COMPREHENSIVE PLAN

Appendix 8

SECOND DRAFT
UTILITIES INVENTORY
AND EXISTING CONDITIONS

~~**August 4, 2017**~~

November 1, 2019

PAGE INTENTIONALLY
LEFT BLANK

APPENDIX 8

DRAFT
UTILITIES INVENTORY
AND EXISTING CONDITIONS

TABLE OF CONTENTS

Section Page

8.1 INTRODUCTION.....1

8.2 ELECTRICITY

8.2.1 Existing Conditions.....1

8.2.2 Capacity Needs.....3

8.2.3 Community Solar.....4

8.3 TELECOMMUNICATIONS

8.3.1 Data & Telephone - Fiber Optic.....4

8.3.2 Telephone – Voice over Internet Protocol (VoIP).....4

8.3.3 Wireless – Fixed Wireless Long Term Evolution (LTE).....4

8.3.4 Wireless – Cellular.....4

8.3.5 Telephone – Plain Old Telephone Service (POTS).....5

8.4 INTERNET & CABLE SERVICES.....5

8.5 COMMUNICATION SITES AND FACILITIES.....6

LIST OF TABLES

Table 8.2.1 Capacity of OPALCO Electric Facilities.....1

Table 8.2.2 OPALCO Electricity Service Accounts—2017.....3

LIST OF MAPS

Map 8.2.1 OPALCO Electric Facilities.....2

<NOTE: update table above after changes below are formalized>

8.1 INTRODUCTION

This document provides an inventory of utility services in San Juan County, including electricity, telecommunications, internet and cable, and communication sites and facilities. In San Juan County, private service providers supply utilities to customers. This inventory includes the providers, general locations and capacities of existing utilities where applicable.

8.2 ELECTRICITY

Electricity for the county is provided by Orcas Power and Light Cooperative (OPALCO). That power is sourced primarily from Northwest hydro power from the mainland. Over the next 20 years OPALCO will be producing over half of that power locally, to increase local energy resilience and moderate mainland price increases. That local power will come from a combination of solar, wind and tidal energy sources, mostly utility scale, with some member generated resources, including rooftop solar. Additionally, with the 2019 WA Clean Energy Transformation Act (CETA), mainland power capacity will likely be reduced in the coming decade, which will increase the likelihood of rolling blackouts. To mitigate outages and increase local energy resilience, OPALCO will be developing a substantial local grid battery resource capacity – both utility scale and member owned.

OPALCO is a member-owned, private, non-profit Rural Utility Services (RUS) Cooperative that provides local electric service to its members in San Juan County. OPALCO was formed in 1937 and currently maintains offices in Eastsound, Friday Harbor, and on Lopez Island with headquarters in Eastsound. OPALCO is an electric distribution utility distributing power via submarine cables to members on twenty islands. OPALCO prioritizes delivery energy that is safe, reliable, affordable, clean, and sustainable.

8.2.1 Existing Conditions

According to OPALCO, existing electric utility facilities in San Juan County have adequate capacity to serve existing loads. OPALCO maintains a comprehensive Integrated Resource Plan to expand capacity as load growth occurs. Table 8.1.1 below, lists the location and capacities, in million volt-amps (MVA) of each substation in OPALCO's transmission network.

Location	Base Capacity (MVA)	Max Capacity (MVA)
Shaw	5	5
Orcas	12	12
Eastsound	12	20
Olga	7.5	7.5
Lopez	12	16
Blakely	2.5	2.5
Decatur	2.5	2.5
Roche Harbor	12	22.4
Friday Harbor	12	22.4
Gravel Pit	12	20

Map 1. OPALCO Electrical Facilities (2019).

OPALCO Islands Served

Table 8.2.2 below, lists the number of service accounts by island for 2019.

Island	Number of Services

Armitage	1
Bell	1
Big Double	3
Blakely	166
Brown	48
Canoe	6
Center	142
Charles	2
Crane	53
Decatur	279
Fawn	1
Henry	97
Little Double	1
Lopez	2,486
Obstruction	36
Orcas	4,736
Pearl	40
Reef Point	1
San Juan	6,528
Shaw	275
Spieden	11

~~Additional information on OPALCO's service territory can be found in Figure 1 of Section B - Element 8 – Utilities.~~

8.2.2 Energy Outlook

- **Climate impact is warming winters and summers**. At the current rate, winters will be summer-like by the end of the century. Summers will be much warmer. There is a rotation of load from winter-peaking to summer-peaking that will unfold over the coming decades. Heat load will decrease, due to warming winters and steadily growing market share of super-efficient heat pumps replacing less efficient electric resistance heating. Air conditioning load will increase, but, being heat pump based, it is inherently efficient. Snowpack is receding (more rain, less snow fall) leading to a shift of hydro flow away from summer, toward winter. This will especially challenge mainland urban areas that depend on air conditioning to stay cool during more frequent climate changed heat waves. That said, trends in local warming, though moderated by the cool surrounding Salish Sea, will become uncomfortable in summers, especially challenging our vulnerable (larger than the mainland) elder population.

- **Mainland power will become more costly and less reliable** in the coming decade as demand for firm, clean, reliable affordable hydro increases, driven by the decommissioning of coal power plants. Capacity will go down, driving energy prices up. Demand will exceed supply, leading to regional rolling blackouts and demand rate inflation during periods of peak load demand. Increasing local renewable energy resources will be an important part of the solution.

- **There is time to solve the problem, if we start now**. Gradual incremental deployment of cost-effective solutions reduces risk and saves money. *An ounce of prevention is worth a pound of cure*. Delay would lead to unmanageable risk and rate shock. OPALCO's near term focus is on building equity, winning grants, and incentivizing member efficiency, renewable energy and battery storage programs.

- OPALCO expects that **local renewable energy resources will become competitive with mainland power** wholesale electric rates around 2025 (grid parity). Solar + storage will be essential parts of our resource mix. Storage is the "Swiss Army knife" of the grid, helping firm the increasing contribution of intermittent resources like solar, helping reduce demand charges, keeping critical infrastructure and town-centers operating during outages, and much more.

- **Direct member investment** will be an essential part of growing our local energy resource mix. This is an especially important way to accelerate local energy resource deployment, before grid parity, without impacting rates. OPALCO's Switch it Up! program will be used to incentivize direct member investment in over 3 MW of member battery storage, and efficiency measures including heat pumps, dispatchable water heaters, dispatchable EV chargers, and smart inverters coupled with rooftop solar.

- **Mainland power will remain an essential part of our resource mix**, albeit less. As we increase local energy resilience with the addition of local energy resources (member and community solar, and utility-scale solar, storage, wind and tidal), mainland energy purchases will decline to about half of total kWh consumption by 2040, depending on post grid parity investment levels. Yet, it will remain a vital resource for firming intermittent resources, powering us during cold snaps, at night and in long gray winters when solar production is limited – the ultimate "backup battery."

- **Load continues to be flat** but will change in the coming decade as more members use electricity for heating and transportation. EVs are projected to reach cost parity with fossil-fueled cars in 2022. EVs will be a significant driver of load growth and revenue toward the end of the 2020s. Ferry electrification will add to load in the 2030s. The increasingly transactional grid helps load and resources become more dispatchable (home battery storage, smart water heaters). This will be an essential tool in avoiding peak demand charges.

- **We are in the early stages of a highly transactional grid**. OPALCO has an outstanding grid that has served us well for over 80 years, more reliable than ever. As communication protocols standardize, we will see increased two-way energy and information flow, members buying and selling energy, solar + batteries increasing local energy resilience, enabled by OPALCO's fast reliable fiber and wireless internet. OPALCO will increasingly serve as a balancing exchange, keeping voltage stable as members buy and sell energy from each other, with mainland power serving as a vital source of firm energy when local energy demand exceeds local generation capacity.

- **Efficiency continues to improve**, helped along by the "internet of things" (IoT) – enabled by the OPALCO/Rock Island fiber and LTE wireless broadband backbone. The "automated home" market exceeded $23 billion in 2018 and is expected to reach $75 billion by 2025, at an impressive compound annual growth rate of 18%. This presents encouraging impetus for helping OPALCO members make their energy use smarter and more efficient, including smart thermostats and appliances, better grid monitoring, grid control and crew information access. Heat pumps will be

the largest reducer of load as members convert from resistance heat to super-efficient heat pumps. Bundling fiber with smart home systems helps incentivize uptake.

