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Energy Equity Indicators Phase II

Martín Flores, Energy Assessments Division

IEPR Workshop on Centering Energy Equity and Environmental Justice

June 30th, 2026



Agenda

1. Energy Equity Indicators (EEI) Background
2. Phase 1 Overview
3. Phase 2 Plan
4. Timeline & Ongoing Engagement



How do we plan for an equitable clean-energy future?

2016

SB 350 Low Income Barriers Study

Directed the CEC to identify clean energy barriers within low-income and disadvantaged communities.

2018

Original Energy Equity Indicators

Developed to identify low-income and disadvantaged community opportunities and track progress.

2022

EI Review Under IEPR

Progress was not effectively tracked. Determined it was time to reimagine and revitalize the tool.

What were the challenges?

1. Reliable energy equity data was difficult to acquire.
2. Existing metrics lacked meaningful insight.
3. California's energy system changed significantly, and new methods were required to accurately capture people's experiences.

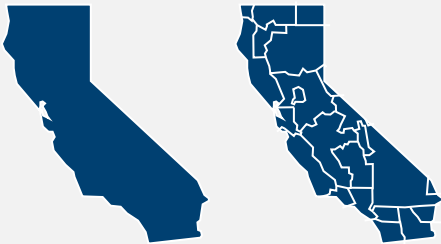


Energy Equity Indicators Tool

1. Data Visualization and Mapping



Database of Equity Data

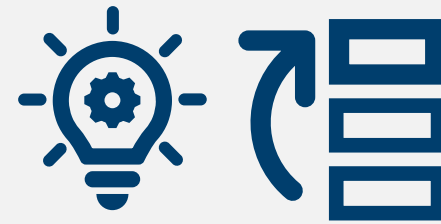


Geographic Data
Layers

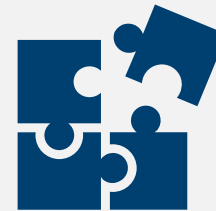


Data Access
and Analysis

2. Insights to Help Prioritize CEC Efforts and Investments



3. Complements CalEnviroScreen





Energy Equity Indicators Application Diagram



Energy Metrics

Access



Reliability



Efficiency



Affordability



Programs



Clean Energy
Adoption



Supplementary Metrics



Community



Health



Safety



Socioeconomics



Agenda Recap

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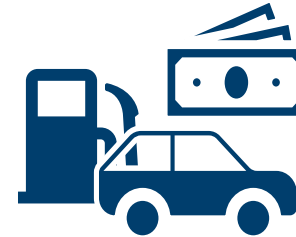


Phase 1 Overview

Focused on **affordability** to address two knowledge gaps:



cost-of-living



transportation fuel costs



Consequences of Neglecting Cost-of-Living Corrections in Affordability Analyses



Case 1

- Single person
- \$100k annual income
- \$10k annual energy costs



Case 2

- Four-person family
- \$100k annual income
- \$10k annual energy costs

$$\frac{\$10,000 \text{ in energy costs}}{\$100,000 \text{ income}} = 10\%$$

But the two households are ***not*** alike



Transportation Gap in Established Energy Affordability Metrics

Transportation fuel expenses are **NOT** normally included in the energy burden and energy affordability gap calculation

“ ...average annual household spending on gasoline totaled **\$2,148** — slightly **more** than **electricity, natural gas, and fuel oil combined** ”

– US Energy Information Administration, 2024

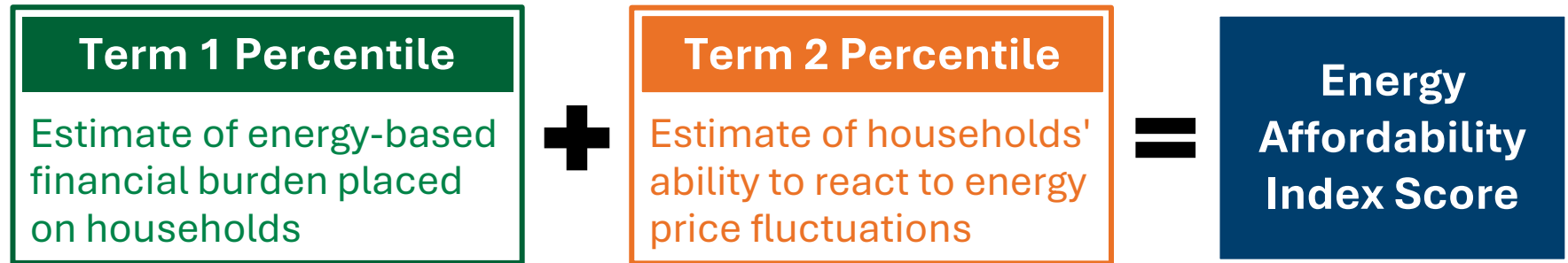


Energy Affordability Index Method

Inputs

1. Household Income (US Census)
2. Household Size (US Census)
3. Cost of Living (University of Washington)
4. Energy Costs (CEC, CalTrans, US DOE)

