

Solar Gardens in the Garden State

**Community Solar Policy
Recommendations for New Jersey**

Princeton University
Woodrow Wilson School
December 16, 2016

Who We Are

Our Project

- Report on the benefits and obstacles of community solar
- Provide policy recommendations for community solar in New Jersey
- Completed a literature review, fieldwork in MN, HI & CA, and interviews with 100+ practitioners and subject-matter experts



Minnesota Public Utilities Commission

Who We Are

- 8 graduate students at Princeton University (MPA, MPA/MEng, PhD)
 - Concentrating in Science, Technology, and Environmental Policy
- Advised by:
 - Anne Hoskins (former Commissioner of MD Public Service Commission; Chief Policy Officer at Sunrun)
 - Jeanne M. Fox (former Commissioner and President of NJ Board of Public Utilities)



PRINCETON
UNIVERSITY



New Jersey Energy Profile

New Jersey By the Numbers

Most densely populated state in the country

90+ Percent of electricity from natural gas & nuclear

1.6 Gigawatts of installed solar capacity in NJ

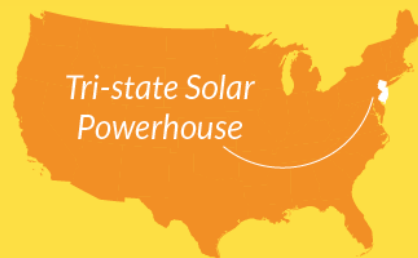
#4 NJ has the 4th highest installed solar capacity

TOP 10 SOLAR STATES COUNTDOWN



4

New Jersey



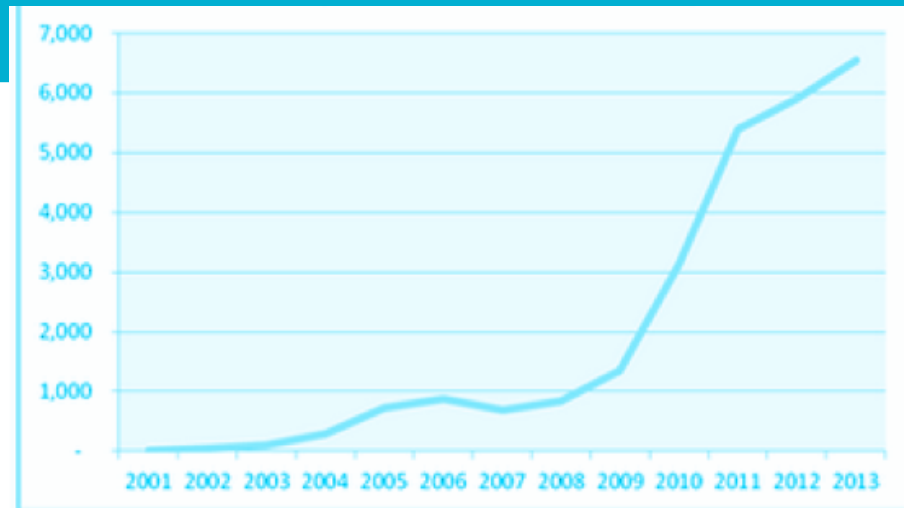
The Garden State has installed 1,632 megawatts (MW) of solar capacity, enough to power 257,000 homes

Learn more: [SEIA.org/smi](https://seia.org/smi)



Current Solar Policies

- Renewable Portfolio Standard
- Solar Renewable Energy Certificates (SRECs)
- NJ's Clean Energy Program
- Net metering
- Sales tax exemption for panels



Number of solar installations in New Jersey, by year. (Source: State of New Jersey Energy Data Center)



