Ensuring Reliable Power for San Juan County Energy

OPALCO

The Urgency of Zoning Reform for Renewable Energy

January 2025

WA State Imperative: Cut GHG emissions in half by 2030

Key Messages

- Regional electric supply is not keeping up with demand.
- Requires massive new construction of renewable energy + storage.
- OPALCO mainland submarine cables will max out before 2035.
- By 2035, rooftop solar will supply less than 4% of local energy.
- There are no perfect local energy solutions. No free lunch.
- Without it, islanders will be hurt from regional outages and price shocks.
- We need to communicate the path forward to our members
- OPALCO ready to do its part, but land use & UDC process needs to be streamlined.
- The clock is ticking. We need clear direction from County Council.

Background

OPALCO must ensure reliable delivery of power to all members

During the January 2024 cold snap, the Washington power system almost collapsed

Between now and 2035, each year we are more at risk

Picture the loss of life and economic impact that took place in the 2021 Texas blackout

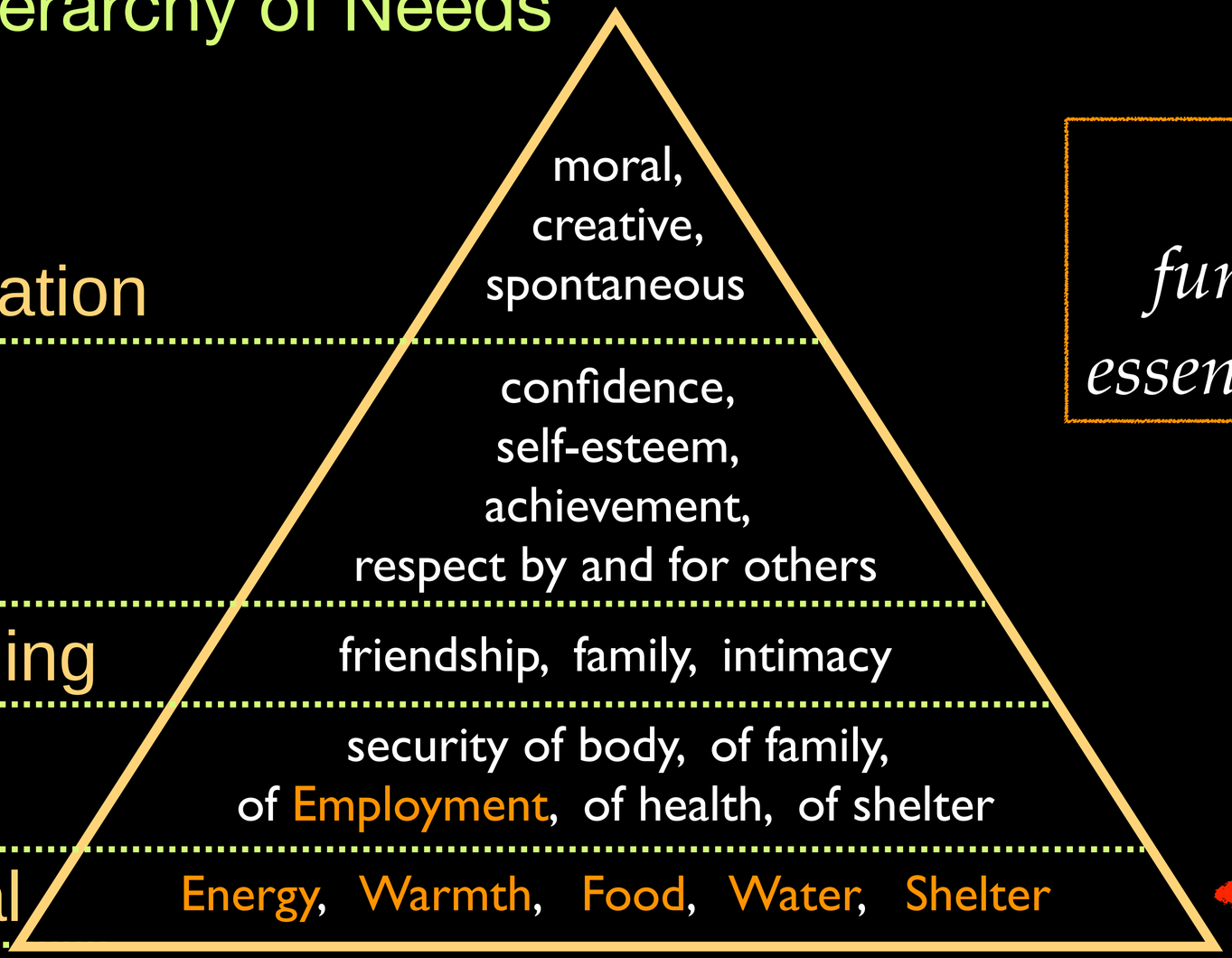
Utility Duty

- Duty to serve - RCW 80.28.110
- Duty to provide energy to utility members to meet demand
- Duty to advise

Growth Management Act (GMA) identifies essential public facilities (EPFs) as facilities that are typically difficult to site but are crucial for public health, safety, and welfare.

Utility Duty To Serve: Essential Public Facilities

Maslow's Hierarchy of Needs



Utilities supply fundamental services essential to human needs.

Essential Public Facilities

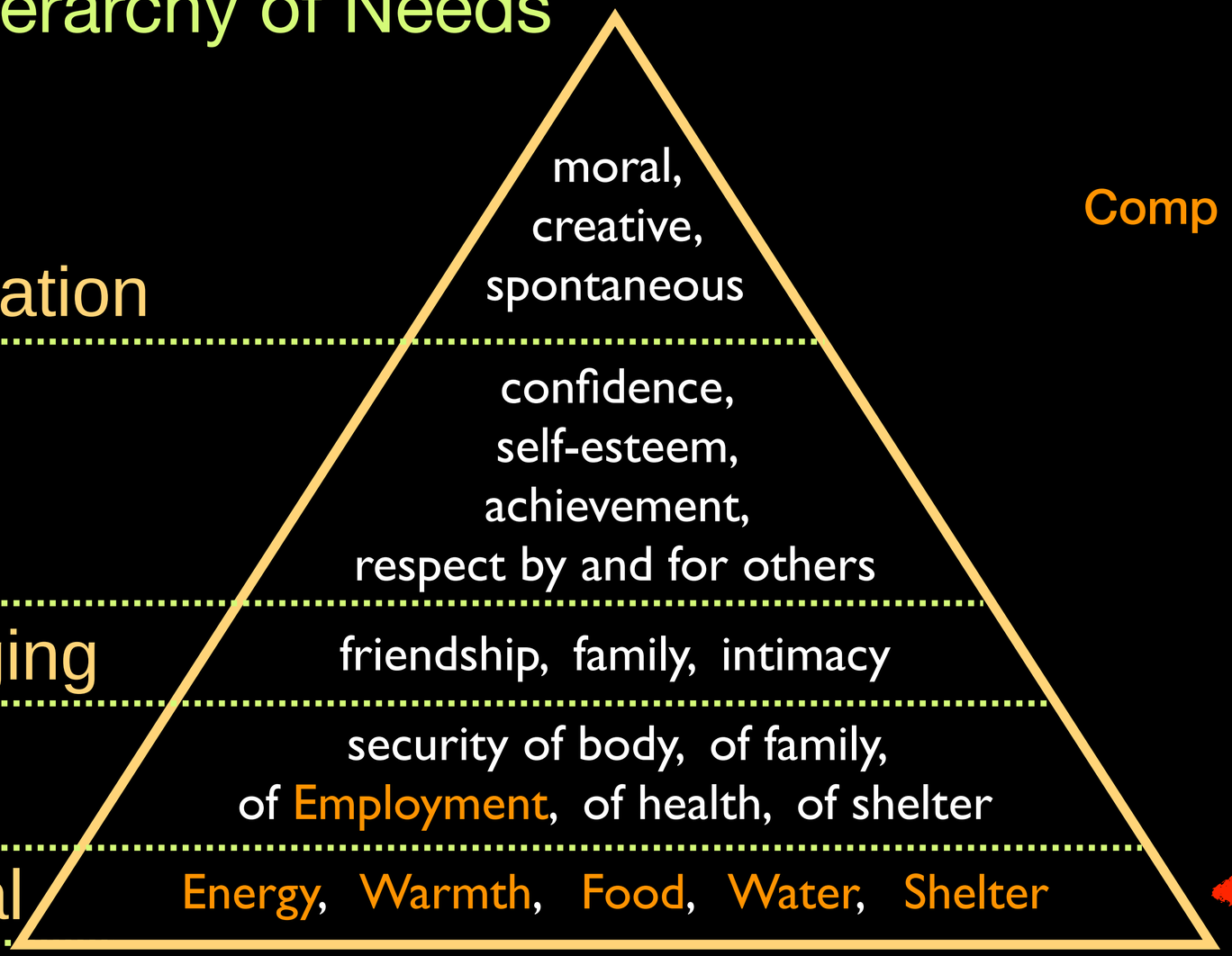
OPALCO must ensure reliable delivery of power to all members

Duty to Advise

- Mainland electric load is exceeding supply
  Shortfall starts this year, growing to over 25,000 MW deficit by 2035
- Outages and price shocks are imminent
  2024 January cold snap - grid almost collapsed, 800%+ wholesale price spike
- There is no new hydro
- New renewables projects will take decades to deploy
  Northwest needs to be adding 2,500 MW per year – 25X faster than normal
- Deficit mainly due to legal and permitting barriers that have historically slowed development to 125 MW per year

Utility Duty To Serve: Essential Public Facilities

Maslow's Hierarchy of Needs

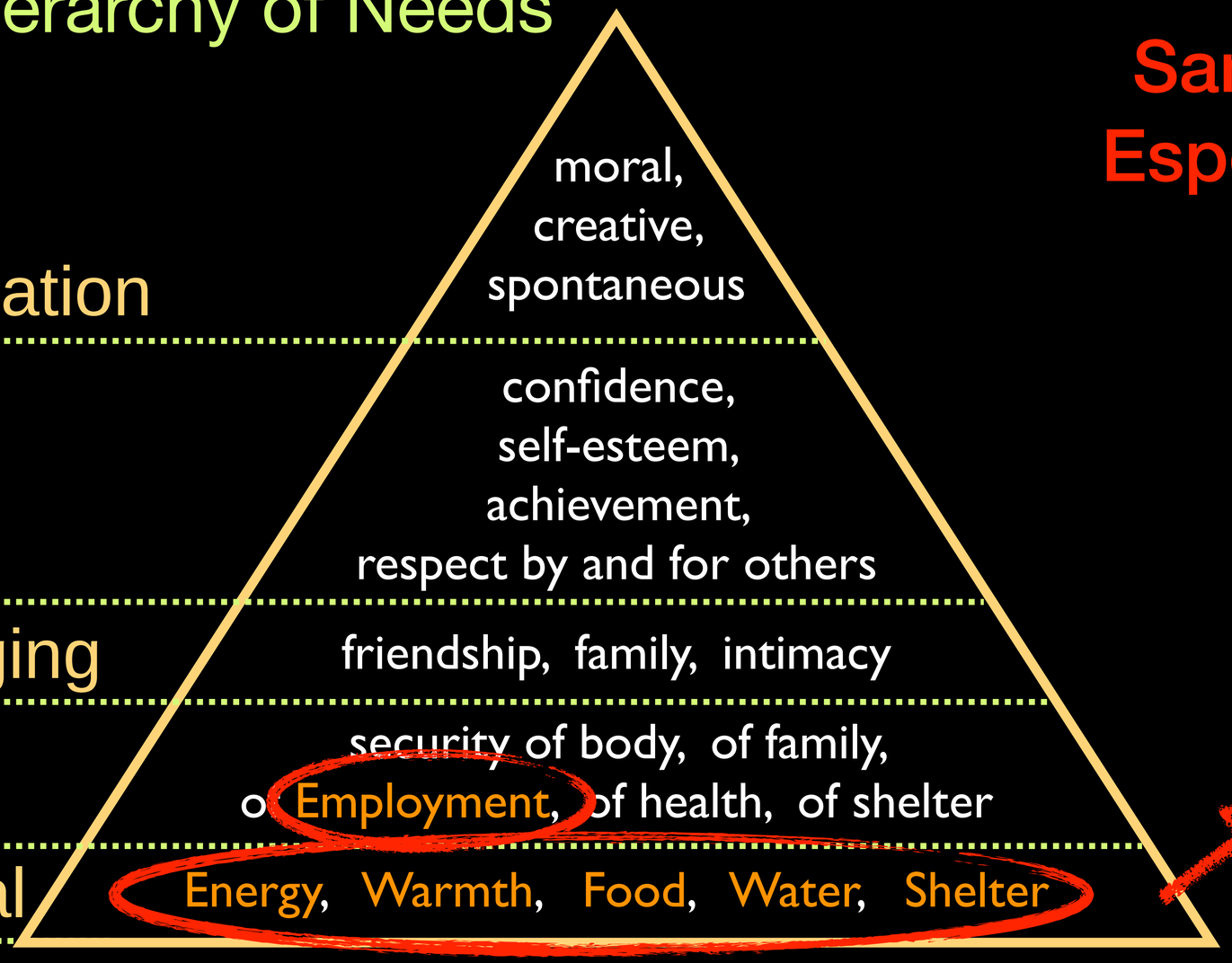


Comp Plan: "*Energy independence from the mainland.*"

