



# JOB IMPLICATIONS IN LOS ANGELES' GREEN BUILDING SECTOR

An analysis of workforce development opportunities in the green building sector; and recommendations for integrating low income communities of color with green building sector jobs.

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## ***Table of Contents***

<b>Executive Summary</b>	<b>2</b>
<b>I. Introduction</b>	<b>3</b>
<b>II. Research Context</b>	<b>3</b>
<b>III. Literature Review</b>	<b>4</b>
Green Building Definition	4
First Green Building Wave	4
Current Green Building Wave	5
Lessons to Learn	6
<b>IV. Green Building Impact in Los Angeles</b>	<b>7</b>
Los Angeles Green Building Policy	7
Los Angeles as a Green Building Leader	8
<b>V. Green Building Job Implications in Los Angeles</b>	<b>9</b>
Findings #1: Policy Drives Green Building	12
Recommendations	13
Finding #2: Green Building Knowledge Gap	15
Recommendations	17
Finding #3: Promising Job Opportunities	19
Recommendations	20
Finding #4: Green Building Materials	21
Recommendations	21
Finding #5: Integrating Communities in Need with Jobs	23
Recommendations	26
<b>VI. Conclusion and Next Steps</b>	<b>27</b>
<b>References</b>	<b>28</b>

## **List of Tables & Figures**

Figure 1. Existing Municipal Buildings in Los Angeles	8
Figure 2. Knowledge Gap Diagram	15

## Executive Summary

This report's goal is to explore potential job implications in the green building sector that can benefit low-income communities of color. The research seeks to answer the following questions:

1. Do green building construction projects require different jobs and skills than conventional construction projects?
2. What are new job opportunities arising in the green building industry?
3. How can green building jobs benefit low-income communities of color?

In researching these questions, case studies on three select green buildings were conducted along with interviews with key green building industry representatives. The analysis of the green building sector revealed that promising opportunities for job creation and local economic development exist. Key findings from the case studies and supporting research are summarized as follows:

1. Public policy is the driving force behind green building and stimulating local economic development in the green building sector. Public policy support for green building is motivated by energy conservation, cost savings, and environmental concerns.
2. A green building knowledge gap exists between the designers and architects who design the project and the contractors and sub-contractors who construct the project.
3. New job opportunities in the green building industry include: LEED certifiers, commissioners and auditors; energy auditors; recyclers; and landscapers.
4. Green building material manufacturing represents the most promising industry to stimulate local economic development across Los Angeles.
5. The most effective way to connect people from low-income communities of color with green building jobs is through union apprenticeship and worker center training programs.

These findings signify that the green building sector is a young, yet promising, industry in Los Angeles. This report assesses the green building sector and offers a number of recommendations for SCOPE. The recommendations are summarized as following:

1. Implement a City policy to retrofit municipal buildings with energy efficient and green building elements.
2. Develop and implement public policies supporting the green sector, including incentives, regulations, green building standards, and tax rebates and credits to attract and support green building businesses and green technology industries in Los Angeles.
3. Apply or expand project labor agreements to appropriate green building projects.
4. Develop a specialized Los Angeles LEED that includes priorities for social justice, economic development, and environmental considerations.

## **I. Introduction**

The green building movement in Los Angeles is gathering momentum. Pushed by policy and justified by volatile energy costs and environmental degradation concerns, green buildings are making an impact in Los Angeles. Their impact is evident in energy savings, water conservation, waste reduction, and increased demand for green building materials. However, the green building movement's social implications are less known. The purpose of this report is to explore the movement's social implications, specifically, the potential for workforce development in low-income communities of color for the green building industry.

The objectives of this report are to:

1. Review the green building industry;
2. Identify potential jobs in the green building sector; and
3. Offer recommendations for workforce development

## **II. Research Context**

This report emerged from a UCLA Urban Planning Master Client Project. The client, Strategic Concepts in Organizing and Policy Education (SCOPE), is a community development organization in Los Angeles that works with low-income communities of color. SCOPE is interested in connecting its constituents with emerging opportunities in the green building sector through a Green Jobs Campaign. Recognizing the workforce development potential in the green building industry, SCOPE's Campaign for Green Jobs aims to provide low income and diverse populations with employment opportunities. The Campaign for Green Jobs targets the green building and energy efficiency industry with the intention to promote safer, healthier, and cleaner industries and environments for low income communities in Los Angeles.

This brief, based on the initial client project, complements research studies at the Lewis Center for Regional Policy Studies, at UCLA, for economic development in the Green sector.

### **III. Literature Review**

#### ***Green Building Definition***

The United States Green Building Council (USGBC) defines green building as design and construction to “significantly reduce or eliminate the negative impact of buildings on the environment and on the building occupants, green building design and construction practices address: sustainable site planning, safeguarding water and water efficiency, energy efficiency, conservation of materials and resources, and indoor environmental quality.” Buildings in the United States account for 36 percent of total energy use; 65 percent of electricity consumption; 30 percent of greenhouse gas emissions; 30 percent of raw material use; and 30 percent waste output.<sup>1</sup> The green building movement seeks to reduce buildings’ impact and maximize economic and environmental benefits.

The USGBC is a coalition leading the building industry in green building. In 2000 the USGBC released green building standards for new construction known as LEED - Leadership in Energy and Environmental Design. Since then, the USGBC succeeded in establishing the LEED standard as the criteria and measurement used by most green builders. LEED is widely accepted across the country. Several states and cities have adopted LEED as part of their green building ordinances. Universities, school districts, and private developers across the country apply LEED as well in their green building.

LEED standards have been expanded to include existing buildings, commercial interior, core and shell projects, neighborhood guides, and specific building application (i.e., hospitals and schools). LEED recognizes three levels of green building: LEED silver, gold, and platinum. Using a checklist format and a point formula, developers acquire points in the following areas: water savings, energy efficiency, indoor air quality; site development, and material use.

#### ***The First Green Energy Wave***

The USGBC succeeded in marketing green building as a feasible, cost effective, and healthier alternative to conventional construction. However, green building elements do not introduce new technologies. Green building – in the form of renewable energy and energy efficiency (green energy) – was popular in the 1970’s, during the days of the OPEC oil embargo and heightened environmental awareness. At that time, green energy received a surge of attention and government budget dollars.<sup>2</sup> At one point, President Carter even installed a solar water heater on the White House, only to be removed by his successor, President Reagan. With consideration to the different political views and global circumstances between these presidents, this small example demonstrates how geopolitical conditions determine interest in green energy. This example also signifies the role of policies, and politics in driving the green energy market.

