NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Briefing on NREL Reports on Solar Policies and Incentives

Clean Energy States Alliance and
State-Federal RPS Collaborative
Webinar

Hosted by
Warren Leon, CESA Deputy Director

April 18, 2013

CleanEnergy States Alliance

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- You can enter questions for today's event by typing them into the "Question Box" on the webinar console. We will pose your questions, as time allows, following the presentations.
- This webinar is being recorded and will be made available after the call on the CESA website at

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About CESA

Clean Energy States Alliance (CESA) is a national nonprofit organization dedicated to advancing state and local efforts to implement smart clean energy policies, programs, technology innovation, and financing tools to drive increased investment and market making for clean energy technologies.

State-Federal RPS Collaborative

- With funding from the **Energy Foundation** and the **US Department of Energy**, CESA facilitates the **Collaborative**.
- Includes **state RPS administrators and regulators**, **federal agency representatives**, and other stakeholders.
- Advances dialogue and learning about RPS programs by **examining the challenges and potential solutions** for successful implementation of state RPS programs, including **identification of best practices**.
- To get the **monthly newsletter** and announcements of **upcoming events**, sign up for the listserv at: www.cleanenergystates.org/projects/state-federal-rps-collaborative

Today's Guest Speakers

-**Lori Bird and Andy Reger, NREL**
"Incentivizing Distributed Solar: Best Practices"

Lori.Bird@NREL.gov and Andy.Reger@NREL.gov

- **Darlene Steward, NREL**
"State Policy Staging to Optimize Private Investment in Solar Technologies"

Darlene.Steward@NREL.gov

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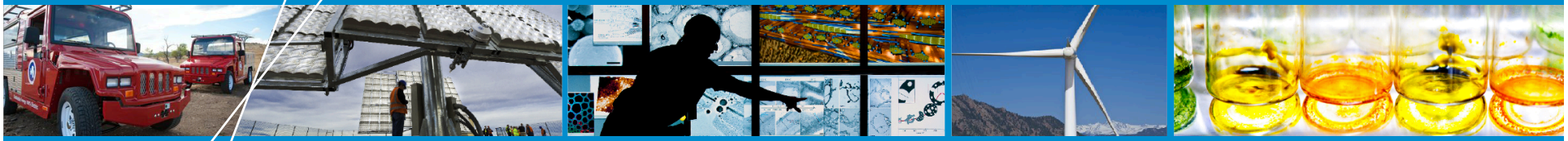
State Policy Staging to Optimize Private Investment in Solar Technologies



CESA Webinar: Briefing on NREL Reports on Solar Policies and Incentives

Darlene Steward

April 18, 2013

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.

Presentation Overview

Presentation Overview

Something about the policies?

Something about the states?

or

Both?

- 2012 Key Findings
- 2013 Strategy and Methods
- Preliminary Findings

19484

2012 Key Findings

Statistical analysis of potential drivers for solar PV:

Market Preparation Policies

- Interconnection Standards
- Net Metering

Renewable Portfolio Standards

- RPS age
- Solar set aside age

Population

19437

2012 Key Findings

Implementing low-cost, market preparation policies prior to more expensive policies might bolster the effectiveness of the latter.

The quality of market preparation policies has an impact on overall development of PV markets.

19437

2013 Strategy

Group states to normalize for non-policy factors

- Verify 2012 results
- Case studies provide detail

2013 Methods

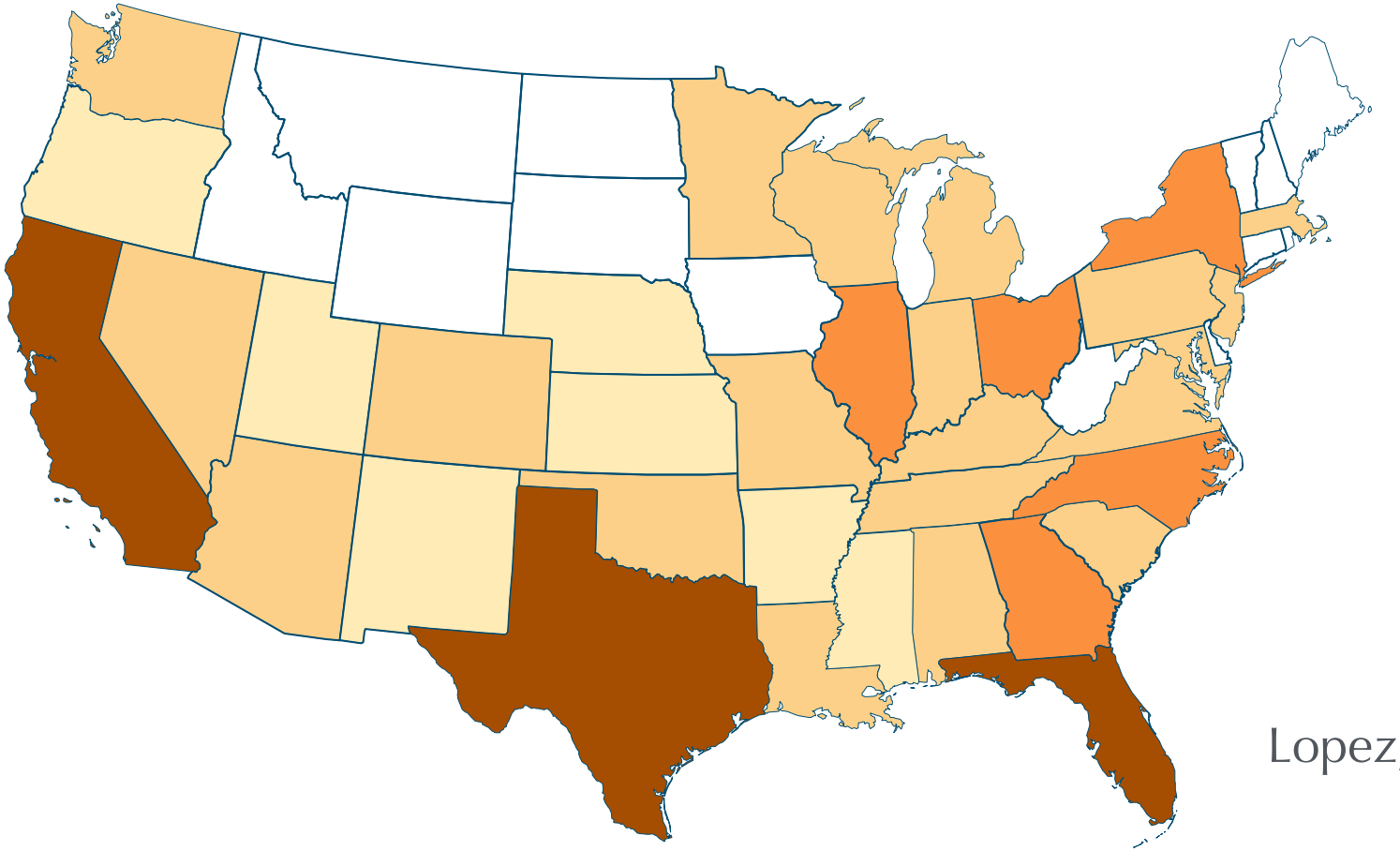
Group states based on four non-policy resource and demographic factors

- Solar rooftop potential (combination of solar resource and available roof area)
- American Council for an Energy Efficient Economy; Energy Efficiency Scorecard
- Median household income
- Residential electricity price

