Solar Powering Your Community

Driving the Adoption of Solar

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U.S. Department of Energy

About the SunShot Solar Outreach Partnership

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

About the SunShot Solar Outreach Partnership

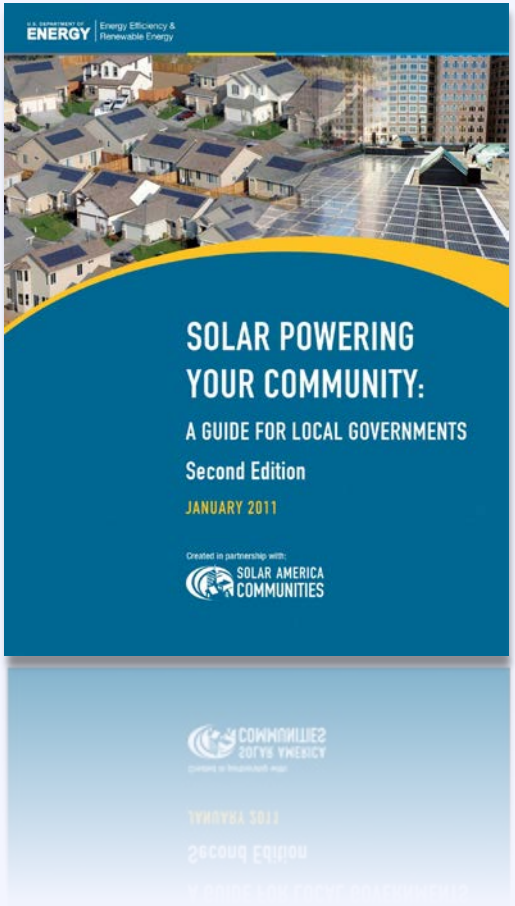
- Increase installed capacity of solar electricity in U.S. communities
- Streamline and standardize permitting and interconnection processes
- Improve planning and zoning codes/regulations for solar electric technologies
- Increase access to solar financing options

About the SunShot Solar Outreach Partnership

Resource **Solar Powering Your Community Guide**

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

www.energy.gov



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About the SunShot Solar Outreach Partnership

Resource Sunshot Resource Center

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

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

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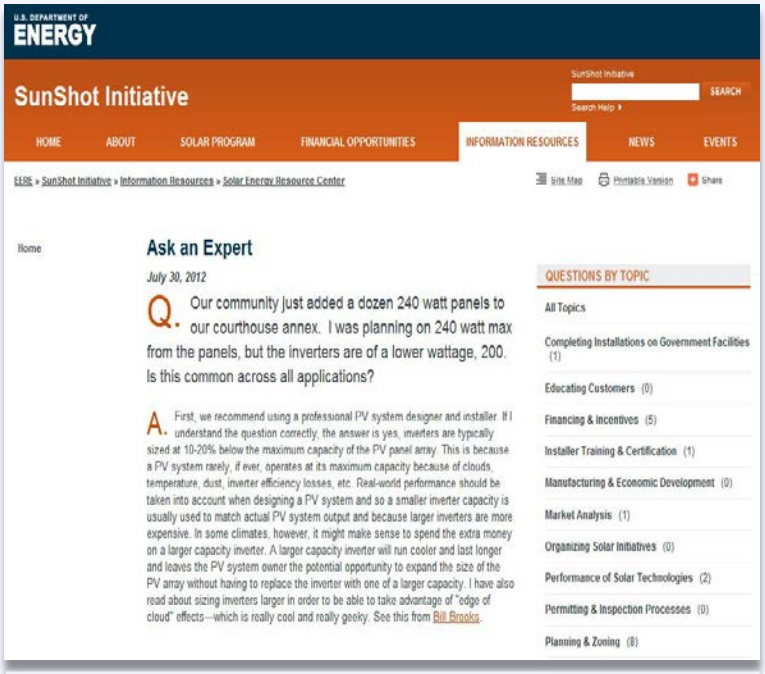
About the SunShot Solar Outreach Partnership

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 Goals

You should leave today's workshop with:

1. An understanding of what barriers impact solar markets
2. Strategies on how to drive growth in your local solar market
3. An understanding of how to structure municipal solar projects

Agenda

08:40 – 09:00	Introduction to the US Solar Market
09:00 – 09:40	Reducing Solar Soft Costs
09:40 – 09:50	*Break*
09:50 – 10:30	Understanding Solar Incentives
10:30 – 11:00	Introduction to Solar Project Finance
11:00 – 11:10	*Break*
11:10 – 11:40	Financing Municipal Solar Projects
11:40 – 12:00	Dimitrious Laloudakis, City of Phoenix
12:00 – 12:10	Next Steps for Solar in Region

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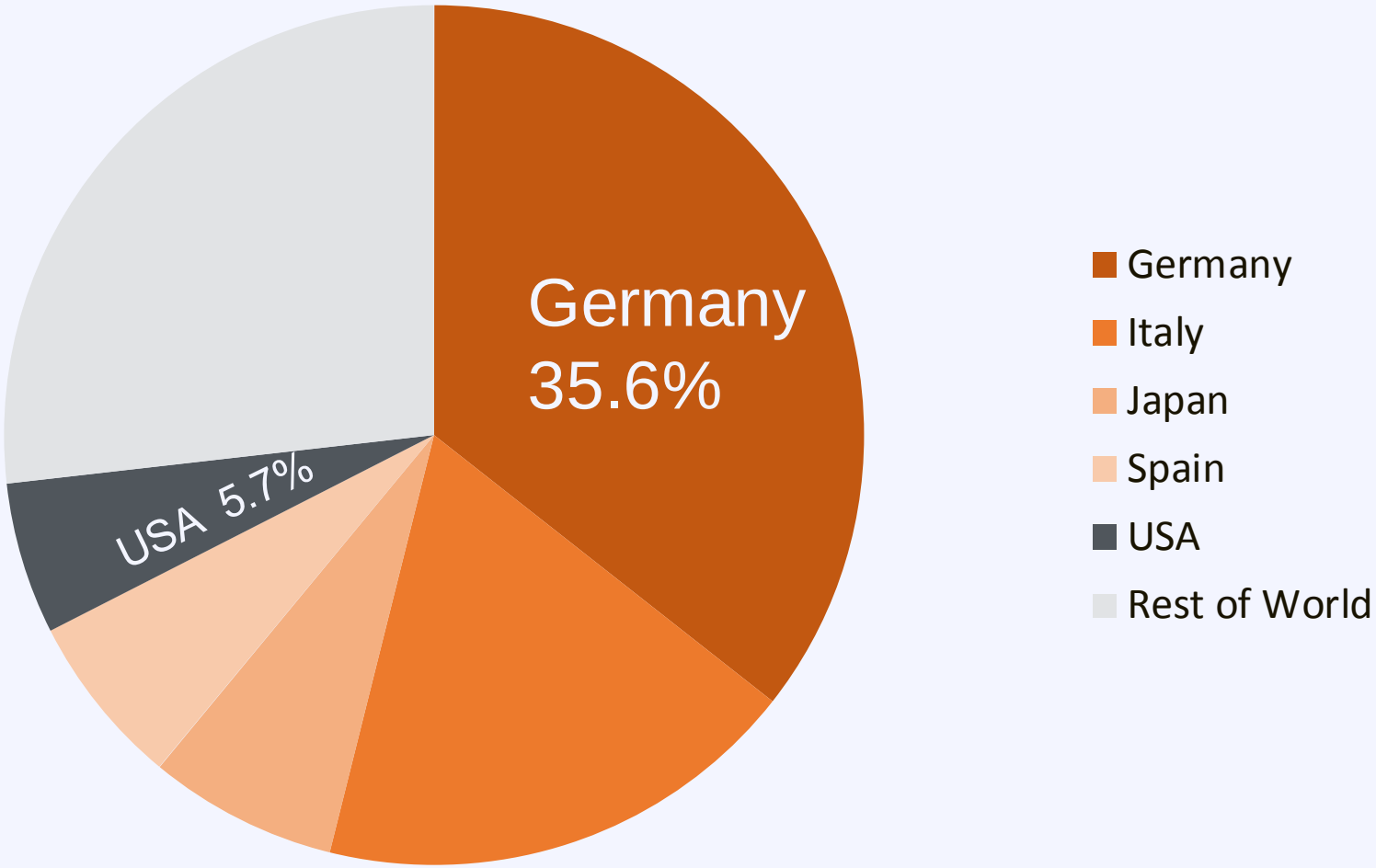
The US Solar Market

Top 5 Countries Solar Operating Capacity



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

The US Solar Market

Total installed solar capacity in the US

4 GW

Capacity installed in Germany in Dec 2011

4 GW

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

The Solar Equation

The Solar Equation

Cost

+ Installed Cost

+ Maintenance

- Direct Incentive

Benefit

+ Avoided Energy Cost

+ Excess Generation

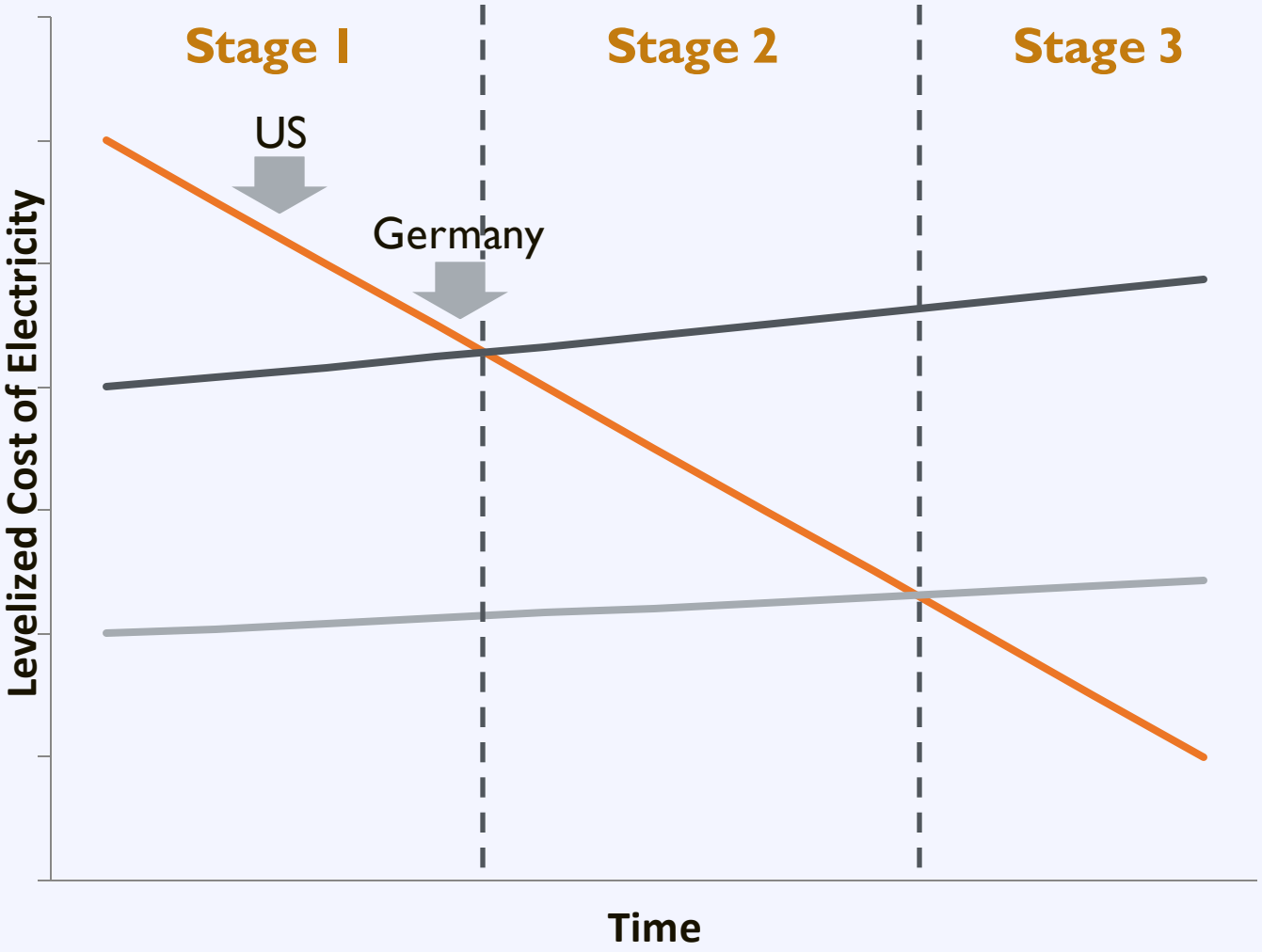
+ Performance Incentive

Levelized Cost of Energy

Levelized Cost of Energy

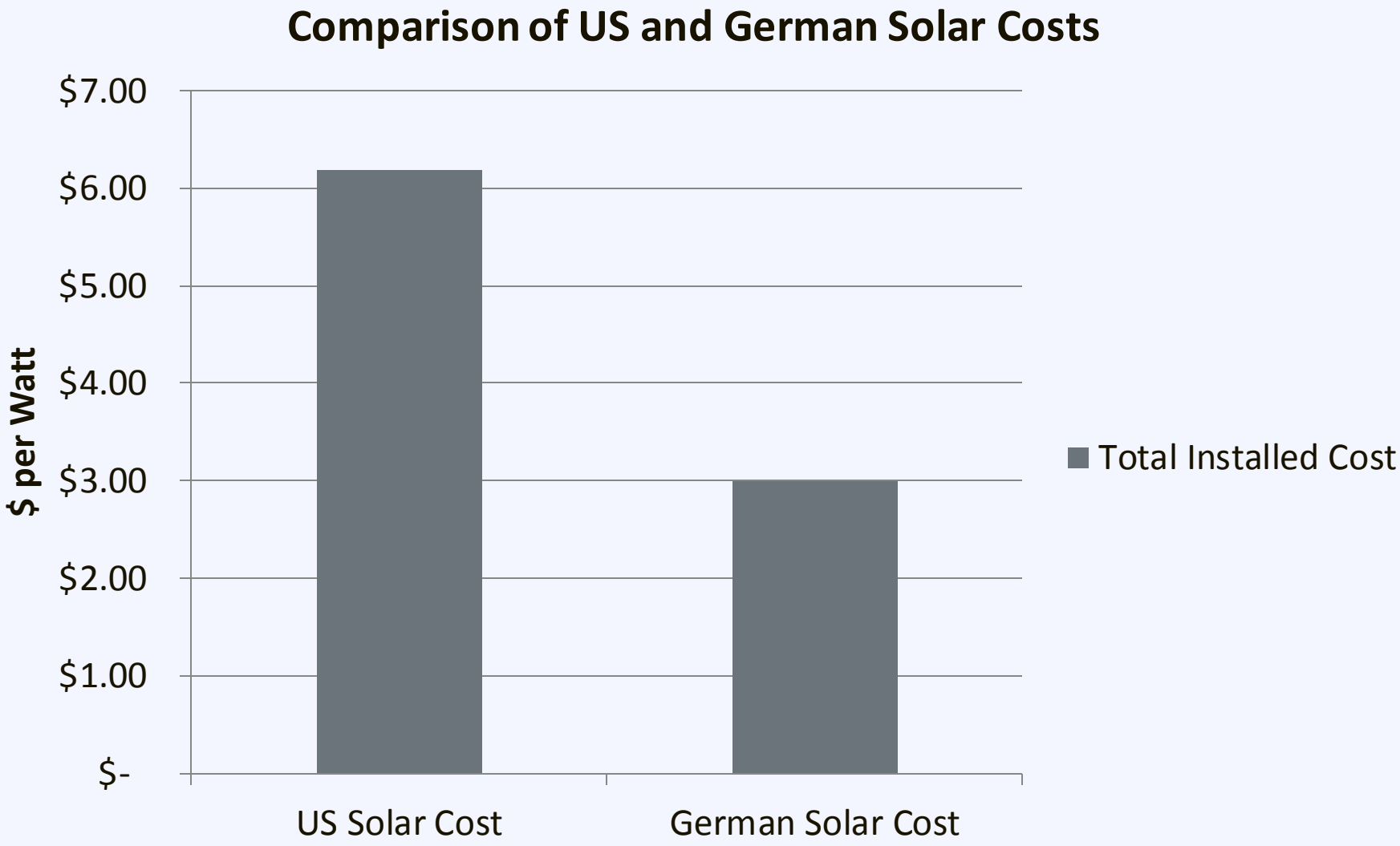
What is the value of each unit of electricity produced over the life of the solar project?

Solar Market Stages



Source: Solar Electric Power Association

The Cost of Solar in the US



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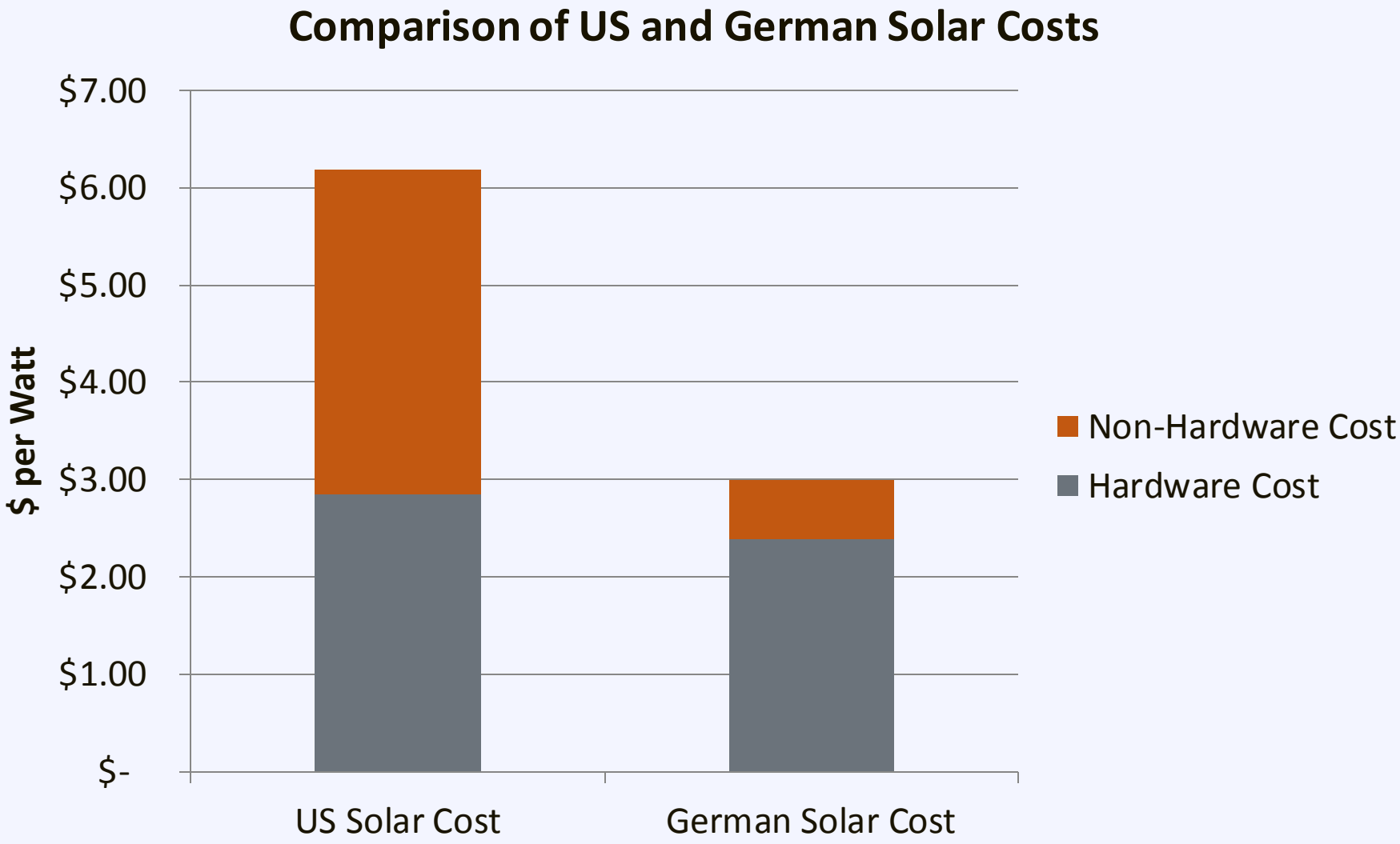
Source: NREL (http://ases.conference-services.net/resources/252/2859/pdf/SOLAR2012_0599_full%20paper.pdf) (http://www.nrel.gov/docs/fy12osti/53347.pdf) (http://www.nrel.gov/docs/fy12osti/54689.pdf)

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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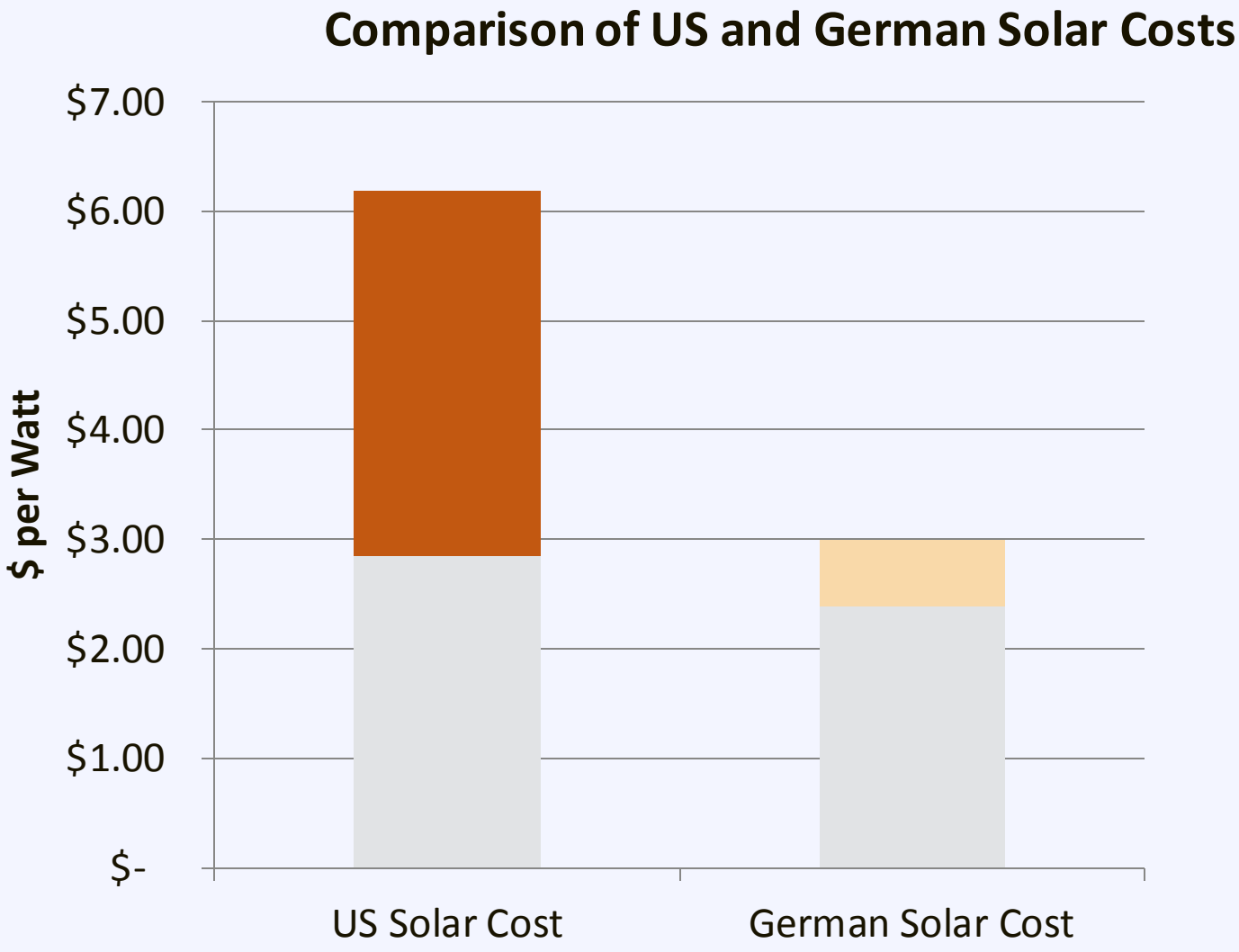

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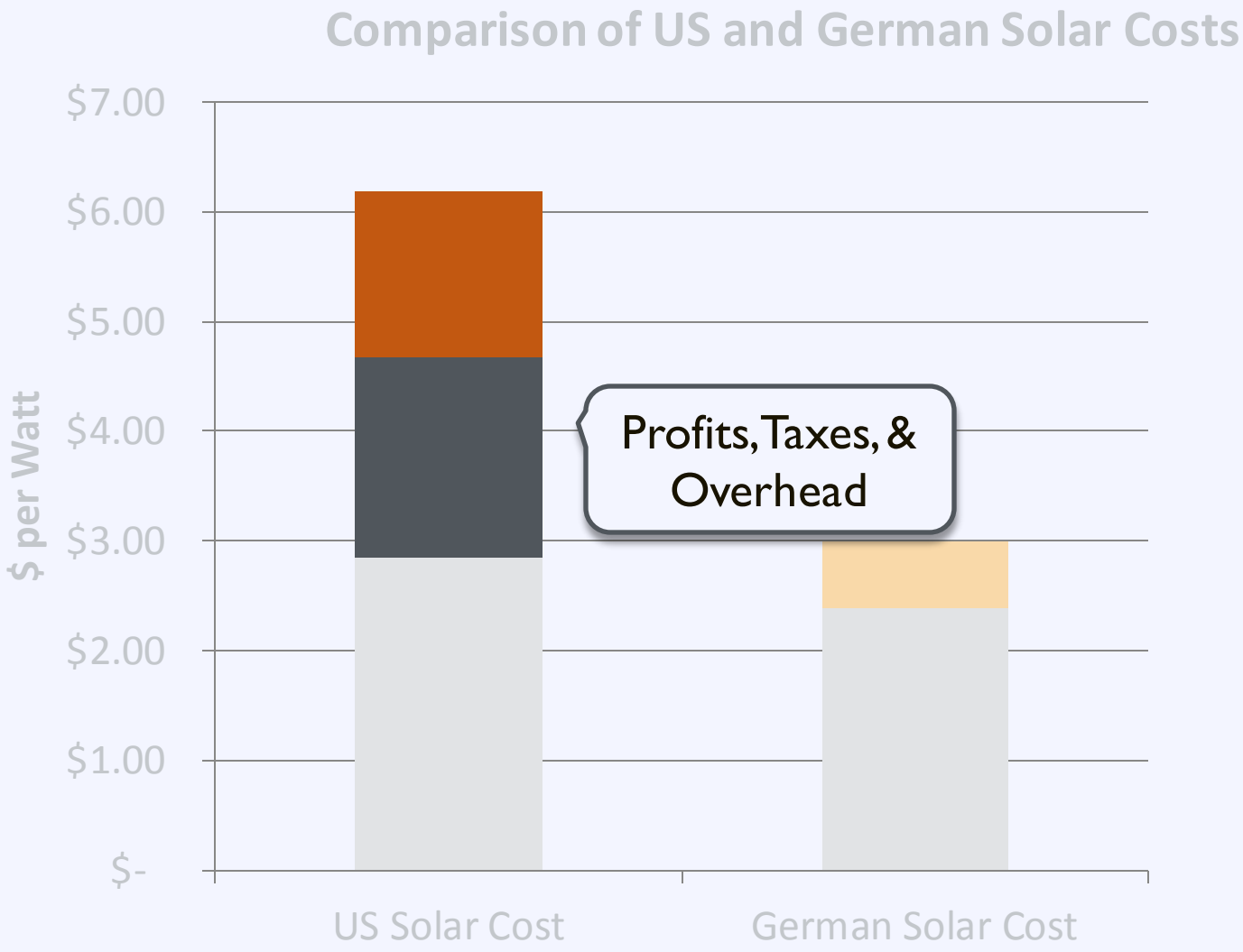

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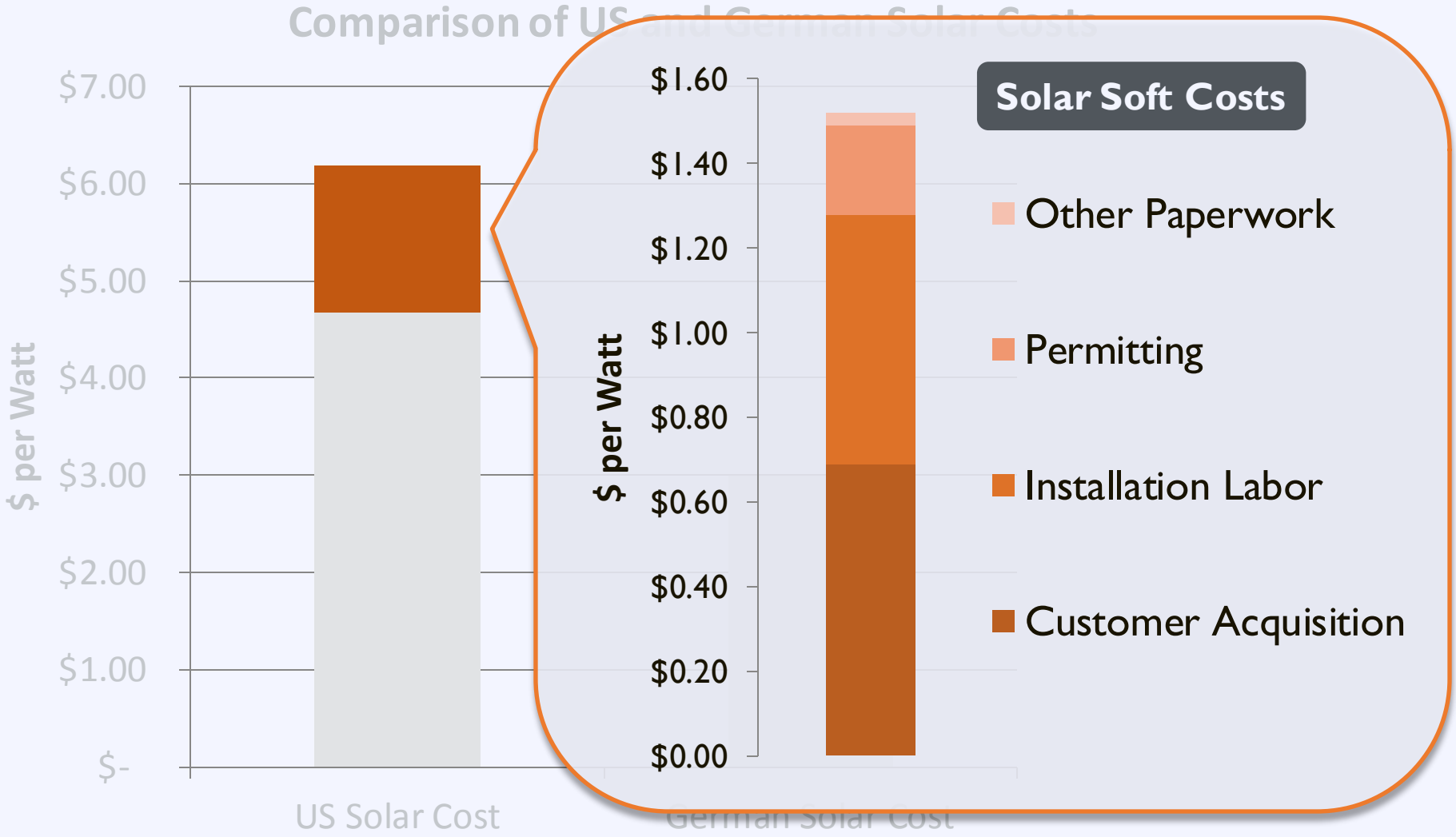

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The Permitting Process: Challenges

18,000+ local jurisdictions

with unique permitting requirements

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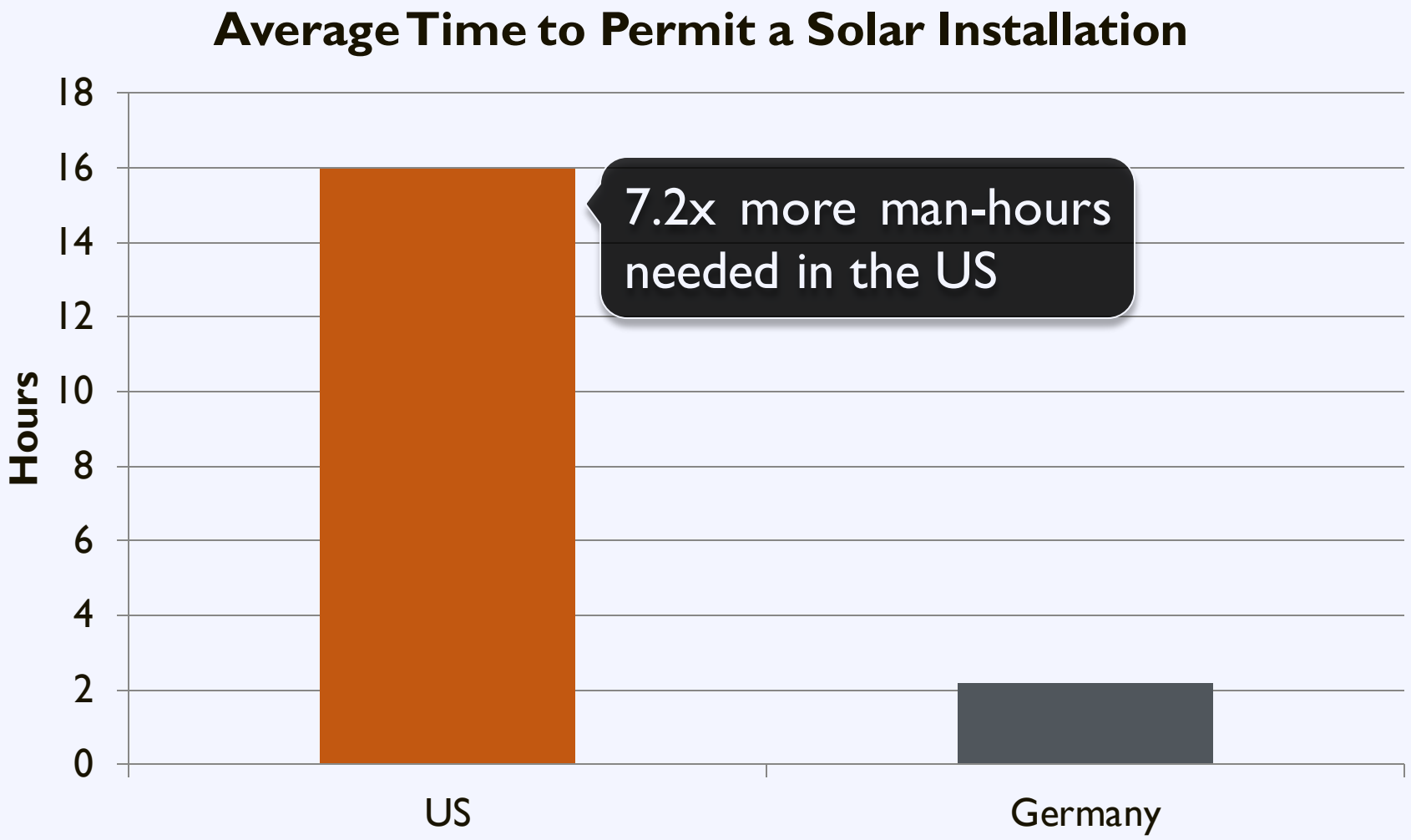
Source: http://www.nrel.gov/docs/fy12osti/54689.pdf

