

Michigan Green Jobs Report: A Regional Analysis

Occupations & Employment in the New Green Economy



Michigan Green Jobs Report: A Regional Analysis

OCCUPATIONS & EMPLOYMENT IN THE NEW GREEN ECONOMY



Michigan Department of Energy, Labor & Economic Growth

Bureau of Labor Market Information & Strategic Initiatives

JULY 2010

Prepared By:

Bureau of Labor Market Information & Strategic Initiatives

Richard Waclawek
Director

Bruce Weaver
Project Manager

Rhea Acuna
James Astalos
Leonidas Murembya
Jason Palmer
Mark Reffitt
Stephen Woods

For Further Information, Please Contact:

Bureau of Labor Market Information and Strategic Initiatives
Labor Market Analysis Section
3032 W. Grand Boulevard, Suite 9-100
Detroit, MI 48202
(313) 456-3100

Table of Contents

Executive Summary	3
Introduction	7
Section I: Cross-Region Comparative Analysis	8
Figure 1: Direct Green Jobs as a Share of Total Private Jobs.....	8
Figure 2: Direct Green Jobs by Region by Core Area	9
Figure 3: Core Area Green Jobs by Region	10
Figure 4: Regional Distribution of Green Jobs by Industry	12
Figure 5: Regional Distribution of Green Jobs by Occupation.....	13
Figure 6: Percent of Employers Expecting Recruiting Difficulties for Green Jobs	14
Figure 7: Percent of Employers Highlighting Unique Skills Required for Green Projects.....	15
Figure 8: Share of Employers Expecting Green Jobs Gains by 2011	16
Figure 9: Anticipated Training Demand by Region: Formal vs. Informal	18
Section II: Michigan Regional Green Job Profiles	19
Southeast Michigan	20
Southwest Michigan	29
West Michigan	37
Mid-Michigan	45
Northern Michigan.....	53
Appendix 1: Michigan Regions	63

Executive Summary

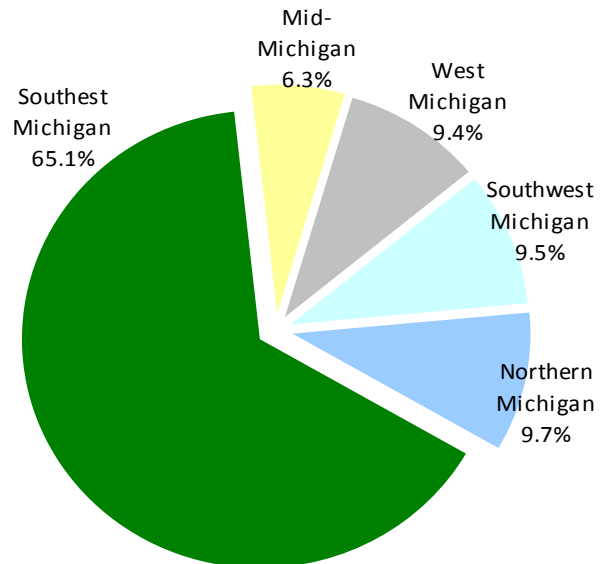
This report is a companion to the *Michigan Green Jobs Report 2009*, which was the first in-depth research report measuring the number and characteristics of green jobs in Michigan. The report *Michigan Green Jobs: A Regional Analysis* presents for the first time green jobs data for five regions in Michigan.^{1,2} The five regions are Southeast Michigan, Southwest Michigan, Mid-Michigan, West Michigan, and Northern Michigan.

Key Findings

- Green jobs accounted for about 2-4 percent of total private jobs across Michigan regions.
- The auto industry is a significant source of green jobs in several Michigan regions, and particularly in Southeast Michigan.
- Concentrations of green jobs can be identified in each region, such as renewable energy jobs in Mid-Michigan, natural resource positions in Northern Michigan, energy efficiency jobs in Southwest Michigan, and environmental cleanup jobs in West Michigan.
- Green jobs by occupation differ across regions, but engineering, construction, production, and installation and repair occupations were reported as “green” by employers in all regions.

Green Jobs by Region

- **Notable green job levels exist in each region of the state.** Green job levels were analyzed by region in two ways: (1) by comparing the **number** of green jobs by region; and (2) by calculating the **concentration** of total private jobs in a region that are considered “green.”
- Michigan boasts a total of 104,000 green jobs. **The largest numbers of green jobs were in Southeast Michigan.** Northern Michigan, Southwest Michigan, and West Michigan were in the second, third, and fourth positions, respectively. Mid-Michigan was the region to report the fewest number of green jobs.
- Statewide, 3.3 percent of total private jobs were considered “green.” **The region with the largest concentration of green jobs was Northern Michigan,** with 4.3 percent. Mid-Michigan and West Michigan reported the lowest concentration of green jobs with 1.8 percent and 2.0 percent, respectively.



Green Jobs by Core Area

- The *Michigan Green Jobs Report* classified green jobs in one of five core areas: *Clean Transportation and Fuels*; *Increasing Energy Efficiency*; *Pollution Prevention and Environmental Cleanup*; *Agriculture and Natural Resources Conservation*; and *Producing Renewable Energy*.

¹ This regional report includes additional survey data beyond what was reflected in the *Michigan Green Jobs Report*. As a result, the estimated number of direct green jobs in Michigan has been revised upward to 104,000.

² The *Michigan Green Jobs Report* can be found on the DELEG Bureau of Labor Market Information and Strategic Initiatives website, at www.michigan.gov/lmi under “Publications”.

- Southeast Michigan, due to its large size, is home to the majority of green jobs in all five core areas. **Nevertheless, the core area of Clean Transportation and Fuels accounted for over half of all green jobs in Southeast Michigan.** This is primarily due to the many green jobs created by the automotive industry and auto suppliers.
- A high regional concentration of green jobs in particular core areas may suggest that **regional specialization exists in different types of green products and services.** Indeed, each of the state's five regions reported a higher-than-average concentration of green jobs in a particular core area when compared to the statewide averages.
- For example, **Southwest Michigan** contains a good share of Michigan employment in *Increasing Energy Efficiency* while **West Michigan** recorded positive statewide job shares in *Agriculture and Natural Resource Conservation* and *Pollution Prevention & Environmental Cleanup*. **Mid-Michigan** reported 16 percent of Michigan jobs in *Producing Renewable Energy* and **Northern Michigan** boasted 20 percent of statewide jobs in *Agriculture and Natural Resource Conservation*.

Green Jobs by Industry and Occupation

- **Regional green jobs were found in a cross-section of industries and occupations.** As expected, there were several green industries and green occupations that were found commonly across all regions. The table on this page gives a few examples of common and region-specific sectors producing green jobs.
- The majority of green jobs in **Southeast Michigan** were predictably concentrated in two industries: transportation equipment manufacturing and professional, scientific and technical services. Other major sources of green jobs were construction, administrative and support services, and waste management and remediation services.

<p style="text-align: center;">Common Green Industries (Across Regions)</p> <p style="text-align: center;">Professional, Scientific, and Technical Services Specialty Trade Contractors Construction of Buildings Crop Production</p> <p style="text-align: center;">Unique Green Industries (Region Specific)</p> <p style="text-align: center;">Transportation Equipment Manufacturing Waste Management and Remediation Services Wood Products Manufacturing Green Wholesaling Chemical Manufacturing Primary Metal Manufacturing</p>

- Among the occupations reporting significant green employment in Southeast Michigan were architecture and engineering occupations, production occupations, installation, maintenance, and repair occupations, and construction and extraction occupations.
- The mix of green industries and green occupations in Southeast Michigan reflect the region's large auto-related economy. **Significant numbers of engineers, technicians, production staff and others in the auto sector are increasingly focused on research, design, and production of fuel-efficient vehicles and new green auto technologies.**
- In **Southwest Michigan**, construction, professional, scientific, and technical services, and crop production were among the industries providing the most green jobs. Occupational employment was concentrated in farming, fishing, and forestry occupations, production occupations, construction occupations, architecture and engineering occupations, and installation, maintenance, and repair occupations.
- The mix of green industries and occupations in Southwest Michigan represent the wide range of knowledge, skills, and abilities that can be applied to green jobs. **Green employment in Southwest Michigan ranges from moderate-**

skill jobs in farming and production to highly skilled jobs in professional services.

- Industries posting significant green job counts in **West Michigan** included construction-related industries, transportation equipment manufacturing, and waste management and remediation. Above average job levels were recorded in construction occupations, production occupations, and installation, maintenance, and repair occupations.
- These industries and occupations reflect the diverse nature of the West Michigan economy. **While the automotive industry is certainly important in West Michigan, other industries have flourished there, making it a region with a diverse range of green-related businesses.**
- Green jobs in **Mid-Michigan** were found in professional, scientific, and technical services and specialty trade contractors. In Mid-Michigan, green employment was concentrated in production and architecture & engineering occupations. Significant job levels also were reported in construction and life, physical, and social science occupations.
- While Mid-Michigan green jobs are a modest share of total employment, the region has attracted new investment in green technology. **The region's significant employment in green-related production occupations reflect the production of more fuel-efficient motor vehicles and parts as well as the manufacturing of products for clean and renewable energy production, such as solar panel components and wind turbines and related components.**
- Many of the green jobs in **Northern Michigan** were concentrated in construction, professional services, and agricultural and natural resource industries. Large green occupations included construction and extraction occupations, architecture and engineering occupations, and production occupations.
- Green employment in Northern Michigan is fairly diversified. **The landscape of Northern Michigan ensures adequate opportunities for**

agriculture and natural resource-related green business, yet there are opportunities for other businesses in green building and alternative fuels.

Green Job Characteristics and Employer Expectations

- The *Michigan Green Jobs Report: A Regional Analysis* also summarizes the responses of regional green employers to five additional survey questions. These survey questions covered topics such as: potential recruiting difficulties when trying to fill specific green occupations; the existence of unique skills for regional workers on green projects; employer expectations for short-term green job growth; and the likely use of formal versus informal training for future green-related workers.
- Statewide, 16 percent of employers expected recruiting difficulties for green jobs. **Green businesses in Mid-Michigan expect the most difficulty recruiting for green jobs**, as nearly a quarter of employers anticipate some issues recruiting. In contrast, just one in ten green businesses in West Michigan expect recruiting difficulties.
- In Michigan, 64 percent of employers indicate that unique skills are required of workers who work on green projects. This measure varies significantly between the regions. **In Mid-Michigan, a large 82 percent of green employers indicate that unique skills are required for green jobs compared to Southwest Michigan, where just 44 percent of respondents indicated unique skills are required.**
- The skills required for green positions can be obtained through either formal or informal training. **Typically, employers indicate that informal training may be the most frequently used option.** Statewide, employers reported about 68 percent of training will be in an informal setting, versus 32 percent of training in formal programs. There was little regional divergence from these statewide results.

- In general, green businesses were cautiously optimistic in 2009 about short-term job gains. **While the long-run outlook for green employment is likely to be positive, only 30 percent of green employers indicated they expected to add green jobs by 2011.**
- Northern Michigan had the most optimistic expectations; as 36 percent of green employers in that region indicated green job gains by 2011. The least optimistic employers were in Mid-Michigan, where just 16 percent of businesses expected to add green jobs in the short-term.

Michigan Green Jobs Report: A Regional Analysis

Introduction

In May 2009, the Michigan Department of Energy, Labor, & Economic Growth (DELEG), Bureau of Labor Market Information and Strategic Initiatives published the *Michigan Green Jobs Report 2009*. This study was the first direct survey of Michigan employers used to define and measure green job totals by occupation and industry.

Green jobs were defined as “jobs directly or indirectly involved in generating a firm’s green-related products or services”. The state’s green economy was defined as being comprised of those industries that provide products or services in five broad areas: *Agriculture and Natural Resource Conservation, Clean Transportation and Fuels, Increased Energy Efficiency, Pollution Prevention or Environmental Cleanup, and Renewable Energy Production*.

A survey was sent to thousands of employers to measure the current number of green jobs in Michigan. It was found that Michigan boasted approximately 109,000 total green jobs— both direct and indirect— among private sector employers. There were 96,767 direct green jobs and 12,300 indirect green jobs.³

This report supplements the content of the *Michigan Green Jobs Report 2009* to evaluate the distribution of these jobs across several state regions. Michigan was divided into five regions: Northern Michigan, West Michigan, Mid-Michigan, Southwest Michigan, and Southeast Michigan.⁴ This regional analysis is divided into two sections. The first section is a comparative cross-regional analysis, while the second section presents the characteristics of green jobs specific to each region.

³ With additional survey data collection since the report publication, the estimated number of direct green jobs in Michigan has been revised upward to 104,000.

⁴ A map showing the counties included in each region can be found in Appendix 1 of this report.

Section I: Cross-Region Comparative Analysis

- According to the *Michigan Green Jobs Survey*, the state contains approximately 104,000 direct green jobs. The overwhelming majority of these jobs (65 percent) were in Southeast Michigan – the most populated region in the state.
- Southwest Michigan, West Michigan, and Northern Michigan each reported roughly 10 percent of the state’s green jobs.
- Interestingly, Mid-Michigan, while home to 12 percent of Michigan’s total jobs, reported a disproportionately low 6.3 percent of the state’s green jobs.

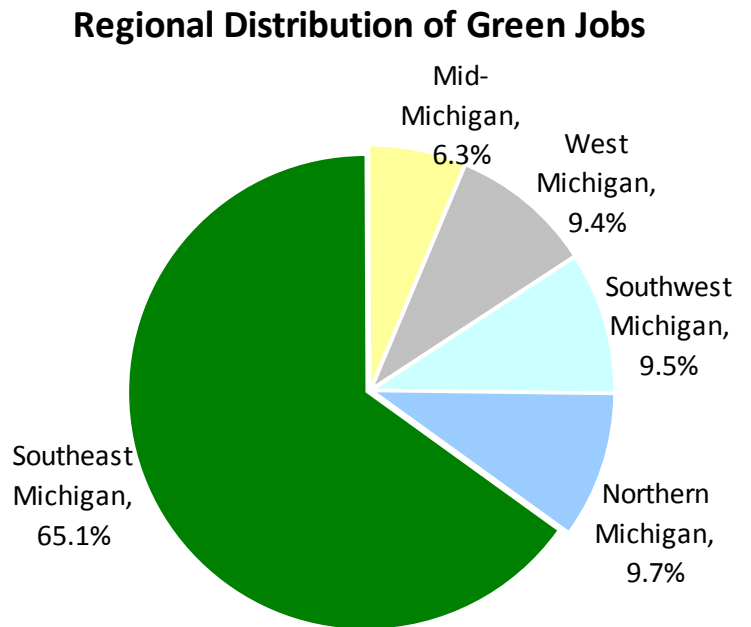


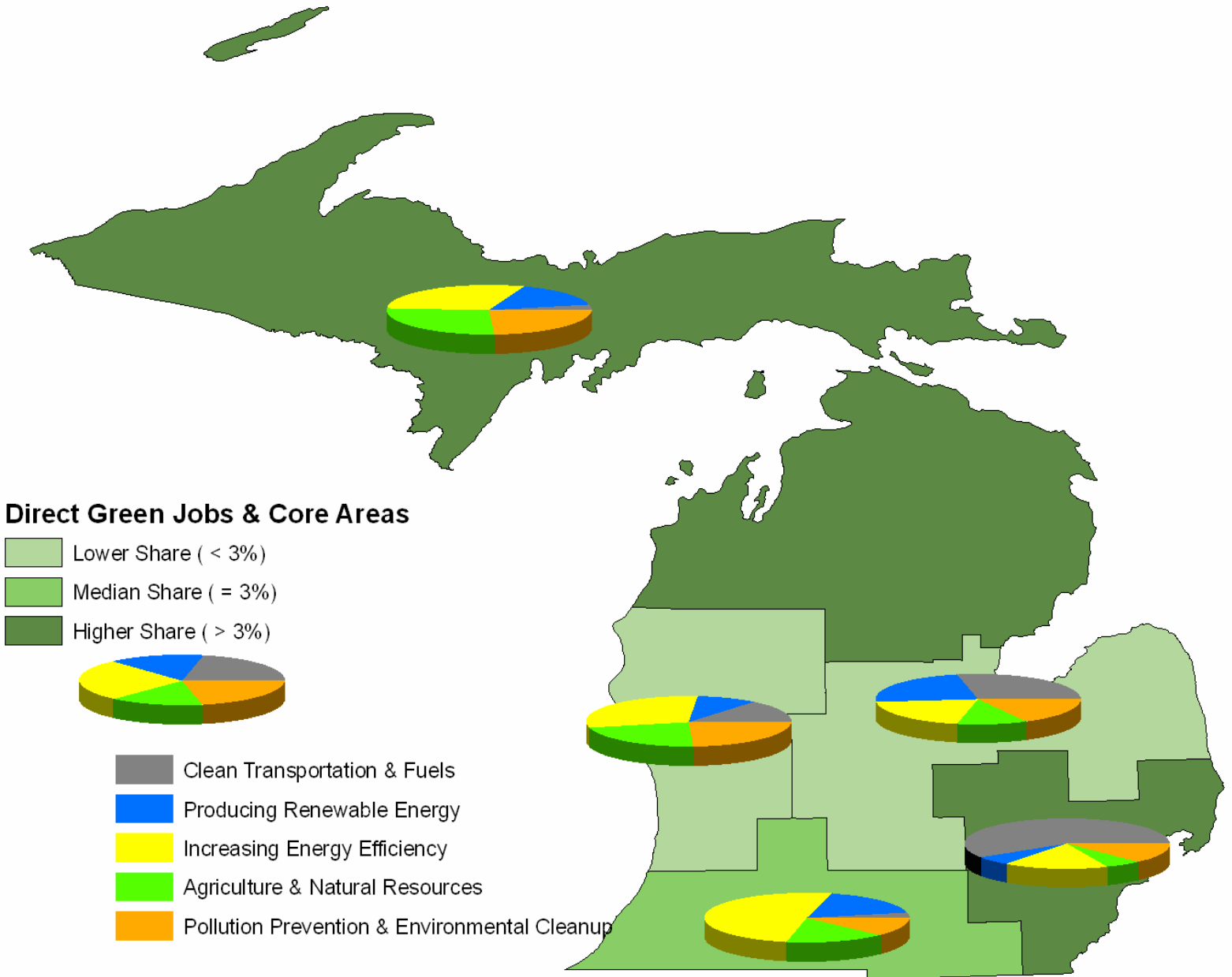
Figure 1: Direct Green Jobs as a Share of Total Private Jobs

Region	Total Private Jobs	Total Green Jobs	Green Jobs as Share of Total Private Jobs
Michigan	3,185,406	104,003	3.3%
Northern Michigan	228,329	9,811	4.3%
Southeast Michigan	1,686,322	65,733	3.9%
Southwest Michigan	317,851	9,545	3.0%
West Michigan	475,353	9,509	2.0%
Mid-Michigan	361,940	6,369	1.8%

Source: Michigan Department of Energy, Labor & Economic Growth

- Another revealing perspective is the share of a region’s total private employment that is “green-related.” Overall, just 3.3 percent of total employment in the private sector was comprised of green jobs.
- One reason for the relatively low share of green jobs is the natural life-cycle of businesses in the green economy. The green economy is still emerging in Michigan. In fact, the *Michigan Green Jobs Report 2009* evaluated job trends using tax data on more than 350 green-related Michigan firms, and one-fifth of the firms appeared to be newly created since 2005.