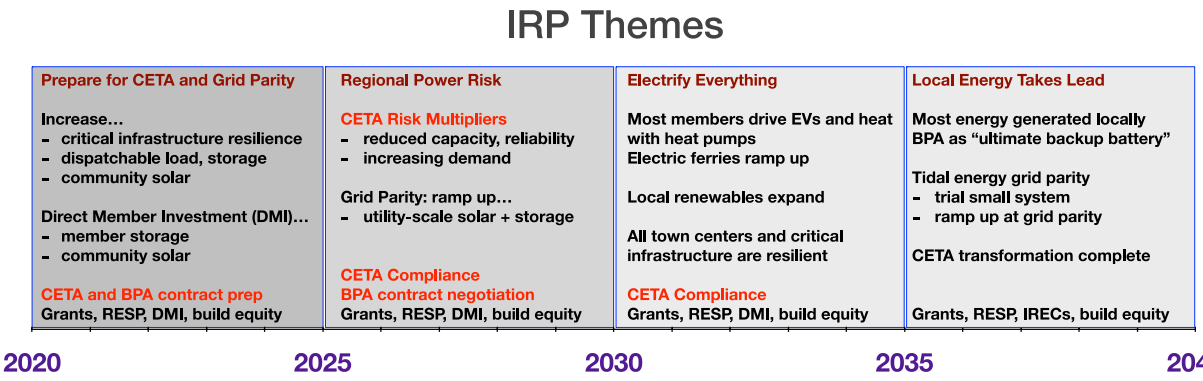
The table below summarizes the resources to be developed, the purpose of those new resources, and the investment source, before and after grid parity (the point at which local power resources become lower cost than mainland power).

	Before Grid Parity	After Grid Parity
Resources	Deploy **moderate** amounts of local renewable energy resources: a combination of solar + storage + demand response, community solar, and utility-scale solar. Incentivize rooftop solar, dispatchable home storage, and demand response units.	**Accelerate** deployment of local renewable energy resources, as they become affordable, to significantly reduce our dependence on mainland power. Initially solar, eventually tidal energy, likely in the 2030s.
Purpose	Reduce vulnerability to mainland demand charges. Increase local energy resilience, especially for critical services in the county: first responders, town centers, government. Community solar helps members lower the cost of their electricity.	Cushion us against the increasing cost of mainland power. Increase local energy resilience.
Investment Source	Community solar is paid for by subscribers. Utility-scale solar is funded through grants and RESP program. Member storage and demand response is paid for through direct member investment, grants and RESP program.	Direct member investment, Grants, RESP program, and rates as a last resort.

Over the 20-year IRP planning horizon, OPALCO sees four distinct themes playing out. First, start with preparing for CETA, developing critical local energy resilience resources, especially dispatchable storage. Also prepare for grid parity, leveraging local grid control backbone to manage the increasingly smart, dispatchable distributed local resource mix. And OPALCO begins negotiations with BPA on the 2028 contract. OPALCO expects that BPA mainland power will be in high demand regionally and all the way down to California, serving as the ultimate low carbon backup battery for the increased intermittent renewable resource mix.

In the later 20s, OPALCO navigates some troubled waters as CETA reduces near-term regional power capacity, increasing demand spikes and risk of mainland power disruption. Beyond that, by 2040, most transportation and heating will be clean electric, most of our energy will be local, with BPA as the ultimate backup battery. Power will be more distributed, resilient and affordable than mainland alternatives. The transformation is funded with a mix of grants, Rural Utility Service funds, direct member investment and, for large local utility-scale renewable generation projects, possibly with investor renewable energy credits (IRECS).

The table below summarizes OPALCO's Integrated Resource Plan themes.

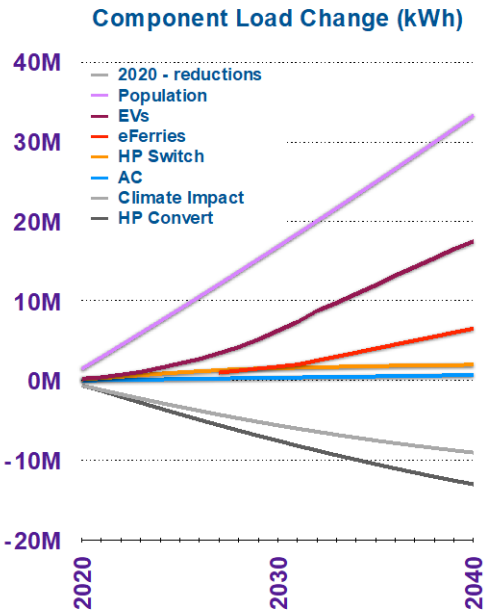


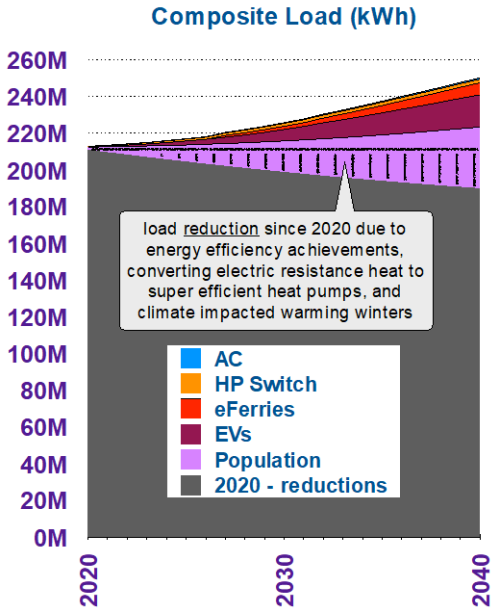
8.2.3 Capacity Needs

The chart below provides a component and composite view of OPALCO's 20-year load forecast.

- **Population growth**, even though it is less than 1%, it remains the most significant component of load growth. Each new member consumes an average of about 12,000 kWh per year.
- **EV charging** load starts softly, but ramps up in the mid-2020s as the price of EVs become less than fossil-fueled cars. EVs currently account for about 6% of cars in San Juan County, growing at about 60% per year.
- **eFerries** start to come online in the 2030s.
- **Climate Impact** with warming winters significantly reduces winter load.
- **Air condicioning increases load as climate impact warms our summers**
- **Heat Pump Conversions** from electric resistance heat also reduces load significantly.
- **Heat Pump Conversions** from fossil fuel heat increases load slightly.

population + EVs + eFerries + fuel switching + AC - efficiency - climate reduced heating





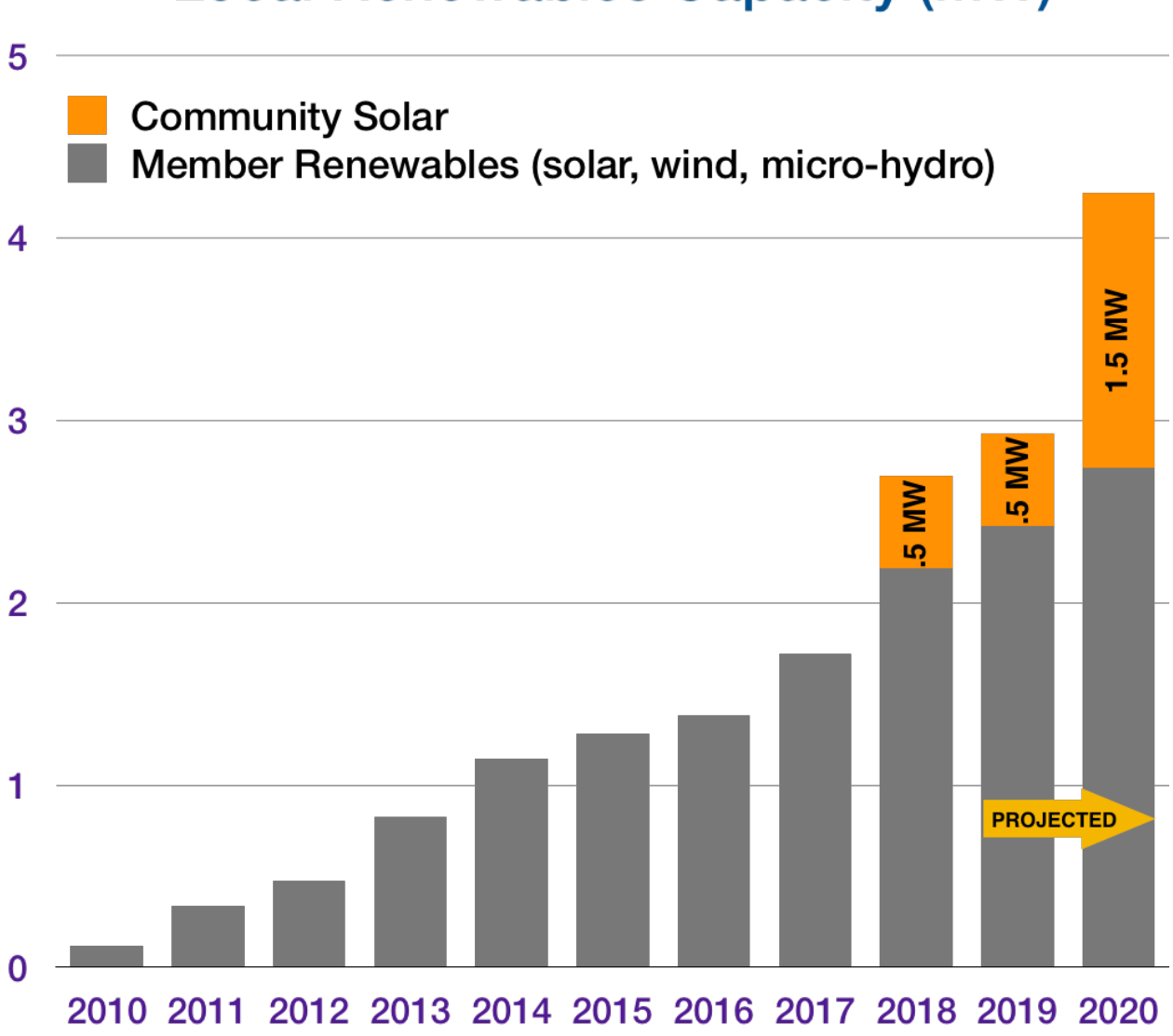
An analysis of capacity development necessary to meet future demand is contained in OPALCO's long-range plan. OPALCO also develops load forecasts and construction projects in their 4-year Construction Work Plan (CWP) in addition to its long-range planning program. OPALCO is currently implementing its 2017-2020 CWP which is reviewed and updated annually as necessary. These capital-planning programs are referenced here for future comprehensive planning purposes.

