



GREEN BUILDINGS, GOOD JOBS, SAFE JOBS: SOCIAL JUSTICE PATHWAYS TO A SUSTAINABLE LOS ANGELES

2009 UCLA COMMUNITY SCHOLARS REPORT

APPENDICES

Community Scholars 2009 is a joint, multidisciplinary initiative of the UCLA:

- *Labor Occupational Safety and Health Program (LOSH)*
- *Labor Center / California Construction Academy*
- *Department of Urban Planning*
- *Institute for Research on Labor and Employment (IRLE)*



GREEN BUILDINGS, GOOD JOBS, SAFE JOBS: SOCIAL JUSTICE PATHWAYS TO A SUSTAINABLE LA

APPENDICES

A. LOCAL AND STATE REGULATIONS

*B. GREEN RETROFIT AND WORKFORCE PROGRAM
ORDINANCE—NUMBER 180633*

http://clkrep.lacity.org/onlinedocs/2006/06-1963_ord_180633.pdf

C. ROADMAP TO RETROFITS TECHNICAL DETAILS

D. LEED-EBOM CHECKLIST

<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=221>

E. LANDSCAPE OF WORKFORCE DEVELOPMENT PROGRAMS

*F. WORKER HEALTH & SAFETY—BENEFITS AND HAZARDS OF
GREEN BUILDING RETROFITS*

*G. HIGHLIGHTS OF THE LOS ANGELES ENVIRONMENTALLY
PREFERABLE PRODUCTS PURCHASING PROGRAM*

2009 UCLA COMMUNITY SCHOLARS REPORT
GREEN BUILDINGS, GOOD JOBS, SAFE JOBS:
SOCIAL JUSTICE PATHWAYS TO A SUSTAINABLE LA

Appendix A: Local and State Regulations

Information in this appendix provides additional details to those presented in the Chapter “Introduction: Green Buildings and Sustainability” of the 2009 Community Scholars report at <http://www.losh.ucla.edu/projects/pdf/green-jobs-report.pdf>. It is organized by A. Regulations and Initiatives Relevant to Green Jobs in Los Angeles and B. Resource Conservation in the Los Angeles Area: Water Conservation, Food Systems, and Transit. This information is based on research conducted by Community Scholars Program participants between January 2009 and June 2009.

A. Regulations & Initiatives Relevant to Green Jobs in Los Angeles

A green building retrofit and jobs program in the City of Los Angeles will operate within the context of a number of other regulations, policies and programs originating from the federal, state and local levels of government. The Mayor’s Office has adopted the “Green LA Plan,” which seeks a 35% reduction in CO2 emissions from 1990 levels by 2030. This section lists other important initiatives in the table below that are relevant to the Los Angeles Green Retrofit and Workforce Development Program.

Regulations & Initiatives Relevant to Green Jobs in Los Angeles		
Federal Regulations & Initiatives		
Federal Economic Stimulus Package	2009	\$787.2 billion economic stimulus package proposed by President Obama and passed by Congress in mid-February 2009
State Regulations & Initiatives		
Million Solar Roofs Initiative	2006	\$2.9 billion incentive plan for one million home and building owners to install solar electric systems by the year 2018. ⁱ
AB 32 California Global Warming Solutions Act	2006	Establishes a comprehensive program of regulatory and market mechanisms to reduce carbon emissions to 1990 levels by the year 2020 (a 25% reduction). ⁱⁱ

AB 3018 Green Collar Jobs Act	2008	Establishes a Green Collar Jobs Council that works to fulfill California's green workforce needs and to ensure that green-collar jobs are a long-term part of the workforce. ⁱⁱⁱ
SB 375 "Smart Growth" bill	2008	Aims to reduce greenhouse gas emissions by curbing sprawl and encouraging "smart growth" planning practices. Designed to help with the implementation of AB 32. ^{iv}
State Model Water Efficient Landscape Ordinance	March 2009	Encourages efficient landscape irrigation and reduced water use. ^v Applies to new construction and rehabilitated landscapes over 2,500 sq. ft. In 2010, local governments will have to either (1) adopt the state landscape ordinance, or (2) enact their own ordinance that is at least as effective as the State's. ^{vi}
County & City Regulations & Initiatives		
L.A. County Stormwater Permit and SUSMP standards	2001	Addresses federal Clean Water Act requirements. The permit's Standard Urban Stormwater Mitigation Plan (SUSMP) sets infiltration requirements for major new developments and redevelopments. ^{vii} The permit is supposed to be reissued every five years. ^{viii}
City Green Building Ordinance	2008	Requires large, new developments to meet the intent of the U.S. Green Building Council's LEED green building standards. Large redevelopments that spend more than 50% of the replacement cost of the existing building must also meet LEED standards. ^{ix}
City Landscape Ordinance	2005	Revised in 2005 to reduce landscape water use, urban heat island effect, and other environmental impacts. ^x In 2010, the City of Los Angeles will be required to either adopt the State's "Model Water Efficient Landscape Ordinance" or update its current ordinance to meet or exceed the State's standards.

The Los Angeles Green Retrofit and Workforce Program builds on prior Los Angeles green building initiatives for new construction, principally the 2008 ordinance that established City capacity and structures. For example, the cross-departmental Sustainability Team lays the groundwork for the City to begin to retrofit its own buildings.

Los Angeles Green Building Ordinance - New Construction

The City of Los Angeles enacted its "Green Building Ordinance" in 2008 as an integral part of the Mayor's Green LA Plan, which was unveiled in May 2007. The aggressive and bold plan calls for the City to reduce its carbon footprint by 35% below 1990 levels by 2030. The goal goes beyond the targets set in the Kyoto Protocol and is the greatest reduction target of any large U.S. city. To foster that effort, the City Council passed the Green Building Ordinance, which takes the following steps:¹

- Require that all new projects greater than 50 units or 50,000 square feet show compliance with the LEED Certified level.
- Expedite processing through all departments, if LEED Silver designation is met.
- Initiate an ongoing review of city codes to ease use of environmentally sound and superior materials and processes.
- Create a cross-departmental Sustainability Team to review and revise green building policies and specific projects. They will meet weekly so that the development community can enjoy ongoing interaction with City staff.
- Direct City General Managers and department and agency heads (namely Planning, Building and Safety, Public Works, Water and Power, Transportation, and CRA) to train and certify their staff in green building methods and policies and/or as LEED Accredited Professionals. This training should be ongoing and appear in each departmental annual budget.
- Work with the Board of DWP Commissioners to continue to add DWP financial incentives for projects that meet green building standards.

B. Resource Conservation in the Los Angeles Area: Water Conservation, Food Systems, and Transit

Los Angeles' water shortage and sprawling design, pose unique environmental issues that converge with efforts to minimize green house gas emissions.

The need for water conservation

On February 27, 2009, Governor Arnold Schwarzenegger declared a drought emergency for the entire state of California.^{xi} This was not an isolated incident—the Los Angeles area regularly faces water shortages and does not generate enough water to sustain itself. In fact, 48% of the City of Los Angeles’ water supply originates from the Mono Basin and Owens Valley aqueducts, and only 13% of its water supply comes from local groundwater.^{xii} Changes in climate patterns could make water shortages even more dire in the future.

The potential benefits of low impact development - using green building and green landscaping techniques to improve the City’s water supply while reducing energy usage and water pollution—are compelling. The interior spaces of green buildings can be outfitted with water-conserving devices such as low-flow faucets and showerheads, water-efficient toilets, and even grey-water systems that allow “dirty” water to be reused for the irrigation of yards and gardens.

The exterior landscaping, site design and paving practices for green building properties can also have an enormous impact on water conservation and supply. Examples are illustrated in the photos in this section. **Each ¼-acre of hardscape in Los Angeles has the potential to collect 100,000 gallons of rainwater per year.**^{xiii} A study by the Natural Resource Defense Council in January 2009^{xiv} found that the use of low impact development landscaping and water collection practices throughout residential and commercial properties in L.A. County would significantly increase groundwater recharge and water capture and reuse, thus reducing the county’s dependence on distant, imported sources of water by 74,600–152,500 acre-feet per year by 2030. Based on current per capita water usage in the City of Los Angeles, this is equivalent to the water consumption of 456,300–929,700 people.^{xv} Moreover, since L.A. County



Drought-tolerant landscaping in West Los Angeles

would be pumping less water from distant locations, and water systems account for 19% of the electricity used in the state of California^{xvi}, 131,700–428,000 MWH of energy would be saved per year by 2030, which is equivalent to the electricity used by 20,000–64,800 households.^{xvii} Therefore, low impact development could also mitigate climate change by reducing greenhouse gases.

Common Water Conservation Best Management Practices for “Green” Properties^{xviii}

			
Vegetated Swales / Bioswales	Rain Gardens	Rain Cisterns	Green Roofs
			
Permeable Pavers	Porous Pavement	Curb Bump-Outs	Curb Cuts

Using Green Buildings to Improve Food Systems

In the wake of the push for alternative solutions to reduce world hunger and poverty, green buildings can incorporate a practice called urban agriculture (UA) into their design, which attempts to cut down on urban food imports by growing crops and products on land in and around cities. Not only does urban agriculture provide local food security, it also helps to reduce the number of miles that food has to travel, which further reduces the carbon footprint of a city. The results of urban agriculture pilot projects in Los Angeles should be evaluated to assess their yields per square foot, how they would feed the surrounding population, and the quantity of CO₂ emissions saved by reducing “food miles” and by eliminating the need to mow and maintain grassy landscapes.

We envision re-purposing of parking lots and even the roofs of buildings targeted for the Green Retrofitting Program for community gardens, pocket parks and outdoor recreational centers. Community-based gardens offer the opportunity for green collar jobs and for hiring residents from low income communities.

In addition, numerous psychological and economic benefits have been documented in studies of the positive correlation between green spaces and improved mental health, lower crime rates and more cohesive communities. Green spaces also offer urban heat island mitigation through tree planting. The recently unveiled green roof project designed by the faculty and students of SCI-Arc at Flat, a residential high-rise conversion in downtown L.A., shows how a self-sufficient ecosystem offers a myriad of environmental benefits. Besides helping to filter pollutants, increasing thermal insulation of the roof, and reducing storm water runoff, the roof top garden creates a complete productive cycle. Food will be grown, consumed, and ultimately returned to the cycle in the form of compost on the premises.

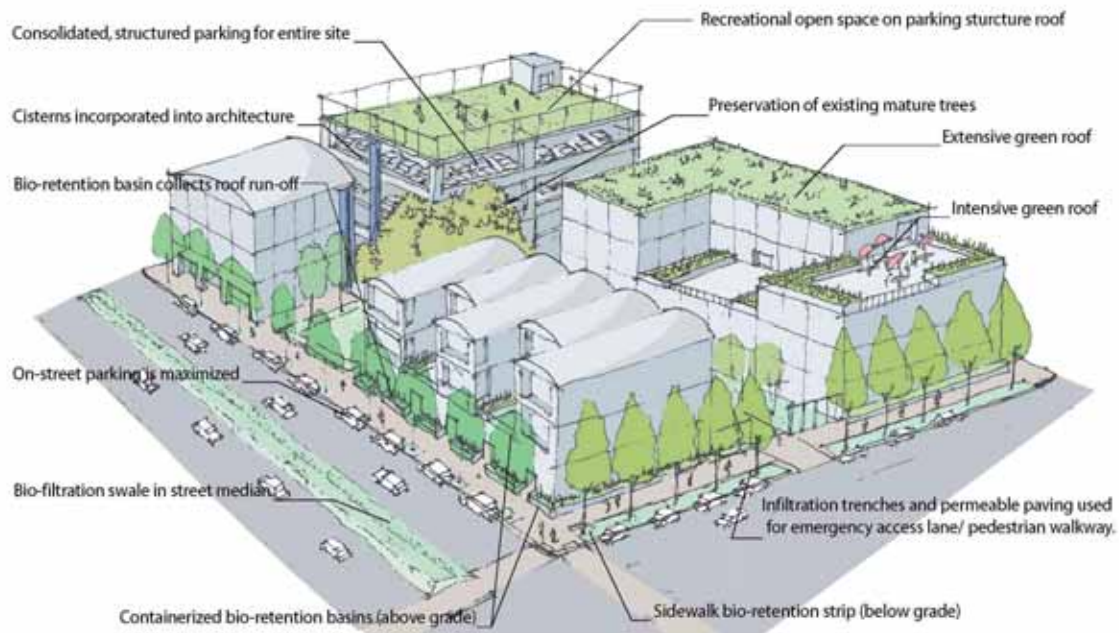


Illustration from the City of Emeryville's "Stormwater Guidelines for Green, Dense Redevelopment" depicting what LID might look like for a commercial development. Credit: City of Emeryville / Community, Design + Architecture

Using Green Buildings to Support Alternative Transit and Community Programs

By selecting a few simple low-cost design options, the retrofitted buildings can create a network of alternative transit centers throughout the city where, for example, parking spaces are reserved for community car-sharing programs and shower facilities are incorporated into restrooms so that employees can bicycle to work.

Additionally, a retrofit program might open the opportunity to provide space—office and performance—to community and arts groups. Depending on the degree of renovation required, a retrofit program might require tearing down walls or offer the chance to "repurpose" an existing (and especially an unused) space within a building.

Moving forward, government-financed green projects must avoid a "silo" mentality that separates the green jobs community from the environmental, local activist, urban garden, and other related communities that are integral to sustainable development.

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- ⁱ State of California, Office of the Governor. Press release: "Schwarzenegger Signs Legislation to Complete Million Solar Roofs Plan," August 21, 2006. Accessed on 3/8/09, <http://www.gov.ca.gov/index.php?/press-release/3588/>
- ⁱⁱ State of California, Office of the Governor. Press release: "Gov. Schwarzenegger Signs Landmark Legislation to Reduce Greenhouse Gas Emissions," September 27, 2006. Accessed on 3/8/09, <http://gov.ca.gov/press-release/4111/>
- ⁱⁱⁱ Ella Baker Center, Green Collar Jobs Campaign. *Passed! California Green-Collar Jobs Act of 2008*. Accessed on 3/2/09. http://www.ellabakercenter.org/index.php?p=gcjc_green_collar_jobs_act
- ^{iv} State of California, Office of the Governor. Press release: "Governor Schwarzenegger Signs Sweeping Legislation to Reduce Greenhouse Gas Emissions through Land-Use," September 30, 2008. Accessed on 3/8/09, <http://gov.ca.gov/press-release/10697>
- ^v LandscapeOnline.com. *California Water Ordinance Update*. Accessed on 8/22/08, <http://www.landscapeonline.com/research/article/10189>
- ^{vi} State of California Department of Water Resources, Office of Water Use and Efficiency Transfers. *Updated Model Water Efficient Landscape Ordinance AB 1881*. Accessed on 1/15/09. <http://www.owue.water.ca.gov/landscape/ord/updatedOrd.cfm/>
- ^{vii} State of California, California Regional Water Quality Control Board, Los Angeles Region. "Waste Discharge Requirements for Municipal Storm Water and Urban Runoff Discharges Within the County of Los Angeles, and the Incorporated Cities Therein, Except the City of Long Beach." Order No. 01-182, NPDES Permit No. CAS004001. December 13, 2001. (Also known as the L.A. County Stormwater Permit SUSMP standards.)

