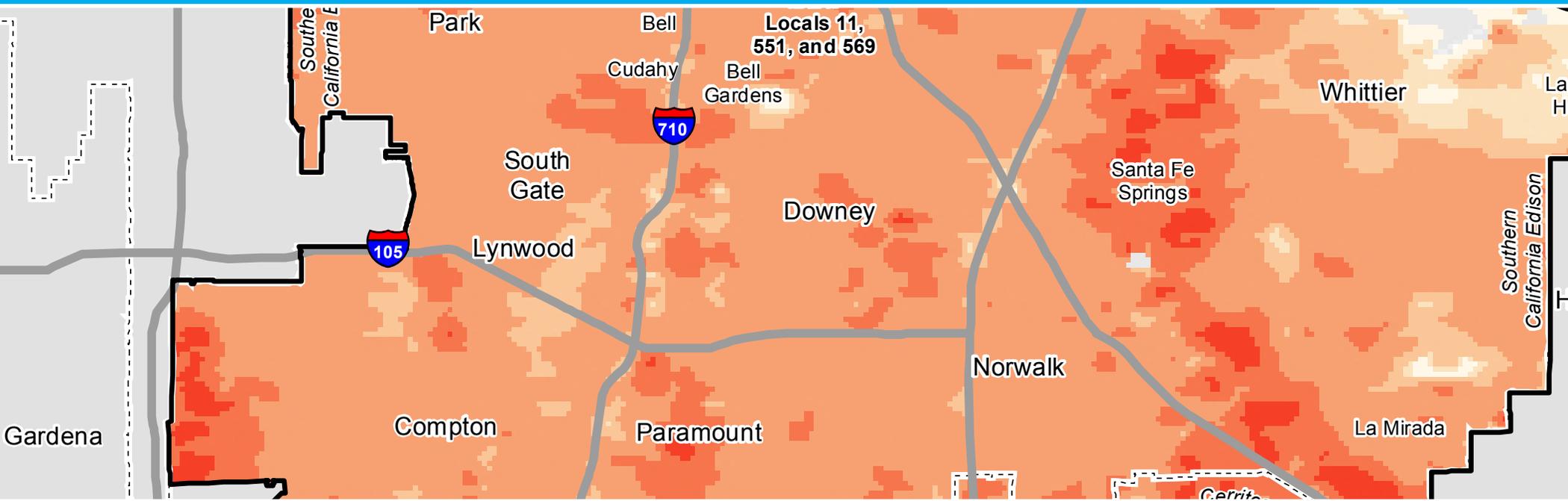


PROFILE OF CLEAN ENERGY INVESTMENT POTENTIAL GATEWAY CITIES



GATEWAY CITIES: 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 the Gateway Cities. 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, specifically 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

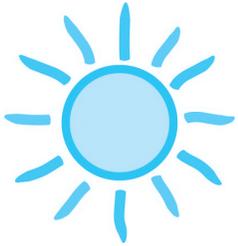
ACKNOWLEDGEMENTS

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.

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A HOTTER REGION



Adaptation in Los Angeles County is inevitable.⁴

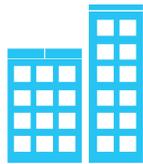
This map illustrates “Mid-Century Warming in the Los Angeles Region.” This is the first study to provide specific climate-change predictions for the greater Los Angeles area, with unique predictions down to the neighborhood level.¹

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 THE GATEWAY CITIES COULD ADAPT³