Essential Public Facilities

A Climate Crisis At Our Doorstep

Maslow's Hierarchy of Needs



San Juan County is Especially Vulnerable

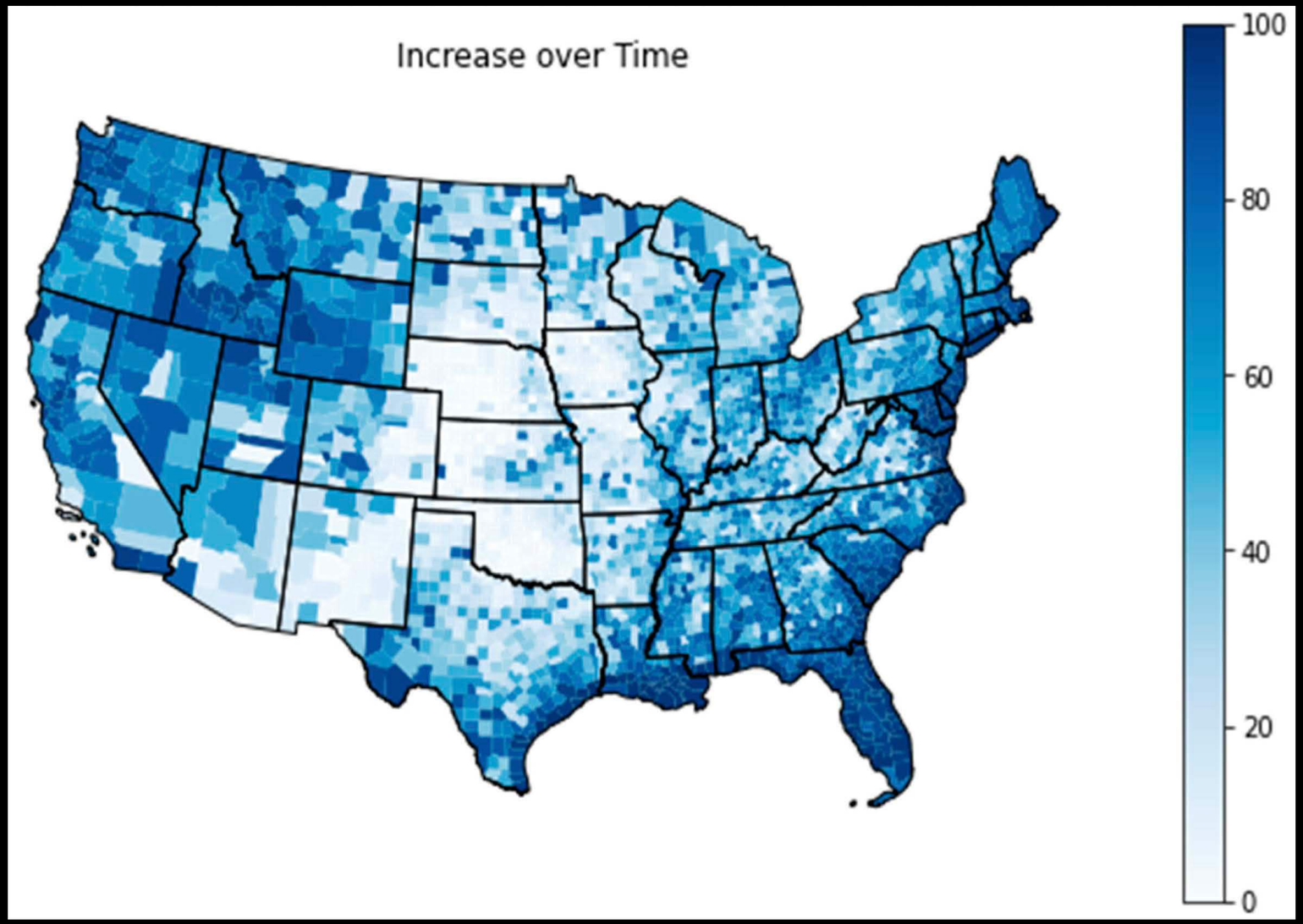
- heat domes
- drought
- water shortages
- wildfires
- extreme rain
- flooding
- sea level rise
- climate refugees
- ocean acidification
- ocean warming

Extreme Weather: Rain

Extreme Weather: Rain

Infrastructure With Operational Risk

change in percent from 2021 to 2051 by county

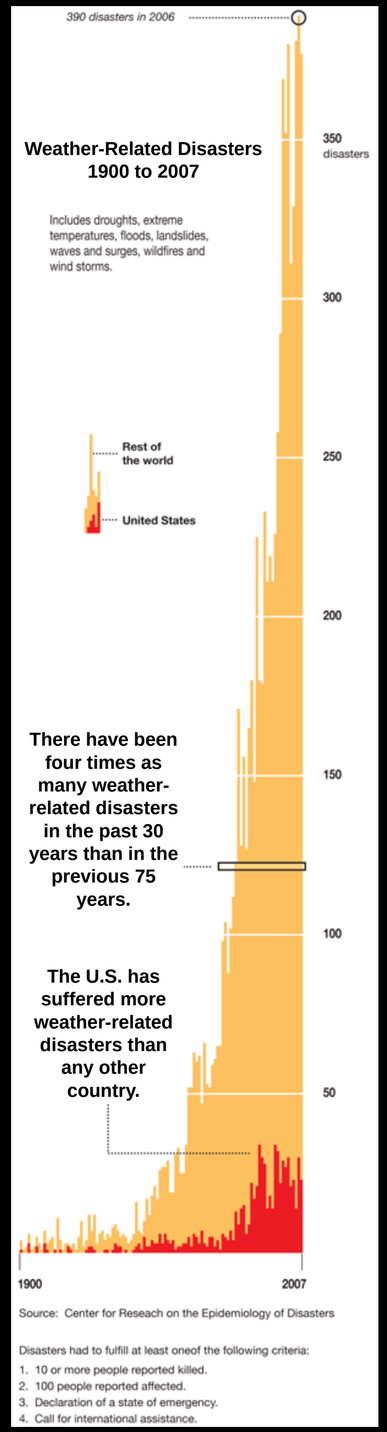


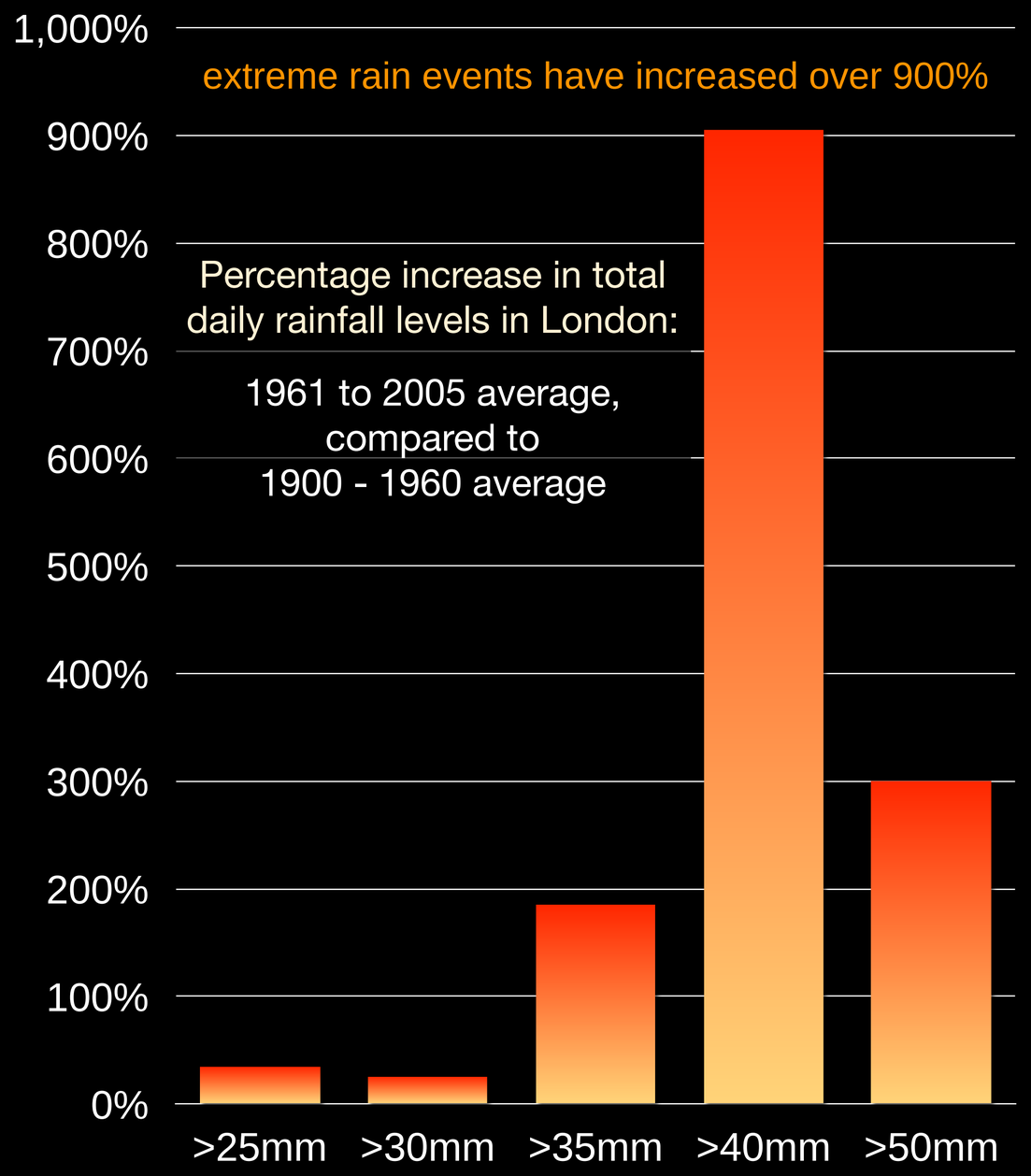
source: MDPI, NY Times Climate Forward

San Juan County is Especially Vulnerable

"As climate-fueled disasters get worse, home insurance is becoming a money-losing business in more of the country. Without insurance, you can't get a mortgage; without a mortgage, can't buy a home."

