Empowering LA's Solar Workforce:

New Policies that Deliver Investments and Jobs

Presented by:

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Acknowledgments

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Making a Market Steering Committee

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Executive Summary
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Overview

Los Angeles is home to year-round sunshine and an entrepreneurial spirit. As such, it has the potential to be the national leader in solar power and clean energy jobs. Further, thanks to an abundance of training programs, Los Angeles boasts a trained workforce ready for jobs in solar installation, design, sales and more. Unfortunately, the Los Angeles Department of Water and Power (LA DWP) has failed to take advantage of the tremendous environmental and economic potential that solar power offers our region. As a result, Los Angeles has unwittingly forfeited significant opportunities to take leadership in this growing industry, meet the renewable energy goals mandated by state law, and create thousands of local jobs.

The UCLA Luskin Center has determined that a robust solar energy program in Los Angeles has the potential to create two billion dollars in local investment and 16,000 job-years with a minimal impact on ratepayers. Yet the LA DWP, the state's largest municipal utility, has one of the most dismal track records in delivering results on solar power. In fact, an analysis demonstrates that LA DWP lags behind every major utility in the state when it comes to solar power capacity installed per customer. For example, LA DWP has generated less than one-sixth as much solar power per customer as Southern California Edison. Further, LA DWP is the least efficient utility at generating solar jobs, spending a total of $129,000 per job-year created.

The market for solar power generation in California expanded significantly in 2006, when Governor Arnold Schwarzenegger announced his "Million Solar Roofs" plan and the Governor and legislature accelerated their 20 percent Renewable Portfolio Standard (RPS) goal to be reached by 2010. The solar market in LA took a major step forward in 2008, when Mayor Antonio Villaraigosa called for one gigawatt (GW) of solar in Los Angeles 150, megawatts (mW) of which to be incentivized by a feed-in tarrif (FiT), a policy that allows ratepayers to generate solar on their rooftops and sell that energy back to the electrical grid. In 2009, a law authored by State Senator Gloria Negrete-McLeod, SB 32, required 750 mW of solar FiT in California. Now, Governor Jerry Brown has called for 12,000 mW of new renewable distributed generation energy in California, and he signed into law 33 percent RPS goals to be reached by 2020.

A private sector FiT program in Los Angeles is critical to leverage private investment in solar power, generate plentiful jobs, and allow LA DWP customers to use the 30 percent federal tax credits available for this effort. Implementation of a successful 75 mW FiT program in the 2012 budget, and a 150 mW FiT program by 2016 in Los Angeles, are necessary steps toward not only realizing our renewable energy goals, but driving economic development throughout the city. A coalition of environmental groups, labor leaders, business organizations and other stakeholders have come together to support such a program, yet, to date, LA DWP has not installed a single solar panel under a FiT. The utility has delayed its implementation for more than two years, and is now set to move forward with a misguided pilot program for six mW of solar, or one-fifteenth of the mandate under SB 32.

SB 32 provides a clear road map, and related mandates, for creating renewable energy in California. However, Senator Negrete-McLeod, recently wrote that LA DWP's approach "ignores the intent behind the legislation and diminishes its potential." Rather, the LA DWP has focused its attention on plans for large-scale solar installations in distant locations – plans that are, for the most part, still unrealized. This flawed approach fails to comply with state law and fails to take advantage of a huge potential generator of jobs and economic activity in Los Angeles, including in many "solar hotspots" in the San Fernando Valley, eastern Los Angeles, and areas west of downtown, including Hollywood.

In many cases, these hotspots are located in low-income areas where solar power potential and economic need directly overlap. They are also home to numerous training programs preparing workers for positions in the solar industry. In Los Angeles County alone, enrollment is estimated at 2,200 people a year in these programs, which are run by such varied organizations as Homeboy Industries, the LA International Brotherhood of Electrical Workers - Local 11/National Electrical Contractors Association, and the Los Angeles Trade and Technical College.

Unless civic leaders ramp up efforts to expand solar programs, the city and region face the prospect of being left behind, as other municipalities and other regions move forward on solar power and clean energy programs. In fact, while a recent study showed that one-quarter of all solar energy jobs in the nation are in California, there is a very real risk of those jobs (and others yet to be created) fleeing to other places. This report is, above all, a wake-up call to policymakers to make certain they are utilizing an important workforce segment – and creating policies that will put qualified people to work. In Los Angeles, the policy mandate is clear: the LA DWP must move forward swiftly on a comprehensive FiT program.

Introduction: Ready for Work

Los Angeles' workforce is trained and ready for solar jobs. Unfortunately, many of these workers are among the 12.4 percent of Angelenos who are unemployed. While the state has set a goal to generate 33 percent of its energy from renewable energy by 2020, our region lacks sound policies that will not only help us meet those goals but will empower and employ these ready, highly trained, green economy workers.

In this fifth piece of our series of reports on the solar industry, we take account of our potential for solar power, describe the strength of the region's workforce development infrastructure to make solar real, and detail policies that could both create demand and ensure that a significant share of the jobs go to workers living in communities of high unemployment and high need. We also look at the extent and efficiency of current solar programs among LA County's seven utilities. We focus on industrial and commercial space, noting that the square footage of available rooftops makes for a large market with economies of scale. And we argue that while this market, and the green economy in general, are no "silver bullet" to solve the economic problems facing our nation and our region, better matching this potential with our region's history of particularly innovative worker training and the state's commitment to environmental protection could be an important tool for policymakers who seek to improve economic conditions, particularly for residents and workers in high-need areas.

The report works through these topics in three major sections: meeting, molding, and making the market. Since this depends on whether a market is actually present, we start by examining the County's solar hotspots and solar potential – that is, the available rooftops across Los Angeles County, particularly in industrial and commercial sites.

We then look at 'meeting the market' – analyzing the key occupations and career ladders within solar-related industries that can fuel the supply side. We then look at 'molding the market' – in this case, using data on workforce training programs throughout the region to map the County's existing training resources and seeing whether they connect effectively with disadvantaged communities and workers. We then turn to 'making the market' – exploring the results of current, local solar programs in terms of the extent of solar built to date, job-creation and cost-per-job, and outlining policies that can expand demand. Finally, we bring it all together to outline what might be a seamless policy package that can develop new demand, deliver appropriate training, *and* ensure solar jobs for disadvantaged workers.

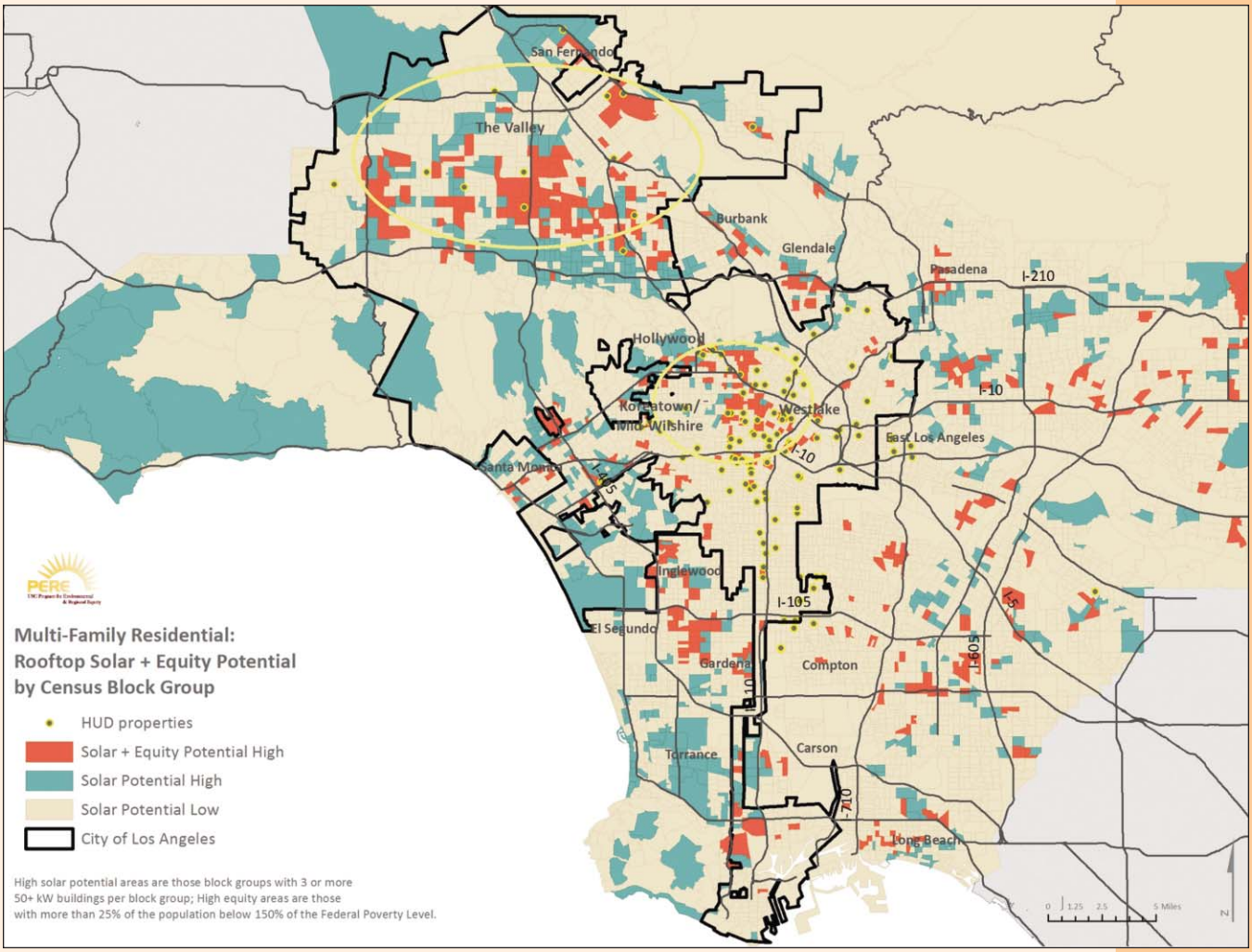
Making all this real requires policies and programs. At the forefront, a modestly-sized FiT could go a long way to enhance demand and spur job creation. To fill those jobs, good models of regional training programs should be replicated and expanded. And we also need to deepen placement networks to connect trainee pools to jobs as well as strengthen links to the good jobs for underserved communities.

