LA100 Equity Strategies
Steering Committee Meeting #18
April 19, 2023

LA DWP

NREL
Transforming ENERGY

UCLA

Los Angeles Department of Water & Power (LADWP)
Project Leads

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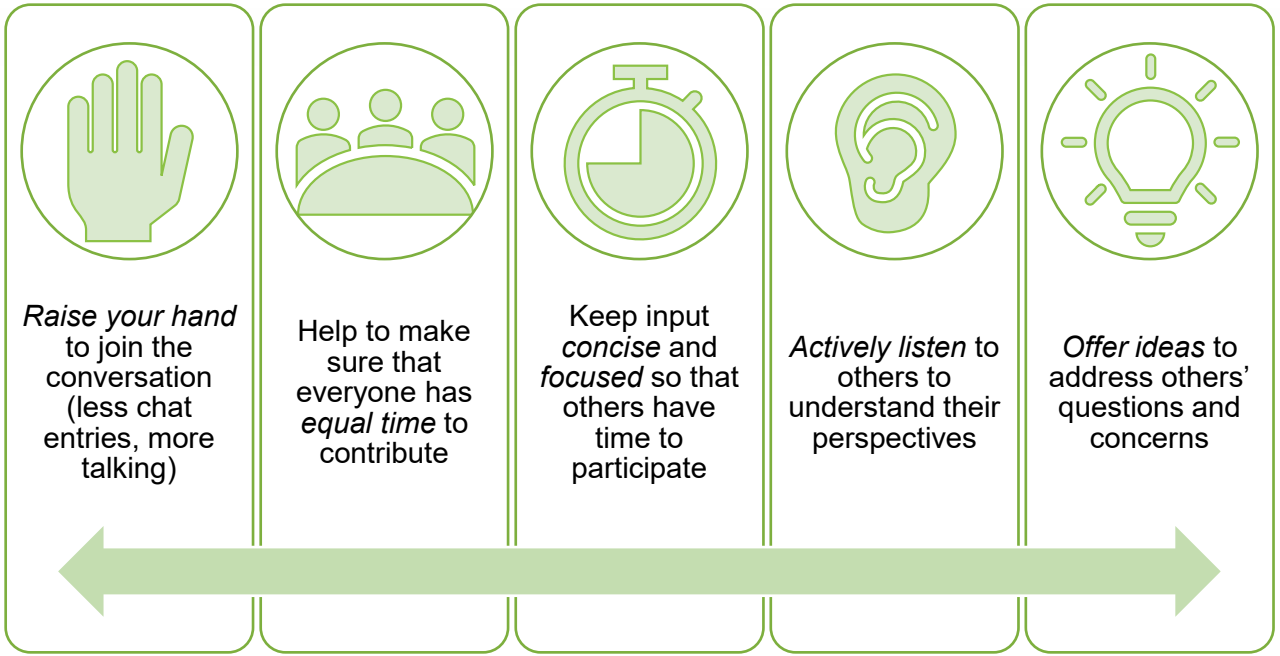
Agenda

Start Time	Item
10:00 a.m.	Welcome, Meeting Purpose and Agenda Overview
10:05 a.m.	Rates and Affordability
10:35 a.m.	Universal Access to Safe and Comfortable Home Temperatures
11:00 a.m.	Grid Reliability and Resilience
11:25 a.m.	Jobs
12:00 p.m.	Adjourn

Our Guide for Productive Meetings



Steering Committee Roster

Organization	Representative
Alliance of River Communities (ARC)	Vincent Montalvo
City of LA Climate Emergency Mobilization Office (CEMO)	Marta Segura, Rebecca Guerra
Climate Resolve	Jonathan Parfrey, Bryn Lindblad
Community Build, Inc.	Robert Sausedo
DWP-NC MOU Oversight Committee	Tony Wilkinson, Jack Humphreville
Enterprise Community Partners	Jimar Wilson, Michael Claproth
Esperanza Community Housing Corporation	Nancy Halpern Ibrahim
Los Angeles Alliance for a New Economy (LAANE)	Kameron Hurt, Estuardo Mazariegos
Move LA	Denny Zane, Eli Lipmen
Pacific Asian Consortium in Employment (PACE)	Celia Andrade, Susan Apeles
Pacoima Beautiful	Veronica Padilla Campos, Melisa Walk
RePower LA	Michele Hasson, Roselyn Tovar
The South Los Angeles Transit Empowerment Zone (SLATE-Z)	Zahirah Mann, April Sandifer
South LA Alliance of Neighborhood Councils	Thryeris Mason
Strategic Concepts in Organizing and Policy Education (SCOPE)	Agustín Cabrera, Tiffany Wong

Steering Committee Agendas

Tentative Schedule

4/19/23 #18	• Preliminary results and strategies discussion:
	  • Rates & Affordability (NREL)
	  • Universal access to safe and comfortable homes
	  • Grid Reliability and Resilience
	• Jobs (UCLA)

5/17/23	• Equity Strategies Summary (NREL & UCLA) • Next Steps Discussion (for LADWP & Steering Committee)

Rates and Affordability

Thomas Bowen, NREL
Christina Simeone, NREL

Equity Strategy Modeling and Analysis

NREL is conducting modeling, analysis, and strategy development along prioritized pathways:	
Affordability	Low-income energy bill affordability.
Housing	Universal access to safe and comfortable home temperatures.
	Housing weatherization and resilience to extreme events.
Solar & Storage	Improved access to solar and storage for multifamily residents and renters.
	Equitable community solar access and benefits.
Transportation Electrification	Equitable transportation electrification – electric vehicles (EVs), charging, and multimodal.
Grid Reliability & Resilience	Distribution grid upgrades to enable equitable solar, storage, and EV adoption and resilience.
Air Quality & Health	Truck electrification for improved air quality and health outcomes.

This presentation covers the highlighted pathway.

Community Guidance

Guidance from the LA100 Equity Strategies Steering Committee, Listening Sessions with community-based organizations and community members, and community meetings included:

- Energy affordability is the highest priority.
- Ensure energy upgrades don't raise rents.
- Low-income ratepayers and seniors suggested subsidies, free aid, and other support instruments to address communities' inability to pay electricity bills.
- Reassess eligibility for Los Angeles Department of Water and Power (LADWP) programs. This could include:
    - Reassessing how to measure eligibility and burden
    - Basing criteria on an understanding of burdens as context-specific
    - Examining how energy burdens affect household access to benefits such as homeownership
    - Expanding access to moderate-income households.
- Expand eligibility for LADWP programs to renters.
- Expand programs helping low-to-moderate-income disadvantaged community (DAC) residents maintain and upgrade their homes affordably, which also improves access to homeownership.

Steering Committee Member:

"Split incentives for affordable housing owners and operators must be addressed. They can't recuperate costs of solar and other upgrades, electrification. Use the rate structure to make sure low-income households receive financial benefits from upgrades."

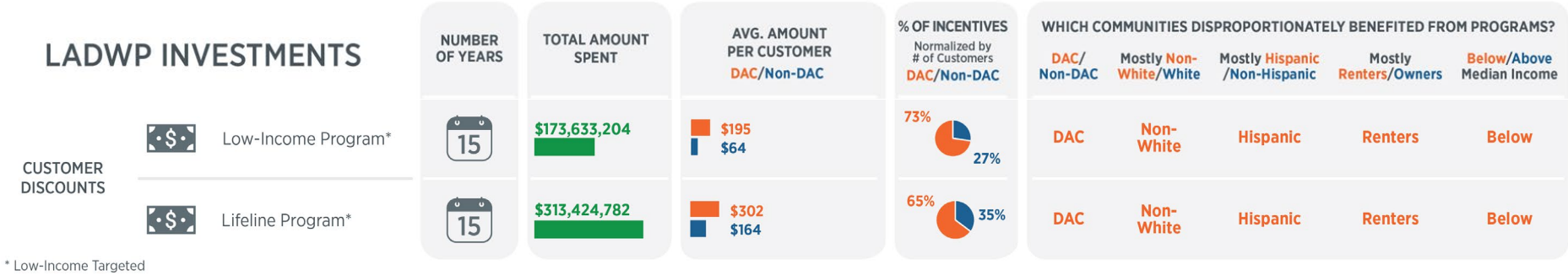
Steering Committee Member/Community-Based Organization Representative:

"Our constituents are concerned about utility debt."

Community Member (at community meeting)**:**

"Households in hotter areas of the city can't afford new technologies like solar and are hit [potentially in the future] with time-of-use charges. This is inequitable."

LADWP Investments



* Low-Income Targeted

The $487 million LADWP invested over the last 15 years in the Low-Income and Lifeline Programs appropriately benefited DACs.

Non-DACs received 56% of the total number of non-low-income-targeted LADWP residential incentives analyzed (including EV, solar, and efficiency programs) and make up 51% of the population.

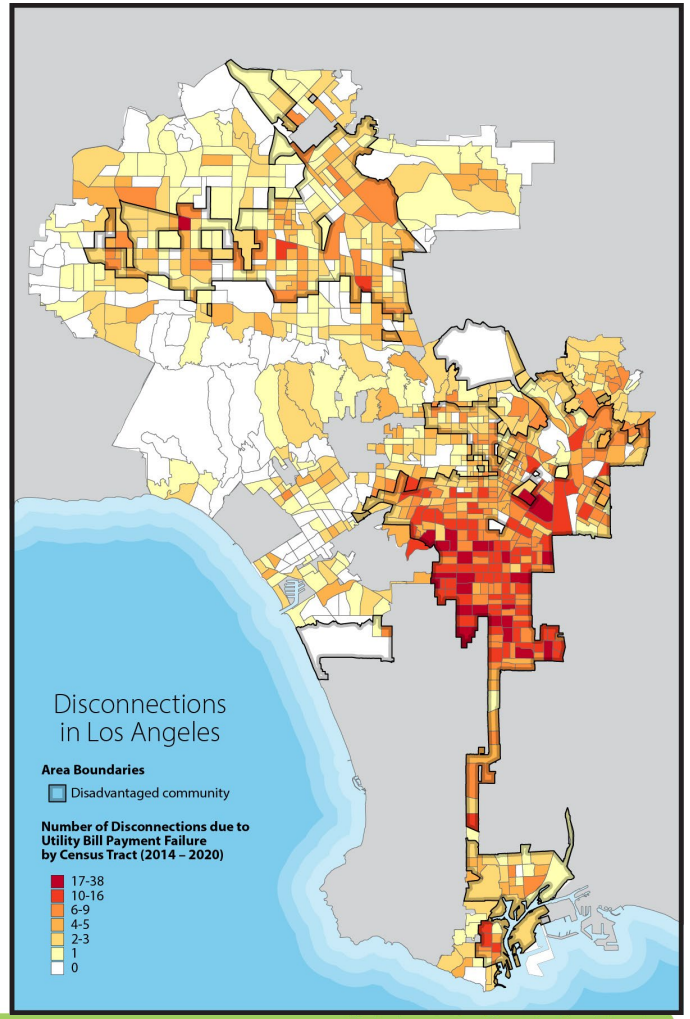
Number of Disconnections

Which communities experienced the most utility disconnections (2014 – 2020)?				
Non-DAC/DAC	Mostly White/Mostly Non-White	Mostly Non-Hispanic/Mostly Hispanic	Mostly Owners/Renters	Above/Below Median Income*
DAC	Mostly Non-White	Mostly Hispanic	Renters	Below

**Median income: $73,100 annual salary (2019)*

Between 2014 and 2020, **disadvantaged communities (DACs), mostly non-White, mostly Hispanic, mostly renters, and mostly below-median-income** households experienced, on average, marginally higher power disconnections than non-DAC/mostly White/mostly non-Hispanic/mostly homeowners/higher-income households.

In November 2022, LADWP ceased disconnections for certain program enrollees (e.g., EZ-SAVE, Lifeline) and during extreme weather events.



Existing Distributional Inequities

Low-Income Assistance Investments in Context

- In 2020, Los Angeles County was home to 30% California's population living in poverty, far more than any other county in the state.

- LADWP has low enrollment (<17% of residential class) and low bill discounts ($8/month in 2019) compared to investor-owned utility assistance programs.

- LADWP described its own low-income assistance programs as having:
  - "Minimal outreach efforts by LADWP to customers"
  - "No targeted communications to customers"
  - "No formal engagement with community-based organizations"
  - "Reduction in customers recertifying for the program." (i.e., losing customers from the program).

  (*January 25, 2022, Rates and Equity Metrics Board Package)*

Low-Income Energy Bill Affordability

Thomas Bowen, NREL
Christina Simeone, NREL

Analysis does not include customer adoption of solar photovoltaics (PVs) or electric vehicles (EVs), which cause cross-subsidization from typically low-income customers to typically high-income adopters and lead to less equitable outcomes in 2035.

Affordability Key Findings

- Under a business-as-usual scenario LADWP bills are anticipated to grow in real terms
- These increases will fall disproportionately on low-income customers
- If LADWP follows CPUC guidance on tier rates, roughly similar equity outcomes are observed even without low-income bill assistance
- Low-income bill assistance in-line with CPUC guidance offers significant improvements in equity but at higher program costs
- Explicitly designing rates to achieve equity outcomes (income-based fixed charges) would be challenging but would yield significantly more equitable outcomes

Equity Metrics

- **Energy Burden** (electricity only) – Annual household income divided by annual household electricity expense, expressed as a percentage. The lower the more affordable. Customers spending more than 6% of income on energy bills are considered energy burdened.
  - Customers where income is zero or electricity expense is greater than income are not included in “average” metrics.

- **Hours Worked at Minimum Wage (HMW)** – The number of hours a person working at City of LA minimum wage must work to pay for a monthly electricity bill. The lower the more affordable.

Modeling and Analysis Results

These preliminary results are under revision.

Key Finding: By 2035, continuing LADWP's existing approach to rates and low-income assistance in a business-as-usual (BAU) scenario increases average monthly electricity bills 8.4% more for lowest-income customers compared to the entire residential customer class. The BAU scenario decreases affordability for low-income customers on all metrics examined.

The BAU scenario results in:

- Higher bills and burdens for all customers ($17.49 higher per month, 0.75% higher burden)
- Disproportionately higher bills for low-income customers ($18.95 higher per month, 3% higher burden)
- 2,118 more customers over 100% electricity burdens, meaning annual electricity expense is greater than annual income.
- Less affordable, based on greater number of Hours at Minimum Wage to pay for bills.

	2019	2035
Rate Equity Metric	**Baseline (LADWP w/ EZ-Save)**	**BAU (LADWP w/EZ-Save)**
Average Monthly Bill (All Households)	$ 93.46	$ 110.95
Average Monthly Bill (Lowest Income , <$20k)	$ 70.08	$ 89.03
Households Over 100% Electricity Burden (Number of Households)	4,249	6,367
Average Annual Electricity Burden (All Households)	3.54%	4.29%
Average Annual Electricity Burden (Lowest-Income, <$20k)	13.66%	16.69%
Average Monthly Hours Worked at Minimum Wage for an Average Month (All Households)	4.74	5.63
Average Monthly Hours Worked at Minimum Wage for an Average Cost Month (Lowest-Income, <$20k)	3.56	4.52

LEGEND - Color coding is relative to other entries in the row.
Less affordable
More affordable

Modeling and Analysis Results

These preliminary results are under revision.

LEGEND - Color coding is relative to other entries in the row.

- Less affordable
- More affordable
- Equal/neutral

Key Finding: Revising rate design from LADWP's existing 15-period rates to a simple 2-tiered inclining block rate structure, as recommended by the CPUC, incrementally improves some affordability and equity metrics at zero program cost, but also makes lowest-income metrics worse. Low-income assistance strategies would be needed to address negative impacts.

- Most affordability improvements in a 2-tiered inclining block rate approach accrue to "all customers" and $20k-$50k customer bins.
- The 2-tiered inclining block rate approach increases average lowest-income bin bills.
- Average electricity burden for lowest-income households is unchanged, likely because number of households over 100% burden increase.
- HMW increases for lowest-income customers.

