Finding Work: New Career Pathways in an Evolving Labor Market

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The manufacturing sector, and the automobile industry in particular, was under stress well before the advent of the Great Recession. But as the Great Recession took hold, the manufacturing sector hemorrhaged middle-class jobs at a staggering rate.

In 2009, automotive sales were only 10.4 million units—the worst year for the market in almost 30 years. The economies of Indiana, Michigan and Ohio depend heavily on automotive and parts production, accounting for nearly 47 percent of all U.S. production in 2010. As a result, the automotive crisis and broader economic recession hit our three-state region particularly hard.

Already, many automotive manufacturing and supplier plants had been shuttered, and communities were dealing with the impact of thousands of workers who had been bought out, retired or laid off. For many workers, their jobs were gone and they weren't ever coming back. For talented younger workers who might have considered an automotive career, the instability of the industry led them to look elsewhere.

The Indiana Department of Workforce Development (IDWD) and the Indiana Business Research Center (IBRC), together with partners in Michigan and Ohio, collaborated on a research project called Driving Change.[1] The goal of the Driving Change tri-state research consortium was to understand the specific nature of the auto industry transformation and skills relevant to efficient and renewable vehicle technologies and other career opportunities in the broader economy. This article highlights two of the project's objectives:

- Finding alternative career path opportunities for dislocated workers for jobs in demand with an emphasis on jobs in the green economy
- Identifying the current and projected skills gaps of the workforce and the required training needed to compete for jobs in demand and green job opportunities

This article first highlights the occupations that are in demand today and those with the brightest prospects for the future. The data are organized around the Driving Change research themes of jobs in the automobile sector and the green economy.

Second, the article moves on to the concept of "pathway clusters." Simply put, a pathway cluster provides a set of occupational options that are well aligned with a worker's knowledge, skill set and personal traits. Pathway clusters are not typical because they are not organized around a particular industry like health care or functions like business administration. Instead, pathway clusters are organized around broad similarities and differences between occupations.

Third, the article considers the time commitment and the relative difficulty of transitioning from one's original occupation to a different occupation. The goal was to boil down the complex components of a worker's skills, an occupation's needs and the mechanisms needed to move from one job to another into one dimension. That dimension is time. The research team developed a time to transition measure—"trip time"—that could inform a worker's decision about which career pathway to follow.

Finally, for the dislocated worker the question of how to move from Point A to Point B is far from academic. Training dollars are of little use in workforce development efforts if they fail to move an individual closer to re-employment in a career with a future. This new pathway cluster analysis and use of trip time as a simple measure to gauge the ease or difficulty of career alternatives will help these dislocated workers make decisions about which transitions are the most feasible.

Jobs for the Future

Structural and cyclical economic forces have had a devastating effect on the labor force across the entire economy and the auto sector especially. Where will these displaced workers find jobs?

Many economists, workforce analysts and policymakers across the nation have asserted that the burgeoning green economy may provide new job opportunities. There is great interest in obtaining information about the quantity and characteristics of jobs produced by the green economy, but traditional sources of information on industries and occupations are not specific enough to accurately measure the number of green jobs in the economy. As a result, IDWD and the IBRC conducted a green jobs survey.[2]

There were four important survey findings:

1. Indiana has a significant number of green jobs. Indiana has an estimated 46,879 direct green jobs or about 1.7 percent of the workforce.
2. Because they are concentrated in industries that are cyclical, green jobs in Indiana are more sensitive to economic cycles.
3. Employers stated that most green jobs simply required on-the-job training. Production green jobs, for the most part, did not require special skills, but jobs like engineering did.

4. The occupations that are in demand today and poised for high growth in the future are those requiring expanded skill sets and higher levels of education and training.