Estimated Technical Potential for Rooftop PV

Thousands of Gigawatt Hours

>50 <5



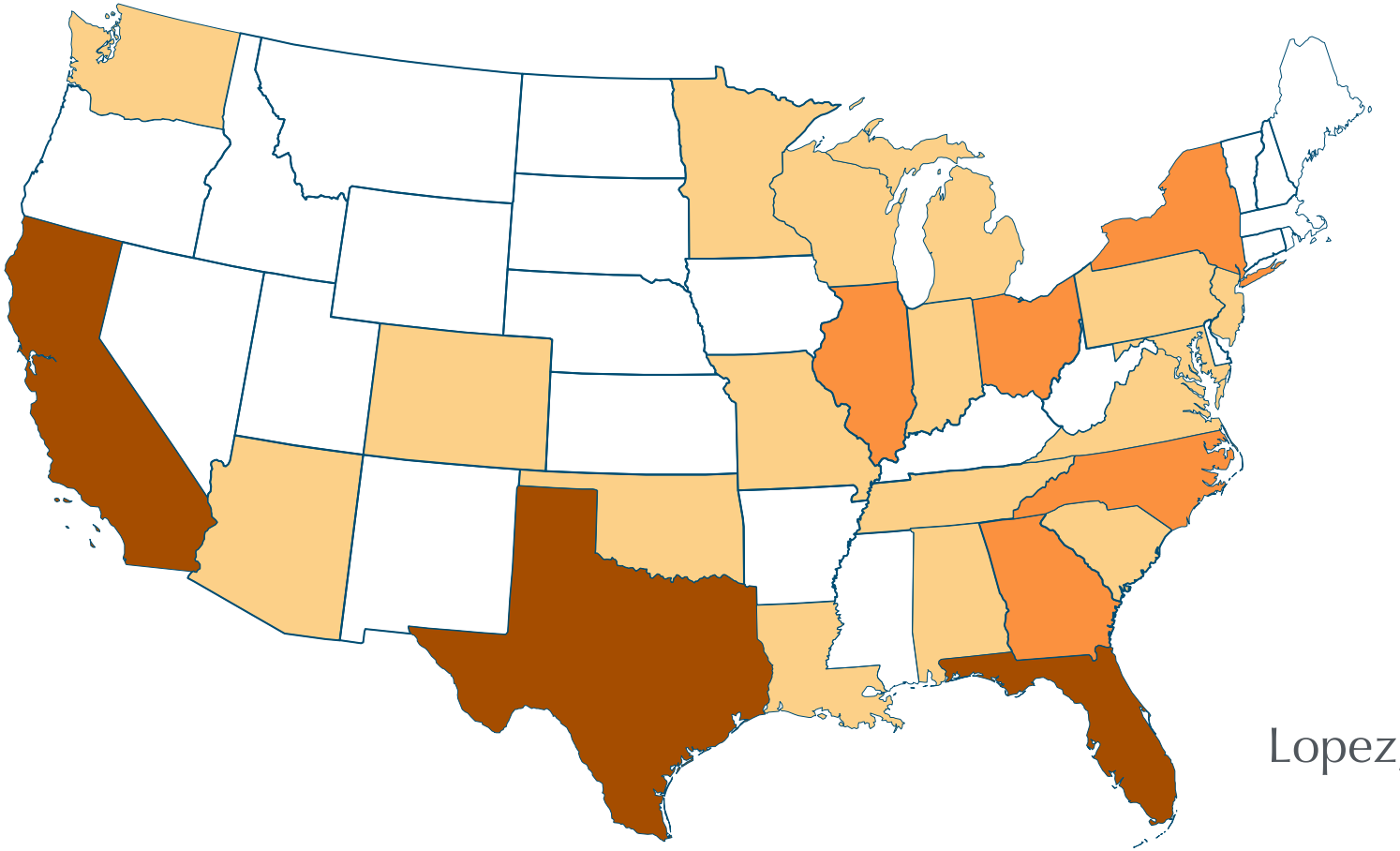
Lopez, 2012

Estimated Technical Potential for Rooftop PV

Thousands of Gigawatt Hours

>50 12,433 = Median

Solar technical potential > median

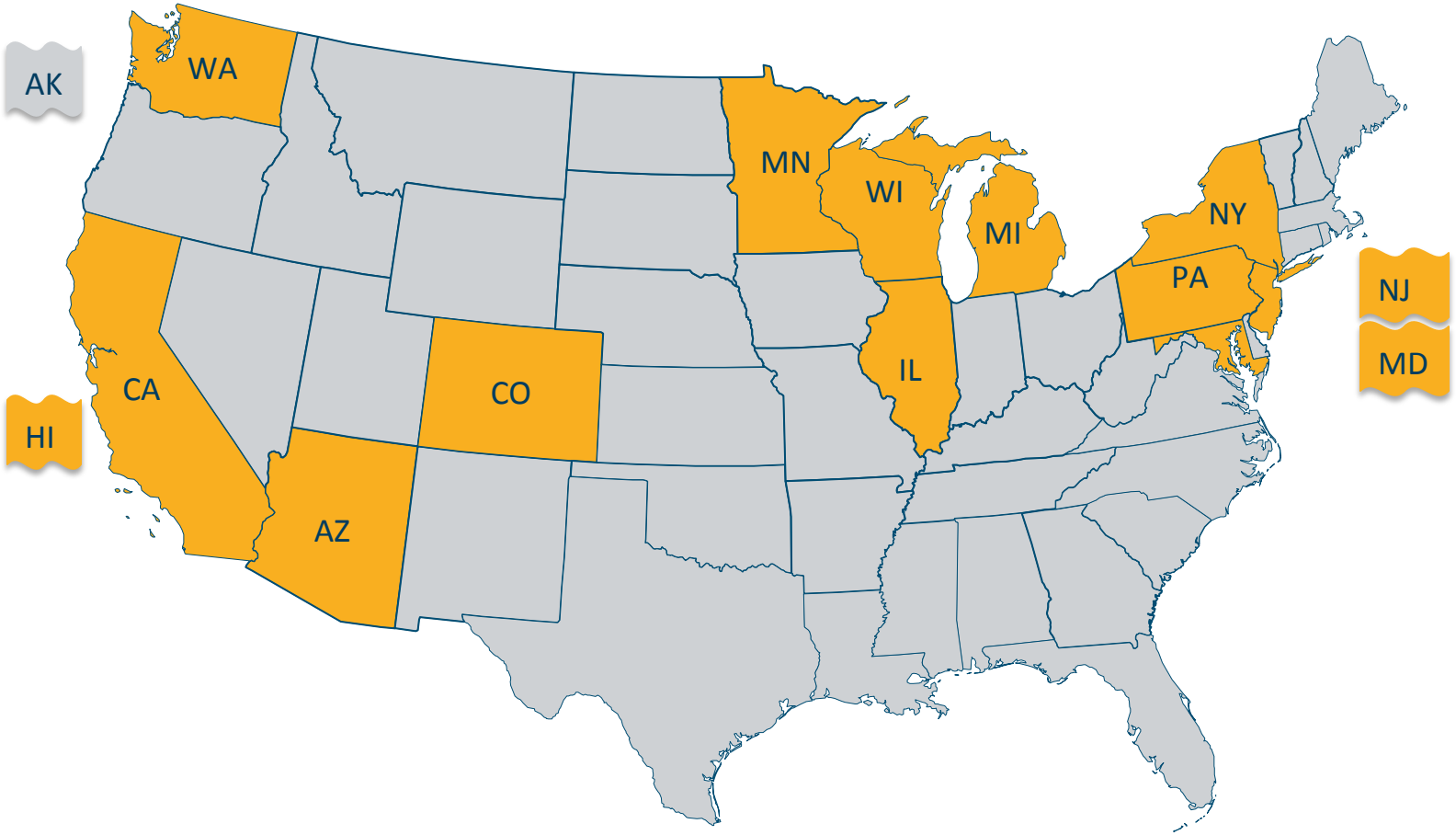


Lopez, 2012

Expected Leaders – High Solar Potential & Interest

Solar technical potential > median

ACEEE scorecard score > average



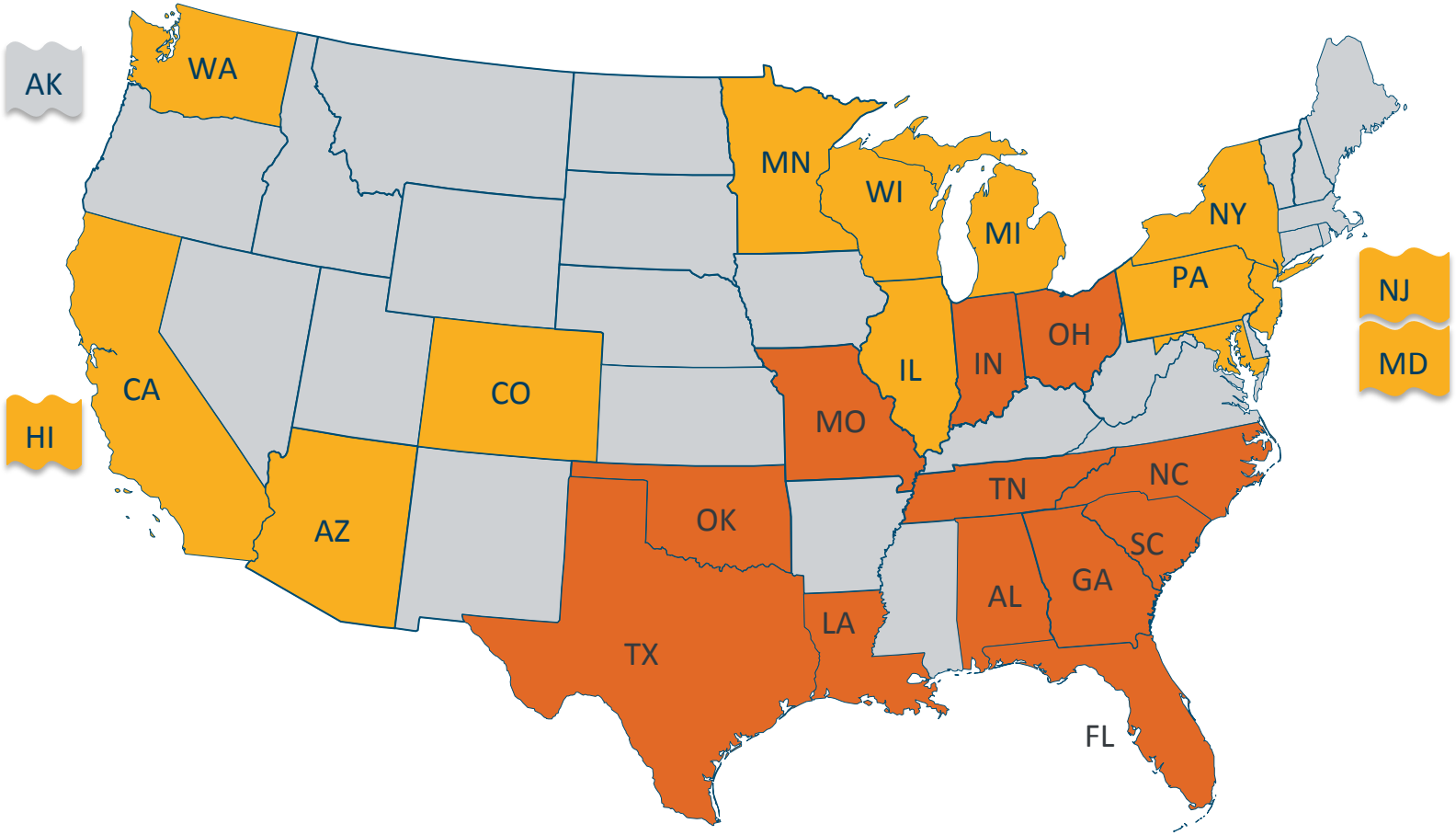
