Building a Greener KC

Transforming an Industry

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The Mid-America Regional Council

MARC
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Executive Summary

BUILDING A GREENER KC: TRANSFORMING AN INDUSTRY

Workforce development to meet the need for "green" knowledge, practices, and skills in new residential and commercial construction, building retro-fitting, and demolition is a key objective of a steering committee that includes representatives from MARC, the Greater KC Chamber, OneKC WIRED, Metropolitan Energy Center, Johnson County Community College and the Metropolitan Community College. The intent of these organizations is to identify the new training needs of Kansas City area businesses attempting to adapt to sustainable energy and energy efficiency opportunities.

Findings from this study include:

- The industry is only slowing becoming "green" in response to customer demand. Demand is driven by incentives, public policy, and public awareness; knowledge of appraisers, lenders, and insurers; and the skills of architects, designers, and contractors in making a case for green building.
- Most training will be for incumbent workers, and it is most likely to be accomplished on the job.
- Green knowledge starts at the top; architecture, design, and manager professionals need to understand and adopt green practices to enable construction workers to build green. The universities need to be part of the collaboration.
- The lead occupations in sectors that are large, high paying, and growing are Carpenters; Construction Laborers; Construction Managers; Electricians; Plumbers, Pipefitters, and Steamfitters; and Heating, Air Conditioning, and Refrigeration Mechanics and Installers, which thus should be the initial focus for "greening" of occupations.
- The construction industry is expected to recover nationally and regionally over the next 5 years;
- There are a plethora of certifications for both buildings and workers, which can create confusion for consumers and professionals alike.
- If we rely solely on incentives, there is a danger that green practices may fade away when the incentives do. We must get to the point where green practices are an integral part of our culture -- the way we do business
- There are gaps in infrastructure that need to be filled to enable the industry to be more green: e.g., sufficient and inexpensive means of recycling materials; locally available green materials; a tax credit for commercial deconstruction similar to residential; and local deconstruction appraisers.
- Educational institutions and unions need to incorporate significantly more green knowledge and practices into their existing training so their graduates and

apprentices will be more competitive in the job market and adaptive to future industry practices.

- On-going collaboration among public and private education and training entities and between the training entities and employers would reduce duplication and increase relevance.

WHAT ARE OUR ASPIRATIONS?	STRATEGIES
➔ The greater Kansas City region will be nationally recognized as a leader in green construction practices and skills. ➔ 100% of all incumbent construction workers will minimally receive green construction awareness training. ➔ The number of individuals in the region who receive LEED Accredited Professional (AP) certification or other "green" certifications will increase annually ➔ All secondary, postsecondary, union, and non-union construction training programs will incorporate green knowledge and practices in their curriculum. ➔ 100% of all public buildings in the region (libraries, schools, city halls, etc.) and private buildings (churches, offices, homes, retail stores) will have had an energy audit leading to action that resulted in lower average energy consumption per square foot. ➔ All customers of residential and commercial construction will demand higher energy efficiency and have expectations for green building and green practices at the construction site (as reported by home builders, designers, architects, and engineers).	➔ Strategic connectivity among groups working on "green" (MARC, KCP&L, KDADC, LMC, Metro Energy Center, KC Chamber, et. al.) to align goals and strategies. ➔ A steering committee led by MARC to provide direction to aspirations, track strategy development, measure progress, and apply for federal and state grants on behalf of the entire region. ➔ Bi-state and community incentives and building code changes to transform behaviors and investments. ➔ On-going employer advisory group comprised of leaders in green construction to provide input and direction to the steering committee. ➔ Job task analysis of green practices by occupation to document specific skills, knowledge, and practices required for green construction. ➔ Exploration of the feasibility of a greater Kansas City education and training system virtual Green Center of Excellence for sharing curriculum, instructors, professional development, and so forth. ➔ Creation of a single portal where employers and skill seekers can access availability and locations of construction and green practice skills training. ➔ Development of a KC green construction brand. ➔ Development of regional bi-state outreach materials to educate the public that include a business case for energy conservation.

The Steering Committee's recommended next steps are:

- ➔ Development of a plan to establish a green construction sector-based partnership, including identifying an intermediary. Since the partnership would

have this study as a starting point, they could likely get to strategies and action steps relatively quickly. However, the real advantage to having an ongoing sector-based partnership is that they would be assessing and reassessing needs on an ongoing basis and designing solutions to meet those changing needs.

- Identification of an industry leader(s) who can be the "champion" for promoting this effort. Champion(s) lend credibility to an industry partnership, and can recruit interested employers through their industry connections. Knowing that there is backing from a recognized, respected and enthusiastic employer representative, who sees the worth and value of a partnership, can often be the glue that holds the group together in the initial phases.
- One-on-one meetings with key industry leaders in the region to discuss their plans and challenges and share the strategic direction.
- An initial convening of the leaders of various groups and public and private sector stakeholders to present the findings of this study and begin the discussion about alignment and the benefits of developing a more formal sector-based partnership. This would also be an excellent opportunity to test the waters for supporting a sector-based approach to workforce development in the construction industry. You may want to consider having a panel of public and private sector individuals who are involved in successful sector-based initiatives outside the region so that they can discuss the benefits of the sector-based approach, funding mechanisms, etc., and/or visits to sector-based regional skill alliances that are successful in other regions (even if they are different industries) to learn how they finance and manage their work.
- Exploration of a virtual Green Center of Excellence for the Greater Kansas City education and training network for sharing curriculum, instructors, and professional development (as articulated by the Study Steering Committee). This system should become closely linked to the sector partnership when/if it evolves; with overlapping membership and ongoing communication to ensure that the education and training system continues to meet the changing needs of the industry.
- Moving the green construction partnership into the WIRED sustainability framework, and identifying separate but related sectors that would benefit from this same process/model for sector work.
- Planning for an annual update of the secondary and primary research contained in this report to track industry trends.
- Final consensus on a vision and strategies and who will do what, by when to move the next steps forward.

Introduction

The Mid-America Regional Council (MARC), is an association of city and county governments and metropolitan planning organizations serving a nine-county, bi-state, greater Kansas City region. At a December, 2008 meeting of the Greater Kansas City Chamber of Commerce Energy Policy Committee, representatives of the Chamber, MARC, Metropolitan Energy Center (MEC), Metropolitan Community College (MCC), OneKC WIRED, and Johnson County Community College (JCCC) agreed to work together as a Steering Committee to coordinate efforts to deploy new programs aimed at developing a regional workforce equipped to meet the needs of private and public sector employers involved in sustainable industries and decision-making. Each Steering Committee representative brought unique knowledge and perspectives to the table:

- MARC is focused on planning and policy development, as well as skills training for local government employees. MARC provides support to One KC WIRED, an initiative designed to help support a coordinated workforce development system in the Kansas City metro area.
- OneKC WIRED is a collaboration of Kansas City regional organizations to develop a comprehensive system of workforce development, education, and training to meet the region's current and future needs.
- MCC is focused on developing skills training and degree programs emphasizing field operations related to construction and energy management systems.
- JCCC is focused on training and degree programs aimed at customer-side information and diagnostics and disciplines related to grid management, as well as thermal, solar, and photovoltaic energy systems.
- The Chamber provides leadership to its members to grow their businesses and create a more vibrant community. The Chamber's Energy Policy Task Force studies opportunities, trends, and challenges in the areas of energy sustainability and security and advises the Chamber Board on developing important energy policy positions.
- MEC is a non-profit organization focused on energy education and awareness, energy planning and development services for nonprofits and the public sector, home energy performance, and creating community partnerships focused on energy efficiency, environmental stewardship and economic improvement.

The Steering Committee determined to collaborate on a strategy for on-going coordination to ensure the region is using its assets efficiently and effectively to support emerging demands for sustainable practices. It was intended that the strategy initially focus on issues related to non-degree training programs that focus on energy efficiency, conservation, and production in buildings.

The committee also agreed to expand the scope of the region beyond MARC's traditional nine counties, but smaller than OneKC WIRED's 18 counties. For purposes of this study, the region is defined as:

Missouri	Kansas
♦ Platte	♦ Leavenworth
♦ Ray	♦ Wyandotte
♦ Clay	♦ Johnson
♦ Jackson	♦ Miami
♦ Cass	♦ Douglas
♦ Buchanan	

The project objectives included:

- Identification of short-term skill training needs.
- Anticipation of longer-term skill training needs.
- Inventorying available training resources.
- Understanding the capacity of training institutions to meet current and emerging demand.
- Establishing a framework for sharing knowledge.
- Establishing a framework for a standardized approach to sector work.

MARC procured the services of Corporation for a Skilled Workforce (CSW) as a facilitator and research organization to aid in assessing potential demand, identifying federal and state resources, and facilitating consensus on strategies. CSW explored secondary labor market information, surveyed employers and training entities, and conducted focus groups with employers and training entities. The data was brought before a "subject matter experts" group that broadly represented the industry, labor, employment and training entities, educational institutions, and community-based organizations to generate recommendations for goals and strategies. This report summarizes the effort.

Building a Greener KC

Background

Industry Trends

Why Construction?

Reducing energy demand offers a bigger return on investment to businesses, homeowners and regional economies in the short term than generating energy through alternative means. Homes and buildings consume 76% of the electricity in the United States and more than 40% of the energy.[1] The construction industry has great potential to reduce our nation's dependence on fossil and foreign fuels through weatherization, retrofits, and green construction -- although it must respond to what customers want and are willing to pay for. According to the Commission for Environmental Cooperation, green building practices could reduce greenhouse gases more effectively than any other action we could take.[2] In 2006, U.S. buildings accounted for 35% of the nation's greenhouse gases, more than the transportation sector.[3] Existing buildings are the primary culprits since they outnumber new construction 100 to 1. Retrofitting needs to become a top priority. Most estimates are that 8-11 direct jobs will be created for every $1 million invested in retrofitting.[4]

In addition to the energy considerations above, the Steering Committee for this report felt a sense of urgency in addressing the construction industry because of plans for a Green Impact Zone in Kansas City and the short-term availability of training resources from the American Recovery and Reinvestment Act (ARRA). While the initial green focus is on construction, it is the intent of the partners to use this framework to explore the impact of green practices on other sectors such as urban agriculture and renewable energy.

The industry is gradually becoming greener, although the rate of transformation varies across the country depending on public policy, incentives, and public awareness/acceptance.

What does "Green" Mean?

What does it mean for a home or building to be "green?" A builder can utilize green materials, for example, yet install them improperly, dispose of waste improperly, or procure the materials from distant sources that actually increase the carbon footprint of construction. Green materials alone do not make a building green, and consumers risk being "greenwashed." Some contractors prefer to talk about high performance, healthy, or sustainable buildings rather than use the term green. In the end, we're talking about

[1] The Fundamentals of Green; Michael Anschel, Remodelers' Journal, April/May 2009

[2] The State of Green Business, 2009; Joel Makower; Green World Media; February, 2009

[3] Energy Information Administration, 2007

[4] Greener Pathways; Sarah White and Jason Walsh; Center on Wisconsin Strategy; 2008

buildings that have as minimal impact on the environment as possible in materials, energy usage, and waste. Minimal impact starts with building design and thinking about the building as a whole system rather than an aggregation of disparate parts. Constructing a green building therefore requires all the workers engaged in its design and construction, from architects, to interior designers, to electricians, to landscapers, to have an understanding of how the entire design "works."

There are several organizations working to create national standards for green buildings. The two most prominent are:

- U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design **(LEED)**. LEED is primarily attached to new commercial construction, although the USGBC is launching LEED-H ratings for homes. LEED includes categories for New Construction, Existing Buildings, and Commercial Interiors. LEED for Schools and LEED for Retail are both in development. Kansas City, Missouri requires LEED for projects of a certain size.
- **Energy Star,** widely known by consumers, is more commonly associated with home construction, but applies to commercial buildings as well. It was created by the U.S. Environmental Protection Agency in 1992. Energy Star rated buildings are growing at a much faster rate than LEED certified. Energy Star is planning to raise its standards to respond to changing building code regulations.

Both rating systems require independent validation of energy efficiency, which in itself can be costly. An employer in one of the focus groups noted,

> "The LEED system...is too expensive because you have to get piles of paper work in to get the accreditation. We just do things that make financial sense and do things right. Doing that and not trying to be green, we still got a silver designation. The problem with LEED is that they charge you for your building based on size before they'll look at it. You already pay to have the green construction, then pay more for LEED assessment. It was more important to LEED to see green materials in the cooling system, despite the fact that it was less efficient. They are horrible at unintended consequences."

We can expect changes in standards as new materials become available and unintended consequences are resolved. Changes in standards have a ripple effect. New criteria impacts the entire value chain for a product, from research and development, to production of materials (vinyl, foam, fiberglass), to components manufacturing (e.g., low-e coatings for glass), to finished product manufacturing, and installation. Companies at all levels of the chain need to be anticipatory of new standards.

Locally developed standards include **EarthCraft** in the South, **Green Point Rated** in California (which is intended to rival LEED), and **Minnesota Green Star** in the North that provide checklists for planning green projects sensitive to the local climate.

The **Living Building Challenge (LBC)** standard was developed by the Cascadia Region Green Building Council, which crosses Canada and the United States. The Council claims the LBC standard "is in no way meant to compete with the LEED® Green Building Rating System, the United States Green Building Council (USGBC) or the

Canada Green Building Council (CaGBC)," although employers in our focus group believe it may be. "You can't get LBC certified until after 1 year that shows your system was put together right and does what it says. LBC raises the bar really high. If maintenance isn't done correctly, the building could have no efficiency; it could be worse. LBC has more accountability than LEED." The rigor of LBC may push LEED to higher standards.

