

This report, prepared by The Institute for Public Policy and Economic Development, details the role of automation in Northeast Pennsylvania's economic evolution.

# Workforce Automation:

A Looming Threat or a Thrilling  
Opportunity?

The Impact of Innovative Technology on  
Tomorrow's Workforce, originally published  
in the May 2019 Joint Task Force Report on  
Economic Competitiveness



## The Institute

*Turning Information into Insight*

*A collaboration among Geisinger Commonwealth School of Medicine, Johnson College, Keystone College, King's College, Lackawanna College, Luzerne County Community College, Marywood University, Misericordia University, Penn State Scranton, Penn State Wilkes-Barre, The Wright Center for Graduate Medical Education, University of Scranton & Wilkes University*

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The Institute is a non-profit research organization dedicated to empowering business and community leaders with research based strategies for informed decision making. We conduct independent, non-biased research to identify the opportunities, issues and challenges unique to the region and find innovative solutions to help solve the problems facing our communities. The Institute also offers a wide array of research, consulting and support services to help organizations boost productivity, increase profitability and be successful in their missions.

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## Preface

In June 2019, the Education & Workforce Development (Ed/WFD) and Jobs, Economy, & Economic Development (JEED) Task Forces met to discuss the release of the Economic Competitiveness report presented at Indicators 2019 and to identify a research agenda for the 2019-2020 year.

It was determined at that time that this upcoming year's research should again be a joint effort because of the nature of the two task forces is extricably linked especially since there was a workforce shortage at the time that was predicted to last at least two decades.

Based on discussion, it was decided that there were several education and workforce related sections in the economic competitiveness report that should be elevated to their own research brief and that several areas were not addressed.

Therefore, the following sections of the report have been developed into stand-alone research briefs:

- Skills Shortages
- Labor Demand
- Industrial Automation
- Comparative Analysis of Job Opportunities and Higher Education Completions

The following new briefs were developed in the fall 2019 – winter 2020 time frame:

- Rethinking the Senior Worker
- Adapting to the Millennial Worker & Beyond
- Soft Skills & the Workforce
- Rethinking the Trades – Regional Opportunities

With the recent economic challenges of the current pandemic, some of this research reflects economic circumstances that have been upended, at least in the short-term. However, it should be noted that the data serves as a pre COVID-19 baseline in order for us to evaluate changes.

Further, as we move through recovery and reach February 2020 economic activity, the labor shortage may be center stage again. Therefore, the information outlined in these briefs is pertinent and gives employers an opportunity to plan for the future in a more informed and thoughtful way.

## Research Methodology

In drafting this report, The Institute for Public Policy and Economic Development consulted a wide variety of federal and state sources. The primary database was Chmura JobsEQ, a proprietary online platform that aggregates federal, state, and local employment, wages, and educational data down to the zip code level.

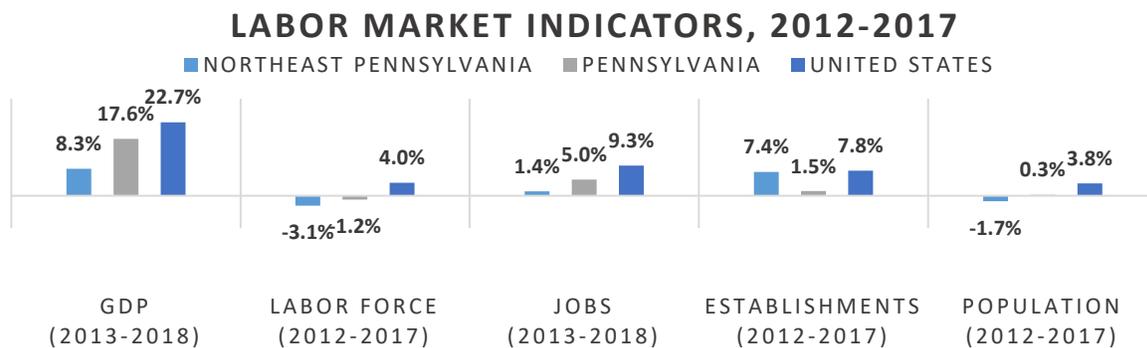
Supplementary data was provided from a range of federal datasets from the United States Census Bureau. Population and workforce data was extracted from the American Community Survey. Data from projected job losses in the coal mining industries, were provided from internal data compiled and analyzed by The Institute.