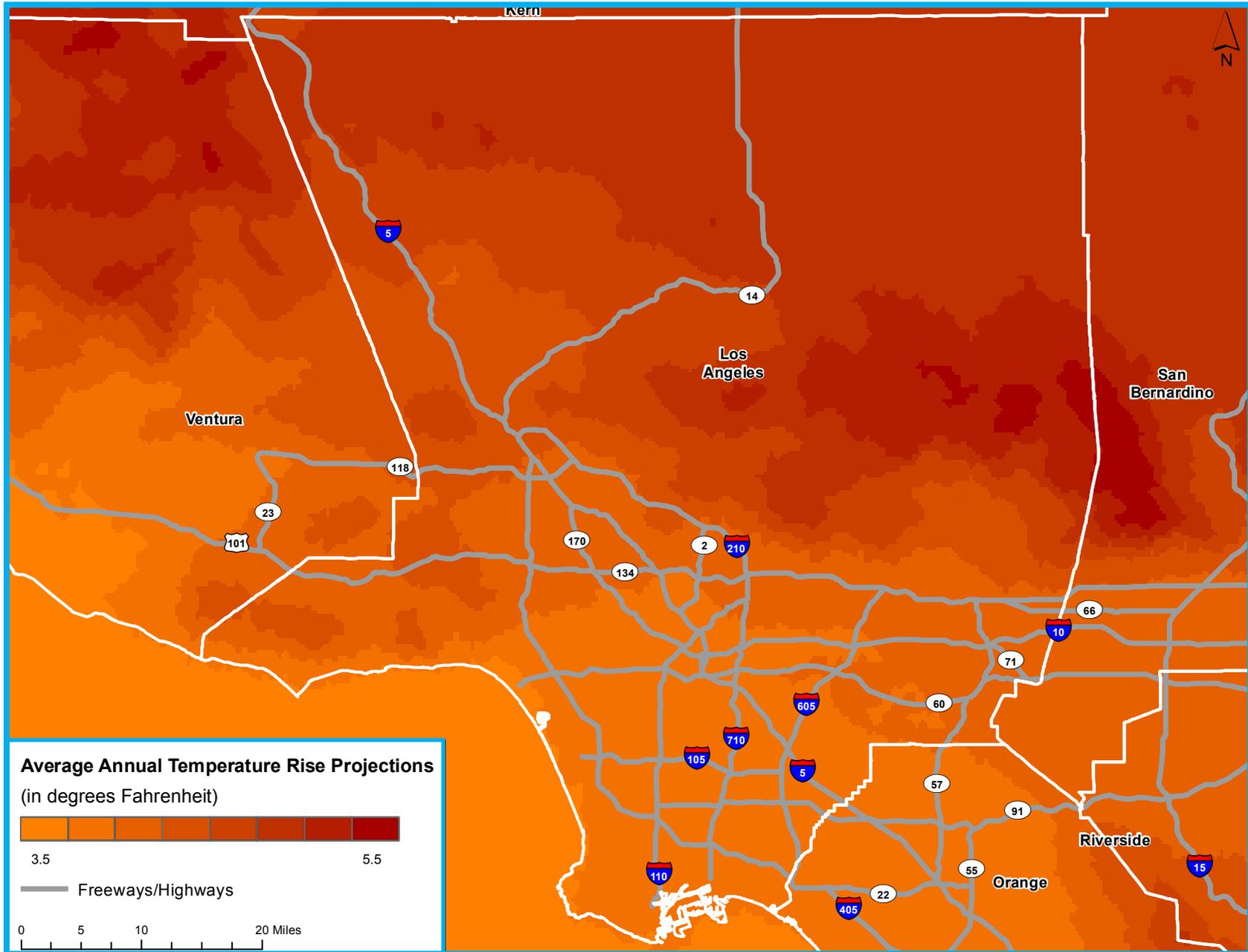


Higher temperatures will increase the importance of **energy efficient buildings**. Conservation and improved energy efficiency—with higher performing heating, ventilating and cooling systems, efficient lighting, etc.—will reduce the demand for energy, thus saving money for residents, owners and taxpayers. 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.

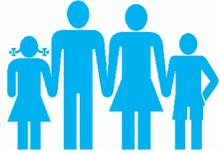
Green spaces and trees reduce the heat island effect caused by buildings and streets, and provide a place for people to cool off. Transit provides transportation access to parks, medical care and other services that can improve community resiliency to climate change.

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.ja/>. See Reference page for information about the uncertainty ranges and other details.

GATEWAY CITIES: 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.

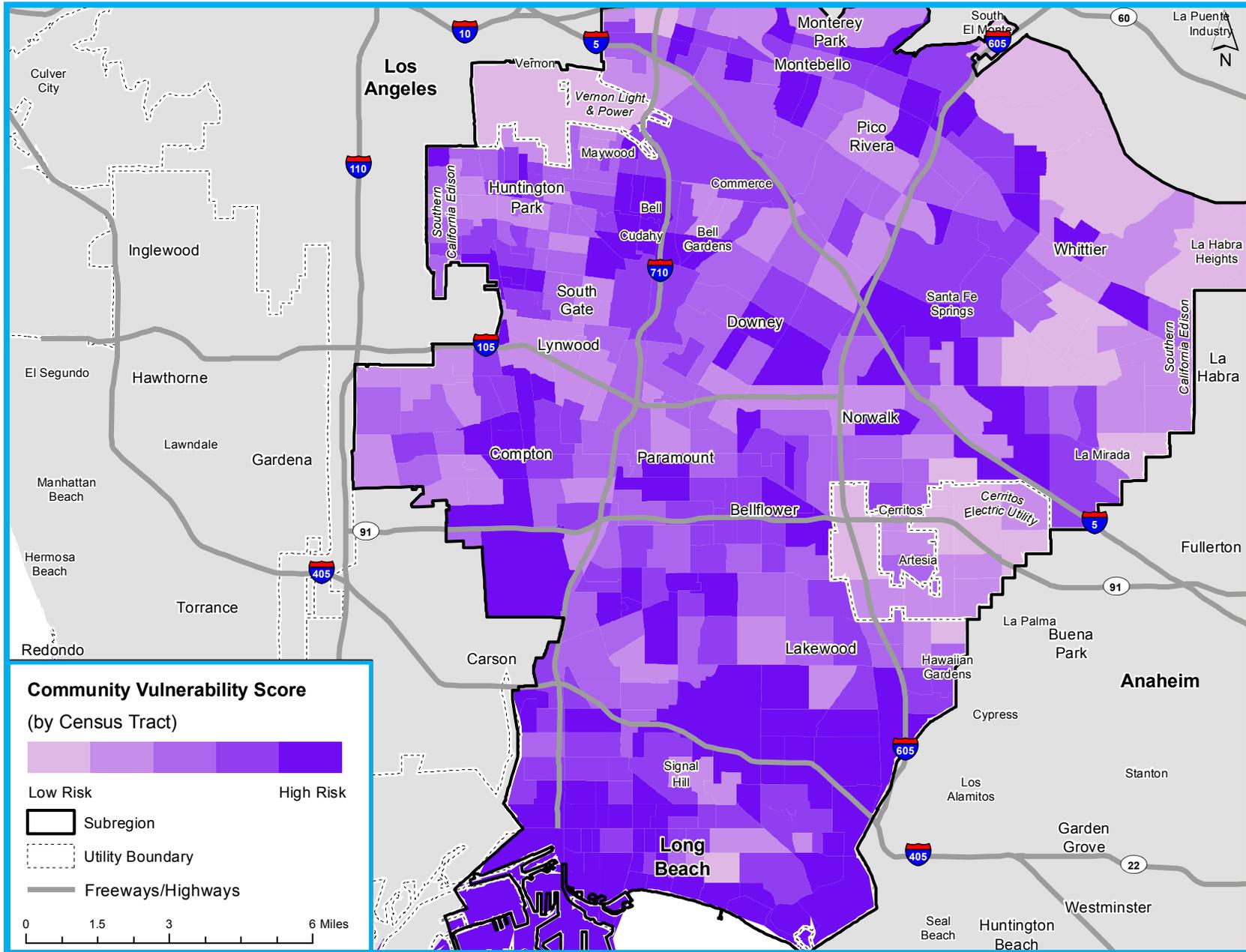
This map illustrates the extent of vulnerability to climate change in the communities (at the census tract level) of the Gateway Cities. The data comes from the California Environmental Health Tracking Program (CEHTP) of the California Department of Public Health, which created an index of 7 indicators.⁵ 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 the Gateway Cities			
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
90703, 90670, and 90650	(06037504102)	Top tier	3.625
90703, 90670, and 90650	(06037504102)	Top tier	3.625
90703, 90670, and 90650	(06037504102)	Top tier	3.625
90802 and 90803	(06037576602)	Top tier	3.556
90802 and 90803	(06037576602)	Top tier	3.556
90803	(06037577501)	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
90602	(06037501504)	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.