Time to Installation



Time to Installation

New York City's Goal

100 days

from inception to completion

Germany Today

8 days

from inception to completion

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Photon Magazine

Germany's Success

Consistency and Transparency

through

Standardized Processes

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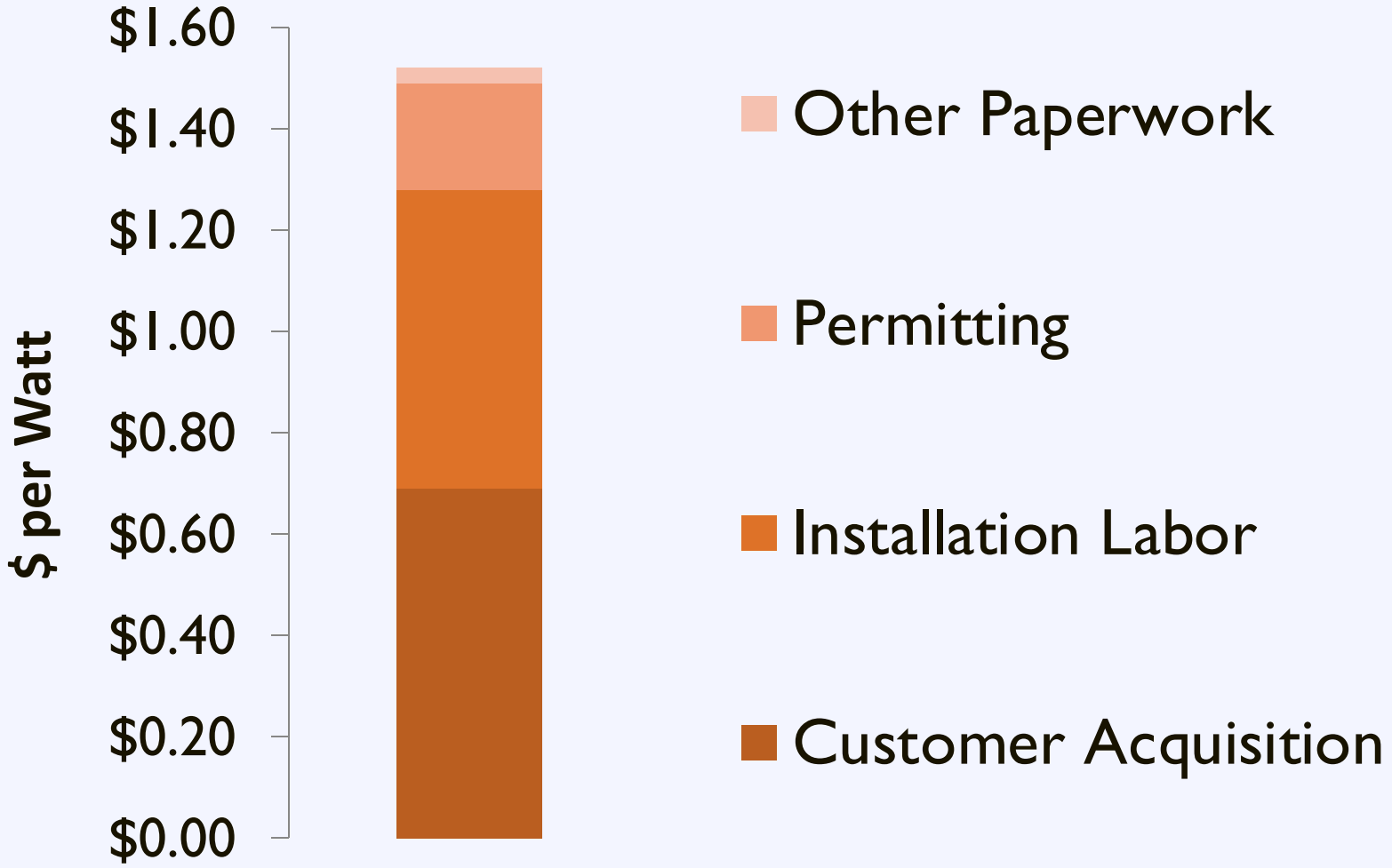
Mitigate Soft Costs



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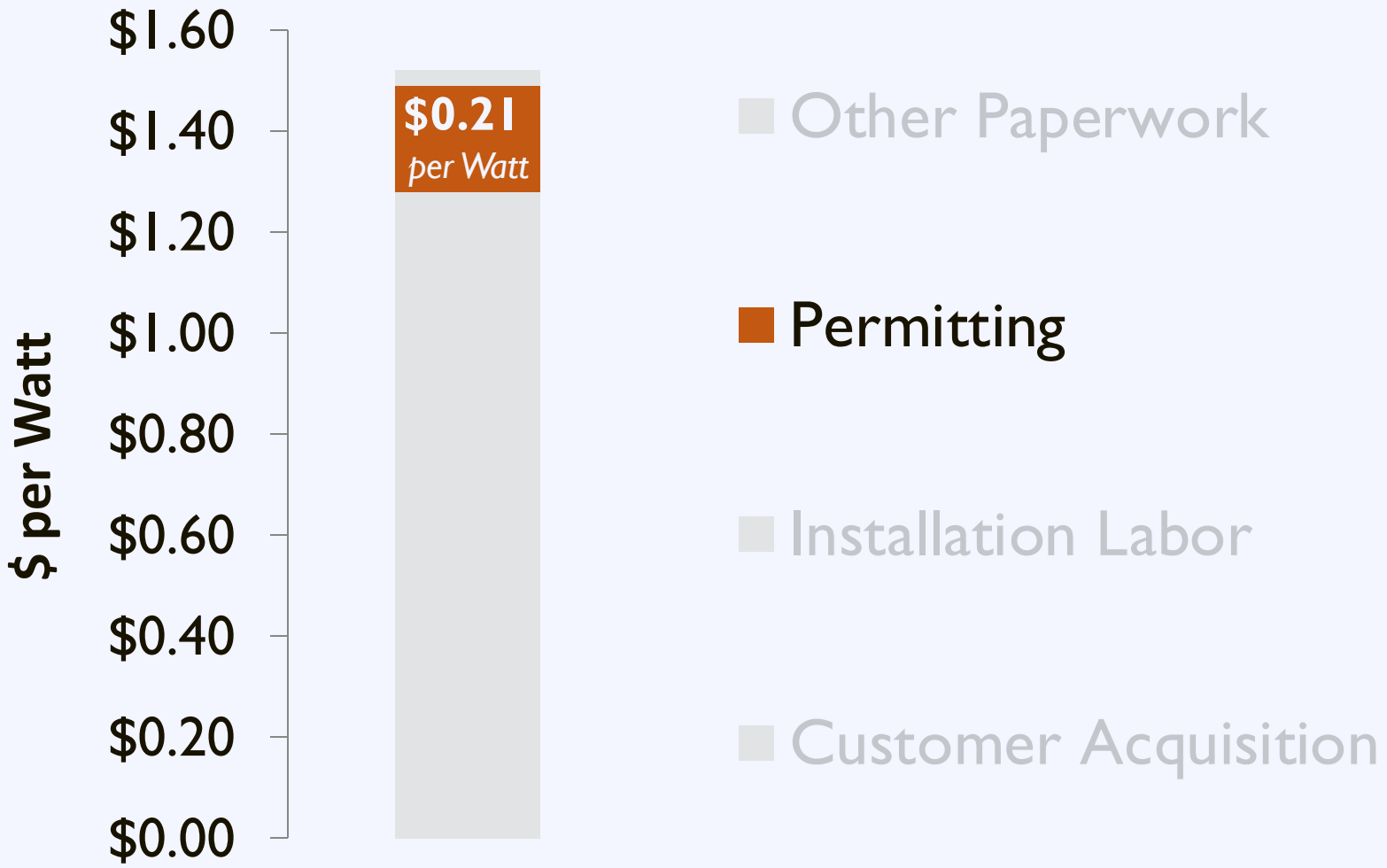
Mitigate Soft Costs



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

Permitting

Remove barriers by:

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

Zoning Codes: Small Scale Solar

Typical Requirements:

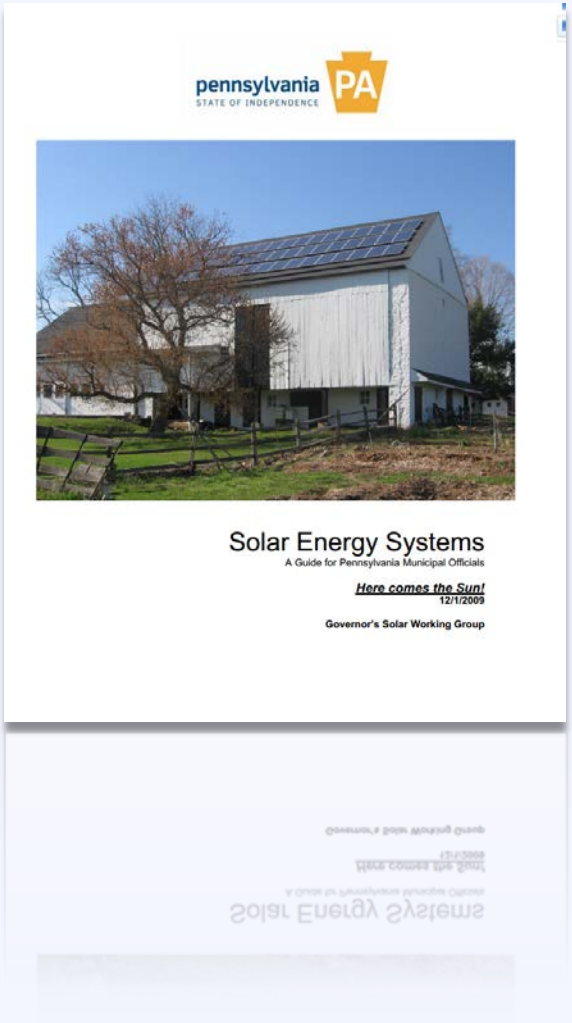
- Permitted as accessory use
- Minimize visibility if possible
- Requirements:
  - District height
  - Lot coverage
  - Setback

Zoning Code: Small Scale Solar

Resource **Pennsylvania Model Ordinance**

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

state.pa.us



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Zoning Codes: Large Scale Solar

Typical Requirements:

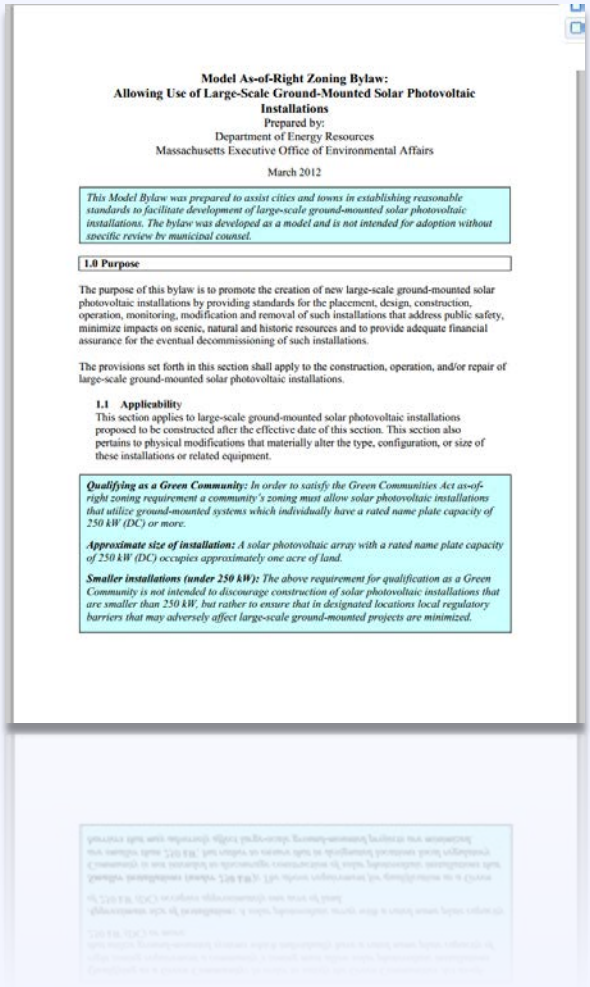
- Allowed for primary use in limited locations
- Requirements:
  - Height limits
  - Lot coverage
  - Setback
  - Fencing and Enclosure

Zoning Code: Large Scale Solar

Resource **Massachusetts Model Ordinance**

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

www.mass.gov



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

March 2012

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

1.0 Purpose

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

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

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

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

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

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

Solar Access

Solar Access Laws:

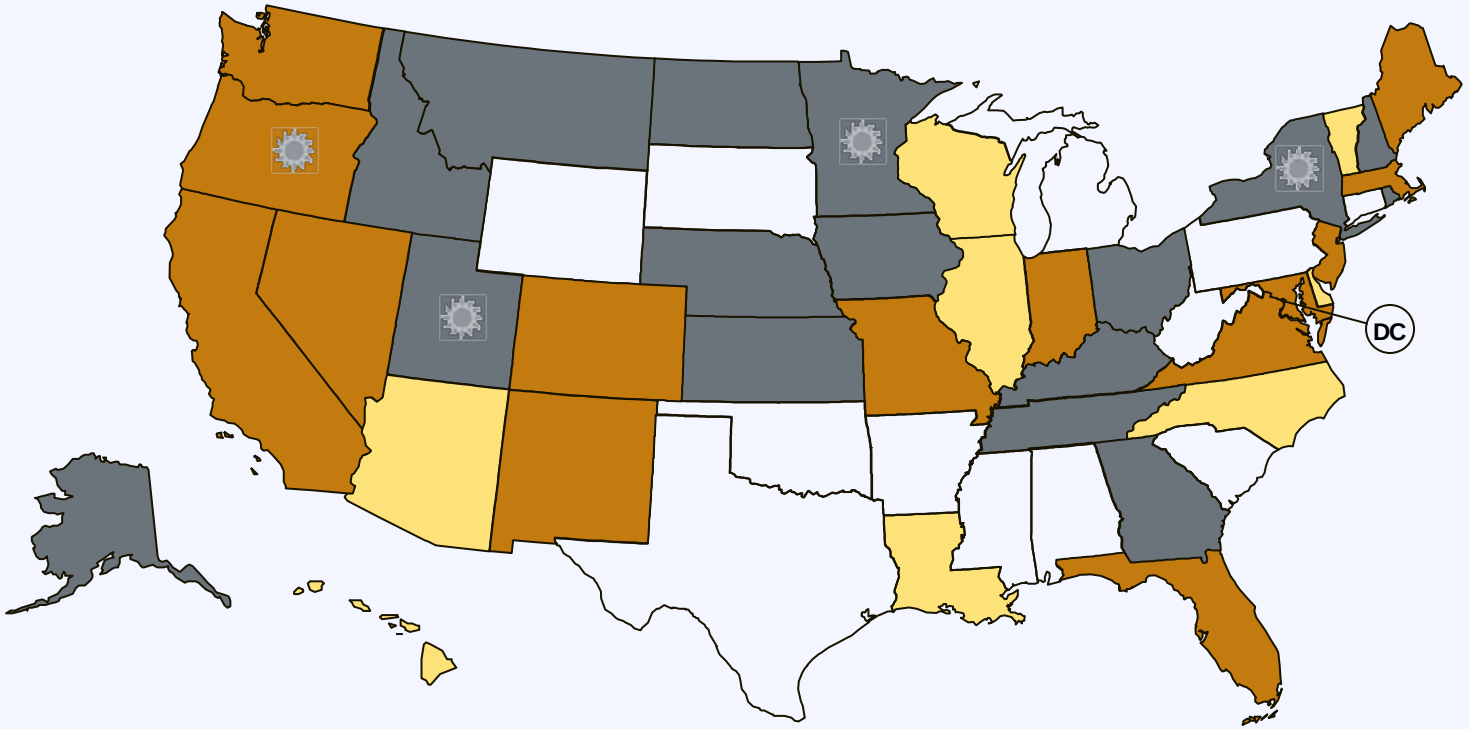
1. Increase the likelihood that properties will receive sunlight
2. Protect the rights of property owners to install solar
3. Reduce the risk that systems will be shaded after installation

Fontainebleau V. Eden Roc (1959)

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

Source: Solar ABCs (Image: Google Earth)

Solar Access



Solar Easements Provision

Solar Rights Provision

Solar Easements and Solar Rights Provisions

U.S. Virgin Islands

Local option to create solar rights provision

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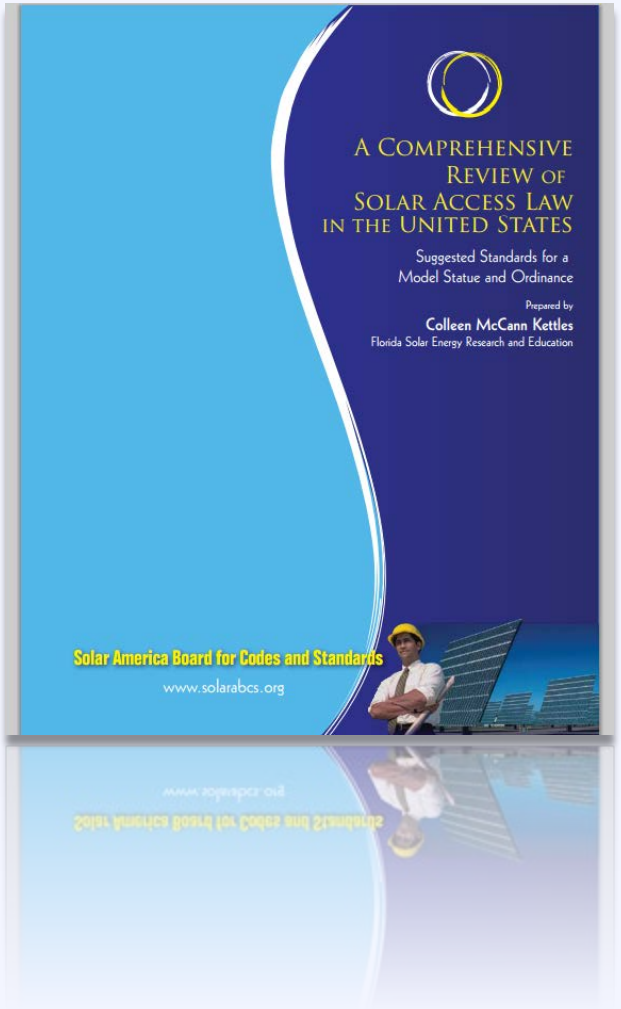
Source: DSIRE

Solar 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

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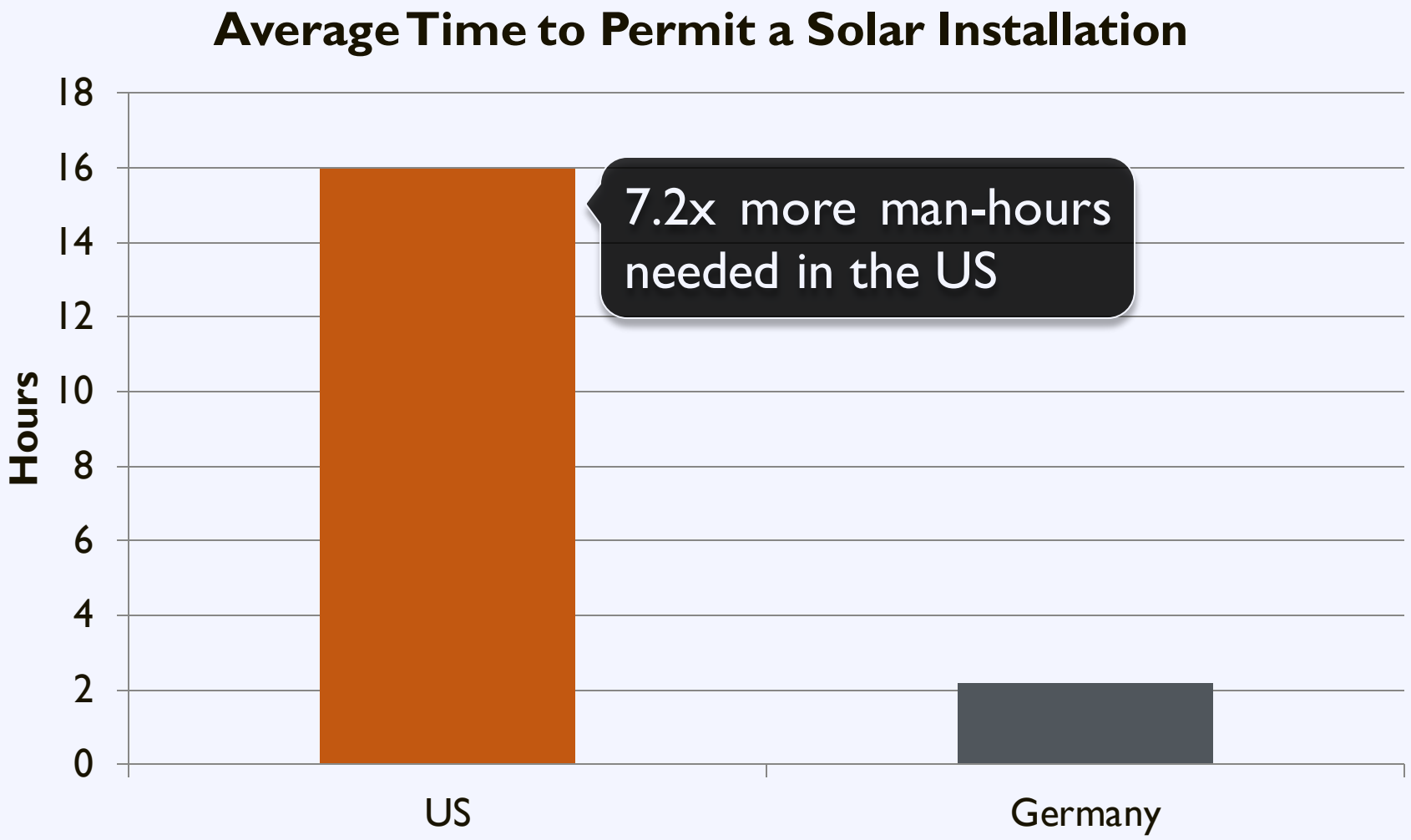
Source: http://www.nrel.gov/docs/fy12osti/54689.pdf

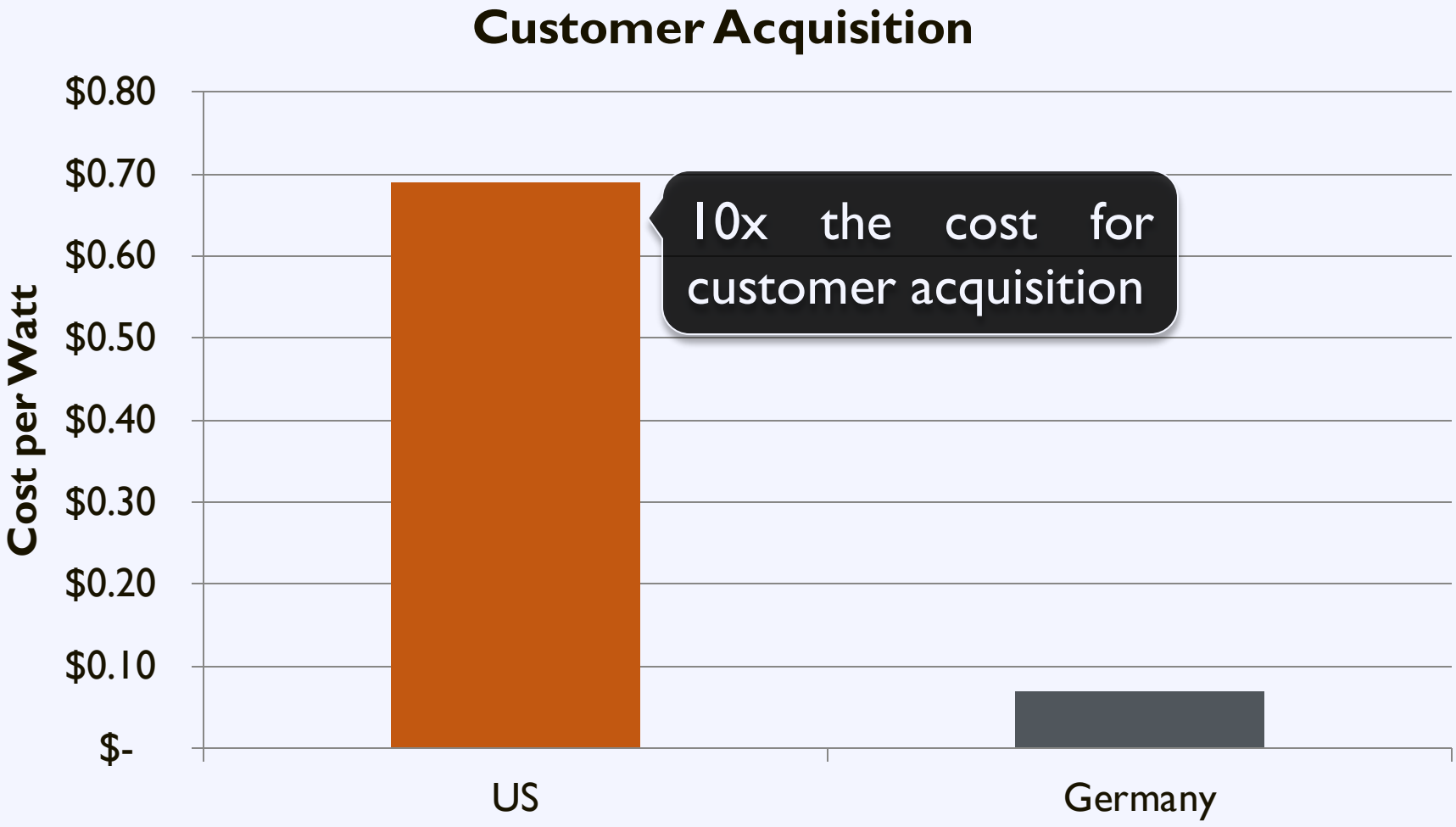
Time to Installation



The Permitting Process: Challenges

Source: Forbes

Customer Acquisition



Source: NREL, LBNL

Expedited Permitting

Solar Permitting Best Practices:

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

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U.S. Department of Energy

Source: Vote Solar

Expedited Permitting

Solar Permitting Best Practices:

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

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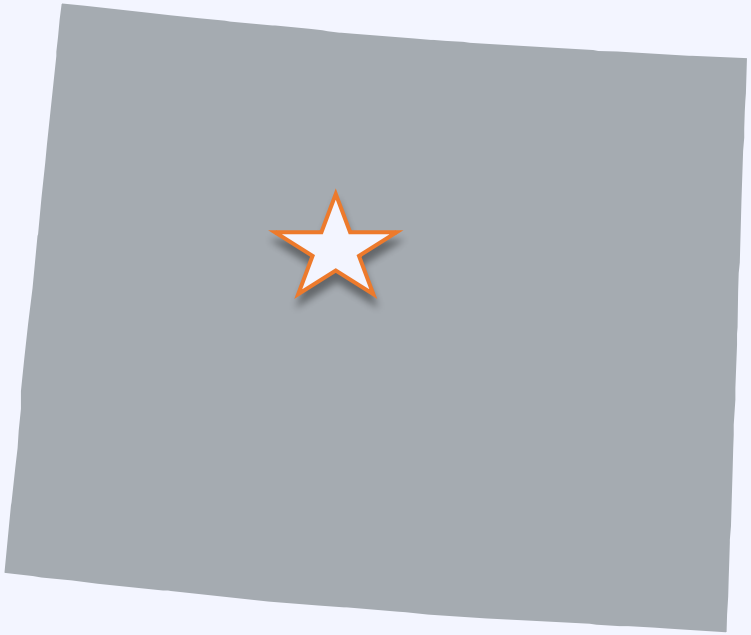
U.S. Department of Energy

Source: Vote Solar

Expedited Permitting: Case Study



Breckenridge, Colorado

Population: 4,540

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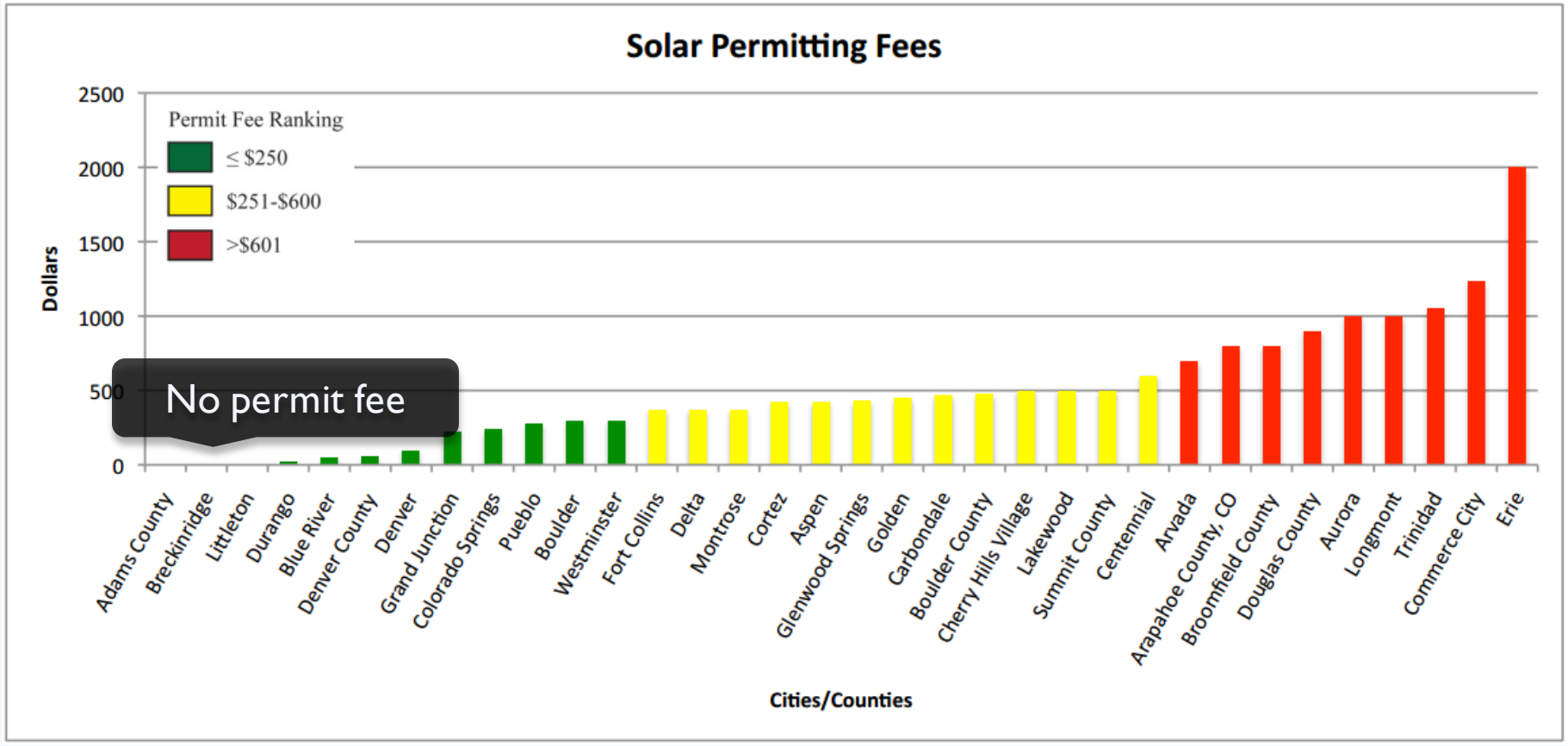
Source: Wikipedia