Finally, for the purposes of this report, the region defined as Northeastern Pennsylvania consists of 11 counties – Bradford, Carbon, Columbia, Lackawanna, Luzerne, Monroe, Pike, Schuylkill, Susquehanna, Wayne, and Wyoming. This region has a combined population of 1.2 million and is home to approximately 560,000 employed workers and a labor force of 589,000 individuals. Data for Northeastern Pennsylvania that is not specifically presented on a county-by-county level may be assumed to be reported on an aggregate level for all 11 counties comprising the area’s geographic scope.

## Executive Summary

Home to nearly 560,000 jobs and 29,000 businesses, the economy of Northeastern Pennsylvania is one of the largest in the Commonwealth, both in size and impact. This economy sits at an important crossroads, however – at the intersection of multiple economic, social, and demographic trends that are accelerating rapidly. While Pennsylvania and the rest of the nation has seen a modest uptick in population, Northeastern Pennsylvania’s contracted by two percent. While other regions’ labor forces are growing or shrinking modestly, this region’s labor force shrank by nearly three percent between 2012 and 2017. Consequently, the region also lags behind the rest of the state and the rest of the nation in other important labor market metrics, including GDP and job creation.

Beyond these demographic troubles, Northeastern Pennsylvania stands at an important economic inflection point, as evidenced by the region’s loss of 39,000 jobs, \$1.5 billion in wages, and \$6.2 billion in economic output from decades of decline in the area’s heavy industrial base of coal mining and manufacturing. In addition to these historical losses, production-oriented industries like these face further threats in the form of automation, as nearly half of regional workers currently employed in these industries face at least a 70 percent risk of having some portion of their positions automated in the coming decades.



### *Economic Impact of Heavy Industry Decline (Net Change) 2001-2018*

| County       | <i>Employment Impact</i> |                          |                          |
|--------------|--------------------------|--------------------------|--------------------------|
|              | Employment               | Labor Income             | Economic Output          |
| Bradford     | -3,895                   | (\$113,890,868)          | (\$586,314,788)          |
| Carbon       | -1,544                   | (\$58,317,293)           | (\$238,565,631)          |
| Columbia     | -2,997                   | (\$40,457,089)           | (\$354,025,765)          |
| Lackawanna   | -10,293                  | (\$470,731,969)          | (\$1,487,845,862)        |
| Luzerne      | -11,700                  | (\$506,010,645)          | (\$1,870,192,790)        |
| Monroe       | -635                     | (\$24,548,649)           | (\$141,568,452)          |
| Pike         | -516                     | (\$28,410,938)           | (\$197,661,960)          |
| Schuylkill   | -2,244                   | (\$112,712,866)          | (\$304,442,361)          |
| Susquehanna  | -844                     | (\$30,778,861)           | (\$136,906,505)          |
| Wayne        | -581                     | (\$23,584,489)           | (\$120,559,543)          |
| Wyoming      | -2,046                   | (\$45,602,945)           | (\$779,797,459)          |
| <b>TOTAL</b> | <b>-39,094</b>           | <b>(\$1,455,046,612)</b> | <b>(\$6,217,881,116)</b> |

The findings of this report make clear that a roadmap is essential for Northeastern Pennsylvania’s economic recovery, which would provide new opportunities for a region struggling to overcome multiple demographic and economic challenges and build a dynamic and accessible labor market for all.

## Workforce Automation and the Future

Workplace automation is fundamentally changing the nature of work, bringing with it both the threat of displacement from job losses, as well as the promise of opportunity through increased productivity and job creation. To harness automation’s opportunities, community stakeholders must better understand the potential for workforce disruption that accompanies these developments. It is also critical to look at workforce disruption not only regionally, but also across Pennsylvania and 15 other states.

Northeastern Pennsylvania’s workforce faces challenges other than the collapse of anchor industries and demographic challenges. Over the coming decades, a rising tide of technological innovations in the workplace risks displacing workers across the United States through automation. In support of its forthcoming analysis on workforce disruption through automation in Northeastern Pennsylvania, The Institute analyzed regional occupations that are deemed to have a 70 percent or greater chance of being automated in at least some capacity during the coming decades.<sup>1</sup>

Following previous studies from researchers in Tennessee and North Carolina, this report is built off the foundational study from 2013, which found 320 occupations that have a 70 percent or higher risk of having some job responsibilities automated in the next decade or two. These 320 automation-sensitive occupations employ nearly 242,000 workers in Northeastern Pennsylvania – nearly 49 percent of the region’s total workforce.