Figure 2: Direct Green Jobs by Region by Core Area



Source: Michigan Department of Energy, Labor & Economic Growth

- Figures 1 and 2 display the green-related share of total private jobs by region, ranging from a high of 4.3 percent in Northern Michigan to a low of 1.8 percent in Mid-Michigan. The pie charts in Figure 2 also display the distribution of green jobs by core area by region.

- Northern and Southwest Michigan possessed a similar number of green jobs, more than 9,500. In addition, the structure of jobs in their regional green economies exhibited similar patterns. *Increasing Energy Efficiency* was the leading core area for both regions. Employment in *Clean Transportation and Fuels* was minimal, accounting for only 2.4 percent of total green jobs in each region.
- Green employment in Southeast Michigan was concentrated in the top two core areas, *Clean Transportation and Fuels* and *Increasing Energy Efficiency*. These two core areas comprised roughly 80 percent of green jobs in the region.
- Mid-Michigan had the most diversified green economy with no core area accounting for more than 30 percent of green jobs. The share of green jobs in each core area ranged from 13.9 percent in *Pollution Prevention and Environmental Cleanup* to 29.4 percent in *Clean Transportation and Fuels*.
- Essentially, about three-fourths of green jobs in West Michigan were evenly distributed between three core areas: *Increased Energy Efficiency* (28.9 percent), *Pollution Prevention and Environmental Cleanup* (23.6 percent), and *Agriculture and Natural Resource Conservation* (23.3 percent).

Regional Distribution of Green Jobs by Core Area

- Figure 3 illustrates the core areas from a different perspective. While the pie charts in Figure 2 show the core area distribution of green jobs for each region, the following table reveals the concentration of jobs by region in each core area.

Figure 3: Core Area Green Jobs by Region

Regions	Clean Transportation & Fuels		Increasing Energy Efficiency		Pollution Prevention & Environmental Cleanup		Agriculture & Natural Resources Conservation		Producing Renewable Energy	
	#	%	#	%	#	%	#	%	#	%
Michigan	39,658	100%	26,761	100%	13,796	100%	13,059	100%	8,223	100%
Southeast Michigan	35,925	90.6%	14,444	54.0%	6,038	43.8%	4,090	31.3%	3,364	40.9%
Northern Michigan	239	0.6%	3,098	11.6%	2,272	16.5%	2,562	19.6%	1,364	16.6%
Southwest Michigan	232	0.6%	4,816	18.0%	1,567	11.4%	1,982	15.2%	844	10.3%
West Michigan	1,010	2.6%	2,745	10.3%	2,241	16.2%	2,211	16.9%	1,141	13.9%
Mid-Michigan	1,872	4.7%	1,187	4.4%	887	6.4%	994	7.6%	1,336	16.2%

Source: Michigan Department of Energy, Labor & Economic Growth

- Southeast Michigan accounted for the largest share of green jobs in each individual core area. Green employment in *Clean Transportation and Fuels* was heavily concentrated in Southeast Michigan, with a staggering 90.6 percent of the core's Michigan total employment. The Southeast Michigan share of green employment in *Agriculture and Natural Resource Conservation* (31.3 percent) was the smallest, reflecting the significant degree of urbanization in the Detroit metro area.
- *Clean Transportation and Fuels* was the leading core area in Michigan, accounting for 39,658 green jobs or 38.1 percent of total green jobs in the state.
- *Increasing Energy Efficiency* was the second largest core area in the state with 26,761 green jobs (25.7 percent). Southeast Michigan accounted for a little over half of the green employment in this core area, while Mid-Michigan accounted for the smallest share with only 4.4 percent.
- *Pollution Prevention and Environmental Cleanup* and *Agriculture and Natural Resource Conservation* each represented roughly 13 percent of total green jobs in the state. Northern Michigan, which consists of mostly rural areas, employed a notable number of jobs in these two core areas.
- *Producing Renewable Energy* was the smallest core area in the state with 8,223 green jobs, or 7.9 percent of the state total. Northern and Mid-Michigan each accounted for a little over 16 percent of employment in this core area. This number will most likely grow in the near future as a large share of the state's new solar and wind investments are directed toward these two regions.

Regional Distribution of Green Jobs by Detailed Industry

- The top three green industries in Michigan: (1) *Transportation equipment manufacturing*, (2) *Professional, scientific, and technical services*, and (3) *Specialty trade contractors* were heavily concentrated in Southeast Michigan.

Figure 4: Regional Distribution of Green Jobs by Industry

NAICS	Industry Title	Region				
		Southeast Michigan	Northern Michigan	Southwest Michigan	West Michigan	Mid-Michigan
336	Transportation Equipment Manufacturing	22,752	*	*	1,027	*
541	Professional, Scientific, & Technical Services	18,216	1,684	1,144	648	973
238	Specialty Trade Contractors	5,678	2,318	1,538	1,974	460
236	Construction of Buildings	1,222	1,400	1,096	1,120	*
111	Crop Production	884	229	1,029	656	*
321	Wood Product Manufacturing	*	138	90	343	*

* Data confidential or does not meet criteria for publication

Source: Michigan Department of Energy, Labor & Economic Growth

- With the anticipation of future high oil prices, a main activity in Michigan’s green economy is the design and production of more fuel-efficient vehicles. With a significant share of the auto workforce contributing to efficiency gains, the *Transportation equipment manufacturing* sector contributed a high number of Michigan green jobs. Accordingly, the center of the automotive industry — Southeast Michigan — exhibited the largest share of “green” jobs in the *Transportation equipment manufacturing* industry.
- Although *Professional, scientific, and technical services* is a multifaceted industry, the majority of the green jobs in this sector were associated with laboratory testing and research and development.
- *Specialty trade contractors* was one of the leading providers of green jobs for each of the five regions. It was the largest industry sector, in terms of the number of green jobs, for three regions: Northern, West, and Southwest Michigan.
- Another industry associated with construction, *Construction of buildings*, accounted for a sizable share (4.8 percent) of green jobs in Michigan. Each of the regions, with the exception of Mid-Michigan, contributed roughly 1,100 to 1,400 green jobs in this industry.

Regional Distribution of Green Jobs by Occupational Group

- Michigan’s top five occupational groups accounted for nearly 80 percent of total green jobs. For each of these occupations, Southeast Michigan accounted for the largest share of the workforce. The regional disparity was especially prominent for the top two occupations, *Architecture and engineering* and *Production*.

Figure 5: Regional Distribution of Green Jobs by Occupation

SOC	Occupations	Region				
		Southeast Michigan	Northern Michigan	Southwest Michigan	West Michigan	Mid-Michigan
17-0000	Architecture & Engineering	22,391	1,383	1,189	691	1,238
51-0000	Production	19,812	1,355	1,625	1,664	2,016
47-0000	Construction & Extraction	5,370	2,668	1,561	2,037	740
49-0000	Installation, Maintenance, & Repair	5,923	1,063	1,046	1,643	455
11-0000	Management	1,957	941	1,009	709	182
45-0000	Farming, Fishing, & Forestry	1,014	458	1,815	887	*
53-0000	Transportation & Material Moving	2,320	402	246	249	275
19-0000	Life, Physical, & Social Science	1,471	379	405	328	546
41-0000	Sales & Related	1,912	387	*	519	*

* Data confidential or does not meet criteria for publication

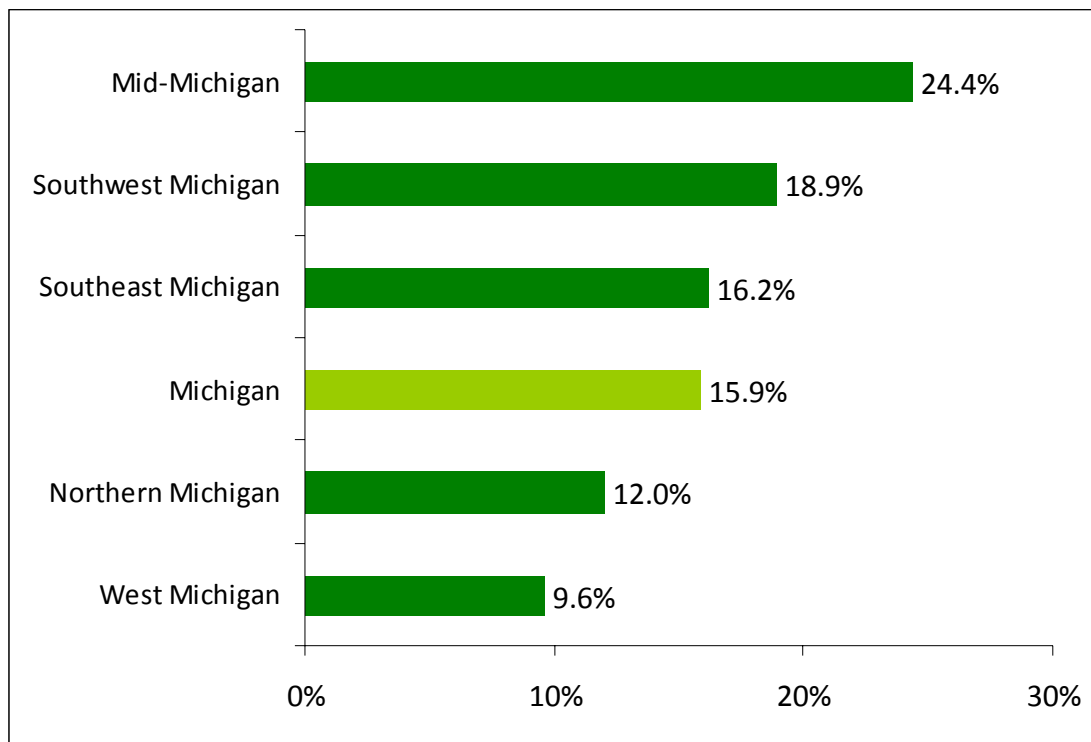
Source: Michigan Department of Energy, Labor & Economic Growth

- The occupational groups in Michigan generating high numbers of green jobs were mixed in terms of educational requirements, ranging from mid-skilled *Construction and extraction* and *Production* occupations to high-skilled occupations, such as *Architecture and engineering*.
- Engineering* and *Production* occupations are commonly found in the automotive, wind turbine, and solar panel manufacturing industries. These occupations represented 64 percent of total green jobs in Southeast Michigan and a little over half (52 percent) of total green employment in Michigan.

Recruiting Difficulties

- A major requirement for a successful green economy is the availability of a well-qualified labor pool to competently work in green jobs. If this labor pool is present, employers will have an incentive to locate in Michigan, and specifically in a particular region, to tap that able labor market. In contrast, if employers perceive the labor market to be unqualified or excessively small, they may have a disincentive to locate in a particular region.

Figure 6: Percent of Employers Expecting Recruiting Difficulties for Green Jobs*



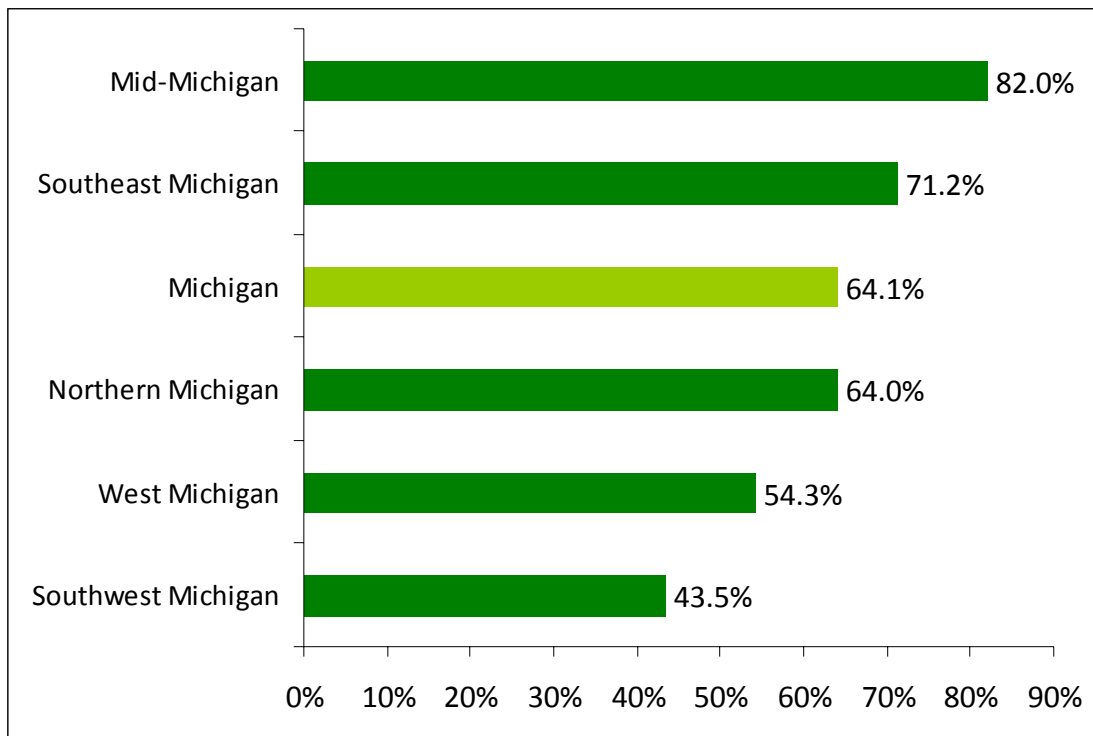
* Across all green job titles with a response to this survey question
Source: Michigan Department of Energy, Labor & Economic Growth

- In the *Michigan Green Jobs Report*, employers indicated the green occupations in which they anticipated potential difficulty in filling future job vacancies. In general, employers in all regions were relatively optimistic about recruiting trends for green jobs. Across all green occupations, employers reported only modest rates of recruiting difficulty, ranging from just 10 percent of observations in West Michigan to under 25 percent in Mid-Michigan.
- Employers anticipated the most hiring difficulty in occupations such as *Architecture and engineering*, *Construction and extraction*, and *Production*. Recruiting issues can reflect a shortage of qualified applicants, or the fact that unique skills (discussed below) are at times required for a position when working on “green projects.” Regardless of the reason, employers will need a well-qualified pool of workers – especially in hard-to-fill occupations – to ensure the green economy can thrive in Michigan regions.

Unique Skills

- The concept of unique skills is important. If an occupation requires unique skills for “green projects”, this suggests that a worker may have difficulty shifting from a traditional work assignment to a green project without first gaining some specialized skills, knowledge, or work abilities. Information on skills is especially important for educators – to develop curriculum – and for workers – to manage expectations, and in many cases to motivate retraining.
- Regional differences were observed when analyzing the need for unique skills for “green projects.” Interestingly, employers in Mid-Michigan and Southeast Michigan, regions that have traditionally been heavily reliant on automotive jobs, indicated that between 70 to 80 percent of designated green occupations require unique skills. This was in contrast with identification of unique skills by a lower share of roughly 45 to 55 percent of employers in Southwest Michigan and West Michigan. Southwest Michigan and West Michigan each have a diversified manufacturing base, and a significant share of green jobs in *Energy Efficiency* combined with a small green job share in *Clean Transportation and Fuels*.

Figure 7: Percent of Employers Highlighting Unique Skills Required for Green Projects*



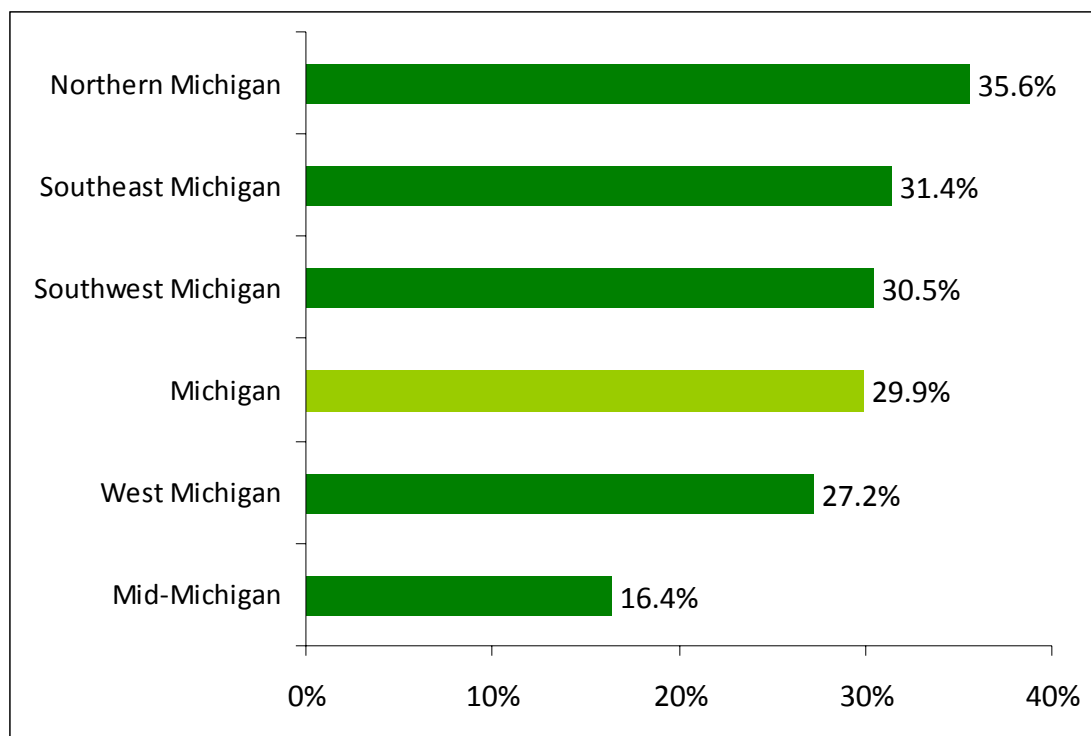
* Across all green job titles with a response to this survey question
Source: Michigan Department of Energy, Labor & Economic Growth

- According to employers, several occupations require unique skills when working on “green projects.” Among the most common occupational categories that require unique skills were *Management; Life, physical, and social science; Architecture and engineering; and Installation, maintenance, and repair.*
- Interestingly, surveyed employers indicated that certain *Production* occupations also require unique skills when working on “green projects.” This further demonstrates the point that the existing blue-collar workforce may need additional skills – beyond those commonly associated with traditional manufacturing jobs– to successfully compete for blue-collar jobs in the green economy.