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- viii County of Los Angeles Stormwater Ordinance. "Title 12, Chapter 12.80 - Stormwater and Runoff Pollution Control." Accessed on 2/1/09, http://ordlink.com/codes/lacounty/ DATA/TITLE12/Chapter_12_80_STORMWATER_AND_R.html
- ix City of Los Angeles, Department of City Planning. "Building a Green Los Angeles: Framework for the City's Green Building Program," May 2008. Accessed on 8/13/08, http://cityplanning.lacity.org/code_studies/GreenLa/Brochure.pdf
- x City of Los Angeles, Department of City Planning. "Los Angeles City Planning Department Recommendation Report." Report to the City Planning Commission, February 10, 2005. Case No: CPC-1992-0043-CA, CEQA: ENV-2003-7106-CE. Accessed on 8/6/08, http://cityplanning.lacity.org/Code_Studies/Other/landscape.pdf
- xi Boxall, Bettina. "Schwarzenegger proclaims statewide drought emergency," February 28, 2009. *Los Angeles Times*. Accessed on 3/1/09, http://www.latimes.com/news/local/la-me-california-drought28-2009feb28_0.526703.story
- xii *First source of information:* Beckman, David S. and Noah Garrison. "NRDC Comment on AB32 Scoping Plan Appendices—Water Sector," August 11, 2008. Natural Resources Defense Council comments sent to the California Air Resources Board. *Second source of information:* Email message from Noah Garrison, Project Attorney at NRDC, on January 21, 2009. "LID Numbers for L.A. County."
- xiii Estimates of potential stormwater runoff assuming an average yearly rainfall in Los Angeles of 15-inches on impervious surfaces. {Potential stormwater from a ¼-acre lot} = (0.25 x 43,560 sq.ft. per acre) x (15" rain per year) / (12" per ft.) x (7.481 gal. per cu.ft.) = 101,835 gallons. An ordinary, 2-lane street is 30 feet wide. {Potential stormwater from a city street, not including sidewalks} = (500 ft. long) x (30 ft. wide) x (15" rain per year) / (12" per ft.) x (7.481 gal. per cu.ft.) = 140,269 gallons. Calculation by the City of Los Angeles Bureau of Sanitation, November 2008.
- xiv *First source of information:* Beckman, David S. and Noah Garrison. "NRDC Comment on AB32 Scoping Plan Appendices—Water Sector," August 11, 2008. Natural Resources Defense Council comments sent to the California Air Resources Board. *Second source of information:* Email message from Noah Garrison, Project Attorney at NRDC, on January 21, 2009. "LID Numbers for L.A. County."
- xv This calculation is based on the average daily per capita water use of Los Angeles residents from 2006-2007, which was 146 gallons per person per day. (According to the City of Los Angeles Department of Environmental Affairs website, <http://www.lacity.org/EAD/2007environmental%20facts.htm>, accessed on 2/22/09.) 146 gallons per day x 365 days per year = 53,290 gallons per person per year = .1635 AF/person/year. Conversion factor: 1 acre foot = 325,851 gallons. 74,600 AF per year saved / .1635 AF per person per year = the water used by 456,269 people. 152,000 AF per year saved / .1635 AF per person per year = the water used by 929,664 people.
- xvi *First source of information:* Beckman, David S. and Noah Garrison. "NRDC Comment on AB32 Scoping Plan Appendices—Water Sector," August 11, 2008. Natural Resources Defense Council comments sent to the California Air Resources Board. *Second source of information:* Email message from Noah Garrison, Project Attorney at NRDC, on January 21, 2009. "LID Numbers for L.A. County."
- xvii This calculation is based on the average monthly electricity use per household in the City of Los Angeles, which is 550 kWh. (According to the C40 Cities website, http://www.c40cities.org/bestpractices/renewables/la_renewable.jsp, accessed on 2/22/09.) 550 kWh per household per month x 12 months = 6,600 kWh = 6.6 MWh per household per year. 131,700 MWh saved per year / 6.6 MWh per household per year = 19,955 households per year. 428,000 MWh saved per year / 6.6 MWh per household per year = 64,848 households per year.
- xviii *Photo credits for Common LID BMPs:* Vegetated swales = Capital Region District, British Columbia. Rain garden = Iowa Natural Resources Conservation Service. Rain cistern = EPA / Abby Hall. Green roof = City of Los Angeles Bureau of Sanitation. Permeable pavers = EPA / Abby Hall. Porous

pavement = City of Los Angeles Watershed Protection Division, Planning and Engineering Section. Curb bump-out = EPA / Abby Hall. Curb cuts = Haan-Fawn Chau.

ORDINANCE NO. 180633

An ordinance adding Article 5 to Chapter 3 of Division 7 of the Los Angeles Administrative Code to establish the Green Retrofit and Workforce Program, including creation of a Green Retrofit Development Interdepartmental Task Force, and a Green Retrofit Development Advisory Council.

**THE PEOPLE OF THE CITY OF LOS ANGELES
DO ORDAIN AS FOLLOWS:**

Sec. 1. A new Article 5 is added to Chapter 3 of Division 7 of the Los Angeles Administrative Code to read:

Sec. 7.300. Purpose

The City's Climate Change Action Plan sets a goal of reducing the City's greenhouse gas emissions by 2030 to 35 percent below 1990 levels.

Buildings use two-thirds of the nation's total electricity output and produce 30 to 40 percent of its green house gas emissions.

The United States Green Building Council (USGBC) has established green standards for existing buildings, referred to as "LEED®-EB," which offer sustainability elements pertinent to many city facilities that are already constructed and operating, including those facilities in need of repair or renovation. The average LEED® certified building uses significantly less electricity than non-green buildings and generates substantially less CO₂.

The federal government has proposed a massive increase in the amount of federal funding available for infrastructure. It is in the City's interest to have innovative programs to qualify for such funding in the event that it becomes available.

The City has an interest in employing productive workers. Research indicates that workers in LEED®-certified or otherwise "green" buildings are healthier and more productive.

There is a critical need for improvements in City buildings.

The proprietary interests of the City will be advanced by the use of project labor agreements, where the legal criteria for their use exists. Project labor agreements minimize the possibilities for labor misunderstandings, grievances, and conflicts, thereby promoting project cost containment, and timely and economical project completion.

Project labor agreements have the capacity to provide additional benefits, including facilitation of efforts to target construction job opportunities to disadvantaged

City residents; prompt generation of tax flow and other income to the City; and more lasting remediation of conditions of poverty and unemployment through the provision of careers in the skilled construction trades.

Sec. 7.301. Definitions

The following words and phrases, whenever used in this Article, shall be construed as defined in this section:

A. "Contractor" means any person, firm, partnership, owner operator, limited liability company, corporation, joint venture, proprietorship, trust, association, or other entity that enters into a Construction Contract.

B. "Construction Contract" means any contract entered into between the City and a Contractor for the performance of construction work related to the Green Retrofit And Workforce Program.

C. "Floor Area" means the area in square feet as defined in accordance with Section 12.03 of the Los Angeles Municipal Code.

D. "Green Building Certification Institute" is an entity established with the support of the United States Green Building Council to administer credentialing programs related to green building practice and standards.

E. "LEED®" means Leadership in Energy and Environmental Design, a rating system put forth by the United States Green Building Council (USGBC) that is the nationally accepted benchmark for the design, construction and operation of high performance green buildings.

F. "LEED® Accredited Professional™" or "LEED® AP" means a person who has been designated a LEED® Accredited Professional by the Green Building Certification Institute.

G. "LEED®-EB" means LEED® standard for existing buildings.

H. "Local Resident" means an individual whose primary place of residence at the commencement of a project under the Program on which that individual is seeking employment is within the City and is within the zip code containing at least part of one census tract with a rate of unemployment in excess of 150% of the Los Angeles County unemployment rate, as reported by the State of California Employment Development Department.

I. "Program" means the Green Retrofit And Workforce Program established pursuant to the terms of this Article.

Sec. 7.302. Establishment of the Green Retrofit And Workforce Program

A. There is hereby established a program to be known as the Green Retrofit And Workforce Program (the Program) in the Office of the Mayor.

B. Subject to availability of state or federal funds, the Mayor shall appoint a Program Director who shall be responsible for development and implementation of the Program. The Program Director, in consultation with the Green Retrofit Development Interdepartmental Taskforce and the Green Retrofit Development Advisory Council, shall submit to the City Council and the Mayor for approval a Plan to retrofit all city-owned properties over 7,500 square feet or constructed prior to 1978 with the goal of meeting the LEED®-EB silver or higher standards. Each of the following specific elements shall be considered in developing the Plan:

1. water efficient landscaping and irrigation;
2. HVAC systems;
3. mechanical systems;
4. water conservation systems;
5. refrigeration systems;
6. retrofitting lighting and electrical systems;
7. retrofitting all energy consuming elements;
8. improving indoor air quality;
9. sustainable carpet;
10. sustainable maintenance;
11. titanium dioxide (TiO₂) windows treatments;
12. solar, geothermal and other renewable energy systems; and,
13. cool roofs.

C. Priority Facilities. The following factors shall be included in determining the proposed priorities for retrofitting City facilities:

1. Whether the City facilities pose substantial health and safety issues;
2. Whether the City facilities are located in areas with high levels of poverty and unemployment relative to other areas of the City; and,
3. Whether the primary function of the City facilities is to provide direct services or facilities for City residents such as recreation centers and libraries.

D. It shall be the goal of the Program during its initial five years that 50 percent of the buildings retrofitted be located in areas with high levels of poverty and unemployment relative to other areas of the City.

E. To the extent feasible and permissible by applicable law, the Program will require that the work performed under Construction Contracts associated with the Program be performed by Local Residents.

Sec. 7.303. Creation and Administration of the Green Retrofit Development Interdepartmental Task Force.

A. There is hereby created a Task Force to be known as the Green Retrofit Development Interdepartmental Task Force. The Task Force shall hold public meetings and perform the following tasks in order to provide guidance and assistance to the Program Director:

1. Provide advice and comments for the development and implementation of the Program;
2. Provide advice and comments in the City's efforts to seek and apply for grants and other funding sources for the implementation of the City's Green Retrofit and Workforce Development Program;
3. Develop recommendations and provide advice on project labor agreements, memoranda of understanding, and Local Hire for all work required by the City's Green Retrofitting Program;

4. Provide advice and comments for the Program to promote a pathway to green careers through employment of workers from green training program(s) and apprenticeship program(s);

5. Provide consultation for the Program to promote inner city economic development by supporting small and disadvantaged green businesses; and,

6. Report to the Council on a quarterly basis.

B. The General Managers and Directors, or designees, of the following City departments, bureaus and offices shall be members of the Taskforce:

1. General Services Department (GSD)
2. Bureau of Engineering (BOE)
3. Environmental Affairs Department (EAD)
4. Department of Building and Safety (DBS)
5. Personnel Department
6. Community Development Department (CDD)
7. Workforce Investment Board
8. Bureau of Contract Administration
9. Chief Legislative Analyst (CLA)
10. Chief Administrative Officer (CAO)
11. Department of Recreation and Parks
12. Planning Department

C. The General Managers of the City proprietary departments and the Director of the Community Redevelopment Agency of the City of Los Angeles, or their respective designees, shall be invited to participate as members of the Taskforce.

The Program Director shall convene and chair the meetings held by the Taskforce.

Sec. 7.304. Creation of the Green Retrofit Development Advisory Council.

A. There is hereby created an advisory council to be known as the Green Retrofit Development Advisory Council (Advisory Council). The Advisory Council shall hold meetings open to the public as often as necessary in order to provide guidance and assistance to the Taskforce. Members shall serve two year terms, with four of the nine members appointed to an initial one year term, subject to the approval of the City Council. The members of the Advisory Council will select a Chair and Vice-Chair from among the members annually on the first meeting of each fiscal year, and implement the following goals:

1. Provide advice and guidance for the development and implementation of the Program;
2. Periodically review the Program's budget and advice regarding potential funding sources;
3. Notify the Task Force of grants and other funding sources for the implementation of the Program;
4. Develop recommendations and provide advice on project labor agreements, memoranda of understanding, and Local Hire elements for all work required by the Program;
5. Develop recommendations and provide advice on promoting a pathway to green careers through employment of workers from green training program(s) and apprenticeship program(s); and,
6. Provide advice to the Taskforce in promoting inner city economic development by supporting small and disadvantaged green businesses.

B. The Green Retrofit Development Advisory Council shall be comprised of nine members to be appointed as follows:

1. Two Labor representatives of whom one will be appointed by the Mayor and the other by the Council President;

2. One LEED® AP to be appointed by the chairperson of the Energy and Environment Committee;
3. One representative of an environmental organization to be selected by the Mayor;
4. One representative of an environmental justice organization to be selected by the Mayor;
5. One workforce development expert to be appointed by the chairperson of the HCED Committee;
6. One representative of a community organization to be selected by the Mayor;
7. One representative of a philanthropic organization to be selected by the Council President; and
8. One academician in the field of architecture, engineering or energy to be appointed by the Mayor.

Sec. 7.305 Cooperation with the Taskforce and Advisory Council

It is hereby declared to be the policy of the City of Los Angeles that all City offices, departments and bureaus shall cooperate to the fullest extent possible with the Task Force and the Advisory Council; provided that no such office, department or bureau shall be required to do anything in this connection which would conflict or interfere with the lawful and necessary conduct of its duties and operations as provided by law.

Sec. 7.306. Consistency with Federal and State Law

No provisions of this ordinance shall be applicable to those instances in which its application would violate or be inconsistent with federal or state law or regulation or where the application would violate or be inconsistent with the terms or conditions of a grant or contract with an agency of the United States, the State of California or the instruction of an authorized representative of any such agency with respect to any such grant or contract.

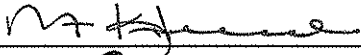
Sec. 7.307. Effective Date

This Chapter shall expire on, and be deemed repealed as of, June 30, 2011.

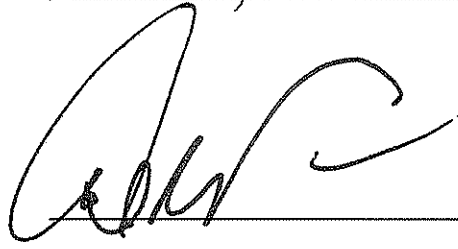
Sec. 2. The City Clerk shall certify to the passage of this ordinance and have it published in accordance with Council policy, either in a daily newspaper circulated in the City of Los Angeles or by posting for ten days in three public places in the City of Los Angeles: one copy on the bulletin board located at the Main Street entrance to the Los Angeles City Hall; one copy on the bulletin board located at the Main Street entrance to the Los Angeles City Hall East; and one copy on the bulletin board located at the Temple Street entrance to the Los Angeles County Hall of Records.

I hereby certify that this ordinance was passed by the Council of the City of Los Angeles, at its meeting of APR 08 2009.

KAREN E. KALFAYAN, City Clerk

By 
Deputy

Approved APR 15 2009


Mayor

Approved as to Form and Legality

ROCKARD J. DELGADILLO, City Attorney

By 
CHRISTOPHER N. LEE
Deputy City Attorney

Date March 31, 2009

File No. 06-1963

DECLARATION OF POSTING ORDINANCE


I, MARIA C. RICO, state as follows: I am, and was at all times hereinafter mentioned, a resident of the State of California, over the age of eighteen years, and a Deputy City Clerk of the City of Los Angeles, California.

Ordinance No. 180633 – Adding Article 5 to Chapter 3 of Division 7 of the Los Angeles Administrative Code to establish the Green Retrofit and Workforce Program - a copy of which is hereto attached, was finally adopted by the Los Angeles City Council on **April 8, 2009**, and under the direction of said City Council and the City Clerk, pursuant to Section 251 of the Charter of the City of Los Angeles and Ordinance No. 172959, on **April 16, 2009** I posted a true copy of said ordinance at each of three public places located in the City of Los Angeles, California, as follows: 1) one copy on the bulletin board located at the Main Street entrance to the Los Angeles City Hall; 2) one copy on the bulletin board located at the Main Street entrance to the Los Angeles City Hall East; 3) one copy on the bulletin board located at the Temple Street entrance to the Los Angeles County Hall of Records.

Copies of said ordinance were posted conspicuously beginning on **April 16, 2009** and will be continuously posted for ten or more days.

I declare under penalty of perjury that the foregoing is true and correct.

Signed this **16th** day of **April 2009** at Los Angeles, California.



Maria C. Rico, Deputy City Clerk

Ordinance Effective Date: May 26, 2009

Council File No. 06-1963

2009 UCLA COMMUNITY SCHOLARS REPORT

GREEN BUILDINGS, GOOD JOBS, SAFE JOBS: SOCIAL JUSTICE PATHWAYS TO A SUSTAINABLE LA

Appendix C: Roadmap to Retrofits Technical Details

Information in this appendix provides additional details to that presented in the Chapter “Roadmap to Retrofits: Technical Implementation” of the Community Scholars report at <http://www.losh.ucla.edu/projects/pdf/green-jobs-report.pdf>. It is organized by Phase 1: Building Selection, Phase 2: Comprehensive Building Audits & Energy, Water, and Retrocommissioning Retrofits, and Phase 3: Additional Retrofits and Policy Changes to Achieve LEED-EBOM Silver Certification. The information is based on interviews and audits conducted by Community Scholars Program participants between January 2009 and June 2009. For each Phase, Steps, Green Jobs, and Outcomes are distinguished as follows:



- Steps



- Green Jobs



- Outcome

Phase 1: Building Selection



1) Assemble List of City-owned Buildings.