While the green jobs surveys asked employers about their green jobs hiring expectations in the next two years, the research team needed a richer and more complete data set to assess the future of green and growing jobs. To analyze current job opportunities in the green economy, the research team used the Help Wanted Online (HWOL) database from The Conference Board to get a snapshot of current hiring activity. The research team used BLS and O*NET data to assess long-term occupational prospects in the tri-state region.

Green and Growing Occupations

What career opportunities exist in the green economy?[3] **Table 1** presents the top 15 green occupation vacancy postings from HWOL in the fourth quarter of 2010 in the tri-state consortium region. To understand the relative strength of current demand for an occupation, the research team calculated the ratio of HWOL postings to the average 2009 employment in that occupation.[4]

TABLE 1: Tri-State Top 15 Green and Growing Non-Automotive Occupation Postings and Expected Job Change to 2018

Environmental Services | Miscellaneous Industries Not Elsewhere Classified | Non-Auto Manufacturing | Energy-Related Industries

Rank	Description	HWOL Green Postings[1]	10-Year Expected Growth[2]	Industry Group[3]	Postings-to-Employment Ratio[4]	Mean Wage[5]
1	Truck Drivers, Heavy and Tractor-Trailer	16,343	13.0%		1 : 10	$39,190
2	Customer Service Representatives	13,767	17.7%		1 : 13	$32,898
3	Marketing Managers	5,919	12.5%		1 : 2	$106,051
4	Sales Representatives, Wholesale and Manufacturing, Technical and Scientific Products	5,194	9.7%		1 : 8	$80,298
5	General and Operations Managers	4,038	-0.1%		1 : 22	$108,057
6	Laborers and Freight, Stock, and Material Movers, Handlers	3,131	-0.8%		1 : 75	$25,930
7	Automotive Specialty Technicians	2,745	4.7%		1 : 20	$37,297
8	Public Relations Specialists	1,826	24.0%		1 : 9	$51,630
9	Training and Development Specialists	1,794	23.3%		1 : 10	$53,051
10	Engineering Managers	1,638	6.2%		1 : 11	$109,392
11	Welders, Cutters, and Welder Fitters	1,574	-1.6%		1 : 21	$35,842
12	Computer Software Engineers, Systems Software	1,377	30.4%		1 : 14	$81,926
13	Production, Planning, and Expediting Clerks	1,365	1.5%		1 : 20	$41,314
14	Aerospace Engineers	1,353	10.4%		1 : 1	$86,484
15	Heating and Air Conditioning Mechanics and Installers	1,323	28.1%		1 : 16	$45,441

[1] Source: HWOL, Quarter 4, 2010; Green jobs total, N=131,248.
[2] Source: BLS; Projections from 2008 to 2018 are for parent, six-digit SOC. HWOL and O*NET now report occupations at the eight-digit SOC detail. As a result, those occupations listed in this table are at the more detailed, eight-digit SOC while the projection figures are for the parent six-digit SOC. Hence the projection is for a group of similar occupations and not the specific occupation listed in the table.
[3] Source: O*NET; O*NET categorizes green industries into 12 sectors. For the purposes of this report, the research team recast those 12 sectors into five categories (auto manufacturing being the fifth).
[4] Source: IBRC using HWOL and BLS/OES data
[5] Source: BLS. Mean wage calculated for the tri-state region using a weighted average.

For example, in the fourth quarter of 2010, there was one posting for one aerospace engineer currently employed in the state. This indicates high demand for aerospace engineers, in contrast to material movers and freight stock handlers with a ratio of one posting to 75 current workers. Based on BLS projections, the need for aerospace engineers will grow more than 10 percent, while the demand for material movers and freight stock handlers is expected to decline in the next 10 years.

Indiana's top 15 occupations largely mirror the tri-state region. As demand for labor and the type of occupation is geographically determined, a would-be job seeker should consider the labor demand in his or her area. For example, the occupational demand for gaming supervisors is dependent upon the presence of a casino. The IDWD publishes the "Hoosier Hot 50" jobs for each of the state's 11 economic growth regions to help one explore regional demand.[5]

Other Growing Occupations

Even though many career opportunities exist in the green economy, the demand for non-green jobs (as evidenced by the more favorable postings-to-employment ratios in this section) indicate that non-green jobs should also be explored as career alternatives for the displaced workforce.