Detailed analyses have been and will be conducted by OPALCO based on planned land use. Planned construction of electric utility facilities serving local load areas is based on existing and projected load rather than time (years). Utilities determine the need for expanded or new electric utility regional transmission network facilities on the basis of established planning standards that define required system performance under specified conditions including load and generation levels, equipment outages, weather, and equipment ratings. As the electric load within San Juan County grows due to an increase in customers and demand, OPALCO will need to add new electrical facilities to increase the capacity of its distribution system. OPALCO estimates an average annual increase of 0.7 percent for residential and commercial accounts. Since 2007, OPALCO has increased its consumer accounts by approximately 10 percent or an increase of over 1,400 customers.

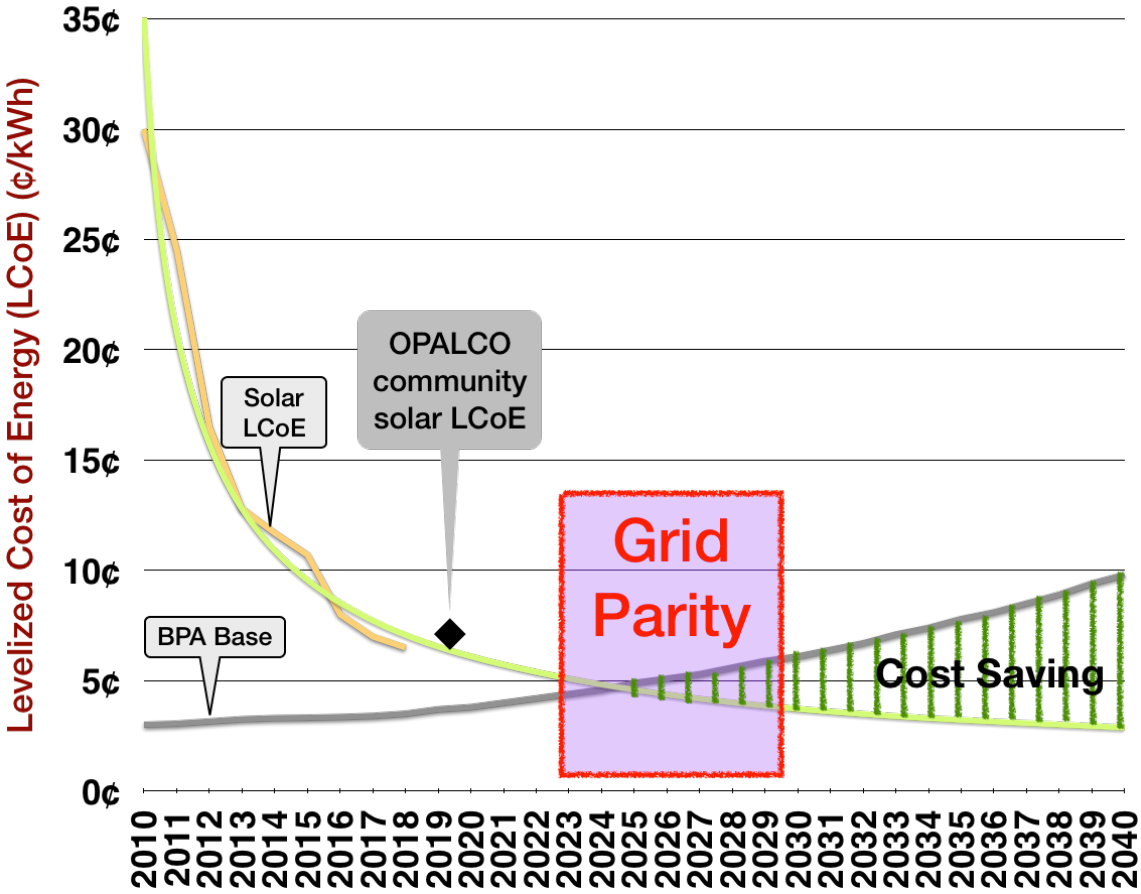
8.2.4 Local Energy Resources

OPALCO operates a 500 KW solar array located on 3.6 acres at the Decatur Substation. This is OPALCO's first Community Solar Project—a program where members offset a portion of their energy use and electric bill via credits by buying shares of a solar array OPALCO operates. Decatur Community Solar began operating in July 2018, and is expected to produce approximately 570,000 kWh/year.

The chart below shows local renewable energy capacity by year with projected capacity for 2019 and 2020.

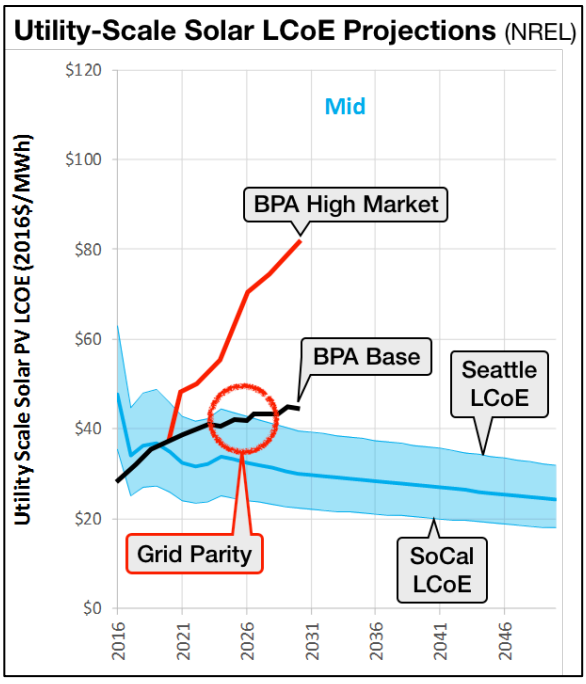


Renewable energy resource costs have been falling, while mainland pricing has been slowly rising. The point at which they cross is called **Grid Parity**. In other words, Grid Parity is the point at which an emerging technology becomes economically viable. At that point, the emerging technology has increasing cost savings compared to the legacy technology (see slide below).



Once a resource is at grid parity or better, it can be added into the energy portfolio to replace or moderate the cost of legacy energy sources.

The chart at right shows mid-level pricing (for the local solar equipment), through 2050. The upper bound of the blue range is Northwest (Seattle) price point. OPALCO has overlaid the northwest mainland base and high market forecast. Having just completed a 500 kW community solar array, the pricing is more representative of larger arrays, with their efficiencies of scale. And mainland pricing has been running a bit above base. Given that, OPALCO projects that utility-scale solar pricing will cross mainland pricing around 2025 (grid parity).



