DOCKETED	
Docket Number:	24-OIIP-03
Project Title:	Informational Proceeding on Non-Energy Benefits and Social Costs
TN #:	259480
Document Title:	Presentations for Non Energy Impacts OIIP Kick Off Workshop
Description:	Initial Workshop for the Non-Energy Impacts Informational Proceeding October 7, 2024 10:00 a.m. - 4:00 p.m.
Filer:	Xieng Saephan
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	10/8/2024 9:28:02 AM
Docketed Date:	10/8/2024

Initial Workshop for the Non-Energy Impacts Informational Proceeding

California Energy Commission

October 7, 2024

Housekeeping

- Workshop is being conducted in person and remotely via Zoom
  - Workshop is being recorded
- Attendees may participate in the workshop by:
  - Making comments during public comment periods and asking questions during public Q&A periods
    - Questions can be entered in the Q&A section of the Zoom application
  - Submitting written comments due **October 21, 2024**

Workshop Overview

Introduction

- **Keynote:**
  - Background and Context
  - Community Perspectives
- **Presentation:**
  - Overview of Existing Approaches to Assess Non-Energy Impacts (NEIs)
- **Lunch Break**
- **Presentations:**
  - Challenges & Opportunities of Better Integrating NEIs in CEC Analytical Approaches
  - Feasibility & Value of Including NEIs

Opening Comments from the Dais

Keynote: Background and Context on Non-Energy Impacts

Community Voices

Lanare Community Resilience Center

Mariana Alvarenga & Isabel Solorio

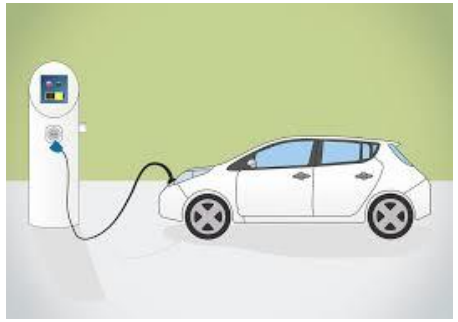
Location Site

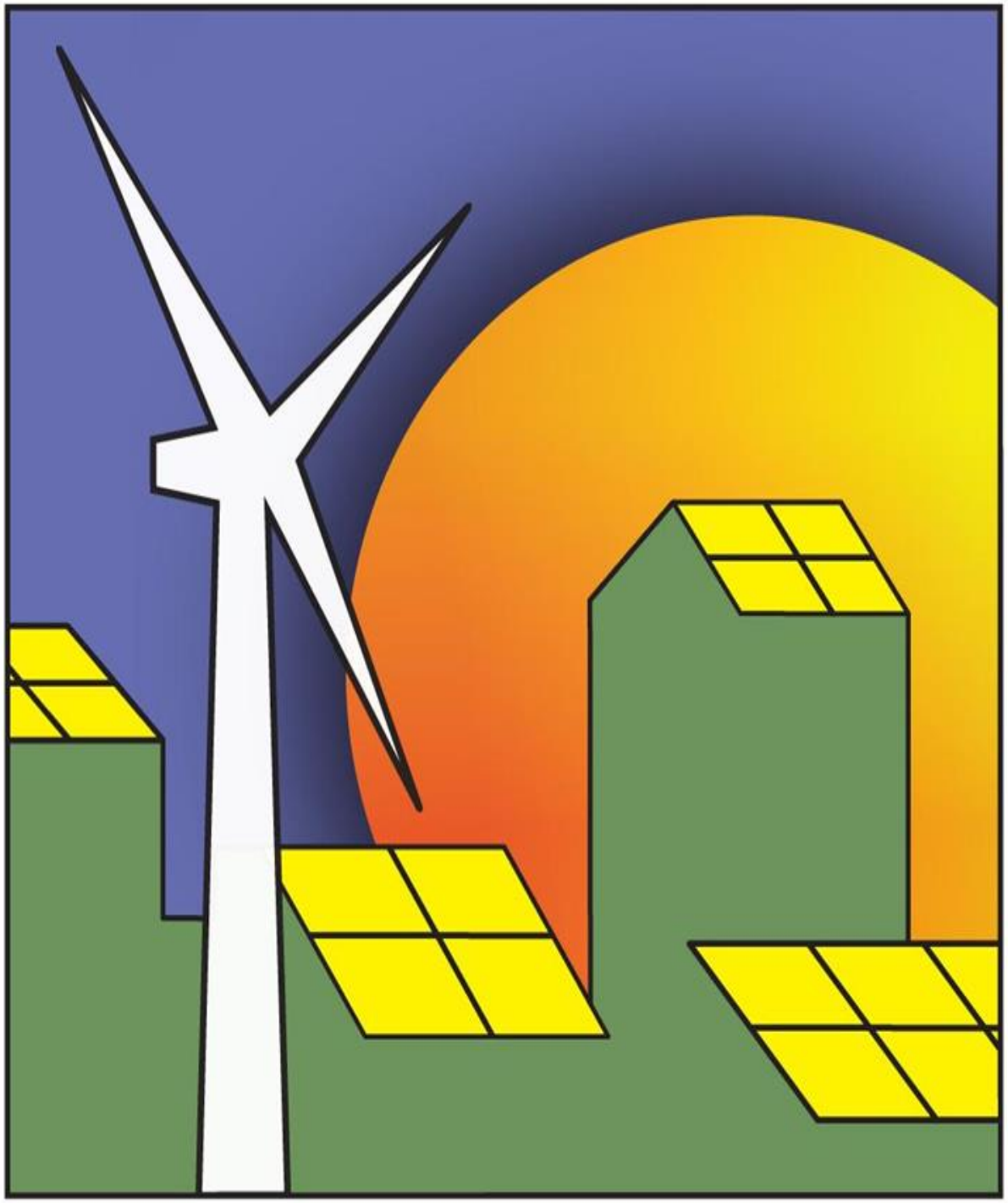
- Lanare in Fresno County
- 10-acre property operated and owned by the Lanare Community Services District
- The site is currently home to a small community center, park, small office, and a parking lot

Local and State Efforts

- Fresno County American Rescue Plan Act (ARPA) Funds
  - $1.6M for community center improvements
- California Department of Food and Agriculture - Fairground and Resilience Center Program
  - Not awarded
  - Requested $6.5 million
- Strategic Growth Council Community Resilience Center Program
  - Not awarded
  - Requested $8.1 million
- State Budget Request
  - Not awarded
  - At least $6.5 million (Fiscal Year 2024-2025)

Community Advocacy + Vision





LOCAL

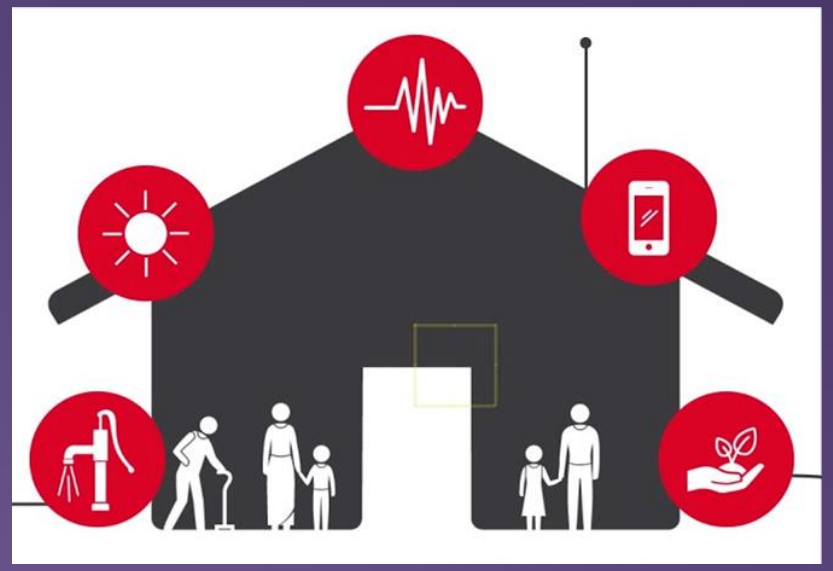
CLEAN ENERGY

ALLIANCE

We are living in a multitude of crises…

LOCAL CLEAN ENERGY ALLIANCE

Resilience Hubs - Non-Energy Benefits



A physical or mobile space that provides resources, risk mitigation and response before, during, and after emergencies.

Inclusion of non-energy benefits addresses daily disproportionate exposure and vulnerability to climate, natural disaster, and other crisis impacts and increase communities' capacity to adapt and thrive.

LOCAL CLEAN ENERGY ALLIANCE


Water storage
Childcare and Education Resources
Career and Employment Guidance
Community Garden
Basic Medical Care
Mental health Resources
Communications Hub
Clean Transportation Resources
Solar Power
Food Access
Creative Art Space

Microgrid

A local source of electricity supply powered by clean solar energy that powers:

- local buildings like community buildings
- street lights
- refrigerators for perishable food or medicines.

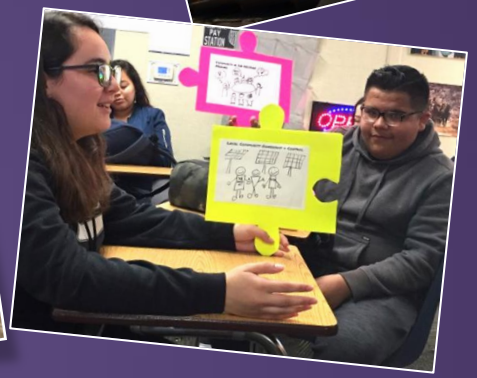
Battery Storage

Rooftop Solar

LOCAL CLEAN ENERGY ALLIANCE

Community Benefits for Community Resilience

- Clean energy jobs
- Affordability
- Local investments
- Local wealth
- Health & Safety
- Community Ownership & Control
- Reduce pollution



LOCAL CLEAN ENERGY ALLIANCE

Local Investment in Community Resilience!

Ava Community Energy

LOCAL CLEAN ENERGY ALLIANCE

Community Solutions

- ★ Direct Action
- ★ People Powered
- ★ Funded by the People
- ★ Need for more resources & funding

LOCAL CLEAN ENERGY ALLIANCE

Community Resilience

- ★ Daily Resources
- ★ Disaster
- ★ Recovery

LOCAL CLEAN ENERGY ALLIANCE

Local Investment

- ★ Builds Circular Wealth
- ★ Powers Communities
  True Local Clean Energy
- ★ Reduces Pollution

LOCAL CLEAN ENERGY ALLIANCE

California Energy Commission,
We need you to adopt non-energy benefits as part of the state's Community Benefits & Resilience program.

Invest in Resilience
before Disaster!

LOCAL CLEAN ENERGY ALLIANCE

Support & Mobilize Community Power for Community Solutions!

Clean Power to the People

Jessica Guadalupe Tovar
Executive Director of
Local Clean Energy Alliance

jessica@localcleanenergy.org415-766-7766

#CleanPowertothePeople

LOCAL CLEAN ENERGY ALLIANCE

Solar On Multifamily Affordable Housing Program (SOMAH)

Tyler Valdes
Energy Justice Manager

SOMAH

CALIFORNIA ENVIRONMENTAL JUSTICE ALLIANCE

Equitable Solar

CEJA co-sponsored the bill that created SOMAH, AB 693 (Eggman), and currently supports implementation.

- **Ensure equitable access**
  to clean energy for EJ communities
- **Reduce the energy burden**
  for low-income renters
- **Boost local economic development**
  in underserved communities
- **Reduce our state's reliance**
  on fossil fuel energy resources

Environmental justice advocates supporting AB 693 (Eggman) to advance equitable solar in 2015.

CALIFORNIA ENVIRONMENTAL JUSTICE ALLIANCE

SOMAH Overview

Provides incentives for installing solar panels systems that benefits low-income tenants and property owners.

- Funded up to $100M annually via GHG auction proceeds (cap-and-trade)
  - ***Not rate-payer funded***
- Goal to install 300 MW by 2032
- 3,500+ properties with nearly 255,000 units qualify for SOMAH incentives

CALIFORNIA ENVIRONMENTAL JUSTICE ALLIANCE

Community Partnerships

Community-based organizations support outreach, education, and marketing for the program.

- Facilitate tenant education workshops
- Co-marketing with local governments
- Outreach to property owners (e.g. direct email, visits, housing conferences)
- Connect community members to solar job training opportunities
- Promote the value of community-scale clean energy solutions

CALIFORNIA ENVIRONMENTAL JUSTICE ALLIANCE

Program Impacts

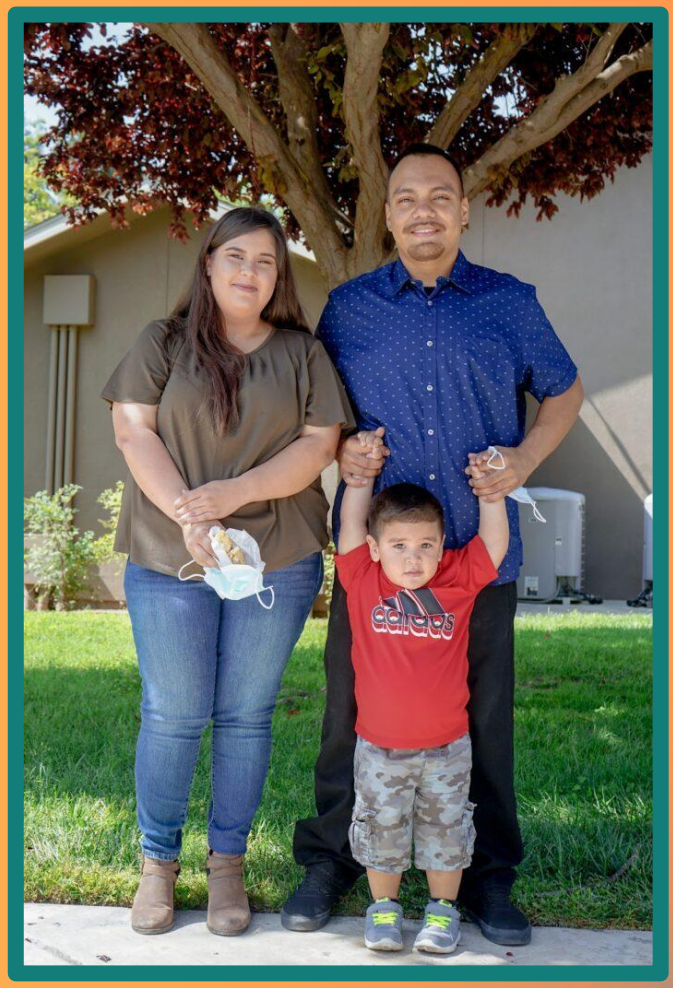
Projects

565 solar projects serving **41,000+** tenant units.
Nearly a **third** of projects are located in DACs.