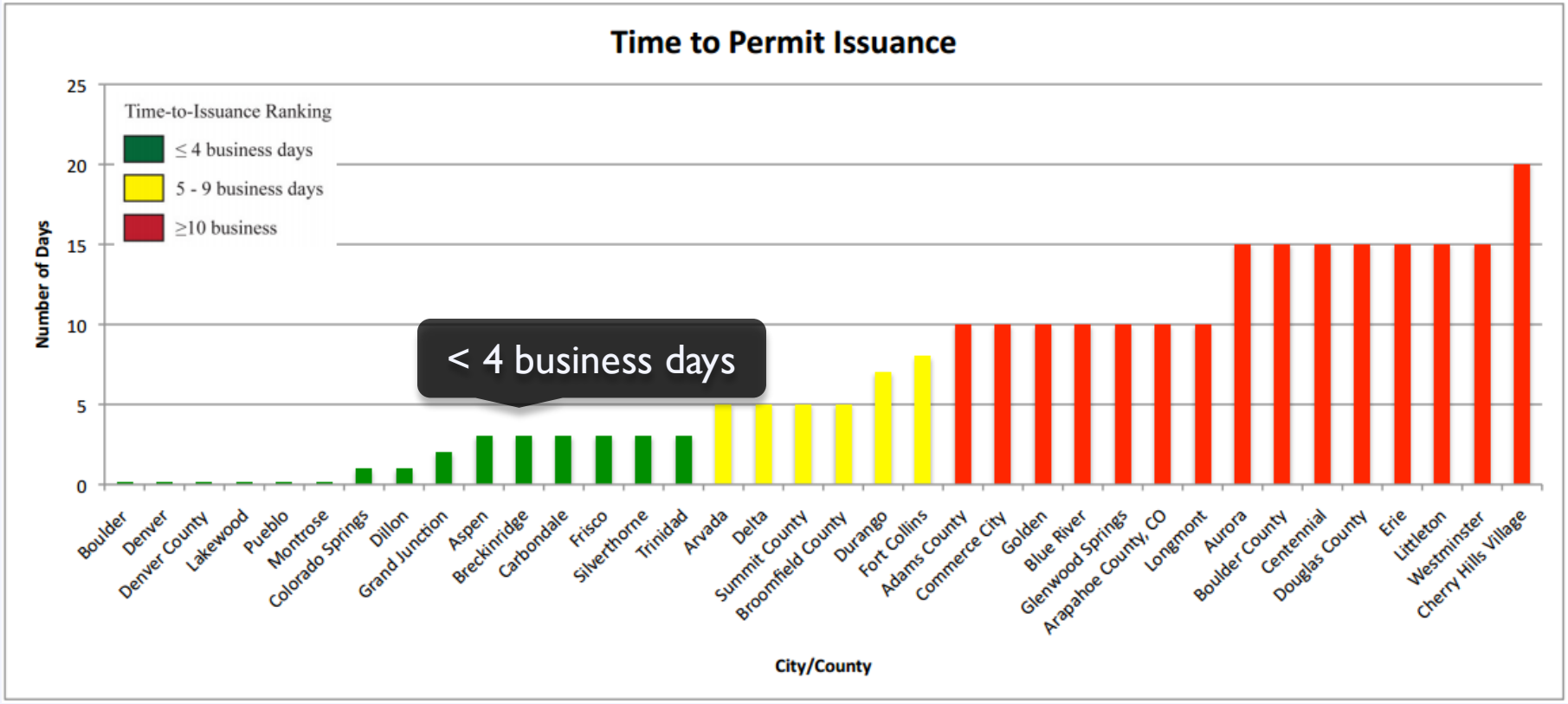
Expedited Permitting: Case Study

Breckenridge charges no fees to file for a solar permit



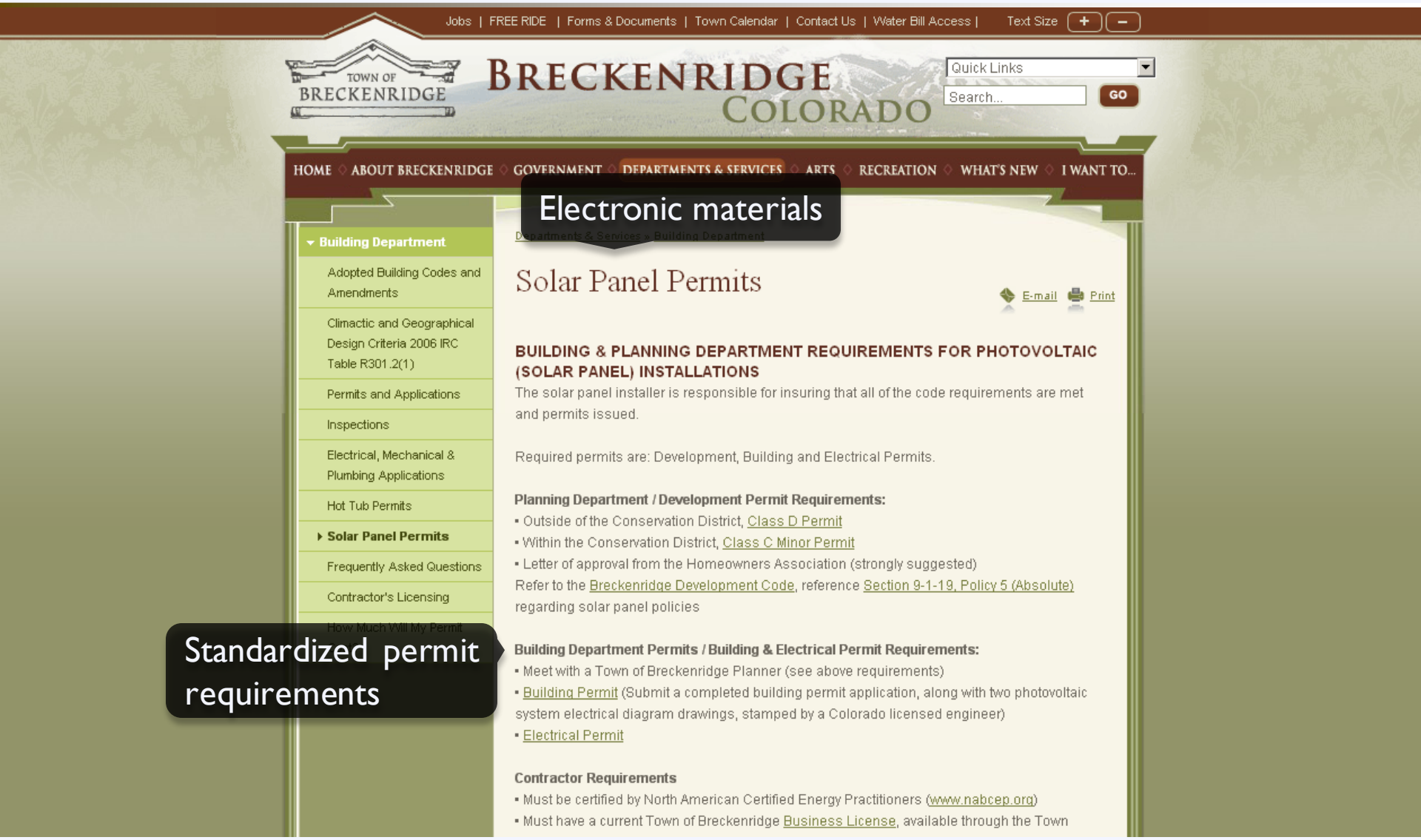
Expedited Permitting: Case Study

Breckenridge offers a short turn around time for solar permits



Source: Vote Solar (http://votesolar.org/wp-content/uploads/2011/03/COPermitReport.pdf)

Expedited Permitting: Case Study



Powered by SunShot U.S. Department of Energy

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

Expedited Permitting

Resource **Solar ABCs**

Expedited Permitting:

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

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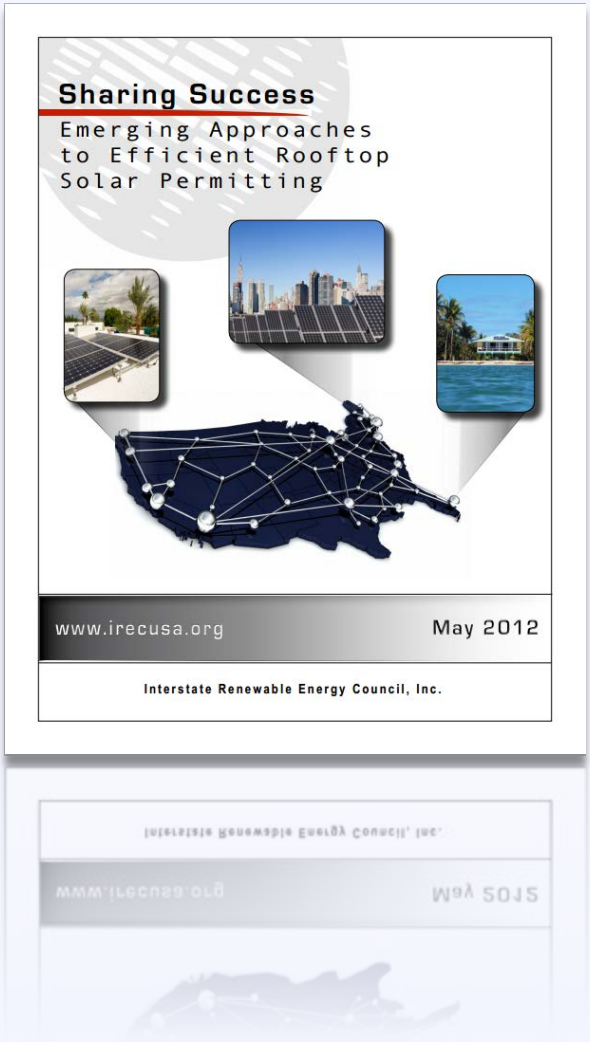
Expedited Permitting

Resource **Interstate Renewable Energy Council**

Outlines emerging approaches to efficient rooftop solar permitting

www.irecusa.org



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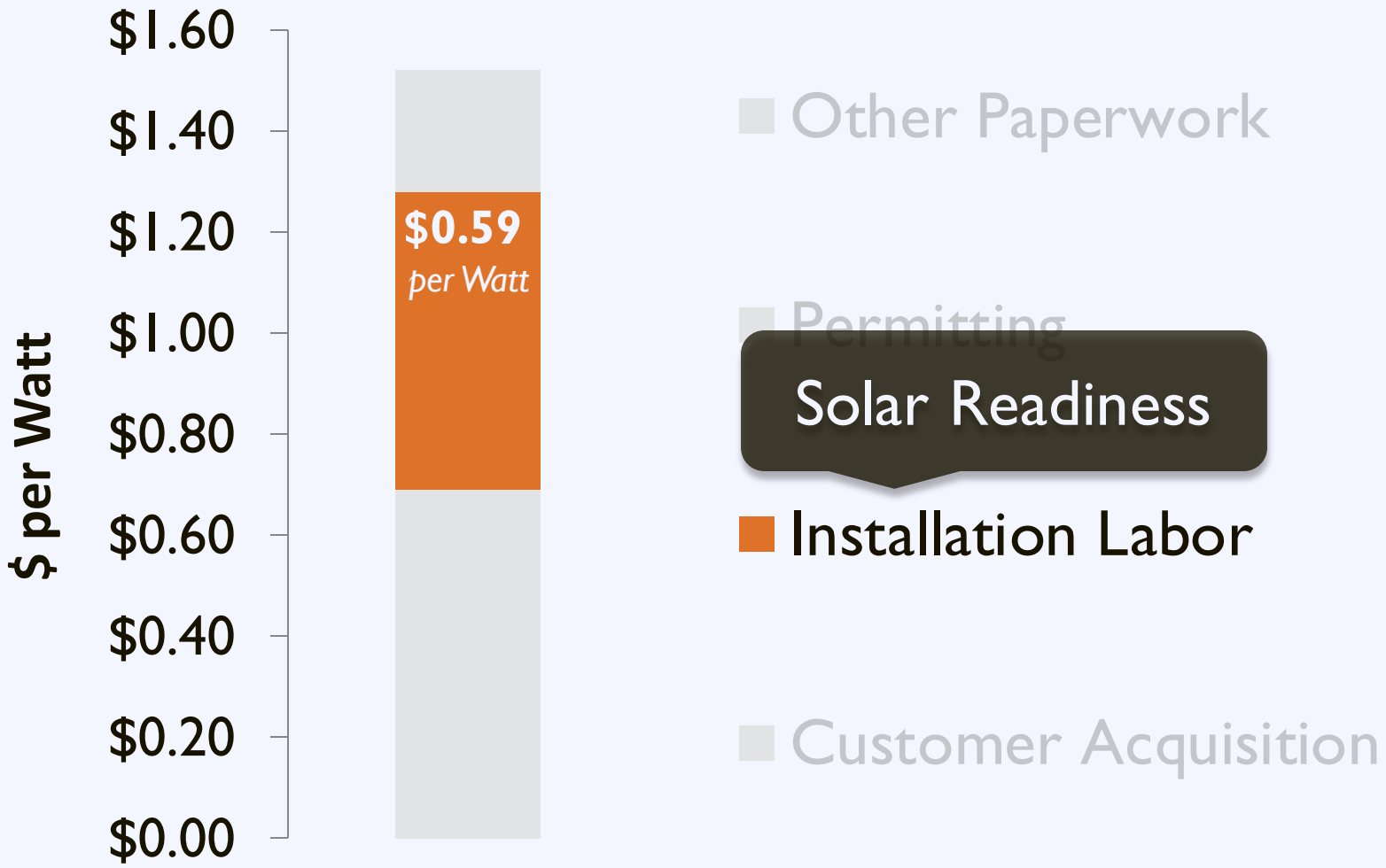
Mitigate Soft Costs



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

Solar Readiness

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

Solar Readiness

Resource NREL

Creating a solar ready guide for buildings:

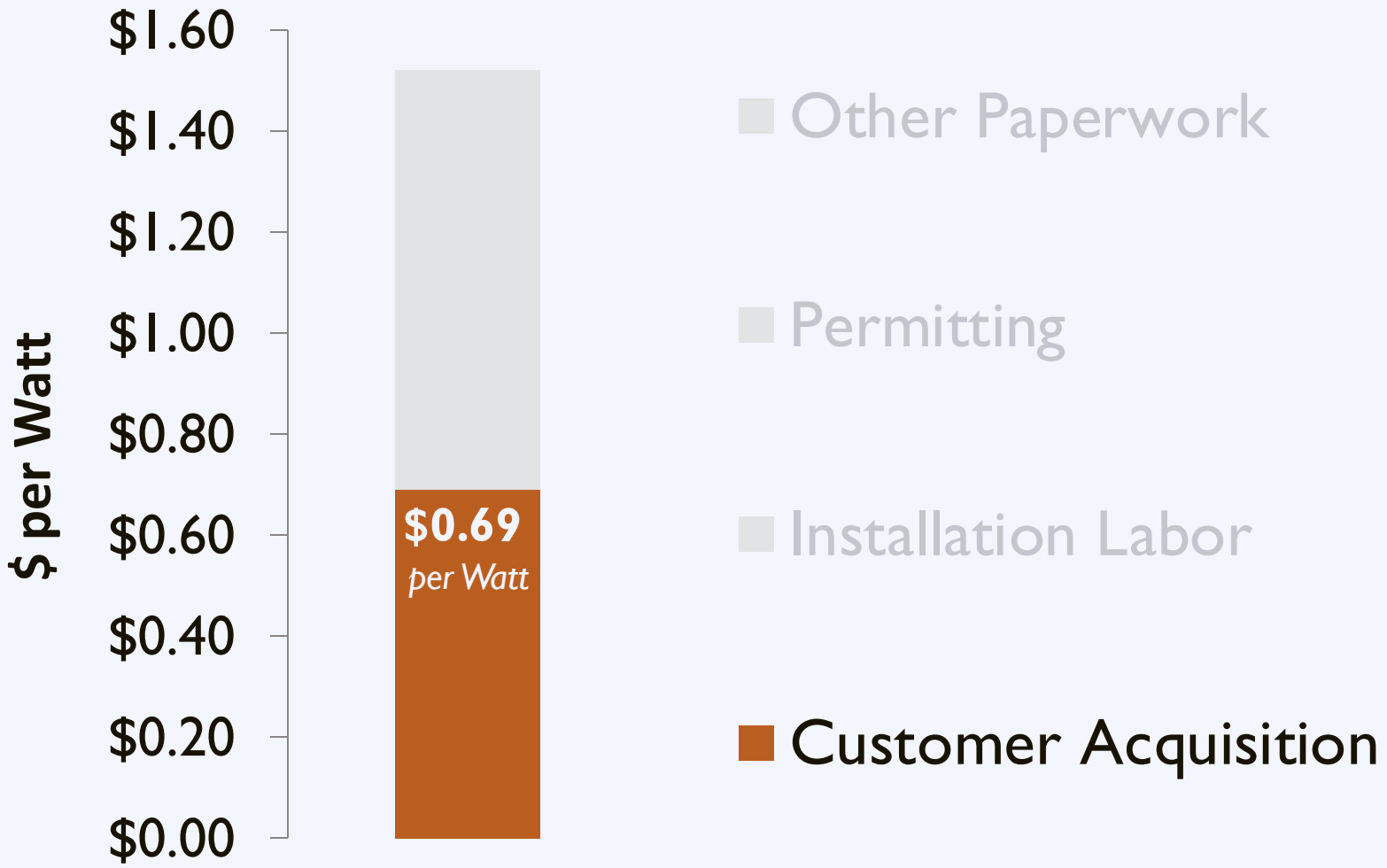
- Legislation
- Certification programs
- Stakeholder Education

www.nrel.gov

Powered by SunShot U.S. Department of Energy

Source: NREL

Mitigate Soft Costs



Powered by SunShot U.S. Department of Energy

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

Customer Acquisition

Solarize

Group Purchasing

Solarize: Advantages

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

Solarize: Advantages

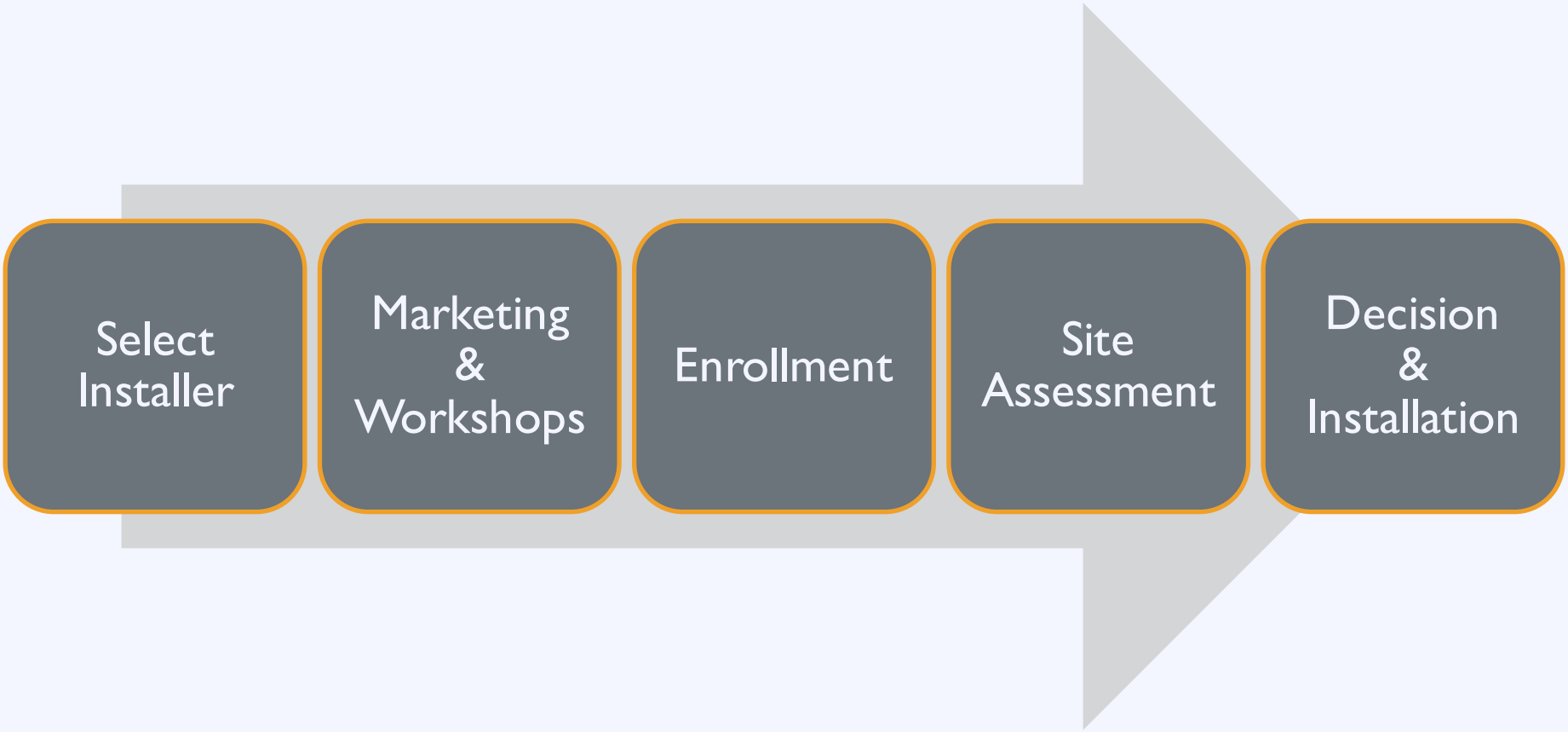
Benefits to Local Government:

Low implementation cost: < $10,000 (+ labor)

Quick turn-around: 9 Months

Long-term impact: Sustainable ecosystem

Solarize: Process



Solarize: Case Study

Harvard, Massachusetts

Population: 6,520

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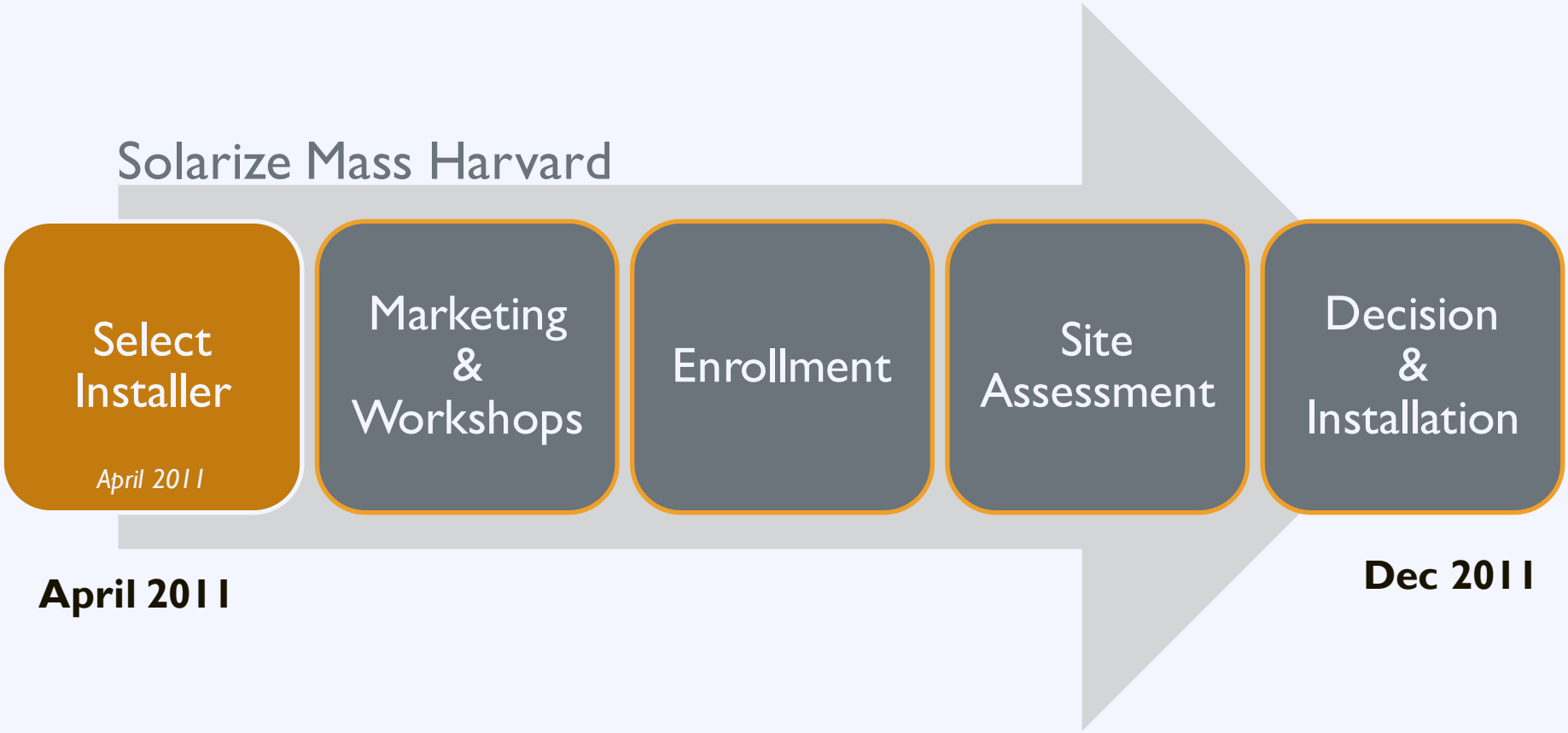
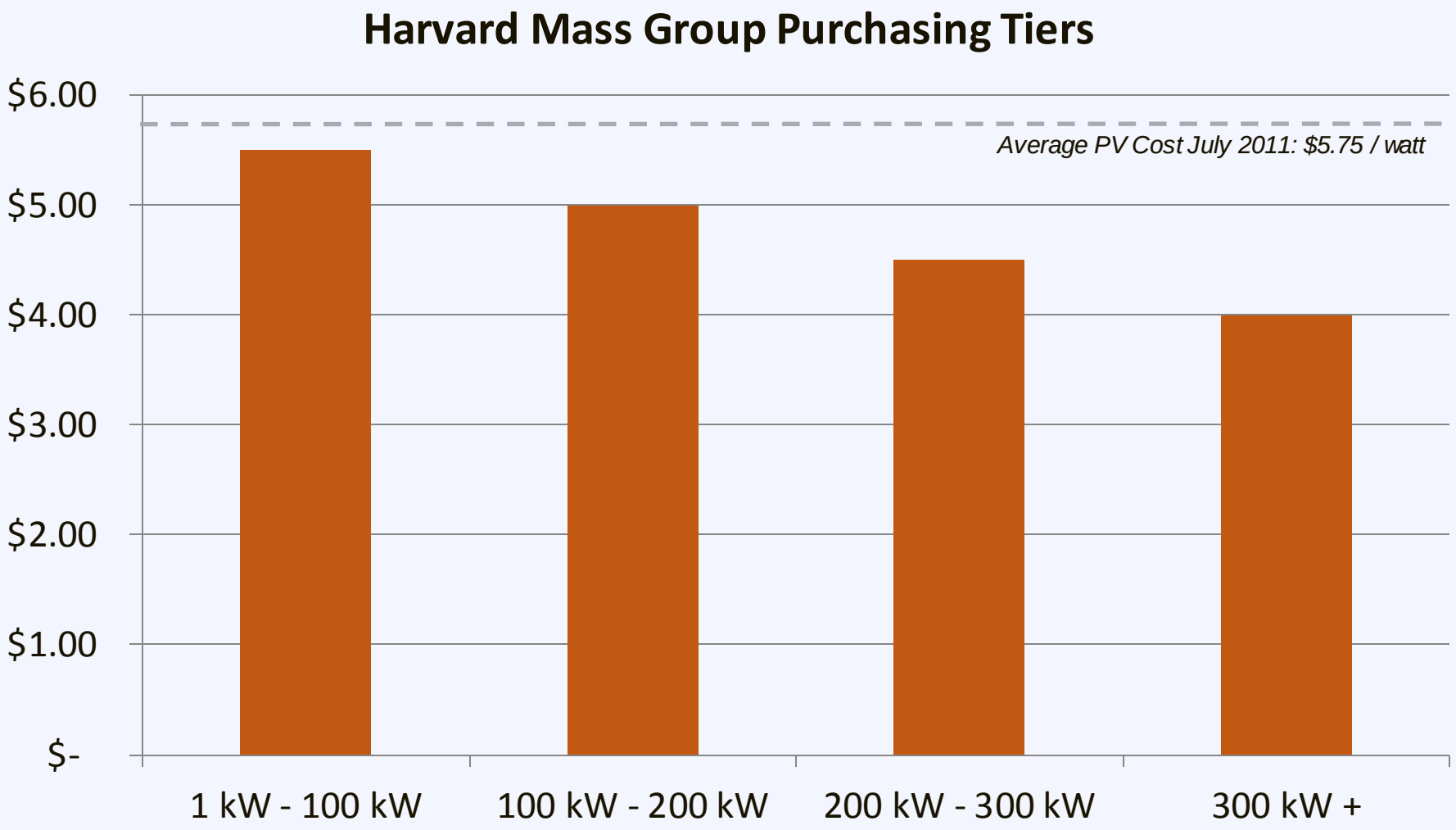
U.S. Department of Energy

Source: Wikipedia

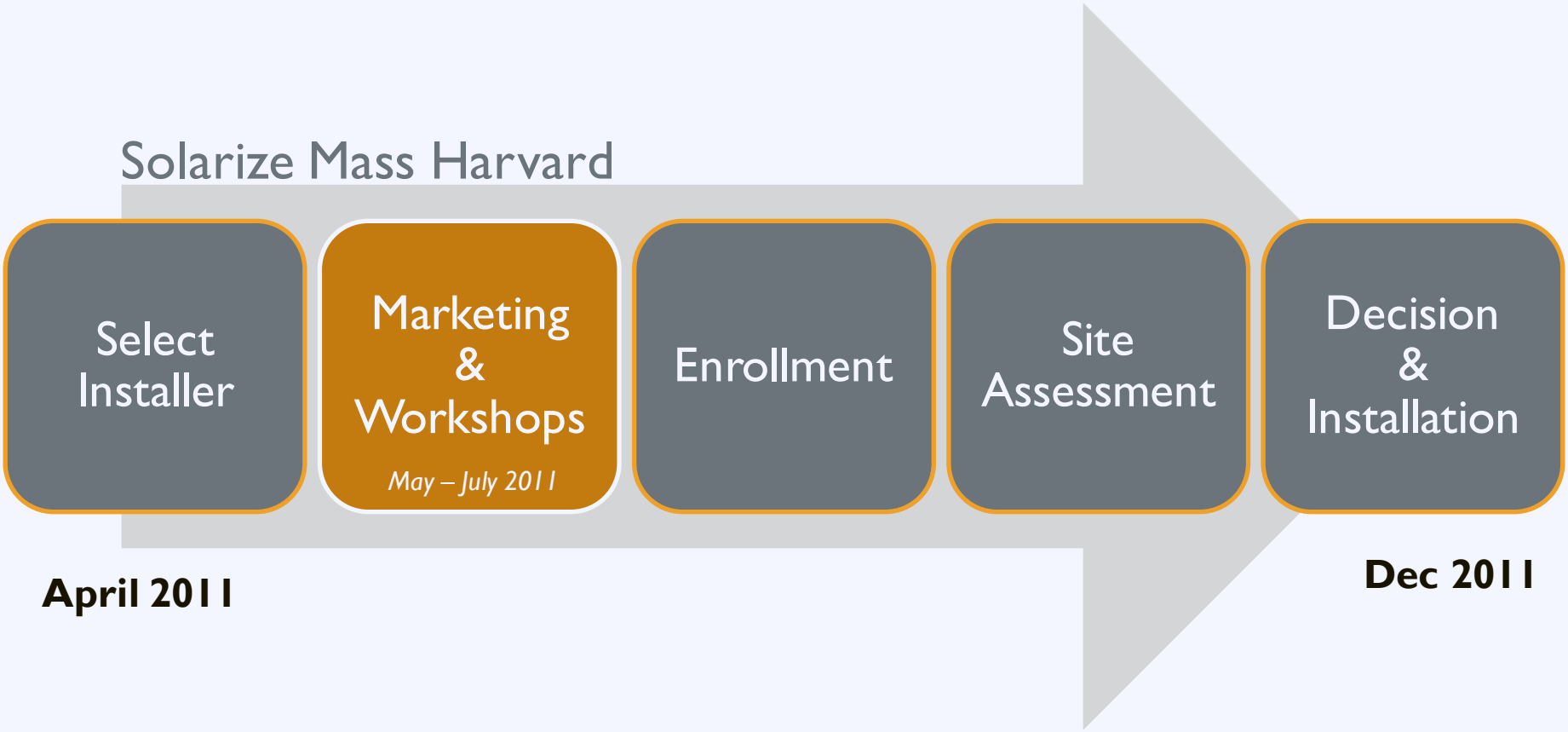
Solarize: Case Study



Group Purchasing



Solarize: Case Study



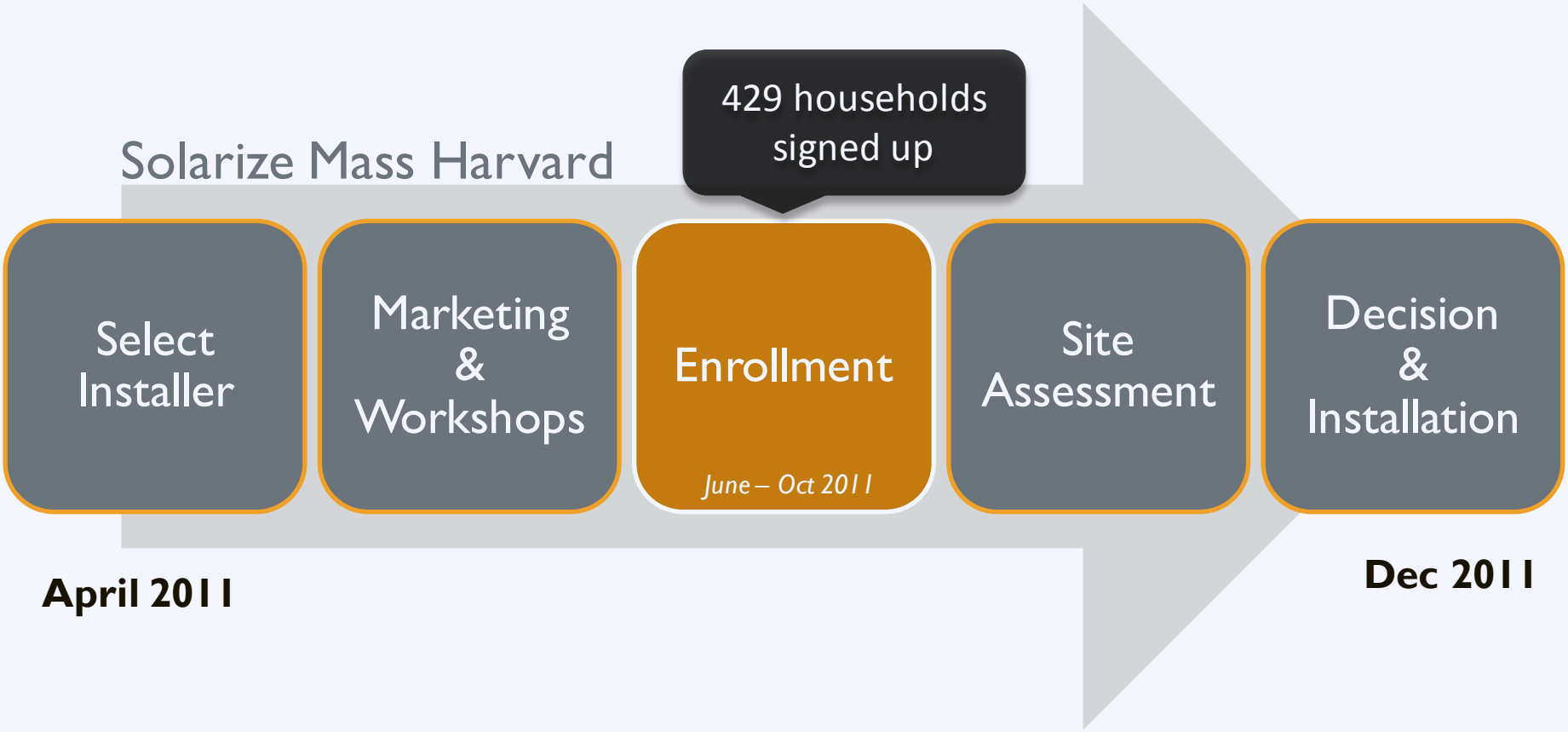
Solarize: Case Study

Marketing Strategy:

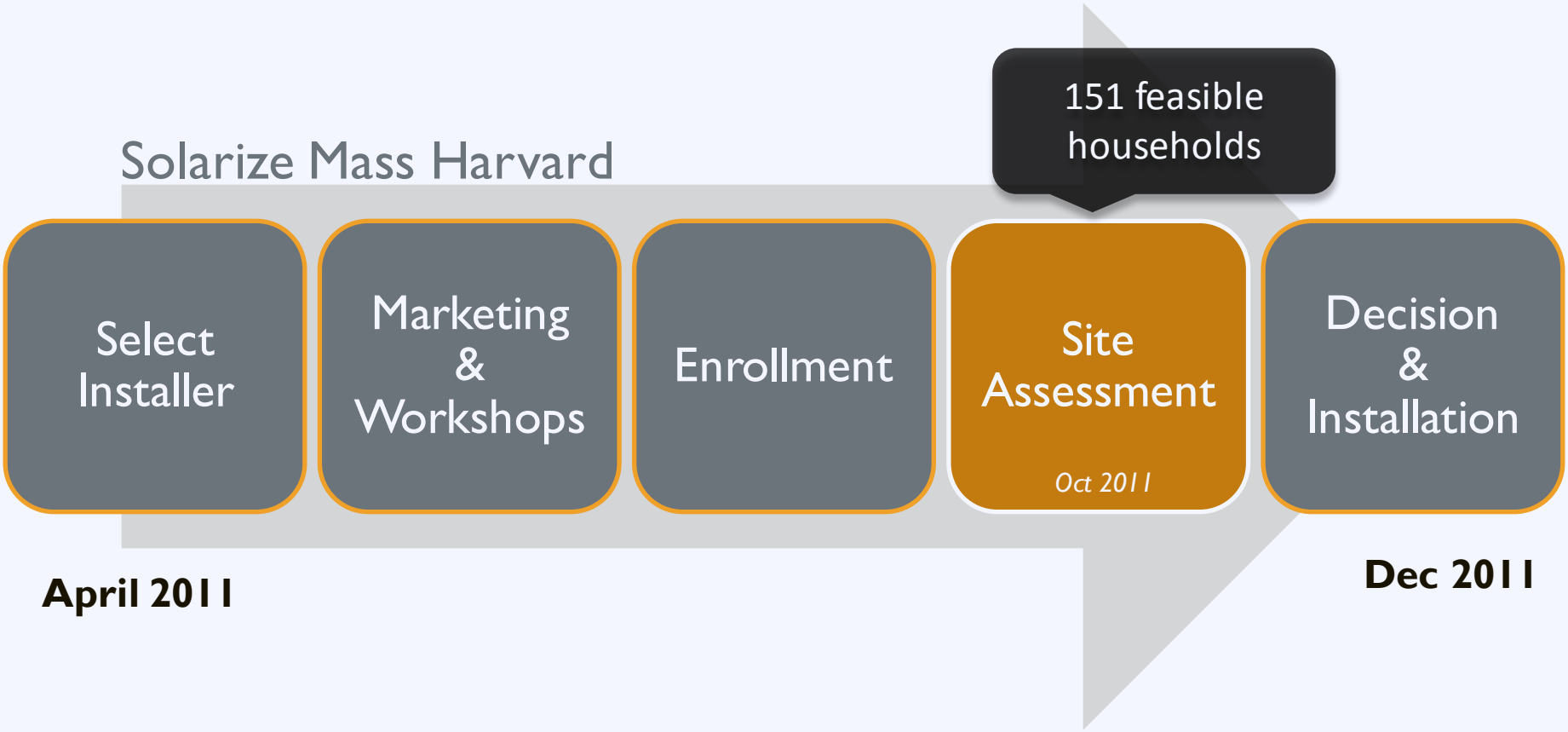
- Electronic survey of 1,100 households
- Email newsletters and direct mailings
- Float in July 4 parade
- Articles and advertisements in local newspaper
- Facebook page and online discussion board

Source: Vote Solar

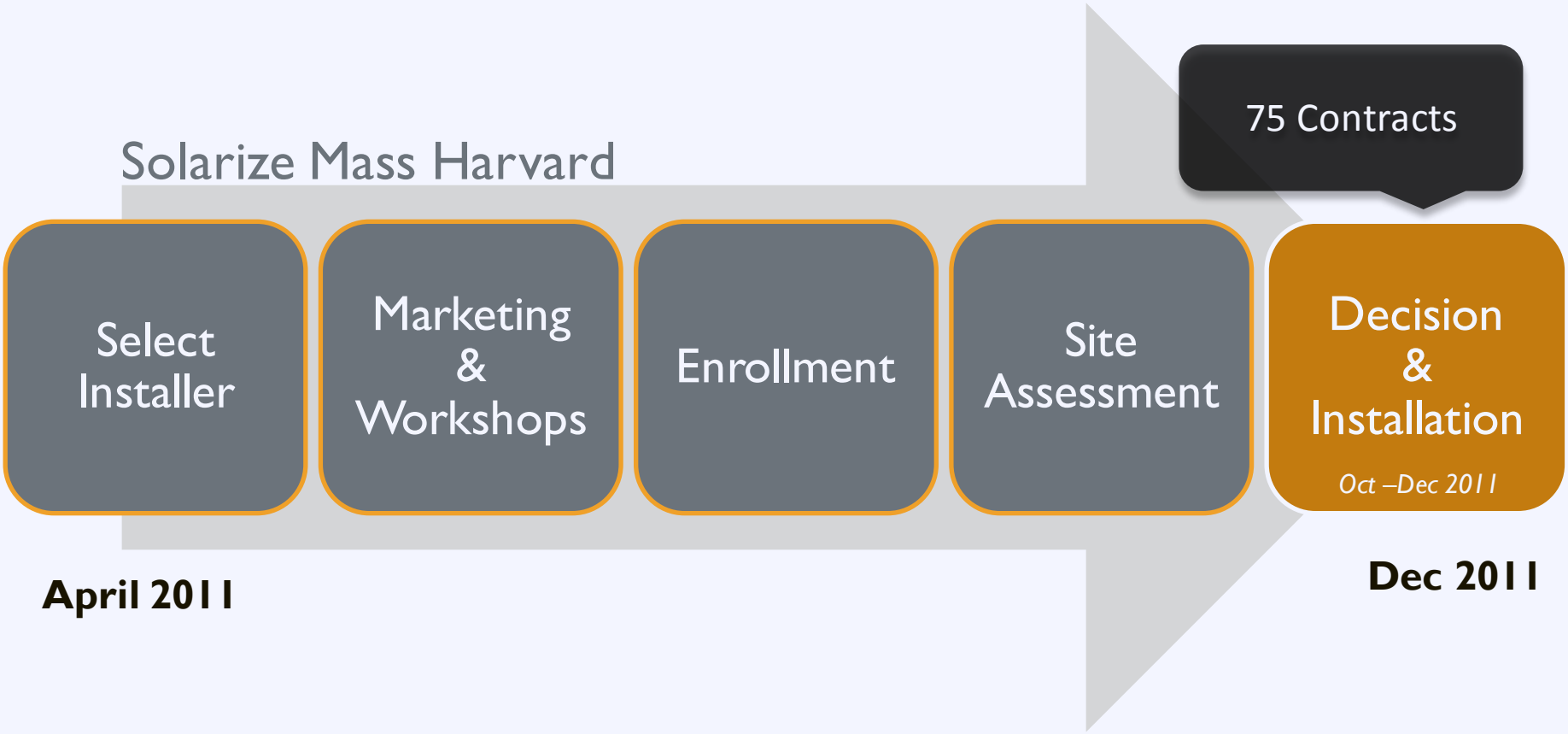
Solarize: Case Study



Solarize: Case Study



Solarize: Case Study



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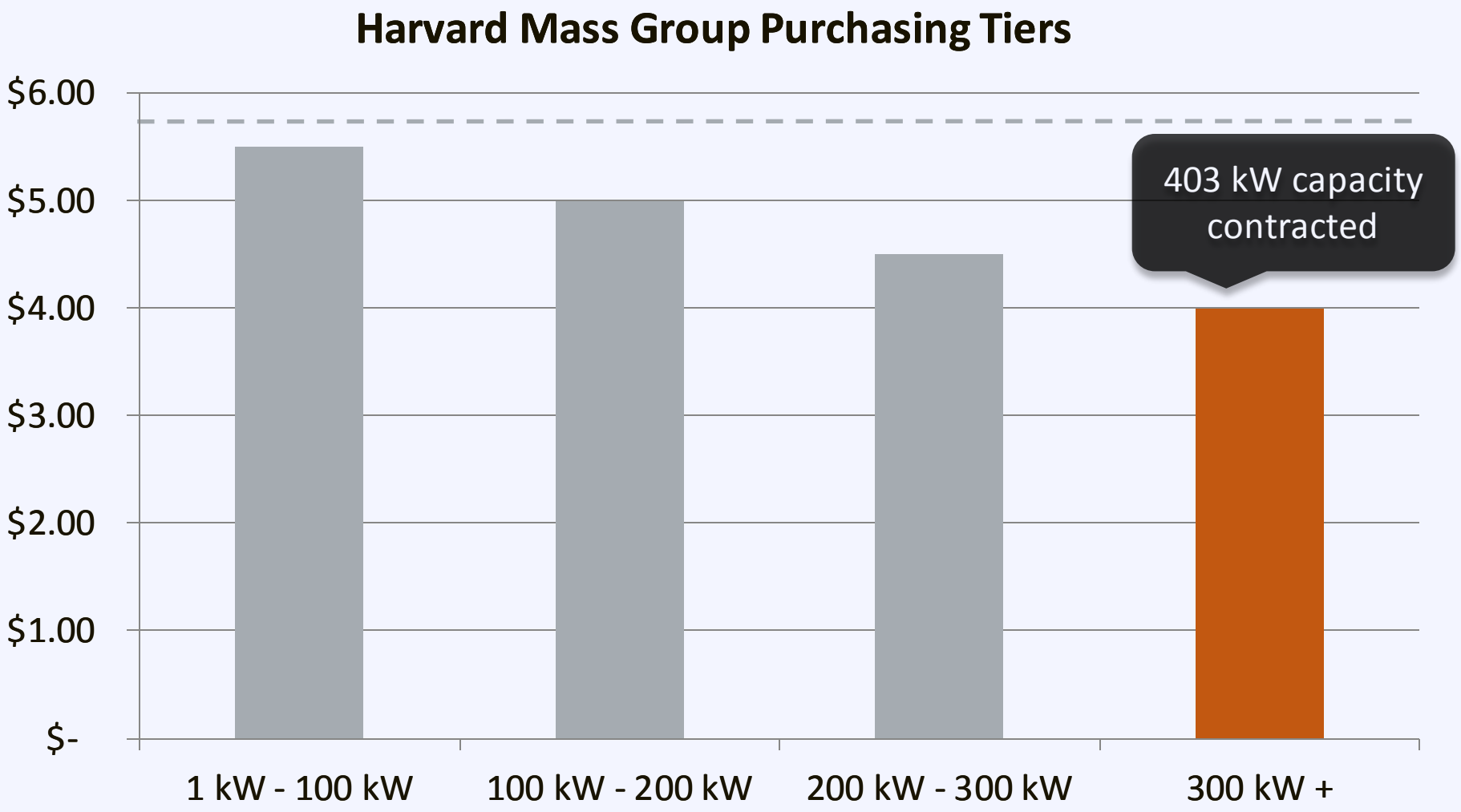


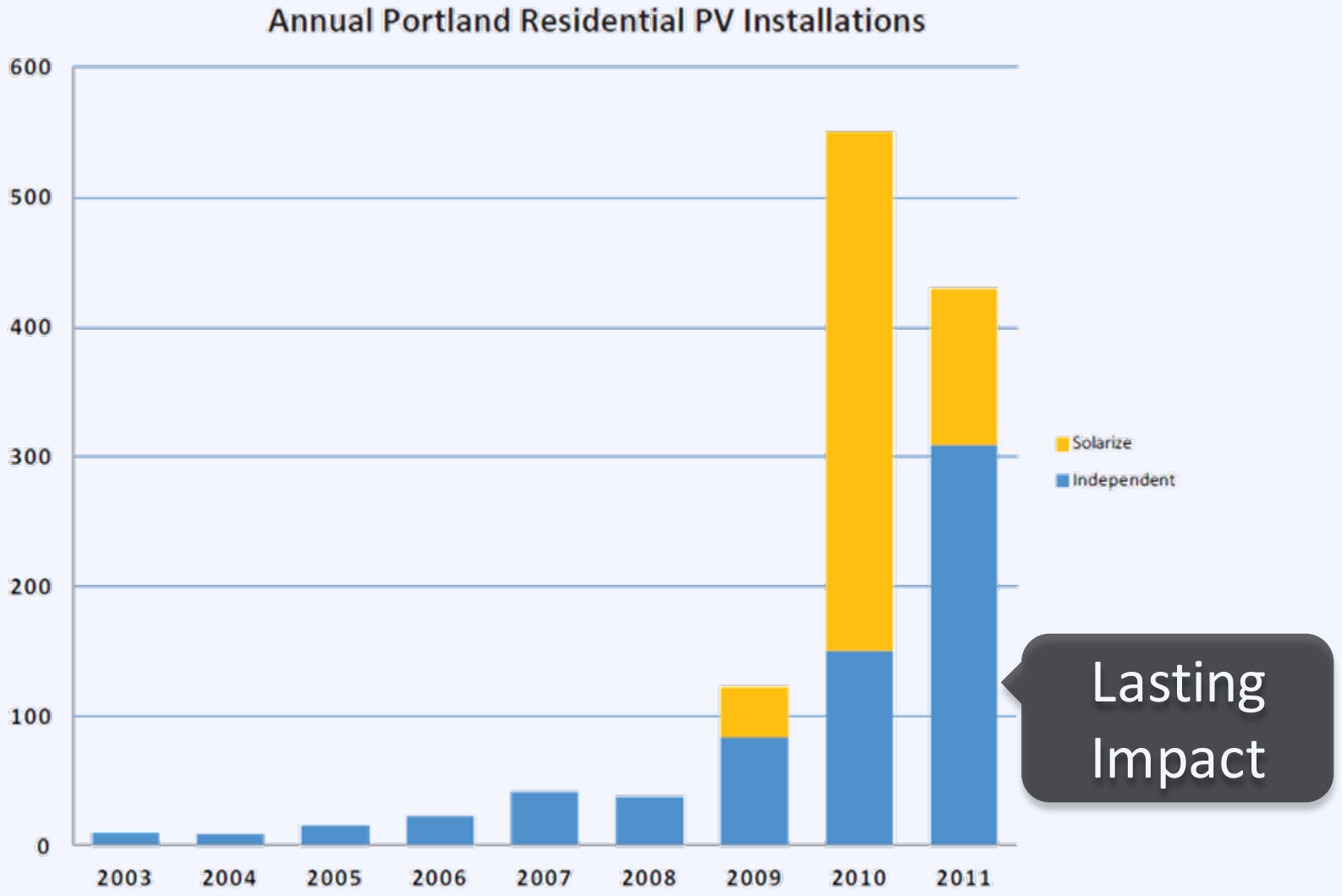
Solarize: Case Study

75 new installations totaling 403 kW

30% reduction in installation costs

575% increase in residential installations

Solarize: Lasting Impact



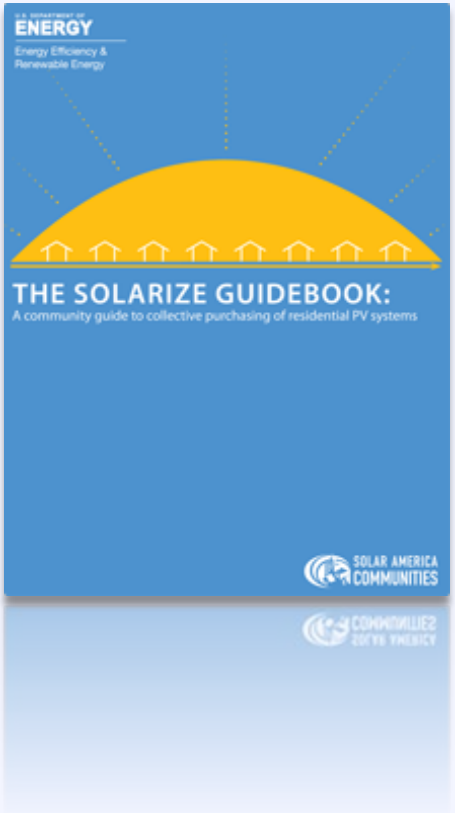
Source: NREL

Solarize: Resources

Resource **The Solarize Guidebook**

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

www.nrel.gov



Q & A

Agenda

08:40 – 09:00	Introduction to the US Solar Market
09:00 – 09:40	Reducing Solar Soft Costs
09:40 – 09:50	*Break*
09:50 – 10:30	Understanding Solar Incentives
10:30 – 11:00	Introduction to Solar Project Finance
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11:10 – 11:40	Financing Municipal Solar Projects
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The Solar Equation

Cost

+ Installed Cost

+ Maintenance

- Direct Incentive

Benefit

+ Avoided Energy Cost

+ Excess Generation

+ Performance Incentive

Incentives

Federal	Investment Tax Credit	Qualified Energy Conservation Bonds	Accelerated Depreciation	
State & Local	Tax Credits	Tax Exemptions	Property Assessed Clean Energy	
Utility	Renewable Energy Credits	Net Metering	Rebates	Feed-in Tariff

Incentives

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Investment Tax Credit

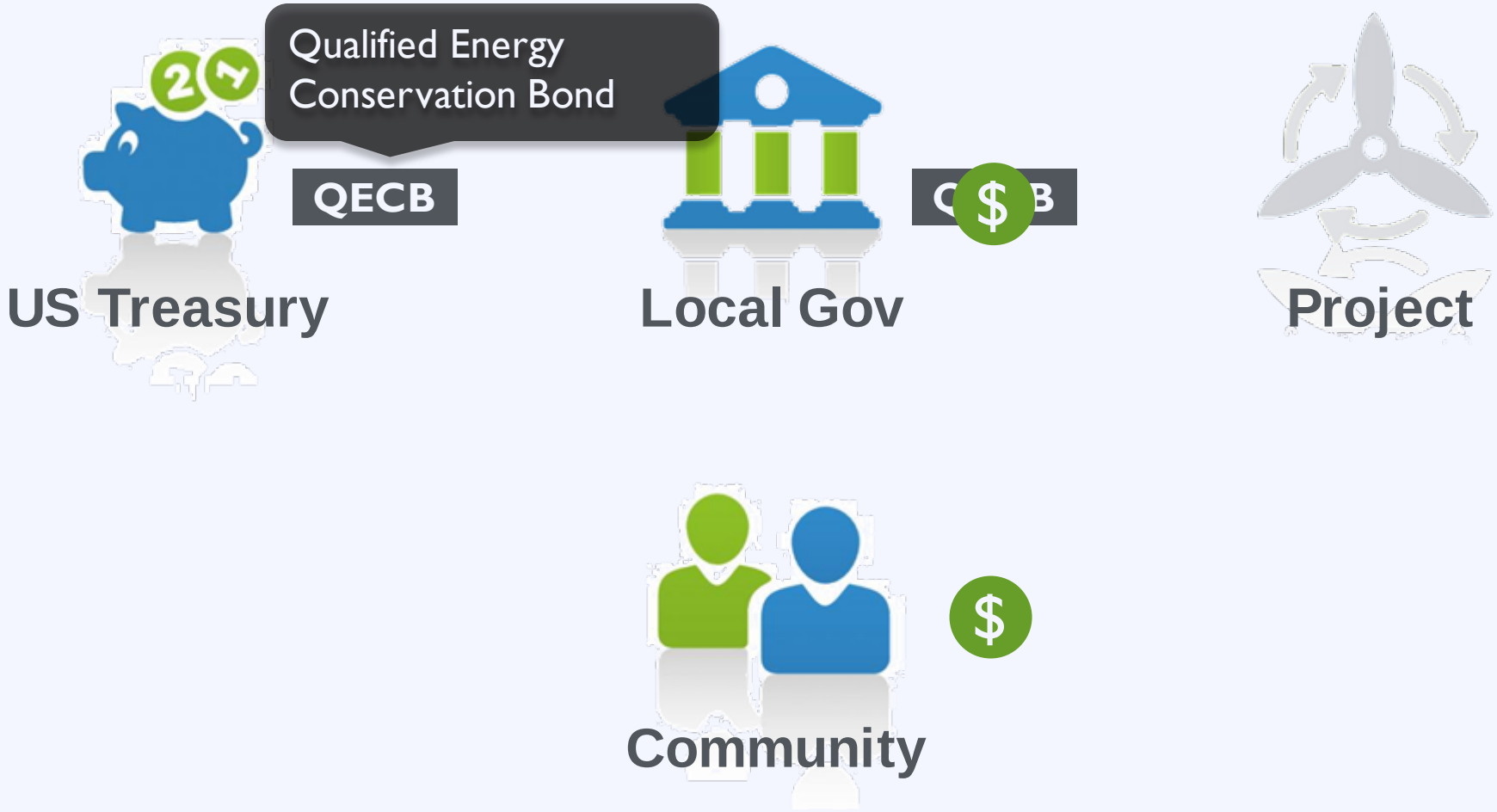
Type: Tax Credit

Eligibility: For-Profit Organization

Value: 30% of the installation cost

Availability: Through 2016

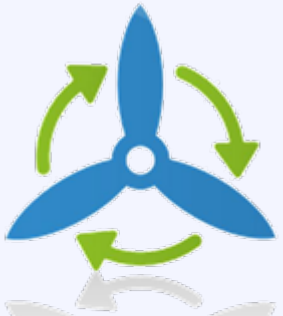
Qualified Energy Conservation Bond



Qualified Energy Conservation Bond

US Treasury

Local Gov



Project

Community

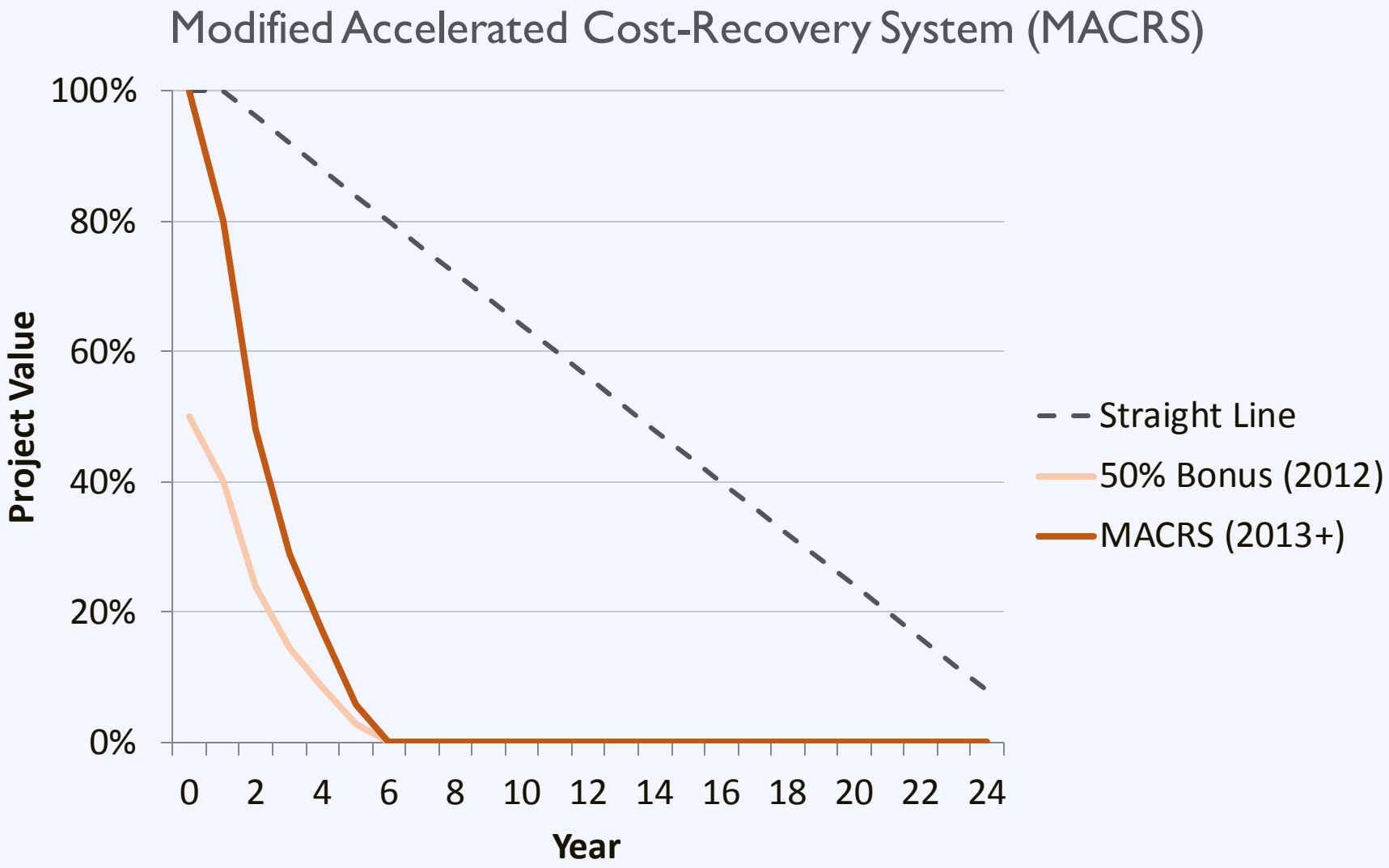
Deeper Dive: QECBs

- 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

Deeper Dive: QECBs

- Being used, especially in SW, to install renewable energy generation projects
- 111 projects completed as of June 2012 using QECBs
- Only 1/5 of QECBs have been used
- $2.5 billion unissued
- States get formula authorization which is then assigned to local gov'ts with population of 100,000 or larger

Accelerated Depreciation



Incentives

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Property Assessed Clean Energy

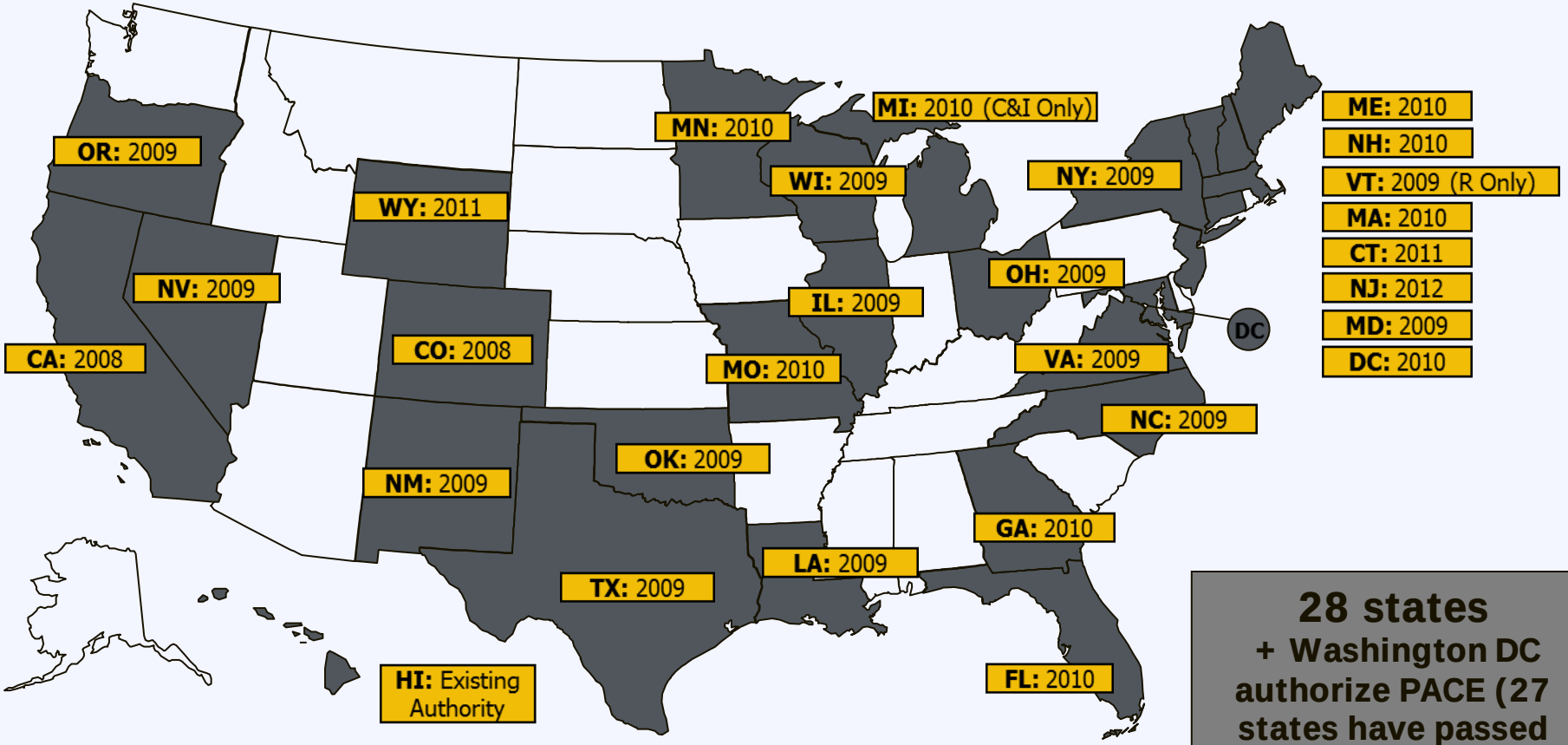
City creates type of land-secured financing district or similar legal mechanism (a special assessment district)

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



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

*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.

Powered by SunShot U.S. Department of Energy

Source: DSIRE

Incentives

Federal	Investment Tax Credit	Qualified Clean Energy Bonds	Accelerated Depreciation	
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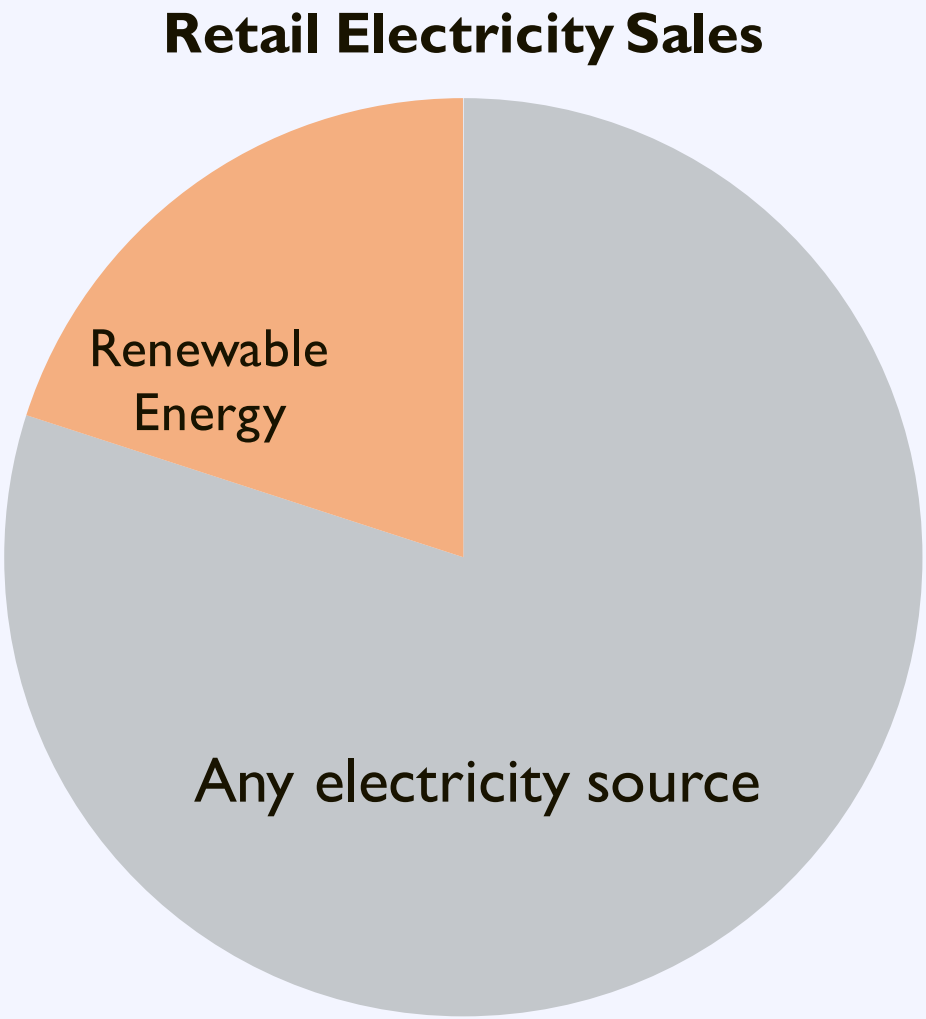
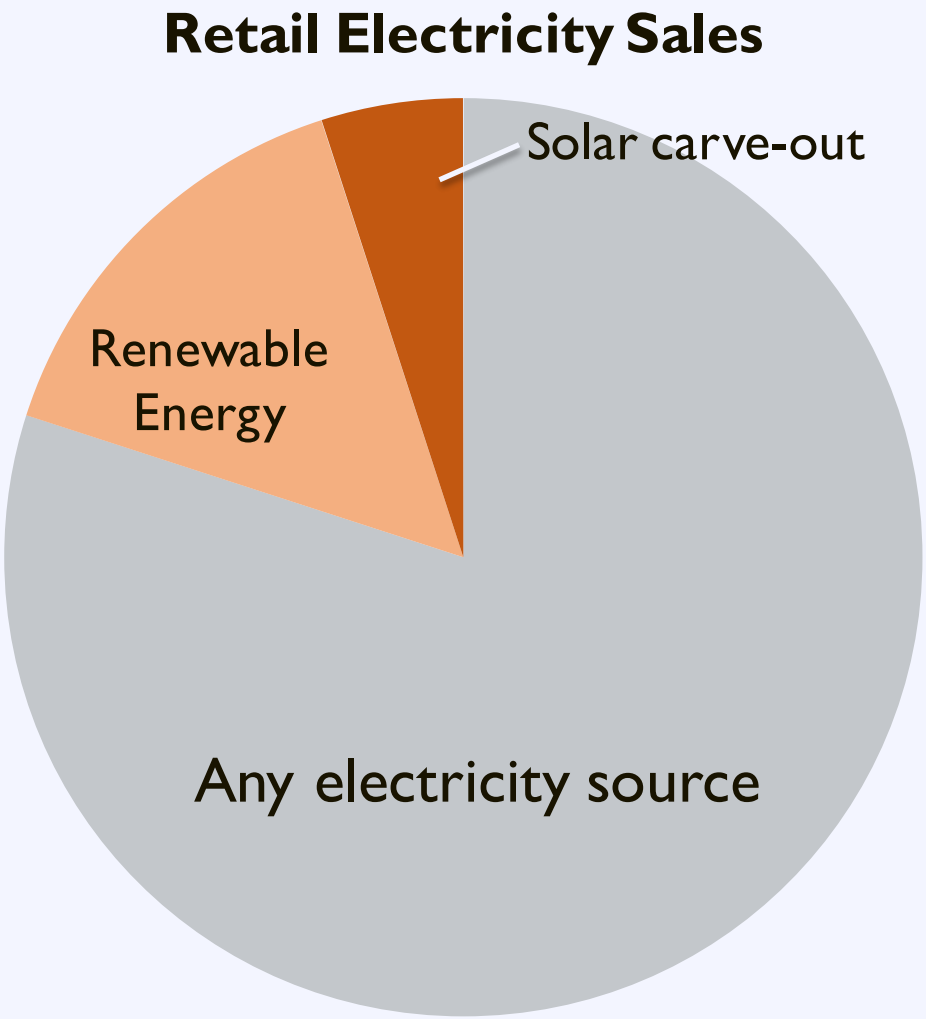
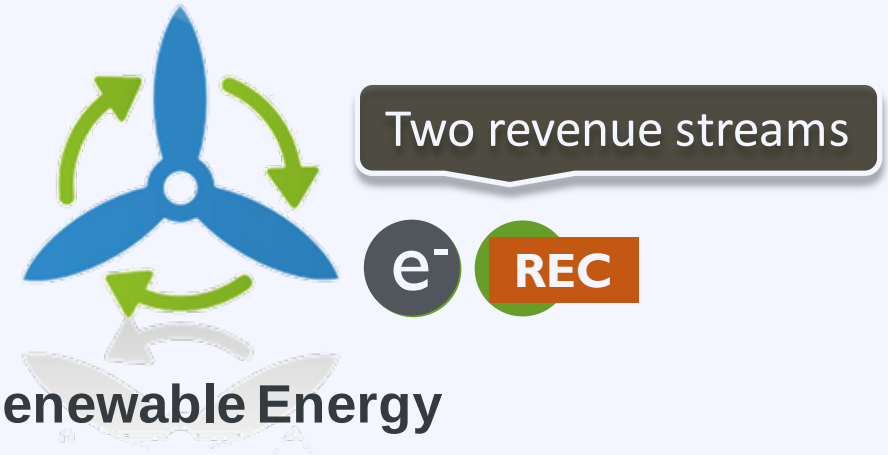
Renewable Portfolio Standard



