

Career Ladders and Training Gaps in CCAP Workforce Impact Areas: Energy Efficiency, Landscape/Horticulture, and Recycling/Reuse

Research Report

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Executive Summary

The “green job” movement has focused attention on how efforts to improve environmental quality and sustainability can generate significant economic opportunities for low income and disadvantaged populations. An important part of this is assessing how entry-level green jobs are linked to career ladders toward advancement and better-paying jobs within and across industries, a concern that has drawn increasing attention within the workforce development field in recent years.

In this report we examine three occupational areas where the recently released Chicago Climate Action Plan (CCAP) is anticipated to generate significant labor market impacts in terms of job creation. These areas are:

- Energy Efficiency (Auditors and Measure Installers);
- Landscape, Horticulture, and Urban Forestry; and
- Recycling and Reuse.

Research Questions

For each of these three occupational areas we look at the demand- and supply sides of the labor market, asking the following research questions:

- What are the core skills required for entry-level and advancement positions?;
- What are the career ladders associated with these occupations?; and
- What is the education and training infrastructure for these occupations in Chicago? Are there gaps in terms of capacity or accessibility?

These questions were investigated through interviews with employers, local training providers and other key informants, as well as available secondary literature and reports.

Findings

<i>Energy Efficiency: Home Energy Auditors</i>	
<i>Skill Requirements</i>	Energy auditors use a variety of diagnostic tools and computer programs to analyze home energy usage. While most job tasks can be learned through short-term training, a strong foundation of math, computer and communications skills are required, and familiarity with construction and buildings is helpful.
<i>Career Ladders</i>	Career advancement for energy auditors typically entails moving from a supporting, data collection role to a lead role engaging with building owners, contractors and program managers. There is significant potential for self-employment and entrepreneurship.

<i>Training Infrastructure</i>	The training infrastructure for energy auditing is currently highly disorganized, with a variety of certification standards in use. Although CCAP-related demand will exceed the supply of trained auditors, this could be addressed by formalizing existing programs.
<i>Energy Efficiency: Measure Installers</i>	
<i>Skill Requirements</i>	Energy efficiency measure (weatherization) installers fall into two broad categories: architectural, which relates closely to carpentry skills, and mechanical, which include specialty trades like electricians and heating and cooling (HVAC) technicians. Educational requirements for entry-level architectural positions are minimal, but math skills are important. Mechanical installation jobs require some postsecondary training, such as a union apprenticeship or specialty trade certificate.
<i>Career Ladders</i>	Potential career ladders for entry-level weatherization positions are diverse, including internal advancement to crew leader and foreman; transition into union apprenticeships or specialty trade programs; or energy auditing.
<i>Training Infrastructure</i>	There are relatively few programs that target weatherization, but a vast array of construction trades training programs in Chicago, including community-based organizations, unions, proprietary schools and community colleges. Although the current recession has resulted in a significant surplus in construction trades workers, there may be opportunities for programs targeting disadvantaged residents for entry-level weatherization jobs.
<i>Landscape, Horticulture and Urban Forestry</i>	
<i>Skill Requirements</i>	Entry-level landscape maintenance and installation positions have no educational requirements and most job skills, such as plant identification and equipment usage, are learned on the job. However, trends such as the shift toward sustainable landscape practices are shifting front-line skill requirements.
<i>Career Ladders</i>	Most landscape contractors maintain strong internal career ladders linking entry-level jobs to front-line supervisory positions, but advancement to highly-paid landscape designer, buyer and horticulturalist positions requires further education.
<i>Training Infrastructure</i>	There are a small number of programs in Chicago training for entry-level landscape jobs, but others such as community colleges offering certificate and two-year degrees for higher-level positions. There is a gap in the training infrastructure for incumbent landscape workers, and also within the city, as most established programs are in the suburbs.
<i>Recycling and Reuse</i>	
<i>Skill Requirements</i>	Jobs in recycling and reuse enterprises are diverse, making it hard to generalize their skill requirements. However, they tend to be labor intensive in nature.
<i>Career Ladders</i>	Entry-level recycling and reuse jobs can be set up as “transitional” jobs providing individuals with work experience to find other private-sector jobs, but can also provide for internal advancement through specific occupational training.

<i>Training Infrastructure</i>	A very small number of training programs in Chicago currently, or are planning to operate, training programs targeted at recycling and reuse. However, CCAP's "zero waste" strategy presents a variety of opportunities to support social enterprises in areas like waste oil recycling and building deconstruction.
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Conclusions

The research in this report highlights where a Workforce Initiative related to the Chicago Climate Action Plan could take steps to address potential gaps and opportunities in these areas. These include:

- Coordination of existing training programs and certification standards for home energy auditors;
- Training for entry-level weatherization jobs that is directly linked to advancement within energy efficiency and the construction trades more broadly;
- Strengthened connections between entry-level landscape training programs like Greencorps and community-college based programs targeting higher-skilled jobs; and
- Support for new social enterprises and training programs in recycling and reuse.

I. Introduction

The recent emergence of the “green collar jobs” movement in the United States has focused attention on how policy-led efforts to address environmental quality and sustainability could also enhance economic opportunities for less-skilled workers who have seen their earnings capacity diminish with the shift toward a post-industrial economy¹. Throughout the country, researchers, policy makers, and advocates have been grappling with how to define “green jobs,” assess their growth potential, and understand the appropriate policy and market interventions necessary to ensure that growth².

Of particular interest to many is the extent and nature of career “ladders” and “pathways” connecting entry-level green jobs to better-paying jobs within those sectors and into related sectors. The workforce development field has been exploring these questions of occupational structure, career development and mobility for many years, in sectors as diverse as manufacturing, healthcare, information technology, and hospitality³. A number of studies have articulated the potential for strengthening existing career ladders and forging new ones within and across industries, while pilot efforts have demonstrated their promise but also their difficulty, especially in molding employer practices to accommodate ongoing skill development. To the extent that any consensus has emerged, it is that the infrastructure for supporting career ladders needs

¹ Several recent publications address this idea, including: “Green-Collar Jobs in America’s Cities: Building Pathways Out of Poverty and Careers in the Clean Energy Economy” (Apollo Alliance and Green For All, March 2008) , and “Greener Pathways: Jobs and Workforce Development in the Clean Energy Economy” (Center on Wisconsin Strategy with The Workforce Alliance and Apollo Alliance, March 2008); see also Van Jones, *The Green Collar Economy: How One Solution Can Fix Our Two Biggest Problems* (HarperOne, 2008).

² For a review of the definitions used in those studies, see Greg Schrock and John West, “Review of Recent ‘Green Jobs’ Studies and Reports,” CUED Memorandum, August 2008.

³ See for example, Joan Fitzgerald, *Moving Up in the New Economy: Career Ladders for U.S. Workers* (ILR Press, 2006), Davis Jenkins, “Career Pathways: Aligning Public Resources to Support Individual and Regional Economic Advancement in the Knowledge Economy” (Workforce Strategy Center, 2006), and Greg Schrock and Judith Kossy, “Career Pathways & Crosswalks in the Hotel, Retail and Restaurant Industries,” (Chicago Workforce Board, 2007).

to be constructed on a sectoral basis⁴, reflecting shared skill needs on the part of employers and enhancing the range of career mobility options for workers.

Chicago Climate Action Plan and Workforce Initiative

The Chicago Climate Action Plan (CCAP), released by the City of Chicago in September 2008, is a comprehensive strategy for reducing greenhouse gas (GHG) emissions within the city, and adapting to the likely climatological effects of global climate change. CCAP consists of five strategy areas – Energy Efficient Buildings, Clean and Renewable Energy, Transportation, Waste and Pollution Reduction, and Preparation and Adaptation – that, when fully implemented, will reduce Chicago’s GHG output to 20 percent below current levels by 2020 and 80 percent by 2050. Implementation of CCAP’s mitigation and adaptation strategies will depend on a combination of public investments from the City, State and Federal governments, private-sector investments and market transformations, and public outreach and behavioral changes at the individual, household and organizational levels.

An analysis completed by CUED and the Center on Wisconsin Strategy (COWS)⁵ identified three occupational areas where CCAP implementation was most likely to generate significant, direct labor market impacts:

- *Energy Efficiency*: Energy auditors and installers of energy efficiency measures in residential and commercial buildings;
- *Landscape, Horticulture and Urban Forestry*: Design, installation and maintenance workers for “Green infrastructure” elements such as green roofs, trees, rain gardens, porous pavements and other landscape installations; and

⁴ See Maureen Conway, Amy Blair, Steven L. Dawson and Linda Dworak-Munoz, “Sectoral Strategies for Low-Income Workers: Lessons From the Field” (The Aspen Institute: 2007), and Anne Roder with Carol Clymer and Laura Wyckhoff, “Targeting Industries, Training Workers and Improving Opportunities: The Final Report From the Sectoral Employment Initiative” (Public/Private Ventures, 2008).

⁵ See Greg Schrock and Eric Sundquist, “Potential Workforce Impacts of the Chicago Climate Action Plan: Quantitative and Qualitative Assessments,” CUED Research Report, January 2009.

- *Recycling and Reuse:* Workers involved in the collection, processing, distribution, manufacturing, resale and/or reuse of materials otherwise destined for the waste stream.

