



# Community Solar Overview

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December 2017 Board Meeting



# Integrated Resource Plan: Local Renewable Energy

## Orcas Power & Light Cooperative Energy Road Map

### Reduce Members' Total Energy Bills



#### Electrify Transportation and Heating

- keep member \$\$ in County
- lower TOTAL energy costs (propane, gasoline, wood)
- reduce carbon impact

#### Continual Modernization of the Grid

- integrate local renewables
- increase automation
- prepare for greater member participation on our grid (buy-sell-store locally produced power)

**today**

### Increase Local Power Generation for Essential Services



#### Leverage our Dynamic Grid

- increase local renewables on the grid
- emergency back-up power for essential services
- support field communications for OPALCO crews
- support EMS services county-wide
- more local power = energy resilience



**tomorrow**

### More Member Control



#### Members Actively Manage Energy Options

- members buy and sell local power production
- incentives for off-peak rates and energy usage
- increased member devices on the grid
- dynamic control of energy usage and bills

#### OPALCO Balances Resources, Costs and Opportunities

- maximize available renewable sources
- integrate member storage on the grid (EVs, batteries . . .)
- leverage regional opportunities for generation

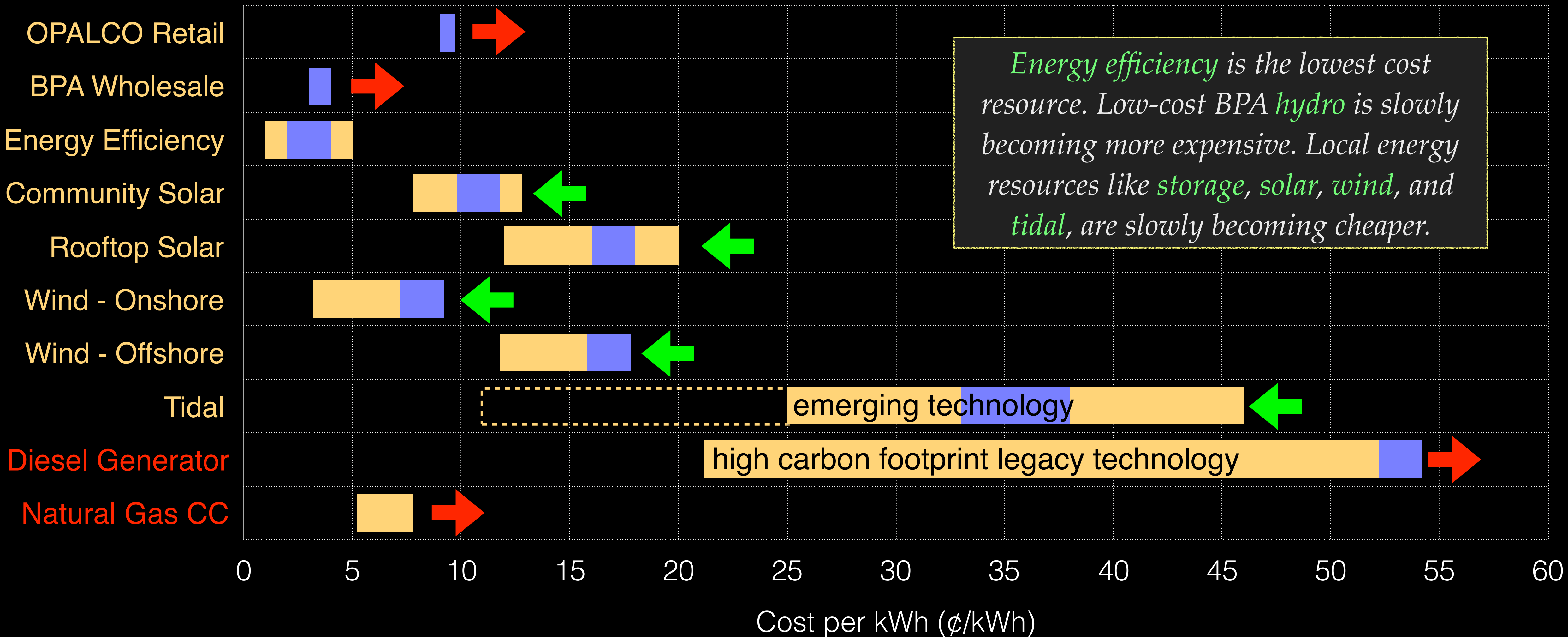
**near future**



# Unsubsidized Levelized Cost of Energy Sources

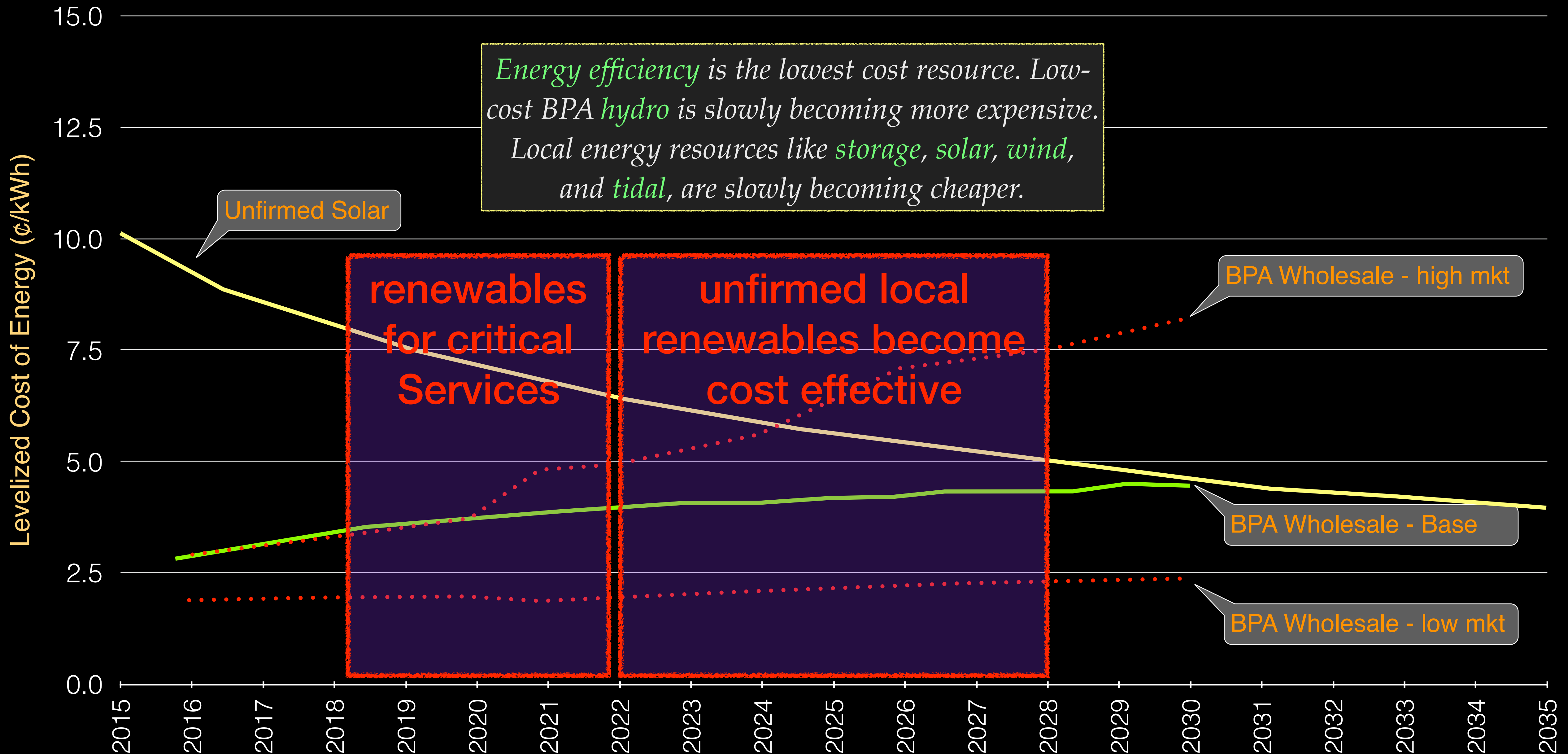
Cost Range:  = US  = SJC (actual, or estimated due to NW capacity factor or fuel costs)