	2035	
Rate Equity Metric	**BAU (LADWP w/EZ-Save)**	**2-Tier (CPUC)**
Average Monthly Bill (All Households)	$ 110.95	$ 110.96
Average Monthly Bill (Lowest-Income , <$20k)	$ 89.03	$ 91.26
Transfer Cost (Assistance Program Cost as % of Total Residential Revenue Requirement)	1.36%	0.00%
Average Annual Electricity Burden (All Households)	4.29%	4.25%
Average Annual Electricity Burden (Lowest-Income, <$20k)	16.69%	16.69%
Households Over 100% Electricity Burden (Number of Households)	6,367	6,998
Average Monthly Hours Worked at Minimum Wage for an Average Month (All Households)	5.63	5.63
Average Monthly Hours Worked at Minimum Wage for an Average Cost Month (Lowest-Income, <$20k)	4.52	4.63

Modeling and Analysis Results

These preliminary results are under revision.

LEGEND - Color coding is relative to other entries in the row.
- Least affordable
- Middle value
- Most affordable
- Equal/neutral

Key Finding: A robust assistance program for low- and moderate-income households modeled after the CARE and FERA* programs (funded by non-eligible customers) significantly improves affordability outcomes. The most affordable scenario is a 2-tiered inclining block rate with CARE and FERA programs. This comes with a 10.3% of residential revenue requirement program cost paid for by non-eligible customers.

**CARE offers 30%-35% electric bill discounts for low-income households. FERA offers 18% discounts for families that are just above CARE income eligibility. California investor-owned utilities (IOUs) are required to offer CARE and FERA programs. Enrollment modelled at 89% for CARE and 15% for FERA, comparable to average IOU enrollment levels.*

	2035		
Rate Equity Metric	**BAU (LADWP w/EZ-Save)**	**BAU (CARE & FERA)**	**2-Tier (CARE & FERA)**
Average Monthly Bill (All Households)	$ 110.95	$ 110.95	$ 110.96
Average Monthly Bill (Lowest-Income, <$20k)	$ 89.03	$ 65.62	$ 63.24
Transfer Cost (Assistance Program Cost as % of Total Residential Revenue Requirement)	1.36%	10.58%	10.30%
Average Annual Electricity Burden (All Households)	4.29%	3.60%	3.45%
Average Annual Electricity Burden (Lowest-Income, <$20k)	16.69%	12.79%	12.04%
Households Over 100% Electricity Burden (Number of Households)	6,367	4,791	4,917
Average Monthly Hours Worked at Minimum Wage for an Average Month (All Households)	5.63	5.63	5.63
Average Monthly Hours Worked at Minimum Wage for an Average Cost Month (Lowest-Income, <$20k)	4.52	3.33	3.21

Modeling and Analysis Results

These preliminary results will change.
Excludes EV & PV adoption

LEGEND - Color coding is relative to other entries in the row.
- Least affordable
- Middle value
- Most affordable
- Equal/neutral

Key Finding: Of the rate structures analyzed, income-based fixed charges (IBFC) – meaning residual costs are assigned to customers at amounts scaled to their income – with robust low-income assistance, achieves the greatest affordability for lowest-income customers. However, this rate design strategy is theoretical and not common utility practice.

	2035		
Rate Equity Metric	**BAU (LADWP w/EZ-Save)**	**2-Tier (IBFC)**	**2-Tier (IBFC, CARE & FERA)**
Average Monthly Bill (All Households)	$ 110.95	$ 110.96	$ 110.96
Average Monthly Bill (Lowest-Income , <$20k)	$ 89.03	$ 38.54	$ 26.81
Transfer Cost (Assistance Program Cost as % of Total Residential Revenue Requirement)	1.36%	0.00%	6.59%
Average Annual Electricity Burden (All Households)	4.29%	2.75%	2.31%
Average Annual Electricity Burden (Lowest-Income, <$20k)	16.69%	7.59%	5.34%
Households Over 100% Electricity Burden (Number of Households)	6,367	4,287	3,909
Average Monthly Hours Worked at Minimum Wage for an Average Month (All Households)	5.63	5.63	5.63
Average Monthly Hours Worked at Minimum Wage for an Average Cost Month (Lowest-Income, <$20k)	4.52	1.96	1.36

California Propositions 26 and 218

- Treats municipal fees as taxes
- Requires fees/taxes to be cost-based
- Prohibits customer rate cross-subsidization
- Voter approval required to increase fees/taxes

Equity Strategies

Rates and Affordability DRAFT for Discussion

Baseline Equity

- LADWP low-income and Lifeline programs appropriately benefited disadvantaged communities.
- LADWP has low enrollment (<17% of residential class) and low bill discounts ($8/month in 2019) compared to investor-owned utility assistance programs.

Community Solutions Guidance

- Low-income ratepayers and seniors suggested subsidies, free aid, and other support instruments to address communities' inability to pay electricity bills.

Modeling & Analysis Key Findings

- The combination of standard rate design practices and reformed low- and moderate-income assistance programs significantly improves affordability for households compared to BAU.
  - $26/month average monthly bill decrease for low-income households
  - Average electricity burden drops from 16.7% to 12% for low-income households
- This combination is generally consistent with practices of other California investor-owned utilities.

Equity Strategies

- Converting to a two-tier CPUC-recommended rate design, with no low-income assistance program results in no transfer costs across residential customers and results in similar outcomes to the existing rate design with the EZ-SAVE program.
- Combining LADWP's existing rate design with low-income assistance approaches modeled after the CPUC's CARE and FERA programs yields a 26% reduction in monthly electricity bills for low-income customers, a 16% reduction in energy burden for all customers, and a 23% reduction in energy burdens for low-income customers compared to the EZ-SAVE program.

Rates and Affordability DRAFT for Discussion

Baseline Equity

- LA County has a higher concentration of low-income population (30%) than any other California county, increasing the need for effective low-income assistance.

Community Solutions Guidance

- Focus on affordability as the highest priority.
- Reassess how to measure eligibility and burden and expand eligibility for moderate-income households.

Modeling & Analysis Key Findings

- Income-Based Fixed Charges (IBFC) deliver the most improved affordability for low-income households at no programmatic cost.
  - $50/month decrease in low-income monthly bills.
  - Electricity burden drops from 16.7% to 7.6% for low-income households.
- IBFC are a theoretical rate construct, not a common practice.
- Verifying customer income is difficult but required for this rate strategy.

Equity Strategy

Compared to the existing rate design and EZ-SAVE program:

- Combining the two-tier rate design with CARE and FERA assistance program approaches yields a 29% reduction in monthly electricity bills for lowest-income customers, a 20% reduction in energy burden for all customers, and a 28% reduction in energy burdens for lowest-income customers.
- Converting to a two-tier CPUC-recommended rate design and income-based fixed charges results in a 57% reduction in monthly electricity bills for lowest-income customers, a 36% reduction in energy burden for all customers, and a 54% reduction in energy burdens for lowest-income customers.

Final Results (coming May 2023)

- Forthcoming results will include affordability metrics for:
  - Modeled time-of-use (TOU) rate scenarios
  - Modeled “Pay as You Save” on-bill efficiency financing scenarios
  - “Renters Discount Program” scenario targeting flat discounts for non-sub-metered rental customers
  - Revisions to inflation adjustments
  - Integrated, improved retail gas price forecasts and expanded energy burden calculation for more complete household energy use.

Discussion

Please share ideas and suggestions about the draft equity strategies.

(A continued response opportunity will be available after the meeting.)

Universal Access to Safe and Comfortable Home Temperatures

Noah Sandoval, National Renewable Energy Laboratory (NREL)
Katelyn Stenger, NREL
Tony Fontanini, NREL
Ry Horsey, NREL

Equity Strategy Modeling & Analysis

NREL is conducting modeling, analysis, and strategy development along prioritized pathways:	
Affordability	Low-income energy bill affordability.
Housing	Universal access to safe and comfortable home temperatures.
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Solar & Storage	Improved access to solar and storage for multifamily residents and renters.
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Grid Reliability & Resilience	Distribution grid upgrades to enable equitable solar, storage, and EV adoption and resilience.
Air Quality & Health	Truck electrification for improved air quality and health outcomes.

This presentation covers the highlighted pathway.

Community Guidance

Guidance from the LA100 Equity Strategies Steering Committee, listening sessions with community-based organizations and community members, and community meetings included the following:

- The need for safe living conditions.
- Concerns that upgrades will raise rents and cause displacement.
- More diversified and community-tailored outreach and support, such as feedback channels.
- Affordable program options that require fewer upfront costs.
- Support for home improvements needed for upgrades like electrical panels or mold abatement.
- Amended eligibility requirements for ratepayers experiencing disadvantages that do not fit current criteria (e.g., moderate-income household eligibility).
- Maintenance and safety upgrade support.
- Revised Los Angeles Department of Water and Power (LADWP) programs that address the split incentive problem between renters and homeowners.
- Need for apprenticeship programs and local knowledge.

Steering Committee member:
"Passive cooling is critical, not just air conditioning. Reflective surfaces, cool roofs, insulation, planting trees on the southwest corner of homes should all be considered."

Steering Committee member:
"We have a housing crisis throughout the city with a burgeoning homelessness crisis … landlords are flipping people out of buildings, using temperature/climate to push tenants out by diminishing the habitability, or they will pass costs on to tenants to increase their rents. We need a code that no benefits/public money will be given to landlords without tenant protections. It has to be written into any strategies from this work—legal mechanisms to ensure habitability without increasing rent or utility burden. It comes down to habitable housing or the streets."

Baseline Equity Analysis

Jane Lockshin, NREL

LADWP Residential Efficiency Investments (2005 – 2021)

LADWP RESIDENTIAL INVESTMENTS		NUMBER OF YEARS	TOTAL AMOUNT SPENT	AVG. AMOUNT PER CUSTOMER DAC/Non-DAC	% OF INCENTIVES Normalized by # of Customers DAC/Non-DAC	WHICH COMMUNITIES DISPROPORTIONATELY BENEFITED FROM PROGRAMS? DAC/Non-DAC	Mostly Non-White/White	Mostly Hispanic/Non-Hispanic	Mostly Renters/Owners	Below/Above Median Income
ENERGY EFFICIENCY	Home Energy Improvement Program	3	$3,378,869	$3 / $2	61% / 39%	DAC		Hispanic	Owners	
	Refrigerator Turn-In and Recycle Program	5	$2,667,307	0.01 refrigerators / 0.014 refrigerators	42% / 58%	Non-DAC	White	Non-Hispanic	Owners	Above
	Consumer Rebate Program	6	$93,248,144	$64 / $74	46% / 54%	Non-DAC	White	Non-Hispanic	Owners	Above
	Other Non-Low-Income-Targeted Programs	15	$36,343,548	$20 / $34	35% / 65%	Non-DAC	White	Non-Hispanic	Owners	Above
	Energy Savings Assistance Program*	5	$7,897,260	$11 / $1	92% / 8%	DAC	Non-White	Hispanic	Renters	Below

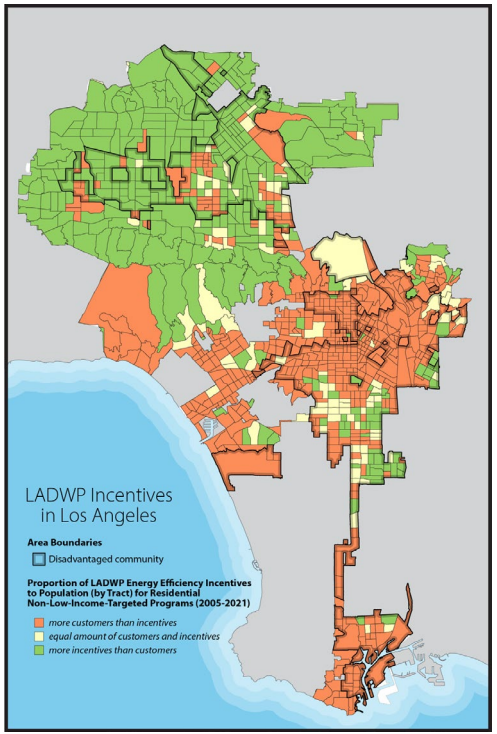
* Low-Income Targeted

Programs representing 92% of the $143.5 million in LADWP residential energy efficiency investments analyzed disproportionately benefited non-disadvantaged (non-DAC), mostly White, mostly non-Hispanic, mostly home-owning, and mostly above-median-income communities.

Did census tracts receive incentives proportional to their population*?

*number of households

Residential Efficiency Programs Not Targeting Low-Income Households (2005 – 2021)



Energy Efficiency Incentive Programs

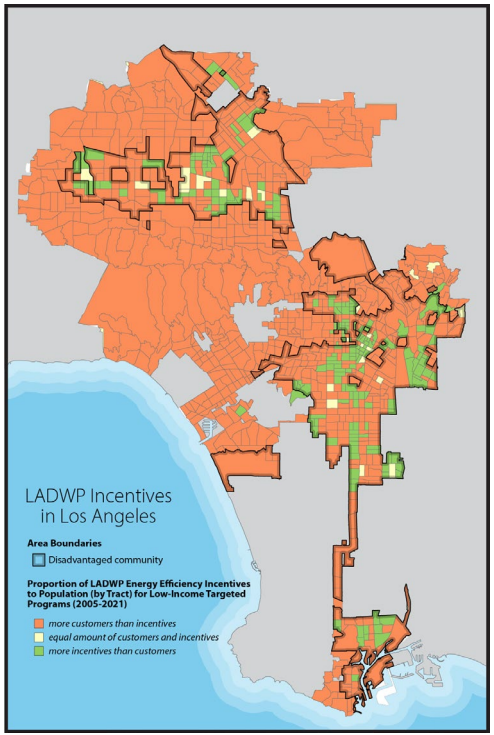
Tracts where:

- % of households* > % of incentives received**:
  "more customers than incentives"
- % of incentives received** > % of households*:
  "more incentives than customers"
- % of incentives received** = % of households*:
  "equal number of customers and incentives"

*% of households = number of households in a census tract divided by the total number of households

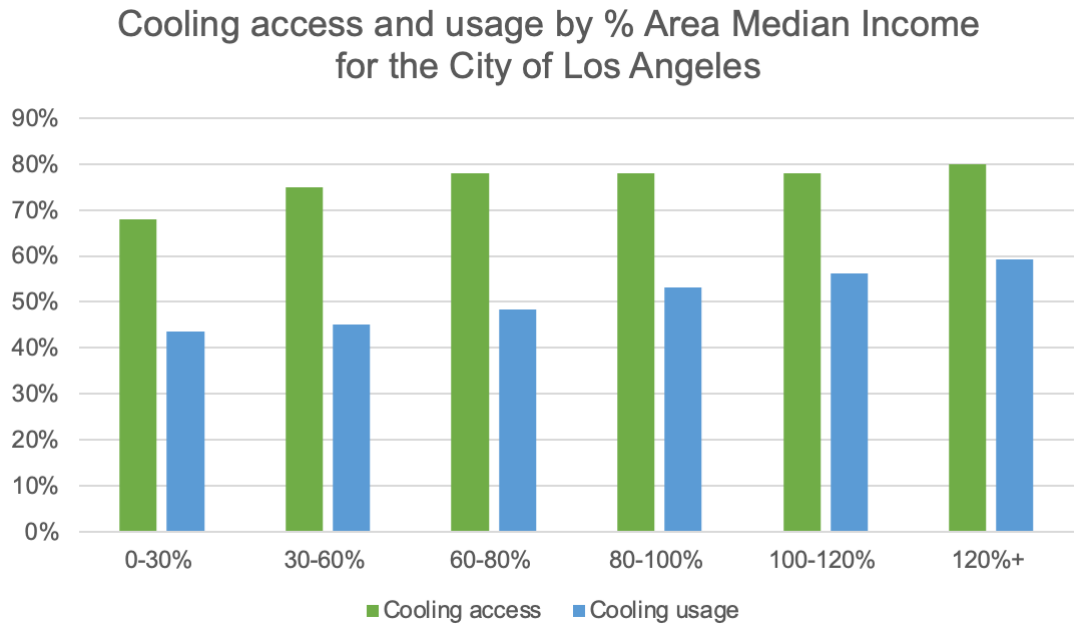
**% of incentives received = number of incentives granted to tract divided by the total number of incentives