GATEWAY CITIES: 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 the Gateway Cities.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:

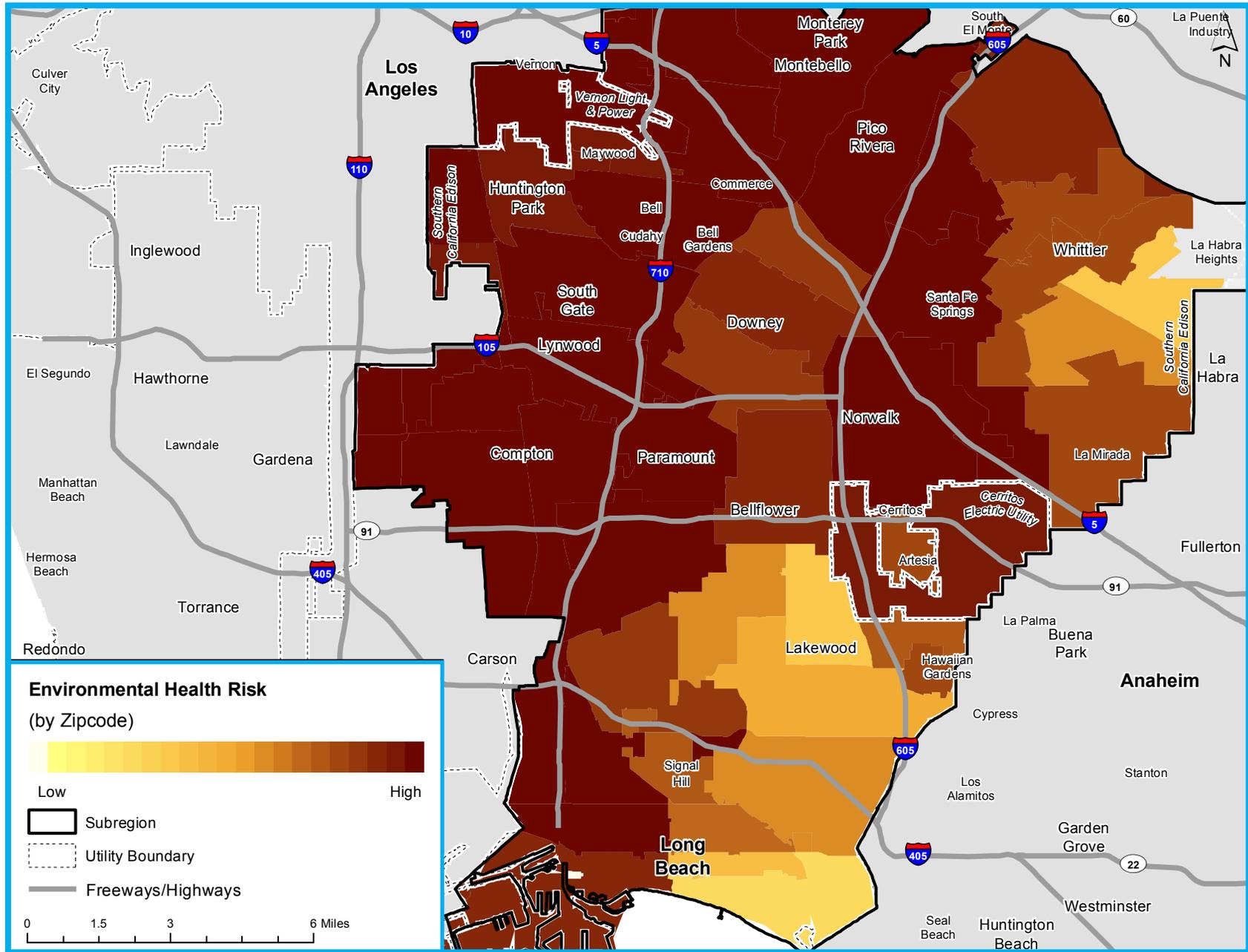
- Pollution Burden, Exposure and Environmental Effect Indicators—
Air quality/ozone, air quality/particulate matter 2.5, diesel particulate matter, pesticide use, toxic releases from facilities, traffic density, cleanup sites, groundwater threats, impaired water bodies, solid waste sites and facilities 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.

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

Results from the California Communities Environmental Health Screening Tool for the Gateway Cities			
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
90220	Top tier	1-5%	58.22
90810	Top tier	1-5%	57.76
90805	Top tier	1-5%	56.21
90221	Top tier	1-5%	55.61
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
90061	Top tier	1-5%	52.20

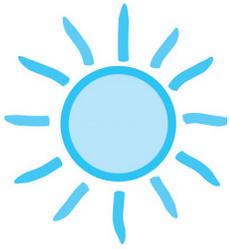
**Highest Scores in the Gateway Cities but Percentage and Tiers Compared to Other Zip Codes in California*

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>.

GATEWAY CITIES: SOLAR CAPACITY



5,577
job years could be created if 5% of rooftop solar potential in Gateway Cities was realized.¹¹

The Gateway Cities 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 the Gateway Cities.⁸ Economic development planners, building owners and anyone interested in expanding solar power can use this map, along other parcel level analyses⁹, 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.

