

Executive Summary

Before the Great Recession, the auto industry in Indiana, Michigan and Ohio was in the throes of restructuring—applying new technologies and production efficiencies, reducing costs, and modifying product lines to equal or beat global competitors—accompanied by an extended period of downsizing. Overlaying the recession on the restructuring compounded the challenges the industry was already facing.

This report is a reality check, accepting that the regional economy is at a fundamentally different place and cannot return from where it came. However, as the auto sector works toward its revival, there are workforce issues to be addressed, particularly in the context of the growing evolution and demands of a green economy.

At the outset of this study, there was limited understanding of the specific nature of the transformation in skills relevant to efficient and renewable vehicle technologies and other career opportunities in the green economy. To more effectively serve the large numbers of dislocated auto industry workers, Indiana, Michigan and Ohio formed the Driving Change consortium to address this subject and in doing so developed four overarching goals:

1. Chronicle the transformation from the old auto industry to a new, more efficient auto industry, especially focusing on the new skill and training requirements of the auto workforce.
2. Identify the effects of this structural transformation on the auto parts supply chain workforce.
3. Examine green job opportunities now and in the future as alternative career pathways for displaced workers.
4. Identify the skills gap and the required educational and technical training

needed for dislocated workers to transition into new occupations.

Technology Drives Change

The pace of vehicle technology change is accelerating, particularly in response to changes in consumer taste and expectations, higher safety standards, and the drive toward a low-carbon future embodied in more aggressive government fuel economy standards and more stringent greenhouse gas emissions rules. When considering changes in automotive technology that support the “greening” of automotive transportation, most people think first about advanced powertrains, materials and electronics.

These three technology sectors play a significant role in the transformation of the new auto industry:

- The most noteworthy change occurring in the powertrain and fuels sector of the industry is the re-emergence of the electric vehicle. The development of alternative forms of energy storage (primarily batteries) is rapidly progressing, but the internal combustion engine could remain the dominant technology for the next decade and beyond. As powertrain technologies advance, the locations of powertrain production and employment may shift. The tri-state region of Indiana, Michigan and Ohio represented 62.2 percent of total U.S. traditional engine production in 2010. It is possible that new vehicle propulsion systems will be produced outside the region and/or that advanced technologies may require fewer workers to produce the same number of propulsion systems. In either event, a large-scale displacement of traditional engine production by alternative technologies puts the tri-state region’s powertrain employment at risk.
- The need to make vehicles lighter for improved fuel economy is a major driver in the development of automotive materials and forming. Vehicle lightweighting focuses on

finding the optimal combination of materials to achieve the desired vehicle weight reduction. Currently, the adoption of new materials is impeded by risks of performance issues and the lack of reliable simulation models to predict potential problems. The ability to develop a regionalized supply base is also a major role in the adoption of new materials for vehicle lightweighting. The U.S. workforce's strength is in steel use, but less so in alternative materials. While there are only a few domestic metallurgy programs focused on lightweight materials, Europe and Asia have much more experience in this field.

- Electronics, software and controls in vehicles will continue to increase at a rapid rate. Today electronics account for about 25 percent of a vehicle's value. In the next five to 10 years, that figure will climb to 40 percent or more. Although the tri-state region is poised to benefit from the research and development, design, engineering, and systems integration side of the electronics used in vehicles, the area will face stiff competition from other automotive regions that are stronger in electronics manufacturing, particularly those in Europe and Asia.

Workforce Implications

Today's auto industry needs engineering and technical employees who consider the interactions among vehicle systems in order to optimize solutions more broadly. This need for systems thinking means that individuals who work in research, development and engineering must also possess the soft skills that enable cross-cultural communication, collaboration and teamwork. Production and skilled trades workers must adapt to an increasingly fast cadence of new product, process and technology introductions. These workers, too, require communication and teamwork skills that enable problem solving and continuous improvement in process and quality systems.

Fortunately, the tri-state region has the educational infrastructure to meet these challenges and prepare the workforce for the occupations and careers of the future. Out of nearly 900 accredited postsecondary

institutions in the region, more than one-third offer programs relevant to the engineering, design, production and maintenance of automobiles.

Investing in the Future

Despite the recession, financial constraints, market and regulatory uncertainty, automakers and suppliers are investing in the technologies discussed above to produce greener products and processes. Automaker announcements in 2010 and thus far in 2011 total \$4.3 billion in "green" investment in the tri-state region alone.

Auto production rebounded significantly in 2010 and many firms have seen profit margins return. Nonetheless, management appears to be concerned about the rebound's permanence and hesitates to expand hiring or production at the rate of previous economic recoveries. Management, it appears, continues to operate in a cost-cutting mode. Unfortunately, simple cost-cutting models of survival alone are not viable in the long run. Firms also need to build on their strengths and the strengths of the knowledge and skills of their workers.