But it is more than policies and programs: leadership from business, labor, community, and civic circles is needed. We have been lagging in the policy innovations that could make the market real. Getting there is a matter of political will.

In this report, we find that solar could be part of shoring up the middle class and providing pathways for those on the margin. For too long, the environment, the economy and equity have been viewed as competing against each other. But clean energy and stable, skilled jobs can contribute to the healthy families that build strong and stable regions. They are all pieces of the puzzle in helping us to achieve both environmental *and* social goals.

Seeing the Market: Realizing Our Solar Potential

The ambitious energy goals set by the state are not at all out of line with our region's solar potential. As we outlined in our last report, *Making the Market: Multifamily Rooftop Solar and Social Equity in Los Angeles (2011)* there is significant potential in the multifamily market, not only to develop solar energy, but also to lower costs for low-income tenants. Many low-income renters currently live in or near high-density, high-solar-potential neighborhoods. In fact, an overlay of high solar potential areas and low-income neighborhoods shows a great deal of confluence. In particular, areas west of downtown Los Angeles including Hollywood, along with parts of the San Fernando Valley, show tremendous overlap (see Map 1 below).



Map 1. Multi-family Residential: Rooftop Solar + Equity Potential by Census Block Group

Channeling consumer-side benefits to low-income residents is a piece of the equitable solar development puzzle, and another, rather large, piece is job creation. This leads us naturally to the sector of the solar market where the largest job creation potential is: industrial and commercial rooftops.

Similar to our last report, we measure 'sizable potential' as 50 kilowatts (kW) or more of potential per building. The region's industrial and commercial potential is concentrated along several corridors. Corridors with an abundance of 50 kW potential clearly line areas around the South Bay (Compton, Carson, Gardena, and Torrance) and to the east (East Los Angeles, Vernon, Commerce, El Monte, Cerritos and La Mirada). Within the City of Los Angeles, the San Fernando Valley is a solar hotspot, as well as eastern Los Angeles. Moreover, the commercial and industrial market has a number of corridors with clusters of potential in excess of 100 and 200 kW per building.

The economies of scale and complexity of worker skillsets inherent in larger industrial and commercial solar projects could build our solar infrastructure and create good jobs in a cost-effective way. Per

megawatt (mW), it is the least expensive market to incentivize given the sizable number of rooftops with at least 50 kW of solar potential. Falling solar installation costs also add to the attractiveness of this market; between 2008 and 2010, solar costs fell nearly two dollars, from ten to eight dollars per watt. Further, because of project size and complexity, industrial and commercial install jobs often require well-qualified crews with diverse skills. As a result, these larger projects often have a higher proportion of union jobs and formal standards, such as subcontractor certification requirements.

We are not the only ones who see this market. The majority of the wattage from the California Solar Initiative (CSI), one of the state's largest solar rebate programs, is derived from commercial and industrial installations. Larger, non-residential projects account for nearly 60 percent of mW on installed projects, a rate expected to climb to 85 percent as planned projects are completed.

Meeting the Market: Workforce Development for a Solar Future

In response to environmental policies and our solar potential, an ecosystem of training programs emerged to feed what many hoped would be a burgeoning occupational group. The region's training system is remarkable in its geographical diversity, in the number of training providers, and in its ability to actually provide local training to prospective workers of a variety of educational backgrounds. This section sketches a current picture of the local solar training system and workforce as well as what is needed for a strong solar job market. First and foremost, catalyzing demand for these workers requires increasing demand for solar panel installation – an effort that will contribute to both economic and environmental gains for the region.

From Occupation to Career

The best job opportunities in solar-related industries are for those with an existing occupation (often in the trades), who 'add on' a solar and/or energy efficiency skill set. Many in construction, installation, maintenance, engineering and business perform solar work as part of their overall portfolio. While there are several points of occupational entry, some tracks offer greater upward mobility than others.

To keep things simple, it is useful to think of four basic categories of work within solar energy:

- **Entry-level trades.** These are lesser-skilled, entry-level jobs in solar installation that are often lower-paying and sometimes temporary. Although certification is technically not required for many jobs, the North American Board of Certified Energy Practitioners (NABCEP) is among the industry leaders for photovolatic (PV) and solar thermal installation certification. Importantly, such certification can translate into higher wages.
- **Specialty trades.** Installation workers can graduate to solar field technicians, many of whom are also trained electricians. Wages in the specialty trades are significantly higher, due to higher skill levels and greater unionization, and often require apprenticeship and/or journeyman training.
- **Professional and technical.** Engineers and project managers are responsible for the design and implementation of solar systems and typically have advanced degrees in business or engineering.
- **Administrative and business.** Sales and marketing professionals are nearly always involved in the administrative side of solar projects and typically manage sales and business development for a solar contractor. Some of these workers were once tradespersons, but often have a background or degrees in a business-related field.

While the specialty trades have sometimes been riddled with obstacles to disadvantaged workers seeking to break through, this has become less the case in LA as the workforce demographics have changed and unions and employers have become more interested in the workforce (as well as the technology) of the future. Taking advantage of this shift is important for linking employment prospects with efforts to make a dent in the region's areas of concentrated poverty.

The professional and technical side of solar is a somewhat separate path that is only attainable with advanced degrees or experience in engineering. However, many in the specialty trades do pursue entrepreneurial activities or use credits earned in apprenticeships towards electrical engineering degrees.

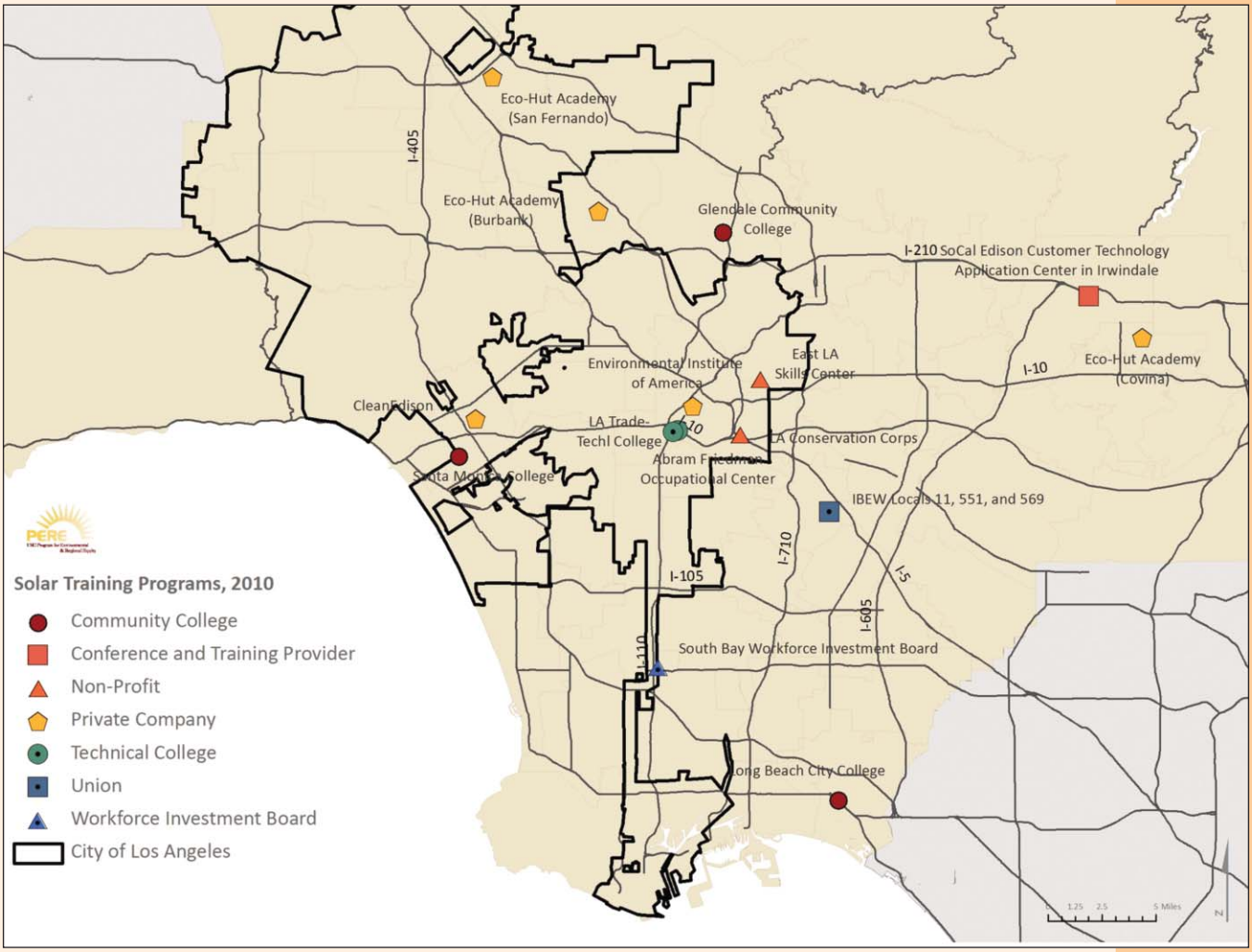
The highest wages and career growth potential are found in the specialty trades, professional and

