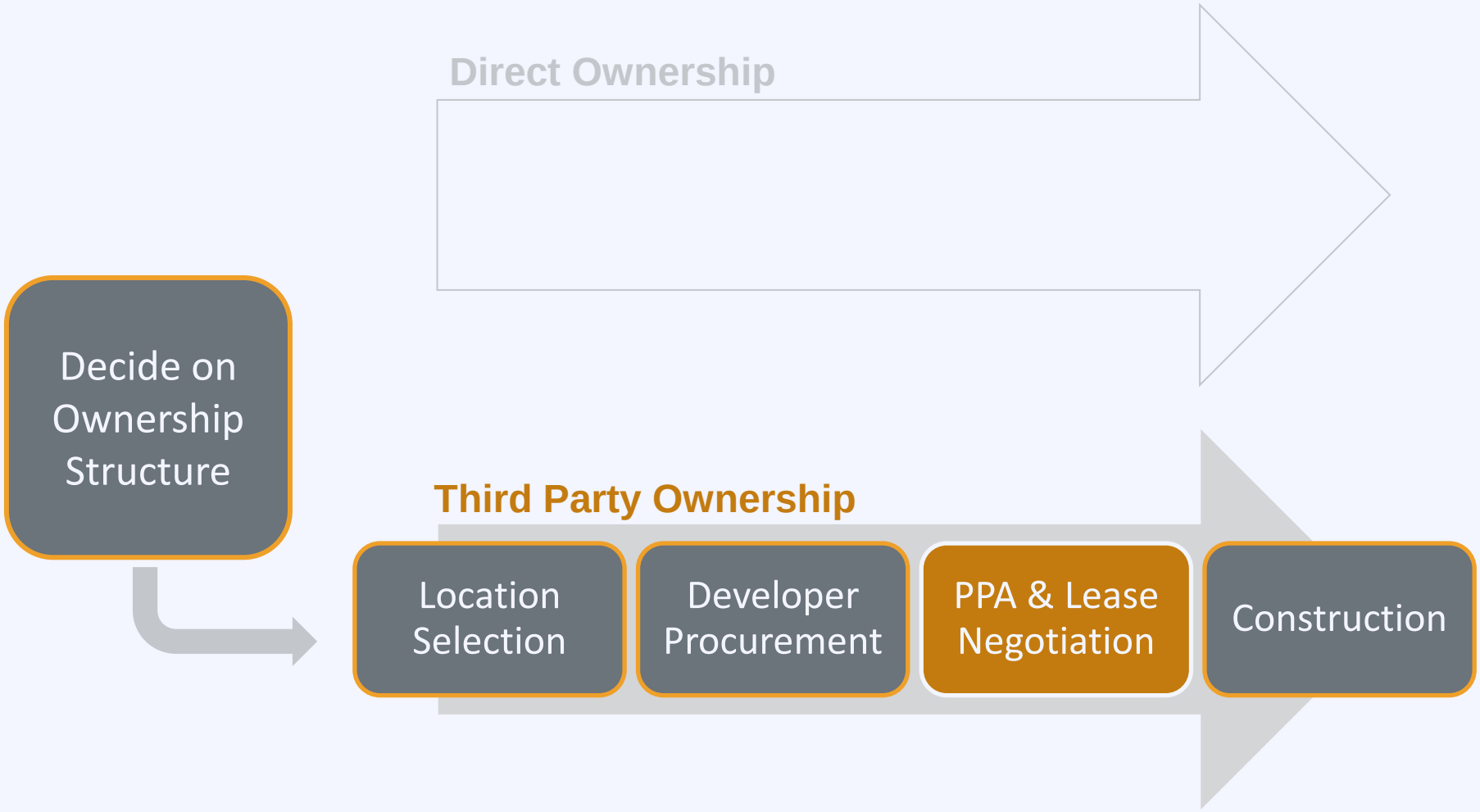
U.S. Department of Energy

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

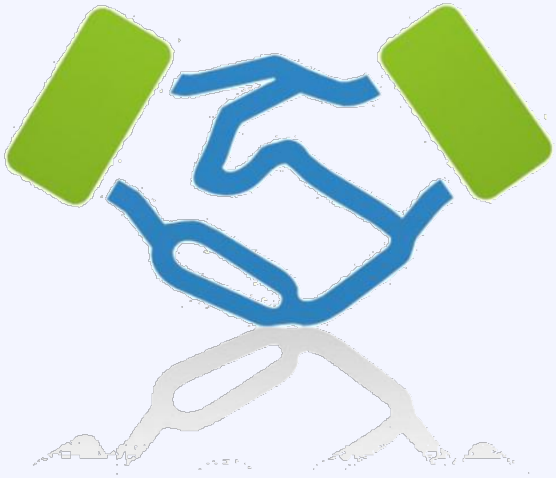
Process


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

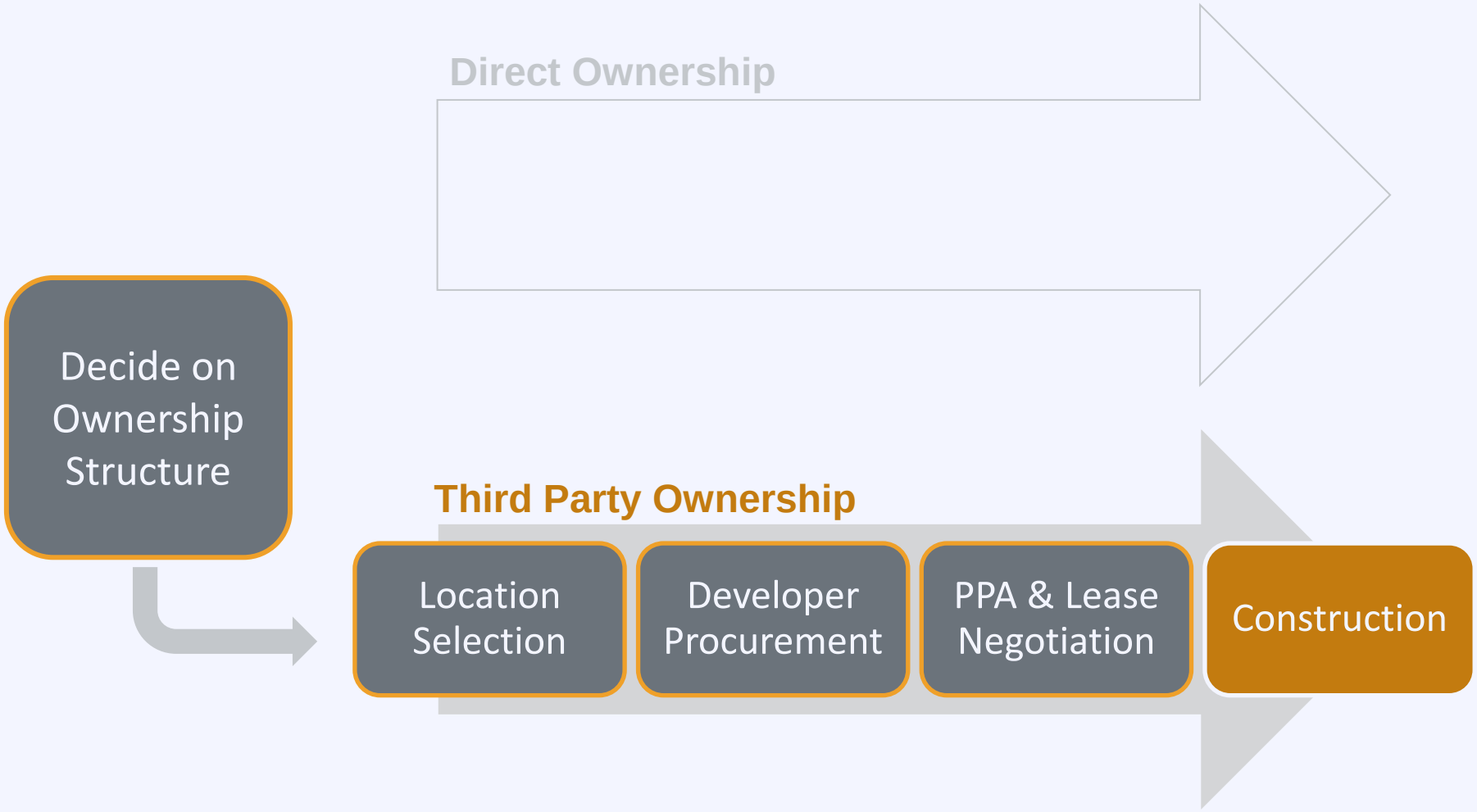