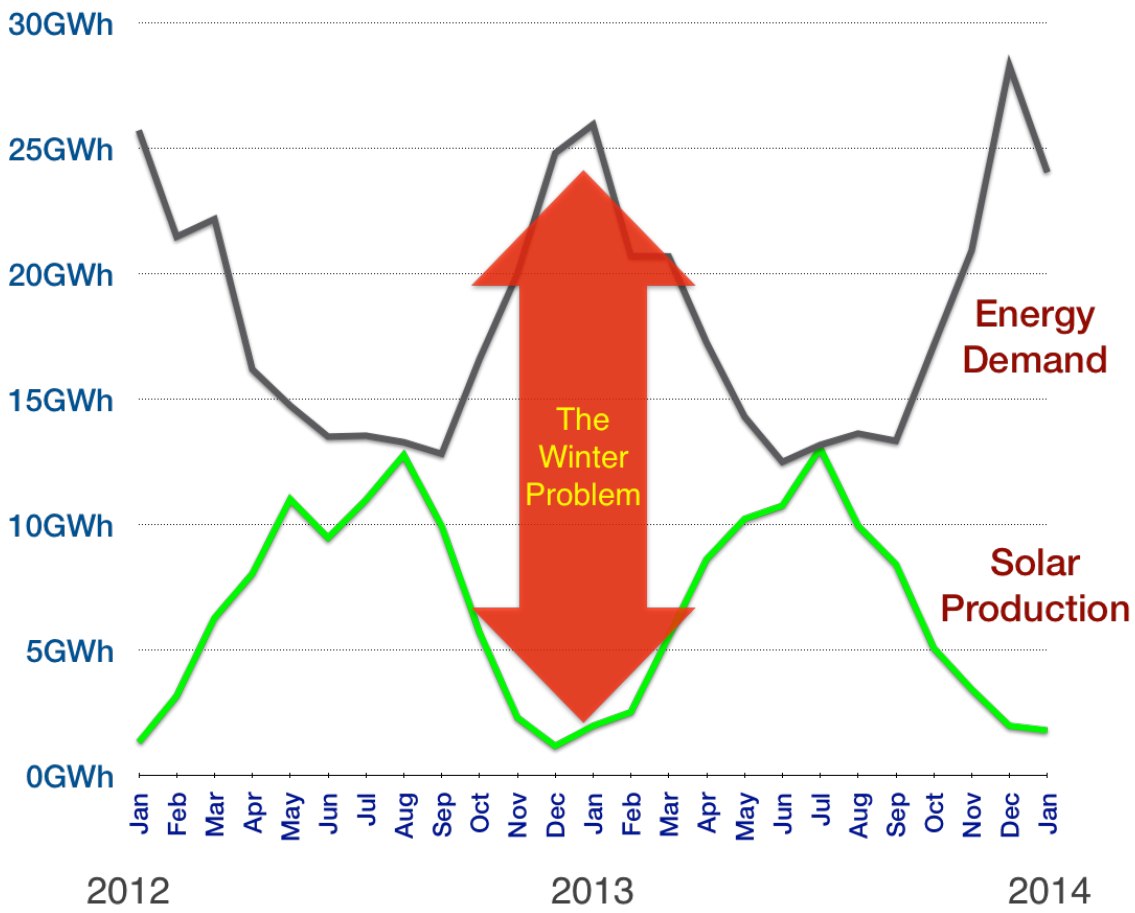
CETA injects additional uncertainty that can impact the LCoE calculus, changing the path the cost of mainland power will follow – base, or high market. For example, CETA may require purchase of Renewable Energy Credits (RECs), increase administrative process to track and meet emerging

new clean energy requirements, and penalties for non-compliance to as yet undefined rules. This may prematurely increase the cost of mainland power.

The Winter Problem

San Juan County solar in summer is quite good, but in winter, output drops to one-fifth of summer output. This is known as "the winter problem." The best year-round resource for our island region is tidal energy, but it is an emerging technology, and OPALCO doesn't expect it to be affordable until the 2030s.

OPALCO rooftop solar members use the grid as their battery, generating energy in the summer, selling excess to the grid, using net metering, and buying it back in the winter when solar output is minimal. The chart below offers an example of 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.



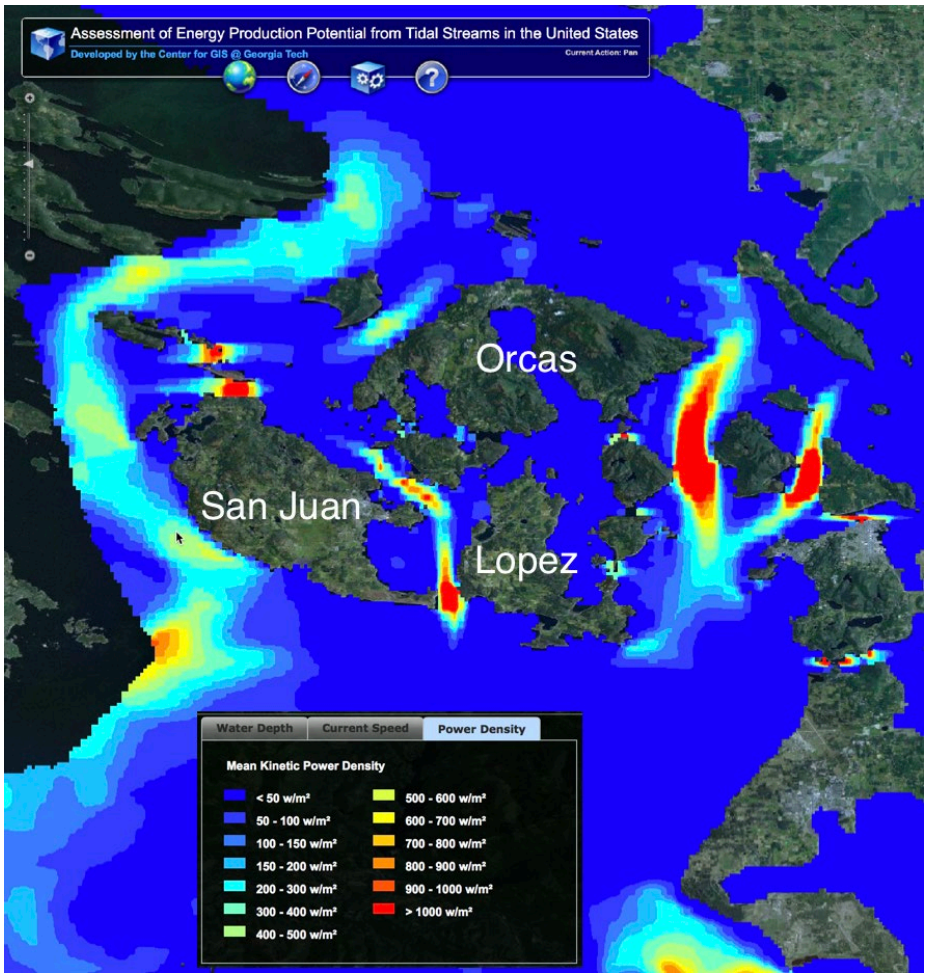
Tidal Energy

Tidal energy potential in San Juan County is enormous.

It has several features suited to our island area:

- In the US, just as sun is better in southern states, tidal energy is best in the northern latitudes, where tidal flows along coastal waters move massive amounts of water back and forth about four times each day. The chart below shows areas of strong tidal flow in red.
- It is predictable energy. This predictability makes the management of tidal energy much simpler than the highly intermittent nature of solar and wind energy.
- Tidal energy is year-round energy, with minimal seasonality. It can help fill the solar winter gap.

That said, just because a resource is being used elsewhere doesn't mean that the community will support it in our territory. OPALCO has a long track record of care for our environment. Any development of tidal resources needs to be done with community support, and engagement with stakeholders, including those most involved with our sensitive marine environments such as the Friends of the San Juans and SeaDoc Society.

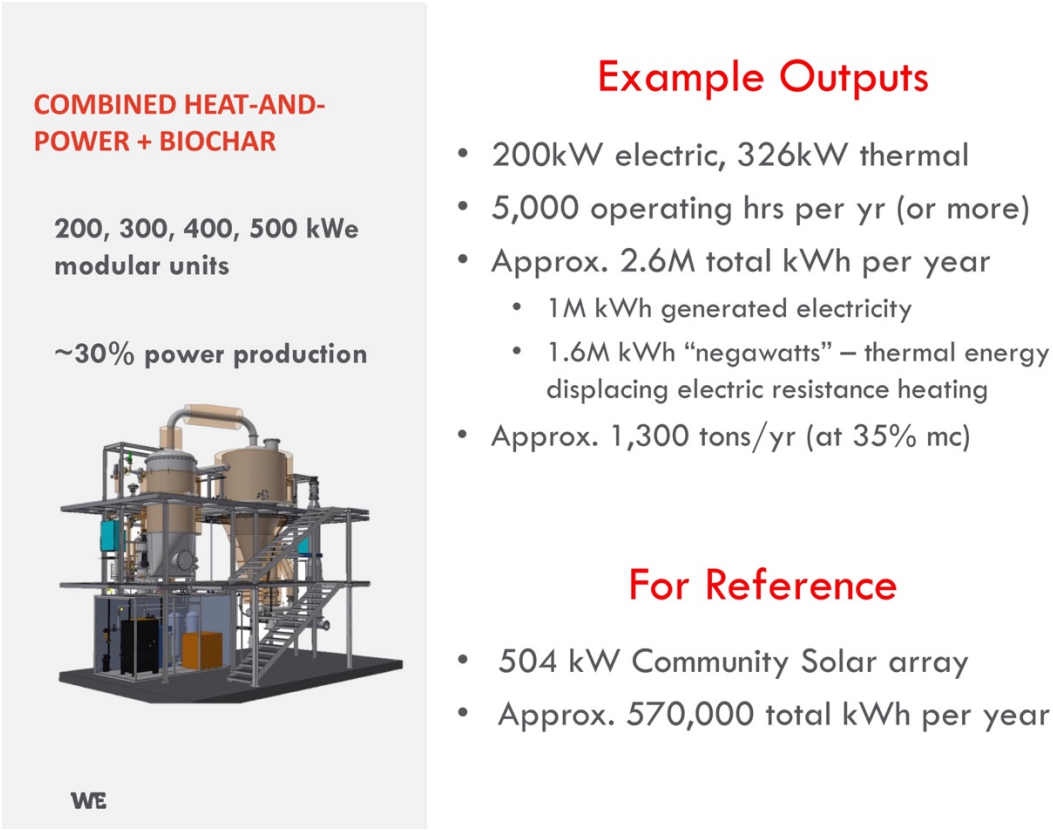


Biomass Energy

There are positive developments and interest in the county toward biomass and biochar carbon sequestration and Combined Heat and Power (CHP) production. The Orcas exchange and Conservation District are exploring grants and emerging biogassification technology to process woody biomass. This can have the beneficial side effects of:

- **Reduced fire risk** in a climate impacted world. Increased proactive stewardship of county forests, removing wood fall and woody biomass "fuel" from forest floors, and using it to generate energy.
- **Energy production**, perhaps purchased by the co-op through a Power Purchase Agreement (PPA).