Cost Trend:  = Inflation  = Deflation



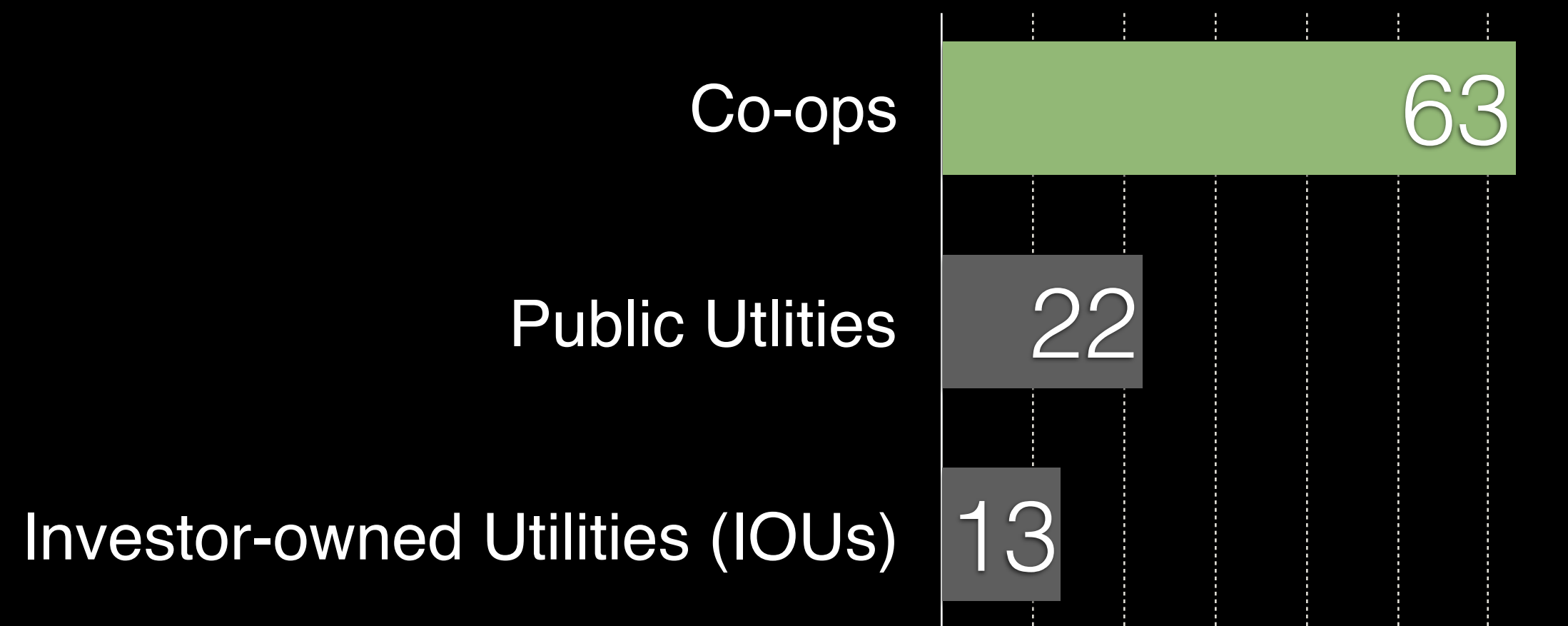
*Energy efficiency is the lowest cost resource. Low-cost BPA **hydro** is slowly becoming more expensive. Local energy resources like **storage**, **solar**, **wind**, and **tidal**, are slowly becoming cheaper.*

# Utility Scale Levelized Cost of Energy: Grid Parity



# Electric Co-ops Are Leading The Way

## Community Solar Projects



*Electric co-ops such as OPALCO were formed to serve rural communities, providing member-owned nonprofit services that help the community prosper.*