technical fields, and business categories. However, high levels of unemployment in construction-related careers, such as the specialty trades, suggest that we most likely have a large pool of qualified workers ready to fill the demand for solar installation. Workers trained only in installation are less competitive for these positions than those with a specialty trade.

Training on Up

California has hundreds of new, clean energy job training programs - 298 such programs are offered at 130 institutions across the state, according to a recent report by Environment California. The report conservatively estimates approximately 12,000 to 15,000 workers are currently enrolled in training programs.

Los Angeles County has a broad mix of these programs – including private, technical, community college, and union efforts – that are spread across the region. Many are solar training programs, but green building certification programs are more plentiful. In total, annual solar program enrollment is conservatively estimated at 2,200.



Map 2. Solar Training Programs: Displays a conservative number of training programs – only those with solar training underway

Different program types meet the needs of workers across the skill spectrum. The major categorizations as well as their specializations are as follows:

1. **Private training programs** represent 'the new industry' and usually prepare trainees to sit for certification exams. With locations around the state, CleanEdison, one of the largest private providers of industry-recognized certifications in construction, energy efficiency, wind and solar, trains 1,200 students annually. Of those, the majority (60 percent) represent small construction and contracting companies looking to gain an edge via green upskilling. The remainder are comprised of those in administration or business (i.e. entrepreneurs, finance professionals) representing a growing demand

for green management training. A small number of seats are filled by Workforce Investment Board (WIB) voucher-holders, who are more likely to be lower-income and/or in need of workforce assistance.

2. With an emphasis on building up the middle class workforce, **unions** offer high-quality and ongoing educational opportunities, which translate into career track jobs. Many multi-year apprenticeship programs have incorporated solar installation and other energy efficiency skills into their existing classroom and on-the-job training.

Case Study: LA IBEW Local 11 & LA NECA

Meeting the Market: Linking Workers and Manufacturers with Projects through Innovative Business Development

The LA International Brotherhood of Electrical Workers Local 11 and National Electrical Contractors Association (LA IBEW 11/NECA) is a poster child for energy efficiency. Their training facility will soon be grid neutral, a feat fueled by new LED lighting and a sprawling half mW array of solar panels covering the rooftop. But the LA IBEW 11/NECA campus not only models the best in energy efficiency practices, it also trains the highly-skilled green workforce of the future.

An early player in solar training, LA IBEW 11/NECA offers solar training and installation as part of its five-year Apprenticeship Program and Journeyman training. Their innovative school is among the best in the country and includes 65 well-equipped classrooms each with videoconferencing capabilities, as well as multiple training labs and a large auditorium.

Rather unique among unions, the LA IBEW 11 has a long-established relationship with the LA Chapter of the NECA, and a shared business development team that travels globally to build relationships with potential clients as manufacturers. They work to secure not only jobs, but to encourage domestic manufacturing of solar panels. And the impact of these relationships is present within the facility—awards from clients cover the wall and donated equipment fills many of the labs and the LA IBEW 11/NECA Labor Management Cooperative Committee often hosts industry conferences in their 200-person auditorium.

LA IBEW 11/NECA makes a substantial investment in each apprentice by covering the cost of training and materials for each student for the duration of their study, and by providing full benefits and competitive wages with rate increases based on job training hours. Students graduate debt-free and qualified to work as journeyman electricians with skills in solar installation, LED lighting, energy storage and energy efficient buildings. But this training is only the beginning.

The sheer breadth of an LA IBEW 11/NECA trainee's expertise means that they can offer turnkey solutions as well as a sizable workforce that is able to finish large projects on time. The union's edge in quality, size, and speed allows them to bid competitively with non-union shops. Given their size, most of the solar projects are commercial and industrial size projects, so they less often work on residential projects, which are the domain of smaller contractors.

Still, these are tough times for electricians and contractors. Far from capacity, the current

apprenticeship cohort includes only 900 students, down from 1,500 but a few years ago. 30 percent of their members are currently unemployed while 10 percent are underemployed. Tom Martinez, Executive Director of Business Development, emphasizes that LA IBEW 11/NECA trained workers are well-equipped to meet the solar installation needs of the green economy, if a strong Feed-in-Tariff (FiT) policy could bring the market to bear. "The job creation potential of the FiT could be incredible. I've seen it work in other places and we could make it work here."

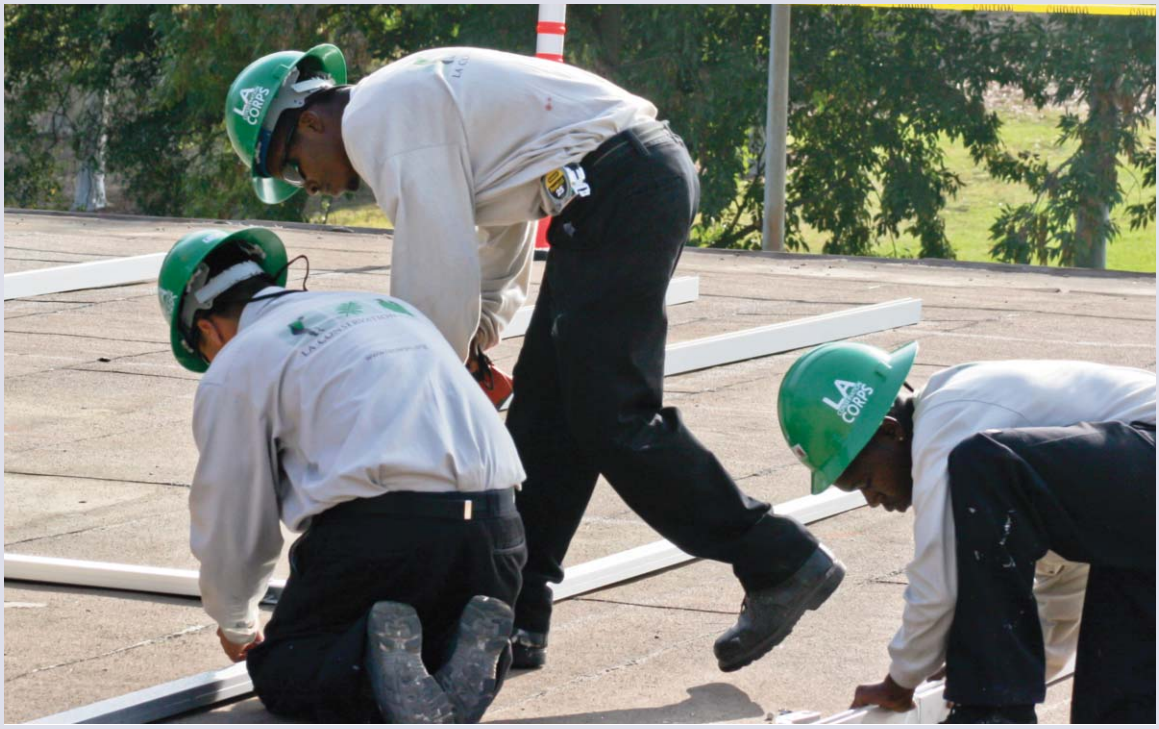
3. **Community and technical colleges** have a growing number of programs and represent nearly one-third of California's green jobs training programs. Both the community and technical college system educate students with more barriers to success – including lower-income students, single parents, and residents of disadvantaged communities. The program offerings generally reflect trends in the state's clean energy economy, with about one-quarter of these programs focusing on solar. Community colleges, which offer two-year associate's degrees, also serve as the gateway to four-year colleges and universities. Technical colleges tend to offer a greater number of degree programs and put a greater emphasis on hands-on, real-life work experience. The community and technical college systems operate through a mix of federal, state, and local funding.