Renewable Portfolio Standard

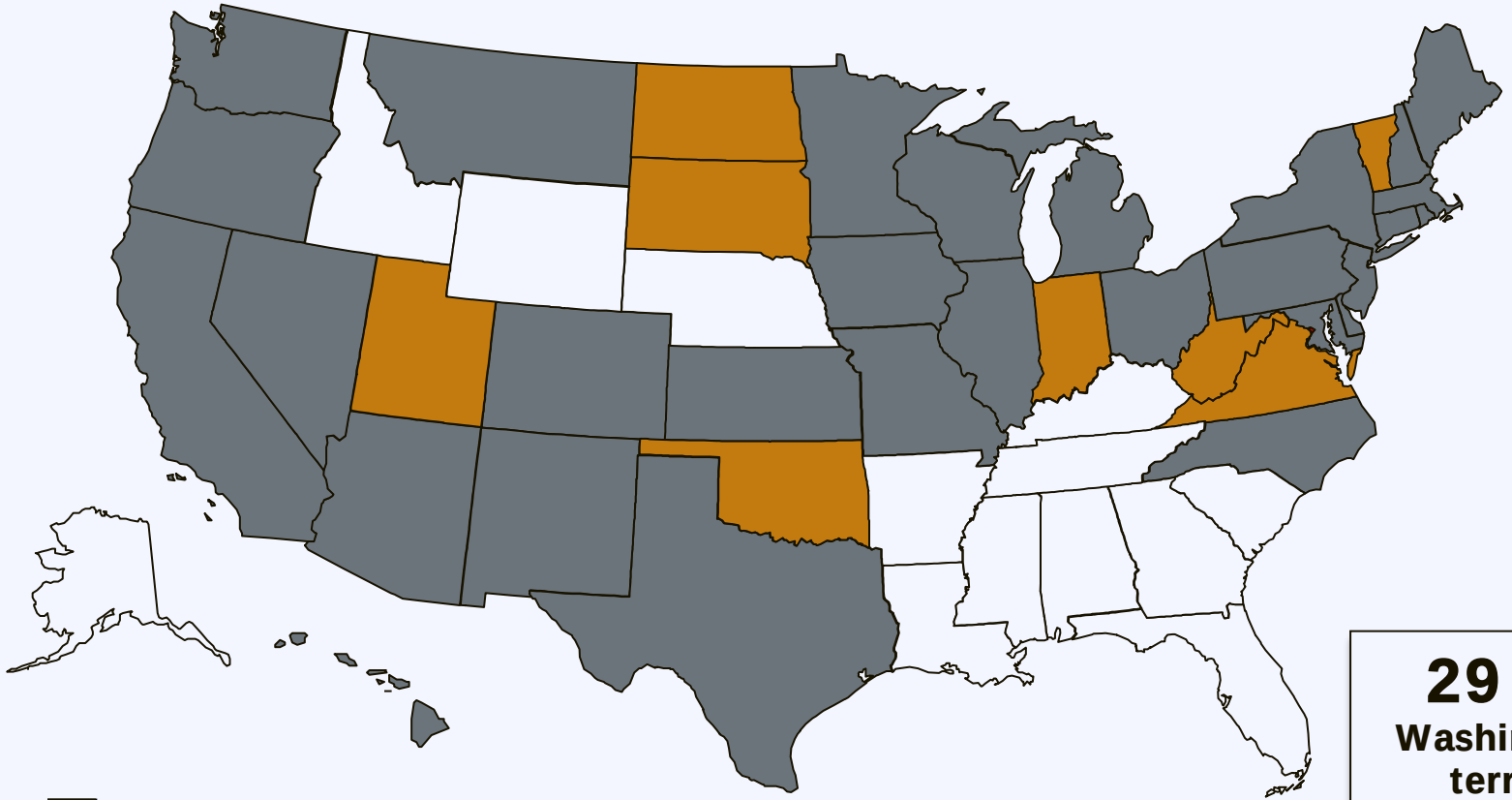


Renewable Portfolio Standard



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)

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U.S. Department of Energy

Net Metering

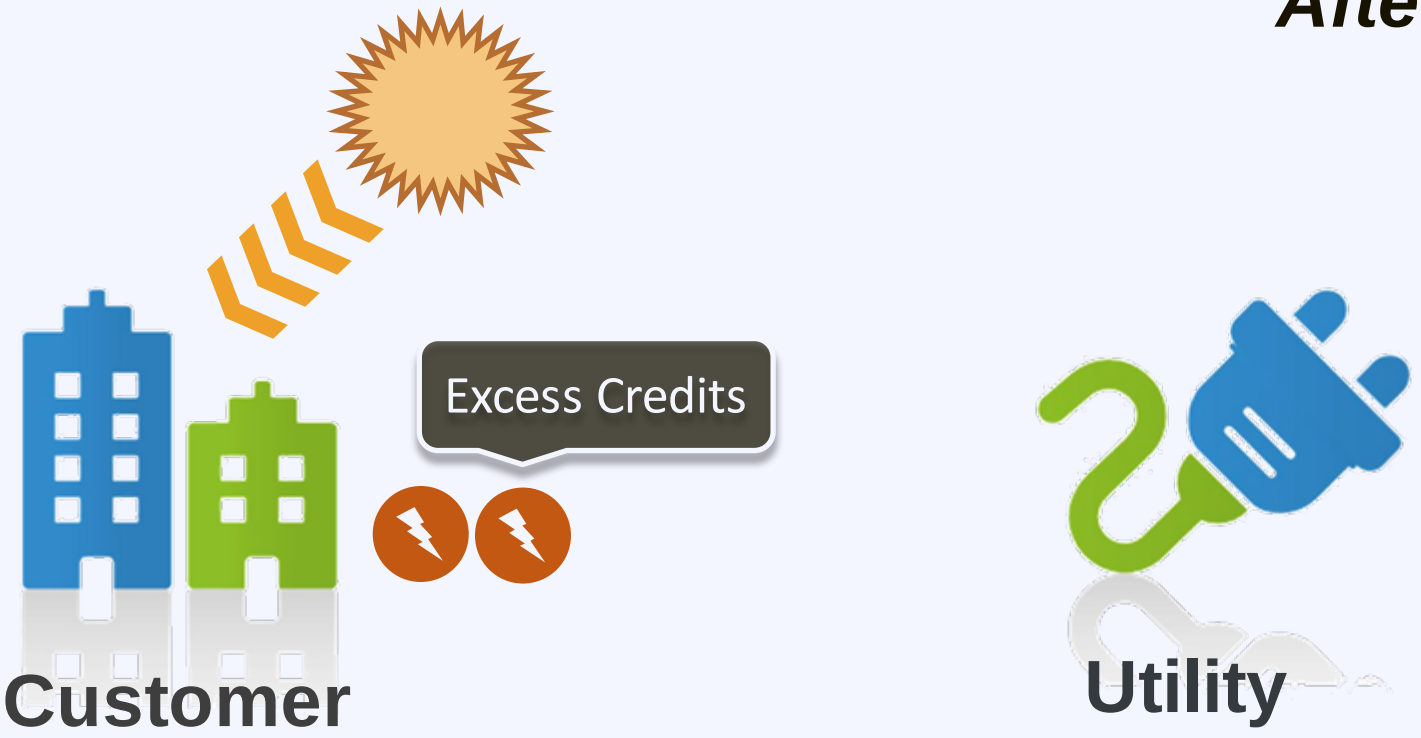
Net metering allows customers to export power to the grid during times of excess generation, and receive credits that can be applied to later electricity usage

Net Metering: Overview

Morning

Net Metering: Overview

Afternoon



Net Metering: Overview

Night

Customer

Utility

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

Net Metering: Market Share

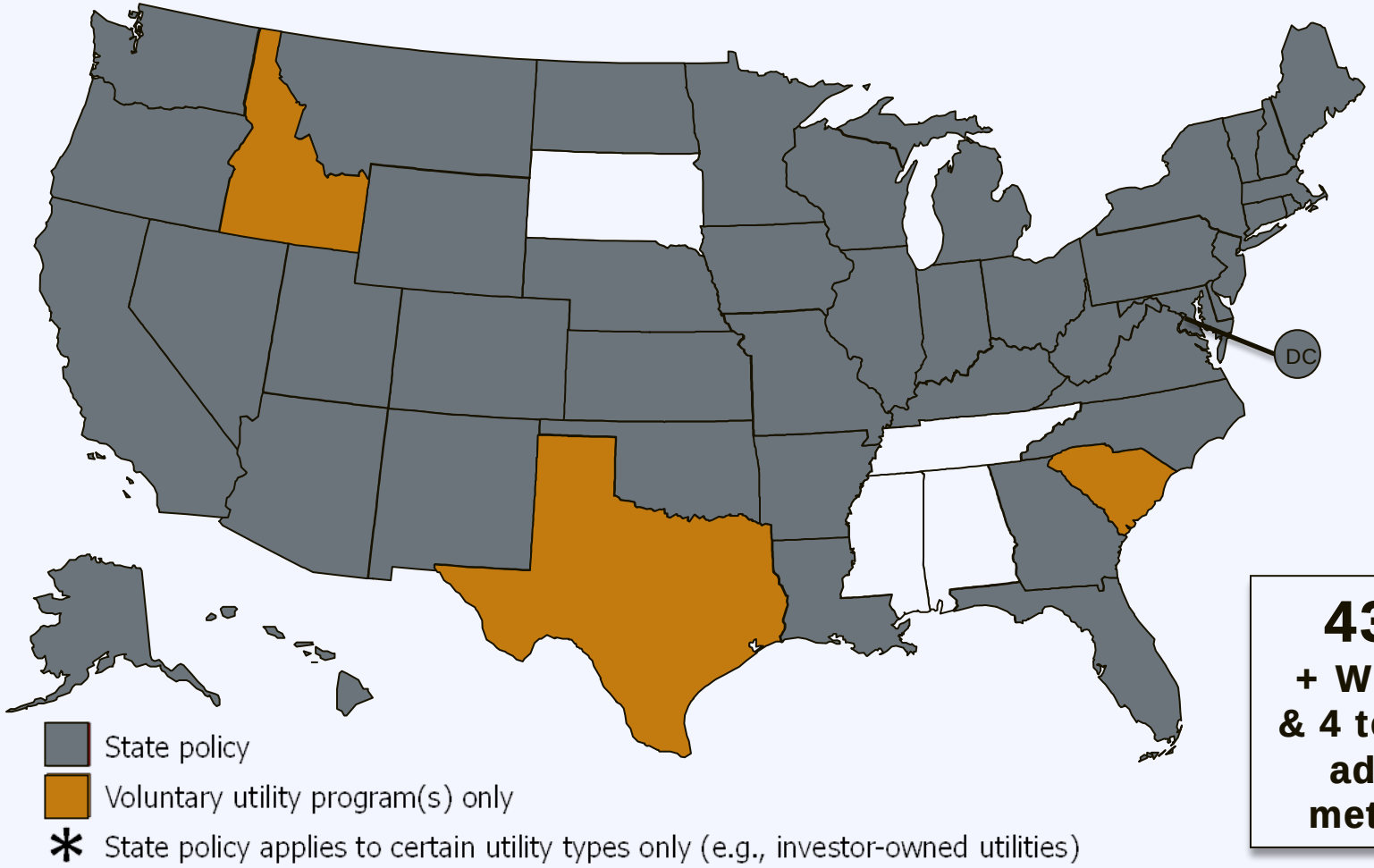
More than **93%** of distributed PV Installations are net-metered

Powered by SunShot U.S. Department of Energy

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

Net Metering: State Policies

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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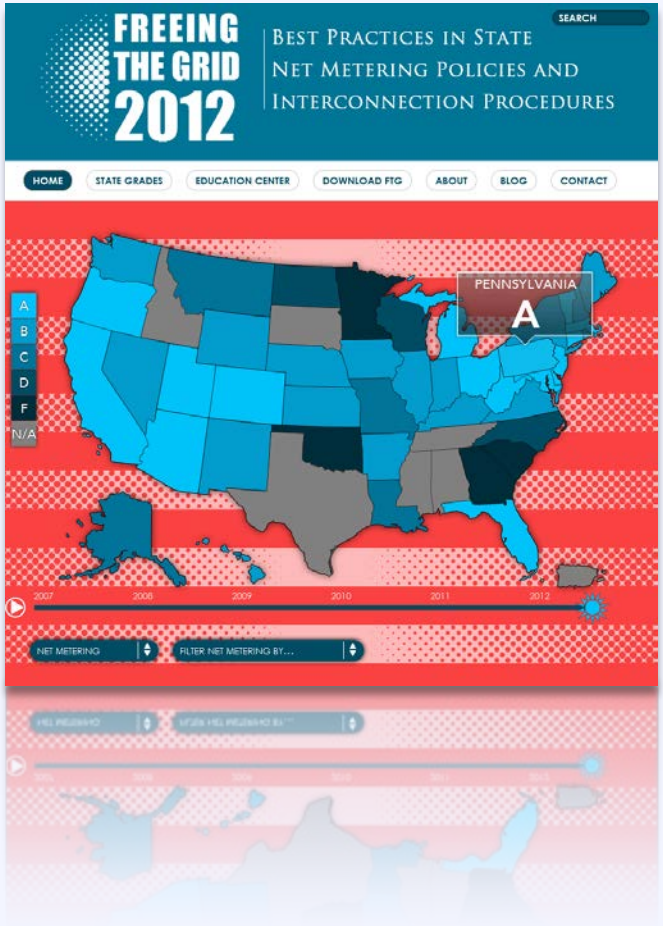
U.S. Department of Energy

Net Metering: Resources

Resource **Freeing the Grid**

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

http://freeingthegrid.org/

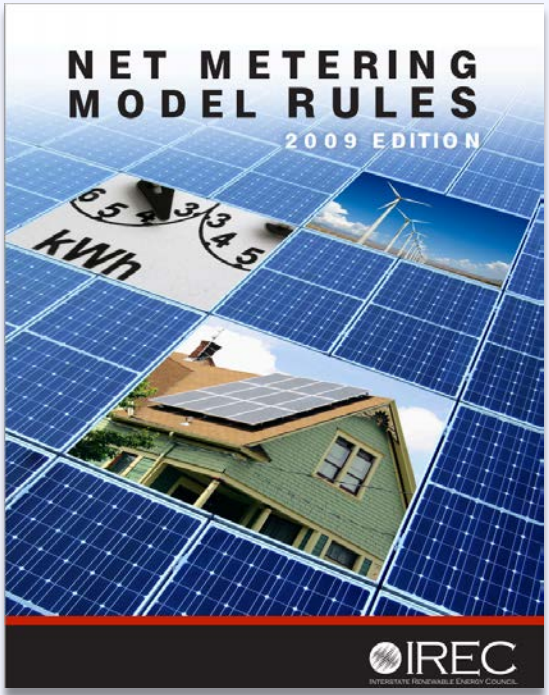


Net Metering: Resources

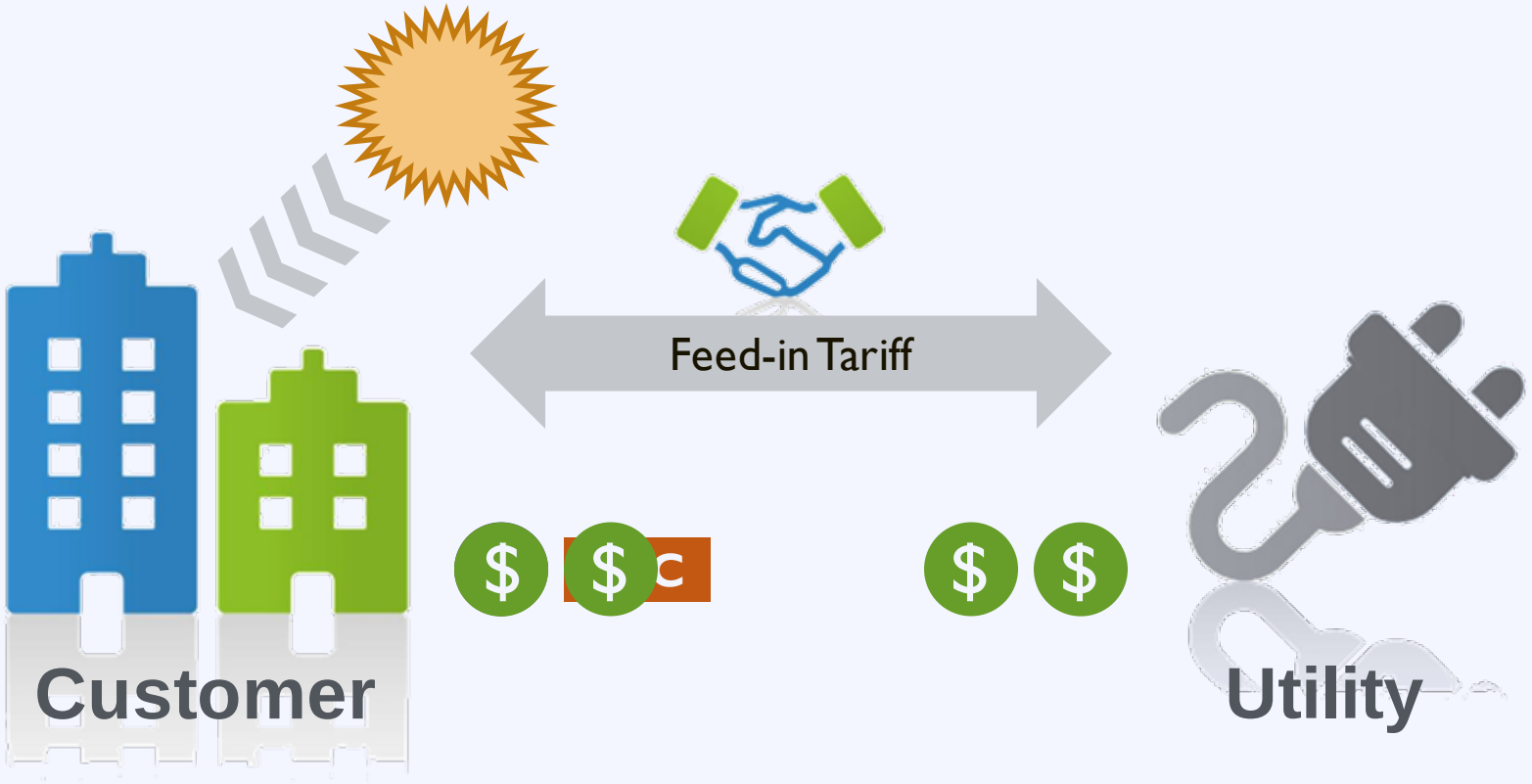
Resource **Interstate Renewable Energy Council**

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

www.irecusa.org



Feed in Tariff



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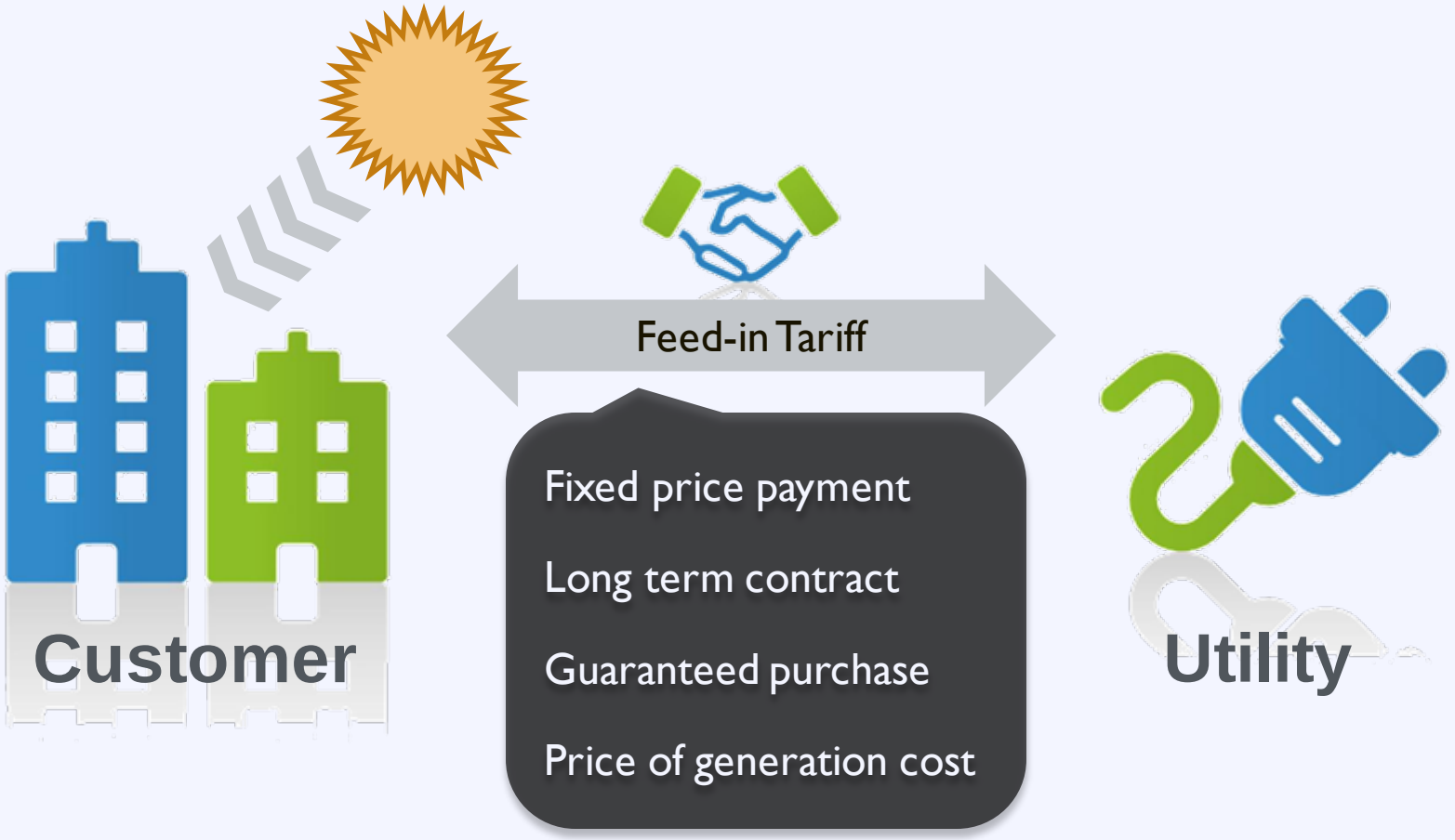

Feed-in Tariff: Case Study

Gainesville, Florida

Population: 125,326

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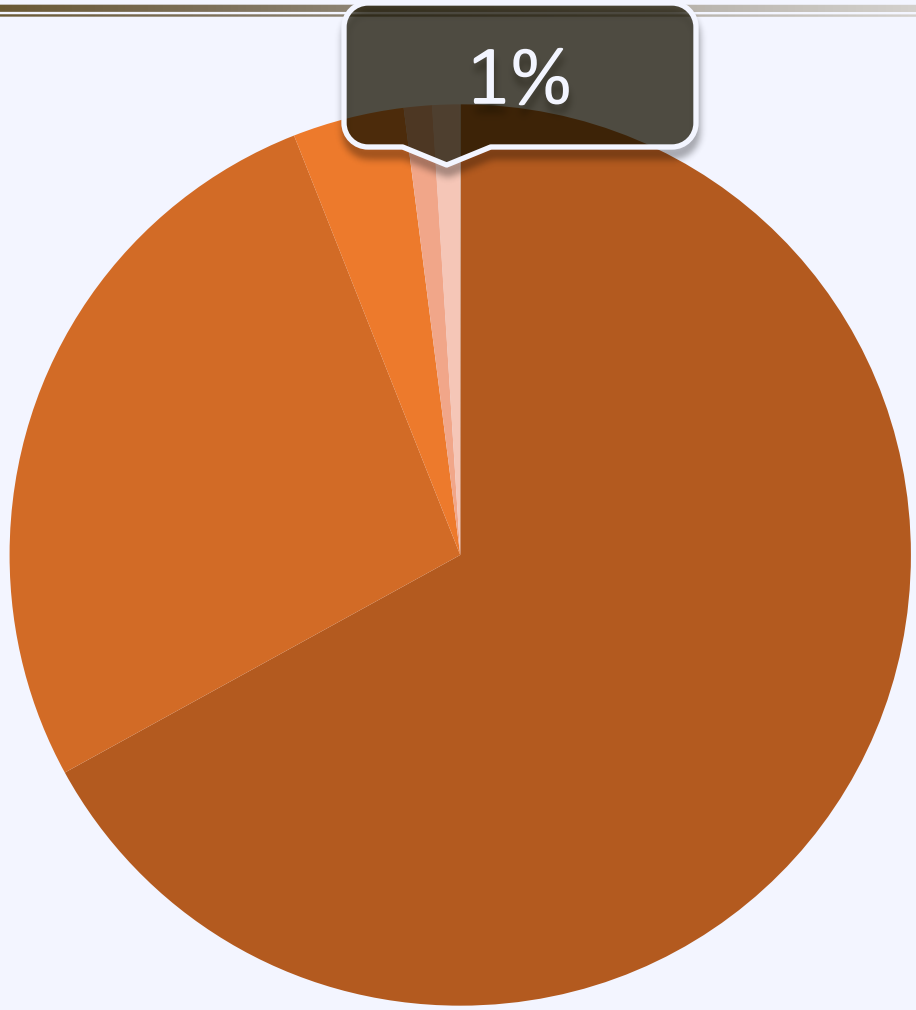
U.S. Department of Energy

Source: Wikipedia

Gainesville Regional Utility (GRU)

- 93,000 Customers
- Budget of $385 million
- Largest customer is UF

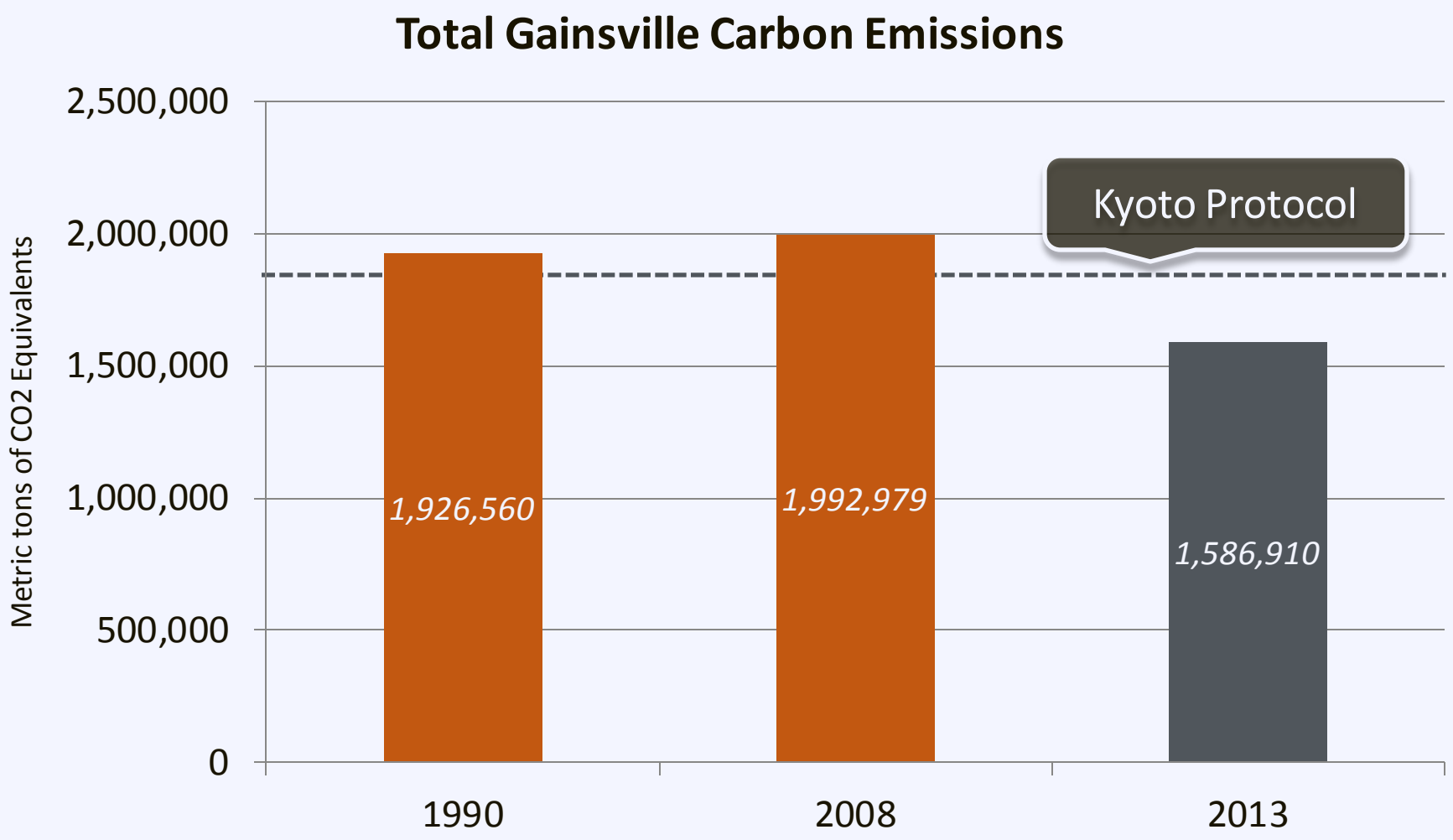
Gainesville Regional Utility (GRU)



- Coal
- Natural Gas
- Nuclear
- Oil
- Renewable Energy

Goal: To reduce fossil fuel energy purchase by 143,000 MWh per year by 2016

Gainesville Carbon Goals



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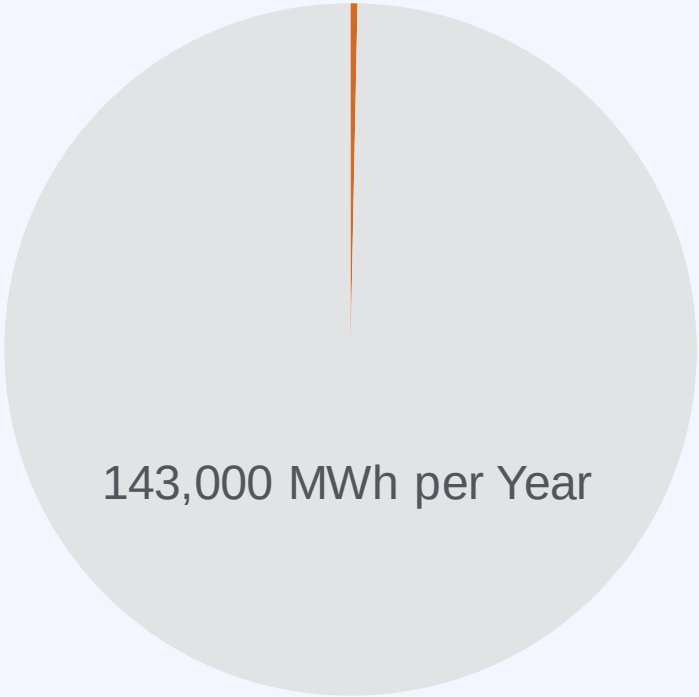
U.S. Department of Energy

Even with progressive solar programs in place, Gainesville was not meeting its goals

Solar Rebate Program Results

Incentive program helped GRU reach 0.5% of Goal



Source: ICLEI Case Study *Gainesville, FL, Feed-in Tariff: A Boost for Solar Power*

Feed in Tariff (FiT)

GRU FiT: Program Design

32 MW Capacity

2009	2010	2011	2012	2013	2014	2015	2016
4 MW	4 MW	4 MW	4 MW	4 MW	4 MW	4 MW	4 MW

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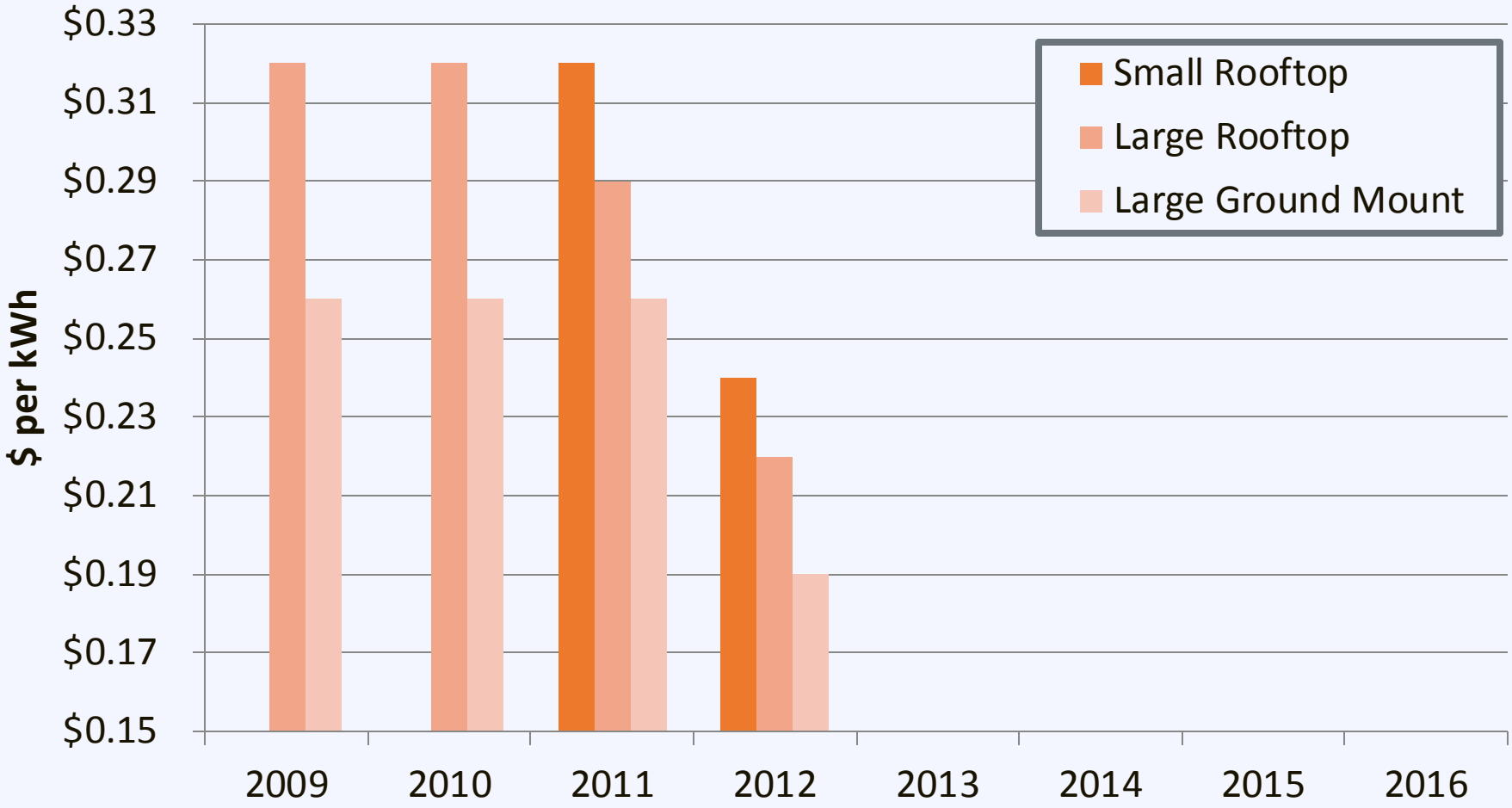
U.S. Department of Energy