Residential Efficiency Programs Targeting Low-Income Households (2005 – 2021)



Residential Building Cooling Access and Use by Income

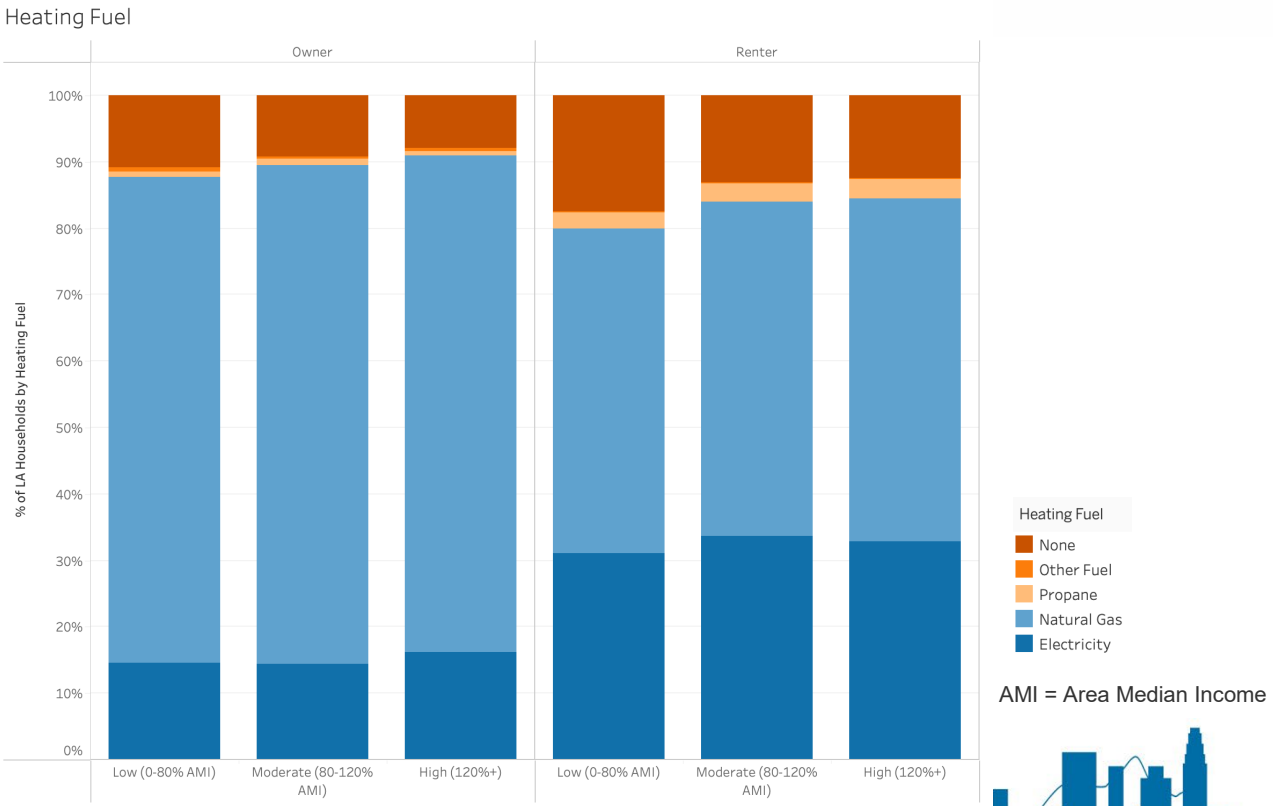
Less than 50% of low-income households (0-80% Area Median Income) use cooling. More than 30% of extremely low-income (0-30%) households lack access to cooling.



Source: NREL preliminary residential building modeling for the City of Los Angeles (2022)

Residential Building Heating Fuel by Income and Renter/ Owner Status

Nearly 20% of low- and moderate-income renters lack access to heating or use propane, the highest-cost fuel, for heating.



AMI = Area Median Income

Source: NREL preliminary residential building modeling for the City of Los Angeles (2022)

Universal Access to Safe and Comfortable Home Temperatures

Noah Sandoval, NREL
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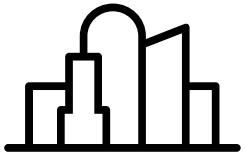
Modeling Los Angeles Homes

ResStock



Building stock characteristics database

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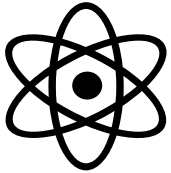

Physics-based computer modeling

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High-performance computing

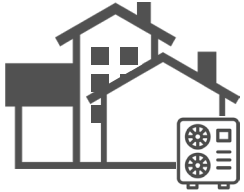
NREL modeled 50,000 dwellings representing the diversity of building types (like single family, multifamily), building technologies, climate zones, incomes, and renter/owner status in LA.

ResStock modeling process:

1. Describe the Los Angeles home characteristics probabilistically.
2. Sample the stock characteristics.
3. Make a physics-based model for each sample.
4. Model changes to the homes: cooling systems, shading, cool roofs, insulation, window improvement, and air sealing.
5. Assess impact on home temperatures, energy use, and bills.

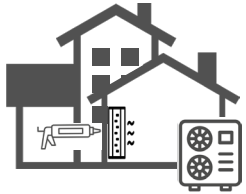
5 Distinct Building Weatherization and Cooling Upgrades Simulated

Baseline

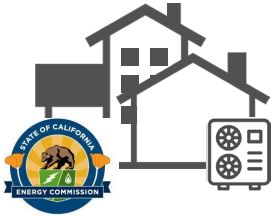


Cooling Use

Cooling Use, Cool Roof, and Shading



Cooling Use and Low-Cost Envelope Improvements



Cooling Use and Title 24 Envelope Improvements

Universal Cooling Access by Income

Key Finding: Adding cooling decreases maximum indoor air temperatures from 93°F to 80°F across all dwelling units. No substantial benefit is observed from added envelope upgrades.

Reducing Heat Exposure

Key Finding: Low-income households are expected to experience 30 more days of dangerous heat exposure on average than higher-income households in 2035 under existing conditions.

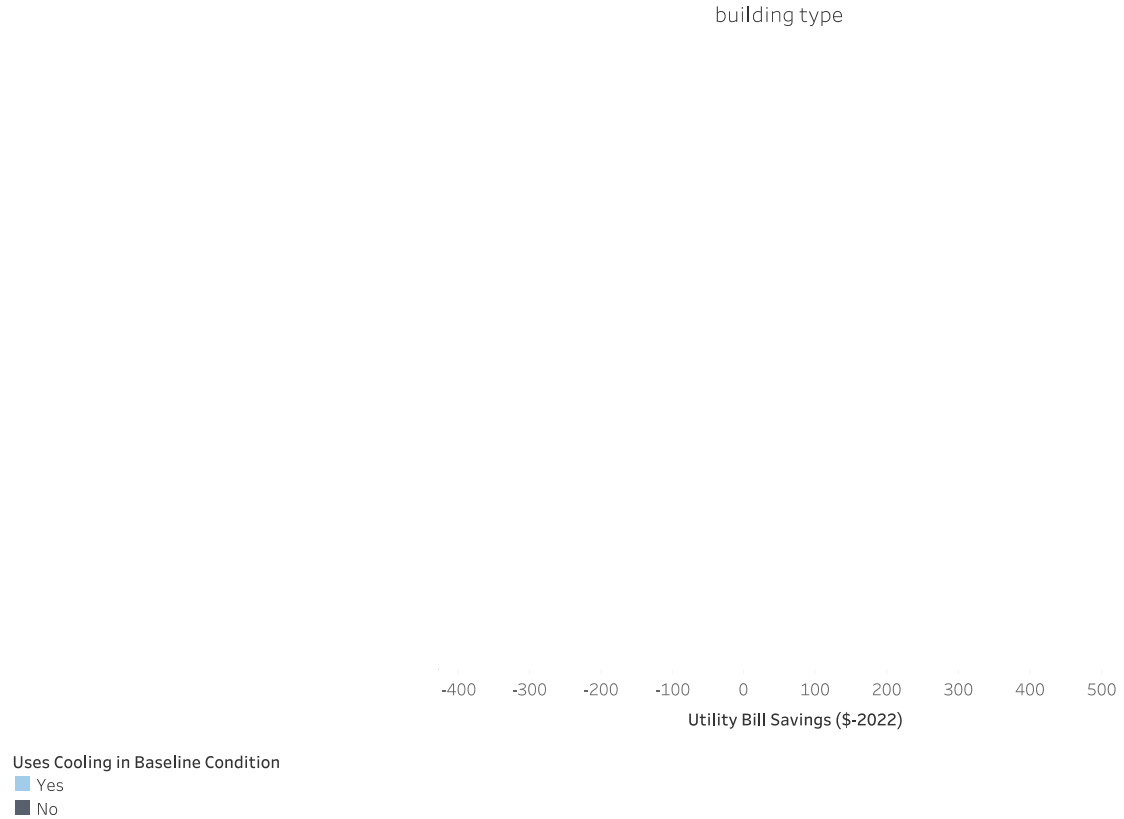
Cooling use decreases the number of hours above 86°F across all income levels.

Upgrade	Low-income 0–80% AMI	Moderate-income 80%–120% AMI	Higher-income 120%+ AMI
Baseline	1,652	1,188	945
Cooling Use	1	0	0
Cooling Use, Cool Roofs, and Shading	1	0	0
Cooling Use and Low-Cost Envelope Improvements	1	1	1
Cooling Use and Title 24 Envelope Improvements	2	1	1

Modeled average hours above 86°F by income and scenario (2035)

The Leadership in Energy and Environmental Design (LEED) *Passive Survivability and Functionality During Emergency* standard requires a residential building to not exceed 86°F.

Annual Utility Bill Savings by Cooling Access



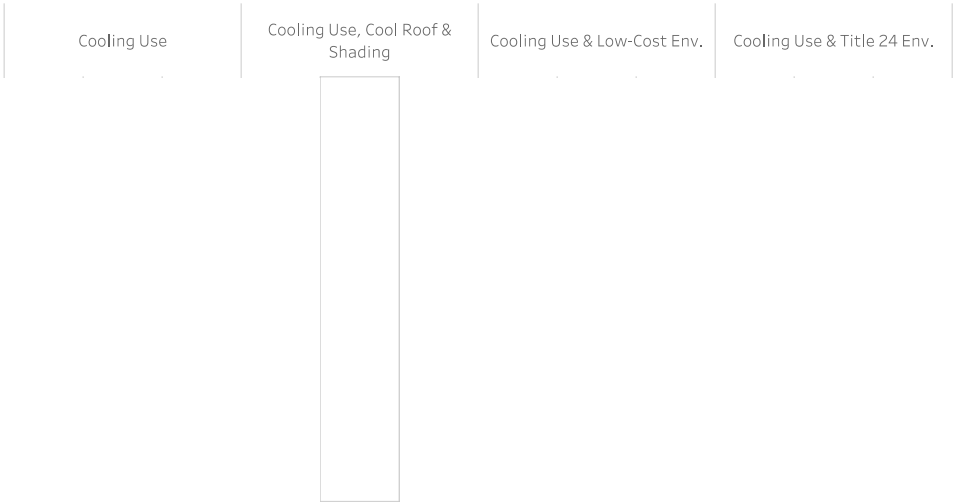
Key Finding: Dwellings with cooling in the baseline all experience utility bill savings regardless of upgrade or building type.

Dwellings without cooling in the baseline do not have utility bill savings because of increased cooling use regardless of upgrade or building type.

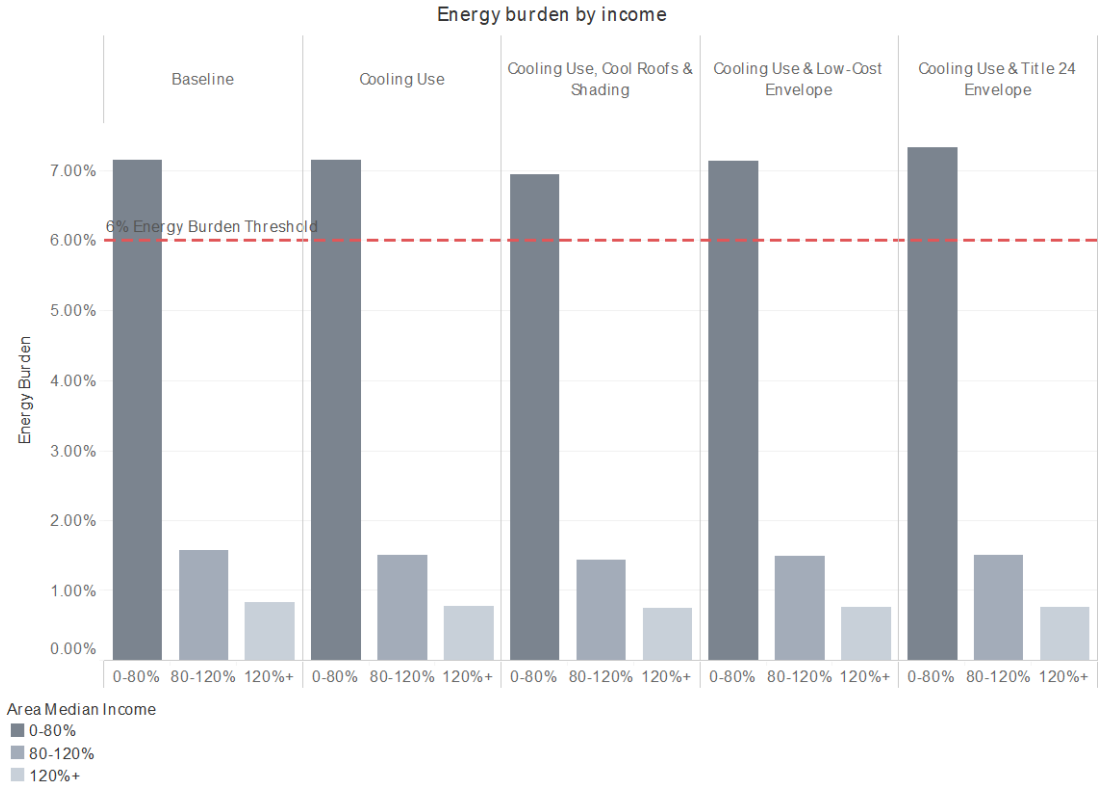
Annual Utility Bill Savings with Cooling Access in Baseline

Key Finding: As compared to the baseline, households with cooling access save on their utility bills for all upgrades, income levels and housing types. Single-family dwellings save more than multifamily dwellings.

On average, renters save the most on utility bills with cooling, cool roofs, and shading for both single and multifamily buildings.



Energy Burden



Energy burden is defined as the percent of household income spent on utility bills.

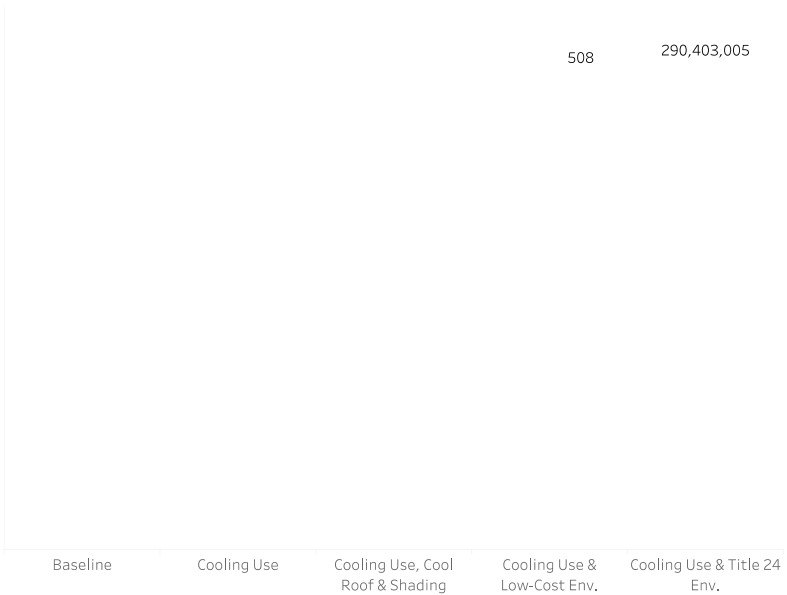
Key Finding: Upgrades do not substantially change energy burdens from the Baseline scenario. Low-income households (0-80% AMI) still experience severe energy burdens.

