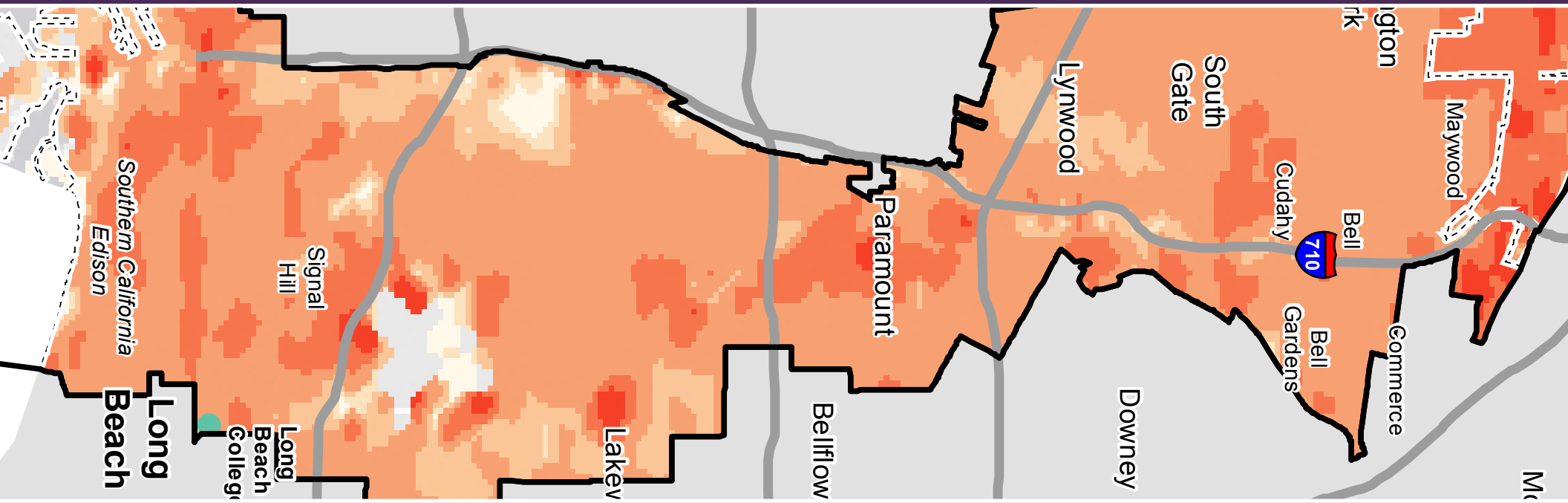
Profile of Clean Energy Investment Potential
DISTRICT 33



EDF ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work

UCLA Luskin School *of* Public Affairs
Luskin Center for Innovation

District 33:
Profile of Clean Energy Investment Potential

Introduction and Objectives

The Environmental Defense Fund commissioned the UCLA Luskin Center for Innovation to profile the potential for clean energy investments in state senatorial districts and sub-regions across Los Angeles County. Each profile is designed to help the legislators and other community stakeholders identify areas of high potential for solar energy and energy efficiency improvements in and on local buildings. The profiles also underscore the benefits of green economic investment. These benefits include capitalizing on incoming state and local funding while creating jobs and community resilience to current environmental health threats that climate change will exacerbate.

Importance of Proposed Project

This project is timely because of new state funding opportunities that could benefit District 33. The maps identify disadvantaged communities that will be prioritized for funding from cap-and-trade auction proceeds per SB 535 (de León), implementing legislation of AB 32 (Pavley), the California Global Warming Solutions Act. In addition, Proposition 39 will result in $2.5 billion to improve energy efficiency and expand clean energy generation. The maps highlight likely recipients of Proposition 39 funding, including schools. Legislators and the Governor are responsible for determining specific allocations of these funds.

Environmental Defense Fund:

Environmental Defense Fund's mission is to preserve the natural systems on which all life depends. Guided by science and economics, we find practical and lasting solutions to the most serious environmental problems. This has drawn us to areas that span the biosphere: climate, oceans, ecosystems and health. Since these topics are intertwined, our solutions take a multidisciplinary approach.

UCLA Luskin Center for Innovation:

Established with a gift from Meyer and Renee Luskin, the UCLA Luskin Center for Innovation translates world-class research into real-world policy and planning solutions. Organized around initiatives, the Luskin Center addresses pressing issues of energy, transportation and sustainability. The Luskin Center is based in the UCLA Luskin School of Public Affairs.

The following people from UCLA worked on this project:

Principal investigator: J.R. DeShazo

Project manager: Colleen Callahan

GIS analyst: Norman Wong

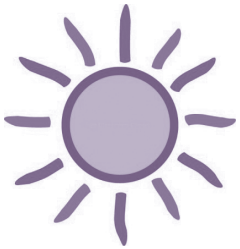
Design: Susan Woodward

Acknowledgements

The aforementioned authors would like to thank the Environmental Defense Fund for their support of this project, including Derek Walker, vice president, and Lauren Faber, political director. Special appreciation goes to Jorge Madrid, Emily Reyes, and Loni Russell for their vision, thoughtful feedback, and all around help during the entire project.

Contents

A Hotter Region



Adaptation in Los Angeles County is inevitable. [4]

This map illustrates "Mid-Century Warming in the Los Angeles Region." This is the first study to provide specific climate-change predictions for the greater Los Angeles area, with unique predictions down to the neighborhood level.[1]

The study looked at the years 2041–60 to predict the average temperature change by mid-century. Southern Californians should expect slightly warmer winters and springs but much warmer summers and falls, with more frequent heat waves. The map shows that climate change will cause temperatures in the Los Angeles region to rise by an average of 4-5°F by the middle of this century. [2]

All areas across the Los Angeles region will experience warming in the coming mid-century but an important aspect of this study is that it shows where *different* areas will experience *different* degrees of warming. According to the study, coastal areas like Santa Monica and Long Beach are likely to warm an average of 3 to 4 degrees, with other areas experiencing more warming. The study predicts a likely tripling in the number of extremely hot days in the downtown area and quadrupling the number in the valleys and at high elevations.

Adaptation to a changing climate will be inevitable in the Los Angeles region.