Of course these are not the only areas where job creation is likely to occur in relation to CCAP's goals and strategies. Federal infrastructure investments, from public transit to water, are certain to generate thousands of construction jobs, while expanded federal incentives for renewable energy could support hundreds of jobs in the installation of solar, wind and geothermal energy systems. However, the three areas identified above represent the most attractive targets for a Workforce Initiative related to CCAP that would align public, private and philanthropic resources toward two goals: first, ensuring that a well-skilled workforce exists to meet the new and altered demand that CCAP will generate for key occupations; and second, creating opportunities for disadvantaged populations and communities to obtain employment in green-collar jobs created through CCAP, and making sure that those entry-level jobs are linked to opportunities for career advancement and economic self-sufficiency.

Research Questions and Methods

This paper examines the three occupational categories listed above, and for each one, assesses key demand- and supply-side characteristics relevant to the development of workforce development responses. The research questions are:

- What are the core skills required for entry-level and advancement positions?;
- What are the career ladders associated with these occupations?; and
- What is the education and training infrastructure for these occupations in Chicago? Are there gaps in terms of capacity with respect to the projected demand? Are there gaps in terms of accessibility for workers and employers?

To investigate these questions, semi-structured interviews were conducted by CUED with employers, workforce training providers and key informants knowledgeable about

the occupations and industries. A list of interviewees is provided in an Appendix. In addition to these interviews, secondary sources like research and policy reports, trade publications, and media reports were used to supplement primary data collected; where relevant, these sources are noted.

II. Profiles

In this section the demand- and supply-side features of the three CCAP occupational impacts areas – Energy Efficiency, Landscape/Horticulture/Urban Forestry, and Recycling/Reuse – are profiled. For each one, we begin by describing the industry context within which these occupations are found, and then assess the skill requirements and typical career advancement patterns for those occupations, and conclude with an assessment of the current infrastructure for education and training for those occupations within and around the city of Chicago.

A) Energy Efficiency

The Energy Efficiency Buildings component of CCAP will create demand for up to 2,200 jobs in the installation of energy efficiency measures in residential and commercial buildings, as well as several hundred jobs in the analysis and auditing of building energy use and efficiency opportunities. The actual demand for each will depend on a number of factors related to the implementation of CCAP’s Energy Efficiency Building Retrofit initiative, as well as energy price levels, in incenting home- and building owners to adopt energy efficiency measures. Current plans call for performing retrofits of 8,000 residential units in 2009, increasing steadily to 50,000 units in 2018, with an overall goal of 400,000 residential units by 2020⁶.

1) Industry Overview

⁶ Katzenbach Partners, “Housing Retrofit Rollout Plan – 2009,” Presentation to Chicago Department of Environment, December 2008.

The model through which buildings are most commonly retrofitted for energy efficiency involves two primary functions: auditing and installation. A third function, program administration, pertains to retrofits that are done with the assistance – usually financial, but sometimes technical – of governmental agencies or non-governmental bodies operating programs funded by government programs, philanthropic sources and/or public utilities.

Good data are unavailable on the extent of energy efficiency building retrofit (EEBR), or *weatherization*, activity that takes place purely within the private market, i.e., where private sector home or building owners contract directly with energy auditors/consultants and construction contractors for the primary purpose of improving a building's energy performance. As energy prices, consumer concern over carbon footprints, and the market for energy efficiency improvements increase over time, EEBR is likely to grow in all segments of the building market.

In the mean time, EEBR activities in Chicago are funded through an array of programs, most of which are targeted at low-income home owners and operators of low-income or affordable housing, who tend to rely upon an older, less efficient building stock and have fewer resources to invest on their own. The primary source of residential EEBR activity is the Weatherization Assistance Program (WAP), which is funded through the U.S. Department of Energy and the Illinois Department of Healthcare and Family Services (IDHFS) and administered in Cook County by the nonprofit Community Economic Development Association (CEDA). Annually, CEDA weatherizes the homes of 3,500-4,000 low-income households in Cook County (roughly 65-75% of which are done in the city of Chicago), a figure that will be projected to increase by at least 75 percent in the next two years as a result of recent expansions in federal funding for WAP. CEDA Weatherization uses an internal staff of energy auditors and outside home weatherization contractors, many of whom specialize in weatherization and other government-sponsored housing rehab work (e.g., emergency

repair assistance). These contractors generally utilize non-union labor⁷, and operate similar to residential housing remodelers in certain respects. The other major program currently engaging in EEBR activity in Chicago is the Energy Savers program, operated by the Center for Neighborhood Technology and the Community Investment Corporation, which combines public, foundation, and utility monies to provide energy audits, technical assistance, low-interest financing and grants to owners of multi-family affordable housing buildings in Cook County. The program, which completed its first year of operation in 2008, is projected to perform audits of 3,500 multi-family residential units and facilitate retrofits of 2,500 units. In addition to these two programs, the City of Chicago has funded or sponsored several smaller EEBR programs and pilots over the past several years through a combination of internal and external funding sources, such as utility settlement monies.

In larger buildings, including larger multi-family residential and commercial buildings, energy efficiency work is coordinated by specialized, private energy service companies (ESCOs), which are engineering consulting firms that are commonly affiliated with equipment manufacturers like Johnson Controls or Siemens, or in other cases, utilities. ESCOs work with building owners to identify potential energy cost savings, amortizing the cost of their consulting services and subsequent building retrofits out of the anticipated energy savings across a defined contractual period. Like residential weatherization programs, ESCOs work with specialized electrical, HVAC, and building envelope contractors to complete the retrofits. To date, the largest area of ESCO activity has been for public buildings in the so-called MUSH sector (Municipal, Universities, Schools and Hospitals), but programs like the Clinton Climate Initiative

⁷ The Weatherization Assistance Program is exempt from the Davis-Bacon Act, which requires contractors to pay union-scale “prevailing wage” levels for federally-funded construction work. The origin of this exemption appears to date to WAP’s inception in the late 1970s, when the program was envisioned as an opportunity to hire unemployed individuals as part of the Public Service Employment provision of the Comprehensive Employment and Training Act (CETA), the federal statute governing workforce development programming at the time. See: <http://www.waptac.org/si.asp?id=340>

are attempting to build the market for private-sector building owners to invest in energy efficiency.

In broad terms, most energy efficiency work can be divided into two groups: *architectural*, which pertains to the building shell or “envelope”; and *mechanical*, which pertains to the devices (such as HVAC systems and water heaters) that utilize energy to heat and cool buildings. According to a labor demand model developed by COWS and the University of Florida’s Powell Center for Buildings and the Environment, architectural measures generate over three-fourths of labor requirements for single-family residential retrofits, while mechanical measures account for two-thirds of jobs for multi-family residential and over 80 percent for commercial retrofits.

2) *Energy Auditors*

The task of evaluating buildings to diagnose areas of energy loss, prescribe energy efficiency measures, and subsequently test and verify the impacts of those measures falls to the job of energy auditors. This occupation, which is presently relatively small in terms of employment⁸, is likely to experience a dramatic rise in demand as a result of programs to encourage home and building owners to audit and install energy efficiency measures.

Skill Requirements

The complexity of the energy auditor job – and thus the skills required – varies considerably by the size and type of building. In general, the larger the building, the more complex the mechanical systems involved (e.g., HVAC) and thus the more specialized training is required. By contrast, the job of auditing single-family and small multi-family buildings can be learned relatively quickly, without specialized education.

Energy auditors for single-family and small multi-family buildings rely on variety of diagnostic tools, include blower doors (which simulate the effect of pressure

⁸ Because there are currently no standardized occupational titles for energy auditors, employment and wage figures for this occupation are not readily available.

change on a building's envelope), infrared cameras, and flue gas analyzers, to assess the extent of energy loss in a home or building. These tools can be learned in a relatively short period of time on the job. Increasingly, energy auditors rely on specialized computer software to analyze data collected from their clients, project potential (and verify actual) energy savings, and communicate that information to their clients. For this reason, most programs employing energy auditors tend to look for individuals with at least some postsecondary education, regardless of the field, who have strong math, computer and communications skills. Another term for the job is *home energy rater*, since many individuals use a standardized set of protocols to "rate" new homes and existing homes for certification systems like Energy Star and HERS (Home Energy Rating System). These systems are increasingly being utilized to qualify homeowners for energy efficient mortgages or energy improvement mortgages.

Energy auditing for larger multi-family (i.e., high rises), commercial and industrial buildings is a much more complex endeavor. For this reason, a background in science or engineering - usually mechanical, but sometimes electrical or civil - is generally required for the job. The most widely accepted certification in this area is the Certified Energy Manager (CEM) designation by the Association of Energy Engineers.

Career Ladders

Although the "science" of the job of energy auditing entails learning to use data collection and analysis tools, the "art" of the job involves learning from experience where common points of home energy loss are found, asking the right questions of building owners, and communicating potential savings. For this reason, a common career progression for energy auditors is to begin as an assistant, collecting data in conjunction with a lead auditor who is responsible for conducting the investigation, working with the building owner and/or program manager, and the contractors involved in the installation process. With time, individuals advance into lead auditor roles and/or project management roles, depending on the size of the firm or organization. Many energy auditors operate either as independent contractors or with

minimal support staff, and there is significant potential for individuals to “hang out their own shingle” to start their own business, although developing a consistent market can be very difficult for individuals relying primarily or exclusively on private home or building owners.