Extreme Weather Events Are Increasing





Source: Lloyd's emerging risks team, Center on the Epidemiology of Disasters

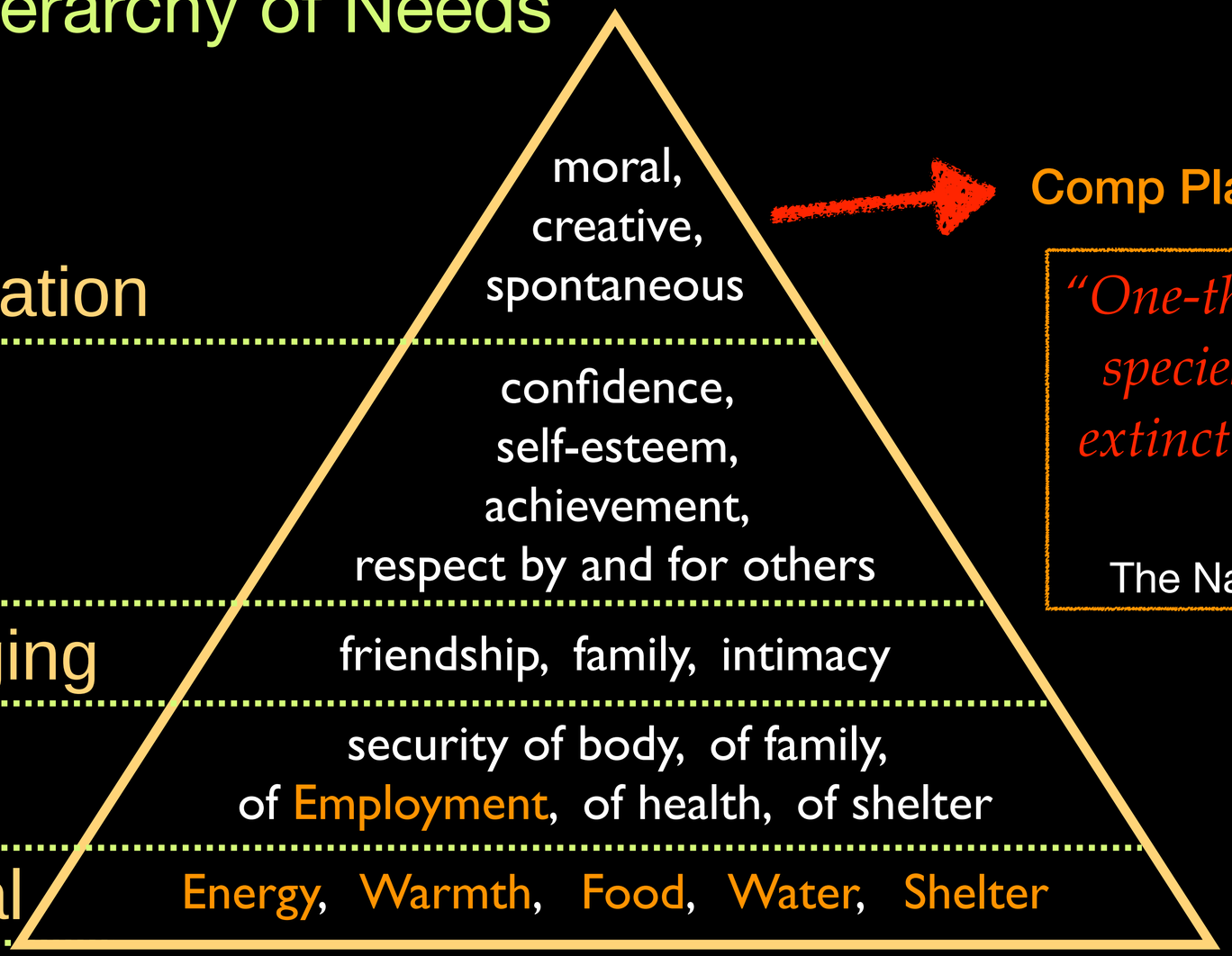
The developed areas of Puget Sound and the transportation, drinking water, wastewater, and energy systems that serve the region's population will face an increasing risk of a variety of extreme weather events (e.g., heat waves, wind, flooding, wildfire). Consequences include flooding of low-lying infrastructure, damage to energy transmission, and higher maintenance costs for many transportation and other elements of the built environment.

UW Climate Impacts Group

Climate disruption will not preserve rural character.

It will destroy it.

Maslow's Hierarchy of Needs



Comp Plan: "Protect rural character"

"One-third of all animal and plant species on the planet could face extinction in just 50 years due to climate change."

The National Academy of Sciences

Climate Action Protects Rural Character

Risk

Climate Change Is Destroying Nature.

Need to reduce CO2 50% by 2030.

Mainland power outages and price shocks are imminent.

Rooftop solar is not a silver bullet.

utility-scale solar will help

utility-scale solar will help

Farming in the San Juans is not economic.

The average farmer loses $51 per acre per year.

A PPA for $6 per MWh would produce $10,000 per acre per year.

Most farmers support utility-scale agrisolar.

No Rural Farm Forest trees to cut.

Helps shade-loving crops in a warming world.

Supports grazing and increased land fertility.

Can be located on poor soil land.

Agri-Solar = Dual-Use Food + Energy Production: Two Approaches

Utility Ownership

- Produces 10X all current rooftop kWh, at 6X less cost
- Much faster to deploy at scale
- Works during outages
- Tracks the sun to maximize production, especially in winter
- Partner with farmers for grazing, pollinators, shade-loving crops
- Improved land fertility and value per acre versus haying

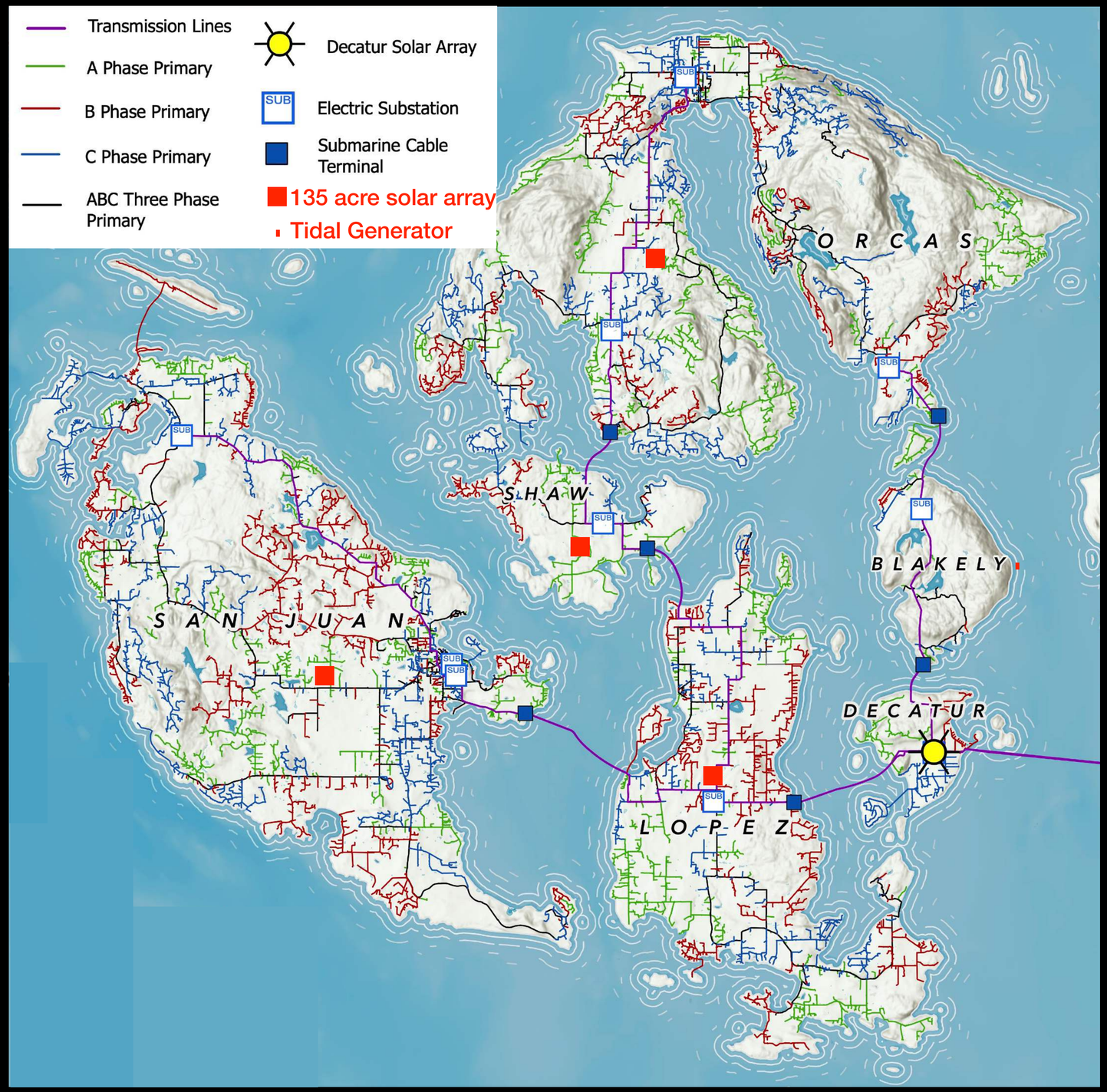
Farmer Ownership

- Farmer sells to OPALCO through a Power Purchase Agreement (PPA)
- Switch It Up Funding and grant-funded joint-projects
- The average farmer loses $51 per acre per year.
- A PPA for $6 per MWh would produce $10,000 per acre per year.

Powers the county through three seasons + critical services in winter

540 acres = just .5% of land

Utility-Scale Solar



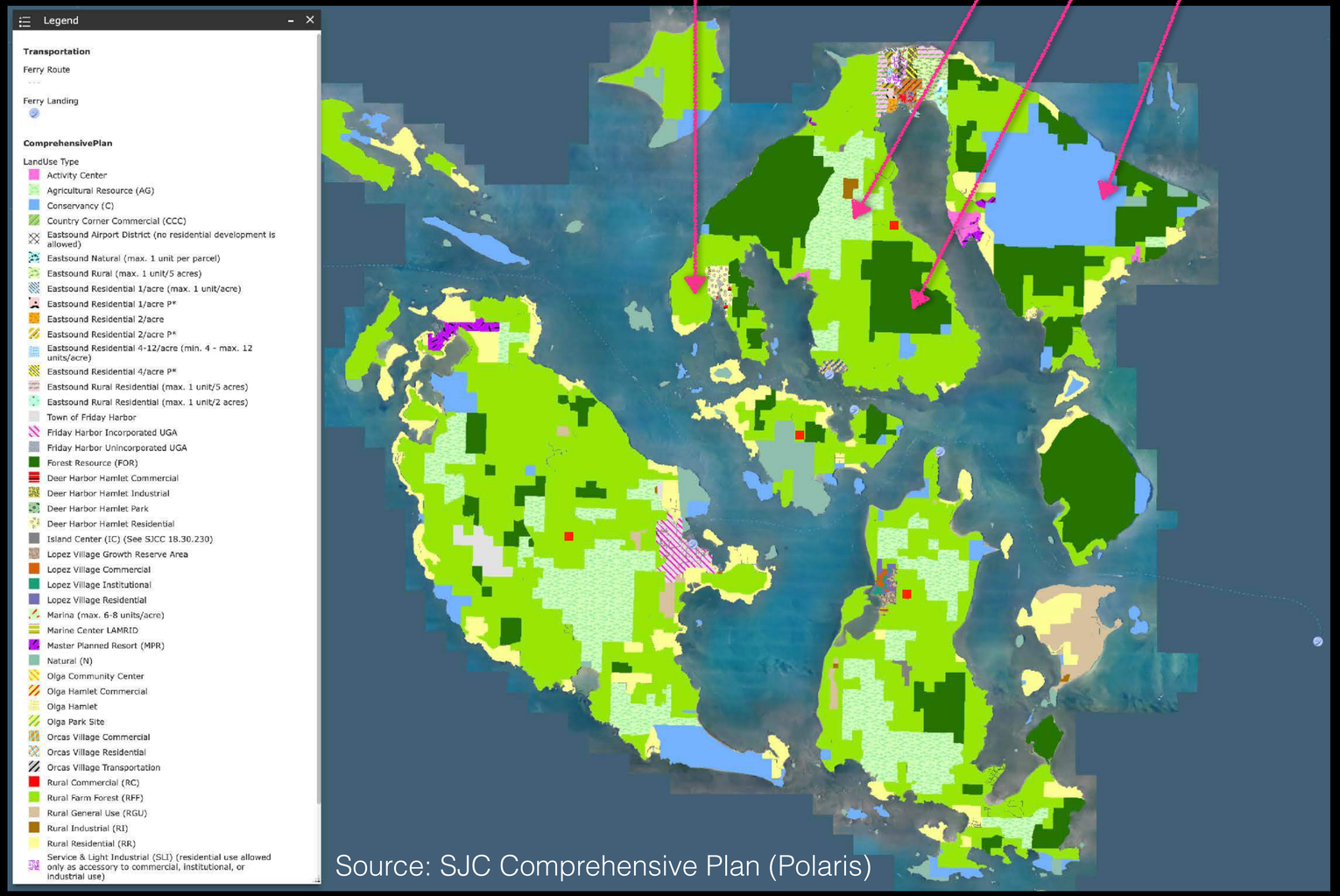
Notes

- Bailer Hill Microgrid solar + storage doubles local solar production over all rooftop installed since 2008.
- 90 million kWh, about 30% of annual load, could be met with just 135 acres per ferry-served island.
- 135 acres could be a single site, or spread across several sites.
- The larger the site, the better the economies of scale and logistics
- Red squares drawn to scale.