Uptick in active applications in 2024:
Q1: 530 ➡ Q2: 565 ➡ Q3: 629 ➡ Q4: ?

Bill savings

Tenants are slated to receive **~84%** of solar credits resulting in average savings of **$21-39** per month.



"The money savings makes us most excited, being able to save $50 a month will really help out. We'll be able to go on a family vacation and buy clothes."

~Maria Garcia, celebrating her apartment getting solar via SOMAH with her family

CALIFORNIA ENVIRONMENTAL JUSTICE ALLIANCE

Program Impacts

Workforce development

1,100+ paid solar job training opportunities supported.

Clean air + climate protection

In first 3 years, completed/active projects removing **20,835 metric tons of CO2** per year. Equivalent to removing ~5,000 gas vehicles from road per year.

Tribal access

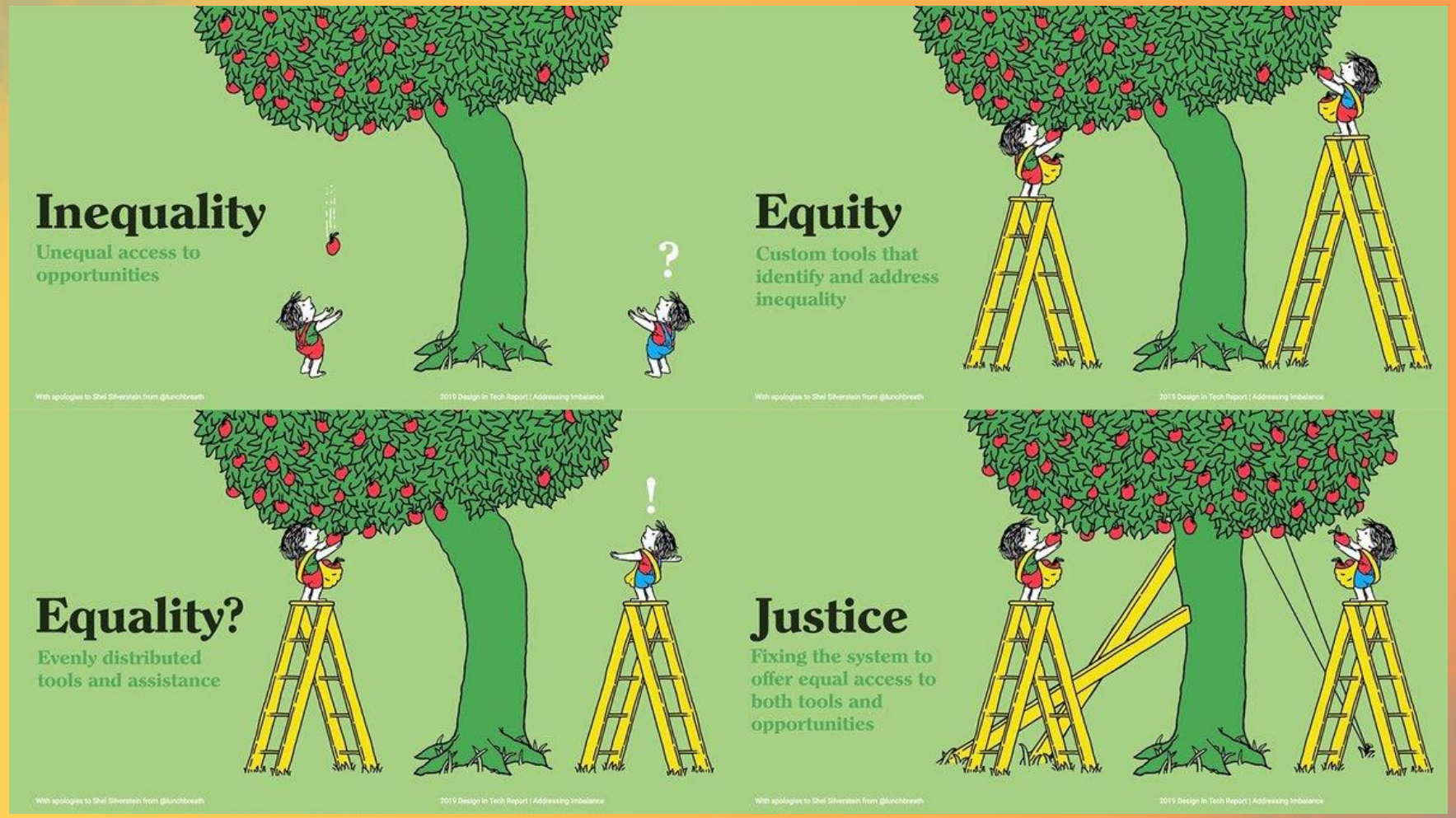
In 2023, SOMAH celebrated its **first project on a tribal property** with the Bishop Paiute Tribe. SOMAH is working to expand solar access for Tribes.

Oscar, a SOMAH job trainee, supports the solar installation at Loma Sierra Apartments.

Ribbon cutting celebration with the Bishop Paiute Tribe.

CALIFORNIA ENVIRONMENTAL JUSTICE ALLIANCE

Equality, Equity, Justice



CALIFORNIA ENVIRONMENTAL JUSTICE ALLIANCE

CALIFORNIA ENVIRONMENTAL JUSTICE ALLIANCE

tinyurl.com/stmarygardenSOMAH (0:00-2:47)

Public Comments

Zoom:

- Use the “raise hand” feature.

Telephone:

- Dial *9 to raise your hand.
- Dial *6 to mute/unmute your phone line. You may also use the mute feature on your phone.

Zoom/phone participants, when called upon:

- Your microphone will be opened.
- Unmute your line.
- State and spell your name for the record, and then begin speaking.

Limited to one representative per organization.

Three-Minute Timer

California Energy Commission

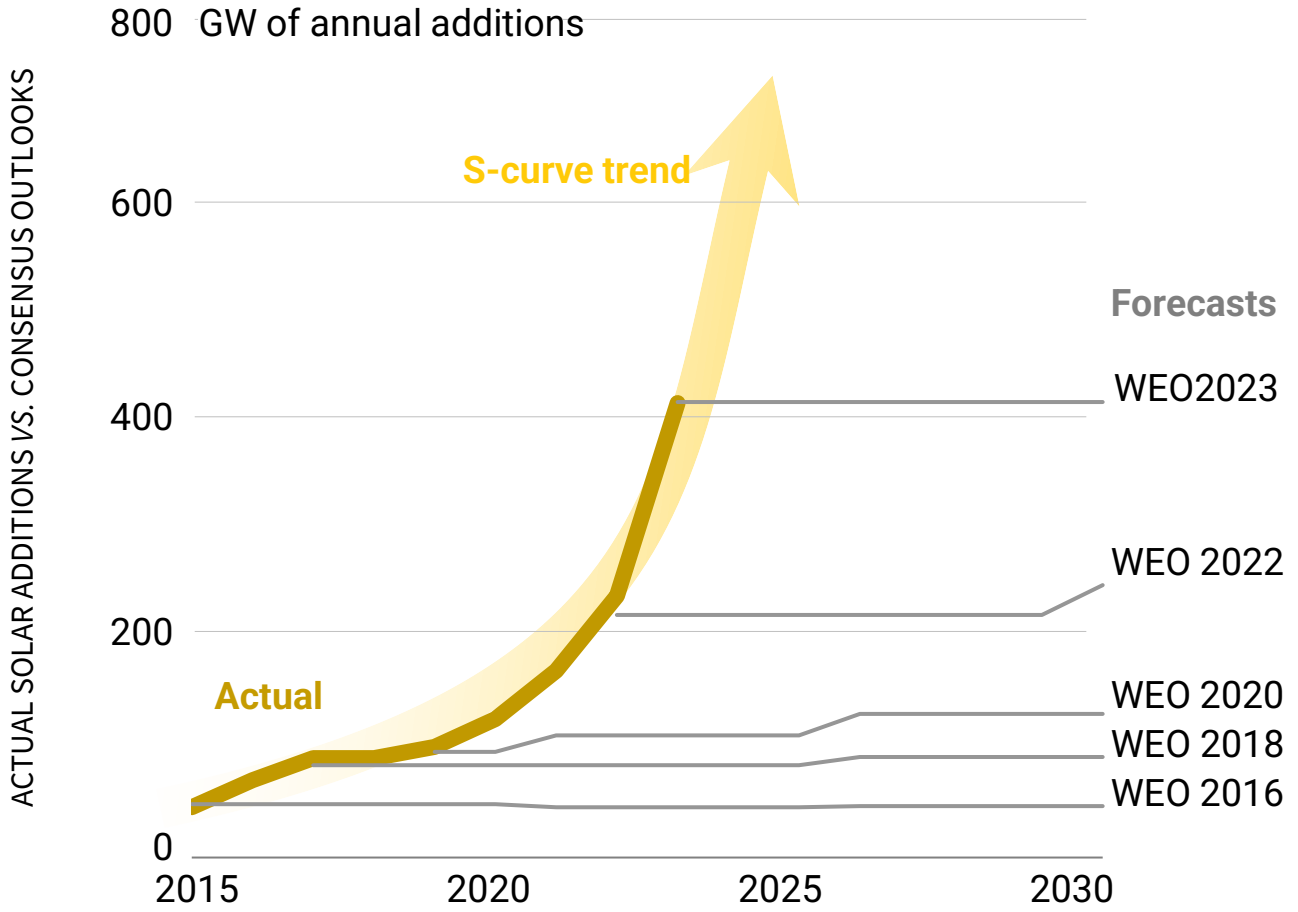
Non-energy Impacts (NEI) Workshop

October 7, 2024

Carmelita Miller, Energy Equity and Justice Director

RMI is an independent, nonprofit organization of experts accelerating the clean energy transition. We are transforming the global energy system to secure a clean, prosperous, zero-carbon future for all.

The transition is happening faster than governments and experts predicted.



Source: IEA STEPS, BNEF actuals

And we want it done with equity and justice

RMI's Equity and Justice Principles

- **Systemic change.** An equitable energy transition cannot be achieved through incrementalism; it requires bold changes in how we reshape markets, guide policy, and shift mindsets.
- **Shared power.** We support the leadership and voices of communities, constituencies, and individuals on the frontlines who are directly affected by climate and energy policies.
- **Self-transformation.** We work adamantly to continuously improve our understanding and application of diversity, equity, and inclusion within our own organization.

Our Commitments

- Based on our strengths, **RMI will define equity priorities** for our work that align with our solutions focus and values.
- We will be fast, economical and efficient, but also just, inclusive, and built to last. To do this, **we will seek to work with relevant stakeholders to advance equitable climate solutions.**
- We will work to understand and address potential harms of proposed interventions and **increasingly focus our solutions on benefits for marginalized groups**.

RMI's benefit / harm analysis for our portfolio of programs align with the U.S. Department of Energy's Justice40 framework

Energy burden
Decrease in energy costs due to technology adoption in frontline communities

Cumulative health Impacts
Air pollutants, remediation impacts on surface water, groundwater, and soil, and legacy contaminated waste in frontline communities

Environmental justice
Inclusion or exclusion of organizations / residents of frontline communities in decision making and stakeholder events

Resilience and adaptation
Availability of climate resilience / adaptation infrastructure and strategies to frontline communities

Parity in clean energy technology access & adoption
Clean energy resources (e.g., solar, BESS) available to and adopted by frontline communities

Access to low-cost capital for clean energy
Low-cost loans for frontline communities to acquire clean energy resources

Clean energy jobs and job training for individuals
Ensuring frontline community members have access to and participation in job training programs and job creation/hiring

Clean energy enterprise creation and contracting (MBE/DBE*)
Awarding contracts to businesses that are principally owned by women, minorities, disabled veterans, and/or LGBT persons

Like RMI's efforts, a statewide NEI analysis will deepen our understanding of our approach to an equitable and just energy system planning.

RMI's Objectives

- Understand the impacts **frontline communities** to **magnify benefits and mitigate harms.**
- Ascertain the breadth and depth of RMI's **community engagement** in FY25 to further develop a OneRMI approach to engaging community-based organizations meaningfully.
- Derive **portfolio-level insights** and program/outcome-level tactics that will inform RMI's EEJ Strategy in FY25 and support Influence and Development efforts.

Why is this important to RMI?

- We recognize that our work creates both benefits and harms to frontline communities, and we are committed to **addressing potential harms**, while increasingly **focusing our solutions on benefits**.
- We cannot achieve our mission without **understanding our impact** on frontline communities and **collaborating** with them to implement the solutions required for the energy transition.
- RMI's work is multi-faceted and far-reaching, but we need a **shared EEJ approach** that's flexible enough to adapt to the unique contexts of individual projects and the needs of local communities.