# OPALCO Community Solar: Increasing local renewable energy by 30%

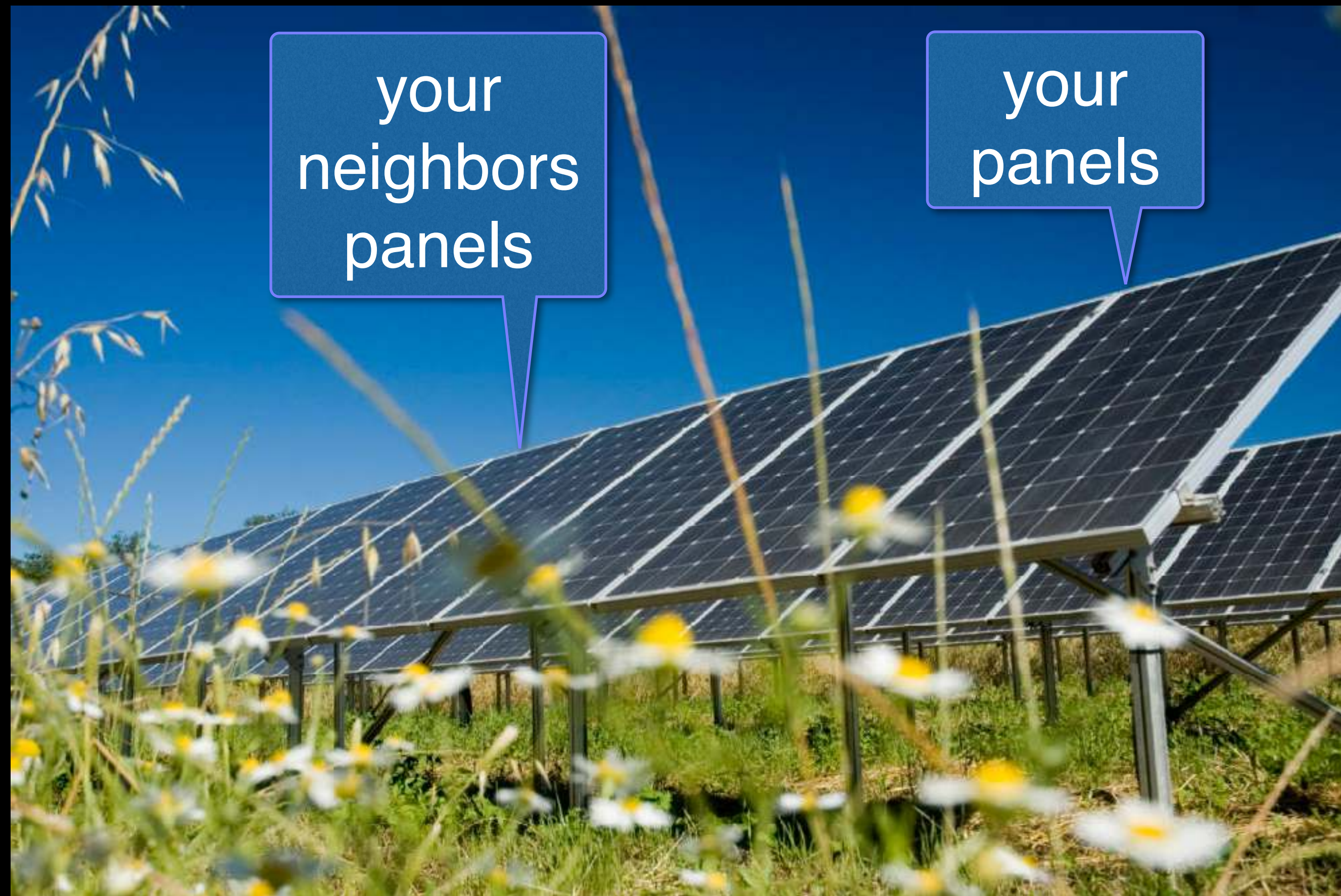


*In 2018, the OPALCO community solar array will increase local solar energy by about 30%.*

*This will likely be the largest community solar array in Washington state.*



# What is community solar?



*It's a community-owned solar array, **shared** by many homes and businesses, **optimally sited** to maximize sun exposure. professionally operated, maintained and insured.*

*Community solar offers an **easier** more **affordable** way for virtually anyone to go solar, without installing solar panels on their roof.*



# Community Solar: Simple, Easy, More Affordable...

## What are community solar benefits compared to rooftop solar?

### ✓ Simple

- we maintain and operate it
- no maintenance, cleaning, permitting, rooftop issues,...
- no modifications to your home, roof or shade trees

### ✓ Easy

- start small, as small as a portion of a single panel
- works for homes, businesses, renters,...
- easily transferred if you sell your home or move

### ✓ More Affordable

- includes operation, maintenance and insurance
- economy of scale - 40 times larger than typical rooftop array
- produce 10 to 15 percent more than typical rooftop systems

*Community solar offers an **easier** more **affordable** way for virtually anyone to go solar, without installing solar panels on their roof.*

While many co-op members are interested in solar energy, only about 27% of residential rooftops are **suitable** for hosting a solar array, and many members want to preserve their **shade trees**.

Even if the sun is good, many people **rent**, don't want the solar array to effect the home **aesthetic**, want to **start small**, or can't afford the **upfront costs** of rooftop solar.



# Community Solar: Tree Friendly

With climate change, shade trees become increasingly important.



*Keep your shade trees!*

No need to clutter your roof with solar panels, and cut trees to open it up to the sun. We locate the community solar array in a sunny spot so you don't have to.

Global warming means hotter summers. Direct sun can significantly heat homes and businesses.

Shade trees help keep you more comfortable in the summer, through passive cooling. This can save 25 to 40 percent of energy used for air conditioning.