GRU FiT: Contract Rates



Source: Gainesville Regional Utilities

GRU FiT: Launch Timeline

February 2009

Feed in Tariff Program Opens

Two weeks later

First year is fully subscribed

July 2009

Queue is fully subscribed through 2016

January 2010

563 kW of solar has already come online

200% more than past 2 years combined

GRU FiT: Launch Timeline

February 2009

Feed in Tariff Program Opens

Two weeks later

First year is fully subscribed

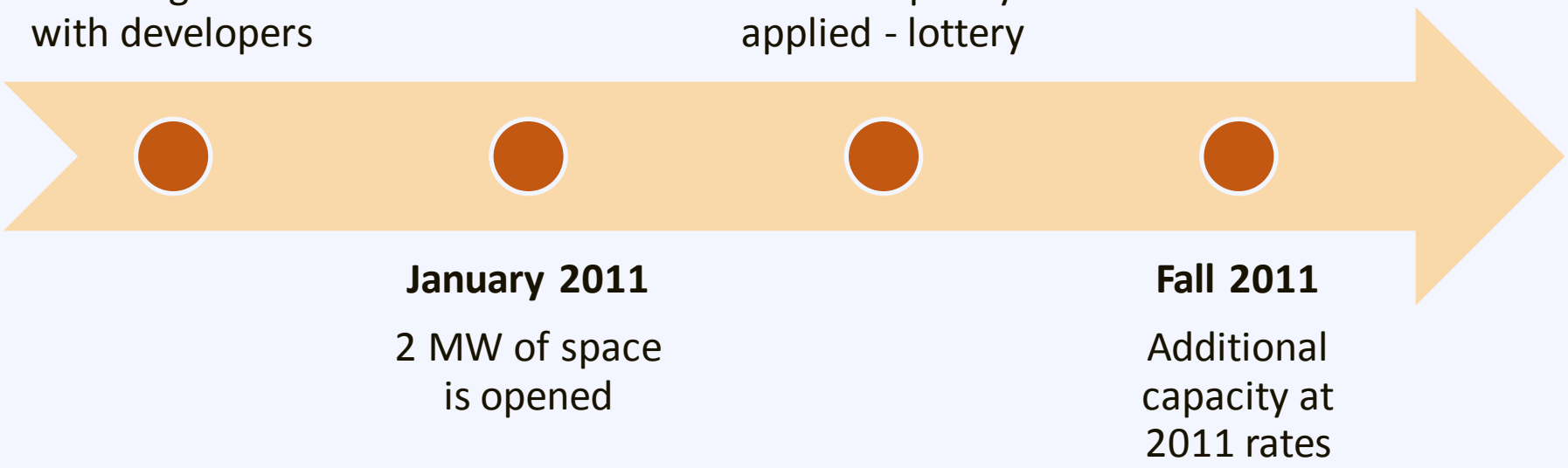
July 2009

Queue is fully subscribed through 2016

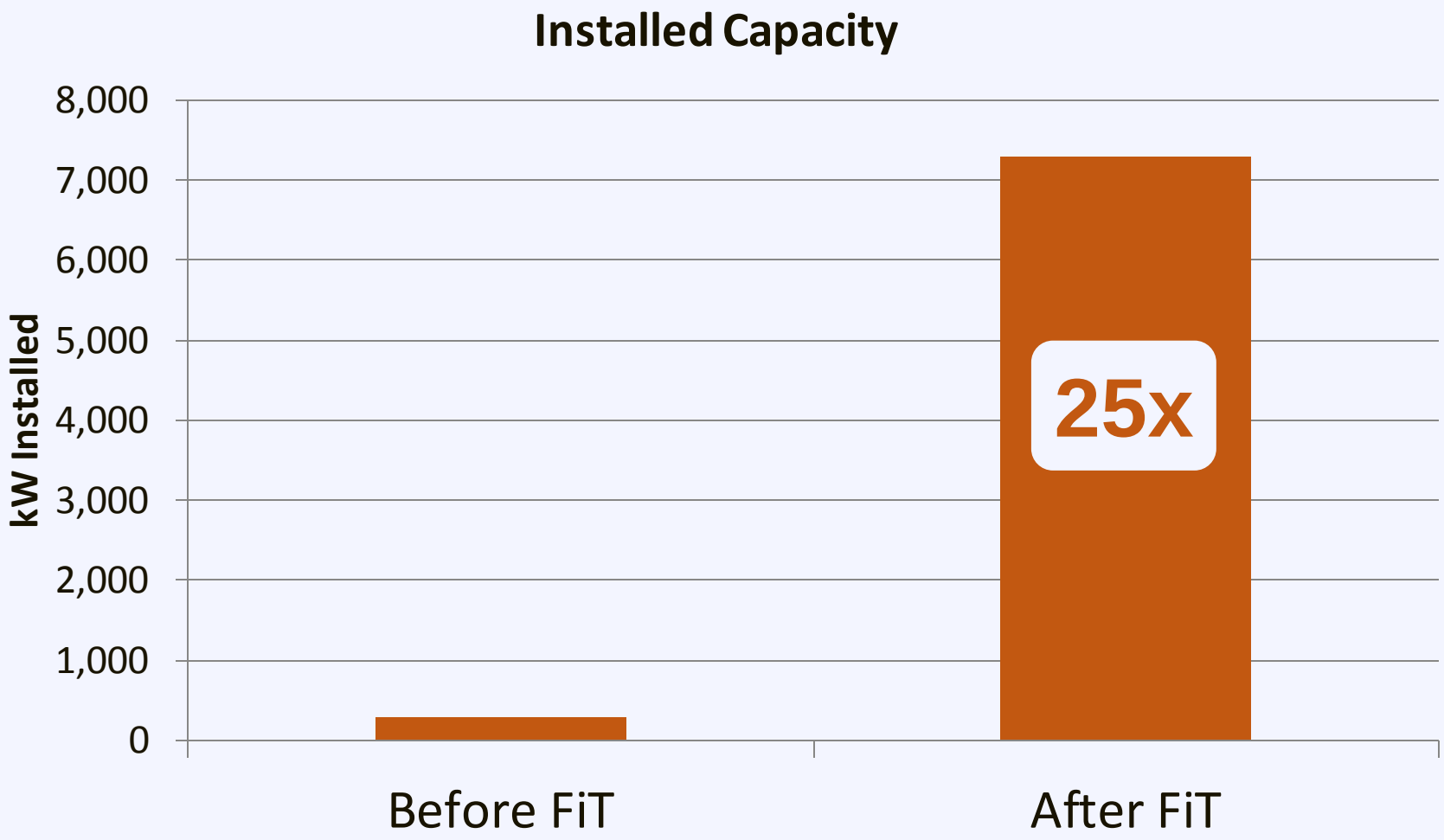
January 2010

563 kW of solar has already been installed

GRU FiT: Reconfiguring the Program



GRU Fit: A Success



Powered by SunShot U.S. Department of Energy

http://wind-works.org/FeedLaws/USA/SolarPVLeadsSmallTownintoSolarBigLeagues.html

GRU FiT: Cost

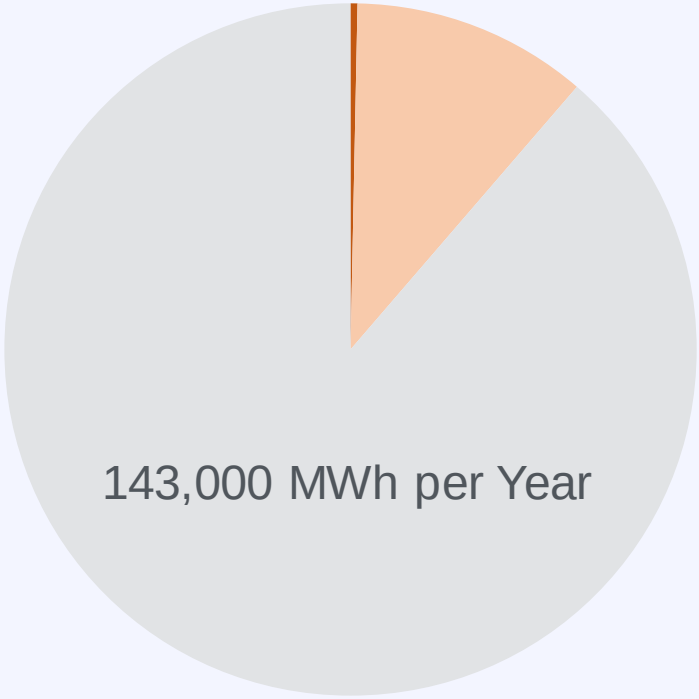
$1 per Month per rate payer

Similar cost as rebate program

Source: Gainesville Regional Utilities

GRU FiT: Projected Impact by 2016

Expected to contribute to 11% of Energy Goal



Source: ICLEI Case Study *Gainesville, FL, Feed-in Tariff: A Boost for Solar Power*

The FiT program provides a better investment yield than the rebate program for the customer and utility

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Ownership Structures

1. Direct Ownership

2. Third Party Ownership

3. Community Ownership

Ownership Structures

1. Direct Ownership

2. Third Party Ownership

3. Community Ownership

Direct: Balance Sheet

REC ~~**Tax Benefits**~~

Municipality

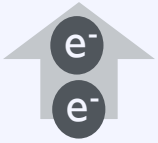
Public entities are not eligible for tax benefits

Solar Project

Direct: Balance Sheet

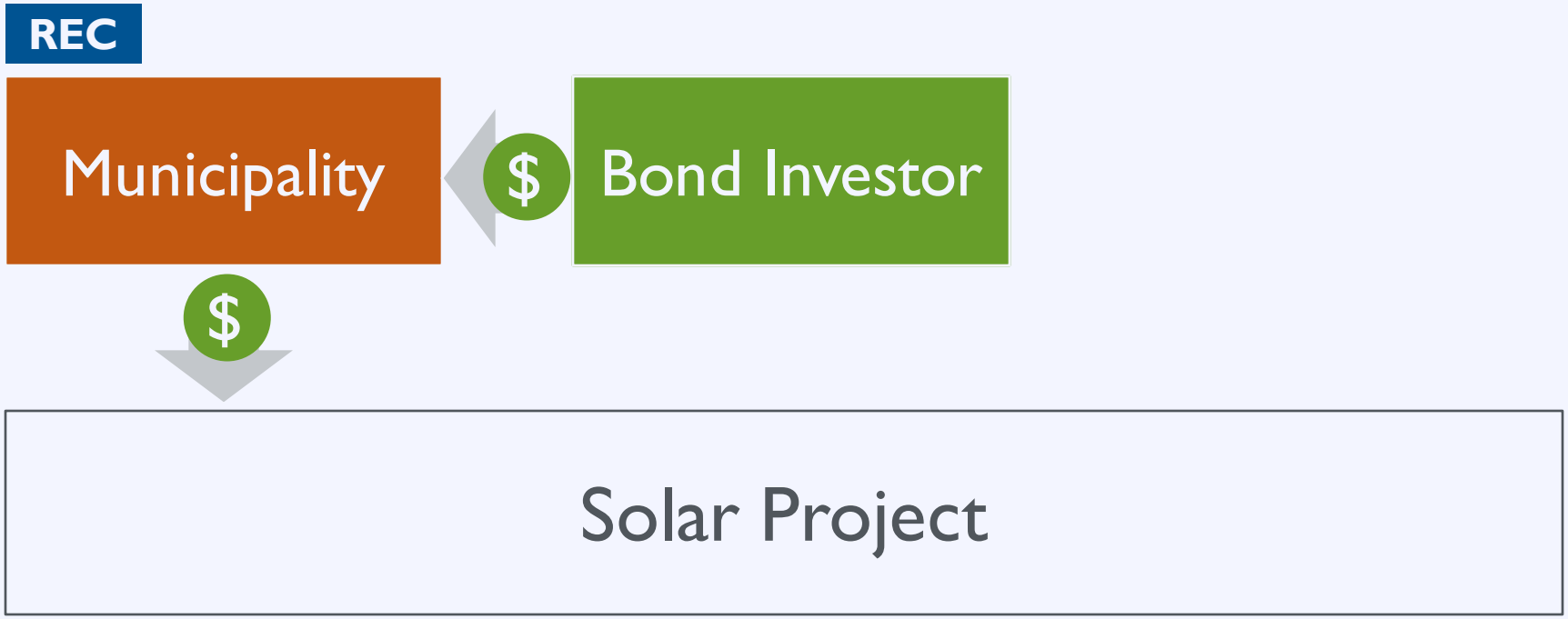
REC

Municipality

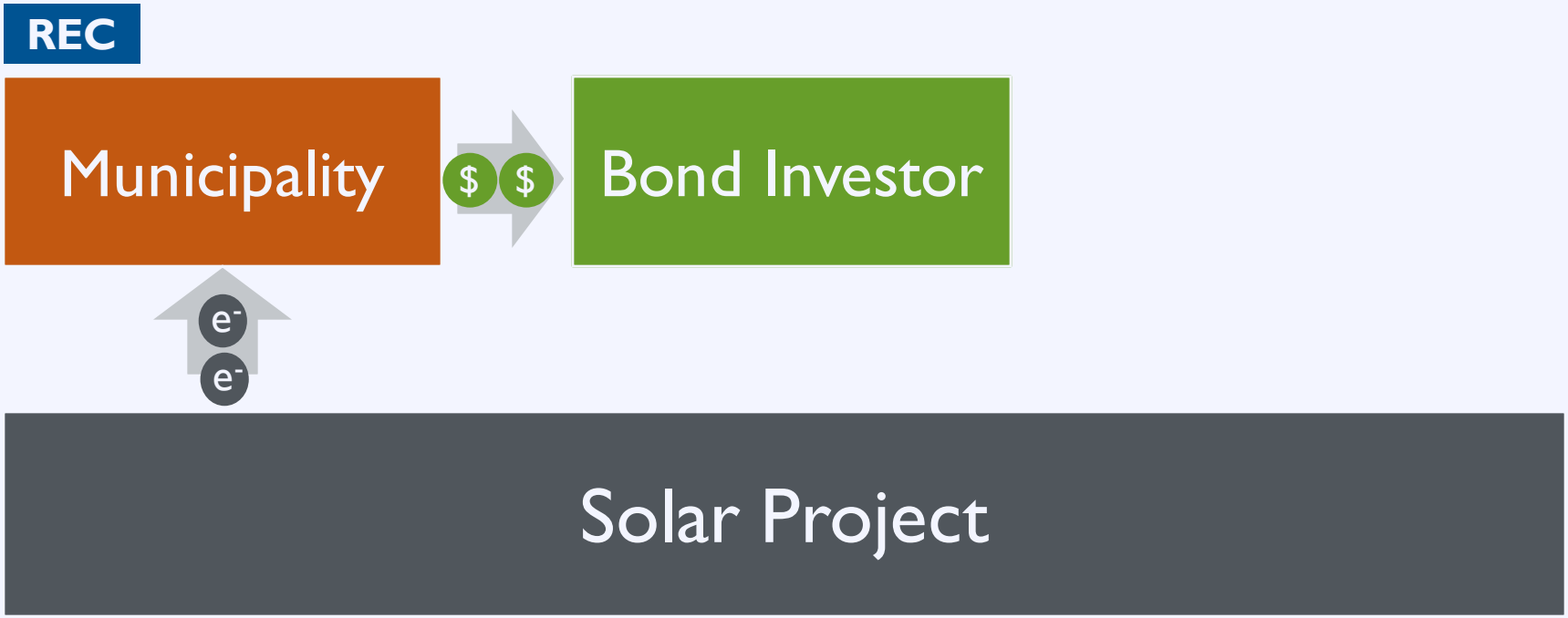


Solar Project

Direct: Debt Financing



Direct: Debt Financing



Direct: Debt Financing

Direct Ownership

Pros

- Low – cost electricity
- REC revenue
- Utilize cheap bond money

Cons

- Large upfront cost
- Long term management
- Can't take tax benefits
- Development risk
- Performance risk

Ownership Structures

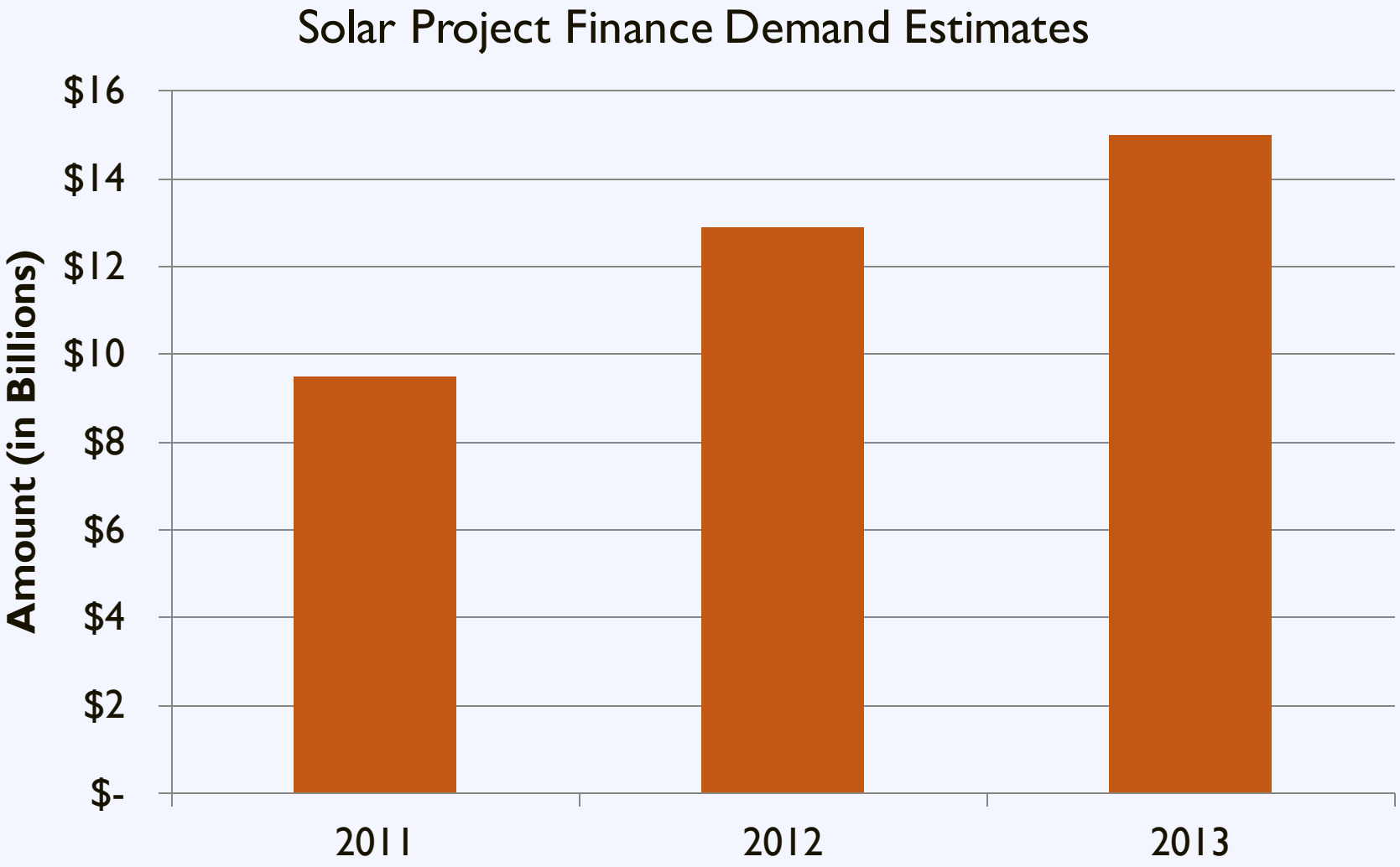
1. Direct Ownership

2. Third Party Ownership

3. Community Ownership

Third Party Ownership

Increasing Demand for Financing



Source: GTM Research (http://www.mintz.com/media/pnc/5/media.2775.pdf)

Third Party Ownership

Third Party

Solar Project Company (LLC)

Municipality

Third Party Ownership

Developer

Provides capital in return for future cash flow

Debt Investor

Tax Investor

Solar Project Company (LLC)

Municipality

Third Party Ownership

Developer

Debt Investor

Provide upfront capital in return for tax benefits

Tax Investor

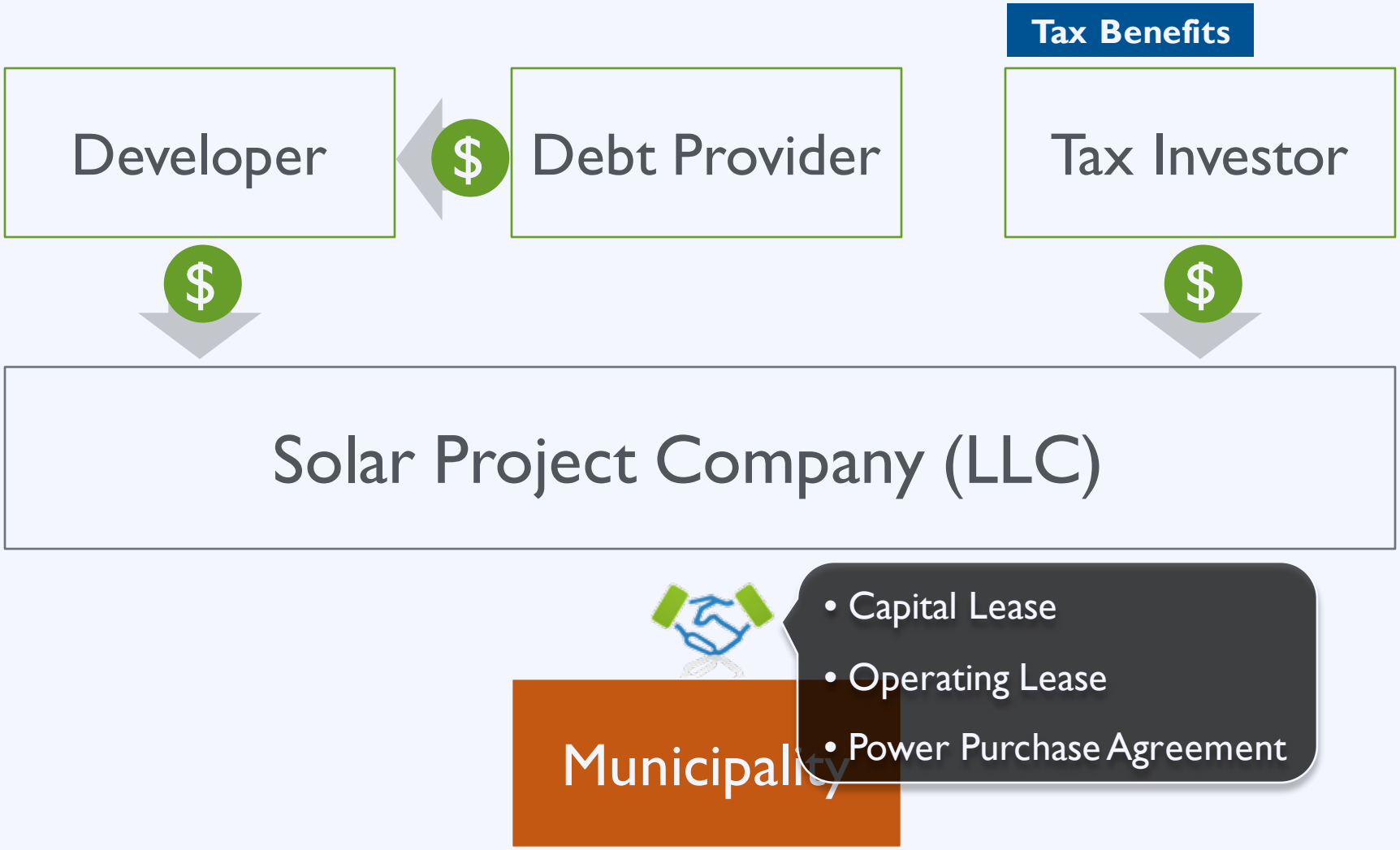
Solar Project Company (LLC)

Municipality

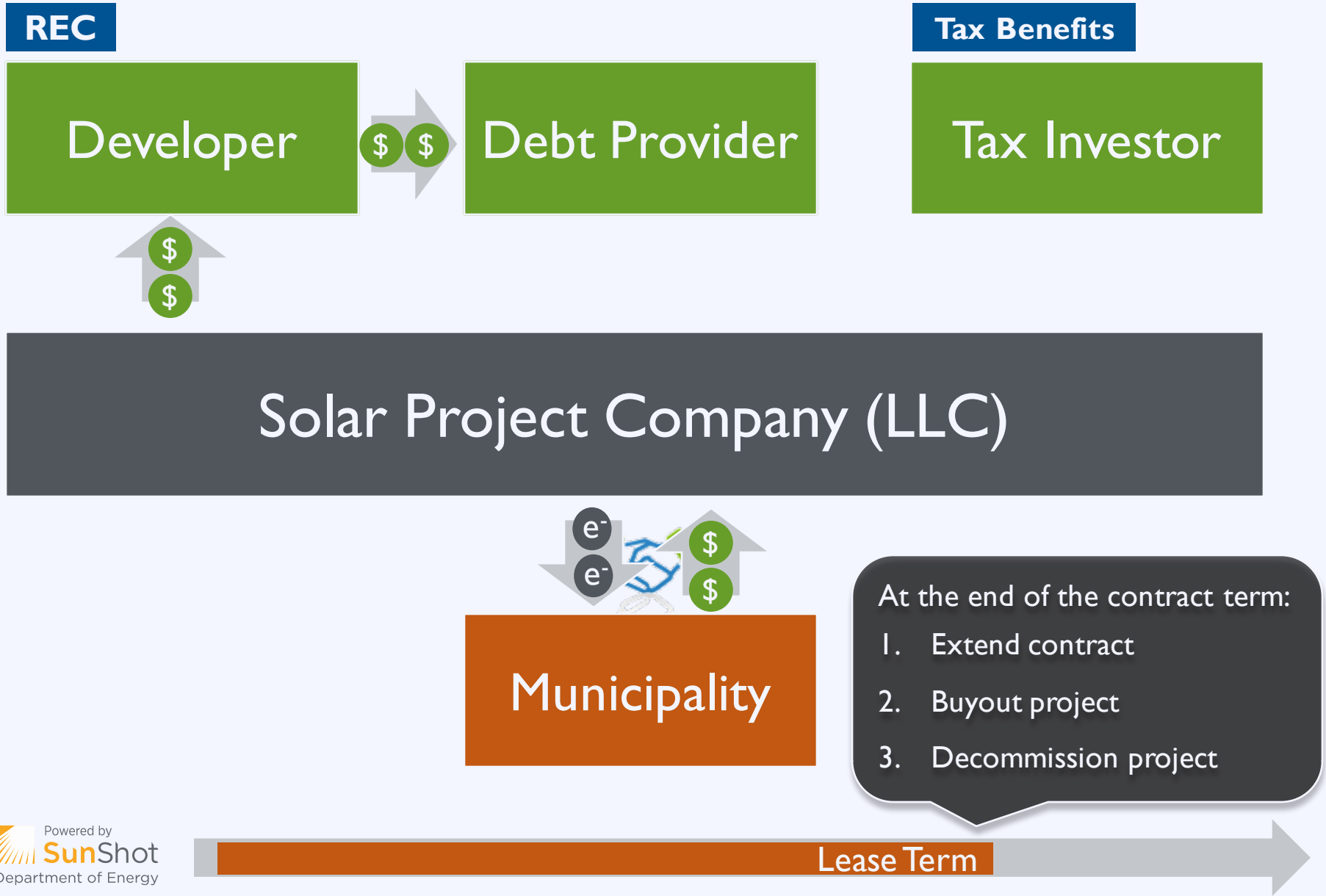
What Investors Look For

- Projected future cash flows
- Offtaker creditworthiness
- Contract risk
- Technology risk
- Availability and types of incentives

Third Party Ownership



Third Party Ownership



Third Party: Capital Lease

REC

Tax Benefits

Developer

Debt Provider

Tax Investor

Solar Project Company (LLC)

Closely resembles ownership

Capital Lease

Municipality

NOT entitled to tax benefits

~~Tax Benefits~~

Fixed buy out option

Lease Term

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Third Party: Operating Lease

REC

Tax Benefits

Developer

Debt Provider

Tax Investor

Solar Project Company (LLC)

Operating Lease

Assumes the performance risk

Municipality

Tax benefits pass through

The buyout option must be at fair market value

Lease Term

Third Party: PPA

REC

Tax Benefits

Developer

Debt Provider

Tax Investor

Solar Project Company (LLC)

Assumes the performance risk

Power Purchase Agreement

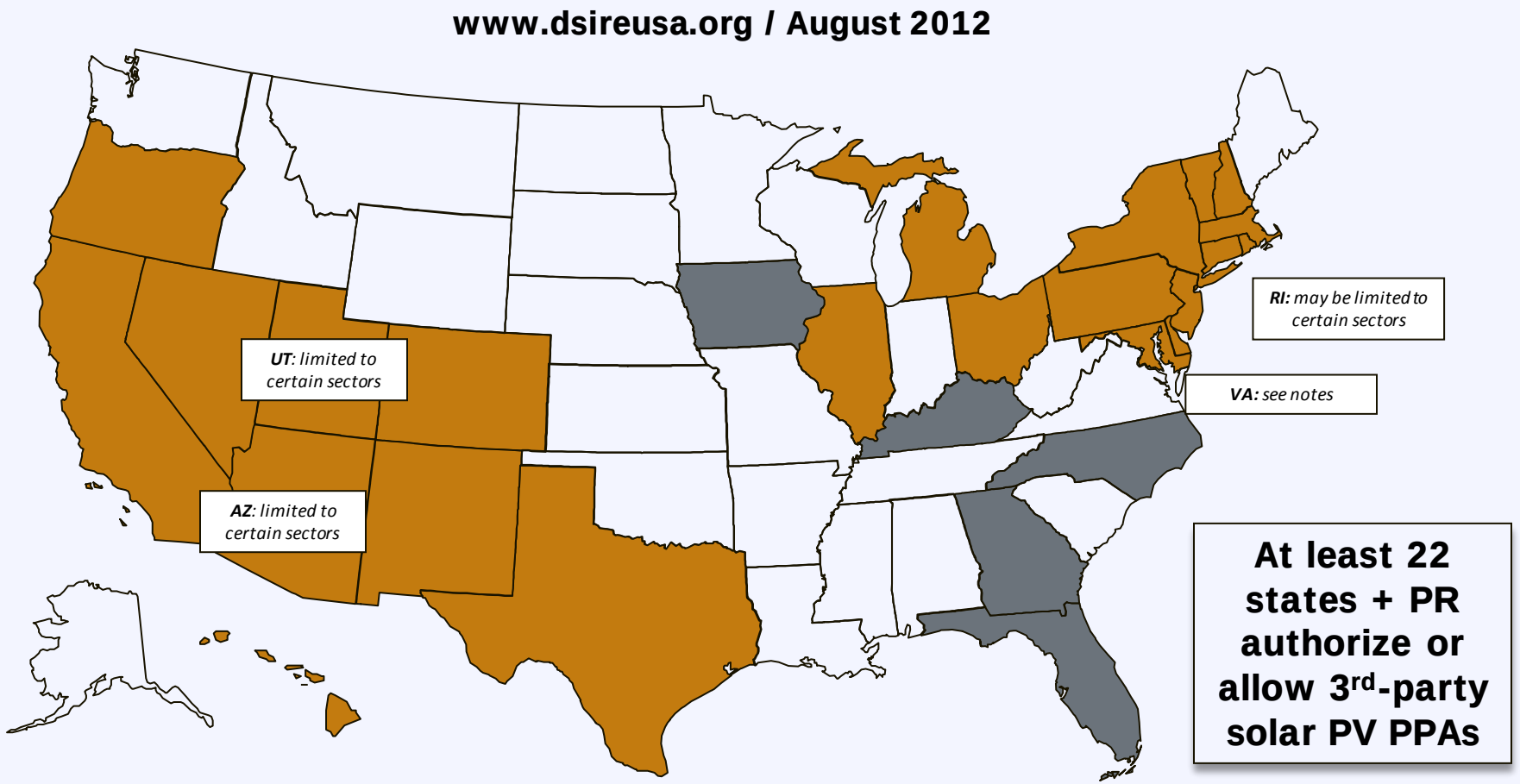
Municipality

Tax benefits pass through

The buyout option must be at fair market value

Power Purchase Term

Third Party: Policy



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.