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<sup>1</sup> United States Green Building Council [www.usgbc.org](http://www.usgbc.org), May 23, 2006.

<sup>2</sup> Daneker, Gail and Richard Grossman, 1977.

On the state level, in the 1970's California served as a leader in green energy actions. Governor Jerry Brown enacted a number of tax incentives encouraging solar energy. Through his administration, between 1975 to 1983, several solar energy companies located in California and sales grew in solar water heating and energy installations. In 1978, California adopted Title 24 as a response to a legislative mandate to reduce California's energy consumption. Title 24, a technology forcing law, set energy efficiency standards for residential and nonresidential buildings. Title 24, along with energy efficient appliances, is attributed to saving more than \$56 billion in electricity and natural gas costs in California since 1978. By 2013, savings are estimated to reach \$23 billion.<sup>3</sup>

Current geopolitical conditions, from reliance on volatile foreign oil to warnings about global warming, have raised new interest in green energy. The green building industry fits into this new wave of interest. Touting energy savings and potentially stimulating domestic economies, green building ordinances and policies have been sprouting across the United States. Recognizing that a similar wave previously peaked and then dissipated, it is relevant to understand the history behind green energy and job implications.

### ***The Current Green Energy Wave***

Green energy is experiencing a new wave of interest. This is evident in the green energy policies and incentive packages emerging at the state and local levels. The academic literature reviewed below highlights current key arguments for green energy and its potential job implications.

A 2003 report from the Environmental California Research and Policy Center analyzes employment impacts in California assuming state investments in renewable energy. In the past, California has set the model in the US for environmental regulation.<sup>4</sup> The report assesses that California has the potential to become the nationwide leader in renewable energy as well. The country's largest photovoltaic (PV) manufacturers are located in California. PowerLight, in Berkeley, is the largest designer, manufacturer, and installer of grid-connected PV systems. In addition, PowerLight's workforce has grown 700% over five years due to growth in the industry (12 employees in 1999 to 96 in 2004).<sup>5</sup> Sharp in Huntington Beach represents another large manufacturer of PV systems. The report includes of California companies associated with renewable energy.

The report states that full realization of the state's Resource Portfolio Standards could boost the state's renewable energy market and create 119,000 person years of employment. The report recommends for California to commit to achieve the Resource Portfolio Standards and expand solar installation in new and existing buildings. Solar

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<sup>3</sup>California Energy Commission, <http://www.energy.ca.gov/title24/>, May 23, 2006.

<sup>4</sup>Del Chiaro, and Bernadette Heavner Bran. 2003.

<sup>5</sup>"How Los Angeles Can Gain the Economic and Environmental Competitive Edge." Prepared by Barua, Blok & Company for Global Green USA. September 2005

installation may be facilitated and enforced through inclusion of incentives and requirements in building code requirements.

A 2004 study reviews 13 independent reports that assess the economic and employment implications from investment in the renewable energy industry.<sup>6</sup> Realizing that all these independent reports use different scales and methods for assessing employment implications, this study attempts to make sense of them for comparative analysis. The study concludes that renewable energy generates more jobs than the conventional energy sector per unit of energy produced. The study suggests that policy interventions can help minimize the impact of a transition from fossil fuel energy to renewable energy. One of the article's clear conclusions is that embedded support for renewable energy in green building standards and sustainable transportation will enhance the impacts of an energy transition on the economy, employment, and environment.

The article raises important issues in assessing the impacts of the renewable energy industry on economic development. For one, the replacement of jobs needs to be considered. The majority of jobs in the fossil fuel industry are in fuel processing, and operations and maintenance, while the renewable energy industry requires manufacturing and construction jobs. This issue is critical in thinking about regional and local scale incentives and job retraining.

### ***Lessons to Learn***

The two common themes found in literature about green energy and green building are: 1) a great potential for job creation exists in renewable energy; and 2) policy and programs induce job creation in renewable energy. Policies for energy conservation and solar power are the significant drivers for job creation in manufacturing, installation, and construction. Overall policies include commitments to renewable resource portfolios, incentives and investments in renewable energy, and energy conservation requirements for new and existing buildings.

Other key lessons include: requiring continuity and certainty in policies; the importance of harnessing political support from decision makers, unions, and the private sector; realization of the different scales of job opportunities possible; consideration of the skills levels required to meet potential job demands in green energy; and special consideration of how poor communities may benefit from green energy.

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<sup>6</sup> Kammen, Daniel, Kapadia, Kamal, and Matticas Fripp. 2004.

#### **IV. Green Building Impact in Los Angeles**

What is currently driving the green building momentum in Los Angeles? First, increasing energy costs, worsening environmental degradation, and rising environmental justice issues make green building an attractive alternative to conventional construction. Green building is touted for its cost savings and reduced resource use through energy and water conservation. Within the urban infrastructure, the accumulation of green buildings reduces the amount of energy demanded from the grid, subsequently, reducing the demand for energy production at power generating plants. In the big picture, this may lead to postponing construction of new power plants, and reducing pollution emissions at existing power plants. For instance, the California Public Utilities Commission is implementing an extensive energy conservation campaign, including green building programs, to eliminate the need for three new large power plants in the next three years; as well as reduce 3.4 million tons of carbon dioxide emissions by 2008.<sup>7</sup> Green building also presents a viable opportunity for affordable housing developers to construct safe and healthy residences while reducing, or even eliminating, energy costs for their tenants.

Second, Los Angeles is currently being led by a Mayor and City Council that are outspoken and committed to greening the city through a multitude of programs and actions, including green building ordinances. The goal of many of these green programs and actions is to address urban problems and to guide the city to a more sustainable future.

##### ***Los Angeles Green Building Policy***

In 2000, Los Angeles adopted LEED, “for all Department of Public Works new design and construction building projects 7,500 square feet or larger, effective July 1, 2003.”<sup>8</sup> California followed this same path and adopted LEED as the standard for all state funded buildings in 2005. California also passed a Million Solar Roofs initiative in 2006, committing \$3.2 billion in incentive funds to drive consumers toward solar power over the next 11 years. The Initiative will be implemented in 2007. Los Angeles is also currently studying the potential of a green roofs program to complement their green building ordinance. The Planning and Land Use Committee motioned for a task force to study the green roof ordinance in Tokyo.<sup>9</sup>

Los Angeles’ citywide LEED policy resulted in a dispersion of LEED buildings to be constructed throughout the City. The Los Angeles Department of Public Works has, or is in the process of constructing a total of approximately 33 green buildings. Figure 1 illustrates the location of green buildings across the City. The City’s green buildings were mapped against Census data including, median income and non-white populations. The two maps demonstrated no significant clustering of green building. The lack of green

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<sup>7</sup> CPUC website, [http://www.cpuc.ca.gov/PUBLISHED/News\\_release/49757.htm](http://www.cpuc.ca.gov/PUBLISHED/News_release/49757.htm), May 23, 2006.