Salaries for home energy auditors who are certified through organizations like RESNET (Residential Energy Services Network) can range from \$35,000 to \$55,000 per year (or more for individuals with their own businesses), while salaries for individuals in assistant positions who have not yet obtained certification are lower, from \$25,000 to \$35,000 annually. Auditors of commercial and industrial buildings have higher salaries on par with the engineering occupation, ranging from \$40-50,000 for entry-level positions up to \$100,000 or more for experienced energy engineers and consultants.

Education and Training

The infrastructure for training and certifying individuals to become energy auditors remains largely disorganized, overall and within Chicago. The most well-established training protocols are those developed and utilized by agencies operating under the federal WAP. CEDA Weatherization trains new auditors internally to the curriculum and standards prescribed by the Illinois Home Weatherization Assistance Program, which manages the WAP program statewide. Some states, such as Ohio, have established specific training organizations (Ohio Weatherization Training Center) connected to the WAP program but available to other programs and contractors as well.

Additionally, a number of consultants and organizations nationally (but none in Illinois) are accredited by RESNET to train individuals to the HERS energy rating standard, while other organizations like the Building Performance Institute (BPI) also offer training and certification⁹. Such training opportunities have generally not been available on a regular basis; the Chicago Center for Green Technology has offered short

⁹ As of November 2008 RESNET and BPI were discussing the possibility of developing a comprehensive energy auditing standard. See: <http://www.bpi.org/documents/BPIandRESNETNewJointComprehensiveHomeEnergyAuditStandard.htm>

courses in an occasional basis, and Wilbur Wright College recently offered an eight-week HERS training course through its continuing education division with funding from the Illinois Department of Commerce and Economic Opportunity.

Given the projected increase in demand for home energy auditors, the lack of an established training infrastructure and certification protocol represents a major gap to be addressed. There is no single model for how this might be done, but because the WAP program is – and will likely remain – the largest single source of (residential) EEBR activity, an entity like the Ohio Weatherization Training Center that serves the training needs of both WAP-funded organizations like CEDA and other public, non-profit and for-profit EEBR organizations and contractors may represent a good approach.

3) *Measure Installers*

Energy efficiency measure installers represent a diverse group of construction trades occupations, including carpenters, HVAC/sheet metal workers, electricians, laborers, plumbers, and boilermakers. The type of trades involved in EEBR work varies by type of building; for single-family homes, carpenters and laborers do 80 to 90 percent of the work, while HVAC technicians, electricians and plumbers play a bigger role in multi-family and commercial retrofits¹⁰.

Skills and qualifications

Entry-level EEBR measure installation positions for architectural work tend to have very modest skill requirements, especially within a single-family residential context. Although familiarity with basic carpentry skills and concepts – and construction experience – is considered helpful, it is not necessarily a prerequisite. Many common residential efficiency measures, such as blowing insulation or installing

¹⁰ Estimates based on the EEBR labor demand model developed by COWS and the University of Florida's Powell Center for Buildings and the Environment. For more discussion of this model, see Greg Schrock and Eric Sundquist, "Potential Workforce Impacts of the Chicago Climate Action Plan: Quantitative and Qualitative Assessments" (January 2009).

windows, can be learned on-the-job in a moderate period of time under the supervision of more experienced team members. Formal educational credentials are not necessary, as individuals without a high school degree or equivalency can successfully complete most entry-level tasks, although basic math skills are considered quite important.

By contrast, mechanical work such as HVAC systems, plumbing and electrical systems generally require individuals with specialized vocational training, either through union apprenticeship programs or post-secondary certificate or degree programs offered through community colleges or proprietary schools like Environmental Technology Institute or Coyne American Institute. And in general, the larger the building, the more complex the systems are, necessitating more highly trained labor and specialized contractors. Within Chicago, the vast majority of contractors in these segments of the market utilize unionized construction trades workers.

Like most non-union residential construction firms, weatherization contractors rely primarily on word-of-mouth and other informal recruitment networks to find new workers. Although in comparison to other residential construction firms, contractors who specialize in weatherization and other publicly-funded rehab and retrofit work are often able to maintain fairly stable and experienced “core” crews due to the (relatively) steady nature of the work. This minimizes their need to expand and contract, taking on and training new workers who they may subsequently need to lay off, or utilizing contingent work or day labor. Some weatherization contractors have experience working with community-based organizations to train and hire individuals, such as out-of-school youth or ex-offenders, to work on specific projects where they need to augment their core capacity. While these partnerships have not always led to full-time positions with those weatherization contractors, they can offer meaningful work experience that leads to better employment opportunities for those individuals.

Energy efficiency contractors utilizing union tradesmen and women adhere to more established protocols for hiring and retaining workers, which gives them less discretion in the hiring process but flexibility to adjust to changing demand. Although

some trades, such as laborers and carpenters, allow contractors to bring in a limited number of individuals as apprentices based on a “letter of intent” to hire, in practice entry tends to be circumscribed based upon each trade’s established apprenticeship protocols. These processes have become more standardized in recent years in order to improve the accessibility of construction trades employment opportunities to broader segments of the labor force, including women and minorities.

Career ladders

Career ladders for measure installers can be diverse in nature. (Figure 1) The most direct advancement path is within the contractor. EEBR contractors work in small crews, providing opportunities for cross-training and skill development and, eventually, opportunities to become crew leaders and supervisors as positions open up. Because crew leaders often operate company trucks, having a valid driver’s license is critical to advancement, and one contractor noted that individuals with criminal backgrounds may pose difficulties in terms of insurance liability for vehicle operation. Although formal educational credentials are not critical at the entry level, basic skills such as reading, writing, math, and computer literacy become increasingly important as one moves up the ladder and has greater responsibility for communicating with clients, subcontractors and program sponsors. With time and significant experience, installers can even be positioned to strike out on their own and start their own contracting firm, either within energy efficiency/weatherization or in general construction, or become an energy rater or auditor with the appropriate education and training.

Entry-level pay for measure installers working in single-family and small multi-family residential buildings ranges from \$11 to \$15 per hour plus benefits. Although this is significantly lower than union wage scales, it compares favorably with other segments of residential construction, or positions in other sectors with similar education and training requirements. With experience, non-union measure installers can see their hourly wages rise to \$20 to \$30 or more, plus overtime during peak periods. Specialty trades workers in areas like HVAC and electricians have higher pay scales, ranging

from \$15 to \$20 per hour or more, plus benefits, for union apprentices to \$35 to \$40 per hour for journey-level trades workers.

Entry-level, non-union measure installation positions could provide a good bridge to union apprenticeship programs for those who are interested; such bridges do not currently exist on a formal basis. However, entrance into apprenticeship programs is highly competitive, requiring at least a high school diploma or equivalency and high scores on standardized examinations that are heavily oriented toward mathematical skills. For individuals lacking necessary educational credentials and/or basic skill capacities, entry-level work experience would likely need to be combined with pre-apprenticeship programs that build basic skills and prepare individuals to pass the examination.

Career ladders for union construction workers are relatively well defined. Upon acceptance into an apprenticeship program, with job experience and ongoing classroom training individuals see their wages rise steadily over the course of the apprenticeship process, which can vary from two to five years in length, until they reach the “journeyman” level. Beyond this level, increased earnings are based in part upon an individual’s ability to work a greater number of hours, which his or her seniority provides for.

Education and training

There are relatively few programs that train individuals specifically to become measure installation workers for EEBR activities. A notable exception is the City of Chicago’s Greencorps program, which works with a South Side community-based organization, the Fuller Park Development Corporation, to offer small-scale weatherization training on a biennial basis to individuals participating in the program. The program is currently operating four weatherization crews training a total of 14 individuals. However, a number of programs exist through non-profit/community-based organizations in Chicago to provide *foundational construction skills training* for entry-level positions in the field. (Table 1) These programs are generally targeted at

defined populations, such as low-income jobseekers, ex-offenders, or “at risk” young adults, to help them gain access to work opportunities. The short-term nature of the programs – e.g., the LEED Council’s construction-related training program is only 11 weeks long – does not allow for in-depth skill development, but it can provide a necessary baseline that can be supplemented with on-the-job training. Many of these programs also combine occupational skills with basic skills such as math and literacy – often contextually-based – to improve an individual’s chances of performing successfully on the job. Such programs are generally funded through public or philanthropic sources. The quality and effectiveness of these programs – both overall and in relative terms – is difficult to assess, in large part due to differences and inconsistencies in tracking key outcomes, such as program completion and job placement rates, entry-level wages and job retention.

A highly elaborate system for education and training exists within the building and construction trade unions. The foundation for this system is *union apprenticeship programs*, which are jointly operated by building trade unions and representatives of contractors employing union workers and regulated by the state and federal government. Apprenticeship programs are funded through payroll taxes levied on existing union members and employers, and combine classroom training with extensive on-the-job training. The Chicago & Cook County Building & Construction Trades Council is the largest in the United States, representing over 30,000 members across 24 different unions. Each trade has different entrance requirements based on the demands of that occupation, and opens its doors to new applicants at varying times – some hold their exams several times per year, others only once per year, and others even less frequently. Timing is based on projected demand within the construction market and forecasts of worker retirement and attrition, and is dictated by the U.S. Department of Labor. The current state of the construction market, especially for housing, suggests that apprenticeship openings are likely to be relatively limited in the near term. This condition may not persist, especially if Chicago is awarded the 2016 Olympics, which would greatly stimulate construction activity in the city.