# Community Solar + Storage: Partners

## WA Clean Energy Fund (CEF)

### \$1 Million Matching Grant for Storage Innovation

Washington State Department of Commerce

Office of Economic Development and Competitiveness

*“OPALCO is a great example of how smaller utilities can work with the Clean Energy Fund grants. We are going to continue to find ways to help smaller utilities across the state engage with the program.”*

Brian Young, Governor's Clean Technology Sector Lead



An innovative storage configuration to provide four complementary functions that enhance grid efficiency, reliability, operation and community solar array performance, while increasing storage system "*capacity factor*," thus maximizing return on investment:

- Community Solar Array Output Conditioning
- Peak Shaving
- Load Shifting
- Island-scale micro-grid



# Community Solar + Storage: Partners

## Department of Energy \$50 K Grant

Pacific Northwest National Labs (PNNL)  
Energy and Environment Directorate

- Analytics
- ROI and economic analysis
- Inventor of flow battery electrolytes we are using

*Wants to work with more smaller utilities*



An innovative configuration to provide four complementary functions that enhance grid efficiency, reliability, operation and community solar array performance, while increasing storage system "capacity factor," thus maximizing return on investment:

- Community Solar Array Output Conditioning
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Use Cases	Description
UC1 Demand Charges	PV and energy storage used to reduce demand charges based on BPA tariff structure.
UC2 Transmission Deferral	Transmission submarine cable investment deferral through use of storage to reduce peak load effects.
UC3 Distribution Deferral	Reduce wear and tear on distribution submarine cables as well.
UC4 Volt-VAR/Conservation Voltage Reduction	CVR to reduce distribution system losses and peak demand spikes.
UC5 Outage Mitigation	Outage mitigation for Decatur and Center Islands.



# Community Solar + Storage: Partners

**Bonneville Environmental Foundation**  
\$50 K grant for low income (10% of production goes to OPALCO's low income EAP)

- Geotech report
- Financial modeling
- Model contracts and contractor evaluation support
- Launch concepts
- Shading and production analysis
- Review of our RFP and selection process
- Marketing and networking to get access to more partners for grant funding and other non-financial assistance.