Rooftop Rich – High Solar Potential, Low Economic Drivers

Electricity price < average

Median income < average

Solar technical potential > median

ACEEE scorecard score < average



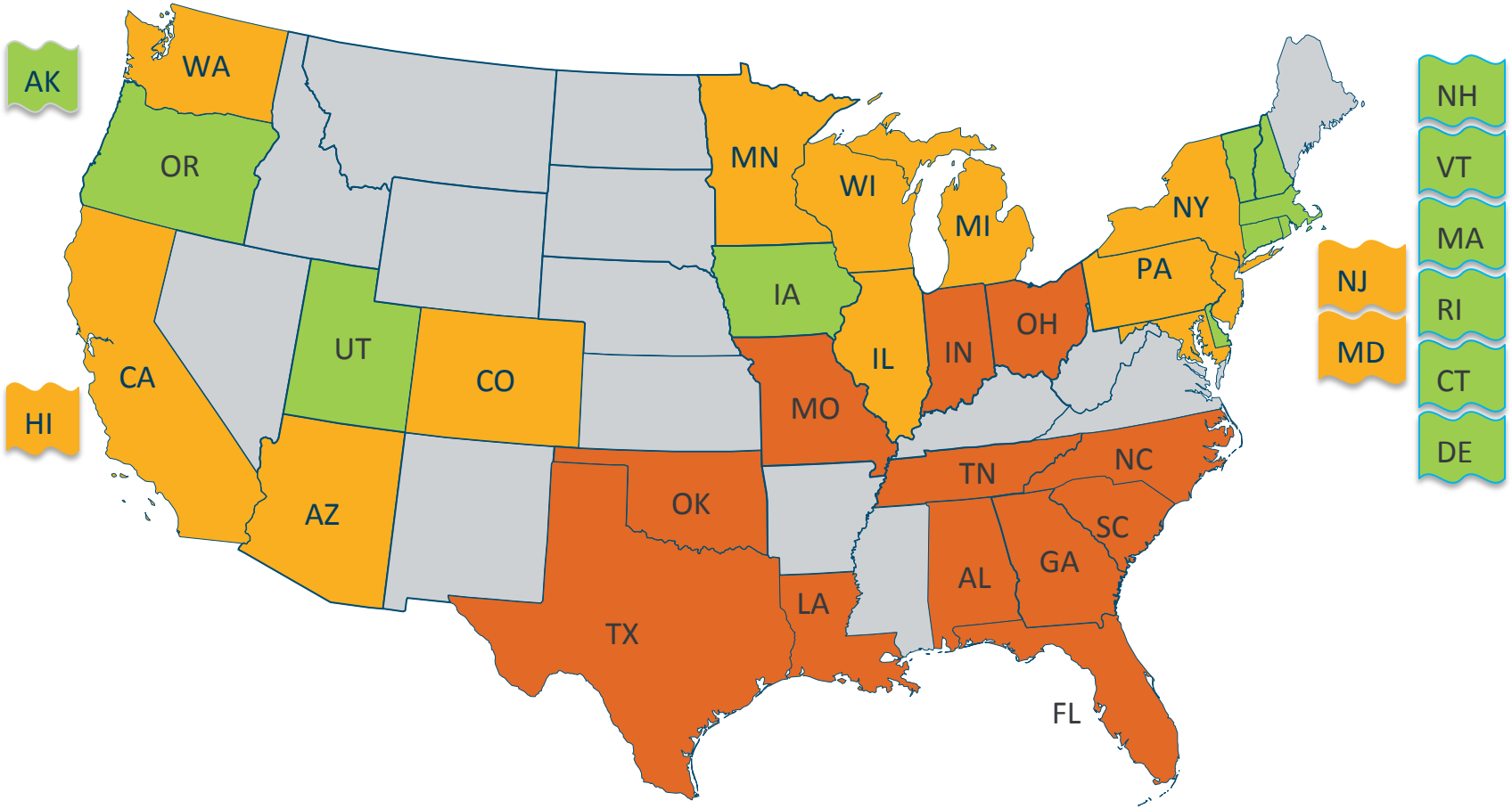
Motivated Buyers – Low Resource, High Economic Drivers

Electricity price > average

Median income > average

Solar technical potential < median

ACEEE scorecard score > average



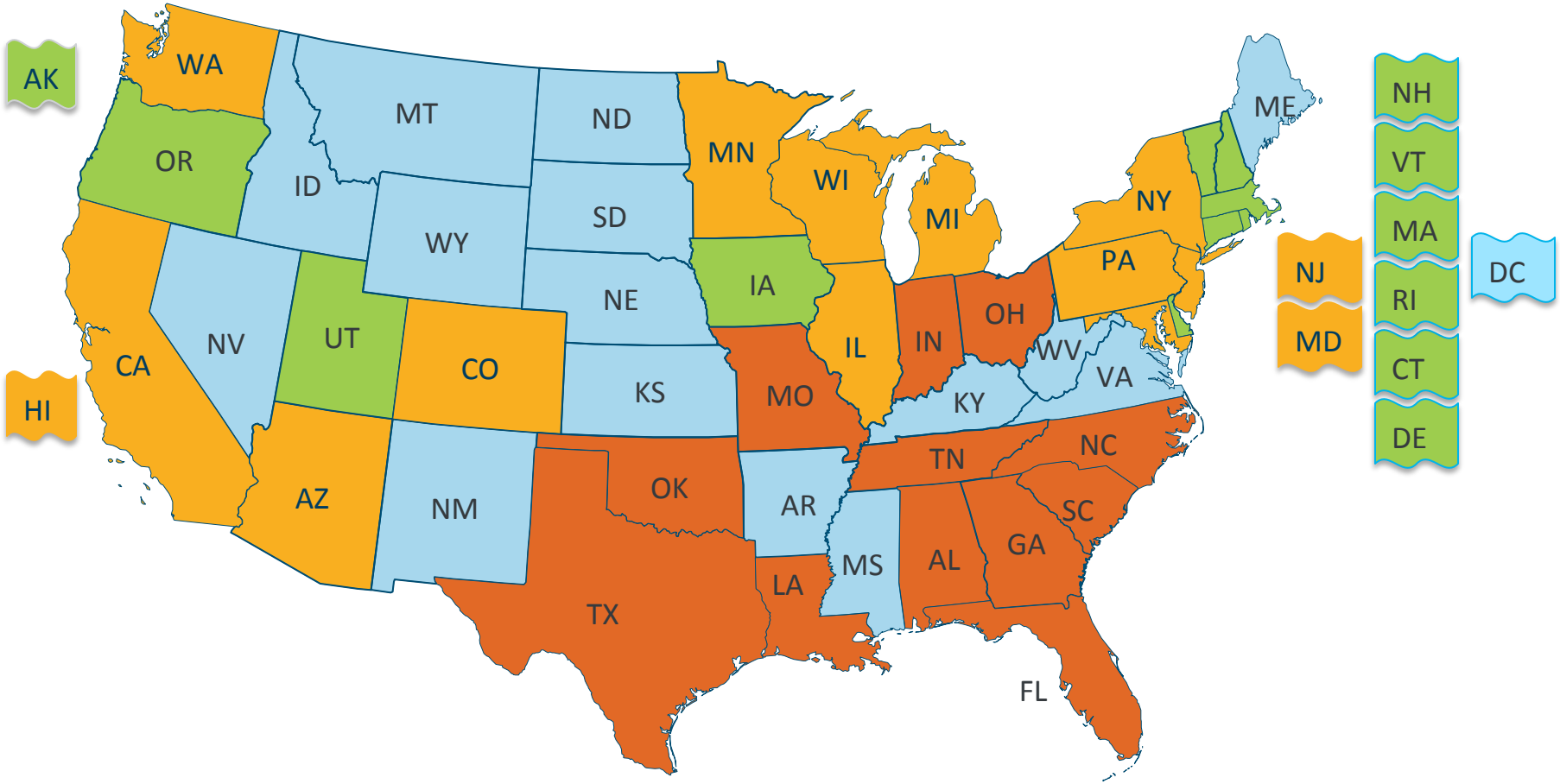
Mixed – States with Mixed Resource & Economic Drivers