HUD, (Lin, 2018), and (Colton, 2011) classify energy burden above 6% as energy burdened, and (Hernandez, 2022) classifies energy burden above 10% as severe.

Electricity Use for LA Housing Stock

Key Finding:
All upgrades decrease total residential electricity use for the LA housing stock.

Cooling use combined with cool roofs and shading decrease electricity use the most of upgrades modeled at 6% or 18.5 GWh in 2035.



Equity Strategies

Universal Access to Safe and Comfortable Home Temperatures DRAFT for Discussion

Baseline Equity

- Less than 50% of low-income households (0–80% AMI) use cooling. More than 30% of extremely low-income (0–30%) households lack access to cooling.
- Nearly 20% of low- and moderate-income renters lack access to heating or use propane, the highest-cost fuel, for heating.

Community Solutions Guidance

- Transparent explanation of benefits and costs of weatherization measures.
- Simplified application materials and methods.
- Funded, staffed, culturally informed, transparent, tailored, and consistent outreach and communication (promotora-type approach).

Modeling & Analysis Key Findings

- Adding cooling decreases maximum indoor air temperatures from 93°F to 80°F across all dwelling units.
- Adding cooling decreases the number of hours above 86°F across all income levels.
- All upgrades decrease total electricity use for the LA housing stock. Cooling use, cool roofs, and shading decrease electricity use by 6%.

Equity Strategies

- Prioritize cooling technology installation for low- and moderate-income multifamily renters without cooling access.
- Prioritize coordinated deployment of cooling access and envelope upgrades in multifamily, renter-occupied buildings to increase comfortable home temperatures.
- Fund and staff program outreach and technical assistance in partnership with community organizations targeting areas that received disproportionately fewer efficiency incentives like South LA, and for programs like LADWP's AC Optimization Program.
- Implement pilot upgrades and enable community access to see results and build trust.

Universal Access to Safe and Comfortable Home Temperatures DRAFT for Discussion

Baseline Equity

- Programs representing 92% of the $143.5 million in LADWP residential energy efficiency investments analyzed disproportionately benefited non-disadvantaged (non-DAC), mostly White, mostly non-Hispanic, mostly home-owning, and mostly above-median-income communities.

Community Solutions Guidance

- Deliver benefits to moderate-income, renter, and energy-burdened households and households in multifamily housing.
- Concerns about increased rent as a result of LADWP-supported improvements.
- Concerns about electric panel upgrades.

Modeling & Analysis Key Findings

- On average, cooling and weatherization upgrades save homeowners more in utility bills than renters. Cooling, cool roofs, and shading upgrades decrease utility bills the most for renters.
- On average, owners have a quicker payback period than renters of at least 2 years across income and upgrade types. Low-income renters have the quickest payback period with a cooling technology upgrade.
- Inflation Reduction Act Home electric rebates (Section 50122) could cover costs of direct installation among low-income households and support electric panel upgrades when needed. IRA HOMES rebate (Section 50121) prioritizes energy saving technologies.

Equity Strategies

- Shift to direct install instead of rebates for low-income households.
- Coordinate with the state to generate financial mechanisms for direct installation of heat pumps using IRA rebates in low-income households.
- Include funding for renovations and electrical upgrades needed to add cooling and use IRA rebates for direct installs.
- Prioritize rent-controlled and affordable housing buildings/units where upgrades will not increase rents.

Universal Access to Safe and Comfortable Home Temperatures DRAFT for Discussion

Baseline Equity

- Many disadvantaged communities, including much of South LA, did not receive LADWP energy efficiency incentives proportional to their population.

Community Solutions Guidance

- Home visits to assess building conditions and safety.
- Apprenticeship, internship, entrepreneurship, and educational opportunities in weatherization.
- Consistent disadvantaged customer support system for safety and comfort maintenance and efficiency upgrades.

Modeling & Analysis Key Findings

- Nearly 20% of low- and moderate-income renters lack access to heating or use propane for heating, the highest-cost fuel.
- Access to cooling through a heat pump decreases extreme heat exposure by 99%.
- As compared to the baseline, households with cooling access save on their utility bills for all upgrades, income levels and housing types.

Equity Strategies

- Prioritize cooling access for low- and moderate-income households with no cooling or heating to provide safe and comfortable temperatures and increase comfort year-round.
- Support apprenticeship programs in disadvantaged communities for HVAC entrepreneurship and educational opportunities using IRA Workforce development funds (Section 50123).

Discussion

Please share ideas and suggestions about the draft equity strategies.

(A continued response opportunity will be available after the meeting.)

Equitable Distribution Grid Reliability and Resilience

Sherin Ann Abraham, NREL
Bryan Palmintier, NREL
Kwami Sedzro, NREL
Jane Lockshin, NREL
Gayathri Krishnamoorthy, NREL

Equity Strategy Modeling & Analysis

NREL is conducting modeling, analysis, and strategy development along prioritized pathways:	
Affordability	Low-income energy bill affordability
Housing	Universal access to safe and comfortable home temperatures
	Housing weatherization and resilience to extreme events
Solar & Storage	Improved access to solar and storage for multifamily residents and renters
	Equitable community solar access and benefits
Transportation Electrification	Equitable transportation electrification – EVs, charging, and multimodal
Grid Reliability & Resilience	Distribution grid upgrades to enable equitable resilience and solar, storage, and EV access
Air Quality & Health	Truck electrification for improved air quality and health outcomes

This presentation covers the highlighted pathway.

Community Guidance

- Invest in infrastructure capacity for all Angelenos by understanding barriers to accessing energy efficient technologies as coming from multiple sociodemographic factors.
- Remedy historical and ongoing neighborhood neglect by remediating outdated infrastructure and resolving safety and health concerns.
- Develop strategies to upgrade the grid and electrical capacity (i.e., panels) of existing housing stock in Los Angeles without further burdening disadvantaged communities.
- Guarantee access to safe & comfortable shelter during extreme events (i.e., heatwaves, fires) when home cooling access & grid reliability is compromised.
- Address underlying causes of blackout risks (i.e., rain, electrical capacity) and their negative impacts on home environments (i.e., short-circuiting, broken appliances, cost of damage).

Power Reliability Equity Baseline

LADWP

		NUMBER OF YEARS	AVERAGE PER YEAR	DO SOME COMMUNITIES EXPERIENCE MORE/LONGER INTERRUPTIONS?				
				DAC/ Non-DAC	Mostly Non-White/White	Mostly Hispanic /Non-Hispanic	Mostly Renters/Owners	Below/Above Median Income
POWER INFRASTRUCTURE RELIABILITY	Frequency of Interruptions *(number)*	6	0.93 DAC vs 0.78 Non-DAC	DAC		Hispanic		
	Duration of Interruptions *(minutes)*	6	159 DAC vs 149 Non-DAC					

Key Finding:
Disadvantaged communities (DACs) and mostly Hispanic communities experience more frequent power interruptions than non-disadvantaged, mostly non-Hispanic communities.

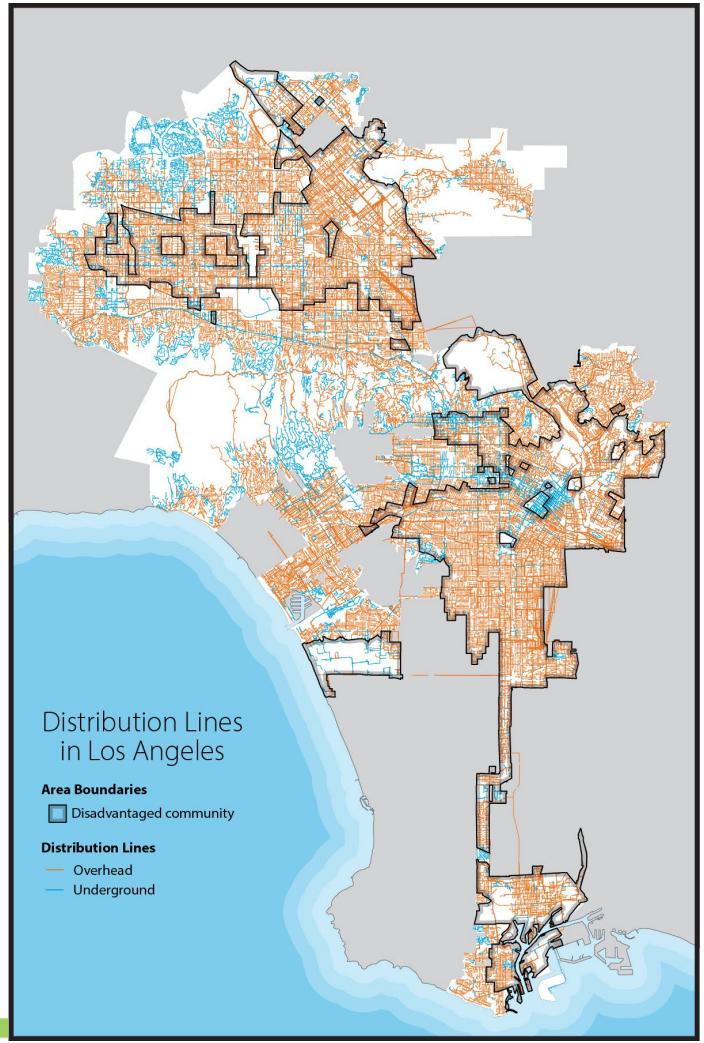
No statistically significant difference was found in the duration of power interruptions across communities.

Does the power infrastructure differ across communities?

Underground lines offer reliability, aesthetic, and other benefits.

	Distribution Lines		
	Overhead	*Underground*	*Percent Undergrounded*
DAC Tracts	3,198 miles	460 miles	12.6%
Non-DAC Tracts	3,413 miles	1,246 miles	26.7%

Key finding:
Disadvantaged community (DAC) census tracts are less than half as likely to have underground distribution lines compared to non-DAC.



Two Themes for Grid Analysis:

1. Equitable distribution grid upgrades for reliability and solar, storage, EV access

There are a series of barriers for DAC participation in the clean energy transition.

EV, PV, etc. Costs

Building Structure

Panels & Wiring

Grid Connection

Grid Itself

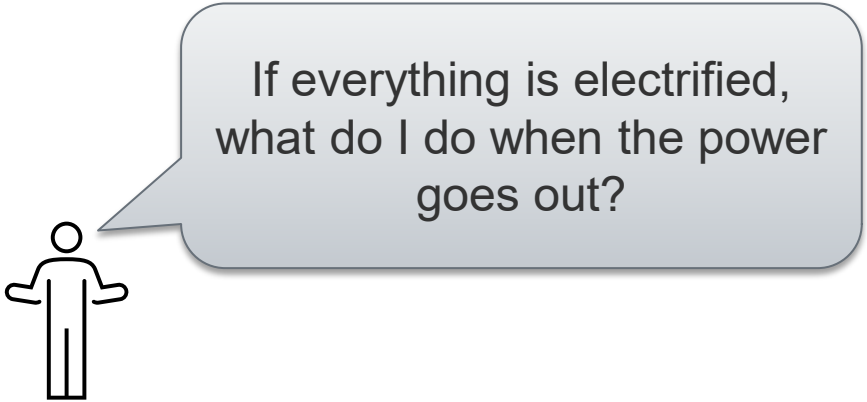
Other parts of LA100 Equity Strategies

Grid Analysis Focus

Two Themes for Grid Analysis:

1. Equitable distribution grid upgrades for reliability and solar, storage, EV access.

2. Equitable and resilient access to electricity-related services during extreme events.



Two Themes for Grid Analysis:

1. Equitable distribution grid upgrades for reliability and solar, storage, EV access.

2. Equitable and resilient access to electricity-related services during extreme events.

Sherin Ann Abraham, NREL
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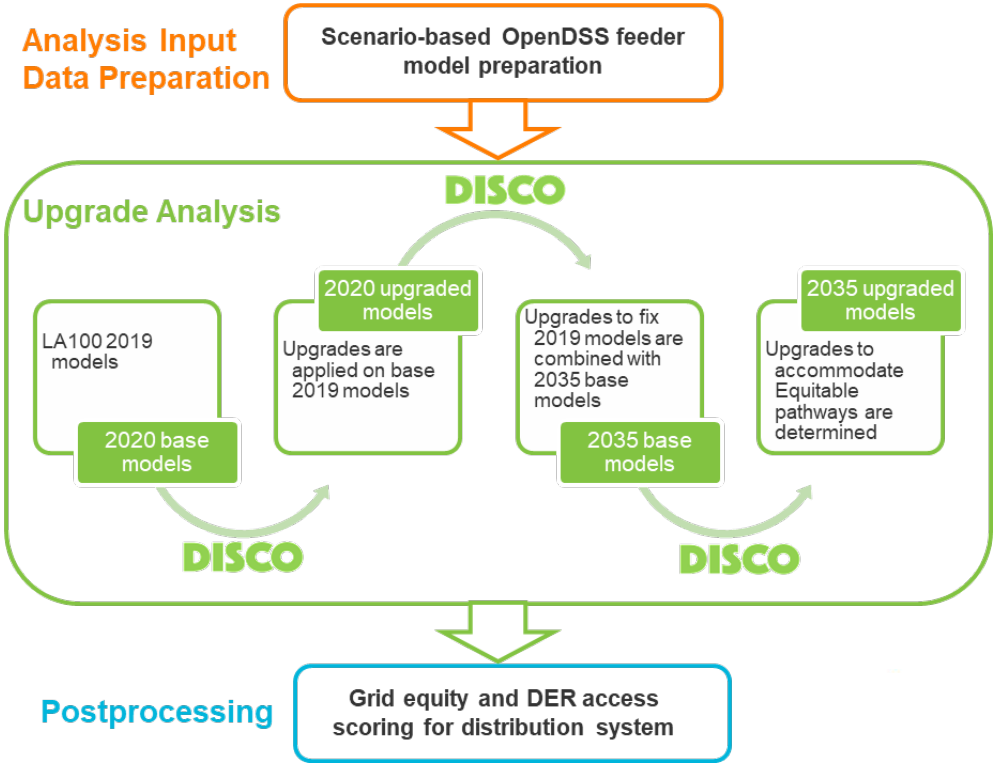
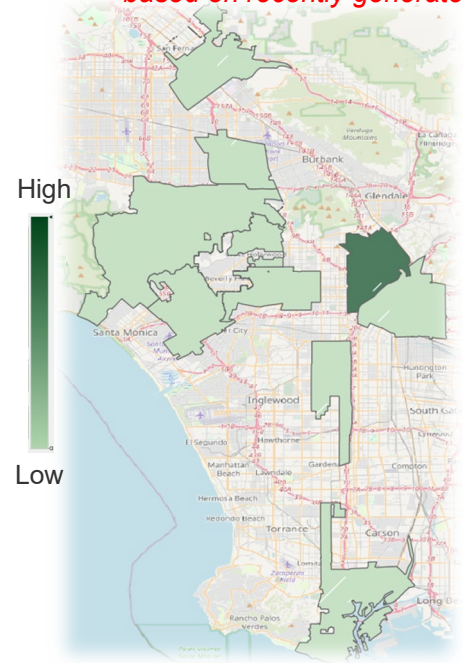
Part 1: Approach
Equitable Distribution Grid Upgrade Investments

- ***Objective:*** Ensure distribution grid is upgraded equitably to prevent voltage issues and overloading (as proxies for reliability) during the transition to clean energy.
- ***How?*** Use physics-based analysis to estimate electricity needs and compute corresponding costs by LADWP region.
- ***Output:*** Estimated upgrade costs and equity factors will be combined to create **a priority region-scale map for equity-informed investments.**
- ***Output:*** Experiences will also be translated into **metrics/approaches for capturing equity in future LADWP grid planning.**