MAP STATISTICS	Single Family	76%	Total Rooftop Solar Potential	4,462 megawatts
	Multi-unit Residential	16%	Total Potential Sites	316,003 rooftops
	Commercial & Industrial	7%	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 the Gateway Cities was realized, approximately 5,577 job years would be created.¹¹

Pollution Reduction: This would also eliminate 237,922 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 the Gateway Cities 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.

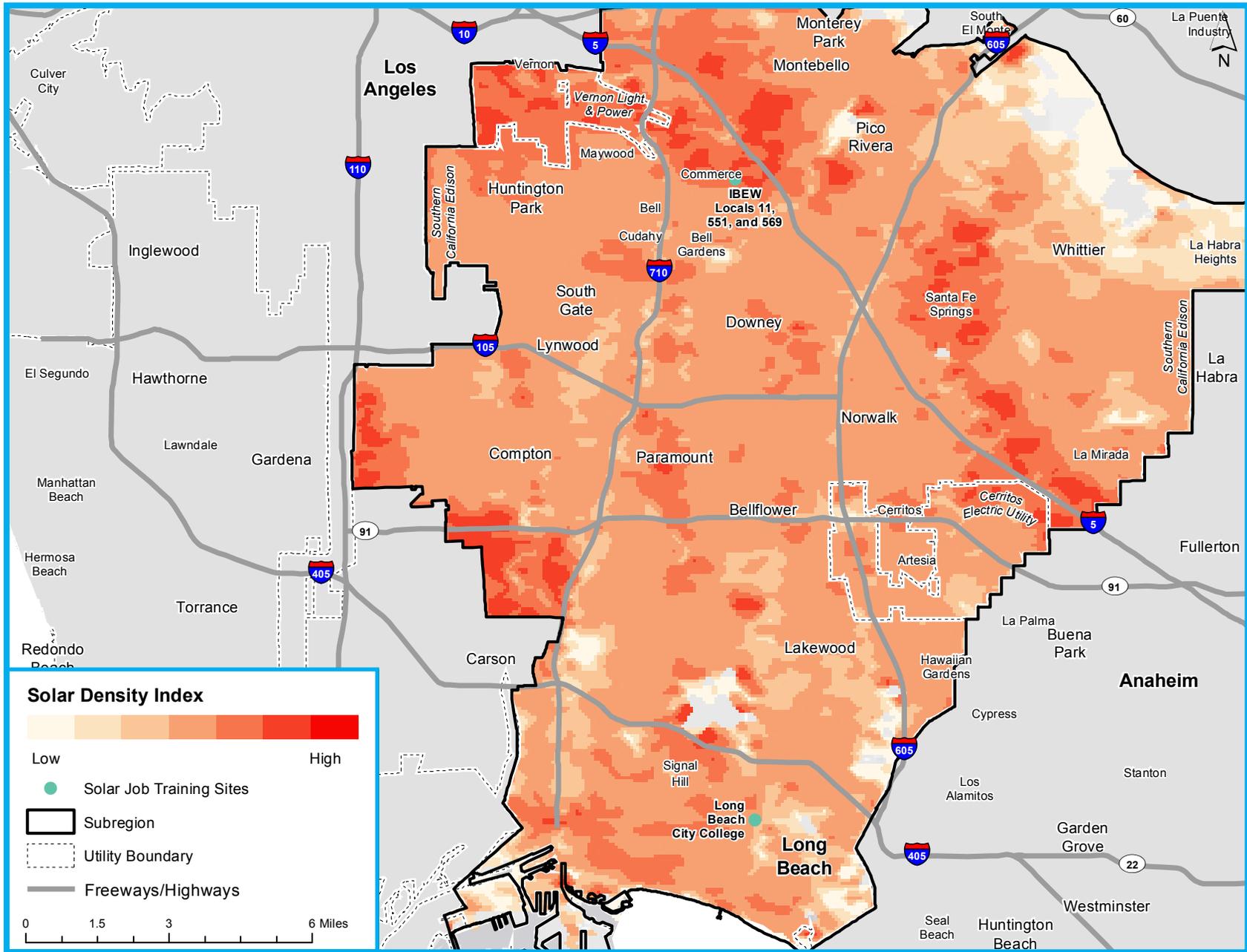
Local policies also provide financial incentives for solar investments. Through the California Solar Initiative, Southern California Edison offers incentives including rebates on solar equipment and installation of photovoltaics and solar heating systems. Residential and commercial customers could also 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 the Gateway Cities

Rank	Potential (kW)	Parcel Address	Zip Code	Parcel Use Description
1	6,706	5300 Sheila St; Commerce	90040	Food Processing Plants
2	5,979	12520 Slauson Ave; Santa Fe Springs	90670	Warehousing, Distribution, Storage
3	5,552	13500 Foster Rd; Santa Fe Springs	90670	Warehousing, Distribution, Storage
4	5,279	9630 Norwalk Blvd; Santa Fe Springs	90670	Warehousing, Distribution, Storage
5	5,170	2400 Yates Ave; Commerce	90040	Heavy Manufacturing

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."

GATEWAY CITIES: ENERGY EFFICIENCY POTENTIAL: RESIDENTIAL BUILDINGS/HOMES



93% of homes in Gateway Cities 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 the Gateway Cities in the map statistics table.