Table 2 presents the region's top 15 non-green occupation job vacancy postings from HWOL in the fourth quarter of 2010. The top 15 occupations account for more than 25 percent of all non-green postings. Medical and health-related occupations dominate the list. None of the non-green occupations that top the list are in manufacturing.

Whether one is a new entrant to the labor force or a worker affected by the Great Recession and wishing to transition to another occupation, the process of winnowing down the hundreds of possible occupations into a manageable and realistic set of target occupations can be daunting. The next two sections present new resources for workers in transition to find those target occupations.

Career Pathway Clusters

How can a dislocated worker plot a path to a new job that uses the skill set he or she has developed over the years? The "pathway cluster" tool is the first step in addressing this question.

The operating principle for the pathway cluster concept is that workers will seek, and be most productive in, occupations that are most similar to their current or former jobs. Based on O*NET's occupation description categories, occupations are grouped into a pathway cluster based on similarities in worker requirements, worker traits and occupational requirements.[6] Because pathway clusters are constructed based on occupational and worker similarities, transitions from one pathway cluster to a different cluster would be relatively more difficult.

A key advantage of pathway clusters over other career transition resources is that the user is provided a set of many possible target occupations, rather than one at a time. Combined with the skills-gap analysis (in the next section), a worker in transition can judge the relative ease required to move from one occupation to another. Also, the pathway cluster approach uses all occupation description categories of O*NET, not just a subset.

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In order to create pathway clusters, the research team analyzed around 500 dimensions and characteristics for each occupation. The research team compressed these into three O*NET-type categories to develop pathway clusters:

- **Requirements of the worker:** Worker requirements that can be gained by the worker through study or training
- **Traits of the worker:** The internal or personal traits of workers who are drawn to—or perform well in—the occupation
- **Occupational requirements:** The requirements for the job, such as work activities (e.g., lifting heavy objects, personal interactions or gathering data)

Compressing the O*NET data—removing characteristics that overlap and realigning the remaining occupation characteristics—means that pathway cluster definitions

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■ TABLE 2: **Tri-State Top 15 Non-Green Occupation Postings and Expected Growth to 2018**

Rank	Description	HWOL Green Postings[1]	10-Year Expected Growth[2]	Postings-to-Employment Ratio[3]	Mean Wage[4]
1	Registered Nurses	23,415	22.2%	1 : 11	$60,750
2	Retail Salespersons	16,233	8.4%	1 : 23	$23,938
3	Occupational Therapists	14,728	25.6%	1 : 1	$68,962
4	Physical Therapists	12,620	30.3%	1 : 1	$73,557
5	First-Line Supervisors/Managers of Retail Sales Workers	12,003	5.3%	1 : 8	$38,589
6	Computer Systems Analysts	10,422	20.3%	1 : 4	$77,109
7	Executive Secretaries and Administrative Assistants	9,971	12.8%	1 : 10	$41,237
8	Web Developers	8,790	13.4%	1 : 2	$68,394
9	Sales Representatives, Wholesale and Manufacturing, Except Technical and Scientific Products	7,895	6.6%	1 : 17	$58,906
10	Medical and Health Services Managers	7,796	16.0%	1 : 4	$82,542
11	Computer Support Specialists	7,740	13.8%	1 : 6	$42,408
12	First-Line Supervisors/Managers of Office and Administrative Support Workers	7,662	11.0%	1 : 13	$48,399
13	Speech-Language Pathologists	7,352	18.5%	1 : 1	$72,655
14	Sales Agents, Financial Services	6,041	9.3%	1 : 4	$72,610
15	Office Clerks, General	5,970	11.9%	1 : 44	$26,764