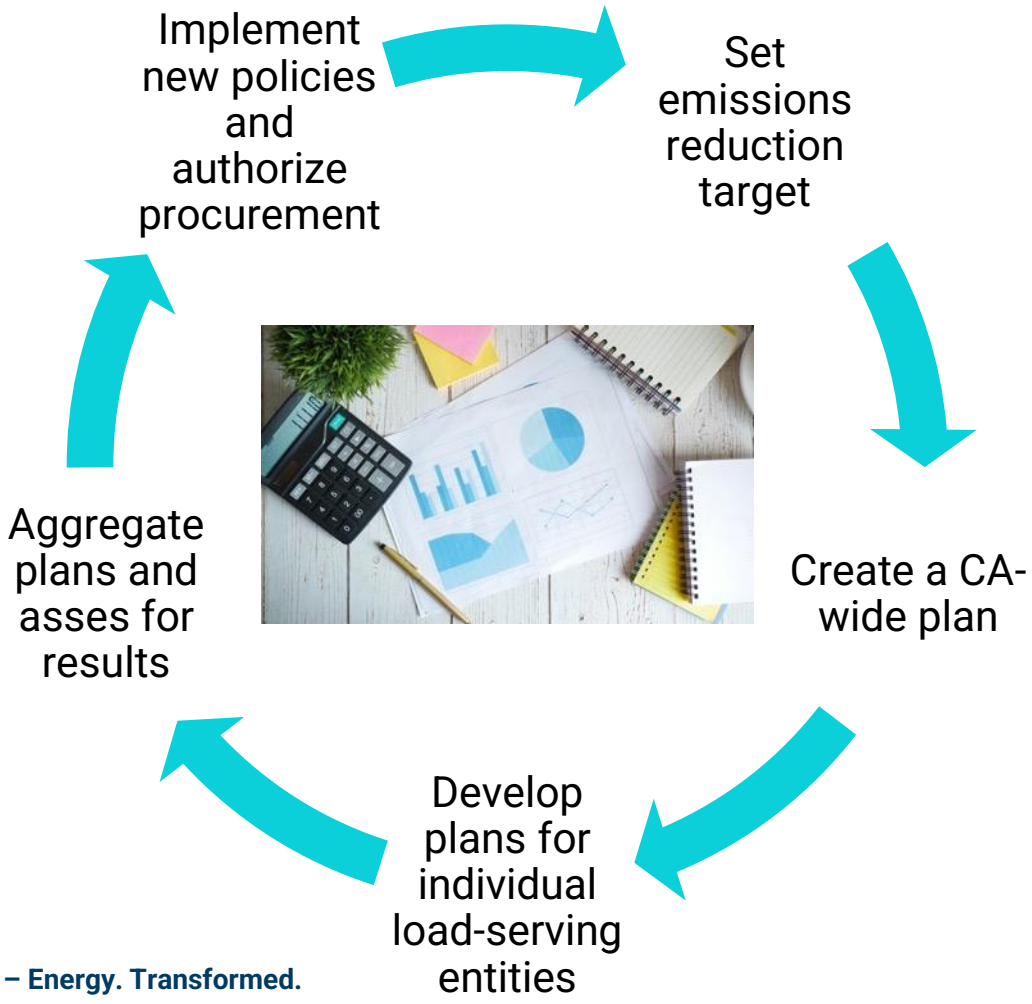
Background for CA's Integrated Resource Planning

Senate Bill (SB) 350, passed in 2015 requires the California Public Utilities Commission (CPUC) to establish an integrated resource planning process to ensure that load serving entities (LSEs) in the state minimize their GHG emissions in disadvantaged communities and meet California's clean energy goals in a reliable and cost-effective manner.

Governor Brown signed Senate Bill (SB)100 in 2018 that accelerates the RPS target to 50 percent by 2026 and increases the RPS target to 60 percent by 2030. SB 100 also creates a separate state policy that requires 100 percent of all retail sales of electricity to serve end-use customers and 100 percent of electricity procured to serve state agencies to come from RPS eligible or zero carbon resources by 2045.

In 2022, Governor Newsom signed SB 1020 and AB 1279 into law to advance the state's trajectory to 100 percent clean-electricity retail sales by 2045. SB 1020 establishes interim SB 100 targets by creating clean electricity targets of 90 percent by 2035 and 95 percent by 2040. AB 1279 codifies the 2045 statewide carbon neutrality goal and establishes an 85 percent emissions reduction target as part of that goal. Both SB 1020 and AB 1279 were signed midway through this planning cycle, and therefore are not reflected in the filing requirements prescribed by the CPUC.

CA is a complex landscape of energy resource planning



The objective of integrated resource planning is to reduce the cost of achieving GHG reductions and other policy goals identifying solutions to affordability, reliability, cost, and other concerns.

CA agencies share the goal of being on track reduce economy-wide GHG emissions 40% from 1990 levels by 2030, and to explore how achievement of SB 100 2045 goals could inform IRP resource planning in the 2020 to 2030 timeframe.

We have gaps in our planning that can address equity and justice concerns:

Stakeholder Input

- Initial stakeholder engagement planning that provides ample time, opportunity, and resources to environmental justice community representatives

Applicable Scenarios

- Hypotheses that align with the principles and values of environmental equity and justice

Optimization

- Comprehensive plan that evaluates all aspects of the energy system, including NEI elements (vs putting NEI assessment in a silo)

Modeling

- Understanding the risks to environmental justice residents and communities associated with the resulting plans

We currently have tools to understand:	But not answer questions like:
What energy infrastructure will meet our energy demand and achieve our emissions reductions goals with least-cost.	Who should own the energy infrastructure and where is it located? Are the state's equity and justice policies explicitly represented?
How much the energy transition will cost their state.	Who should pay for the infrastructure? Who benefits or owns?
Where to prioritize efforts to meet emissions targets	How do we prioritize outcomes for environmental justice communities?

Recommended considerations

- **Improving systems planning to incorporate equity concerns**
    - Design processes that thoughtfully solicit meaningful community input early on during visioning and evaluation stages.
    - Gather data for equity to ensure the clean energy transition improves the lives of our most disadvantaged and energy burdened communities.
    - Use a suite of analysis tools at different levels of scale to make results more community relevant.
    - Recognize analyses tools are limited in redefining the world to be modeled, they are not the tools for radically re-envisioning the status quo.
- **NEIs are valuable.** To make real progress on the intangible task of reducing our GHG emissions, we should rely on measurable data. NEIs have measurable value.
- **NEIs can advance coordination between various state actions on prioritizing environmental justice communities.**
    - A siloed approach to prioritizing the needs of DACs will fail to meet the goals of landmark policies like SB 350 and SB 100 to reduce emission and increase the energy benefits to DAC residents.

Thank you!

Questions from the Dais

Questions from the Public

Lunch Break – Return @ 1:15 PM

October 7, 2024

Integrating Non-Energy Impacts into Least Cost Optimization

CEC Workshop

PSE Bringing science to energy policy

Agenda

Introduction

Non-Energy Impacts (NEI) Framework

NEI Analysis Within Existing Grid Decision Support Tools

NEI Analysis Potential/Path with Improved Tools

Questions & Discussion

About PSE

PSE Healthy Energy is a nonprofit energy science and policy research institute. Our mission is to generate science-based energy and climate solutions that protect public health and the environment.

Sofia Bisogno is an Air Quality Analyst with experience in air quality and sustainability, emissions inventories, health risk assessments, air dispersion modeling, and life cycle assessments.

Patrick Murphy, PhD, is a senior scientist at PSE Healthy Energy, where he researches clean energy transitions with a focus on resilience and energy equity.

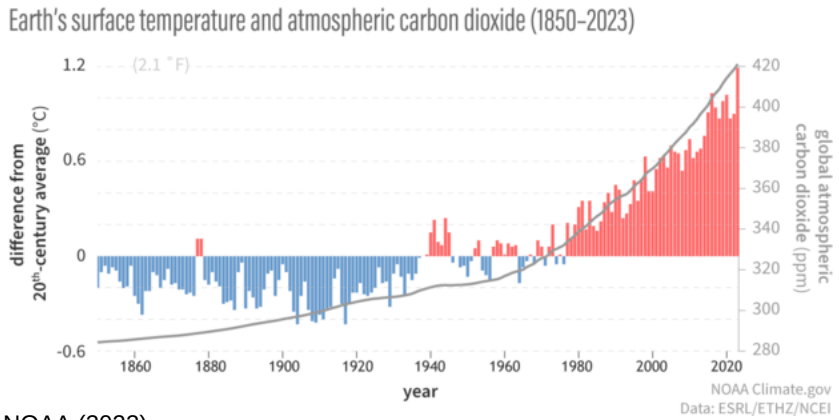
NEI Framework

Background & Outline

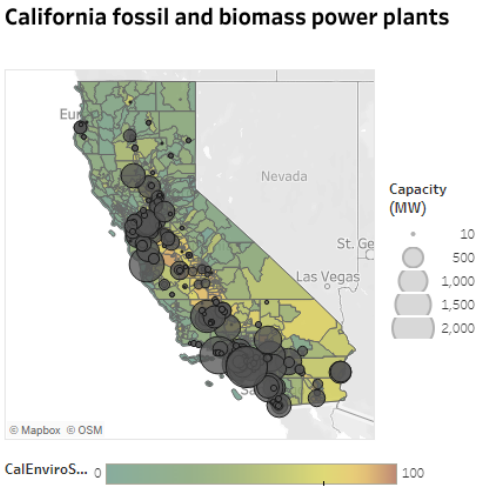
GHG as a the first NEI: We've Done This Before

- From decades of not including GHG in least cost analysis, to now having multiple methods (e.g. Avoided Cost Calculator, Social Cost of Carbon, legislative targets, and others).
- Additional NEI metrics can–and must–be incorporated into least-cost optimization, else models risk quantifying only a fraction of the actual costs.

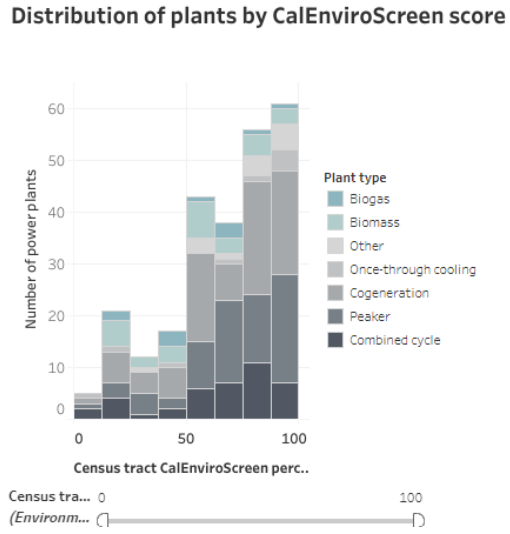
- NEI metrics face some challenges that GHG metrics did not:
  - GHG impacts don't have to be localized; global warming is global.
  - NEIs impacts are local.
  - Equity impacts demand finer scale analysis.



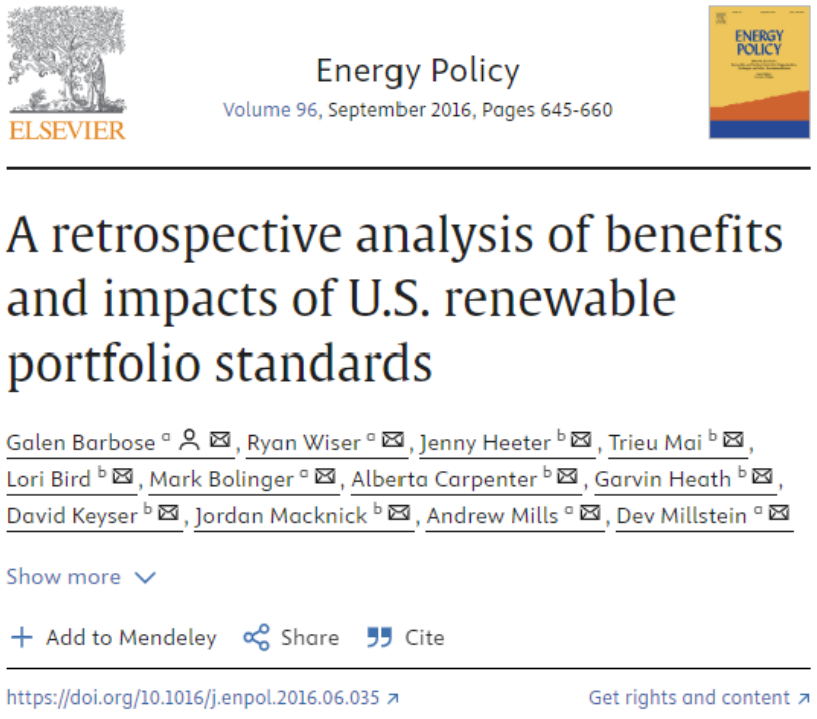
NOAA (2023)



PSE (2018)



Broader Impacts of Decarbonization



ELSEVIER

Energy Policy

Volume 96, September 2016, Pages 645-660

A retrospective analysis of benefits and impacts of U.S. renewable portfolio standards

Galen Barbose [a], Ryan Wiser [a], Jenny Heeter [b], Trieu Mai [b], Lori Bird [b], Mark Bolinger [a], Alberta Carpenter [b], Garvin Heath [b], David Keyser [b], Jordan Macknick [b], Andrew Mills [a], Dev Millstein [a]

Show more

Add to Mendeley Share Cite

https://doi.org/10.1016/j.enpol.2016.06.035 Get rights and content

Impacts of RPS in 2013:

- **CO_2-equivalent emissions cut by 59 million metric tons (global benefits ~ $2.2 Billion)**
- **Reduced air pollution (health and environmental benefits ~ $5.2 Billion)**
- **Reduced water withdrawals (830 Billion gal) and consumption (27 Billion gal)**

Are more savings possible with more inclusive optimization?

Barbose, et al. (2016)

Just and Equitable Energy Transition

Energy Justice and Equity: Applying a Critical Perspective to the Electrical Power Grid for a More Just Transition in the United States

Publisher: IEEE | Cite This | PDF

Benjamin K. Sovacool ; Sanya Carley ; Lynne Kiesling ; Miguel Heleno All Authors

Pathways:

- Increase affordability
- Achieve equitable reliability and resilience
- Reduce environmental burdens
- Promote participation in the decision-making process

Where/how is equity captured?

