Organizing for the Transition to a Cleaner and More Sustainable Energy Future at Blue Lake Rancheria

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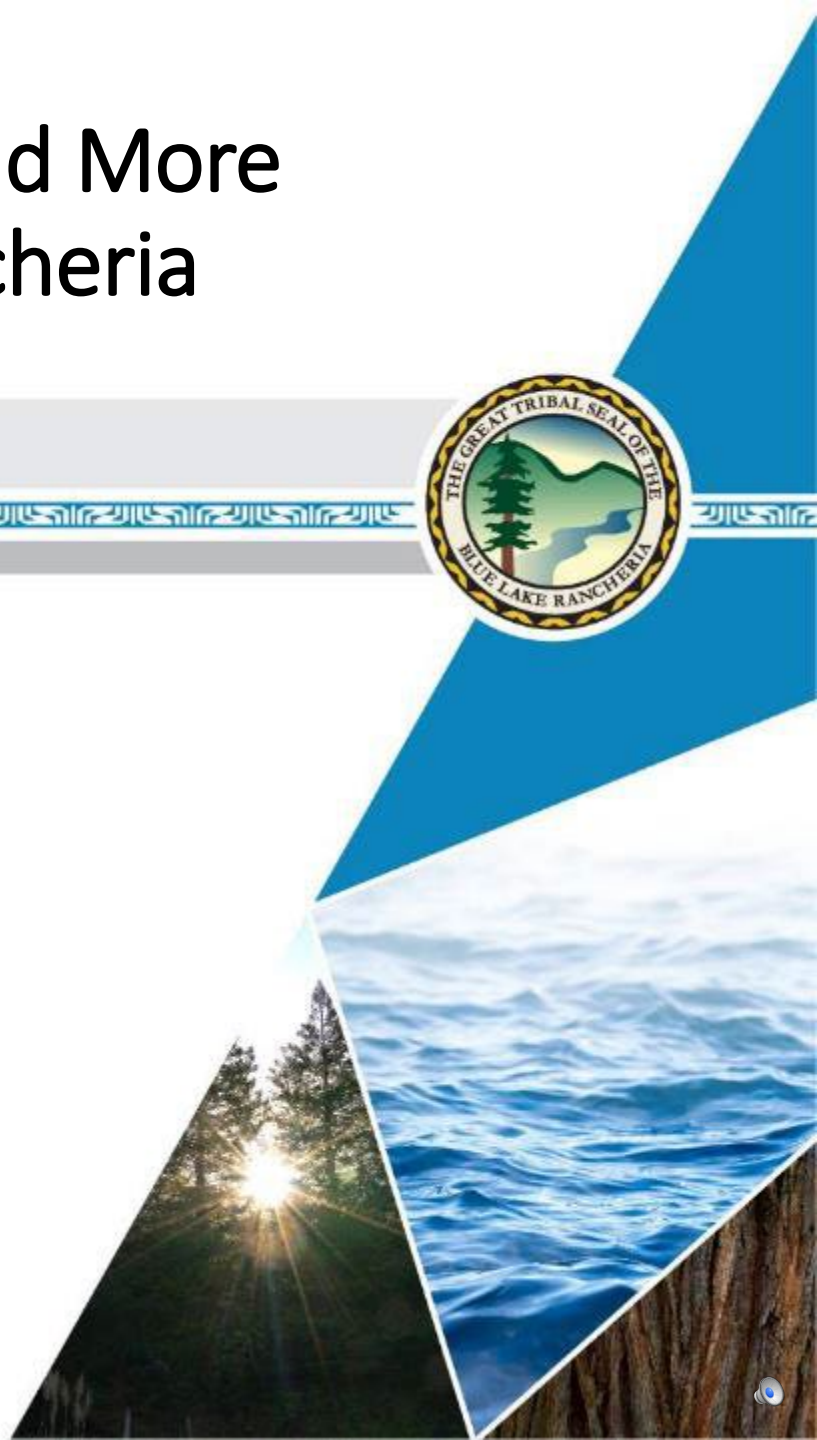
Jana Ganion, Sustainability and Government Affairs Director

jganion@bluelakerancheria-nsn.gov

BLUE LAKE RANCHERIA

A Federally Recognized Tribal Government



Clean Energy Rationale

- **Global climate change amplifies local conditions**
- Increasing temperatures on land and in oceans
    - Oceans absorbed ~90% of warming between 1971-2010
        - Increases acidification
- Unpredictable, volatile weather, extreme storms
    - Power outages are worsening
    - Emergency-scale flooding a ~monthly occurrence by 2030
    - "The U.S. has experienced an increase in billion-dollar, non-hurricane, inland flood disasters (i.e., from extreme rainfall, riverine flooding) in the last decade (18 floods during 2010-2019) than during the prior 3 decades *combined* (15 floods during 1980-2009)."

Source: https://www.ncei.noaa.gov/, emphasis added.