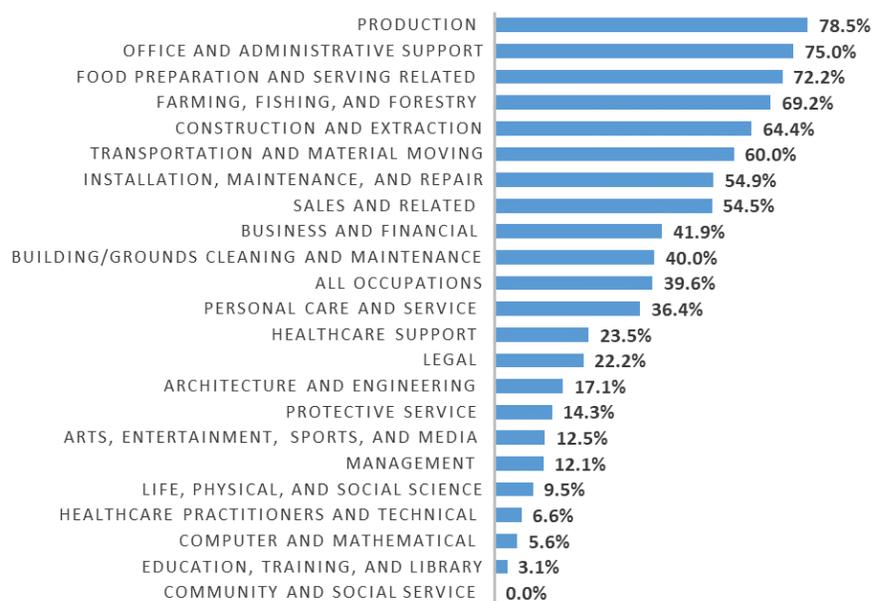
Counties with above-average representation of these jobs include Schuylkill and Luzerne, while both Wayne and Pike have underrepresented proportions in their respective workforces. Moreover, vulnerable occupations are found in a wide range of occupational categories throughout the region, representing over 50 percent of jobs in: (1) Production; (2) Office and Administrative Support; (3) Food Preparation and Serving; (4) Farming, Fishing, and Forestry; (5) Construction and Extraction; and (6) Transportation and Material Moving. Occupational categories left relatively unaffected include: (1) Life, Physical, and Social Science; (2) Healthcare Practitioners and Technical; (3) Computer and Mathematical; (4) Education, Training, and Library; and (5) Community and Social Services, the last of which is completely unaffected by automation.

### AUTOMATION-SENSITIVE JOBS AS A PERCENTAGE OF ENTIRE WORKFORCE

|                           |        |
|---------------------------|--------|
| SCHUYLKILL COUNTY, PA     | 50.65% |
| INDIANA                   | 50.45% |
| WISCONSIN                 | 49.94% |
| LUZERNE COUNTY, PA        | 49.93% |
| COLUMBIA COUNTY, PA       | 49.74% |
| WYOMING COUNTY, PA        | 49.34% |
| NORTHEASTERN PENNSYLVANIA | 49.24% |
| SUSQUEHANNA COUNTY, PA    | 48.97% |
| LACKAWANNA COUNTY, PA     | 48.86% |
| MONROE COUNTY, PA         | 48.61% |
| BRADFORD COUNTY, PA       | 48.52% |
| CARBON COUNTY, PA         | 48.24% |
| OHIO                      | 47.56% |
| MICHIGAN                  | 47.42% |
| WAYNE COUNTY, PA          | 47.29% |
| PENNSYLVANIA              | 46.22% |
| PIKE COUNTY, PA           | 46.16% |
| DELAWARE                  | 45.70% |
| NEW JERSEY                | 43.92% |
| NEW YORK                  | 42.30% |
| MARYLAND                  | 41.08% |

<sup>1</sup> For more information concerning the methodology of occupations with a high probability of automation, see Frey & Osborne’s 2013 study, “The Future of Employment,” at [https://www.oxfordmartin.ox.ac.uk/downloads/academic/The\\_Future\\_of\\_Employment.pdf](https://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf)