Electricity price

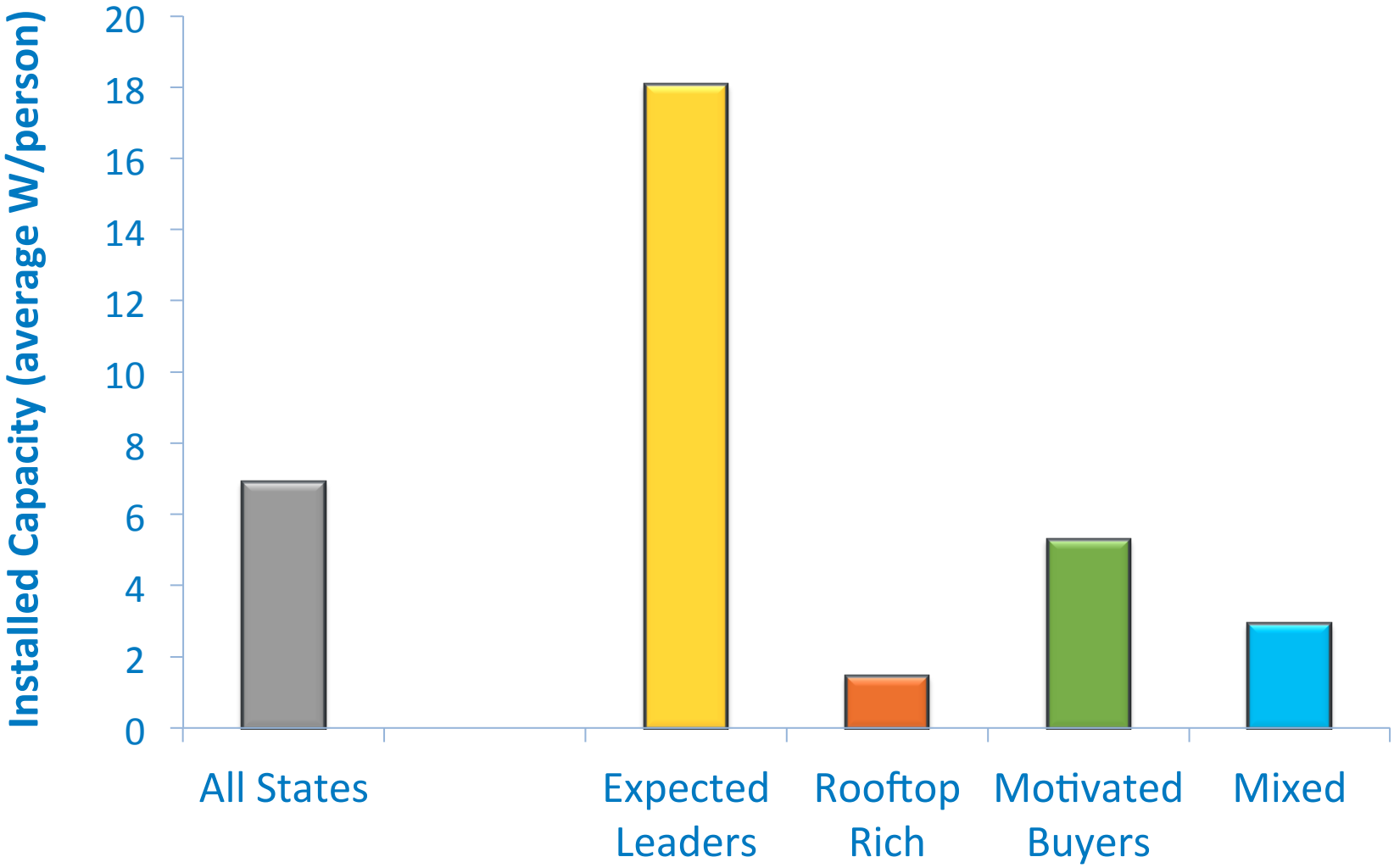
Median income

Solar technical potential

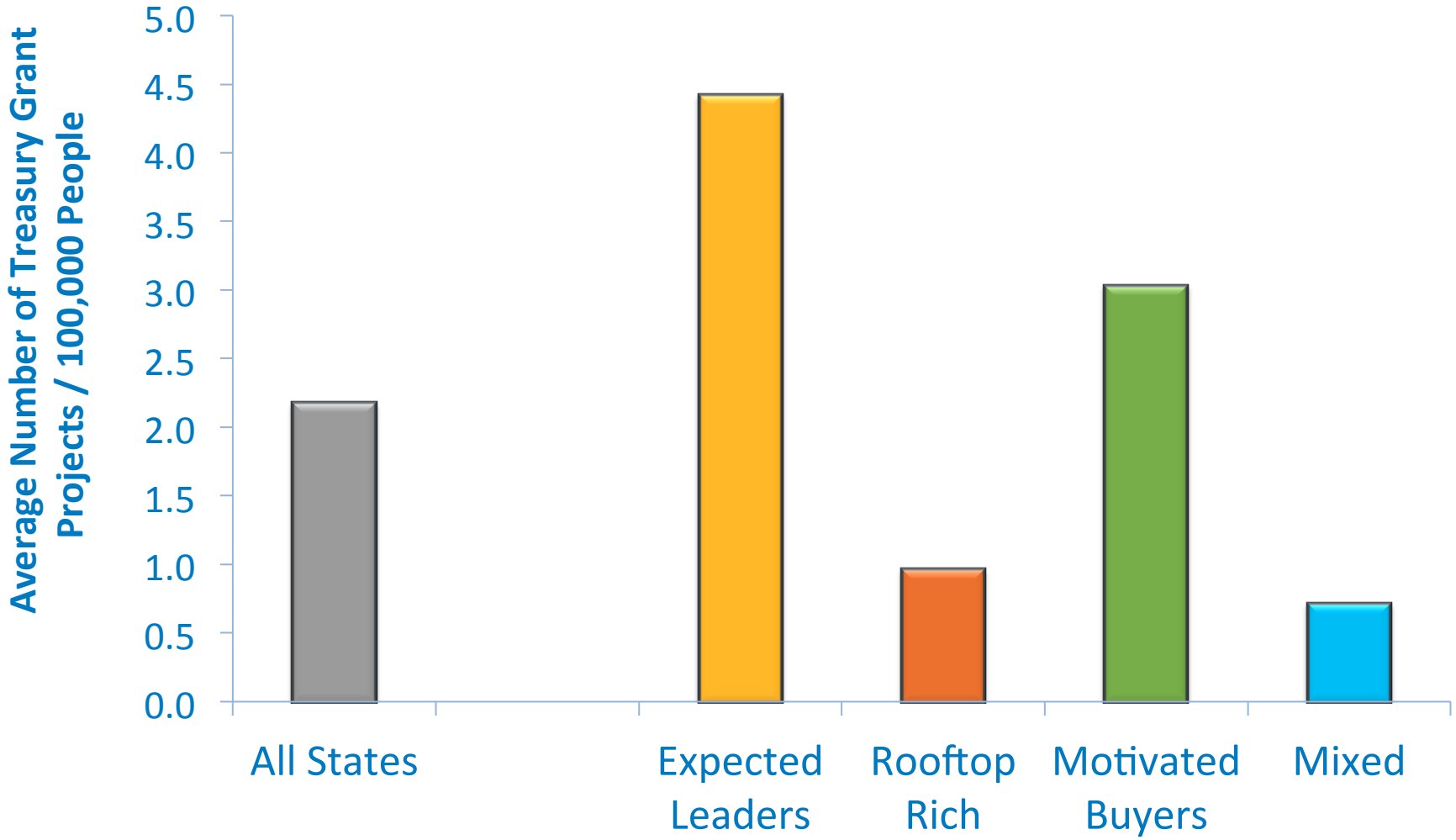
ACEEE scorecard score



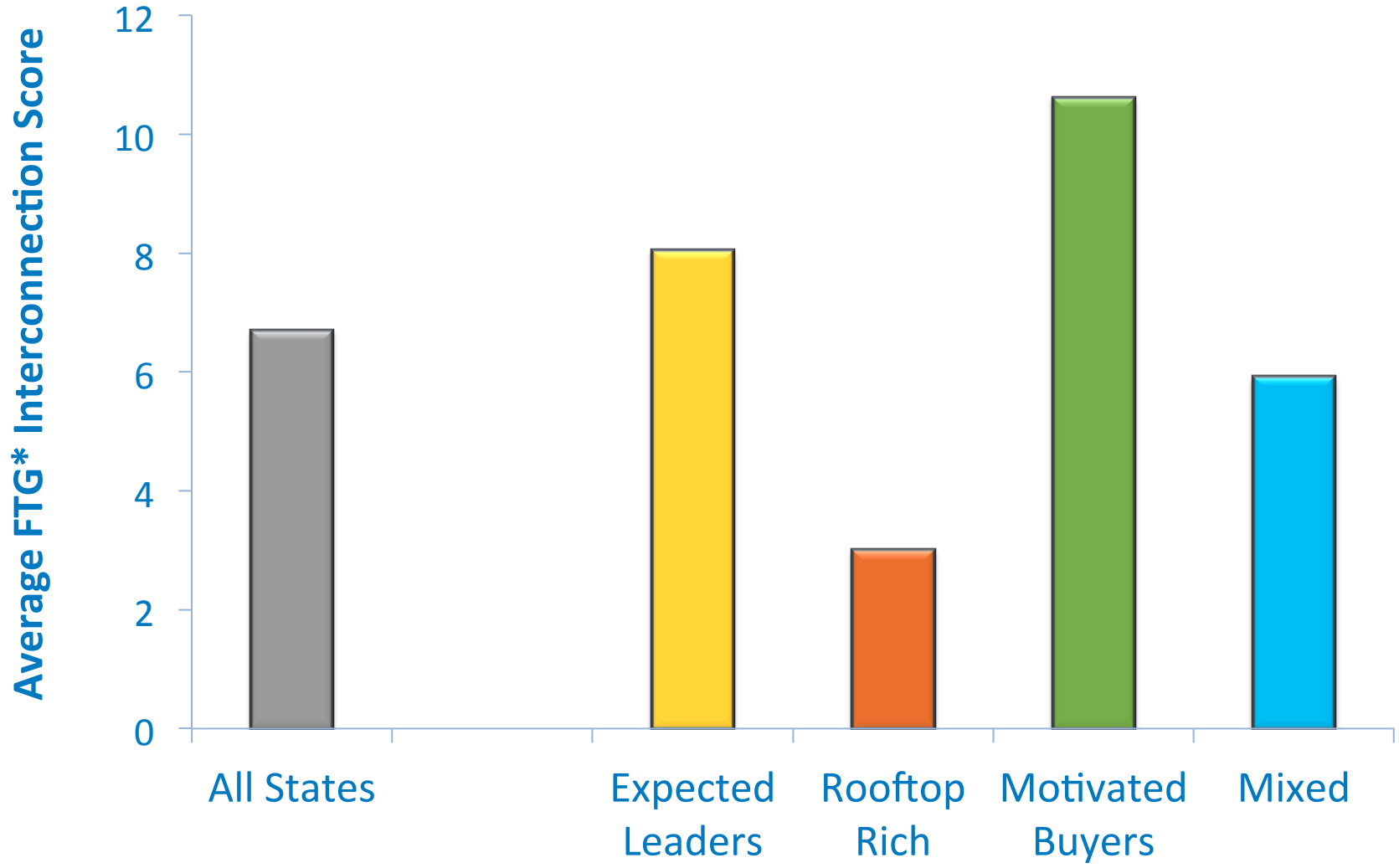
Solar Market Penetration Differences Between Groups of States – Installed Capacity