OCEAN HEAT COMPARED TO AVERAGE

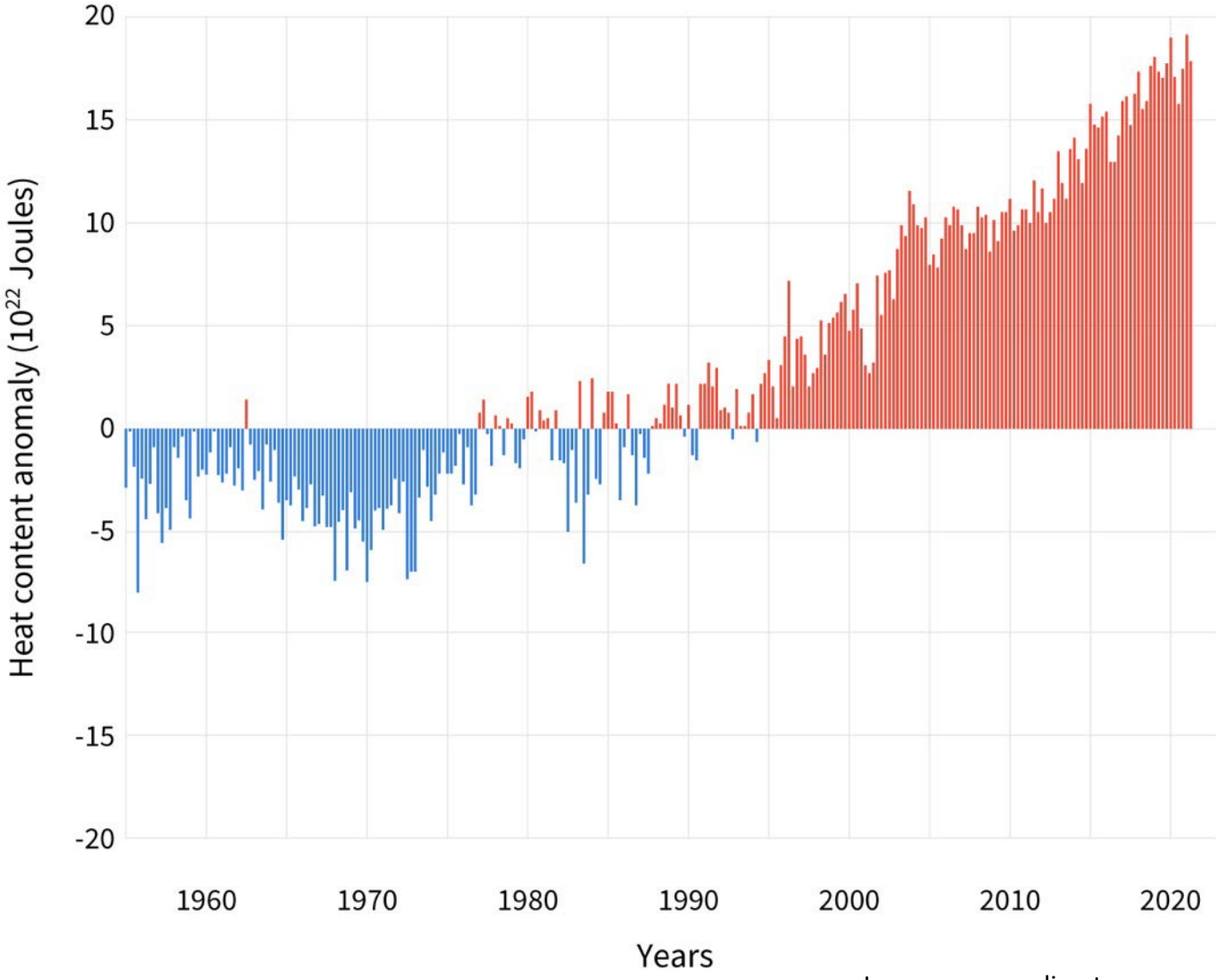


Image source: climate.gov

Climate Crisis Expense

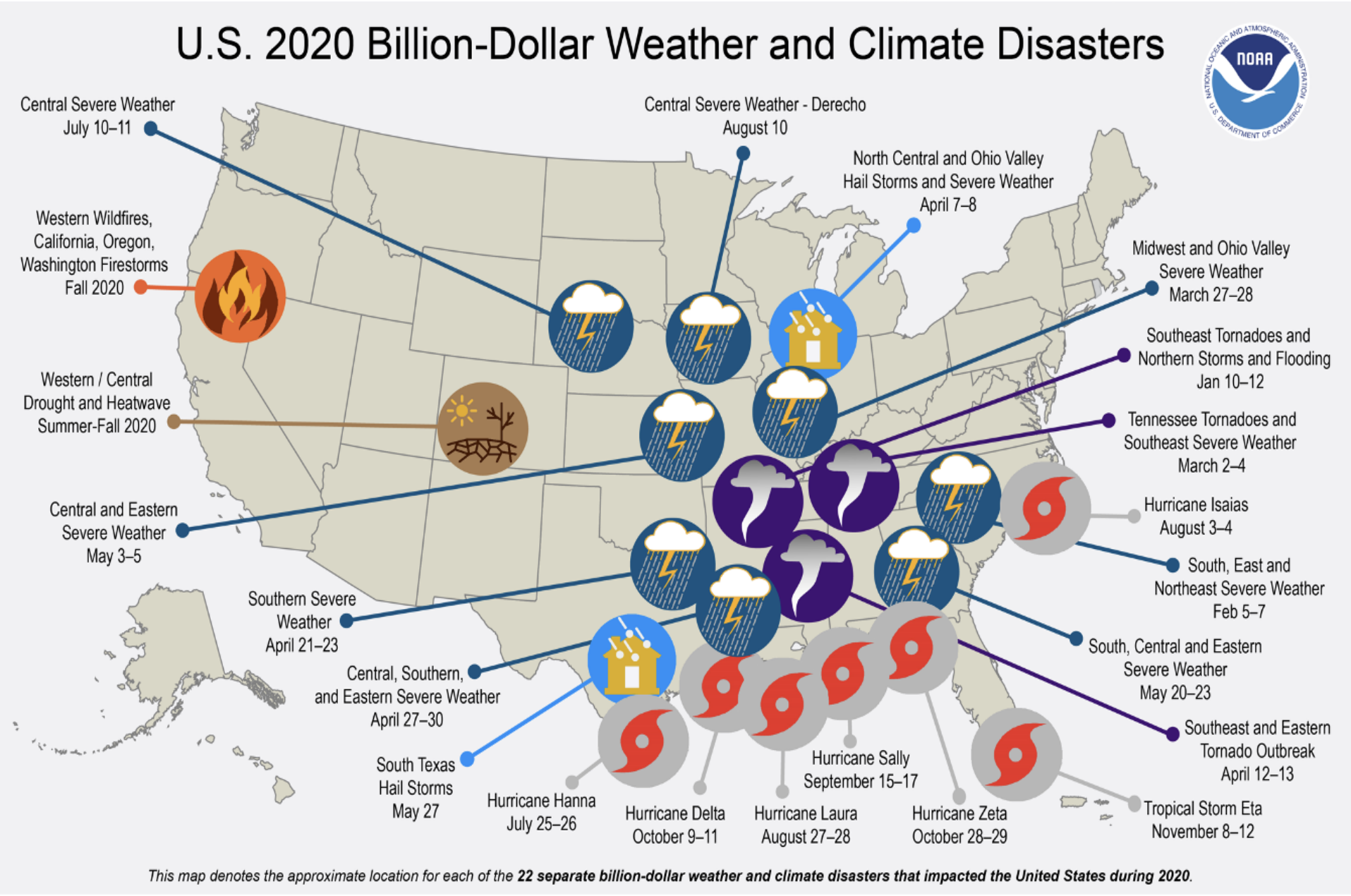
2020 – highest rate of billion-dollar disasters from climate and weather in U.S. ever

2021 – Texas utility damages ~$140B (both cold and hot temperature impacts)

Prices of oil, gas are high and volatile; vulnerable to supply disruption

Energy and infrastructure disruptions impact tribal economies and social programs