BUT

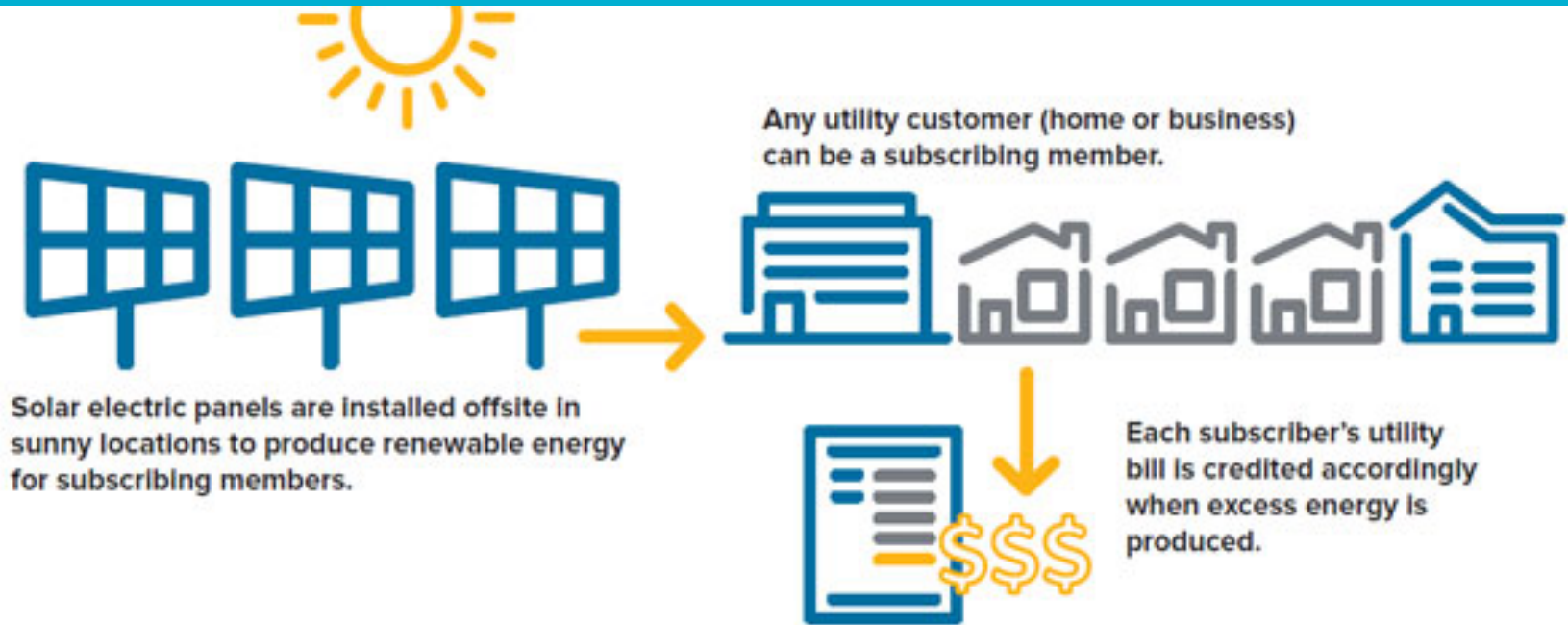
- Many people still lack solar access
- Community solar could be a valuable addition to NJ's energy portfolio

Community Solar - Key Considerations

49%

Of households lack access to solar

What is Community Solar?



Benefits of Community Solar

	Residential	Community solar	Utility-scale
Economies of scale		✓	✓ +
Less transmission cost /proximity to user	✓ +	✓	
Ease of siting	✓ (small scale, single-household)	✓ (medium scale, multi-household)	
Low- to moderate- income access		✓	