Sovacool et al. (2024)

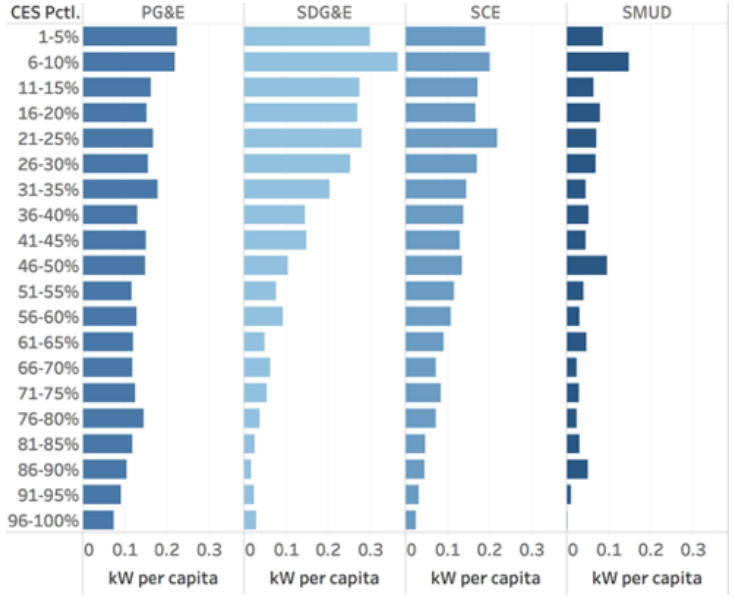
ELSEVIER

Energy Policy
Volume 134, November 2019, 110935

Distributed solar and environmental justice: Exploring the demographic and socio-economic trends of residential PV adoption in California

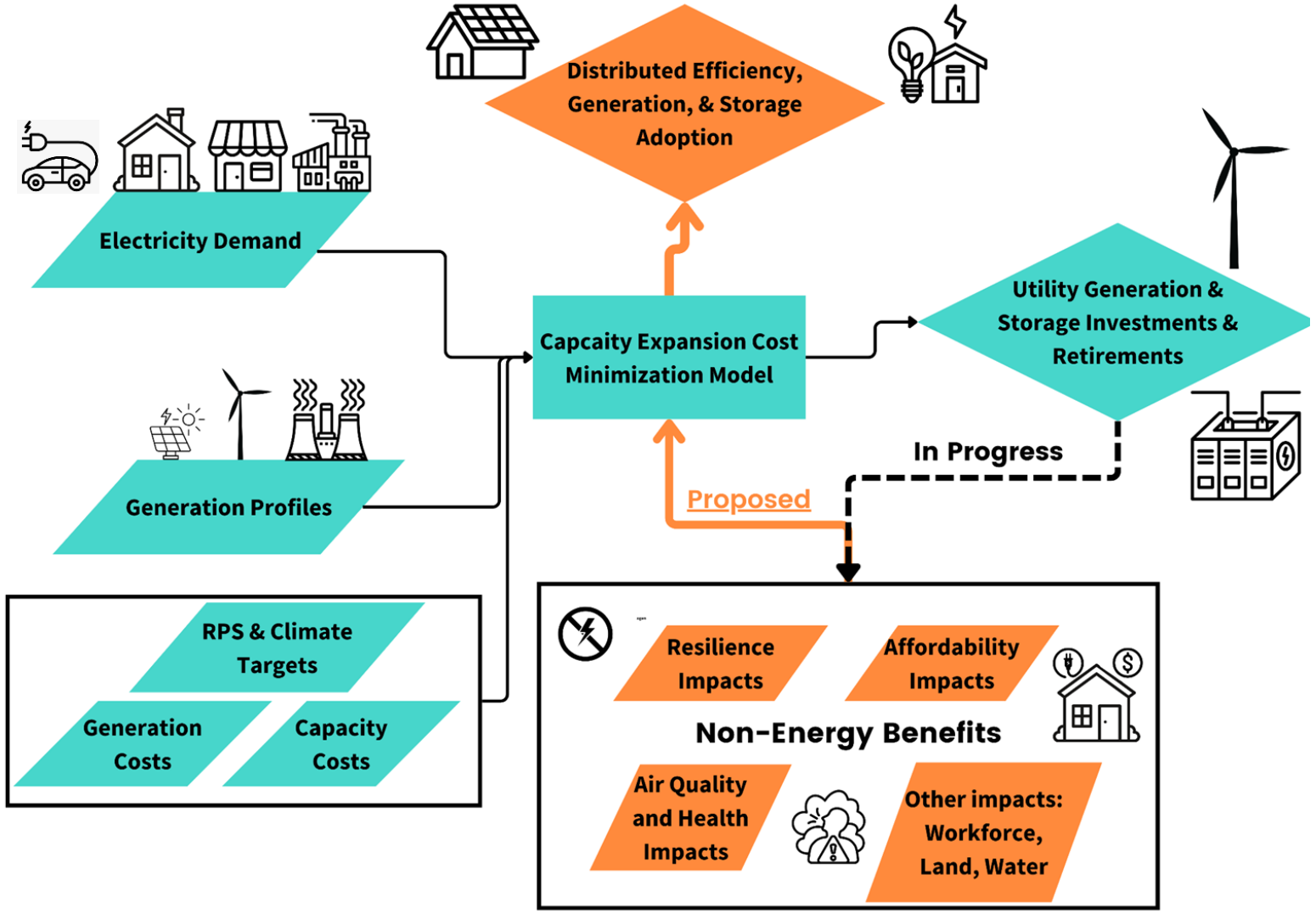
Boris R. Lukanov, Elena M. Krieger

Solar Adoption by CES Percentile



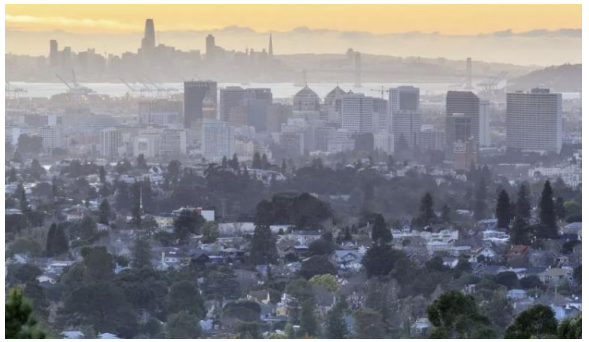
Lukanov & Krieger (2019)

Example Decision-Making Framework



Metric Breakdown – Not Comprehensive

Factor	Sub-Factor
Land Use	Siting of Energy Resources
	Alternative Productive Uses
	Real Estate Impacts & Displacement
Public Health and Air Quality	Electricity Generation - Outdoor Air
	Transportation - Outdoor Air
	End Use - Outdoor Air
	Multiple Sources - Indoor Air
Water Supply and Quality	Water Supply - Consumption
	Water Supply - Withdrawal
	Water Supply - Quality
Economics	Energy Affordability - Household
	Economics and Jobs
	Workforce Development
Resilience	Affordability & Availability
	Remaining Costs/Impacts
Cross-Cutting Metrics	Equity
	Ecological Impacts
Safety and Risk	Wildfires
	Fires and Explosions
	Gas Leaks (H2, CO2, natural gas, ...)
Technology Dev	Hydrogen
	Direct Air Capture

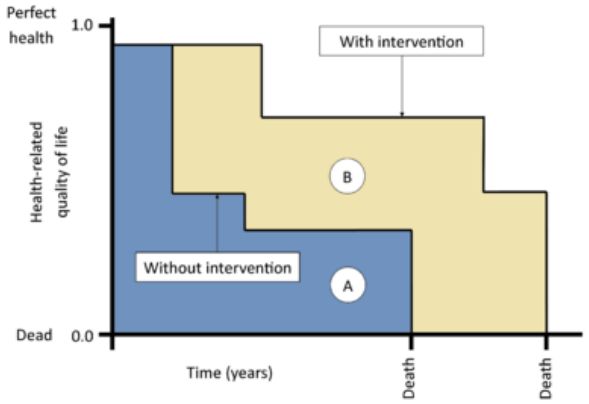


NEI Analysis Today

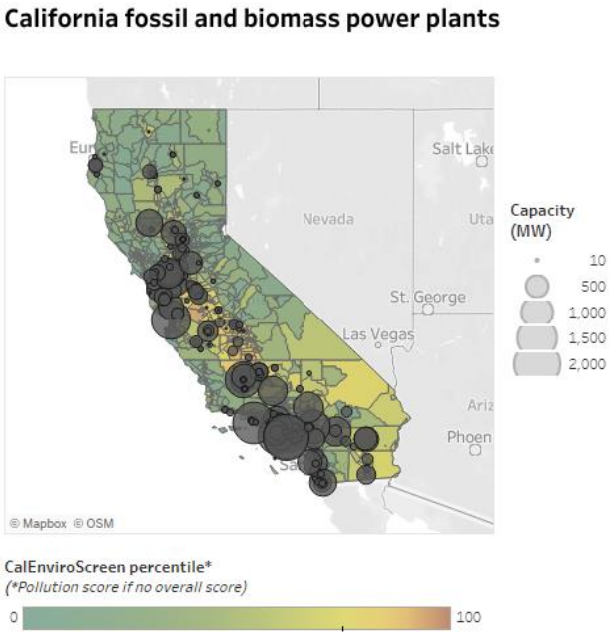
Challenges & Adaptive Methods

Key Challenges

- Data availability, scale, and precision
  - Geographic
  - Demographic
  - Equity impacts
- Addressing quantifiable and non-quantifiable impacts
  - Conversion to dollar value (e.g. healthcare costs vs. quality of life impacts)
  - Incorporating non-dollar-value metrics
- Feedback into optimizations
  - Objective functions - dollar quantifiable costs
  - Constraints - other impacts



https://www.physio-pedia.com/Quality-Adjusted_Life_Year



https://www.psehealthyenergy.org/introducing-the-california-power-map/

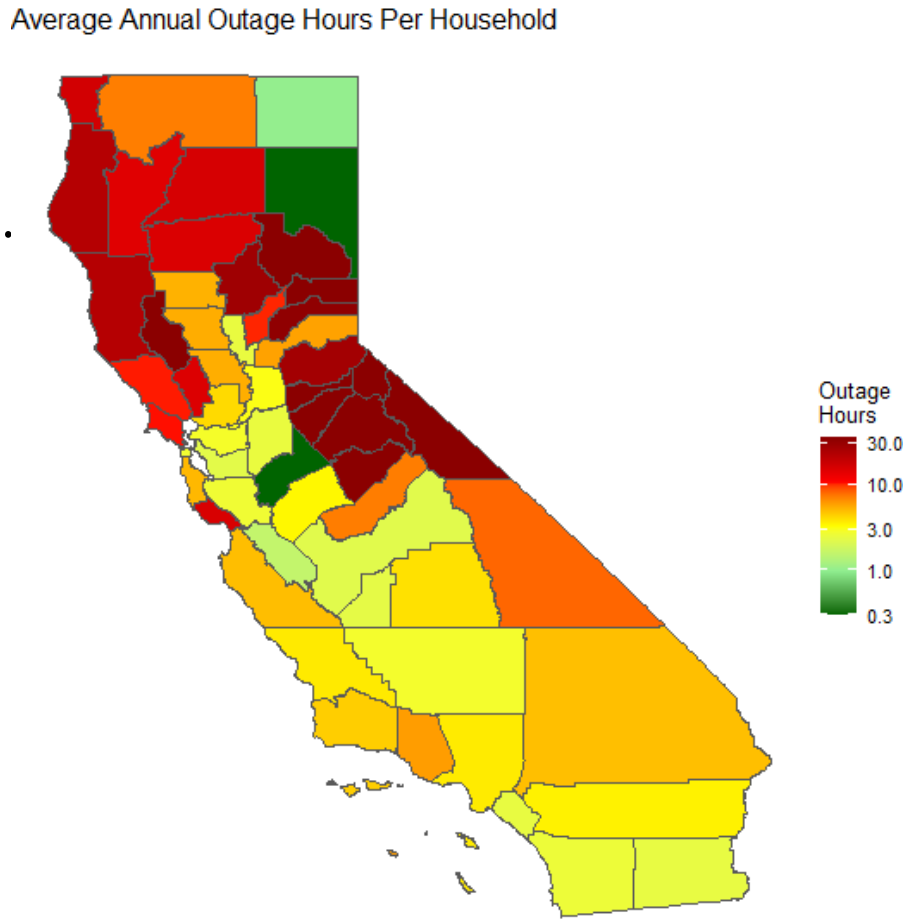
Example of geographic scale of modeling: Map of REGEN resource areas

Key Challenges: Examples by NEI Factor

Factor	Sub-Factor	Available Resolution	Improved Resolution	Integration Challenge
Land Use	Siting of Energy Resources	Key census tracts	TBD	REGEN region
	Alternative Productive Uses	TBD		
	Real Estate Impacts & Displacement	TBD		
Public Health and Air Quality	Electricity Generation - Outdoor Air	County via COBRA	Census tract	REGEN region
	Transportation - Outdoor Air			
	End Use - Outdoor Air			
	Multiple Sources - Indoor Air			
Water Supply and Quality	Water Supply - Consumption	Hydrologic region	TBD	REGEN region
	Water Supply - Withdrawal	Hydrologic region	TBD	
	Water Supply - Quality	TBD	Census tract	
Economics	Energy Affordability - Household	Synthetic household	NA	REGEN region
	Economics and Jobs	County	Census tract	
	Workforce Development	County	Census tract	
Resilience	Affordability & Availability	County - synth. hsld	Synth. hsld	REGEN region
	Remaining Costs/Impacts	Synth. hsld	Synth. hsld	Assumptions
Cross-Cutting Metrics	Equity	Census tract	Sub populations	REGEN region
	Ecological Impacts	TBD	Census tract	
Safety and Risk	Wildfires	HFTD		
	Fires and Explosions	Ongoing		
	Gas Leaks (H2, CO2, natural gas, ...)	Ongoing		
Technology Dev	Hydrogen			
	Direct Air Capture			

Example: Resilience

- County-level annual outage totals (transmission + distribution) range from less than 1 to more than 30 hours. (Highest outage hours in forested mountain ranges).
- Quantification challenges:
  - What do outages cost households and businesses?
  - What measures can mitigate these costs? How are measures distributed now and in the future?
  - What are the implications (outage frequency, duration, and impact) of future energy scenarios on resilience and equitable resilience?