Solar Market Penetration Differences Between Groups of States – Projects Receiving Federal Grants

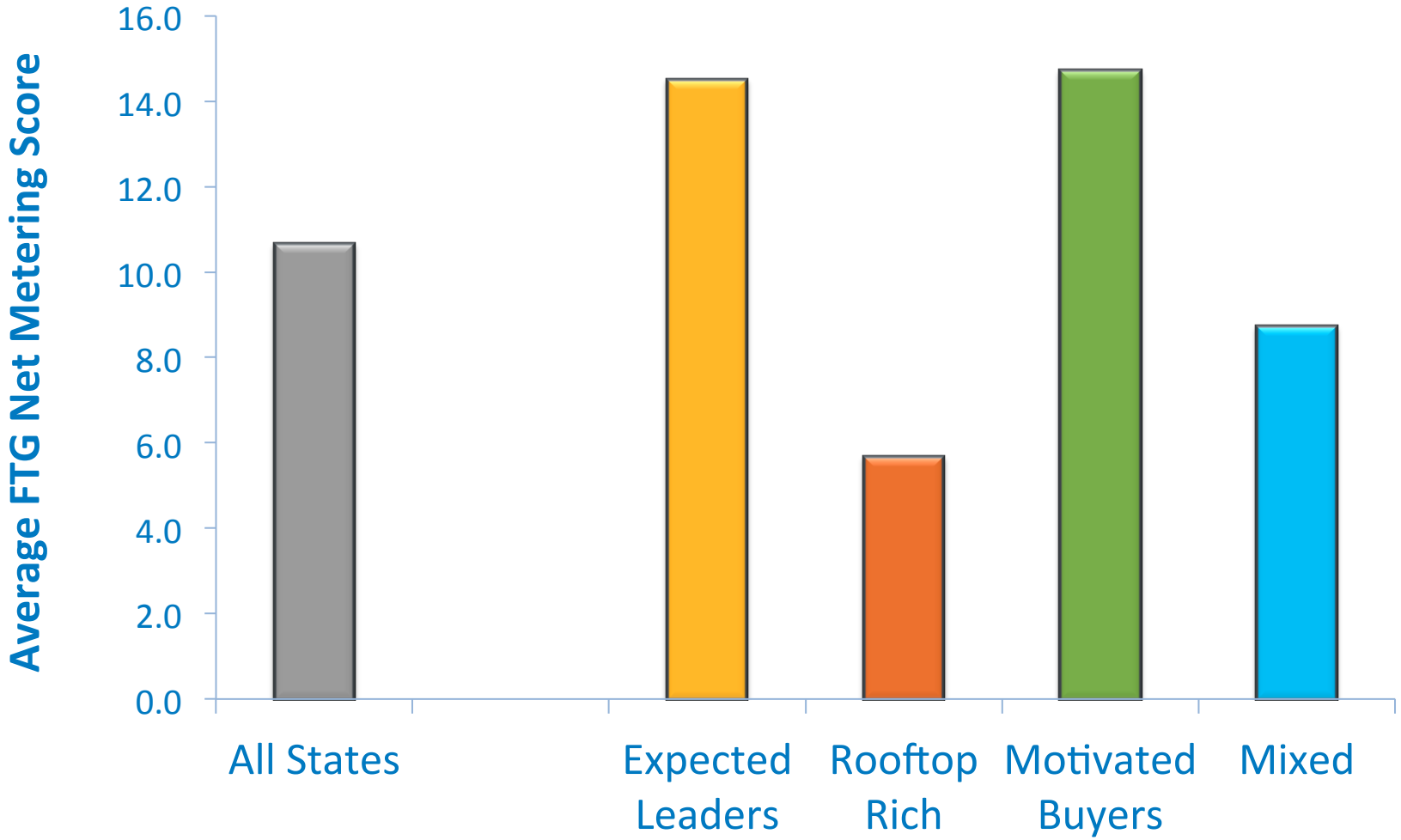


Solar Policy Differences Between Groups of States – Freeing the Grid Interconnection Scores