The chart below offers an example of how biomass compares with solar.



San Juan County biologist and forestry guru Tom Schroeder, researches and writes extensively on County forests. As many have observed, and Tom notes:

> *Trees in our local forests grow more slowly, are much shorter at every age, and experience challenging conditions that derive from peculiarities of local geology and climate.*
>
> *Low timber productivity in San Juan County means that, even at culmination, the rate of volume growth is low. Culmination - the age at maximum timber growth - is also relatively delayed compared to more productive areas. In this county's forests culmination is at 100-120 years, whereas in forests on "good" land of grade II culmination is at about 50 years. For sustainability, age at culmination should be matched to rotation of timber harvesting, so it follows that* ***San Juan's forests are***

being harvested 2 to 3 times too rapidly *(turning over every 45 years vs 100-120 years).*

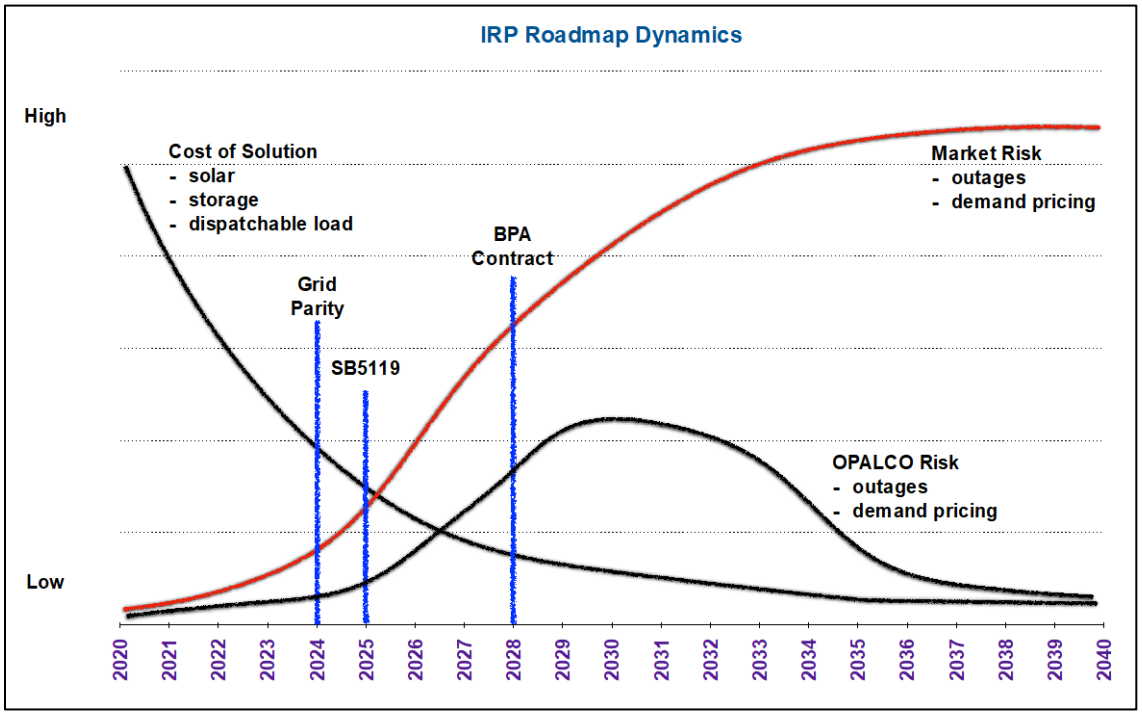
One estimate suggests that only about 320 to 500 of the total 70,000 acres of County forest could be harvested annually in a sustainable fashion. In the Pacific Northwest, hybrid poplar grown for saw-log production is estimated to yield up to 12 dry tons per acre of chips for energy production at the time of harvest (Stanton et al. 2002). So, 320-500 acres x 12 ODT (one dry ton) = 3,840 to 6,000 tons/yr of burnable biomass. It takes from 5,600 to 8,600 ODT to generate 1 MW of power. So, about 1MW, or 5,600 tons of woody mass/yr. At best, this gives about 8,760MWh, or 4.4% of our annual 200,000 MWh demand, and more likely only 3% if you assume a 70-80% capacity factor.

And at the end of the day, you are releasing all that carbon, comparable to coal, into the atmosphere. Just as it has been said that much of the remaining oil and coal should be left in the ground, when it comes to burning wood, to paraphrase, "leave it on the ground" for a slower release of carbon, and nutritive benefit of the soil.

That said, though biomass emits carbon when burned for energy, and is considered by many a problematic source of renewable energy, biogassification systems are becoming increasingly efficient, and carbon neutral holding promise as a potential source for local energy production and fire risk mitigation.

Resource Roadmap

OPALCO's resource roadmap unfolds over a very dynamic decade ahead, with grid parity expected around 2024, CETA legislation decommissioning coal plants by 2025, and negotiation of a new BPA contract by 2028. The chart below shows how trends in **local renewable energy resource cost**, and **mainland power reliability and cost risk** playout against these important markers.



Initially, OPALCO's risk is lower than market risk, thanks to the contract guarantees for BPA power. But OPALCO and BPA co-exist in a complex shared transmission system, making it difficult to know how buffered we will be from CETA effects. As we increase our local generation resource portfolio, especially in winter-strong tidal capacity, we expect to see that risk reduce.

Given the above dynamics, the table below summarizes a recommended roadmap for OPALCO resource development, in four-year Capital Work Plan (CWP) increments.

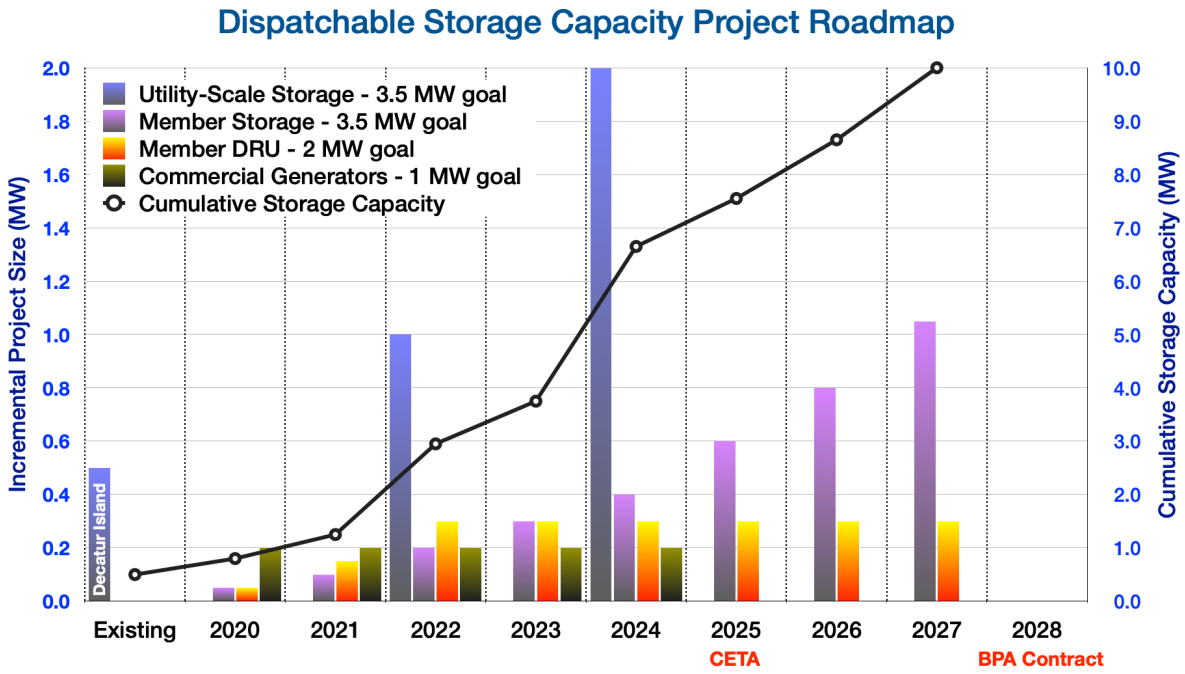
Each of the following Themes, Benefits, and Actions tie back to our Mission and Strategic Directives – safe, clean, cost-effective, reliable and sustainable energy, with a commitment to the use of renewable resources and carbon reduction.