In response to concerns about chronic underrepresentation of women, racial and ethnic minorities in the construction trades, a number of organizations in and around Chicago have developed *pre-apprenticeship* programs that help individuals prepare for union apprenticeship examinations. Chicago Women in Trades is among the most well established of these programs, but others like the New Skill Builders Program at ACE Tech Career Academy and OAI, Inc.'s Pathways to Apprenticeship in Construction Trades (PACT) program have grown in recent years as a result of funding from the Illinois Department of Commerce and Economic Opportunity. Most pre-apprenticeship programs prepare individuals for a variety of trades, but some, like the Jump Start program recently established by Local 134 of the International Brotherhood of Electrical Workers (IBEW), are trade-specific. While these programs provide no guarantee of acceptance into an apprenticeship program (which makes the term “pre-apprenticeship” somewhat misleading), the basic skills and test preparation they offer help level the playing field. And the hands-on occupational skills that some provide can be useful once they get in, or in finding alternative construction-related employment as they wait for apprenticeship opportunities to develop. Although there is no direct evidence that pre-apprenticeship programs have resulted in a significant increase in women and minority representation in the construction trades, they are a potentially important component of the education and training infrastructure for the sector in terms of widening access to well-paid jobs in the trades.

In addition to union-run programs, proprietary trade institutes and community colleges in and around Chicago prepare individuals for careers in the construction sector, especially for specialized areas like electrician and HVAC training. In some cases these are multi-year degree programs that lead toward an Associates of Applied Science, in other cases they are shorter (less than 12 month) certificate programs that are linked to industry-recognized credentials and certifications. Proprietary schools are funded primarily through student tuition, which can run over \$11,000 for private for-profit schools, but eligible students can obtain financial aid in the form of grants and loans to offset these costs, while displaced and disadvantaged individuals can obtain

training vouchers through the federal Workforce Investment Act (WIA) to subsidize their training; according to data from the Chicago Department of Community Development, approximately 30 WIA training vouchers were issued to such programs in 2007. Finally, Dawson Technical Institute at Kennedy-King College offers a series of construction-related courses and certificates, including masonry, carpentry, and plumbing, which train a moderate number of individuals (139 certificates awarded in 2007) for union apprenticeships or other construction-related employment. In general, however, the training infrastructure for the construction trades within the City Colleges of Chicago is relatively modest.

4) *Conclusion*

Increased EEBR activity resulting from the Chicago Climate Action Plan has the potential to generate gaps in the available supply of workers – quite likely for energy auditors, and potentially for measure installers. The extent of these gaps will depend on how quickly retrofit activity is brought to scale (both through subsidized programs and private market activity), how the programs are organized, and the overall state of the labor market for construction activity.

For energy auditors, the projected demand for up to 200 to 300 home energy auditors greatly exceeds the current workforce, which is likely in the range of 50. However, to the extent that demand for energy auditors ramps up gradually as program rollout takes place, it is quite possible that the increased demand could be accommodated by extending existing training activities related to the Illinois Home Weatherization Assistance Program and formalizing courses offered through institutions like Wright College. In any case, it will be imperative for the various organizations funding and operating EEBR programs to reach agreement on training and certification standards for energy auditing.

For measure installers, in theory there are more than enough available, experienced construction workers – both union and non-union – to accommodate the new demand related to CCAP retrofit activity. Even if 2,200 measure installation jobs

are created as the COWS analysis suggests, this would represent only a fraction of total construction employment in the city. This is especially the case for specialty trades like HVAC and Electricians, where the demand from multi-family residential and commercial retrofits is unlikely to outstrip the base of skilled workers. Nonetheless, the nature of home weatherization work, especially for single-family residential buildings and small multi-family buildings, suggests that a significant number – perhaps several hundred on an ongoing basis – of entry-level jobs could be filled through pre-employment programs targeted at disadvantaged populations, who would learn basic construction and weatherization skills and then be hired by contractors. The practical challenge would be scalability and absorption, since an on-the-job training model would require contractors to train new individuals under the direct supervision of skilled workers.

A bigger issue is the potential for gaps in the number of contractors with the experience and knowledge to do home weatherization. For example, program officials interviewed noted that specialized insulation contractors are less numerous than other types, with one suggesting that the labor-intensive nature of that energy efficiency measure – which is the one most commonly installed in single-family homes – allows for lower margins and makes it therefore less attractive to contractors. On the other hand, the current collapse in the housing market is likely to result in more contractors being willing to learn about weatherization, especially if it can be translated into a reliable, longer-term business opportunity. A twofold strategy on the part of EEER program sponsors that, on one hand, builds the capacity of experienced weatherization contractors, and on the other, brings in a select number of new contractors – especially those who are willing to offer competitive wages, hire from job training programs, and provide routes to career advancement – represents the most likely route to addressing potential gaps in the number of weatherization contractors.

An important caveat is that the analysis reported here on demand and supply for EEER jobs is based on the existing programs and models for auditing and installing efficiency measures, which operate on a relatively small scale compared to that

projected by CCAP. Achieving that scale might require new models for organizing the retrofit process, such as a community-scale “block by block” model that could change the parameters of the auditing process (e.g., allowing more homes to be audited with a given number of staff), and also change the work organization on the part of weatherization contractors and subcontractors – potentially creating new job categories such as materials specialists and community outreach workers while changing the skill content and career progression for others.

B) Landscape, Horticulture, Urban Forestry

Opportunities in the “Green Industry”¹¹ – landscape, horticulture and urban forestry – have expanded significantly in Chicago in recent years. This is the result of both the general surge of commercial and residential development within the city, as well as specific public policies like the 1999 Landscape Ordinance, which built upon Mayor Daley’s beautification and “greening” of public spaces by requiring private developers to include more trees and greenery to parking lots and other planned developments. According to the Illinois Department of Employment Security, as of 2006 there were over 10,000 jobs in Landscaping and Grounds Maintenance occupations in the city of Chicago and nearly 21,000 in Cook County and according to the Census Bureau nearly 6,500 private-sector jobs in the Landscape Services industry¹².

The Chicago Climate Action Plan will build upon the demand for landscape-related occupations in the coming years, particularly through its focus on “Green Infrastructure” as a strategy for adapting to climatological changes that are likely to result in more heat and precipitation. Rooftop gardens, additional tree cover and

¹¹ “Green Industry” is a term that is widely used by professional organizations in the Landscape and Horticulture field to describe itself. To avoid confusion with other “green” definitions, I will refer to it as the “landscape” industry.

¹² Illinois Department of Employment Security, Short-Term Occupational Projections for Local Workforce Areas 7, 8, 9, 2006-2008, Grounds Maintenance Workers (37-3000); US Census Bureau, County Business Patterns, 2006, Cook County, NAICS 56173. Detailed industry employment data unavailable at the city level.

stormwater management tools like vegetative swales and rain gardens are all likely to generate demand for both highly-trained landscape professionals and semi-skilled landscape installation and maintenance workers. At the same time, shifts toward more sustainable landscaping practices – from increased use of native plantings to reduction of pesticides – will mean ongoing changes in the kinds of skills required by both professionals and front-line workers in the field.

1) *Industry Overview*

According to the University of Illinois at Urbana-Champaign, which has periodically surveyed the state of the landscape industry in Illinois, the industry can be divided broadly into *product* and *service* firms¹³. Product firms are engaged in growing plants for installation, and/or selling those plants on either a wholesale (e.g., to landscape installation firms or large institutional customers) or retail (i.e., to end consumers) basis. Service firms are engaged in landscape design and architecture, construction and maintenance, lawn care, or arboriculture (i.e., tree care). In practice, many larger landscaping companies are involved in multiple segments of the industry, operating wholesale/retail nurseries, landscape design services, and installation and maintenance operations. But there are also many smaller, specialized companies operating within particular market niches, for example, around green roof design and installation (e.g., companies like Ecosystems and Intrinsic Landscapes) or natural landscape design (e.g., companies like WRD Environmental and Conservation Design Forum).

2) *Landscape/horticulture workers*

The employment structure of the landscape industry exhibits a distinct two-tiered form, generally based on skill and education requirements. Entry points in the lower tier are for *laborers*, who are involved in maintenance, installation and other

¹³ See the University of Illinois at Urbana-Champaign, Natural Resources and Environmental Sciences, Green Industry Survey Reports: <http://www.nres.uiuc.edu/Dynamic.aspx?PageId=83> .

production-related work, while upper-tier jobs include *landscape designers and architects, horticulturalists, and arborists* involved in design, sales and management aspects of the operation. This profile will focus primarily on careers starting from within the lower tier of jobs.

Skills and qualifications

Entry-level positions in landscape maintenance and installation have relatively minimal education and training requirements, with most relevant skills learned on the job. Horticultural skills such as plant identification, planting and propagation techniques are considered helpful but are not a requirement for most entry-level jobs. For landscape maintenance positions a basic familiarity with standard equipment such as mowers and trimmers is essential. The work can be very physically demanding, especially in extreme summer temperatures, making physical fitness an important job requirement.