Expectations for Job Growth

- Employers in the *Michigan Green Jobs Survey* also reported their expectations for job levels in the next two years for each green occupation they identified. Across all green occupations, employers expected job gains ranging from 16.4 percent of observations in Mid-Michigan to 35.6 percent in Northern Michigan. Several factors influence the potential short-term regional climate for green job growth, such as the current industry base of the region, the region’s desire and ability to transition into a more green economy, and the availability of qualified workers to fill green job openings.

Figure 8: Share of Employers Expecting Green Job Gains by 2011*



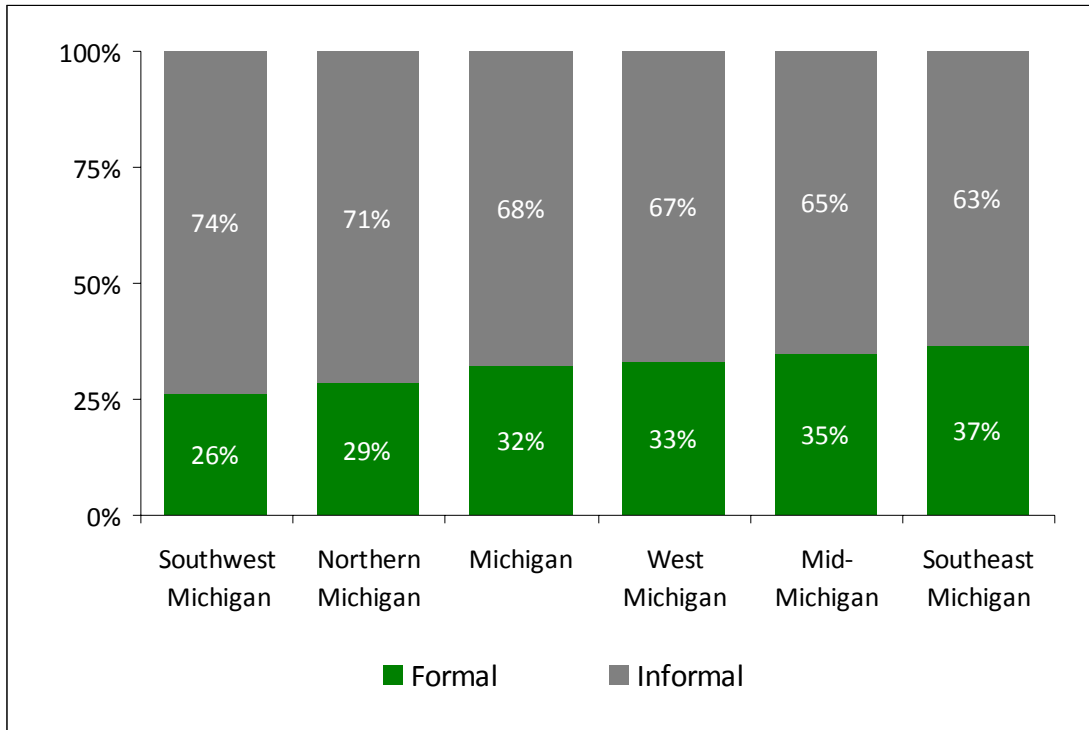
* Across all green job titles with a response to this survey question
 Source: Michigan Department of Energy, Labor & Economic Growth

- Mid-Michigan employers reported the least optimistic job growth expectations among Michigan regions. Nevertheless, *Construction and extraction, Installation, maintenance, and repair*, and *Production* occupations may see near-average growth in the region. This probably reflects optimism among area businesses that demand will increase for green-related building projects and that the region's current infrastructure can be used to attract and retain green manufacturers.
- It is important to note that Mid-Michigan includes several communities that are disproportionately reliant on automotive-related jobs including Lansing, Saginaw, Bay City, and the Thumb. Each of these regions may find opportunities by transitioning their existing capital stock and labor force from traditional manufacturing to green manufacturing.
- Near-average expectations were reported in West Michigan, Southwest Michigan, and Southeast Michigan; where about 30 percent of employers expected to see green job growth. Businesses were most optimistic about *Construction and extraction, Life, physical and social science*, and *Architecture and engineering* occupations.
- The highest share of expected green job gains was reported in Northern Michigan. Among the occupational categories expected to see growth were *Architecture and engineering, Life, physical, and social science*, and *Agriculture and Construction* positions. The first two categories reflect the research and design stage of the product life-cycle, indicating that businesses expect to grow these operations in Northern Michigan. The last two categories reflect the potential for the "greening" of two major industry sources of jobs in this region.

Training

- Whether workers are employed in a “green” job or in a traditional job, they must possess the skills to do the job. Typically, these skills are gained through formal education – maybe a vocational certificate or an associate’s degree – or through some type of on-the-job training or employer-hosted training.

Figure 9: Anticipated Training Demand by Region: Formal vs. Informal



Source: Michigan Department of Energy, Labor & Economic Growth

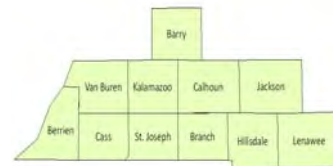
- According to employers across the state, about two-thirds of all training for green-related jobs will come from informal training – that is, on-the-job or employer-hosted training.
- This same trend was observed in each region, with only slight variations. Differences ranged from Southeast Michigan – where employers indicated 63 percent of training would be informal and 37 percent will be formal – to Southwest Michigan – where employers reported 74 percent of training would be informal and 26 percent may be formal.

Section II: Michigan Regional Green Job Profiles

1. Southeast Michigan



2. Southwest Michigan



3. West Michigan



4. Mid-Michigan



5. Northern Michigan



Southeast Michigan Regional Green Jobs Survey Results



Quick Profile

Population — 2009
5,307,769

Labor Force — 2009
2,551,486

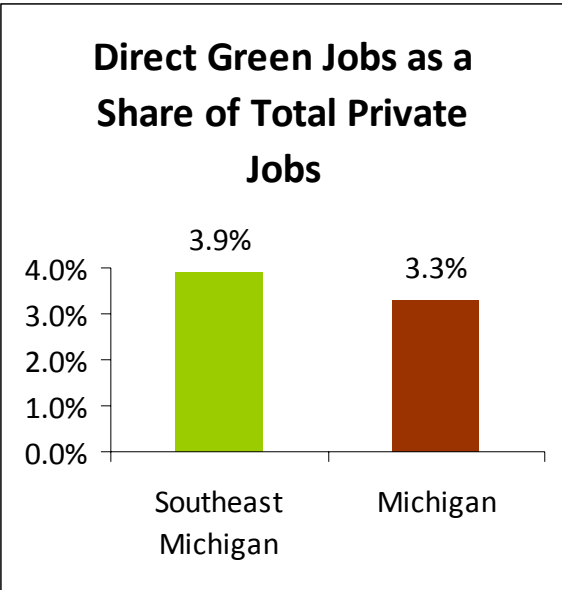
Jobless Rate — 2009
14.5 %

Total Private Payroll Jobs – 2nd Qtr. 2009
1,686,322

Total Direct Green Jobs
65,733

Regional Green Jobs Highlights in Southeast Michigan

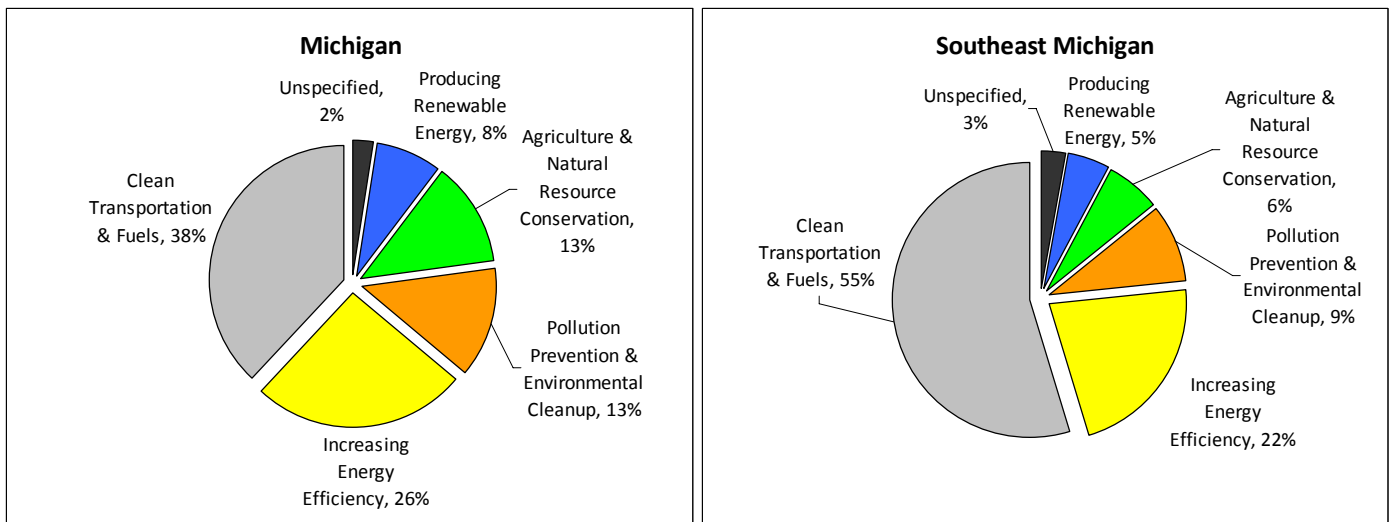
- Green jobs account for 3.9 percent of total industry employment in the region. This is slightly above the state’s average 3.3 percent concentration of green jobs. The Southeast Michigan region accounts for more than 63 percent of all green jobs in Michigan.
- The largest green core area in the region is *Clean Transportation and Fuels*, with over 54 percent of all area green jobs.
- Several industries contributed a significant number of jobs to the area’s total green job count including *Transportation equipment manufacturing* (22,800), *Professional, scientific and technical services* (18,200) and *Specialty trade contractors* (5,700).



Distribution of Green Jobs by Core Area

- In the Michigan Green Jobs Report, five green-related core areas were identified and defined. These included: (1) *Clean Transportation and Fuels*, (2) *Increasing Energy Efficiency*, (3) *Pollution Prevention and Environmental Cleanup*, (4) *Agriculture and Natural Resources*, and (5) *Producing Renewable Energy*.

Figure 1: Distribution of Green Jobs by Core Area for Michigan and Southeast Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

- Reflecting the overall importance of the auto industry in Southeast Michigan, the *Clean Transportation and Fuels* core area accounted for the largest number of regional green jobs. Significant numbers of engineers, technicians, production staff and others in the auto sector are increasingly focused on research, design, and production of fuel-efficient vehicles and new green auto technologies.
- Statewide, 38 percent of all green jobs were in *Clean Transportation and Fuels*, while more than one-half, or nearly 36,000 green jobs in Southeast Michigan were in this core area. Over 90 percent of all statewide green jobs in the *Clean Transportation and Fuels* core area were located in Southeast Michigan.
- About one-quarter of green jobs in the state and the region were attributed to the *Increasing Energy Efficiency* core area, with the majority of these jobs in the construction industry.
- One major difference between the region and state is seen in *Agriculture and Natural Resource Conservation*, which shows the percentage of green jobs in Southeast Michigan at one-half the share statewide.

Figure 2: Summary of Southeast Michigan Green Jobs by Core Area

Core Area	Total Green Jobs	Percent Share of Total Green Jobs
Total Green Jobs	65,733	100.0%
Clean Transportation and Fuels	35,925	54.7%
Increasing Energy Efficiency	14,444	22.0%
Pollution Prevention and Environmental Cleanup	6,038	9.2%
Agriculture and Natural Resource Conservation	4,090	6.2%
Producing Renewable Energy	3,364	5.1%
Green Jobs Not Assigned to a Core Area	1,872	2.8%

Source: Michigan Department of Energy, Labor & Economic Growth

Green Jobs by Industry

- Figure 3 identifies the detailed industries with the largest number of green jobs in Southeast Michigan. The top ten industries in the table provide over 56,000 green jobs or 85 percent of the regional total.

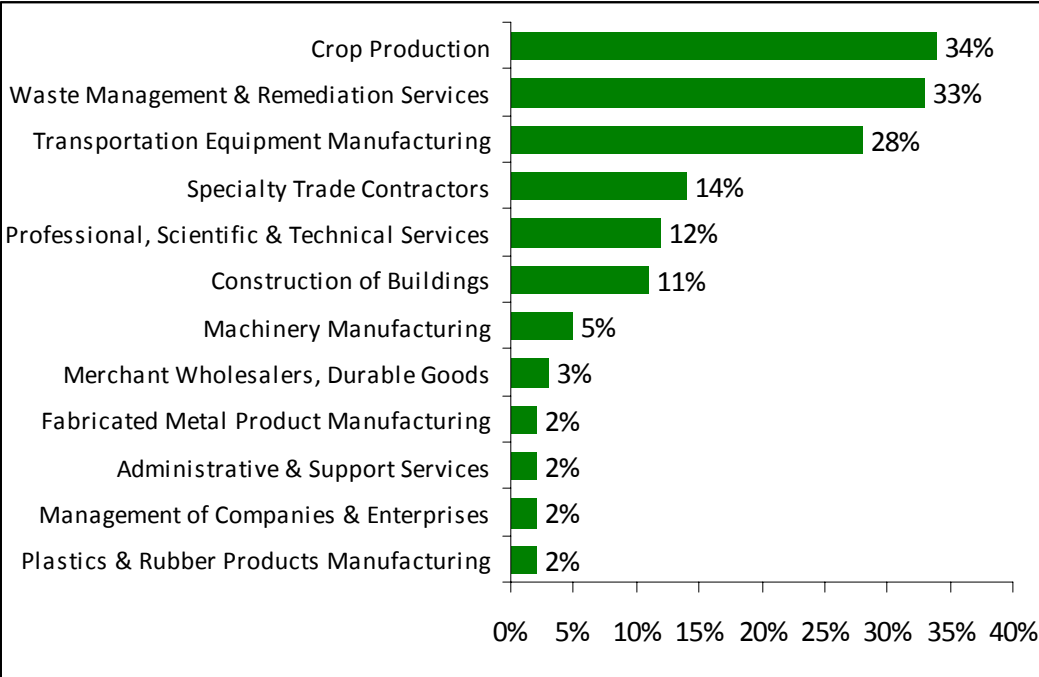
Figure 3: Industries Generating Significant Green Job Levels - Southeast Michigan

NAICS	Industry	Total Green Jobs	Total Industry Employment	Green Jobs as % of Industry Employment
336	Transportation Equipment Manufacturing	22,752	81,360	28.0%
541	Professional, Scientific, and Technical Services	18,216	155,934	11.7%
238	Specialty Trade Contractors	5,678	41,901	13.6%
561	Administrative and Support Services	2,297	118,124	1.9%
562	Waste Management and Remediation Services	1,617	4,903	33.0%
423	Merchant Wholesalers, Durable Goods	1,429	48,288	3.0%
333	Machinery Manufacturing	1,376	26,137	5.3%
236	Construction of Buildings	1,222	11,148	11.0%
111	Crop Production	884	2,569	34.4%
551	Management of Companies and Enterprises	598	37,243	1.6%
332	Fabricated Metal Product Manufacturing	574	25,718	2.2%
326	Plastics and Rubber Products Manufacturing	118	8,071	1.5%

Source: Michigan Department of Energy, Labor & Economic Growth

- As expected, firms in the automotive sector were the primary source of green jobs in Southeast Michigan. *Transportation equipment manufacturing* provided nearly 23,000 direct green jobs to the Michigan economy. In addition, more than 2,000 green jobs exist in related sectors such as *Machinery manufacturing*, *Fabricated metal product manufacturing*, and *Plastics and rubber products manufacturing*.
- *Professional, scientific, and technical services* was the second largest source of green jobs in the region with over 18,000 positions, providing nearly 28 percent of all green jobs in Southeast Michigan. This industry contains a variety of architecture, engineering and scientific firms that provide consulting services on clean energy technologies.
- Additionally, three other service-based industrial sectors, *Administrative and support services*, *Waste management and remediation services* and *Management of companies and enterprises* recorded a combined 4,500 green jobs. Landscaping and groundskeeping workers, environmental science and protection technicians, water treatment plant operators, and engineering managers are examples of green jobs in these three sectors.
- As indicated in Figure 4, *Crop production* in Southeast Michigan has the largest share of green jobs to total jobs of any sector (34 percent). In this industry, green jobs were reported among workers that manage farm, ranch and agricultural operations as well as farmworkers and laborers who actually plant, cultivate and harvest farm products.

Figure 4: Green Jobs as a Share of Total Industry Employment – Southeast Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

Green Jobs by Occupation

- The top five occupations in Figure 5 account for over 55,800 green jobs, and comprise 85 percent of all green employment in Southeast Michigan.

Figure 5: Occupational Groups Generating Significant Green Job Levels — Southeast Michigan

SOC	Occupational Category	Total Green Jobs	Percent of Total Green Jobs
	All Green Occupations	65,733	100.0%
17-0000	Architecture and Engineering Occupations	22,391	34.1%
51-0000	Production Occupations	19,812	30.1%
49-0000	Installation, Maintenance, and Repair Occupations	5,923	9.0%
47-0000	Construction and Extraction Occupations	5,370	8.2%
53-0000	Transportation and Material Moving Occupations	2,320	3.5%
11-0000	Management Occupations	1,957	3.0%
41-0000	Sales and Related Occupations	1,912	2.9%
37-0000	Building and Grounds Cleaning and Maint. Occupations	1,488	2.3%
45-0000	Farming, Fishing and Forestry Occupations	1,014	1.5%
13-0000	Business and Financial Operations Occupations	971	1.5%
43-0000	Office and Administrative Support Occupations	466	0.7%

Source: Michigan Department of Energy, Labor & Economic Growth

- *Architecture and engineering* accounts for one-third of all green occupations as mechanical, electrical and environmental engineers in all core areas work toward providing new “green” technologies and the production of clean energy.
- *Production* occupations provide just under one-third of green jobs in Southeast Michigan. Even though the majority of these 20,000 jobs are in the automotive industry, many production workers are employed in other core areas such as *Pollution Prevention and Environmental Cleanup* and *Producing Renewable Energy*.
- In addition, *Maintenance* (such as *heating, air conditioning and refrigeration mechanics*) and *Construction* (such as *carpenters, electricians, and laborers*) accounted for a considerable number of jobs in the green economy. These two occupational groups represent 17 percent of all green jobs in Southeast Michigan.

Recruiting Difficulties

- As indicated in Figure 6, employers anticipate that they will have varying degrees of difficulty in recruiting green workers and filling future job needs.