Aggregation



Validation

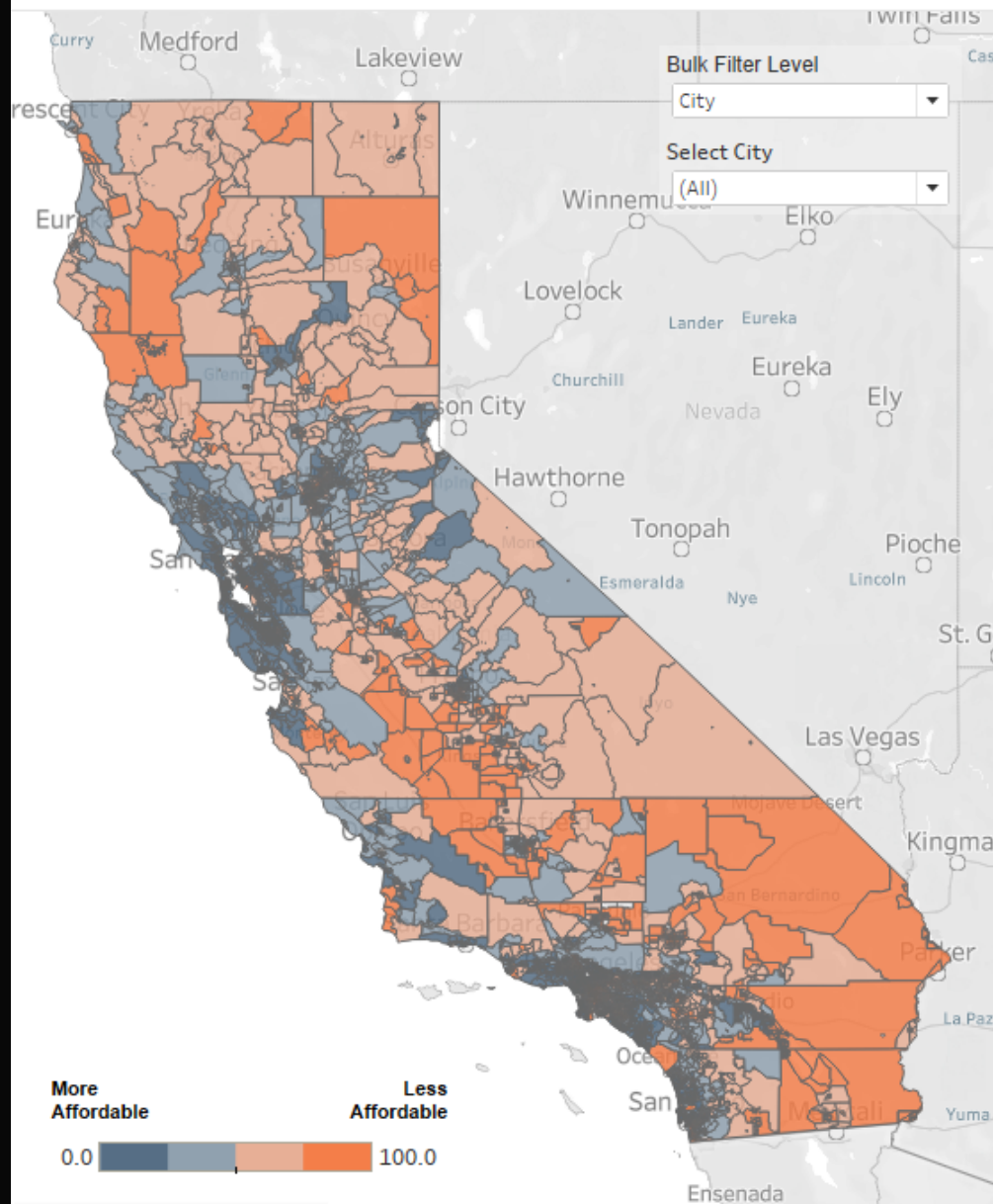
Test 1: Which community types does Energy Affordability Index align with?

Test 2: How do correlation results compare to other metrics?

❖ **Result: Energy Affordability Index aligns with established experiences better than the other metrics!**

A Deep Dive into Energy Affordability

Energy Affordability Index by Census Tract



Pearson Correlation Tool

Independent Variable:

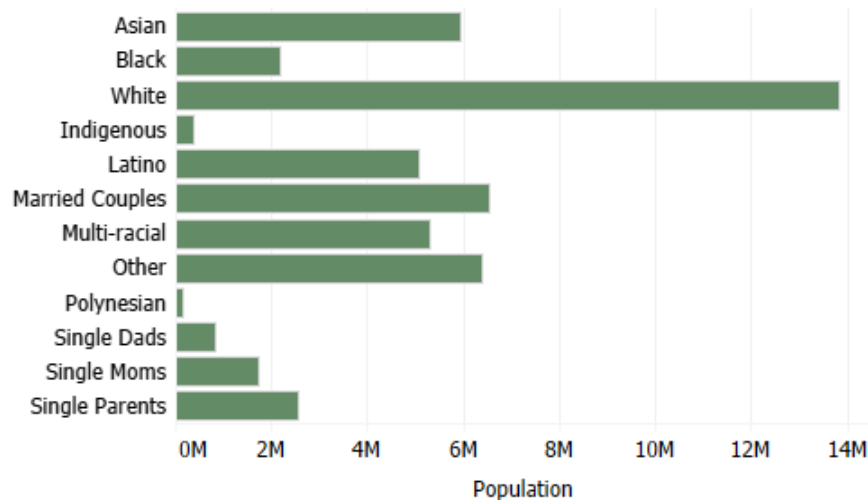
Energy Affordability Index

Vulnerability Variable:

Energy Affordability Index

$r = 1.00$

Community Characteristics



Total Population Selected **39,226,477**

Average Household Size **3.0**

Average TEC Relative to State Median

Average In-Home Energy Costs **\$2,389**

Average Energy Affordability Index **50.01**

Average Energy Burden **2.1%**

Total Energy Affordability Gap **3,228.5M**

Filters

Geographic Level:

- ☒ Census Tract
- ☐ ZIP Code
- ☐ City
- ☐ County
- ☐ State Assembly District
- ☐ State Senate District
- ☐ Natural Gas Provider
- ☐ Electric Power Provider

Metric:

- ☒ Energy Affordability Index
- ☐ Energy Affordability Gap
- ☐ Energy Burden

Home Ownership Type:

- ☒ Combined
- ☐ Owners
- ☐ Renters

Energy Affordability Index:

- ☒ Show All
- ☐ Filter Top 25%

SB 535 DACs Filter:

- ☒ Show All
- ☐ DACs

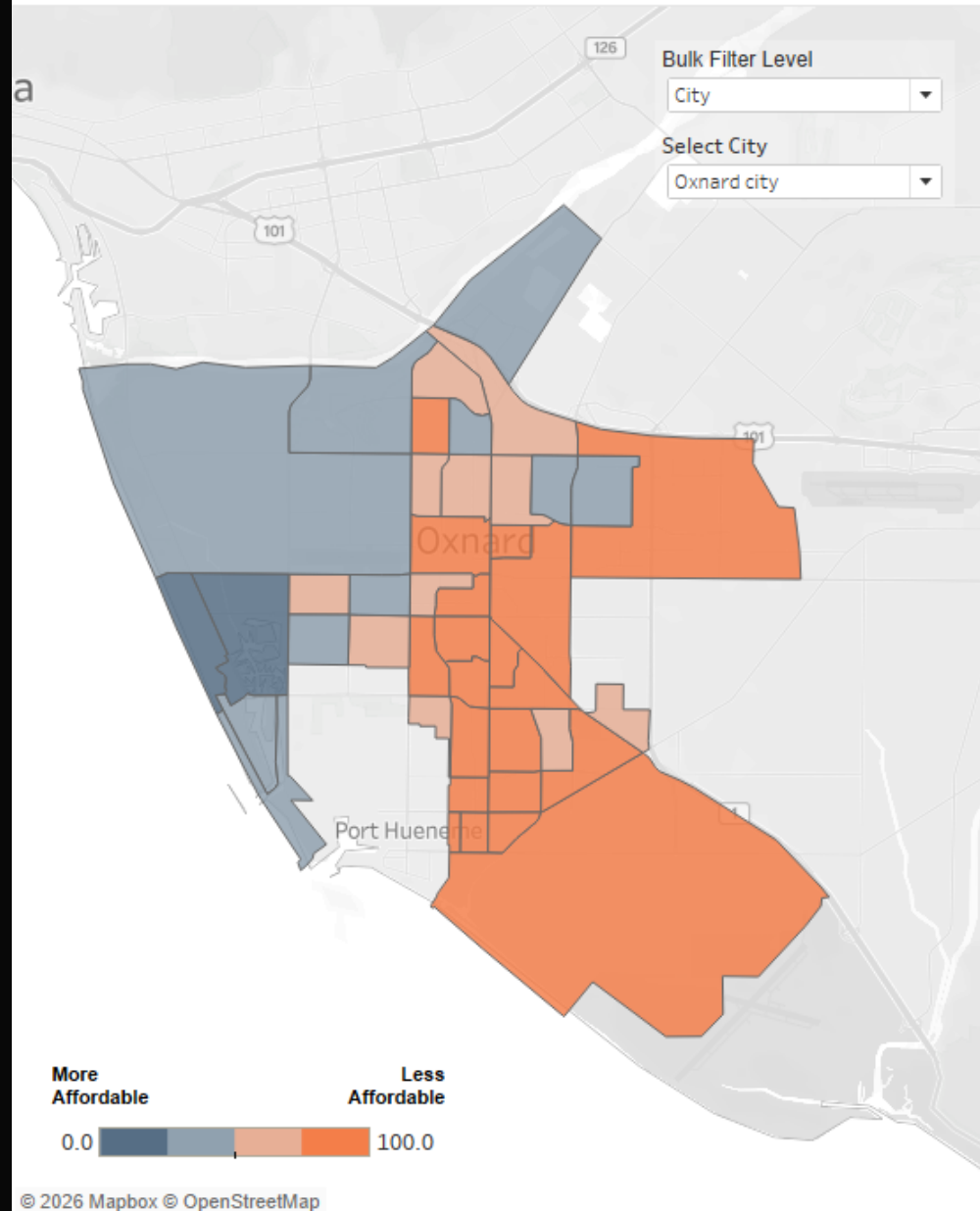
Justice Census Tract Filter

- ☒ Show All
- ☐ Justice Census Tracts



A Deep Dive into Energy Affordability

Energy Affordability Index by Census Tract



Pearson Correlation Tool

Independent Variable:

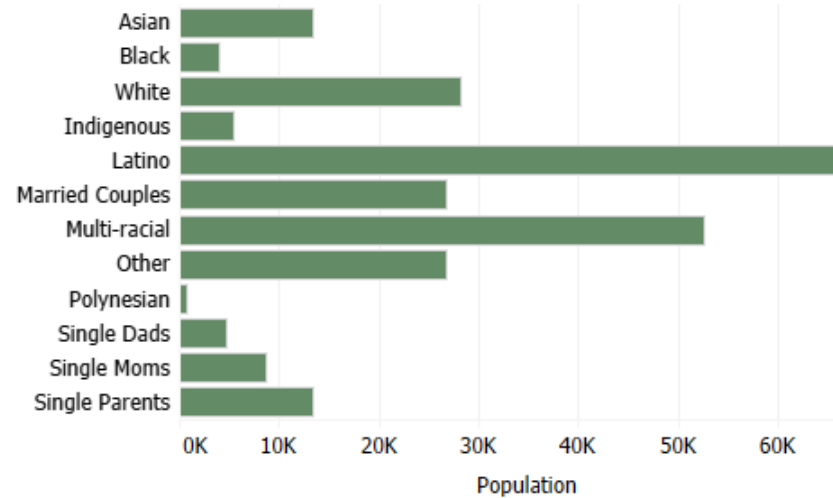
Energy Affordability Index

Vulnerability Variable:

Energy Affordability Index

$r = 1.00$

Community Characteristics



Total Population Selected **197,316**

Average Household Size **4.0**

Average TEC Relative to State Median **104%**

Average In-Home Energy Costs **\$1,800**

Average Energy Affordability Index **67.42**

Average Energy Burden **1.7%**

Total Energy Affordability Gap **3.5M**

Filters

Geographic Level:

- ☒ Census Tract
- ☐ ZIP Code
- ☐ City
- ☐ County
- ☐ State Assembly District
- ☐ State Senate District
- ☐ Natural Gas Provider
- ☐ Electric Power Provider

Metric:

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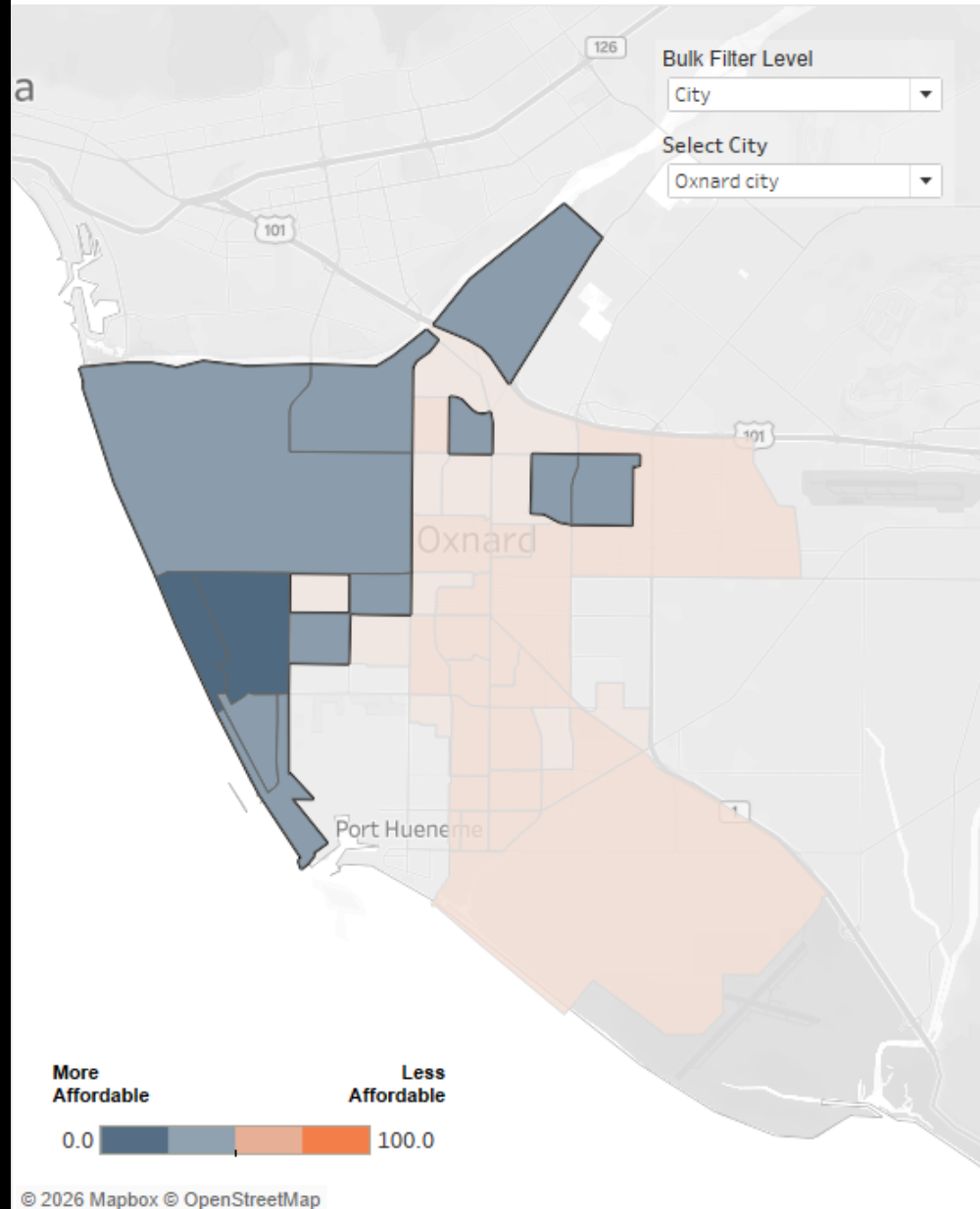
Justice Census Tract Filter

