

OPALCO Community Solar

Overview and Comparison to Rooftop Solar

What is community solar?



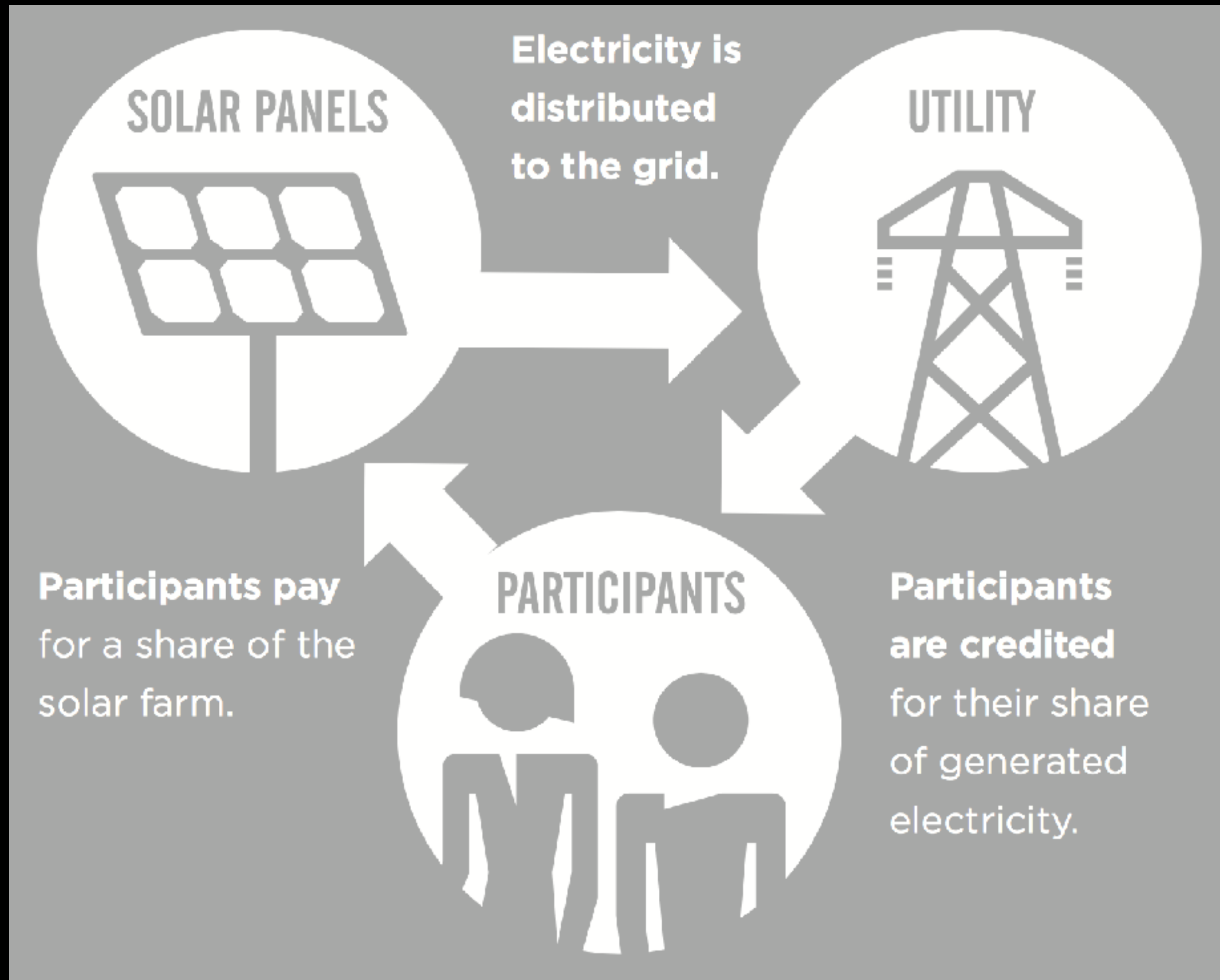
your
neighbors
panels

your
panels

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

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

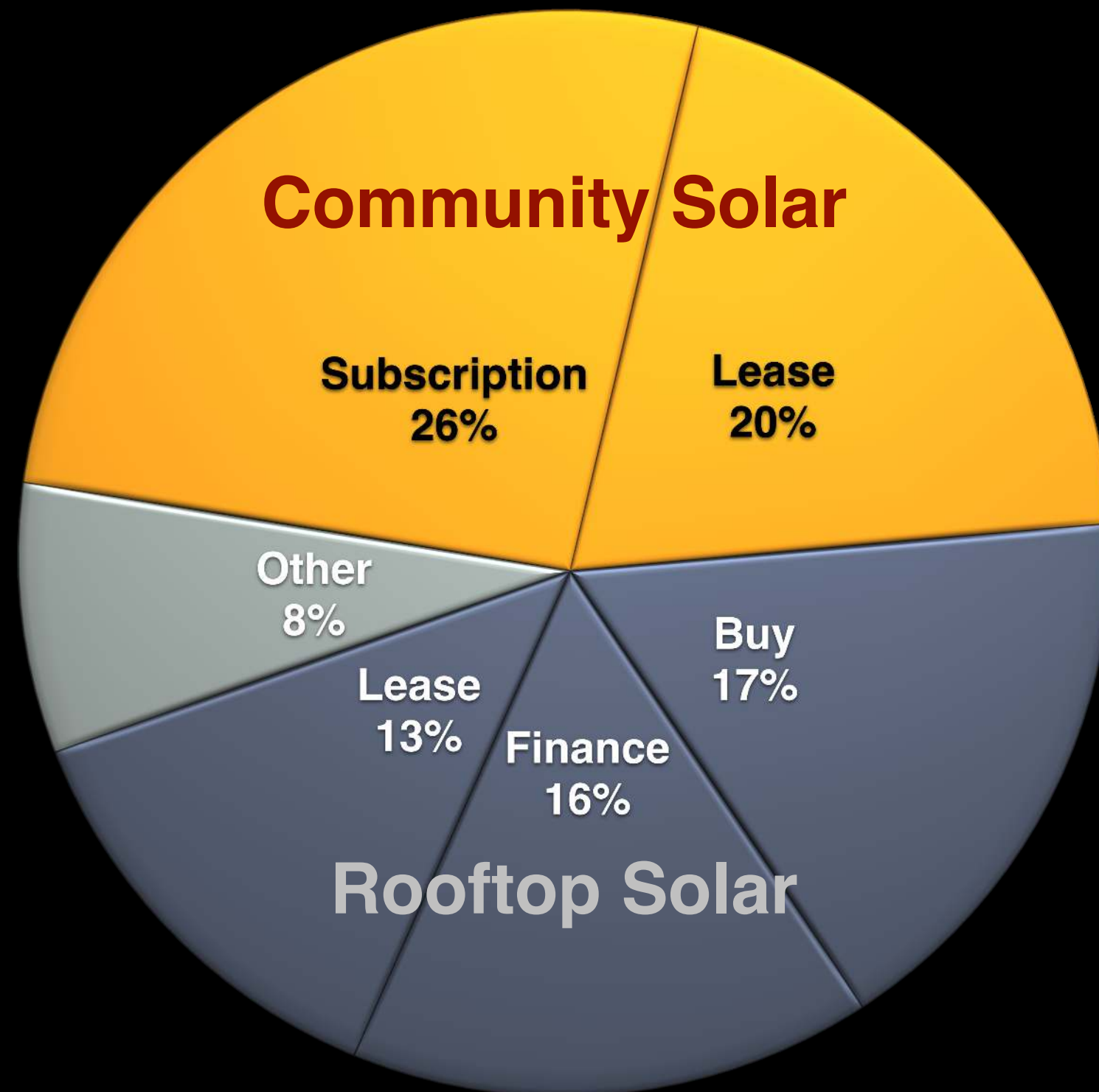
How does it work?



*You buy a **share** of the solar array.*

*Electricity generated by your share of the array is **credited** to your OPALCO bill.*

US Homeowner Solar Survey



*While rooftop and community solar are of equal interest to homeowners, community solar is appealing to people who want to **lower their electric bill, start small and have no maintenance.***