Image source: https://www.ncei.noaa.gov/access/billions/



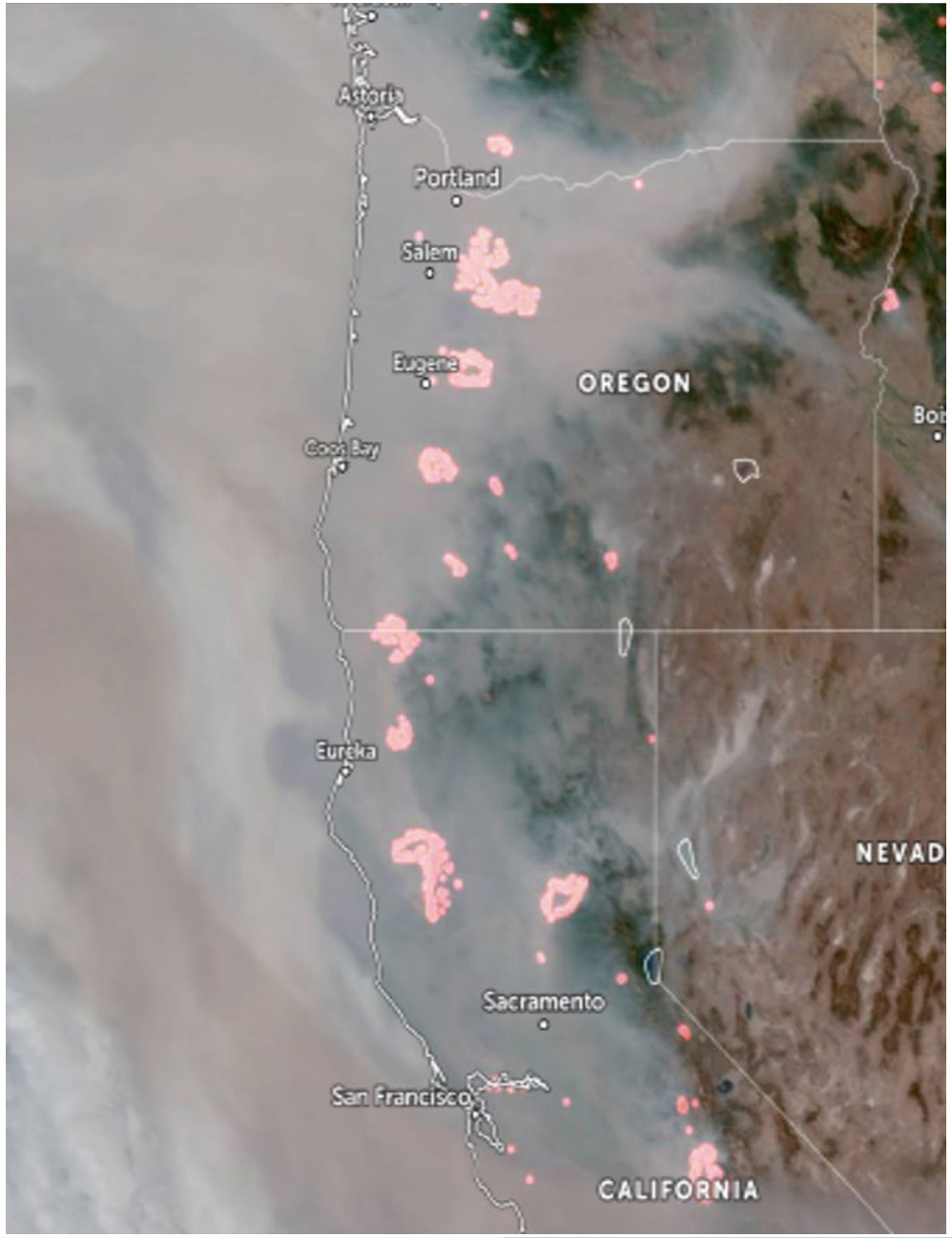


Image credit: zoom.earth 9/11/2020

Risks and Impacts

- Increased wildfires and air pollution
- Amplified by climate emergency
  - Historically Low Fuel Moisture Content
  - In forests, at woodland/urban interface (WUI)
- Public Safety Power Shutoffs (PSPSs)
  - Planned outages to prevent wildfires from electrical grid; projected to last 2-10 days; two PSPS events in 2019, 2020; predicted to be needed for the next decade
- Seeing historic extended drought, wildfire, wildfire smoke – persistent and in new areas
- ‘Heat dome’ over entire western U.S. in 2020, 2021, 2022 – extreme heat, rolling power outages; grid stress

Risks and Impacts

- Sea Level Rise (SLR), groundwater Inundation, and flooding
- **Humboldt County coastline: fastest rate of sea level rise on the Pacific Coast.**
  - Combination of land subsidence and ocean expansion from warming temperatures
- Impacts to infrastructure
  - Arterial roads
  - Water and wastewater systems
  - Threatens coastal natural gas power plant
  - Threatens local nuclear waste site