Third Party Ownership

Pros

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

Cons

- Not supported in all states
- Don't keep RECs

Third Party Ownership

Negotiation points:

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

Ownership Structures

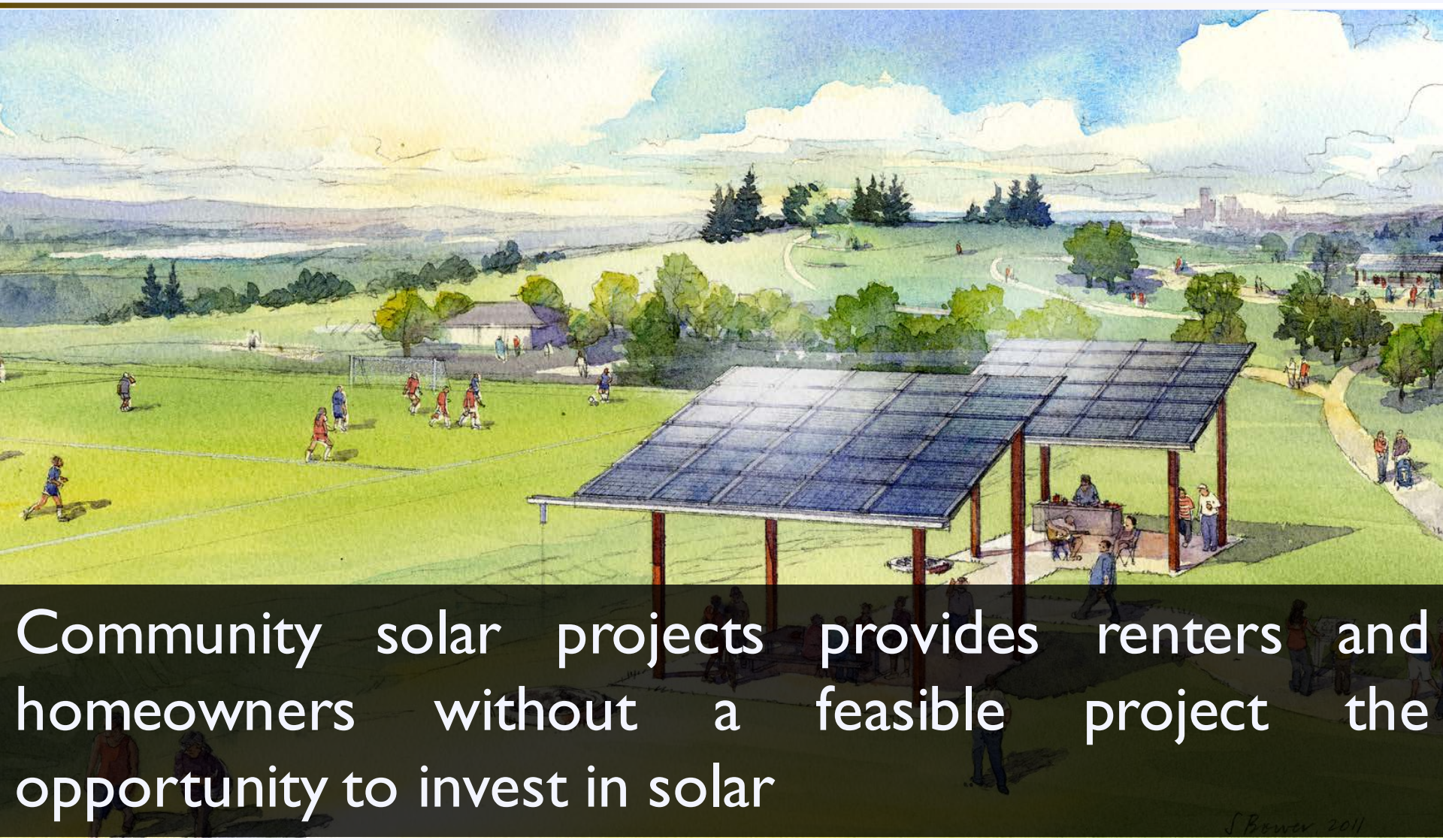
1. Direct Ownership

2. Third Party Ownership

- Self Ownership Model
- Public Lease Model
- Investment Model

3. Community Ownership

Community Ownership

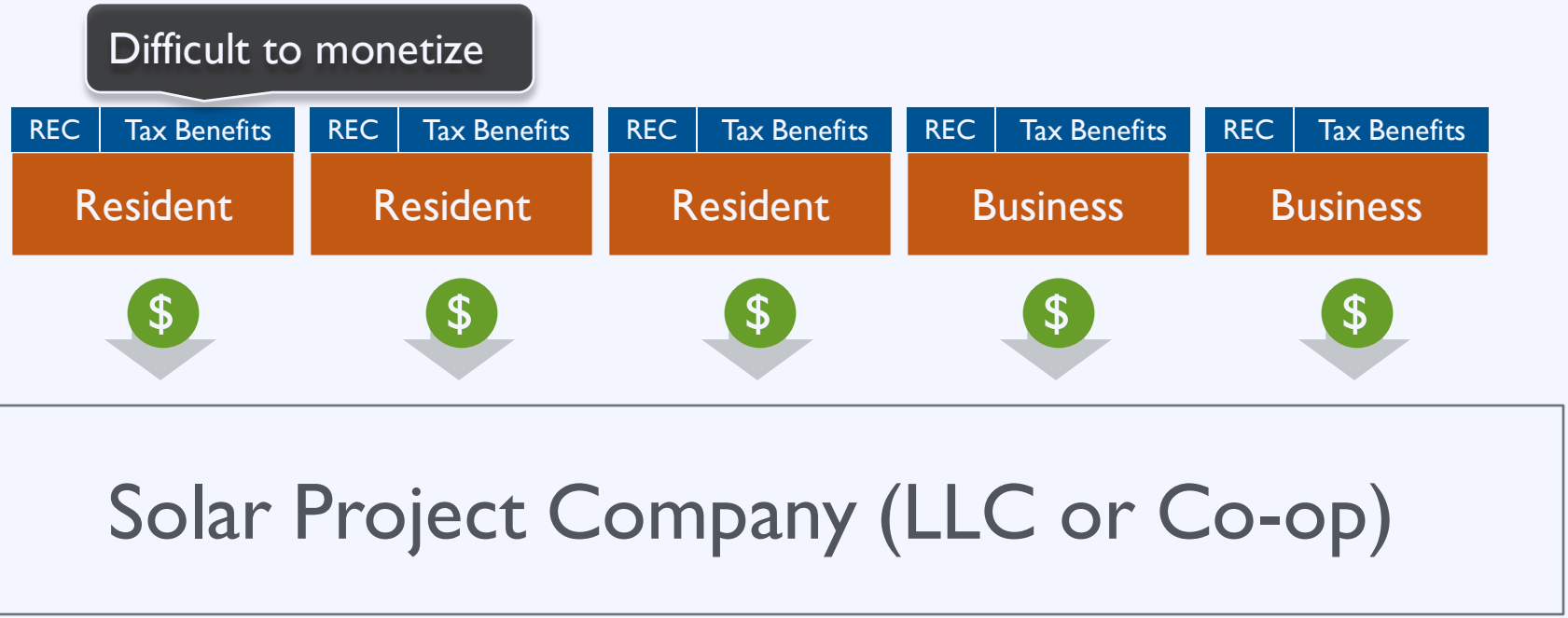


Community solar projects provides renters and homeowners without a feasible project the opportunity to invest in solar

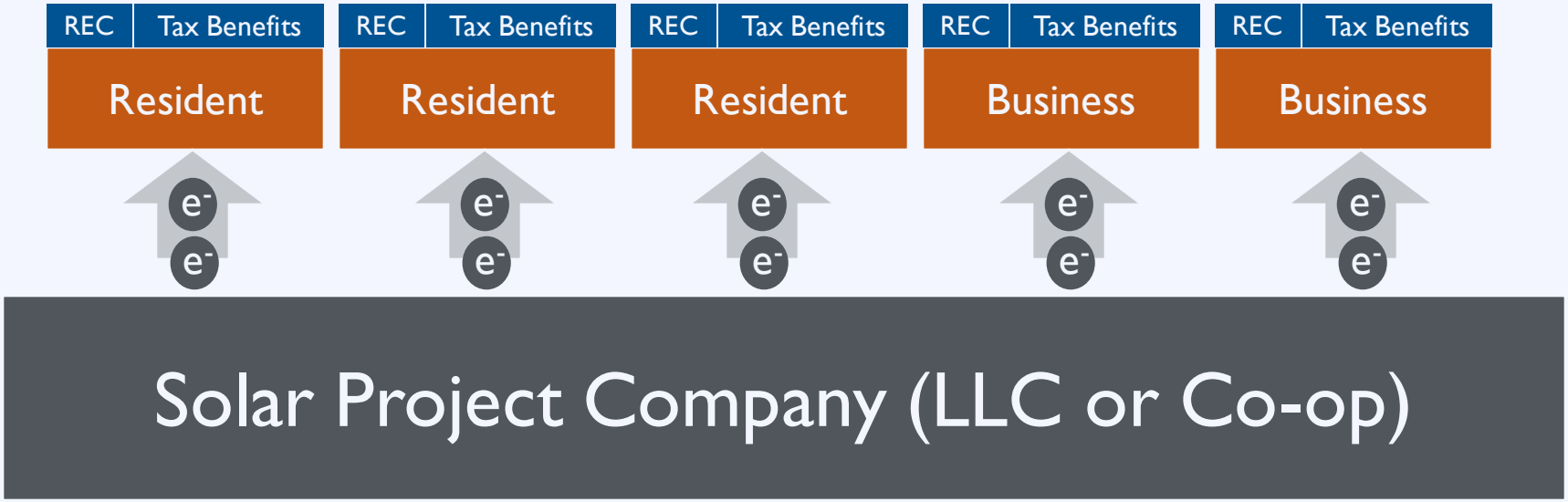
Powered by SunShot
U.S. Department of Energy

Source: Seattle City Light

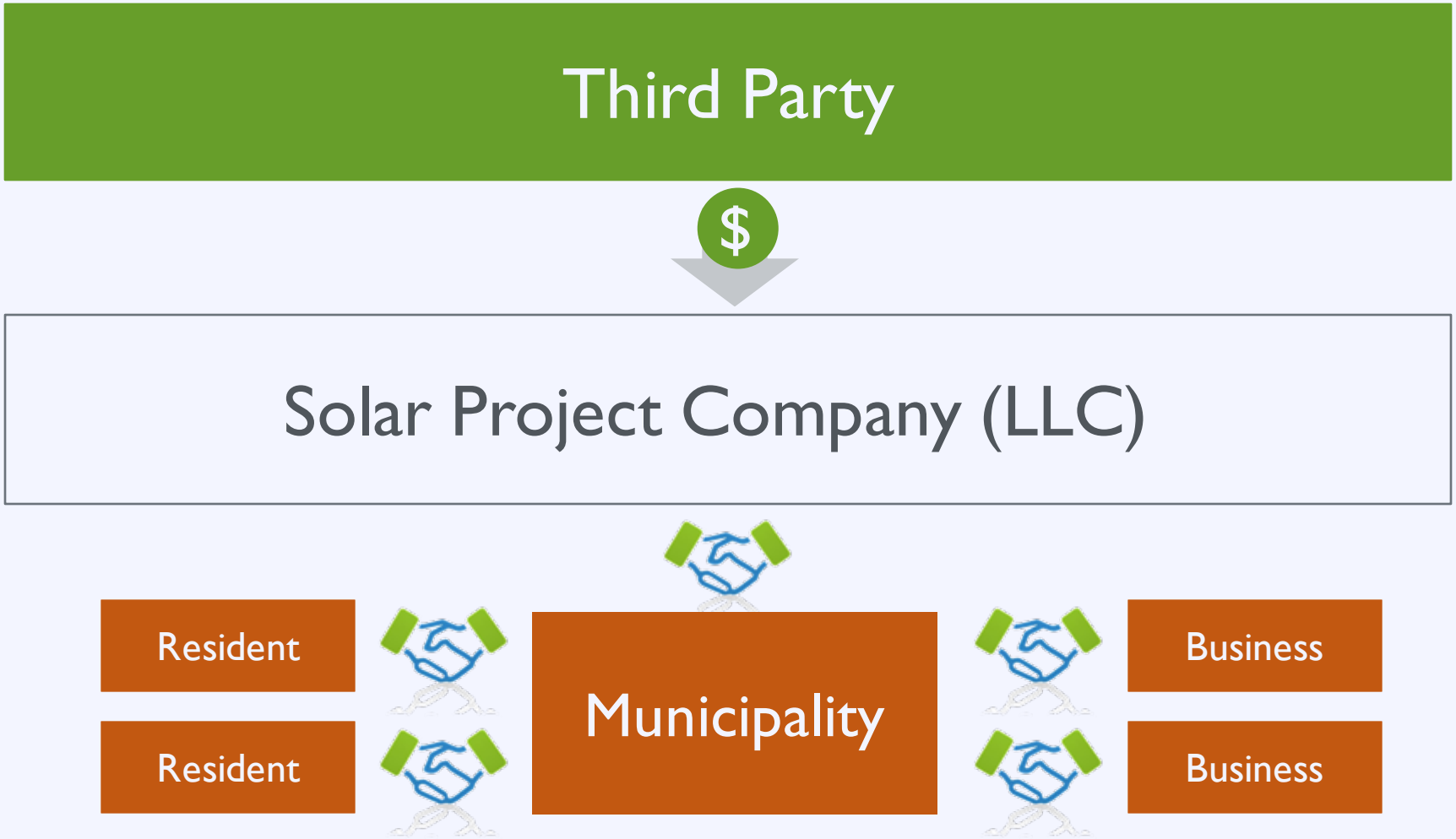
Community: Self Ownership



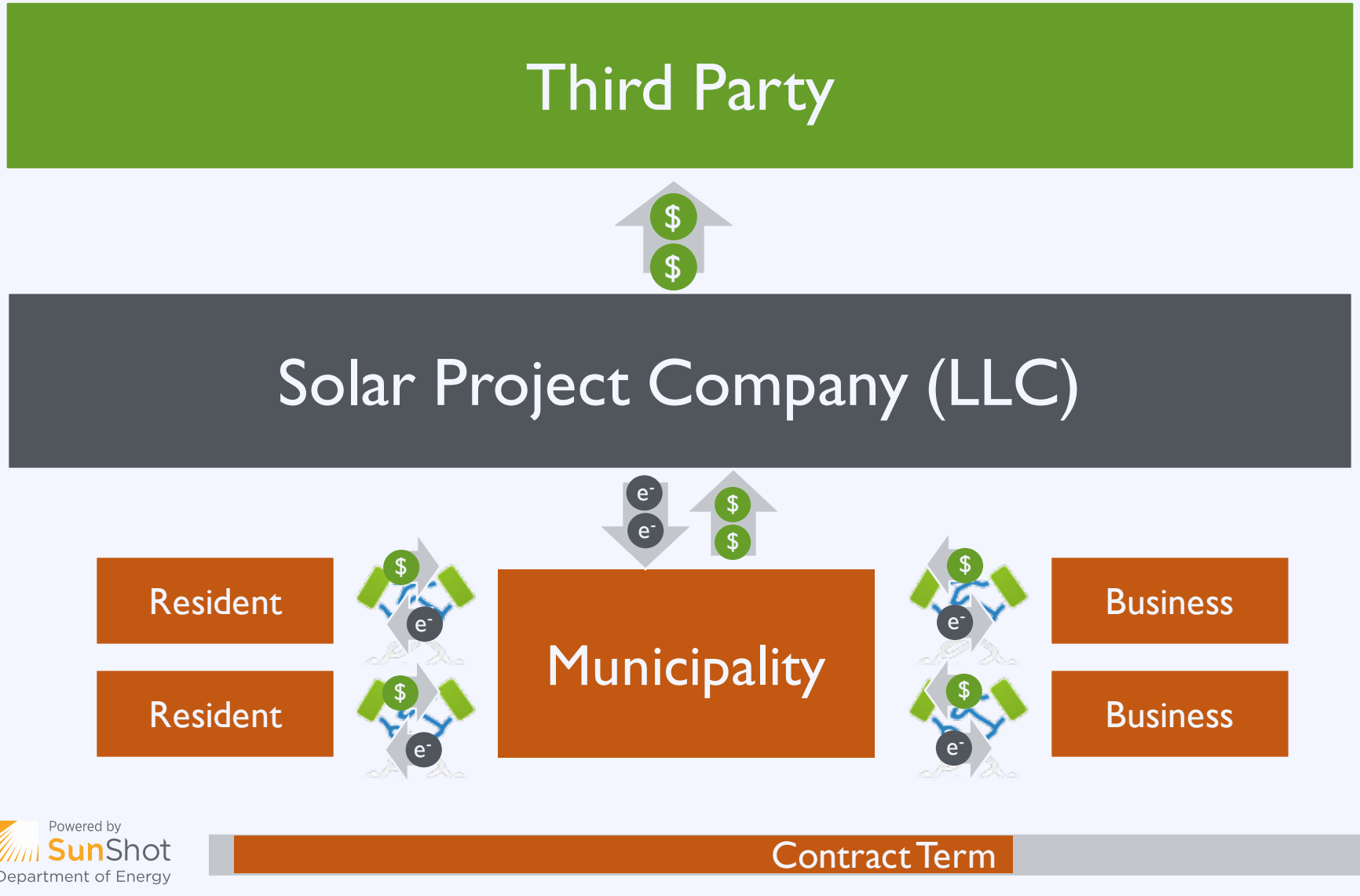
Community: Self Ownership



Community: Public Lease



Community: Public Lease



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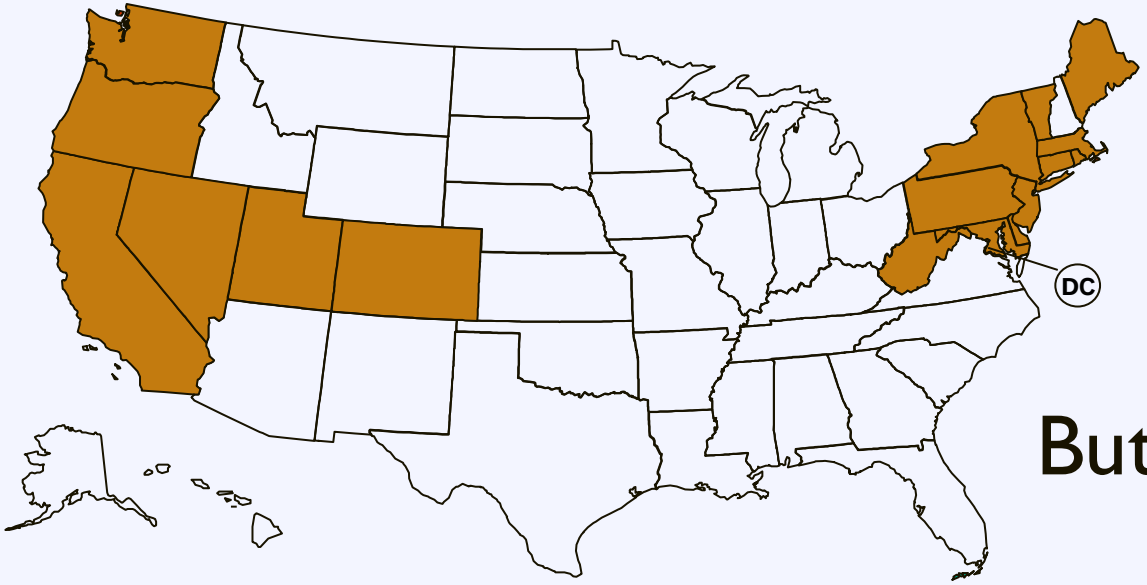
Virtual Net Metering

Virtual Net Metering

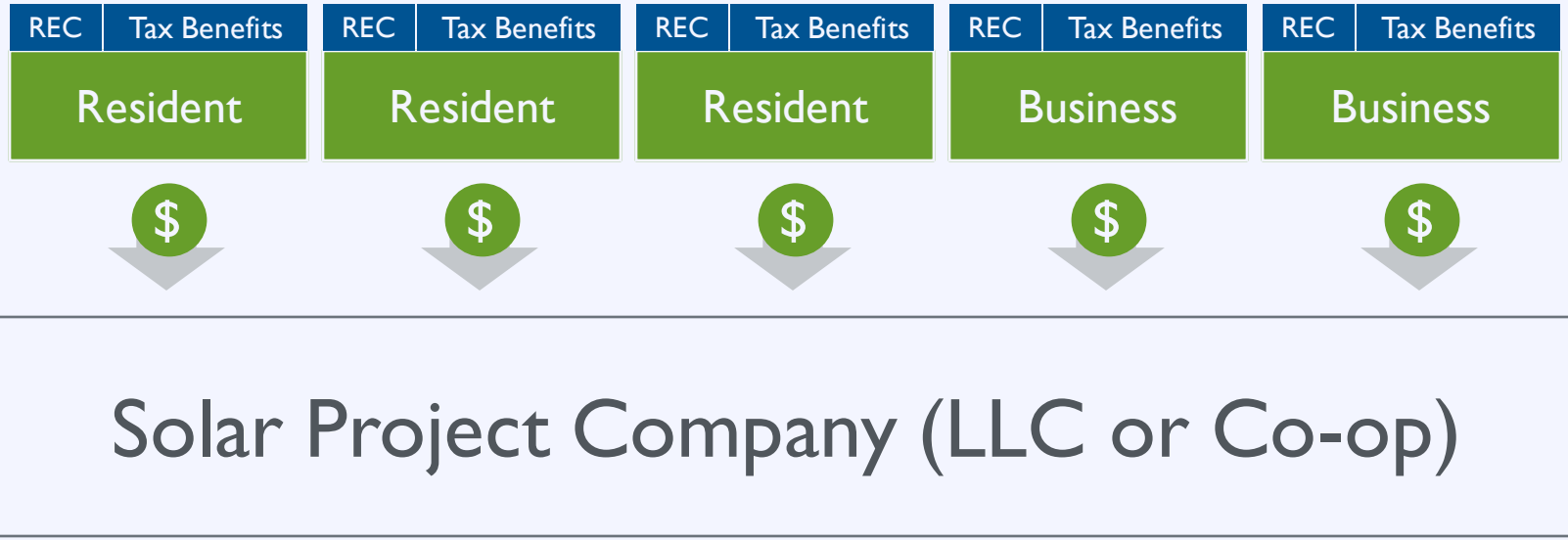


Aggregation of some form authorized by state

But…It's complicated

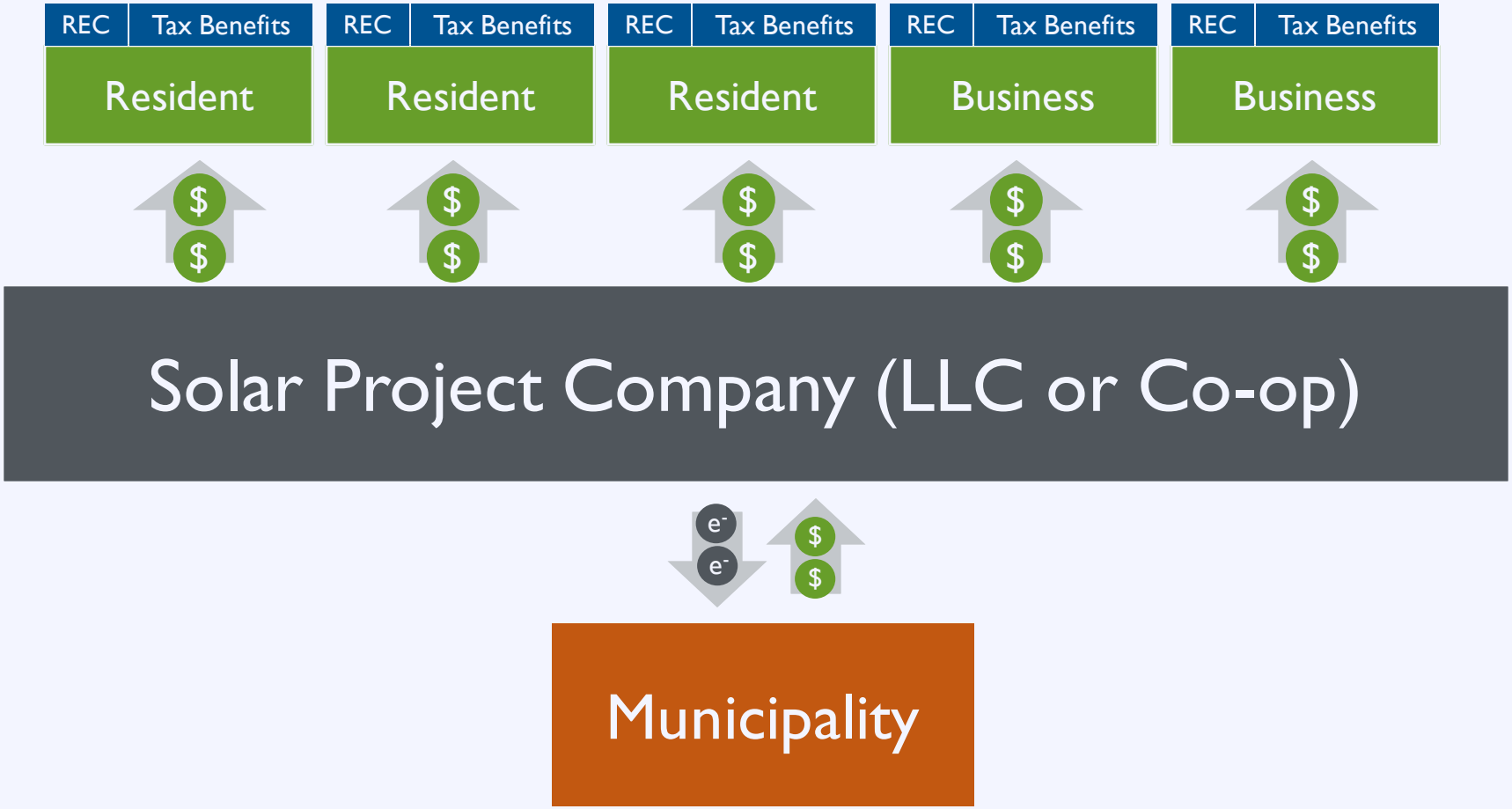
- Ownership requirements
- Contiguous vs. non-contiguous properties
- Multiple customers
- Multiple generators
- Modified system/aggregate system size limits
- Rollover rates
- Distance limitations
- Number of accounts
- How to address accounts on different tariffs

Community: Investment



Community: Investment

No need for Virtual Net Metering



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Contract Term

Financing: Resources

Resource **Solar Project Financing**

A guide for deploying solar PV projects on public property by state and local governments

www.nrel.gov

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Q & A

Agenda

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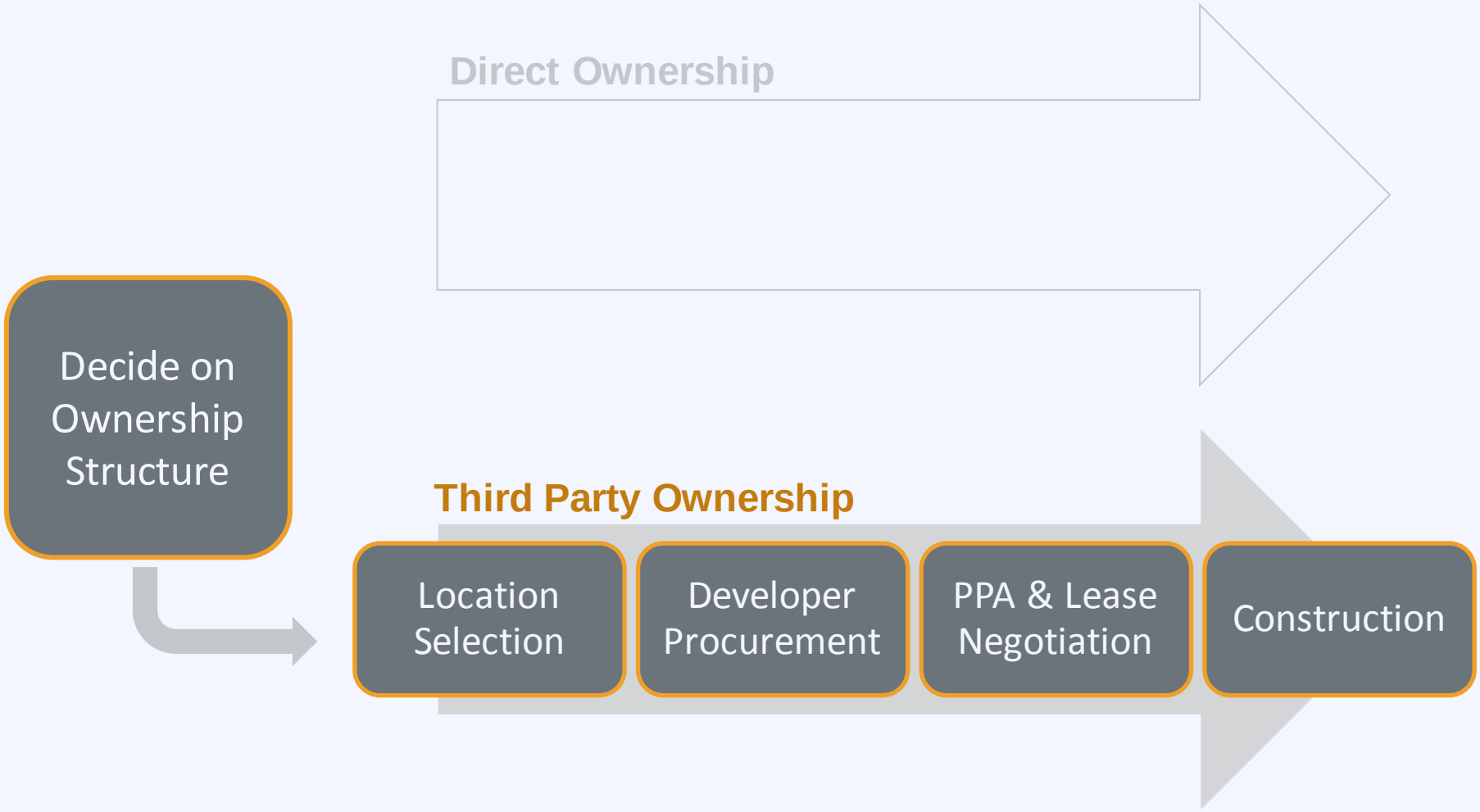
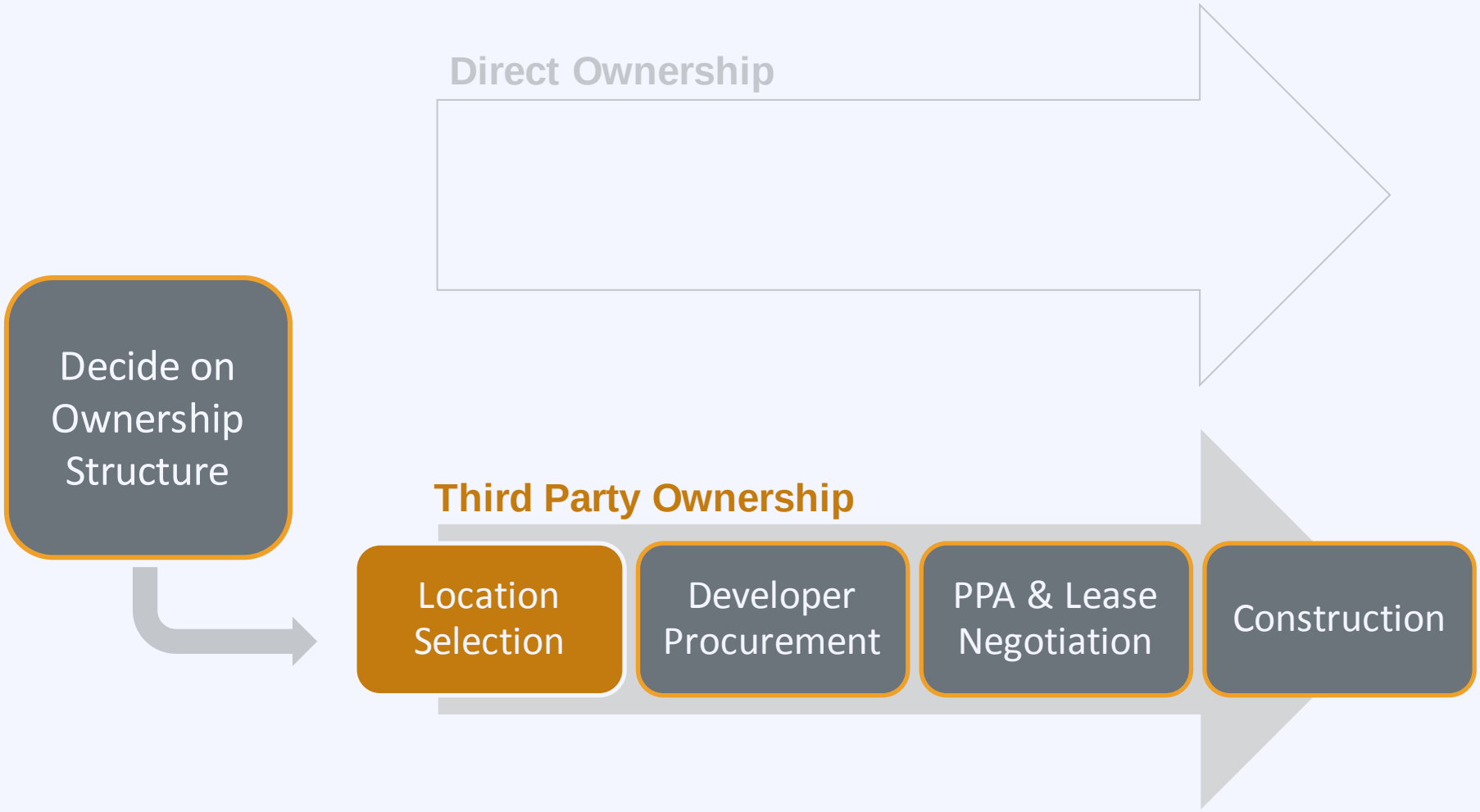
Case Studies: Third-Party Ownership, Hybrid Model, Community Ownership

Process


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

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

Step 2: Developer Procurement

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

50% savings in administrative costs

10-15% reduction in energy cost

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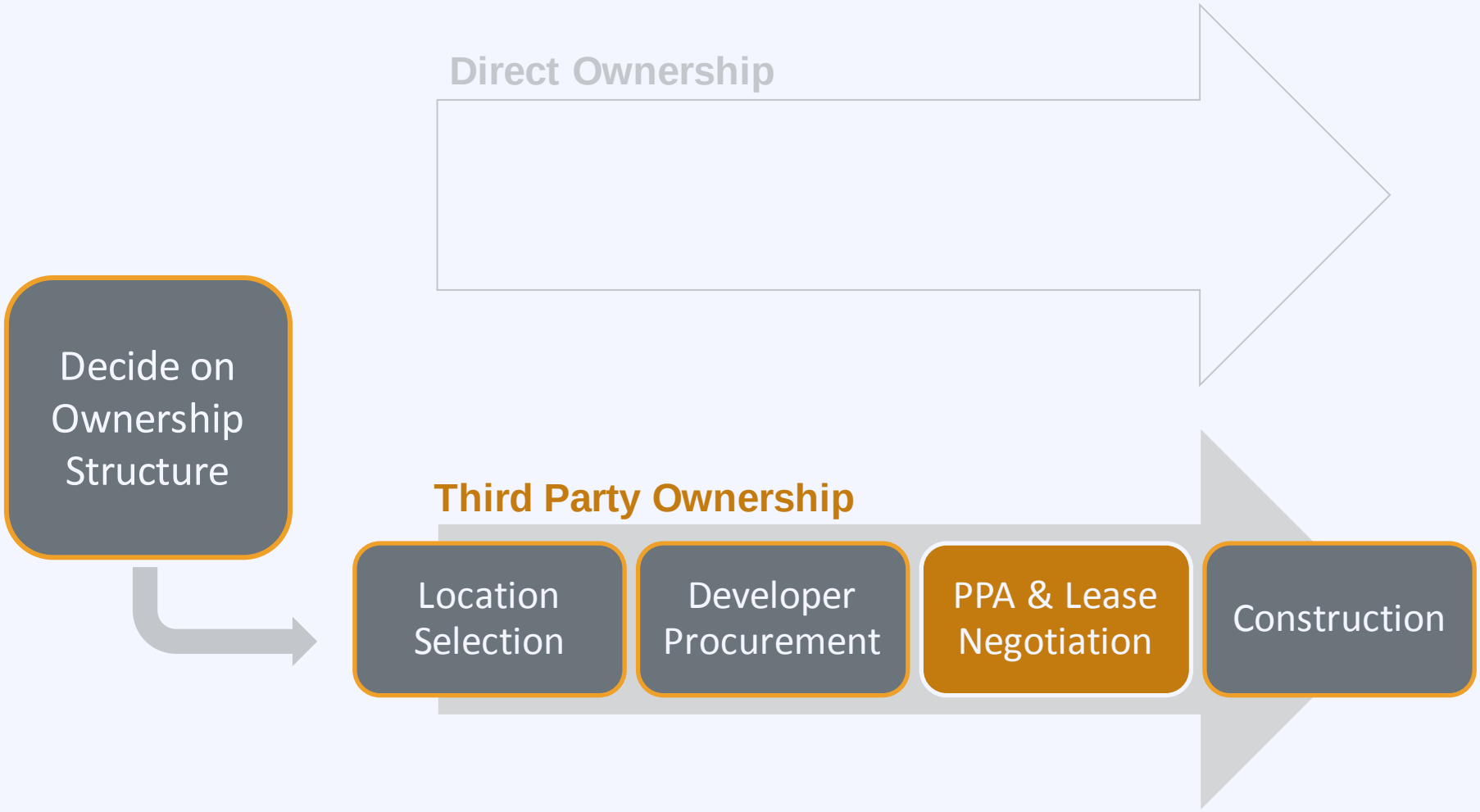
Source: NREL Webinar "Procuring and Implementing Solar Projects on Public Buildings: How to Avoid Common Pitfalls" December 8, 2010