The #1 reason homeowners consider solar

“I want to lower my monthly energy costs.”

When considering community versus rooftop solar approaches, the **top two** preferences were for community solar **subscription** and **lease** programs.

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

- economy of scale - 40 times larger than typical rooftop array
- on-bill financing available at low interest rate
- 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.



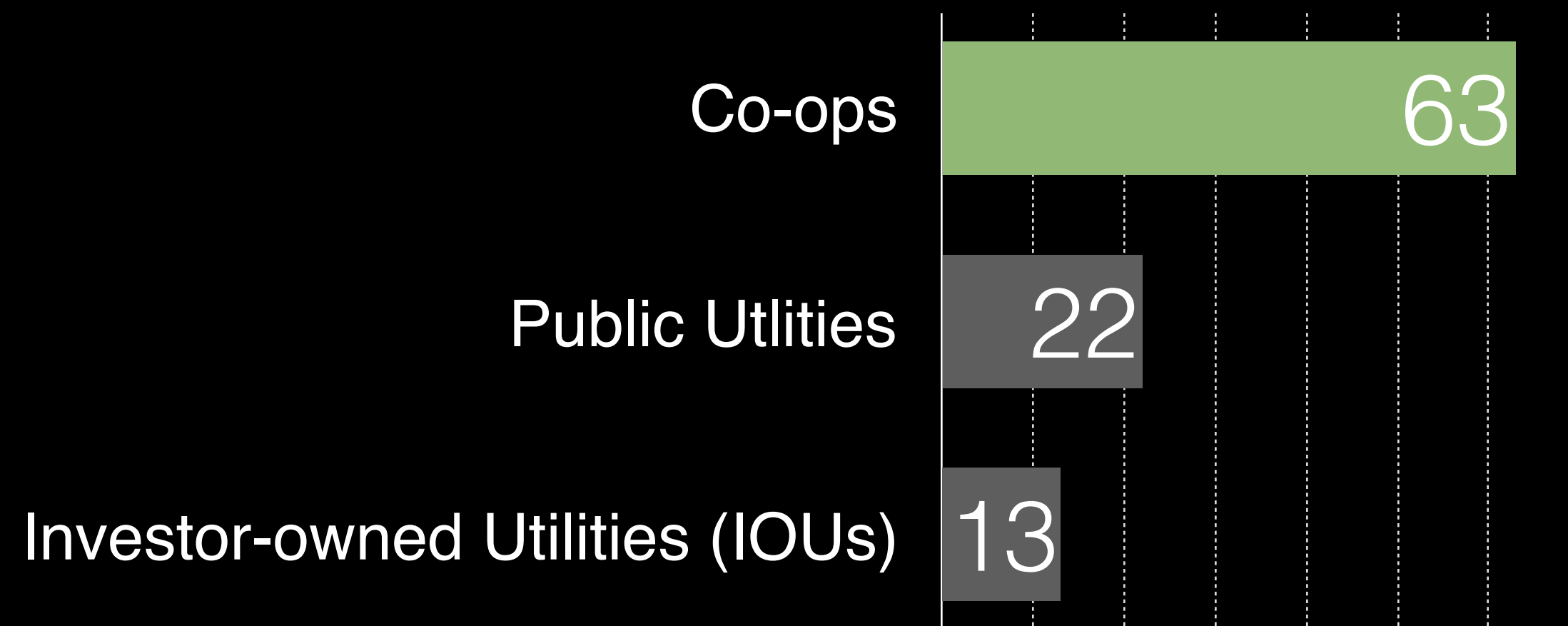
OPALCO installs its community solar arrays in existing open areas, with optimal solar exposure, minimizing impact to trees and forests.