NJ has a high percentage of renters

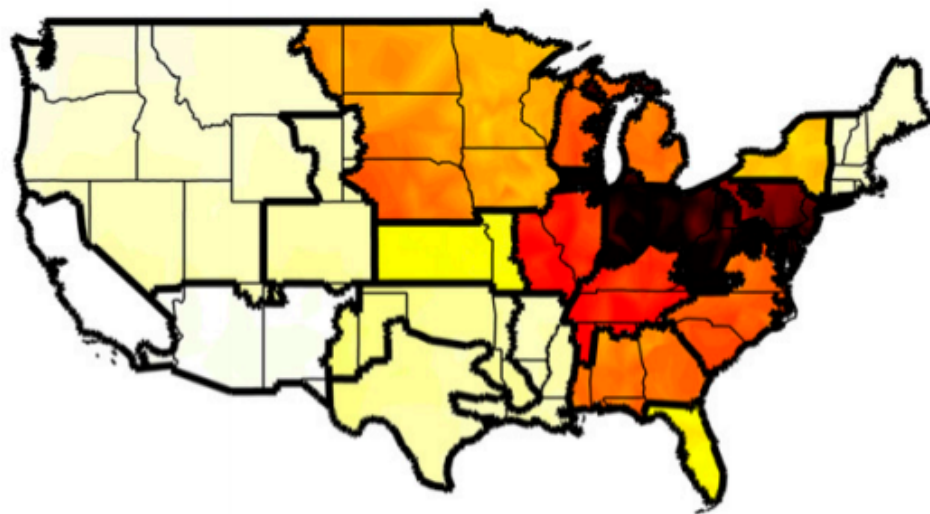
Rank	City	Renters	Population
1	Bronx, NY	80.7%	1,383,871
2	Union City, NJ	79.9%	68,668
3	West New York, NJ	78.7%	52,597
4	Newark, NJ	77.9%	280,579
5	Manhattan, NY	77.2%	1,621,897
6	New Brunswick, NJ	76.1%	57,080
7	Hartford, CT	75.6%	124,705
8	Passaic, NJ	74.6%	71,509
9	San Marcos, TX	73.7%	58,892
10	East Orange, NJ	73.4%	65,078
11	Elizabeth, NJ	73.3%	128,705
:	:	:	:
17	Jersey City, NJ	70.5%	262,146
18	Paterson, NJ	70.4%	146,753

New Jersey's population:
8.8 million people

Percentage of renters in
NJ: 36.7%

Source: City-Data.com

Health and Environmental Benefits



\$20 \$40 \$60 \$80 \$100



Solar: Annual Health & Environmental Benefits
From Displaced SO_2 , NO_x , and $\text{PM}_{2.5}$
(\$ per kW installed)

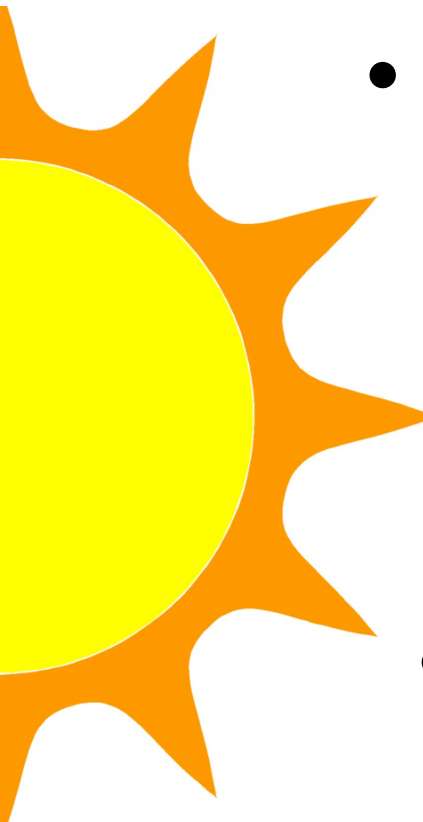
High health and environmental benefits in NJ from deploying solar:

- Avoided sulfur, nitrous oxides, and particulate matter emissions
- Major benefits from improved air quality

Source: Siler-Evans, K., Azevedo, I.L., Morgan, M.G, Apt, J. (2013). Regional variations in the health, environmental, and climate benefits from wind and solar generation. *PNAS*, 110 (29), pp. 11768-11773.

Policy Recommendations

Specify Intent and Make Implementation Flexible

- 
- **Program Structure:** Why does New Jersey want community solar?
 - **Financing:** How should community solar be balanced with other goals?
 - **Mechanics:** Encourage best practices in application and interconnection
 - **Low-Income Participation:** What are NJ's goals for low-income participation?

Trade-offs in Mandating Statutes

Minnesota Statute

(661 words)

(1) “Reasonably allow for the creation, financing, and accessibility of solar gardens;”