- ☒ Show All
- ☐ Justice Census Tracts



A Deep Dive into Energy Affordability

Energy Affordability Index by Census Tract



Pearson Correlation Tool

Independent Variable:

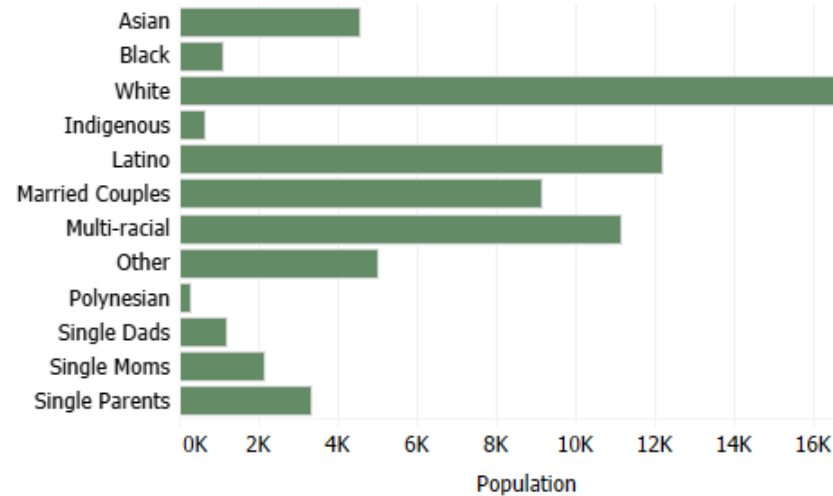
Energy Affordability Index

Vulnerability Variable:

Energy Affordability Index

$r = 1.00$

Community Characteristics



Total Population Selected **51,512**

Average Household Size **2.9**

Average TEC Relative to State Median **83%**

Average In-Home Energy Costs **\$1,830**

Average Energy Affordability Index **36.41**

Average Energy Burden **1.4%**

Total Energy Affordability Gap **0.0M**

Filters

Geographic Level:

- ☒ Census Tract
- ☐ ZIP Code
- ☐ City
- ☐ County
- ☐ State Assembly District
- ☐ State Senate District
- ☐ Natural Gas Provider
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Metric:

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Home Ownership Type:

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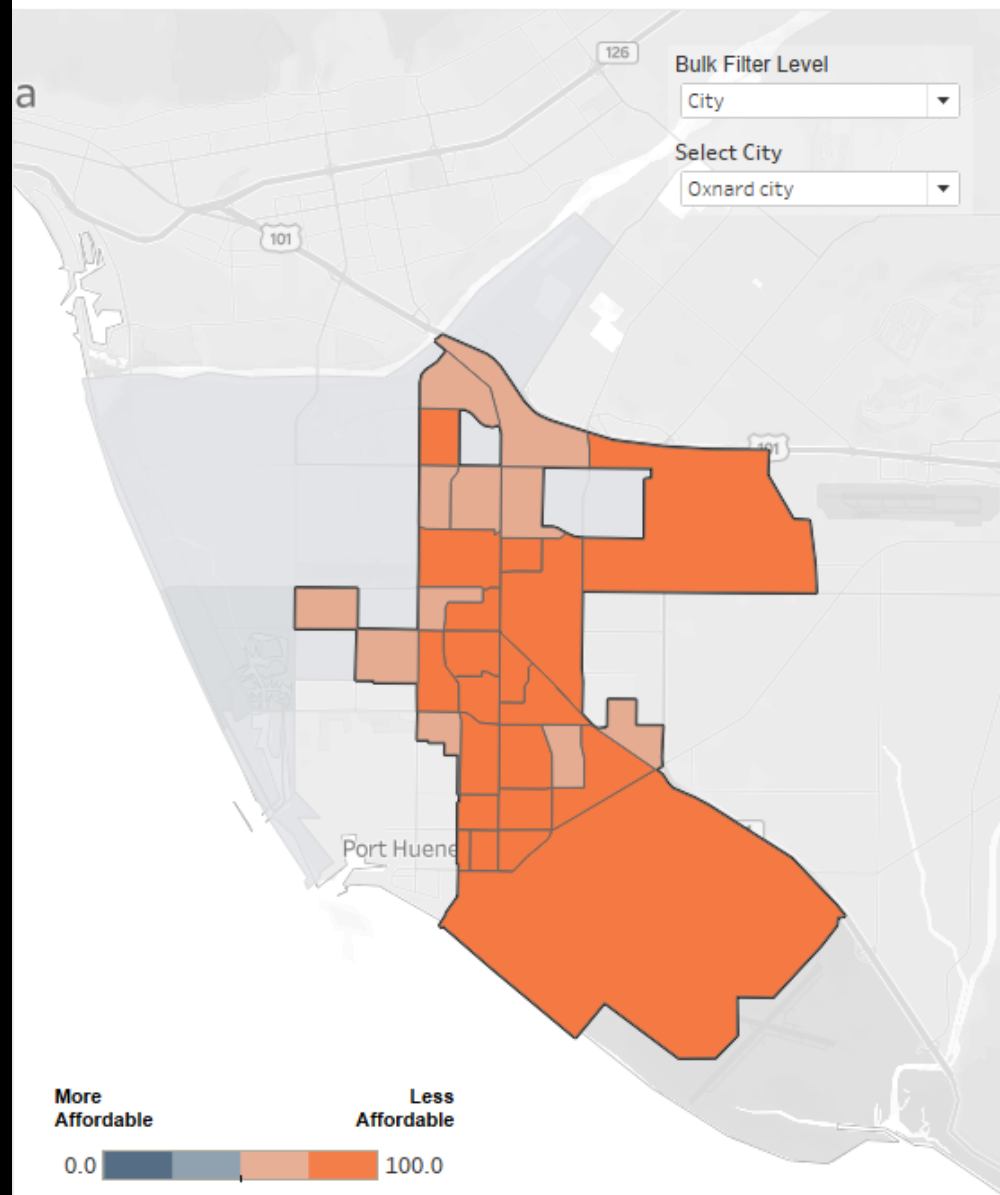
Justice Census Tract Filter