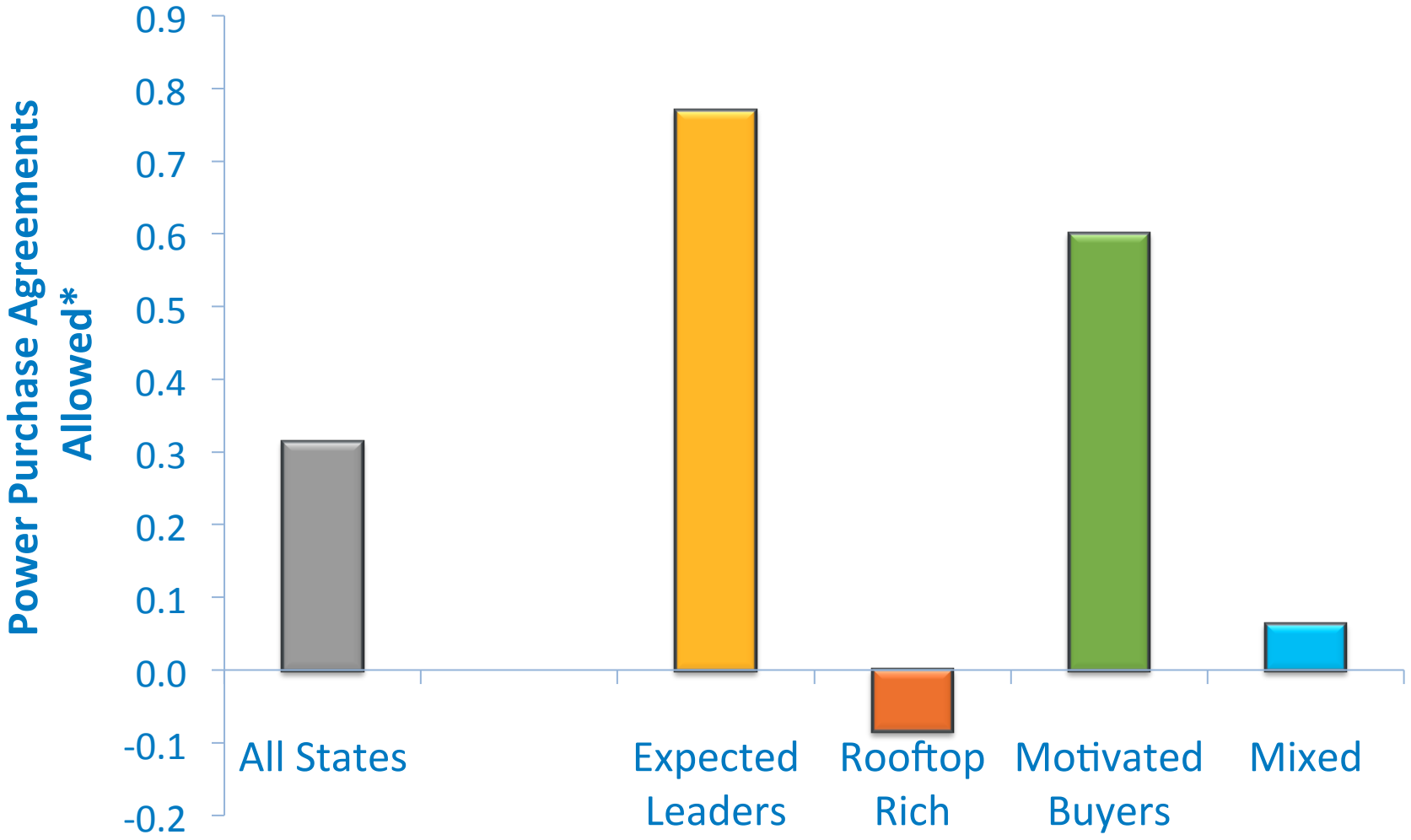
*Network for New Energy Choices Freeing The Grid 2012 Report

Solar Policy Differences Between Groups of States – Freeing the Grid Net Metering Scores



*Network for New Energy Choices Freeing The Grid 2012 Report

Solar Policy Differences Between Groups of States – Power Purchasing Agreements



*Power Purchase Agreements Allowed 1 = yes, 0 = unknown, -1 = prohibited

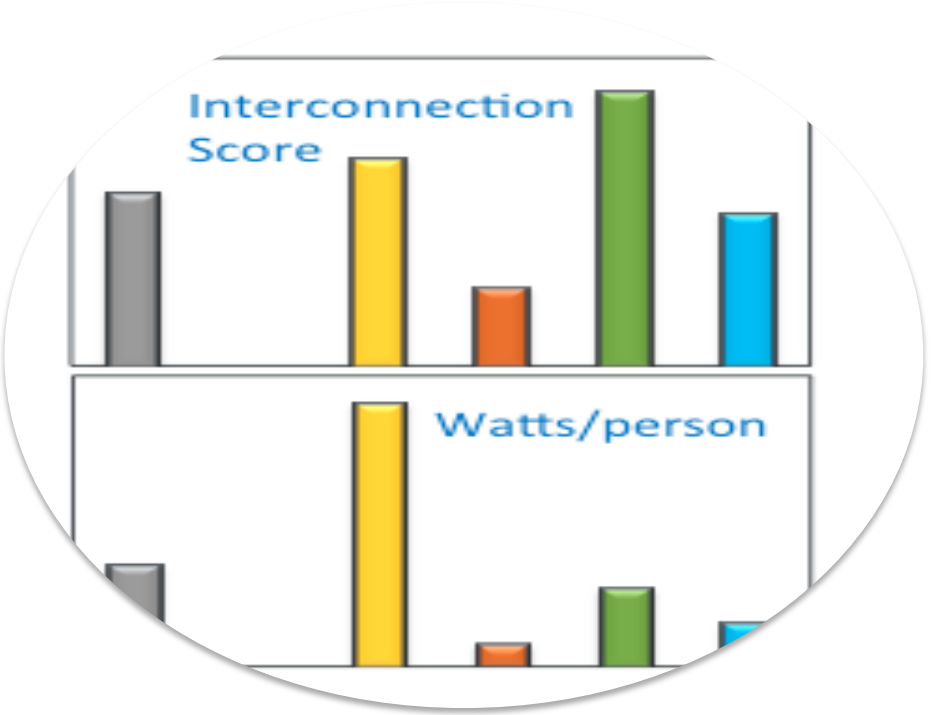
Summary

A statistical model accounts for ~70% of the variation between states

Policy Differences -> Differences within groups of states

+

Non-Policy Factors -> Differences between groups



Case studies will illuminate details

Thank You

Questions?

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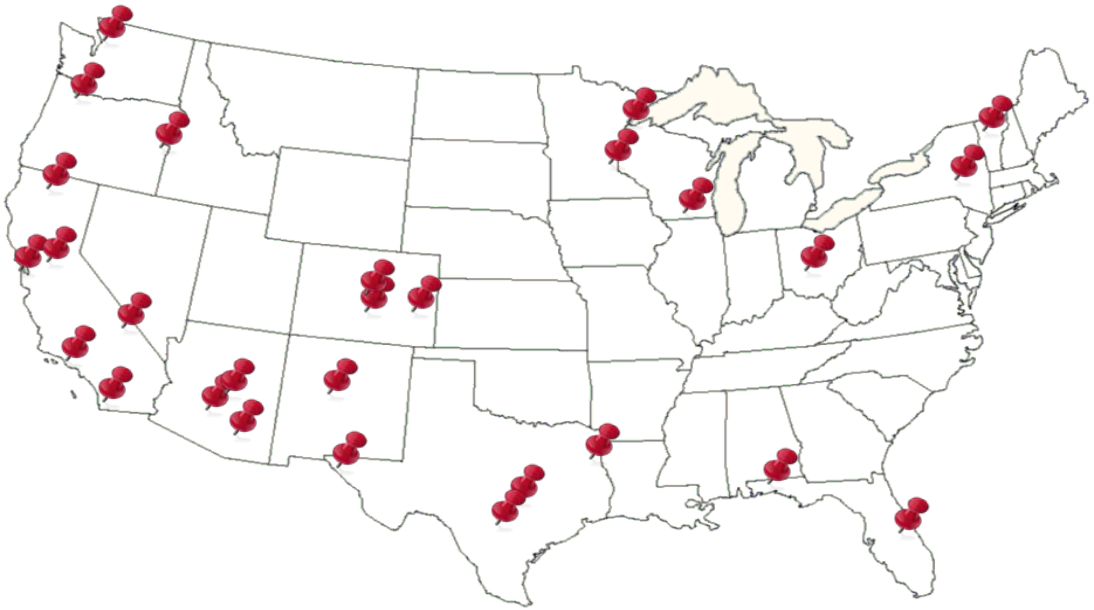
Incentivizing Distributed Solar: Best Practices

Lori Bird and Andy Reger
NREL

Webinar April 18, 2013

Background

Objective: Explore best practices in the design and administration of distributed solar incentive programs



Method:

- Reviewed existing PV incentive programs, with focus on larger programs outside of SREC markets
- Interview utilities, administrators, regulators, and industry

Key Challenges

- **Highly variable solar costs, difficult to predict**
  - Modifying incentive levels in response to installed solar cost changes
- **Program longevity, predictability and stability to aid solar market growth**
- **New business models (leasing, PPA)**
- **Cost-effective incentive disbursement**

Photo by Dennis Schroeder, NREL 21538

What Defines Program Success?