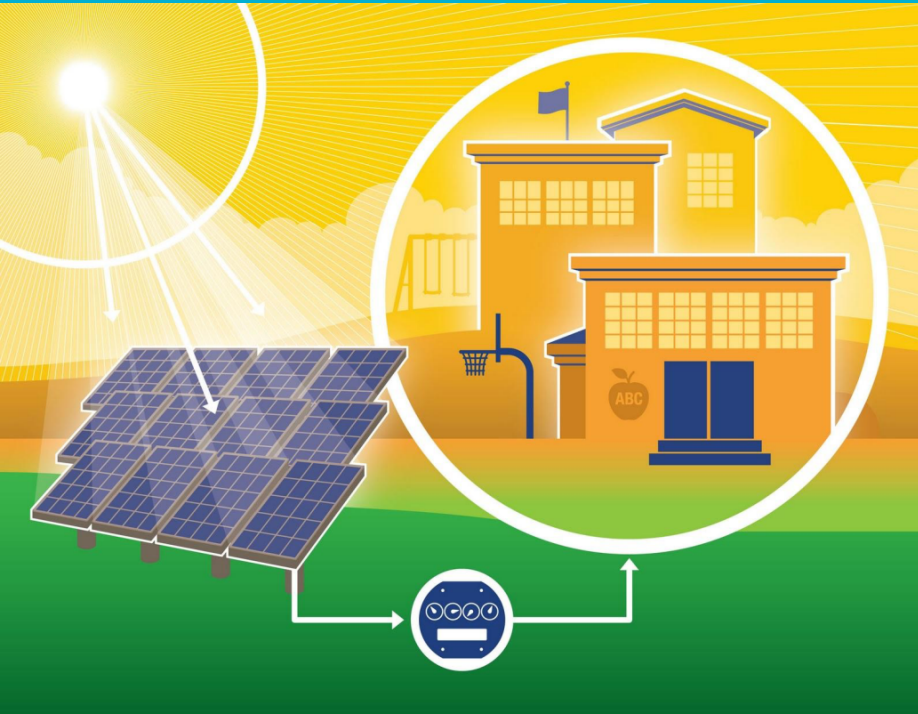
California Statute

(2452 words)

(h) “It is the further intent of the Legislature that a green tariff shared renewables program be implemented in a manner that ensures nonparticipating ratepayer indifference for the remaining bundled service, direct access, and community choice aggregation customers.”

1. What Are the Essential Program Elements?

Program Specifications



Subscribers: any one customer may subscribe up to 40%

Proximity: same service territory and county, or adjacent county

Project size: limited to 5 MW per project

Aggregate cap: regular increases in aggregate cap until phased out

Two-Phase Program

Phase 1: Pilot

Study the impact

Identify areas for improvement

Assess locational value

Use interim rate structure (ARR)
while developing a value of solar
(VOS) tariff

Phase 2: Full implementation

- Incorporate changes
- Integrate locational benefits
- Implement VOS rate

2. How Should Customers Be Credited?

Key Recommendations:

- **Legislation should direct the BPU to explore a value-of-solar credit rate, but allow for an interim alternative during Phase 1.**
- **Discussions and methodologies explored should be transparent, predictable, and collaborative.**