Why did OPALCO choose Bailer Hill Site? Not allowed in 65% of county's 109,000 acres!

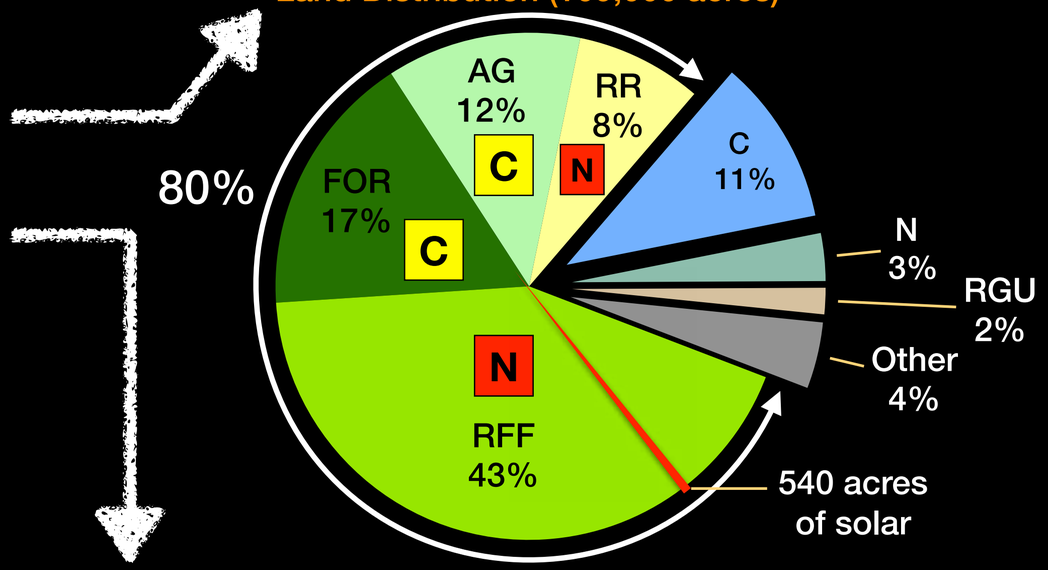
San Juan County Land Use Designations

Land Use Designations	RURAL					RESOURCE		SPECIAL	
	RGU	RR	RFF	RI	RC	AG	FOR	C	N
	Rural General Use	Rural Residential	Rural Farm-Forest	Rural Industrial	Rural Commercial	Agricultural	Forest	Conservancy	Natural
Commercial Power-generation Facilities	C	N	N	C	C	C	C	N	N



Source: SJC Comprehensive Plan (Polaris)

Land Distribution (109,000 acres)



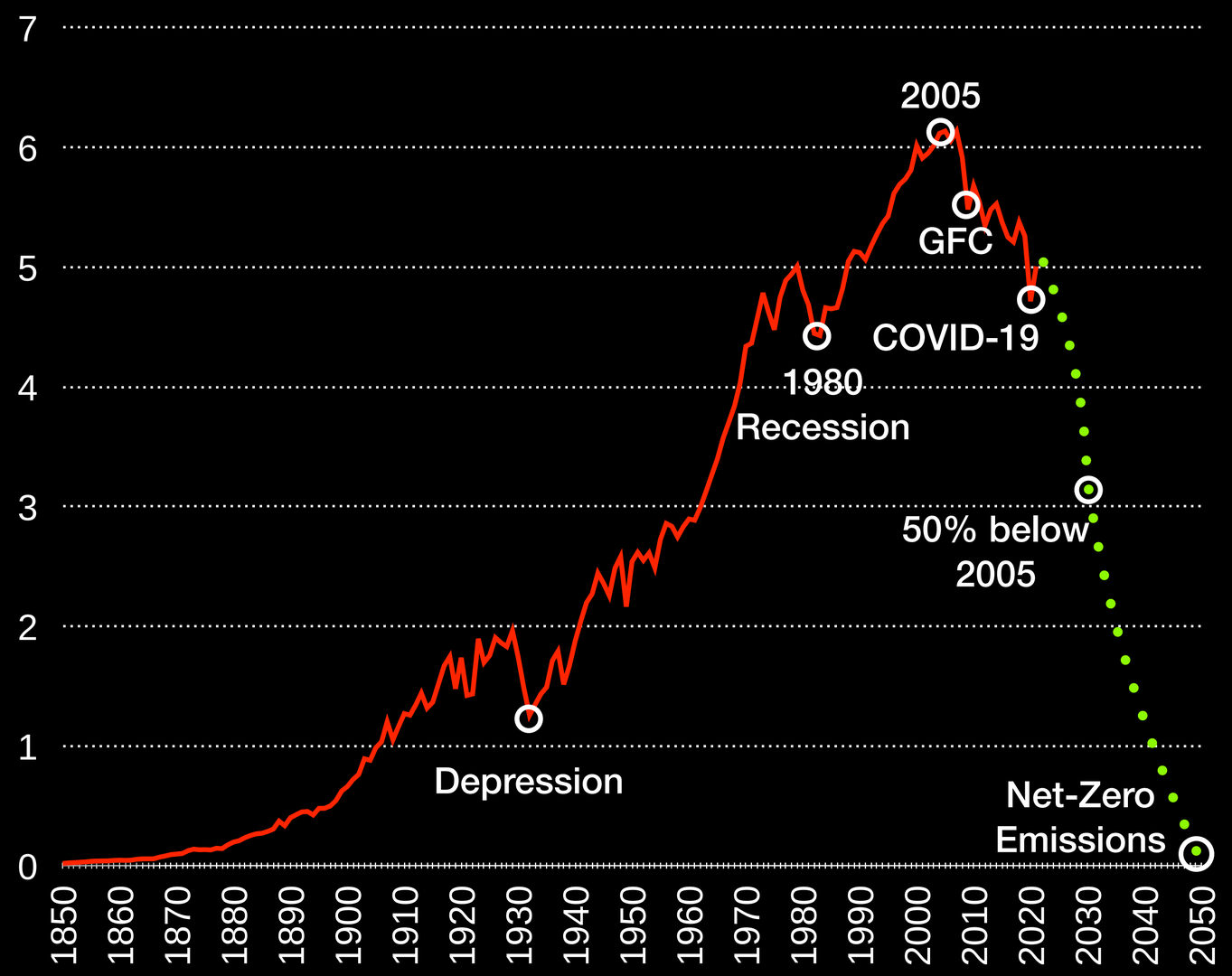
Y	Use allowed outright, without project permit
P	Provisional use, subject to administrative consistency review for compliance
C	Conditional use, subject to public notice and permit hearing procedure
N	Prohibited use

Of the county's 109,000 acres, we only need 540 acres (0.5%) to produce 35% of our energy use.

Addenda

Bailer Hill Micro-grid public support is running about 8 to 1 in favor.

US Annual CO_2 Emissions: 1850 - 2050 (billions of tons - Gt)

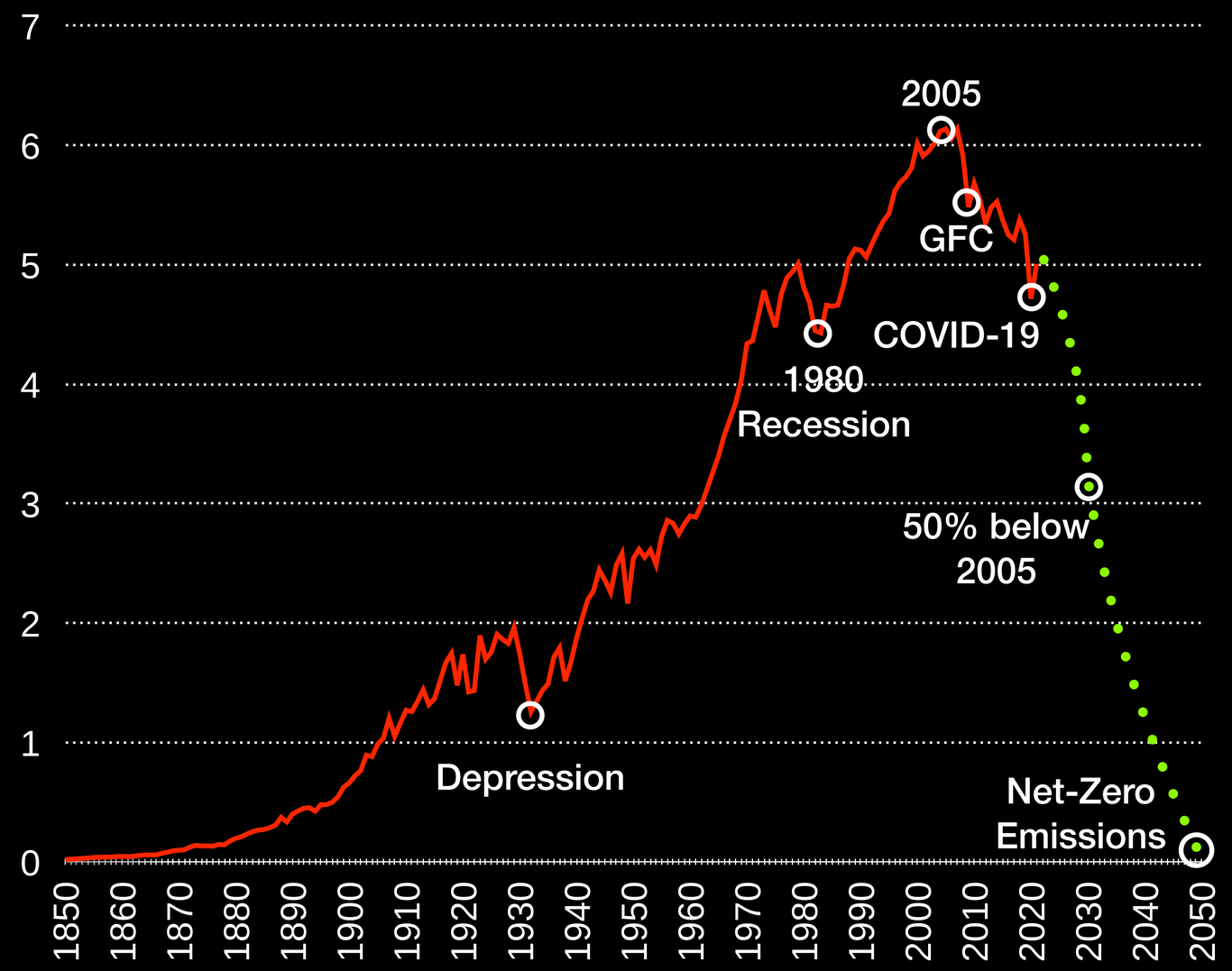


Washington Objectives

- reduce GHG emissions 50% below 2005 levels by 2030, Net-Zero by 2050
- invest in infrastructure, renewables + storage, resilience, electrify transportation (cars, trucks, ferries, planes)
- delivering 40% of the benefits to disadvantaged communities
- increase clean-tech jobs
- substantial funds from WA departments of Commerce and Transportation