Green Jobs: General Services Department

The City should focus on City-owned properties - buildings or facilities - that are over 7,500 square feet and built before 1978. The City’s General Services Department (GSD) has a list 4,459 City-owned properties. The City should eliminate from this list properties with no buildings or with buildings that are less than 7,500 square feet and constructed after 1978.



This should reduce the number of listings to about 1,985 properties.



2) Utilize Building Prioritization Tool to prioritize buildings by poverty, unemployment and public use.



Green Jobs: General Services Department

Using the Building Prioritization Tool, prioritize the list of 1,985 properties based on three characteristics identified in the Ordinance: 1) area poverty rate, 2) area unemployment rate, and 3) public use.

Poverty & Unemployment Index

First, generate an index based on poverty and unemployment data. To do this, determine which of the 1, 985 City-owned buildings and facilities are located in Census tracts with high poverty and unemployment levels using Census data.

High poverty is defined as a rate of poverty greater than the median poverty rate in the City of Los Angeles. To determine the median poverty rate and the poverty rate for each census tract in the City of Los Angeles, use data from the 2000 Census (the latest available).

Median Poverty Rate = 19.1 percent

Those census tracts that exhibit poverty rates greater than 19.1 percent are considered “high poverty.”

Unemployment is defined as a rate of unemployment higher than the Los Angeles County average (available from the California Employment Development Department (EDD)). The City can use 2000 Census tract level unemployment data. While unemployment rates are considerably higher today than in 2000, the assumption is that the distribution of unemployment is similar.

Average Unemployment Rate = 5.4 percent

Those census tracts with unemployment rates greater than 5.4 percent are considered “high unemployment areas.”

An index can then be created by combining census tract data with poverty and unemployment data. The index can be calculated for each census tract by dividing the poverty rate by the median poverty rate (19.1 percent) and unemployment rate by the average unemployment rate (5.4 percent) and taking the average of the two resulting numbers. Using this combined index of poverty and unemployment rates, tracts should be classified as having *no priority*, *low priority*, *medium priority* or *high priority* based on their deviation from the mean index score. Buildings in high priority census tracts should receive a score of three, medium priority a score of two, low priority a score of one and no priority a score of zero.



Buildings are designated as high, medium, low, or no priority based on poverty and

unemployment data. The map below, generated using this type of index, depicts South Los Angeles areas of high poverty and unemployment in dark green. City buildings are overlaid on the map, with public use buildings designated by a star.

Public Use Buildings

After generating the poverty and unemployment index, prioritize public use buildings. One way to determine whether or not a building serves the public is to determine which City department oversees it. Community Development Department Facilities, Cultural Facilities, Libraries, Police Facilities and Recreation and Parks Facilities should be considered public use buildings (although it should be noted that some buildings within these departments may not be used by the public). Using this specification, 1,491 of the 1,985 City-owned properties would be considered public use buildings. These buildings would be assigned a score of one, which, along with the poverty and unemployment index, can be used within the Building Prioritization Tool pictured below.

Poverty & Unemployment Rate Index – Close-up of South Los Angeles



Building Prioritization Tool


Using the Building Prioritization tool, identify high priority buildings that meet the criteria for the Ordinance. Input Poverty and Unemployment Index scores and Public Use Scores into the Tool. The Tool will total up all the scores for each building. Those buildings with the highest scores will be the highest priority buildings to be retrofitted.


Building Prioritization Tool with Examples of Building Scoring

Building Name	Size (Square Feet)	Year Built	Public Use	Poverty + Unemployment Index*	Total Score
Central Library	538,802	Unknown	1	3	4
Vernon Branch Library	10,631	1975	1	2	3
Fire Station #14 Woodland Hills	11,188	1950	0	2	2
Recreation Center DOT Parking	91,367	Unknown	1	0	1
Enforcement Office	Unknown	Unknown	0	0	0


*High Priority = 3, Medium Priority = 2, Low Priority = 1, No Priority = 0

Note: This building selection tool can be expanded to incorporate additional information to further prioritize specific buildings for green retrofits.

 **3) Identify and prioritize buildings that pose health and safety risks by working with the General Services Department and the Coalition of LA City Unions to solicit input from workers, stewards and Health and Safety Committee members**

 **Green Jobs: General Services Department; Upgraded skills training for Health and Safety Committee members and stewards across departments**

Work with the Coalition of LA City Unions to train Health and Safety Committee members about the Green Retrofit Ordinance and to solicit their input and the input of workers and stewards to identify and prioritize those buildings that pose health and safety risks.

 **The final outcome is a Priority Building List that includes City-owned buildings eligible for green retrofits prioritized based on socio-economic criteria, public use, and health and safety indicators as specified in the Ordinance.**

Phase 2: Comprehensive Building Audits & Energy, Water, and Retrocommissioning Retrofits



1) Obtain an ENERGY STAR Rating across the entire portfolio of buildings on the Priority Building List (list generated during Phase One: Building Selection). Use these ratings to further prioritize buildings for retrofitting.



Green Jobs: General Services Department

ENERGY STAR Benchmarking

The first step is to obtain an ENERGY STAR rating to show a building's energy consumption in relation to other buildings and use the score to further prioritize buildings for retrofitting. ENERGY STAR is an EPA rating system to track and improve energy efficiency across a portfolio of buildings by collecting benchmarking data for key metrics such as energy intensity and costs, water use, and carbon emissions.

Ratings can be obtained online through the **Portfolio Manger** system (www.energystar.gov/istar/pmpam). To use this rating tool, input utilities data – electricity, gas, and water - for at least the past 12 months (and ideally three years) as well as the building's square footage, year built, and hours of use. Most of the data can be gathered across the portfolio of City buildings and does not require a walk-through audit.

Once the data has been entered into the Portfolio Manager system, the building will receive an **ENERGY STAR rating** between 1 and 100. A rating of 50 indicates energy performance is average compared to similar buildings. A building that receives a rating of 75 or higher is considered a top performer (in terms of energy use) and may be eligible for ENERGY STAR certification. ENERGY STAR ratings can be used to further prioritize City-owned buildings for retrofits. To do this, record the ENERGY STAR ratings for each City-owned building into a spreadsheet and sort the spreadsheet according to the ratings. Buildings with the lowest ratings are the most energy inefficient and are the highest priority for retrofits. These ratings, as well as the systems deferred maintenance schedule, can be added to the Building Prioritization Tool (used in Phase One).



This will rank the buildings on the Priority Building List (generated from Phase One) according to their energy performance.

In addition to the rating, the Energy Star Portfolio Manager tool will calculate the potential costs savings for a building that achieves the 75 or higher rating required for ENERGY STAR certification. **We recommend that the City set the goal of achieving ENERGY STAR certification for all city-owned buildings targeted for retrofits.**



2) Conduct a Comprehensive Building Audit that simultaneously gathers data on energy and water components and retrocommissioning. Compile findings into a report with recommendations for retrofits related to energy efficiency, water conservation, renewable energy, and fine-tuning of mechanical systems. Include information about potential hazards of retrofit work to ensure plans are made to protect workers and building occupants.



Green Jobs: General Services Department, Bureau of Engineering, Energy Auditor, Retrocommissioning Agent, Building Engineer, Building Operations and Maintenance Staff



This step will provide recommendations for energy efficiency, water conservation, and renewable energy measures and demonstrate how systems' calibration can make a building perform better. The focus of this process is on some of the 13 elements outlined in the attached Ordinance that have been found to produce jobs, generate cost savings, and reduce greenhouse gas emissions.

Best practices for 'green retrofit' audits usually only involve a focus on energy consumption elements. During our research, we recognized that several other building elements with retrofit potential for emission reductions, cost-savings, and job creation can be bundled into this phase to create a *Comprehensive Building Audit*. **We recommend additionally**

List of 13 Elements from Ordinance included in this Phase:

1. Water efficient landscaping and irrigation
2. HVAC systems
3. Mechanical systems
4. Water conservation systems
5. Refrigeration systems
6. Retrofitting lighting and electrical systems
7. Retrofitting all energy consuming elements
8. Improving indoor air quality
9. Sustainable carpet
10. Sustainable maintenance
11. Titanium dioxide (TiO2) windows treatments
12. Solar, geothermal and other renewable energy systems
13. Cool roofs

including:

- **water components in the audit to capture water conservation opportunities that benefit our region and save energy;**
- **an analysis of renewable energy systems suitable for the building;**
- **data gathering on mechanical systems needed for Retrocommissioning; and**
- **data gathering related to deferred maintenance needs and health and safety risks within the building (such as the presence of asbestos-containing material).**

Conducting a Comprehensive Building Audit requires a site visit to document current conditions by collecting data on water efficient landscaping and irrigation, HVAC systems, mechanical systems, water conservation systems, refrigeration systems, and lighting and electrical systems; interviewing building staff and users to note any health and safety risks; and recording deferred maintenance needs. Before finishing the audit process, replace systems and equipment that are at the end of their life cycle.

Data gathering for Retrocommissioning typically involves an audit of the entire building, including a study of past utility bills and interviews with facility personnel to determine. Much of this data gathering overlaps with traditional energy audits and thus can be bundled into a Comprehensive Building Audit.

In addition, Retrocommissioning requires scientific testing of building systems through diagnostic monitoring and functional tests. Building systems are retested and remonitored to fine tune improvements. This process helps find and repair operational problems. Retrocommissioning identifies opportunities for technology upgrades of many systems outlined in the Ordinance that have the potential to create jobs. This process also provides a cost and payback analysis related to mechanical fine-tuning.

Retrocommissioning

Retrocommissioning is a process that looks at how and why a building is performing in a certain manner; it identifies ways to improve the building's performance and efficiency by calibrating systems. It involves collecting building data and testing systems to understand where improvements can be made and systems can be adjusted to work better.

BENEFITS of Retrocommissioning:

The retrocommissioning process provides a staff training opportunity, produces cost savings, earns LEED-EBOM points, and complements energy and water retrofit measures.

Retrocommissioning can engage and train staff. Involving building and maintenance staff in the data collection and documentation process is critical to understanding how and why systems may not be running as efficiently as possible. Engaging staff in this part of the process can reduce the costs of hiring a technical expert and lays the foundation for staff to conduct ongoing maintenance and to track data to ensure that systems continue to run efficiently after the initial retrofit process.

Retrocommissioning reduces operating costs through low-cost investments with high rates of return. A 2004 study by Lawrence Berkeley National Laboratory aggregated the following savings and paybacks from 100 buildings:

- Value of energy savings: \$0.11 to \$0.72/SF
- Value of non-energy savings: \$0.10 to \$0.45/SF
- Energy Savings: 5 to 15%
- Gas Savings: 1 to 23%
- Payback times: 0.2 to 2 months



3) Using the Green Retrofit Matrix Tool, create a work plan for all energy efficiency, water conservation, renewable energy, and systems calibration retrofits based on their potential for cost savings, job creation, greenhouse gas reduction, and health and safety criteria.



Green Jobs: General Services Department, Advisory Council, Interdepartmental Taskforce, Bureau of Engineering, LEED AP

The recommended retrofits from the Comprehensive Building Audit process are prioritized based on their potential for cost savings and energy efficiency. Yet, these retrofits may also produce different but equally important benefits such as job creation and improved health and safety. In order to address this challenge, we created the “Green Retrofit Matrix Tool” to discern the relative benefits of each retrofit element in the categories of cost savings, job creation, greenhouse gas reduction, and worker health and safety. These indicators help translate how technical retrofit components, outlined in the audit recommendations (from the previous step) relate to the larger sustainability goals of the Ordinance.

We recommend using the Green Retrofit Matrix Tool to:

- 1) Translate the Energy and Water Audit and Retrocommissioning findings and recommendations into a larger context of multiple goals;**
- 2) Prioritize potential retrofits identified during the LEED-EBOM Gap Analysis (described in Phase Three below); and**
- 3) Help make balanced decisions that weigh cost savings and energy efficiency against job creation, greenhouse gas reduction, and health and safety benefits.**

The recommended retrofit elements can be compared in terms of GHG reduction, cost savings, job creation, and worker health and safety benefits.



Once the multiple goals of the Ordinance are weighed using the Matrix, the Advisory Council, Interdepartmental Taskforce, and General Services Department can decide on a work plan for retrofit implementation. The Program Director and staff will need to choose among the retrofit elements according to the individual building conditions. The work plan should include urgent health and safety repairs. In addition, the planned retrofits should enable buildings to achieve ENERGY STAR ratings of 75 or higher. Consultation with a LEED Accredited Professional (LEED AP) during this phase can ensure that each retrofit also qualifies for points in the LEED-EBOM framework.

Green Retrofit Matrix Tool

	Possible Retrofit Elements	Economic		Environment	Health	Total Symbols	Associated LEED Credits
		Potential Payback	Potential Job Creation	Potential GHG emissions reduction	Potential for occupant health and safety		
Energy Efficiency	Upgrade to energy efficient appliances	\$\$\$				8	Required: EA PR 1 Minimum Energy Efficiency Performance 1-18 points: EA Credit 1 Optimize Energy Performance
	EE Lighting	\$\$\$				10	Required: EA PR 1 Minimum Energy Efficiency Performance 1-18 points: EA Credit 1 Optimize Energy Performance
	Lighting sensors	\$\$				7	Required: EA PR 1 Minimum Energy Efficiency Performance 1-18 points: EA Credit 1 Optimize Energy Performance 1 point: IEQ Credit 2.1 Occupant Comfort - Occupant Survey
	HVAC system upgrades	\$\$\$				12	Required: EA PR 1 Minimum Energy Efficiency Performance 1-18 points: EA Credit 1 Optimize Energy Performance 1 point: IEQ Credit 1.3 IAQ Best Management Practices Increased Ventilation
	Cool Roofs	\$\$\$				10	1 point: SS Credit 7.2 Heat Island Reduction-Roof Required: EA PR 1 Minimum Energy Efficiency Performance 1-18 points: EA Credit 1 Optimize Energy Performance
	Refrigeration Systems	\$\$\$				10	1 point: EA Credit 5 Enhanced Refrigeration Management Required: EA PR 2 Minimum Energy Efficiency Performance 1-18 points: EA Credit 1 Optimize Energy Performance
	Weatherization Window Replacement	\$\$\$				12	1 point: IEQ 2.1 Occupant Comfort Survey 1 points: IEQ 2.4 Daylight and Views
	Weatherization Window Tinting	\$\$\$				9	Required: EA PR 2 Minimum Energy Efficiency Performance 1-18 points: EA Credit 1 Optimize Energy Performance 1 point: IEQ Credit 2.1 Occupant Comfort Controlled Lighting 1 point: IEQ Credit 2.4 Daylight and Views
	Weatherization Insulation (walls & hot water heater)	\$\$\$				9	Required: EA PR 1 Minimum Energy Efficiency Performance 1-18 points: EA Credit 1 Optimize Energy Performance
	Weatherization Caulking	\$\$\$				8	Required: EA PR 1 Minimum Energy Efficiency Performance 1-18 points: EA Credit 1 Optimize Energy Performance
Renewable Energy	Micro turbines	\$\$\$				10	1-6 points: EA Credit 4 Renewable Energy
	Solar panels	\$\$\$				10	1-6 points: EA Credit 4 Renewable Energy
	Solar thermal hot water	\$\$\$				10	Required: EA PR 1 Minimum Energy Efficiency Performance 1-18 points: EA Credit 1 Optimize Energy Performance 1-6 points: EA Credit 4 Renewable Energy
Measurement and Monitoring	Automated building systems	\$\$				7	1 point: EA Credit 3.1 Performance Monitoring- Building Automation System
	System-level metering/sub metering	\$\$				8	1-2 points: WE Credit 1.1-1.2 Water Performance Measuring 1-3 points: EA Credit 3.1-3.2 Performance Measurement
	Demand Management Software	\$\$				7	1 point: EA Credit 3.1 Performance Monitoring- Building Automation System

	Possible Retrofit Elements	Economic		Environment	Health	Total Symbols	Associated LEED Credits
		Potential Payback	Potential Job Creation	Potential GHG emissions reduction	Potential for occupant health and safety		
Water Conservation	Water sensors	\$ \$				6	1-2 points: WE Credit 2.1-2.2 Addition Indoor Plumbing Fixture and Fitting Efficiency
	Efficient toilet/urinals	\$ \$ \$				8	1-2 points: WE Credit 2.1-2.2 Addition Indoor Plumbing Fixture and Fitting Efficiency
	Water Efficient Landscaping/Irrigation	\$ \$ \$				8	1-5 points: WE Credit 3 Water Efficient Landscaping
	Grey Water Recycling	\$ \$ \$				10	1-5 points: WE Credit 3 Water Efficient Landscaping 1 point: WE Credit 4.2 Non-Potable Water Source Use
	Natural Filtration Systems	\$ \$				8	1-5 points: WE Credit 3 Water Efficient Landscaping
	Rainwater Catchments	\$ \$				8	1-5 points: WE Credit 3 Water Efficient Landscaping
	Water Conservation Systems	\$ \$ \$				9	1-2 points: WE Credit 1 Water Performance Measurement
Indoor Environ. Quality	Green Cleaning/Sustainable Maintenance	\$				7	1-6 points: IEQ PR 3, IAQ Credits 3.1-3.6 Green Cleaning
	Low-VOC Paints	\$				6	1 point: MR Credit 1 Sustainable Purchasing - Ongoing Consumables
	Daylight Modeling	\$ \$				9	1 point: IEQ Credit 2.4 Daylight and Views
	Indoor Air Quality Monitoring Systems	\$				7	Required: IEQ PR 1; 1-5 points: IEQ Credits 1.1-1.5 Indoor Air Quality Best Management Practices
	Thermal Controls	\$ \$				9	1 point: IEQ Credit 2.3 Occupant Comfort- Thermal Comfort Monitoring. 1-18 points: EA Credit 1 Optimize Energy Performance
	Lighting Controls	\$ \$				7	Required: EA PR 1 Minimum Energy Efficiency Performance 1-18 points: EA Credit 1 Optimize Energy Performance 1 point: IEQ Credit 2.1 Controllability of Systems - Lighting
	Sustainable Carpet	\$				7	Assoc IEQ credits

3 symbols = direct potential, 2 symbols = indirect potential, 1 symbol = no or very little

WE: Water Efficiency, EA:Energy and Atmosphere, SS: Sustainable Site, IEQ: Indoor Environmental Quality

Sources: LEED for Existing Buildings: Operation and Maintenance Reference Guide, USGBC, September 2008; LEED 2009 for Existing Buildings Check



4) Implement energy efficiency, water conservation, renewable energy generation, and mechanical system retrofits.