Some builders and customers elect to incorporate green materials and practices without pursing certification. They are more interested in the benefits to be derived than in the claim to rating level. Organizations that assist builders without certification as an end goal include:

- **Building America**, a private/public partnership sponsored by the U.S. Department of Energy that is focused on creating partnerships among architects, engineers, builders, and contractors to produce homes that utilize energy- and material-saving strategies from the very point of design.
- The Sustainable Buildings Industry Council (**SBIC)** provides tools, software, and manuals to assist homebuilders in rethinking design.
- **Energy-10** software was collaboratively developed by the National Renewable Energy Laboratory's Center for Buildings and Thermal Systems, SBIC, Lawrence Berkeley National Laboratory, and the Berkeley Solar Group to help architects and builders identify energy efficient measures.
- The U.S. Department of Energy's **Building Energy Codes** Program is developing national model energy codes for both residential and commercial buildings.

And there are many, many more. The proliferation of organizations, products, magazines, and tools focused on green seems to be growing at an exponential rate. "Green" has become an integral part of the industry, and firms that decline to participate will find themselves struggling to compete.

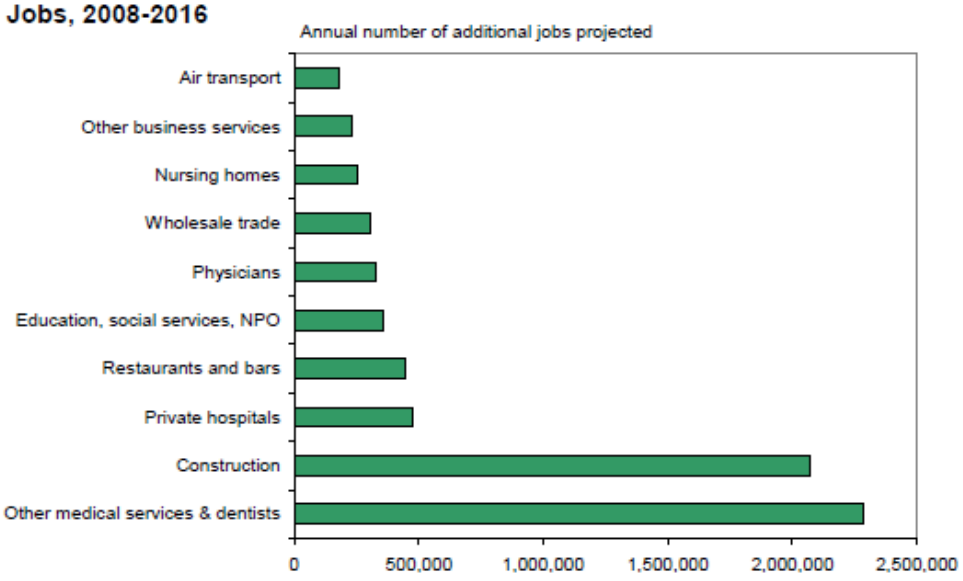
Unfortunately, the process of moving construction in a greener direction has been negatively impacted due to the prevailing recession, which was caused in part by the collapse of the housing market. Nationally, employment in construction fell from 8 million in 2006 to 7.2 million in July of 2008, and the most recent figures show a drop of 59,000 construction jobs just from April to May of this year (2009). Employment continued to decline through May, 2009 despite economic stimulus projects. However, Jim Haughey, Chief Economist, Reed Construction Data, predicts "An end to the construction recession about year-end is suggested by recent market reports.[5]" Construction layoffs are making training more difficult and there is less demand for all types of construction training.

The Bureau of Labor Statistics' (BLS) most recent industry projections were produced in 2007. Its next projections won't be released until December of 2009. However, using data from the Inforum LIFT Model Industry Projections, the President's Council of

[5] http://www.reedconstructiondata.com/

Economic Advisor anticipate the construction industry will experience robust growth over the next five to ten years. The graphic below shows that the construction industry is expected to be one of the top gainers of jobs through 2016 over 2008 levels (recognizing that the 2008 levels are depressed, so many "new" jobs will simply be regaining what was lost).[6] In defining construction, the Council includes the construction of manufacturing and retail buildings, roads and bridges, utility systems, and homes.

Figure 2: Projected Employment Changes in Industries Adding the Most Jobs, 2008-2016



Source: Inforum LIFT Model Industry Projections. NPO are nonprofit organizations.

While construction overall is currently suffering, anecdotal evidence suggests that green construction and retrofitting are growing. Energy efficiency incentives, upgrades in building codes, and building construction mandates will drive increased demand and thus increased employment. An employer in one of our focus groups noted, "I can have the best educated green worker, but if the customer doesn't want it, I don't get to put in the green design. In marketing you push or pull, and right now it's a push. Tax incentives create a pull, but when that's over, the pull will be gone."

The Apollo Alliance and Green for All suggest several examples of ways to create demand:

- Commitments to energy efficiency retrofits of public buildings;
- Commitments to build new public buildings to green standards;

[6] Preparing the Workers of Today for the Jobs of Tomorrow; Executive Office of the President's Council of Economic Advisors; July, 2009

- Commitments to plant trees, create green spaces, and manage storm water with green roofs and other green infrastructure;
- Tax incentives, rebates, reduced fees, or streamlined permitting for building owners that invest in energy efficiency or green building;
- Technical assistance or innovative financing for private investment in energy efficiency;
- Green building codes, energy conservation ordinances, or other requirements.[7]

Consistent with these suggestions, MARC's draft Strategic Regional Framework for Energy Efficiency and Conservation acknowledges that local governments can lead by example as well as through codes and incentives. MARC's goals include:

- Retrofit existing government buildings to achieve maximum energy efficiency;
- Develop energy efficiency standards for new buildings or remodels (each jurisdiction will determine to what extent they will adopt updated International Energy Conservation Code (IECC) codes. Regional efforts will concentrate on establishing priorities and baseline standards).
- Increase energy efficiency in existing homes;
- Develop major business and residential outreach campaigns to support the adoption of best practices;
- Build regional capacity within local governments, nonprofit organizations, and universities and community colleges to respond to the increased need for energy auditors, contractors, installer labor, and other skills;
- Develop a regional strategy to provided needed resources and/or incentives to residents to implement energy efficient residential and commercial upgrades

The National Geographic Green Guide ranked Kansas City 25th out of all 251 metropolitan areas with populations of at least 100,000, based on data from the Environmental Protection Agency and the U.S. Green Building Council. Local and regional efforts have included:

- A 47,000-square-foot community center being built to meet the U.S. Green Building Council's Leadership in Energy and Design (LEED) standards.
- A KCMO ordinance that says new buildings and renovation projects must meet LEED standards.
- A potential $2.3 billion investment in a sewer overhaul to prevent overflow, which will include 10,000 rain gardens across the city.

[7] Green Collar Jobs in America's Cities; Apollo Alliance and Green for All;2008.

- Green roofs on a number of buildings such as the Nelson-Atkins Museum of Art, downtown public library, and Boulevard Brewing Company.
- Formation of a new Kansas Blue Green Alliance to promote programs and policies that create a green economy.
- Plans for a Green Impact Zone on the City's east side that would include a Climate Sustainability Center. The Center will have three components: education and job training; research on climate change and development of environmentally friendly applications and products to reduce the carbon footprint; a green small-business incubator; and a cutting-edge, hands-on botanical garden. The Center has already received a $150,000 planning grant from the Economic Development Administration and $200,000 in matching funds from the Kansas City Manager's Office. The Impact Zone will offer home energy audits and weatherization and green job training for weatherization work.
- A $36.1 million energy performance initiative for the renovation and upgrade of campus buildings at the University of Central Missouri and establishment of a Center for Alternative Fuels and Environmental Systems (CAFES). The current focus of the center is on alternative energy topics and analytical support of central Missouri constituents.
- Several communities have conducted energy audits of municipal facilities and are prepared to request funds to support retrofits.
- Independence Power and Light is completing a master plan, including rebates, low income weatherization efforts, lighting retrofits, and tailored programs for commercial/industrial customers.
- Kansas City Power and Light offers a broad variety of rebates and incentives to customers for energy efficiency.
- Several communities have invested in replacement of street lights and traffic signal synchronization.
- Platte County and Kansas City, MO adopted the 2006 International Energy Conservation Code (IECC).
- Prairie Village and Gladstone are exploring ordinances to allow installation of photovoltaic cells in residential areas.

Regional Industry Data

To develop a picture of the construction industry in the greater Kansas City region, CSW and the Steering Committee selected NAICS[8] codes for residential and commercial construction sectors as shown in the table below. For this first phase of analysis, we did

[8] [8] North American Industrial Classification System ("NAICS")

not include infrastructure construction such as water lines, gas pipelines, highway and bridge construction, or power and communication lines.

Plumbing and HVAC Contractors are far and away the largest sector within construction with 7,182 employees, although in terms of the number of establishments, there are only half as many Plumbing and HVAC Contractors as there are Residential Building Construction firms.

Number of Firms by Construction Sector in Greater Kansas City

NAICS Code	Description	ESTABLISHMENTS
23611	Residential building construction	1,452
23822	Plumbing and HVAC contractors	704
23821	Electrical contractors	589
23622	Commercial building construction	422
23832	Painting and wall covering contractors	408
23899	All other specialty trade contractors	400
23835	Finish carpentry contractors	326
23891	Site preparation contractors	305
23813	Framing contractors	291
23811	Poured concrete structure contractors	221
23814	Masonry contractors	208
23816	Roofing contractors	184
23831	Drywall and insulation contractors	184
23833	Flooring contractors	134
23829	Other building equipment contractors	102
23839	Other building finishing contractors	89
23817	Siding contractors	85
23834	Tile and terrazzo contractors	62
23812	Steel and precast concrete contractors	42
23815	Glass and glazing contractors	36
23621	Industrial building construction	33
23819	Other building exterior contractors	30

Number Employed by Construction Sector in Greater Kansas City

NAICS	DESCRIPTION	NUMBER EMPLOYED IN MARC REGION
23822	Plumbing and HVAC contractors	7,182
23821	Electrical contractors	6,012
23622	Commercial building construction	5,792
23611	Residential building construction	4,382

23899	All other specialty trade contractors	3,256
23891	Site preparation contractors	2,603
23831	Drywall and insulation contractors	2,258
23832	Painting and wall covering contractors	2,101
23811	Poured concrete structure contractors	1,976
23835	Finish carpentry contractors	1,903
23814	Masonry contractors	1,829
23829	Other building equipment contractors	1,800
23816	Roofing contractors	1,777
23813	Framing contractors	1,391
23833	Flooring contractors	842
23812	Steel and precast concrete contractors	707
23839	Other building finishing contractors	502
23834	Tile and terrazzo contractors	471
23817	Siding contractors	464
23815	Glass and glazing contractors	415
23819	Other building exterior contractors	385
23621	Industrial building construction	381

Of the total **48,427** jobs in these NAICs sectors in the region, over half (**26,624**) can be found in just five categories:

- Plumbing and HVAC contractors
- Electrical Contractors
- Commercial Building Construction
- Residential Building Construction
- All other Specialty Trade Contractors

In the last five years, 12 of the sectors in the tables above have had positive changes in employment. Changes in the size of the sectors must be looked at two ways: the absolute change and percentage change. "Other Building Exterior Contractors" evidenced a huge 121% rate of growth, but then it was one of the smallest of all sectors, so its high growth rate only resulted in a total of 385 employees. Plumbing and HVAC Contractors, the largest sector, only realized a 1% increase in employment over the same 5 years. Several sectors had negative growth rates even before the height of the recession, such as Residential Building Construction which declined by 878 jobs (while commercial building instruction gained 678 jobs during the same period).

CHANGE IN NUMBER AND PERCENT OF JOBS BY SECTOR, 2003-2008[9]

Description	Change	% Change
Other building exterior contractors	211	121%
Other building equipment contractors	563	46%
Tile and terrazzo contractors	149	46%
Finish carpentry contractors	435	30%
Masonry contractors	294	19%
Steel and precast concrete contractors	106	18%
Commercial building construction	678	13%
Site preparation contractors	198	8%
Poured concrete structure contractors	40	2%
Siding contractors	7	2%
Roofing contractors	18	1%
Plumbing and HVAC contractors	101	1%
Industrial building construction	(2)	(1%)
Drywall and insulation contractors	(26)	(1%)
Painting and wall covering contractors	(53)	(2%)
All other specialty trade contractors	(104)	(3%)
Electrical contractors	(237)	(4%)
Other building finishing contractors	(70)	(12%)
Flooring contractors	(132)	(14%)
Residential building construction	(878)	(17%)
Glass and glazing contractors	(83)	(17%)
Framing contractors	(486)	(26%)

Projections for the Kansas City Metropolitan Statistical Area (MSA) produced by the Missouri Economic Research and Information Center (MERIC) estimate that construction employment will increase 18.5% over 2000 figures by 2010, but given the current economic times and the unknown impacts of the recovery investments, projections are difficult to make with any accuracy.