source: EPA

Only 5 years to cut GHG emissions in half

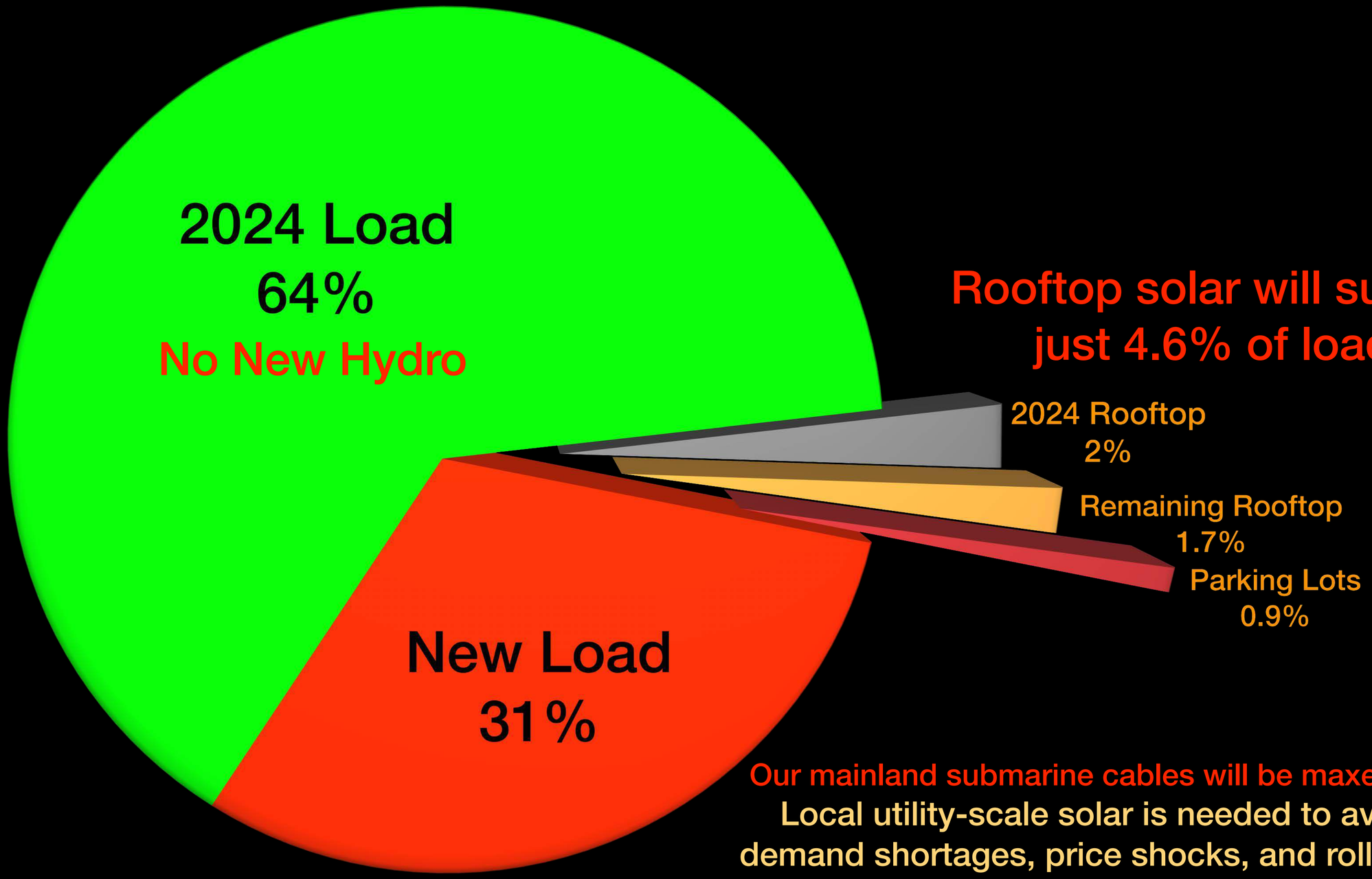


Bailer Hill: A Giant First Step

- Doubles county solar production at 6x less cost of rooftop
- Reduces GHG emissions by 4.5 tons per year
- Equal to planting 44,000 trees per year, growing for ten years
- Rooftop solar capacity will supply less than 5% of 2035 load.
- Utility-scale solar can supply 7x more, at a fraction of the cost, on just 135 acres per island.
- Sun-tracking arrays will improve winter solar production when it is needed most.

source: EPA

2035 Rooftop Analysis: 357 million kWh projected load



Rooftop solar will supply just 4.6% of load

Our mainland submarine cables will be maxed out by 2035.

Local utility-scale solar is needed to avoid supply/demand shortages, price shocks, and rolling blackouts.

News: Small US State Launches Game-Changing Agrivoltaic Project

DOE recognizes the enormous opportunity for agrivoltaics to combine agriculture with clean energy production, while increasing revenue for farmers and landowners,"

Dr. Becca Jones-Albertus

Director, U.S. DOE Solar Energy Technologies Office.

"We found increases over time for all habitat and biodiversity metrics: floral rank, flowering plant species richness, insect group diversity, native bee abundance, and total insect abundance, with the most noticeable temporal increases in native bee abundance," the research team concluded. Overall, they assessed that insect communities responded to the habitat restoration project at the relatively rapid pace of less than four years.

In another key finding, the researchers found that bee visitations from the solar array to a nearby soybean field were comparable to the visitations from a nearby farmland preserved under the US Department of Agriculture's Conservation Reserve Program.

Agri-Solar Economics

	Acres	% Total	$/ACRE	500 acres
Cropland	7,928	40.5%		6.3%
Pastureland	6,255	32.0%		8.0%
Woodland	3,954	20.2%		12.6%
Other	1,434	7.3%		
Total	19,571	100.0%		2.6%

Crops	$5,734,000	$723	$/ACRE CROPLAND
Livestock	$4,909,000	$785	$/ACRE PASTURELAND
Total	$10,643,000	$544	$/ACRE TOTAL

Gov't Payments	$72,000
Farm Related	$747,000

Total Income	$11,462,000	$585.66	$/ACRE/year TOTAL
Total Expenses	$12,453,000	-$636.30	$/ACRE/year TOTAL
NET INCOME	-$991,000		

If Agrivoltaics adopted:

1MW	6 acres
1,000MWh/yr	
$42/MWh	$42,000/yr
	+$7,000/acre/yr

Community agri-solar is more efficient, cost-effective, and equitable

WASHINGTON STATE UNIVERSITY
Energy Program

The Washington State University (WSU) Energy Program delivers program management, on-site assessments, analytical tools, and training to meet evolving energy challenges in the State of Washington, the Pacific Northwest, the United States, and internationally.

Partnering with a wide range of agencies, organizations, institutions, and businesses, our energy experts identify energy challenges and develop solutions.

Our customers include large and small businesses, public and private utilities, manufacturing plants, local and state governments, federal agencies and facilities, schools and universities, national laboratories, tribes, professional and trade associations, and consumers.

Our staff of energy engineers, energy specialists, technical experts, and software developers work out of Olympia, Washington. The WSU Energy Program is a self-supported department within the University.

We are part of the College of Agricultural, Human and Natural Resource Sciences (CAHNRS). Our Director reports to the Associate Dean of the College/ Director of WSU Extension.

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WSUEEP23-05 • June 2023

Photo by Lexie Haln, Lightsource bp; courtesy of the U.S. Department of Energy.

Dual-Use Solar Opportunities for Washington State

Executive Summary

To meet Washington state's directive to replace its fossil-fuel generated energy sources with renewable and non-emitting energy sources by 2045, clean energy such as solar will need to be developed. Solar photovoltaic (PV) installations require five to ten acres per one megawatt (MW) of generated electricity, which can create conflict with other land uses. Across the country and the world, land use conflicts are eased when solar PV is co-located with agricultural operations, often called dual-use solar, allowing food production and ecosystem services to continue on the same site where electricity is generated.

Currently, Washington state lags far behind many other states in dual-use solar applications and research. This report, written by Washington State University (WSU) Energy Program as mandated by the Washington State Legislature, provides information such as dual-use solar research, benefits, considerations, policies, and incentives. The intent of this report is to increase the opportunities and practice of dual use in Washington.

Benefits and challenges

Dual-use solar provides numerous economic and environmental benefits, including improved economics for farmers and other agricultural producers, ecosystem services such as maintaining soil health, and expanded siting opportunities for solar development. Farmers benefit by keeping their land in production, and developers may see some soft costs (non-hardware) reduced.

Below are many of the benefits derived from various dual-use activities. More specific information is under the individual activities in the next section.

Dual-Use Agri-solar Benefits

- Improved farm economics from solar energy sales
- Increase access to ag land that would otherwise be unaffordable
- Reduce climate impacts, including:
  - Reduce soil evaporation and plant transpiration
  - Shade cooling - grazing, bees, sun-sensitive crops, broccoli, etc.
  - Pollinator habitat diversity - safeguards soil health, improves stormwater retention, reduces wind and soil erosion

Agri-solar is more efficient, cost-effective, and equitable

County Council, Planning Department

- Permitting certainty is needed to meet grant schedule requirements
- Balance competing land use priorities agriculture and local renewable energy, working together
- Collaborate as a team to win infrastructure and energy transition grants

Members, Community Organizations

- Work together to achieve carbon reduction goals
- Adopt energy efficiency measures for home and business
- Donate land and easements for renewable energy projects
- Support local energy resilience
  - rooftop solar (4.2 MW rooftop solar + battery)
  - community solar microgrids
  - EVs and chargers
  - electric public transit
  - tidal and biomass energy

Supply/Demand Overview

The Three Pillars of Washington Energy Policy

Rooftop Solar is a small fraction of what's needed, more expensive, with more cost-shifting

✓ Net-zero GHG emissions by 2050 (50% reduction by 2030)
- 5 years left to achieve 50% reduction

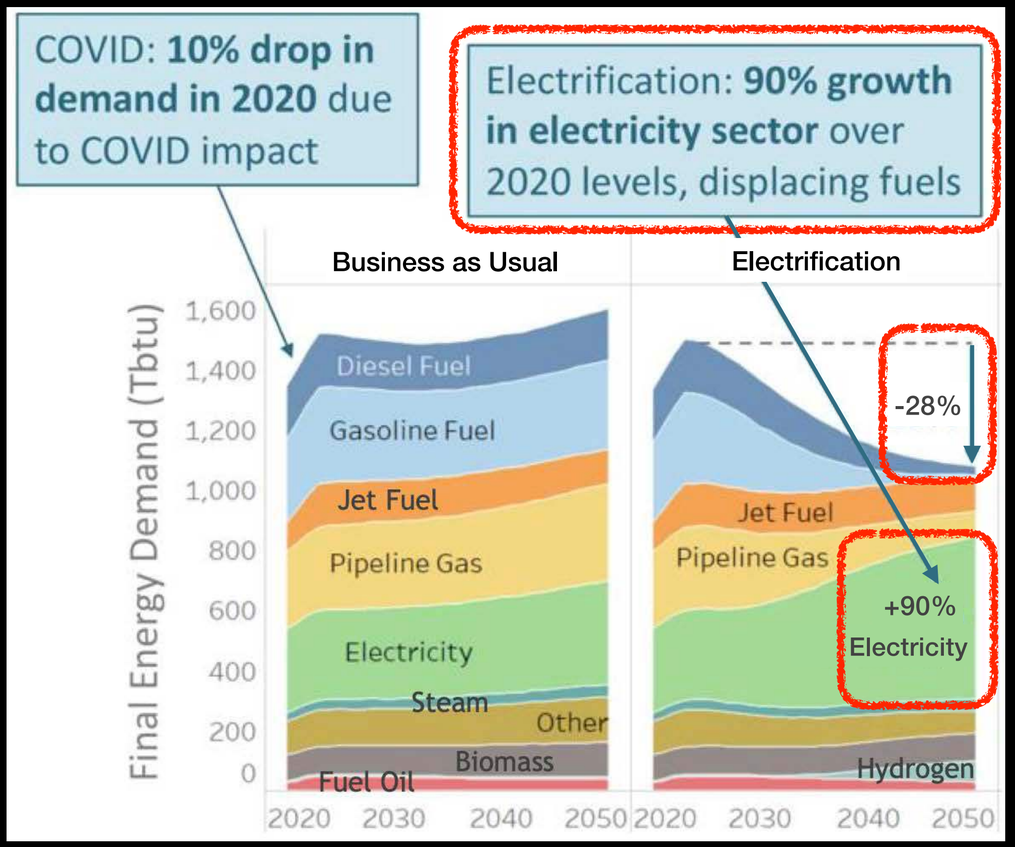
✓ Energy Resilience
- Rooftop doesn't work during outages
- Utility-scale solar + storage does, directed to critical services via sectionalized grid
- Utility solar are tilting arrays to maximize winter production
- Only 1,500 to 1,700 potential roofs (see appendix)
- Only 3.5 MW of commercial rooftop and parking area