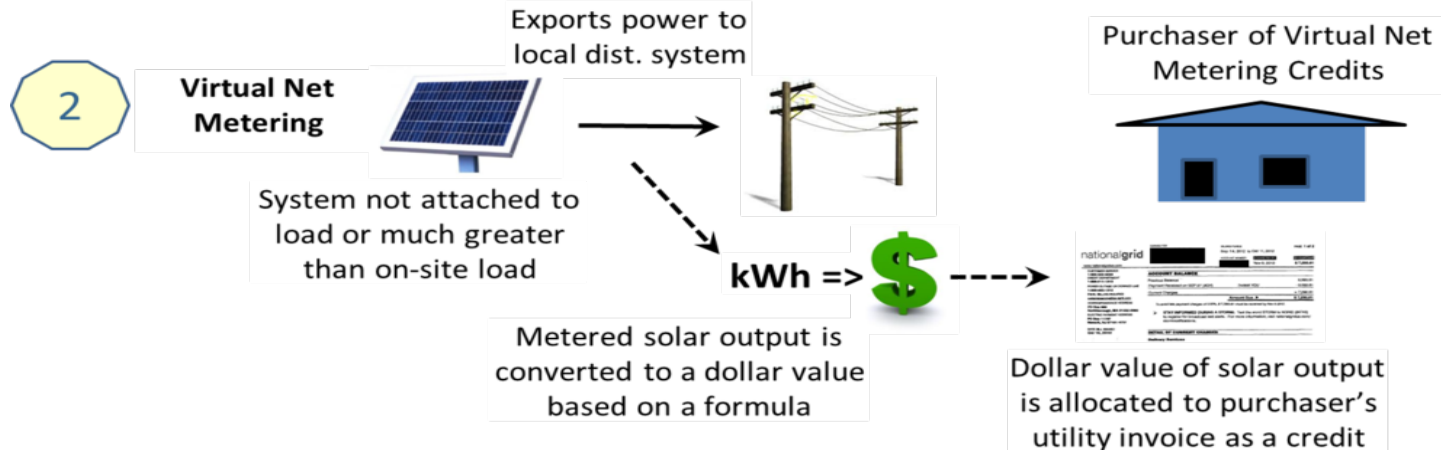
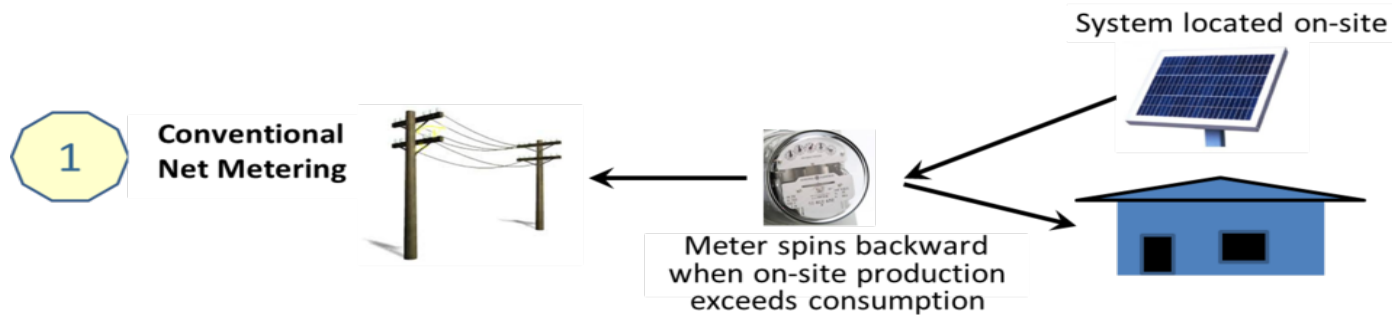
The credit scheme largely determines:

- (1) the financial benefits that customers receive,
- (2) the amount that developers can charge for subscriptions,
- (3) the project's financeability.

Phase 1: Bill Credit at Retail Rate

- For Phase 1, use an interim bill credit that is both straightforward to calculate and familiar to customers.
- As with rooftop PV in NJ, we recommend that the utility credit a subscriber's electric bill for the amount of electricity generated by their subscription to a community solar project, based on the **applicable retail rate**.