**Figure 6: Which Green Occupations Do Employers Expect Recruiting Difficulties?
Southeast Michigan**

SOC	Occupational Category	Share of Firms Expecting Recruiting Difficulty
41-0000	Sales and Related Occupations	35.7%
37-0000	Building and Grounds Cleaning and Maintenance Occupations	30.0%
13-0000	Business and Financial Operations Occupations	23.8%
17-0000	Architecture and Engineering Occupations	17.7%
49-0000	Installation, Maintenance, and Repair Occupations	14.6%
27-0000	Arts, Design, Entertainment, Sports, and Media Occupations	14.3%
51-0000	Production Occupations	14.3%
53-0000	Transportation and Material Moving Occupations	13.3%
11-0000	Management Occupations	11.2%
47-0000	Construction and Extraction Occupations	9.5%
19-0000	Life, Physical, and Social Science Occupations	7.4%

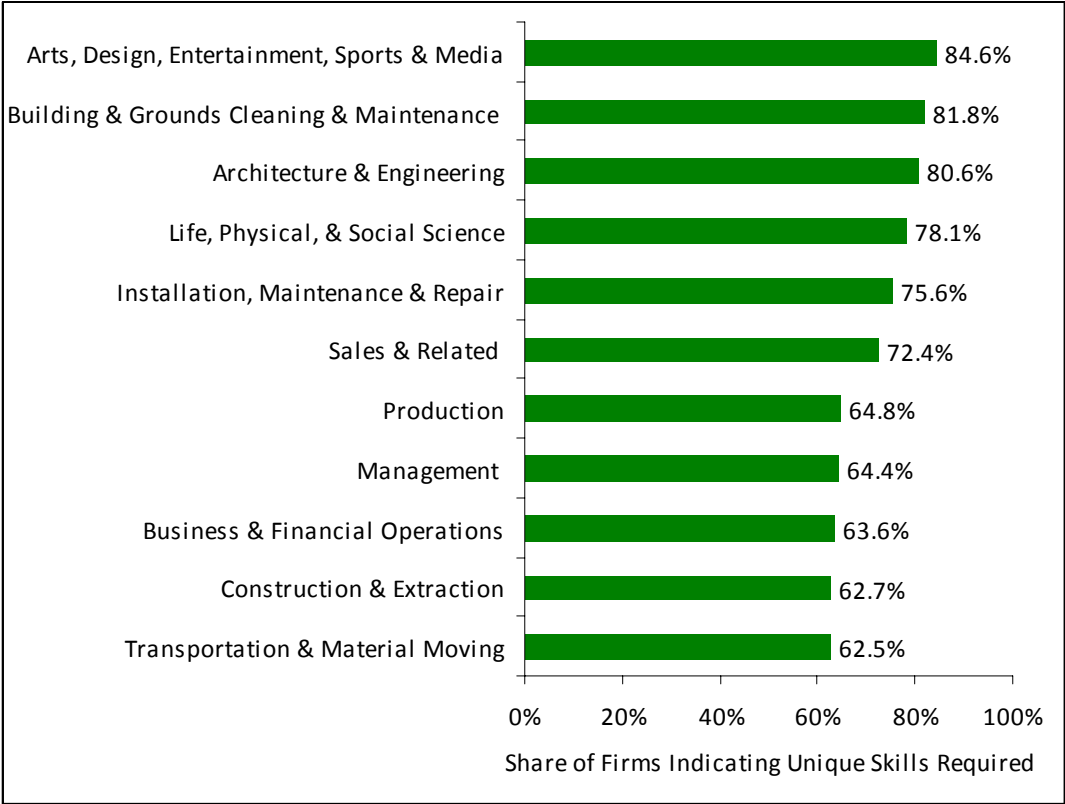
Source: Michigan Department of Energy, Labor & Economic Growth

- Job vacancies in *Business and financial operations* and *Architecture and engineering* occupations, due to the requirements of education, experience and specialized job skills, will be especially hard for employers to fill.
- Conversely, job openings in *Production, Construction and extraction, and Transportation and material moving* occupations, which contain low-to-mid skill job titles which may require minimal on-the-job training, may be less difficult to fill.

Unique Skills

- Can the new “green” economy create jobs that can be filled by the current regional workforce, either by utilizing their existing skill sets or through retraining to obtain the requisite skills? The Michigan Green Jobs survey asked employers which occupations required unique skills when working on a “green-related” project.

Figure 7: Occupations That Require Unique Skills for “Green Projects” – Southeast Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

- The data presented in Figure 7 are the occupational categories that the highest share of employers identified as needing unique green skills. At least 63 percent of all survey respondents indicated that these occupational groups will require unique skills when working on “green” projects.
- Detailed job titles that employers identified as potentially requiring unique green skills included industrial designers, landscaping workers, architects, civil engineers, mechanical engineers, and others.

Expectations for Job Growth

Figure 8: Share of Employers Expecting Green Job Gains by 2011 – Southeast Michigan

SOC	Occupational Category	Percent of Employers Reporting Occupation is Likely to Add Jobs
27-0000	Arts, Design, Entertainment, Sports and Media Occupations	50.0%
37-0000	Building and Grounds Cleaning and Maintenance Occupations	50.0%
41-0000	Sales and Related Occupations	47.2%
49-0000	Installation, Maintenance, and Repair Occupations	38.0%
47-0000	Construction and Extraction Occupations	36.4%
13-0000	Business and Financial Operations Occupations	35.7%
53-0000	Transportation and Material Moving Occupations	35.3%
19-0000	Life, Physical, and Social Science Occupations	33.3%
17-0000	Architecture and Engineering Occupations	32.0%
51-0000	Production Occupations	28.6%
45-0000	Farming, Fishing and Forestry Occupations	23.1%
11-0000	Management Occupations	18.9%

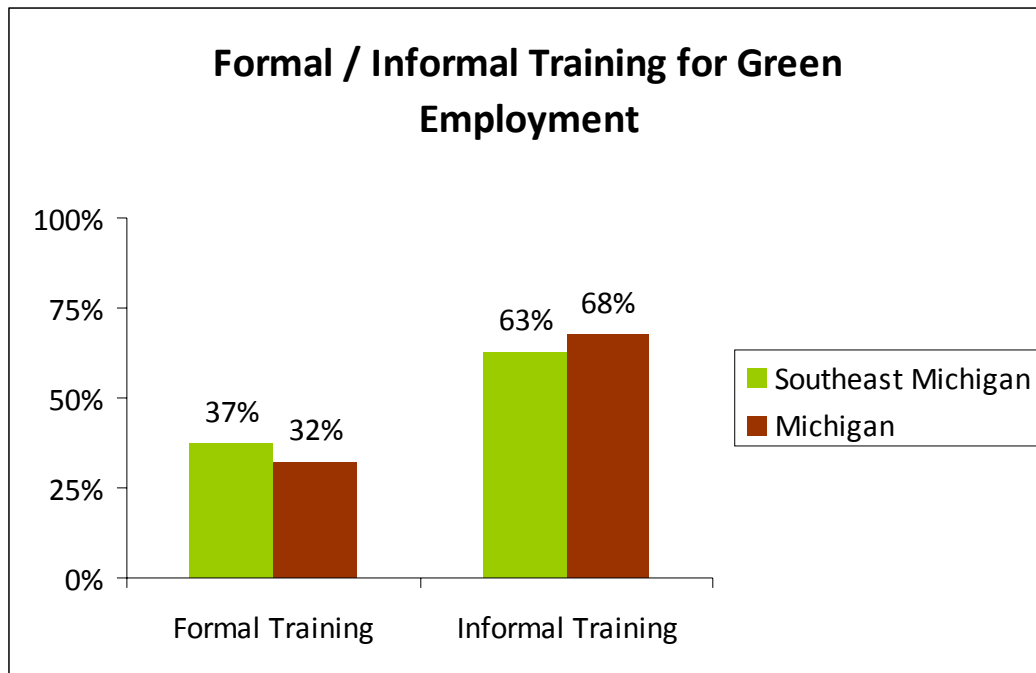
Source: Michigan Department of Energy, Labor & Economic Growth

- The *Michigan Green Jobs Report* revealed that there are numerous firms related to the green economy that experienced job gains from 2005-2008, including some in Southeast Michigan.
- The top eight occupational categories in Figure 8 represent job titles in which one-third to one-half of employers anticipate some green job growth through 2011.
- About one-half of all employers that report green jobs in *Arts, design, entertainment, sports and media; Building and grounds cleaning and maintenance; and Sales* occupations anticipate possible green job gains over the next two years.

Training

- In the original survey, an effort was made to measure the training needs of employers, in an attempt to highlight the potential future green-related training requirements of employers in the state.

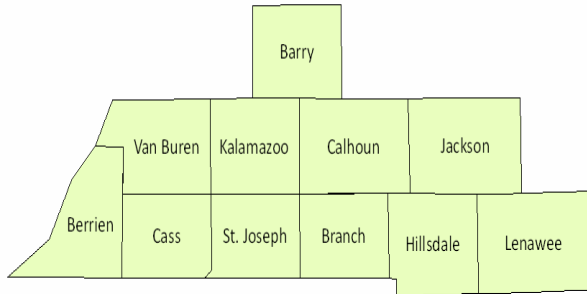
**Figure 9: Anticipated Training Demand — Formal vs. Informal Training
Michigan vs. Southeast Michigan**



Source: Michigan Department of Energy, Labor & Economic Growth

- The results were a mix of formal training, provided by community colleges or outside training providers, or informal on-the-job training.
- Michigan survey firms indicated an average potential use of both informal training methods (68 percent) and formal training providers (32 percent) for their future green workforce.
- Southeast Michigan employers reported very similar survey results, as informal on-the-job training will account for 63 percent and formal sources will represent 37 percent of future green worker training.

Southwest Michigan Green Jobs Survey Results



Quick Profile

Population — 2009
1,142,856

Labor Force — 2009
570,000

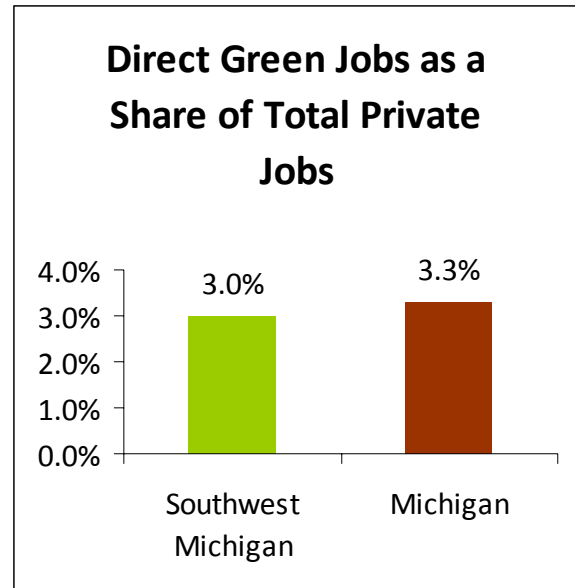
Jobless Rate — 2009
12.4 %

Total Private Payroll Jobs – 2nd Qtr. 2009
317,851

Total Direct Green Jobs
9,545

Regional Green Jobs Highlights in Southwest Michigan

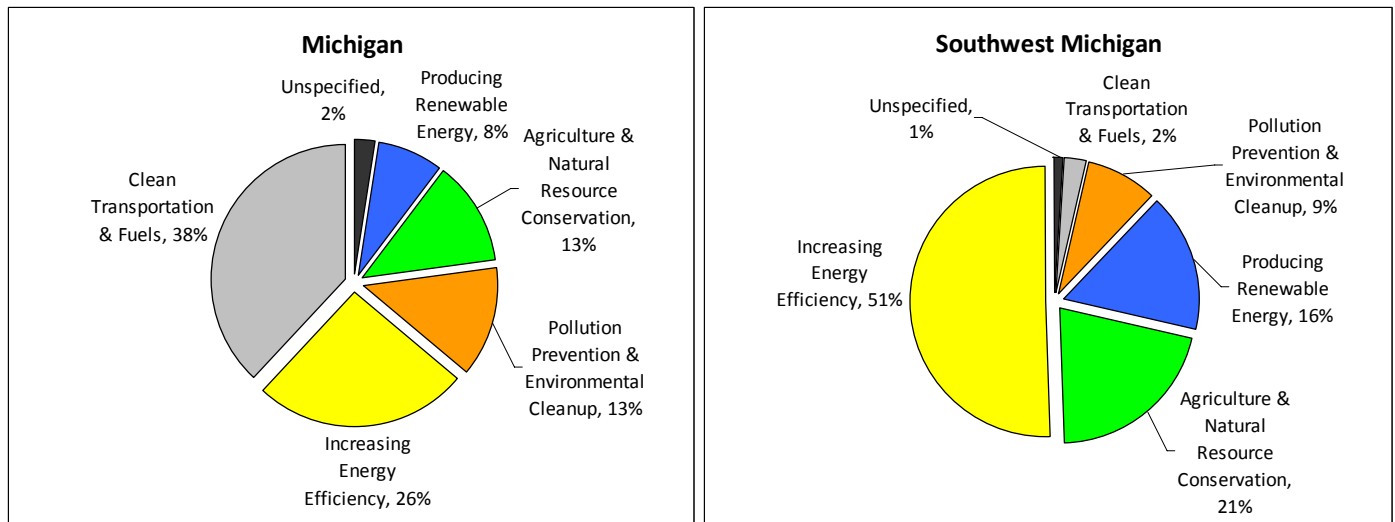
- Green jobs account for 3.0 percent of total industry employment in the region. This is similar to the state’s average green job share of 3.3 percent. With an estimated pool of 9,545 green jobs in 2009, the Southwest Michigan region accounts for roughly nine percent of all green jobs in Michigan.
- Around half of the green jobs in Southwest Michigan are concentrated in the *Increasing Energy Efficiency* core area.
- The construction industry is a major source of regional green jobs. *Specialty trade contractors* and *Construction of buildings* are among the top regional industries in green job creation.
- *Farming, fishing, and forestry, Production,* and *Construction and extraction* occupations were the three most commonly reported green occupational categories in Southwest Michigan.



Distribution of Green Jobs by Core Area

- In the Michigan Green Jobs Report, five green-related core areas were identified and defined. These included: (1) *Clean Transportation and Fuels*, (2) *Increasing Energy Efficiency*, (3) *Pollution Prevention and Environmental Cleanup*, (4) *Agriculture and Natural Resources*, and (5) *Producing Renewable Energy*.

Figure 1: Distribution of Green Jobs by Core Area for Michigan and Southwest Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

- Unlike the state, green jobs in Southwest Michigan are mainly concentrated in the *Increasing Energy Efficiency* (50.5 percent) core area. Included in this core area are firms engaged in, for example, insulation of buildings; adopting green building design/LEED certification; producing a household appliance, such as a refrigerator or dryer, which delivers the same performance using less electricity; and providing engineering, consulting, or research services on operations, materials, or technologies that improve energy efficiency.
- Statewide, the highest share of green jobs is in *Clean Transportation and Fuels*. This reflects the statewide importance of the automotive industry in general, and specifically highlights the significant number of auto engineers, technicians, and production jobs involved in improving auto fuel economy and developing advanced automotive technologies.

Figure 2: Summary of Southwest Michigan Green Jobs by Core Area

Core Area	Total Green Jobs	Percent Share of Total Green Jobs
Total Green Jobs	9,545	100.0%
Increasing Energy Efficiency	4,816	50.5%
Agriculture and Natural Resource Conservation	1,982	20.8%
Producing Renewable Energy	1,567	16.4%
Pollution Prevention and Environmental Cleanup	844	8.8%
Clean Transportation and Fuels	232	2.4%
Green Jobs Not Assigned to a Core Area	103	1.1%

Source: Michigan Department of Energy, Labor & Economic Growth

- *Agriculture and Natural Resource Conservation* is another key component of the green economy in Michigan and Southwest Michigan, accounting for 25.7 percent and 20.8 percent of green jobs, respectively. Some of the regional businesses reporting green jobs in this core area include floriculture production, landscaping services, zoos, nature parks, and farms. Specific green job titles in this core area included farmworkers, conservation scientists, landscaping workers, environmental scientists, and more.

Green Jobs by Industry

Figure 3: Industries Generating Significant Green Job Levels — Southwest Michigan

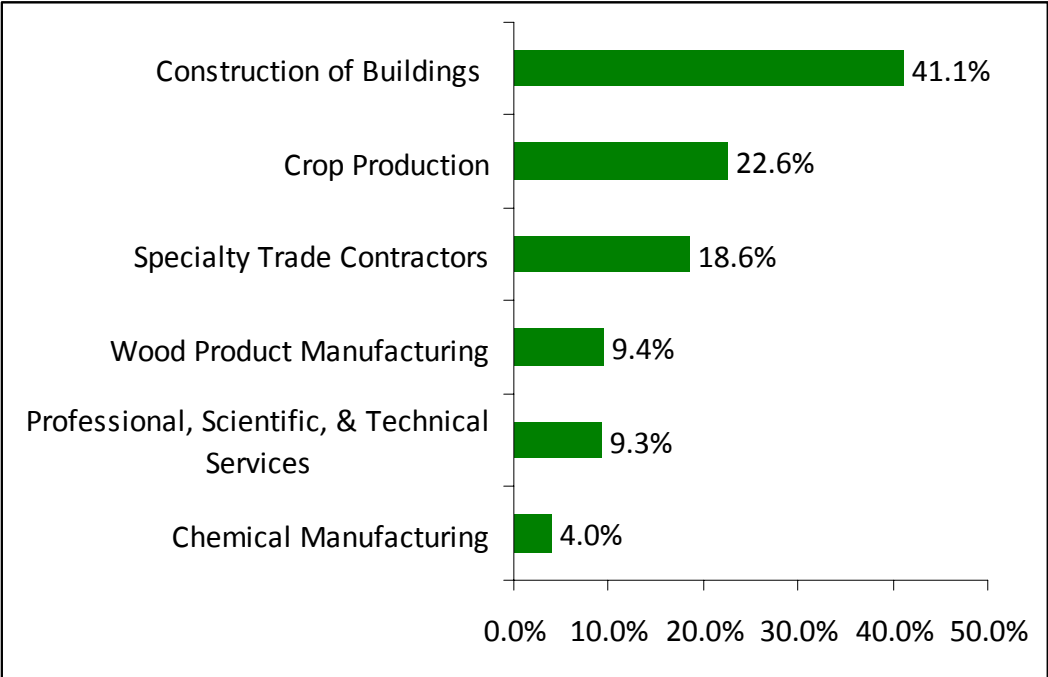
NAICS	Industry	Total Green Jobs	Total Industry Employment	Green Jobs as % of Industry Employment
238	Specialty Trade Contractors	1,538	8,259	18.6%
541	Professional, Scientific, and Technical Services	1,144	12,362	9.3%
236	Construction of Buildings	1,096	2,669	41.1%
111	Crop Production	1,029	4,544	22.6%
325	Chemical Manufacturing	189	4,675	4.0%
321	Wood Product Manufacturing	90	958	9.4%

Source: Michigan Department of Energy, Labor & Economic Growth

- Among detailed industries, the greatest number of green jobs in Southwest Michigan is found in the *Specialty trade contractors* sector. This sector includes many green building contractors, and activities related to weatherproofing homes for energy efficiency.

