SAN MATEO COUNTY ENERGY WATCH

OFFICE OF SUSTAINABILITY
COUNTY OF SAN MATEO

RICAPS

Regionally Integrated Climate Action Planning Support

Multi-city Working Group

April 25, 2023

RICAPS technical assistance is available through the San Mateo County Energy Watch program, which is funded by California utility customers, administered by Pacific Gas and Electric Company (PG&E) under the auspices of the California Public Utilities Commission and with matching funds provided by C/CAG and additional funding provided by Peninsula Clean Energy.

Agenda

- **Welcome & Agenda**- Avana Andrade, Senior Sustainability Specialist, County of San Mateo
  - Announcements: last meeting recap, what's next for RICAPS programs (Avana)
  - Climate Reduction– Abby Young, Bay Area Air Quality Management District
  - Berkeley New Building Electrification Federal Appeals Court Ruling Update & Q&A, Ryan Gardner, Rincon Consultants
- **Peer-to-Peer Share Out-** All Jurisdiction Check-In (Cameras on, as able!)
- **Electrification & Grid Reliability; BAAQMD Zero NOx Electric Infrastructure Impacts-** Ari Gold-Parker, Associate Director, E3
  - What does electric grid reliability mean?
    - Q&A (10 mins)
  - Electrification & Electric Infrastructure Impacts: E3 Study for BAAQMD Zero-NOx Rules
    - Q&A (15 mins)
- **Discussion on Grid Reliability Worries**- Avana Andrade & Ryan Gardner
  - Discussion: how do constituents/ electeds perceive electrification & grid reliability

RICAPS Programming to Support Existing Building Electrification: *your votes; visualized*

Top 3 Programs

Jurisdiction Votes (Number)	Potential RICAPS Program Concept
10	**Electrification outreach campaign to small contracting businesses and distributors, with a focus on businesses that are multilingual, and not covered under BayREN contractor outreach.**
10	**Regional compliance work: permit streamlining; coordinated compliance workforce, letter writing campaign (ex. regional time of sale check compliance mechanism); lobbying higher-level regulators for electrification-ready policies with a focus on compliance (ex. BAAQMD)**
7	**Create tailored education materials for electeds, enabling conditions for passage of existing building electrification policies**
6	Outreach campaign for the general public & local governments, focusing on grid upgrades, reliability, zonal electrification, etc.
4	Whole home electrification plan training pilot
3	Support electrification curriculum development pilot programs/apprenticeship incubator
1	Strategic fundraising for workforce training programs
1	Outreach and storytelling: outreach package to compliment PCE building electrification hub
0	Research on building vintage: what kinds of building stocks are more likely to have electrification challenges

EPA's Climate Pollution Reduction Grant Program's Planning Grant

San Francisco-Oakland-Berkeley MSA

Abby Young
ayoung@baaqmd.gov

How the funding works

There is funding available for states and metropolitan areas

"Metropolitan Statistical Areas (MSAs)" get their own funding

Bay Area has 2 MSAs:

- SF-Oakland-Berkeley
- Santa Clara-San Benito

Jurisdictions not in an MSA can access funding through the State's program

How the funding works

Implementation money is dependent on a regional climate plan

Step 1: *Priority* Climate Action Plan

- Identifies a priority action sector
- GHG inventory and measures quantification for that sector

Step 2: *Comprehensive* Climate Action Plan

- GHG inventory covers all emissions sectors and sinks
- Measures quantification for all sectors
- Additional studies

Step 3: Access federal funding

- Access funding for priority projects identified in Step 1

Priority Climate Action Plan

- **Due March 1, 2024**
- **Applications for Implementation Funding must be consistent with measures in the PCAP**
  - Note: The state will submit a PCAP as well so eligible Bay Area entities can apply for implementation funding using either PCAP
- **Elements include:**
  - Preliminary GHG inventory for targeted sector(s)
  - Quantified GHG reduction measures for the targeted sector(s)
  - Low-income and disadvantaged communities (LIDAC) benefits analysis
  - Stakeholder engagement approach defined
  - LIDAC engagement approach defined

Comprehensive Climate Action Plan

- **Due Summer/Fall 2025**
- **Elements include:**
  - GHG Inventory (all sectors, region-wide)
  - GHG Emissions Projections
  - GHG Reduction Targets
  - Quantified GHG Reduction Measures (all sectors)
  - Benefits Analysis for full geographic scope and population covered by plan
  - Stakeholder engagement approach
  - Low Income/ Disadvantaged Communities Benefits Analysis
  - Intersection with Other Funding Availability
  - Workforce Planning Analysis
  - LIDAC engagement approach