   The Los Angeles Trade and Technical College (LATTC) began its Green College Initiative in 2006, integrating green education and training goals within its workforce development department. The Initiative, combined with funding from grants and other resources, provided money for machinery and other advanced equipment –resources rarely available at similar institutions. The eighth school in California to be an approved provider of solar installation certification from NABCEP, it also has 14 other green degree and certificate programs. Many graduates work as journeyman, while others become entrepreneurs. Recognized for their abilities, they received American Recovery and Reinvestment Act (ARRA) funding in 2008. They have a breadth of non-profit and business partners, including: Habitat for Humanity, the Los Angeles Conservation Corps, and Youth Build, Solar City and GRID Alternatives.

Case Study: The Los Angeles Conservation Corps Solar Training Program

Making the Market: Creating Job Opportunities for Recent Graduates

The LA Conservation Corps is a regional steward in connecting socioeconomically disadvantaged youth—often marginalized from the higher reaches of the economy—to environmental and economic opportunities. The opportunities the Corps offers include: skills training, education and direct work experience with an emphasis on conservation and service that benefit the community at large.



The solar workforce development training program started at the Corps in 2009, and was catalyzed by Federal ARRA funding, which filtered through to many LA County green workforce initiatives. The training program focuses on the solar installation process. The Corps program itself acts as a conduit by channeling youth into the Solar Training Program at Los Angeles Trade Technical College (LATTC) and connecting them to on-the-ground work experience with private solar companies on fee-for-service projects set-up by the Corps. The Corps developed this program so that 10 youth at a time can have the opportunity to work on fee-for-service projects. Unfortunately, there is not much direct funding for solar workforce development programs as compared to other energy efficiency or water conservation programs.

The solar panel installation training at LATTC is one of the more established programs in the County. No certificates are awarded yet, but students can obtain course credit and specific awards which they can take into the private sector. With the assistance of the Corps, youth are taken from the classroom at LATTC to actual solar installation job sites. The Corps is known for connecting LATTC program graduates with hands-on experience at private companies.

One recent example reflects the workforce development program above. The Corps approached the Los Angeles County Parks and Recreation Department to propose a 30 kW solar installation project in Obregon Park in East Los Angeles. The Parks and Recreation Department agreed to the proposal and then subcontracted to a private solar firm, PermaCity, who hired 10 Corps youths for the project. The installation project took three months, and at the end, not only did the Corps youth get hands-on experience in the field, but three workers were permanently hired by the PermaCity team. Bruce Saito, Executive Director of LACC described this as the "perfect situation."

Unfortunately, the Great Recession has stymied most nascent green industry development. For the market that does exist, Saito repeats that the Corps continually finds that there are already

well-experienced unemployed workers waiting to file into the solar industry. In a competitive labor market, these workers often overshadow young trainees emerging from Corps with only a few months of experience.

The health of the solar economy is very much linked with the health of the construction industry and while that particular sector continues to struggle, solar installation opportunities will remain stagnant. In response to this, the Corps stresses post-secondary education. Saito is confident that this emphasis will amplify his trainees' solar career options, as well as provide them with skills transferable to related sectors.

4. **Adult education programs** play a critical role in serving the most disadvantaged workers, offering solar training and skills to those without a high school education and/or other barriers to work. Many of these programs operate through local school districts and work in tandem with non-profits or social service agencies, who provide wrap-around services.

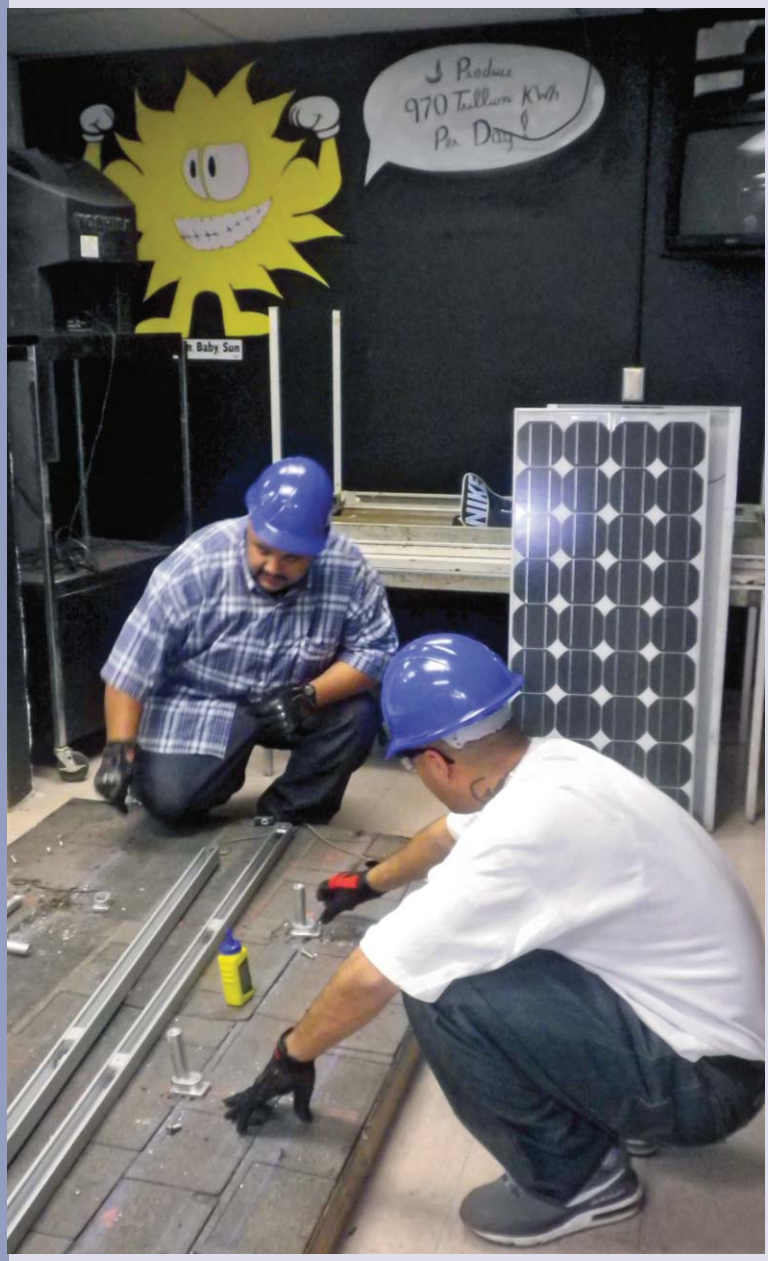
   The Los Angeles Unified School District operates the East Los Angeles Skills Center (ELASC), a well-recognized adult skills center which houses a popular Solar (PV) Electric Training Program. In 2007, ELASC became Southern California's first approved provider of training from NABCEP in public schools. ELASC draws many of its solar program students from local social enterprise and non-profit organizations, such as Homeboy Industries and the Los Angeles Conservation Corps.

Case Study: Homeboy Industries

Molding the Market: Creating Opportunities for Underserved Workers

There is currently a one-year waiting list to get into Homeboy Industries' Solar Energy Program. Right now, program coordinator, Jose Osuna is trying to pick the most challenging cases –people with a drive to be successful who might find themselves at the end of the line in the job market. Like many of its other programs, the solar program gives people an opportunity to enter a tough labor market. Already well-known for social enterprises, Homeboy is an innovative job training, placement and education center that works with at-risk youth formerly involved in gangs.

Started in 2008, Homeboy's Solar Energy Program is a collaborative effort with Los Angeles Unified School District's East Los Angeles Skills Center (ELASC), an adult education and training center. ELASC



provides the technical training through its Solar PV Installation Certification Preparation Program. Each semester, 25 seats per class are set aside for Homeboy trainees. Following completion of the four-month course, students are qualified to take the entry-level NABCEP certification exam. Homeboy also provides essential wraparound services that increase the participants' shot at success including a customized tutoring program that focuses on individual training and job development needs.

The partnership between ELASC and Homeboy was a natural fit since both organizations have deep roots in East Los Angeles and provide complementary services in technical training and support programs. While Homeboy initially responded to the needs of East Los Angeles serving a largely Latino population, their reach has deepened to South Los Angeles and outlying counties. Homeboy recruits through the California Department of Rehabilitation, WorkSource Centers, treatment facilities, as well as transitional living and substance abuse programs.

How have the Homeboy students fared? When it comes to passing the NABCEP's entry-level solar certification exams, Homeboy students have performed well. Since the program's inception, they have passed at or above the national pass rate (at between 40-70 percent). Osuna attributes this to the hard work and dedication of his students and the finely honed curriculum at ELASC. Certification can translate into an additional three dollars an hour in wages, with average hourly wages of installers at $12-18 dollars an hour. Many graduates work in temporary jobs, but Osuna emphasizes short-term jobs are a 'foot-in-the-door' that often lead temp agencies to commit to rehiring the workers as jobs come up.