- ☒ Show All
- ☐ Justice Census Tracts



A Deep Dive into Energy Affordability

Energy Affordability Index by Census Tract



© 2026 Mapbox © OpenStreetMap

Pearson Correlation Tool

Independent Variable:

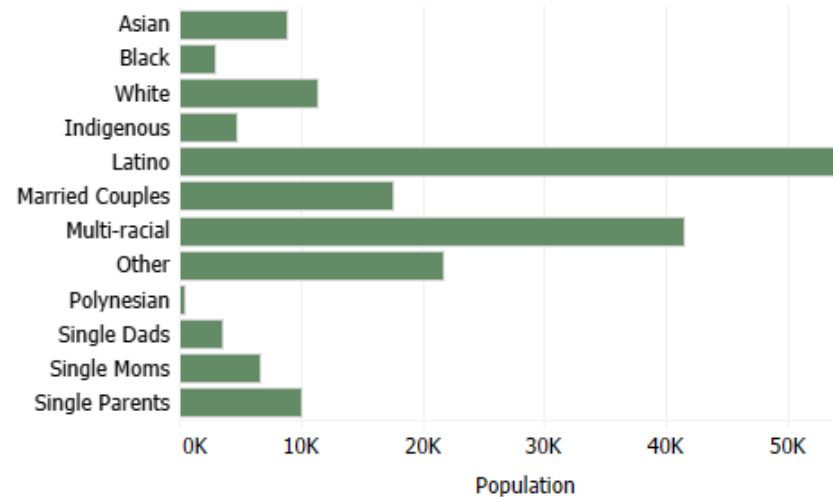
Energy Affordability Index

Vulnerability Variable:

Energy Affordability Index

$r = 1.00$

Community Characteristics



Total Population Selected **145,804**

Average Household Size **4.4**

Average TEC Relative to State Median **112%**

Average In-Home Energy Costs **\$1,789**

Average Energy Affordability Index **79.42**

Average Energy Burden **1.8%**

Total Energy Affordability Gap **3.5M**

Filters

Geographic Level:

- ☒ Census Tract
- ☐ ZIP Code
- ☐ City
- ☐ County
- ☐ State Assembly District
- ☐ State Senate District
- ☐ Natural Gas Provider
- ☐ Electric Power Provider

Metric:

- ☒ Energy Affordability Index
- ☐ Energy Affordability Gap
- ☐ Energy Burden

Home Ownership Type:

- ☒ Combined
- ☐ Owners
- ☐ Renters

Energy Affordability Index:

- ☒ Show All
- ☐ Filter Top 25%

SB 535 DACs Filter:

- ☒ Show All
- ☐ DACs

Justice Census Tract Filter

- ☒ Show All
- ☐ Justice Census Tracts



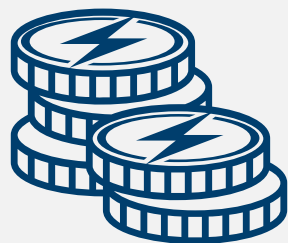


EEl Case Study Results at a Glance

	Northwest Oxnard	Southeast Oxnard	Statewide
Average Energy Affordability Index	36	79	-
Average In-Home Energy Costs	\$1,830	\$1,789	\$2,389
Average Transportation Energy Costs	17% LOWER than state average	12% HIGHER than state average	-
Average Household Size	2.9	4.4	3
Cost of Living Based on Average Household Size	~\$52,000	~\$74,000	~\$54,000
Median Income	Approx. \$94,500	Approx. \$76,000	\$96,334