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.

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.

How much will you save on your annual electric cost?

When you buy a share of the Community Solar array, the cost and the credit on your electric bill depend on how many watts of the array you buy. Though we are still refining the details, here are some typical numbers to help you calculate how much you would save on your electric bill.

For each **100 watts** you buy, you would pay about **\$200**.

Each year, that **100 watts** would generate about **120 kWh** of solar energy, credited to your bill.

At current rates, that's about **\$12** credited to your bill. As rates go up, the credit goes up too.

Over the 25 year life of the array, you would typically receive a total of about **\$450** to **\$750** of credit, depending on rate inflation.

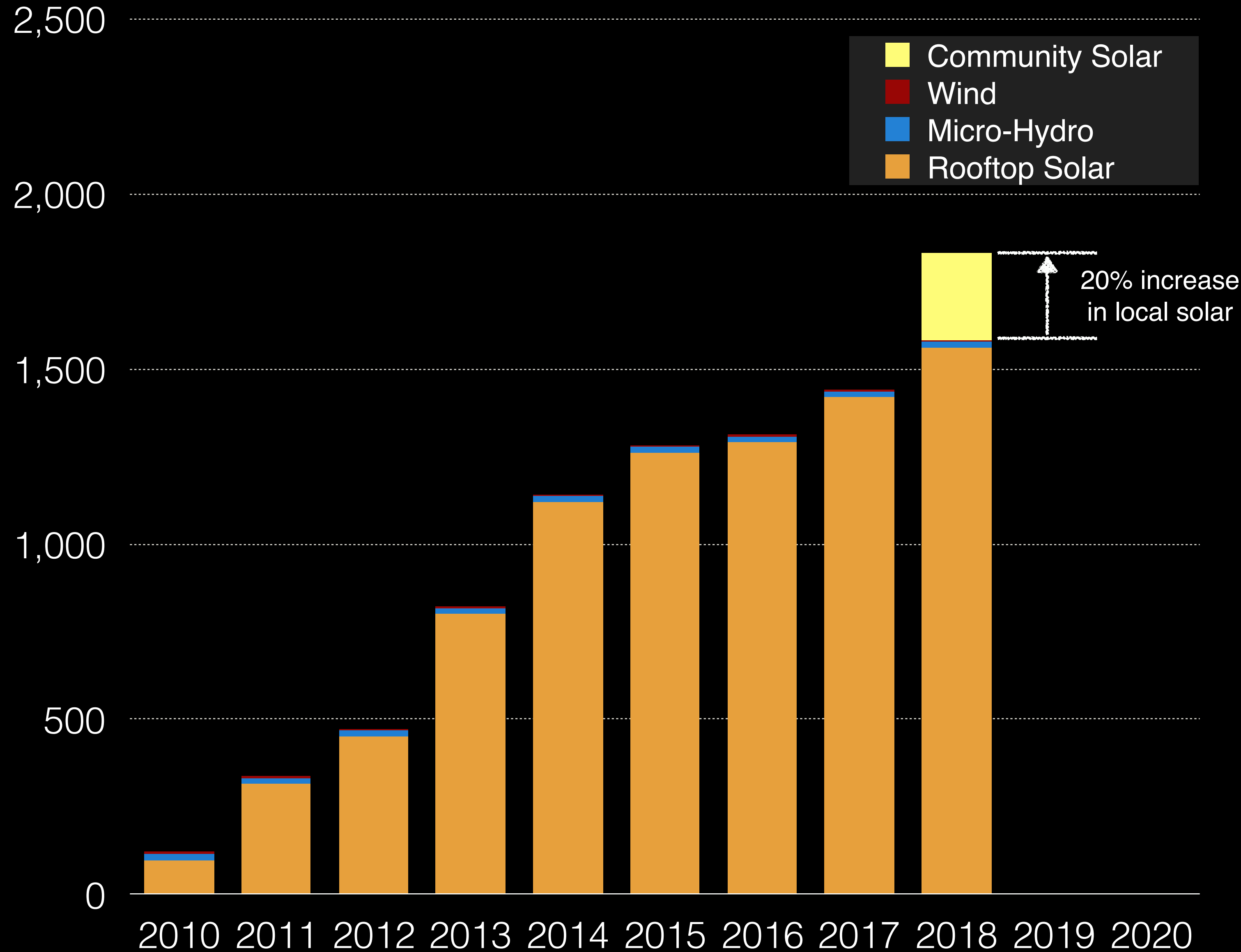
That includes 8 years of a WA state production incentive. And we take care of all the maintenance, cleaning, and repairs. **Care-free!**

How does community solar fit into the big picture?

*Most of our electric energy comes from **hydro** from BPA. But it is slowly becoming more expensive. Local energy resources like **energy efficiency, storage, solar, wind, tidal, and biochar** are slowly becoming cheaper. In the next few years, as local renewables reach “**Grid Parity**” local renewables share of the energy pie will accelerate rapidly.*

The next few slides show how community solar is part of a bigger picture, and where our energy comes from, now and in the future.