Green Jobs: General Services Department, Bureau of Engineering, Retrocommissioning Agent, Building Engineer, LEED AP, Building and Construction Trades: Electricians, Sheet Metal Workers, Plumbers, Painters, Roofers, Laborers, Operating Mechanics, Insulators

Once the work plan (from step three) has been laid out, retrofit implementation can begin. Energy efficiency, water conservation, renewable energy generation, and mechanical system retrofits create numerous jobs because they tend to require the most labor (compared to other building retrofits). Retrofit work will be done by various workers including existing City maintenance workers as well as newly recruited apprentices and other building trades workers. General Services Department and the Bureau of Engineering will manage the work plan and contracts. A Retrocommissioning Agent should take part in this process and conduct training with building operations and maintenance staff.



These retrofits will boost job creation, reduce greenhouse gas emissions, and lessen water usage. A LEED AP should also be involved to ensure that each retrofit has a chance to contribute to LEED credits. **We recommend starting the work and then moving onto the LEED-EBOM Gap Analysis described in Phase Three.**

Phase 3: Additional Retrofits and Policy Changes to Achieve LEED-EBOM Silver Certification



1) Complete the LEED-EBOM Gap Analysis using a LEED checklist. Formulate initial recommendations for achieving Silver Certification. This must be done building-by-building.



Green Jobs: General Services Department, LEED AP

LEED-EBOM Gap Analysis

The purpose of a **LEED-EBOM Gap Analysis** is to document possible LEED-EBOM points to inform the certification process. Points can be earned in five main credit categories: sustainable sites,

energy efficiency, water conservation, renewable materials and reuse, and indoor environmental quality. There is also an additional category for Innovation in Design for building design elements not included under the five other categories.

A LEED-EBOM Gap Analysis is an audit conducted by a LEED AP to assess how close a building is to achieving LEED certification. The LEED AP evaluates a building based on a LEED-EBOM checklist (attached in Appendix D) and determines the likelihood and opportunity for certification. A LEED-EBOM checklist is an inventory of all possible points under each of the five credit categories. **We recommend that all city-owned buildings achieve LEED Silver Certification.** LEED-EBOM Silver Certification requires a score of 50 out of 100 possible points.



A LEED-EBOM Gap Analysis will help determine what retrofit elements would be needed to achieve this level of compliance with LEED standards.

Steps conducted during Phase Two will contribute toward and increase the potential for LEED certification; the LEED gap analysis additionally incorporates criteria that retrofitting and energy audits do not address. It does not, however, address job creation because LEED-EBOM is designed to capture no-cost and low-cost measures first. We do not recommend using the LEED framework without implementing Phase Two.

	PROS	CONS
COMPREHENSIVE BUILDING AUDIT: ENERGY, WATER, & RETROCOMMISSIONING	<ul style="list-style-type: none"> Cost-savings GHG reductions Potential to create jobs and green career pathways Generates preliminary set of recommendations 	<ul style="list-style-type: none"> Not as comprehensive as LEED framework No institutionalized best practices in industry
LEED GAP ANALYSIS	<ul style="list-style-type: none"> Comprehensive framework Standards for implementation 	<ul style="list-style-type: none"> Can achieve certification with little to no job creation Not all credits generate cost savings

A LEED Accredited Professional (AP) can help guide the process to analyze gaps and plan retrofits for LEED certification.

- i. LEED AP meets with building staff to walk through each credit and determine feasibility for the building to obtain points.
- ii. Count up number of points achieved from energy and water conservation retrofits (from Phase 2). The Energy and Water Audit and Retrocommissioning process can achieve LEED-EBOM credits in Energy and Atmosphere, Indoor Environmental Air Quality, and Water Conservation.
- iii. **Total the points on the LEED-EBOM checklist to see how close the building is to achieving LEED-EBOM Silver Certification.** To do this, select yes, no, or maybe for each LEED-EBOM credit and total the points to determine the “gap” between the current systems and policies and LEED-EBOM Silver certification.

LEED and ENERGY STAR

In addition to the stand alone benefits of achieving the ENERGY STAR rating, the LEED-EBOM framework also gives points for achieving the ENERGY STAR rating. LEED-EBOM requires an ENERGY STAR rating of 69, however it provides up to 18 points ranging from one point for an ENERGY STAR rating of 71 to 18 points for an ENERGY STAR rating of 95+.



2) Use the Green Retrofit Matrix Tool to create a work plan for achieving points needed for LEED-EBOM Silver certification.



Green Jobs: General Services Department, LEED AP, Bureau of Engineering, Building Operations and Maintenance Staff

The Green Retrofit Matrix Tool can be used to evaluate LEED-related retrofits and policy changes in terms of cost-saving, GHG reductions, job creation, and health and safety indicators. Retrofits and policies can then be prioritized according to the relative benefits they produce in these four categories. Because a majority of the LEED points can be achieved through portfolio-wide policy changes, it is important to implement LEED in a way that not only makes a building green, but also creates jobs, improves health and safety conditions, and generates other benefits.



The Advisory Council, Interdepartmental Taskforce, and General Services Department should meet together to decide on a work plan for achieving LEED-EBOM Silver certification.



3) Implement retrofits and policy changes to achieve LEED-EBOM Silver certification.



Green Jobs: General Services Department, LEED AP, Building and Construction Trades: Electricians, Sheet Metal Workers, Plumbers, Painters, Roofers, Laborers, Operating Mechanics, Insulators, Janitorial Staff, Building Operations and Maintenance Staff

Implementation requires the installation and repair of equipment and materials and new operations and maintenance policies. This work will be conducted by existing City Maintenance and Building Trades Staff as well as other building trades' workers. Certain LEED-EBOM points are policy-based and can be achieved across the whole building portfolio for little cost.

Secondly, implementation requires monitoring and evaluating performance as part of achieving LEED certification. A LEED AP should oversee the LEED certification process. This person could delegate oversight for the different LEED credits to team members. He or she would submit credit templates for review and certification once work is complete. Additionally, a Joint Labor-Management Safety Committee should monitor work conditions and track injuries, illnesses, and health benefits of retrofit work (described in detail in Appendix F).



The final outcome is LEED-EBOM Silver certification for all buildings targeted in the Ordinance.



LEED 2009 for Existing Buildings: Operations & Maintenance

Project Name

Project Checklist

Date

Sustainable Sites Possible Points: 26

Y	N	?			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1	LEED Certified Design and Construction	4
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2	Building Exterior and Hardscape Management Plan	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3	Integrated Pest Mgmt, Erosion Control, and Landscape Mgmt Plan	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4	Alternative Commuting Transportation	3 to 15
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 5	Site Development—Protect or Restore Open Habitat	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 6	Stormwater Quantity Control	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 7.1	Heat Island Reduction—Non-Roof	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 7.2	Heat Island Reduction—Roof	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 8	Light Pollution Reduction	1

Water Efficiency Possible Points: 14

Y	N	?			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 1	Minimum Indoor Plumbing Fixture and Fitting Efficiency	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1	Water Performance Measurement	1 to 2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1	Additional Indoor Plumbing Fixture and Fitting Efficiency	1 to 5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1	Water Efficient Landscaping	1 to 5
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1	Cooling Tower Water Management—Chemical Management	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1	Cooling Tower Water Management—Non-Potable Water Source Use	1

Energy and Atmosphere Possible Points: 35

Y	N	?			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 1	Energy Efficiency Best Management Practices	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 2	Minimum Energy Efficiency Performance	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 3	Fundamental Refrigerant Management	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1	Optimize Energy Efficiency Performance	1 to 18
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.1	Existing Building Commissioning—Investigation and Analysis	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.2	Existing Building Commissioning—Implementation	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.3	Existing Building Commissioning—Ongoing Commissioning	2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.1	Performance Measurement—Building Automation System	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.2	Performance Measurement—System-Level Metering	1 to 2
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4	On-site and Off-site Renewable Energy	1 to 6
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 5	Enhanced Refrigerant Management	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 6	Emissions Reduction Reporting	1

Materials and Resources Possible Points: 10

Y	N	?			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 1	Sustainable Purchasing Policy	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 2	Solid Waste Management Policy	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1	Sustainable Purchasing—Ongoing Consumables	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.1	Sustainable Purchasing—Electric	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.2	Sustainable Purchasing—Furniture	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3	Sustainable Purchasing—Facility Alterations and Additions	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 4	Sustainable Purchasing—Reduced Mercury in Lamps	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 5	Sustainable Purchasing—Food	1

Materials and Resources, Continued

Y	N	?			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 6	Solid Waste Management—Waste Stream Audit	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 7	Solid Waste Management—Ongoing Consumables	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 8	Solid Waste Management—Durable Goods	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 9	Solid Waste Management—Facility Alterations and Additions	1

Indoor Environmental Quality Possible Points: 15

Y	N	?			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 1	Minimum IAQ Performance	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 2	Environmental Tobacco Smoke (ETS) Control	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Prereq 3	Green Cleaning Policy	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.1	IAQ Best Mgmt Practices—IAQ Management Program	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.2	IAQ Best Mgmt Practices—Outdoor Air	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.3	IAQ Best Mgmt Practices—Increased Ventilation	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.4	IAQ Best Mgmt Practices—Reduce Particulates in Air Distribution	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.5	IAQ Mgmt Plan—IAQ Mgmt for Facility Alterations and Additions	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.1	Occupant Comfort—Occupant Survey	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.2	Controllability of Systems—Lighting	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.3	Occupant Comfort—Thermal Comfort Monitoring	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2.4	Daylight and Views	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.1	Green Cleaning—High Performance Cleaning Program	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.2	Green Cleaning—Custodial Effectiveness Assessment	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.3	Green Cleaning—Sustainable Cleaning Products, Materials Purchases	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.4	Green Cleaning—Sustainable Cleaning Equipment	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.5	Green Cleaning—Indoor Chemical and Pollutant Source Control	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3.6	Green Cleaning—Indoor Integrated Pest Management	1

Innovation in Operations Possible Points: 6

Y	N	?			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.1	Innovation in Operations: Specific Title	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.2	Innovation in Operations: Specific Title	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.3	Innovation in Operations: Specific Title	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.4	Innovation in Operations: Specific Title	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 2	LEED Accredited Professional	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 3	Documenting Sustainable Building Cost Impacts	1

Regional Priority Credits Possible Points: 4

Y	N	?			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.1	Regional Priority: Specific Credit	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.2	Regional Priority: Specific Credit	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.3	Regional Priority: Specific Credit	1
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Credit 1.4	Regional Priority: Specific Credit	1

Total Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

2009 UCLA COMMUNITY SCHOLARS REPORT
GREEN BUILDINGS, GOOD JOBS, SAFE JOBS:
SOCIAL JUSTICE PATHWAYS TO A SUSTAINABLE LA

Appendix E: Landscape of Workforce Development Programs

Information in this appendix provides additional details to that presented in the Chapter “Worker and Community Engagement: Section 2. Workforce Development” of the Community Scholars report at <http://www.losh.ucla.edu/projects/pdf/green-jobs-report.pdf>. This landscape chart is organized by A. Publicly Funded Workforce Development Programs, B. Union Apprenticeship Programs, and C. Nonprofit Workforce Development Programs. The information is based on interviews conducted by Community Scholars Program participants between January 2009 and March 2009.

A. Publicly Funded Workforce Development Programs

Program Overview (Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<p>WorkSource Centers:</p> <ul style="list-style-type: none"> • Job Training, Work Readiness, Business Services, Recruitment for Employers, Host Job Fairs and Hiring Events, Case Management, Supportive Services, Linkages to vocational training and higher education. • Funded by federal Workforce Investment Act formula dollars through DOL and State of California to various Workforce Investment Areas (including LA City) 	<ul style="list-style-type: none"> • Age 18 and older • No previous experience required 	<ul style="list-style-type: none"> • Walk-ins, job seekers, businesses, employed and unemployed, persons with disabilities 	<ul style="list-style-type: none"> • Partners with Department of Public and Social Services, Job Corps, Department of Rehabilitation, Economic Development Department, a Title V provider (mature worker program Department of Aging), Veterans, American Indian Involvement, Migrant Worker Programs, School Districts, Community College Districts, training institutions • WorkSource center staff recruits and does its own marketing for its services and the services that it hosts for employers, recruitment, job fairs, training, etc. 	<p>No specific linkage to green jobs</p>

Program Overview (Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<p>OneSource Centers:</p> <ul style="list-style-type: none"> • Job Training, Work Readiness, Case Management, Supportive Services, Leadership Development, work experience opportunities, linkages to vocational training and higher education. • Also funded by federal WIA dollars as described above 	<ul style="list-style-type: none"> • Ages 14-21 • Must meet eligibility requirements 	<ul style="list-style-type: none"> • Youth ages 14-21, who meet eligibility requirements and have barriers to employment or education. 	<ul style="list-style-type: none"> • Linkages include local adult schools, alternative education, trade schools, WorkSource Centers. • Recruitment and enrollment are all done by program staff for a prescribed amount of youth per program year. 	<p>No specific linkage to green jobs or building</p>
<p>Los Angeles Unified School District WeBuild Program</p> <ul style="list-style-type: none"> • Construction trades pre-apprenticeship program • Funding?? 	<ul style="list-style-type: none"> • Driver's license • Social Security Card • 18 years and older • Reside within the LAUSD service area 	<ul style="list-style-type: none"> • Adults that want to enter a construction trades union 	<ul style="list-style-type: none"> • Recruitments include outreach to local WorkSource and OneSource centers. Walk-ins are welcome and participants are often referred internally from other classes for GED, trades, etc. 	<p>Yes- program includes certified advanced training</p>
<p>Infrastructure Academy</p> <ul style="list-style-type: none"> • LA Trade Technical College (LATTCC) partnership with DWP • Prepares high school aged youth for jobs in civil infrastructure industry through a pilot training program. • Funding -Department of Water and Power 	<ul style="list-style-type: none"> • Students attending Jefferson & Manual Arts High Schools, LA Center for enriched studies, Santee Educational Complex 	<ul style="list-style-type: none"> • LA City Youth • Higher percentage of women than currently in the industry 	<ul style="list-style-type: none"> • LAUSD, Labor Unions, Utility Companies, Economic Development Collaborative Networks 	<p>Yes- linked to LA City's green jobs initiative</p>
<p>SEIU Local 721 & City Jobs:</p> <ul style="list-style-type: none"> • Workers will be hired as vocational workers with the city of Los Angeles, with the assistance of City Jobs, and will work with crews on the retrofit projects. While working on the projects they will be preparing to get into union apprenticeship programs, by taking courses to help fulfill the 	<ul style="list-style-type: none"> • Valid driver's license • Legally allowed to work in US • Clean record (no serious crimes) 	<ul style="list-style-type: none"> • Will be targeting lowest income areas in Los Angeles, specifically south and east LA. • People who come into WorkSource centers that need 	<ul style="list-style-type: none"> • Recruit vocational workers from the 17 different publicly funded WorkSource centers in Los Angeles • Will send out notices about the vocational program through different outlets (including their union networks) and through word of mouth. • City staff will also be assigned to help 	