<sup>8</sup> Los Angeles Department of Public Works, <http://eng.lacity.org/projects/sdip/execsummary.htm>. May 23, 2006.

<sup>9</sup> Planning and Land Use Committee Meeting Minutes, April 18, 2006.

building clustering demonstrates the effectiveness and equity of the citywide policy. The case may be different if green building policy addressed only private developers.<sup>10</sup>



### ***Los Angeles as a Green Technology Leader***

Global Green USA in 2005 published a report describing economic benefits from the PV industry specific to Los Angeles.<sup>11</sup> The report proposes that Los Angeles commit at least 1% of the City's total electricity generation capacity by 2017 to solar photovoltaic energy. This effort would establish Los Angeles as a new "Solar Silicon Valley" in development, manufacturing, and implementation of renewable energies. This effort would improve air quality by offsetting the energy required from the polluting Valley Generation Station. In addition, the PV industry is 2-3 times more labor intensive than the

<sup>10</sup> Rosner, Sigalle. "Job Implications of Los Angeles' Green Building Industry." Masters Client Project for UCLA. June 2006.

<sup>11</sup> "How Los Angeles Can Gain the Economic and Environmental Competitive Edge." Prepared by Barua, Blok & Company for Global Green USA. September 2005

City's current mix of electricity resources. The proposal encourages predictability in policy and an open and competitive marketplace to foster the industry in Los Angeles.

Los Angeles is currently revamping its solar incentive program. With 500 applicants still on the wait list from the City's previous solar incentive program, demand exists for more effective solar rebates. The Los Angeles Department of Water and Power is in the midst of developing a new strategy for its Solar Photovoltaic Incentive Program. The program will align with the state Million Solar Roofs Initiative. LADWP committed \$150 million to the incentive program. The program started in 2000 and will run until 2011. The solar program will assist LADWP in achieving its renewable resource portfolio goal of 20 percent renewable energy by 2010.<sup>12</sup>

A 2004 report by the Los Angeles Department of Water and Power (LADWP), discusses job implications from the City's solar incentive program.<sup>13</sup> The report summarizes the City's experience with the Los Angeles Manufacturing Credit (LAMC). The LAMC supplemented the City's solar power incentive with an additional \$1.50 per watt rebate if the PV system installed was manufactured in Los Angeles. The LAMC was phased out in 2005 for two primary reasons. First, the City stopped its entire solar incentive because it was not able to handle the growing waiting list. Second, the LAMC contained loopholes, where PV systems that were assembled, and not actually manufactured, in Los Angeles were receiving the incentive.

The report notes that due to the LAMC incentive, 97 percent of the installed PV systems supported by LADWP were produced in Los Angeles. In addition, since initiating LAMC, two solar technology companies located in Los Angeles – Solar Integrated Technology in South Los Angeles' Empowerment Zone and Shell Solar in Canoga Park (Shell Solar has since left). Furthermore, according to Shell Solar, 14 direct manufacturing jobs were created for each megawatt of photovoltaic produced energy. Using the U.S. Department of Energy's calculation that one manufacturing job creates three to five related jobs, the solar program in Los Angeles created about 300 new jobs. The report notes that LADWP trained over 300 workers in PV installation; and employs about 1000 people who spend some portion of their time in PV installation.

The Economic Roundtable, a nonprofit public policy research organization, recently prepared a report for the Los Angeles Department of Water and Power and the Workforce Investment Board. The report, title "Jobs in Los Angeles' Green Technology Sector,"<sup>14</sup> explores potential areas for local economic development in the green technology sector. The report highlights green technology occupations in Los Angeles with potential for job growth, from environmental consulting to fuel cell manufacturing. In all, the report identifies the construction and building trades as a potential sector for workforce development.

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<sup>12</sup> [www.ladwp.com](http://www.ladwp.com)

<sup>13</sup> "Solar Photovoltaic Buy-Down Program Funding." LADPW report to the Los Angeles City Council. June 7, 2004.

<sup>14</sup> Burns, Patrick, and Daniel Flaming.

## V. Green Building Job Implications in Los Angeles

Green building represents a promising industry for job opportunities in Los Angeles. To identify and analyze the sector's job opportunities, building specific case studies and interviews with industry representatives were conducted. The research sought to answer the following three questions:

4. Do green building construction projects require different jobs and skills than conventional construction projects?
5. What are new job opportunities arising in the green building industry?
6. How can green building jobs benefit low-income communities of color?

In answering these questions, five key findings emerged from the conducted research. The following sections discuss each finding and offer lessons learned and/or recommendations.

### **Research Method**

Research was conducted through case studies and interviews. The purpose of the case studies is to provide a snapshot of the green building sector and related jobs and costs. The three buildings chosen for the case study include:

1. Lakeview Terrace Library, Los Angeles, the City's first public green building;
2. 20<sup>th</sup> Street Apartments, Santa Monica, a green retrofit of a low-income residential building; and
3. Van de Kamp Bakery, Los Angeles, an adaptive reuse of a historic building.

The three case study buildings, located in Los Angeles County, involve public financing to cover construction costs. Publicly financed buildings were purposely selected because project workers are guaranteed prevailing wages under the Davis Bacon Act of 1978. The case study analyses are integrated into the appropriate subsequent finding sections.

To further explore employment and economic development opportunities in the green building sector, several interviews were conducted along with site visits. The interviews' purpose was to create a clearer picture of job implications in green building. Interviews were conducted between February and April 2006. Interviews were conducted over the phone and face to face. Representatives from the following organizations and firms were interviewed:

- > City of Los Angeles Department of Public Works (LADPW)
- > Los Angeles Community College District
- > Global Green USA
- > Community Corporation of Santa Monica

- > PV Jobs
- > IBEW Local 11
- > Greenworks Studio, LADPW LEED consultant
- > Sinanian, LADPW contractor
- > ARUP, LACCD engineering consultant
- > Solar Integrated Technologies
- > Bentley Prince Street

The research findings also reflect information collected from a number of attended forums and conferences. The following events were attended:

- > UCLA Energy Forum Speaker Series, at UCLA, January 11, 2006
- > LADWP Solar Incentive Program: Proposed Revisions and New Application of Process, at LADWP, February 22, 2006.
- > LA Economy Project Forum on Green Technology, at Debs Audubon Center, March 2, 2006
- > UCLA Solar Energy Forum, at UCLA, May 24, 2006.