Local Solar, Wind, and Micro-Hydro Power Capacity (kW)



In 2018, the OPALCO community solar array will increase local solar energy by about 20%.

The next two slides shows how the share of **local renewable energy** will increase dramatically as prices continue to fall and become comparable to low-cost BPA **hydro**.

We call that point "**grid parity**."

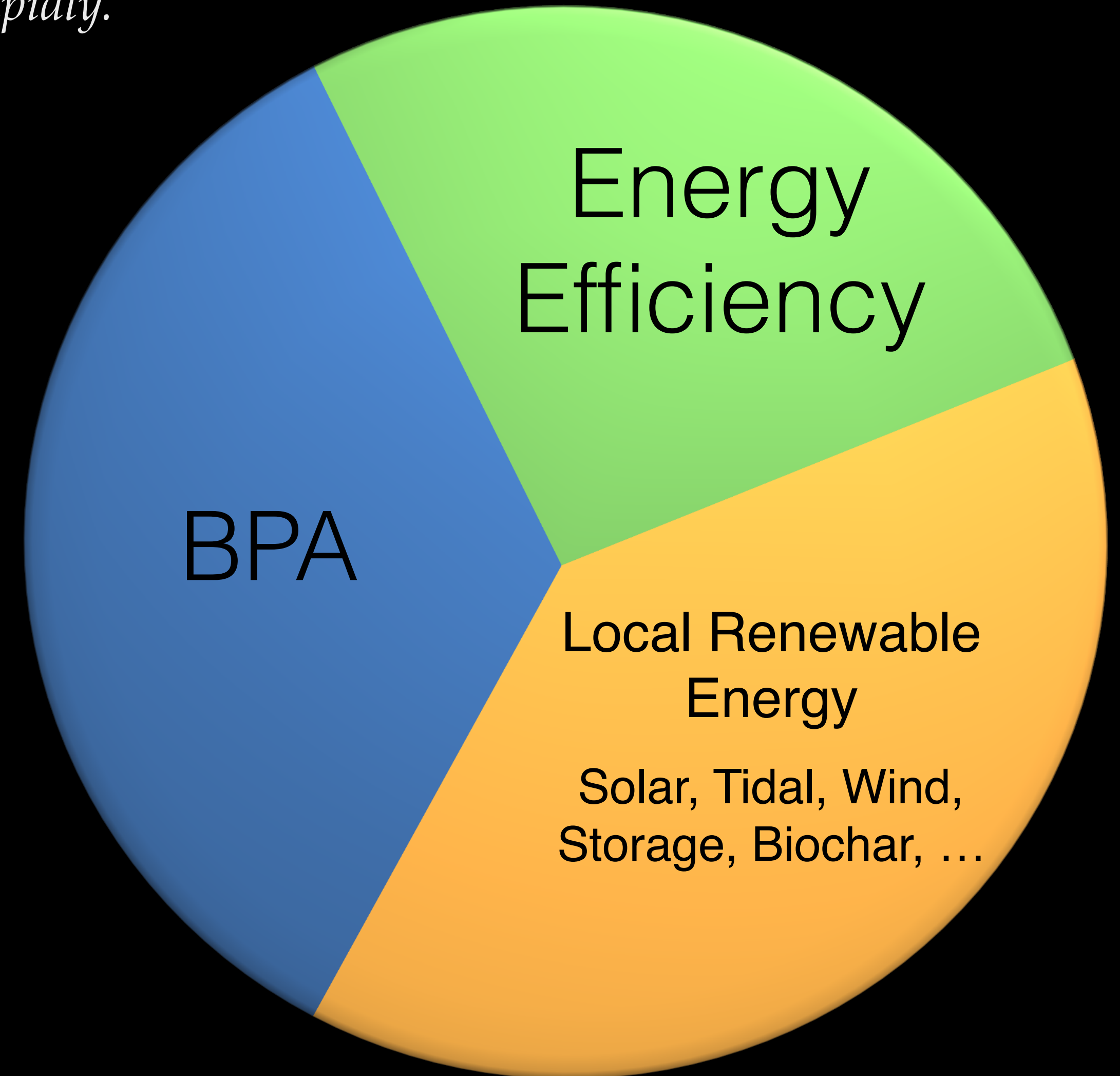
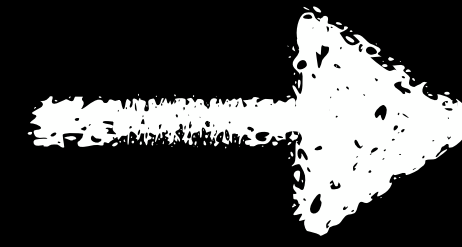
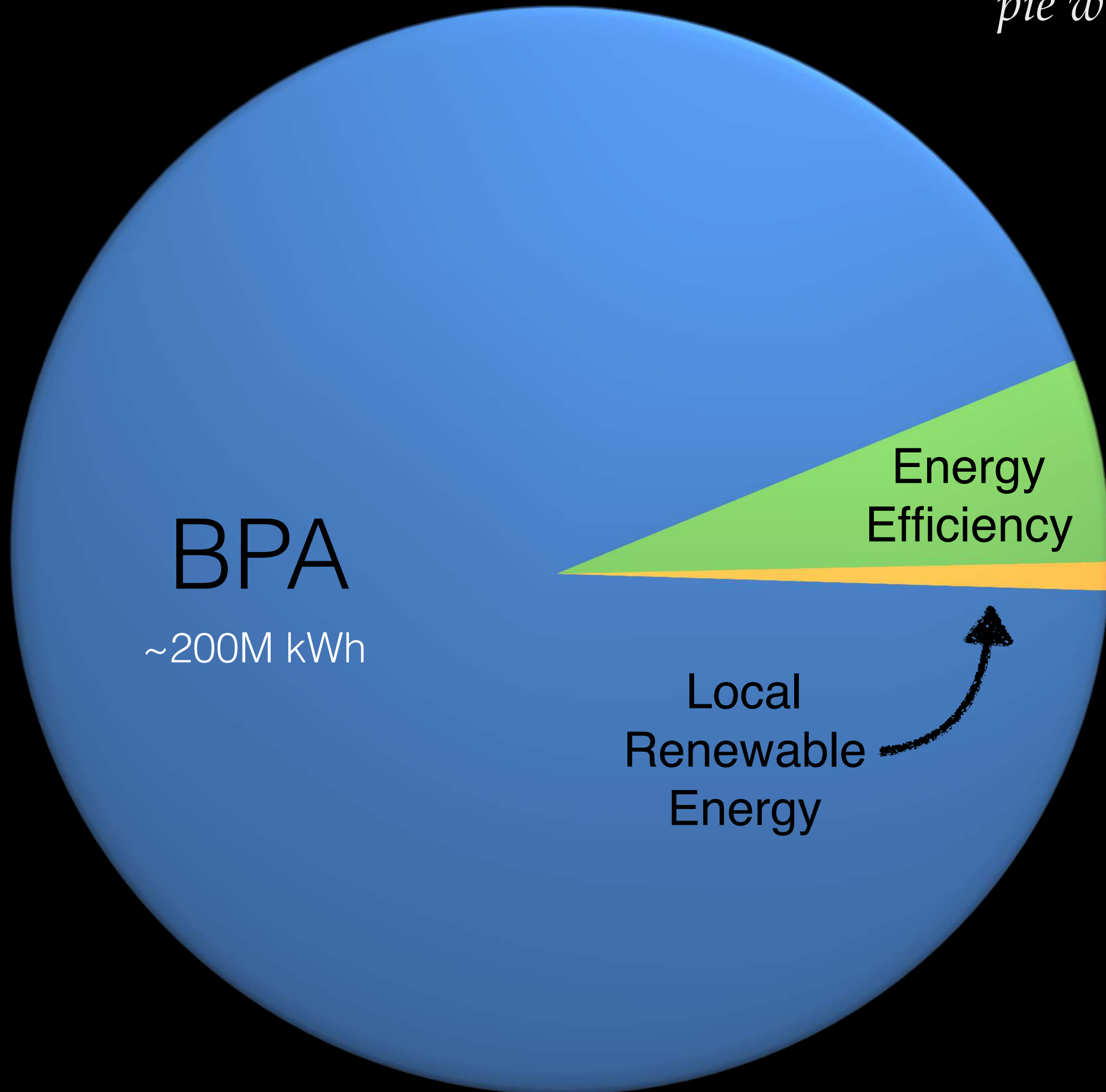
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OPALCO Energy Resources