Schedule	Theme and Benefits	Actions
2020 – 2024 **CWP 1**	**Before Grid Parity + CETA Preparation** Increase local energy resilience at minimum cost to members through community solar subscriptions, grants and RESP funds. This helps increase local energy resilience, especially for critical services in the County: first responders, town centers, government. Community solar helps members lower the cost of their electricity Continue beneficial electrification programs.	Deploy as much community solar as members want (at least 1 MW) – funded by subscribers. Create incentives and OBF program for 3 MW dispatchable home storage - funded by grants and RESP funds. Create incentives and OBF program for 2 MW dispatchable load (water heaters) for home and business - funded by grants and RESP funds. Create incentives for dispatchable commercial member generation for peak demand mitigation. Cooperate with partners on grant-funded tidal projects that help assess potential solutions. Continue grid modernization projects (see Grid chapter below).
2024 – 2028 **CWP 2**	**At utility-scale solar Grid Parity and CETA** Increase local energy resilience by ramping up utility-scale solar. Cushion against the increasing cost of mainland power. Rate inflation should start to flatten. Continue beneficial electrification programs. More revenue helps moderate rate increases.	Deploy all cost-effective local energy resources, including solar, storage and dispatchable load solutions, funded by grants, RESP and rates. Continue grid modernization projects (see Grid chapter below). Continue tidal power collaborations, through grant funded projects.
2028 - 2032 **CWP 3**	**New BPA Contract** Continue deploying local energy solutions. Optimize mix of local generation with BPA as firming and gap filling. Continue beneficial electrification programs.	Continue deploying all cost-effective local energy resources, including solar, storage and dispatchable load solutions, funded by grants, RESP and rates. Continue grid modernization projects (see Grid chapter below). As tidal approaches grid parity, prepare for deployment when cost effective.

Schedule	Theme and Benefits	Actions
2032 – 2036 **CWP 4**	**Ramp up Tidal Power at Grid Parity** Switch from solar to tidal investment to strengthen winter generation resource portfolio. Further reducing dependence on mainland power and pricing. Continue beneficial electrification programs.	Funded through grants, RESP program, rates.
2036 – 2040 **CWP 5**	**Build Equity** In preparation for forthcoming submarine cable replacement projects. Continue beneficial electrification programs.	Grants, RESP program, rates.

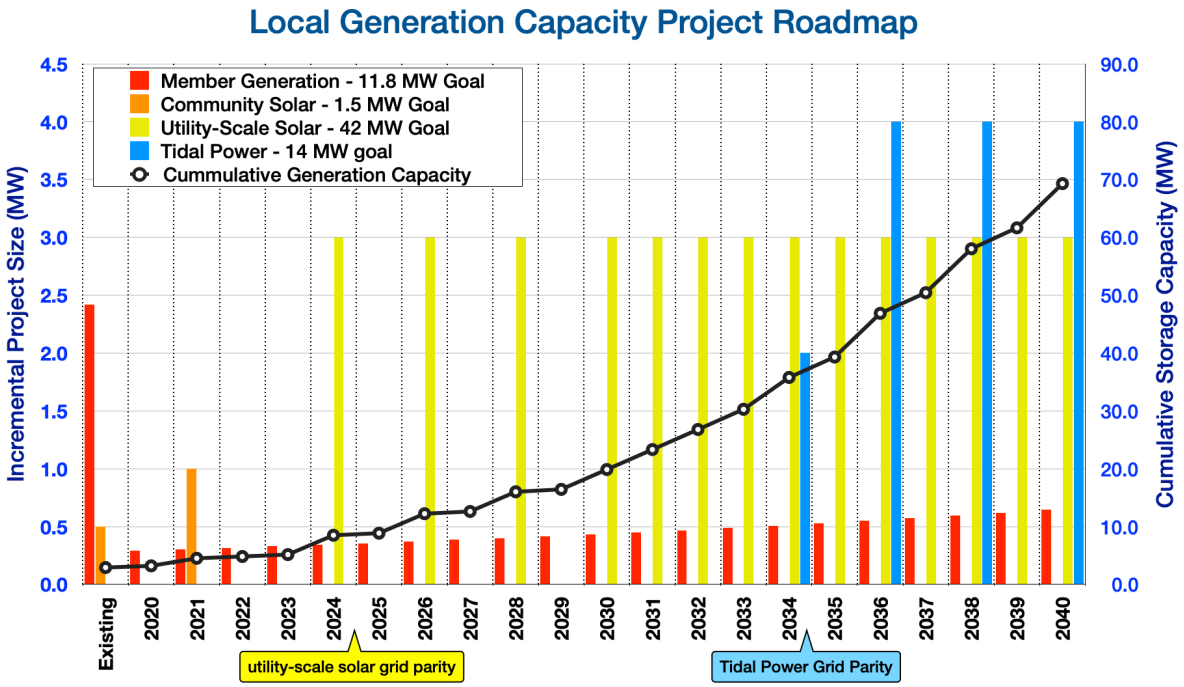
Storage Project Roadmap

The roadmap below lays out a mix of dispatchable storage resources between now and 2028, with a goal of having 10 MW of capacity by 2028. Storage helps with demand cost control, outage mitigation, intermittent resource smoothing, and other valuable functions.

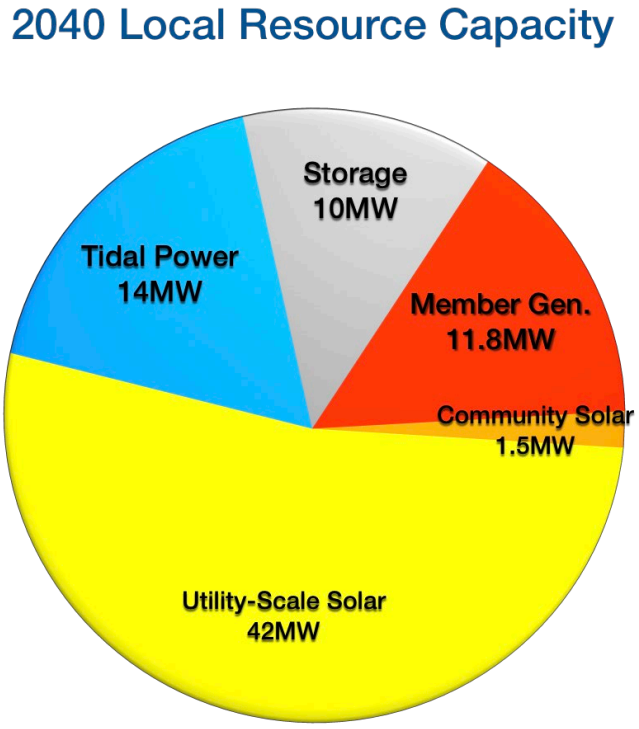


Local Renewable Generation Project Roadmap

The roadmap below lays out a mix of local renewable energy resources between now and 2040, with a goal of building capacity at a steady rate once utility-scale solar hits grid parity. In the example below, OPALCO is adding 3 MW of solar every other year, in the 2020s, and every year in the 2030s. Once tidal cost hits grid parity, OPALCO starts with 2 MW of tidal for the first project, ramping to 3 MW every other year, which, in this example takes us to 2040. As mentioned above, local renewable energy resources help moderate the rising cost of mainland energy and improve local energy resilience. With climate impact accelerating, it is possible that deployment of local renewables might accelerate, if grant funding rises, allowing OPALCO to build more for less.



The chart at right shows the resulting local resource capacity mix in 2040. It's worth remembering that as we ramp up local generation, the load on the mainland cables is reduced, extending the life of the transmission and submarine cables through congestion relief and asset deferral. That improves the cost benefit equation.