Most landscape contractors install both “softscapes” (i.e., vegetative matter) and “hardscapes” such as concrete, pavers and stones. Entry-level positions on this side are similar in terms of their skill requirements, although the work tends to be closer in nature to construction labor. Contractors suggested that hardscape work has a significant craft element to it, with an emphasis on attention to detail and accumulated knowledge about how to build installations. For larger commercial installation work, skilled landscape operators are responsible for running excavation and other heavy equipment.

The urban forestry (arboriculture) field is similar to the landscape field in terms of entry-level job requirements and categories. Entry-level maintenance positions involve physical and mechanical work such as pruning trees and grinding stumps, but other semi-skilled positions relate to soil care and insect and pest control.

One of the most challenging aspects of landscape-related fields in a four-season climate like Chicago’s is that the work is highly seasonal in nature. Most contractors rely heavily on part-time and seasonal labor – e.g., students, and especially migrant

workers – to accommodate peak summer demand, and maintain a smaller core staff for the shoulder and winter seasons. Maintaining experienced frontline workers from season to season can represent a challenge for contractors, and as a result they use various strategies, from allowing workers to “bank” summer hours toward winter, expanding winter services like holiday lighting and snow removal, to utilizing 12-month employment contracts that allow workers to collect unemployment insurance during the off-season. This seasonality ensures that entry-level opportunities are almost always available in the late spring and summer, but it poses challenges for new entrants to the industry in terms of maintaining steady work and earnings.

Another challenge for entrants into the industry is the tendency toward informal recruitment methods on the part of contractors. While this lowers recruitment costs, it also reinforces exclusionary hiring patterns leading toward a homogenous workforce. In the case of the landscape industry, Latino immigrants are considered the workers of choice for their perceived willingness to work long hours for low pay. Job training programs like Greencorps attempt to reach out to progressive employers to give them alternative sources of job-ready workers, but due to their small scale they do not represent a major recruitment source for most contractors.

Workplace training for OSHA safety protocols is standard throughout the industry, and individuals whose jobs involve the application of chemicals and fertilizers must pass a state certification. Additionally, some landscape contractors like Christy Webber Landscapes are beginning to offer formal horticultural training, and in some cases English language training, to their hourly workforce to help them strengthen their skills and knowledge base and improve their capacity to advance into supervisory and front-line management positions. And some are utilizing the Certified Landscape Technician (CLT) credential recently developed by the Professional Landcare Network to codify skill and knowledge areas used in the field.

The sustainability movement has the potential for significant impacts on the kinds of skills required by workers in the landscape field, although at present these changes have not yet become widespread within the industry. The shift toward more

sustainable landscape practices, such as the use of native and drought-tolerant plants, reduced usage of inorganic pesticides and fertilizers and permeable hardscape surfaces, may result in a change in the types of skills and knowledge that frontline workers require to do their jobs. Other areas like “green roofing” are still niches at present but could eventually emerge into a robust subfield for landscape installation workers.

Career ladders

Most landscape contractors maintain relatively strong internal career ladders that link entry-level positions to more specialized, semi-skilled positions and front-line supervisory slots (Figure 2). From entry-level laborer/maintenance positions, which can range from \$8 to \$11 per hour to start, individuals can move directly into foreman or crew leader positions that provide modest increases in pay in exchange for greater responsibility for team performance. At this level, individuals are usually required to have a (commercial) driver’s license to operate company vehicles to and from job sites. In addition to front-line supervisory positions, most companies fill specialized installation positions such as plantsmen, as well as support positions like drivers, yard and equipment maintenance and managers through internal promotion rather than external hires. More lucrative – and more typically unionized – laborer and equipment operator positions on the commercial landscape side of the business, which can pay upward of \$30-35 per hour (albeit with less stability in hours worked), are also considered advancement positions for which contractors generally promote from within.

With time and experience, individuals can rise from entry-level positions to field supervisors, who have direct oversight over particular job sites and multiple work crews. These positions pay in the \$35-40,000 range annually, and do not necessarily require formal educational credentials or specialized horticultural training. In moving beyond this level, however, a lack of formal education and training can become a significant barrier to advancement. For higher level project management, landscape design, horticulturalist, arborist and buyer positions, employers are increasingly seeking individuals with a college degree, preferably but not necessarily in a related

field such as horticulture. In addition to new graduates from two- and four-year colleges and universities, a growing number of “career changers” are utilizing certificate programs offered by community colleges and institutions like the Chicago Botanic Garden to access entry-level opportunities at the professional level within the landscape field. Although this is not necessarily a negative development on its own, it does create an education-based gap for individuals in moving from frontline into professional positions.

Education and training

Currently, the education and training infrastructure for helping individuals enter and improve their skills within the landscape industry tends to be geared toward postsecondary degree and continuing education programs for professionals within the upper-tier occupations like landscape designers and horticulturalists (Table 2). This reflects the fact that entry-level positions within the lower tier have relatively low skill requirements, with most key skills learned on the job.

However, in Chicago there are a small but increasing number of organizations that target entry-level landscaping occupations as an opportunity for helping disadvantaged populations gain skills and labor market experience. The two most prominent of these programs are Greencorps Chicago and Chicago Christian Industrial League (CCIL). Greencorps is a City-run job training program that has operated since 1994 to provide individuals with training and work experience over a nine-month period, primarily around landscaping but increasingly around a range of “green” occupations. CCIL is a non-profit organization based on Chicago’s West Side that provides job training and other social services to populations in need, which began offering landscape training in 1993 as part of a partnership with the City to provide landscape maintenance services on a social enterprise basis. In both cases, these programs combine classroom training in both basic skills and occupationally-specific skills like plant identification with significant on-the-job, hands-on training, for which individuals are paid at roughly minimum wage. At the conclusion of their program,

program managers attempt to place graduates in permanent jobs, either in the landscape industry or in other related fields like warehousing and construction. Combined, the programs graduate roughly 60 individuals annually, not all of which go into the landscape industry. For this reason, these programs are not currently considered a major recruitment source for landscape companies in Chicago.

Community colleges are among the primary sources of education and training targeted at the landscape field. According to the Illinois Community College Board, roughly half of all community colleges in Illinois offer two-year Associates of Applied Science (AAS) degrees in Applied Horticulture, and/or shorter, non-degree Occupational Certificates in specific topics like Ornamental Horticulture, Greenhouse and Plant Nursery Operations, Turfgrass Management and Floriculture. Certificates represented 59 percent of the 162 Applied Horticulture credentials awarded by Chicago-area community colleges in the 2006-2007 academic year¹⁴, reflecting the tendency for many such programs to attract career changers who have already obtained a postsecondary degree in another field, or who are already working within the landscape field in some capacity. The most established community college horticulture programs in the Chicago metro region are in the suburbs – College of DuPage, Harper College and Joliet Junior College. Within the City Colleges of Chicago, Landscape/Horticulture programs have existed over the years at Daley College-West Side Technical Institute, and most recently at Harold Washington College (HWC). HWC is planning to shift its program from an Associate’s Degree program to a Certificate program, in part due to the program’s tendency to attract individuals already possessing a college degree. The lack of a well-established Landscape/Horticulture program within the city of Chicago represents a significant gap in the education and training infrastructure for the industry, especially for companies and residents within the city.

¹⁴ Data from National Center for Education Statistics, Integrated Postsecondary Educational Data System.

Bachelor's degree (and above) programs in Landscape Architecture, Horticulture and Plant Sciences are fewer in number within the Chicago area, but the options are increasing. The University of Illinois at Urbana-Champaign (UIUC) recently established a Chicago-area program in Horticulture, specializing in Landscape, Nursery and Turf, which allows individuals to complete coursework online and at two suburban locations toward a Bachelor's of Science degree. And Northwestern University recently established a Master's Degree program in Plant Biology in conjunction with the Chicago Botanic Garden in Glencoe. Beyond these programs, land-grant universities such as UIUC, Purdue, Michigan State, Iowa State, and Wisconsin (Madison and Platteville) are considered among the top programs regionally for individuals entering the landscape field at the professional level.

In addition to degree-granting institutions, there are several industry-related non-profit organizations and public entities that serve as a resource for training related to the landscaping field. Within the Chicago area, the two major entities are the Chicago Botanic Garden in Glencoe and the Morton Arboretum in Lisle. Both offer non-degree certificate programs at relatively low cost (a few hundred dollars per class), similar to community colleges, targeted at individuals interested in either getting into the field or simply fulfilling a personal interest in the subject. The Master Gardner Program run by the University of Illinois Extension Service falls into this latter category. In addition, the Botanic Garden, the Illinois Landscape Contractors Association, the Midwest Ecological Landscape Association, and other organizations offer "short courses" and seminars on a variety of topics, which allow professionals within the field to learn about new technologies, practices, and techniques, such as the trend toward sustainable landscape practices.

3) Conclusions

Jobs in landscaping, horticulture, and urban forestry are projected for moderate job growth in the coming decade, and the strategies proposed in the Chicago Climate Action Plan, which include planting more trees, installing green roofs, expanding and

adding sustainability criteria to the City's Landscape Ordinance, and using "green infrastructure" elements such as rain gardens, permeable hardscapes and bioswales, will all further the demand for these occupations. This effort to make Chicago a more verdant city will generate demand for both entry-level positions in installation and maintenance, and higher level design and management positions, although this may be offset to some extent by landscape practices that require less maintenance.