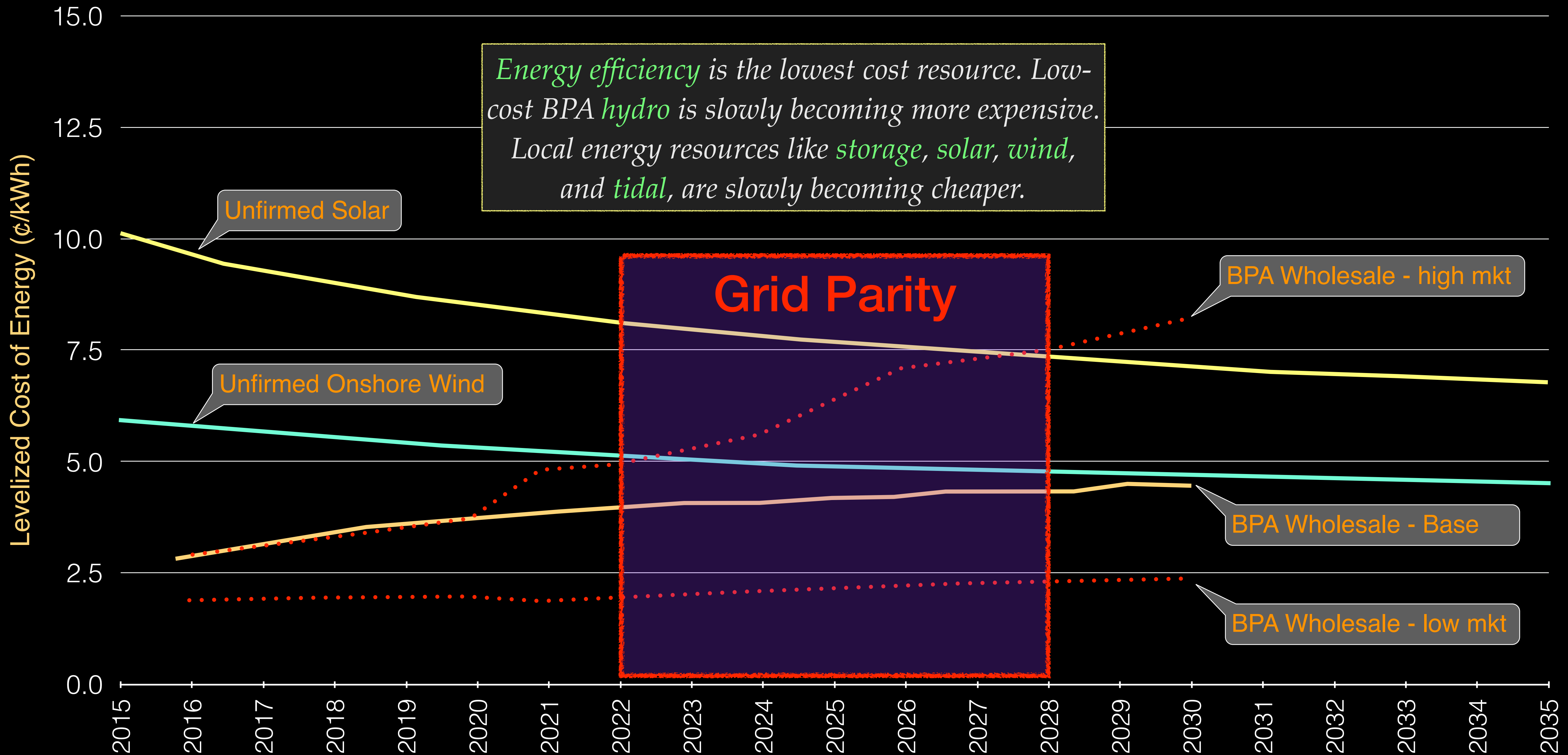
2018

In the next few years, as local renewables reach "grid parity" their share of the energy pie will accelerate rapidly.

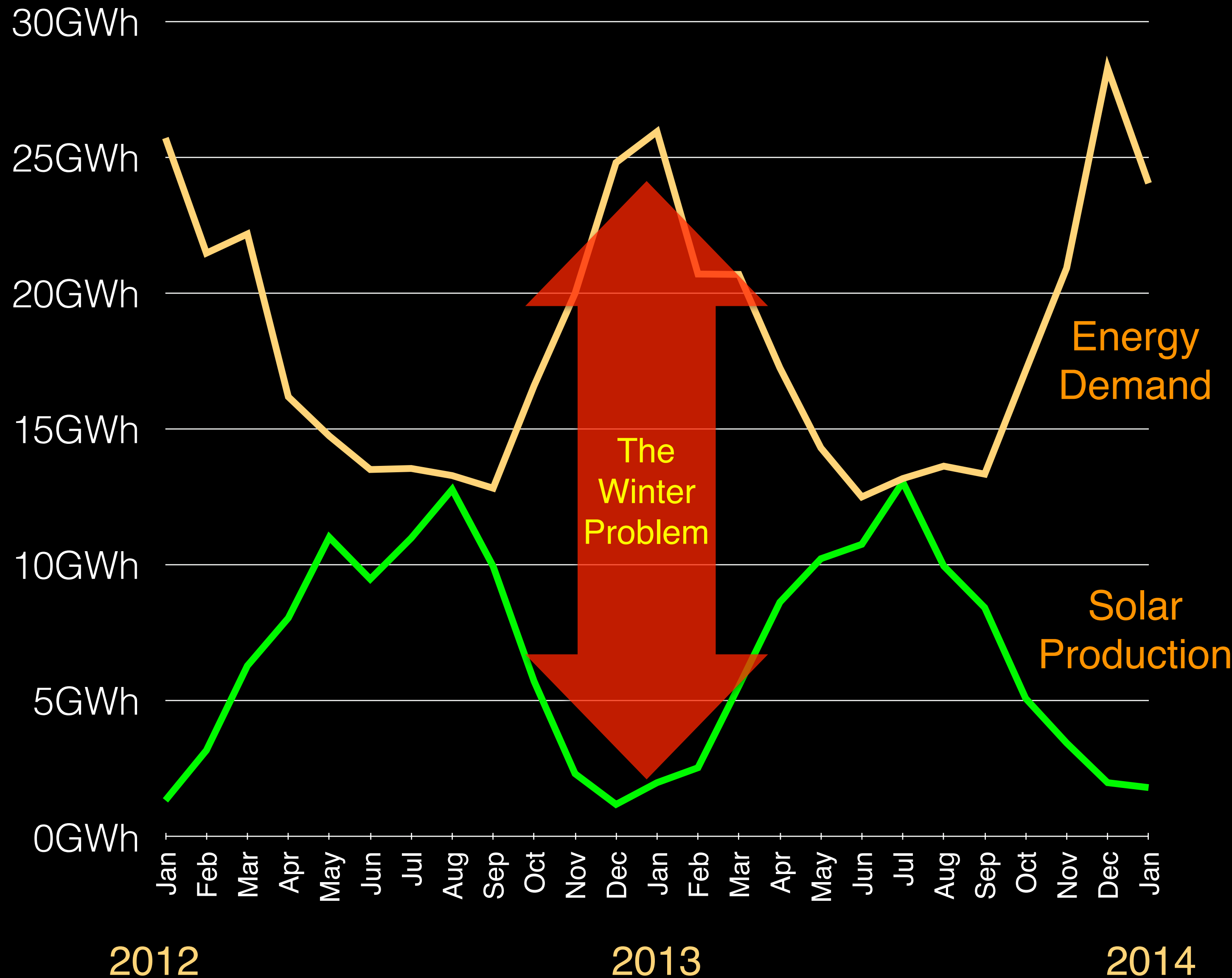
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Utility Scale Levelized Cost of Energy: Grid Parity



What if every home in the county had solar? **The Winter Problem**



Assuming each home had good sun, and had a 7.5 kW array, solar would only meet about 38% of the county electric load, due to limitations of sun in the Northwest.