		Residential Buildings in the Gateway Cities		All Buildings in the Gateway Cities	
MAP STATISTICS	# of single-family homes	239,840	# of total buildings in the Gateway Cities	315,377	
	% built before 1978	93%	% built before 1978	92%	
	Average square footage of pre-1978 buildings	2,168	Average square footage of pre-1978 buildings	3,409	
	% built in or after 1978	7%	% built in or after 1978	8%	
	Average square footage of post-1978 buildings	3,198	Average square footage post-1978 buildings	9,762	

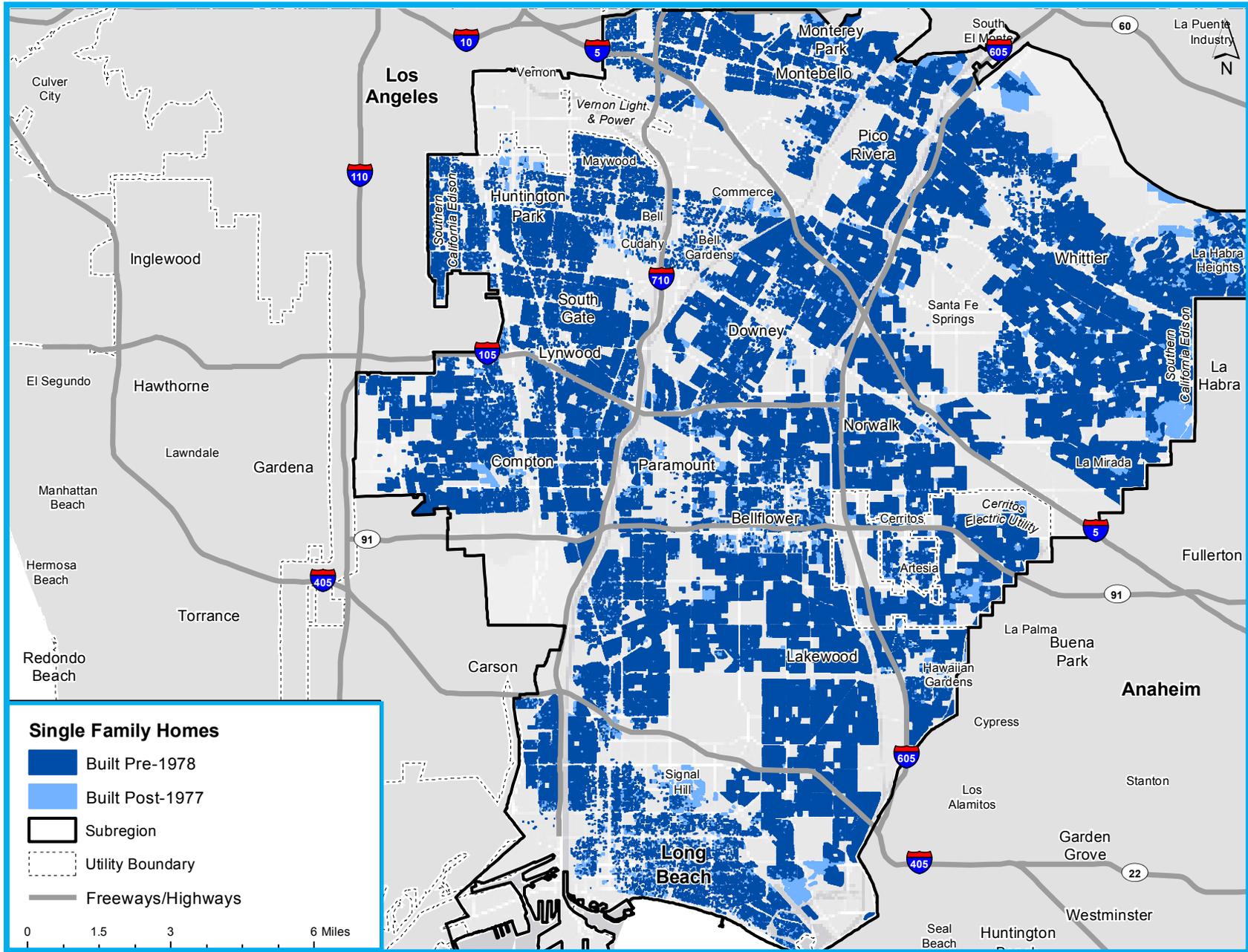
FUNDING OPPORTUNITIES

State policies such as Proposition 39 will distribute billions of dollars to support energy efficiency improvements. The Gateway Cities 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 customers for energy efficiency upgrades, ENERGY STAR equipment.
- California Advanced Homes Incentives—
Incentive 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.

GATEWAY CITIES: 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 the Gateway Cities in the map statistics table.

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

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

		Multi-unit Residential Buildings in the Gateway Cities		All Buildings in the Gateway Cities	
MAP STATISTICS	# of multi-unit residential buildings	50,287	# of total buildings in the Gateway Cities	315,377	
	% built before 1978	94%	% built before 1978	92%	
	Average square footage of pre-1978 buildings	3,827	Average square footage of pre-1978 buildings	3,409	
	% built in or after 1978	6%	% built in or after 1978	8%	
	Average square footage of post-1978 buildings	6,238	Average square footage post-1978 buildings	9,762	