# Decatur Island Substation





# OPALCO Community Solar Overview

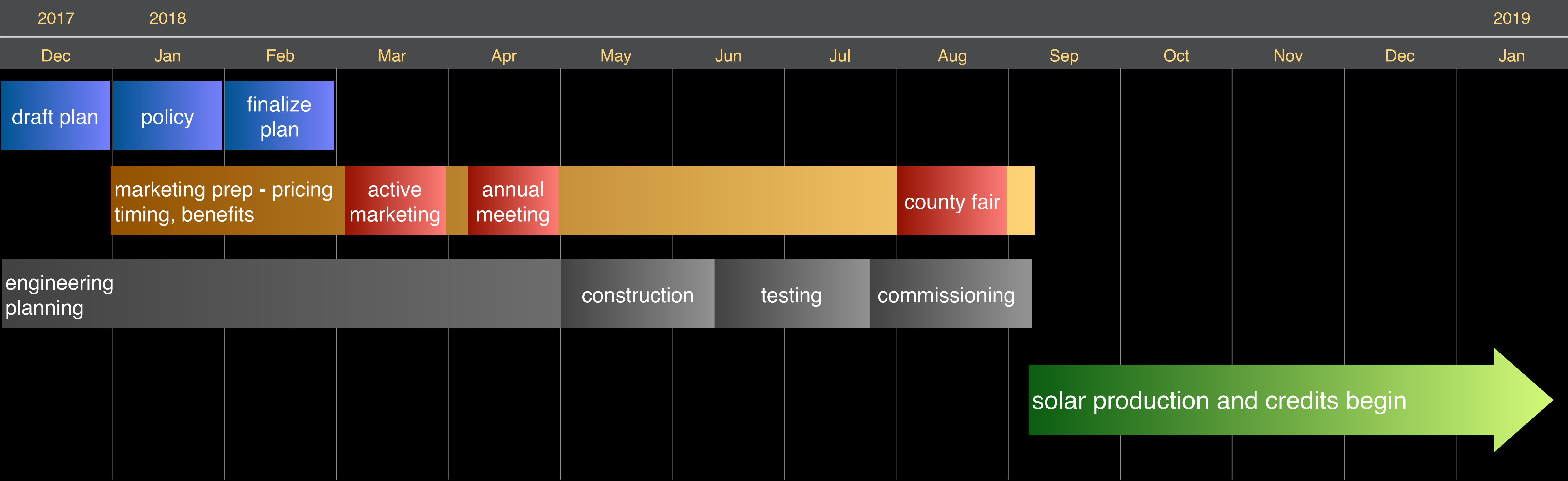
## Quick Facts

- ✧ Total size of the array: ~504 kW DC, between 350-400 kW AC inverter
- ✧ Annual Production: ~570,000 kWh; first full year estimated to be 579,761, with a 0.5% degradation each following year.
- ✧ Location: Decatur Island substation on ~3.6 acres
- ✧ When will the array start producing energy: by 6/30/18
- ✧ How much to participate: \$150 per unit (80 W per unit, \$1.86 per watt), includes O&M and insurance
- ✧ How many units: 6,300 total
- ✧ How much will the project cost: Approximately \$945,000
- ✧ How many units can each member purchase: limited by member interest (TBD)
- ✧ Number of panels: 1,260 - each with a 400W capacity
- ✧ How many solar units per panel: 5 (80W each)
- ✧ Low income: 10% of the array will be reserved for low income participants, which requires funding of ~\$94,500. At this point Bonneville Environmental Foundation (BEF) has agreed to match up to \$50,000 and we are working with other organizations to contribute the remainder.





# Community Solar Plan: Timeline



# Community Solar Policy

1. Decision on Community Solar kWh energy credit rate
2. Community Solar policy as outlined in Board Report materials (OPALCO Community Solar Project #1)



# Community Solar Energy Credit Rate Methodology

Energy Credit Rate Methodology	OPALCO Residential Retail Rate	BPA Wholesale rate	BPA Wholesale + \$.02	OPALCO Residential Retail + \$.01	Grandfathered rate
<b>Energy Credit Rate (ECR) (\$/kWh)</b>	<b>\$ 0.1007</b>	<b>\$ 0.0422</b>	<b>\$ 0.0622</b>	<b>\$ 0.1107</b>	<b>\$ 0.0808</b>
<i>Example: 1 Panel = 5 Units</i>					
Estimated Annual Production (kWh)	455	455	455	455	455
Annual Net Metering Credit <sup>1</sup>	\$ 45.82	\$ 19.20	\$ 28.30	\$ 50.37	\$ 36.76
State Incentive Credit <sup>2</sup>	\$ 72.80	\$ 72.80	\$ 72.80	\$ 72.80	\$ 72.80
Total Annual Credit	\$ 118.62	\$ 92.00	\$ 101.10	\$ 123.17	\$ 109.56
<b>Simple Payback (years)<sup>3</sup></b>	<b>9.0</b>	<b>21.5</b>	<b>14.6</b>	<b>8.2</b>	<b>11.3</b>
20 Year Net Benefit/(Cost) <sup>4</sup>	\$ 504.16	\$ (28.28)	\$ 153.72	\$ 595.16	\$ 323.07

<sup>1</sup> Paid out monthly via on-bill credit (ECR \* kWh production)