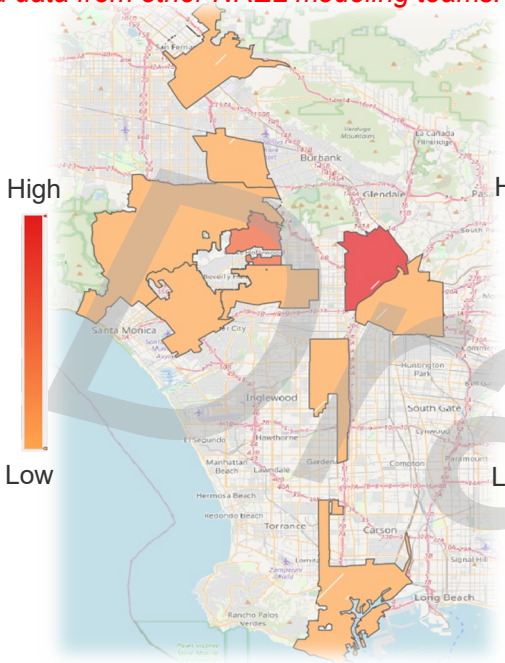


Draft Equitable Distribution Grid Upgrades

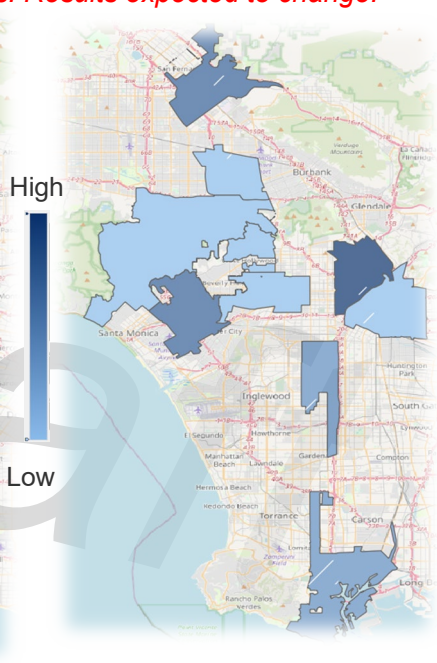
Preliminary, indicative results for a small sample with incomplete data. Further analysis is underway based on recently generated data from other NREL modeling teams. Results expected to change.



Voltage Stress



Lines Needing Upgrades

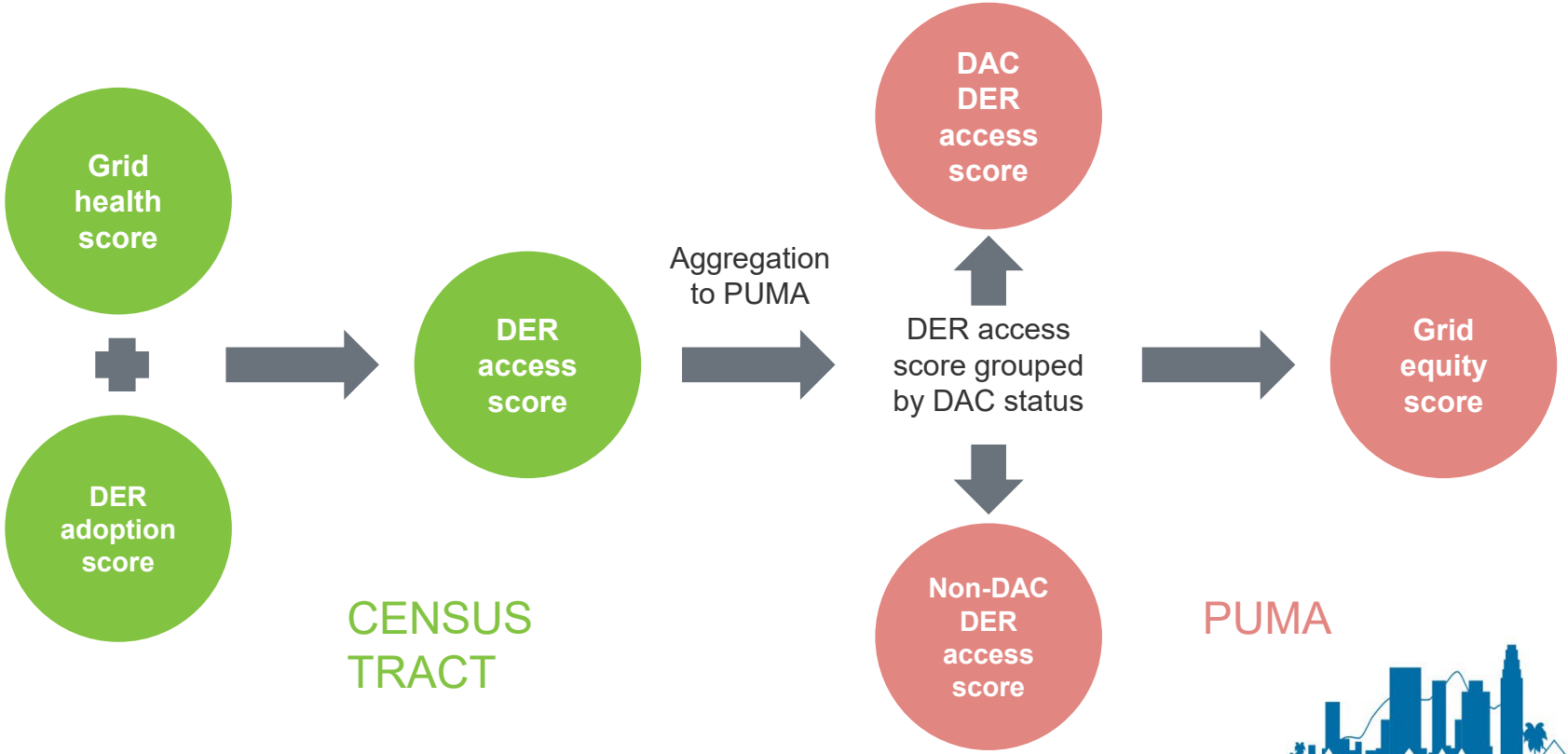


Transformers Needing Upgrades

Anticipated Findings: Consequences of poor grid reliability do not equally impact all communities.

Current: 1-2 feeders per area (census PUMA) in 2035 equity case
Coming: 70+% of feeders, 2020, 2035 business as usual, 2035 equity

Draft Grid Equity Score for Upgrade Prioritization

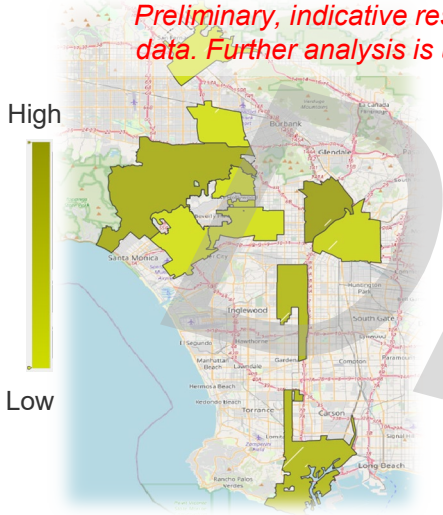


Draft Equitable Distribution Grid Upgrades

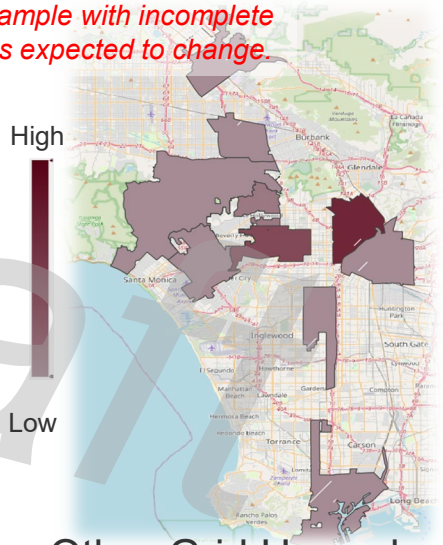
Preliminary, indicative results for a small sample with incomplete data. Further analysis is underway. Results expected to change.

Anticipated Findings:
Although a wide range of grid upgrades are needed, requirements for customers to pay for service transformer upgrades may limit access to EVs, solar and storage, and electrification in homes, particularly in DACs.

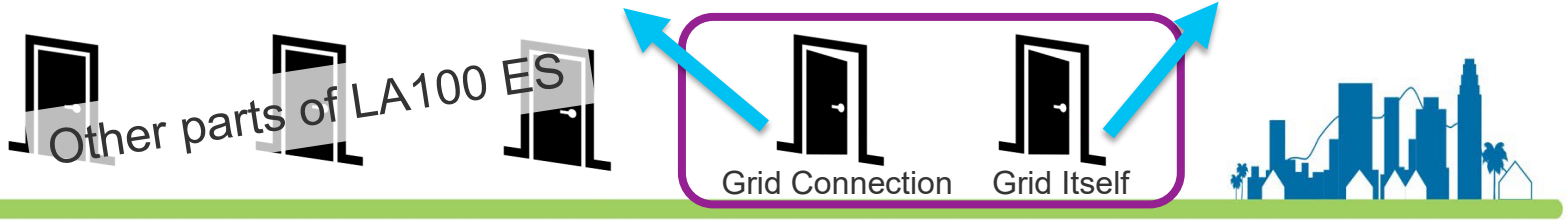
Current: 1-2 feeders per area (census PUMA) in 2035 equity case
Coming: 70+% of feeders, 2020, 2035 business as usual, 2035 equity



Service Transformer Upgrades
(Customer might pay)



Other Grid Upgrades
(Utility likely pays)



Two Themes for Grid Analysis:

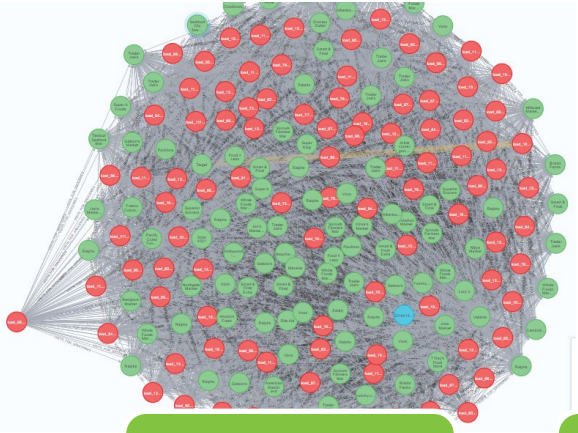
1. Equitable distribution grid upgrades for reliability and solar, storage, and EV access.

2. Equitable and resilient access to electricity-related services during extreme events.

Kwami Sedzro, NREL
Bryan Palmintier, NREL
Kapil Duwadi, NREL
Jane Lockshin, NREL

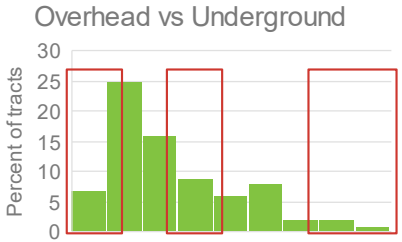
Community Energy Resilience Evaluation

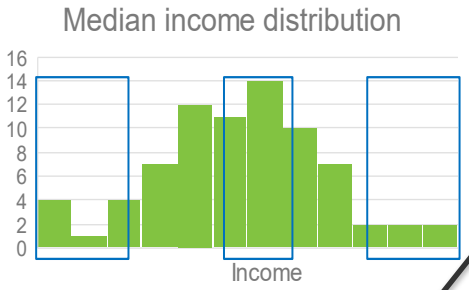
Objective: Estimate the relative resilience of example neighborhoods during a set of extreme events to identify effective grid hardening approaches.

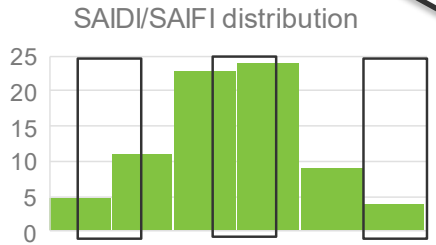


Build community graph database → Apply a set of representative resilience events → Evaluate community energy resilience → Apply Upgrades & Derive energy resilience equity strategies

Neighborhood Selection

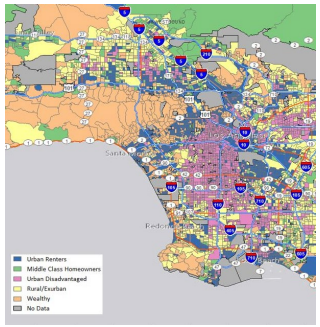






Qualitative Observations

Neighborhood Typology



Selection

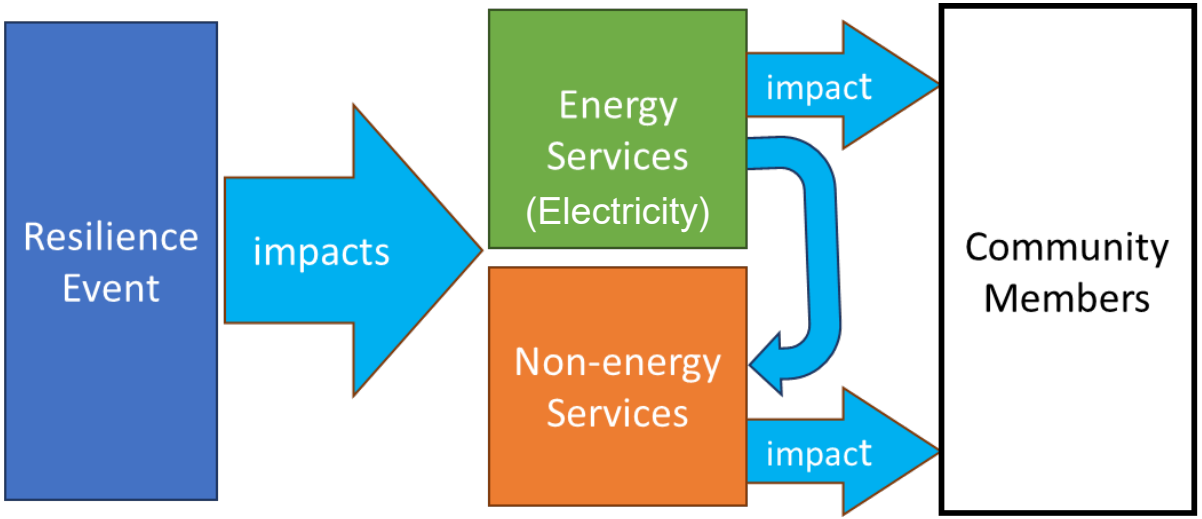
DAC Status

Neighborhoods selected to represent a mix of DAC and non-DAC and geographic diversity through a mix of quantitative and qualitative criteria

Anticipated Neighborhoods

Beverly Hills
Boyle Heights
East Los Angeles
Pacoima
Florence
Historic South-Central
Hollywood Hills West
Sun Valley
West Hills
Wilmington