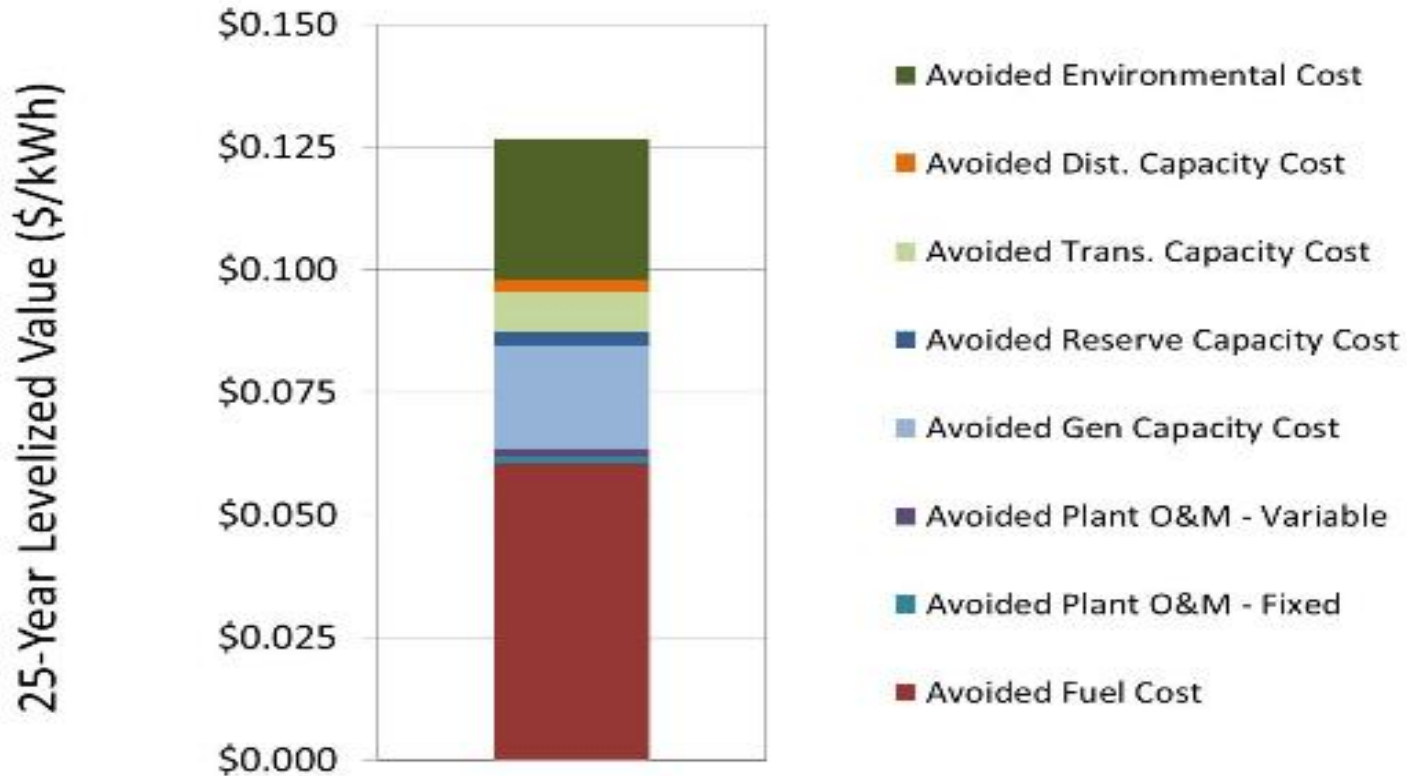
Virtual Net Metering Illustration



Phase 2: Use of Value-of-Solar Rate

- During Phase 1, the BPU should explore options for a Value-of-Solar methodology to implement during Phase 2.
- Elements to consider:
 - **Energy & Capacity Value**
 - **Direct Benefits:** Less transmission & distribution/line losses, merit-order effects, fuel price hedge, resiliency
 - **Direct Costs:** Firming expenses, interconnection costs
 - **Externalities:** Local environmental impacts, lowered GHG emissions, economic effects

Example: Value Stack used in MN



*For 2016, MN's VOS rate is \$0.0996/kWh

3. How Do We Integrate Solar Into The Grid?

Disclosure of Grid Information from Utilities

Phase 1:

Utilities required to disclose grid data they have now (e.g. congestion zone maps)

Phase 2:

Utilities required to compile and disclose more comprehensive grid data to inform solar development and locational pricing for the value of solar proceeding

Interconnection Upgrade Cost-sharing

Many solar projects require grid upgrades
(e.g. substation and distribution system upgrades)

The BPU should proactively approve a cost-sharing mechanism to govern grid upgrades among developers

All developers benefiting from a grid upgrade should pay for it,
proportional to their project's capacity

New York's "Cost-Sharing Mechanism for Interconnection Upgrades"
provides a model to consider

4. How Should Project Applications Be Processed?

Two Frameworks

Request for Proposals (RFP):

Proposals must satisfy the PUC's specified requirements

Utilities or a third-party entity manage the RFP process

Winning projects move forward

Used in CA, HI

Interconnection Queue:

Projects may apply to interconnect after a date set by the PUC

First-come, first serve

Projects in the queue must meet benchmarks by stated deadlines, or be removed

Used in NY, MN, MA

Pros and Cons

Request for Proposals (RFP):

Benefits:

- Familiar, established process
- Better for capped programs

Drawbacks:

- Slower and less efficient
- Administratively burdensome
- Higher project costs

Interconnection Queue:

Benefits:

- More transparent
- Creates a level playing field
- Better for wholesale markets