## **Finding #1: Policy Drives Green Building**

*Public policy is the driving force behind green building and stimulating local economic development in the green building sector. Public policy support for green building is motivated by energy conservation, cost savings, and environmental concerns.*

Los Angeles serves as a leader in adopting policies that encourage green building. These policies have spurred green building construction in the City. Subsequently, the influx of green building activities have stimulated local economic development by inducing demand for green building materials, green technology businesses, and LEED accredited professionals.

As explored through this research, green building policy can take many forms. Several policy forms implemented in California are listed below:

- **Technology forcing policy**, like California's Title 24, mandates requirements for energy efficiency building standards in lighting, HVAC, and mechanical systems.
- **Building standard requirements**, such as Los Angeles LEED policy, requires all new public works building to comply with LEED green building standards.
- **Financial incentives**, like those implemented in Burbank, provide some financing to private property owners who voluntarily comply with LEED.
- **Tax credits and rebates policies**, such as those offered by Los Angeles Department of Water and Power, encourage solar energy installation by paying property owners an amount per kilowatt of energy produced.

The IBEW (electrician's union) training center recently completed a solar energy power project illustrating policy's powerful impact. An IBEW training center representative explained how policy impacted the center's decision to invest in solar power. Interest existed to create a solar training center for the union's apprentices. However, the real push came from the future energy cost savings. The PV system cost approximately three million dollars, of which half was financed by Edison subsidies. The representative emphasized that Edison receives all of its incentive funding from the State. Therefore, finance incentives on the state level represent the true driving force behind IBEW decision to install a PV system. The system is expected to pay for itself in four years through its 800 megawatt cost savings per year. This pay off period is quicker than first anticipated due to higher performance panels being introduced to the market.

The IBEW representative also explained that Title 24 significantly impacted energy conservation in California. Adopted in 1978, Title 24 acted as a response to reduce California's energy consumption by setting building standards for electrical systems. The representative recalled that in 1978 the lighting trades protested the ordinance and feared that they would not be able to meet required standards. However, the lighting trades ended up successfully responding with innovations in technology. Subsequently,

California's Title 24 building standards serves as a model for energy conservation in other states.<sup>15</sup>

### **Recommendations**

- 1. City to develop consistent and continuous policies for green building across departments.*

Consistent green building policies that create certainty for the private sector are critical to supporting the green building movement. This notion was repeatedly stated at the Solar Energy Forum at UCLA on May 24, 2006. The state is taking a lead in adopting a long term solar energy policy. The Solar Initiative, a ten year plan, is set to go in effect in 2007 with close to \$3 billion for incentives and green energy programs. Solar industry representatives at the forum predicted that the Solar Initiative would resituate California as the national leader in solar due to the certainty and continuity they are bringing to the solar private sector.

On the local scale, the Los Angeles Department of Water and Power has struggled with their solar incentive. After accumulating a 500 applicant waiting list, the Department decided to halt the program and revamp it for improved efficiency and effectiveness. Halting of the solar incentive, along with the Los Angeles Manufacturing Credit (discussed p. 24), has impacted local businesses. A number of small firms went out of business with the departure of the incentive. In addition, lack of consistent policy prevents manufacturers from moving in and the local sector from expanding. The Department plans to reinstitute a solar incentive by fall of 2006. Rather than providing a capacity based incentive, like the previous solar incentive program, the Department plans to implement a performance based incentive. The Department has funds for a solar incentive program until 2011.

- 2. Implement a City policy to retrofit municipal buildings with energy efficient and green building elements.*

This strategy would significantly increase the scale of green building in Los Angeles, in comparison to relying on new construction alone. Los Angeles contains more than 1,500 municipal buildings versus approximately 50 new green buildings. It would contribute to inducing demand for green building related jobs, materials, and products. Such a strategy could also result in significant energy costs savings for Los Angeles.

The USGBC recently released a LEED Existing Building (EB) certification option. LEED EB provides guidelines for retrofitting existing buildings with green elements. LEED EB points include the following retrofits, among others: energy efficiency, renewable energy use, daylight and ventilation improvements, water conserving

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<sup>15</sup>California Energy Commission, <http://www.energy.ca.gov/title24/>

plumbing systems and landscaping, innovative wastewater technologies, indoor air quality improvements, heat island effect reductions, use of environmentally safe cleaning products.

The 20<sup>th</sup> Street Apartments case study provides information to consider for developing a green building retrofit strategy. Global Green USA, an environmental organization in Santa Monica completed a case study on the apartment complex to highlight the building's energy rehab. The case study describes the project's challenges. One challenge explains the project's limited capability: "It is generally easier to incorporate green approaches into a new building design than into a renovation project. Because the siting, form, and window location were all predetermined at 20<sup>th</sup> Street, the majority of the work focused on upgrading existing systems. Furthermore, because rehabilitation projects often involve selective rehab work (replacement of materials and finishes in only a few units), such projects do not lend themselves to high-volume economies of scale for procuring alternative materials."<sup>16</sup>

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<sup>16</sup> "20<sup>th</sup> St. Apartments." Global Green USA Case Study. [www.globalgreen.org](http://www.globalgreen.org)

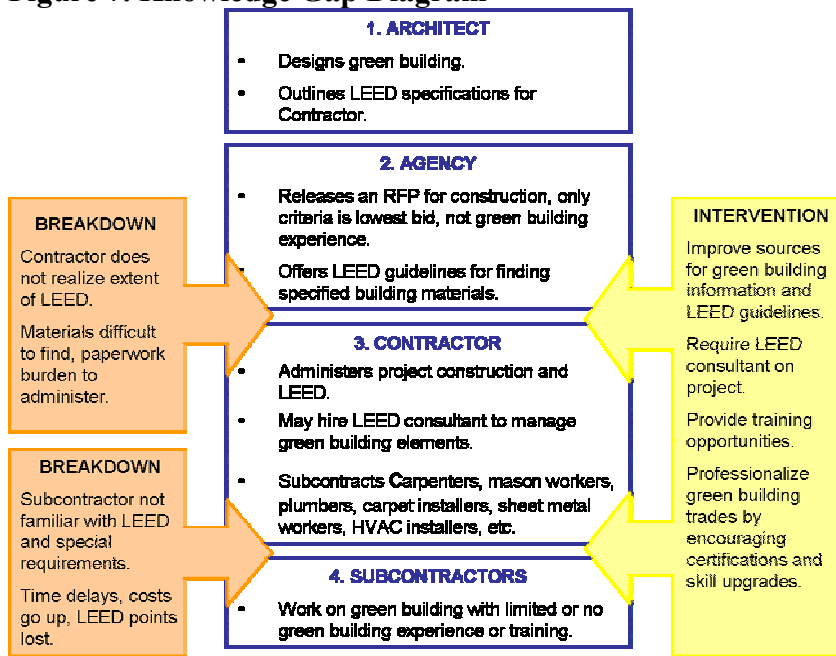
## Finding #2: Green Building Knowledge Gap