Partners

- **Air District is applicant and lead agency**
- **Key partners include:**
  - MTC/ABAG
  - BayREN
  - BARC
  - San Francisco
  - Oakland
  - Berkeley
  - Counties of San Mateo, Alameda, Contra Costa and Marin

Timeline

Due Date	Deliverable
April 28, 2023	NOIP – BAAQMD as lead agency
March 1, 2024	Priority Climate Action Plan
Summer/Fall 2025	Comprehensive Climate Action Plan
Summer/Fall 2027	Status Report

What do we need from you?

What?	When?
Fill out our survey!	This week (to be sent ASAP)
Input on priority sector(s), measures	In survey
Input on existing outreach	May
Participation in discussions	May through summer

Berkeley Vs. California Restaurant Association Update

What We Know

- Berkeley lost the appeal by CRA. Judge Found “Municipal Code” pre-empted EPCA.
- No stay has been issued yet by the court to Berkeley, they can still enforce the ordinance.
- Berkeley could appeal or request an En Banc.
- EPCA does not cover AQ standards. BAAQMD zero-emissions standards not effected.
- Building codes that allow but disincentivize gas are not affected.

What We Don’t Know

- Does this affect building code ordinances that pass the “7 point” rule provided under EPCA.
- No stay has been issued yet by the court to Berkeley, they can still enforce the ordinance.
- Timelines for more clarity (many potential pathways moving forward).

Peer-to-Peer Share Out

What is something you've been working on lately that you'd like the group's feedback on/ would like to share out?

Funding highlight:

- *What grants have you been working on or are you tracking closely?*
- *Do members of RICAPS want to coordinate on grant funding moving forward?*
- *If so, what might that look like? What is the county able to provide in terms of support?*

Electric Grid Reliability & BAAQMD Zero NOx Rules Electric Grid Infrastructure Impacts

RICAPS – San Mateo County

4/25/2023

Energy+Environmental Economics

Ari Gold-Parker, Associate Director

About Energy & Environmental Economics (E3)

Technical and Strategic Consulting for the Clean Energy Transition

~100 consultants across 4 offices with expertise in economics, mathematics, policy, modeling


San Francisco


New York


Boston


Calgary

Our parent company:

WILLDAN

Engineering and energy solutions

Recent E3 Projects

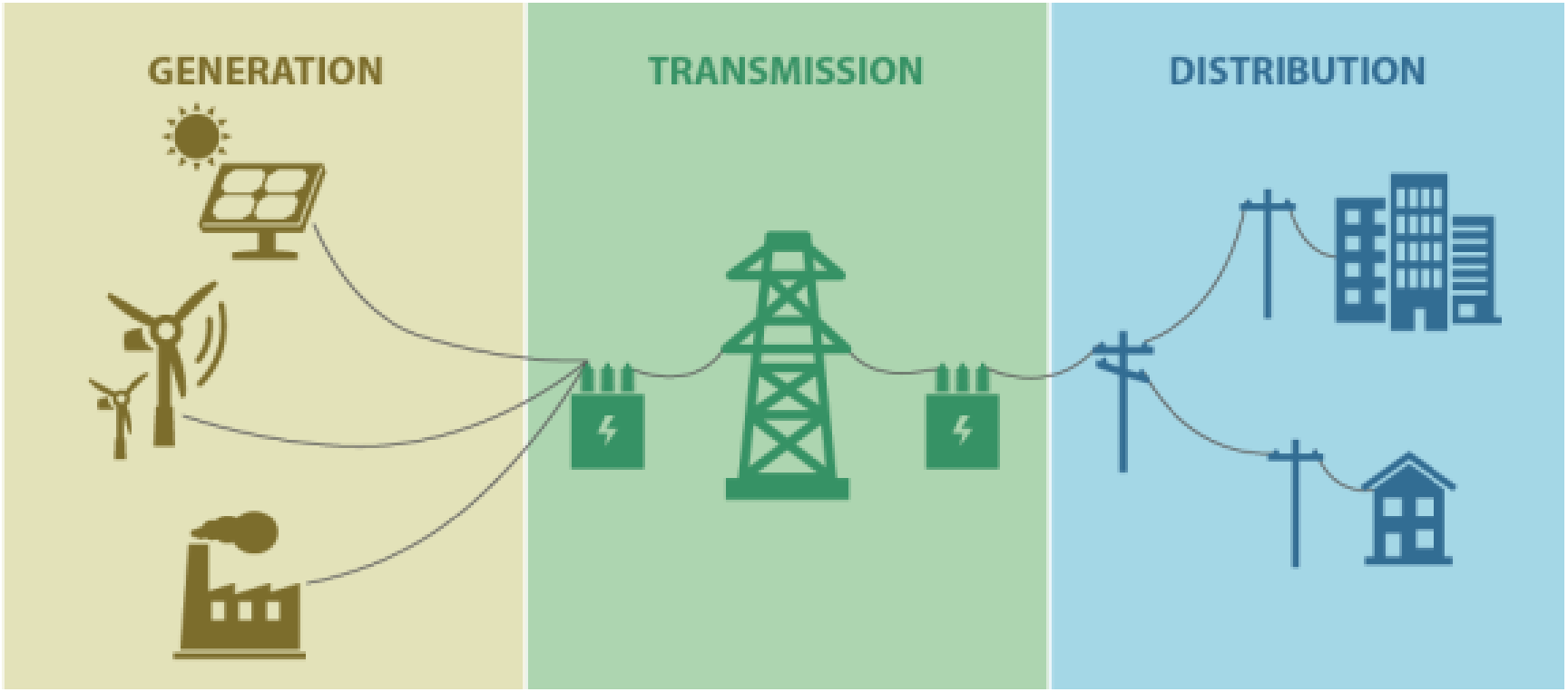
- BAAQMD Zero NOx Electric Infrastructure Impacts – E3 supported the air district by analyzing the potential electric infrastructure impacts associated with Zero NOx rule amendments
- CARB Scoping Plan – E3 supported the California Air Resource Board in using our PATHWAYS economywide decarbonization model to evaluate long-term scenarios aligned with California's climate targets