Data from EAGLE-I (Brelsford et al., 2023)

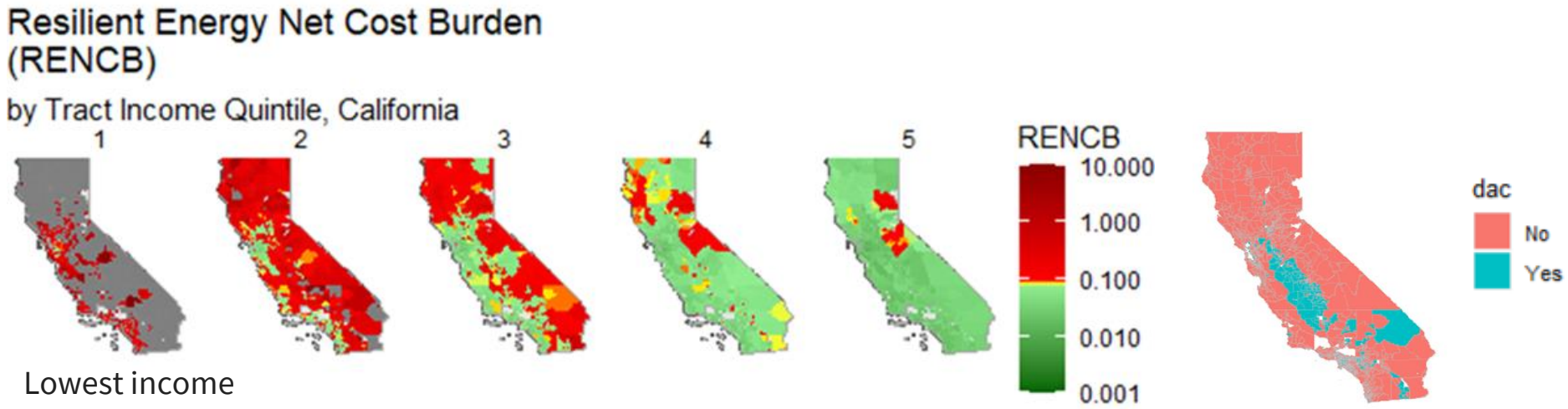
Local Impacts of County-Level Outage Data

Outage impact and resilience analysis methods are improving:

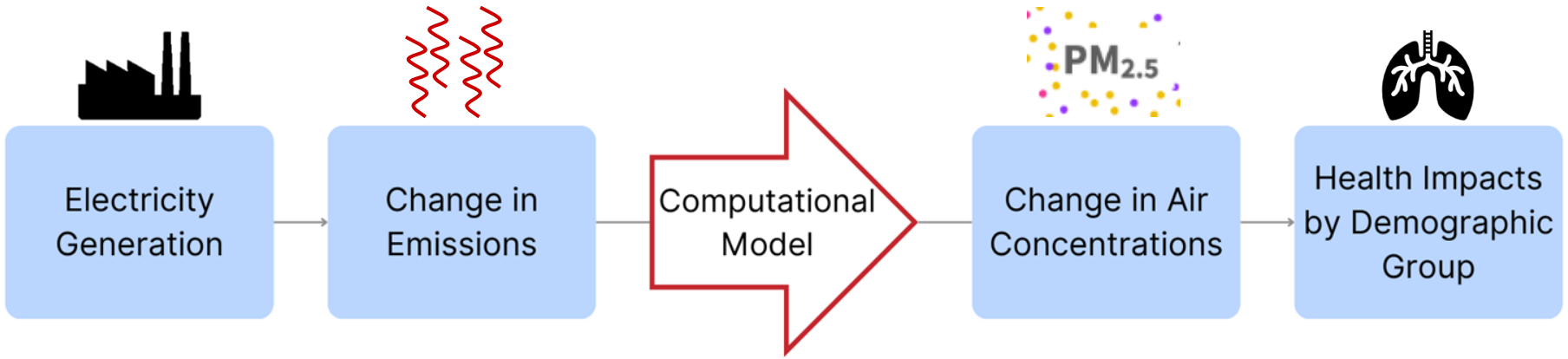
- Interruption Cost Estimate (LBL),
- CEC “Valuation of Investments in Electricity Sector Resilience” (LBL)
- CPUC Equitable Resilience Study (E3, Lumen, etc.)
- Gorman (2022) “The quest to quantify the value of lost load” (Berkeley)

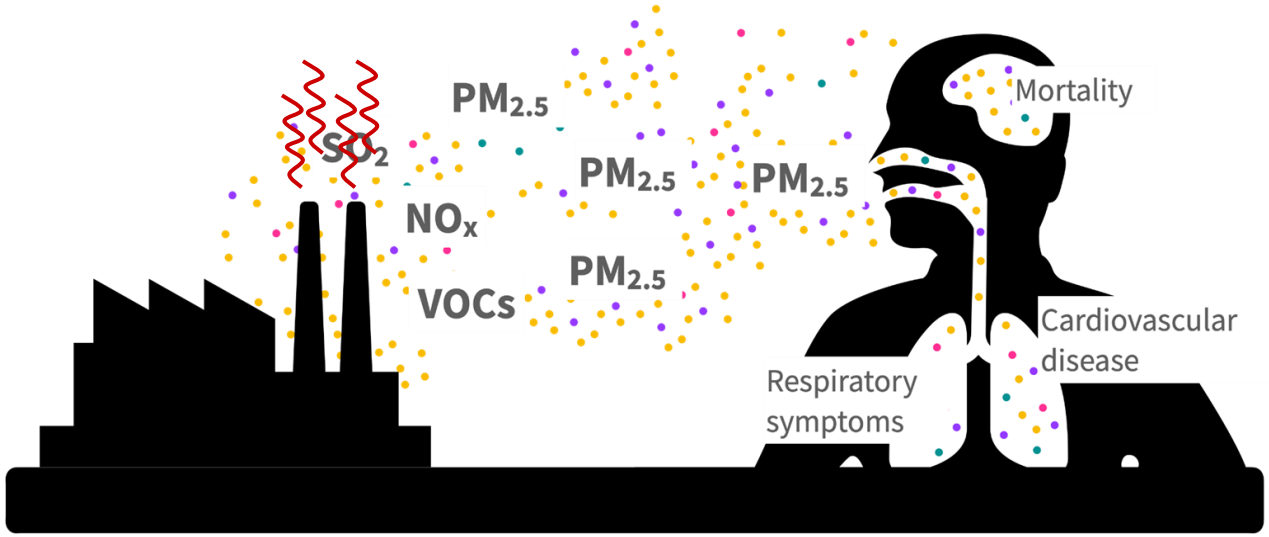
Maps below adapt CPUC’s Energy Affordability Ratio to account for outage costs:
(energy cost + outage costs)
(income - housing - utilities - other essentials)

- DAC is a poor proxy for resilience impacts
- Must include other vulnerabilities (low income, medical needs, climate vulnerabilities)
- Energy & housing insecurity are not resilient



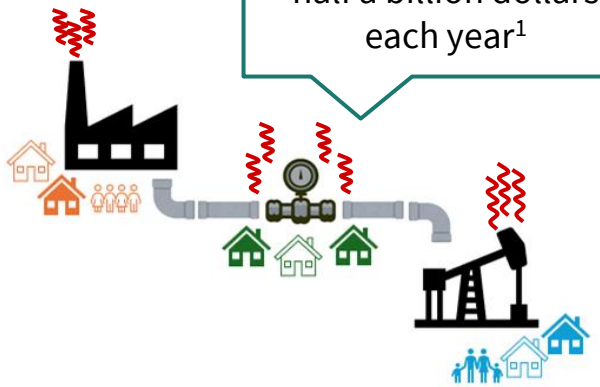
We Use Computer Models to Evaluate the Air Quality and Health Impacts from the Power Sector





Air Quality and Health Impacts Exist Across Energy Systems and Beyond

Gas leaks cost fire departments nearly half a billion dollars each year[1]



Gas stoves can create benzene concentrations comparable to secondhand smoke[2]

Decommissioning Oil and Gas Infrastructure

Increased reliance on non-oil and gas energy generation → decreased emissions from oil and gas drilling, processing, transmission, and distribution

Electric Vehicle Adoption

Increased EV adoption → decreased diesel and gasoline vehicle emissions near major roadways

Building Electrification

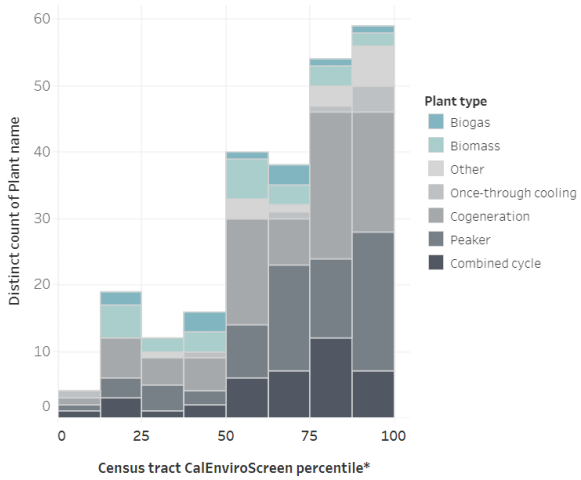
Increased building electrification → decreased natural gas leaks within homes and near distribution pipelines

[1] Brodsky, C. N., et al. (2024). The burden of natural gas leaks on public sector emergency response in the United States. Energy Policy, 192, 114214.
[2] Czolowski, E. D., et al. (2017). Toward Consistent Methodology to Quantify Populations in Proximity to Oil and Gas Development: A National Spatial Analysis and Review. *Environmental Health Perspectives, 125*(8).

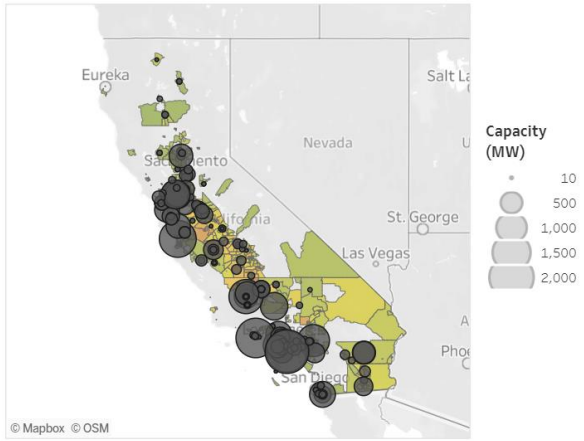
Impacts Are Not Distributed Equally

Current

Distribution of plants by CalEnviroScreen percentile



California fossil and biomass power plants

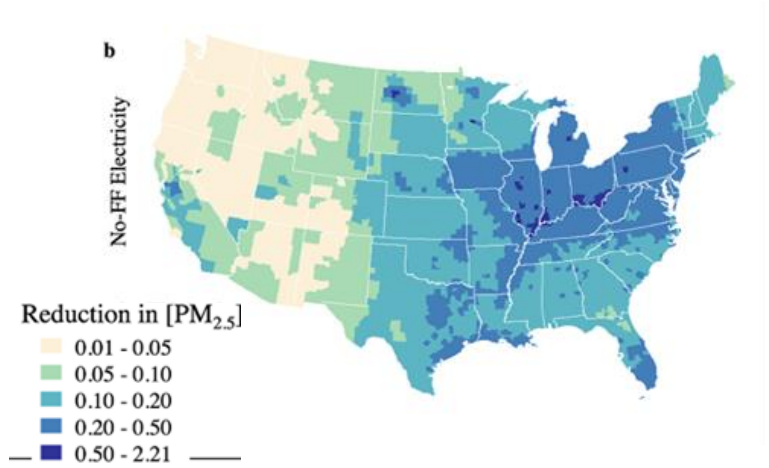


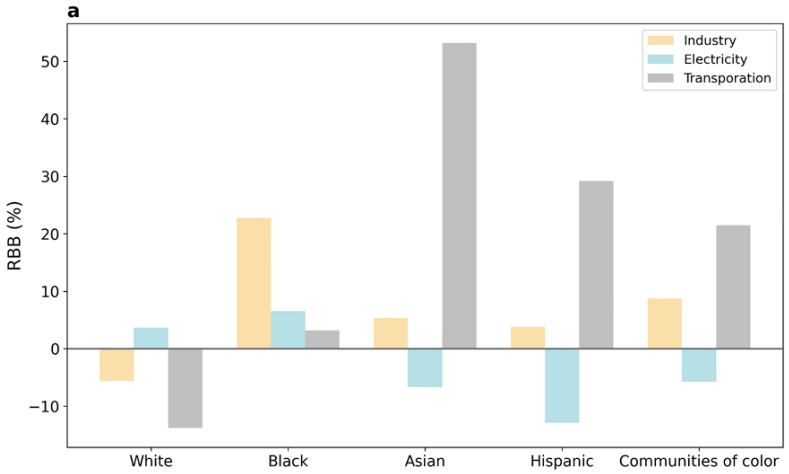
PSE (2018)

Potential

U.S. decarbonization impacts on air quality and environmental justice

Ciaran L Gallagher[1,*] and Tracey Holloway[1,2]



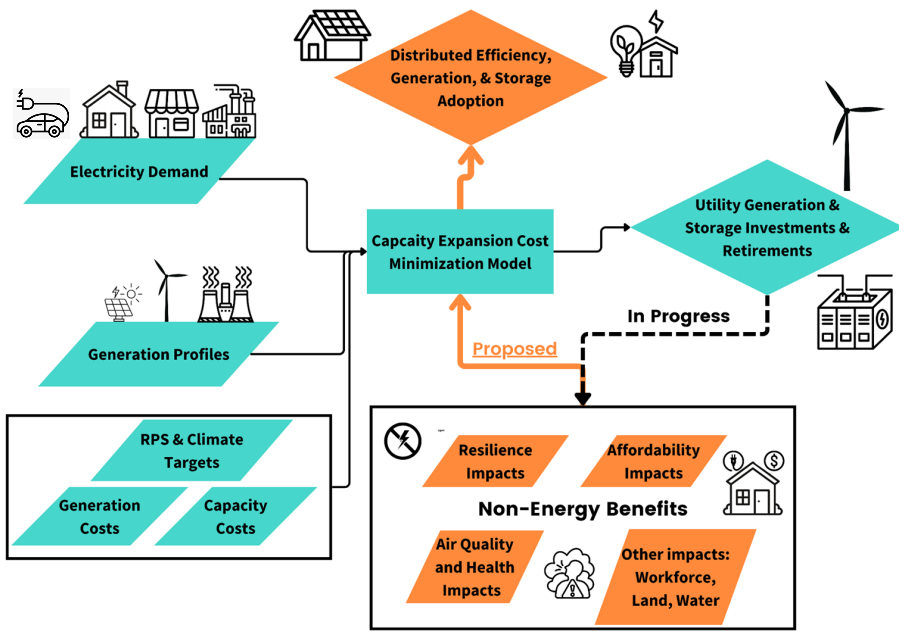


NEI Analysis Potential

Improved tools, data and integration

Integration with Decision Modeling

- Prioritization
- Data gathering, and curation
- Method development
- Method integration
- Validation w/ existing models
- Iterative improvement



Process questions:

- Integrate NEIs w/ existing models, or develop new ones?
- If new models, when switch? What are the minimum capabilities required? Run in parallel?
- Methods/rules for selecting dollar-quantification/ranges?
- Methods/rules for selecting appropriate constraints for non-dollar items?

Questions & Discussion

Thank you!

PSE Bringing science to energy policy

www.psehealthyenergy.org

Facebook.com/PSEHealthyEnergy

@PhySciEng

Questions from the Dais

Questions from the Public

The Economics of Non-Energy Benefits

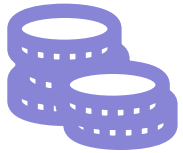
Presented to the California Energy Commission October 7, 2024

Richard McCann, Partner, M.Cubed

Introduction and Outline

My background

How economists and agencies address non energy benefits (NEBs)



Examples of measuring economic outcomes for NEBs

Ways to include NEBs in resource planning

What are non-energy benefits?