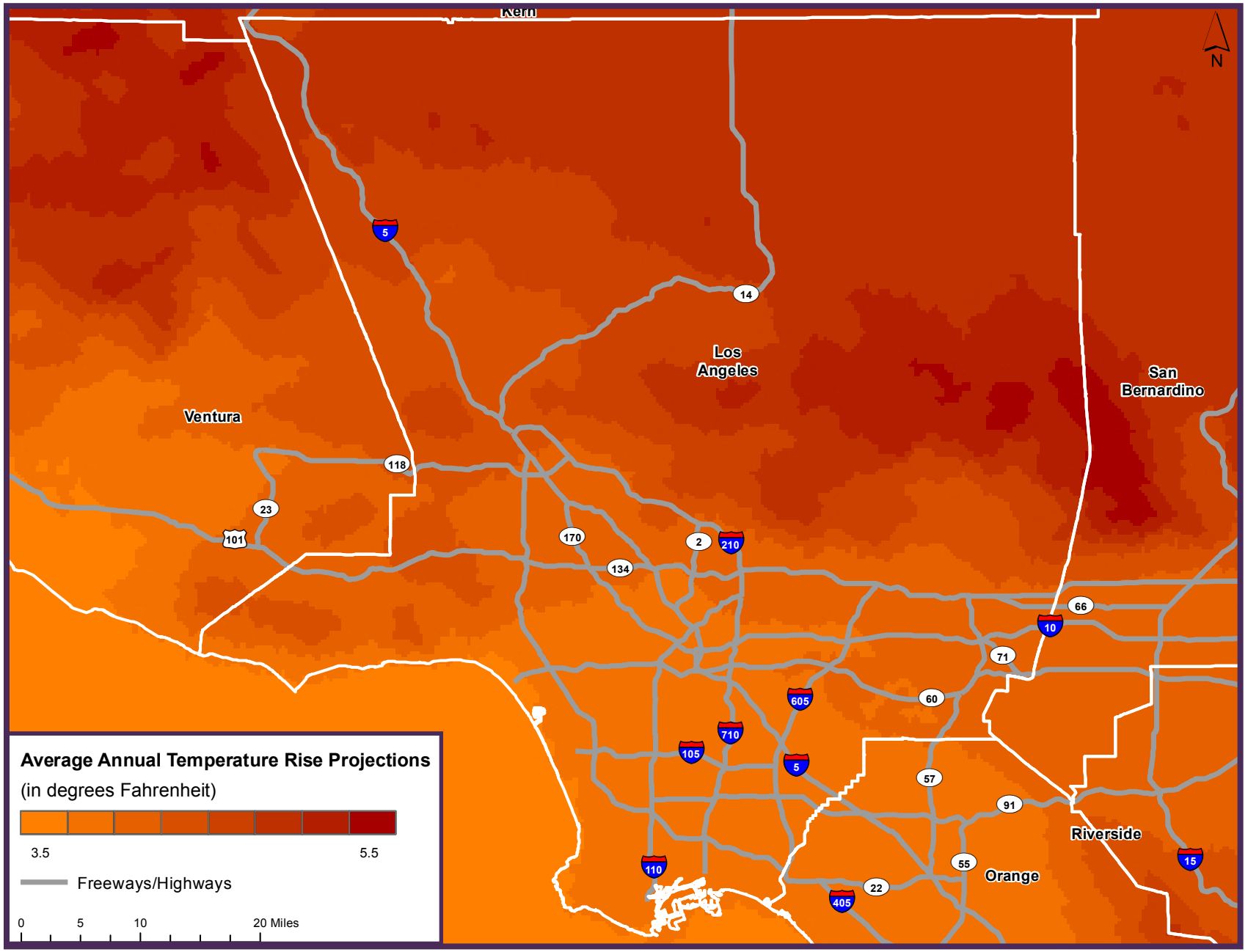
How District 33 Could Adapt [3]

Higher temperatures will increase the importance of **energy efficient buildings**. Conservation and improved energy efficiency—with higher performing heating, ventilating and cooling systems, efficient lighting, etc.—will reduce the demand for energy, thus saving money for residents, owners and taxpayers. Producing **solar energy** on rooftops as well as retrofitting roofs to reflect sunlight (**cool roofs**), can also reduce electricity bills, while reducing emissions that contribute to climate change.

Municipal buildings can serve as **cooling centers**. This will be important because without this and other planning measures in place, hospitals will likely see an increase in patients suffering from heat stroke and heat exhaustion, as well as smog-related respiratory effects. Air quality is profoundly affected by higher temperatures because heat increases ozone smog formation. Ozone is a known lung irritant associated with asthma attacks, pneumonia and other respiratory diseases.

Green spaces and trees reduce the heat island effect caused by buildings and streets, and provide a place for people to cool off. Transit provides transportation access to parks, medical care and other services that can improve community resiliency to climate change.

MID-CENTURY WARMING IN THE LA REGION



Source: Alex Hall, Fengpeng Sun, Daniel Walton, et al, 2012. "Mid-Century Warming in the Los Angeles Region." University of California, Los Angeles. *See reference page for more details.* Full report at http://c-change.la/. See Reference page for information about the uncertainty ranges and other details.

District 33: Vulnerability to Climate Change

The map can inform spatially-targeted strategies to reduce health risks from climate change.

Knowing what communities are vulnerable to climate change, as identified in the table below, enables policymakers to identify strategies to reduce risk and improve community resiliency. Climate change will increase health issues in many communities.

This map illustrates the extent of vulnerability to climate change in the communities (at the census tract level) of District 33. The data comes from the California Environmental Health Tracking Program (CEHTP) of the California Department of Public Health, which created an index of 7 indicators.[5] These indicators, of climate change impacts and a community's adaptive capacity, included:

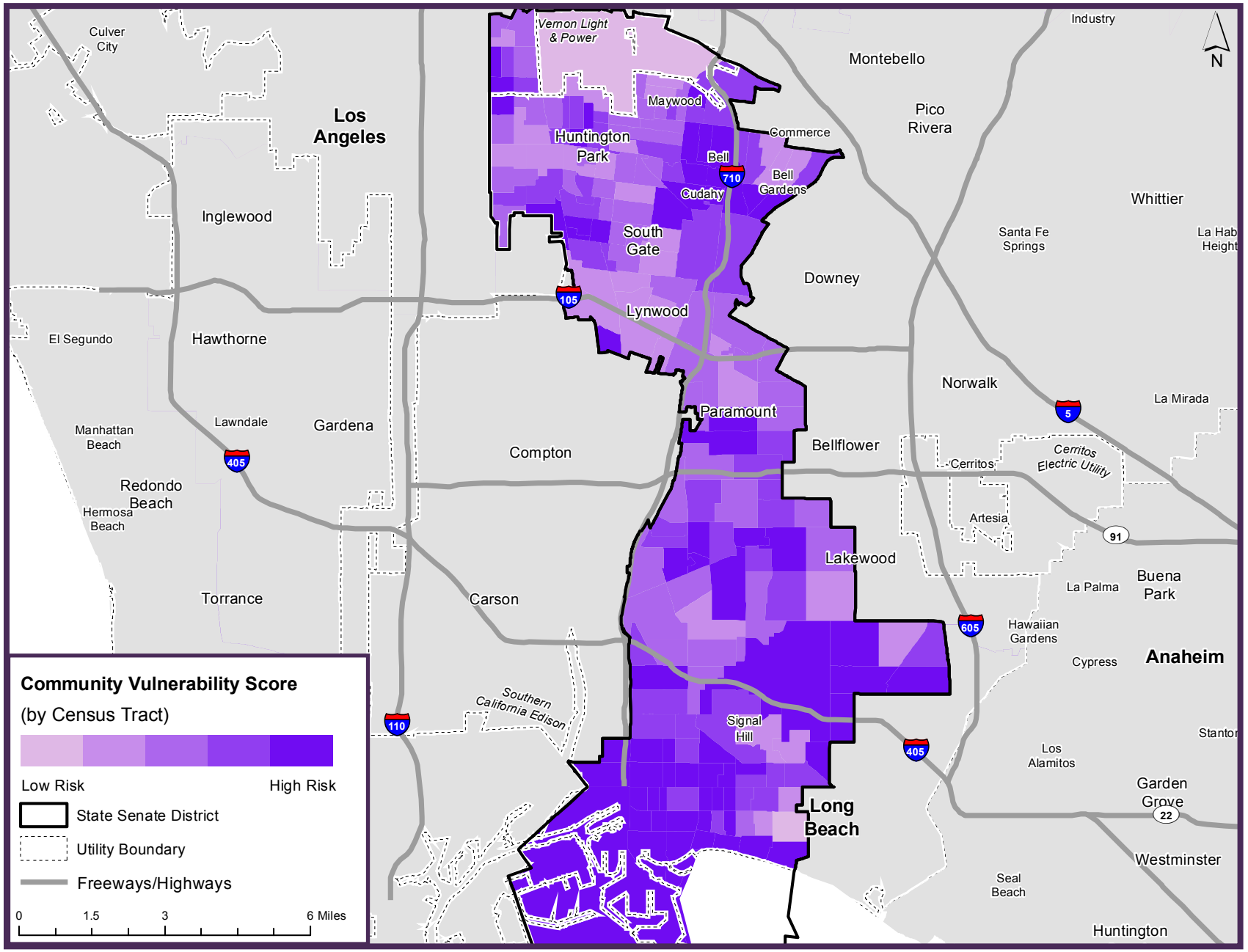
- Air conditioning (AC) ownership;
- Land cover characteristics (tree canopy and impervious surfaces);
- Access to transportation (transit and household car access);
- Social vulnerabilities (elderly living alone);
- Flood risk;
- Wildfire risk; and
- Sea level rise.