FUNDING OPPORTUNITIES

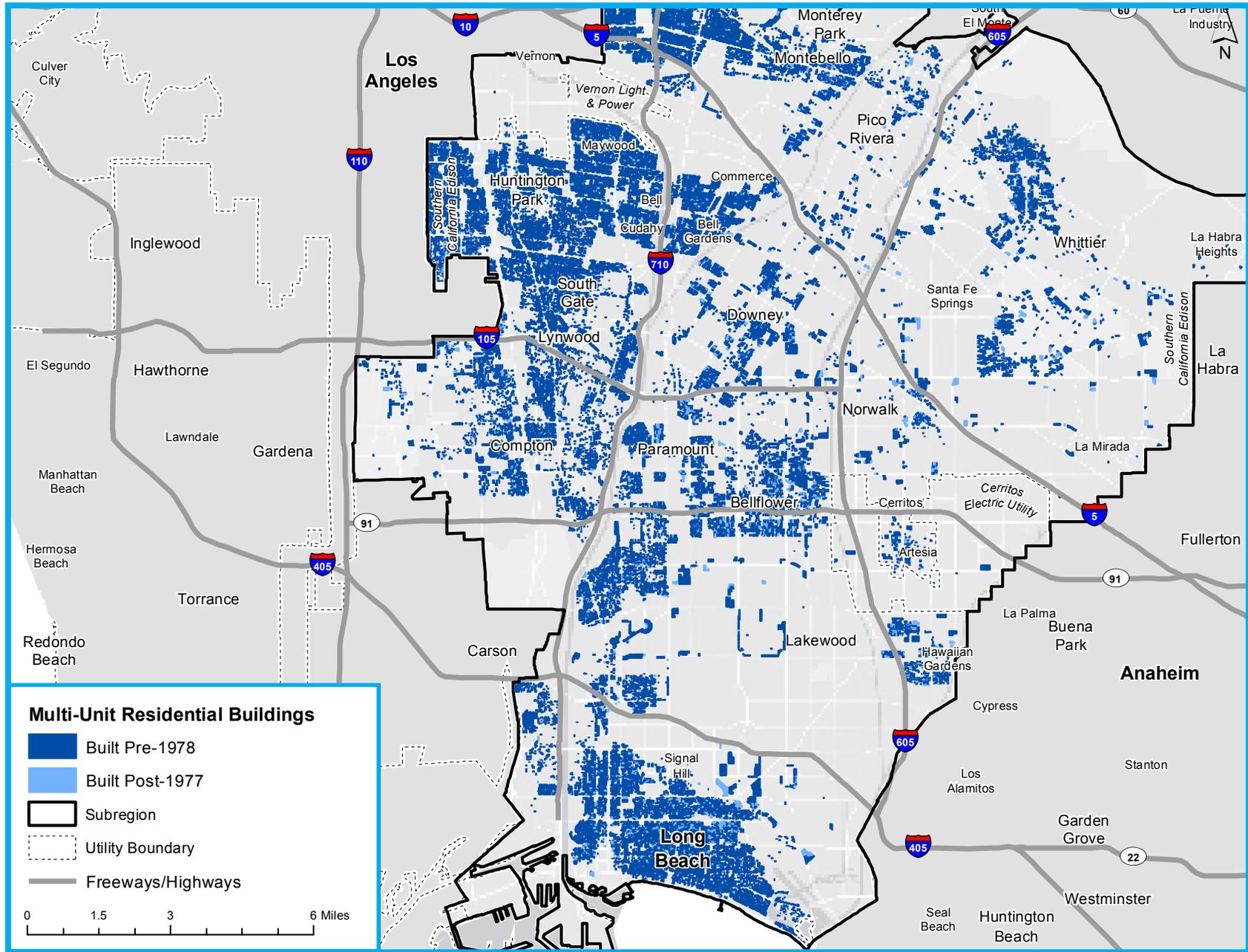
State policies such as Proposition 39 will distribute billions of dollars to support energy efficiency improvements. The Gateway Cities could benefit from state funds for rebates, grants and loans to finance energy efficiency investments, which would help consumers and property owners save money on their 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 to property managers and owners of multi-unit residences for energy efficiency upgrades.

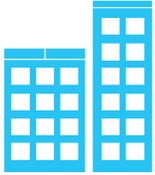
SoCal Gas also offers a multi-family residential energy program that provides rebates for energy efficiency investments made by property managers and owners of multi-unit residences.

ENERGY EFFICIENCY POTENTIAL: MULTI-UNIT RESIDENTIAL



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

GATEWAY CITIES: 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 the Gateway Cities 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 the Gateway Cities		All Buildings in the Gateway Cities	
# of commercial and industrial buildings	23,590	# of total buildings in the Gateway Cities	315,377	
% built before 1978	77%	% built before 1978	92%	
Average square footage of pre-1978 buildings	16,639	Average square footage of pre-1978 buildings	3,409	
% built in or after 1978	23%	% built in or after 1978	8%	
Average square footage of post-1978 buildings	30,513	Average square footage post-1978 buildings	9,762	