Construction firms were surveyed by CSW to obtain a sense of their own projections. Respondents ran the gamut from new commercial construction to new residential construction (the two largest groups of respondents), to energy efficiency/weatherization, deconstruction, heavy construction, electrical utility, remodeling, architecture, engineering and design, maintenance and replacement, and home performance consultant. There was an even distribution of respondents among

[9] Industry data was obtained through EMSI. In order to capture a complete picture of industry employment, EMSI basically combines covered employment data from Quarterly Census of Employment and Wages (QCEW) produced by the Department of Labor with total employment data in Regional Economic Information System (REIS)

firm sizes (1-9, 10-49, 50-99, 100-249, and 250+). More than a third (38%) of the 49 respondents anticipates they will expand their workforce size in the next two years. Slightly less than a third (31%) expect to remain about the same size. Others anticipated staying the same size but needing to replace workers due to retirements or turnover or not being able to project what will happen. Only 7% thought they might downsize.

Workforce Trends

Existing Jobs

Everyone seems to want to know how many green jobs there are in their state or region, yet "green jobs" defies a common definition. NAICS has no code or codes for identifying green sectors or occupations although the BLS has begun to consider a new classification system. For example, recommendations have been made to create a new Standard Occupational Code (SOC) for Solar Panel Installers and Repairers (which is currently reported variously under HVAC, Roofers, Plumbers, and Electricians since it incorporates all those skills) and for Home Energy Auditor (which is variously reported under Building Inspectors, Farm and Home Management Advisors, and Cost Estimators).

Additionally, most "green jobs" are actually traditional jobs that now incorporate green practices and knowledge, such as carpenters, electricians, and plumbers. A carpenter may be "green" on one project, but not on another depending on the customer, the materials, and the building design. Some states consider Truck Driver to be a green job – if the driver is hauling parts for a wind turbine (and regardless of the energy efficiency of the truck doing the hauling). Estimating the number of green jobs may seem like smoke and mirrors. **Very few green jobs are brand new occupations that require a unique new set of knowledge and skills.**

Across all occupations among the construction sectors, the largest occupations are expecting modest growth.

ANTICIPATED JOB GROWTH 2008-2013 FOR THE LARGEST CONSTRUCTION OCCUPATIONS IN THE GREATER KANSAS CITY REGION

Occupation	2008 Jobs	2013 Jobs
Carpenters	6,602	6,779
Construction laborers	4,673	4,864
Electricians	3,468	3,675
First-line supervisors/managers of construction trades and extraction workers	2,559	2,665
Plumbers, pipefitters, and steamfitters	2,184	2,326
Painters, construction and maintenance	2,117	2,138
Operating engineers and other construction equipment operators	1,646	1,708
Cement masons and concrete finishers	1,543	1,594
Construction managers	1,290	1,403
Heating, air conditioning, and refrigeration mechanics and installers	1,314	1,391
Cost estimators	1,191	1,294

Office clerks, general	1,211	1,254
Brickmasons and blockmasons	1,105	1,244
Roofers	1,126	1,129
Bookkeeping, accounting, and auditing clerks	1,032	1,077
Sheet metal workers	1,002	1,050

These figures are based on pre-recession estimates. They do not take into account retirements and turnover which would increase the number of new hires needed each year.

What we *do* know is that all these occupations will need some level of green knowledge and skills to be adaptable to the increasing demand for sustainable construction practices. Based on the above chart, we can anticipate that, for example, over 6,000 incumbent carpenters will need some level of training in green to be competitive in the job market in the future. Training could be provided through "stackable credentials" that provide short term training that can be "stacked" toward a certification or degree. Stackable credentials provide more "on" and "off" ramps to postsecondary education that enable working adults to build on their skills over time.

For purposes of analysis, CSW focused on the top five construction sectors, identified that three of those five paid above average industry wages, and two of those three demonstrated growth over the last five years: Commercial Building Construction and HVAC and Plumbing Contractors. For each of those sectors, CSW used regional staffing patterns to identify the largest occupations in those sectors, their anticipated 5-year growth rate within the sector, average hourly earnings, and required education level (see Appendix A). The occupations with the largest predicted numerical growth in these large, well paying, growing sectors include:

- **Carpenters;**
- **Construction Laborers;**
- **Construction Managers;**
- **Electricians;**
- **Plumbers, Pipefitters, and Steamfitters; and**
- **Heating, Air Conditioning, and Refrigeration Mechanics and Installers**.

All six appear among the largest occupations across all construction sectors and therefore should be the **first area of focus** for training if Kansas City is to become known as a center of green construction expertise and practice.

Our Stakeholders group recommended that the region include the following when considering who needs green knowledge and skills:

- Code inspectors
- Real estate industry
- Appraisers
- Lenders
- Insurers
- Design industry

- Residential retro-fitters
- Building operators
- Site construction trades (public and private property – i.e., landscaping, rain gardens)
- Building deconstruction
- Material diversion
- Energy modelers/auditors
- Commissioning agents
- Renovation

The inclusion of insurers, lenders, commissioning agents, and others shows just how broadly green knowledge must go in order to support greener construction practices in the region, but *what* each of these occupations needs to know and be able to do is very different.

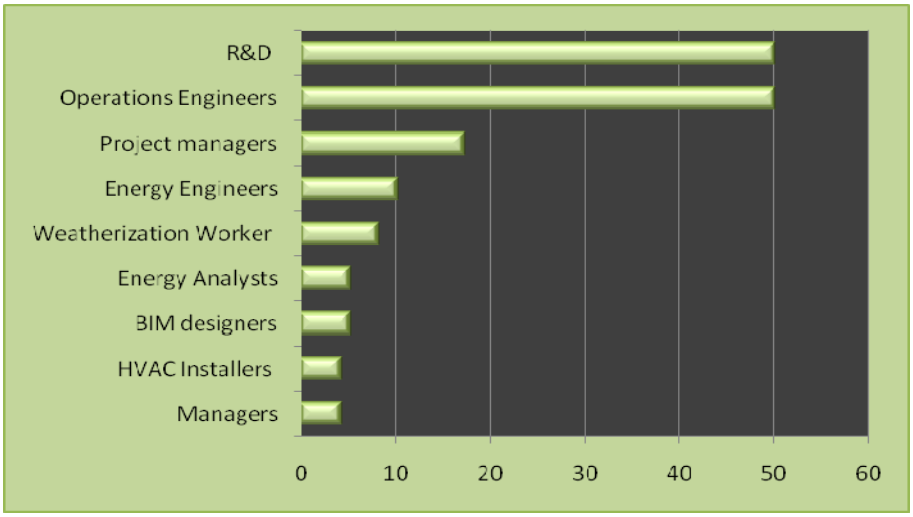
New Jobs

Surveyed employers indicated that their expansion plans for the next two years include:

- Energy Modelers
- Energy Technicians
- Energy Salespersons
- Energy Analysts
- Energy Engineers
- Energy Auditors
- Energy Inspectors
- Energy Weatherization Workers.

As can be seen from the titles, these occupations are more like "tweaks" on traditional jobs (by adding the word "energy" in front) than entirely new. Of the above, only Energy Engineers, Energy Analysts, and Weatherization Workers are among the top *types* of jobs to be added in expansion plans, and they are fewer in number than some of the traditional titles such as HVAC installers. It should also be noted in the graph below that the top types of jobs to be added in expansion plans are more likely to be those that require four years of postsecondary education.

TOP JOBS FOR EXPANSION NEEDS

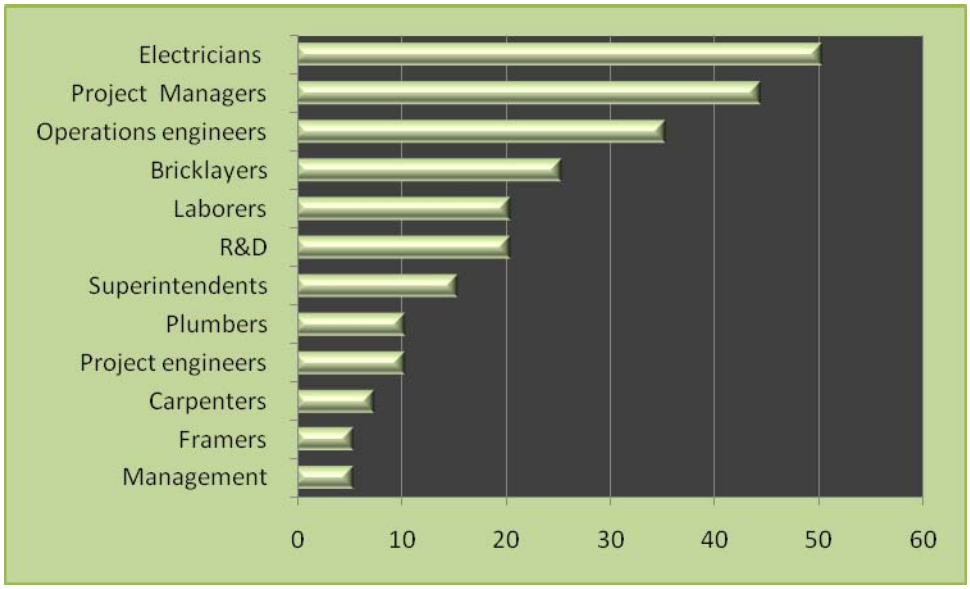


While the above chart shows that the skills most needed for expansion are those found in R&D, Operations Engineers, and Project Managers, the occupations that were cited as most needed for replacing workers lost to retirements and turnovers were:

- Electricians;
- Project Managers;
- Operations Engineers.

The graph below shows responses to the survey question regarding replacement needs.

TOP JOBS FOR REPLACEMENT NEEDS



Project Managers and Operations Engineers appear high on both expansion and replacement plans, and both require four-year degrees.

Hard to Fill Jobs

Despite the industry downturn, there are still positions that the survey respondents are finding difficult to fill. Among those cited as most difficult to fill were:

- Construction Superintendent
- CADD Mechanical Designers
- Electrical Linemen
- Estimators
- Carpenters
- Energy consultants
- Property manager
- Deconstruction workers
- Engineers with practical Knowledge
- Energy Specialists
- Senior Project Managers
- Trade Persons with Computer Skills
- Business Development
- Management for Startup Companies

Those cited as second most difficult to fill were:

- Estimator
- Mechanical Estimators
- Apprentice Lineman
- Engineers
- Division/Project Managers
- Bricklayers
- Senior Scientist
- Equipment Operators
- Operations Personnel
- Senior Superintendents
- Trade Persons – Foreman
- Energy technicians
- Maintenance Engineer

From among the six occupations with the largest predicted numerical growth in the large, well paying, growing sectors, Carpenters were also cited as being among the most difficult to fill.

Green Skills

Surveyed employers were asked to identify the specific green skills that their employees would need. The skills range from the awareness and knowledge level to specific skills:

- Identifying "green" practices
- General knowledge about green building to provide information to our customers/builders
- Jurisdictional issues with emerging technology as a result of green products
- Green renovation, green construction, green Demolition
- Energy auditing
- Energy analysis
- Energy system retrofit engineering
- Sustainable design, energy efficiency audits, renewable energy applications
- Specific requirements of "green" materials and installation of same
- Solar, wind and hot water solar installation
- How to integrate photovoltaic panels into the building envelope
- Construction waste management
- Sustainability consulting
- How to build a rain garden and related landscaping
- Living rooftops
- Brick salvage
- Home weatherization
- Install and repair mechanical equipment, install windows

And finally, as one respondent tersely said, "Common sense to know what green things have payback and which are a waste of time, money and resources."

The types of certifications that local employers anticipate their employees will need include:

- LEED A.P.
- HERS certified home energy rater
- Building Performance Institute (BPI)
- Infra-red thermography.

During employer focus groups, participants pointed out that broad based knowledge certification is one thing, and micro certification for the installer is another.

> "LEED is at the 30,000 foot level. Most of this [green construction] doesn't require rocket science." Different levels of training or certification are needed for different jobs.
>
> "A lot of LEED building certification is in the *products* rather than the *process*. A bamboo floor still a floor."
>
> "People in the analysis, inspection and design are the ones that need to be fully trained. If we are talking about the actual building side, a green carpenter has to be a carpenter *first*."
>
> From the standpoint of training, "it may not be the guy grabbing the can of foam. But he needs to have a little understanding of the desired outcomes. Like a foam guy doesn't understand he's trying to stop a draft; he needs micro training."

There are many more types of certifications available than referenced by employers in either the focus groups or survey.

Entry Level Certifications

- **The Occupational Safety and Health Administration** issues OSHA 40 Hazardous Waste Operations certificates and OSHA 10 Site Safety certificates. Each allows an individual to be a hazardous waste handler and an asbestos abatement mechanic.
- **EPA HVAC Certification** – Allows someone to be an energy efficiency services technician in the heating, ventilation, and air conditioning industry.
- **The Home Builders Institute (HBI)** offers a **Residential Construction Academy Series.**

Certifications for Skilled Labor

- **Air Conditioning Contractors of America (ACCA) offers EPA Refrigerant Certification**. Clean Air Act section 608 requires that individuals working on air conditioning and ventilation systems receive EPA Refrigerant Certification. ACCA offers a certification training program and tests.
- **The North American Board of Certified Energy Practitioners® (NABCEP) –**systems provides an NABCEP Certificate Program.
- **The National Electrical Contractors Association (NECA)** offers green certification to electricians.
- **The National Association of Home Builders** offers the **Home Builders Institute (HBI)** curriculum for Workforce Training & Employment, which is an apprenticeship program in residential construction offered to targeted populations.
- **Other trade and apprenticeship programs:** Some local unions have created green apprenticeship programs.