Note that the index does not include temperature predication data under climate change. Temperature predictions under climate change are shown in the previous map.

Community Vulnerability to Climate Change in District 33

Zip code(s) for which the census tract (in parentheses) falls within		Level	Scores (on a scale of 1-3.778 with 3.778 being the most vulnerable)
90802	(06037576100)	Top tier	3.750
90802	(06037576601)	Top tier	3.667
90802 and 90803	(06037576602)	Top tier	3.556
90802 and 90803	(06037576602)	Top tier	3.556
90802, 90731, and 90813	(06037575600)	Top tier	3.500
90802, 90731, and 90813	(06037575600)	Top tier	3.500
90802, 90731, and 90813	(06037575600)	Top tier	3.500
90814 and 90803	(06037576700)	Top tier	3.444
90814 and 90803	(06037576700)	Top tier	3.444
90813	(06037575401)	Top tier	3.444
90813	(06037575801)	Top tier	3.444
90810	(06037572900)	Top tier	3.444

Vulnerability to Climate Change



Source: California Environmental Health Tracking Program, August 2011. "Community Vulnerabilities to Climate Change." Environmental Health Investigations Branch, California Department of Public Health. Final report available at www.cehtp.org/p/climate_population_vulnerabilities.

District 33: Environmental Health Risk

The map will inform the investment plan for the Greenhouse Gas Reduction Fund, with priority given to disadvantaged communities with environmental health risk.

The California Environmental Protection Agency (CalEPA) prepared the nation's first comprehensive screening tool to identify California communities that are disproportionately burdened by and vulnerable to multiple sources of pollution.[6] Called the California Communities Environmental Health Screening Tool (CalEnviroTool), it generates scores at the zip code level that are used in the map.

California's greenhouse gas (GHG) cap-and-trade program will generate revenues from credits sold to pollution emitters. These proceeds will go into the Greenhouse Gas Reduction Fund. By law, at least 25 percent of the program funding expended will be directed to projects that benefit disadvantaged communities and at least 10 percent of program funding expended will be directed to projects located in disadvantaged communities, including in District 33.[7]

Using the CalEnviroTool, CalEPA identified the top 10 percent of the zip codes in the state as "disadvantaged communities" for the purpose of investing auction proceeds. These communities are shown in the below table and map. The tool incorporates data from 18 indicators within two categories:

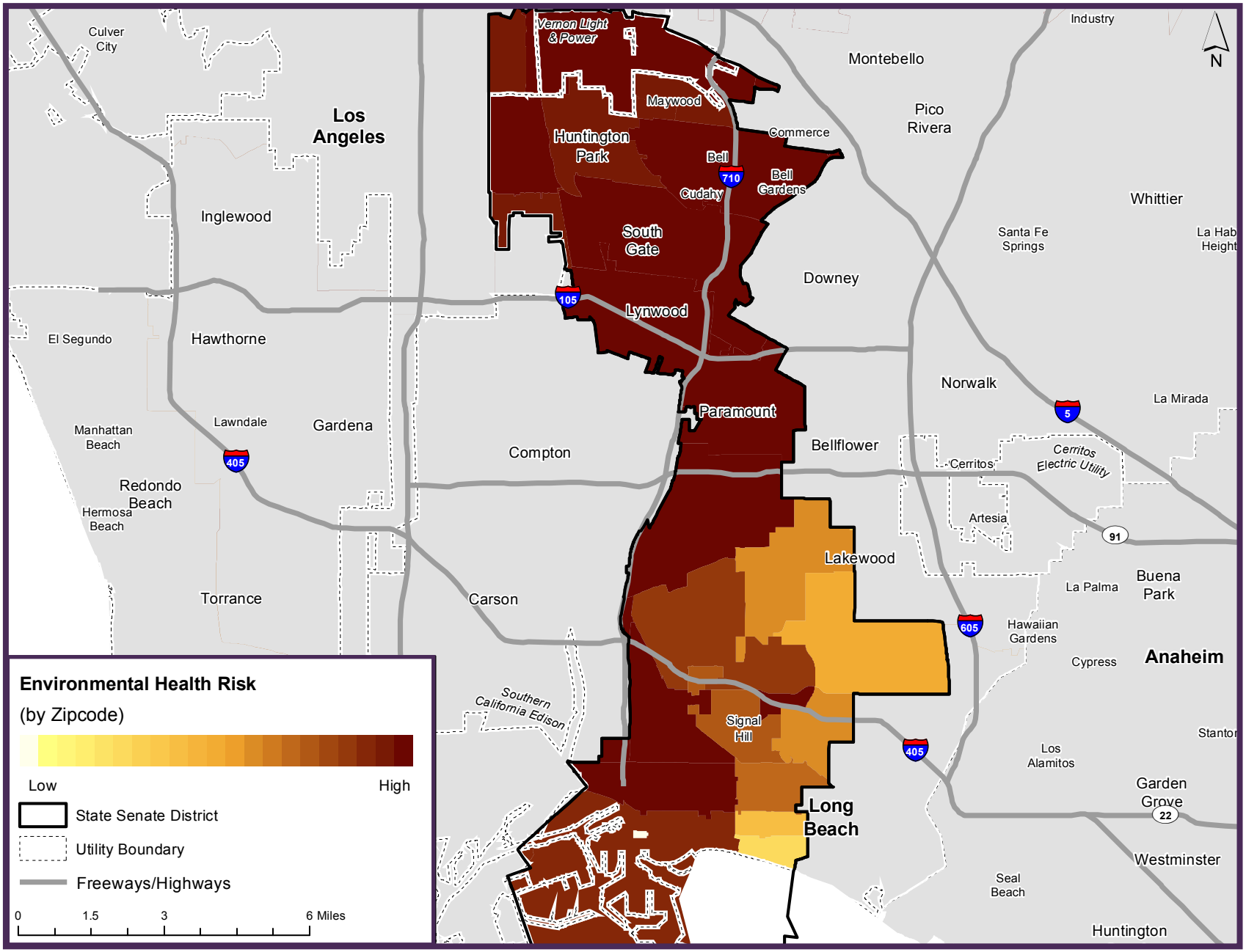
- Pollution Burden, Exposure and Environmental Effect Indicators—
  Air quality/ozone, air quality/particulate matter 2.5, diesel particulate matter, pesticide use, toxic releases from facilities, traffic density, cleanup sites, groundwater threats, impaired water bodies, solid waste sites and facilities and hazardous waste facilities.
- Pollution Characteristics, Sensitive Populations and Socioeconomic Factor Indicators—
  Age/children and elderly, asthma, low birth weight infants, educational attainment, linguistic isolation, poverty and race/ethnicity.

Results from the California Communities Environmental Health Screening Tool for District 33

Zip code	Tier	Top 10 percent (top and second tiers) identified as disadvantaged communities for purpose of investing auction proceeds	Score
90058	Top tier	1-5%	60.48
90805	Top tier	1-5%	56.21
90723	Top tier	1-5%	55.48
90813	Top tier	1-5%	54.78
90201	Top tier	1-5%	53.96
90262	Top tier	1-5%	52.36
90806	Top tier	1-5%	51.48
90280	Top tier	1-5%	49.68
90001	Top tier	1-5%	47.31
90255	2nd tier	6-10%	41.18

**Highest Scores in District 33 but Percentage and Tiers Compared to Other Zip Codes in California*

Environmental Health Risk



Source: California Environmental Protection Agency and the Office of Environmental Health Hazard Assessment, April 2013. "California Communities Environmental Health Screening Tool, Version 1." Full report available at http://oehha.ca.gov/ej/ces042313.html.