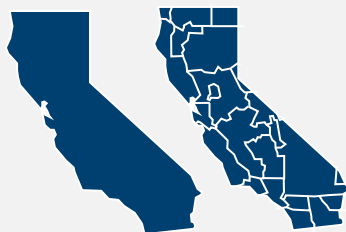
Areas for Improvement in Phase 1



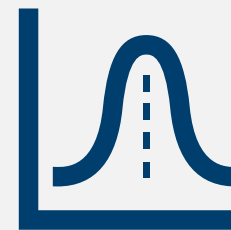
Develop more accurate energy cost estimates.



Utilize a more capable GIS mapping tool.



Develop metrics with finer spatial-granularity.



Investigate equity through a distribution-informed lens, not just location averages.



Agenda Recap

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Phase 2 Steps

1. Scoping & Public Engagement

- Scope out new data and metrics
- Engage public on project scope
- Implement public engagement feedback

2. IMD Integration

- Interval meter data QA/QC
- Update existing metrics
- Finalize methodologies for new metrics
- Calculate new metrics

3. Transition to ArcGIS

- Transfer existing dashboard and features
- Develop new data visualization functions
- Develop dashboards for new metrics



What is Interval Meter Data?

Interval Meter Data: Highly granular record of energy consumption, typically collected at 15 mins, 30 mins, or hourly intervals. Sometimes comes coupled with billing tables associated with the energy consumed.

	LADWP	PGE	SCE	SCG	SDGE	SMUD
Electric Usage + Billing Data	X	X	X		X	X
Nat. Gas Usage + Billing Data		X		X	X	

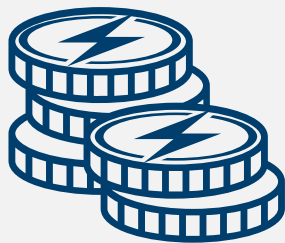
Missing: PacifiCorp, Liberty, Bear Valley, Imperial Irrigation District



Update Affordability Dashboard with IMD

Use billing data to update electricity and natural gas cost estimates on,

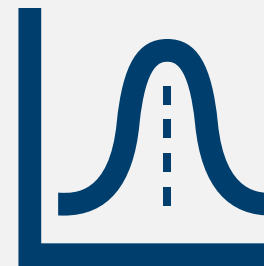
- 1. Energy Affordability Index**
- 2. Energy Burden**
- 3. Energy Affordability Gap**



Aggregate IMD to finer geospatial level to improve granularity.



Provide more detailed distributional insights instead of only averages.





Residential Reliability & Disconnection Metrics



Average Interruption Duration

What is the total time without power that the average customer experiences?



Average Interruption Frequency

How many interruptions does the average customer experience annually?



Average Interruption Restoration

What is the average restoration time that customers experience after an outage?



Total Customers with Disconnections

How many total customers have experienced disconnections within a particular year?



Total Customer Disconnection Duration

How long are customers being disconnected for annually?