Process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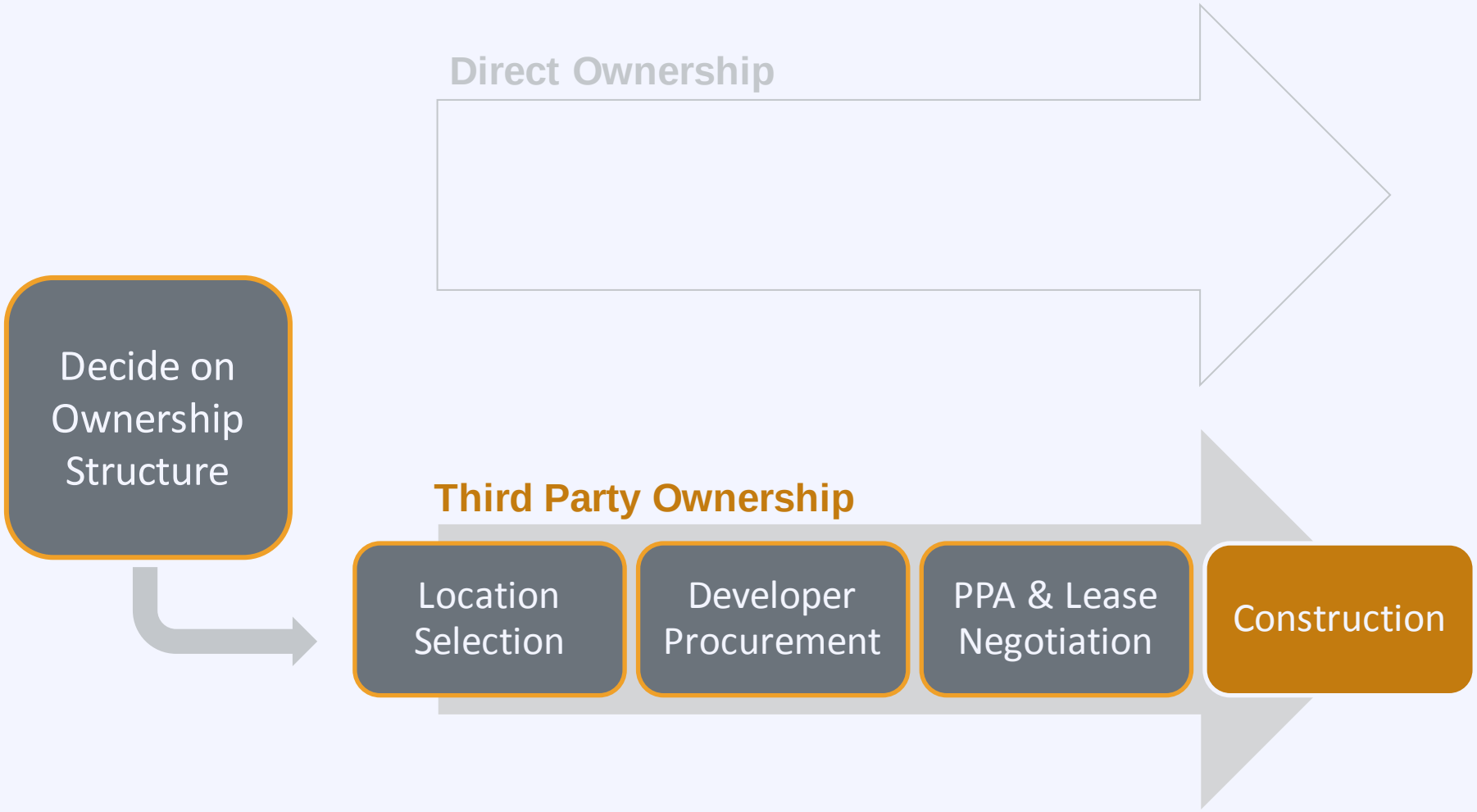
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Third Party Ownership

Pros

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

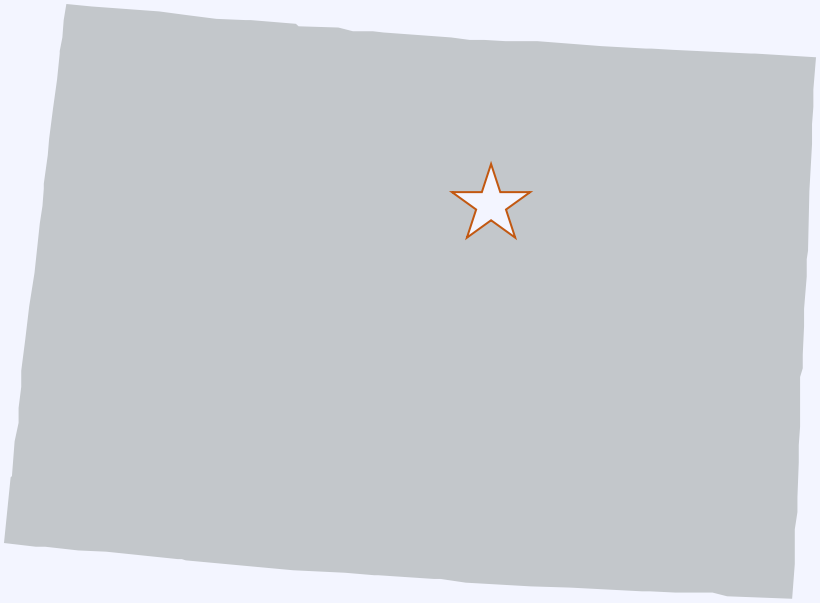
Cons

- Market electricity price risk
- 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

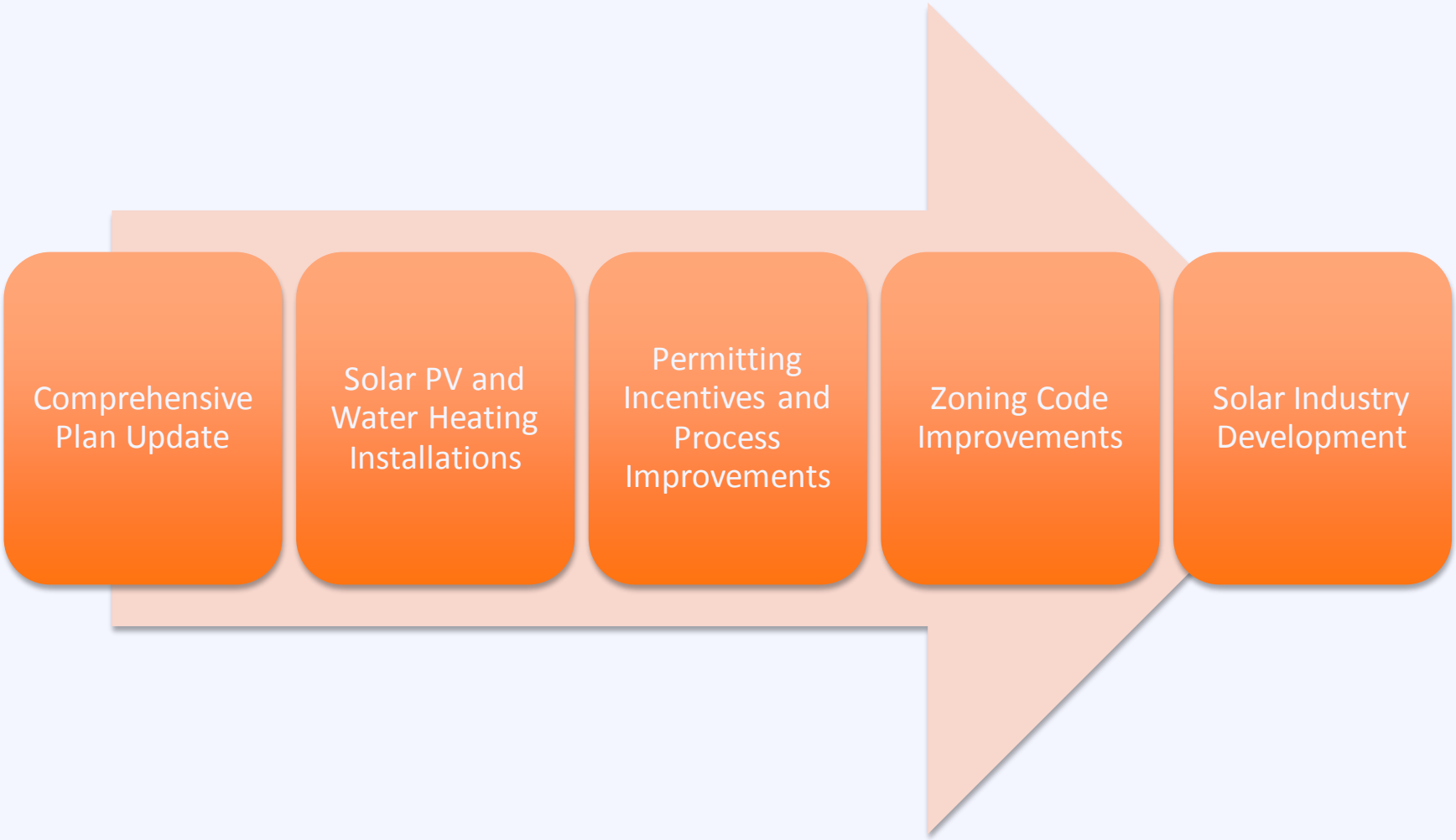
PPAs: Case Study



Aurora, Colorado

Population: 325,078

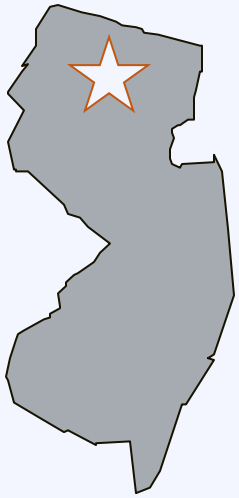
PPAs: Case Study



PPAs: Case Study

- Three 100 kW solar PV installations
  - Aurora Municipal Court
  - Sand Creek Water Reuse Facility (ground mounted)
  - North Facilities Building
- 3rd Party PPAs legal in CO
- Financed by PPAs
- Produce 460,200 kWh annually, enough to power 50 average homes

Bond-PPA Hybrid: Case Study



Morris County, New Jersey

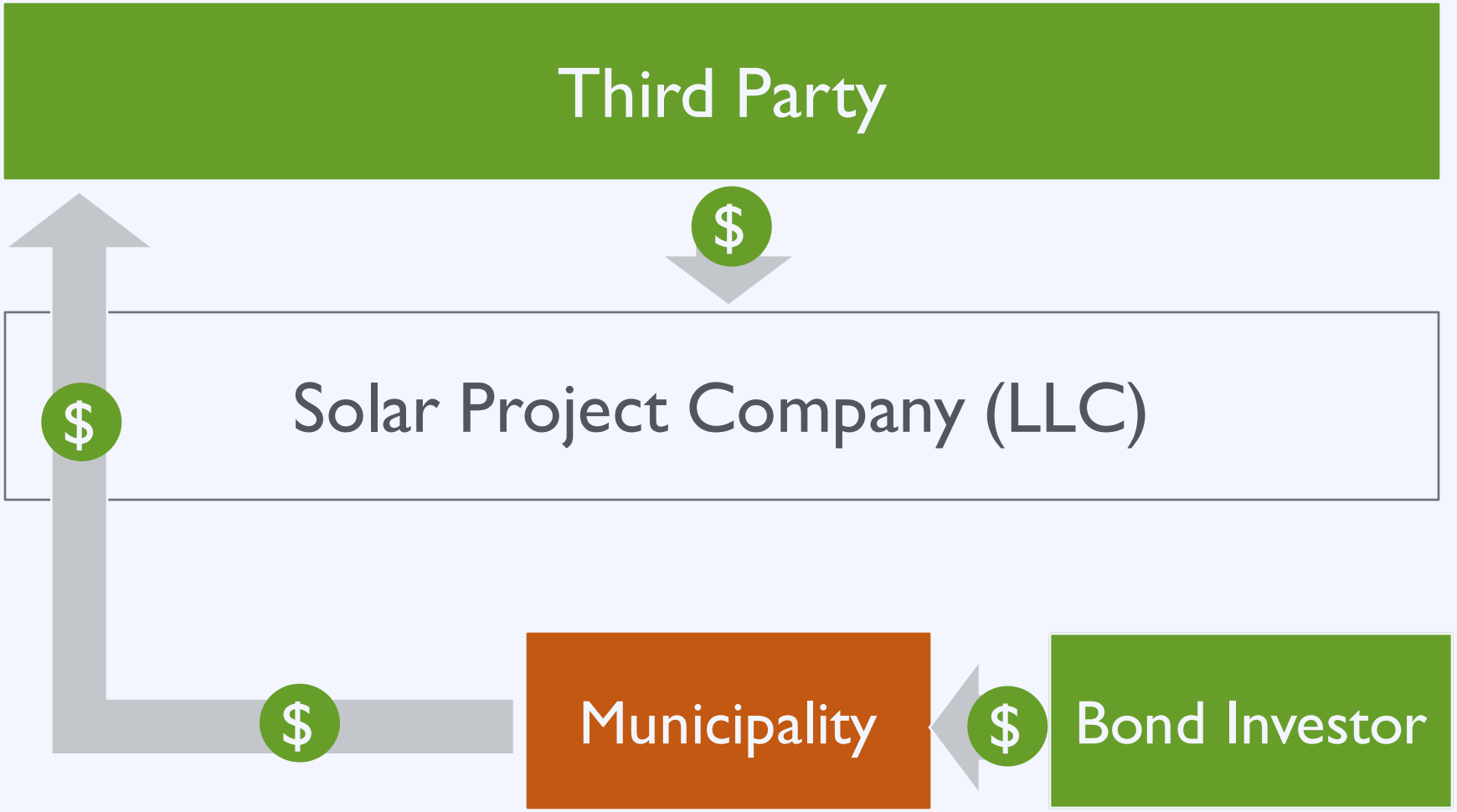
Population: 492,276

Bond-PPA Hybrid: Case Study

- Used to install systems on schools, colleges, county administrative buildings, and other public buildings
- Local government issues RFP for developer
- Enters into lease-purchase agreement, PPA, security agreement with winning developer
- Bonds issued for this model are considered to be used for private use and are taxable
- The lease payments developer makes cover the bond payments

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

Bond-PPA Hybrid



Bond-PPA Hybrid

REC | Tax Benefits

Third Party

Closely resembles ownership

Capital Lease

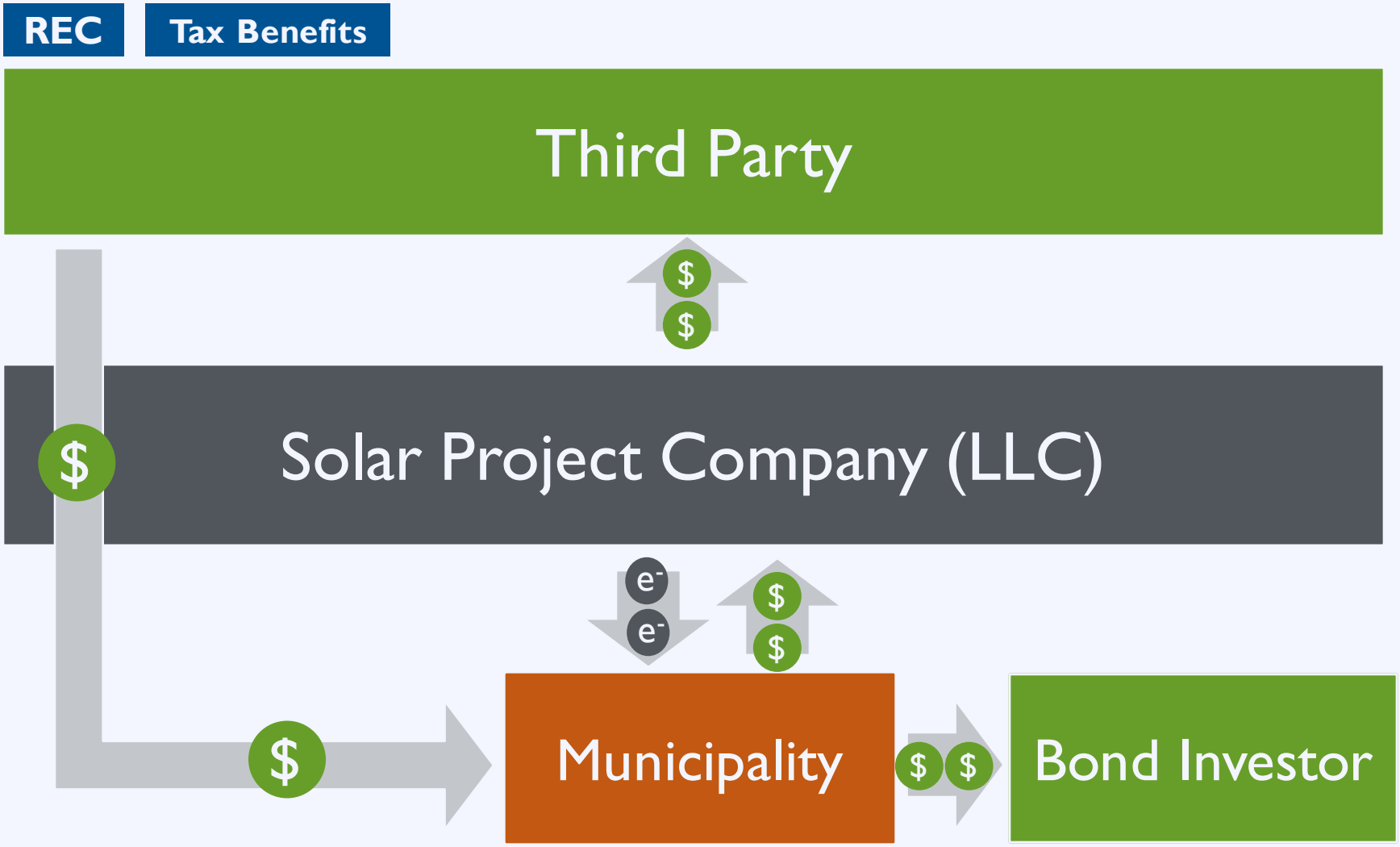
Solar Project Company (LLC)

Power Purchase Agreement

Municipality

Bond Investor

Bond-PPA Hybrid



Replication of "Morris Model"

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

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

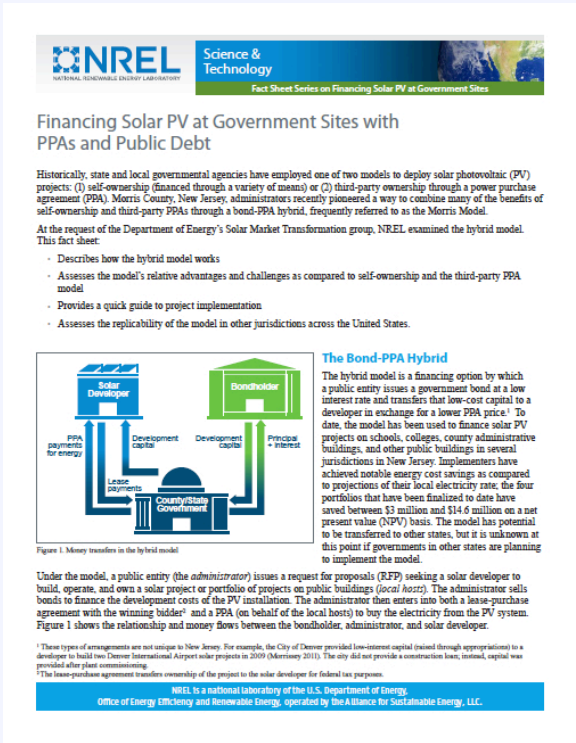
Bond-PPA Hybrid: Resources

Resource

Financing Solar PV at Government Sites with PPAs and Public Debt

A fact sheet on how the hybrid bond-PPA model works.

http://www.nrel.gov/docs/fy12osti/53622.pdf



NREL Science & Technology

Fact Sheet Series on Financing Solar PV at Government Sites

Financing Solar PV at Government Sites with PPAs and Public Debt

Historically, state and local governmental agencies have employed one of two models to deploy solar photovoltaic (PV) projects: (1) self-ownership (financed through a variety of means) or (2) third-party ownership through a power purchase agreement (PPA). Morris County, New Jersey, administrators recently pioneered a way to combine many of the benefits of self-ownership and third-party PPAs through a bond-PPA hybrid, frequently referred to as the Morris Model.

At the request of the Department of Energy's Solar Market Transformation group, NREL examined the hybrid model. This fact sheet:

- Describes how the hybrid model works
- Assesses the model's relative advantages and challenges as compared to self-ownership and the third-party PPA model
- Provides a quick guide to project implementation
- Assesses the replicability of the model in other jurisdictions across the United States.

Figure 1. Money transfers in the hybrid model

The Bond-PPA Hybrid

The hybrid model is a financing option by which a public entity issues a government bond at a low interest rate and transfers that low-cost capital to a developer in exchange for a lower PPA price.[1] To date, the model has been used to finance solar PV projects on schools, colleges, county administrative buildings, and other public buildings in several jurisdictions in New Jersey. Implementers have achieved notable energy cost savings as compared to projections of their local electricity rate; the four portfolios that have been finalized to date have saved between $3 million and $14.6 million on a net present value (NPV) basis. The model has potential to be transferred to other states, but it is unknown at this point if governments in other states are planning to implement the model.

Under the model, a public entity (the *administrator*) issues a request for proposals (RFP) seeking a solar developer to build, operate, and own a solar project or portfolio of projects on public buildings (*local hosts*). The administrator sells bonds to finance the development costs of the PV installation. The administrator then enters into both a lease-purchase agreement with the winning bidder[2] and a PPA (on behalf of the local hosts) to buy the electricity from the PV system. Figure 1 shows the relationship and money flows between the bondholder, administrator, and solar developer.

[1] These types of arrangements are not unique to New Jersey. For example, the City of Denver provided low-interest capital (raised through appropriations) to a developer to build two Denver International Airport solar projects in 2009 (Morrissey 2011). The city did not provide a construction loan; instead, capital was provided after plant commissioning.
[2] The lease-purchase agreement transfers ownership of the project to the solar developer for federal tax purposes.

NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

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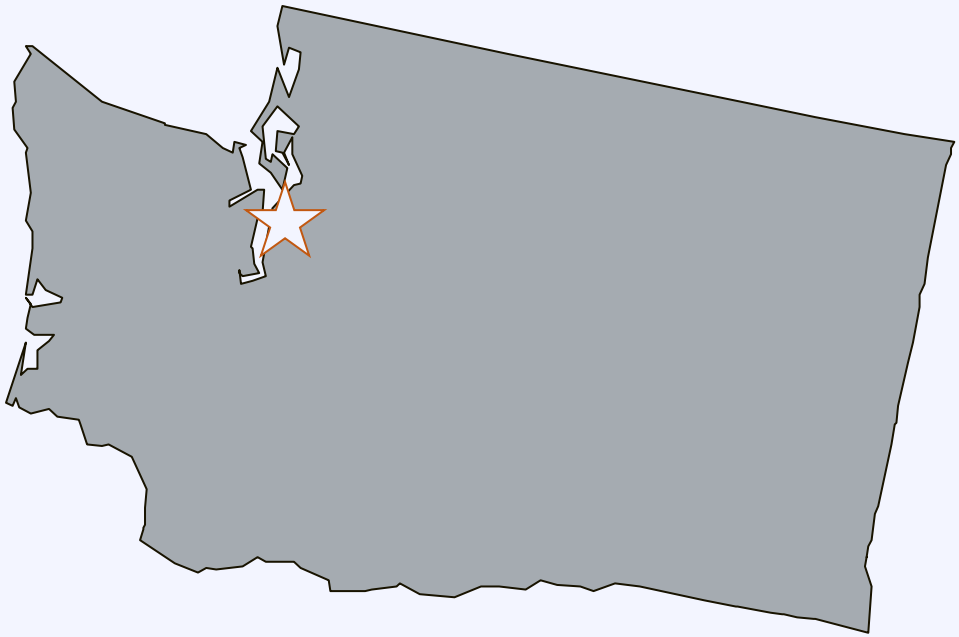
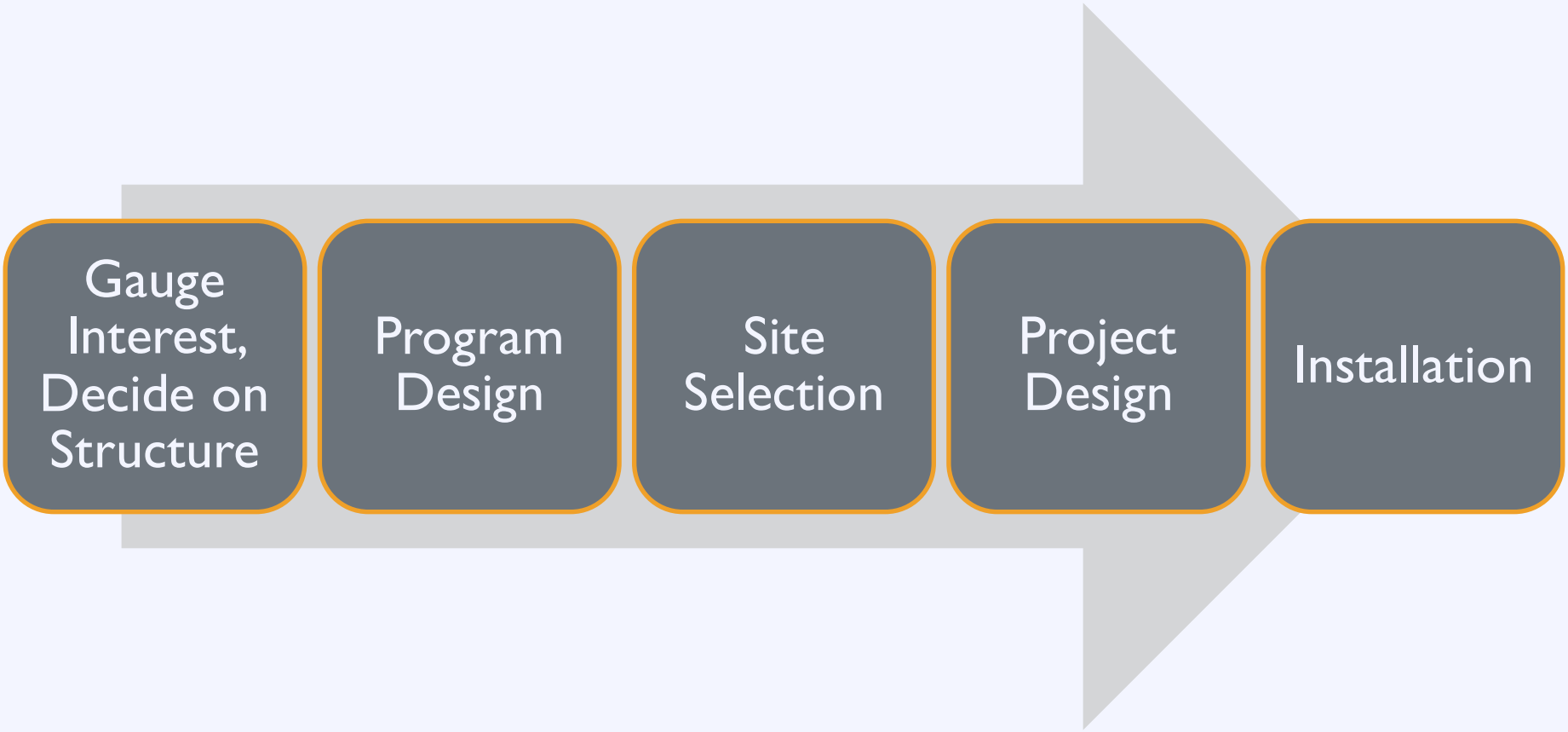
Community Shared Solar: Case Study



Seattle, Washington

Population: 620,778

Community Shared Solar: Process



Community Shared Solar: Case Study

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Seattle City Light's Jefferson Park Project

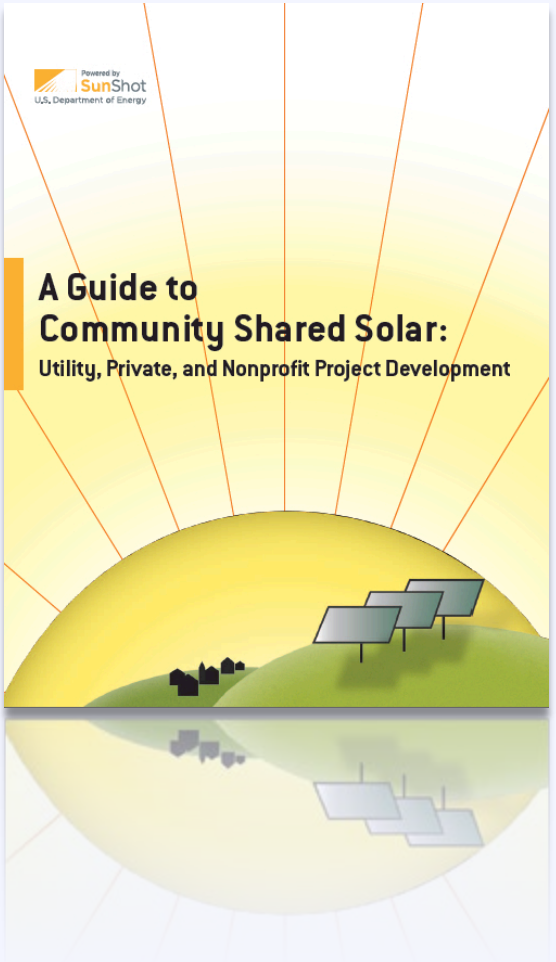
Community Shared Solar: Resources

Resource

A Guide to Community Shared Solar

A guide on different types of community shared solar projects, case studies of existing projects, and important considerations.

http://www.nwseed.org/documents/ComSolarGB_2012.pdf



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Dimitrious Laloudakis

City of Phoenix

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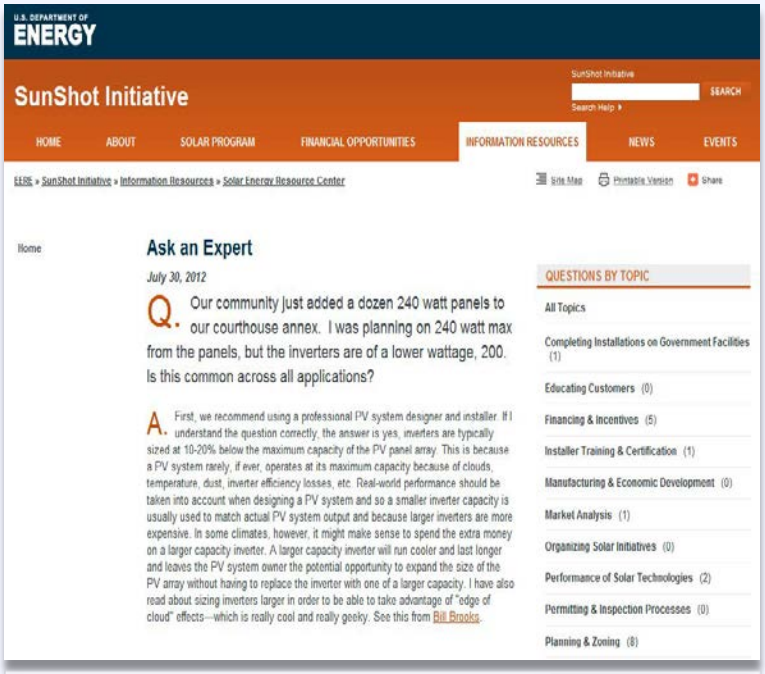
Activity: Next Steps

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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Meister Consultants Group

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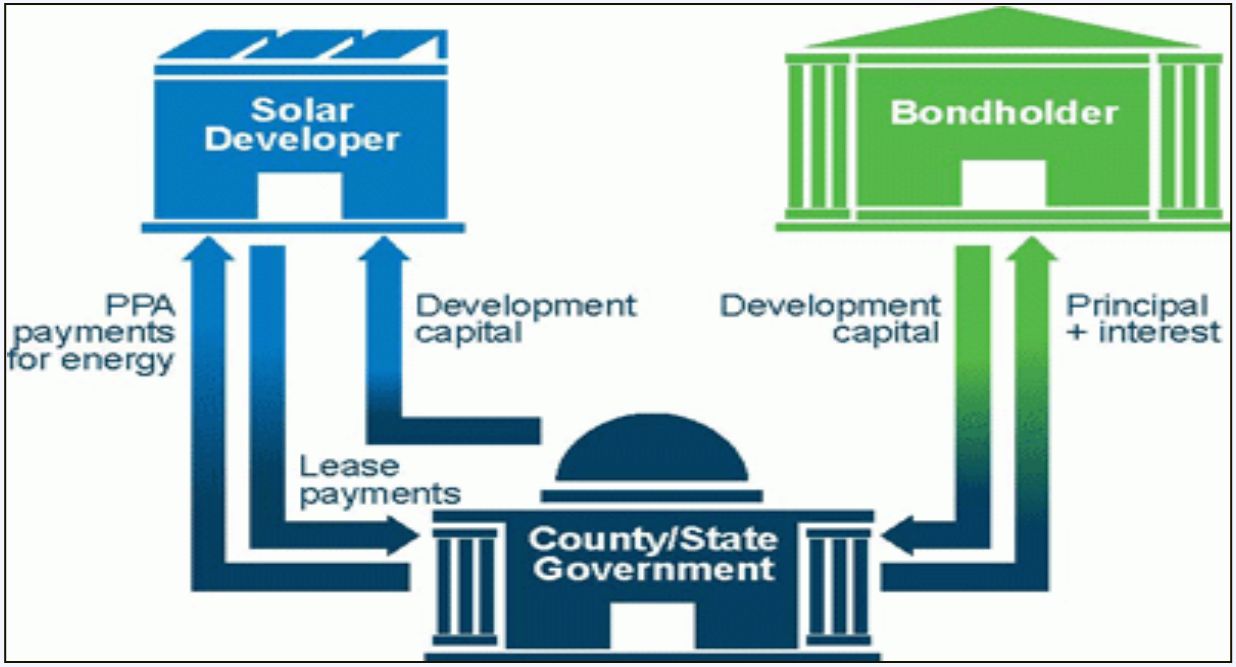
(617) 209 -1990

Bond-PPA Hybrid: Case Study

Public Debt + PPA = **MORRIS MODEL**



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