District 33: Solar Capacity

District 33 is endowed with both bountiful sunshine and numerous buildings that offer valuable siting opportunities for solar energy generation. This map identifies the rooftop solar opportunities across neighborhoods in District 33.[8] Economic development planners, building owners and anyone interested in expanding solar power can use this map, along other parcel level analyses [9], to identify potential investment opportunities. [10] Because cost-effectiveness increases with the size of a solar installation, the map statistics table presents the number of potential solar projects by size and the total rooftop potential.

1,882
job years could be created if 5% of rooftop solar potential in District 33 was realized. [11]

MAP STATISTICS				
Single Family	61%	Total Rooftop Solar Potential	1,506 megawatts
Multi-unit Residential	28%	Total Potential Sites	112,096 rooftops
Commercial & Industrial	10%	Median Rooftop Availability	475 sq. ft.
Government & Non-profit	1%	Median Potential of Available Parcels	4.56 kilowatts

Jobs: If just 5% of total rooftop solar potential in District 33 was realized, approximately 1,882 job years would be created. [11]

Pollution Reduction: This would also eliminate 80,295 metric tons of carbon dioxide pollution each year. [12]

Funding Opportunities

State policies that expand opportunities for solar include the potentially billions of dollars from Proposition 39's Clean Energy Job Creation Fund as well as the AB 32 Greenhouse Gas Reduction Fund (cap-and-trade auction proceeds). In order for District 33 to benefit, policymakers will have to be vigilant to ensure that residents, businesses and schools have access to these opportunities.

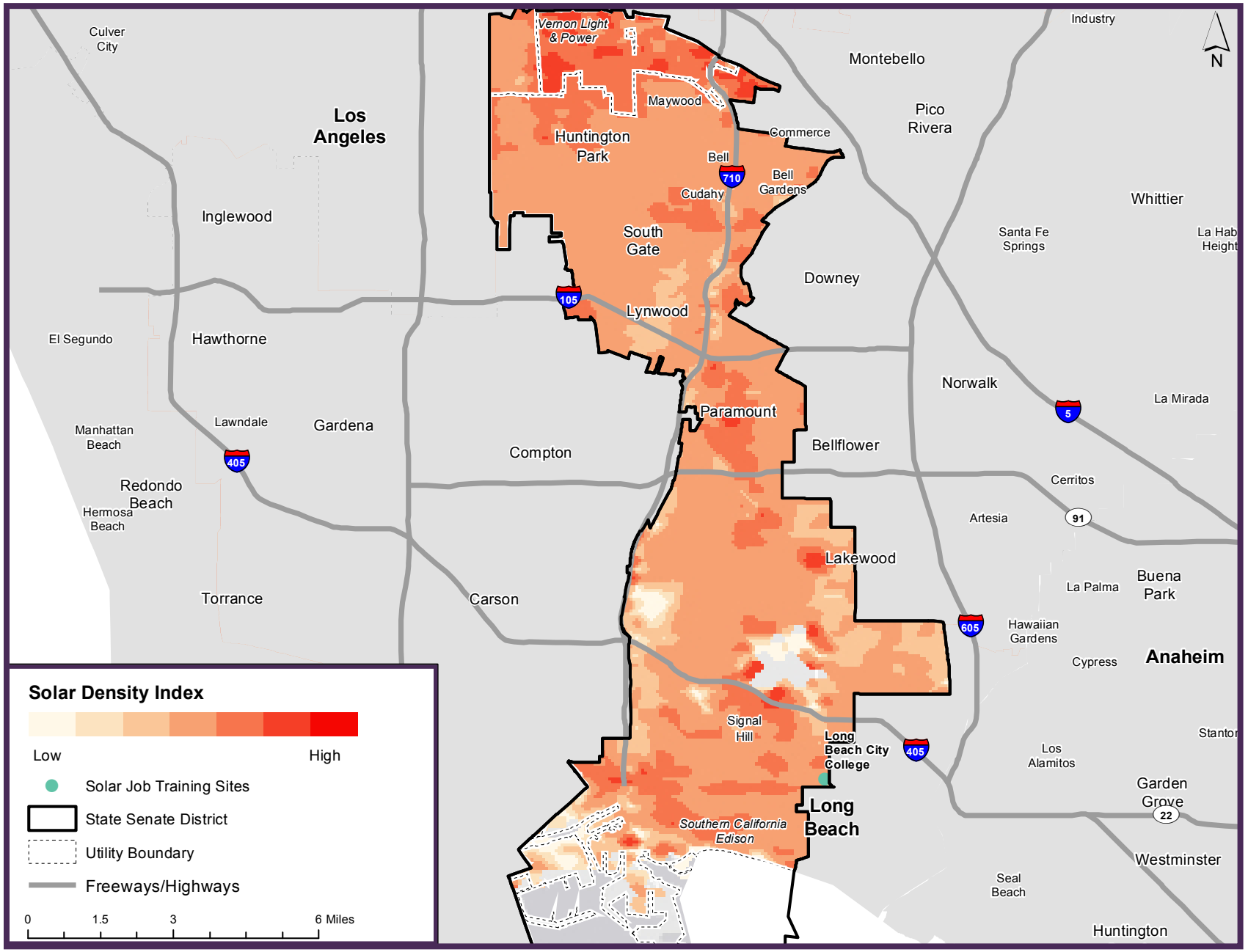
Job training will also be supported by Proposition 39. The map identifies solar job training sites that could be eligible for these resources.

Local policies also provide financial incentives for solar investments. Through the California Solar Initiative, Southern California Edison offers incentives including rebates on solar equipment and installation for photovoltaics and solar heating systems. Residential and commercial customers could also be eligible for Net Energy Metering, which gives property owners credit for the electricity generated by the solar system on their rooftop.

Parcels with the Largest Potential Solar Projects in District 33

Rank	Potential (kW)	Parcel Address	Zip Code	Parcel Use Description
1	4,478	3100 E Slauson Ave; Vernon	90058	Warehousing, Distribution, Storage
2	4,402	2501 S Alameda St; Los Angeles	90058	Warehousing, Distribution, Storage
3	3,786	5525 S Soto St; Vernon	90058	Warehousing, Distribution, Storage
4	3,643	2401 E Wardlow Rd; Long Beach	90807	Heavy Manufacturing
5	2,942	2700 E Imperial Hwy; Lynwood	90262	Warehousing, Distribution, Storage

Solar Capacity



Source: Original solar capacity data: Los Angeles County, "Los Angeles County Solar Map." solarmap.lacounty.gov. Data modified by UCLA for the "Los Angeles County Solar Atlas," from which the above map was created. innovation.luskin.ucla.edu. Solar training sites data: USC Program for Environmental and Regional Equity, 2011. "Empowering LA's Solar Workforce." Sponsored by the Los Angeles Business Council. Original data from Environment California Research and Policy Center, 2011. "Building a Clean Energy Workforce: Preparing Californians for New Opportunities in the State's Green Economy."

District 33: Energy Efficiency Potential: Residential Buildings/Homes

94% of homes in District 33 were built before the state's energy efficiency building codes.

Simple retrofits can save money and make the home more comfortable year round.

The map highlights neighborhoods where potential for energy efficiency investments might be greatest for residential homes.[13] Buildings constructed before 1978 in general produce greater cost savings when retrofitted than buildings built after 1978.[14] The potential for energy efficiency investments is summarized for District 33 in the map statistics table.