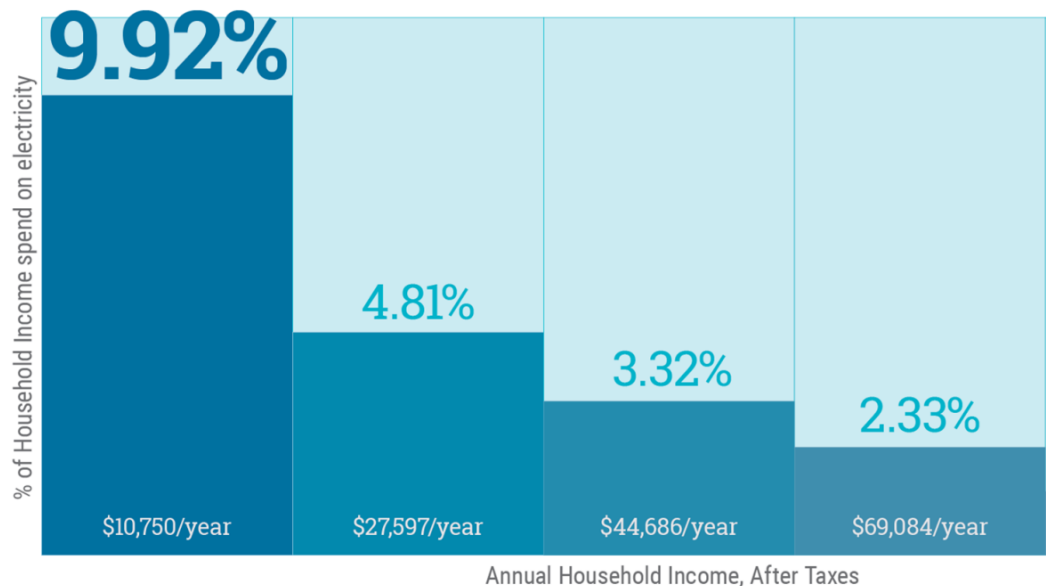
Drawbacks:

- Requires grid data
- Could lead to “land rush”
- Needs high application requirements

5. How Do We Ensure Access for Low- and Moderate-Income Residents?

Low-Income Benefits of Community Solar

- Energy savings
 - The poorest families pay the highest percentage of their income on utilities
- Public education and engagement on climate change
- Nearly 1 million NJ residents, or 11.1% of the population, live in poverty



Source: Consumer Expenditure Survey, U.S. Bureau of Labor Statistics, September 2015

Defining Low- and Moderate-Income (LMI)

- Low- to moderate-income (LMI): at or below 80% of the statewide area median income for New Jersey
 - LMI: \$57,777 per year for a 3-person household (2015)
- Important to design a community solar program that ensures LMI access
 - For NJ, especially important to include both LMI and EJ (environmental justice) communities in community solar

Major Barriers

Financing: Community solar projects with LMI participation face difficulty securing loans due to lower credit scores of participants, making them appear risky.

Access to Capital: Low-income participants may lack sufficient capital to buy subscriptions of community solar.

Customer Outreach: LMI customers may not be aware of the existence of community solar programs, or may not have full information on the financial benefits of solar

Barriers & Solutions

Financing:

- Loan underwriting - buying down risk for customers with low credit scores

Access to Capital:

- 5-10% LMI carve-out
- Subsidies from NJ Universal Service Fund, NJ's Clean Energy Program

Customer Outreach:

- Outreach through energy efficiency & low-income assistance programs
- Consumer protections in disclosures

**DO YOU
NEED HELP
WITH YOUR
HOME
ENERGY
BILLS?**



Source: NJ Universal Service Fund

Conclusion

Key Recommendations

Make the statute specific in intent, but flexible for BPU implementation.

- Create a two-phase program. During phase 1, use the applicable retail rate and limit total capacity to quickly spot and fix problems. For Phase 2, create a value-of-solar credit rate.
- Cap projects at 5 MW, with a 40% subscription ceiling. Restrict projects to customers in the same service territory and county, or adjacent county.
- Require utilities to disclose grid information. Implement a cost-sharing mechanism for necessary grid upgrades.
- Use an interconnection queue process, rather than an RFP process.
- Include a 5-10% LMI carve-out. Underwrite loans for LMI customers and provide subsidies for low-income customers.

Q&A



Thank You!