Program Overview (Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<p>apprenticeship requirements.</p> <ul style="list-style-type: none"> Will train individuals in vocational programs in order to fulfill entrance requirements of the union apprenticeship programs. City Jobs will need to coordinate with the unions to go over the different entrance requirements. <p>PROSPECTIVE FUNDING:</p> <ul style="list-style-type: none"> WIA funding (however is limited and can be only used for pre-apprenticeship programs) Federal/state grants, private financing. City Jobs & City of Los Angeles need funding to cover salaries and cost of construction jobs. Cannot use WIA funds for this. 		<p>to start working right away</p> <ul style="list-style-type: none"> Unskilled workers In the past the program served to help people who were transitioning off public assistance (often times single mothers with few job skills and limited education) 	<p>applicants navigate the job application system.</p> <ul style="list-style-type: none"> City Jobs is institutionalized as an MOU (memorandum of understanding) between the union and the City. For each project, the unions and the city will need to coordinate how many vocational workers, apprentice workers, and journey persons will be required for each project. 	
<p>LOS ANGELES COUNTY HEALTHCARE WORKFORCE DEVELOPMENT PROGRAM</p> <ul style="list-style-type: none"> Supports lower wage county workers in the healthcare system (including clerks, nurse attendants, parking attendants, laundry workers, etc.) to move into a career ladder trajectory Served 9,500 students in an 8 year period Intensive hands-on mentoring, counseling and coaching throughout entire program Life skills and basic academic preparatory work is contextualized 	<ul style="list-style-type: none"> Requires legal work documentation and high school diploma to be considered 	<ul style="list-style-type: none"> Participants are mostly middle aged women in their forties; one third are Latina, under one third are African American, and about twenty five percent are Asian/Asian American Emphasis on people who need the most support, NOT “the cream of the crop.” 	<ul style="list-style-type: none"> Program operates as a labor-management partnership 	

Program Overview (Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<p>for healthcare/workplace</p> <ul style="list-style-type: none"> • Emphasize group work and peer-to-peer mentorship • Powerful partnership between employer and union, including joint leveraging of funds for program • Clearly defined career ladder and/or path trajectory where participants can meet set goals and advance to the next level of the program until placement and promotion is achieved. HCWDP participates in every step of the advancement process • The program is extremely time intensive and requires “students to re-arrange their lives” in a significant way. This can lead to family and marital problems for women with children. 		<p>Not concerned with finding “easy” students, but focus on those with least skills</p> <ul style="list-style-type: none"> • Retention: about 100 out of every 1,000 students follow through on entire ladder program 		

B. Union Apprenticeship Programs

Program Overview (Including Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<p>IBEW:</p> <ul style="list-style-type: none"> • Electrical Training Institute • 5 year program including 8000 hours of on-the-job training and attending classes 2 nights a week for 3 hours for 10 semesters. • Three tracks within the apprenticeship program: <ul style="list-style-type: none"> ○ Inside wireman program ○ Intelligent traffic system program ○ Voice data (sound) program • Each apprentice costs \$20,000 per year (\$100,000 total) <p>Funded by membership and employer contributions and EAP funding</p>	<ul style="list-style-type: none"> • Age 18 or older • High school graduate or GED • One year of high school algebra or a semester of college algebra • Qualifying on aptitude test • Drug free 	<ul style="list-style-type: none"> • 1500 apprentices • Ages 18 to late 40s 	<p>They do educational outreach and training on their apprenticeship program and how to apply, and provide help to prepare for the aptitude test and to fulfill the algebra requirement. They recruit through:</p> <ul style="list-style-type: none"> • The 7 LA area Workforce Investment Boards • High Schools • faith based organizations, • The LA Community Redevelopment Agency • Veteran's programs 	<p>Yes</p> <ul style="list-style-type: none"> • Solar installation training • Building refurbishment and water treatment.

Program Overview (Including Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<p>Bricklayers & Pointer-Cleaner-Caulkers</p> <ul style="list-style-type: none"> • Bricklayers: build walls, chimneys and other structures from masonry units • 6000 hours on-the-job for eight periods • Pointer-Cleaner-Caulker (PCC): patches weathered masonry, replaces old mortar and does caulking, waterproofing and cleaning of both new and old masonry • 4500 hours for 6 periods (there is also classroom training for both programs) 	<ul style="list-style-type: none"> • 18 years or older • High school diploma or GED • For Bricklayers: able to lift 50+ pounds • For PCC, able to work on swing staging many stories high • Attend school two Saturdays per month. 	<ul style="list-style-type: none"> • Ages 18 and up 	<ul style="list-style-type: none"> • Outreach to high school and college students • Contractors often refer family members such as a son or cousin to the program. • The prison system 	
<p>PIPE</p> <ul style="list-style-type: none"> • Plumbers and pipe fitters • 5 year program includes classroom instruction and paid on-the-job training 	<ul style="list-style-type: none"> • High school diploma or GED • Birth certificate • Driver's license 	<ul style="list-style-type: none"> • Ages 18 and up 		
<p>Painters and Allied Trades Union</p> <ul style="list-style-type: none"> • Covers 4 trades: Glass and glazing workers, Floor coverers, Drywall Finishers, and Painters. • Most of their membership is comprised of painters. • Programs range from 3-4 years 	<ul style="list-style-type: none"> • 18 years old • All programs besides paint require a High School diploma. 	<ul style="list-style-type: none"> • Ages 18 and up • Breakdown of different types of apprentices includes: <ul style="list-style-type: none"> • 500 Painters • 300 Drywall 	<ul style="list-style-type: none"> • A lot of painters are referred by other painters. • Sometimes they help organize non-union companies and recruit from there. • Glazers are most skilled of the 4. Those recruits usually come from 	<ul style="list-style-type: none"> • They are using the same skills but using more green products. • Floor coverers use carpet companies that use recycled

Program Overview (Including Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<ul style="list-style-type: none"> Initial stage of program includes 800 on the job hours for a 6 month period and 80 hours of class time After 6 months apprentices move up to another level in the program. There are 7 levels and when apprentices move to next levels they also get a pay increase. Funded mostly through employer contribution Some money from state training funds through the Division of Apprenticeship Standards 		Finishers <ul style="list-style-type: none"> 100 Glass & Glazing 100 Floor Coverers 	personal references of contractor or members <ul style="list-style-type: none"> Attend career fairs at high schools & colleges Job Corps program which is similar to a pre-apprentice program. Onestop programs, EDD – employment development department programs. When they have a new PLA with the city of LA, for example doing painting or other work on LA schools they will get new recruits. 	materials. <ul style="list-style-type: none"> Also use less toxic glues. Painters use low VOC paint
Ironworkers <ul style="list-style-type: none"> 4 year program Mix of classroom time and on the job training 	<ul style="list-style-type: none"> High school diploma or GED Valid ID Reliable transportation 	<ul style="list-style-type: none"> Ages 20s – 40s There aren't a lot of women 	<ul style="list-style-type: none"> Recruit at high schools and colleges College career fairs Adult schools Vocational schools Community outreach programs. 	

C. Nonprofit Workforce Development Programs

Program Overview (Including Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<p>Alameda Corridor Jobs Coalition</p> <ul style="list-style-type: none"> Formed in 1998 to demand local hiring and job training on the Alameda Corridor project The coalition won its demands and implemented the outreach, training, and placement on this project Outreached to approximately 10,000 local low-income people Approximately 1100 graduated from the training program, 710 were placed in jobs in the construction industry, and 637 into union apprenticeship programs Preapprenticeship program leads to apprenticeship in trade unions. Nontrades jobs were also offered. Funded by the Owner & Contractor 	<ul style="list-style-type: none"> 18 years old Valid CDL Have reliable transportation Drug free 	<ul style="list-style-type: none"> Local (certain zip codes impacted by project) low-income High percentage of African Americans, Latinos and women 	<ul style="list-style-type: none"> Organized with local and regional CBOs, ex-offenders, minority contractors to win the hiring program. Outreach done by 8 paid CBOs through RFP process. Contractor paid union initiation dues for laborers. Partnered with Carpenters union, Century Community Trg Program. Certain WSCs offered support services & case management. LB City College helped with assessment until they lost funding. The coalition also referred people to further training through Comm. Colleges. Worked with nonprofit legal services providers to reinstate CDLs and expunge criminal records 	No
<p>California Construction Academy</p> <ul style="list-style-type: none"> Provides leadership, coordination, and collaboration on workforce development, apprenticeship training programs, policy initiatives around Project Labor Agreements, green building, and health and safety issues 	None	<ul style="list-style-type: none"> Currently, they are not operating programs, but rather serving a research and policy development role 	<ul style="list-style-type: none"> Coordination between building trades unions, contractors, and local, state, and federal policymakers 	unknown

Program Overview (Including Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<ul style="list-style-type: none"> Convenes educational meetings on workforce development, disseminates research on relevant policy initiatives, and holds multi-stakeholder roundtables on local best practices throughout the state 				
<p>Century Community Training Program</p> <ul style="list-style-type: none"> Eight week non-paid pre-apprenticeship building trade construction training course Over 1,600 graduates placed in construction trades, 17% of them women Over 85% of placements are in union jobs Convenes a tradeswoman support group network Certified by the State of California Bureau of Private Postsecondary and Vocational Education Funded by State ETP funds, WIA, DOL, foundation funding, project based funds, fee for service 	<ul style="list-style-type: none"> At least 18 years of age Right to work in the U.S. Males born after 1960 must have registered with the Selective Service Valid CDL Have reliable transportation Must also pass written assessment, oral interview, and complete a research project 	<p>People transitioning from:</p> <ul style="list-style-type: none"> welfare low-income jobs incarceration, or unemployment <p>Special emphasis on women</p>	<ul style="list-style-type: none"> 85% of placements are in building trades unions Participated in the Alameda Corridor and LAX local hiring programs, collaborating with many other organizations. Referrals come from WorkSource Centers, EDD, local Prison and Community Teams (PACTs) working to help ex-offenders find jobs as they leave the prison system, parole officers and word of mouth from Century graduates. Century staff participates in job fairs and events sponsored by unions, contractors, faith and community based organizations. 	<p>Program with Santa Monica college to train solar panel installers.</p>
<p>Chrysalis (Downtown)</p> <ul style="list-style-type: none"> Case managed self-directed job search 6-12 month work experience programs through “Chrysalis Enterprises” for those who are 	<ul style="list-style-type: none"> Attend an orientation 	<ul style="list-style-type: none"> Largely homeless Over 35% have a physical or mental disability Nearly 70% have a criminal record 	<p>Unknown</p>	<p>No</p>

Program Overview (Including Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<p>not successful in self-directed job search: includes temp placements in labor or handy work or contracted street maintenance work.</p> <ul style="list-style-type: none"> Funded by foundations, private giving, special events and government 		<ul style="list-style-type: none"> 35 - 45% are ex-felons 70% have been or are in substance abuse programs Survivors of domestic violence 70% men Age range 20s-40s. Vast majority African-American 		
<p>Figueroa Corridor Community Jobs Coalition (FCCJC)</p> <ul style="list-style-type: none"> Advocated for and implemented outreach, training, and placement pursuant to LA Live (Staples) Community Benefits Agreement Job readiness assessment, access to job listings, apprenticeship opportunities, personalized employment plans, case management, work readiness, popular education training and opportunities for community activism Clients referred by FCCJC receive priority in hiring Outreached to approximately 2,500 local low-income job seekers in last year (2008-March 2009) 	<ul style="list-style-type: none"> At least 18 years old Job placement at trades and non-trades jobs: <ul style="list-style-type: none"> -Right to work in U.S. -HS Diploma -Pass Background & Drug Test -ESL level 6 Job Development & Popular Education: <ul style="list-style-type: none"> -Open to all 	<ul style="list-style-type: none"> Local (preferably living in Corridor or disadvantaged zip code) Low-income High percentage of women, Latinos and African Americans High percentage of monolingual Spanish speaking participants with and without legal documents 	<ul style="list-style-type: none"> Coalition of local and regional CBOs Strategic Actions for a Just Economy (a lead organization in the coalition) offers tenants rights clinics and opportunities for organizing around tenants rights Outreach done by 22 member CBOs Strong collaboration with South East LA WS center offers support services, preapprenticeship opportunities & case management LATTC helped with assessment and education/training until funding for project ceased. FCCJC also refers people to further training through local Comm. Colleges. 	No

Program Overview (Including Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<ul style="list-style-type: none"> • 1,200 people were placed in customer service jobs at LA Live project • Funded through private grants, private donations, and foundation grants. Apply for funding with collaborating partners 				
<p>Homeboy Industries</p> <ul style="list-style-type: none"> • Collaboration with East LA Skill Center • Two month class, weekdays • Teaches the design, construction and installation of solar panels. • Homeboy pays \$131 tuition for each student • It also pays participants an hourly wage of \$8 for class participation • Some who completed the course are already working for private solar installation firms earning about \$15 an hour; experienced installers can make upwards of \$30 an hour. • Homeboy also provides classes in G.E.D. preparation, parenting, basic finances and budgeting, and art. • Additionally, classes are offered on site that will allow clients to earn their high school diploma. • Funded by individual donations, 	<ul style="list-style-type: none"> • Drug Test 	<ul style="list-style-type: none"> • Ex-offenders • Former gang members 	<ul style="list-style-type: none"> • East Los Angeles Skills Center created an intensive course for Homeboy. • LAUSD is planning to hire graduates soon to implement their solar program. 	<ul style="list-style-type: none"> • Course trains people to be solar panel installers

Program Overview (Including Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
community groups, and earned income				
IDEPSCA <ul style="list-style-type: none"> • Established six day laborer centers throughout the city to help workers obtain fair wages and safer working conditions • Popular education model for training means materials are accessible and relevant to all participants • Emphasis on leadership development leads to increased organizational capacity and visibility of programs and resources among targeted demographic • Worker Health Program emphasizes holistic approach to wellness for workers and includes health fairs, checkups by volunteer physicians, workshops related to worker safety and reporting on-the-job injuries, sexual and gender identities, infectious disease and nutrition • In process of developing worker-owned cooperative to encourage entrepreneurship and management experience among workers, and profit-earning 	<ul style="list-style-type: none"> • No minimum requirements for participants for all IDEPSCA programs, fully accessible to all 	<ul style="list-style-type: none"> • Primarily Latino men and women working as construction laborers or domestic workers; many of these workers are either without legal work documentation, or/and are unemployed, underemployed or in need of a second or third source of income. 	<ul style="list-style-type: none"> • IDEPSCA has faced challenges building closer relationships with building trade unions, but hopes to negotiate collaborations to allow for increased placement of day laborers in union apprentice programs 	<ul style="list-style-type: none"> • Green Gardener Program

Program Overview (Including Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<p>venture to support community work of IDEPSCA</p> <ul style="list-style-type: none"> Lack of funding or inconsistent funding to expand or continue current programs Inconsistent or less defined career ladder trajectory in training with some exceptions; e.g. Green Gardener Program. 				
<p>Los Angeles Communities Advocating for Unity, Social Justice and Action (La Causa)</p> <ul style="list-style-type: none"> Runs a YouthBuild program focusing on green retrofits of homes in East LA 10 month program to earn diploma while gaining job skills, rotating weeks between class & job site Both class participation and job site time are paid Emphasis on leadership dev., community organizing, networking and social justice One year follow up; career development and job placement services Funded by US DOL, foundations, private donations, contracts for services Most program participants 	None	<ul style="list-style-type: none"> 16 -24 youth who have dropped out of high school One-third of participants are women Primarily Latino 	<ul style="list-style-type: none"> Outreach is done door to door, in public housing, and on the street in East LA as well as referrals from local high schools and probation Work closely with other CBOs, including placing their student/trainees in internships with other CBOs in the community Partner with YouthBuild charter school. Part of Small Schools Initiative, East LA Community Learning Collaborative Frequent co-enrollment with WorkSource and OneSource Centers Unions, particularly IBEW, provide workshops and mentoring opportunities Working with CD Tech, LA City College, LAUSD & other nonprofits to develop green building curricula & certificate programs Hold monthly mandatory service 	<ul style="list-style-type: none"> Has focused on green construction for 2 years Provide training for homeowners whose homes are retrofitted on green issues, so that they can maintain their homes (e.g. how to maintain a water reclamation pond)