Osuna has built up his recruiting and placement network over the past year and a half, and better customized the tutorial program. In turn, he has seen an increase in the number of committed candidates and a higher demand for his graduates. The program has graduated nearly 300 students, with approximately 100 graduating in 2010. And graduation rates are increasing as the program matures—last year, over 95 percent graduated. Of those that graduate, 65 percent have found jobs. "Long term—my goal is to teach people how to change their perspective on themselves and their place in society," said Osuna. He is cautiously optimistic about the future of solar, mentioning the need to pursue our energy goals to scale up the number of jobs. "I think this industry could be huge. The dots just need to be connected."

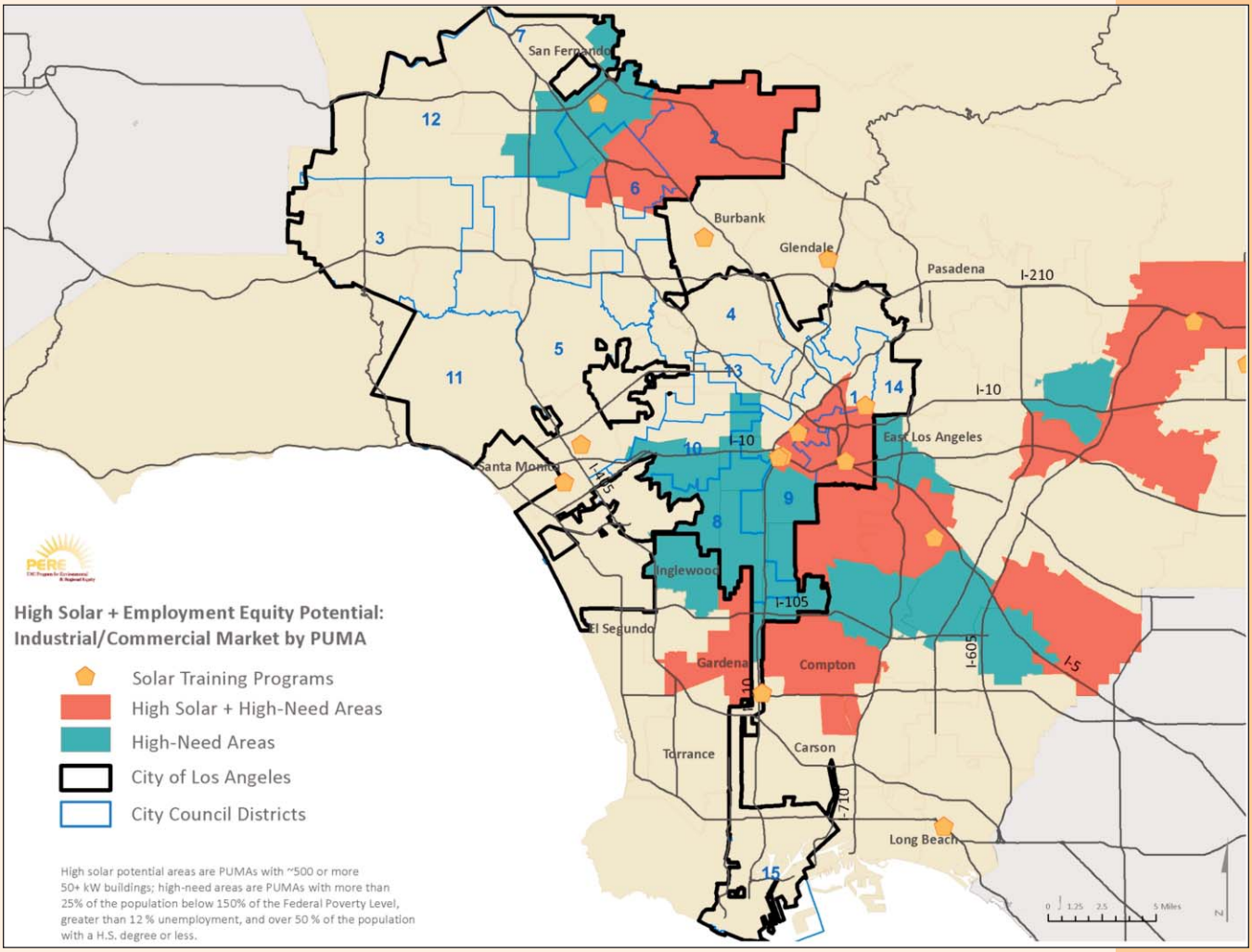
Molding the Market: Linking Need and Training

Even with a solid workforce development system, which now includes a growing solar training component, we are still plagued with a high unemployment rate – the County has an overall 12.4 percent unemployment rate. Just as important, some areas in the region are more stressed than others and an effective solar strategy should try to link training opportunities with communities most in need.

Unemployment is particularly high, in Compton, Gardena, Long Beach, and South and East Los Angeles, between 15 and 20 percent. Not surprisingly, many high unemployment areas also have high rates of poverty and low levels of educational attainment. There is also a clear west–east divide in educational attainment levels: in large swathes of the eastern San Fernando Valley, East Los Angeles, and South Los Angeles over half of all adults over 25 have a high school degree or less – the outcomes of which are higher unemployment and poverty rates.

In trying to put all this data together, we created a combined 'high-need' index, highlighting areas with greater than:

- 12 percent unemployment, and
- 25 percent of the population below 150 percent of the Federal Poverty Level, and
- 50 percent of the adult population with a high school education or less.



Map 3. High Solar + Employment Equity Potential: Industrial/Commercial Market by PUMA

As can be seen in Map 3 above, high need areas emerge strongly in the eastern San Fernando Valley, central and eastern Los Angeles, parts of South Los Angeles, East Los Angeles, the South Bay, the Southeast or "Gateway" cities, and the eastern part of the San Gabriel Valley.

As the map shows, a bright spot, is that many of these communities are well-served by programs providing entry-level training for solar installation. The number of programs serving the region is well-distributed, with programs in or near many high-need neighborhoods, especially near downtown, eastern Los Angeles, the South Bay, and Gateway cities. In particular, areas near downtown Los Angeles are well-served by those programs for adults without a high school degree.

Not only are these workers trained, they live near solar potential. Not surprisingly, many high-need neighborhoods are adjacent to commercial and industrial corridors. Many of the communities in eastern and central Los Angeles, the eastern San Fernando Valley, South Los Angeles, the South Bay, and eastern San Gabriel Valley are high- need areas near both solar training programs and solar potential — these areas are ripe for local hiring.

With so many high-need neighborhoods located near places with some of the highest commercial and industrial solar potential, it is only right that equity, including geographic equity, be a key consideration in how we move forward.

While the region has every reason to be proud of the training programs that have developed, there are new avenues of workforce development to which we can now turn. They include the following:

- **Continue to connect with the most disadvantaged workers.** It is unemployed, low-income workers who most need to be incorporated into the solar training classes– like many of those living in the eastern San Fernando Valley, central and eastern Los Angeles and South Los Angeles.
- **Articulate solar-related career pathways.** Strengthening the connection between entry-level installation, training programs and apprenticeship and/or degree programs is essential to building solar career pathways and creating permanent, middle-class inroads for new entrants.
- **Keep up with changes in solar technology.** Solar technology is advancing—newer technologies may mean more opportunities for highly skilled workers, but fewer jobs in installation. Solar education professionals must keep pace with these changes, modifying curriculum to reflect market needs.
- **Standardize installation quality.** The relative infancy of the solar training program infrastructure and the varying degrees of installer expertise often result in uneven installation quality. A recent clean energy study commissioned by the California Public Utilities Commission expressed concerns that insufficiently trained workers can lower the quality of work, leading to poor performance outcomes in solar installation, ultimately affecting the consumer satisfaction needed for widespread adoption of solar.
- **Insure job quality and sustainability.** In the absence of strong demand, many training programs have connected with temporary agencies and their workers with a series of short-term jobs. While there is a role for temporary service placements – it is often good for both employees and employers to check each other out first – in a healthy market, temporary work should not constitute the majority of placements. For workers to permanently work their way out of disadvantage, we need a system that tries to better connect workers with high-quality employment.

Making the Market: Connecting Policies, Possibilities and People

While there are clearly gaps to be addressed, program managers and policy experts across LA County agree that the region does not lack training programs. Far from concerns of a shortage, it is now thought that we have an oversupply given market demand. Local programs report difficulties in finding work for their trainees. The problems range from those at the top of the food chain – LA IBEW 11/NECA reports between 30 and 40 percent un- and underemployment rates for its journeyman electricians with solar installation training —to those at the bottom with only installation— Homeboy Industries reports that many of its trainees are having trouble finding work in the County, and instead travel to outlying counties for temporary installation jobs.

However, there is not a shortage of area firms with which to connect workers, once local demand is in place. Indeed, the location of a majority of contractors working on completed industrial and commercial CSI projects are located in LA County, with many in LA City. While an important challenge is improving the pipelines to work, one of the most critical issues is pumping up demand. What we need is a shift in policy – and a sense of how many jobs that would create.