Benefits realized beyond direct energy consumption and financial transactions

Environmental, social, distributional, economic vitality and stability, reliability and resilience

Often included in an ad hoc fashion in planning, regulation and rates

Importance of NEBs is a strong motivation for regulation even if not acknowledged

What is in the economics toolbox for NEBs?

Economics not limited to market transactions: Economics is about evaluating choices and resource allocation in the face of scarcity and externalities.

1. Directly measurable financial transactions and inferred choices from that data
2. Valuing environmental attributes based on transactions or valuation surveys
   - Human-centered valuation rather than habitat focused
3. Uncertainty and risk valued based on financial models
   - Incorporation into decision making complex, and cumbersome for energy planning
4. Distribution of outcomes among different groups and geographies more recently developed
   - No metrics yet developed for measuring equitable outcome, but has become a focus in last two decades
5. Resilience, reliability and sustainability only recently became salient, and valuation is undefined and difficult

Least cost analysis and optimization cannot cover the full range of benefits and costs

- "Least cost" and "optimization" are mythological beasts
  - Least cost / optimization requires either perfect foresight or complex quantitative analysis of variance
  - Requires complete information on resources, variables and behavior that is not available
  - Relies on simplifying assumptions as well as unspoken premises about how market mechanisms lead to "economic efficiency"
  - Question of "least cost to whom?"
  - Assumes that a change of a dollar has the same value to everyone
- Incorporating NEBs complicate optimization due to diversity of metrics
  - Prices provide a summary single statistic useful for measuring economic efficiency for direct transactions
  - Other NEBs either lack this singular metric or cannot be easily measured

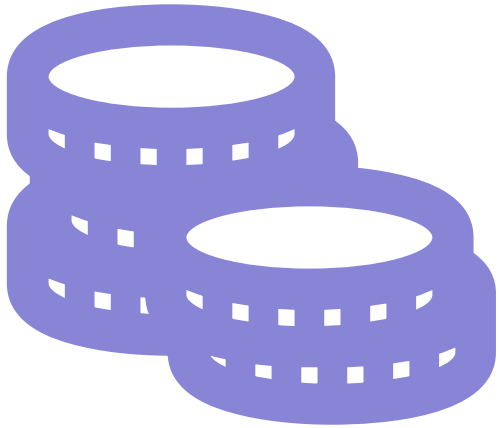
NEBs already in the CEC's wheelhouse

- Consideration of economics in NEBs embedded in creation of CEC with Warren-Alquist Act:*

  (a) The Legislature further finds and declares that, ***in addition to their other ratepayer protection objectives,*** a principal goal of electric and natural gas utilities' resource planning and investment shall be *to* ***minimize the cost to society of the reliable energy services*** that are provided by natural gas and electricity, and ***to improve the environment and to encourage the diversity of energy sources through improvements in energy efficiency and development of renewable energy resources***, such as wind, solar, and geothermal energy.

  (c) In calculating the cost effectiveness of energy resources, including conservation and load management options, the commission shall include ***a value for any costs and benefits to the environment***, including air quality.

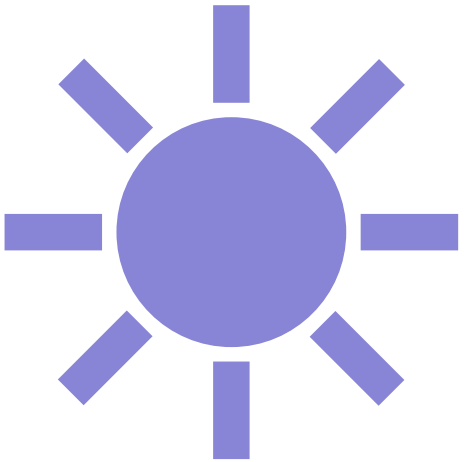
- CEC considers economics of NEBs in such areas as:
  - Energy efficiency, building and appliance standards
  - Plant siting



* Public Resources Code 25000.1

Other examples in California of inclusion of NEBs

- CARB air quality standards and regulations
- CEQA
- Renewable QFs
- Renewable portfolio standard
- Million solar rooftops
- AB 32 GHG goals
- SWRCB once-through cooling regulations
- Wildfire protection bond
- Climate protection bond



Examples of key NEBs often excluded from resource planning and valuation

Mitigating extreme heat events

Record peak days and sustained temperatures

Mortality and morbidity impacts

Department of Public Health: "Excess Mortality During the September 2022 Heat Wave in California"

Valuation methods well developed

Infrastructure and economic productivity

Department of Insurance: "Impacts of Extreme Heat to California's People, Infrastructure, and Economy"

Reducing wildfire risk

Convergence of three forces

- Climate change effect on drought and drying heat
- Population increase in wildland-urban interface
- Increased ignition sources

Insurance crisis

- Compounded by global catastrophes from climate change
- Change in rates and payments not included in planning

Expensive mitigation measures

- Utilities' undergrounding costs approaching $50 billion
  - Serves less than 5% of utility customers
  - Costs and co-benefits of alternatives not being considered

Land use impacts

- Habitat destruction and degradation

  Consider ecological webs and species corridors

- Local environmental effects

  Locations in disadvantaged communities

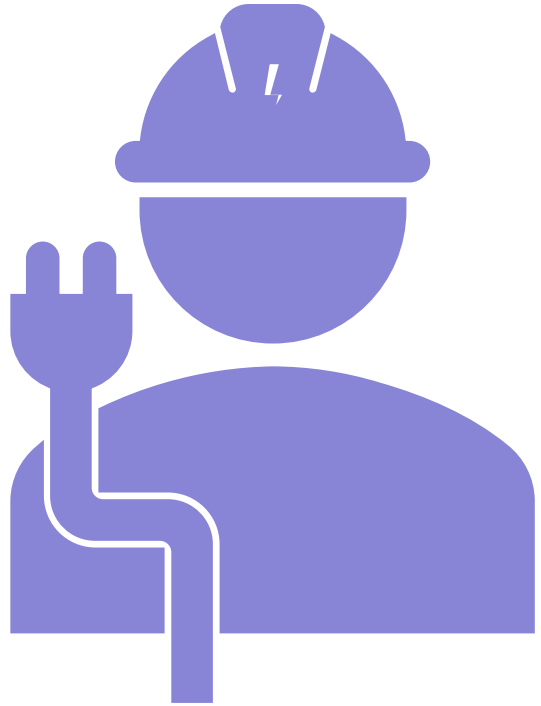
  Interplay with affordability impacts

- Changes in property values

  LULU effects

Resilience vs. reliability

- Reliability measures the ability to withstand a shock and provide continuous service
  - Reliability has long dominated planning and rates considerations
  - Specific metrics such as a planning reserve margin, contingency planning and new Central Procurement Entity
- Resilience measures the ability to recover from a shock that disrupts service
  - Planning focus on generation & transmission reliability, yet customers experience many more distribution outage and must recover from those mishaps
    - PG&E has 100,000+ miles of distribution lines
- Increasing heat stress reduces distribution reliability as thermal loads increase
- Decentralization improves resilience
  - Outage impacts multiplied with centralization



Valuing system resilience

- Reliability valued either through least-cost measure or value of lost load to customers
  - Viewed as a potential market transaction
- Resilience more complex and should reflect interactions across the economy
  - Includes many externalities for which a single actor does not have visibility
  - Use regional economic modeling to measure effect
  - Case studies on long term effects, e.g., power outages after hurricanes
- Costs of alternative solutions that include ancillary co-benefits
  - Proliferation of back up generators (BUGs) creates air quality impacts

Risk management from decentralization vs. centralization

Utility-centric planning and operations concentrates societal risk for a single decision, price volatility and asset outage

- Socializes risk for consumers
- Monitoring standards & goals
- Compounds forecast errors

Decentralized asset ownership and operation diversifies societal risk from investment and reliability

- Privatizes risk for individuals
- Disperses political power

Risk management through resource choices

- Hedging value from reducing price / cost volatility usually not quantitatively included

  On the other hand, being overly "long" in resources also creates stranded assets

  Utility shareholders not penalized in either case

- Bill stability for consumers not considered

  Protecting consumer investments in energy saving measures and devices should have the equitable priority with investments by utility shareholders

    Ratepayers are not speculators in energy day-trading – usually not financially sophisticated

Timeliness of resource additions

Earlier GHG reductions have greater effect and value because it is a “stock” pollutant

Adaptation needed for climate change that has already arrived

Large-scale resources come in a lump-sum – first benefits arrive at the same time as the last benefits

Infrastructure planning and deployment takes years

Decentralized resources deployed in small increments spread over time

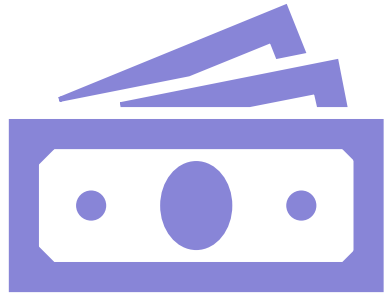
Rapid deployment generally limited only by amount of money and labor

Economic activity impacts

- Consider both production and consumer sides
- Differences in jobs and income impacts from different technologies
  - Decentralized technologies appear to have larger local job and income impacts (e.g., NREL JEDI results)
  - EVs likely to have close synergies with decentralized energy resources
- Higher rates and bills decrease available unencumbered income and jobs
  - Interacts with affordability metrics
  - Higher utility costs and resulting rates should be measured against lost economic output and jobs

Equity, distribution & affordability

- California energy burden high despite mild climate
  - **San Jose, Riverside, San Francisco in top third of ACEEE survey of 35 cities**
- State addresses through:
  - **CARE/FERA rates**
  - **Baseline allowances**
- CPUC adopted methods used in GRCs and rate applications
  - **Energy bill burden for low income households**
  - **Hours at minimum wage to pay energy bills**
  - **No metric for locally-owned and small businesses**
- Not translated yet for resource planning and investment decisions
- No criteria yet identified for decision thresholds and mitigation



Inclusion of NEBs in resource planning

Refine process of including economic metric and decision criteria and thresholds

Other NEBs are likely to be identified

A holistic evaluation framework must incorporate NEBs

Should include ability to vary weights/factors for parameters on the variables

Potential evaluation frameworks

- Weighted matrix

  Develop comparable metrics (can be qualitative)

  Develop weights through stakeholder discussion

  Examples in municipal climate action plans, e.g., Toronto, Oakland

- "Deep" uncertainty scenario & sensitivity studies

  Create simple models, run many scenarios, look for vulnerabilities and risks

  Stakeholders identify most important vulnerabilities and outcomes

  Examples include robust decision making in State Water Plan

Matrix Example: Davis CCA Options Evaluation

Table ___
Davis Technical Study
Comparative Analysis of Implementation Models

Score:	
2	Highly Favorable
1	Moderately Favorable
0	Neutral
-1	Moderately Unfavorable
-2	Highly Unfavorable

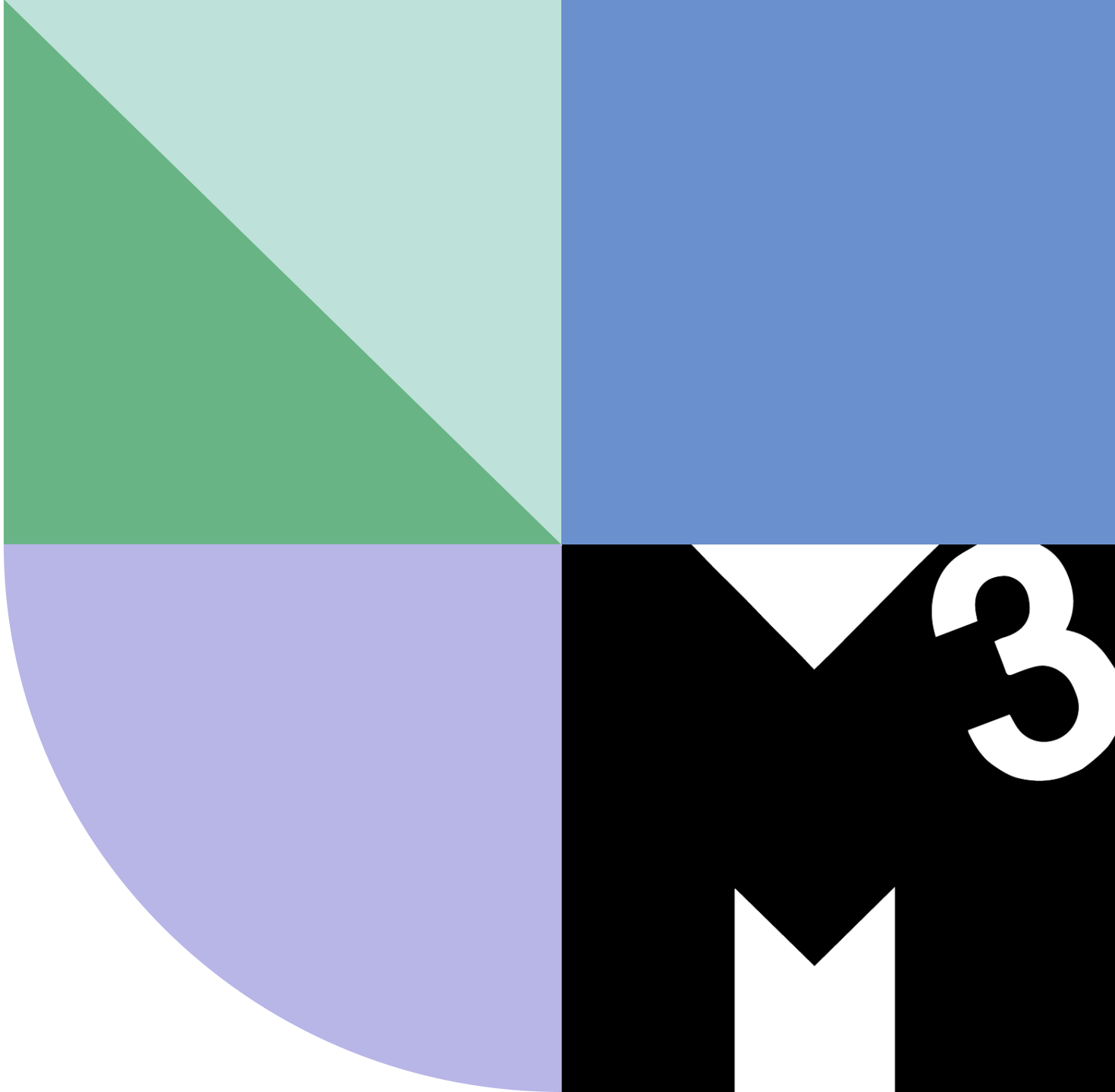
Comparative Crit	Considerations	Weight	Status Quo (PG&E)	Davis Only	Davis + Yolo	Join MCE - Davis Only	Join MCE - Davis+Yolo	CCP - Davis Only	CCP - Davis+Yolo
1 Rate Competitiveness									
	Are rate payers expected to pay no worse than the same, and preferrably less than, the status quo?		Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Level of anticipated rate payer savings under range of future scenarios	50%	*0.00*	*0.69*	*1.55*	*1.96*	*2.00*	*0.48*	*0.78*
	Accretion of financial reserves for energy investment, financial and risk management	50%	*-3.84*	*2.00*	*1.95*	*1.39*	*1.29*	*1.59*	*-0.53*
	Score - Rate Competitiveness	*50%*	**-1.9**	**1.3**	**1.8**	**1.7**	**1.6**	***1.0***	***0.1***
2 Governance & Local Control									
	Weight of individual vote in governing board decisions	5%	-2.0	2.0	1.5	1.0	1.0	2.0	2.0
	Complexity, contentiousness & transparency of decision making process	5%	-2.0	0.0	-0.5	1.0	1.0	-1.0	-1.0
	Ability of community to interact with governing board	10%	-2.0	2.0	2.0	1.0	1.0	2.0	2.0
	Directing energy investments to meet local objectives	40%	-2.0	2.0	2.0	1.0	1.0	1.0	1.0
	Adoption of planning, management and business practices consistent with local objecti	20%	-2.0	2.0	2.0	1.0	1.0	0.0	0.0
	Flexibility to adopt to evolving market, regulatory, legislative conditions	20%	-2.0	1.0	1.2	1.5	1.5	0.5	0.5
	Score - Governance & Local Control	***30%***	**-2.0**	**1.7**	**1.7**	**1.1**	**1.1**	**0.8**	**0.8**
3 Risks & Mitigation									
	Startup risk	15%	2.0	-1.0	-1.5	1.5	1.5	-1.0	-1.0
	Customer opt out risk	10%	1.0	-1.0	-1.5	-0.5	-0.5	-2.0	-2.0
	Operating risk (excluding market and counterparty risk)	15%	0.0	-1.0	-0.5	1.0	1.0	-1.5	-1.5
	Market and counterparty risk	35%	0.0	1.0	1.0	1.0	1.0	1.0	1.0
	Incumbent utility opposition risk	5%	2.0	0.0	-0.5	0.0	-0.5	-0.3	-0.3
	Legislative and regulatory risk	15%	-1.0	-2.0	-2.0	-1.5	-1.5	-2.0	-2.0
	Host entity risk	2%	1.0	-1.0	-1.0	0.0	0.0	-2.0	-2.0
	Management of unwinding contracts & partnerships	2%	2.0	-2.0	-1.0	0.0	0.0	0.0	0.0
	Management of CCA shutdown	1%	2.0	-2.0	-1.0	0.0	0.0	-1.0	-1.0
	Score - Risks & Mitigation	***20%***	**0.4**	**-0.4**	**-0.5**	**0.5**	**0.4**	**-0.6**	**-0.6**
4 Overall Ratin	**Total Weighted Score where Max Score = 2**	***100%***	**-1.5**	**1.1**	**1.3**	**1.3**	**1.2**	**0.6**	**0.2**
			7	*4*	*1*	*2*	*3*	*5*	*6*