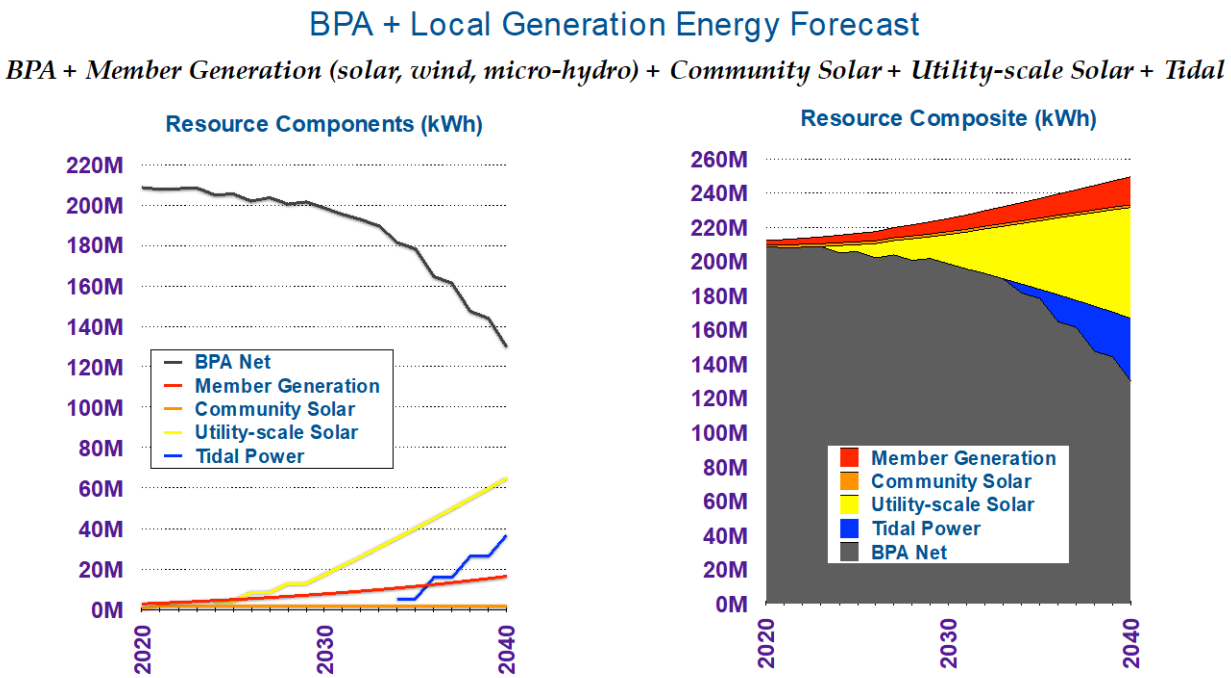


Winter, Summer, Night, Day

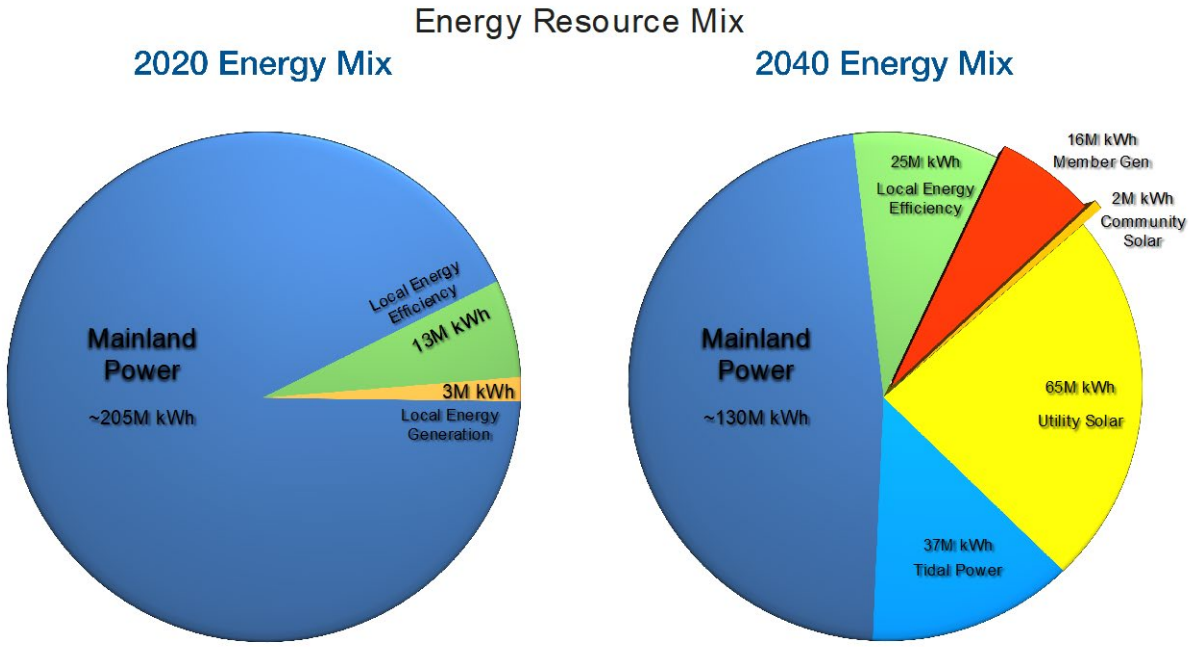
This emerging mix of local renewable energy, each resource with its own seasonal and daily productions patterns, has some remarkable implications for when we draw on mainland power. OPALCO is in the early stages of modeling this, but here are a few preliminary implications to consider:

- 14 MW of tidal power yields 4 MW of power (30% Capacity Factor). That is day and night, winter and summer.
- 55 MW of local solar (member + community + utility), yields 8 MW of power (15% Capacity Factor). That is daytime only in summer. In winter solar is daytime only, and 20% of summer – 1.6 MW.
- Summer load in 2040 is forecast to typically be 17 MW. So, summer daytime load will be mostly met by local generation. Summer nights tidal is still generating, but we will need more mainland power. In summer, mainland power daytime rates may be expensive due to climate heating, increased demand for air conditioning, and reduced hydro flow due to reduced snowpack.
- Winter load in 2040 is forecast to typically be 23 MW. So, winter daytime load will be mostly met by mainland generation. Daytime will have about 1.6 MW of solar on the occasional sunny day. Day and night will have about 4 MW of tidal. That gives us about 5.6 MW of local energy, leaving about 17 MW need from the mainland. In winter, mainland power daytime, and especially nighttime rates may be less expensive than summer, with warming winters, reduced heat load, and a shift in hydro from summer to winter as snow decreases, and winter rains increase, increasing winter hydro flow.

Given the roadmap above, the chart below shows the energy production over time as we ramp up the local energy resource mix. The left chart breaks out the component energy resources in the mix. The right chart shows the combination of the components.



The chart below shows the energy production mix for 2040 compared to 2020. It is worth noting that 52% of the energy is still coming from the mainland in this example. The 2040 resource mix requires a steady aggressive resource development commitment. There are a number of challenges behind this, including securing and permitting adequate siting for local solar, tidal, wind and other resources.



OPALC will be exploring low and high cases in their Long Range Plan, in 2020. There are two drivers they want to explore as we model high and low business cases.

- **CETA** drives investment in storage to mitigate demand and outages – a form of insurance. How much storage do we want to roll out to mitigate CETA exposure? And there are beneficial side-effects of have that storage for the many use cases storage offers?
- **EVs** load increases revenue using existing infrastructure – no new capital needed to handle the increasing load. That new revenue helps moderate rates. EV market share has been accelerating. Will it continue, especially given the current political climate in Washington, DC aimed at slowing climate action, clean energy incentives, etc?

Right of Way (ROW) and Essential Public Facilities

With climate impact, there is rising risk of extreme wind and fire, as evidenced by recent wildfires in California. It is increasingly important to maintain clear right of way around utility high voltage electric distribution and transmission systems. Much of San Juan County is heavily forested, with electric aerial cables threading their way those forests. With increased fire risk and tree fall in heavy winds, it is therefore important to ensure adequate clearance between electric facilities and nearby vegetation. The county needs to maintain their roadside rights of way for joint franchise use, to ensure easy safe access by public utilities and assistance in clearance to overhead high voltage lines.

With mainland power capacity likely to be reduced in coming decades, leading to potentially increasingly unreliable mainland electric service, development of substantial local energy resources is essential. The NW Power and Conservation Council estimates there is a 30-50 percent chance of a major outage in the next 10 years.

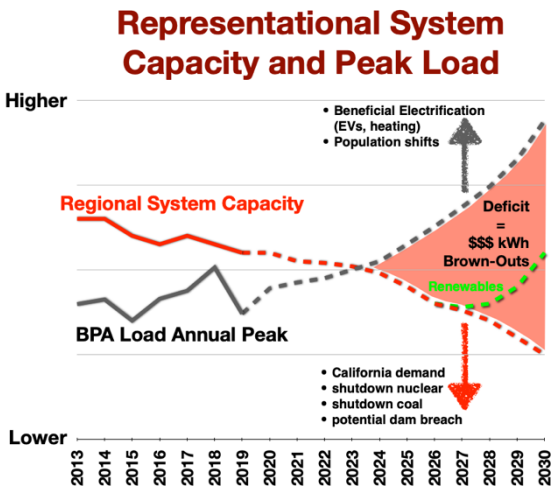
The problem is two-fold: The mainland is reducing capacity, and there is no plan or funding to replace that capacity. The table below summarizes the actions that are underway that will impact regional power capacity, and the impact/reaction that reduction will have. Reduced mainland capacity will necessitate development of local energy resources to mitigate mainland challenges. This is discussed in the Energy Resources section below.

Action	Reaction
• Increased hunger for climate friendly hydro, especially in California • CETA • Decommissioning coal/nuke plants • Potential dam removal	• **Reducing Capacity** • **Demand Charge increases** • **Energy cost increases** • **Brownouts** • **Rolling Blackouts**

Reduced capacity and the attendant impact will lead to increased costs for OPALCO and their members. There are two kinds of cost:

- **Direct** Cost of Power – energy cost and demand charges
- **Indirect** Cost of Outages

The potential impact of capacity shortages on cost of power are shown at right, representationally. The regional capacity is falling, while load is increasing and accelerating as beneficial electrification hits its stride in the mid-2020s.



The development of new local and regional renewables can mitigate outages, but it will take time to implement an adequate capacity to balances losses.