Note: All occupations in this table fall within the "Miscellaneous Industries Not Elsewhere Classified" industry group.
[1] Source: HWOL, Quarter 4, 2010; Green jobs total, N=131,248.
[2] Source: BLS; Projections from 2008 to 2018 are for parent, six-digit SOC. HWOL and O*NET now report occupations at the eight-digit SOC detail. As a result, those occupations listed in this table are at the more detailed, eight-digit SOC while the projection figures are for the parent six-digit SOC. Hence the projection is for a group of similar occupations and not the specific occupation listed in the table.
[3] Source: IBRC using HWOL and BLS/OES data
[4] Source: BLS. Mean wage calculated for tri-state using a weighted average.

will not be one-to-one with O*NET, but the general thrust of the O*NET method remains intact.

Table 3 shows how the 731 occupations were grouped among seven pathway clusters. Occupations were fairly evenly divided among these seven clusters, except for the particularly large production, construction and engineering "super cluster." This cluster was further subdivided into 1) engineering and applied technology, 2) construction and extraction, equipment operation, and repair, and 3) design and production.

Green occupations are fairly well distributed across clusters, with the exception of the health, social and personal services cluster. Any worker interested in making a transition to a green occupation would likely have several green target occupations within their cluster for which they have a relatively similar skill set and worker traits.

Space does not allow a complete detailed breakdown of the occupations in each pathway cluster and the dominant characteristics that bundled occupations into a cluster. The full report, available at www.drivingworkforcechange.org/reports/careerpathways.pdf, describes the clusters in greater detail.

Finding and Closing the Skills Gap

The pathway cluster analysis groups occupations based on the similarities and differences of over 500 job and worker characteristics. Thus, the Driving Change project has not only identified the displaced workers and the green and growing occupations of promise, but developed a resource that can identify occupations that are relatively similar to the original occupation of the displaced worker.

■ **Table 3: Summary of Career Pathway Clusters**

Cluster Name[§]	Cluster ID	Number of Occupations	Number of Green[¤]
Information and Investigation	1	62	12
Health, Social and Personal Services	2	90	0
Production, Construction and Engineering	3	217	55
Engineering and Applied Technology	3a	75	26
Construction and Extraction, Equipment Operation, and Repair	3b	69	15
Design and Production	3c	73	14
Liberal Arts, Education and Human Relations	4	86	7
Business, Sales and Administration	5	105	15
Transportation and Public Services	6	97	20
Environmental Sciences and Food Service	7	74	15

[§] Clusters are ordered based on their relative strength, or how "tight" the clusters are. Information and investigation was the strongest cluster. The environmental sciences and food service cluster, in contrast, had the weakest similarity scores. The number of occupations in a cluster does not speak to the cluster's relative strength or importance.
[¤] Based on the six-digit SOC definitions of the 2009 vintage of O*NET. The 2010 eight-digit O*NET/SOC definitions have considerably more jobs classified as green.
Source: Indiana Department of Workforce Development (IDWD) and the Indiana Business Research Center (IBRC)

Next, we address the questions of how long and how difficult the transition will be from an originating occupation to a destination occupation. Like the selected occupations from the production cluster presented in **Figure 1**, there is a distance between them. One cannot simply jump from one job to another. So what will it take to get from one occupation to another? The relative distance between occupations is the skills gap—the education, training or apprenticeship time required to transition from one occupation to another.