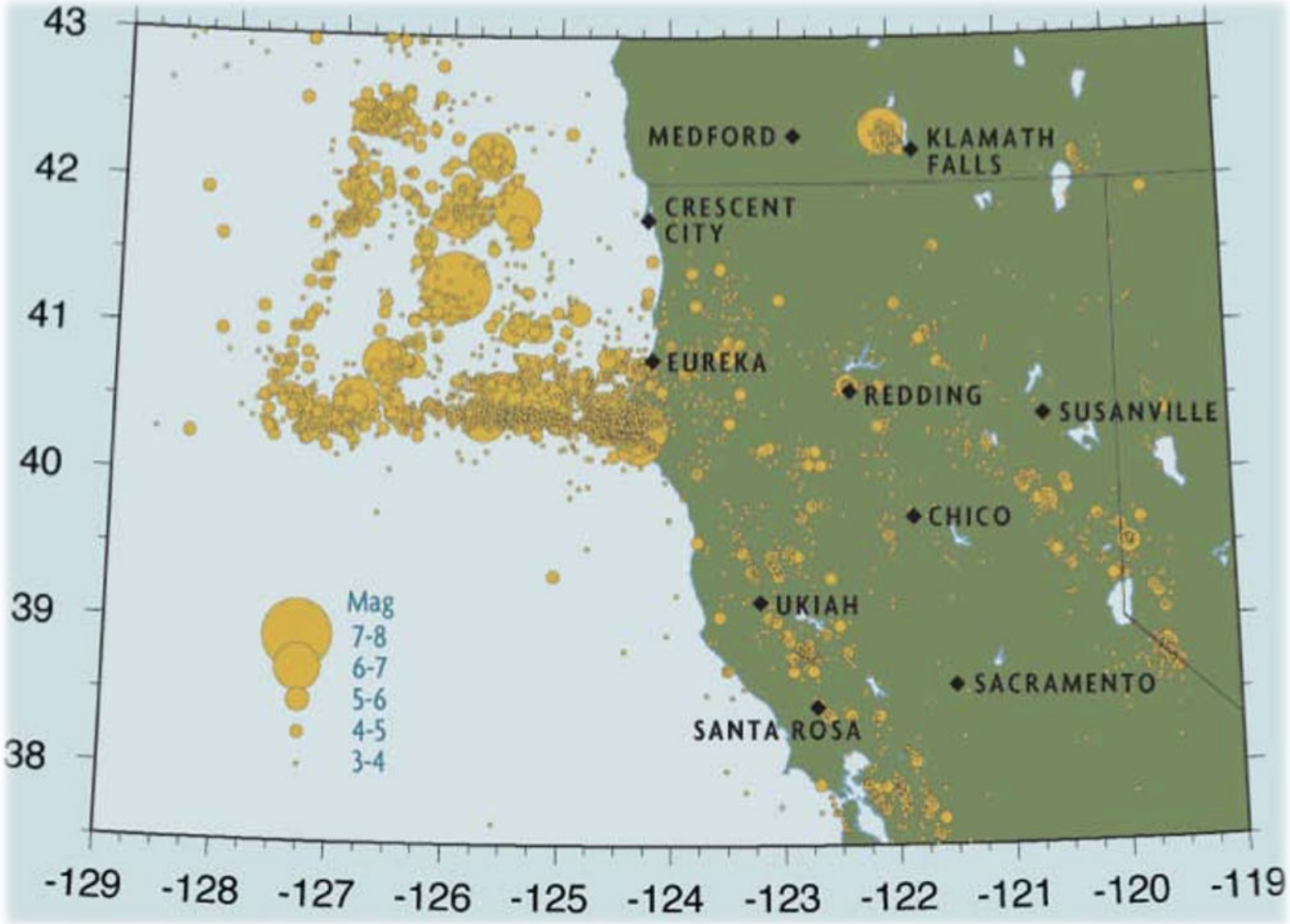
King Tide 2020

Photo Credit: Tim and Rose Hanan

Seismic & Tsunami Risks

- Serious earthquake / tsunami risk
- Cascadia Subduction Zone, Mendocino Fault, Gorda Plate, Pacific Plate, North American Plate all converge at the ‘triple junction,’ directly offshore
- Can achieve >9.0 earthquake
- Most of the Pacific Coast can be simultaneously impacted
- Due to relatively low population, our region may be lower priority for response