Impacts of Resilience Events on Communities



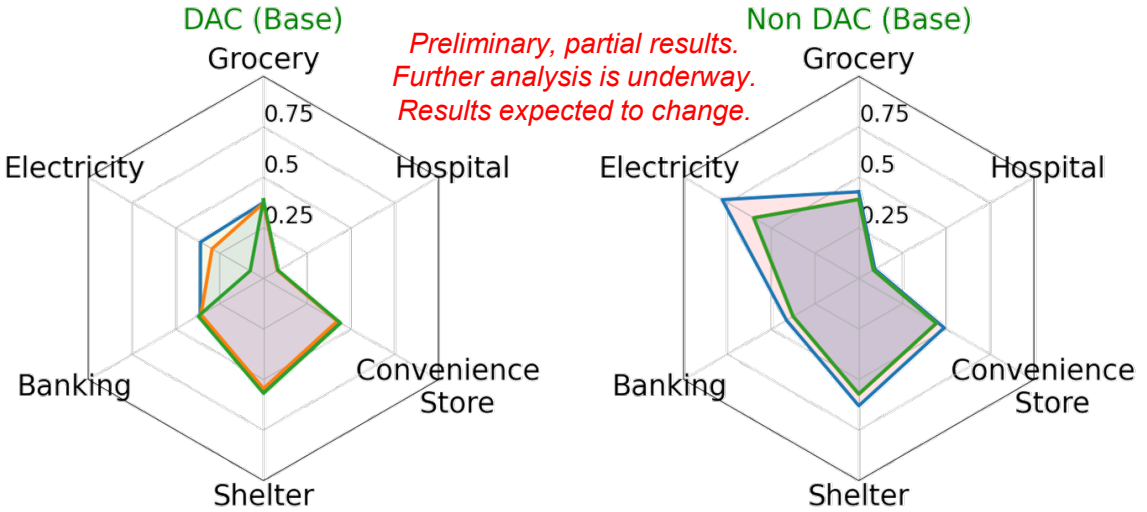
- Hospital
- Shelter
- Grocery
- Banking
- Convenience Store

The level of access a community has to critical services under a representative set of energy resilience events determines its energy resilience

Access: distance to service
Community resilience: aggregated members averaged over outage scenarios
Equity: resilience in DAC vs. non-DAC

Preliminary Community Energy Resilience Evaluation

Anticipated Key Finding:
DAC communities show historically lower grid resilience although this varies for different neighborhoods



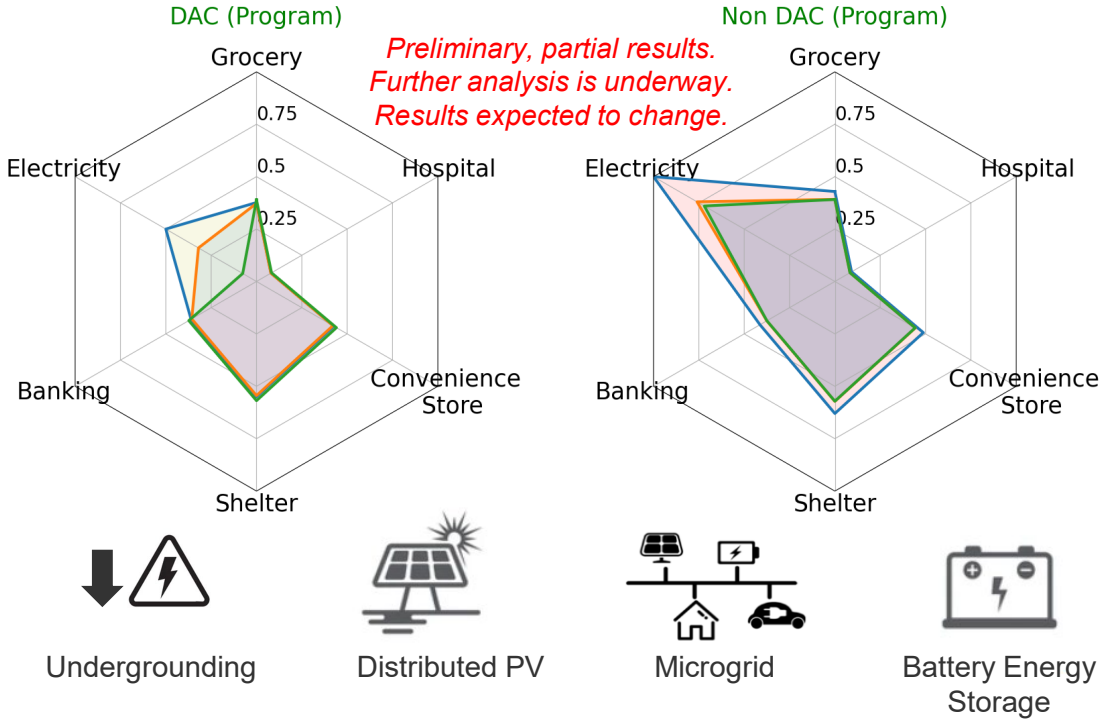
Baseline Resilience

Current: Per-service resilience score distribution across five earthquake scenarios for 6 census tracts
Coming: Selected neighborhoods across Earthquake, Fire, & Flooding

Preliminary Community Energy Resilience Evaluation

Anticipated Key Finding: Implementing strategies like undergrounding of electrical equipment, microgrids, battery energy storage improve resilience. (In future analysis expect to discuss relative effectiveness and qualitative cost comparison among approaches)

With Example Resilience Programs



Current: Only Microgrids
Coming: Comparison of different strategies

Equity Strategies

Equitable Grid Upgrades DRAFT for Discussion

Baseline Equity

- Disadvantaged communities and mostly Hispanic communities experience more frequent power interruptions.
- Customer costs to upgrade utility transformers, when modernizing service size for electrification, integration of solar, storage, EVs, etc., can be a key barrier.
- Disadvantaged community census tracts represent 32% of the total land area in LA but include 48% of all overhead distribution lines and 27% of all underground distribution lines.

Community Solutions Guidance

- Update aging electric equipment to improve reliability in DAC neighborhoods.
- Support low- and moderate-income households in upgrading their electrical panels and service connections so they can access and use air conditioning, heat pumps, EVs, solar, storage, or upgraded appliances.

Modeling & Analysis Key Findings

- Inequities exist in the present distribution grid.
- Consequences of poor grid reliability do not equally impact all communities.
- Distribution grid limits access to new technologies inequitably. *(Anticipated finding)*

Equity Strategies

- Incorporate equity while prioritizing and planning grid infrastructure investments.
- Proactively upgrade service transformers for larger service when replacing aging equipment to avoid burden for EVs, solar, electrification, etc.
- Increase investments in underground lines in DAC communities.

Grid Resilience Equity DRAFT for Discussion

Baseline Equity

- Social burden (effort to access critical services) during extreme events is worse in disadvantaged communities. *(Anticipated result)*

Community Solutions Guidance

- Guarantee access to safe & comfortable shelter during extreme events.
- Address underlying causes of blackout risks and their negative impacts on home environments.
- Expand outreach and awareness about resources and options in emergencies.
- Prioritize community members with energy-related heath needs and seniors in emergency situations.

Modeling & Analysis Key Findings *(Anticipated findings)*

- Disadvantaged communities can be made at least as energy-service resilient as other parts of the city with targeted programs.
- Increased grid undergrounding in less resilient neighborhoods can increase the overall survival probability of these communities.
- Microgrids, local generation and storage, and community hubs can support increased resilience.

Equity Strategies

- Invest in underground cables, where possible, in replacement of overhead lines.
- Provide programs to support energy storage and backup generation assets for households and critical service facilities located in low-resilience-score neighborhoods.
- Collaborate with community-based organizations on education and support programs for long outage preparedness in these neighborhoods.

Discussion

Please share ideas and suggestions about the draft equity strategies.

(A continued response opportunity will be available after the meeting.)

Green Jobs Workforce Development Preliminary Report

Dr. Raúl Hinojosa-Ojeda and Dr. Abel Valenzuela,
UCLA

Preliminary Report Overview

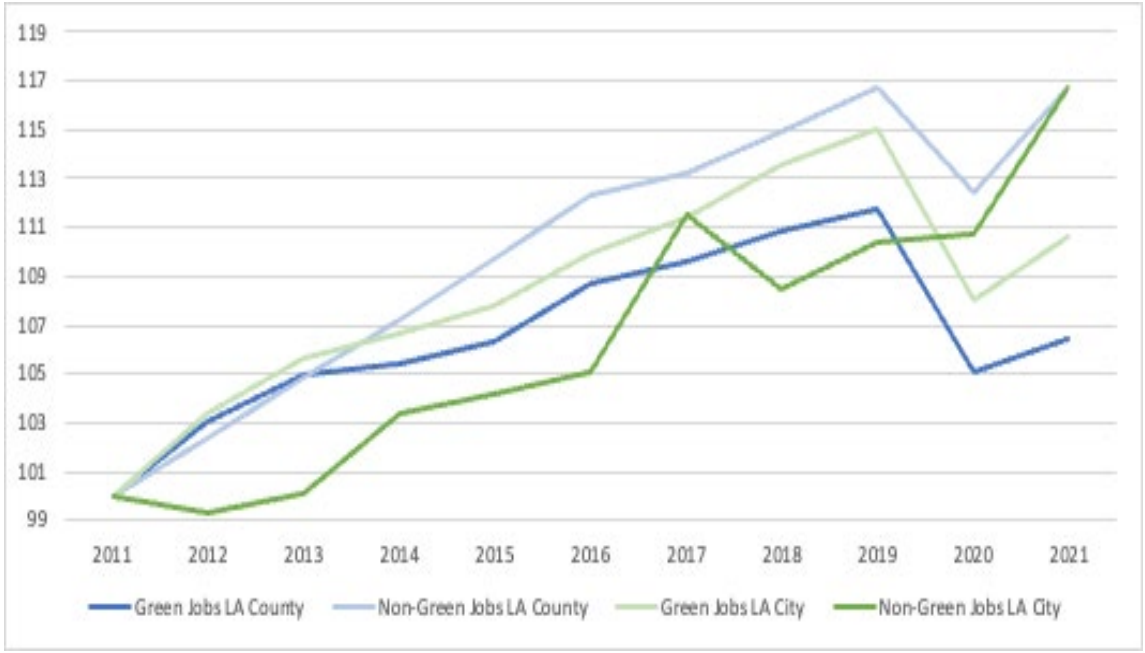
- Preliminary Green Jobs Calculator
- LADWP Jobs and Regional Equity
- Green and LADWP Jobs Projections
- Green Jobs Workforce Development Pilot Project Projections
- Preliminary Wilmington Case Study
- Preliminary Community Engagement Report

Green Jobs Calculator Preliminary Report

1. Green Job Historical Trends
2. Calculating Direct, Indirect and Induced Green Jobs
3. Regional/Racial Equity and Interdependence
4. LA100 Scenarios Workforce Needs
5. Current and Future Scenarios for Equitable Employment Composition
6. Required Workforce Development Investments

Total green jobs have been growing more rapidly compared to total non-Green Jobs in LA City since 2011

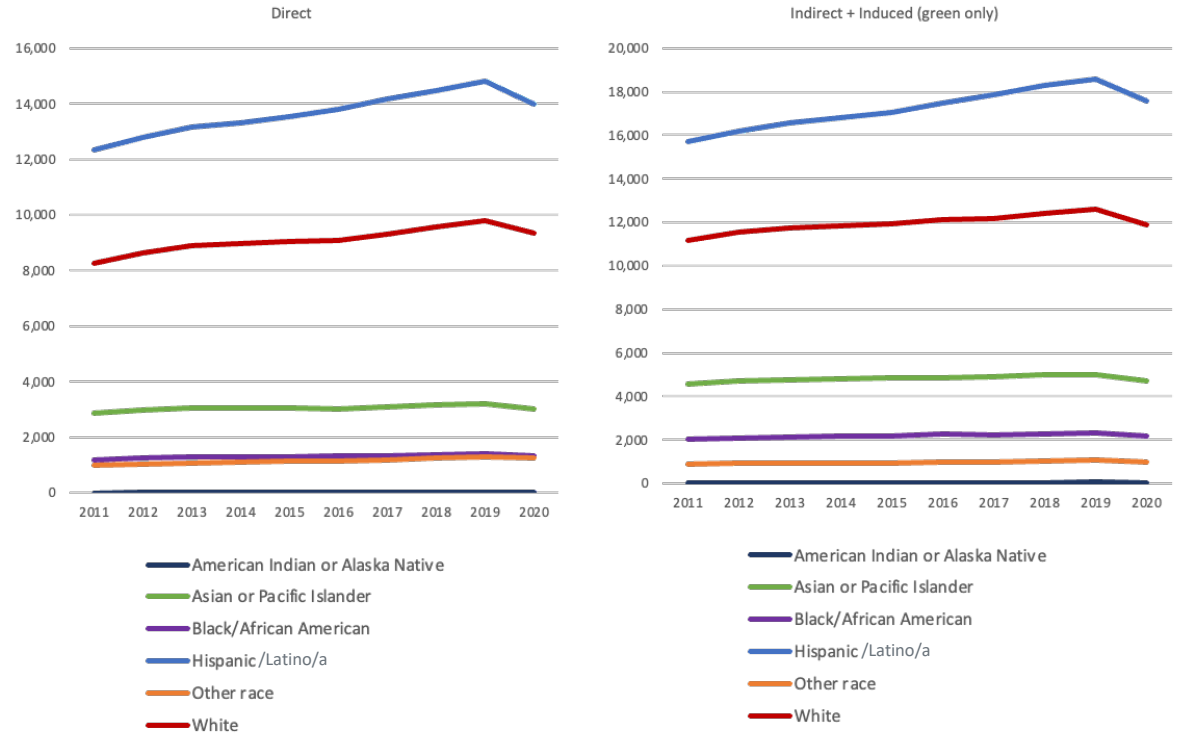
Figure 1: LA City and LA County, green and total non-green jobs growth index, 2011 = 100



Green jobs in LA City have grown 8.4% on average from 2011 to 2021 (base year = 2011), while total non-green jobs grew 6.4%.

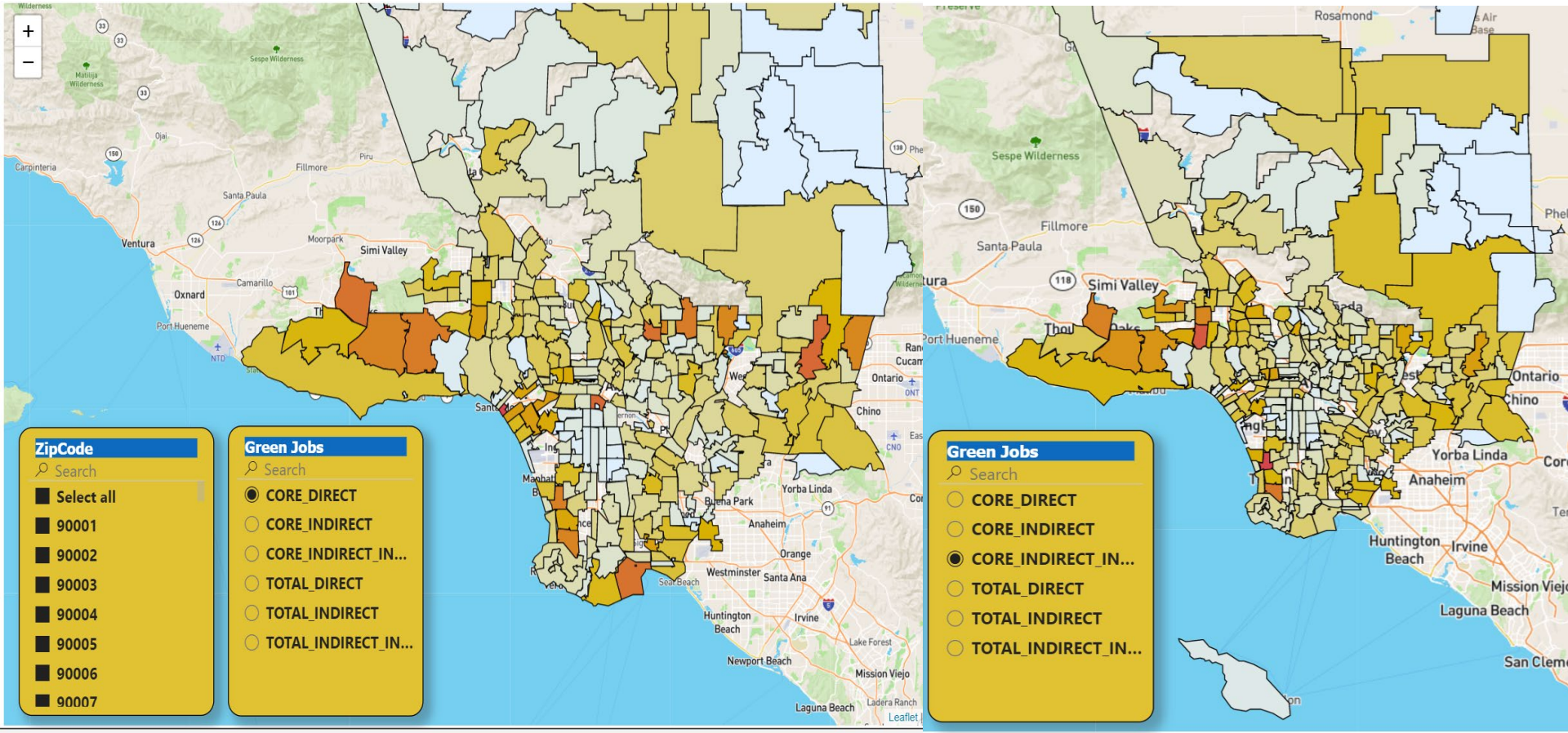
The Growth of Hispanic Green Jobs is very complementary and beneficial to White and Black Green and non-Green workers

Figure 2: LA City Green Direct, Indirect and Induced Total Green Jobs by Ethnicity, Number of Jobs



Latinx workers are the largest group with Direct Green Jobs, yet the indirect + induced Green Jobs growth effects for all other races is higher than for Latinx workers.