- Green jobs as a share of total employment are highest in the *Construction of buildings* (both residential and commercial/industrial) sector at 41.1 percent. *Crop production* comes in second, with 22.6 percent of the industry’s jobs categorized as “green” (see Figure 4).

Figure 4: Green Jobs as a Share of Total Industry Employment — Southwest Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

Green Jobs by Occupation

Figure 5: Occupational Groups Generating Significant Green Job Levels — Southwest Michigan

SOC	Occupational Category	Total Green Jobs	Percent of Total Green Jobs
	All Green Occupations	9,545	100.0%
45-0000	Farming, Fishing, & Forestry Occupations	1,815	19.0%
51-0000	Production Occupations	1,625	17.0%
47-0000	Construction & Extraction Occupations	1,561	16.4%
17-0000	Architecture & Engineering Occupations	1,189	12.5%
49-0000	Installation, Maintenance, & Repair Occupations	1,046	11.0%
11-0000	Management Occupations	1,009	10.6%
19-0000	Life, Physical, & Social Science Occupations	405	4.2%
53-0000	Transportation & Material Moving Occupations	246	2.6%

Source: Michigan Department of Energy, Labor & Economic Growth

- The occupations generating the largest number of green jobs in Southwest Michigan reflect a wide range of skills; from mid-skill occupations in farming and manufacturing to high-skill professional occupations.
- Nineteen percent of green jobs in Southwest Michigan are in *Farming, fishing, and forestry* occupations (just over 1,800 jobs in 2009). This occupational category comprises farm managers and workers in green agriculture, fishing and hunting, and forest, conservation, and logging.
- There were more than 1,600 jobs in green *Production* occupations in Southwest Michigan in 2009, including *production supervisors, assemblers, machine operators*, and others.

Recruiting Difficulties

**Figure 6: Which Green Occupations Do Employers Expect Recruiting Difficulties?
Southwest Michigan**

SOC	Occupational Category	Share of Firms Expecting Recruiting Difficulty
17-0000	Architecture and Engineering Occupations	41.7%
11-0000	Management Occupations	23.7%
19-0000	Life, Physical, and Social Science Occupations	21.4%
47-0000	Construction and Extraction Occupations	16.7%
49-0000	Installation, Maintenance, and Repair Occupations	14.3%
45-0000	Farming, Fishing, and Forestry Occupations	9.1%
51-0000	Production Occupations	8.3%

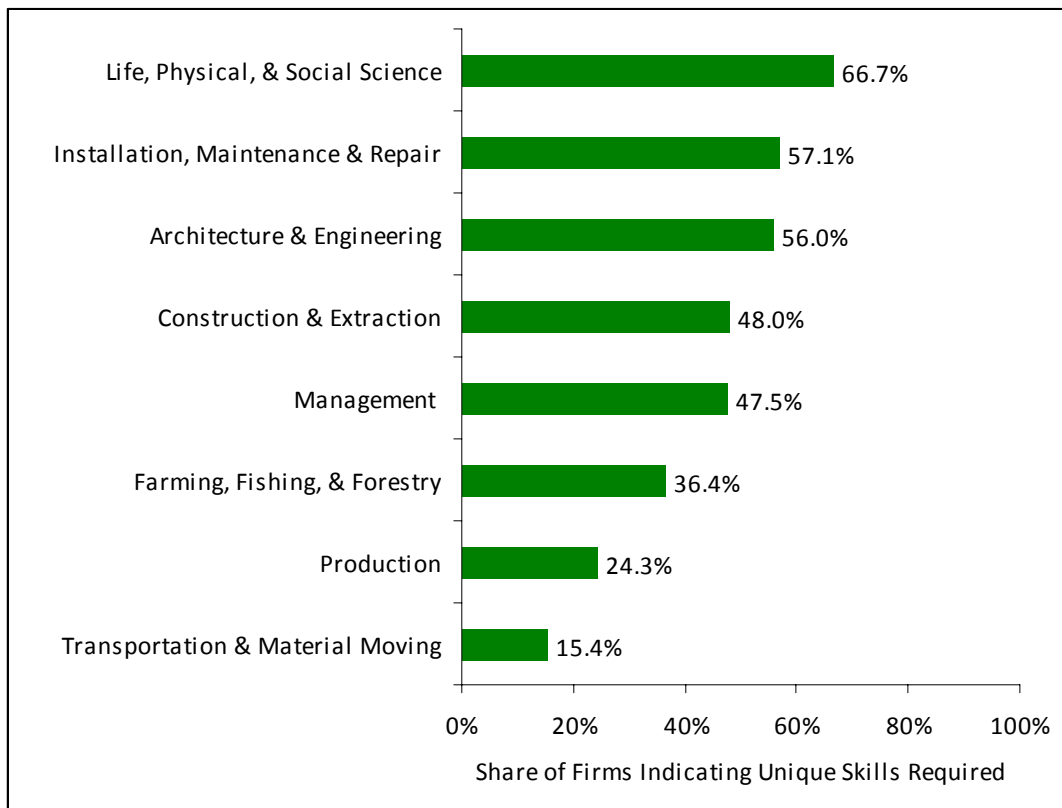
Source: Michigan Department of Energy, Labor & Economic Growth

- During the survey, employers were asked to indicate which occupations they anticipate facing hiring difficulties.
- The greatest difficulties in recruitment were anticipated within occupations requiring higher education levels, such as *Architecture and engineering*, and *Management*. Smaller shares of employers indicated potential recruitment issues with mid-skill jobs such as *Construction* and *Installation, maintenance, and repair*.

Unique Skills

- Employers were also asked to indicate which green occupations require unique skills. The percentages for each occupation in Figure 7 are the shares of employers who indicated that specialized knowledge was necessary for that occupation when working on a green project.

Figure 7: Occupations That Require Unique Skills for “Green Projects”– Southwest Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

- For the Southwest Michigan region, the top six occupational groups in Figure 7 that may require unique green skills are a mix in terms of educational requirements, ranging from mid-skill *Installation and repair* and *Production* occupations to high-skill occupations in the *Life, physical and social sciences*. Some of the job titles reported in the green survey in *Life, physical and social sciences* included environmental scientists and technicians, geoscientists, hydrologists, and more.

Expectations for Job Growth

- Employers surveyed were asked to indicate the total number of workers they expected to employ in two years (by year 2011) for each green occupation reported.

Figure 8: Share of Employers Expecting Green Job Gains by 2011 – Southwest Michigan

SOC	Occupational Category	Percent of Employers Reporting Occupation is Likely to Add Jobs
19-0000	Life, Physical, and Social Science Occupations	52.9%
45-0000	Farming, Fishing, and Forestry Occupations	50.0%
51-0000	Production Occupations	38.5%
17-0000	Architecture and Engineering Occupations	33.3%
47-0000	Construction and Extraction Occupations	25.8%
53-0000	Transportation and Material Moving Occupations	23.1%
49-0000	Installation, Maintenance, and Repair Occupations	22.2%
11-0000	Management Occupations	6.8%

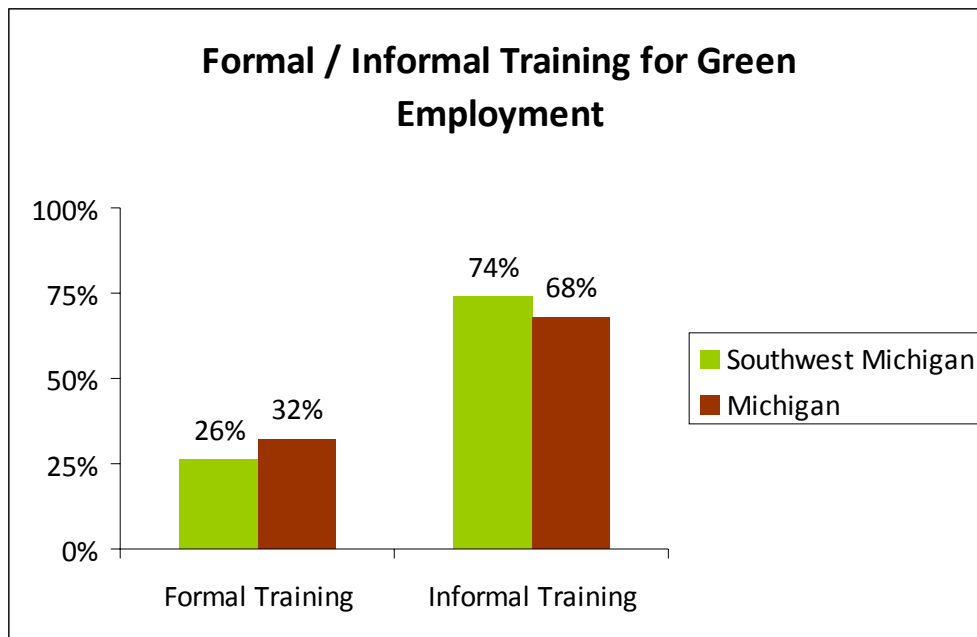
Source: Michigan Department of Energy, Labor & Economic Growth

- Around half of the surveyed employers expected additional green jobs in *Life, physical, and social sciences*, and in *Farming, fishing, and forestry* occupations.
- More than a third of the polled employers expected job gains in *Production* occupations, and in *Architecture and engineering*.

Training

- As noted during the statewide green jobs study, many green jobs are a “re-tooling” of current jobs. As a result, many future “green jobs” will simply evolve from existing positions in the regional economy, and may be filled by current workers who will need additional training.

Figure 9: Anticipated Training Demand — Formal vs. Informal Training — Michigan vs. Southwest Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

- Employers in Southwest Michigan may make greater use of informal on-the-job training for green occupations, partly due to the greater than average share of green construction jobs in the area.
- Southwest Michigan employers who participated in the survey indicated that about 74 percent of their green-related training would be on-the-job (as compared to 68 percent statewide).
- Several colleges and universities across Michigan are developing green degree programs in Engineering, Public Health, and Natural Resources & Environment studies. For example, in Public Health, degree programs range in topics from industrial hygiene to environmental health to toxicology. A course in Appropriate Technology and Sustainability at Western Michigan University is being expanded to include design of “green roofing” as an energy conservation technique. The Michigan Technical Education Center at Kalamazoo Valley Community College has a Wind Turbine Technician Academy, which provides graduates with skills needed in the construction, operation and maintenance of utility size wind turbines. The program can be completed in approximately six months.

West Michigan Green Jobs Survey Results



Quick Profile

Population — 2009
1,337,976

Labor Force — 2009
671,700

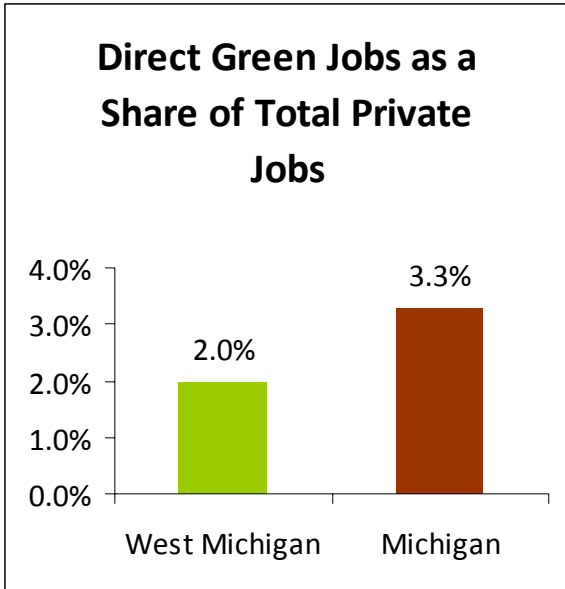
Jobless Rate — 2009
12.3 %

Total Private Payroll Jobs – 2nd Qtr. 2009
475,353

Total Direct Green Jobs
9,509

Regional Green Job Highlights in West Michigan

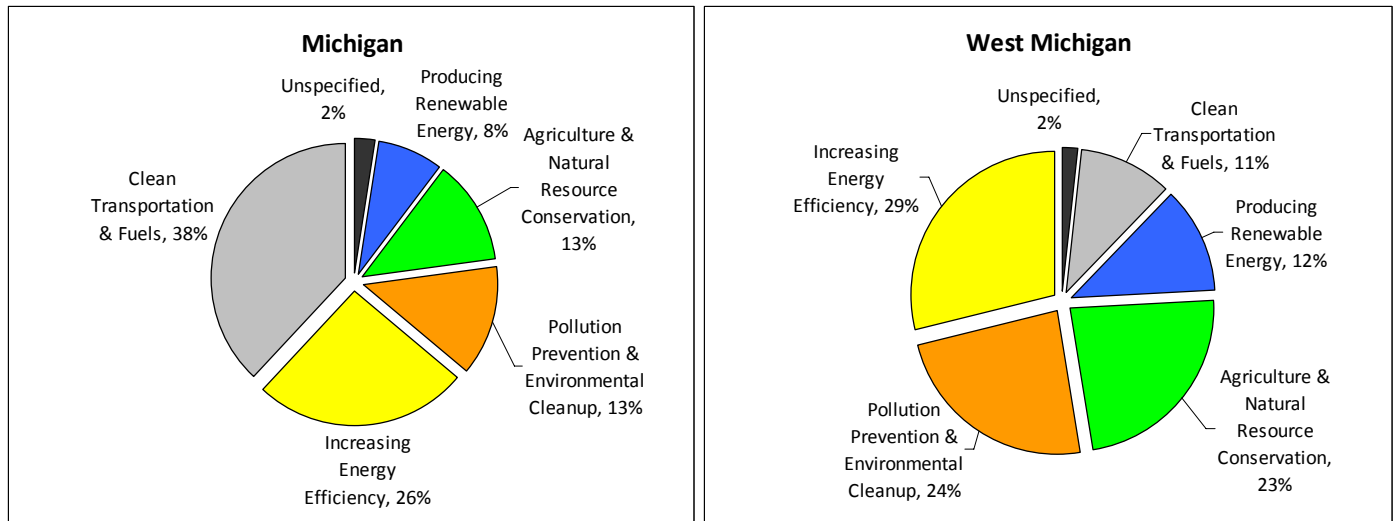
- According to the green jobs survey, there were 9,509 green jobs in the West Michigan region, representing 2.0 percent of regional private employment. Statewide, there were 104,003 green jobs, accounting for 3.3 percent of statewide private jobs.
- In West Michigan, the majority of green jobs are concentrated in three core areas, including: *Increasing Energy Efficiency, Pollution Prevention and Environment Clean-Up, and Agriculture and Natural Resource Conservation.*
- Three industries, *Specialty trade contractors, Construction of buildings, and Transportation equipment manufacturing,* provided a large number of West Michigan’s green jobs. Workers in these industries ranged from carpenters on green building projects to assemblers working on energy efficient products.
- While West Michigan may see growth in green jobs, employers indicate they expected difficulty recruiting qualified candidates for some green positions. Similarly, employers indicate that many green jobs require unique skills.



Distribution of Green Jobs by Core Area

- In the Michigan Green Jobs Report, five green-related core areas were identified and defined. These included: (1) *Clean Transportation and Fuels*, (2) *Increasing Energy Efficiency*, (3) *Pollution Prevention and Environmental Cleanup*, (4) *Agriculture and Natural Resources*, and (5) *Producing Renewable Energy*.

Figure 1: Distribution of Green Jobs by Core Area (Michigan and West Michigan)



Source: Michigan Department of Energy, Labor & Economic Growth

- West Michigan's mix of green jobs by core area differs from the statewide shares. While *Clean Transportation and Fuels* provides the most green jobs in Michigan, *Increasing Energy Efficiency* is the dominant core area in West Michigan, with 29 percent of green jobs. This is partially a reflection of West Michigan's diversified economy, with a lower share of jobs in the auto sector. The auto industry in Michigan is the primary source of green jobs in *Clean Transportation and Fuels*.
- A major difference also exists in *Pollution Prevention and Environmental Cleanup*, which accounts for almost twice the share of green jobs in West Michigan than statewide. This is likely due, in part, to the large presence of professional and business service establishments in West Michigan.
- Another difference was seen in *Agriculture and Natural Resource Conservation*, which comprised just 13 percent of green jobs in Michigan but 23 percent of green employment in West Michigan. Much of this may be due to the concentration of agricultural jobs in some West Michigan counties and the number of sustainable farming establishments in the region.

Figure 2: Summary of West Michigan Green Jobs by Core Area

Core Area	Total Green Jobs	Percent Share of Total Green Jobs
Total Green Jobs	9,509	100.0%
Increasing Energy Efficiency	2,745	28.9%
Pollution Prevention and Environmental Cleanup	2,241	23.6%
Agriculture and Natural Resource Conservation	2,211	23.3%
Producing Renewable Energy	1,141	12.0%
Clean Transportation and Fuels	1,010	10.6%
Green Jobs Not Assigned to a Core Area	162	1.7%

Source: Michigan Department of Energy, Labor & Economic Growth

Green Jobs by Industry

- Looking at the specific industries in which green jobs are concentrated can be useful. According to the green job survey, a concentration of green jobs is generated by the construction sector. In fact, *Specialty trade contractors* and *Construction of buildings* were the detailed industries with the highest green employment levels, with 1,974 and 1,120 green jobs, respectively (**Figure 3**).
- *Transportation equipment manufacturing* recorded 1,027 green jobs – representing 8 percent of total jobs in that industry. Other manufacturing industries with lesser numbers of green jobs included *Wood product manufacturing*, *Electrical equipment, appliance, and component manufacturing*, and *Fabricated metal product manufacturing*, reflecting the diversity of West Michigan’s manufacturing sector.
- The survey identified 650 green jobs in the *Waste management and remediation services* industry, or about 43 percent of total jobs in that sector. Many of the green jobs in this industry are related to traditional waste disposal services, such as trash removal and recycling. In addition, some of the green jobs in this industry are related to medical waste disposal, supporting the rapidly growing health industry in West Michigan.
- *Professional, scientific, and technical services* was the fourth largest green industry, with just over 600 green jobs. Green employment in this industry was in a wide range of businesses, and included occupations ranging from environmental lawyers to landscape architects and from scientists to engineers. The majority of these jobs, however, were in environmental consulting services and in landscape architectural services.