Certifications for Housing Professionals

- **Green Advantage® Certification for commercial and residential practitioners –** Green Advantage® is an environmental certification for building-related practitioners, primarily contractors, subcontractors, and trades people. The exam covers green building industry issues such as green building materials, siting and design.
- **National Association of Home Builders (NAHB): Certified Green Professional™ (CGP)** – The National Association of Home Builders CGP designation recognizes builders, remodelers, and other industry professionals who incorporate green building principles into homes without driving up the cost of construction. NAHB recently released the "National Green Building Standard"

for all residential construction work, approved by the American National Standards Institute (ANSI); it is intended to be an alternative, not a replacement, for LEED for Homes (LEED-H).

- **The North American Board for Certified Energy Practitioners (NABCEP)** offers:
  - Solar Photovoltaic and Solar Thermal Installer Certifications
  - Small Wind Certification (under consideration)
- **The National Association of the Remodeling Industry's (NARI) Green Certified Professional (GCP)** is designed to recognize and identify remodelers who apply green or sustainable principles to their remodeling projects.
- **Residential Energy Services Network (RESNET): Home Energy Rating System (HERS)**: RESNET is a membership 501(c)(3) organization and its standards are officially recognized by the U.S. mortgage industry for capitalizing a building's energy performance in a mortgage loan, certification of "White Tags" for private financial investors, and by the federal government for verification of building energy performance for such programs as federal tax incentives, the Environmental Protection Agency's Energy Star program, and the U.S. Department of Energy's Building America Program.
- **Building Performance Institute (BPI)** –BPI certification areas are Building Analyst, Air Conditioning and Heating, Building Envelope, and Multifamily. BPI certification for contractors and auditors includes written and field practical examinations.
- **National Association of Realtors® (NAR) Green Designation –** The Green Resource Council administers NAR's Green Designation, which is designed to address the concerns of consumers who want real estate professionals with real green expertise.
- **EcoBroker® –** EcoBroker Certified professionals help clients market properties with green features, save money, and live comfortably, through energy efficiency and environmentally-sensitive choices. Training and certification are overseen the Association of Energy and Environmental Real Estate

Certification for Housing Professionals and Professional Designers

- **Appraisal Institute**
- **American Lung Association of Washington:** Master Home Environmentalist Program

Professional Designer (Architect/Engineer) Designation

- **Build-It-Green – The Certified Green Building Professional (CGBP)** Build-It-Green CGBP

- **Green Building Certification Institute's (GBCI)** Leadership in Energy and Environmental Design (LEED) Professional Accreditation.

CERTIFICATION FOR ENERGY MANAGEMENT

- **The Association of Energy Engineers** offers a number of certifications, including a Certified Energy Manager exam. You do not have to be an engineer to receive this certification.

The importance placed on certifications by employers is mixed. A little over a third intend to give hiring preference to applicants with certifications, and a little less than a third will require appropriate employees to obtain them in the next two years. Twenty percent (20%) of the respondents said they place no value on green certifications, but that does not mean they do not value green knowledge and skills. An employee can learn much about green practices without pursuing a certification.

Employers may not place high value on certifications until consumers do. "No one asks if we are certified or what kind of certifications we have," the focus group participants said. "They are interested in what they need to do to get a tax credit." A contractor noted, "We are going to have to be certified but don't know how the certification we have for our workers compares to other certifications. **But we will HAVE to be certified**. The guy who owns the place will have to be certified, but the guys doing the work probably *won't* have to unless it's required."

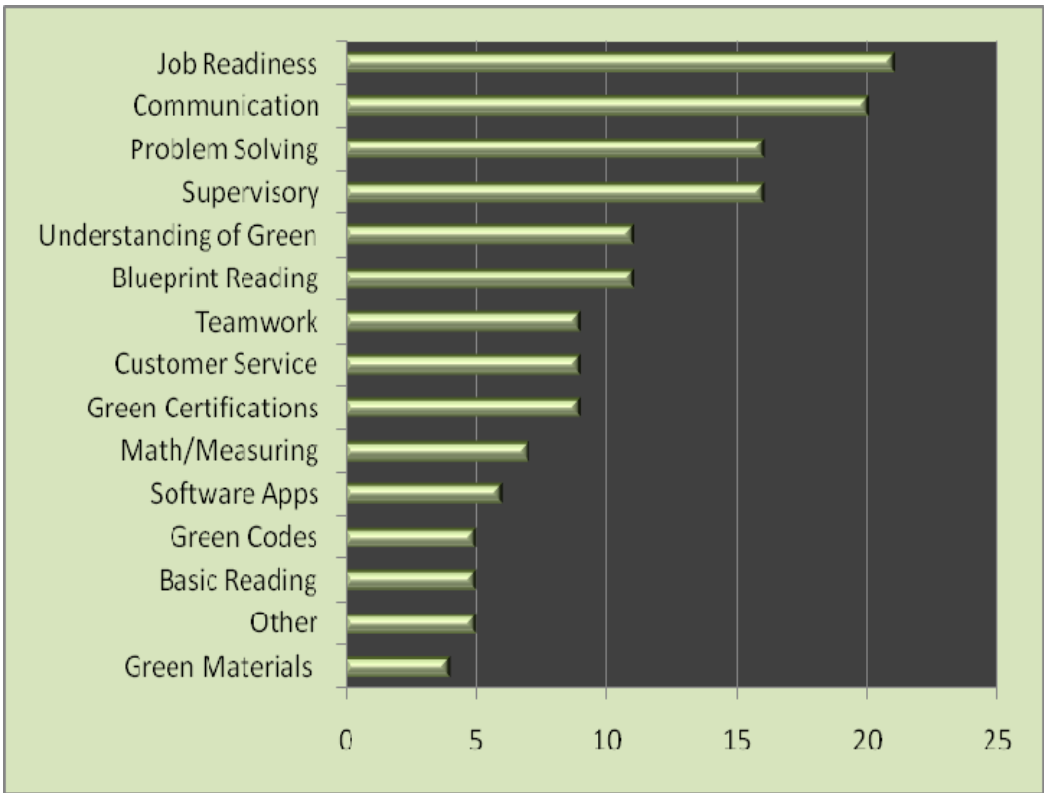
Employers in the focus groups expressed some concern about competing certifications and whether one type of certification would be transferrable to other parts of the country. They were also surprised by the sheer number of types of certifications available and recommended that stimulus funds focus on 2-3 of them.

Of more concern to employers than certifications and green skills, however, are foundation skills, which is a situation unchanged since before green became a buzzword. Skill deficiencies among incumbent workers are mostly cited in the areas of job readiness, communication skills, supervisory, and problem solving skills. Even blueprint reading ranked higher than any potential green skills. Focus group employers said it is difficult to learn green skills if you don't even possess the basics. The current trend is to embed foundation skill into technical skill training to provide context for the basic skills.

"We don't spend enough time on communication skills," employers told us. "There is lots of wasted time on the job site because I need to talk to somebody or I'm missing a piece, and when you throw green in there on top of it, there are different wrinkles."

The most commonly identified skill deficiencies are shown in the graph below.

SKILL DEFICIENCIES OF THE CURRENT WORKFORCE



In summary:

- The construction industry is expected to recover national and regionally over the next 5 years;
- There are a plethora of certifications for both buildings and workers, which can create confusion for consumers and professionals alike. Focusing on a limited number to achieve critical mass would be useful to reaching the regional vision of being nationally recognized as a leader in green construction.
- The industry is only slowing becoming "green" in response to customer demand. Demand is driven by incentives, public policy, and public awareness; knowledge of appraisers, lenders, and insurers; and the skills of architects, designers, and contractors in making a case for green building. We need an environment that makes green understandable and accessible from the point of idea conception to the finished building to maintenance of that building.
- In greater Kansas City, the integration of green knowledge, skills, and practices into all levels and aspects of construction is below where the region needs to be if it is to realize the vision.
- If we rely solely on incentives, there is a danger that green practices may fade away when the incentives do. The ethic in construction needs to change overall to incorporate the green philosophy as the normal way of doing business.

- The industry is dominated regionally by Plumbing and HVAC contractors; Electrical Contractors; Commercial Building Construction; Residential Building Construction; All other Specialty Trade Contractors, which should thus be the initial focus for "greening" of construction sectors.
- The lead occupations in sectors that are large, high paying, and growing are Carpenters; Construction Laborers; Construction Managers; Electricians; Plumbers, Pipefitters, and Steamfitters; and Heating, Air Conditioning, and Refrigeration Mechanics and Installers, which thus should be the initial focus for "greening" of occupations.
- There are gaps in infrastructure that need to be filled to enable the industry to be more green: e.g., sufficient and inexpensive means of recycling materials; locally available green materials; a tax credit for commercial deconstruction similar to residential; and local deconstruction appraisers.

The Education and Training Environment

Sources of Training

The Greater Kansas City region has many education and training assets that offer skills needed by the construction industry, including apprenticeship programs, community colleges, universities, secondary career and technical education, non-profit organizations, and trade associations. Appendix B describes the type of education and training available from many regional institutions. Appendix D lists apprenticeable trades in residential construction with links to more detailed information about the apprenticeships.

New programs that the various entities have implemented in the last two years to try and keep up with the rise of green demand include:

- Green Engineering Technology-Architectural.
- Certificates in Photovoltaics, Solar Thermal, and Energy Efficiency.
- Residential Energy Training: Weatherization Technician; BPI Energy Analyst Training; Residential Energy Auditor Training.
- Residential Energy Auditor (24 credit hour certificate) & Energy Performance and Resource Management A.A.S.
- Basic HERS Rater Training, BPI Building Analyst Training, and coming soon: BPI Building Analyst for HERS Rater Training, Field Inspector Training, Green Rater Training.

However, of the 16 institutions that responded:

- ➔ 43% have not initiated any new programs in green technologies.
- ➔ 46% have not incorporated green skills into existing programs.
- ➔ A third do not have curriculum for green construction/deconstruction training. For those that do have curricula, they were primarily staff-developed, which suggests there may be "reinventing of the wheel."

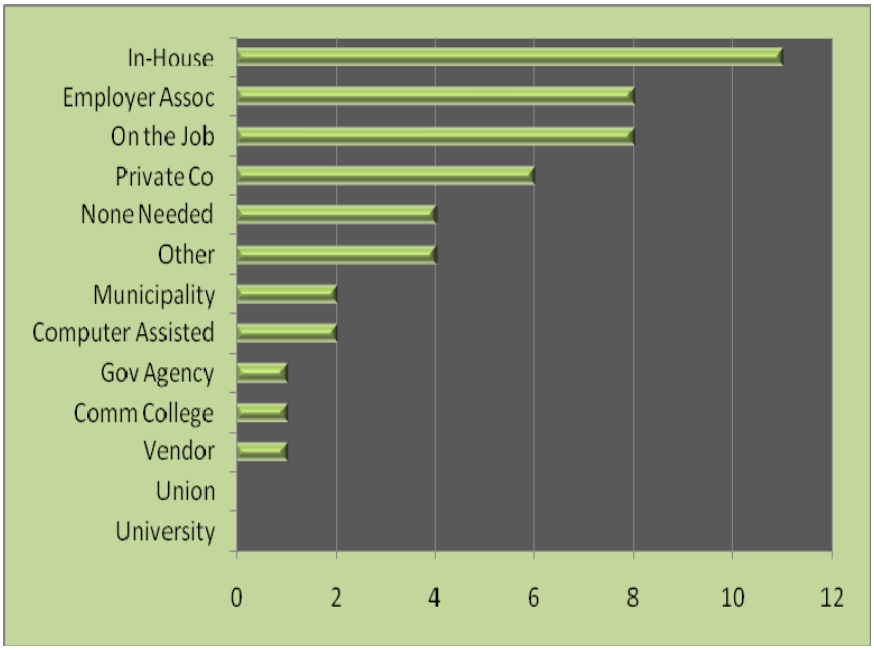
Postsecondary institutions have been active in incorporating green technologies into their curricula, but the secondary career and technical education programs have done virtually nothing.

Employers indicated in the survey that they anticipate most green training for their workers will be accomplished in-house or on-the-job. This is consistent with a statewide green survey of employers across many industries in Michigan. That survey, that had over 6,000 respondents, found that because many "green jobs" are really a retooling of

current jobs, employers in all industries expected that most training (nearly 70%) would occur informally in the workplace.[10]

The graph below shows the anticipated primary means of providing green training to existing workers by employer survey respondents in greater Kansas City.

PRIMARY MEANS OF PROVIDING GREEN TRAINING FOR EMPLOYEES



Although the surveyed employers did not identify unions as sources of green training, focus group participants did. Their perceptions were that:

- Employers use a mix of sources for training: unions, their own internal training, and industry associations. They will use any available resource for very specific tasks such as computer training, and use community colleges for the construction basics, such as HVAC training.
- "Green" will just be another element rolled into union apprenticeship training because of the federal standards that are applied to apprenticeships. Since the federal government is currently the primary catalyst for green building, its requirements will necessarily trickle down into the trades training.
- In cases where the union workers do not have the immediate green skills/knowledge needed for a specific job, the employers simply provide it themselves or reach out to get it quickly.
- The Associated Builders and Contractors (ABC; non-union) is more flexible than the union programs because they do not have the same federal standards. ABC

[10] Michigan Green Jobs Report; Michigan Department of Energy, Labor and Economic Growth, 2009.

will have an opportunity to train ***for*** green jobs. One employer opined that ABC is good for training "but it [the training] takes too long."