Program Overview (Including Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings																														
pursue higher education and/or community organizing and nonprofit work upon completion			projects, working with groups such as LA Works & MLK Day of Service																															
<p>PVJOBS</p> <ul style="list-style-type: none"> Places people into construction positions set aside for at-risk youth and adults. Filled 104 positions in the last 6 months of 2008 (down by about 1/3 over previous similar periods). 1121 new enrollments over the same period of time. Average wage \$19.38 hr. Retention rate is 89.5% measured at 90 working days. Clients initially placed by PVJOBS receive subsequent and priority placements until 3000 hours have been worked. Advocates for a portion of the work on major construction projects be held for at-risk youth and adults. Has secured hiring commitments from LACCD, Playa Vista, Public Works, CRA and other smaller projects. Funded by fee-for service contracts, government and foundation grants 	<ul style="list-style-type: none"> Complete program at one of 87 collaborative partners who refer to PVJOBS Have an interest in construction career Right to work in US <p>Meet one of the following:</p> <ul style="list-style-type: none"> No HS Diploma Substance Abuse 50% median income Homeless Welfare Recipient Criminal Justice System involvement Unemployed Single Parent 	<p>Breakdown by risk factor:</p> <table border="0"> <tr><td>No HS Dip/GED</td><td>50.3%</td></tr> <tr><td>Substance Abuse</td><td>57.1%</td></tr> <tr><td>50% Med. Income</td><td>89.5%</td></tr> <tr><td>Homeless</td><td>42.5%</td></tr> <tr><td>Welfare Recipient</td><td>27.6%</td></tr> <tr><td>Justice System</td><td>72.4%</td></tr> <tr><td>Unemployed</td><td>94.6%</td></tr> <tr><td>Single Parent</td><td>13.2%</td></tr> </table> <p>Breakdown by ethnicity:</p> <table border="0"> <tr><td>Native Am.</td><td>2.0%</td></tr> <tr><td>Asian</td><td>0.5%</td></tr> <tr><td>Black</td><td>59.7%</td></tr> <tr><td>Filipino</td><td>0.4%</td></tr> <tr><td>Latino</td><td>28.3%</td></tr> <tr><td>Pacific Islander</td><td>0.5%</td></tr> <tr><td>White</td><td>8.1%</td></tr> </table>	No HS Dip/GED	50.3%	Substance Abuse	57.1%	50% Med. Income	89.5%	Homeless	42.5%	Welfare Recipient	27.6%	Justice System	72.4%	Unemployed	94.6%	Single Parent	13.2%	Native Am.	2.0%	Asian	0.5%	Black	59.7%	Filipino	0.4%	Latino	28.3%	Pacific Islander	0.5%	White	8.1%	<ul style="list-style-type: none"> Recruitment is done through collaborative partners, job fairs, printed materials, etc. They collaborate with certain WorkSource Centers, training centers, and specialty nonprofits (e.g. dealing with substance abuse, homelessness, welfare, youth) which have signed Memoranda of Understanding to ensure client needs are met. Contracted with LACCD to service their workforce development needs on their bond projects. Works with We Build and some of the LAUSD Skills centers. 	<ul style="list-style-type: none"> New Green Jobs program with LACCD to place LACCD students in green jobs and help develop curriculum
No HS Dip/GED	50.3%																																	
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White	8.1%																																	
<p>W.I.N.T.E.R</p> <ul style="list-style-type: none"> Offers training programs to at-risk young girls and adult women in 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> at-risk young girls and adult women 	<ul style="list-style-type: none"> Works with labor unions, non-profits, businesses and apprenticeship programs on women's recruitment 	<ul style="list-style-type: none"> hands-on training on construction 																														

Program Overview (Including Funding & Career Pathways)	Prerequisites	Who do they Serve?	Relationships to Other Programs/ Outreach	Green Jobs/ Buildings
<p>non-traditional jobs</p> <ul style="list-style-type: none"> • offers intensive 1 to 12-week training sessions to develop workplace competency skills, life skills, personal assessment, job retention skills, preparation training for career entry into non-traditional employment, safety instruction, financial literacy, credit counseling, and hands-on training on construction trades and environmental remediation • Case management • Assistance with work attire and tools • Assistance with transportation and emergencies • Training stipends • Tuition assistance for non-traditional classes and ESL • Employment referrals and placement • Monthly face-to-face support group with women mentor • Programs for teens are designed to encourage dialogue and critical thinking among students 			<p>and retention issues</p> <ul style="list-style-type: none"> • Linkages to social services providers • Works with eleven school districts to provide workshops and presentations on non-traditional employment opportunities for young girls and women • In the community WINTER works with local agencies to provide information sessions and workshops for various community groups such as domestic violence and homeless shelters, church groups, and other community based organizations 	<p>trades and environmental remediation</p>

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2009 UCLA COMMUNITY SCHOLARS REPORT

GREEN BUILDINGS, GOOD JOBS, SAFE JOBS: SOCIAL JUSTICE PATHWAYS TO A SUSTAINABLE LA

Appendix F: Worker Health & Safety – Benefits and Hazards of Green Building Retrofits

Information in this appendix provides additional details to that presented in the Chapter: “Worker and Community Engagement: Section 2. Worker Health” of the 2009 Community Scholars report at <http://www.losh.ucla.edu/projects/pdf/green-jobs-report.pdf>. It is organized by Hazards, Benefits, and Recommendations for A. Building Trades, B. Services and Crafts, and C. Building Users. We have included our findings on various green retrofit elements including: solar panels, cool and vegetated roofs, demolition and remediation, HVAC upgrades, low VOC paints, system level-metering, green cleaning and sustainable maintenance, sustainable landscaping and weatherization. This appendix combines research from the 2009 UCLA Community Scholars course with additional data gathered from site visits and interviews conducted over the summer of 2009 as part of the Occupational Health Internship Program (OHIP).¹ Our methods included:

1) Literature Review:

- Online articles and peer-reviewed publications
- The L.A. Green Building Retrofit and Workforce Development Ordinance and
- The Leadership in Energy and Environmental Design for Existing Buildings: Operations & Maintenance (LEED EBOM) reference manual, a book on the rating system for green building certification by the United States Green Building Council.

2) Interviews, Site Visits, and Focus Groups

- 8 site visits to new construction and retrofit projects as well as worker training courses
- 20 in-depth interviews with workers and other health and safety professionals about their experiences and working conditions related to “green jobs”

¹ The 2009 OHIP project focused on green jobs was funded by the National Institute of Environmental Health Sciences (NIEHS) grant # U45ES006173 and the Association of Occupational and Environmental Clinics (AOEC). OHIP interns were Maya Saraf and Chris Le.

- 2 focus groups with building trades members of the Community Scholars class in February 2009 and May 2009 to discuss workers’ perspectives about green building retrofits and health and safety

Triangulating results from site visits and the literature review enabled us to understand the occupational health issues of green jobs in a more holistic way. We developed a “Green Building Retrofits Health Benefits and Hazards Matrix” included as a table at the end of this Appendix. It summarizes the health benefits and hazards for each of the retrofit elements discussed in the Roadmap to Retrofits chapter of the Community Scholars 2009 and provides a quick way to glance at all of the potential benefits and hazards of green retrofits that may affect the three categories of workers. Finally, we proposed recommendations on ways to mitigate or eliminate these hazards across the three categories of workers based on the “hierarchy of controls” pyramid (See Figure 1).²



Figure 1.

Hazards, Benefits, and Recommendations

In the pages below, we examine the health benefits and hazards of green jobs for three categories of workers—Building Trades, Service and Crafts Workers, and Building Users. For each group, we examine the specific hazards of several retrofit elements to provide concrete examples of the potential risks and the need for training and precautions. For the most part, the green retrofit hazards that we identified are traditional risks such as the likelihood of more trips, slips and falls when HVAC workers are working on rooftops. Some retrofit jobs may become more hazardous because particularly high risk job tasks become more frequent as described in the report. In other cases, newly hired workers with less experience and training may be at higher risk for work-related injuries and illnesses.

² Note – many of the recommendations in this Appendix are required by Cal/OSHA regulations.

We have divided our analysis into safety hazards which can result in immediate injuries or death and health hazards whose effects may not immediately surface and generally affect long term health. We also include examples of the potential benefits of green building elements to worker safety and health. Finally, for each worker group we discuss recommendations to minimize or eliminate job hazards.

A. Building Trades

Green building retrofit construction work involves many of the same job tasks that building trade workers traditionally do, such as upgrading or maintaining HVAC systems or demolition.³ The hazards of green building retrofits include falls; electrocution; exposure to lead, dust, molds, silica, asbestos, fiberglass; and ergonomic hazards.⁴ Retrofits discussed in this section include:

- 1) Solar Panels
- 2) Cool and Vegetated Roofs
- 3) Demolition and Remediation
- 4) HVAC Upgrades
- 5) Low VOC Paint
- 6) System-Level Metering

1) Solar panels

Solar panel installation involves electrical work to wire the system, and may also involve structural work such as building frames to mount the solar panels⁷ or digging trenches to install photovoltaic (PV) systems.⁸ Once installed, the systems may need to be routinely commissioned to ensure optimal performance.⁷

Safety Hazards:

- Electrical hazards working with charged equipment
- Working on rooftops
 - Fall hazards—exacerbated when working in windy conditions or around skylights
 - Excessive roof loading
- Metal shavings that can get into workers' eyes
- Cuts from the sharp edges of solar panels
- Wind can also cause solar panel parts to become flying objects that can injure workers

As soon as the sun hits solar panels, they generate electricity.⁹ These panels generate direct current (DC), which—according to one electrician—“bites harder than AC (alternating

current),”⁹ thereby causing a more painful shock. The voltage of a solar panel system increases as panels are connected to each other, so that once 3 to 4 panels are connected, there is enough voltage in the system to cause a fatality.^{9, 10} During a power outage, if solar panels continue to power a building, utility “linesmen” workers who are unaware that the building is still being powered face a fatal risk if they attempt work on power lines.^{9, 10}

Rooftop solar workers face fall hazards, particularly if there is no fall protection and no training on topics such as safe ladder use.⁸ The presence of conduits, boxes, and raceways used to connect the systems increases the likelihood of trips,¹⁰ while wind and other weather conditions can also contribute to falls.^{9, 10} Skylights also pose a safety hazard for workers, particularly old plastic skylights that may have degraded from the sun’s ultraviolet rays.⁹ Workers who put weight onto these old skylights are at risk of crashing through them, particularly when they are carrying heavy objects such as solar panels.⁹ Finally, increased roof loading from rooftop solar installations can lessen the time it takes for a roof to cave in during an emergency such as a fire.⁹

Other hazards of solar panel installation and maintenance include cuts from sharp edges^{7, 10} and eye injuries from metal shavings (produced during processes such as cleaning out pipes) that can get into workers’ eyes.⁷ Additionally, solar panel coverings that are removed during repairs can become sharp flying objects that can injure workers when there are high winds.¹⁰

Health Hazards:

- Ergonomic hazards from lifting heavy solar panels
- Heat illness
- Exposure to toxic substances during solar panel demolition

Solar panels may be very heavy and cause worker strains.²⁶ Solar panels are often installed in warm and sunny climates such as Southern California, where heat illness can be a major hazard.^{7, 10} And demolition of solar panels can be hazardous because toxic substances may be released in the process.⁸

2) Cool Roofs and Vegetated Roofs

Installing a cool roof system involves applying paints and coatings with high solar reflectance to a roof’s surface.¹² By reflecting the sun’s warmth, cool roofs keep building temperature down and can reduce the costs associated with cooling it.¹² A vegetated roof uses plant materials to achieve the same effect as a cool roof¹² by cooling the air on top of a building. It can also provide insulation to a building.¹²

Safety Hazards:

- Fall hazards
 - Caused by glare that impairs vision
 - Surface becomes slippery when wet

The surface of cool roofs produces glare that can impair vision and lead to injury. Cool roofs also become slippery when wet thereby increasing fall hazards.^{10, 13}

Health Hazards:

- Chemical exposure from cool roofing material
- Heat illness in warm climates

Cool roofing material may contain chemicals that are harmful to workers.¹⁵ Heat illness can also be a significant risk when working on cool and vegetated roofs, particularly in very warm climates.^{10, 13}

3) Demolition & Remediation

Demolition involves tearing down structures through methods such as wrecking and blasting.¹⁶ Building remediation is the removal and disposal of hazardous materials such as lead and asbestos.¹⁷

Safety Hazards:

- Electrical hazards working around “live” wires
- Slips from wetting down surfaces to prevent the spread of hazardous fibers
- Cave-ins from old building structures that lack reinforcement bars

Often when structures are undergoing retrofits, the building’s electrical components and units cannot be shut off as they feed other parts of the building. Workers who encounter these “hot” or “live” wires can be shocked if precautions are not in place.¹⁸ Remediation workers face slipping hazards when wetting down the job site to minimize the release of asbestos fibers.^{18,}
¹⁹ When tearing down old buildings, there is the potential for collapses, as older structures may not have reinforcement bars (or rebars).²⁰

Health Hazards:

- Lung hazards
 - Exposure to asbestos
 - Exposure to silica dust

According to Legerski, the main hazard in retrofitting and reconfiguring a structural unit is exposure to hazardous dust such as carcinogenic asbestos fibers because “you have to ‘gut’ down a building when you remodel.”¹⁸ In the Leadership in Energy and Environmental Design for Existing Buildings: Operations and Maintenance (LEED-EBOM) reference manual, asbestos removal and encapsulation is a prerequisite that can earn a building one LEED point.¹² The intent of this credit is to reduce the potential exposure of building occupants to asbestos.¹² Yet it is common for building trades workers to be exposed to asbestos fibers¹⁹ that are encapsulated when those asbestos-containing materials are disturbed.²¹ The effects of asbestos exposure may not show up until several years later.¹⁶ Asbestos exposure can cause a buildup of scar tissue in the lungs that impairs lung function, and may eventually cause disability or death.²¹

Demolition and renovation workers may also be exposed to airborne hazards such as silica dust. When crystalline silica is made into a fine dust from activities during demolition or renovation of concrete, it can be inhaled by workers²² and lead to Silicosis, a lung disease²² that restricts normal lung function and may increase the risk of developing lung cancer.²²

4) HVAC Upgrades

Putting energy efficient HVAC systems in place often involves installing high efficiency gas-electric units and replacing exhaust fans.¹³ Preventive maintenance may be conducted on the units periodically to ensure that they are operating optimally.¹³ This maintenance includes changing filters, greasing bearings, and replacing valves.¹³

Safety Hazards:

- Electrocution and burns from working with electrical systems
- Cuts from sheet metal used within HVAC systems
- Trips and falls
 - Due to piping and other machinery parts in the workspace
 - Working on rooftops

Working with gas-electric HVAC systems poses electrocution and burn hazards.²³ In terms of materials, workers are at risk of cutting themselves on the sheet metal that is used within HVAC systems.¹³ Another main hazard is trips and falls—HVAC systems often include piping and other machine parts that can create trip hazards.¹³ HVAC workers are at particular risk of falling when they work on rooftop systems, especially where there are multiple trades working at the same time.¹³

Health Hazards:

- Working in confined spaces
 - Dust exposure
 - Heat illness
- Exposure hazards
 - Asbestos
 - Mold
 - Refrigerants
- Ergonomic hazards

HVAC systems may be located within attics or other confined spaces that can present heat and dust hazards for workers.¹³ Workers may also be exposed to other toxic substances such as asbestos on the surfaces of fume hoods and in fireproofing materials¹³ and mold growing on exhaust and air conditioning systems.²⁴ Exposure to refrigerants used in cooling systems can also be hazardous to HVAC workers because they can cause skin damage, frostbite, and blindness and can be toxic when inhaled.²³ Finally, HVAC workers are often required to lift heavy equipment and therefore face ergonomic hazards.²³

Benefit:

- Monitoring devices that cut back on the need to physically inspect HVAC systems

Upgraded HVAC systems often include monitoring devices that are hooked up to wireless networks.¹³ This feature allows workers to troubleshoot the systems remotely.¹³ Monitoring systems off site cuts back on the necessity to physically inspect HVAC systems¹³ and may reduce the risk of being electrocuted or incurring ergonomic injuries.