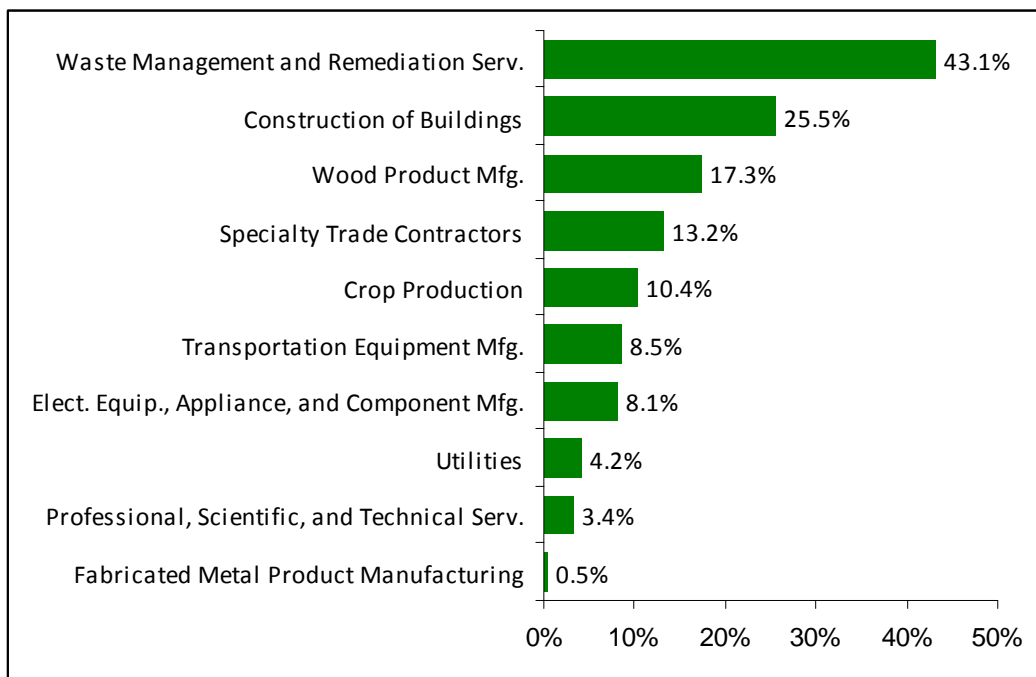
Figure 3: Industries Generating Significant Green Job Levels — West Michigan

NAICS	Industry	Total Green Jobs	Total Industry Employment	Green Jobs as % of Industry Employment
238	Specialty Trade Contractors	1,974	14,916	13.2%
236	Construction of Buildings	1,120	4,388	25.5%
336	Transportation Equipment Mfg.	1,027	12,034	8.5%
111	Crop Production	656	6,318	10.4%
562	Waste Management and Remediation Services	650	1,507	43.1%
541	Professional, Scientific, and Technical Services	648	19,074	3.4%
321	Wood Product Mfg.	343	1,981	17.3%
221	Utilities	83	1,996	4.2%
335	Electrical Equipment, Appliance, and Component Mfg.	77	956	8.1%
332	Fabricated Metal Product Mfg.	58	12,795	0.5%

Source: Michigan Department of Energy, Labor & Economic Growth

- In West Michigan, *Waste management and remediation* was the greenest industry, as measured by the largest share of total industry jobs that were considered green. **(Figure 4)**
- *Construction of buildings* and *Specialty trade contractors* were the second and fourth greenest industries in West Michigan. Many of the green jobs in these industries are related to new green building projects and retrofitting existing buildings to be more energy efficient.

Figure 4: Green Jobs as a Share of Total Industry Employment — West Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

Green Jobs by Occupation

- With total green employment in West Michigan measuring 9,509, individuals in green positions can be found in several different occupations. The largest green categories were *Construction and extraction, Production, and Installation, maintenance, and repair* occupations.
- These occupational categories were responsible for nearly 60 percent of total green employment. Individuals in these occupations ranged from *carpenters* to *team assemblers*.
- *Management* and *Architectural and engineering* occupations were also large green categories with 709 green jobs and 519 green employees, respectively.

Figure 5: Occupational Groups Generating Significant Green Job Levels — West Michigan

SOC	Occupational Category	Total Green Jobs	Percent of Total Green Jobs
	All Green Occupations	9,509	100.0%
47-0000	Construction and Extraction Occupations	2,037	21.4%
51-0000	Production Occupations	1,664	17.5%
49-0000	Installation, Maintenance, and Repair Occupations	1,643	17.3%
45-0000	Farming, Fishing, and Forestry Occupations	887	9.3%
11-0000	Management Occupations	709	7.5%
17-0000	Architecture and Engineering Occupations	691	7.3%
41-0000	Sales and Related Occupations	519	5.5%
19-0000	Life, Physical, and Social Science Occupations	328	2.6%
53-0000	Transportation and Material Moving Occupations	249	2.6%

Source: Michigan Department of Energy, Labor & Economic Growth

Recruiting Difficulties

- Despite recessionary conditions, some employers expect to face difficulty when recruiting for certain occupations. For instance, 20 percent of employers indicate that they expect difficulty recruiting qualified candidates for green *Production* occupations.
- Difficulty recruiting can encompass having a difficult time finding job candidates with the requisite skills as well as finding job candidates with an interest or knowledge of the position. In both cases, recruiting difficulties can be mitigated by publicizing opportunities for green jobs and the skills that are required for those opportunities.

**Figure 6: Which Green Occupations Do Employers Expect Recruiting Difficulties?
West Michigan**

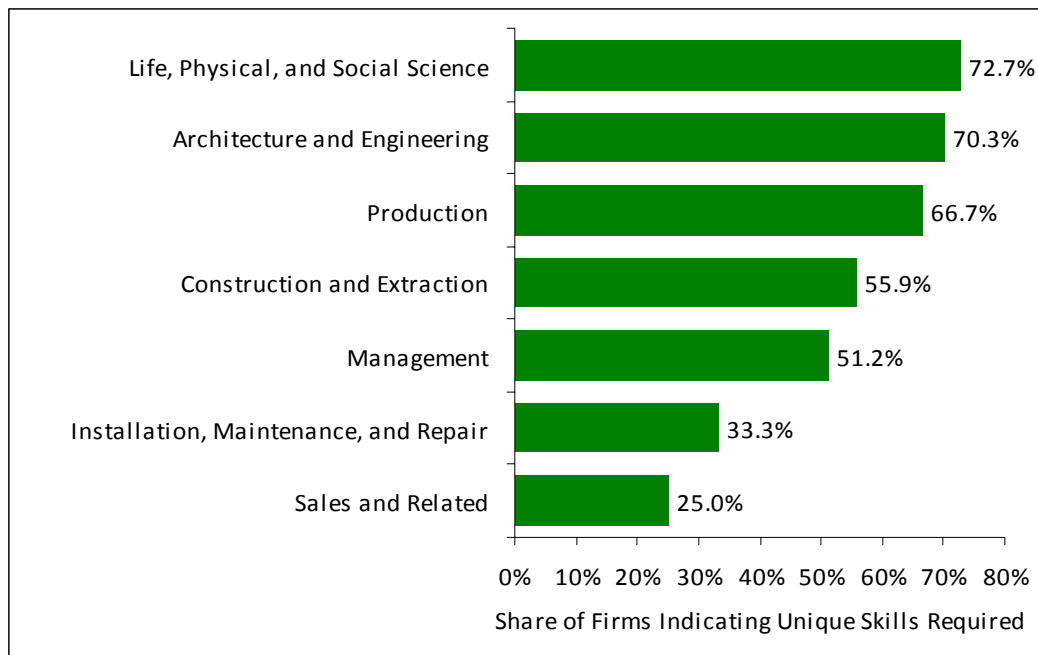
SOC	Occupational Category	Share of Firms Expecting Recruiting Difficulty
51-0000	Production Occupations	20.6%
17-0000	Architecture and Engineering Occupations	17.1%
47-0000	Construction and Extraction Occupations	11.4%

Source: Michigan Department of Energy, Labor & Economic Growth

Unique Skills

- In some cases, job candidates applying to work on green-related projects will need special skills. Employers report that unique skills are required in a number of occupations ranging from production to management job titles.

Figure 7: Occupations That Require Unique Skills for “Green Projects” – West Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

- *Life, physical, and social science* occupations were the most commonly reported group with 73 percent of employers indicating that unique knowledge and skills were required to perform green job duties.

- Similarly, 70 percent of employers report that *Architecture and engineering* occupations require unique green skills. These occupations – in particular – will play a key role in the green economy as green architecture and green engineering will invent, design, and implement green technologies. These occupations are also employed in a variety of industries, including construction and manufacturing.
- *Construction and extraction* occupations and *Installation, maintenance, and repair* occupations are among those that employers indicate require unique skills. Workers in these occupations will need to be familiar with green building and installation techniques, such as the selection of green building materials and the installation and repair of energy efficient production components.

Expectations for Job Growth

- Michigan’s green economy is showing signs of growth. In West Michigan, some surveyed employers were mildly optimistic about employment prospects. For example, 37 percent of employers with green *Production* occupations expect to add jobs in the next two years. Similarly, 33 percent of employers expected to add green-related *Construction and extraction* jobs.
- In addition, 20 percent of employers with green *Management* positions and 28 percent with green *Architecture and engineering* jobs expected higher job levels in these occupations in two years.

Figure 8: Share of Employers Expecting Green Job Gains by 2011 – West Michigan

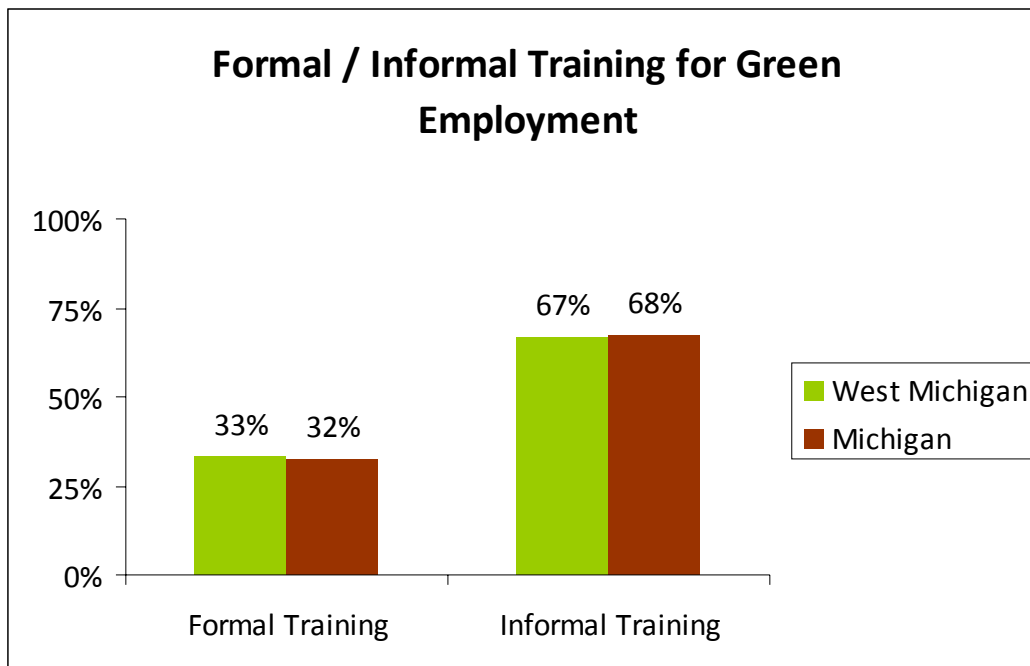
SOC	Occupational Category	Percent of Employers Reporting Occupation is Likely to Add Jobs
51-0000	Production Occupations	37.1%
47-0000	Construction and Extraction Occupations	33.3%
19-0000	Life, Physical, and Social Science Occupations	28.6%
17-0000	Architecture and Engineering Occupations	27.9%
49-0000	Installation, Maintenance, and Repair Occupations	27.3%
11-0000	Management Occupations	20.8%
41-0000	Sales and Related Occupations	20.0%
45-0000	Farming, Fishing, and Forestry Occupations	7.1%

Source: Michigan Department of Energy, Labor & Economic Growth

Training

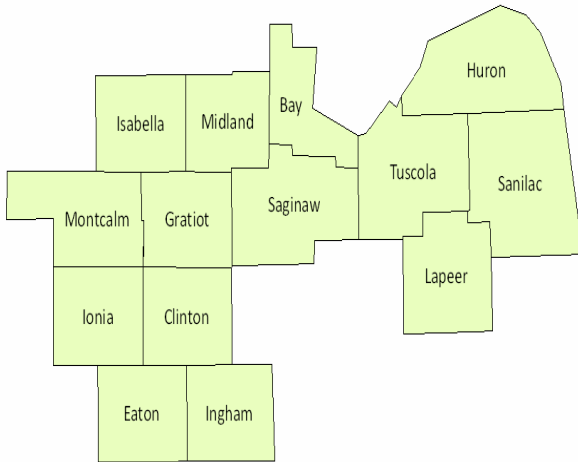
- Statewide, employers indicated that 32 percent of training of green workers might take place using formal sources of training such as community colleges while 68 percent of activity would be informal on-the-job training.
- West Michigan employers indicated a very similar potential distribution of formal (33 percent) versus informal (67 percent) training.

Figure 9: Anticipated Training Demand — Formal vs. Informal Training — West Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

Mid-Michigan Green Jobs Survey Results



Quick Profile

Population— 2009
1,297,735

Labor Force — 2009
660,875

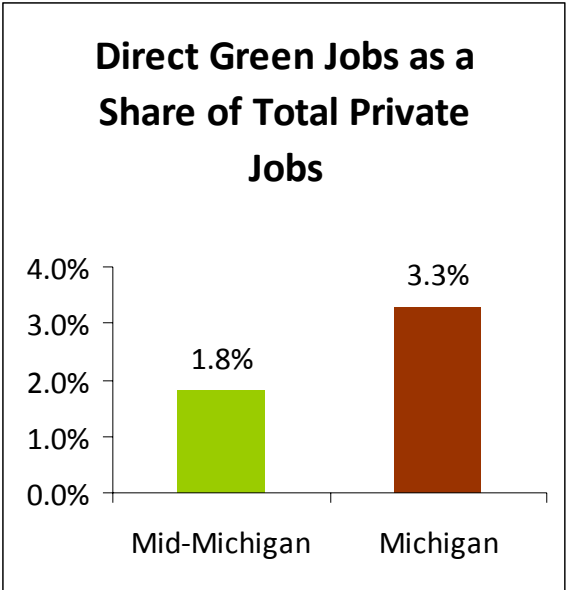
Jobless Rate — 2009
12.4 %

Total Private Payroll Jobs – 2nd Qtr. 2009
361,940

Total Direct Green Jobs - 2009
6,369

Regional Green Jobs Highlights in Mid-Michigan

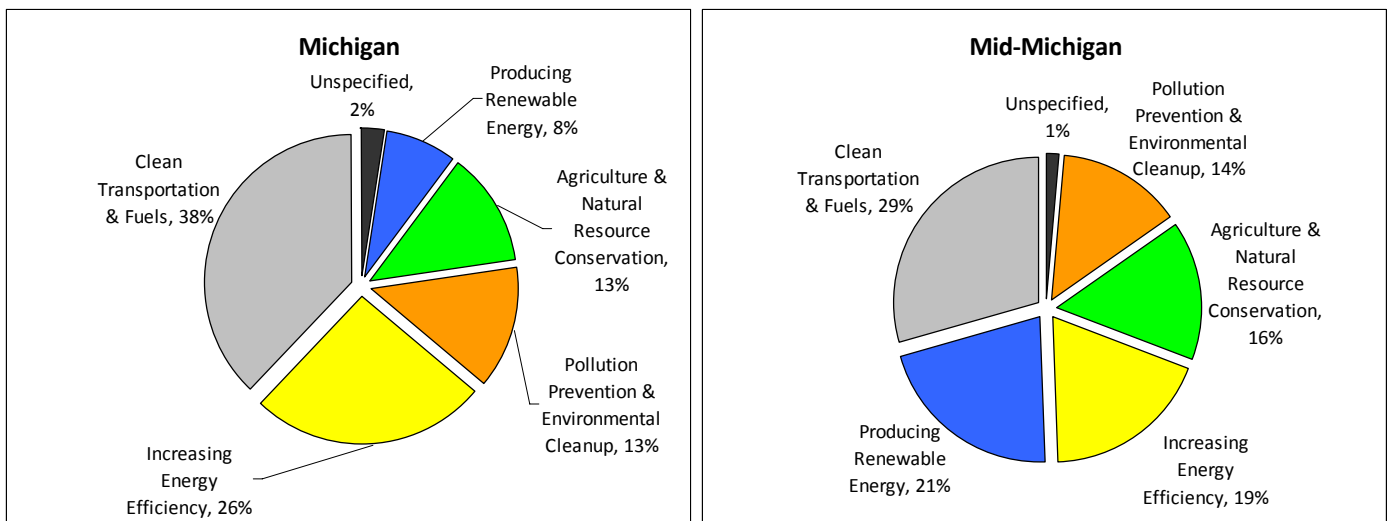
- There were an estimated 6,369 green jobs in the greater Mid-Michigan region in 2009, according to a survey of employers. Green jobs accounted for 1.8 percent of total industry employment in the region. This is lower than the state’s overall average 3.3 percent share of green jobs.
- The largest green core area in the region is *Clean Transportation and Fuels*, with 29 percent of all area green jobs.
- Industries reporting a good number of green jobs included *Professional and technical services* (973), *Specialty trade contractors* (460) and *Primary metal manufacturing* (174).
- *Production* occupations and *Architecture and engineering* occupations combined to account for half of all green jobs in the Mid-Michigan region in 2009, with more than 3,200 total green positions.



Distribution of Green Jobs by Core Area

- In the Michigan Green Jobs Report, five green-related core areas were identified and defined. These included: (1) *Clean Transportation and Fuels*, (2) *Increasing Energy Efficiency*, (3) *Pollution Prevention and Environmental Cleanup*, (4) *Agriculture and Natural Resources*, and (5) *Producing Renewable Energy*.

Figure 1: Distribution of Green Jobs by Core Area (Michigan and Mid-Michigan)



Source: Michigan Department of Energy, Labor & Economic Growth

- The Mid-Michigan shares of green jobs by core area differ somewhat from Michigan's mix. While *Clean Transportation and Fuels* dominates all green jobs for both areas, only 29 percent of green jobs in Mid-Michigan fall under this category compared to 38 percent statewide. While the Mid-Michigan region has contributed greatly to the state's auto industry, the significant number of green jobs in this industry in Southeast Michigan produces the larger share in this core area observed statewide.
- The region also has a lower share of green jobs in the *Increasing Energy Efficiency* core area, with only a 19 percent regional share of total green jobs versus 26 percent statewide. Nearly 1,200 jobs across the area are estimated to be involved in goods and services that aim to improve energy efficiency.

- The Mid-Michigan region outpaces the state in the share of green jobs related to *Renewable Energy*. The state only has about 8 percent of total green jobs in this core area, while the greater Mid-Michigan region generates one out of every five green jobs from this category. Initiatives ranging from the increased focus on wind energy in the Thumb Region to solar power equipment production in Montcalm County contribute to local green jobs in this core area.