Energy+Environmental Economics

Electric Grid Reliability

This section reflects E3 work and expertise on electric grid reliability and is **not related** to work for the Bay Area Air Quality Management District

The electric grid: overview

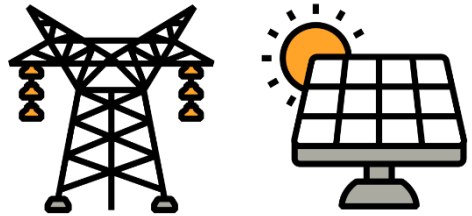


Congressional research service
https://sgp.fas.org/crs/misc/R45764.pdf

What is “electric grid reliability”

- **Reliability = maintaining electricity service for customers, “keeping the lights on”**
- **Broadly speaking: two kinds of reliability that describe different types of power outages**

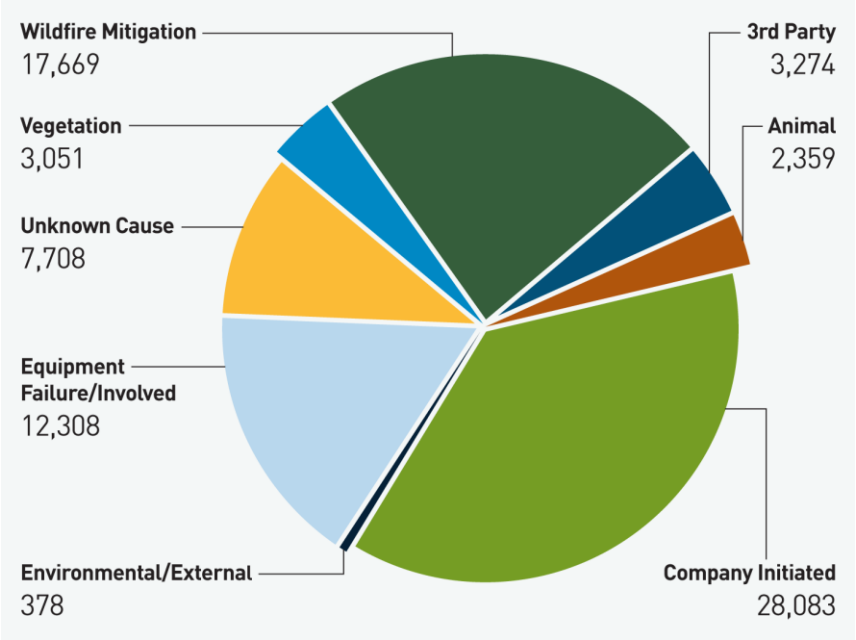
	Distribution system reliability	“Bulk system” reliability, a.k.a. “Resource Adequacy”
Type of outage	• Local outage on part of the distribution system	• System-wide blackout • Rolling blackouts
Overall outage drivers	• Weather • Equipment failures or maintenance	• Not enough generation (and/or transmission) to meet peak load
Direct causes of outages	• Tree falling on power line • Public Safety Power Shutoff (PSPS) due to fire risk • Planned maintenance projects	• Inadequate generation to meet peak load • Peak load exceeding forecast • Generator or transmission outage