*A green building knowledge gap exists between the designers and architects who design the project and the contractors and sub-contractors who construct the project.*

Green buildings are generally designed by architects and engineers. Once designed, project specifications guide the contractor through the green elements of a project. The construction team's familiarity and experience with LEED specifications determines the project's success and efficiency. Since LEED is relatively young, contractors have limited or no experience with LEED. They also generally have limited or no green building experience. Knowledge gaps in green building attribute to time delays and higher costs in project construction. Lack of green building experience can lead to inappropriate material use and applications and loss of LEED points. Yet, with the growing number of municipal green building projects, construction teams are slowly undergoing a learning curve and narrowing the gap in green building knowledge.

The diagram below illustrates the green building project process and where breakdowns in knowledge gaps may occur; along with intervention suggestions to remediate breakdowns.

**Figure 7. Knowledge Gap Diagram**



In examining the job implications of the green building sector, the initial assumption was that green building involves significantly different skill jobs than conventional construction projects. However, this turned out not to be case. In fact, the same contractors and sub-contractors that work on conventional construction projects are bidding and working on green building projects. Instead of involving different skill jobs,

green building construction requires a new knowledge base that is acquired from experience and retraining.

Contractors seem to rely on project specifications and LEED accredited professionals to guide them through the LEED process. Now that green building is becoming more common, contractors generally hire or consult a LEED professional to ensure timely and efficient construction. It is in the City's best interest to connect contractors with LEED professionals, since inefficiencies and delays run on the City's account.

Green building does not generally require new skills in the construction trades. Instead, it requires a knowledge base of the types of materials to use. For instance, a carpet layer for a green building would lay carpet using the same skills as for a conventional construction. However, the type of carpet and adhesive would be different; the materials would comply with LEED standards for the green building. The construction trades that could benefit from a green knowledge base include: electricians, carpenters, pipeworkers, laborers, drywall and ceiling installers, plumbers, sheet metal workers, plasterers, and other construction related workers.

Specialty green building fields that require high skills and a solid green building knowledge foundation include: photovoltaic manufacturing and installation, HVAC (heating, ventilation, and air conditioning) innovations, LEED consulting, green landscaping, and green material manufacturing and distribution. Actual job opportunities in these fields are further discussed in Finding #3.

The Lakeview Terrace Branch Library provides an example of the knowledge base required for LEED. The library was the first LEED certified building in Los Angeles. It was constructed in 2003, when LEED was a relatively new concept in Los Angeles.

The contractor on the job expressed that the library was his first and last LEED project he bid for. As LEED was just being introduced in Los Angeles at the time of construction, the contractor had no prior experience in LEED. When the Los Angeles Department of Public Works selects a contractor from a bid process, the City's only criterion is to choose the lowest bidder. Experience in green building is not a factor.

The contractor explained that the biggest challenge in the project was obtaining the green building materials. The contractor went through seven different sub-contractors due to inexperience and inadequate knowledge about green building materials and where to seek out fitting materials to match the project's specifications. The contractor noted that not enough information on LEED and its requirements were offered during the bidding process. Contractors bid for the project without comprehending the full extent of work that LEED would require. The contractor explained that the biggest project issue was a lack of knowledge base on green building.

Due to these inefficiencies, the cost of construction was higher than necessary. Reflecting the learning curve in green building, the Sun Valley Library was constructed immediately

after the Lakeview Terrace Library with similar green building elements at 30 percent lower cost. The American Institute of Architects (AIA) case study on the library also notes the need for more green building knowledge within the construction team. In the AIA's case study, one of the five listed lessons learned is to "Work hard during the bid process to educate the bidders and the project goals, strategies, and technologies. This project was bid high due to unfamiliarity with LEED-driven elements of the work and required submittals."<sup>17</sup>

Similarly, the 20<sup>th</sup> Street Apartments in Santa Monica, experienced challenges with the lack of familiarity with and availability of green building materials. The project's green materials use was limited by the project manager's unfamiliarity with materials, their installation and maintenance, and purchasing locations.<sup>18</sup>

### **Recommendations**

*1. Work with Los Angeles Community College District to offer green building training for college students.*

The best recommendation for bridging the green building knowledge gap is to offer opportunities for green building training. The LACCD currently offers a curriculum in environmental design within its Construction Technology department. A green building certification program would fit in this department. In addition, it would flow well with LACCD's e7 internship program. The e7 program places LACCD students with internships at firms involved in the District's capital improvement projects.

With consideration to an LACCD green building certification program, two tracks of education should be developed: 1) a green building architecture and engineering tract; and 2) a green building construction tract. The first tract would address the design of a building; while the second tract would focus on actual construction and material technologies and innovations. It is critical that a potential green building certification program be able to transfer to a four year college tract for higher skills and education opportunities.

*2. Establish a green resource center as a one stop shop for developers, contractors, and residents to access for green building information and resources.*

Currently, Los Angeles's green building resources are spread across its departments. The Department of Water and Power handles solar and water conservation incentives; the Department of Public Works provides LEED guidelines for contractors; the Environmental Affairs Department offers support for residential rehabilitation and published a guidebook for sustainable building; and the non-City owned utilities provide energy efficiency programs and services. A one-stop shop that provides information and

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<sup>17</sup> Ibid.

<sup>18</sup> "20<sup>th</sup> St. Apartments." Global Green USA Case Study. [www.globalgreen.org](http://www.globalgreen.org)

guidance on all the City's green building efforts and general green building resources would greatly benefit developers, contractors, and residents.