Unemployment-Construction Occupations, Los Angeles County, 2010

	Unemployment Rate
First-Line Supervisors/Managers of Construction Trades and Extraction Workers	30%
Carpenters	29%
Construction Laborers	18%
Electricians	20%
Painters, Construction and Maintenance	23%
Pipelayers, Plumbers, Pipefitters, and Steamfitters	21%

Source: American Community Survey 2007-2009, Current Population Survey, 2010

Figure 1. Unemployment-Construction Occupations, Los Angeles County, 2010

Programs, Policies, and Solar Jobs

Los Angeles County contains seven utilities, as shown in Figure 2 below, which can implement local solar programs. By far, the largest utilities are Southern California Edison and the LA DWP followed by relatively small but diverse municipal utilities.

Utilities in Los Angeles County by Program Targets, Progress and Size

Utility Company	SB 1 mWs Installed through 2010	SB 1 mWs Target for 2016	% of SB 1 Target achieved by 2010	SB 32 mWs Target for 2016	Population (2010)	Geographic Size (Sq Miles)
Azusa Light & Water	0.1	3	3%		46,361	8
Burbank Water & Power	1.6	15	11%		103,340	17
Glendale Water & Power	1.2	12	10%		191,719	30
Los Angeles Water & Power	17.4	280*	6%	75	4,100,000	484
Pasadena Water & Power	2.2	14	16%		137,122	23
Southern California Edison (Los Angeles County)	160.0	805	20%	124	14,000,000	35078
Vernon Light & Power	0.0	10	0%		112	5

*As of 2011, LA DWP has implemented 22 mW. Source: California Public Utilities Commission

Figure 2. Utilities in Los Angeles County by Program Targets, Progress and Size

Utilities have four different types of local solar programs that they can implement. These include:

1. **Net metering,** also known as the California Solar Initiative (or SB1), permits households and businesses to size and install solar systems that offset their annual energy load.
2. **A feed-in-tariff program** (FiT) authorized by SB 32 requires utilities to pay households and businesses a set price (or tariff) for the renewable energy they generate, and is typically designed to create excess energy, as opposed to simply offsetting the building's current energy load.
3. **In competitive-procurement programs,** households, businesses and solar developers compete by offering to build solar at the lowest price or tariff.
4. **Local utility-built solar programs** create solar systems on public buildings or grounds, such as schools, airports, and along public right-of-ways.

Solar Performance to Date

In seeking to examine the performance of the various local utilities, we now look more closely at the results of the California Solar Initiative (SB1 program), since nearly all utilities have set solar capacity targets, and all have begun approving eligible solar projects. In terms of job creation potential, two utilities stand out because of their large size: Southern California Edison and the LA DWP.

Progress in the region can be measured in several ways. One is to look at each utility's progress towards their goal in percentage terms. This is shown in Figure 2 for the utilities in Los Angeles County. We see that completion rates range from a high of 20 percent for Southern California Edison to a low of zero percent for Vernon. LA DWP lags with only six percent installed, well below the county-wide average of approximately 10 percent.

A better performance metric is solar capacity installed per capita or per annual energy produced. These measures provide a more apples-to-apples comparison of utility effort, while controlling for differences in their sizes and resource bases. These results can be presented on different geographic scales. Figure 3 presents the cumulative solar initiative (SB1) watts per capita installed by Southern California utilities through 2010, including Los Angeles County.

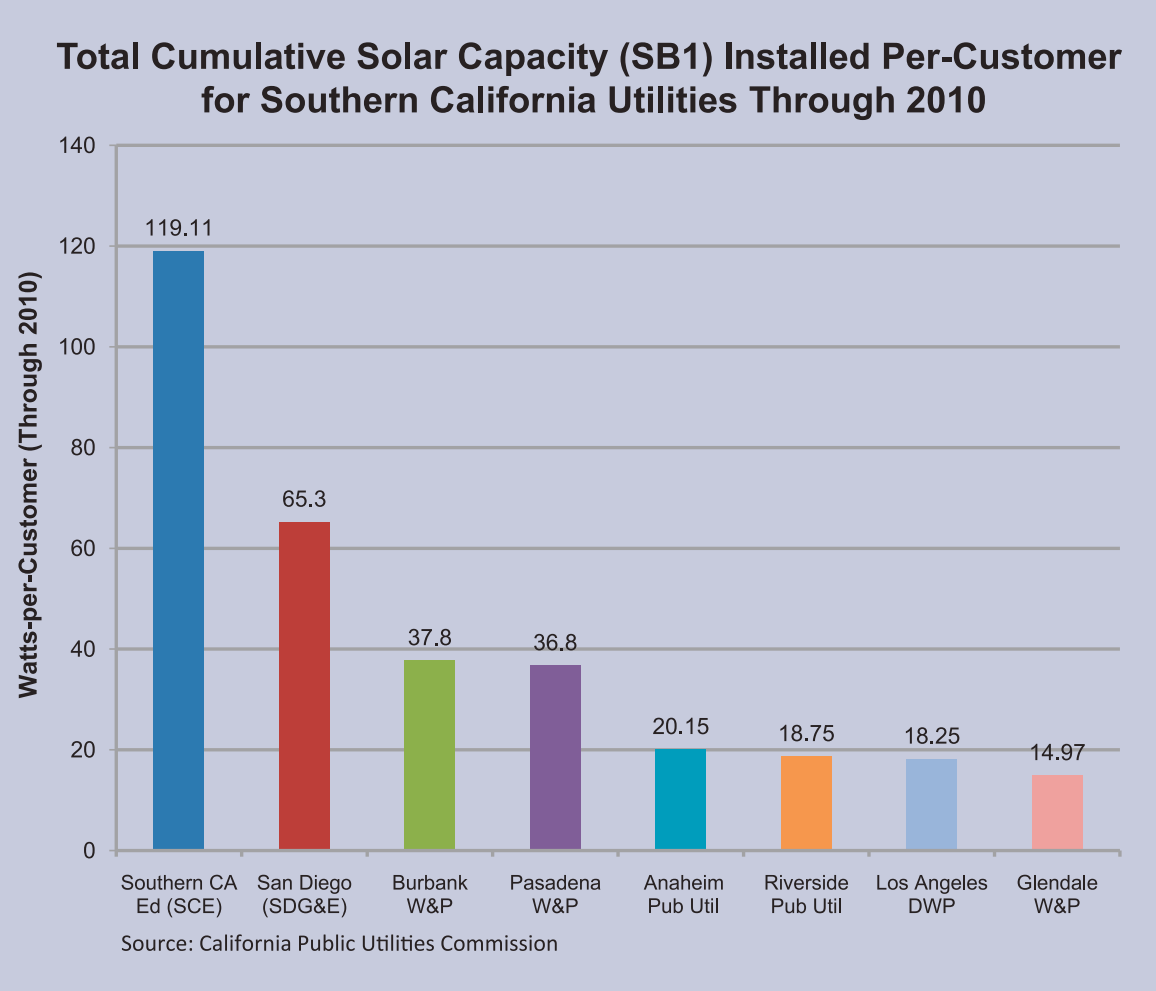


Figure 3. Southern California Edison leads the region with 119.11 watts of solar per customer followed by San Diego Gas and Electric with 65.3 watts of solar per customer. The utilities average 41 watts per customer while the Los Angeles Department of Water and Power trails most utilities with only 18.25 watts per customer.

Estimating Solar Job-Years Created in Los Angeles County

Although most of the information used in this report to assess the feasibility and impacts of an in-basin program is based on local conditions here in Los Angeles, in the case of job creation impacts, there currently are no local studies to give credible estimates for the region. Instead, this report seeks to recalibrate and transfer estimates from the most credible existing studies (Navigant, 2008) to the Los Angeles context. We focus on job-years, which may be defined as economic activity sufficient to employ one full-time worker for one year.

Total Types of Job Years Created by Residential and Commercial Solar Projects Per Mega-watt (MW) Installed

	Smaller Projects (> 50KW)	Larger Projects (<50KW)
BOS Components	3.0	3.0
System integration	7.8	2.8
Installation	9.2	2.1
Annual O&M	0.3	0.4
Indirect manufacturing	1.4	1.4
Indirect construction	4.1	1.0
Total direct & Indirect job years	**25.3**	**11.3**

Source: Navigant, 2008

Figure 4. Total Types of Job Years Created by Residential and Commercial Solar Projects per Mega-Watt (mW) Installed

Throughout this recalibration and transfer, conservative assumptions are made so as to not risk overstating job creation. Our analysis does not include job-years created from wafer or panel manufacturers, since most of the installed panels are manufactured oversees. As we show in Table 4, we do include job-years created by the manufacture of the balance of systems (BOS) equipment, system integration, installation, as well as annual operation and maintenance.