Distribution system outages

- **Distribution system outages are the most common outages**
  - Only one *bulk system outage* since CA Energy Crisis: August 2020 rolling blackouts
    - Or two if you count September 2022 emergency text messages from CAISO
  - There were tens or hundreds of thousands of smaller distribution-system outages over this time period
- **Distribution system outages are driven by factors including *weather* and *maintenance***
- **Distribution system outages are generally not driven by *customer load***
  - New loads may require distribution system upgrades, leading to costs
  - But loads are generally not associated with distribution system reliability

PG&E 2021 – number of distribution outages by cause

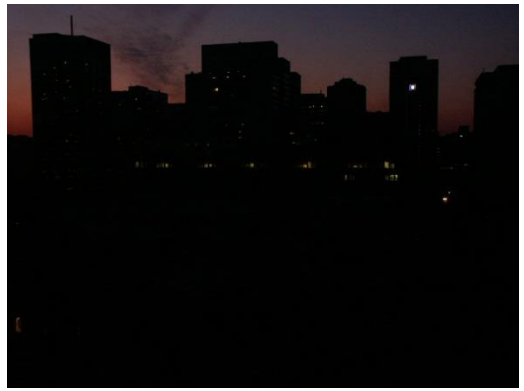


https://www.pge.com/en_US/residential/outages/planning-and-preparedness/safety-and-preparedness/grid-reliability/electric-reliability-reports/electric-reliability-reports.page

Bulk system outages

- **Bulk system outages are much less common, but can be very disruptive when they occur, e.g.:**
  - CA rolling blackouts during 2000-2001 energy crisis
  - Northeast blackout of 2003
  - Texas blackouts during 2021 Winter Storm Uri

2003 Northeast Blackout



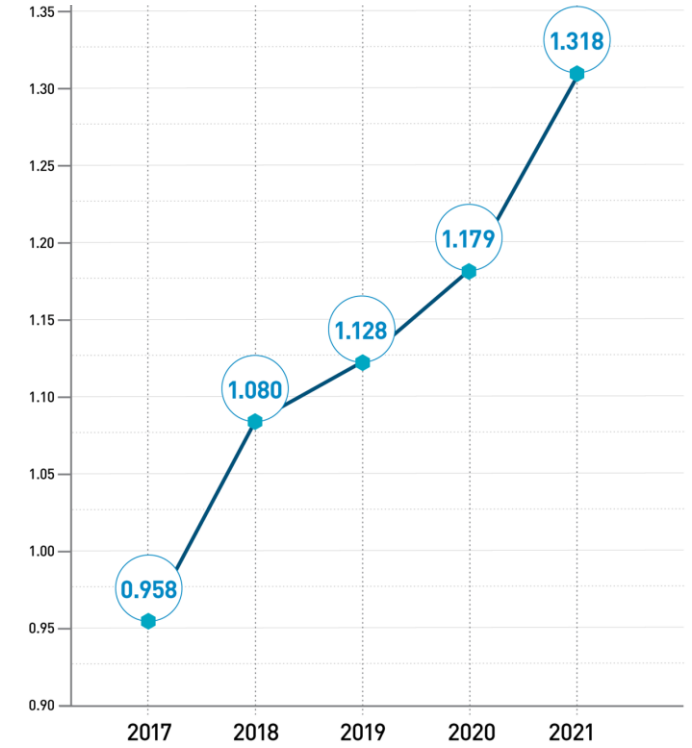
- **Bulk system outages are caused by inadequate generation to meet load during peak hours**
- **Proximate causes may include operational errors, high loads, generator outages, or transmission outages, if these occur during system peak hours**
- **Root cause would generally be issues in system planning, *e.g.*, issues associated with:**
  - Forecasting of load growth
  - Modeling of severe weather
  - Capturing correlations in generator and/or transmission outages
  - Reflecting capacity value of variable and energy-limited resources