- **Solar market stimulation through cost reduction**
- **Increase long-term viability of solar**
  - Market longevity and stability
  - Predictability for sustainable market growth
- **Cost-effective management of ratepayer funds**
- **Consumer protection**
- **Providing price transparency to the solar market**

Photo by Dennis Schroeder, NREL 21605

Overview: Design Considerations

1. **Form of incentives**
   - Rebates vs. PBIs (term, level)
2. **Setting Incentive Levels**
3. **Encouraging multiple market segments**
4. **Modifying Incentive levels**
   - Step-down schedules, solicitations, or auctions
5. **Consumer Protection**
6. **Administration**

Photo by Misty Conrad, NREL 23028

Common Solar Incentive Types

- **Up-front rebate**
  - ($/watt capacity)

Utility	Rebate	Size
Austin Energy	$2.00/watt	1kW – 20kW
LIPA	$1.75/watt	< 10kW
Gulf Power Co.	$2.00/watt	< 5kW
LADWP	$1.62/watt	1kW – 1 MW
PG&E (CSI)	$0.20/watt	< 30kW
Snohomish PUD	$0.50/watt	< 100kW

- **Performance-based Incentive (PBI)**
  - ($/kWh production)

Utility	PBI	Length	Size
Xcel Energy (CO)	$.150/kWh	10 years	.5kW – 10kW
Green Mountain	$.060/kWh	10 years	< 250kW
Madison G&E	$.250/kWh	10 years	< 10kW
Orlando Utilities	$.050/kWh	5 years	< 2MW
PG&E (CSI)	$.025/kWh	5 years	< 30kW
SMUD	$.100/kWh	5 years	No limit

*DSIRE – Accessed 7/10/2012

Common Incentive Program Comparison

Rebate Incentive

Strengths

- Directly addresses up-front installed cost of solar
- Primarily short-term administrative burden

Weaknesses

- Incentivizes capacity, not production; may not ensure system performance
- Requires payment in year one; can create short-term cash constraints

Performance Based incentive

Strengths

- Incentivizes production and system performance
- Limited near-term budgetary cash demands
- Effective with third-party ownership

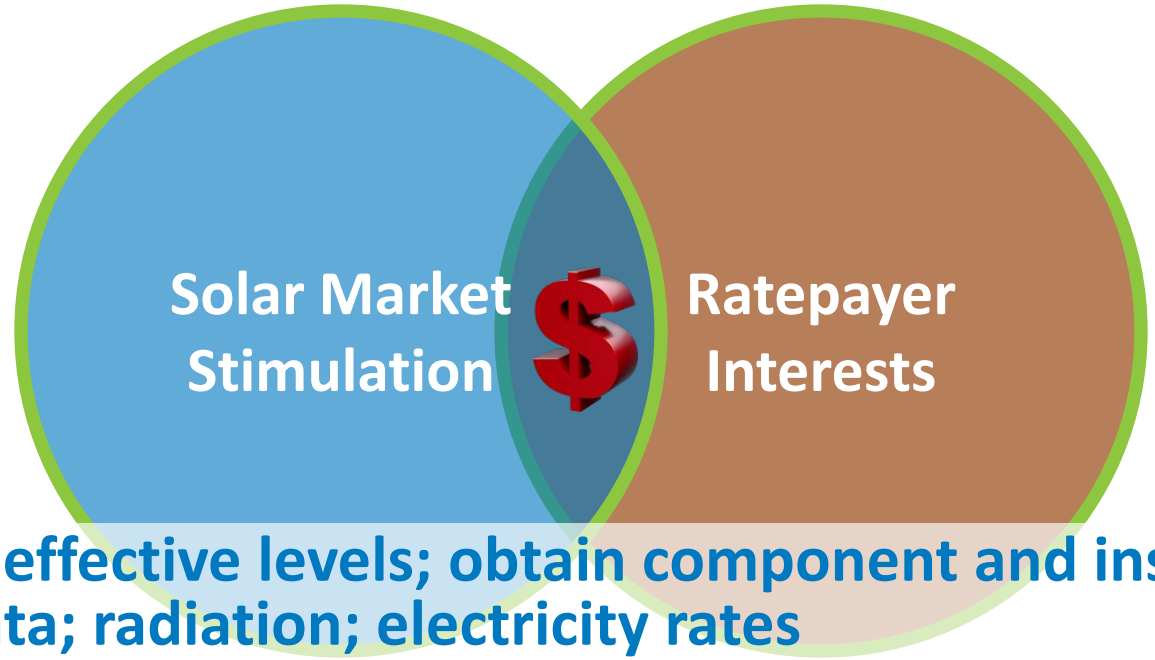
Weaknesses

- Does not address up-front investment in solar
- Long-term administrative burden of incentive payments

Stimulating Multiple Market Segments

- **Diversity of system sizes, customer classes may be an objective**
  - residential, commercial, industrial, third-party owned
- **Differences in barriers and cost structures across segments**
  - Residential owned systems – up-front cost
  - Larger commercial, 3rd party owned systems – access to financing
- **Competitive procurement often used with larger systems**
  - Costs can differ by size substantially
  - Accurately pricing incentives important; large payments
- **System cut-off level can affect utilization of incentives**
  - System sizes – small 0-30kW?, medium 30-100kW?, large >100kW?

Setting the Incentive Level



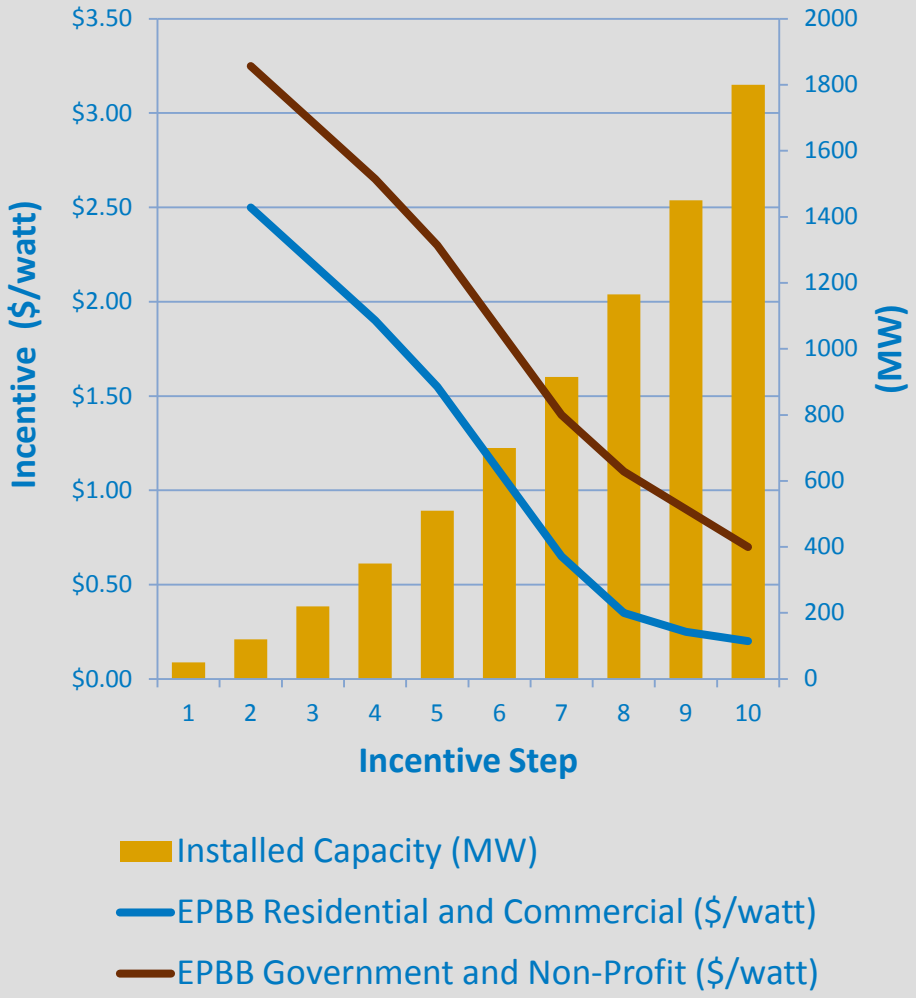
- **Model effective levels; obtain component and installed-cost data; radiation; electricity rates**
  - SAM and PV watts; data on installed costs
- **Benchmark against other programs**
- **Establish a targeted ROI/payback period for customers**
  - 10-15 year payback; incentive to cover up to 50% of cost