- The National Home Builders Association training is perceived to be of good quality.
- Project managers are typically individuals with a bachelor's degree so the employers target local universities for recruitment (although not for on-going training). The employers said that if community colleges trained project managers, they would use those colleges as a resource.

Challenges

Resources

The lack of adequate **resources** is the biggest challenge for education and training providers to incorporate green knowledge and skills into their programs**.** Resources are required to develop the curriculum, procure new materials as they become available, and continually upgrade the knowledge and skills of the instructors as the environment changes.

Where will the funding come from? Who will pay for capacity development? In these economic times, companies are wary of committing money to green training unless they are assured there will be a return on their investment. And providers are similarly wary of obligating money to development without hiring commitments from employers. Employers may claim they want/need a certain skill set, but don't always follow through with hiring the workers.

One private training entity noted that while they have the capacity to provide training to public workforce system participants, there are roadblocks to doing so because of all the "hoops" required to be recognized as a an eligible training and certifying entity.

Communications and Connections

The Builders' Association noted in a focus group that they have a waiting list for LEED A.P. preparation. MCC is in the process of developing LEED training, and will be able to help alleviate the wait – providing there is communication among the institutions. With better communications, learner loads could be shared to more quickly meet the needs of workers and businesses. The consumer needs access to a database that would allow him/her to identify *who* is providing *what* training at what cost, and with what intended result (i.e., certification, a degree, journeyman status). The employer survey revealed that 31% of the employers did not know where certifications could be obtained.

The data from the training entities' survey indicated they are mostly using staff-developed curricula to incorporate green skills and knowledge, which implies duplication of effort. Organizing to share curricula would conserve resources. However, while some entities are eager to share, others are hesitant. There was an expressed desire to come together more regularly in forums such as the focus group, but

organizing and sustaining the regional collaboration would take more effort than the will of the group.

Partnerships with Industry

A number of the employers surveyed described working relationships with various training providers, including:

- Area middle schools and high schools;
- Community Colleges;
- Workforce Investment Boards and one stops in both Kansas and Missouri;
- Builders' Association;
- Union apprenticeship programs;
- National Institute of Construction Excellence (NICE);
- Universities.

However, the majority said they do *not* work with any of the training entities to address skill shortages. For the majority of those who do not, the primary reason was because there was no need. But only 5% of the respondents said they not be willing to work with such institutions in the future; 42.5% said they would, and 45% said "maybe."

Developing viable partnerships among education/training providers and employers could hasten definition and adoption of specific green skills.

Opportunities

- The employers themselves recommended convening the education and training entities such as colleges, ABC, Hathmore Technologies and others as part of this project to align training because they could see the value in doing so. At least one of the community colleges – Kansas City, KS Community College – is highly supportive of an ongoing venue for sharing and aligning.
- Deconstruction is growing and might become an apprenticeable trade in the future. Jobs in this sector can serve as entry points into the construction industry. There is opportunity in growing this field.
- There are only four deconstruction appraisers in the US, and none of them are in the Midwest. As deconstruction grows and especially if tax credits become more amenable for commercial deconstruction, this will be a growing field. As one home builder who deconstructs homes said, "It all comes down to the tax breaks. You can claim deductions up to $150k. The value of the materials that you donate is determined by the value estimated by deconstruction appraisers. There are no such appraisers here."
- Kansas is looking at requiring green training for professional development for teachers that would count as CEUs.

- At least for community colleges, a July 14, 2009 announcement made by President Obama is promising for future opportunities. The administration plans for:

  - $9 billion in competitive grants to community colleges and states over ten years.
  - $10 billion loan fund to expand community college facilities.
  - $50 million to expand online learning options.

  Partnerships that are inclusive of colleges, unions, and industry are likely to be more competitive in obtaining grants.

- Employers identified several ways the public system could be of more value to them:

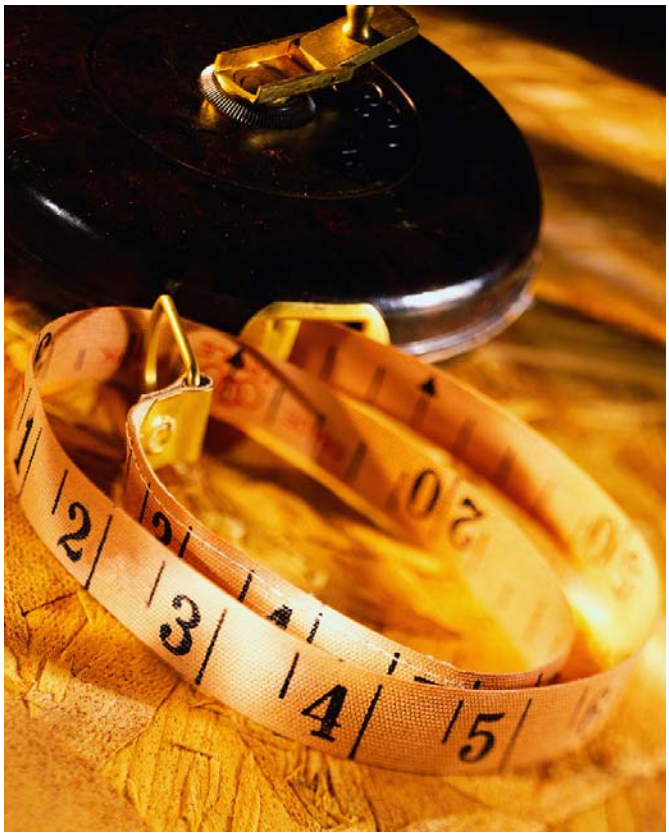
  - ➔ Develop industry specific BIM Training.
  - ➔ Develop industry specific project management training.
  - ➔ Provide college trained men and women who understand construction management, green, BIM and construction means and methods.
  - ➔ Incorporate internships into existing programs.
  - ➔ Work with the unions to train new workers.
  - ➔ Provide a reasonable and affordable means of obtaining "green" training.
  - ➔ Provide Healthcare Construction Education and Certification
  - ➔ Hold a seminar or class on LEED's criteria for manufactured products. (More than one employer asked for this, and a specific mention was made regarding how to market and manufacture aluminum windows to get MR credits 4.1, 4.2, 5.1, and 5.2.)
  - ➔ Give real world training and structure it to be offered after work hours.
  - ➔ Provide CAD Detailing courses at the Union Halls.
  - ➔ Provide focused training on how to analyze and design green projects.

In summary:

- Most training will be for incumbent workers, and it is most likely to be accomplished on the job.
- Green knowledge starts at the top; architecture, design, and manager professionals need to understand and adopt green practices to enable construction workers to build green. The universities need to be part of the collaboration.
- Educational institutions and unions need to incorporate green knowledge and practices into their existing training so their graduates and apprentices will be

more competitive in the job market. Appendix C contains a competency model for residential instruction that includes green concepts.

- On-going collaboration among public and private education and training entities and between the training entities and employers would reduce duplication and increase relevance.



Mechanisms for Change

Utility Incentives

The Kansas City, KS Board of Public Utilities Energy Smart Electric-Heating Program provides incentives for their residential and commercial customers living in Kansas to purchase energy efficient heating and cooling equipment. Rebates are available for qualifying air-source, water-source and ground-source heat pumps; package terminal heat pumps; resistance heating systems; electric boilers; and electric water heaters. The board also encourages builders to construct energy efficient homes in Kansas by providing rebates to the builder for the installation of electric heat pumps and electric hot-water tanks and encourages developers to populate their subdivisions with energy efficient homes. BPU will award water-main rebates to developers who equip homes in a subdivision with energy efficient electric heating equipment.

KCP&L offers a variety of incentives for reducing or shifting electrical usage. Customers who have an energy audit performed by a KCP&L certified auditor are eligible for a rebate to cover up to 50% of the cost of the audit. KCP&L Commercial Industrial Rebate Programs provide rebates to customers who purchase high-efficiency equipment for their facilities. There is also a custom rebate for new construction. KCP&L offers rebates to its residential customers to help offset the cost of replacing inefficient central AC and heat pump systems with newer, more efficient models and provides rebates of $800 to builders for every home that achieves the ENERGY STAR rating label. KCP&L also pays Home Energy Rating System Inspectors (HERS) up to $750 for the third party inspections and ratings required to achieve the ENERGY STAR rating.

Platte-Clay County, MO Electric Cooperative members who wish to install a ground source heat pump are eligible for a $750 per ton rebate for new installations. The rebate program also includes replacing an existing propane, natural gas, air source or electric resistance heating unit or a $150 per ton rebate for replacing an existing geothermal unit.

State Incentives

In July 2008, the state of Missouri enacted legislation allowing homeowners to deduct from their income taxes the cost of home energy audits and energy efficiency improvements based on recommendations made in such an audit for expenses of this nature incurred on or after January 1, 2009. Audits must be performed by a home energy auditor certified by the Missouri Department of Natural Resources (DNR). The program website contains a directory of certified auditors and instructions for becoming a certified auditor for the purpose of this incentive.

Missouri offers a loan program, administered by the Energy Center of the Missouri Department of Natural Resources (DNR) that is available for energy efficiency and renewable energy projects for public and governmental buildings and structures. Loan amounts are based on projected energy savings, resulting in monetary savings that is used to repay the loan.

PRIVATE INCENTIVES

KEEP is a revolving loan program in Kansas (offered only through Sunflower Bank). They recently lifted the income requirement and individuals can access up to $10,000 for energy efficiency improvements.

FEDERAL RESOURCES AND INCENTIVES

State Energy Program (SEP): The SEP provides grants to states to assist in designing, developing, and implementing renewable energy and **energy efficiency** programs. Funding from the SEP is directed to state energy offices, and each state's energy office manages all SEP-funded projects. States may also receive project funding from technology programs in the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) for SEP Special Projects. EERE distributes the funding through an annual competitive solicitation to state energy offices.

Energy-Efficiency Tax Credits for Homeowners: The Recovery Act triples the tax credit for various energy efficiency improvements, including installation of insulation and energy-efficient roofing, windows, doors, and heating and cooling systems, and extends it through tax year 2010. The legislation also removes current caps on the 30 percent tax credit for solar water heating.

Energy-Related Bonds for State and Local Governments: State and local governments are authorized to issue an additional $4 billion in clean renewable energy (CREBs) and qualified energy conservation bonds (QECBs). QECBs can be used to finance a range of projects, including capital projects to reduce energy consumption in public buildings; demonstration projects designed to promote the commercialization of green-building technology; and public education campaigns to promote energy efficiency.

School Construction Bonds: The Recovery Act authorizes the issuance by state and local governments of $22.4 billion in new bonds for the construction, rehabilitation, and repair of public schools.

Recovery Zone Bonds: The Recovery Act authorizes $25 billion in recovery zone economic development and facility bonds. Recovery zone bonds may be used for infrastructure, job training, education, and economic development in areas within the boundaries of the state, city, or county that has significant poverty, unemployment, or home foreclosures.

Neighborhood Stabilization Grants: These Housing and Urban Development grants may be used to purchase and rehabilitate homes and residential properties that have been abandoned or foreclosed; demolish foreclosed properties that have become blighted structures; and redevelop demolished or vacant foreclosed properties. HUD encourages grantees to strategically incorporate modern green building and energy efficiency improvements in rehabilitation projects.

Energy and Green Retrofit Investments in Elderly, Disabled, and Section 8 Assisted Housing: The HUD resources may be used for energy retrofit and green investments in project-based assisted housing. The Secretary may provide incentives to

owners to undertake energy or green retrofits, including fees to cover investment oversight and implementation, or to encourage job creation for low-income or very low-income individuals.

Veterans Medical Facilities: The Department of Veterans Affairs, Veterans Health Administration provides $150 million for grants to states to acquire or construct nursing homes, or remodel, modify, or alter existing hospital or nursing home facilities for veterans.

Energy Efficiency and Conservation Block Grants: Uses may include conducting residential and commercial building energy audits; establishing financial incentive programs for energy-efficiency improvements; grants to non-profits and government organizations to perform energy efficiency retrofits; developing/implementing building codes and inspections services to promote building energy efficiency; energy efficiency and conservation programs for buildings and facilities within entity's jurisdiction; and developing, implementing, and installing on or in any government building onsite renewable energy technology that generates electricity from renewable sources.

Weatherization Assistance Program: Installing weatherization materials such as attic insulation, caulking, weather-stripping, furnace efficiency modifications, certain mechanical measures to heating and cooling systems, and replacement furnaces, boilers, and air-conditioners**.**

Job Corps: Construction, Rehabilitation, Acquisition, and Operation: Construction, rehabilitation, and acquisition of Job Corps centers. (There is a Job Corp Center in Excelsior Springs, MO).

Green Jobs: Energy Efficiency and Renewable Energy Worker Training (Statute: 171(e)(1)(B) of WIA): Job training projects that prepare workers for careers in energy efficiency and renewable energy industries, including energy-efficient building, construction, and retrofit industries; the deconstruction and materials use industries**;** and the energy efficiency assessment industry serving the residential, commercial, or industrial sectors.

YouthBuild: YouthBuild USA is implementing a Green Initiative to train youth for jobs building energy efficient buildings with sustainable materials. The program builds on the traditional YouthBuild model, a full-time program that combines training in construction trade skills with time in the classroom.

Workforce Investment Act – Adult, Dislocated Worker, and Youth: These resources are available for training eligible individuals for any in-demand occupation, not just construction or green, but they *can* be used for construction and green.

Pathways Out of Poverty: Competitive grants under this SGA will fund projects that provide training and placement services to prepare individuals seeking pathways out of poverty for careers in the industries described within. The Full Employment Council is leading the development of a grant application in the greater Kansas City region.