- In winter, load doubles, but solar decreases by 80%
- But, with climate change...
 - ◆ Winters are warming and summers are too
 - ◆ There will be reduced need for winter heat and increased need for summer air conditioning
 - ◆ Snowpack is decreasing, which means less hydro flow in summer, which could mean lower hydro production and higher hydro costs in summer when big cities have increased air conditioning load.
 - ◆ Solar can help fill the gap from reduced summer hydro
 - ◆ And, increasing local renewable energy such as solar, wind and tidal helps increase local energy and economic resilience.

Appendix

The following slides provide additional data showing detailed cost analysis of community solar, cost of various forms of energy, and benefits of community solar in making us more resilient to outages.

How much will you save on your annual electric cost?

example comparison of typical community solar and rooftop solar economics

pay up-front for the cost of the array

Array Type:	Community	Community	Community	Rooftop
Array Size (DC watts):	100	1,000	5,000	5,000
cost per watt	\$2.00	\$2.00	\$2.00	\$2.25
total system cost	\$200	\$2,000	\$10,000	\$11,250
annual production (kWh)	120	1,200	6,000	5,250
annual bill credit	\$12	\$120	\$600	\$525
total 25 year credit	\$300	\$3,000	\$15,000	\$13,125
25 year net value of solar	\$100	\$1,000	\$5,000	\$1,875

finance the up-front cost

interest rate	2%	2%	2%	5.9%
total interest cost	\$18	\$183	\$914	\$3,115
total financed cost	\$218	\$2,183	\$10,914	\$14,365
25 year net value of <u>financed</u> solar	\$82	\$817	\$4,086	-\$1,240

WA kWh solar production credits

annual credit	\$19	\$192	\$960	\$840
total 8 year credit	\$154	\$1,536	\$7,680	\$6,720

Up-Front Cost Notes

- 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 the 5,000 watt array comparison, community solar credits \$3,125 more than the rooftop solar system, over a 25 year typical system life.
- For small array shares less than 3,000 watts, community solar is especially cost effective, compared to rooftop solar.
- Community solar kWh production is higher than rooftop solar due to better solar siting, cleaning and maintenance.
- Cost per watt assumes a 30% Investment Tax Credit (ITC). WA production credit assumes 16¢ per kWh for first 8 years.

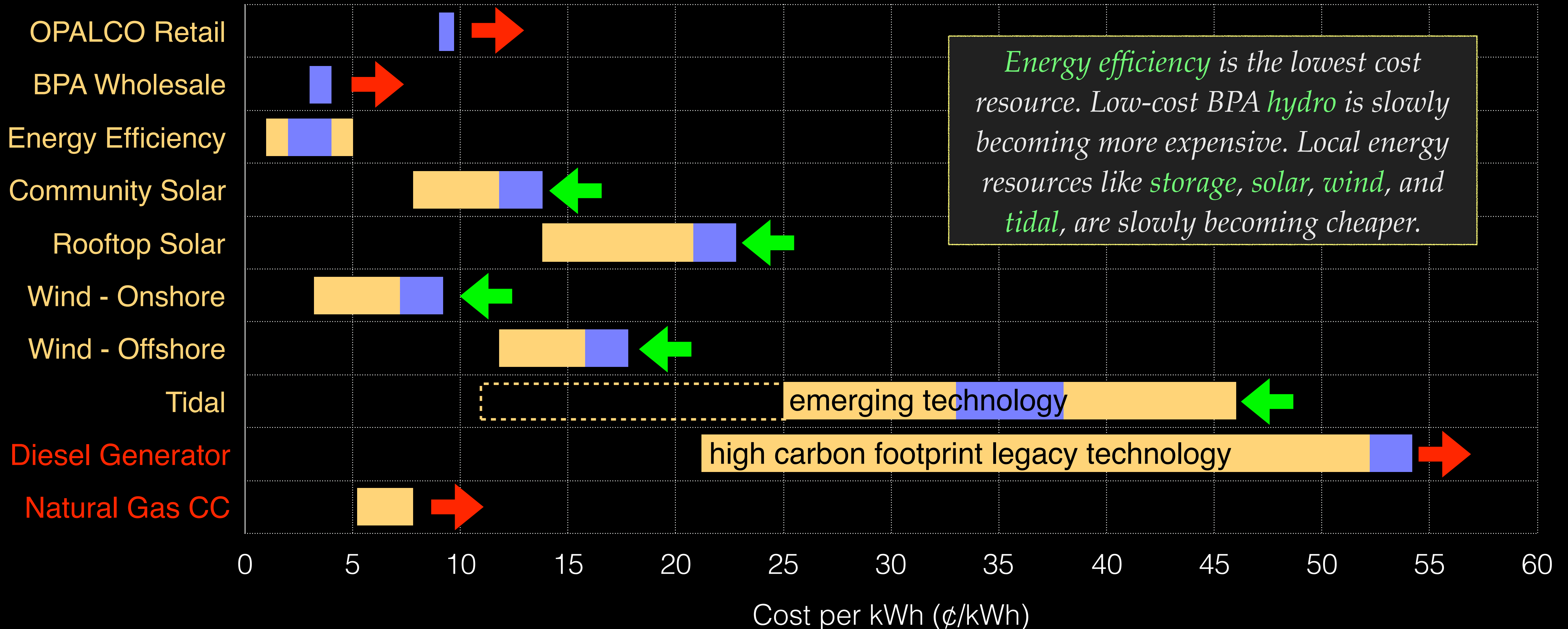
Finance Cost Notes

- Finance for 10 years. Rooftop solar interest rate currently about 5.9%. Community solar finance rate may be about 2.5%
- Total financed cost = total system cost + total interest cost
- 25 year value of financed solar = 25 year credit - financed cost
- For the 5,000 watt array comparison, community solar credits \$4,086. The rooftop solar system, ends up losing \$1,240, not including home-owner costs for cleaning and maintenance, and WA production credits.