Solar Job-Years Created to Date

Since most of the solar projects installed to date have been under 50 kW, we use the estimate of 25.3 job-years created per mW in our forgoing analyses of the California Solar Initiative (or SB1). In an effort to measure job creation progress in terms of the size of local labor markets, we estimate job-years created per capita as shown in Figure 5. We calculate these estimates by multiplying 25.3 job-years by the cumulative solar capacity installed through 2010 for each utility, and then dividing that by the population within each utility's service area in 2010.

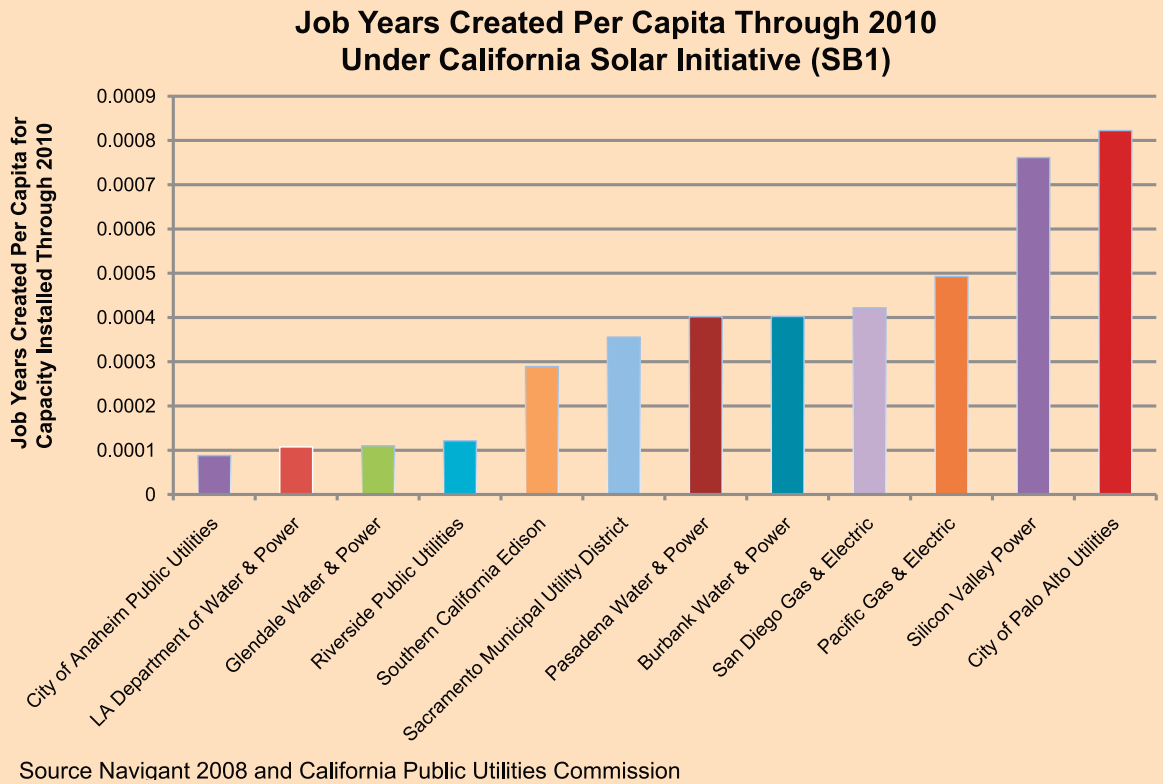


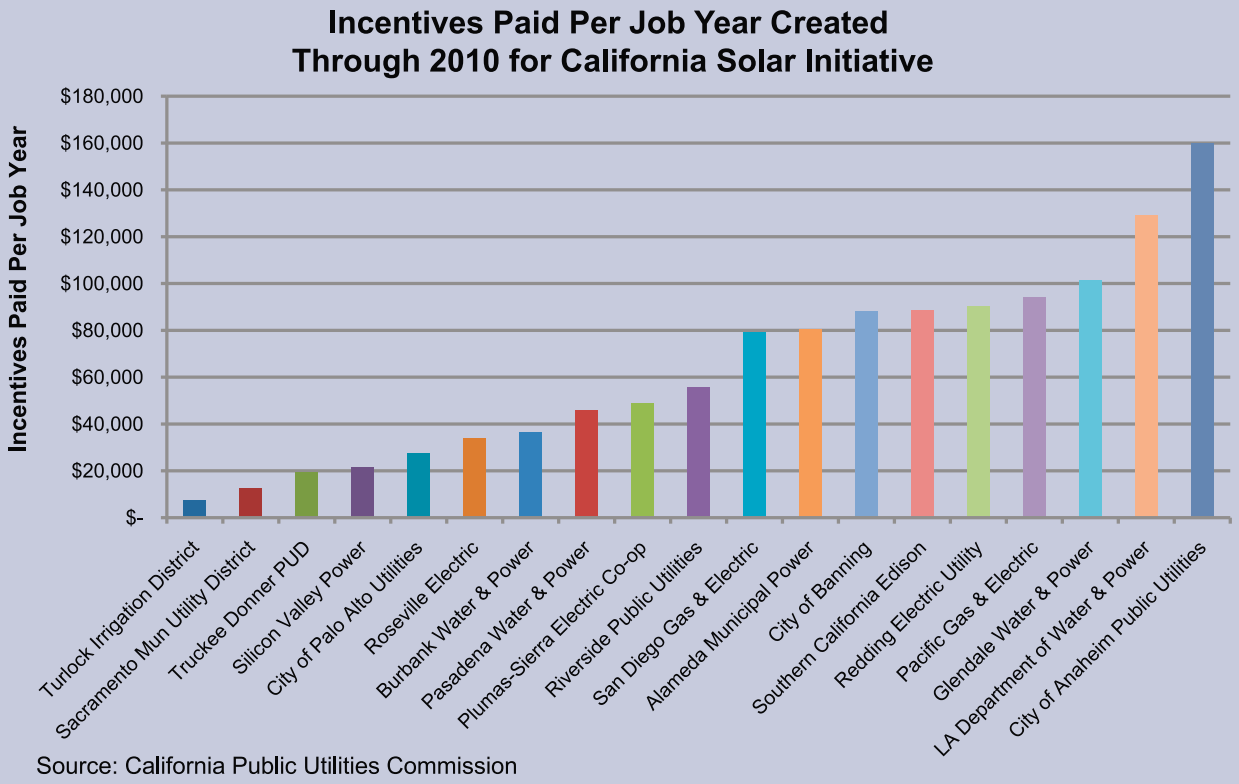
Figure 5

Among Los Angeles County utilities, it is interesting to observe that Burbank and Pasadena have created more job-years relative to the size of their local labor markets than have other utilities. Southern California Edison lies in the middle of this ranking, while LA DWP is next to last.

Measuring Cost-effective Job Creation

How much has it cost utilities to create these jobs? To assess this, we calculate the total incentives that each utility paid to incentivize the installation of SB1 solar capacity through 2010. We then divide this number by the total number of job-years created. Figure 6 presents the incentives paid per job-year created through 2010 for CSI. Smaller incentives paid per job-year created mean that, relatively speaking, a utility has spent ratepayer money more efficiently and effectively when creating a new job. A larger number means a utility has been less efficient and effective.

Figure 6 shows that among Los Angeles County utilities, Burbank and Pasadena, respectively, have



Source: California Public Utilities Commission

Figure 6

created the most job-years per dollar spent ranging at $36,000 and $44,000 per job-year, respectively. In comparison, Southern California Edison and Glendale spent $88,000 and $101,000 respectively per job-year created. The LA DWP was the least efficient, spending over $129,000 per solar job-year created.

In examining the above data about local utilities' relative performance, it is important to note that not all utilities are on a level playing field. Size of customer base, geographic considerations and other factors may play a role in these figures. That said, general trends can easily be gleaned from these figures, and it is useful for policymakers to know where their respective utilities stand. Again, these figures are useful in determining which utilities are most successful in installing solar power, based on volume, as well as the number of jobs per capita created, and the cost to create those jobs.

An Integrated Package: Advancing Solar Development in Los Angeles

A private sector solar program in the City of LA is critical to leverage private investment, generate good paying jobs and allow LA DWP customers to use the 30 percent federal tax credits. Implementation of a successful 75 mW Solar FiT program in the 2012 budget, and a 150 mW FiT program by 2016 in the City of Los Angeles is a necessary step towards not only realizing our renewable energy goals, but also driving economic development in the City.

A robust FiT program would save ratepayers money, create much-needed jobs, spur investment in the City and grow the solar industry here in Los Angeles. Our research has determined that a successful FiT should: 1) have a fixed price; 2) offer the program to participants on a first come, first serve basis; 3) have a simple application process; and 4) incur minimal administrative costs. It is further necessary to incorporate a FiT program in areas of high social equity and solar potential, as indicated in the *Making a Market* study's 4 cluster areas.

These areas are not only hotspots of solar potential in high-need neighborhoods, but are also in close proximity to a number of solar workforce training programs, which are educating a well-trained workforce that can not get jobs in LA. These workers would directly benefit from the jobs created by a robust FiT program in LA. In fact, a viable FiT program is an essential precursor program to drive jobs development in the City.