The City of Santa Monica established a Green Building Resource Center in partnership with Global Green USA. The center offers green building design advice; displays of green building materials; publications and technical information; financing, incentives, and rebate information; a directory of local green building professionals; and ongoing educational workshops.<sup>19</sup>

Chicago contains an example of a model green building resource center. The Chicago Department of Environment opened the Chicago Center for Green Technology in 2002. The Center's building was previously owned by Sacramento Crushing, who illegally dumped tons of concrete debris at the site. In 1995, Chicago succeeded in closing down the operation; taking over the site; and cleaning up the brownfield soon after. Hundreds of thousands of tons of concrete was removed from the site and were sold to recycling firms or reused by the Department of Transportation. In 1999, the Department of Environment renovated the building to meet LEED platinum standards and to house the City's Center for Green Technology. The Center provides green building information to the public as well as houses the following tenants: Greencorps Chicago, the City's community landscaping and job training program; Spire Solar, a PV panel manufacturer; and WRD Environmental, an urban landscape design firm.<sup>20</sup>

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<sup>19</sup> Green Building Resource Center, <http://www.globalgreen.org/gbrc/index.htm>. May 25, 2006.

<sup>20</sup> Chicago Center for Green Technology, <http://www.ci.chi.il.us/Environment/GreenTech>. May 25, 2006.

### **Finding #3: Promising Job Opportunities**

*New job opportunities in the green building industry include: LEED certifiers, commissioners and auditors; energy auditors; recyclers; and landscapers.*

Insight on job opportunities emerged from the Solar Energy Conference in Harbor College on October 21, 2005. As part of its commitment to building green and to the sustainability plan, the Los Angeles Community College District (LACCD) hosted the conference to discuss opportunities in the solar industry. Representatives from green technology companies voiced their need for qualified and educated people to join the workforce. A Sharp Solar Corporation representative noted interest in a solar certification program to enforce a workforce knowledgeable about solar technologies and implementation. A representative from Solar Integrated Technology, one of the few solar power companies located in Los Angeles, explained that the solar industry is growing 20 to 30 percent a year and workers at all experience levels are in strong demand.<sup>21</sup>

Besides the solar industry, potential workforce development opportunities exist in other branches of the green technology sector. New technologies in HVAC present job opportunities. A LACCD representative noted that thermostorage, an ice storage technology for building ventilation systems, requires high skill jobs in manufacturing and installation, and mid-level skill jobs in maintenance and operation. The representative also stated a demand for energy auditors, LEED certifiers, and commissioners – all high skill level job positions that require experience and/or training. The LACCD representative acknowledged that a knowledge gap exists between the building designers and those who construct the building. This knowledge gap is bridged with retraining and gained green building and LEED experience. The representative also explained that select contractors are repositioning and remarketing themselves for green building projects.

The conference noted above and interviews with key representatives from the green building sector shed light on the major job fields that are growing in demand within the industry. These job fields are discussed below.

#### **LEED Professionals**

The growing demand for LEED accredited professionals was repeatedly voiced by a number of interviewees. LEED accreditation is gained through the United States Green Building Council and involves passing an exam. Preparation courses are often offered by local USGBC chapters, but are expensive. LEED professionals include commissioners and agents. LEED commissioning is a growing field as more and more buildings seek LEED certification. Commissioners ensure a building's compliance with LEED. Commissioners are not required, but are frequently LEED accredited professionals. LEED agents represent another LEED professional occupation. LEED agents oversee LEED projects and guide contractors through the project specifications.

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<sup>21</sup> "Solar Energy Conference Lights the way at Los Angeles Harbor College." Los Angeles Community College Press Release, October 21, 2005.

### **Energy Auditors**

Another subset of green building jobs is energy auditing. Energy auditors work with Home Energy Efficiency Rating Services to verify correct installation of energy systems. Energy auditors and engineers also design innovative natural HVAC systems to minimize building energy use. Energy auditors are key players in energy efficient retrofits for existing buildings. Energy auditing is a high skill level profession that requires training.

Work in energy auditing includes retrofitting or subcontracting out retrofitting. This includes window installations, carpet installations, caulking, HVAC system operation and maintenance, and replacement of lighting systems.

### **Landscaping**

Landscaping presents a potential area for employment in green building. Permeable landscaping and stormwater management related jobs contain growth possibilities as water conservation is prioritized in green building. LEED contains landscaping principles, including points for drought tolerant and native vegetation. Landscaping is also promising because it represents an existing and prominent industry in Los Angeles.

### **Building Waste Recycling**

LADPW recently decided to increase building waste recycling requirements. Seventy-five percent of inert materials (i.e., bricks and wood) need to be diverted from landfills and recycled; and fifty percent of non-inert materials (i.e., glass, plastics, and metals) need to be recycled. The Sanitation Department is working on building the infrastructure to support these new requirements. The Department is foreseeing demand for low-skill workers to work in recycling facilities.

### **Recommendations**

*1. Professionalize green building trades by encouraging certifications and skill upgrades.*

The most effective way to standardize green building professions is to encourage certification programs and opportunities for skill upgrades. Professionalizing the job areas described above will create more certainty and accountability in the green building workforce. For employees, job professionalizing can provide them with career ladder opportunities and options for skill upgrades.

Professionalizing opportunities exist in several areas within the green building sector. For instance, landscaping focusing on sustainable elements, such as permeable hardscapes and native and drought tolerant plants, presents a potential niche for specialized training, education and certification.

Professionalizing has to occur on two levels. First, the City, developers, and contractors may prefer (or possibly even require) employees with specific certification or training for green building projects. Second, education institutions, such as LACCD, need to develop curriculum and standards for such certification and training programs.

#### **Finding #4: Green Building Materials**

*Green building material manufacturing represents the most promising industry to stimulate local economic development across Los Angeles.*

Green building materials are growing in demand as LEED is being pushed across cities. Green building material needs range from PV panels, microturbines, waterless urinals, compact light bulbs, water filtration systems, permeable concretes, fly-ash concrete, insulation, flooring, certified wood, and low (or no) VOC paints, carpets, and adhesives.

These materials are growing in demand yet, they prove difficult to find. Representatives from the Lakeview Terrace Library and 20<sup>th</sup> Street Apartments stated that one of their most difficult obstacles was finding specified green building materials. The 20<sup>th</sup> Street Apartments representative provided an example with recycled carpeting. For new construction, it is easier to find a vendor for recycled carpets because it is being purchased in high quantities. However, with small purchase quantities, for replacements and building maintenance, it is difficult to find an interested vendor. When materials are found, for large or small quantities, they generally come from out of state vendors.

The gap in supply for green building materials in Los Angeles shouts out an opportunity for economic development. Green buildings' significant job implication is in the growing demand for green building materials. Investment in this sector shows promise of job creation in the City. Investing in and expanding the green building material industry in Los Angeles may represent the most effective way to stimulate local economic development around green building.