This study concluded that the U.S. auto supply chain could prosper by adopting a "high-road" production approach in which firms, their employees and suppliers work together to optimize investment, labor, quality and technology development.

Adopting high-road policies requires that everyone in the value chain be willing and able to share knowledge. Production will also gravitate toward decentralization and greater reliance upon all workers. Our fieldwork found examples of firms that are thriving because they adopted an agile production model—a variety of products for a variety of industries delivered quickly. They use advanced equipment enhanced with cutting-edge information technology; but in addition to changing their product and operations strategies, they have also transformed their human resource policies.

Green Opportunities

Even if labor and management work together to advance the productivity of the value-chain,

many workers who have lost jobs due to industry restructuring or the Great Recession still need work, and many will never be hired back into the auto industry. Team assemblers and assemblers/fabricators were the two auto manufacturing occupations experiencing the largest job losses, accounting for more than 57,000 dislocated workers in the three states. More than 60 percent of these workers have only a high school education—a troubling statistic.

Where will these displaced workers find jobs in tomorrow's economy? How will they increase their training and skills in order to secure the jobs of the future? What are their alternatives? Is the green economy a viable alternative?

The project partners conducted surveys to benchmark the number of green jobs in each state and the industries they are concentrated in. While the percentage of jobs considered green differs among states, survey results show that green jobs span a wide range of industries and occupations from engineering jobs to production jobs.

The surveys found that green jobs were concentrated in manufacturing and construction, the industries most affected by the recent economic downturn. Demand for these jobs varied across the region, based on the industry mix and employers' perceptions of green.

Employers reported that most green jobs require only on-the-job training. Considering that a large number of green jobs are in production, this finding also supports the findings of the automaker interview and survey responses. Automakers also stated that green products and production techniques will have a more profound effect on engineering and technical staff requirements than on the production and trades worker skill sets.

The green engineering and technology occupations with the greatest demand now and projected for the future tend to require expanded skill sets and more education and training. This trend in “up-skilling” of occupational requirements is true of green jobs as well as most other in-demand occupations.

Alternative Career Pathways

Given restructuring in the auto industry, many displaced workers need help to find suitable alternative jobs. The two-step pathway cluster and skills gap analyses developed in this study offer valuable guidance to displaced workers charting pathways to new career opportunities.

The technique used to group occupations into pathway clusters is groundbreaking. Pathway clusters are organized based not upon industries or functions, but upon the similarities and differences of worker and job characteristics. Not only are occupations in a given pathway cluster considered similar to one another in terms of their knowledge and skill requirements; the pathway cluster analysis also measures the degree to which worker traits such as “highly social” or “attentive to detail” make occupations more or less similar. Job transitions within a given cluster, therefore, would be easier than moving from one cluster to another.

There are seven pathway clusters. Auto industry occupations are concentrated in the production, construction and engineering cluster, but there are dozens of green or high-wage, high-demand jobs in the same cluster that make good target occupations for each displaced worker. Except for the health, social and personal services cluster, green occupations are well distributed throughout the seven pathway clusters.

Knowing the alternative occupations that are most similar to one's current occupation—those in the same pathway cluster—is a good first step. A worker still needs to know the relative difficulty or ease in closing the skills gap between two occupations. The uniform measure, or common denominator, to gauge the difficulty or ease of making the transition from one occupation to another is the amount of time required to prepare for a new occupation.

The skills gap is the education, training or apprenticeship time required to transition from one occupation to another. The skills gap analysis then measures the time (“trip time”) required to change from one occupation to another based on the extent

of preparation required for the new job. While the trip time measure is not perfect, it is a great advance over many previous career pathway tools because it provides users an easily understandable measure of a worker's skills gap.

Finally, this study produced a tri-state training program database for green and growing occupations as a resource to complement the trip time results. After a displaced worker generates a set of suitable alternative occupations, he or she can match those occupations with postsecondary educational, technical and vocational programs in the region. The skills gap and training program databases, together with all the Driving Change analysis and research results, are available on the web free of charge at www.drivingworkforcechange.org.

Workforce Implications

Several practical responses emerged from this research:

- The need for ongoing access to capital for the supplier network is critical to the stabilization of this sector.

- Emerging green and cross-functional systems approaches to design, manufacturing, equipment maintenance and building construction will demand corresponding changes in the training of workers from the design center to the shop floor.
- Strategic training for managers that emphasizes long-term planning, worker training benefits and the need to integrate complex investments could improve acceptance of the associated investment costs.
- Current differences among definitions of green jobs and inconsistent use of occupational coding systems frustrate and complicate research efforts aimed at identifying and quantifying these jobs and identifying training opportunities.
- Many of the workers displaced from the auto sector who will need to transition to alternate occupations are starting with limited education (high school or less). These workers will be especially challenged in finding acceptable replacements for their old jobs and will need support throughout that process. 