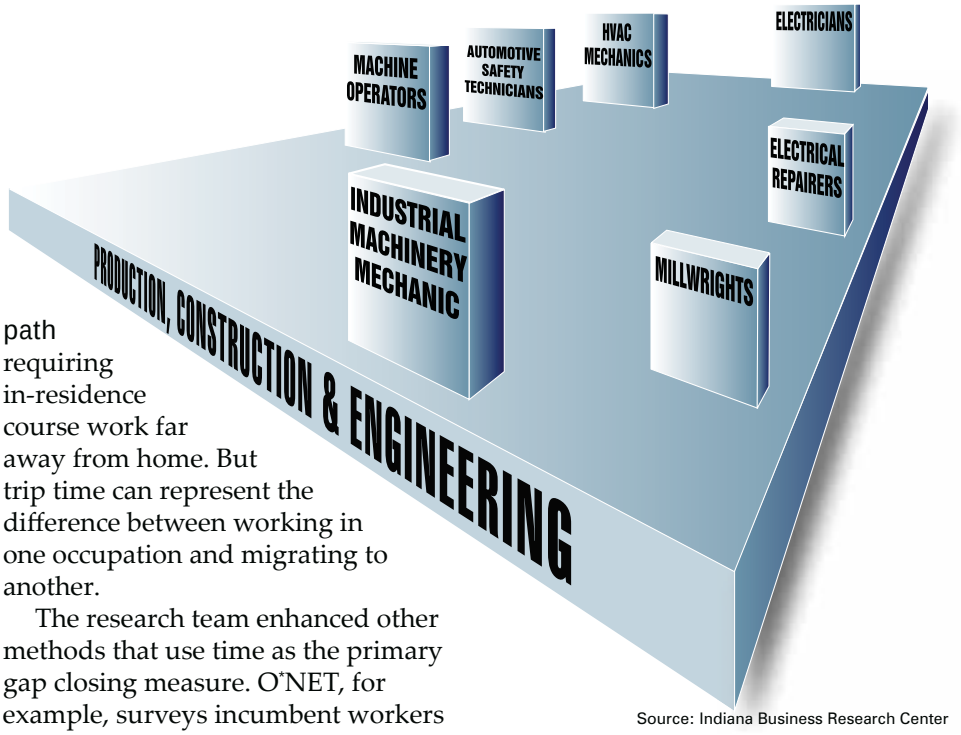
The time to transition—the "trip-time method"—is "a first" because it compresses all the differences between occupations into a common numéraire, namely the preparation or retraining time it would take to change jobs. The skills gap is primarily a knowledge or human capital gap. Closing the knowledge gap can take months or years in the classroom earning credits and degrees, just as closing many types of skills gaps requires many months or even years as an apprentice. The trip-time method measures the distance of a skills gap and the relative ease of moving from one occupation to another.

In short, time is the dimension for measuring a skills gap: how long the journey is to move from occupation A to occupation B. There are many other considerations, of course. A path that means paying large sums for tuition would not be feasible for many. Many would rule out a path requiring in-residence course work far away from home. But trip time can represent the difference between working in one occupation and migrating to another.

The research team enhanced other methods that use time as the primary gap closing measure. O*NET, for example, surveys incumbent workers to determine, among many things, the level of proficiency necessary for a wide range of worker and job characteristics and the educational and training time it would take for an individual to become proficient at a particular job. To the extent possible, the estimated hours required for education and training were made consistent across different formats—academic, vocational or apprenticeships. This was no easy task and, as a result, trip times should not be taken literally but rather as a measure of comparison between different career transitions.

The research team estimated the longest sequence of courses or training required to fulfill the most important knowledge or skills requirement for an occupation. This sequence is the dominant skills gap. Trip time, then, is the skills gap measured in hours of preparation. If the pathway clusters are how occupations are grouped in two dimensions, then **Figure 2** shows

■ **Figure 1: Selected Occupations in the Same Cluster as an Industrial Machinery Mechanic**



Source: Indiana Business Research Center

how trip time, or preparation time, is measured in the third dimension.

The pathway cluster method used to group occupations might suggest that all within-cluster trip times would be less than trip times between clusters, but this is not always true. Occupations were grouped into pathway clusters according to many criteria including personal traits of the worker (such as highly social) and work activities (such as handling heavy objects), not just knowledge and skill levels. As a rule, however, it is easier to move within clusters.