#### **Recommendations**

*1. Los Angeles to implement strategies that attract and support green building businesses and green technology industries, including incentives, regulations, green building and infrastructure standards, and tax rebates and credits.*

The Economic Roundtable's 2006 report argues that Los Angeles should stimulate its local economic development with investment in green technology. Building off the City's assets, the report lists promising industries for growth in green technology. Leading the list are utilities, construction, and manufacturing industries. Six out of the top 20 green technology occupations in Los Angeles lie in construction. The report applies the following criteria to its occupation research: possibility for 500 or more new jobs; stable or growing employment; and average monthly wage of at least \$2,500. The construction trades have the potential to meet these criteria. Construction represents a large and growing industry sector with low costs of investment to create jobs.

Economic development incentives for the green technology sector could create quality jobs and stimulate the local economy. Such incentives attracted Solar Integrated Technologies (SIT), a solar roof manufacturing company to locate in Los Angeles. A SIT representative explained that economic incentives and social values impacted the firm's decision to locate in south central Los Angeles. SIT was interested in creating jobs in the

inner city, an area with a long history of disinvestment. In addition, since the area is designated as a Federal Empowerment Zone (EZ), SIT would benefit from tax rebates and credits. SIT was also capable of benefiting from the Los Angeles Manufacturing Credit. However, due to program phase out, SIT never reaped any benefits from the LAMC. Complying with the EZ local hire criterion, SIT employs about 30 people in their production line, all residents of an EZ. The company trains their employees for high skill production line work.

Other ideas for economic development incentives to attract and support green building and technology industries include:

- Create municipal green procurement requirements to broaden the base and induce demand for green technology and material products.
- Outreach to identified existing companies and encourage them to branch out to green products, using purchase guarantees as requirements.
- Develop incentives for the private sector to invest in green building. For instance, offer streamlined permit processes, and create models for using future operating cost savings to assist in initial capital costs.

*2. Encourage local purchasing and manufacturing of green building materials by decreasing the 500 mile radius LEED standard.*

Within LEED's green building point system, points are offered for using materials manufactured within a 500 mile radius of the project site. This option provides some incentive for purchasing materials locally. However, as understood from industry representatives, this point is fairly easily attainable, since 500 miles encompasses a wide region. One idea is to provide more LEED points for utilizing a smaller footprint. For example, two LEED points may be attainable for purchasing materials within 100 miles, and 3 LEED points for materials purchased within Los Angeles County.

This strategy would induce a demand for locally manufactured green building materials. Currently, LEED projects receive most materials outside of Los Angeles. LADPW provides contractors with LEED specifications for bidding and constructing City projects. The specifications list recommended green building material manufacturers, such as for certified wood and low VOC carpet and paints. Out of the 41 LADPW listed manufacturers, 11 are located in California, three of which are in Los Angeles. However, a greater green building manufacturing potential exists in Los Angeles. Oikos, a green building manufacturing guide, lists a number of green building manufacturers in Los Angeles.<sup>22</sup> Manufacturers include: flooring, furniture, lighting, carpet, paving, concrete, photovoltaic systems, plumbing, and paints.

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<sup>22</sup> [www.oikos.com](http://www.oikos.com)

### **Finding #5: Integrating Communities in Need with Jobs**

*The most effective way to connect people from low-income communities of color with green building jobs is through union apprenticeship and worker center training programs. Training programs must recognize and address the fact that many potential employees lack basic high school math and English skills.*

The previous sections demonstrated the growth and promise of job opportunities in the green building sector. Integrating low income communities of color with these jobs presents a challenging task. PV Jobs presents a model for integrating low-income communities of color with green building jobs using existing resources. PV Jobs, a non-profit organization providing job placement opportunities for disadvantaged youth and adults, utilizes worker center training and union apprenticeship programs to connect their applicants with jobs.

### **LACCD Project Labor Agreement Overview**

In 2001, Los Angeles Community College District (LACCD) succeeded in passing Proposition A, followed by Proposition AA in 2003. These propositions embarked LACCD on a massive capital improvement project totaling over \$2.2 billion in bond measure funding. In 2002, the LACCD Board of Trustees adopted a district wide policy setting LEED as the building standard for the bond-funded improvements. In all, more than 40 LEED buildings are planned for construction.<sup>23</sup> The construction projects are expected to be completed by 2012, but will most likely continue longer.

In 2001, the LAACD Board of Trustees approved a Project Labor Agreement for the capital improvements project. The critical section of the agreement states, “the Project [is to] provide employment opportunities through outreach, education, and training for students and residents of the District, in particular those disadvantaged and at-risk, and increase business opportunities for all qualified local businesses within the District, including small, emerging, women-owned, minority-owned, disabled veteran owned, and other businesses.”<sup>24</sup>

### **Local Hire Goals**

The Project Labor Agreement sets goals to hire local residents and contract small local businesses for LACCD construction projects. Thirty percent of workers at an LACCD construction site must be a resident in an LACCD district.<sup>25</sup> Within the 30 percent, six percent of workers must be at-risk adults. PV Jobs is responsible for implementing the District’s Project Labor Agreement. PV Jobs’ experience stems from its implementation

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<sup>23</sup> “LACCD Building for the Future.” A Report to the Community, Fall 2003. [www.propositiona.org](http://www.propositiona.org)

<sup>24</sup> Los Angeles College Community College District Proposition a Facilities Project Labor, 2001.

<sup>25</sup> District residents are determined by their zip codes. One-hundred and fifty zip codes are eligible. Due to the inconsistency and unpredictability of construction jobs, the project labor agreement allows for residents in one district to work at a construction site of another LACCD district. This is still considered local hire.

of the labor agreements included in the large Playa Vista development in Los Angeles. In the LACCD project, PV Jobs' responsibility is two-fold. Its first goal is to integrate unemployed people with union jobs. Its second goal is to connect LACCD students with internship positions with firms working on the construction projects. Firms include engineering, architecture, design, and energy consultants. In the LACCD internship program (called e7), 175 interns have been placed with LACCD consulting firms. The interns generally are paid between \$10 to \$15 an hour.

### **Utilizing Existing Resources**

PV Jobs works with numerous community organizations and over 50 worker centers throughout Los Angeles to integrate potential employees with union trades working on one of the nine LACCD campus construction projects. These organizations are responsible for marketing the PV Jobs program and are the first stop for interested applicants. Union trade jobs include: painters, carpenters, floor installers, laborers, plumbers, concrete masons, sheet metal workers, electricians, and tile setters. To qualify for PV Jobs, an applicant must show one of the following employment barriers: income below 50 percent of median; homeless; welfare recipient; unemployed; single parent; and past justice system involvement.