<sup>2</sup> Annual amount, based on \$0.16/kWh

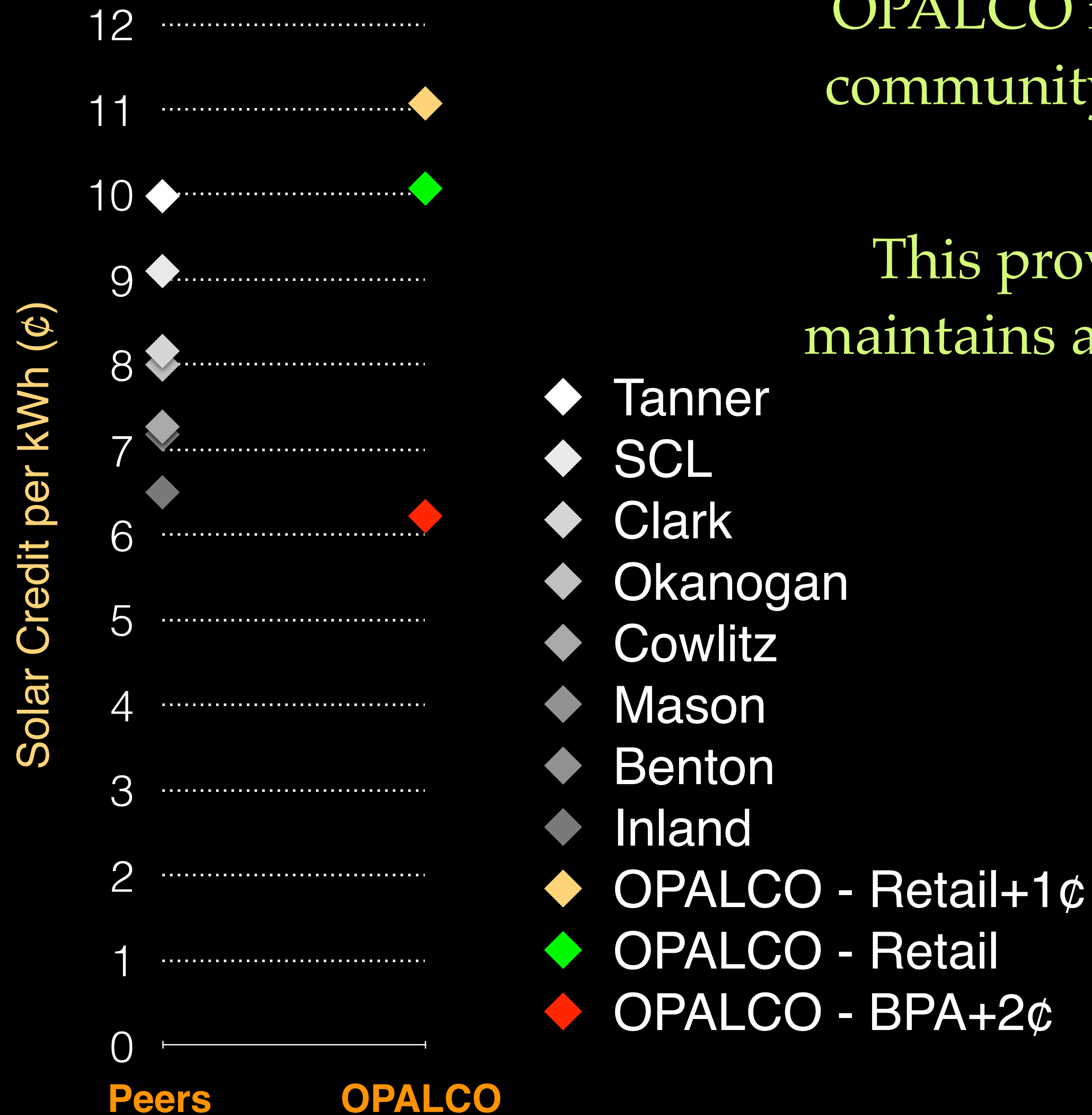
<sup>3</sup> Assumes ECR is constant & State Incentive received for 4.6 year

<sup>4</sup> Accumulated credits less cost of units

# Community Solar Credit Summary: Peers and OPALCO

OPALCO reviewed eight northwest utilities who offer community solar programs. All set their energy credits to the retail residential rate.

This provides a simple consistent market price and maintains a uniform level playing field for both to grow.