Entry-level landscape maintenance and laborer positions have relatively low education and training requirements but equally low wage levels, which is often fueled by cost-based competition for public and private maintenance contracts. Internal career ladders linking entry-level jobs to specialized equipment and maintenance occupations and frontline supervisory positions are common within the industry, but advancement to higher-level design, sales and management positions is generally limited to individuals with postsecondary education and/or specialized horticultural training. A small number of landscape contractors are striving toward "high road" employment practices, hiring a more diverse workforce, paying above-market wages and permitting union organization, and offering training that helps frontline workers to advance.

The existing education and training infrastructure in the Chicago area for the landscape industry is largely geared toward professional positions in the areas of horticulture and landscape design. An array of short course offerings targeted at professionals is available through places like the Chicago Botanic Garden, Illinois Landscape Contractors Association and the Midwest Ecological Landscape Association, and existing degree and certificate programs in community colleges are increasingly focused on already-educated career changers. To the extent that there appears to be gaps in the workforce training infrastructure serving this industry, they are twofold: first, training targeted at the hourly incumbent workers in the industry - and their employers - to help them strengthen their basic and industry-specific skills in ways that would facilitate advancement; and second, capacity within the city of Chicago, as most of the established providers are located in the suburban areas, away from businesses and individuals working in the city. Strengthened landscape/horticulture offerings

through Harold Washington College – the only City College with programming in the field – could help to address these gaps.

C) Recycling and Reuse

The third area where the Chicago Climate Action Plan is likely to generate near-term opportunities to create jobs and workforce opportunities is around the broad category of *recycling and reuse* occupations. The Plan’s “zero waste” strategy, which sets a goal of reducing the city’s waste stream by 90 percent by 2020, offers a wide variety of opportunities to stimulate new enterprises – public, for-profit and non-profit – engaged in the recovery, processing and reuse of materials otherwise destined for the region’s landfills. According an analysis by the environmental consulting firm CDM for the Chicago Department of Environment, a ten percent increase in the City’s overall recycling rate could generate nearly 1,000 new jobs within and around Chicago. These range from activities where markets are already nascent, such as waste oil recycling, to others that will likely require more direct stimulus from public policies, such as building deconstruction and organic waste/composting. Many of these activities offer excellent opportunities to build workforce development programs that could help a modest but meaningful numbers of individuals gain labor market experience and begin the path toward economic self-sufficiency.

1) Industry overview

The recycling industry can be conceptualized as a “revalue chain” that takes materials that have already been used for one purpose and restores their use and exchange values through reprocessing, remanufacturing, and/or identification of new end markets. The “Illinois Recycling Economic Information Study” completed in 2002 for the Illinois Department of Commerce and Community Affairs categorized recycling industry activities in terms of four broad functions: collection, processing, manufacturing (i.e., using recycled materials as inputs, such as steel mini-mills or

engineered plastic products), and reuse/remanufacturing (i.e., rebuilding and reusing recycled materials, such as electronics, tires or building materials)¹⁵. By their estimate, the industry employed over 56,000 individuals in Illinois as of 2002.

Enterprises in the recycling industry range from public sector municipal solid waste (MSW) collection operations to multinational corporations like Waste Management, which own and/or operate materials recovery facilities under municipal recycling contracts, to small for-profit businesses like Mahoney Environmental, a Joliet-based waste oil recycler, that have entered profitable niches created by market trends (e.g., increased commodity prices) or government contracting opportunities (e.g., operating publicly-sponsored e-waste recycling programs), to non-profit organizations like The ReUse People, the California-based organization that operates a social enterprise model for building deconstruction and resale of recovered building materials. This latter category represents one of the most promising areas for the recycling and reuse industry from a workforce development perspective, for two reasons; one, because the social mission of nonprofits typically includes creating employment and training opportunities for disadvantaged populations; and second, because of a competitive advantage built into the tax system that allows them to offer donors of recyclable materials tax write-offs for the value of their materials, which can serve to catalyze nascent markets for those activities.

2) *Recycling/reuse occupations*

There is no “typical” recycling occupation. The process of recovering recyclable materials can take many forms, from collecting bottles, cans, and paper from city streets, to driving and picking up appliances from households and businesses, to the systematic dismantling of obsolete buildings for their salvage parts. Similarly, the “downstream” value re-creation activities – from processing to remanufacturing to resale – vary greatly as well from production occupations to retail sales occupations. In

¹⁵ R.W. Beck Inc., “Illinois Recycling Economic Information Study,” Final Report to Illinois Department of Commerce and Community Affairs, December 2001.

fact, the only occupational function that is relatively common across recycling enterprises is the need to transport those materials from the point of collection to points of distribution and/or processing. But even then, this function takes on different forms from enterprise to enterprise.

Skill requirements

Because of the varied nature of the work of recycling, it is difficult to generalize about the skill requirements involved. One feature, however, that can be generalized is that recycling collection and processing functions tend to be labor-intensive in nature. From an economic perspective, one of the reasons that materials are discarded rather than recycled is that the time and labor necessary to recover them often does not make it cost-effective to do so. In some cases the value of raw materials increases to a point where labor-intensive modes of collection are economical; this has been the case in recent years with metals like aluminum, copper and steel. For most other materials – from building materials to plastics to electronics – the time-cost of collection and processing exceeds either their potential exchange value or the cost of disposal. In many cases, it is the potential environmental benefit of recycling that justifies subsidies for labor-intensive recovery efforts that would otherwise not be feasible economically.

An excellent illustration of this is refrigerator recycling. Because of the toxic chemical fluids that are used as coolants in refrigerators, federal law requires that those fluids must be drained before disposal can occur. As a result, many large appliance retailers and wholesalers, as well as specialized recyclers like ARCA Incorporated, utilize automated equipment that drains those fluids quickly and efficiently. However, one of the most environmentally deleterious aspects of refrigerators is the rigid foam that is used to insulate the appliance and prevent energy loss, which when landfilled emits ozone-depleting gasses at a rate significantly greater than automotive emissions. To comply with the Environmental Protection Agency's (EPA) Responsible Appliance Disposal guidelines, appliance recyclers like JACO Environmental – which operates ComEd's recently opened refrigerator recycling facility in suburban Lombard – employ

a small team of individuals whose job entails, essentially, the manual destruction of the refrigerator unit, using hand tools like mechanized cutters to pull out and segregate the metals, plastics, and rigid foam for appropriate recycling and/or disposal¹⁶. These jobs are relatively unskilled in nature – they are accessible to individuals with low levels of education and require no specialized training – and are generally low-paid as a result. But from an economic perspective, there is no incentive to engage in such labor-intensive recovery activities; only the environmental benefits (reflected in ComEd’s contract to JACO) make such activities possible.

In many cases, the work of recycling emulates skills in other types of occupations. For example, the job of building deconstruction and salvaging of building materials closely parallels the work of building construction, in particular carpentry skills. Collecting recyclables as part of supplementary street cleaning, as The Cara Program’s Cleanslate program does, closely resembles the work of janitorial and building services occupations. And the work of composting organic waste materials draws on agricultural and horticultural principles. The relevance of this point is that job training programs to prepare individuals for entry-level positions would likely differ in terms of the occupational skills and learning that would be emphasized, even though in most cases the entry-level positions themselves would likely not require specialized training per se.

Career ladders

As noted, entry-level positions recovering and processing recyclable materials are often relatively low-skilled in nature and can be performed without any significant amount of formal education or specialized training. For this reason they are attractive options as “transitional jobs” for individuals with low levels of educational attainment,

¹⁶ One of the most disturbing trends related to the salvage value principle of recycling is that the increased price of metals has spurred an “informal” system of recycling whereby enterprising individuals collect refrigerators and other appliances from alleys and other unregulated locations (including landfills) and take them to metals recyclers – either *in toto* or dismantled – for their scrap metal value alone, a process that does little to guarantee environmentally responsible disposal of fluids, let alone the rigid foam.

little if any labor market experience and, consequently, few occupational skills. Programs like Cleanslate, and other transitional jobs (TJ) programs for that matter, are not necessarily designed with intent of connecting those entry-level job experiences directly to semi-skilled jobs in related occupations. Rather, they operate on the premise that work experience in itself – regardless of occupation – is a marketable skill to potential employers, and that the “soft skills” and life skills associated with work, such as teamwork, reliability and respect for authority, are the baseline requirements for successful labor market attachment.

This may be the case, but ideally, TJ programs should also provide individuals with specific occupational skills, marketable credentials – and even direct employment opportunities – that make the next step on the career ladder more apparent. A good model in the area of recycling and reuse is *RWA Resource Recovery*, a project of the New York City non-profit organization The Doe Fund (TDF). RWA, which stands for “Ready, Willing and Able,” is one of several social enterprises operating under the aegis of The Doe Fund that provides occupational training and work experience to their client population, which is comprised of ex-offenders, recovering substance addicts, and homeless individuals. TDF’s main program is 12 months long and includes life skills training, computer training, and other job readiness skills to prepare individuals one of several transitional job “tracks” they offer, including supplementary street cleaning, pest control, security and food service.