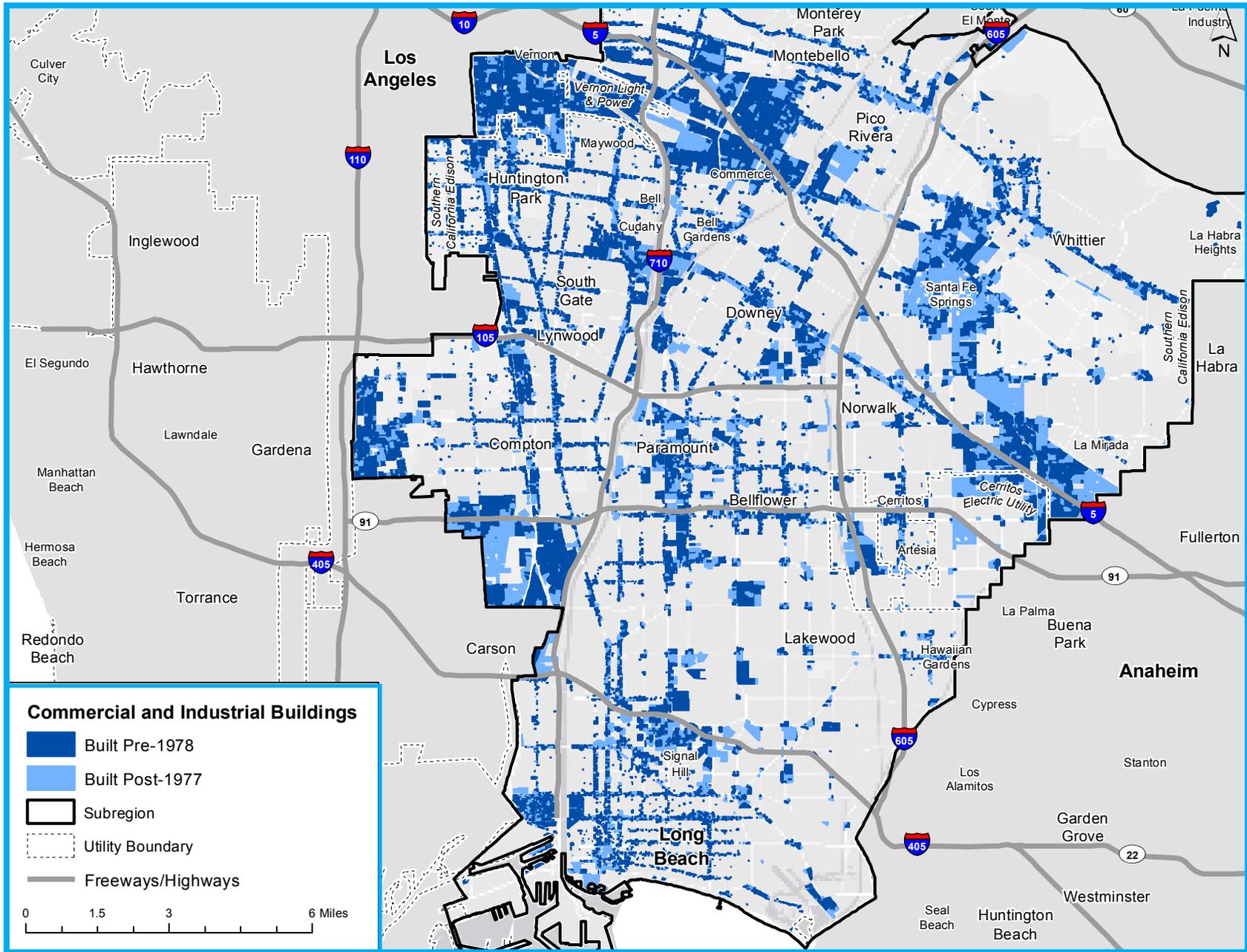
FUNDING OPPORTUNITIES

State policies such as Proposition 39 will distribute billions of dollars to support energy efficiency improvements. The Gateway Cities 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 calculate incentive program, and 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.

GATEWAY CITIES: 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 the Gateway Cities in the statistics table, below.

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

		Government and Non-profit Buildings in the Gateway Cities		All Buildings in the Gateway Cities	
MAP STATISTICS	# of government and non-profit buildings	1,660	# of total buildings in the Gateway Cities	315,377	
	% built before 1978	91%	% built before 1978	92%	
	Average square footage of pre-1978 buildings	15,296	Average square footage of pre-1978 buildings	3,409	
	% built in or after 1978	9%	% built in or after 1978	8%	
	Average square footage of post-1978 buildings	19,542	Average square footage post-1978 buildings	9,762	

FUNDING OPPORTUNITIES

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

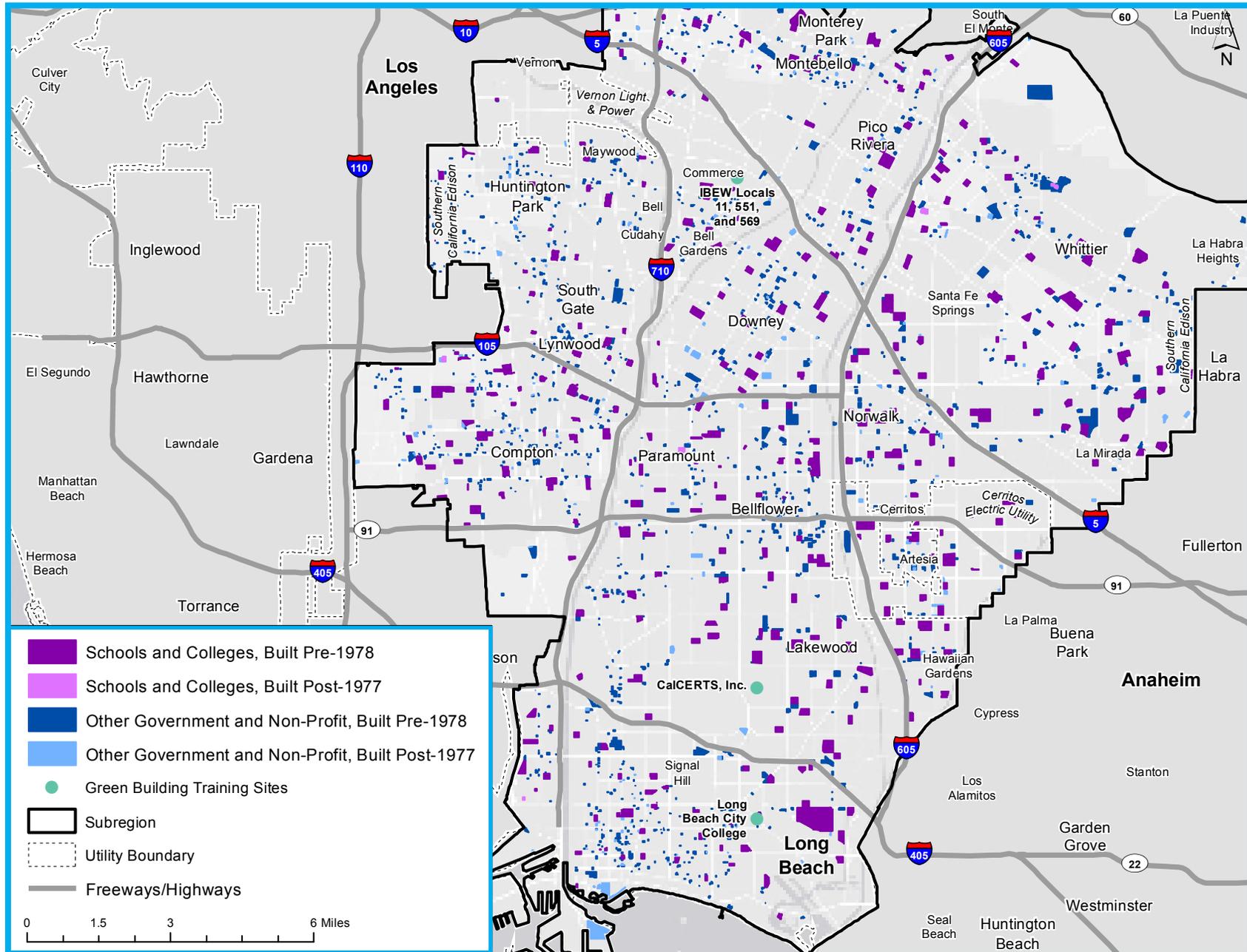
Municipal buildings will be eligible recipients for Proposition 39 funds. The map identifies the municipal buildings constructed before 1978, an indication of likely cost effectiveness for a retrofit.