✓ Equitable
- Rooftop costs 6X more than utility-scale solar (capital and power cost)
- Rooftop solar cost-shifts operational costs to those who can't afford solar

Source: energy.ca.gov, NREL suitable roofs study, SJC housing data

WA 2021 Energy Strategy and Implications

*Decarbonization will reduce **TOTAL** energy consumption by 28%, by nearly doubling demand for electricity*



Energy Megatrends to Decarbonize Energy Supply

- Climate change –> Decarbonization –> Electrification Transportation and Heating
- Electric capacity decreasing dramatically 2025 coal plant shut down, hydro spill
- Solar and wind generation will be deployed to meet demand, but slowly
- California power play - NW hydro needed to stabilize intermittent solar and wind

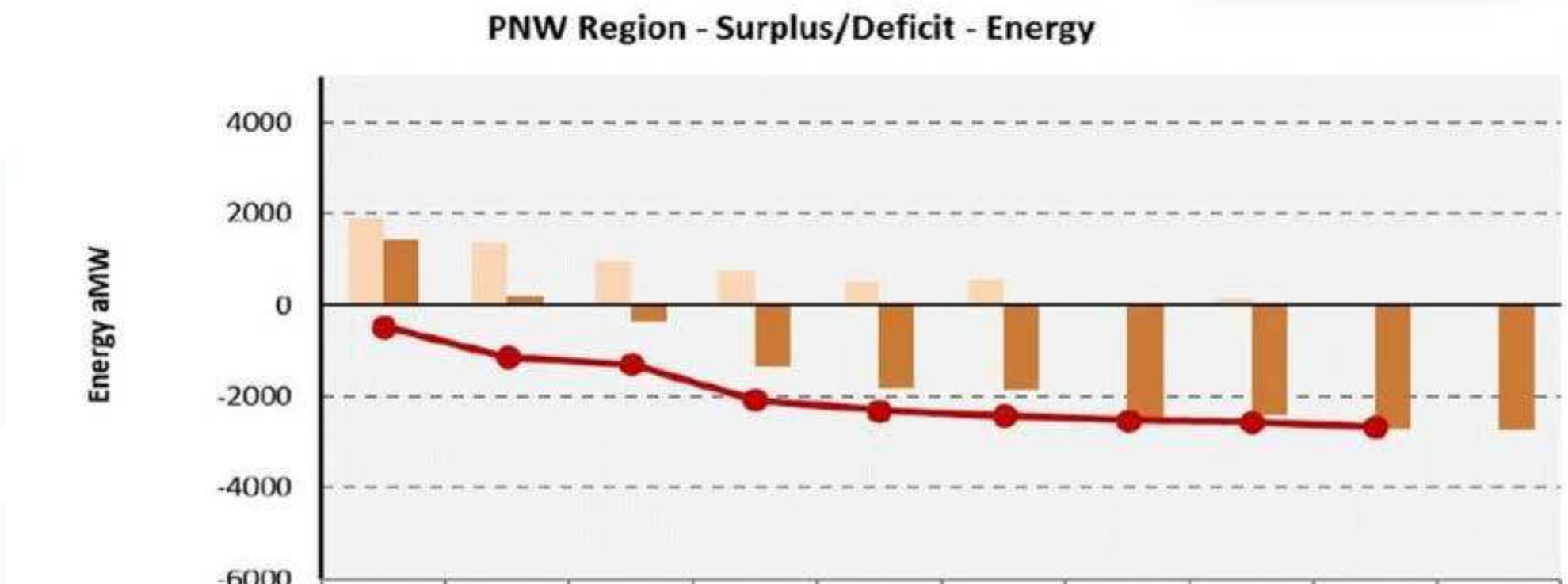
If California was a country, it would be the fifth largest economy in the world!

Major Challenges Ahead

- Millions of acres of land will be required for solar, wind and transmission corridors
- Permitting/siting/acquiring new land resources will take years and capital - NIMBY
- Federal and State financial assistance will be needed to meet capital requirements

Source: Washington 2021 Energy Strategy

NW Regional Energy Deficit Forecast Accelerating



	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
2023 White Book	1905	1357	932	728	509	553	40	144	-61	
2024 White Book	1426	207	-370	-1352	-1808	-1861	-2492	-2407	-2725	-2738
Delta	-479	-1150	-1302	-2080	-2317	-2414	-2533	-2551	-2664	

From *BPA's Load and Resource Study Shows Energy Deficits Starting in 2027 and Growing Rapidly in Low Water Years* by Ernst, S. (2024). NewsData.

Source: BPA

Washington Energy Strategy Reality Check

During the January 2024 cold snap, the Washington power system almost collapsed

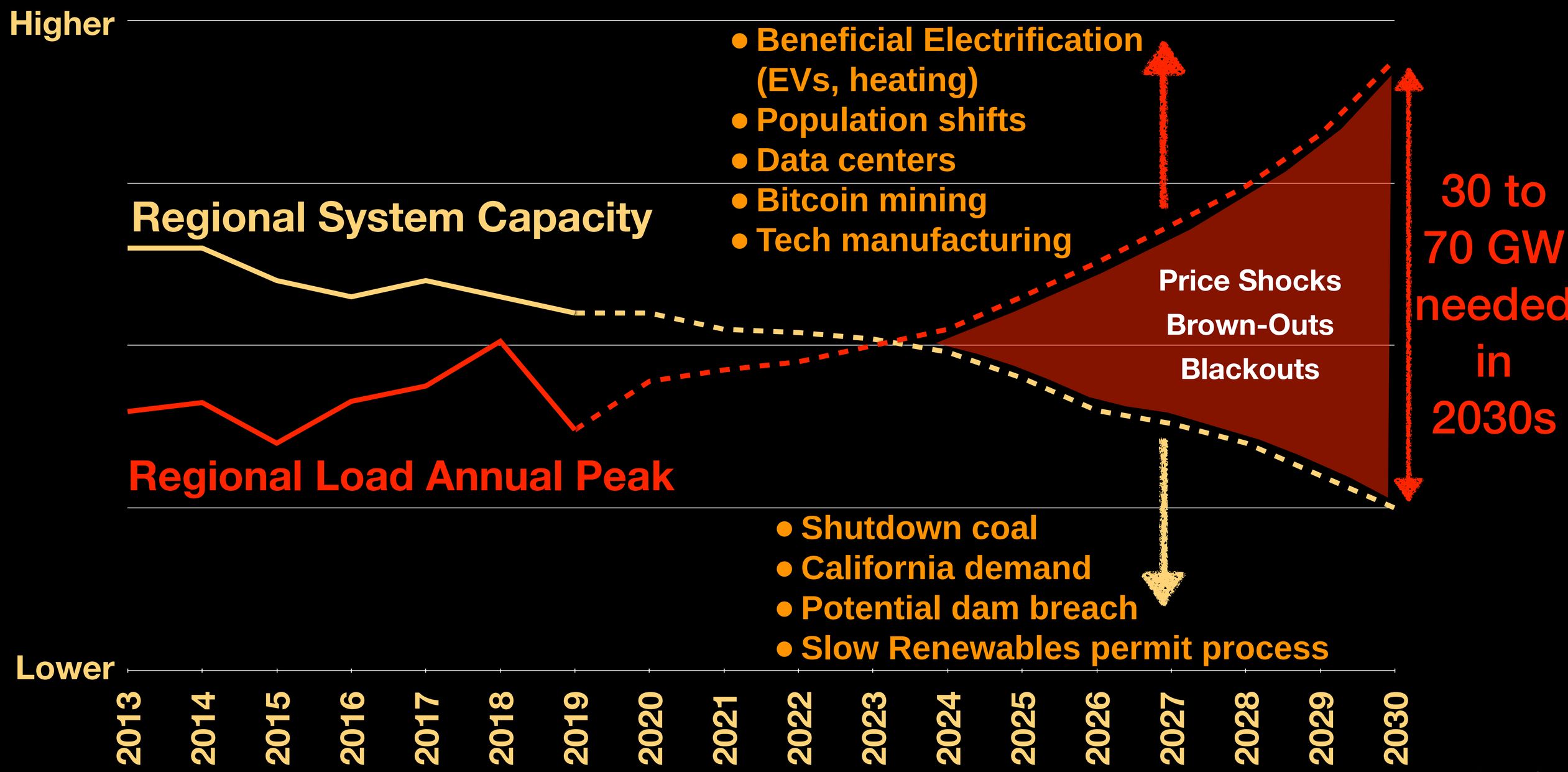
Between now and 2035, each year we are more at risk

Picture the loss of life and economic impact that took place in the 2021 Texas blackout

The Clock Is Ticking

- Regional loads growing faster than projected
- Coal plant shutdowns shrinking regional capacity
- New renewables projects will take decades to deploy
- Shortfall starts this year, growing to 25,000 MW deficit by 2035
  source: Northwest Regional Forecast, 2023; PNUCC
  source: Transportation Electrification Strategy, 2023; WA DoT
- Northwest needs to be adding 2,500 MW per year – 25 X faster than normal
  Deficit mainly due to legal and permitting barriers that have historically slowed development to 125 MW per year

NW Energy Capacity is Declining, Load is Increasing

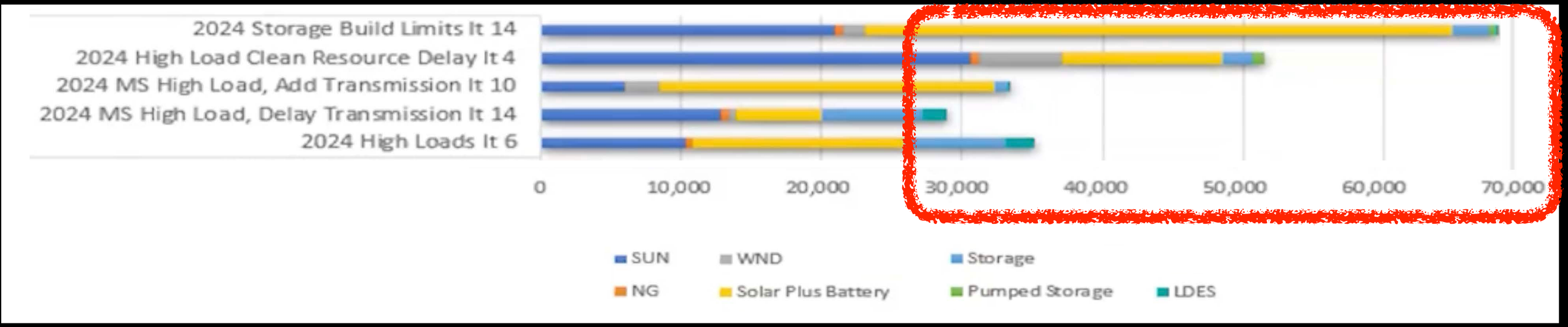


Source: Northwest Regional Forecast, 2023; PNUCC, Transportation Electrification Strategy, 2023; WA DOC