UCLA GIS MAPPING: Green Jobs by location of Work, Direct/Indirect+Induced



LADWP Green Jobs and Equity

Income

Occupation

Race/Ethnicity/Gender

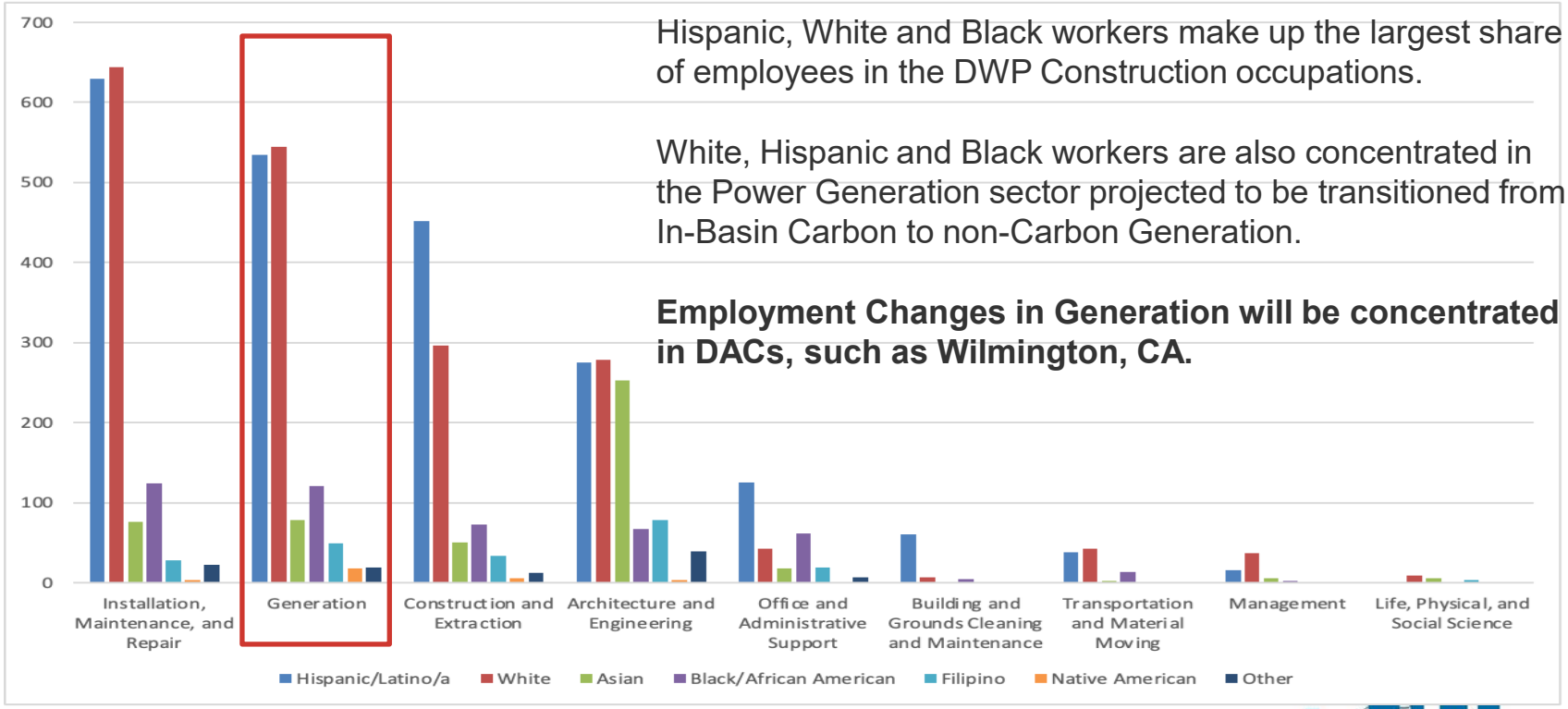
Geo-Residency DAC/non-DAC

Investment Employment Impact

LADWP Employee Data

1. **Hispanic, White, Asian and Black workers make up the largest shares of employees in the DWP Power sector**
   - Hispanic workers are most represented in Construction, followed by White and Black workers
   - Energy Generation has White workers as the largest group, followed closely by Hispanic workers, and then Black workers
2. **Most DWP Workers, who are relatively well paid, do not live in Disadvantaged Communities (DACs)**
3. **However, Hispanic and Black workers make up the largest share of DWP employees living in DACs and earn the lowest wages of DWP workers living in both DACs and Non-DACs**
4. **Hispanic and Black workers are more concentrated in lower wages occupations and activities yet earn comparable wages in higher and lower paid occupations**

LADWP Total Workers in Power Sector by Occupation and Ethnicity



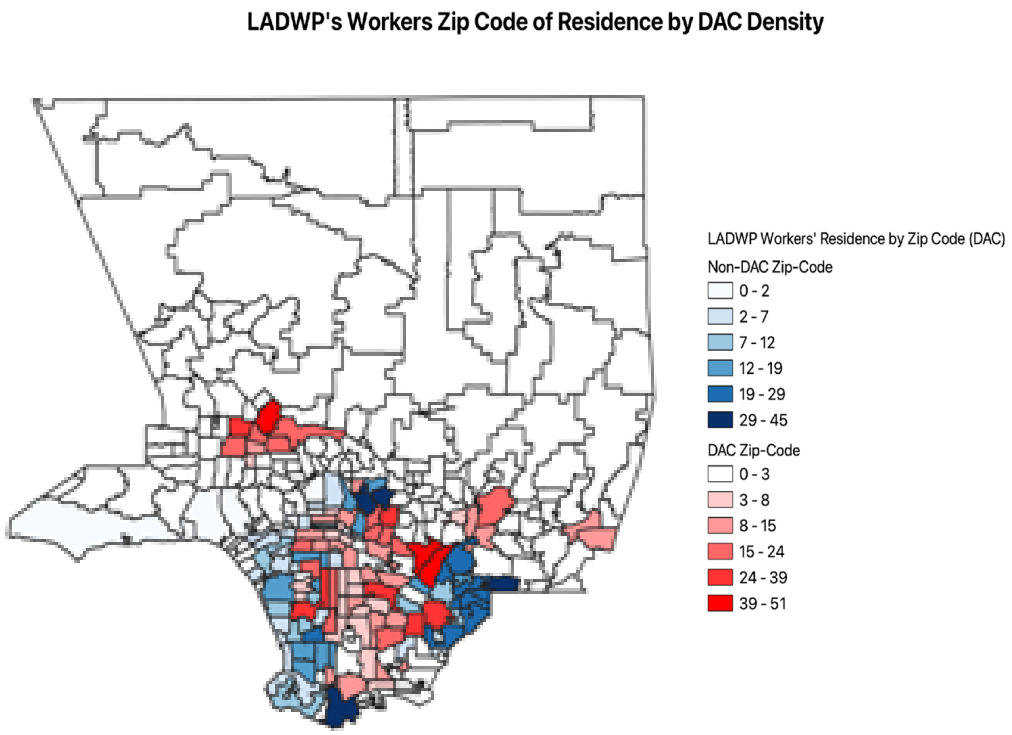
Hispanic, White and Black workers make up the largest share of employees in the DWP Construction occupations.

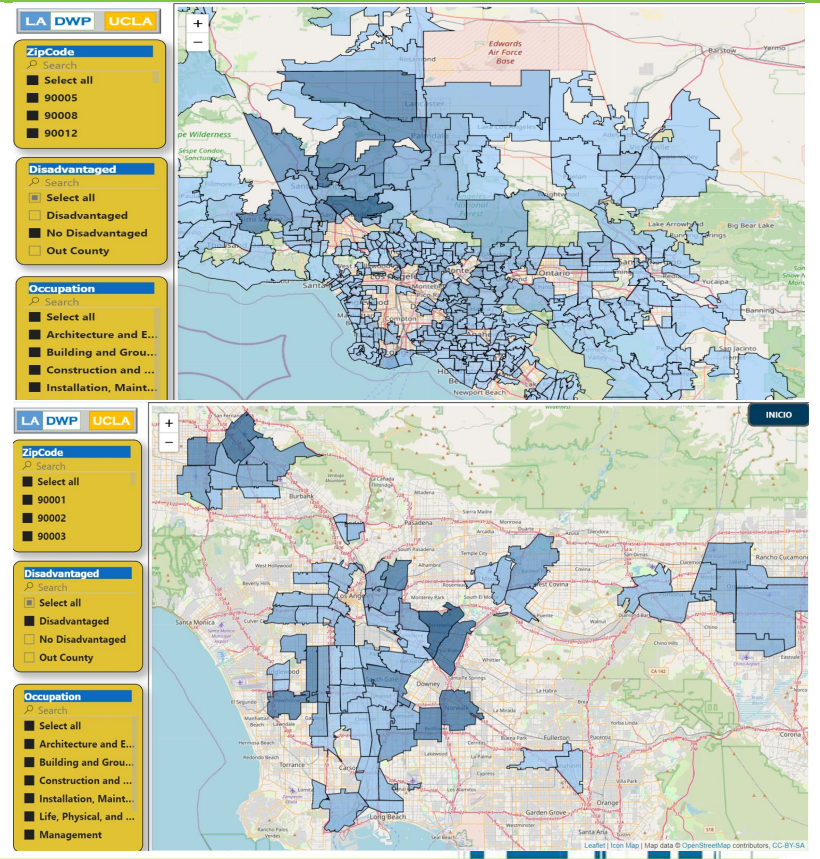
White, Hispanic and Black workers are also concentrated in the Power Generation sector projected to be transitioned from In-Basin Carbon to non-Carbon Generation.

Employment Changes in Generation will be concentrated in DACs, such as Wilmington, CA.

Source: Author's elaboration based on LADWP Administrative Data

UCLA Mapping Tool: LADWP Workers Zip Code Residence by DAC / Non-DAC Density



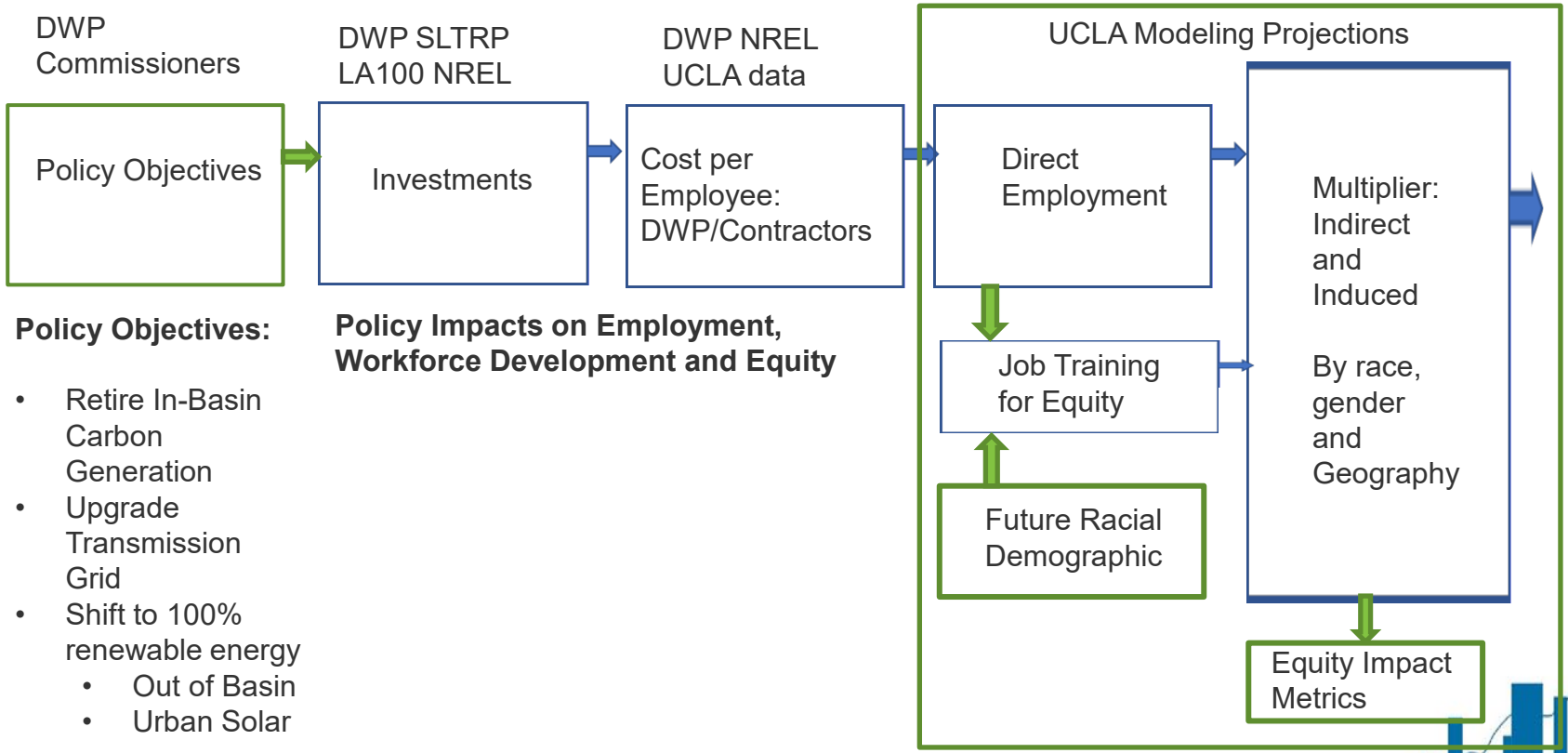


LADWP Green Jobs Projections

To ensure investments in DWP employment are sustainable and equitable, we must:

1. Estimate Baseline Inequality Gaps;
2. Estimate Employment Impacts of DWP Transition;
3. Estimate Projected Demographic Change;
4. Estimate Necessary Workforce Development Investments.