RWA was started in 2006 as an enterprise that collects waste vegetable oil from restaurants and sells that oil to producers of biodiesel in the New York area. Although a growing number of larger restaurants and restaurant chains were beginning to see the financial benefits of contracting with for-profit “grease haulers,” who were increasingly able to pay restaurants for their waste oil, many smaller neighborhood restaurants were being missed due to their size. Being a non-profit organization, RWA can offer restaurants free pickup of their waste oil in exchange for an end-of-year certification of the value of their “donation” that can be written off on their taxes. Based on this business model, RWA developed a fleet of three trucks, employing five full-time staff

(four drivers and a warehouse manager) and ten helpers from the TDF program. This past year they obtained a foundation grant to expand their operations, with the goal of eventually operating 12 trucks running two shifts, seven days a week, which would result in approximately 30 full-time positions and 60 helpers. To staff this growth, RWA plans to hire from its pool of helpers, who will train toward a Class B Commercial Driver's License necessary to operate a tanker truck. Others can take their experience and skills into other private-sector jobs, particularly in warehousing and transportation. By offering permanent employment opportunities within its core enterprise, RWA hopes to make the potential career ladder for its trainees more visible and transparent.

As organizations examine social enterprise models for recycling and reuse activities, they should consider both the potential for creating entry-level jobs with modest skill requirements, but also how they can ensure both internal and external career ladders for those individuals.

Education and training

There are a small number of organizations in Chicago that currently operate social enterprises and/or job training programs related to recycling and reuse, or are in the planning phases (Table 3). These include The Cara Program's Cleanslate initiative for supplemental street cleaning and recycling, Delta Institute's initiative around building deconstruction (with Safer Foundation and The ReUse People), and Computers for Schools around electronics recycling (in partnership with Greencorps). These programs (will) operate off a variety of income sources, including philanthropic funds, program income from their services, and public grant funding. A number of other organizations provide training in related skills, such as janitorial skills, material handling, or construction.

3) Conclusion

The Chicago Climate Action Plan's strategy for waste reduction will help to stimulate the market for new enterprises engaged in recycling and reuse of materials.

Some of these enterprises, especially around labor-intensive materials recovery and processing functions, could lend themselves to non-profit-operated social enterprises committed to providing meaningful employment and training opportunities to disadvantaged populations while at the same time accomplishing CCAP's environmental goals. These opportunities could range from building deconstruction to waste oil collection to organic waste and composting. If designed well, they could provide more than just transitional jobs – they could be intentionally linked to occupational career ladders both internal and external to the enterprise.

From the City's standpoint, it could further the development of such enterprises in two ways. One, it could help build the demand for such enterprises through its procurement activities (similar to what it does with the Chicago Christian Industrial League around landscape maintenance services), incentives to encourage recycling of materials rather than disposal (or use of recycled or recovered materials rather than virgin materials), or regulations (e.g., stricter enforcement of waste oil disposal guidelines for restaurants). The second avenue would be to support the establishment of such enterprises, through financial support and technical assistance to develop training programs and help organizations obtain startup financing.

III. Conclusions

The Chicago Climate Action Plan (CCAP) will generate jobs in a variety of different occupations and industries, from energy efficiency installers to landscape workers to renewable energy installation. The promise of the “green collar jobs” movement is that these labor market opportunities can be channeled to populations, such as ex-offenders, public housing residents and long-term unemployed – who experience difficulty in finding gainful employment, and that these entry-level opportunities should be linked to more highly-skilled, better-paying jobs further up the career ladder. “Green jobs should be good jobs” is a powerful normative idea that

frames the movement, and it should inform the work of the City of Chicago and its partners as they implement CCAP.

As appealing as the idea of building career ladders is, the experience of the workforce development field over the past decade or so suggests that it is infinitely more difficult to put into practice than to draw on paper. This is because effective career ladders require a coordinated effort to incent employers to make investments in training and development that may not benefit them immediately or directly, align education and training resources such as community colleges to support workplace learning and educational advancement, and work with individuals to help them understand their career advancement possibilities.

Summary of Findings

This report examined the skill requirements, career ladders and training gaps for the three occupational areas where CCAP is most likely to impact the local labor market – energy efficiency, landscaping/horticulture/urban forestry, and recycling/reuse.

- *Energy efficiency* occupations, specifically auditors and measure installation (weatherization) workers, represent the most obvious impact area due to CCAP's ambitious goals for residential and commercial building retrofits over the coming decade. There is certain to be a supply gap for energy auditors, an occupation requiring strong basic skills but accessible through short-term training. And while the current slump in the building market has generated a surplus of construction labor, there are likely to be significant opportunities to train individuals for entry-level measure installation positions that offer diverse career ladders.
- *Landscape* occupations, which will continue to offer significant numbers of entry-level job opportunities based on CCAP's goal of utilizing Green Infrastructure to cool the city and manage stormwater. For this sector there is a potential need to strengthen systems for career advancement for incumbent workers, which could

be achieved by incenting progressive landscape contractors who invest in training and better utilizing the City Colleges.

- *Recycling and reuse* is a broad category where CCAP's "zero waste" strategy could generate opportunities to build innovative social enterprises that provide transitional job opportunities to targeted populations. But a high priority should be placed on building internal and external career ladders into those programs, and not simply providing work experience.

Implications for CCAP Workforce Initiative

As the City of Chicago and the Chicago Jobs Council implement the Workforce Initiative component of CCAP, there are several implications that can be drawn from this research. First is that the Initiative needs to develop a set of differentiated strategies and partnerships to address the particular needs of the different sectors that are impacted by CCAP. Green jobs are not a sector. By pulling together stakeholders relating to each sector, including employers, public agencies, unions, educational institutions, trade associations and others, the Initiative will benefit from a more focused conversation about the workforce needs facing that sector.

Second, to ensure that "green jobs are good jobs," the Initiative must look for ways to make job quality and economic opportunity priorities whenever possible, and use its role in implementing CCAP to advance this agenda. This means using a variety of policy levers, including living wage and prevailing wage standards, local hiring and "first source" agreements, procurement incentives for "high road" businesses, and training resources, to ensure that businesses who are doing the work of CCAP are providing good jobs with real career opportunities.

Tables and Figures

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Table 4	Entry, Median and Experienced Wages, Typical Occupations
Figure 1	Energy Efficiency Career Ladder
Figure 2	Landscape Career Ladder
Figure 3	RWA Resource Recovery Career Ladder

Table 1

Energy Efficiency and Construction (Non-Degree) Training Programs in Chicago, by Type

Energy Auditing

Building Performance Institute
RESNET – Home Energy Rating System (HERS)
Illinois Home Weatherization Assistance Program
Wilbur Wright College -- Building Energy Technology Program

Weatherization

Greencorps/Fuller Park CDC

Construction - Basic Skills

Center for Employment Training
Dawson Technical Institute - Kennedy-King College
Fuller Park-Southpoint Academy
Gordie's Foundation Inc.
LEED Council
Michael Barlow Center/St. Michael's Ministries

Union Apprenticeships

24 programs affiliated with Cook Cty Building & Construction Trades Council, most directly related to EE include: Carpenters, Electricians, Boilermakers, Heat & Frost Insulator, Pipefitters/HVAC-R, Plumbers, Sheet Metal Workers

Pre-Apprenticeship Programs

Chicago Women in Trades
Coalition for United Community Action - ORTC Inc.
IBEW 134 Jump Start
New Skill Builders Program
OAI Inc./Pathways to Apprenticeships in Construction Trades

Specialty Trade Certificates

Coyne American Institute
HVAC Tech
Environmental Technology Institute
Chicago Professional Center

Table 2

Landscape/Horticulture Training Programs in Chicago, by Type

Basic Landscape/Horticulture Skills

Greencorps Chicago
Chicago Christian Industrial League
Windy City Harvest

Community College (Advanced Certificate/AAS)

College of DuPage
College of Lake County
Harold Washington College
Harper College
Joliet Junior College
Triton College

Baccalaureate and Above

UIUC Horticulture Program - Chicago Program
Northwestern University - Plant Biology (w/ Chicago Botanic Garden)

Certificate/"Short Course"

Chicago Botanic Garden
Illinois Landscape Contractors Association -- CLT/CLP certification
Midwest Ecological Landscape Association
Morton Arboretum
UI Extension - Master Gardener Program

Table 3

Recycling and Reuse Training Programs in Chicago

The Cara Program (Cleanslate -- Supplemental Street Cleaning)
Computers for Schools (Electronics Recycling)
Delta Institute, with Safer Foundation and The ReUse People
(Building Deconstruction)

Table 4

Entry, Median and Experienced Wages, Typical Occupations

Occupation	Entry	Median	Experienced
<i>Energy auditors</i>			
Energy Engineers (Mechanical)	\$45,141	\$72,709	\$90,187
Home Energy Auditors*	\$25,000		\$55,000
<i>Energy efficiency measure installation</i>			
Front-line Construction Managers	\$29.35	\$39.57	\$47.37
Plumbers & Pipefitters	\$18.68	\$36.51	\$39.96
Electricians	\$24.79	\$36.30	\$38.95
Boilermakers	\$7.58	\$34.89	\$37.52
Carpenters	\$19.07	\$33.80	\$36.70
Sheet Metal Workers	\$11.18	\$29.52	\$34.21
HVAC Mechanics & Installers	\$19.00	\$26.38	\$32.82
Insulation Workers (Floor, Ceiling, Wall)	\$14.40	\$17.80	\$19.58
Construction Laborers	\$7.46	\$15.64	\$26.15
Carpenter Helpers	\$9.12	\$13.87	\$21.93
<i>Landscape, Horticulture and Urban Forestry</i>			
Landscape Architects	\$25.39	\$28.80	\$35.99
Tree Trimmers and Pruners	\$19.55	\$25.76	\$28.77
Forest and Conservation Workers	\$16.41	\$23.83	\$26.29
Front-line Landscape Managers	\$15.51	\$22.13	\$29.22
Pesticide Handlers and Sprayers	\$10.41	\$17.26	\$25.65
Landscaping/ Groundskeeping Workers	\$8.82	\$11.74	\$15.36
<i>Recycling and Reuse</i>			
Refuse/Recyclable Material Collectors	\$12.67	\$22.40	\$26.12
Truck Drivers, Light or Delivery Services	\$9.54	\$14.66	\$19.28
Helpers--Carpenters	\$9.12	\$13.87	\$21.93
Laborers and Material Movers, Hand	\$8.04	\$11.16	\$14.42

Source: Illinois Department of Employment Security, Labor Market Information, Occupational Wage Survey, Cook County, 2008 3rd quarter. Data are for workers in all industries. Data unavailable for Home Energy Auditors -- information from interviews and secondary sources used instead.