NW Power & Conservation Council: 6 August 2024 Planning and Analysis Study

NWPCC increased estimate to 30 to 70 GW needed in the NW

2030 NW New Energy Resource Buildout By Fuel Type (MW)



NWPCC just estimated over 400 GW needed across <u>western region</u>

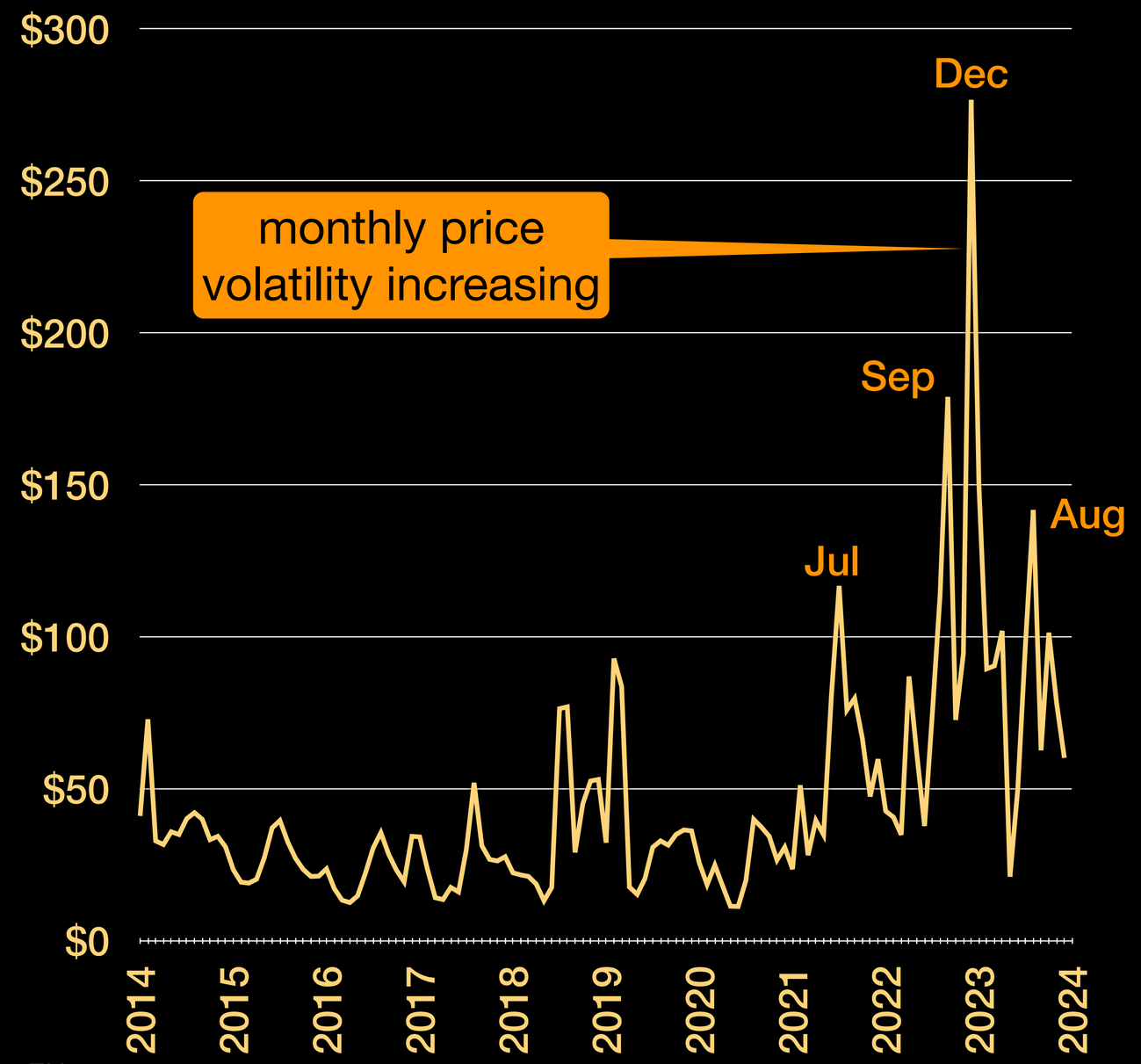
"We should expect our total build to be between 406 and 613 GW, which is astonishing! That is the biggest number I have ever seen."

NWPCC 13 August 2024 Study Presentation

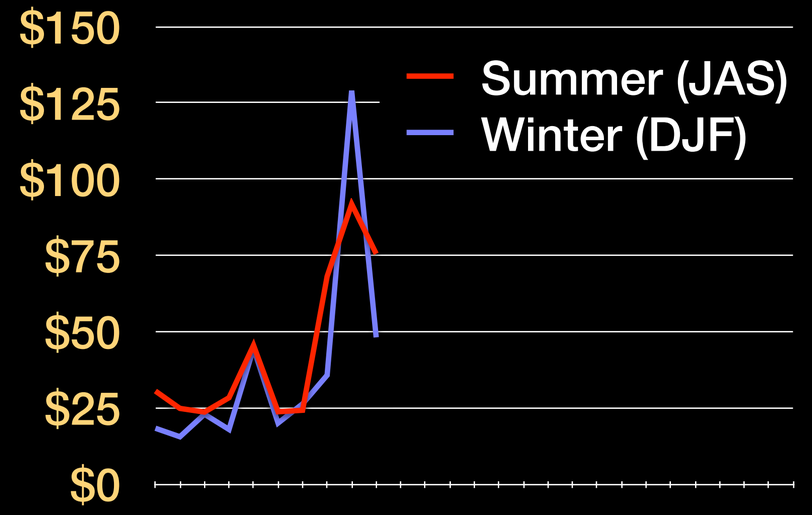
Source: NWPCC 6 August 2024 Planning and Analysis Study, August 2024

Supply-Demand Shortfall: Mid-Columbia Price History ($/MWh)

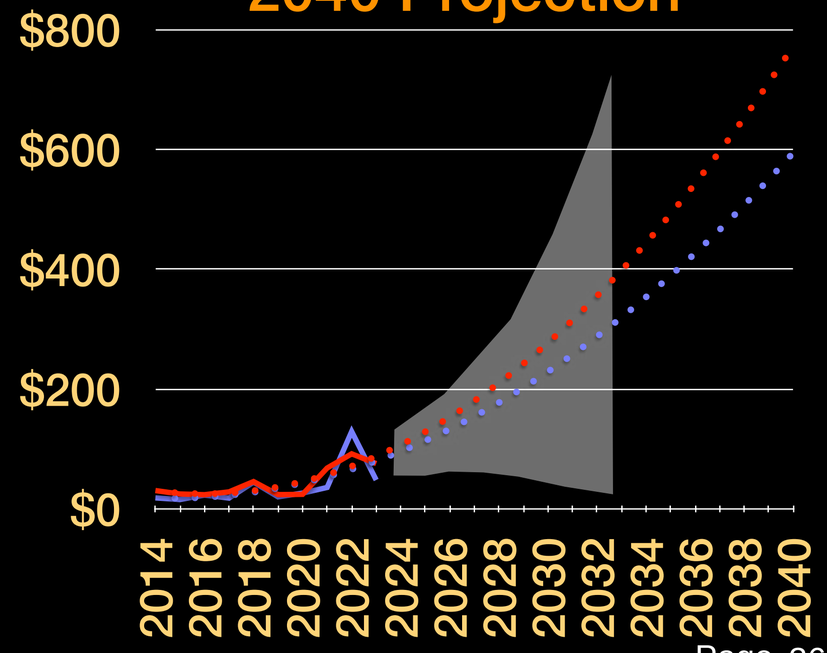
Monthly Weighted Avg. Mid-C Price



Seasonal Mid-C Price



2040 Projection



Source: EIA

California Is Actively Pursuing Our Northwest Energy Supply

If California was a country, it would be the fifth largest economy in the world!

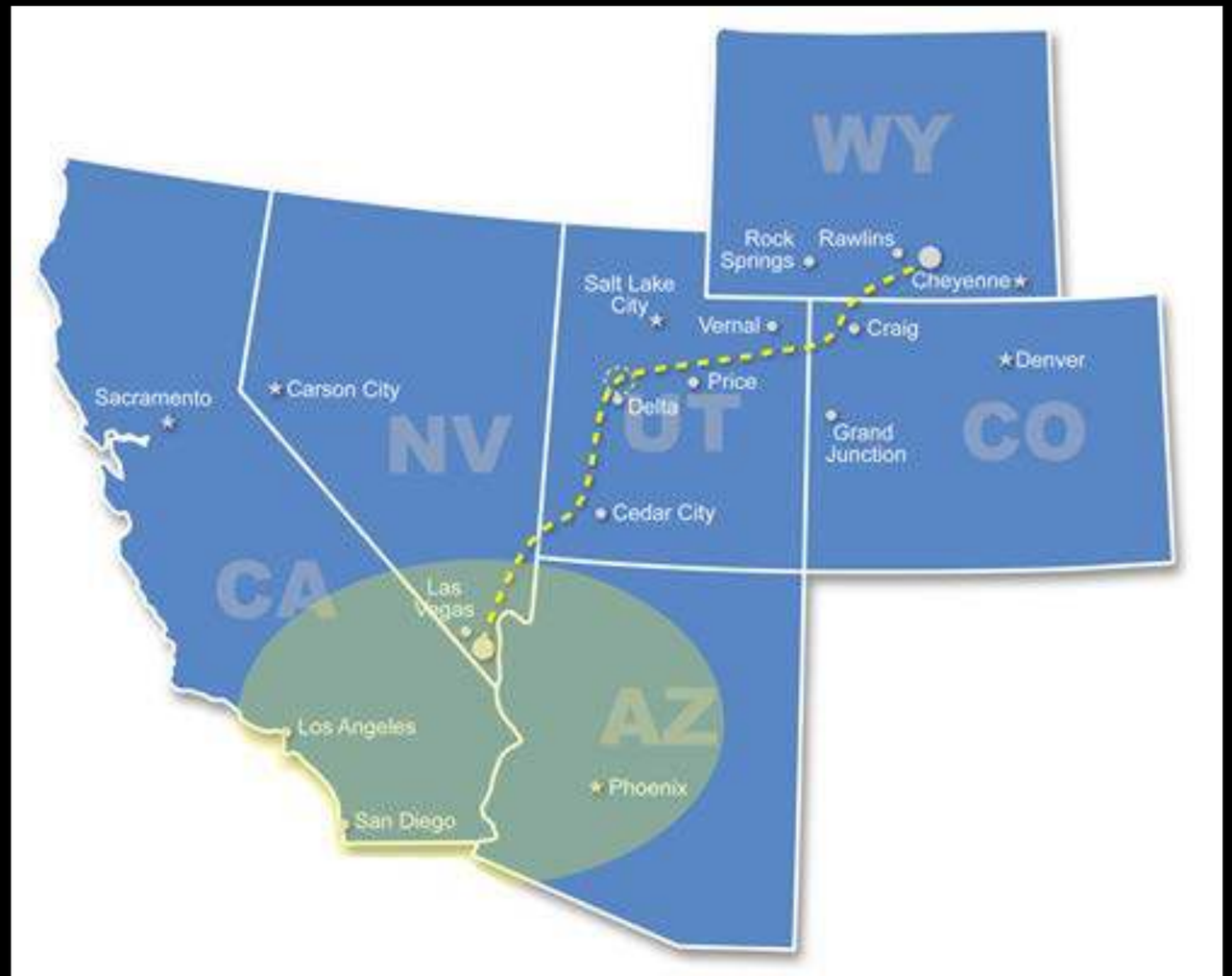
Need a power line? That'll be $3B and 18 years.

By **ARIANNA SKIBELL** | 06/21/2023 05:59 PM EDT

Interior Secretary Deb Haaland (center left) and Energy Secretary Jennifer Granholm (center right) arrive at a ceremony for the TransWest Express transmission line in Wyoming. | Jason Plautz/POLITICO's E&E News

A 732-mile power line broke ground in Wyoming this week, paving the way for the country's largest onshore wind project to send zero-carbon energy to California, Arizona and Nevada.

While the $3 billion TransWest Express Transmission project marks a win for the Biden administration, it took nearly two decades to green-light, writes Jason Plautz.