MAP STATISTICS

Residential Buildings in District 33		All Buildings in District 33	
# of single-family homes	67,778	# of total buildings in District 33	111,800
% built before 1978	94%	% built before 1978	93%
Average square footage of pre-1978 buildings	2,062	Average square footage of pre-1978 buildings	3,534
% built in or after 1978	6%	% built in or after 1978	7%
Average square footage of post-1978 buildings	3,641	Average square footage post-1978 buildings	9,514

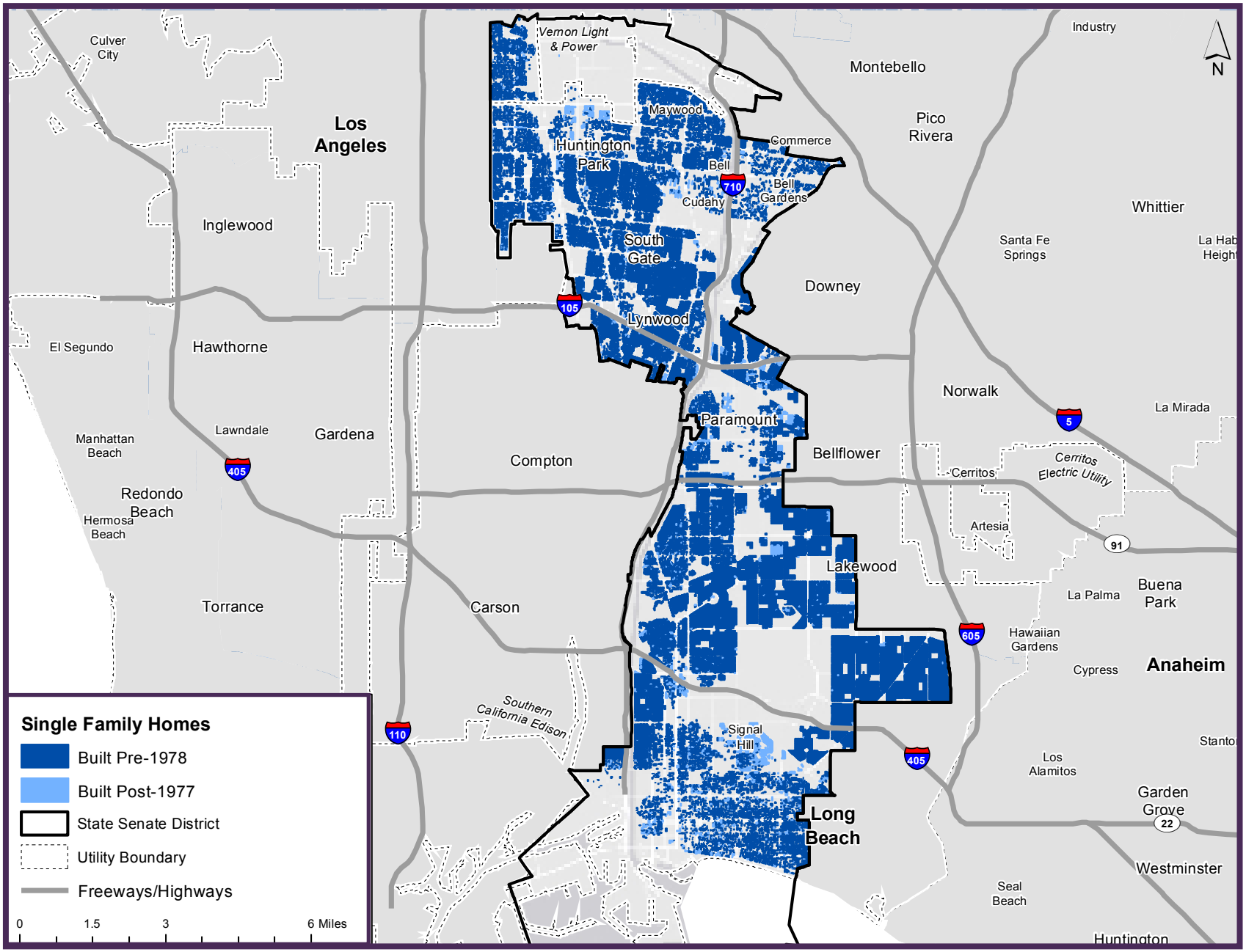
Funding Opportunities

State policies such as Proposition 39 will distribute billions of dollars to support energy efficiency improvements. District 33 could benefit from state funds for rebates, grants and loans to finance energy efficiency investments, which would help consumers save money on their electricity bills, support local green jobs and reduce pollution.

Local policies provide financial incentives to homeowners for energy efficiency investments. Through Energy Upgrade California™, incentives of up to $4,500 are available to residential customers of Southern California Edison (SCE) and the Southern California Gas Company (SoCal Gas). Other programs include:

- Residential Energy Efficiency Rebate Program—
  SCE provides residential incentives for a wide range of energy efficiency upgrades, including up to $1,100 to help with A/C installation, maintenance and repair as well as refrigerator recycling, ENERGY STAR refrigerator rebates, pool pump and motor rebates, the More Light for Less program, whole house fan rebates, evaporative cooler rebates, water heater rebates and clothes washer rebates.
- Home Energy Efficiency Rebate Program—
  SoCal Gas provides rebates to residential custmers for energy efficiency upgrades with ENERGY STAR equipment.
- California Advanced Homes Incentives—
  Incentives for home construction that performs at least 15% better than Title 24 Standards.

Energy Efficiency Potential: Residential



Source: 2009 Assessors/Solar Potential Data: UCLA modified from County of Los Angeles eGIS, specifically from Mark Greninger.

District 33: Energy Efficiency Potential: Multi-unit Residential Buildings

The map highlights neighborhoods where potential for energy efficiency investments might be greatest for multi-unit residential buildings.[13] Buildings constructed before 1978 in general produce greater cost savings with building retrofits than buildings built after 1978,[14] as illustrated in the map. The potential for energy efficiency investments is summarized for District 33 in the map statistics table.

94% of apartments and other multi-unit residential buildings in District 33 were built before the state's energy efficiency building codes.

The cheapest energy is the energy not used in the first place.

MAP STATISTICS

Multi-unit Residential Buildings in District 33		All Buildings in District 33	
# of multi-unit residential buildings	31,833	# of total buildings in District 33	111,800
% built before 1978	94%	% built before 1978	93%
Average square footage of pre-1978 buildings	3,511	Average square footage of pre-1978 buildings	3,534
% built in or after 1978	6%	% built in or after 1978	7%
Average square footage of post-1978 buildings	5,534	Average square footage post-1978 buildings	9,514