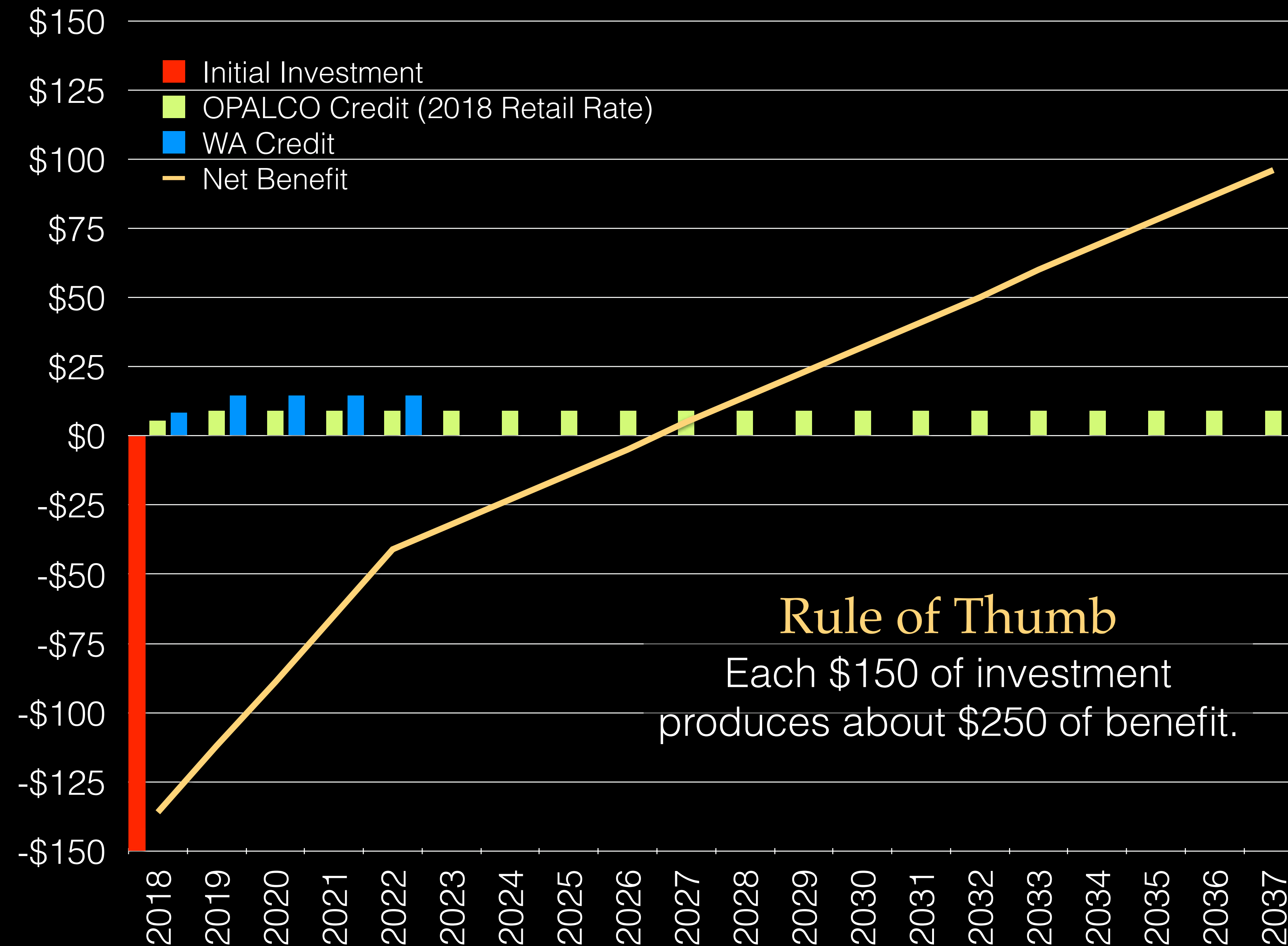


## Notes

- All Peers are using retail net meter rates. The solar rate tracks changes in the retail residential rate - 1 kWh solar production = 1 kWh retail rate credit.



# Community Solar Credit Benefit Analysis: Per Unit (80 W)



**Rule of Thumb**  
Each \$150 of investment  
produces about \$250 of benefit.

## Notes

- \$150 per unit initial investment, which includes operation, maintenance, and insurance.
- Payback is about 9 years, depending on solar production, WA production credit and residential retail kWh rate.
- 20 year return on investment is about ~\$250 per unit.
- WA production credit pays about 10.6% of your investment each year (\$14.56/unit), for 4.5 to 8 years, depending on when 50% of cost is achieved.
- OPALCO community solar production credit is based on retail residential rate, each year. It pays about 6.1% of your investment each year (\$9.16/unit), for 20 years.



# Rooftop Versus Community Solar Comparison

example comparison of typical community solar and rooftop solar economics

## Notes

Array Type:	Community	Community	Community	Rooftop
Array Size (DC watts):	400	1,000	5,000	5,000
cost per watt	\$1.86	\$1.86	\$1.86	\$2.00
total system cost	\$744	\$1,860	\$9,300	\$10,000
annual production (kWh)	455	1,138	5,688	5,250
annual OPALCO kWh credit	\$46	\$115	\$573	\$529
4.5 yr annual WA kWh credit	\$73	\$182	\$910	\$840
total 20 year credit	\$1,244	\$3,110	\$15,550	\$14,354
20 year net (credit - cost)	\$500	\$1,250	6,250	4,354
Return (total credit / cost)	1.67	1.67	1.67	1.44

- Rooftop kWh net meter retail rate. Same for Community Solar?
- OPALCO community solar includes operation, maintenance and insurance. Rooftop doesn't. Community solar kWh production is therefore higher than rooftop solar due to better solar siting, cleaning and maintenance.
- We only compare community to rooftop solar for a 5,000 watt array. Smaller arrays are not cost-effective for rooftop solar installers. The price per watt becomes too high, to cover labor and inverter costs.
- For small array shares less than 5,000 watts, community solar is especially cost effective, compared to rooftop solar.
- Cost per watt assumes a 30% Investment Tax Credit (ITC).
- WA production credit assumes 16¢ per kWh for up to 8 years, however, OPALCO calculates that community solar and rooftop solar projects will more typically be limited to an average of 4.5 years of production credits, subject to WA limits of system cost and date of system certification.

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# *Discussion*

*Thank You!*