5) Low VOC Paints

Painters have begun to use water-based rather than solvent-based paints, and this reduces worker exposure to harmful solvents.³ Less toxic low-VOC (volatile organic compounds) paints are generally water-based “latex paints” that can be thinned and cleaned with water.²⁵

Health Hazards:

- Irritation and allergic reaction to additives in low VOC paints
- Inhalation hazards to breathing in paint dust particles

Some water-based paints contain additives that can cause irritation and allergic reactions.²⁶ When water-based paints are sprayed, they can settle to the ground as fine dust that may be

hazardous to workers who are exposed to this dust for long periods of time.²⁷ Additionally, these less toxic paints may not be suitable for certain types of surfaces such as on exterior metal structures.²⁷ In these cases, traditional lead or oil-based paint may still be used because it is more durable and adheres to metal surfaces better than less toxic low-VOC paints.²⁷

Benefits:

- Cleaner air
- Easier to use because they do not need to be cleaned up with solvent-based thinners

According to the authors of *Green Design & Construction, Understanding the effects on construction worker safety and health*, using low Volatile Organic Compound (VOC) materials in green construction resulted in cleaner air and reduced health hazards to workers.¹ Low-VOC paints can be easier for workers to use than traditional paints because they do not need to be cleaned up with solvent-based toxic thinners.²⁷

6) System-Level Metering

System-level metering can be used to more closely monitor building energy use than traditional metering systems.¹² This feature allows for quick identification of system problems that, once addressed, can drastically cut down building energy costs.¹²

Benefits:

- Allows workers to monitor systems remotely
 - Reduces hazards such as vehicle collisions, walking over uneven and unfamiliar ground, entering backyards, encountering dogs or other animals, and contact with people

System-level metering may enable workers to monitor systems remotely, thereby reducing the hazards of working at the actual sites. Through an energy-efficient approach, the Southern California Edison company may have indirectly minimized worker hazards by implementing the “SmartConnect” technology, a system-level meter system that helps consumers manage their power usage as well as allow Edison to monitor residential readings remotely.²⁸ According to the authors of *Acute Work Injuries among Electric Utility Meter Readers*, electric utility meter readers may have a wide array of potentially hazardous exposures, including “vehicle collisions, walking over uneven and unfamiliar ground, entering the backyards of residences, encountering dogs or other animals, and contacts with people.”²⁹ Many homes and businesses may soon have these new electrical systems installed where meter readers will not have to be sent out to perform their work. This may reduce the above mentioned hazards as well as other hazards

such as heat exhaustion from working on outdoor systems.²⁹ Installing new technology will require planning and job re-training to ensure workers do not lose their jobs but have access to jobs using the new technology.

Recommendations for Building Trades Workers:

Remove the Hazards:

- Design green building retrofits with consideration for worker health and safety
- Install a “shorting clip” that shorts out solar panels so that they do not generate large amounts of electricity
- Install a sensing circuit on solar panel units that automatically disconnects power in the event of a power outage in order to protect utility linesmen workers
- Install walk treads on roofs to prevent trips and slips
- Use special tools to facilitate moving heavy items
- Wet cut concrete and wet down worksite to prevent spread of dust and other hazardous materials during demolition and abatement
- Inspect and abate asbestos and other hazardous materials before other work (such as HVAC upgrades) begins
- Substitute hazardous products with less toxic products (such as low VOC paints)

Those involved in green building retrofit planning, such as architects and engineers, should consider eliminating or mitigating design features that may compromise the health and safety of the workers who install and maintain these retrofits. For solar panels, electrical hazards can be reduced by putting in “shorting clips” that short out panels.⁹ Another device that can be installed is a sensing circuit that automatically disconnects power in the event of a power outage so that utility linesmen are protected.^{9, 10} In the case of rooftop fall hazards (such as for rooftop solar systems, cool and vegetated roofs, and rooftop HVAC systems), walk treads should be installed in order to minimize trips and slips.^{10, 13} The ergonomic hazards of moving heavy equipment such as HVAC systems can be reduced by using special hooking tools that facilitate moving those items.¹³

Asbestos exposure hazards are minimized when worksite policies include job site inspection and abatement of hazardous materials before any work (such as HVAC upgrades) begins.¹³ Methods, such as wet cutting of concrete, prevent environmental and worker exposure to silica dust.³ The use of less toxic products on job sites, such as low VOC paints, reduces hazardous chemical exposure.²⁷

Policies and Procedures:

- Set up safety programs for contractors who lack them
- Wait to connect and power up solar systems until the end of the installation
- Shield solar panels to prevent them from generating electricity
- Conduct job hazard analyses
- Hold weekly safety meetings on job sites
- Create daily safety reports
- Provide water, shade, and frequent breaks to prevent heat illness
- Implement a lock-out/tag-out procedure to reduce the chance of injury when multiple workers are servicing the same equipment
- On job sites where multiple trades are working, negotiate a system where each group of workers takes turns in order to minimize injuries
- Worker training and certification
 - General safety training
 - Fall protection
 - Ladder safety
 - Cardiopulmonary Resuscitation (CPR)
 - OSHA 10 and OSHA 30
 - Abatement licenses – asbestos, lead, and other hazardous materials
 - Respirator use

Policies and procedures on job sites as well as worker training can reduce safety and health hazards of green building retrofit work. Contractors and unions⁸ have established safety programs and training that ensures safety on solar job sites. In order to reduce the risk of working “hot” (i.e., working with electrically charged equipment), solar panels are often shielded with items such as their cardboard packing boxes.⁹ Yet another way to reduce the hazard of working “hot” is to avoid plugging in the system (powering it up) until the project is almost complete.⁷

Continual monitoring of the job site through job hazard analyses, weekly safety meetings, and informing workers of hazards through daily safety reports have been cited by workers as being effective in ensuring safety.^{7,9,27} These meetings and reports update workers on job site hazards ranging from the location of charged wires and circuits to paint inhalation risks.²⁷ On job sites where there is risk of heat exhaustion and heat stroke, workers are kept hydrated and removed from the job site if they begin to feel ill.^{7,10} When multiple trades are working on a job site, negotiating a system where each group of workers takes turns can minimize the potential for injuries.¹³

Finally, workers should receive training such as fall protection, ladder safety, OSHA 10 and 30 and Cardiopulmonary Resuscitation in case of electric shock,⁸ that help to minimize worker

injuries and illnesses. Training should include basic principles of participatory adult education to ensure the training is relevant, they are engaged, and are given the opportunity to ask questions and propose ideas. Unions and companies also offer training and certifications in hazards such as lead painting and respirator use²⁷ for workers who face lung hazards. It is important that remediation workers have their certified abatement licenses and proper safety training, in addition to having preliminary medical clearances to use respirators before performing any type of remediation work.¹⁸

Personal Protective Equipment:

- Fall protection – crucial for rooftop workers
 - Harnessing and Fall Arrest systems
 - Skid-resistant shoes
- Eye protection such as sunglasses or safety goggles
- Gloves
- Respirators

As a last resort when the hazard cannot be removed, green building retrofit workers should be provided with personal protective equipment (PPE). When working at heights such as on rooftops, workers should be equipped with harnessing and fall arrest systems.^{7, 10, 13} Skid-resistant shoes are also recommended to prevent slips on slippery surfaces such as wet cool roofs.^{10, 13} Where there is high glare, such as on top of cool roofs, workers should be given sunglasses (or other similar eye protection).¹³ Safety goggles should also be worn when working around fine particles.⁷ Workers should also wear gloves in order to prevent getting cut from objects such as solar panels^{7, 10} and sheet metal in HVAC systems.¹³ Gloves can protect from cuts, but may be an imperfect solution. Workers point out that gloves can be unwieldy and that sometimes work requires the fine use of their hands that gloves ultimately restrict.¹³ Respirators may also be required on work sites, particularly for workers such as remediation workers and painters who are exposed to asbestos, lead, and other hazardous materials.^{18, 27}

B. Services and Crafts

Service and craft workers include occupations such as custodians, landscapers, mechanics, and building repairers.⁴⁸ In terms of health and safety, services and crafts workers face a variety of hazards such as chemical and ergonomic hazards.³¹ Retrofits discussed in this section include:

- 1) Solar Panels
- 2) Cool and Vegetated roofs
- 3) Green Cleaning and Sustainable Maintenance
- 4) Low VOC Paint

5) Sustainable Landscaping

1) *Solar Panels*

Service workers may be responsible for keeping solar panels clean once they have been installed. This may include processes such as routinely washing down the solar panels with water.⁷

Safety Hazards:

- Electrical hazards
- Slips, trips, and falls – exacerbated on rooftops
- Cuts from sharp edges of solar panels

Because solar panels continuously produce electricity as long as the sun is hitting them, service workers face electrical hazards when cleaning them.¹⁰ Solar panel systems are commonly installed on rooftops where building cleaners are at risk of slips, trips, and falls – particularly on cool roofs, roofs with skylights, or when there are high winds (as referred to above).^{7, 9, 10} The panels also have sharp edges on which workers can cut themselves.⁷

Health Hazard:

- Heat illness in warm climates

These workers are also at risk of heat illness in warm climates, particularly when cleaning rooftop solar panels.^{7, 10}

2) *Cool Roofs and Vegetated Roofs*

Service workers may be asked to periodically clean off the surfaces of cool roofs so that they maintain their reflectivity.^{12, 13} Depending on the type of vegetated roof installed, service and craft workers may have to upkeep plant materials.¹²

Safety Hazards:

- Rooftop fall hazards
 - Reflective surface of cool roofs causes glare that impairs vision
 - Surface of cool roofs becomes slippery when wet

As mentioned above with building trades workers, the surface of cool roofs can exacerbate the fall hazards of working on rooftops.^{10, 13}

Health Hazards:

- Heat illness
- Exposure to mold if water from vegetated roofing leaks into buildings

In warm climates, heat illness is a major risk for service and craft workers who maintain cool and vegetated roofs.^{10, 13} These workers may also face biological hazards inside buildings if water from vegetated roofing leaks into the building and causes mold growth.¹²

3) *Green Cleaning/Sustainable Maintenance*

Traditional cleaning products often contain volatile components that can be toxic to service and craft workers who may use these products on a daily basis.³² In green buildings, less toxic cleaning products may be used as substitutes for these hazardous substances.

Health Hazards:

- Ergonomic hazards because green cleaners may require more strenuous labor
- Terpenes that can exacerbate asthmatic people's symptoms

Because green cleaning products contain less toxic chemicals, they may be less effective than traditional cleaners.³³ Green cleaning may involve more strenuous labor to achieve the same results as cleaning with more toxic chemicals and additional staffing may be required.³³ This aspect leaves service and craft workers with increased risks of ergonomic injuries.³³ According to NIOSH, some green cleaners may contain substances such as Terpenes that can exacerbate asthmatic people's symptoms. Terpenes can react with components in the indoor environment to form new chemicals that might be irritants and contribute to observed increases in work-related asthma.

Benefit:

- Minimizes worker exposure to toxic chemicals

The use of green cleaners to reduce the amount of toxic chemicals in the environment, simultaneously protects janitorial workers and environmental health.¹

4) *Low VOC Paints*

In green buildings, low VOC paint is often used to refurbish interior and exterior building surfaces such as walls. Service and craft workers may be required to periodically clean off or repaint these surfaces.

Benefit:

- Reduces exposure to toxic chemicals

Low VOC paints usually lack harmful chemicals such as solvents and lead – this, in turn, benefits the workers who are responsible for the upkeep of these surfaces.²⁷

5) Sustainable Landscaping:

Sustainable landscaping encompasses a wide range of landscaping techniques that conserve natural resources³⁵ (such as water) and reduce pollution (such as pesticide runoff).^{35,36} A critical aspect of sustainable landscaping is Integrated Pest Management (IPM), which involves “planting the right plant in the right spot”.³⁷ Over-watering plants often leads to insects and necessitates pesticide use.³⁷ When observing IPM practices, water-needy plants are grown apart from drought tolerant species to cut down on the tendency to over-water certain plants.³⁷

Benefits:

- Reduced pesticide use lessens worker exposure to toxic chemicals
- Hand pruning cuts back use of more hazardous machines

IPM strategies can reduce pesticide use, thereby minimizing worker exposure to these hazardous substances (pesticide exposure can cause chronic health effects such as cancer, neurological problems and reproductive problems).^{38, 39, 40} Manually hand pruning and shaping shrubs may reduce the risks of working with more dangerous equipment such as powered-hedge trimmers that pose noise and laceration hazards.⁴¹

Recommendations for Services and Crafts Workers**Remove the Hazards:**

- Design green building retrofits with consideration of service and craft worker health and safety
- Install walk treads on roofs to prevent trips and slips
- Substitute hazardous products with less toxic products (such as low VOC paints)

Architects and engineers who design green buildings and plan retrofits should keep in mind how these systems will perform over time and how they will need to be maintained in order to

eliminate or mitigate potential worker hazards. Installing walk treads on roofs can prevent slips and trips for service and craft workers who have to clean and maintain rooftop systems (such as solar panels, cool roofs, and vegetated roofs). In addition, substituting hazardous products with safer ones such as low VOC paints can cut down on chemical hazards for these workers.

Policies and Procedures:

- Implement a sustainable purchasing program
- Worker training similar to training received by building trades workers
- Provide water, shade, and hydration to prevent heat illness

Worksite policies such as a sustainable purchasing program can ensure that service and craft workers use safer products such as low VOC paints. Safety programs, similar to those used by the building trades, should also be set up to provide training to workers. For example, service workers should be trained on how to work around charged equipment and how to stay safe while working on rooftop systems (such as vegetated and cool roofs). Service and craft workers should also be made aware of surfaces that were painted with lead or oil-based paints and should be trained on how to safely work with these chemicals. In warm climates, service and craft workers such as garden caretakers should be provided with shade, hydration, and frequent breaks to prevent heat exhaustion.

Personal Protective Equipment:

- Fall protection
 - Harnessing and fall arrest system
 - Skid-resistant shoes
- Eye Protection
- Gloves

Harnessing and skid-resistant shoes should be provided to workers who have to clean and service rooftop systems such as solar panels, cool roofs, and vegetated roofs. They should also be given eye protection such as sunglasses when working on cool roofs and safety goggles when working with small particles that can get into their eyes. Gloves can help minimize the chance of being cut when performing service tasks such as hand pruning plants.

C. Building Users

Building users may include workers such as office workers, clerical workers, and librarians,⁴⁹ as well as visitors. Two main issues that affect building user worker health and safety are indoor air quality and building temperature. Highlighted retrofits in this section include:

- 1) Low VOC Paint
- 2) Weatherization
- 3) HVAC Upgrades
- 4) Vegetated Roofs

1) *Low VOC Paint*

Benefit:

- Improves indoor air quality

Using green products such as low VOC paint can enhance building user health by contributing to better indoor air quality¹² that can, in turn, improve worker performance and reduce absenteeism.⁴²

2) *Weatherization*

Weatherization is a technique designed to help conserve energy in a building by replacing windows and/or sealing cracks. This essentially can help make a building more “tight.”

Health Hazard:

- Sick Building Syndrome and other discomfort associated with inadequate ventilation

Weatherized buildings may become “too energy efficient” if they are sealed so tightly that they have limited exchange of fresh air.¹⁸ These conditions can contribute to Sick Building Syndrome (sometimes referred to as tight-building syndrome), where building users experience discomfort associated with inadequate ventilation.⁴⁴

3) *HVAC Upgrades*

Upgrading HVAC systems can affect building users by altering indoor air quality and building temperature.