FOUNDATIONS

National Science Foundation: With an emphasis on two-year colleges, the Advanced Technological Education (ATE) program focuses on the education of technicians for high-technology fields, including energy efficiency and renewable energy. The program involves partnerships between academic institutions and employers to promote improvement in the education of science and engineering technicians at the undergraduate and secondary school levels. The ATE program supports curriculum development; professional development of college faculty and secondary school teachers; and other activities. This year's deadline is October 15, 2009.

BUILDING CODES

Missouri does not have a statewide building or energy code. Each local jurisdiction has the authority to adopt its own codes.

Conversely, the Kansas State Legislature assumes authority for building energy standards. Both the International Energy Conservation Code (IECC) 2006 and American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 90.1-2001 are mandatory throughout the state. The statewide standards require an energy efficiency disclosure by the builder or seller of new residential buildings to the buyer. The potential for litigation exists as a way to ensure compliance for commercial and industrial buildings.

SECTOR-BASED APPROACHES TO WORKFORCE DEVELOPMENT

A sector initiative is an employer-driven, industry-focused partnership that addresses regional workforce needs – including skill shortages and training mismatches – within a specific industry sector. Sector initiatives make it possible for stakeholders in a geographic area to focus on the needs of multiple employers in one or more specific industry sectors. Traditional workforce development and college customized training approaches tend to operate at the **retail level**- one employer at a time. Sector-based approaches operate at the **wholesale level – meeting the shared needs of firms across an industry**.

Ultimately, sector initiatives enable employers to act in concert to develop and maintain a skilled workforce and healthy communities. Sector initiatives take the form of public-private partnerships that have also been known as *regional skills alliances, regional training partnerships, regional skills partnerships,* and *skill panels,* among others.

Sector initiatives are typically launched by a "convener" who serves as the champion and organizer of the public-private partnership that is the foundation of the initiative. The convener should be an intermediary organization with substantial knowledge and partnerships in a targeted industry sector. The convener brings together various partners, facilitates the strategizing and planning process, and manages the sector initiative and growth of the partnership. The convener can be a community college, university, workforce investment board, economic development agency, chamber of commerce, industry association, labor union, human services agency, community based organization or any other entity with the right level of credibility and capacity.

Industry sector expertise and experience are essential in the staff that manages the sector partnership work. It is not enough to have managerial skills. First-hand knowledge of the industry, from product development, operations, and market trends to training needs is fundamental to the job.

At present, there is no regional construction sector approach in the greater Kansas City area. There are numerous groups engaged in construction, energy, and green that have no formal connections or regular communications among them. These include:

- Kansas City Area Development Council's Advanced Energy Task Force
- The Metropolitan Energy Center Board
- Heartland Utilities for Energy efficiency
- The Builders' Association
- Home Builders' Association Build Green Council
- Mid-America Regional Council's Sustainability Council
- The Greater Kansas City Chamber of Commerce Energy Policy Task Force
- The Construction Industry Steering Committee of the Labor Management Council
- The local National Institute of Construction Excellence (NICE) board
- Associated Builders and Contractors, Heart of American Chapter
- The Kansas Blue-Green Alliance

Strategic Direction

Stakeholders met June 16, 2009, to review the findings from the study and deliberate strategies. Participants' reactions were that:

- There is a challenge/dichotomy between the federal government's ARRA focus on training dislocated workers, and employers' primary need to train incumbent workers. Money such as ARRA funding should not drive our plans – we need to develop a sustainable infrastructure/framework that will sustain effective and changing strategies and programs.
- We need to move away from separating "green jobs" or "green collar" as special designations, to incorporation of green concepts in **common practice** for all jobs.
- Providing ***portable*** **credentials** is important.
- There is a lack of significant communication and collaboration among some training institutions that wastes valuable resources.
- There are very few "generic solutions" to our training challenges because of the complexity and segmentation of the supply and demand side markets.
- We need a seamless pipeline and career pathways from high school to community colleges to four- year institutions.

The stakeholders identified three priority areas of focus:

1. **Understand, identify and generate the demand for green practices, work processes, products.**
2. **Build an education and training system to support the green economy.**
3. **Promote Regional Leadership and Connectivity**

The group recommended tracking:

- How ARRA dollars are spent.
- How many people are becoming employed in jobs that utilize green knowledge, skills, and practices.
- The number of loans made to businesses and individuals for green construction, remodeling, retrofitting, or deconstruction.
- The uptake on incentives and rebates.

On a less quantitative side, the stakeholders are interested in knowing:

- The extent to which we move from "innovative green practice" to "common practice".
- The increase and effectiveness of collaborative efforts.

- An assessment of whether we are training faster and more effectively.
- The degree to which we are able to create a regional workforce development system that focuses on sustainability.

As products of this strategic direction, they would like to see:

- An ongoing committee that builds and oversees the system.
- Defined career pathways with required skills and credentials.[11]
- A map of where credentials are offered that is easily accessible to employers and students/workers.
- Expansion of the green construction model to other sectors.

Based on input from the stakeholders, the project Steering Committee established the following aspirational goals:

➔ The greater Kansas City region will be nationally recognized as a leader in green construction practices and skills.

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[11] There is a tool at (http://www.careeronestop.org/CompetencyModel/CareerPathway/CPWCllInstructions.aspx) for creating career ladders/lattices. It takes about 45 minutes per occupation (inclusive of learning curve; the time would go down with practice). Before you begin building a career ladder/lattice, you will be required to create an account by establishing a User Name and password. Your account lets you save your career ladders/lattices so you can build, revise, or edit them at your convenience. The career ladders or lattices that you create will not be shared with the public or other users. The Career Ladder/Lattice Tool will guide you through the creation of career ladders/lattices that show different routes that employees can follow in order to develop their careers. Step-by-step instructions are provided on each page. In addition, you may review extra tips on how to proceed at different steps in the ladder/lattice development process by clicking on the links. You will be able to research jobs, place relevant data in the tool to describe jobs, and arrange job titles in a grid to reflect career progression. The tool is able to incorporate both vertical and lateral movement across jobs in a career. The tool requires you to choose an industry competency model to serve as the foundation for the career ladder/lattice you want to build. Therefore, the first step to building a career ladder/lattice is the creation or customization of a competency model using the Building Blocks for Competency Models Tool. The competency model you select in the Career Ladder/Lattice Tool serves to identify the competencies required for successful task performance in all of the jobs in your ladder/lattice. It will be included in the completed career ladder/lattice document. Once you have chosen an industry competency model, you must follow four steps to create the career ladder/lattice.

- Step 1: Enter Job Information – This step helps you identify the important characteristics of these jobs.
- Step 2: Place and Link Jobs – This step allows you to identify how people may progress through these jobs.
- Step 3: Add Critical Developmental Experiences – This step allows you to describe the key differences between jobs in this career.
- Step 4: Finalize your Career Ladder/Lattice – This step allows you to save and download your work, so you can share it with others for review and validation.

Step-by-step instructions are provided throughout the tool,

- ➔ 100% of all incumbent construction workers will minimally receive green construction awareness training.
- ➔ The number of individuals in the region who receive LEED Accredited Professional (AP) certification or other "green" certifications will increase annually.
- ➔ All secondary, postsecondary, union, and non-union construction training programs will incorporate green knowledge and practices in their curriculum.
- ➔ 100% of all public buildings in the region (libraries, schools, city halls, etc.) and private buildings (churches, offices, homes, retail stores) will have had an energy audit leading to action that resulted in lower average energy consumption per square foot.
- ➔ All customers of residential and commercial construction will demand higher energy efficiency and have expectations for green building and green practices at the construction site (as reported by home builders, designers, architects, and engineers).

These aspirations are proposed to be accomplished through strategies that may include:

- ➔ Strategic connectivity among groups working on "green" (MARC, KCP&L, KDADC, LMC, Metro Energy Center, KC Chamber, et. al.) to align goals and strategies.
- ➔ Establishment of a sector-based steering committee led by MARC to provide direction to aspirations, track strategy development, measure progress, and apply for federal and state grants on behalf of the entire region.
- ➔ Bi-state and community incentives and building code changes to transform behaviors and investments.
- ➔ Job task analysis of green practices by occupation to document specific skills, knowledge, and practices required for green construction.
- ➔ Exploration of the feasibility of a greater Kansas City education and training system virtual Green Center of Excellence for sharing curriculum, instructors, professional development, and so forth.
- ➔ Creation of a single portal where employers and skill seekers can access availability and locations of construction and green practice skills training.
- ➔ Development of a KC green construction brand.
- ➔ Development of regional bi-state outreach materials to educate the public that include a business case for energy conservation.

Next Steps

Pursuing the aspirational goals for green construction cannot be achieved by the existing project Steering Committee (which lacks any representatives from the industry). There are many other groups (identified at the end of the Mechanisms for Change section) that are also interested in promoting green practices, but they have no unifying common vision and goals. Without aligning strategic direction, progress in the region is more likely to be a smattering of random acts of excellence.

The Steering Committee's recommended next steps are:

- Development of a plan to establish a green construction sector-based partnership, including identifying an intermediary. Since the partnership would have this study as a starting point, they could likely get to strategies and action steps relatively quickly. However, the real advantage to having an ongoing sector-based partnership is that they would be assessing and reassessing needs on an ongoing basis and designing solutions to meet those changing needs.
- Identification of an industry leader(s) who can be the "champion" for promoting this effort. Champion(s) lend credibility to an industry partnership, and can recruit interested employers through their industry connections. Knowing that there is backing from a recognized, respected and enthusiastic employer representative, who sees the worth and value of a partnership, can often be the glue that holds the group together in the initial phases.
- One-on-one meetings with key industry leaders in the region to discuss their plans and challenges and share the strategic direction.
- An initial convening of the leaders of various groups and public and private sector stakeholders to present the findings of this study and begin the discussion about alignment and the benefits of developing a more formal sector-based partnership. This would also be an excellent opportunity to test the waters for supporting a sector-based approach to workforce development in the construction industry. You may want to consider having a panel of public and private sector individuals who are involved in successful sector-based initiatives outside the region so that they can discuss the benefits of the sector-based approach, funding mechanisms, etc., and/or visits to sector-based regional skill alliances that are successful in other regions (even if they are different industries) to learn how they finance and manage their work.
- Exploration of a virtual Green Center of Excellence for the Greater Kansas City education and training network for sharing curriculum, instructors, and professional development (as articulated by the Study Steering Committee). This system should become closely linked to the sector partnership when/if it evolves; with overlapping membership and ongoing communication to ensure that the education and training system continues to meet the changing needs of the industry.

- Moving the green construction partnership into the WIRED sustainability framework, and identifying separate but related sectors that would benefit from this same process/model for sector work.
- Planning for an annual update of the secondary and primary research contained in this report to track industry trends.
- Final consensus on a vision and strategies and who will do what, by when to move the next steps forward.

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Appendix A

Commercial/Industrial Construction Jobs Employing More than 50	2008 Jobs	2013 Jobs	Change	% Change	% of Industry	Hourly Earnings	Education Level	Level	Category
Carpenters	1,188	1,292	104	9%	19%	$20.65	Long-term on-the-job training	9	3
Construction laborers	919	1,004	85	9%	15%	$16.48	Moderate-term on-the-job training	10	3
First-line supervisors/managers of construction trades and extraction workers	501	546	45	9%	8%	$29.01	Work experience in a related field	8	2
Construction managers	415	499	84	20%	7%	$34.48	Bachelor's degree	5	1
Structural iron and steel workers	277	307	30	11%	4%	$25.89	Long-term on-the-job training	9	3
Cost estimators	185	211	26	14%	3%	$27.11	Work experience in a related field	8	2
Operating engineers and other construction equipment operators	174	191	17	10%	3%	$22.5	Moderate-term on-the-job training	10	3
Cement masons and concrete finishers	171	185	14	8%	3%	$17.76	Moderate-term on-the-job training	10	3
Civil engineers	124	136	12	10%	2%	$34.5	Bachelor's degree	5	1
Brickmasons and blockmasons	116	128	12	10%	2%	$29.38	Long-term on-the-job training	9	3
Executive secretaries and administrative assistants	108	118	10	10%	2%	$17.99	Moderate-term on-the-job training	10	3
Bookkeeping, accounting, and auditing clerks	101	110	9	9%	2%	$15	Moderate-term on-the-job training	10	3
General and operations managers	100	105	5	4%	2%	$40.08	Degree plus work experience	4	1
Office clerks, general	98	106	8	8%	2%	$12.43	Short-term on-the-job training	11	3
Reinforcing iron and rebar workers	93	103	10	11%	2%	$18.54	Long-term on-the-job training	9	3
Plumbers, pipefitters, and steamfitters	84	92	8	9%	1%	$25.76	Long-term on-the-job training	9	3
Helpers, carpenters	84	92	8	10%	1%	$13.51	Short-term on-the-job training	11	3
Painters, construction and maintenance	80	87	7	8%	1%	$14.77	Moderate-term on-the-	10	3

							job training		
Millwrights	*77*	*89*	*12*	*15%*	*1%*	*$27.09*	*Long-term on-the-job training*	*9*	*3*
Electricians	*67*	*74*	*7*	*11%*	*1%*	*$26.89*	*Long-term on-the-job training*	*9*	*3*
Secretaries, except legal, medical, and executive	*66*	*68*	*2*	*3%*	*1%*	*$13.26*	*Moderate-term on-the-job training*	*10*	*3*
Accountants and auditors	*60*	*66*	*6*	*11%*	*1%*	*$25.43*	*Bachelor's degree*	*5*	*1*
Boilermakers	*59*	*68*	*9*	*15%*	*1%*	*$27.1*	*Long-term on-the-job training*	*9*	*3*
Welders, cutters, solderers, and brazers	*50*	*57*	*7*	*14%*	*1%*	*$16.32*	*Long-term on-the-job training*	*9*	*3*