Figure 1
Energy Efficiency Career Ladder

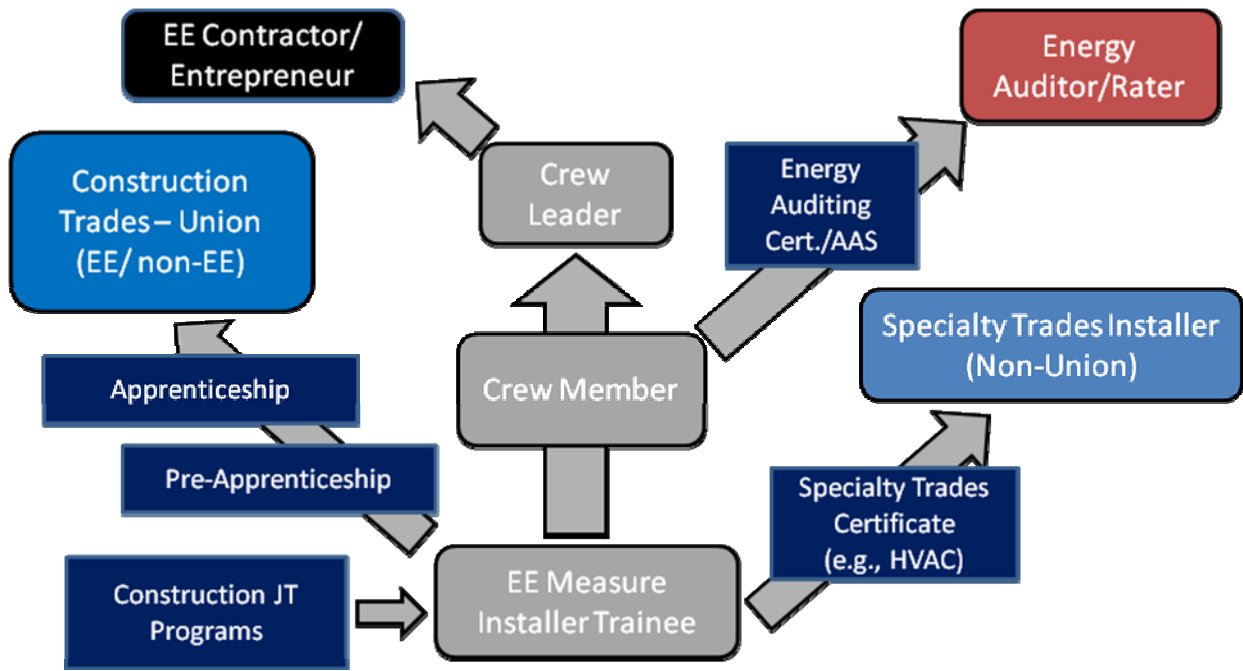


Figure 2
Landscape Career Ladder

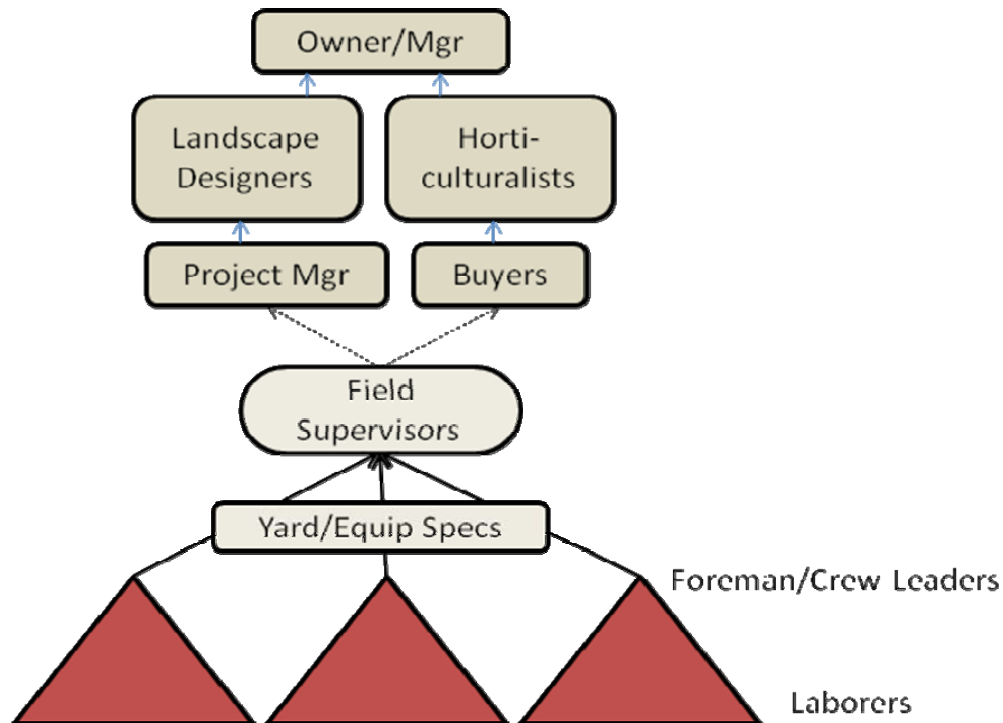
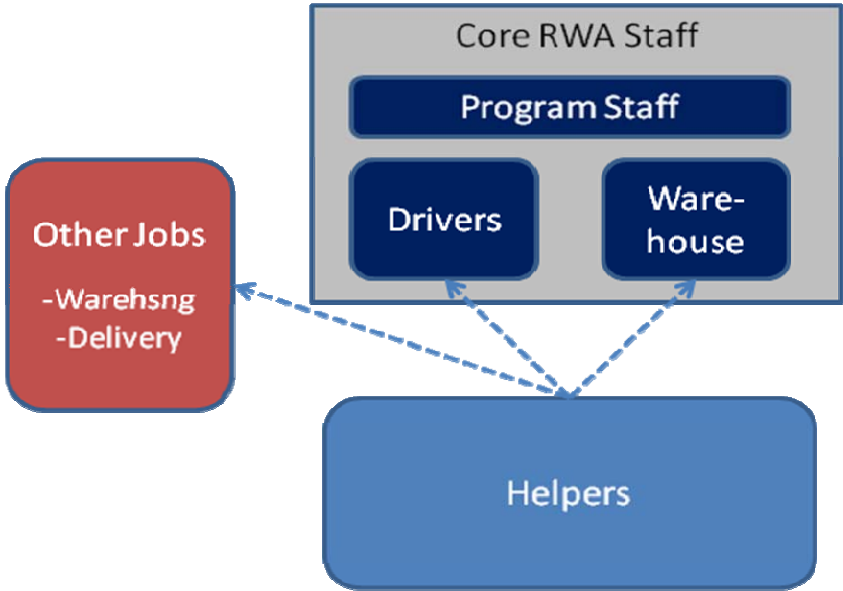


Figure 3
RWA Resource Recovery Career Ladder



Appendix

Interviewees/Information Providers

Energy Efficiency/Construction

Cavallo & Associates
CEDA Weatherization
Center for Employment Training
Chicago Women in Trades
CNT Energy
Cook County Building and Construction Trades Council
Dawson Technical Institute
Delta Institute
DNR Construction
Fewer Boiler
Fuller Park Development Corporation
IBEW-NECA Technical Institute
Informed Energy Decisions
LEED Council
Leopardo Construction
New Skills Builders Program
OAI Inc./PACT
OAKK Construction
Parliament Builders
Siemens Building Technologies
Solid Builders
Wilbur Wright College

Landscape/Horticulture/Forestry

CCIL Landscape Services/Aramark
Chicago Botanic Garden
Chicago Christian Industrial League
Chicago Park District
Christy Webber Landscapes
College of DuPage
Greencorps Chicago
Harold Washington College
Hoerr Schaudt Landscape Architects
Illinois Landscape Contractors Association
Intrinsic Landscaping
McAdam Landscaping
Morton Arboretum
The Care of Trees
Windy City Harvest

Recycling/Reuse

Chicago Manufacturing Center
Chicago Recycling Coalition
ComEd
Delta Institute
Illinois Recycling Association
JACO Environmental
RWA Resource Recovery
The Cara Program
The ReUse People