No system is perfectly reliable

- **All engineered systems have a tradeoff between cost and risk**
  - E.g., stormwater systems may be built for a "10-year flood" or a "100-year flood"
    - Building for the 10-year flood is *cheaper* but the system will flood every 10 years
    - Building for the 100-year flood is *more expensive* but the system would only flood every 100 years
- **Bulk power systems are generally designed to a "1-in-10-year" standard**
  - Empirically, CA's bulk system has met this standard since the CA energy crisis
- **Distribution outages are more frequent**
  - PG&E customers experience 1.3 distribution outages per year on average (see figure)

PG&E Average Number of Outages Per Year

SAIFI = System Average Interruption Frequency Index



https://www.pge.com/en_US/residential/outages/planning-and-preparedness/safety-and-preparedness/grid-reliability/electric-reliability-reports/electric-reliability-reports.page

What does this all mean for electrification?

- **New loads may require new investment**
  - Distribution system capacity investments driven by “connected load” or by local peaks
  - Transmission and generation capacity investments are driven by system peaks
  - Any new loads may need new electric generation resources to serve them
- **New loads should not directly impact reliability as long as utilities (PG&E) and load serving entities (PCE) are planning for them**

What does this all mean for electrification?

- **New loads may require new investment**
  - Distribution system capacity investments driven by “connected load” or by local peaks
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  - Any new loads may need new electric generation resources to serve them
- **New loads should not directly impact reliability as long as utilities (PG&E) and load serving entities (PCE) are planning for them**
- **If higher loads meant worse reliability…**
  - …then larger electric systems would have worse reliability
  - There is no evidence to support this!
- **Instead, higher loads require more resources to serve them…**
  - …but can be served reliability with good planning

Grid impacts vs. customer impacts

- **E3 study for BAAQMD did not evaluate customer impacts**
  - Customer costs were considered in a separate part of the BAAQMD rule amendment materials

<u>E3 perspective on customer costs</u>

- **Customer costs of building electrification will be highly heterogeneous**
- **In addition to equipment and installation costs, some customers may need electric panel and/or service upgrades to support building electrification**
  - These costs are real and may be expensive!
- **However, these upgrades would likely be needed to support other home upgrades such as electric vehicle charging or air conditioning**
  - Thus, these costs should not be attributed solely to building electrification

Questions?

Energy+Environmental Economics

BAAQMD Zero NOx Rules
Electric Grid Infrastructure Impacts

This section describes a study that E3 performed on behalf of the Bay Area Air Quality Management District

Study overview

- **BAAQMD proposed Zero NOx standards for residential and commercial space and water heaters**
  - These rule amendments were adopted in March 2023

- **To support an environmental impact review of the proposed rules, E3 analyzed the potential for electric load increases and electric infrastructure impacts**
  - To estimate conservative (upper-end) impacts, the study assumed that heat pump devices are used to comply with the zero NOx standards
  - If gas-fired technologies are developed that meet the proposed standards and these devices are adopted by customers, the overall impacts on electric infrastructure would be smaller

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Key Finding #1

- **The potential electric grid impacts of the zero NOx standards are highly dependent on the other policies California enacts around building electrification to meet the state's climate goals**
  - In other words, the answer depends on *how much building electrification would occur in the region absent the rule amendments*
- **E3 developed two different reference scenarios ("counterfactuals") in which the rule amendments are not implemented**
  - Low Policy Reference: assumes no major state policy changes in support of building electrification
  - High Policy Reference: assumes major state policy support for building electrification aligned with the California Air Resource Board 2022 Scoping Plan
- **Relative to the Low Policy Reference:**
  - Zero NOx standards would result in incremental load impacts, capacity impacts, and infrastructure needs by 2050.
- **Relative to the High Policy Reference:**
  - Zero NOx standards would result in electric grid impacts occurring *earlier than would otherwise be expected*, but there would be *very small net impacts by 2050*.

Key Finding #2

- **The largest infrastructure impacts would be from increased electric loads and the associated need for zero-carbon generation to meet these loads**
  - Relative to the Low Policy Reference, the zero NOx standards could result in 6.2 terawatt-hours per year of additional electric load by 2050, which represents 2.2% of 2020 statewide electric loads.
  - If this load was met by new utility-scale solar, this would require 2180 MW of new solar capacity, with an estimated direct land impact of 19,500 acres
    - New utility-scale solar would likely be sited in the Central Valley, Inland Empire, and/or Mojave Desert, with little to no utility-scale solar development within the Bay Area

- **While there would also be potential impacts on generation capacity, transmission capacity, and distribution capacity, these capacity-related impacts would be small relative to potential impacts on electric generation**