### **Opening the Door to Union Apprenticeships**

The first step for an interested applicant is to attend a brief orientation, proving her/his commitment. Next, the applicant is placed in the program tract. The program tract provides applicants with training and connects them with a construction trades union. Through a union position, the applicant is guaranteed health benefits and prevailing wages. PV Jobs commits 3000 working hours to each employer. This means that PV Jobs conducts regular follow-ups to ensure that constituents are truly placed at paying jobs. The union tract often moves slowly, so PV Jobs frequently places people before they are accepted in a union. At these times they are not guaranteed prevailing jobs, and the construction jobs may not even be related to the College District. Contractors may even benefit from this program. PV Job candidates are often eligible for the Work Opportunity Tax that gives employers a tax credit of up to \$250, on average, per employee.

### **PV Jobs Challenges**

The biggest obstacle in the process, as expressed by two PV Jobs representatives, is placing dedicated and committed applicants with the available jobs. Construction jobs are labor intensive and team oriented. The PV Jobs program tract provides job orientation and training. However, applicants may not have the right mind set for such jobs. They need to realize that they are members of a working crew. It is not excusable if a person does not show up for work. Second, many applicants lack the basic math and English skills to enter the higher skill unions, such as electricians and plumbers. A representative from the IBEW Local 11 training center in Los Angeles echoed this same challenge. The

most serious obstacle facing applicants for IBEW apprenticeship programs is the lack of basic math and English skills.

The Los Angeles unions are taking steps toward addressing this issue. The laborers union, a lower skill job sector, is running boot camp training programs and providing assistance in basic education skills. The electricians union connects applicants with the multitude of bridge programs and organizations existing in Los Angeles. Yet, the level of union participation in the program and integration ease varies greatly. The laborers union is one of the more active participants. It is more difficult to integrate employees into the electricians and crane unions. This is mainly because of the high skill levels required and the union's unique apprenticeship allowances for new apprentices.

### **Seeing Results with Job Placements**

Since its involvement with LACCD in 2004, PV Jobs has placed 55 employees on LACCD projects, and 265 employees on construction jobs outside of LACCD. In addition, PV Jobs has surpassed the 30 percent goal for local hire; the actual local hire percentage equals 42. PV Jobs advocates integrating potential employees with unions as the best career ladder opportunity. Once in a union, the employee receives healthcare, prevailing wage, representation, and support through the cyclical nature of construction jobs.

### **Green Building Training in Unions**

The union tract may present the best approach for integrating low-income communities of color with construction trade jobs. Realizing this, it is relevant to examine how, or if, unions are addressing green building and LEED specifications in their training.

The IBEW Local 11, the electrician union, recently installed photovoltaic panels on its training center rooftop in the City of Commerce. Completed in February 2006, the photovoltaic (PV) panels provide the center with its energy, and serve as a training station for apprentices. The panels are expected to provide 750 to 800 megawatts per year. The training center uses 1.1 million megawatts per year, which requires only 300 megawatts to be purchased from the grid.

The IBEW representative disagreed that a major obstacle in green building is a knowledge gap between project designers and project constructors. Union electricians generally have the skills to install and operate photovoltaic panels and green lighting fixtures (such as motion sensor lighting). In addition, national IBEW partnered with Sharp, a PV manufacturer, and developed a Sharp PV installation certificate process for union members (Sharp's interest in PV certification was also noted at the LACCD Harbor College Solar Energy Conference, see LACCD section above). However, the IBEW union is not representative of lower-skill unions with less rigorous training requirements. IBEW has historically stood on the forefront in training for new technologies and energy systems. The representative did agree that a large number of training applicants lack basic

high school skills. The training center generally connects such applicants with City and County bridge programs that offer basic math and English courses.

The PV Jobs representative, who works closely with unions and their training centers, noted that the carpenters union has an extensive training program that includes green building principles. The laborers union may feature green building elements in its construction simulation work station site. Other construction trades to consider working with for a Green Jobs Campaign are the pipetrades, finishers, and plumbers.

### **Recommendations**

*1. Apply or expand project labor agreements, such as the LACCD and PV Jobs model, to public and private green building projects.*

*2. Foster relationships with construction trade unions through the Apollo Alliance to align on social, environmental, and economic development issues to advance the Green Jobs Campaign.*

Project labor agreements present an attractive approach to integrating low income communities of color with quality jobs. Project labor agreements may include local hiring, livable wage, and training requirements.

Unions also present promising opportunities for workforce development. Unions are well established and organized; they have training and career center resources; they offer health benefits; and they present career ladder opportunities. Unions also have political influence and a stake in the future of green building and renewable energy.

*3. Develop a specialized Los Angeles LEED that includes priorities for social justice, economic development, and environmental considerations.*

LEED presents credible and established standards for green building. However, LEED fails to prioritize unique and critical issues in its point system. One option is to support a Los Angeles LEED – City specific green building requirements that reflect relevant issues and priorities. For instance, a Los Angeles LEED could place more weight on energy and water conservation; and integrates social justice considerations, such as local hire and training requirements.

An LA LEED offers a tool for implementing some of the recommended policies discussed earlier. Project labor agreement models and decreasing the 500 mile radius local purchasing requirement may be integrated in an LA LEED. An LA LEED may also include points for supporting local sustainable practices. An LA LEED can integrate methods for rewarding sustainable manufacturing processes into its point system

## VI. Conclusion & Next Steps

This research analysis concludes that a real potential exists in the Los Angeles green building sector for job creation and local economic development. This paper demonstrates how progress in the green sector, including building, technology, and energy, is closely tied with policy. This paper offers suggestions for harnessing the City's existing potential in the green sector. The paper recommends courses of actions that include: policy to induce more demand for green sector goods and services; tools for improving green building resources, knowledge base, and training; and methods for integrating low income communities of color with workforce development opportunities.

Los Angeles has acted as a regional leader and initiated several supportive policies to encourage progress in the green sector. Subsequently, green industries are slowly emerging in Los Angeles. Yet, more possibilities for actions exist to better support and attract green industries. This report contributes to understanding the weaknesses and strengths in the City's green building sector.

Utilizing this information as a first step, next steps should include both more broad and specific research to developing and implementing strategies. For instance, on the broad scale, the Ralph and Goldy Lewis Center for Regional Policy Studies at UCLA completed a policy brief recommending key actions for advancing Los Angeles' and Southern California's green economic sector. On the specific scale, SCOPE is working with the labor union to identify green building training opportunities for their members. In sum, next steps should work on actualizing the green building sector's potential as revealed in this report.

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