Image Credit: Humboldt State University

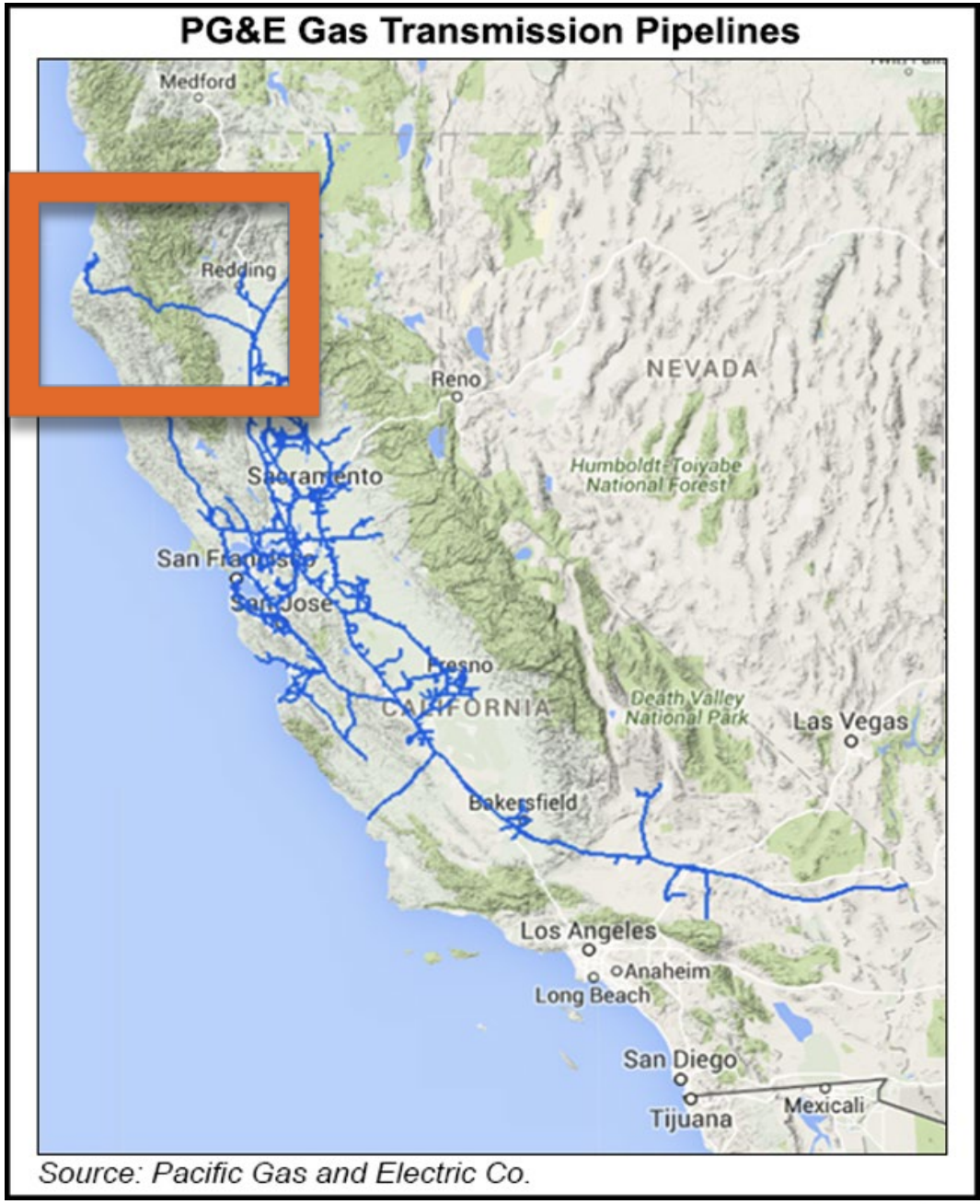


Tenuous Natural Gas Grid

- Region is served by a single 10-inch natural gas pipeline
  - Runs through seismically unstable landscape
  - Risk of rupture and lengthy service restoration (~weeks)

- Serves region's anchor natural gas power plant
  - Provides most of our *actual* electrons used here