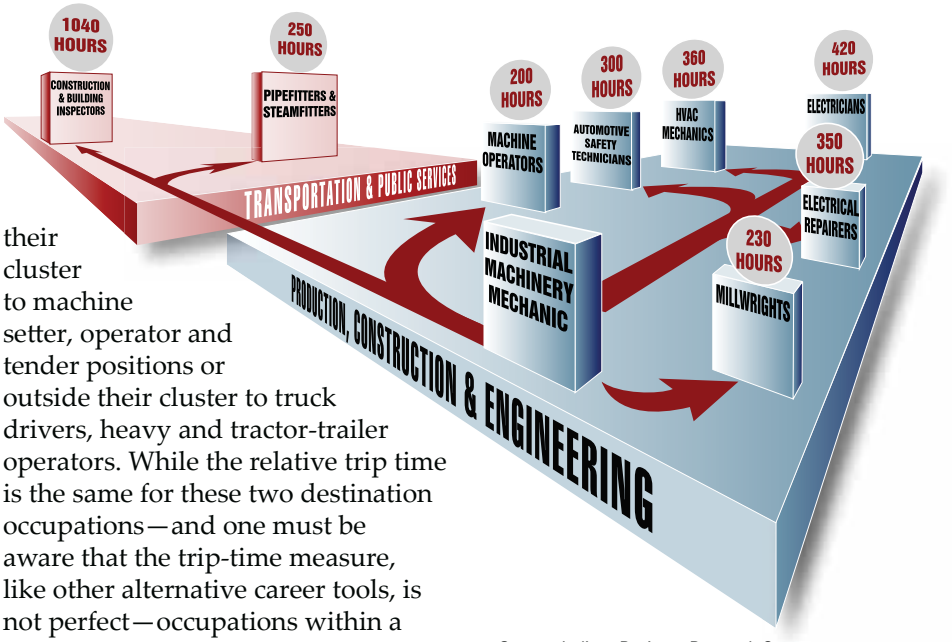
Research into Practice

Several displaced autoworker occupations can serve as examples to show that each occupation has several options and that each one has an expected amount of time to make the occupation transition. **Table 4** provides two transition options for selected automotive occupations, one within the originating cluster and one outside. These examples also have relatively short trip times, which some workers may prefer in order to adopt new career opportunities as quickly as possible. Moreover, transitions within the same pathway cluster allow workers to move to an occupation that is much more similar to their previous occupation in terms of worker requirements, worker traits and job requirements.

Production helpers can make relatively fast transitions both within their cluster to machine setter, operator and tender positions or outside their cluster to truck drivers, heavy and tractor-trailer operators. While the relative trip time is the same for these two destination occupations—and one must be aware that the trip-time measure, like other alternative career tools, is not perfect—occupations within a cluster share many similarities. The dislocated worker would probably feel more comfortable, and perform better, in an occupation in his or her cluster.

Limiting transitions from auto sector occupations to only green occupations greatly reduces a displaced worker's options. In the tri-state region, non-green jobs comprised almost 82 percent of all fall 2010 HWOL postings. **Table 5** presents a sampling of non-green career transition alternatives for team assemblers and production helpers with relatively short trip times.

■ FIGURE 2: **Trip Times to Transition from an Industrial Machinery Mechanic to Selected Occupations**



Source: Indiana Business Research Center

Closing the Gap

One of the Driving Change project goals was to develop a resource to help displaced workers plot a path, in some cases a green path, to a new future. Workers considering a transition to a new occupation would also benefit from knowing their retraining and education options. As a result, the Driving Change website also provides a web-based resource to look up educational, training and vocational programs for green and growing occupations. Based on their targeted occupation, users can find

■ TABLE 4: **Sample Career Transitions from Automotive Occupations to In-Demand Green Occupations with Above Average Wages**