Figure 2: Summary of Mid-Michigan Green Jobs by Core Area

Core Area	Total Green Jobs	Percent Share of Total Green Jobs
Total Green Jobs	6,369	100.0%
Clean Transportation and Fuels	1,872	29.4%
Producing Renewable Energy	1,336	21.0%
Increasing Energy Efficiency	1,187	18.6%
Agriculture and Natural Resource Conservation	994	15.6%
Pollution Prevention and Environmental Cleanup	887	13.9%
Green Jobs Not Assigned to a Core Area	92	1.4%

Source: Michigan Department of Energy, Labor & Economic Growth

Green Jobs by Industry

Figure 3: Industries Generating Significant Green Job Levels – Mid-Michigan

NAICS	Industry	Total Green Jobs	Total Industry Employment	Green Jobs as % of Industry Employment
541	Professional, Scientific, and Technical Services	973	15,149	6.4%
238	Specialty Trade Contractors	460	10,109	4.6%
331	Primary Metal Manufacturing	174	1,881	9.3%

Source: Michigan Department of Energy, Labor & Economic Growth

- Three industries producing significant numbers of green jobs in the Mid-Michigan region are displayed in Figure 3 above. These three sectors alone accounted for a combined total of over 1,600 green jobs in the region, or about one out of every four total green positions.⁵
- *Professional, scientific and technical services* topped the list of publishable green industries in terms of total green jobs, accounting for nearly 1,000 such positions in 2009. Jobs in engineering, architecture, environmental consulting and scientific research and

⁵ Due to the limited number of reporting companies, not all industry sectors were publishable due to confidentiality and statistical criteria. In some cases, larger green industries may exist.

development all contributed to this sector’s standing among the top green industries in the region.

- *Specialty trade contractors* contributed almost 500 green jobs in the region in 2009, while *Primary metal manufacturing* chipped in roughly 200 additional jobs to the green economy. Combined, these two detailed industries accounted for one out of every 10 green jobs in the region.
- Not only do the industry sectors listed hold a good number of green jobs overall, but they also have high concentrations of these positions relative to their overall employment. Green jobs make up anywhere from 4.6 to 9.3 percent of total employment within these industries, much higher than the 1.8 percent share of green jobs versus total private employment overall.
- Other key industry sectors that failed to meet publishability criteria for the table above employ a large number of green workers in Mid-Michigan and deserve mention. These include *Wood product manufacturing*, *Nonmetallic mineral product manufacturing* and *Transportation equipment manufacturing*. These industries combined accounted for roughly half of all green jobs in the area.

Green Jobs by Occupation

Figure 5: Occupational Groups Generating Significant Green Job Levels – Mid-Michigan

SOC	Occupational Category	Total Green Jobs	Percent of Total Green Jobs
	All Green Occupations	6,369	100.0%
51-0000	Production Occupations	2,016	31.7%
17-0000	Architecture and Engineering Occupations	1,238	19.4%
47-0000	Construction and Extraction Occupations	740	11.6%
19-0000	Life, Physical, and Social Science Occupations	546	8.6%
49-0000	Installation, Maintenance, and Repair Occupations	455	7.1%
53-0000	Transportation and Material Moving Occupations	275	4.3%
11-0000	Management Occupations	182	2.9%

Source: Michigan Department of Energy, Labor & Economic Growth

- *Production* occupations generate the largest number of opportunities for green workers in the region, with roughly 2,000 jobs or almost one-third of total green jobs in the region. These jobs are likely to be involved in both the production of more fuel-efficient motor vehicles or parts and the manufacturing of products for clean renewable energy production, such as solar panel components and wind turbines and related components.

- *Architecture and engineering* occupations will also play a key role in the green economy, as companies will look both to engineers in-house and from outside consulting agencies for improvements in energy usage and in the production of renewable or clean energy. Engineers are expected to contribute substantially to newer, cleaner technologies in the auto industry as well.

Recruiting Difficulties

Figure 6: Which Green Occupations Do Employers Expect Recruiting Difficulties? – Mid-Michigan

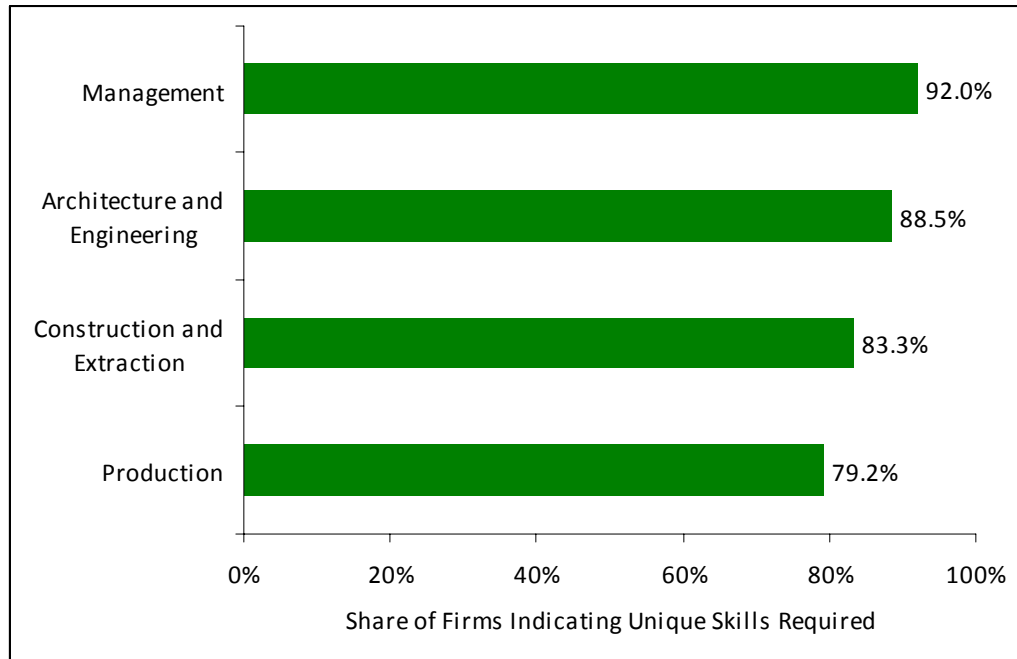
SOC	Occupational Category	Share of Firms Expecting Recruiting Difficulty
47-0000	Construction and Extraction Occupations	36.4%
51-0000	Production Occupations	36.0%
11-0000	Management Occupations	25.0%
17-0000	Architecture and Engineering Occupations	14.8%

Source: Michigan Department of Energy, Labor & Economic Growth

- The concept of the green economy is a relatively new one and green knowledge and skills are not common within the current available labor pool. Because of this, employers across several industries are anticipating at least some difficulty in recruiting qualified workers in green occupations.
- *Construction* and *Production* occupations tended to be the most commonly reported job classifications that employers had concerns with recruiting difficulty in the Mid-Michigan region. Over one third of employers that answered the recruiting question regarding green employment in each of these occupational groups expect to have some difficulty getting the right type of workers for these jobs. In construction, it is well known that certifications in green building concepts (such as LEED certification) can provide barriers to worker recruitment. With production occupations, it’s possible that at least some specific knowledge of unique components and/or materials may be required of workers in jobs that typically attract only minimally trained jobseekers.
- Green opportunities in *Management* occupations and *Architecture and engineering* occupations also may be difficult to fill as well. Specific green knowledge and skills as well as the fact that these occupations have generally extensive education and training requirements (aside from just green concepts) are the likely reasons for this.

Unique Skills

Figure 7: Occupations That Require Unique Skills for “Green Projects” – Mid-Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

- Mid-Michigan employers from several occupational groups answered affirmatively to whether green jobs will require unique skills. *Management* occupations were the most commonly reported group with 92 percent of employers indicating that green managerial jobs require specific green knowledge and skills.
- *Architecture and engineering* occupations were nearly as likely (89 percent) to require unique skills when applied to a green project. Because energy efficiency will be largely driven by products and processes that minimize material and energy usage, engineers and architects will have a key role in the green economy. Engineers will also be very important in clean transportation developments and technology, as well as renewable energy production, all of which will depend on very specific green knowledge and ideas.
- *Construction* occupations (83 percent reported as needing specific skills) and *Production* occupations (79 percent) also are more likely to demand specific green skills compared to other green occupations. It’s clear from the survey that even these typically mid-skill positions may require specific knowledge when working on green projects. This shows that green skill and knowledge sets will be important across the occupational spectrum, and not just in professional and technical occupations.

Expectations for Job Growth

Figure 8: Share of Employers Expecting Green Job Gains by 2011 – Mid-Michigan

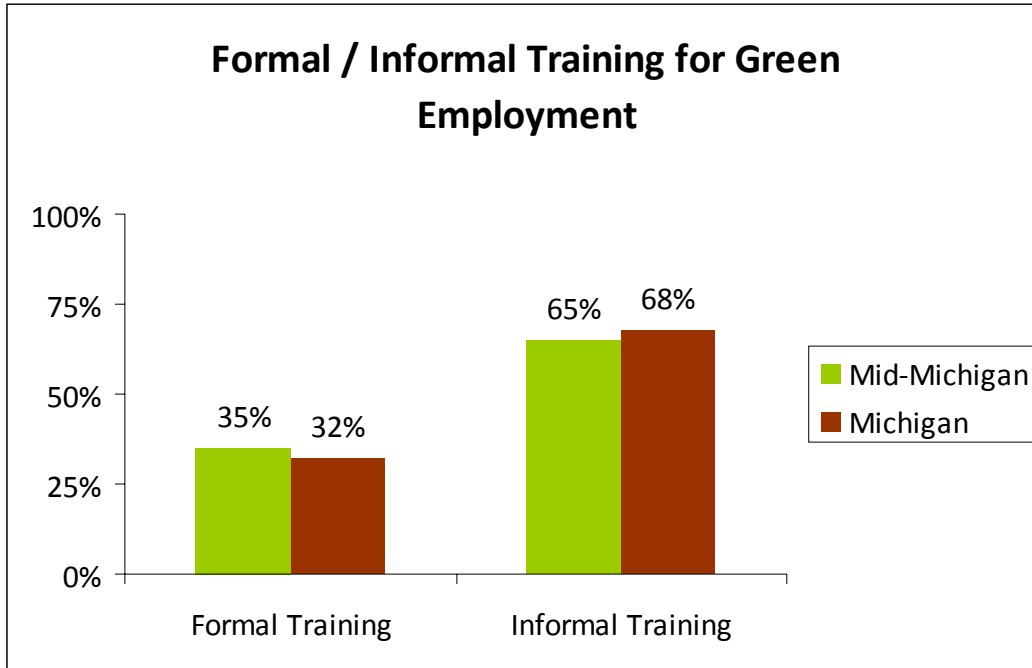
SOC	Occupational Category	Percentage of Employers Reporting Occupation is Likely to Add Jobs
47-0000	Construction and Extraction Occupations	33.3%
49-0000	Installation, Maintenance, and Repair Occupations	30.0%
51-0000	Production Occupations	20.7%
17-0000	Architecture and Engineering Occupations	14.3%
53-0000	Transportation and Material Moving Occupations	10.0%
11-0000	Management Occupations	8.0%

Source: Michigan Department of Energy, Labor & Economic Growth

- While the anticipated growth of the green economy is difficult to quantify, the survey was able to pinpoint occupational groups that employers expected to see some job gains from 2009 to 2011.
- In spite of the fact that overall business and consumer expectations for the economy as a whole are currently conservative at best, employers registered some optimism for green opportunities according to the Michigan Green Jobs survey. In Mid-Michigan, roughly one out of every three employers that answered the survey question on employment expectations for *Construction* and *Installation and maintenance* occupations anticipate that green job levels within those categories will grow through 2011.
- One fifth of employers reporting future green *Production* positions expect to see growth in these jobs during this period. This is at least partially due to the lowering demand for labor in the manufacturing of traditional products and the potential utilization of existing excess labor supply and production facilities to help support green technologies such as solar panels and wind turbines.

Training

**Figure 9: Anticipated Training Demand — Formal vs. Informal Training
Michigan vs. Mid-Michigan**



Source: Michigan Department of Energy, Labor & Economic Growth

- There is essentially little difference between the Mid-Michigan region and Michigan overall in terms of the anticipated training of green workers. Employers statewide responded that roughly 32 percent of green training would take the shape of formal educational and vocational programs. Mid-Michigan employers expect a slightly higher, though similar proportion (35 percent) of green training to be through formal programs designed specifically for the green economy.
- The vast majority of training in greater Mid-Michigan in terms of specific green skills will take place informally or on-the-job. Area employers expect that almost two-thirds of green training will take place in this form, as is the case statewide.

Northern Michigan Green Jobs Survey Results



Quick Profile

Population — 2009
883,364

Labor Force — 2009
434,750

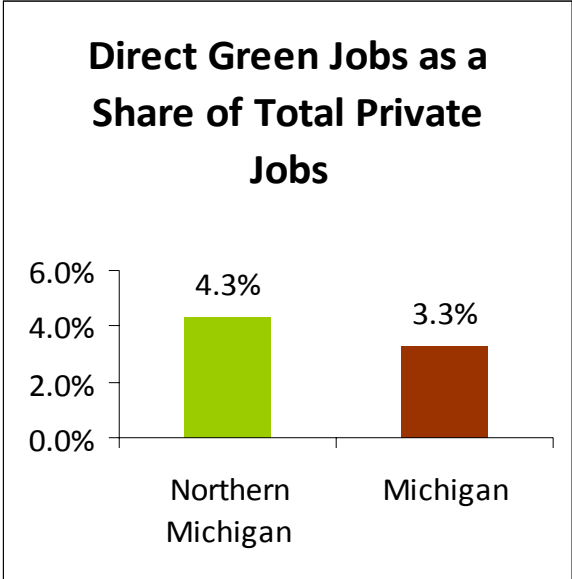
Jobless Rate — 2009
13.7 %

Total Private Payroll Jobs – 2nd Qtr. 2009
228,329

Total Direct Green Jobs
9,811

Regional Green Jobs Highlights in Northern Michigan

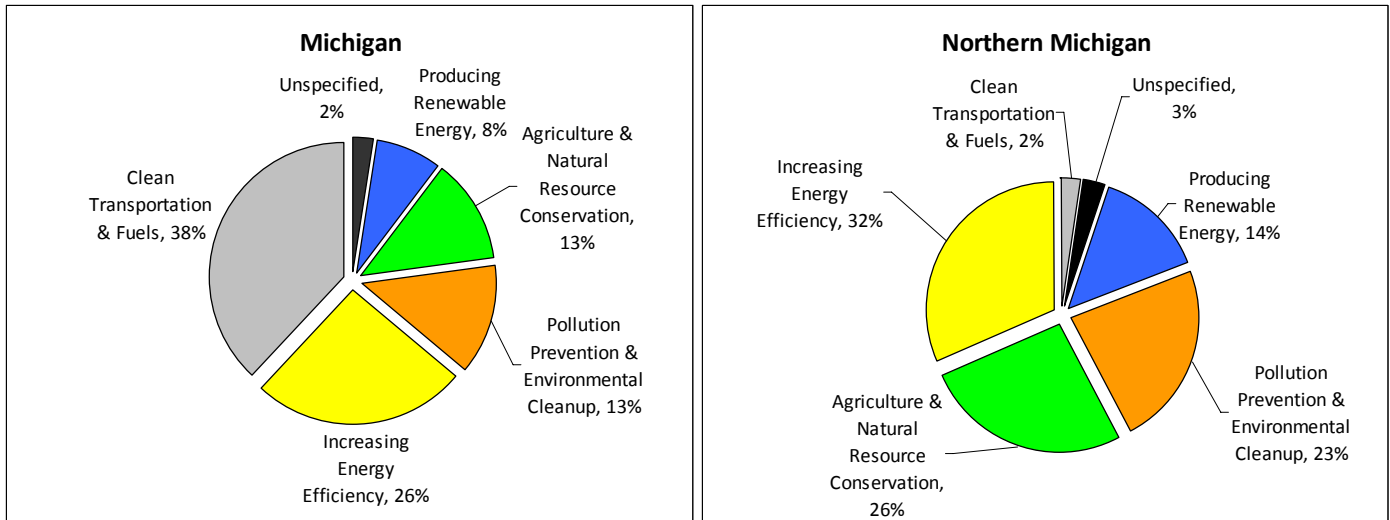
- Green jobs represent 4.3 percent of total industry employment in Northern Michigan. This is one percent above the state’s average green job share of 3.3 percent. As might be expected due to the smaller share of the statewide population residing in Northern Michigan, the region only accounts for 9.4 percent of direct green jobs in Michigan.
- Considering the abundance of natural resources in Northern Michigan, it is no surprise that more than 80 percent of green jobs in the region are concentrated in: *Increasing Energy Efficiency* (31.6 percent), *Agriculture and Natural Resource Conservation* (26.1 percent), and *Pollution Prevention and Environmental Cleanup* (23.2 percent).
- Industries and occupations related to construction contributed greatly to the local green economy. Construction has a large impact on the *Increasing Energy Efficiency* core area, as homeowners and businesses become more aware of energy efficient and environmentally-sound building construction options.



Distribution of Green Jobs by Core Area

- In the Michigan Green Jobs Report, five green-related core areas were identified and defined. These included: (1) *Clean Transportation and Fuels*, (2) *Increasing Energy Efficiency*, (3) *Pollution Prevention and Environmental Cleanup*, (4) *Agriculture and Natural Resources*, and (5) *Producing Renewable Energy*.

Figure 1: Distribution of Green Jobs by Core Area for Michigan and Northern Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

- There are 9,811 total green jobs in Northern Michigan. Due to the distinct economic structure of the region, the distribution of green jobs in the region is starkly different from statewide averages.
- With the dominance of the auto industry in Southeast Michigan, *Clean Transportation and Fuels* was the largest core area in Michigan with 38.1 percent of green jobs. However, this core area accounts for just 2.4 percent of green jobs in Northern Michigan.
- Nearly one third of total green jobs in Northern Michigan were in the *Increasing Energy Efficiency* core area. Due to high energy prices and the focus on climate change, firms producing products or services that enhance energy efficiency exist throughout the state. The *Increasing Energy Efficiency* core area boasts roughly 26,800 jobs in Michigan and was the state's second largest core area.

Figure 2: Summary of Northern Michigan Green Jobs by Core Area

Core Area	Total Green Jobs	Percent Share of Total Green Jobs
Total Green Jobs	9,811	100.0%
Increasing Energy Efficiency	3,098	31.6%
Agriculture and Natural Resource Conservation	2,562	26.1%
Pollution Prevention and Environmental Cleanup	2,272	23.2%
Producing Renewable Energy	1,364	13.9%
Green Jobs Not Assigned to a Core Area	276	2.8%
Clean Transportation and Fuels	239	2.4%

Source: Michigan Department of Energy, Labor & Economic Growth

Green Jobs by Industry

- The top three industries in Figure 3 provided about 55 percent of total regional green jobs. Several diverse sectors in the region contain green jobs.