Step 3: Contract Negotiation

Negotiation points:

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



Process


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

Third Party Ownership

Pros

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

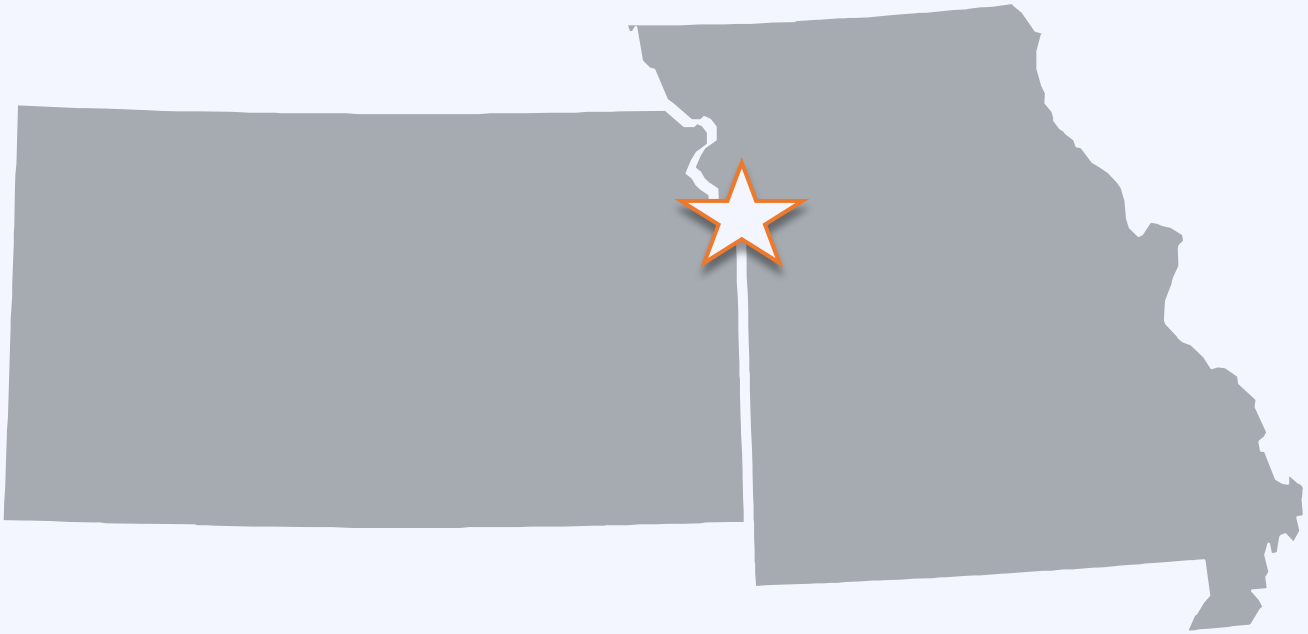
Cons

- 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

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U.S. Department of Energy

Source: Solar Ready KC

Case Study: Kansas City