Education Level	Level	Category
Degree plus work experience	4	1
Bachelor's degree	5	1
Associate's degree	6	2
Postsecondary vocational award	7	2
Work experience in a related field	8	2
Long-term on-the-job training	9	3
Moderate-term on-the-job training	10	3
Short-term on-the-job training	11	3

Plumbing/HVAC Jobs Employing More than 50	2008 Jobs	2013 Jobs	Change	% Change	% of Industry	Hourly Earnings	Education Level	Level	Category
Electricians	3,369	3,567	198	6%	22%	$26.89	Long-term on-the-job training	9	3
Plumbers, pipefitters, and steamfitters	2,064	2,198	134	6%	14%	$25.76	Long-term on-the-job training	9	3
Heating, air conditioning, and refrigeration mechanics and installers	1,302	1,379	77	6%	9%	$20.32	Long-term on-the-job training	9	3
Sheet metal workers	840	888	48	6%	6%	$25.28	Long-term on-the-job training	9	3
First-line supervisors/managers of construction trades and extraction workers	595	631	36	6%	4%	$29.01	Work experience in a related field	8	2
Millwrights	443	502	59	13%	3%	$27.09	Long-term on-the-job training	9	3
Office clerks, general	439	462	23	5%	3%	$12.43	Short-term on-the-job training	11	3
Bookkeeping, accounting, and auditing clerks	366	389	23	6%	2%	$15	Moderate-term on-the-job training	10	3
Cost estimators	357	394	37	10%	2%	$27.11	Work experience in a related field	8	2
Construction laborers	336	359	23	7%	2%	$16.48	Moderate-term on-the-job training	10	3
Helpers, pipelayers, plumbers, pipefitters, and steamfitters	324	345	21	7%	2%	$13.22	Short-term on-the-job training	11	3
Construction managers	275	293	18	6%	2%	$34.48	Bachelor's degree	5	1
General and operations managers	260	263	3	1%	2%	$40.08	Degree plus work experience	4	1
Secretaries, except legal, medical, and executive	233	233	0	0%	2%	$13.26	Moderate-term on-the-job training	10	3
Helpers, electricians	231	242	11	5%	2%	$13.23	Short-term on-the-job training	11	3
Sales representatives, wholesale and	184	197	13	7%	1%	$25.6	Moderate-term	10	3

manufacturing, except technical and scientific products							on-the-job training		
First-line supervisors/managers of mechanics, installers, and repairers	177	190	13	7%	1%	$27.58	Work experience in a related field	8	2
Executive secretaries and administrative assistants	153	163	10	6%	1%	$17.99	Moderate-term on-the-job training	10	3
Insulation workers, mechanical	143	156	13	9%	1%	$26.44	Moderate-term on-the-job training	10	3
Structural iron and steel workers	125	136	11	8%	1%	$25.89	Long-term on-the-job training	9	3
Boilermakers	110	120	10	9%	1%	$27.1	Long-term on-the-job training	9	3
Helpers--Installation, maintenance, and repair workers	109	117	8	7%	1%	$13.12	Short-term on-the-job training	11	3
Sales representatives, services, all other	106	118	12	12%	1%	$24.32	Moderate-term on-the-job training	10	3
Laborers and freight, stock, and material movers, hand	104	106	2	1%	1%	$11.58	Short-term on-the-job training	11	3
Maintenance and repair workers, general	99	106	7	8%	1%	$15.63	Moderate-term on-the-job training	10	3
Telecommunications line installers and repairers	93	98	5	5%	1%	$24.99	Long-term on-the-job training	9	3
Operating engineers and other construction equipment operators	93	99	6	7%	1%	$22.5	Moderate-term on-the-job training	10	3
Receptionists and information clerks	89	95	6	6%	1%	$11.66	Short-term on-the-job training	11	3
Security and fire alarm systems installers	88	90	2	2%	1%	$14.49	Postsecondary vocational award	7	2
Accountants and auditors	85	91	6	7%	1%	$25.43	Bachelor's degree	5	1
Telecommunications equipment installers and repairers, except line installers	85	102	17	21%	1%	$24.12	Long-term on-the-job training	9	3
Carpenters	81	88	7	8%	1%	$20.65	Long-term on-	9	3

							the-job training		
First-line supervisors/managers of office and administrative support workers	80	82	2	3%	1%	$21.65	Work experience in a related field	8	2
Welders, cutters, solderers, and brazers	73	81	8	11%	0%	$16.32	Long-term on-the-job training	9	3
Electrical and electronics repairers, commercial and industrial equipment	70	77	7	10%	0%	$19.74	Postsecondary vocational award	7	2
Dispatchers, except police, fire, and ambulance	68	69	1	1%	0%	$16.97	Moderate-term on-the-job training	10	3
Payroll and timekeeping clerks	58	59	1	1%	0%	$16.92	Moderate-term on-the-job training	10	3
Electronic home entertainment equipment installers and repairers	55	59	4	6%	0%	$15.14	Postsecondary vocational award	7	2
Chief executives	55	55	0	1%	0%	$64.63	Degree plus work experience	4	1
Electrical and electronics drafters	54	57	3	6%	0%	$23.72	Postsecondary vocational award	7	2
Installation, maintenance, and repair workers, all other	50	53	3	8%	0%	$14.89	Moderate-term on-the-job training	10	3

Jobs Appearing on Both Lists

- Carpenters
- Construction laborers
- First-line supervisors/managers of construction trades and extraction workers
- Construction managers
- Structural iron and steel workers
- Cost estimators
- Operating engineers and other construction equipment operators
- Executive secretaries and administrative assistants

- Bookkeeping, accounting, and auditing clerks
- General and operations managers
- Office clerks, general
- Plumbers, pipefitters, and steamfitters
- Millwrights
- Electricians
- Secretaries, except legal, medical, and executive
- Accountants and auditors
- Boilermakers
- Welders, cutters, solderers, and brazers

Largest Jobs (employing 50 or more) across all Construction Sectors

Description	2008 Jobs	2013 Jobs
Carpenters	6,602	6,779
Construction laborers	4,673	4,864
Electricians	3,468	3,675
First-line supervisors/managers of construction trades and extraction workers	2,559	2,665
Plumbers, pipefitters, and steamfitters	2,184	2,326
Painters, construction and maintenance	2,117	2,138
Operating engineers and other construction equipment operators	1,646	1,708
Cement masons and concrete finishers	1,543	1,594
Construction managers	1,290	1,403
Heating, air conditioning, and refrigeration mechanics and installers	1,314	1,391
Cost estimators	1,191	1,294
Office clerks, general	1,211	1,254
Brickmasons and blockmasons	1,105	1,244
Roofers	1,126	1,129
Bookkeeping, accounting, and auditing clerks	1,032	1,077
Sheet metal workers	1,002	1,050

General and operations managers	738	734
Drywall and ceiling tile installers	669	664
Secretaries, except legal, medical, and executive	663	652
Millwrights	532	605
Helpers, carpenters	514	532
Executive secretaries and administrative assistants	500	526
Structural iron and steel workers	483	525
Helpers, brickmasons, blockmasons, stonemasons, and tile and marble setters	437	494
Truck drivers, heavy and tractor-trailer	469	486
Sales representatives, wholesale and manufacturing, except technical and scientific products	390	407
Excavating and loading machine and dragline operators	369	385
Helpers, pipelayers, plumbers, pipefitters, and steamfitters	344	366
Laborers and freight, stock, and material movers, hand	361	358
Sales representatives, services, all other	290	318
Reinforcing iron and rebar workers	276	292
Maintenance and repair workers, general	277	291
Accountants and auditors	274	290
Tapers	285	283
Receptionists and information clerks	255	266
Welders, cutters, solderers, and brazers	246	264
Helpers, electricians	236	246
First-line supervisors/managers of office and administrative support workers	227	229
Insulation workers, mechanical	212	225
First-line supervisors/managers of mechanics, installers, and repairers	210	224
Insulation workers, floor, ceiling, and wall	221	223
Plasterers and stucco masons	213	216
Boilermakers	174	193
Chief executives	163	163
Payroll and timekeeping clerks	162	161
Civil engineers	147	160
Paving, surfacing, and tamping equipment operators	148	153
Tile and marble setters	131	141
Helpers--Installation, maintenance, and repair workers	127	135

Truck drivers, light or delivery services	125	131
Janitors and cleaners, except maids and housekeeping cleaners	124	131
Construction and related workers, all other	123	129
Mobile heavy equipment mechanics, except engines	102	107
Pipelayers	100	105
Telecommunications equipment installers and repairers, except line installers	85	102
Helpers, construction trades, all other	96	99
Telecommunications line installers and repairers	94	99
Business operation specialists, all other	86	95
Customer service representatives	83	91
Security and fire alarm systems installers	89	90
Dispatchers, except police, fire, and ambulance	84	84
Installation, maintenance, and repair workers, all other	78	83
Electrical and electronics repairers, commercial and industrial equipment	74	81
Paperhangers	87	80
Floor sanders and finishers	77	77
Landscaping and groundskeeping workers	72	76
Purchasing agents, except wholesale, retail, and farm products	64	67
Electronic home entertainment equipment installers and repairers	55	59
Electrical and electronics drafters	55	59
Structural metal fabricators and fitters	55	59
Electrical engineers	53	56
Stonemasons	53	55
Crane and tower operators	53	55
Helpers, roofers	54	53

Appendix B

Regional Education and Training Assets[12]

METROPOLITAN ENERGY CENTER'S ENERGY AND ENVIRONMENTAL TRAINING CENTER (MEC- EETC) WWW.KCENERGY.ORG

- EETC Home Weatherization Training Certificate. The training satisfies contractor and worker requirements for participation in the Kansas City, MO weatherization program as well as others.
- EETC Energy Auditor and Energy Auditor Supplemental (accredited by the state of Missouri). The certification that the course leads to is necessary for auditors planning to perform audits for the "Efficiency Kansas" programs.
- Building Performance Institute (BPI) Energy Analyst Certification
- HVAC
- Insulation Installation
- Residential Energy Training
- Energy System Fundamentals

ACCURATE RATER NETWORK WWW.ACCURATERATER.COM

- Basic HERS Rater Training (preparation for the Residential Energy Services Network [RESNET] HERS rater test).
- Advanced HERS Rater Training.
- BPI Building Analyst (home energy diagnostics, combustion equipment safety training and preparation for the BPI Building Analyst test).
- BPI Building Analyst Certification for the Certified HERS rater (shortened BPI course).
- Field Inspector Training (preparation course for the RESNET Field Inspector test).
- Running a Home Energy Rating/Home Energy Auditing Business (marketing, bookkeeping, paperwork).
- Advanced Energy Auditor training (focused on HVAC systems and construction practices and materials).
- Green Rater Training (preparation for the LEED for Homes Third-Party Certification Role.
- Green Verifier Training (preparation for the NAHB Green Verifier test).

HATHMORE TECHNOLOGIES, LLC WWW.HATHMORE.COM

- RESNET training and certification.
- BPI Building Analyst training and certification.
- US Green Building Council (USGBC) LEED for Homes training and certification.

[12] This is not an exhaustive list of resources since not all entities responded to requests for information.