  - Located directly across from the mouth of Humboldt Bay, vulnerable to tsunami
  - Plant site will be inundated by sea level rise *and groundwater intrusion* from sea level rise by ~2050-2070

- PG&E / CA studies to prune natural gas infrastructure
  - CA SB 100 - Renewable and zero-carbon energy resources supply 100% of electric retail sales by 2045

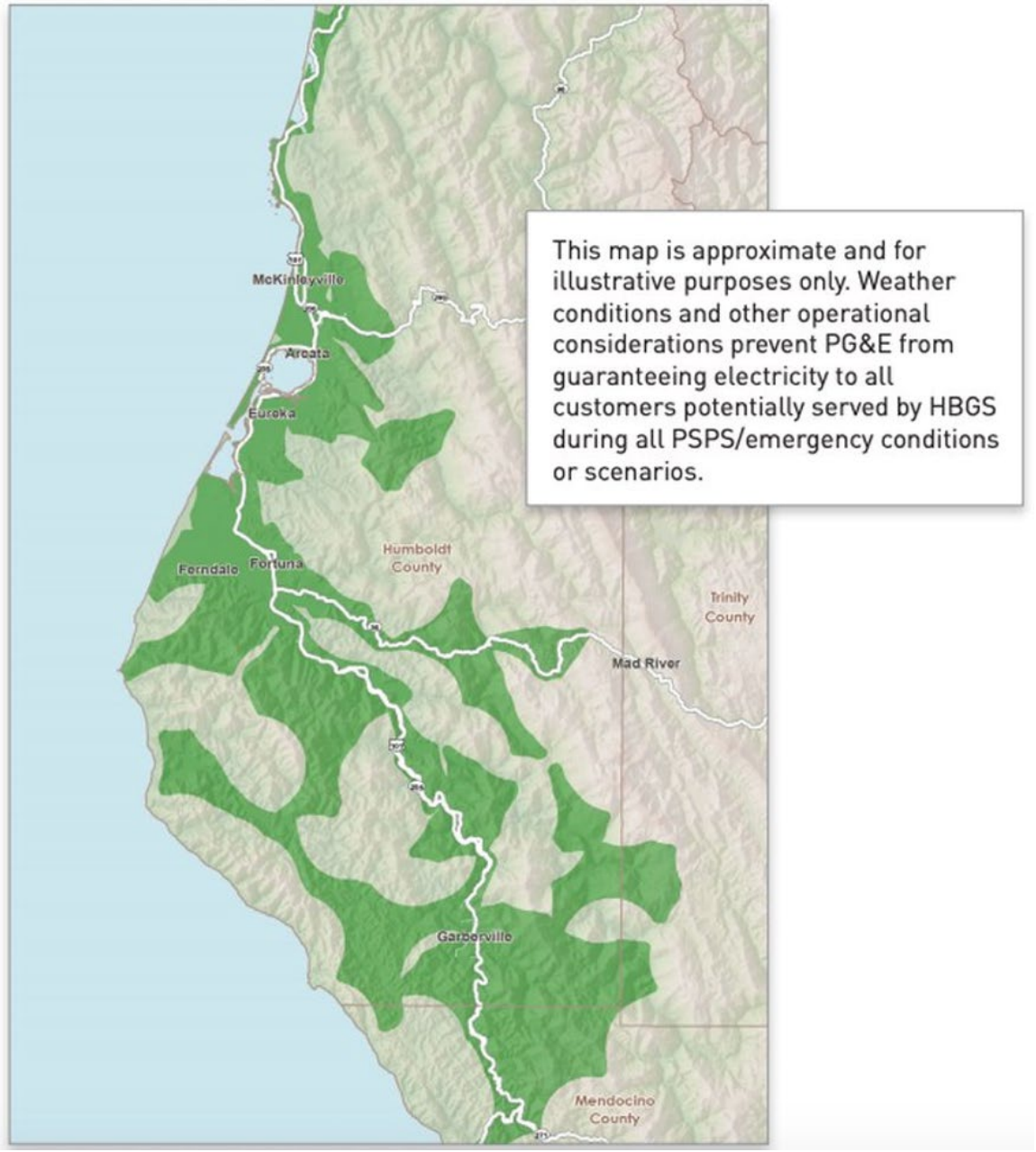


Source: Pacific Gas and Electric Co.