Funding Opportunities

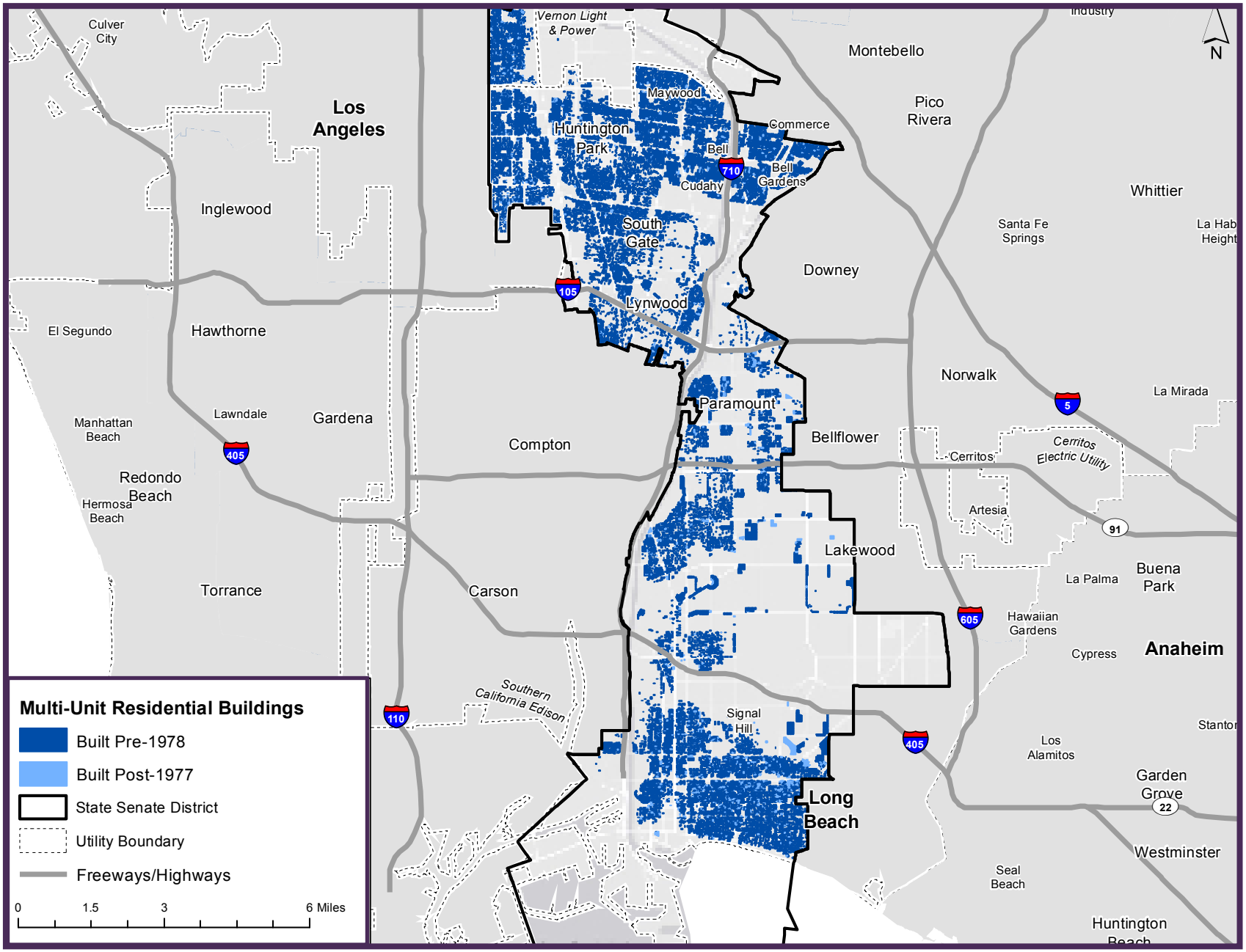
State policies such as Proposition 39 will distribute billions of dollars to support energy efficiency improvements. District 33 could benefit from state funds for rebates, grants and loans to finance energy efficiency investments, which would help consumers and property owners save money on their electricity bills, support local green jobs and reduce pollution.

Local policies also provide financial incentives for energy efficiency investments in multi-unit residential buildings. The previous narrative page describes residential incentive programs offered by Southern California Edison (SCE) and the Southern California Gas Company (SoCal Gas).

In addition, SCE offers a multi-family residential energy program that provides rebates for energy efficiency upgrades to property managers and owners of multi-unit residences.

SoCal Gas also offers a multi-family residential energy program for property managers and owners of multi-unit residences who make energy investments.

Energy Efficiency Potential: Multi-unit Residential



Source: 2009 Assessors/Solar Potential Data: UCLA modified from County of Los Angeles eGIS, specifically from Mark Greninger.

District 33: Energy Efficiency Potential: Commercial and Industrial Buildings

The map highlights neighborhoods where potential for energy efficiency investments might be greatest for commercial and industrial buildings.[13] Buildings constructed before 1978 in general produce greater cost savings with building retrofits than buildings built after 1978,[14] as illustrated in the map. The potential for energy efficiency investments is summarized for District 33 in the statistics table, below.

30%
on average of the energy used in commercial buildings is wasted, according to the U.S. Environmental Protection Agency.

Retrofitting buildings to be energy efficient saves money and creates jobs.

MAP STATISTICS

Commercial and Industrial Buildings in District 33		All Buildings in District 33	
# of commercial and industrial buildings	11,422	# of total buildings in District 33	111,800
% built before 1978	81%	% built before 1978	93%
Average square footage of pre-1978 buildings	13,003	Average square footage of pre-1978 buildings	3,534
% built in or after 1978	19%	% built in or after 1978	7%
Average square footage of post-1978 buildings	23,300	Average square footage post-1978 buildings	9,514

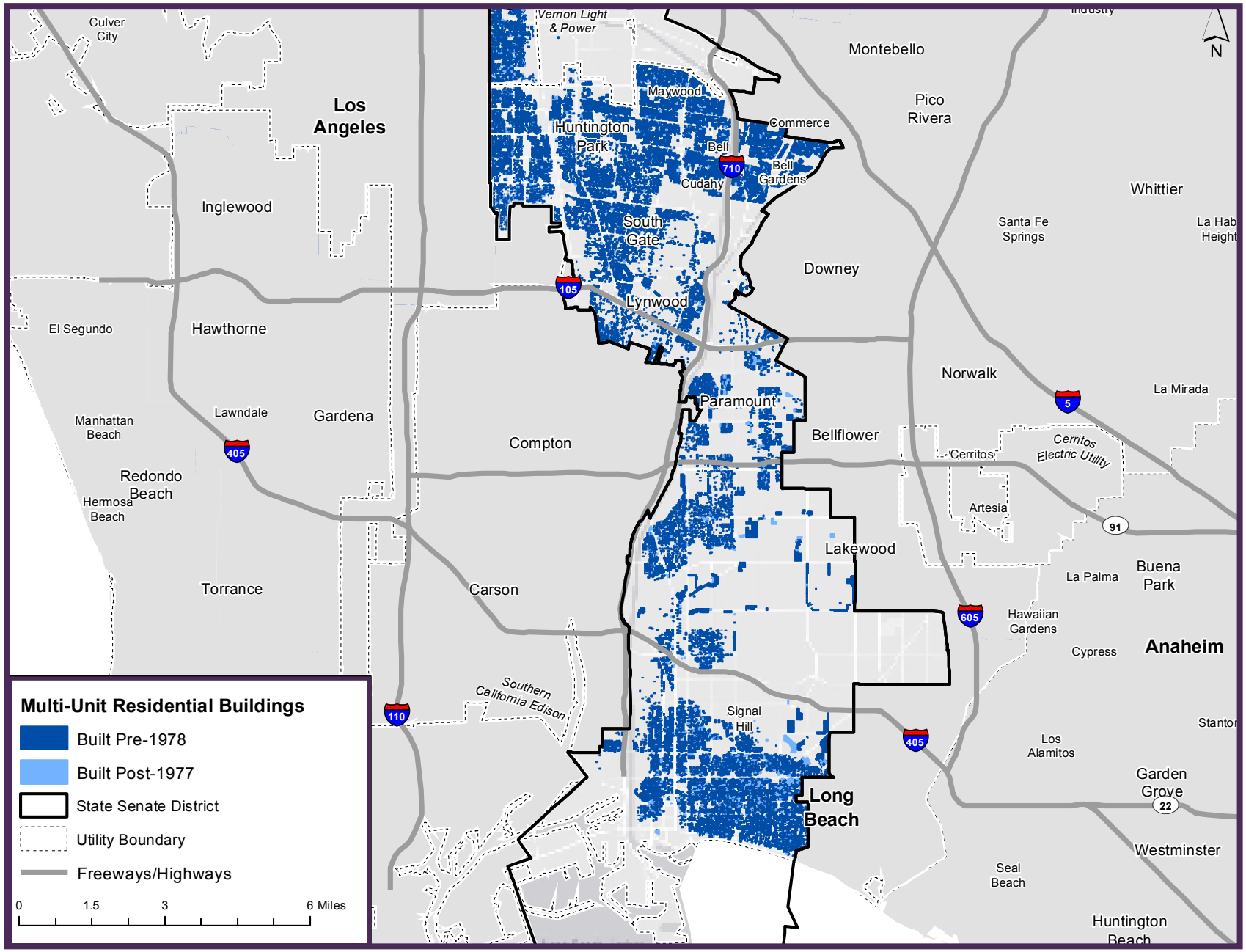
Funding Opportunities

State policies such as Proposition 39 will distribute billions of dollars to support energy efficiency improvements. District 33 could benefit from state funds for rebates, grants and loans to finance energy efficiency investments, which would help businesses save money on their electricity bills, support local green jobs and reduce pollution.