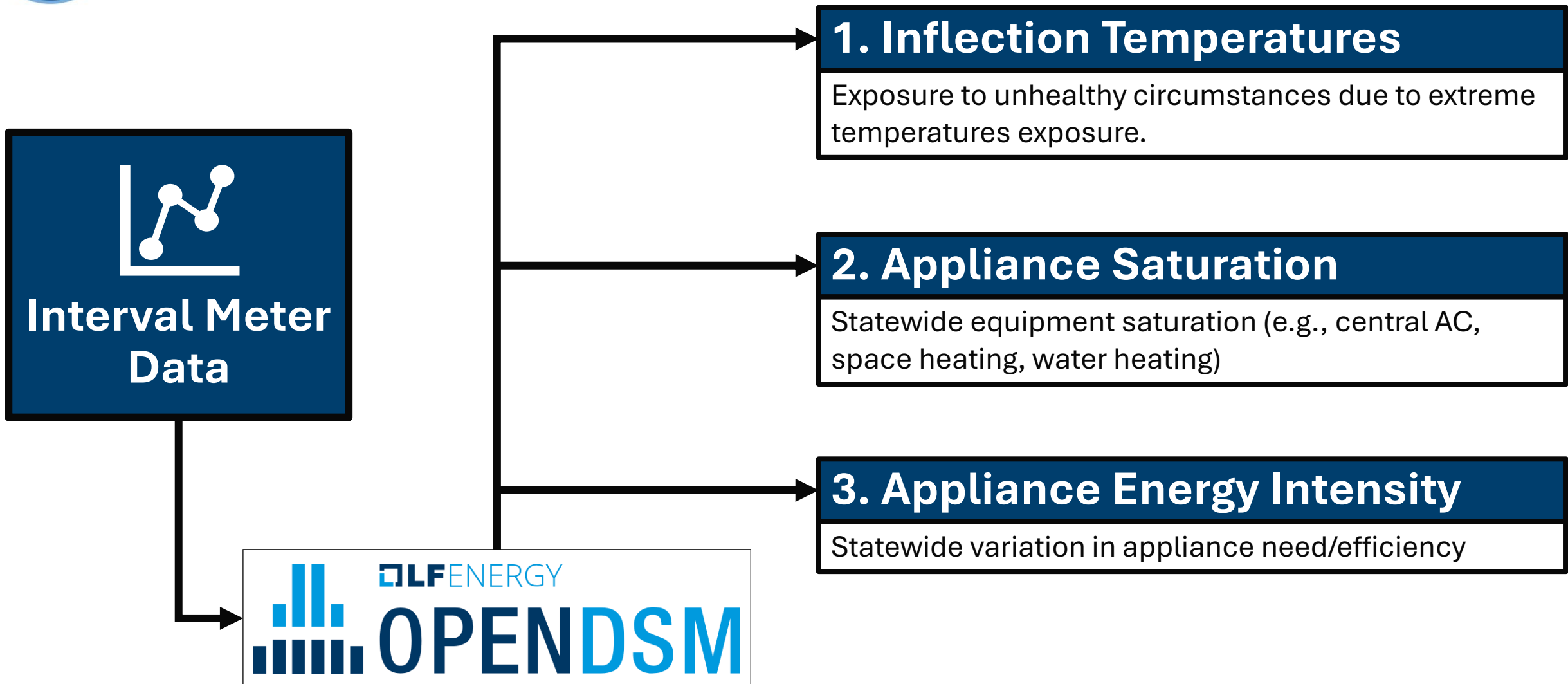


Average Disconnected Customer Bill Cost

Among customers struggling to pay energy bills, what is the average bill cost?



OPEN DSM Implementation





Residential Energy Programs



Energy Program Availability

What energy programs exist and which locations are eligible?



Energy Program Participation

What are the participation rates among existing programs? Are there enrollment barriers?



Average Energy Program Savings

How do energy costs compare between groups in energy programs vs not?



Distributed Energy Resource Program Participation

Has participation in DER credits programs increased among low-income customers? Where?



Distributed Energy Resource Credits

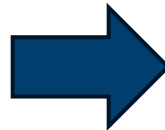
How much are DER credit program participants saving vs non-program participants?



Transition EEI to ArcGIS

Tableau Challenges

1. Operationally slower with large datasets, like census tract/block
2. Doesn't support map layering natively
3. Limited heatmap map control and unintuitive map legends



ArcGIS Solutions

1. Handles large datasets efficiently leading to smoother interactions
2. Layering supported: layers can be toggled on/off for comparison
3. Full classification control over heatmap data



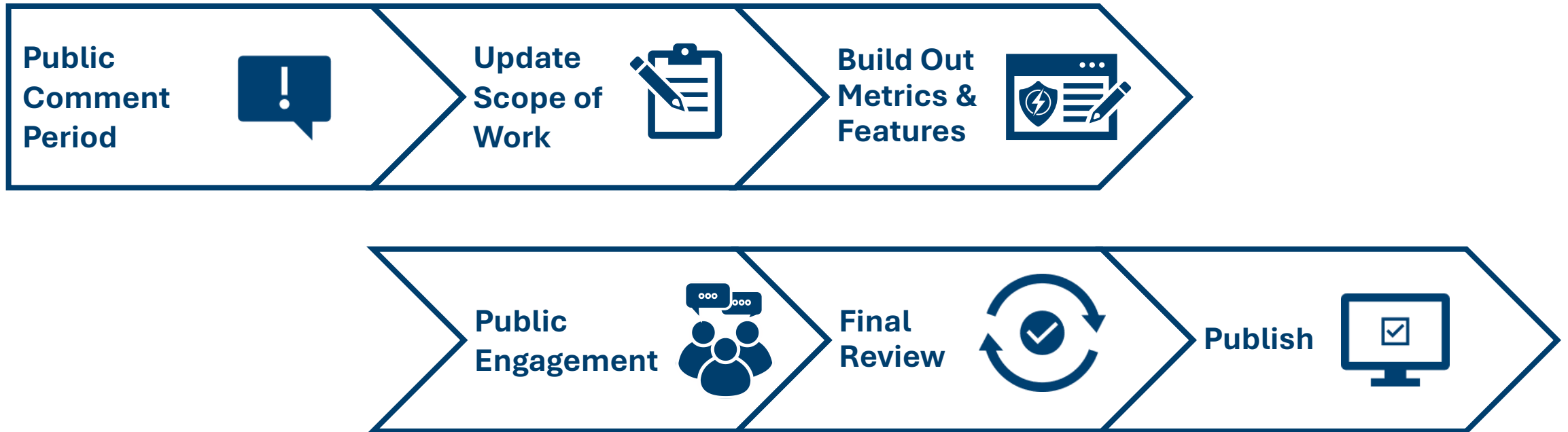
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Timeline

Phase II Timeline



Submit your comments:

2026 IEPR Update Energy Equity & Environment Justice Docket

<https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report-iepr/2026-integrated-energy-policy-report>

Connect with us:

Energy Equity Indicators Email

EnergyEquityIndicators@energy.ca.gov



Contact Information

Martin Abram Flores, Energy Equity Indicators Lead
Martin.Flores@energy.ca.gov