Image source: PG&E

Tenuous Electrical Grid

- Region is served by a single transmission line
  - With one redundant line
- Runs through wildfire country
- Import restricted to 70 megawatts, less than half the local use
  - Humboldt's typical use is 140-180 megawatts
  - Anchor natural gas plant provides most *actual* electrons
  - Clean energy use is largely contractual, not actual
- Need cleaner and more resilient local grid
  - Humboldt grid "island" created in 2020 >>>
    - A temporary fix
    - Inequities outside the island's energized reach



Organizational Strategy for Transition

- Pair Climate Mitigation + Adaptation
  - Solutions are low- or zero-carbon
    - Avoid making underlying causes of disasters worse
- Transition to climate-resilient infrastructure ASAP
- Focus on “Lifeline Sectors”
  - Energy – e.g., solar + battery storage, microgrids
  - Water
  - Food
  - Transportation
  - Communication / IT
- When these are done well, social, economic, and environmental benefits result
- Tribal Government investment leveraged w/other resources

Low-carbon Microgrids at Blue Lake Rancheria

1. Community scale – in operation 2017
2. Facility scale – in operation 2019
3. Campus scale – in operation 2022
4. Facility scale, nested – in design, full operation by 2024

Multiple interactive microgrids allow for redundancy, and ongoing reliability and grid benefit studies; and a “connected community strategy”

Solar+ Microgrid

- Public/private partnership
- Funded by Tribe and CA Energy Commission
- Fuel station, grocery, EV charging
- Solar PV + battery storage
  - Diesel available for deep back up
- Islands from regional electric grid
- Advanced controls (e.g., efficiency)
- Normal operations: low cost, GHGs
  - Improves Continuity of Operations
- In emergencies: provide lifelines
  - To public and emergency responders
  - Important in tribal / rural areas

Real World Value of Clean Energy Transitions

- Public Safety Power Shutoff (PSPS) 10/9/2019
- Served >10,000 people (~10% of pop.)
- Supplied general public & emergency response agencies for ~30 hours
  - Saved several lives in the event
- The PSPS did its job – no wildfires
- Microgrids did their job – regional support
  - Proved the benefit stack – economic, social, environmental

Job Creation & Economic Growth

- Decarbonized resilience has resulted in a ~30% increase in employment since 2013
  - Tribal utility authority
  - Added roles across departments
    - Electricians / Facilities / Information Technology (IT) / Telecommunications
- De-silo infrastructure and safety
  - Public safety and emergency operations
    - Added police and fire roles
- Refreshed existing economic enterprises
  - E.g., technology tourism
- Leads to long term strategic partnerships and more projects
  - Tribal / university / research partnerships
    - Schatz Energy Research Center and Cal Poly Humboldt
  - Tribal / federal / state / county / local emergency preparedness agencies

Workforce Development

- **Resiliency Training & Innovation Center (RTIC)**
  - Bring more trainings/capacity to remote, rural, tribal areas
    - Reduce costs of access
  - Emergency preparedness (e.g., HazMat, NICS)
  - Regional planning (e.g., “Tsunami Con”)
  - First Tribe to host National Emergency Management “Advanced Academy”
  - >1,500 certifications since 2017

New Facilities

- TOMA Resilience Campus
  - *A place to develop solutions for clean energy and community resilience*
  - Blend workforce training, education, and climate-resilience business incubation
    - Workforce training spaces
    - Business incubator
    - Demonstration kitchen
    - Event / conference spaces
    - Retail store | Café
  - Estimated opening ~2024
  - Dedicated solar + storage islanding microgrid
  - EDA funding + tribal government investment

TOMA
RESILIENCE CAMPUS

Other Solutions

- Energy efficiency
- Building and Transportation Electrification
  - Natural gas to electricity; Gas/diesel to electricity
- Offshore Wind Energy http://schatzcenter.org/wind/
- Redesign existing infrastructure out of path of sea level rise
- Carbon sequestration strategies and economics
- Food sovereignty to improve nutrition, local food production
- Climate-smart economy, financial strategies
  - Monetize climate assets
  - De-silo hazard mitigation and core infrastructure investments
  - De-silo infrastructure projects e.g., energy + telecom + roads = dig once)
- New partnerships

Final Thoughts

- Early actor advantage
  - Risk mitigation for resource constraints
  - Supported by effective governance, planning, partnerships, investment, deployment
- Tribe's strategy is working
  - Centering climate crisis, pairing mitigation + adaptation has supported economic enterprise continuity and cost reductions
  - Climate science, data, and models are proving correct, and *conservative*
- Tribe is creating a manageable, equitable transition to a climate-resilient community
- Exploring climate justice principles: distributive, procedural, and representative