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.



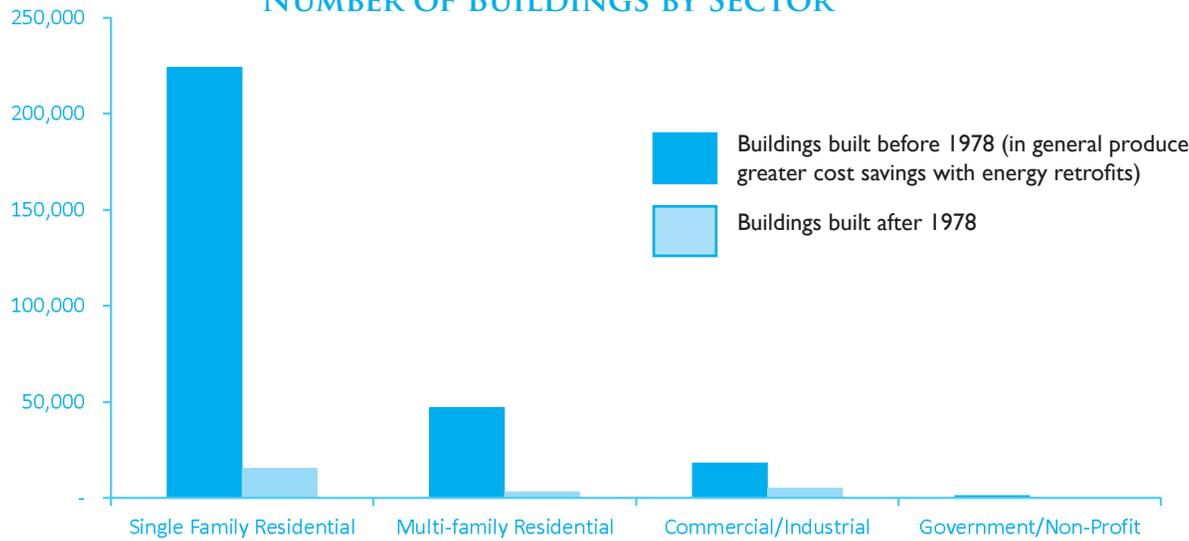
ENERGY EFFICIENCY POTENTIAL: GOVERNMENT AND NON-PROFIT



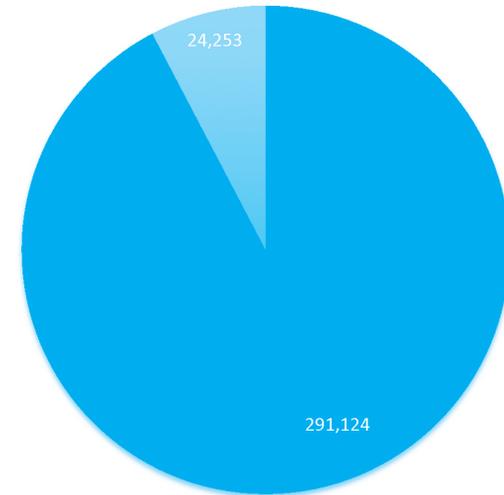
Source: Building age data: Los Angeles County Assessor; Schools: Extracted from Points of Interest (LMS Data) from LA County GIS Portal; Green building training site data: USC Program for Environmental and Regional Equity. Original data from Environment California Research and Policy Center, 2011. "Building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

GATEWAY CITIES: ENERGY EFFICIENCY POTENTIAL SUMMARY

NUMBER OF BUILDINGS BY SECTOR



ALL BUILDINGS IN THE GATEWAY CITIES

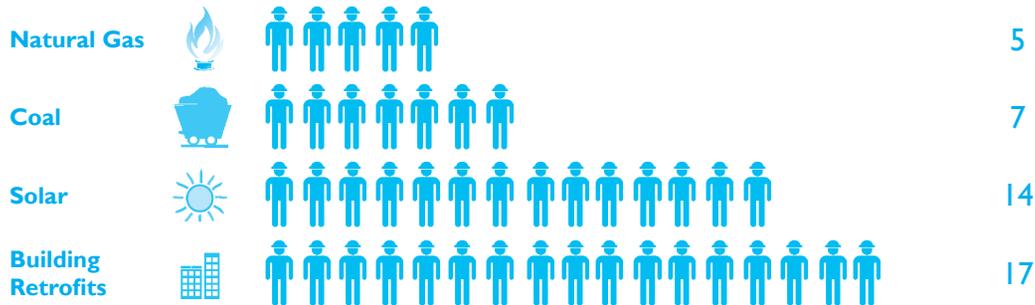


LINKING INVESTMENTS IN WORKFORCE TRAINING TO SUSTAINABLE JOBS

“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.

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11. U.S. Department of Energy, 2012 “SunShot Vision Study.” Study estimated that the job intensities for photovoltaics 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.



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