Local policies also provide financial incentives for energy efficiency investments. Southern California Edison offers a range of programs for industrial and commercial customers, including:

- Demand Response Program—
  Helps commercial customers save money by reducing energy use during peak demand times.
- Energy Efficiency Express Solutions—
  Provides rebates paid up to 100% on energy upgrades for lighting, temperature control, refrigerators and water heaters.
- Savings by Design Program—
  SCE partners with the Southern California Gas Company (SoCal Gas) on this program that provides technical expertise and rebates to commercial and industrial customers to reduce energy usage.
- Other SCE and SoCal Gas services include energy efficiency customized solutions, energy efficiency calculated incentive program, and a non-residential on-bill financing program.

Energy Efficiency Potential: Commercial and Industrial



Source: 2009 Assessors/Solar Potential Data: UCLA modified from County of Los Angeles eGIS, specifically from Mark Greninger.

District 33: Energy Efficiency Potential: Government and Non-Profit Buildings

The map highlights neighborhoods where potential for energy efficiency investments might be greatest for government and non-profit owned buildings.[13] Buildings constructed before 1978 in general produce greater cost savings with building retrofits than buildings built after 1978,[14] as illustrated in the map. The potential for energy efficiency investments is summarized for District 33 in the statistics table, below.

Billions of $
are on the table for energy efficiency and clean energy investments in California.

MAP STATISTICS

Government and Non-profit Buildings in District 33		All Buildings in District 33	
# of government and non-profit buildings	767	# of total buildings in District 33	111,800
% built before 1978	92%	% built before 1978	93%
Average square footage of pre-1978 buildings	13,066	Average square footage of pre-1978 buildings	3,534
% built in or after 1978	8%	% built in or after 1978	7%
Average square footage of post-1978 buildings	25,293	Average square footage post-1978 buildings	9,514

Funding Opportunities

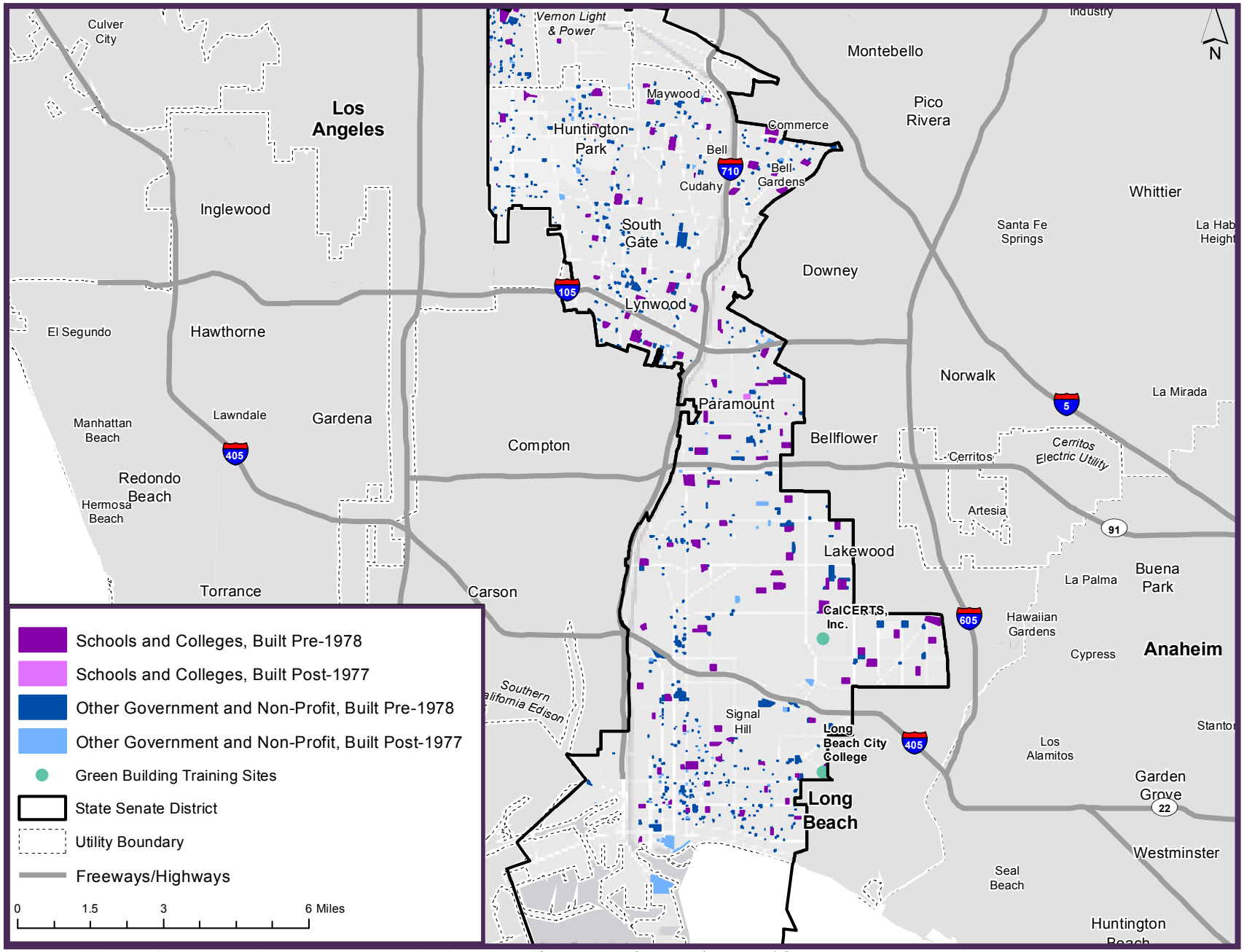
State policies such as Proposition 39 will distribute billions of dollars to support energy efficiency improvements. District 33 could benefit from state funds for rebates, grants and loans to finance energy efficiency investments, which would save taxpayer money while supporting local green jobs and reducing pollution.

Municipal buildings will be eligible recipients for Proposition 39 funds. The map identifies the municipal buildings constructed before 1978, an indication of likely cost effectiveness for a retrofit.

Schools are pulled out because schools will be prime recipients of Proposition 39 funds. As the map indicates, numerous schools were constructed pre-1978, before energy efficiency building codes were in effect.

Green job training sites will also be supported by Proposition 39 funds. The map identifies green buildings training sites that could be eligible for these funds.

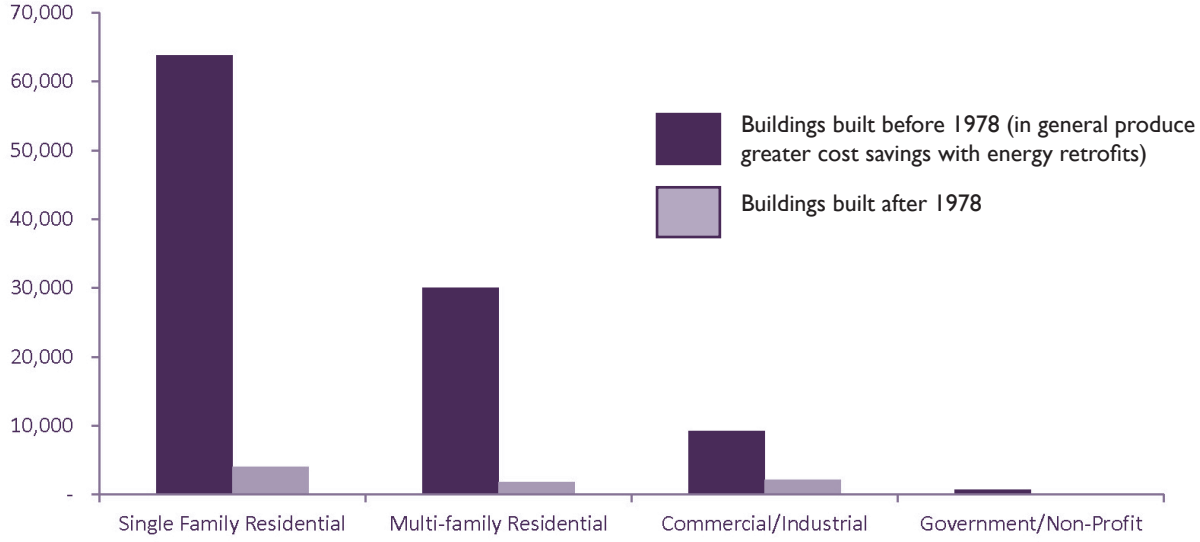
Energy Efficiency Potential: Government and Non-Profit