Unsubsidized Levelized Cost of Energy Sources

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

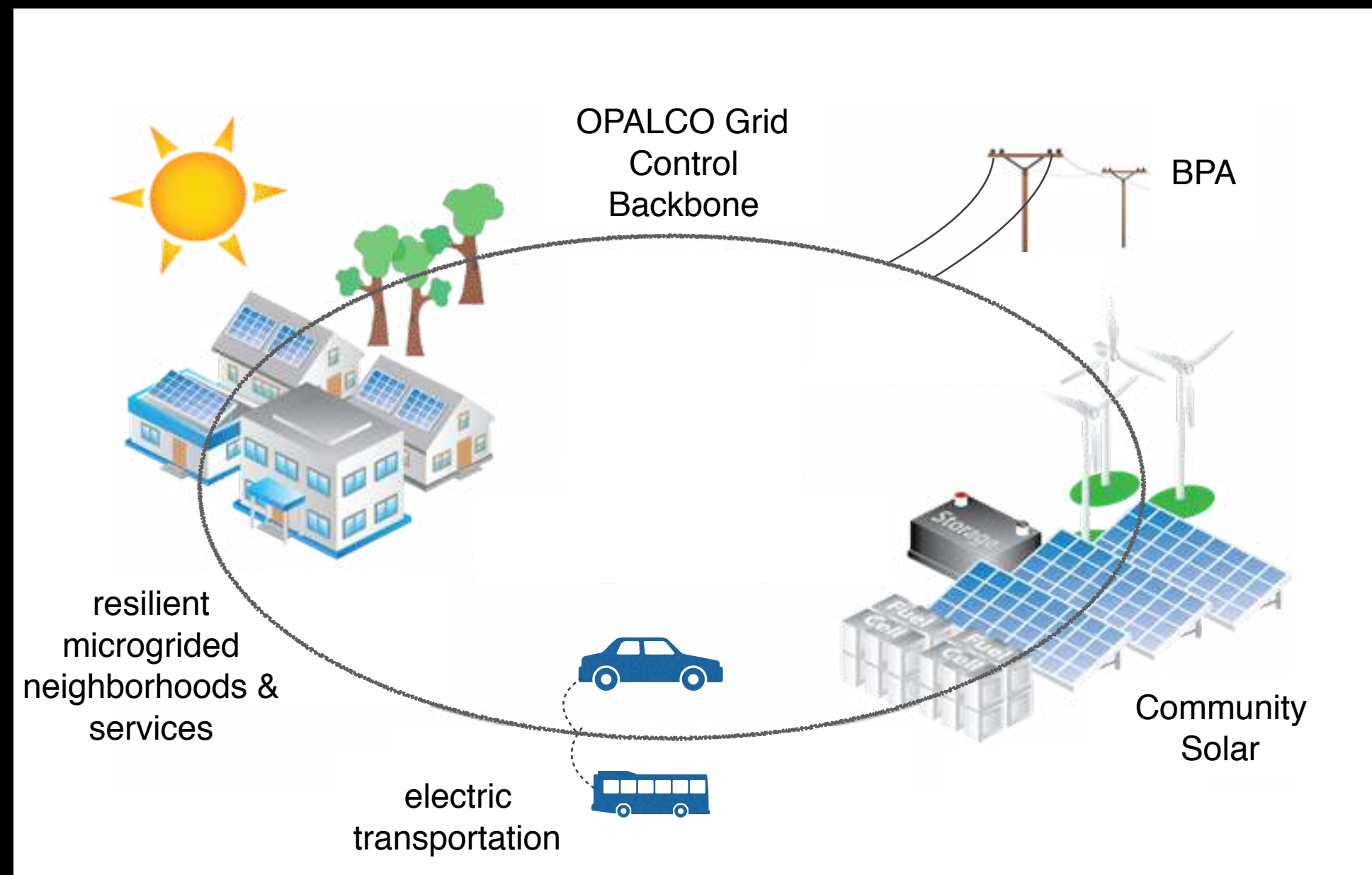
Cost Trend: ➔ = Inflation ➔ = Deflation



Community Solar Benefits All Community Members

Though the community solar program and system are paid for by the participants, this project benefits the whole community.

The community solar array is being paired with a utility-scale battery to provide four important functions that help reduce costs of energy and operation of grid. The battery, in addition to conditioning the intermittent output of the solar array (due to variations in cloud cover), helps...



- **Reduce BPA energy costs**
 - improves load shape
 - improves load factor
 - reduces spikes in peak demand
 - reduces submarine cable transmission losses
- **Reduce submarine cable system component wear and tear**
 - balancing capacitance and reactance in the transmission system
 - reducing peak demand pulses that can heat the expensive submarine cable
 - reduce cable connector heating, extending component life
- **Increase reliability of grid through "micro-gridding" the solar and battery system**
 - and helps stabilize the grid as distributed intermittent rooftop solar increases

This first system will serve as a template for expansion of local renewable energy and storage around the grid, especially in town centers, using the solar powered battery backup in case of emergencies, to support critical community functions like first responders, medical centers, grocery stores and disaster support facilities.