In order to realize these opportunities, our recommendations fall into our three categories of market-meeting, market-molding, and market-making. **Market-meeting** activities are those that create career and educational pathways and identify where skills transfer across occupations. **Market-molding** activities are those activities that deepen connections between job seekers and employers, with a specific focus on improving the odds for disadvantaged workers and communities. **Market-making** activities are those that grow and transform the labor market. In short, they create sustained demand for jobs. To reiterate, market-making activities are of the highest priority.

A comprehensive approach includes:

- **Incentivizing and targeting additional federal or state subsidies to complement the FiT for the industrial and commercial market.** As outlined in our previous reports a FiT could be well-tailored to meet local needs.This could involve work with utilities such as LADWP, Southern California Edison, and others to create a regional Commercial and Industrial Solar Installation Assistance Program.
- **Channeling benefits to disadvantaged communities.** Policies here could include: 1) incentive rates for contractors who use local labor; 2) community benefits agreements (CBAs) that contain targeted hiring requirements; and 3) project labor agreements (PLAs) with one or more labor organizations that establishes the terms and conditions of employment for a specific project, including targeted hiring from underserved communities.
- **Engaging a multi-sector workforce development partnership,** such as the Los Angeles Workforce Systems Collaborative, which includes the community college system, business, union, workforce development, City, health and safety representatives. The collaborative's goal is to build a comprehensive economic and workforce development system in the City of Los Angeles to meet the employment and educational needs of the region's low income, and underserved communities. Currently, in the absence of strong demand, such a partnership could solidify the exisiting solar training foundation and employers in 'hotspot' areas, providing on the job assistance and coordinating wrap-around support services by:
  - **Aligning and building workforce development partnerships,**
  - **Bringing transparency and consistency** to the labor market through certifications and training standardization, and
  - **Advocating for continued funding of green training programs.**

As demand for solar grows, such a partnership should turn its attention towards conducting outreach to workers.

Getting Real and Making it Happen

We are at the beginning of the road of a green economy. Like other shifts in our underlying economic structure, the path has been unclear at times and the stumbles have been many. But the potential for increased demand makes this an exciting time. Policymakers, communities, and businesses can shape the path we take—whether it will be a vibrant or timid market, provide high-road or low-road employment, and be connected or disconnected from low-income communities in profound distress.

But even as we urge our leaders to boldly go ahead with realizing our solar potential – relying on both our abundant sun and rooftops, *and* our well-trained workforce – we want to stress that we need to be realistic in our goals and our measure of success. For example, a recent Brookings Institution Report, *Sizing the Clean Economy* suggested that the size of the national clean economy is relatively modest, employing 2.7 million workers across sectors, which is significantly smaller than the size of the IT industry, which employs 4.8 million workers. Clean tech jobs are a part of the new and recovering economy, but not the only leg on which it will stand.

Market growth is the lynchpin—a strong demand side generator is needed. Adopting creative ideas and moving forward – breaking the logjam that has prevented progress – is necessary. To do this, we will need new coalitions with unusual suspects, particularly strong business partners. Engaging labor and business, particularly alongside each other fosters cross-fertilization that would not exist if they were to remain independent. Likewise, linking the energy and workforce development sectors will also engender new forms of engagement and incentives. Many in the energy community do not realize they are in the front seat when it comes to job creation, nor are they aware of equity issues that are central to the effectiveness of workforce development and training programs.

We have a ready market, a ready workforce, and a ready set of policies. Generating solar jobs will require continued strong implementation of energy goals and incentivization of the local market. It will require that local utilities be made accountable for their current solar efforts by policymakers who can assess the job-creation impacts – and their costs – relative to desired outcomes. And it will require that equity and the environment come together in programs to connect disadvantaged workers with solar employment.

LABC Institute

The LABC Institute is the 501 (c) 3 designated research and educational arm of the LA Business Council. The Institute plays a critical role in the organization's key priority areas of sustainable and clean-tech development as well as workforce housing, transportation and jobs development. This policy-driven research is critical to informing LABC's advocacy.

It is with great excitement and momentum that we are officially announcing the launch of the LABC Institute. Behind the scenes, we have been hard at work for over a year building a strong base of support and producing some of the most groundbreaking and compelling original research in LABC's history. This year alone we released the 4th Phase of our groundbreaking solar studies with UCLA, as well as our continued collaborations between UCLA and USC that explore solar on multifamily housing and LA's solar workforce.

Today's release represents another unprecedented report from the UCLA and USC research teams, *Empowering LA's Solar Workforce: New Policies that Deliver Investments and Jobs.* This study provides critical research findings and will be featured on the November 16 summit program. It shows that we have a well-trained workforce and that with the right solar policies and investments, we will create many new jobs and foster healthy communities. The study will also show how solar will reduce operating costs and provide benefits to tenants for affordable housing developments throughout Los Angeles.

Please stay tuned and get involved as the LABC Institute continues to grow. We have a lot of research and education aims related to sustainable development, energy efficiency, housing, transportation and the green workforce. Los Angeles is a complex and inspiring city, and we are thrilled to be engaged at a more insightful and effective level than ever before.

To learn how to get involved, please contact Zarui Naksalyan at zneksalyan@labusinesscouncil.org

LABC Studies on Solar

LABC and the LABC Institute have, in the past few years, produced a large body of research on solar and Los Angeles. Below is a list of these studies, including the one we released today on LA's solar workforce (See page 23).

1. ***Designing an Effective Feed-in Tariff for Greater Los Angeles,*** **UCLA**
2. ***Bringing Solar Energy to Los Angeles: An Assessment of the Feasibility and Impacts of an In-basin Solar Feed-in Tariff Program,*** **UCLA**
3. ***Implementing Feed-in Tariff Programs: Comparative Analyses and Lessons Learned,*** **UCLA**
4. ***Making a Market: Multifamily Rooftop Solar and Social Equity in Los Angeles,*** **UCLA and USC**
5. ***Empowering LA's Solar Workforce: New Policies that Deliver Investments and Jobs,*** **UCLA and USC**

To download these studies and to learn more about the work the LABC is doing in the area of solar, please visit **labusinesscouncil.org/sustainability** or scan the QR Code below with your smart phone.

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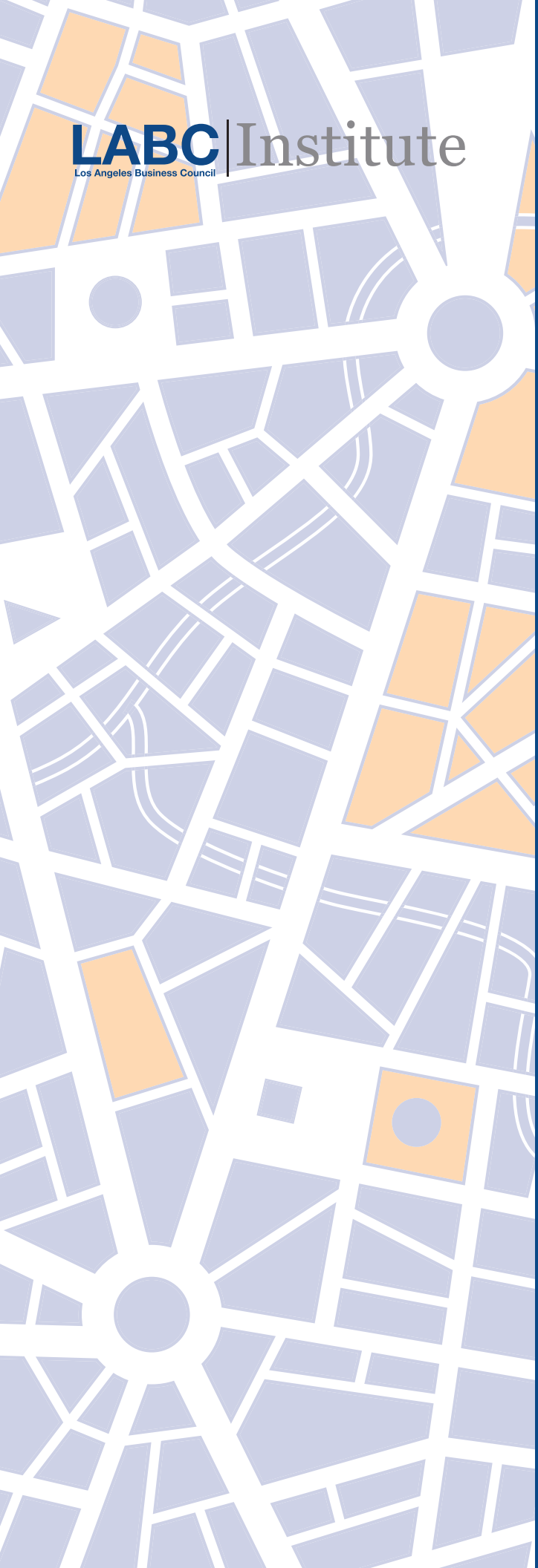

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