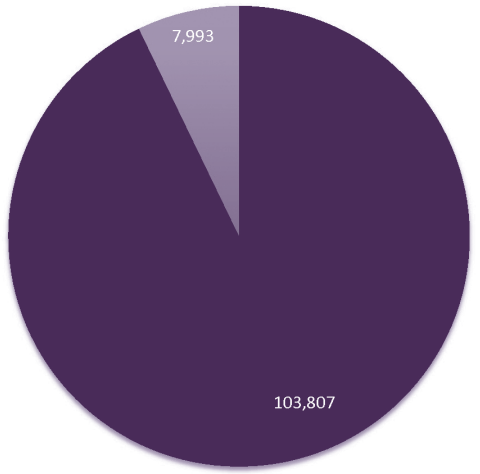
Source: Building age data: Los Angeles County Assessor; Schools: Extracted from Points of Interest (LMS Data) from LA County GIS Portal; Green building training site data: USC Program for Environmental and Regional Equity. Original data from Environment California Research and Policy Center, 2011. "Building a Clean Energy Workforce: Preparing Californians for New Opportunities in the State's Green Economy."

District 33: Energy Efficiency Potential Summary

Number of Buildings by Sector



All Buildings in District 33



Linking investments in workforce training to sustainable jobs

"Sustainable jobs" pay prevailing wages and provide healthcare and access to opportunities for wage growth.[15] To effectively link Proposition 39's funding for worker training with sustainable jobs, policymakers should consider best practices for a strong pipeline between training programs and careers. For example, the Los Angeles Community College District and the City of Los Angeles have approved project labor/stabilization agreements, or contracts with labor unions, that include goals for local hires and apprentices workers. Apprenticeship programs can create a strong pipeline between education and sustainable jobs and careers.

The Truth about Job Creation

Energy efficiency investments create costs savings for the customer and jobs for the region. Invest $1 million in the following industries, you get this many jobs.[16]

References

Data sources are listed immediately below the respective map except for the data sources repeated throughout the map listed here:

County map layer: 2000 Census Tracts, 2010 Senate District, 2010 ZCTA: US Census (http://www.census.gov/geo/reference/zctas.html)

Utility map layer: UCLA self-generated from city and SCE boundaries.

Cities, Freeways, gray basemap: ESRI Online

1. Alex Hall, Fengpeng Sun, Daniel Walton, et al. (2012) "Mid-Century Warming in the Los Angeles Region." Part of the Climate Change in the Los Angeles project. Produced by UCLA with funding and support from the City of Los Angeles, in partnership with the Los Angeles Regional Collaborative for Climate Action and Sustainability (LARC). http://c-change.la/
2. There is a 95% confidence that the warming will be between 1.7 and 7.5°F. To account for uncertainty associated with the trajectory of future greenhouse gas emissions and other factors affecting the planet's energy balance, the researchers inputted projections for both the standard "business-as-usual " (RCP8.5) and "mitigation" (RCP2.6) emission scenarios. In the map we illustrate the average annual temperate increases modeled under the business-as-usual scenario. Yet the study found that even the best case scenario will lead to significant warming due to emissions that are already moving through the Earth's atmosphere.
3. Adapted from C-Change-LA. Written and published by Climate Resolve and hosted by the Los Angeles Regional Collaborative for Climate Action and Sustainability, housed at the UCLA Institute for the Environment and Sustainability. http://c-change.la/los-angeles/
4. Alex Hall, lead researcher of the "Mid-Century Warning in the Los Angeles Region" study and UCLA professor of Atmospheric Sciences.
5. California Environmental Health Tracking Program. Community Vulnerabilities to Climate Change. August 2011. Environmental Health Investigations Branch, California Department of Public Health. Final report available at www.cehtp.org/p/climate_population_vulnerabilities.
6. California Environmental Protection Agency (Cal/EPA) and the Office of Environmental Health Hazard Assessment (OEHHA), California Communities Environmental Health Screening Tool, Version 1 (CalEnviroScreen 1.0). http://oehha.ca.gov/ej/ces042313.html
7. SB 535 (de León) and AB 1532 (Pérez) provide direction on the process for allocating cap-and-trade auction proceeds, including the requirements outlined above concerning disadvantaged communities.
8. Map based on aerial photography of the solar-usable rooftop space, utilizing data from the Los Angeles County Solar Map tool at http://solarmap.lacounty.gov/. UCLA modified the data for a regional analysis.
9. UCLA Luskin Center, 2011 "Los Angeles County Solar Atlas." http://innovation.luskin.ucla.edu/content/los-angeles-solar-atlas.
10. The map is not intended to be a complete tool for investigating individual sites, but rather highlights overall spatial trends and opportunities. The map assumes that roofs that have solar potential but cannot currently support solar because of old age or poor quality will be replaced in 10 to 15 years under a standard capital maintenance program, but the map does not contain information about building age or condition.

References

11. U.S. Department of Energy, 2012 "SunShot Vision Study." Study estimated that the job intensities for photovoltacis were roughly 25 jobs per megawatt in manufacturing/distribution and 25 jobs per megawatt in installation. These 2010 U.S. PV job intensity estimates are considerably higher than one would expect in a mature manufacturing/distribution supply chain and installation infrastructure, which is not surprising given that the U.S. PV industry in 2010 was in a scale-up phase, where a significant fraction of FTE jobs were likely focused on business development, research and development (R&D), regulatory issues, and production scale-up. Future numbers could be lower.

12. U.S. Environmental Protection Agency, using the Emissions & Generation Resource Integrated Database (eGRID), 2012. http://www.epa.gov/cleanenergy/energy-resources/refs.html.

13. This map is best used to identify overall spatial patterns of energy efficiency investment potential. It is an incomplete tool for investigating individual sites. The map does not contain information about energy retrofits, LEED or EnergyStar certification, nor electricity usage.

14. California Energy Commission. Title 24 Building Codes, state green building standards, went into effect in 1978 in California, and are regularly updated. http://www.energy.ca.gov/title24/

15. UCLA Labor Center (2008). Construction Careers for Our Communities. http://labor.ucla.edu/publications/pdf/ConstructionCareersForOurCommunities.pdf.

16. Employment estimates include direct, indirect, and induced jobs (where induced jobs =.4(direct + induced)) and were derived from an input-output model, using the IMPLAN 2.0 software and IMPLAN 2007 data set constructed by the Minnesota IMPLAN Group, Inc. This data provides 440-industry level detail and is based on the Bureau of Economic Analysis input-output tables. A number of factors create variability in published employment estimates; it is not an exact science. Here, calculations were done by the Political Economy Research Institute at the University of Massachusetts and the Center for the American Progress, 2009 "The Economic Benefits of Investing in Clean Energy." Page 29.

WWW.EDF.ORG

UCLA Luskin School *of* Public Affairs
Luskin Center for Innovation

WWW.INNOVATION.LUSKIN.UCLA.EDU