Thank you

Richard McCann

mccann@mcubed-econ.com

530.757.6363



Non Energy Impacts

CEC Workshop

Marc Costa
The Energy Coalition

Who We Are

90
staff members across four offices

517
combined years in energy industry

13M
kWh energy reduction last year

274
Public agencies reached last year

Sample Project Experience

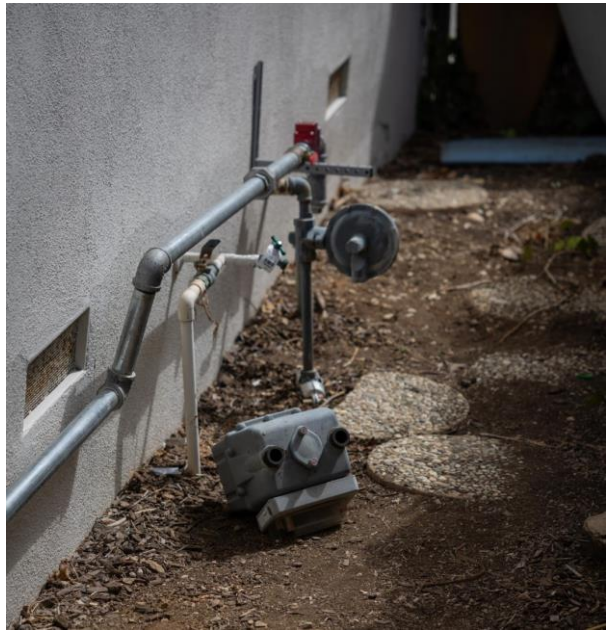
Bassett Avocado Heights advanced energy community
Energy is Everything — a program of the Energy Coalition
Southern California Regional Energy Network
County of Los Angeles California
I·REN Inland Regional Energy Network
BayREN Local Governments Empowering Our Communities
City of Irvine 1971
State of California Energy Commission
San Diego Community Power
Port of San Diego Environment
NCCC Energy Partnership
Westside Energy Partnership
energy upgrade California in Los Angeles County
CPA Clean Power Alliance
Brisbane City of Stars
City of Chula Vista
Anaheim Public Utilities
LA DWP Los Angeles Department of Water & Power

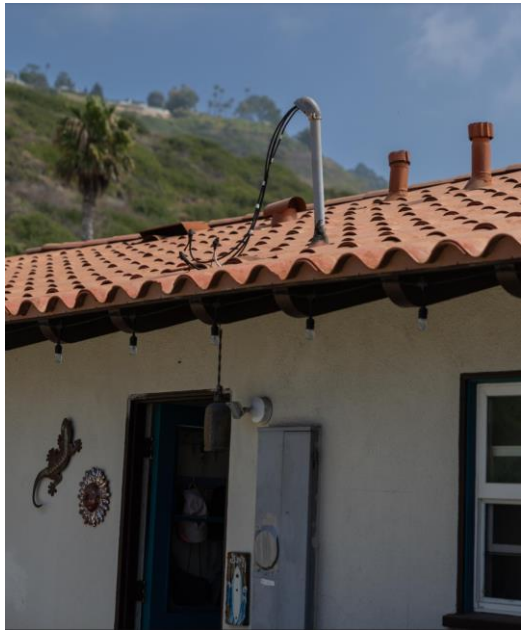
TEC is creating the building blocks for a **new energy economy** in which communities are energy-producing networks and clean energy is **affordable and accessible** for everyone.

Local Government Topics

Local Government

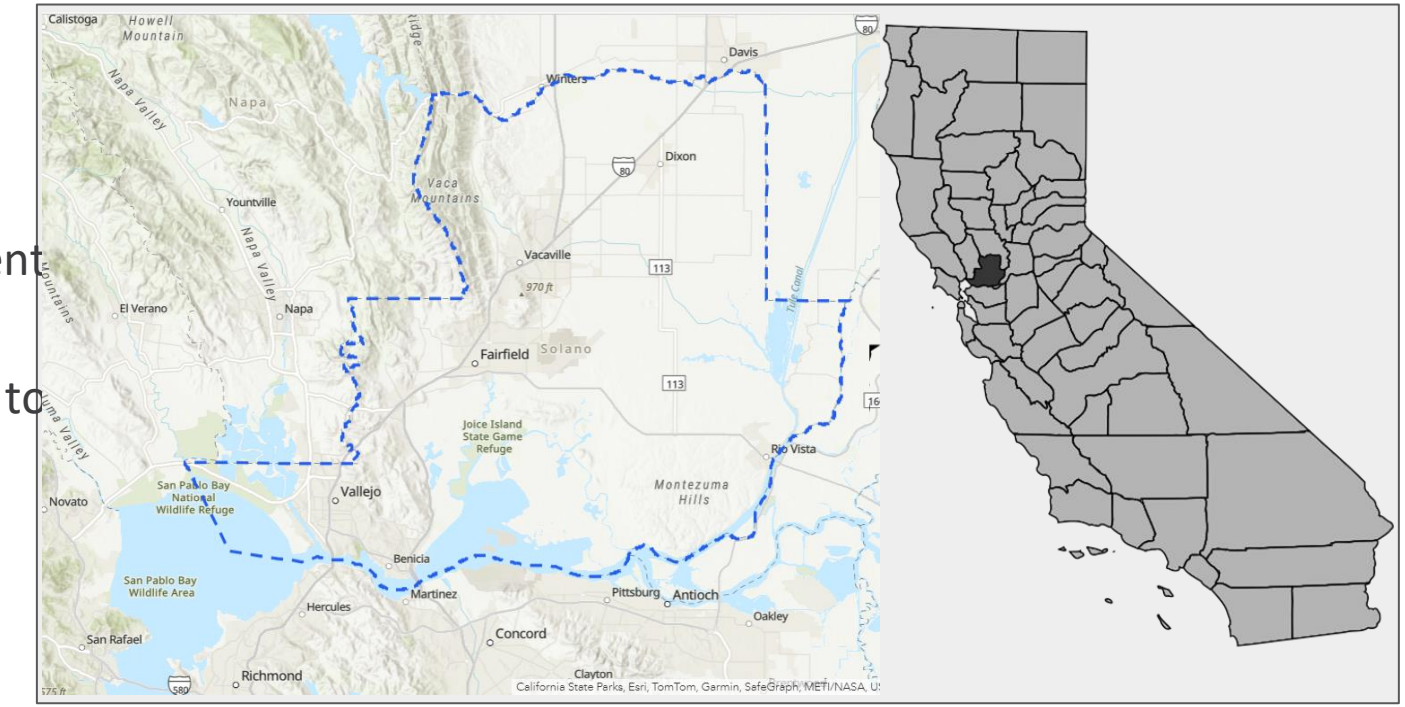
- Economic development
- Energization of new buildings and electric vehicles
- Resilience
- Emergency preparedness and response





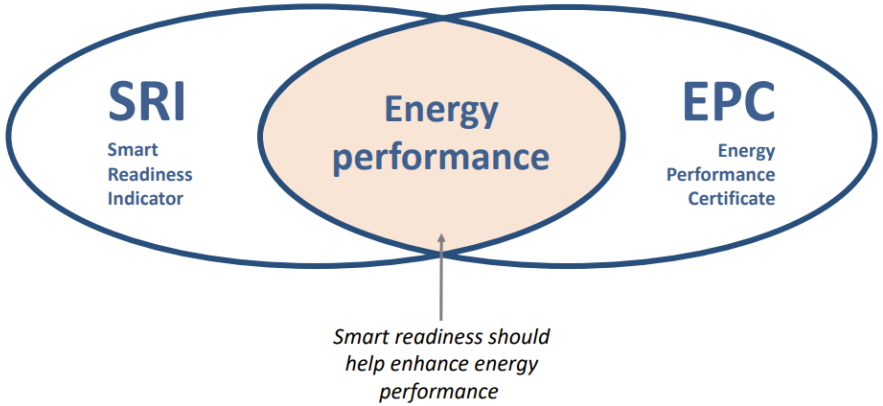
Local Government

- Solano Economic Development Corporation
- $400M bio foods plant proposed in Solano County
- 120 high wage jobs as part of the development
- Energization timeline was 4 years
- Opportunity was lost and sited in Illinois due to the energization timeline
- Impacts business retention
- Impacts business expansion



Example Policy Opportunity

SRI vs EPC



- Experts in charge of issuing EPCs are also competent for issuing SRI certificates
- Member States may couple the issuing of the SRI certificate with their EPC scheme

23

Scores calculated at different levels

	Overall SRI score (%) + SRI class							
	%		%				%	
	1 Optimise energy efficiency and overall in-use performance		2 Adapt its operation to the needs of the occupant				3 Adapt to signals from the grid (energy flexibility)	
	%	%	%	%	%	%	%	
	Energy efficiency	Maintenance and fault prediction	Comfort	Convenience	Health, well-being and accessibility	Information to occupants	Energy flexibility and storage	
Heating	%	%	%	%	%	%	%	%
Cooling	%	%	%	%	%	%	%	%
Domestic hot water	%	%	%	%	%	%	%	%
Ventilation	%	%	%	%	%	%	%	%
Lighting	%	%	%	%	%	%	%	%
Dynamic building envelope	%	%	%	%	%	%	%	%
Electricity	%	%				%	%	%
Electric vehicle charging		%		%		%	%	%
Monitoring and control	%	%	%	%	%	%	%	%

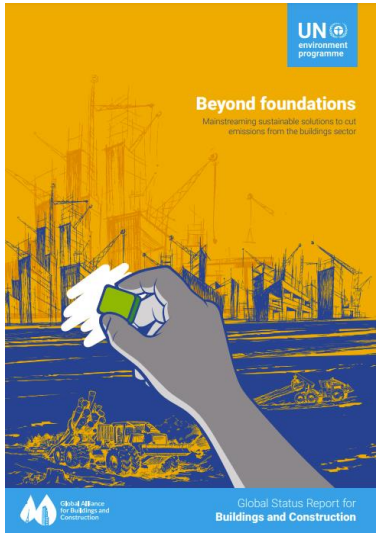
… and the overall SRI score together with the corresponding SRI class (seven classes, from SRI < 20% to SRI > 90%)

17

Smart Readiness Indicator (SRI)