Figure 3: Industries Generating Significant Green Job Levels — Northern Michigan

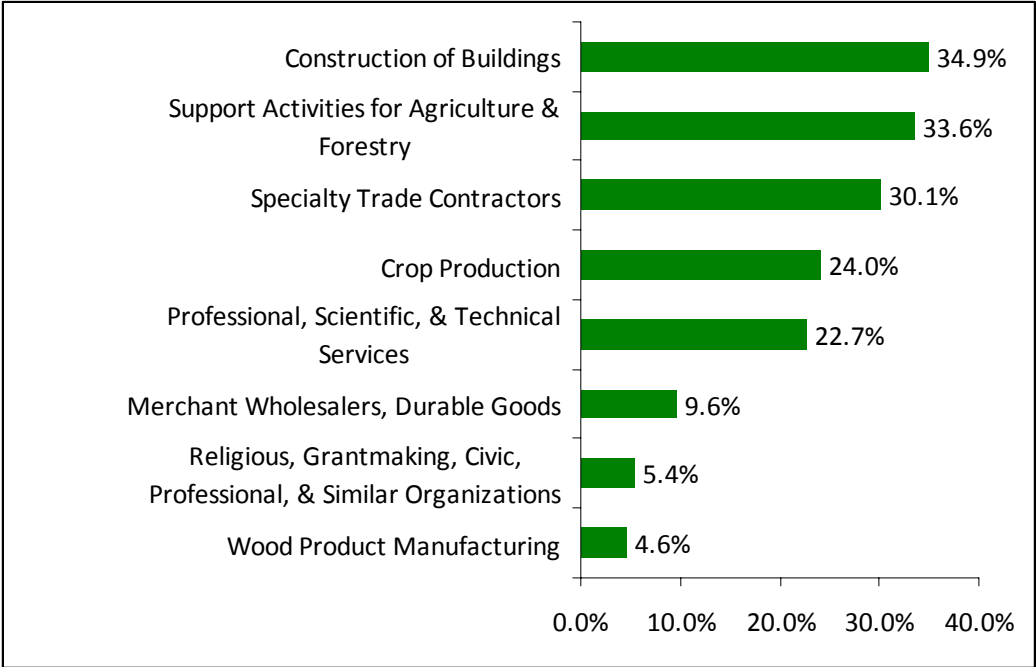
NAICS	Industry	Total Green Jobs	Total Industry Employment	Green Jobs as % of Industry Employment
238	Specialty Trade Contractors	2,318	7,697	30.1%
541	Professional, Scientific, and Technical Services	1,684	7,406	22.7%
236	Construction of Buildings	1,400	4,009	34.9%
423	Merchant Wholesalers, Durable Goods	267	2,789	9.6%
111	Crop Production	229	952	24.0%
813	Religious, Grantmaking, Civic, Prof., & Similar Organizations	217	4,064	5.4%
321	Wood Product Manufacturing	138	2,983	4.6%
115	Support Activities for Agriculture and Forestry	108	320	33.6%

Source: Michigan Department of Energy, Labor & Economic Growth

- The Construction industry provided a large share of the green jobs in Northern Michigan as the *Specialty trade contractors* and *Construction of buildings* sectors combined for more than 3,700 green jobs. There has been a movement towards “green buildings” as residents and businesses look for ways to cut utility costs and become more environmentally responsible.
- *Professional, scientific, and technical services* firms were also a prominent source of green jobs in Northern Michigan. This broad industrial category supplied 1,684 green jobs in the region. A majority of these jobs provided consulting or surveying services in various components of the green economy.

- Green jobs within the *Religious and grant making* sector were minimal, accounting for only 217 positions. Establishments in this industry are primarily small and interest-specific.

Figure 4: Green Jobs as a Share of Total Industry Employment – Northern Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

- Not only does the *Construction* industry provide the largest number of green jobs in the region, a significant share of construction jobs may be related to the green economy. Nearly 35 percent of total regional employment in the *Construction of buildings* sector was green. *Specialty trade contractors* also boast an impressive share of green jobs with 30 percent of local employment considered green.
- Relatively large shares of jobs in the Agricultural sector appear to be green-related. One out of every three jobs in the *Support activities for agriculture and forestry* sector was green-related, while about a quarter of the industry employment in *Crop production* was engaged in green activities.
- Due to the wide scope of the *Professional, scientific, and technical services* sector, a significant share of jobs in the sector are related to the green economy. Some specific examples of detailed industries providing regional green jobs were environmental consulting and architecture-related services.

Green Jobs by Occupation

- The top five broad occupational groups supplied approximately three-fourths of total green jobs in the region.

Figure 5: Occupational Groups Generating Significant Green Job Levels - Northern Michigan

SOC	Occupational Category	Total Green Jobs	Percent of Total Green Jobs
	Total, All Green Occupations	9,811	100%
47-0000	Construction and Extraction Occupations	2,668	27.2%
17-0000	Architecture and Engineering Occupations	1,383	14.1%
51-0000	Production Occupations	1,355	13.8%
49-0000	Installation, Maintenance, and Repair Occupations	1,063	10.8%
11-0000	Management Occupations	941	9.6%
45-0000	Farming, Fishing, and Forestry Occupations	458	4.7%
53-0000	Transportation and Material Moving Occupations	402	4.1%
41-0000	Sales and Related Occupations	387	3.9%
19-0000	Life, Physical, and Social Science Occupations	379	3.9%

Source: Michigan Department of Energy, Labor & Economic Growth

- With the construction industry being one of the biggest employment providers of green jobs, *Construction and extraction* occupations registered the largest number of green jobs in Northern Michigan, accounting for 27.2 percent (2,668) of regional green jobs.
- Occupations in *Architecture and engineering* (1,383), *Production* (1,355), and *Installation, maintenance, and repair* (1,063), also generated a significant number of local green jobs. Many of the occupations in *Production* and *Installation, maintenance, and repair* are mid-skill jobs that only require a short period of training.

Recruiting Difficulties

**Figure 6: Which Green Occupations Do Employers Expect Recruiting Difficulties?
Northern Michigan**

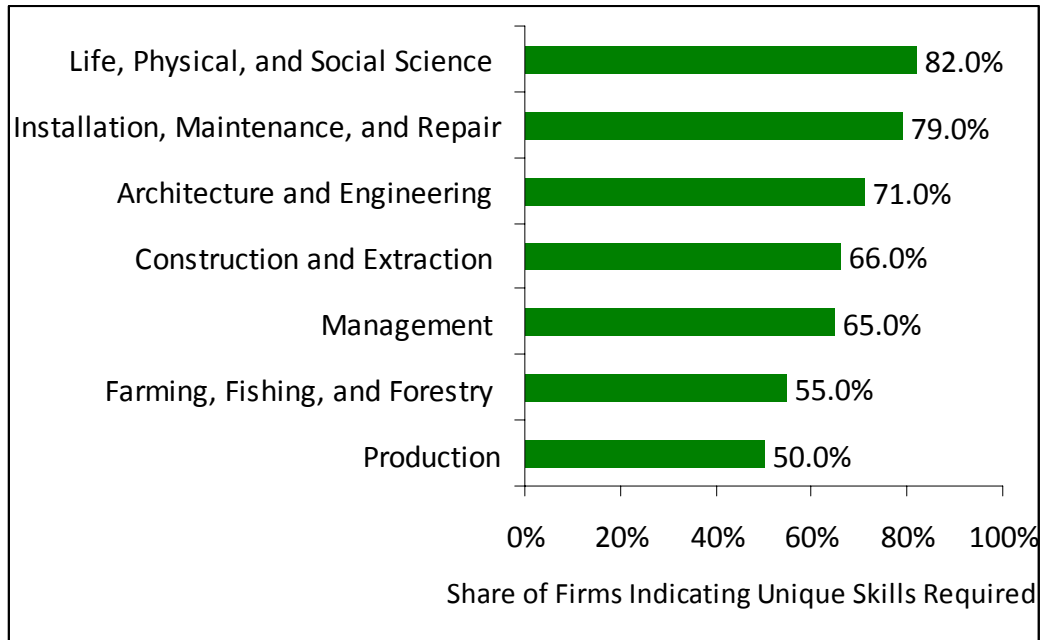
SOC	Occupational Category	Share of Firms Expecting Recruiting Difficulty
45-0000	Farming, Fishing, and Forestry Occupations	36.4%
17-0000	Architecture and Engineering Occupations	24.0%
49-0000	Installation, Maintenance, and Repair Occupations	23.1%
19-0000	Life, Physical, and Social Science Occupations	13.3%
11-0000	Management Occupations	7.7%
51-0000	Production Occupations	3.6%
47-0000	Construction and Extraction Occupations	2.2%

Source: Michigan Department of Energy, Labor & Economic Growth

- Recruiting difficulties for future green jobs will encompass various levels of education and training.
- The green economy provides new opportunities for *Architecture and engineering* occupations, and 24 percent of responding employers in Northern Michigan anticipate potential recruiting difficulty for these occupations. The majority of these are high skilled occupations that generally require at least a four-year degree.
- A significant percentage of responding employers indicated that they expect to have difficulties filling vacancies for *Farming, fishing, and forestry* (36.4 percent) and *Installation, maintenance, and repair* (23.1 percent) occupations. In contrast to occupations in *Architecture and engineering*, many of these jobs are in mid-skill occupations, and workers may only need on-the-job preparation.

Unique Skills

Figure 7: Occupations That Require Unique Skills for “Green Projects” – Northern Michigan



Source: Michigan Department of Energy, Labor & Economic Growth

- Employers were asked to identify occupations that required unique skills when working on green-related projects. In Northern Michigan, seven broad occupational categories had at least half of responding employers indicating unique skills were needed for green-related projects.
- Occupations in *Life, physical, and social science* appear to require the most specialized skills when working on green projects with 82 percent of responding employers indicating a need. This supports the statewide result, which had *environmental scientist* as the occupation with the largest share of responding employers requiring specialized skills for green projects.
- Responding employers in Northern Michigan signified *Installation, maintenance, and repair* as one of the top broad occupational categories that would most likely have green specialization needs. In contrast, employers throughout the state did not identify specific occupations within this category as among the top occupations needing more specialized training.

Expectations for Job Growth

Figure 8: Share of Employers Expecting Green Job Gains by 2011 – Northern Michigan

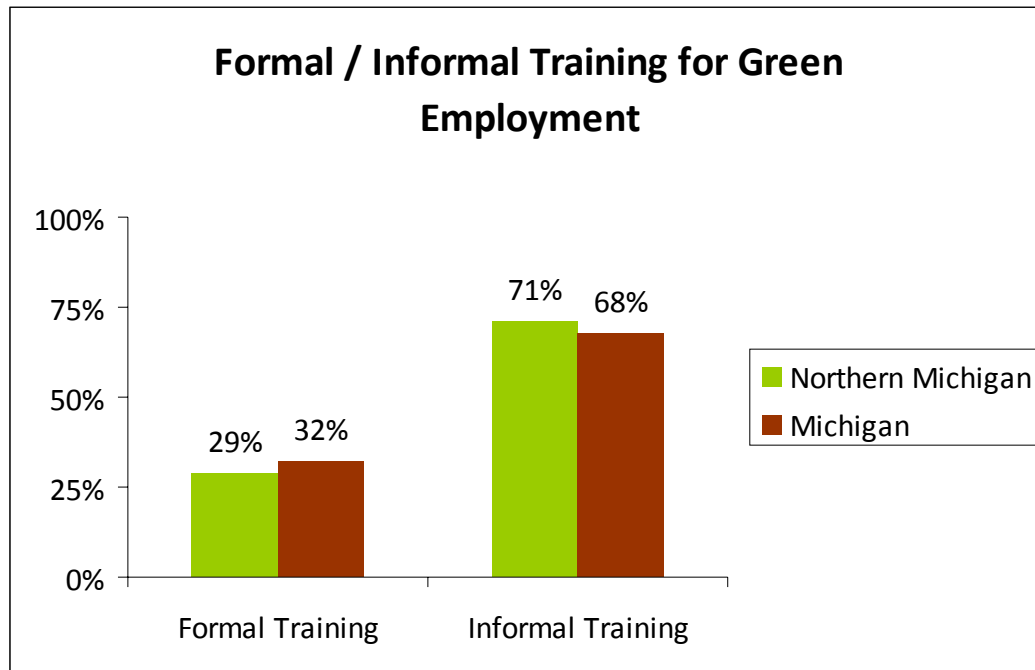
SOC	Occupational Category	Percent of Employers Reporting Occupation is Likely to Add Jobs
17-0000	Architecture and Engineering Occupations	50.0%
19-0000	Life, Physical, and Social Science Occupations	47.4%
45-0000	Farming, Fishing, and Forestry Occupations	40.0%
47-0000	Construction and Extraction Occupations	40.0%
41-0000	Sales and Related Occupations	35.7%
51-0000	Production Occupations	34.2%
49-0000	Installation, Maintenance, and Repair Occupations	29.4%
11-0000	Management Occupations	22.2%
53-0000	Transportation and Material Moving Occupations	10.0%

Source: Michigan Department of Energy, Labor & Economic Growth

- Employers in Michigan anticipate that *Engineering* and *Construction* occupations are among the most likely to add green-related jobs in the near future and employers in Northern Michigan support this conclusion.
- In Northern Michigan, half of the responding employers with green *Architecture and engineering* workers projected growth for this occupational category in the near future. The majority of occupations within this broad category require mid to high skill levels, such as *civil engineers* and *surveying and mapping technicians*.
- Even with the recent declines in the Construction Industry, 40 percent of *Construction and extraction* employers in Northern Michigan expect some job gains in their green workforce through 2011.
- Only ten percent of regional employers anticipate job gains among *Transportation and material moving* occupations in the green economy as the recession stifled consumer demand. Most of the jobs in this occupation are related to the movement of goods from producers to consumers.

Training

**Figure 9: Anticipated Training Demand — Formal vs. Informal Training
Michigan vs. Northern Michigan**

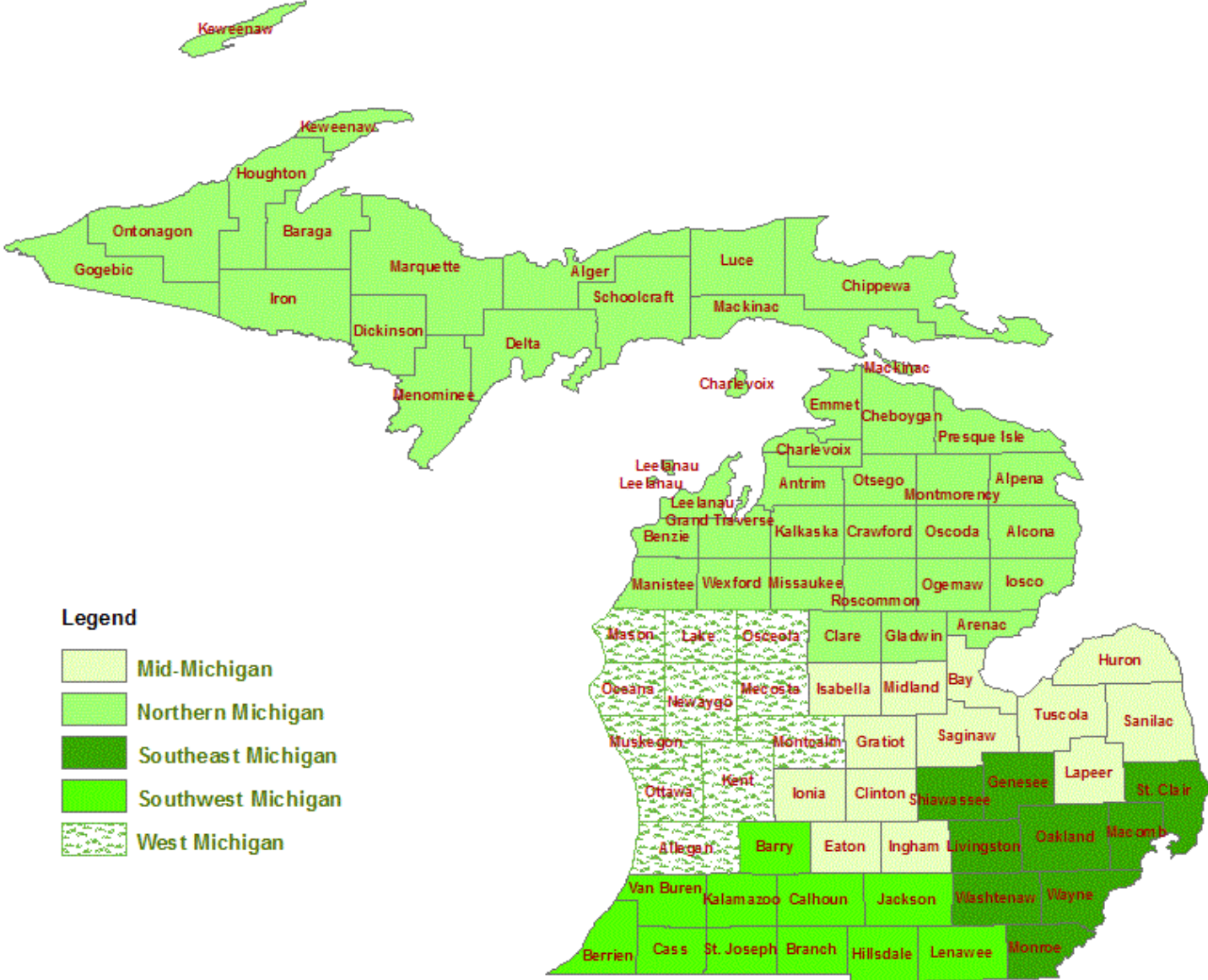


Source: Michigan Department of Energy, Labor & Economic Growth

- Firms were asked to estimate what percentage of their training needs for “green-related” employees would be formal (provided by community colleges or outside training providers) or informal (on-the-job) training.
- The majority of the firms surveyed anticipate needing a mix of informal and formal training for the future “green” workforce. However, a larger share of the training may be conducted on-site.
- The statewide results were very similar to the results in Northern Michigan. In Northern Michigan, 71 percent of future training needs for the local green economy may be conducted on-the-job. The statewide results were slightly lower, indicating 68 percent of the training may be informal.
- As part of the growing list of green jobs training providers in the state, Northwestern Michigan College in Traverse City provides a unique training program combining both classroom and hands-on experience. Two of their training programs are the Solar Photovoltaic (PV) Electric System and Residential Energy Assessment programs.

- Northwestern Michigan College is also committed to educating the public on ways to incorporate green activities in their daily lives. One of eight demonstration centers in Michigan is located at Northwestern Michigan College. These centers provide the public information and demonstrations on renewable energy, green building solutions, and other green-related topics.

Appendix 1: Michigan Regions



Source: Michigan Department of Energy, Labor & Economic Growth