Adjusting the Incentive Level

- **Responding to changing market conditions and solar costs**
- **Two primary methods used:**
  - **Pre-established schedules for declining incentives**
    - Planned incentive decreases along with market circumstances
  - **Auction mechanism to set market price**
    - Competitive bidding process for selecting lowest-cost solar installations

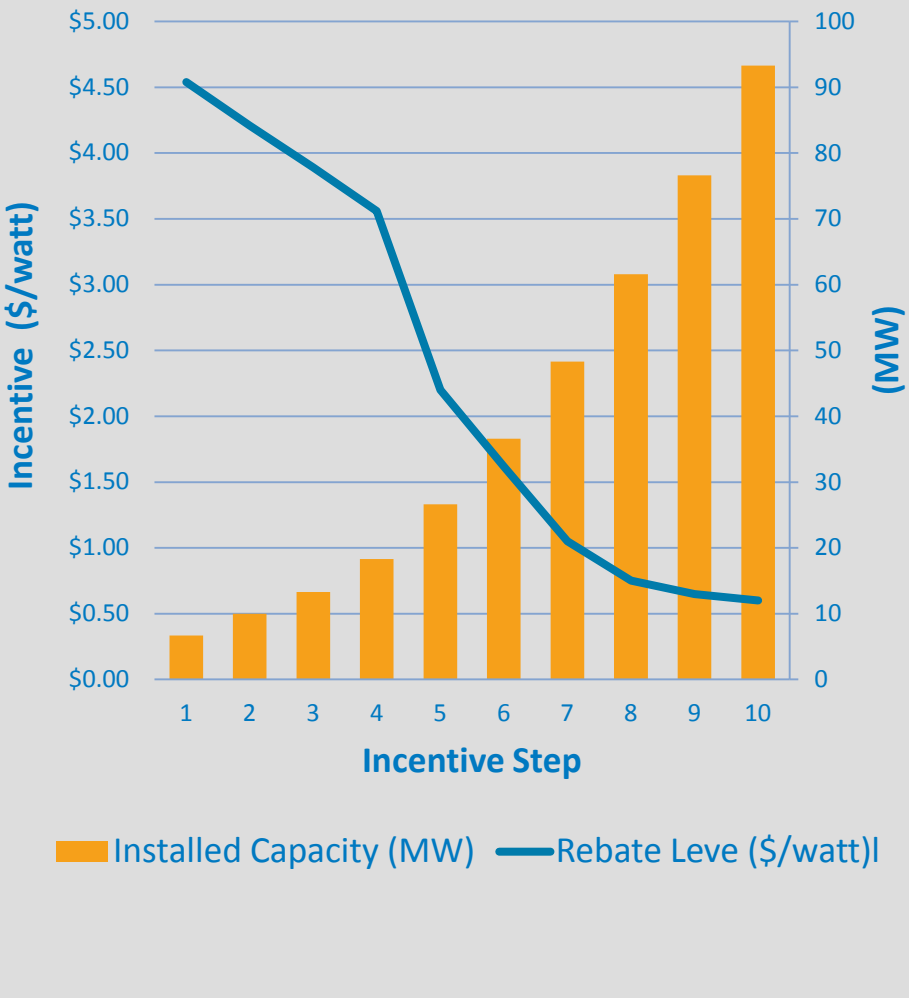
Declining Incentives - Capacity Targets

California Solar Initiative Rebate Program



Data Source: http://www.csi-trigger.com

LADWP Residential Solar Rebate Program



Data Source: https://www.ladwp.com/ladwp/faces/ladwp/residential/r-gogreen/r-gg-installsolar/r-gg-is-progstusincetlvl?_adf.ctrl-state=nswihfbn6_4&_afrLoop=247659160109000

Declining Incentives – Budgetary Timing

Arizona Public Service – Solar Incentive Decline Schedule (2012)

Initial 2012 Incentive Rate ($/watt)		$0.50
	Reduction Amount	Incentive Rate
If 75% of funds used by 4/21/2012 incentive reduced by	$0.20	TBD
If 75% of funds used by 5/21/2012 incentive reduced by	$0.10	
If 90% of funds used by 11/1/2012 and incentive is greater than or equal to $0.35 the incentive reduced to:	$0.20	TBD
If 90% of funds used by 11/1/2012 and incentive is less than $0.35 then incentive reduced to:	$0.10	

Declines: Capacity vs. Budgetary Timing

Capacity Targets

Strengths

- Can ensure multi-year program commitment
- Communicates the amount of installed capacity by program end

Weaknesses

- Risks associated with unknown rate of uptake (budget/year unknown)
- Not all customers understand concept of “installed capacity”

Budgetary Timing

Strengths

- Ensures intra-year program commitment
- Communicates with customers in terms ($ not MW) they understand

Weaknesses

- Uncertainty for solar market when program is adjusted annually
- Timing can be confusing or unpredictable at the year’s outset

Reverse Auction for Adjusting Levels

Arizona Public Service Example

1. A maximum incentive level is established by APS and communicated to prospective bidders.
2. Bidders enter system specs into the APS ranking calculator.
3. Incentive calculator determines the maximum available incentive for the system and assigns a score to the bid.
4. Scores are ranked and incentives disbursed, starting with the lowest score, until the budget for RFP has been exhausted.

Consumer Protection Measures

- **Encourage optimal system performance**
  - Orientation, tilt, azimuth, shading, etc.
  - Most common in rebate programs; some for PBIs
- **Installer certifications and system warranties**
  - Protect customers from fly-by-night companies
- **System components CEC-listed/UL Certified**

Photo by Dennis Schroeder, NREL 21613

Consumer Protection (cont.)

- **Encourage energy efficiency**
  - Cost-effective
  - Buy-down solar capacity needs
  - Ex: Gulf Power, SMUD, Austin Energy

- **Protecting customers from price gauging**
  - CSI informs customers when a system price is more than one standard deviation above the avg. solar price
- **REC ownership determined equitably**
  - Utility often granted the RECs in return for the incentive

Administrative Issues

- **Make aggregated installed cost data publicly available to assert downward price pressure**
  - CA Solar Statistics allows customers to view individual system cost data by zip code, size, installer, etc.
- **Administering PBI payments**
  - On-bill crediting preferred; frequency of crediting needs to balance customer interests and admin costs
- **Inspections for performance**
  - Reduce inspection frequency after installers show that installations meet program requirements

Application Process

Equitable access to available incentives

- Random lottery vs. first-come-first-served; queuing systems

Streamline process – online applications

- Don’t require all system specifics initially

Establish administration cost caps?

- CSI limited administrative costs to 10% of program expenditures, but challenging to meet

Summary: Key Considerations

Program specifics vary for different markets

- Solar installed costs, electricity prices, access to financing, expected program uptake, solar irradiance, regulatory process, etc.

Balance competing stakeholder interests

- Buy-down solar costs and increase installations
- Program longevity and predictability to decrease costs
- Cost-effective program administration

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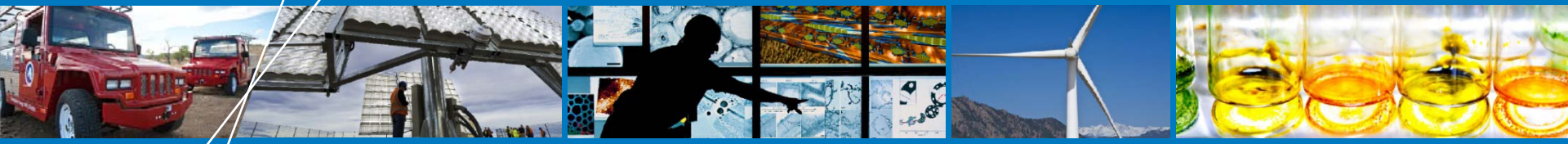
Distributed Solar Incentive Programs: Recent Experience and Best Practices for Design and Implementation
http://www.nrel.gov/docs/fy13osti/56308.pdf



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