The Washington Post

Amid shut-off woes, a beacon of energy

A Native American tribe has insulated itself from California's blackouts by creating a microgrid utility

Select Recognition

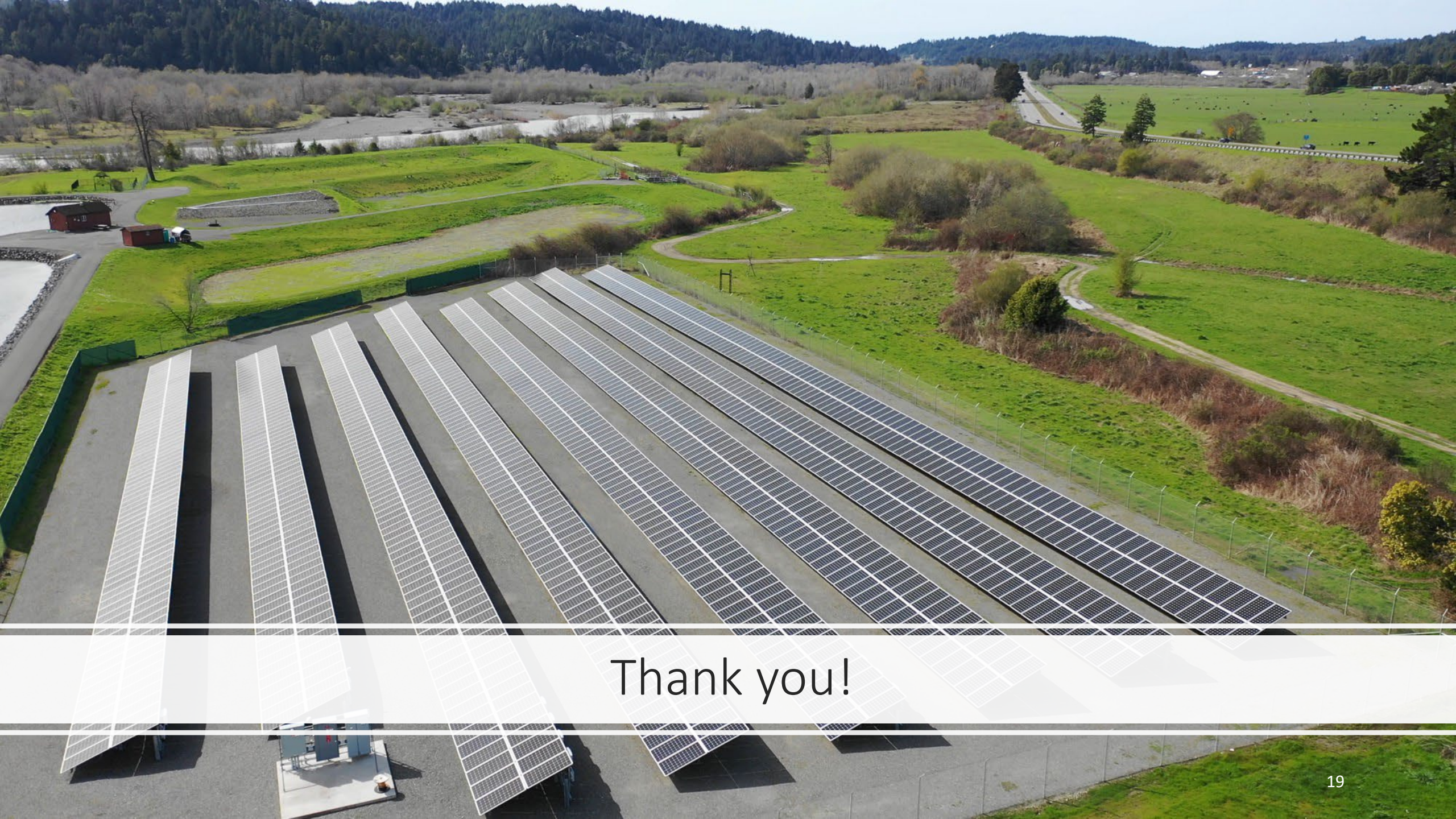
"Honoring Nations" Award Harvard Project on American Indian Economic Development 2021

FEMA John D. Solomon "Whole Community Preparedness" Award

"Climate Action Champion" White House and U.S. Dept. of Energy

Further Reading

- NASA Climate Website: https://climate.nasa.gov/
- NOAA Climate Website: https://www.climate.gov/
- Technical reports on microgrids: https://ww2.energy.ca.gov/2019publications/CEC-500-2019-011/CEC-500-2019-011.pdf and https://ww2.energy.ca.gov/2018publications/CEC-500-2018-022/CEC-500-2018-022.pdf
- Intergovernmental Panel on Climate Change, "Climate Change 2022 Impacts, Adaptation, Vulnerability Summary for Policymakers" https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicymakers.pdf



Thank you!