Which brings us to the indirect costs. As the potential for outages and brownouts increase, there is an associated interruption cost. Using the Department

of Energy Interruption Cost Estimator (ICE) to calculate the cost, the table below summarizes the results for residential and commercial members in the OPALCO service area. The column at right shows the value of improving reliability by 30%, for a total of about $38 million over a 25 year improvement asset life.

Members	Meters	Typical Outage Event Cost	Value of 30% Reliability Improvements
Residential	13,200	$217,957	$1,030,287
Commercial	1,900	$6,381,580	$37,326,937
Total	15,100	$6,599,538	$38,357,224
Notes		Typical February outage event: **SAIFI = 1.74** **SAIDI = 358**	Project start: 2020 Inflation: 2% Asset Life: 25 yrs Discount Rate: 6% **SAIFI = 1.4** **SAIDI = 240**

As OPALCO responds to the emerging risk of capacity shortfalls, they are attempting to thread the needle by scaling investments to mitigate increasing risk associated with inaction. Rolling blackouts will have a galvanizing effect on members, helping them realize the seriousness of the problem. But we risk losing the trust of the public. The more we can anticipate the outage risk, communicate the urgency of the problem, and make the investments to mitigate risk, the less the impact on the co-op and members. Development of multi-megawatts of these essential local resources such as solar and tidal will present significant siting challenges. It is estimated that solar alone would require hundreds of acres alone. These new local electric facilities are Essential Public Facilities that protect the local economy, reducing risk and economic loss during outages and natural disasters.

8.3 TELECOMMUNICATIONS (DATA & VOICE)

8.3.1 Data & Telephone - Fiber Optic

The availability of fiber optic based services has grown extensively throughout the county in the past decade. This is meeting the growing needs of the electric grid, emergency communications, residential and business broadband and cell phone service. In Mid-2015, deployment of Fiber to the Home and Premise (FTTH & FTTP) began throughout the county. As of Oct 2019, approximately 50% of the county (7,500 addresses) is within a serviceable distance (500') of existing fiber optic facilities. Of those addresses, 1,800 are utilizing fiber optic service. As demand for higher bandwidth and additional improvements are made to public infrastructure, the availability of fiber optic services will continue to grow. FTTP enables homes and businesses to scale their

needs up to 1Gbps (1,000 Mbps) upon initial installation with the ability to go to 10Gbps (10,000 Mbps) as required. Fiber is considered a future-proof technology that allows for massive increases in available bandwidth for generations to come. The average monthly new connection rate is 30-40 locations. The fiber is spanning 500 plus miles connecting all major islands and to the mainland with multiple upstream connections in Bellingham and Seattle.

8.3.2 Telephone – Voice over Internet Protocol (VoIP)

With the increase use of data communication services, Voice over Internet Protocol (VoIP) has become the predominate method for non-wireless based voice communications around the nation, particularly for businesses. VoIP services are dependent on reliable, low-latency internet connectivity. Unlike Plain Old Telephone Service (POTS) lines, the Washington Utilities and Transportation Commission (WUTC) does not regulate VoIP.

There are various resellers of VoIP services for residents and businesses in San Jun County. Anyone with a reliable internet connection can purchase voice services from a variety of national providers. Each of these providers deliver a wide variety of services and advanced features based upon the consumer requirements.

8.3.3 Wireless – Fixed Wireless Long Term Evolution (LTE)

In addition to deploying FTTH around the county, LTE locations have been deployed to service areas where fiber is unavailable currently. Fixed Wireless LTE utilizes cellular technology enabling high-speed data and voice connections in the range of 25Mbps to 150 Mbps. As of Oct 2019, 3,000 locations were serviced with fixed wireless broadband service recognized nationally as one of the top 10 fastest wireless services available to U.S. residents and the highest available offering in Washington State. This includes service to 18 non ferry-served islands, some without utility power service. With increased capacity being added regularly, this service is available to over 4,500 locations in San Juan County..

8.3.4 Wireless – Cellular

Personal wireless communication facilities are not classified as public utilities or essential services, but are a commercial service. Nationally, the Federal Communications Commission (FCC) regulates the airwaves and the personal wireless communications industry and is responsible for issuing construction permits for transmission facilities and licenses to operate wireless systems. All major national cell phone providers have a presence in San Juan County from T-Mobile, Verizon, AT&T and Sprint to smaller service providers. Overall capacity of the network with multiple new frequency bands opening enables for higher throughput and data rates. It is expected providers will expand their capacity and coverage area over time to accommodate their respective customer base.

Local governments regulate the development of the wireless communications network by specifying where facilities can locate, applying buffering and setback requirements, etc. Federal case law from regulating facilities covered by the Federal Aviation Administration (FAA) has preempted local governments. The FAA reviews the location and height of proposed support structures to prevent interference with operations of airports and flight paths. The FAA regulates proposed towers that exceed 200 feet and smaller structures located within 20,000 feet of a major airport and 10,000 feet of a general aviation airport. The FAA does not have the authority to deny an FCC construction permit, but it can cite a proposed support structure as a hazard to navigation. (See the discussion on Airport facilities in Element II-D Transportation.) In 2014, San Juan County adopted a joint use wireless ordinance enabling the broader development of wireless infrastructure for essential public services.

8.3.5 Telephone - Plain Old Telephone Service (POTS)

CenturyLink, based in Monroe, Louisiana, is the primary provider of POTS (Plain Old Telephone Service), to approximately 10,000 residential and business customers in the county. The number of locations decreases as consumers discontinue landline service or port their number over to VoIP providers such as Rock Island Communications, a subsidiary of OPALCO. In addition, CenturyLink also provides digital subscriber line (DSL) service; as well as private dedicated services (i.e. Ethernet) which helps meet the needs of telecommunication customers throughout the county.

CenturyLink provides service to the county via a fiber optic cable network that connects all the major islands to the mainland. It provides these essential services to meet the needs of telecommuters and those who run businesses from their homes. Service is currently provided to Blakely, Brown, Center, Crane, Decatur, Henry, Lopez, Obstruction, Orcas, Pearl, San Juan and Shaw Islands.

Geographic isolation and comparatively small resident populations have historically inhibited the extension of telephone service to some islands within the county, such as Stuart Island.

8.4 INTERNET & CABLE SERVICES

Fast, reliable Internet connection is increasingly important to economic development, health and safety, and daily life in San Juan County. Broadband Internet connection allows residents opportunities to work remotely and connect with others globally. Medical facilities and emergency services rely heavily on broadband Internet in order to provide modern, up-to-date care. The Economic Development Element of this Comprehensive Plan states the goal of "support[ing] development of reliable high-speed (100 Mbps or higher, or the current standard for urban regions of the U.S., whichever is higher) broadband infrastructure that enables the creation of jobs and improved educational opportunities for islanders, and increased competitiveness for the county." Internet utility infrastructure comes in several forms, including LTE fixed wireless, fiber, and cable.

Rock Island Communications provides broadband Internet via LTE fixed wireless and fiber in San Juan County. Rock Island is a subsidiary of OPALCO, as of 2015. Fiber connectivity is growing rapidly, with LTE providing service in areas awaiting fiber deployment. Cable Television and Internet services have continued to see a significant decrease throughout the county with CenturyLink, Zito Media and POGO Zone which operates the old cable tv facilities covering parts of Friday Harbor and Orcas Island. This decline has been driven by the consumer move to online streaming services such as Netflix, Hulu and Amazon as broadband services via fiber and wireless increase, in addition to increased competition from satellite providers.

8.5 COMMUNICATION SITES AND FACILITIES

Antennae and towers atop Mt. Constitution on Orcas Island are used to provide broadcast communications and electronic controls. As telecommunications technology and demands continue to change, service providers must retain the ability to expand existing and build new antennae and towers for operational purposes.

Mt. Constitution Sites, Inc. owns 160 acres of land within Moran State Park and leases communication towers to approximately 40 users. In all they have five towers with three primary sites ranging from 500', 400', to a 235' tower, located in the northeast corner of this property.

East of the 160-acres of private property mentioned above, the U.S. Coast Guard leases a one-acre site from the Washington State Parks and Recreation Commission (WSPRC) and operates a 100-foot tower with microwave dishes to monitor small vessels. KVOS leases a one-acre site from the WSPRC at the 2,409 summit

of Mt. Constitution and operates a transmitter facility and a 150-foot tower. Washington State Department of Transportation (WSDOT) leases a one-acre site from WSPRC southwest of the KVOS site and operates two 70-foot towers. The U.S. Forest Service also leases one acre from WSPRC and operates two 70-foot towers. The University of Washington also operates a seismographic telemetry station at this site. This site may, at some point, no longer be sufficient for future forms of, or demand for, personal wireless services. The county adopted Ordinance 8-1997, which established a subarea plan and requirements for future personal wireless communication service facilities through Chapter 16.80 of the SJCC.

[INSERT MAP OF TOWERS HERE—COMING FROM GIS]

<OPALCO recommends limiting location of utility assets, to minimize vulnerability from domestic and foreign terrorism. Energy and communication infrastructure is expected to be a prime target of attack>