Training slide deck

European Commission



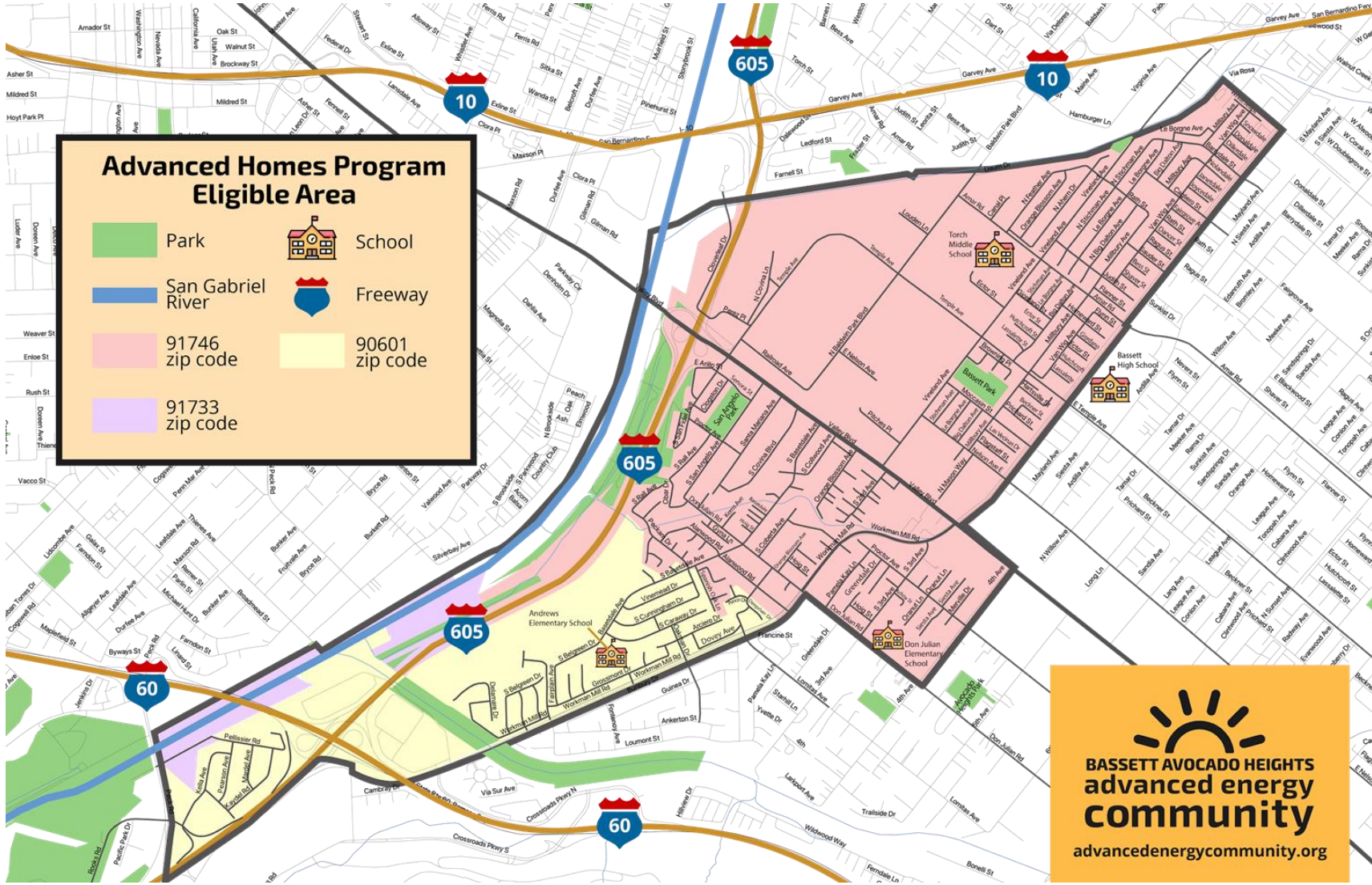
BASSETT AVOCADO HEIGHTS
advanced energy
community

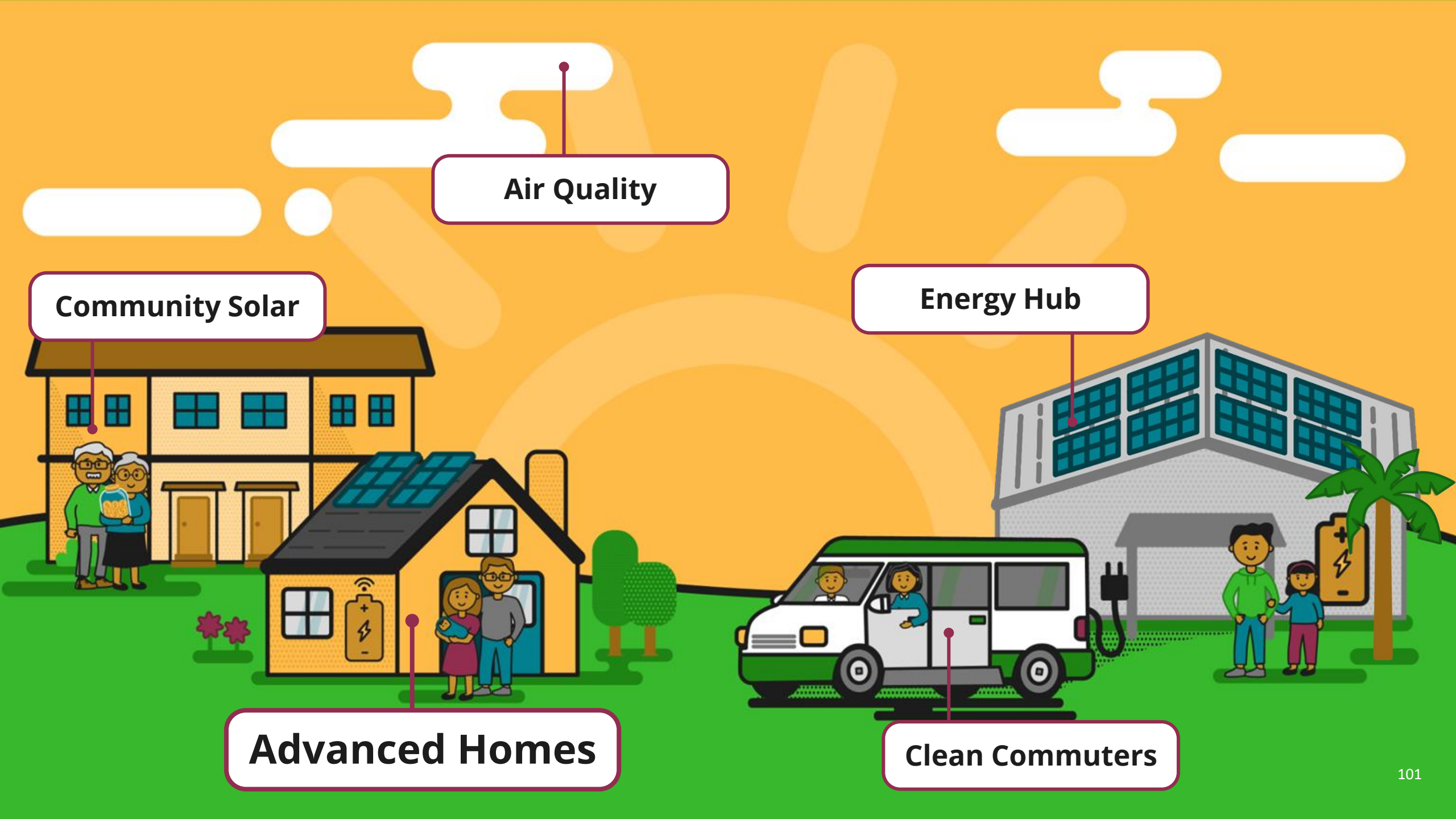
BAAEC - CEC EPIC Grant

Equity & Non-Energy Benefit Project

BAAEC Location

- Unincorporated LA County
- DAC census tracts
- 60% of residents on CARE
- 84% Hispanic
- $60,000 median income
- Predicted to experience over 40 additional extreme heat days per year by 2050




Air Quality
Community Solar
Energy Hub
Advanced Homes
Clean Commuters

Design Principles and Demonstration Objectives

BASSETT | AVOCADO HEIGHTS advanced energy community

- People first (customer centric)
  - Vs. grid needs, low-income focus

- Community-wide transition
  - A look into the future, behavior change

- Distributed and decentralized grid (local)
  - Community solar
  - Rooftop solar
  - Storage and demand flexibility
- Resiliency
  - Microgrid
  - Interconnected residential batteries
  - Small plug and play residential batteries
- Electrification
  - Electric vehicle charging stations
  - Mobility options
  - Home electrification

Outreach Mission
Misión de Alcance Comunitario

To inspire, educate and engage community members to actively take part in the implementation of their advanced energy community.

Inspirar, educar e involucrar a los miembros de la comunidad para que participen activamente en la implementación de su comunidad de energía avanzada.

Induction Stove Demo

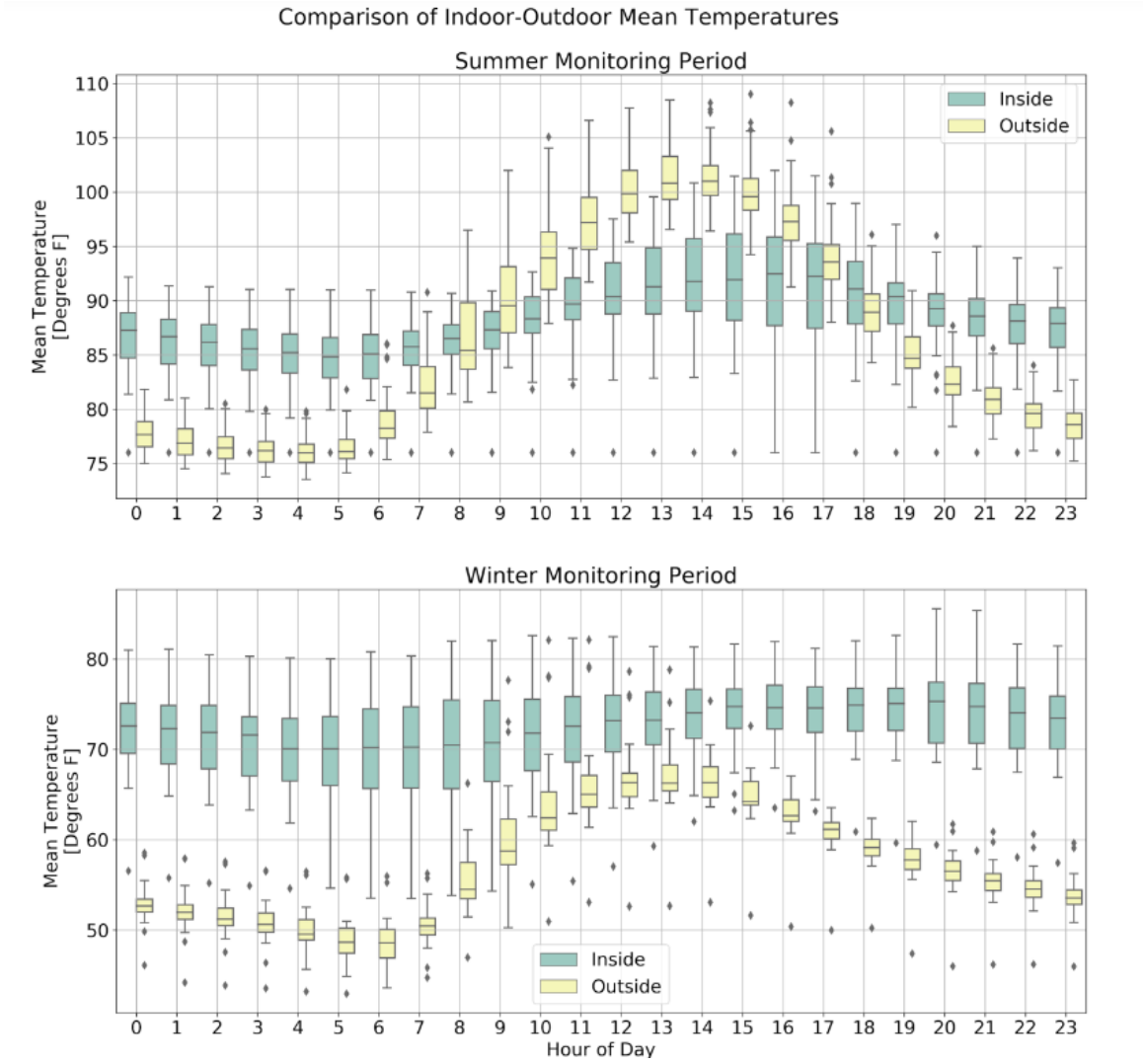
Demostración de Estufa de Inducción

Non-Energy Impacts to Residents

Purple Air monitors showed that most homes do not run air conditioners even if they are installed in the home.

They also showed that homes had reasonable indoor air temperatures in the winter, and used space heaters and heating appliances regularly.

However, in the summer, AC was found to be used only 2 hours a day, with indoor air temperatures averaging ~85F for every hour during the summer monitoring period.



Energy Burden Potential Relief

Benefits even before
- Grid services]
- VPPs
- EAC carbon markets

Data from income-qualified households participating in the Bassett / Avocado Heights Advanced Energy Community project (eastern LA County, funded by the California Energy Commission)

Self-reported income	Historic baseline electricity (annual kWh)	Historic combined energy bills (annual)	Forecasted combined energy bills w/o solar PV, w/ partial electrification (annual)	Forecasted combined energy bills with solar and partial electrification (annual)	Energy burden % total baseline energy bill as % of income	Energy burden % total forecasted energy bill as % of income	Total forecasted energy bill savings % (annual)
$33,722	6,457	$2,143	$1,990	$287	6.4%	0.6%	88.2%
$69,374	6,101	$1,758	$1,515	$321	2.5%	0.5%	81.7%
$16,812	6,506	$2,274	$2,070	$519	13.5%	3.1%	77.2%
$32,336	8,501	$1,521	$1,399	$446	4.7%	1.4%	70.7%
$75,559	2,889	$981	$862	$279	1.3%	0.4%	71.6%
$52,248	19,776	$6,659	$6,583	4,464	12.7%	8.5%	33.0%
$29,119	6,050	$1,525	$1,337	$256	5.2%	0.9%	83.2%
$80,000	12,612	$2,913	$2,868	$1,608	3.6%	2.0%	44.8%
$46,998	8,339	$2,973	$2,861	$1,015	6.3%	2.2%	65.9%
$50,000	4,889	$1,514	$1,381	$411	3.0%	0.8%	72.9%
$76,437	13,215	$3,464	$3,352	$1752	4.4%	2.2%	49.8%
			Averages				
$51,146	8,667	$2,520	$2,383	$1,033	5.78%	2.05%	67.18%

We must unlock the inherent value in the way people interact with buildings, energy, and the grid to realize decarbonization


the Energy
Coalition

Questions from the Dais

Questions from the Public

Public Comments

Zoom:

- Use the “raise hand” feature.

Telephone:

- Dial *9 to raise your hand.
- Dial *6 to mute/unmute your phone line. You may also use the mute feature on your phone.

Zoom/phone participants, when called upon:

- Your microphone will be opened.
- Unmute your line.
- State and spell your name for the record, and then begin speaking.

Limited to one representative per organization.

Three-Minute Timer

Closing Remarks