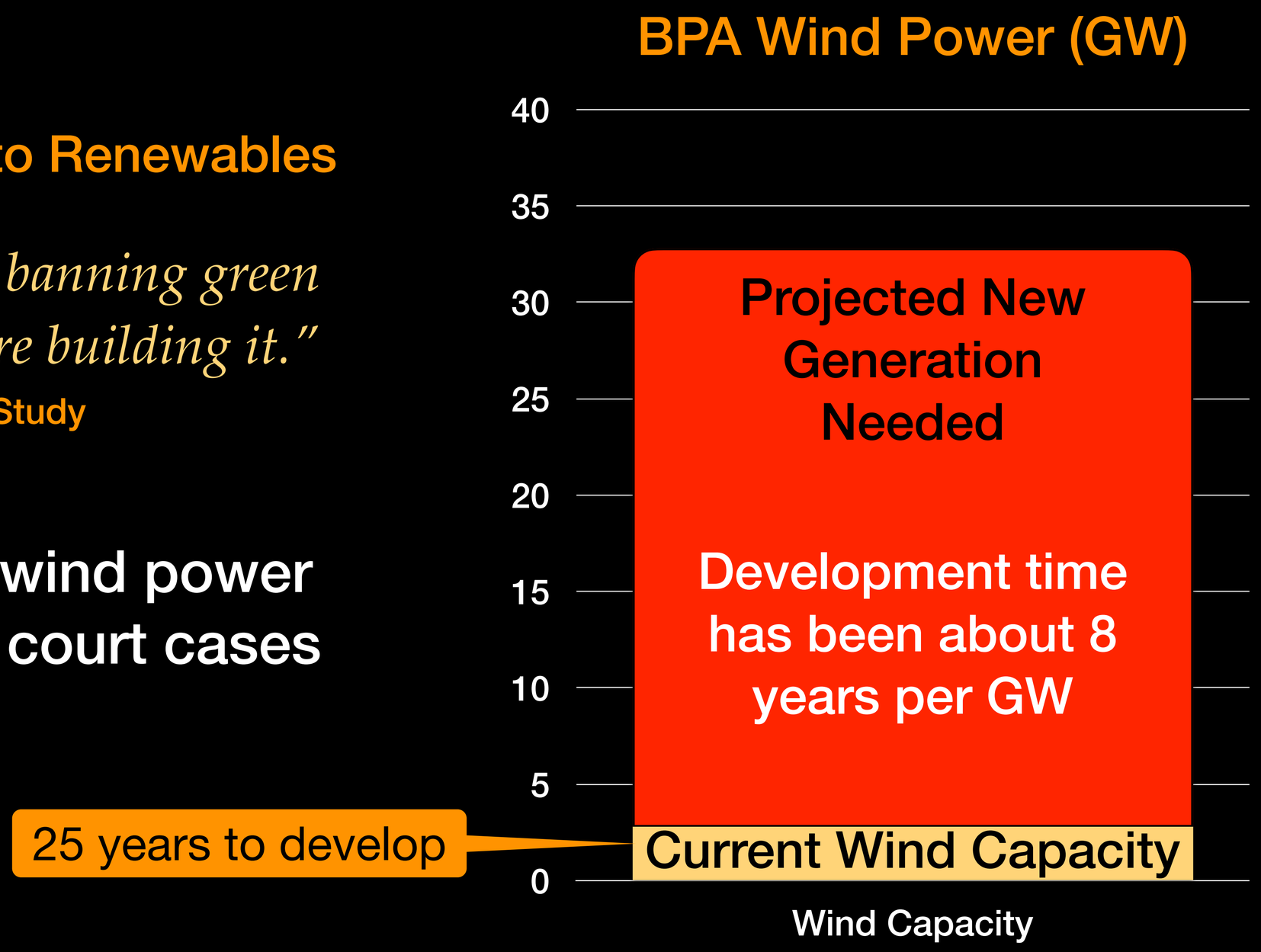
How Long Will it Take to Develop 25+ GW of Renewable Resources?

National Resistance to Renewables

"Local governments are banning green energy faster than they're building it."

2024 USA Today Study

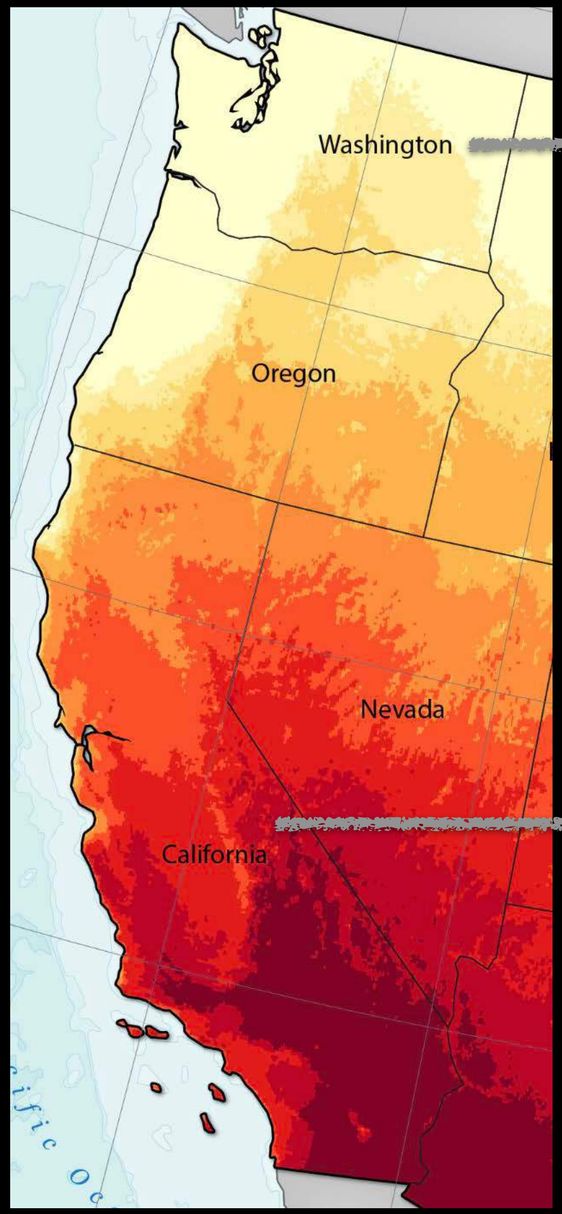
There are over 300 wind power projects held up by court cases

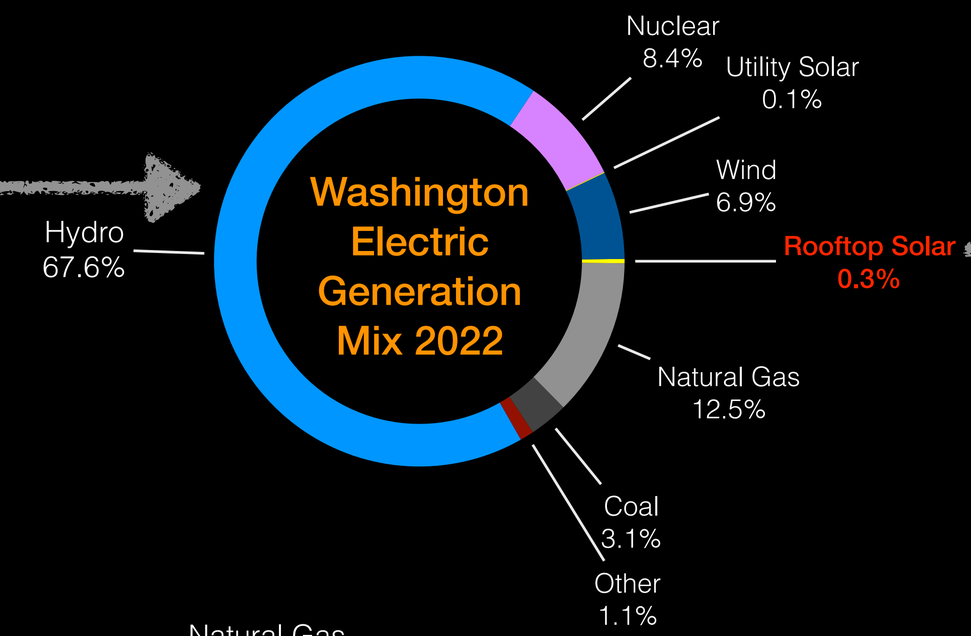


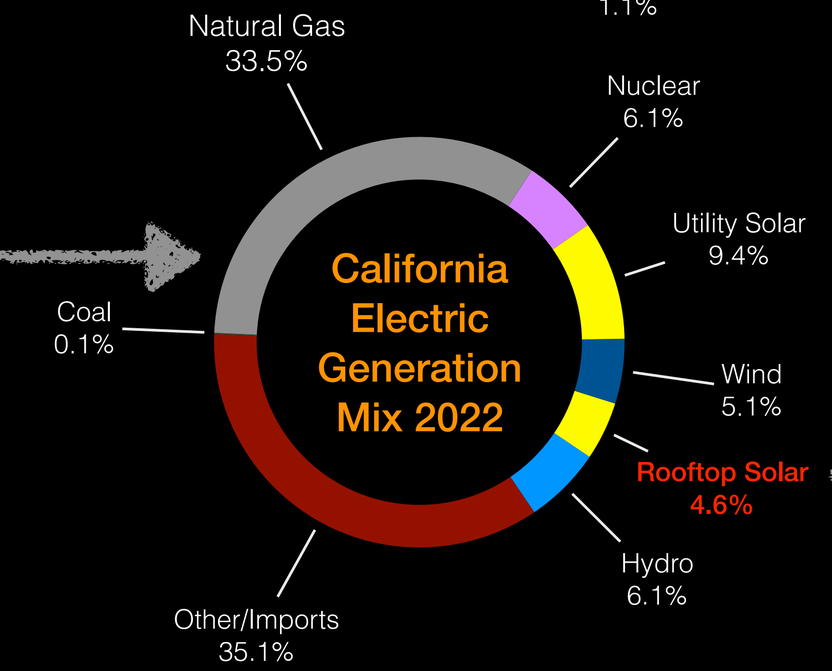
Source: Army Corps of Engineers 2022 data, USA Today, Renewable Energy Rejection Database

The Winter Problem: Northwest is not the Southwest – NW winter solar production is less than one-third of the SW

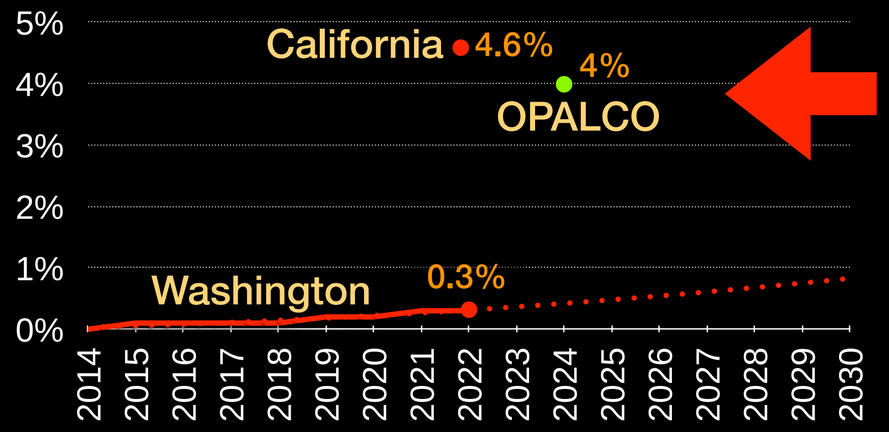
Annual Solar Irradiance







Rooftop Solar % of Total



Notes

- In California, rooftop solar is only 4.6% of the total state energy portfolio.
- In Washington, where solar irradiance is a small fraction of California, rooftop solar contributes only 0.3%, and is projected to be less than 1% by 2030.
- December production is 72% less than California.
- Washington solar capacity factor is about one-third of California's.
- California utility-scale solar production is double rooftop. In Washington, it's one-third of rooftop. WA policy should incentivize utility-scale solar, which is more capital and production-efficient.

Source: EIA, energy.ca.gov, NREL, PV Watts