- National Association of Home Builders (NAHB) Green Verifier Program training and certification.
- Basic HERS Rater Training
- HVAC
- Insulation Installation
- Weatherization
- Thorough Home Diagnostics
- Coming soon: BPI Building Analyst for HERS Rater Training, Field Inspector Training, Green Rater Training

UNIVERSITY OF CENTRAL MISSOURI (UCM) HTTP://WWW.UCMO.EDU

- Weatherization Tech program (Missouri Department of Elementary and Secondary Education and focused on training people for Green Jobs under ARRA) with career pathway.
- Construction Management B.S. Degree
- LEED Accredited Professional Exam
- Wind Turbine Technician Certification
- Solar Technician Certification
- Non College Credit Training:
    - Asbestos Abatement
    - Laborer, General
    - Laborer, First Semi-Skilled
    - Carpentry
    - Insulation Installation
    - Landscaping
    - Weatherization
    - Electrical (inside wiring)
    - Welding
    - Blueprint reading
    - Construction Management
    - Facility Management
    - Deconstruction
    - Energy Auditing
    - Geothermal Heating/Cooling Installation
    - Solar PV System Installation
    - Wind Turbine Installation
    - Environmental Compliance
    - Hazardous Materials Handling
    - Energy Systems Fundamentals
    - Renewable Energy Systems
    - Energy Equipment Troubleshooting
    - Building Systems Maintenance
    - Waste Management
    - Fuel Cells

JOHNSON COUNTY, KS COMMUNITY COLLEGE HTTP://WWW.JOHNCO.CC.KS.US

- Residential Energy Auditor Certification
- Energy Performance and Resource Management A.A.S.
- HVAC
- Sheet Metal Working
- Electrical (inside wiring)
- Industrial Electrical
- Welding
- Blueprint Reading
- Construction Management

KANSAS CITY, KS COMMUNITY COLLEGE HTTP://WWW.KCKCC.CC.KS.US/

- Laborer, General
- Laborer, First Semi-Skilled
- Laborer, Second Semi-Skilled
- HVAC
- Carpentry
- Roofing
- Sheet Metal Working
- Tile Setting
- Insulation Installation
- Floor Laying
- Landscaping
- Weatherization
- Electrical (inside wiring)
- Industrial Electrical
- Millwright
- Cement Masonry
- Painting
- Plastering
- Plumbing
- Pipefitting
- Welding
- Blueprint Reading
- Building Inspection
- Facility Management
- Environmental Technology
- Electrical Technology
- Building and Property Maintenance

- Green Skills:
  - Building rain gardens
  - Energy auditing
  - Geothermal heating/cooling installation
  - Solar PV System installation
  - Wind turbine installation
  - Environmental remediation
  - Environmental compliance
  - Hazardous materials handling
  - Energy systems fundamentals
  - Renewable energy systems
  - Energy equipment troubleshooting

METROPOLITAN COMMUNITY COLLEGE, KANSAS CITY, MO HTTP://MCCKC.EDU/

- Degree and Certificate credit programs
  - Energy Efficiency
  - Engineering Technology-Architecture
  - Grounds and Turf Management
  - Heating, Ventilation, and Air Conditioning
  - Industrial Electrical and Industrial Maintenance
  - Photovoltaics
  - Stationary Engineering
  - Solar Thermal
  - Industrial Technology Construction Management
- Industrial Technologies († = Apprenticeship programs)
  - Bricklayer †
  - Construction Carpentry †
  - Construction Cement Masons †
  - Construction Ironworking †
  - Construction Laborer †
  - Construction Management
  - Electric Utility Line Technician
  - Glaziers †
  - Industrial Electrical
  - Industrial Maintenance
    - Electrician †
    - Welding
  - Industrial Mechanic †
  - Industrial Pipefitter/Sprinkler Fitter †
  - Industrial Welder †
  - Inside Wiring †
  - Instrumentation & Controls
  - Lineman Tech/Cable Splicer †
  - Millwright

- Painter †
- Plumbing †
- Sheet Metal †
- Stationary Engineer

- Green Skills
  - Geothermal heating/cooling installation
  - Solar PV system installation
  - Hazardous materials handling
  - Energy Systems Fundamentals
  - Renewable Energy Systems
  - Building Systems Maintenance
  - Waste Management

ERA ENVIRONMENTAL & SAFETY (INDEPENDENCE, MO) WWW.ERASAFETY.COM

- Asbestos Abatement
- Laborer, General
- Painting
- Blueprint Reading
- Building Inspection
- Construction Management
- 40-Hour HAZOPER, Lead Abatement

GREATER KANSAS CITY LABORERS TRAINING CENTER

- Asbestos Abatement
- Laborer, General
- Laborer, First Semi-Skilled
- Laborer, Second Semi-Skilled
- Weatherization
- Cement Masonry
- Welding
- Blueprint Reading
- Construction Management
- Hazardous Waste Worker, Lead Abatement, Mold Remediation
- Building Deconstruction
- Wind Turbine Installation
- Environmental Remediation
- Hazardous Materials Handling

PLUMBERS LOCAL 8 EDUCATIONAL TRAINING FUND

- Plumbing
- Welding
- Blueprint Reading

- Building Inspection
- Construction Management
- United Association Green System Awareness Certification
- Building Rain Gardens
- Green Roof Construction
- Solar Thermal System Installation
- Building Systems Maintenance

IBEW Local 124 Apprenticeship

- Electrical (inside wiring)
- Industrial Electrical
- Welding
- Blueprint Reading
- Solar Photovoltaic and Solar Technician Certification
- Wind Turbine Installation and Technical Certification
- Energy Systems Fundamentals
- Renewable Energy Systems
- Energy Equipment Troubleshooting
- Building Systems Maintenance

Park Hill School District Career and Technical Education
http://www.parkhill.k12.mo.us/parkhill

- Carpentry
- Electrical (inside wiring)
- Plumbing
- Welding

Glaziers' Labor Union #558

- Glazing

Kansas City, MO MSD, Manual Career Center
http://www.kcmsd.k12.mo.us/school_home.asp?id=34

- Carpentry
- Roofing
- Landscaping
- Painting
- Plumbing
- Welding
- Building Deconstruction
- Energy Auditing
- Environmental Compliance

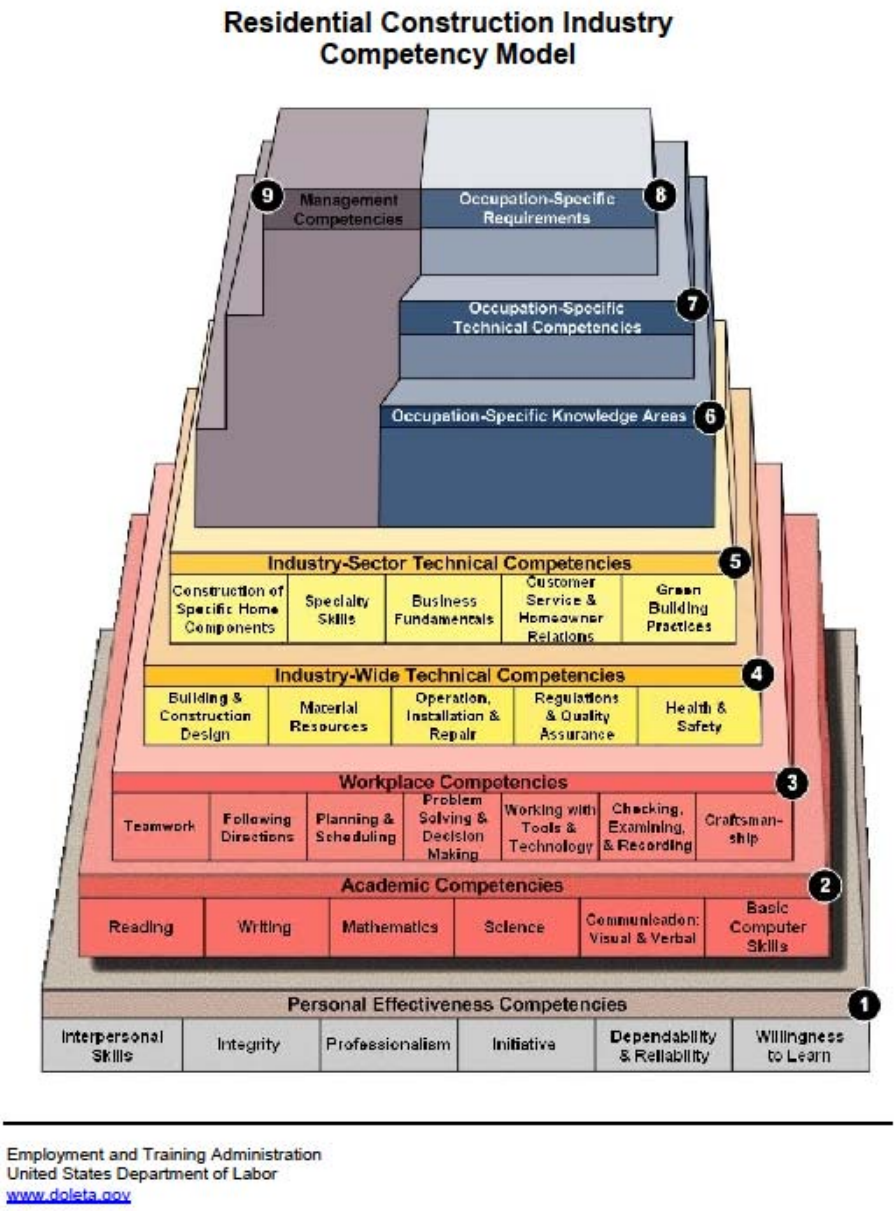
Fort Osage, MO Career and Technology Center
http://www.fortosage.net/education/school/school.php?sectiondetailid=201&

- Carpentry
- Landscaping

Northland Career Center (Platte City, MO) www.northlandcareercenter.com

- Laborer, General
- HVAC
- Carpentry
- Welding

Appendix C



Employment and Training Administration
United States Department of Labor
www.doleta.gov

Green Building Practices: Knowledge and application of green building practices to the construction or renovation of residential buildings:[13]

[13] The following page is an extract of green competencies only. For the full competency model, go to http://www.careeronestop.org/competencymodel/pyramid.aspx?CONR=Y

Construction Trends

- Recognize and research green building trends in the residential construction industry including use of new materials, technologies, and processes
- Understand the growth and impact of green building practices
- Explain the environmental and economic benefits of green building practices
- Incorporate new methods and materials into design and construction of residential buildings
- Meet requirements to verify that a building project meets the highest green building and performance measures

Siting

- Select sites well suited to take advantage of mass transit when possible
- Protect and retain existing landscaping and natural features
- Select plants that have low water and pesticide needs
- Use compost and mulches

Efficiency

- Perform home energy audits to determine the energy efficiency of a structure
- Develop strategies to provide or increase natural lighting
- Select sustainable construction materials and products
- Minimize wastewater by using water conserving fixtures

Waste Management

- Follow waste management plans per contract requirements
- Minimize construction waste and demolition debris
- Understand waste management terminology including: construction waste, demolition debris, land clearing debris, disposal, recycling, salvage, reuse, deconstruction, commingled, source separation
- Reuse or recycle materials, e.g.: concrete, masonry scrap, metals, clean wood, plastics, insulation material, un-tempered glass, carpet and carpet pad, ceiling tiles, plumbing fixtures and equipment, lighting fixtures and electrical components, cardboard packaging

Appendix D

Apprenticeship Work Process Schedules Related to Residential Construction[14]

The following table lists apprenticeable occupations related to residential construction. Each occupation links to a work process schedule saved in the Competency Model Clearinghouse database.

Automated Access Systems Technician http://www.doleta.gov/oa/bul08/Automated_access_workprocess.doc
Bricklayers http://www.careeronestop.org/competencymodel//modelFiles/BRICKLAYERS_Construction_.0052 Converted.pdf
Cabinetmaker http://www.careeronestop.org/competencymodel//modelFiles/CABINETMAKER.0055 Converted.pdf
Carpenter http://www.careeronestop.org/competencymodel//modelFiles/CARPENTER. 0067 Converted.pdf
Carpenter, Acoustical Specialist http://www.careeronestop.org/competencymodel//modelFiles/Acoustical Carpenter Specialist.pdf
Carpenter, Interior Systems http://www.careeronestop.org/competencymodel//modelFiles/CARPENTER INTERIOR SYSTEMS.0653 Converted.pdf
Construction Craft Laborer http://www.doleta.gov/OA/bul08/Bulletin_2008-16.pdf
Dry-Wall Applicator Specialist http://www.careeronestop.org/competencymodel//modelFiles/DRYWALL APPLICATOR SPECIALIST.0145 Converted.pdf
Electrician http://www.careeronestop.org/competencymodel//modelFiles/ELECTRICIAN.0159 Converted.pdf
Floor Coverer (Layer) http://www.careeronestop.org/competencymodel//modelFiles/FLOOR COVERER_Layer_.0199 Converted.pdf
Heating, Ventilation, Air Conditioning, and Refrigeration Specialist http://www.careeronestop.org/competencymodel//modelFiles/HVAC and Refrigeration.pdf
Lathing Specialist http://www.careeronestop.org/competencymodel//modelFiles/LATHING SPECIALIST.0272 Converted.pdf
Marble Finisher http://www.careeronestop.org/competencymodel//modelFiles/MARBLE FINISHER.pdf
Marble Setter http://www.careeronestop.org/competencymodel//mode

[14] Competency Model Clearinghouse: http://www.careeronestop.org/competencymodel/pyramid.aspx?CONH=Y

lFiles/MARBLE SETTER.pdf
Masonry Occupations http://www.doleta.gov/OA/bul01/Bul2001-09%20International%20Masonry%20Institute.pdf
Mosaic Worker http://www.careeronestop.org/competencymodel//modelFiles/MOSAIC WORKER.pdf
Painter http://www.doleta.gov/oa/bul00/Bul2000-13%20NGS-Painters.pdf
Plasterer http://www.careeronestop.org/competencymodel//modelFiles/PLASTERER.pdf
Residential Carpenter Specialist http://www.careeronestop.org/competencymodel//modelFiles/RESIDENTIAL CARPENTER SPECIALIST.pdf
Residential Wirer http://www.doleta.gov/OA/bul98/Bul98-03%20Residl%20Wirer.pdf
Sheet Metal Worker http://www.doleta.gov/OA/bul08/Bulletin-2008-04.pdf
Stonemason http://www.careeronestop.org/competencymodel//modelFiles/STONE MASON.pdf
Structural Carpenter http://www.careeronestop.org/competencymodel//modelFiles/Structural (Carpenter).pdf
Terrazzo Finisher http://www.careeronestop.org/competencymodel//modelFiles/TERRAZZO FINISHER.pdf
Terrazzo Worker http://www.careeronestop.org/competencymodel//modelFiles/TERRAZZO WORKER.pdf
Tile Finisher http://www.careeronestop.org/competencymodel//modelFiles/TILE FINISHER.pdf
Tile Setter http://www.careeronestop.org/competencymodel//modelFiles/TILE SETTER.pdf
Timber Framer http://www.doleta.gov/OA/bul08/Bulletin_2008_17.pdf
Utilities Systems (Plumber) http://www.careeronestop.org/competencymodel//modelFiles/Utilities Systems (Plumber).pdf