Summary of potential infrastructure impacts

Table 1: Summary of potential 2050 electric grid impacts of proposed zero NOx standards

	Impact relative to Low Policy Reference	Impact relative to High Policy Reference
Utility-scale solar *to serve electric loads*	2,180 MW new solar by 2050	70 MW new solar by 2050 *+ accelerated build in 2030s & 2040s*
4-hour battery storage *for generation capacity*	680 MW new batteries by 2050	< 10 MW new batteries by 2050 *+ accelerated build in 2030s & 2040s*
Transmission Capacity	460 MW impact by 2050	< 10 MW impact by 2050 *+ accelerated build in 2030s & 2040s*
Distribution Capacity	420 MW impact by 2050	< 10 MW impact by 2050 *+ accelerated build in 2030s & 2040s*

Questions?

Energy+Environmental Economics

Appendix – BAAQMD study

Utility-scale solar

Table 4: Potential utility-scale solar impacts from proposed standards

	2050 impact relative to Low Policy Reference	2050 impact relative to High Policy Reference
Utility-Scale Solar (MW)	2180 MW	70 MW impact by 2050 *Accelerated impact in 2030s, 2040s*
Cumulative Cost (Real $2021 Million)	$1,860	$390 *Due to accelerated build*
Land Use (acres)	19,500	700

Battery storage

Table 5: Potential generation capacity impacts from proposed standards

	2050 impact relative to Low Policy Reference	2050 impact relative to High Policy Reference
Generation Capacity (MW)	410 MW	< 10 MW impact by 2050 *Accelerated impact in 2030s, 2040s*
4-Hour Battery Storage (MW)	680 MW	< 10 MW impact by 2050 *Accelerated impact in 2030s, 2040s*
Cumulative Cost (Real $2021 Million)	$90	$30 *Due to accelerated build*
Land Use (acres)	8	< 0.1

Transmission capacity

Table 6: Potential transmission capacity impacts from proposed standards

	2050 impact relative to Low Policy Reference	2050 impact relative to High Policy Reference
Transmission Capacity (MW)	460 MW	< 1 MW impact by 2050 *Accelerated impact in 2030s, 2040s*
Cumulative Cost (Real $2021 Million)	$100	$25 *Due to accelerated build*
Associated infrastructure	Costs reflect one transformer upgrade **or** 10-20% of a 100-mile transmission project	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*

Distribution capacity

Table 7: Potential distribution capacity impacts from proposed standards

	2050 impact relative to Low Policy Reference	2050 impact relative to High Policy Reference
Distribution Capacity (MW)	420 MW	< 10 MW impact by 2050 *Accelerated impact in 2030s, 2040s*
Cumulative Cost (Real $2021 Million)	$380	$100 *Due to accelerated build*
Estimated Banks (New, by 2050)	6 New Banks	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*
Estimated Feeders (New, by 2050)	45 New Feeders	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*
Estimated Line Sections (New, by 2050)	10 New Line Section	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*
Estimated Banks (Upgrades, by 2050)	31 Bank Upgrades	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*
Estimated Feeders (Upgrades, by 2050)	42 Feeder Upgrades	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*
Estimated Line Sections (Upgrades, by 2050)	35 Line Section Upgrades	Negligible impact by 2050 *Accelerated impact in 2030s, 2040s*

Grid capacity for future electrificaiton

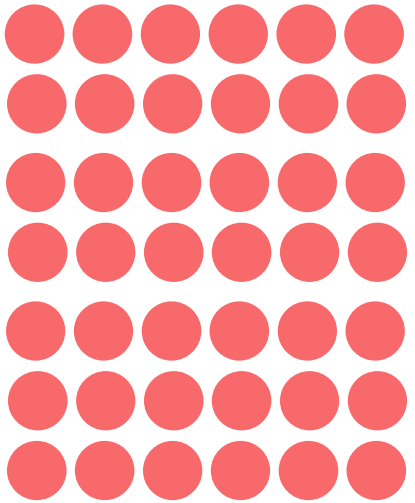
Grid reliability during weather events

Local service line interconnection delays

PSPS

Local capacity issues during peak events

Very Concerned



Moderately Concerned

Drag the dots for ‘very concerned’ or ‘moderately concerned’ to each specific category of electric grid reliability worry that you’re hearing from the public and from electeds.

This will help us shape future RICAPS programming

Additional thoughts- why did you vote the way you did?

Any standout thoughts to share?

Please go to the link in the chat to take your *quick* survey!