Health Hazards:

- Thermal discomfort and pollutant-related health problems from reduced operating hours

Upgrading HVAC systems may involve reducing operating hours. When an HVAC system is powered back on after it has been shut off for a period of time, it may not be able to ventilate

air as efficiently. This can lead to building user thermal discomfort and accumulation of indoor air pollutants.⁴⁵

Benefit:

- Energy efficient HVAC systems can improve air quality if other complementary measures are taken

Energy efficient HVAC systems can improve air quality for building users if other complementary measures are taken such as improving energy efficiency of the building shell, upgrading fans motors and drives, upgrading chillers and boilers, installing energy recovery ventilation systems, and downsizing equipment.⁴⁵

4) *Vegetated Roofs*

Health Hazards:

- If a vegetated roof begins to leak into a building, it can cause mold growth that can sicken building users
- Vegetated roofs located near air intakes can introduce allergens into buildings

If a vegetated roof is improperly maintained, water can leak into the building and cause mold growth¹² that can sicken building users. Moreover, vegetated roofs installed near the air intakes can potentially introduce allergens in the air distribution system if plant species are not properly selected.⁴⁶

Benefit:

- Vegetated roofs provide insulation and keep buildings cool, improving thermal comfort for building users

Vegetated roofs help insulate buildings as well as keep them cool,¹² thereby improving thermal comfort for building users.¹²

Recommendations for Building Users

Remove the Hazards:

- For HVAC systems, keep fans running to ensure adequate ventilation
- Allow building users to override HVAC system to adjust to their thermal comfort

From an industrial hygiene perspective, buildings need to have adequate ventilation in order to keep air flowing and prevent the likelihood of Sick Building Syndrome.⁴⁷ In terms of HVAC systems, one way to prevent air flow problems is to keep fans running so that there is adequate ventilation.⁴⁵ Another possibility is to allow building users to override the system so that they can adjust thermal conditions to their comfort.¹³ Proper remediation procedures, discussed above, are also important to minimize building users' exposure to asbestos-containing materials and other dusts.

Policies and Procedures:

- Implement maintenance programs to periodically ensure building systems that affect air quality and temperature are functioning properly

Maintenance programs should be set up to ensure that building systems (such as vegetated roof systems) that affect indoor air quality and thermal conditions are functioning properly in order to reduce the likelihood of building user health problems.

Building users should also be educated about the proposed changes so they can provide input and so they understand the importance of the retrofits and their role in maintaining a green building.

Summary

Without consideration of the health and safety risks of green work practices and materials, workers will remain vulnerable to hazards. During the planning stage, green building retrofits should be designed to minimize or eliminate worker hazards such as electrocution, falls, and chemical exposure. This can be done through engineering controls and policies. Personal protective equipment should only be used as a last resort when other measures have failed to minimize risks. A building can only be considered sustainable when it protects both environmental and worker health.

GREEN BUILDING RETROFITS HEALTH BENEFITS & HAZARDS MATRIX

	Possible Retrofit Elements	BUILDING TRADES	SERVICES & CRAFTS	BUILDING USERS
		Benefits and Hazards	Benefits and Hazards	Benefits and Hazards
Energy Efficiency	Upgrade to energy efficient appliances	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Electrocutation while installing appliances.³⁶ - Cuts and punctures.³⁶ - Strains from moving units.³⁶ - Exposure to microwave radiation.³⁶ - Exposure to welding/soldering materials, refrigerant chemicals.³⁶ 	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Electrocutation while cleaning and maintaining appliances.²⁹ 	
	EE Lighting	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Electrocutation while installing lamps.²² - Cuts from broken lamps.³⁶ - Exposure to mercury if lamps break.⁸ 	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> -Compared to incandescent lamps, the wattage is much lower for CFLs (compact fluorescent lamps).⁸ -Less frequent need to replace lighting fixtures.⁸ <p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Electrocutation while replacing lamps.²⁹ - Cuts from broken lamps.²⁹ - Exposure to mercury if lamps break.⁸ 	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> -Energy efficient lighting reduces heat gain, saves air conditioning and improves thermal comfort for occupants.³⁵ <p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Exposure to mercury if lamps break.⁸
	Lighting Controls	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Risk of electrocutation while installing lighting fixtures and components.²² 	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> -Less handling of lighting fixtures – reduced risk of electrocutation.²⁹ 	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> -Provides more control for comfortable lighting.³⁰
	HVAC System Upgrades	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Falls cleaning HVAC systems.⁴ - Electrocutation from using equipment.²⁷ - Burns from using equipment.²⁷ - Exposure to refrigerants – which may cause skin damage, frostbite, or blindness; also an inhalation hazard in confined spaces.²⁷ - Strains from lifting equipment.²⁷ - Asbestos exposure while working in ducts.⁴ - Exposure to mold in exhaust and air conditioning systems.¹⁵ 	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Falls while cleaning HVAC systems.⁴ - Electrocutation while cleaning HVAC systems.⁴ - Exposure to refrigerants – which may cause skin damage, frostbite, or blindness; also an inhalation hazard in confined spaces.²⁷ - Exposure to dust from cleaning HVAC systems.³⁸ - Exposure to mold when cleaning HVAC systems.³⁸ 	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> - Upgrading HVAC systems can significantly improve air quality and thus occupant health.³⁰ <p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> -Reducing HVAC operating hours - An insufficient lead-time prior to occupancy can result in thermal discomfort.²⁸
	Cool Roofs	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Trips and falls while working on roofs.⁴ - If using PVC cool roof layouts, this can also potentially increase slip hazards if wet (i.e. HVAC 	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Trips and falls while working on roofs.⁴ - Paints and coatings on roof used for high reflectance 	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> - Cooler building temperature for occupants.³⁰ <p>POTENTIAL HAZARDS:</p>

		condensation). ⁴ - Impaired vision/eye-strain from cool roof's bright reflectivity while installing. ⁴ - Exposure to chemicals while using paints and coatings on roofs for reflectivity purposes. ¹⁸	may include hazardous chemicals. ¹⁸ - Mold growth on the inside of buildings if vegetative roof leaks. ³⁰ - Impaired vision/eye-strain from cool roof's bright reflectivity during maintenance. ⁴	- If the roof leaks from a vegetated roof, it can cause mold growth on the inside of buildings where office workers can be exposed. ³⁰ - Vegetated roofs installed near the air intakes can potentially introduce allergens in the air distribution system if plant species are not properly selected. ³¹
	Refrigeration Systems	POTENTIAL HAZARDS: - Exposure to refrigerants. ²⁷	POTENTIAL HAZARDS: - Exposure to refrigerants. ²⁷	
Renewable Energy	Micro-turbines	POTENTIAL HAZARDS: - Trips and falls while working on roofs. ²⁵	POTENTIAL HAZARDS: - Trips and falls while performing maintenance on roofs. ²⁵	
	Solar Panels	POTENTIAL HAZARDS: - Electrocutation while working "hot"/charged systems - instant powering of panels from sun exposure; increasing voltage power with consecutive panels linking together. ^{1,14} - DC shocks are more painful than AC shocks. ¹ - During a power outage when converting DC to AC can potentially be hazardous if it does not have a sensor to shut off. ^{1,14} - Falls while working on rooftops and with ladders; increased falls in windy conditions. ^{1,6,14} - Increased roof loading will add weight and can lessen time it takes for roofs to cave-in in event of emergency (such as fire). ¹ - Cuts and scrapes - solar panels may have sharp edges. ⁶ - Metal shavings produced from cleaning out pipes can get into workers' eyes regardless of eye protection. ⁶ - Increased risk of falls with skylight systems in place - carrying heavy solar panels; old skylights may have degraded or may not be as safe as new skylights. ¹ - Heat illness when installing panels in hot climates such as Southern California. - Potential exposure to chemicals contained in solar panels during demolition projects. ¹⁴ - Inexperienced workers – may not be accustomed to working with charged materials. ⁶ - Lack of safety programs in solar companies. ¹⁴	POTENTIAL HAZARDS: - Risk of electrocution while cleaning and performing maintenance on solar panels. ⁶ - Slips and falls while cleaning and performing maintenance on rooftops. ⁶ - Slips and falls while washing panels if panels are on PVC cool roof layouts. ⁵	

	Solar thermal hot water	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Burns from hot components.³⁹ - Falls if installing systems on roofs - falling through a ceiling.³⁹ - Punctures from protruding nails in attic spaces.³⁹ - Heat illness while working in small confined spaces or on roofs.³⁹ 	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Burns from cleaning around hot water systems.³⁹ - Falls from cleaning system on roofs or falling through the ceiling.³⁹ - Heat illness while working in small confined spaces or on roofs.³⁹ - Exposure to dust and mold when cleaning and maintaining systems near the top of the building or in small confined spaces.³⁹ 	
Measurement and Monitoring	Automated building systems	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> - Easier to maintain systems and quickly identify problems.³⁰ 		
	System-level metering/sub-metering	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> -Easier to maintain building systems – fewer risks because don't actually have to go out to job site.⁸ 		
	Thermal Controls	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> -Easier to maintain systems and quickly identify problems.³⁰ 		<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> -Provides more control for comfortable temperature³⁰
Weatherization	Window Replacement	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Potential falls when installing heavy windows.¹³ - Potential strains from carrying and installing heavy energy efficient windows.¹³ - Potential exposure to lead and dust when removing old windows.^{2,3, 13} 		<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> - Improved lighting and temperature.³⁰ <p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Introduction of sick building syndrome or poor air quality if not enough ventilation.^{1,3,10}
	Window Tinting	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Cuts from working with glass.¹³ - Irritation to the eyes, skin, and respiratory system.²⁴ - Fires and explosion from using tinting aerosolized chemical.²⁴ 	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Irritation to the eyes, skin, and respiratory system.²⁴ 	<p>POTENTIAL HAZARDS:</p>
	Insulation (walls and hot water heater)	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Strains from carrying and installing heavy insulation panels.²⁵ - Exposure to fiberglass when installing panels.²⁵ - Exposure to asbestos when removing old insulation.³ 	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Exposure to fiberglass when panels are disturbed while cleaning.³ - Exposure to mold growing on fiberglass insulation panels if wet.³³ 	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Fiberglass insulation may be an irritant if it breaks down and is emitted into air over time.³ - Possible introduction of sick building syndrome or poor air quality if not enough ventilation.^{1,3,10}

	Caulking	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Exposure to lead and dust when working around old windows and walls removing old caulking.³ - Exposure to PCBs in removing caulk from old buildings.²¹ - Exposure to caulk dust that contains titanium dioxide.³⁷ -Butyl Acetate contained in some tub and tile caulking can irritate eyes and vapors can cause illness.³⁷ 	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Exposure to lead and dust when working around old windows and walls removing old caulking.³ - Exposure to PCBs in removing caulk from old buildings.²¹ - Exposure to caulk dust that contains titanium dioxide.³⁷ -Butyl Acetate contained in some tub and tile caulking can irritate eyes and vapors can cause illness.³⁷ 	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> -Improved temperature and lighting quality.³⁰
Water Conservation	Water Conservation Systems: Water Sensors:		<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> - Easier to maintain sprinkler system¹¹ 	
	Water Conservation Systems: Efficient toilets/urinals		<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> - Waterless urinals don't flush, there may be a reduction in bacteria or pathogens that are transported in aerosols to users.¹⁶ - Without the need for a flushing lip, waterless urinals may be more streamlined, making cleaning easier and reducing areas where bacteria breed.¹⁶ <p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Without regular flushing, bacteria can build up in old pipes and cause chemical reactions that produce ammonia gas - this creates an unpleasant odor and can be hazardous if it reaches high levels¹⁶ 	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Without regular flushing, bacteria can build up in old pipes and cause chemical reactions that produce ammonia gas - this creates an unpleasant odor and can be hazardous if it reaches high levels¹⁶
	Water Efficient Irrigation/Sustainable Landscaping:		<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> - Integrated Pest Management (IPM) program will require less to no use of pesticides.¹² <p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Strains from more manual hand pruning with improper equipment – cutting thicker diameter branches with small tools.¹¹ 	

Indoor Environment Quality	Green Cleaning/ Sustainable Maintenance		<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> -Less toxic cleaning products are better for the environment and workers.²⁶ - Improved air quality.³⁰ <p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Strains and other ergonomic injuries because green cleaners may require more strenuous labor⁴¹ -Cleaning products may be toxic³¹ if increase in the use of terpenes (hydrocarbons produced by plants— particularly conifers) like alpha-pinene, limonene and delta-carene in cleaners and air fresheners; Terpenes can react with components in the indoor environment to form new chemicals that might be the irritants responsible for increases in work-related asthma.³⁴ 	<p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> -Cleaning products may be toxic³¹ if increase in the use of terpenes (hydrocarbons produced by plants— particularly conifers) like alpha-pinene, limonene and delta-carene in cleaners and air fresheners; Terpenes can react with components in the indoor environment to form new chemicals that might be the irritants responsible for increases in work-related asthma.³⁴
	Improved Air Quality, Ventilation		See "HVAC System Upgrades"	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> -Improved air quality and air change over rates.³⁰
	Sustainable carpet	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> - Working with less toxic materials.³⁰ 	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> -Working with less toxic materials.³⁰ 	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> - Less toxic materials so improved air quality.³⁰
	Low-VOC paint	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> - Paints are less toxic and easier to use because there is no need to clean up with solvent-based thinners² <p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Exposure to toxic chemicals irrespective of the low VOC component of water-based, latex paints; proper safety measures still required.² - Inhalational exposure to fine dust after spraying low VOC paints.² - Exposure to other chemicals used in conjunction with water-based paints – such as Ethylene-glycol (has since been removed).² 	<p>POTENTIAL BENEFITS:</p> <ul style="list-style-type: none"> -Paint has no lead or glycols and low VOC content – benefit to those who paint, touch up or remove paint.² <p>POTENTIAL HAZARDS:</p> <ul style="list-style-type: none"> - Exposure to lead when old paint is grinded into dust² 	<p>POTENTIAL BENEFITS:-Improved air quality.³⁰</p>

	<p>Remediation of toxic materials (asbestos, lead, etc)</p>	<p><u>POTENTIAL HAZARDS:</u></p> <ul style="list-style-type: none"> - Collapse of structure if it lacks reinforcement bars (rebars).⁹ - Electrocutation while encountering “live” or “hot” wires when tearing down walls or other parts of a building.³ - Exposure to asbestos and lead while tearing down walls and actual abatement job. - Strains and repetitive motions from awkward positions and constant scraping, respectively.³ 	<p><u>POTENTIAL HAZARDS:</u></p> <ul style="list-style-type: none"> - Exposure to asbestos and lead safe work practices not observed. 	<p><u>POTENTIAL HAZARDS:</u></p> <ul style="list-style-type: none"> - Exposure to asbestos and lead if these materials are disturbed
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2009 UCLA COMMUNITY SCHOLARS REPORT

GREEN BUILDINGS, GOOD JOBS, SAFE JOBS: SOCIAL JUSTICE PATHWAYS TO A SUSTAINABLE LA

Appendix G: Los Angeles City Environmentally Preferable Products Purchasing Program

Information in this appendix provides additional details to those presented in the Chapters “Worker Health” and “Next Steps: Manufacturing Green Building Products”. It summarizes the policy adopted by the LA City Council on June 12, 2009 to be implemented by the General Service Department. http://clkrep.lacity.org/onlinedocs/2009/09-0729_ord_180751.pdf

The purpose of the EPPP Program is for the City of Los Angeles:

- to conserve and enhance our local and global natural resources; promote and support a vibrant, diverse, and equitable economy; safeguard human health and the environment; and improve the livability of the City's neighborhoods without compromising the ability of future generations to do the same
- to, as a major purchaser, promote the use of environmentally preferable products in its acquisition of goods and services and to reduce the environmental impact of the City's purchasing decisions by buying goods and services from manufacturers and distributors who share the City's commitment to the environment

The EPPP program will utilize criteria established by governmental or other widely recognized and respected third-party authorities such as Energy Star, Green Seal, EPA Recycled Materials Advisory Notice (RMAN) Purchasing Guidelines, Federal Electronic Product Environment Assessment Tool (EPEAT) program guidelines for electronics, State Agency Buy Recycled Campaign (SABRC)

The EPPP Program includes, but is not limited to:

1. Paper products, including but not limited to fine grades of paper, corrugated boxes, newsprint, tissue, and toweling;
2. Compost and co-compost products;
3. Glass;
4. Lubricating oil;
5. Plastic;
6. Solvents and paint, including water-based paint;
7. Tires/re-treaded;
8. Building insulation;
9. Concrete and cement containing fly ash;
10. Automobile parts;
11. Rubber;

12. Asphalt;
13. Batteries;
14. Aggregate rock;
15. Remanufactured, recyclable or recycled toner cartridges;
16. Antifreeze/coolant;
17. Processed and crushed miscellaneous base materials; and
18. Movable/portable walls.