Auto Sector Occupation		Destination Occupation		
Occupation	Pathway Cluster ID	Occupation	Pathway Cluster ID	Trip Time (Hours)
Helpers—Production Workers	3a	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	3b	370
		Truck Drivers, Heavy and Tractor-Trailer	6	370
First-Line Supervisors/ Managers of Production and Operating Workers	5	First-Line Supervisors/Managers of Farming, Fishing, and Forestry Workers	5	360
		Computer-Controlled Machine Tool Operators, Metal and Plastic	3a	310

Source: IDWD and IBRC

■ **TABLE 5: Sample Career Transitions from Automotive Occupations to In-Demand Non-Green Occupations with Above Average Wages**

Auto Sector Occupation		Destination Occupation		
Occupation	**Pathway Cluster ID**	**Occupation**	**Pathway Cluster ID**	**Trip Time (Hours)**
Team Assemblers	3c	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	3c	130
		Pipelayers	3b	170
		Coin, Vending, and Amusement Machine Servicers and Repairers	6	310
Helpers—Production Workers	3a	Excavating and Loading Machine and Dragline Operators	3b	200
		Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	3c	205
		Coin, Vending, and Amusement Machine Servicers and Repairers	6	330

Source: IDWD and IBRC

all the relevant postsecondary schools offering programs for that occupation within their selected geographic boundary.

Education and workforce development policymakers may also find these resources of use because the data present the relative concentration or scarcity of educational programs at a highly granular geographic level. For economic development practitioners who may be trying to cultivate the growth of firms or attract new investment, it may expose a region's training weak spots. If a region does not have a specially trained workforce, what educational programs are nearby to fill the gap?

These resources, tools and analysis are online and free of charge at www.drivingworkforcechange.org, helping today's displaced workers in the tri-state region find suitable employment, but also serving as a foundation for expanding the workforce development toolkit in the future. ■

Notes

1. The Driving Change study has been a collaborative effort of workforce development agencies of Indiana, Michigan and Ohio and their strategic partners. This project was supported by a grant from the Employment and Training Administration of the U.S. Department of Labor. The career pathway and trip-time research was conducted by the Indiana Business Research Center at Indiana University's Kelley School of Business and the Research and Analysis division of the Indiana Department of Workforce Development. All Driving Change research findings, reports and resources are available at: www.drivingworkforcechange.org.
2. The complete report on Indiana Green Jobs can be found at: www.drivingworkforcechange.org/greenjobs.asp.
3. The classification of green jobs relies upon the official slate of 202 green occupations from O'NET. Out of 1,110 occupations in the 2010 vintage of the standard occupational code, 202 are defined as green by O'NET. See Erich C. Dierdorff, Jennifer J. Norton, Donald W. Drewes, Christina M. Kroustalis, David Rivkin, and Phil Lewis, "Greening of the World of Work: Implications for O'NET-SOC and New and Emerging Occupations," February 2009, www.onetcenter.org/reports/Green.html.
4. For example, if HWOL reports an occupation in Indiana had 25 postings and the total number of workers in that occupation is 100, the postings-to-employment ratio is 1:4. Thus, the number of postings for marketing managers is a large proportion of all marketing managers working in the state in 2009. The authors acknowledge that a HWOL posting may reflect a true job opening, may be the result of a human resource department wanting to build their resume pool or otherwise not represent a true job opening. Thus, the posting-to-employment ratio is a relative measure of a job-seeker's competition.
5. The regional lists can be accessed at https://netsolutions.dwd.in.gov/hh50/RegionalDownloads.aspx.
6. This operating principle is similar to the TORQ system, which is a powerful tool that provides a compatibility score for comparing one occupation with another (http://www.torqworks.com/products). The TORQ system pulls in every detailed aspect that define the knowledge, skills and abilities (KSAs) of an occupation to determine whether two occupations are a good match. However, the pathway cluster approach uses all occupation description categories of O'NET (of which KSAs are a subset).