Methodology for Estimating LADWP Investment and Employment Impact

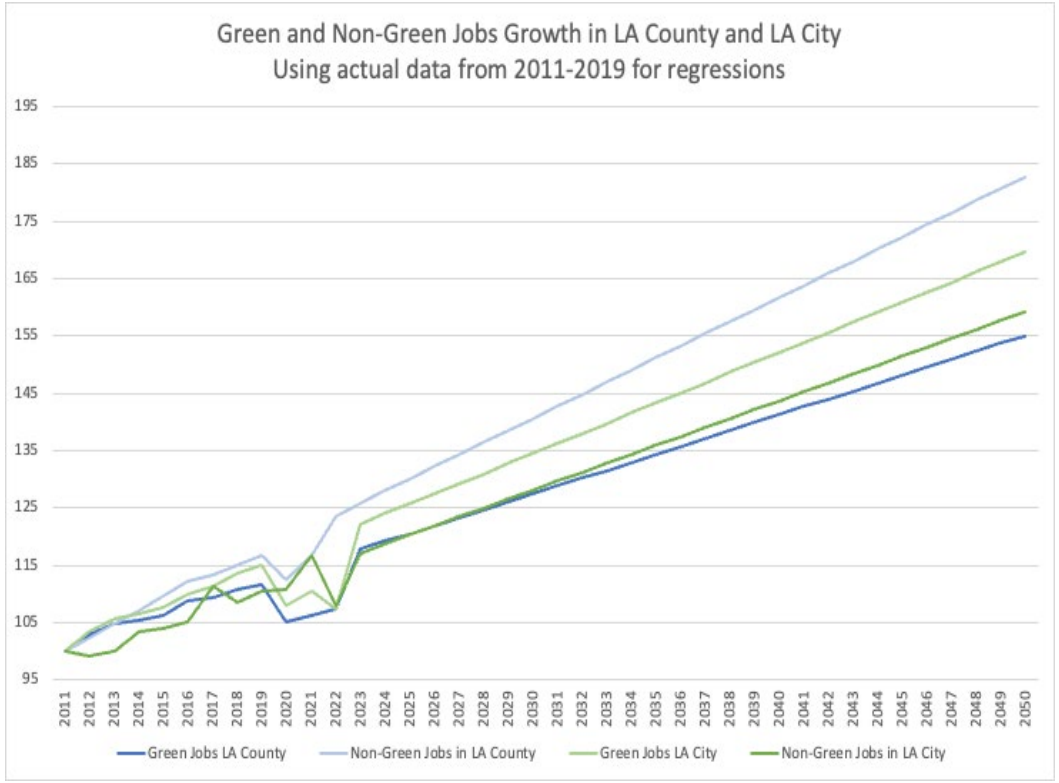


Policy Objectives:

- Retire In-Basin Carbon Generation
- Upgrade Transmission Grid
- Shift to 100% renewable energy
  - Out of Basin
  - Urban Solar

Policy Impacts on Employment, Workforce Development and Equity

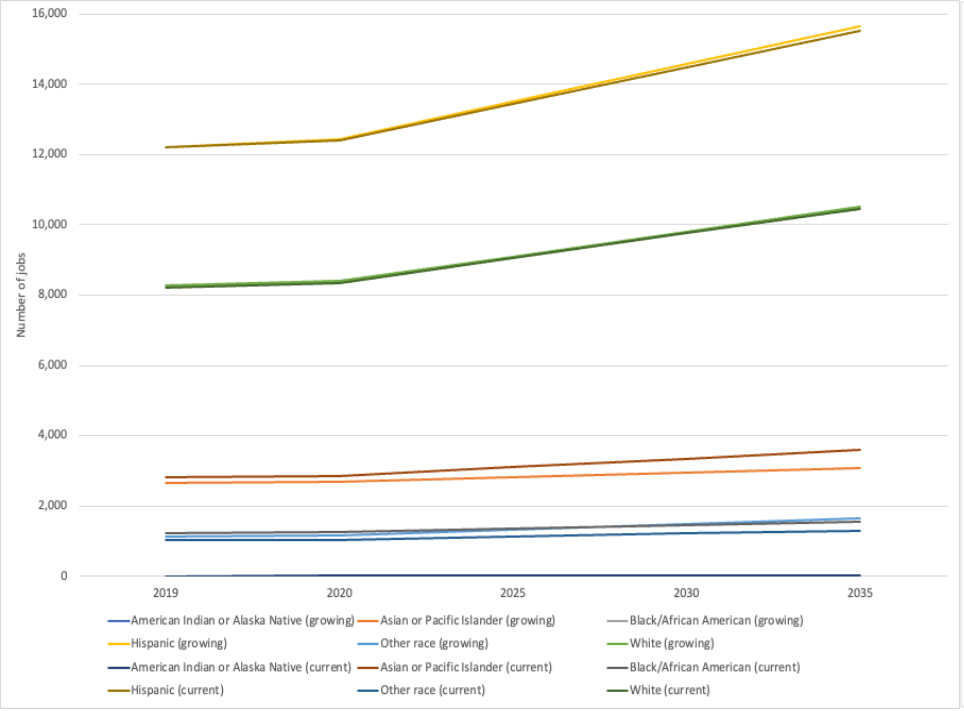
Preliminary Projections Results for Total Green Jobs Growth



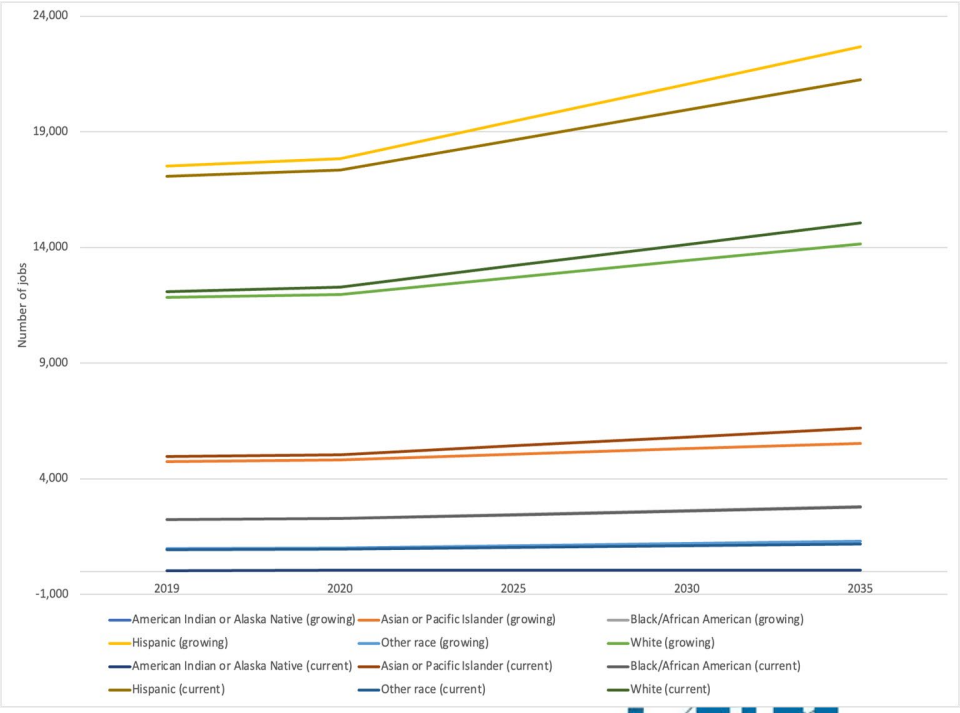
Green jobs in LA City will grown 9.4% on average from 2019 to 2050 (base year = 2011), while total non-green jobs will grow at 6.4%.

Preliminary Gap Analysis of Projected Green Jobs in LA City (Growing vs Current Structure)

Direct

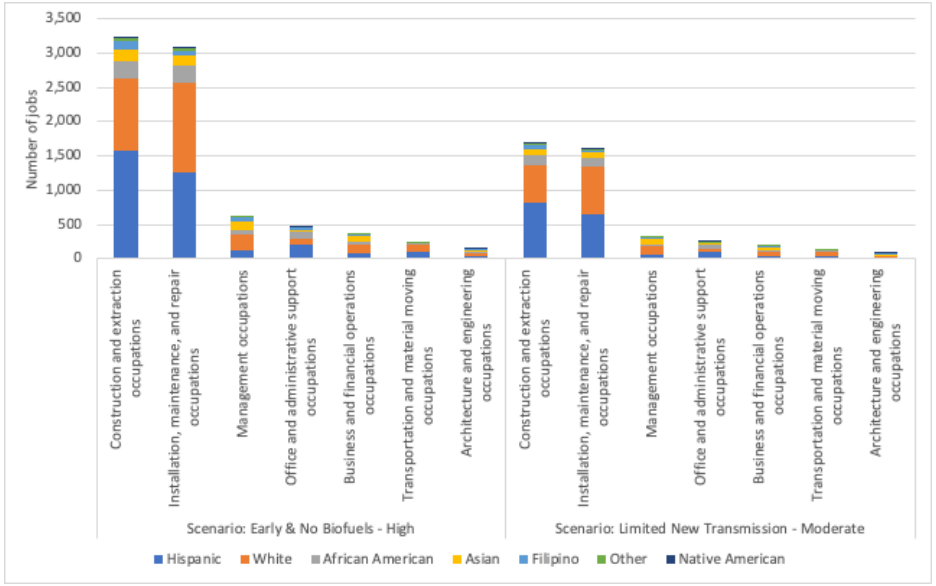


Indirect +



Preliminary Workforce Development Projection, Based on LA100 Projections

Installation and Construction, In-Basin



Occupation	Early & No Biofuels-High	SB100-Moderate
Architecture and engineering occupations	153	80
Arts, design, entertainment, sports, and media occupations	3	2
Building and grounds cleaning and maintenance occupations	17	9
Business and financial operations occupations	364	190
Computer and mathematical occupations	42	22
Construction and extraction occupations	3,238	1,688
Installation, maintenance, and repair occupations	3,082	1,607
Legal occupations	10	5
Life, physical, and social science occupations	42	22
Management occupations	614	320
Office and administrative support occupations	471	246
Production occupations	66	34
Protective service occupations	17	9
Sales and related occupations	38	20
Transportation and material moving occupations	239	125
Total	8,397	4,378

Preliminary Community Engagement and Green Jobs Workforce Development

Wilmington Case Study Methodology

- Historical Construction of Inequality, Projected Options
- Complementary Check to Equity Impact Modeling and Estimating Workforce Investment Requirements
- Community Resident and Organization Engagement of Data Evidence Usage for Future Strategic Investments for Workforce Training and Equitable Development
- Foundations for Equitable Workforce Trainings
- Principles of the High Road Workforce System

1. Wilmington Demographics
2. Wilmington & Industries Background
3. Wilmington Residents' Health Risk Background
4. State Policy Impacting Wilmington and Challenges
5. Wilmington Residents' Low Political Participation
6. Community Engagement in Wilmington
7. Green Jobs Workforce Development Pilot Project
8. Recommendations

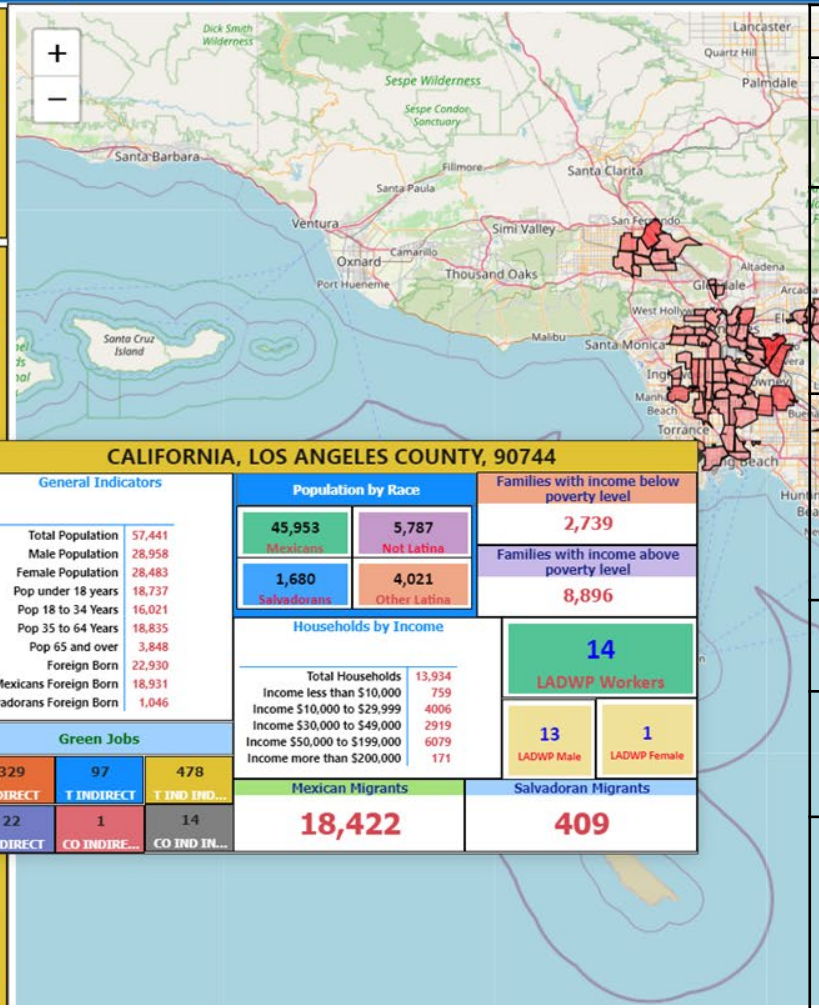
DWP Workers Residence by Zip Code Los Angeles County

INICIO

ZipCode
Search
- Select all
- 90001
- 90002
- 90003

Disadvantaged
Search
- Select all
- Disadvantaged
- No Disadvantaged
- Out County

Occupation
Search
- Select all
- Architecture and Er...
- Building and Grour...
- Construction and E...
- Installation, Mainte...
- Life, Physical, and S...
- Management
- Office and Administ...
- Production
- Transportation and ...



CALIFORNIA, LOS ANGELES COUNTY, 90744

General Indicators

Total Population	57,441
Male Population	28,958
Female Population	28,483
Pop under 18 years	18,737
Pop 18 to 34 Years	16,021
Pop 35 to 64 Years	18,835
Pop 65 and over	3,848
Foreign Born	22,930
Mexicans Foreign Born	18,931
Salvadorans Foreign Born	1,046

Population by Race

45,953 Mexicans	5,787 Not Latina
1,680 Salvadorans	4,021 Other Latina

Families with income below poverty level: 2,739

Families with income above poverty level: 8,896

Households by Income

Total Households	13,934
Income less than $10,000	759
Income $10,000 to $29,999	4006
Income $30,000 to $49,000	2919
Income $50,000 to $199,000	6079
Income more than $200,000	171

Green Jobs

329 T DIRECT	97 T INDIRECT	478 T IND IND...
22 CO DIRECT	1 CO INDIRE...	14 CO IND IN...

14 LADWP Workers

13 LADWP Male | 1 LADWP Female

Mexican Migrants: 18,422

Salvadoran Migrants: 409

DWP Data on Wilmington

DAC Census Tracts in Zip Code	88%
LADWP Power Workers Residing in Wilmington	0.26%
LADWP Power Workers Reporting in Wilmington	2.4%
Green Jobs in Wilmington	807
Direct Green Jobs	329
Indirect + Induced Green Jobs	478

Legacy pollution

At or above at least one threshold?	Yes
Proximity to hazardous waste facilities Count of hazardous waste facilities within 5 kilometers	95th ↑ above 90th percentile
Proximity to National Priorities List (NPL) sites Proposed or listed NPL (Superfund) sites within 5 kilometers	73th ↓ below 90th percentile
Proximity to Risk Management Plan (RMP) facilities RMP facilities within 5 kilometers	99th ↑ above 90th percentile
AND	
At or above both associated thresholds?	Yes
Low income Household income is less than or equal to twice the federal poverty level	91st ↑ above 65th percentile
Higher education non-enrollment Percent of the census tract's population 15 or older not enrolled in college, university, or graduate school	91% ↑ above 80% percent

Wilmington Residents Community Engagement Preliminary Report

- Community Engagement meetings began November 2023, monthly meetings for six months
- Measure before and after level of knowledge on LADWP and Green Jobs
- Surveyed participants to compare Wilmington's representation of demographics based on DACs indicators
- Preliminary findings in early stage since our last meeting will be on April 25th

Wrap Up, Questions and Answers

Preliminary Report Summary LADWP Green Jobs on the energy sector

- Build on green jobs workforce development pilot in DACs for an equitable distribution of labor and further explore income gaps
- Utilize community engagement recommendation for DACs case studies to create bottom up approach towards a more equitable workforce development transition

Going Forward

Steering Committee Meetings

May 17, 2023
• Equity Strategies Summary (NREL & UCLA) • Next Steps Discussion (for LADWP & Steering Committee)

Thank you!