## HIGH-RISK AUTOMATION OCCUPATIONS BY CATEGORY

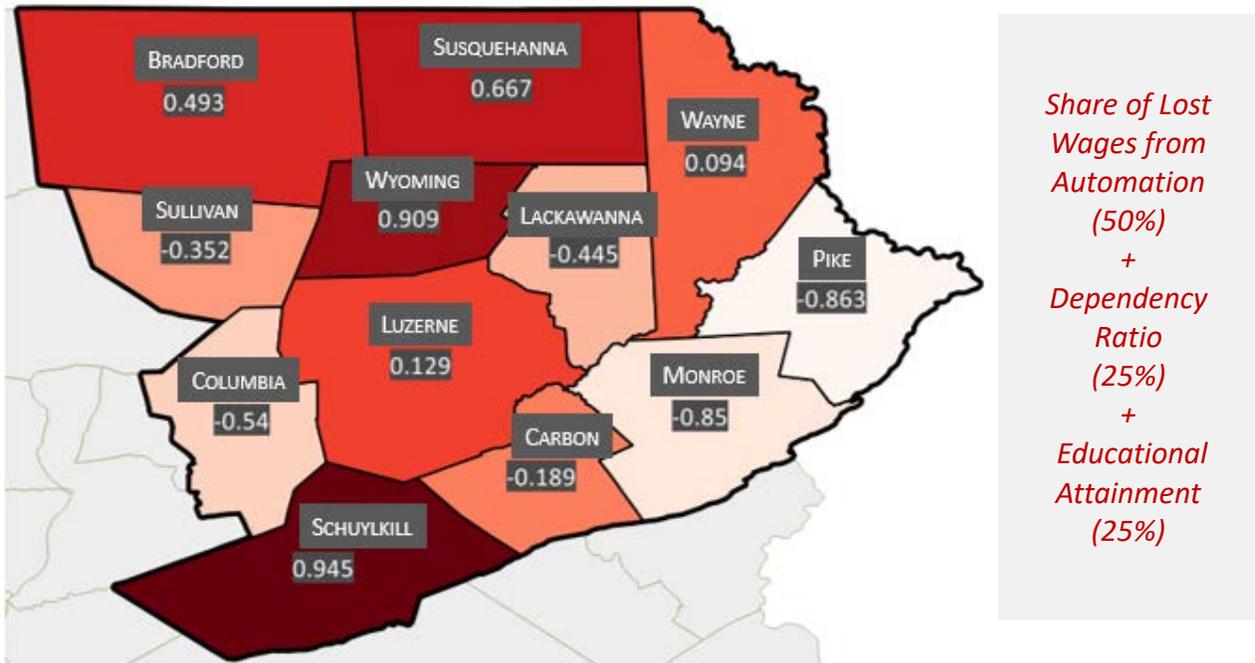


Source: Chmura JobsEQ®

It is *extremely important* to note that this report does not quantify the number of jobs that will actually be automated. It does not suggest that this region will someday have a 49 percent unemployment rate. Jobs involve a combination of varying tasks, and the 49 percent of regional workers in this category may end up staying in their current positions, but given other responsibilities.

The centerpiece of the report is a regional index of forecasted vulnerability to workforce disruption, composed of three indicators. The primary indicator is the potential maximum share of lost wages resulting from workforce automation, at 50 percent of the score. Dependency ratios were weighed next, which helped identify regions with a lack of sufficient working age labor, as regions without it may experience automation at a faster pace. The final 25 percent is attributed to educational attainment, which can help mitigate disruptive changes from automation.

Creating this index allows researchers to understand more about the jobs likely to be affected by automation. Occupations vulnerable to automation tend to pay anywhere from 18 to 27 percent less than average wages, and are considered repetitive or routine in nature – such as Food Services, Production, and Transportation. Less vulnerable occupations tend to reward critical thinking, advanced skills, and substantial personal interaction – like Computers, Education, Social Services, and Management.



*\*Counties with a lower score (and lighter color) are deemed less at-risk of workforce disruption from automation, while counties with a higher score (and darker color) are considered more vulnerable.*

More importantly, this index identifies potential vulnerabilities and strengths geographically. Among the least vulnerable counties are Monroe and Pike, which are strong commuter counties to various metro areas in New York and New Jersey. Counties where universities are major employers, like Bloomsburg in Columbia County, also tend to be less vulnerable, as these counties have younger and more educated workers. That is why, in the state-level analysis, State College was Pennsylvania’s least vulnerable area. Also, urban areas like Philadelphia and Harrisburg are less vulnerable due to a higher proportion of younger, educated workers.

Darker-colored counties on this map are more vulnerable to workforce disruption. These counties tend to be more rural in nature, face major demographic challenges, and have lower proportions of younger and better-educated individuals. Urban counties that still have large proportions of workers employed in heavy industry can also be very vulnerable to disruption (like Schuylkill County, which is actually considered the most vulnerable county in Northeastern Pennsylvania for purposes of this report).

Finally, applying this index to 16 different states put Pennsylvania’s challenges in context. Geographically, Pennsylvania is situated at the intersection of two regions – the post-industrial Mid-Atlantic Region with New York and New Jersey, and the deindustrialized Rust Belt with Ohio, Indiana, and West Virginia. Pennsylvania’s unique position is not just geographic – it is economic. Among Mid-Atlantic states, Pennsylvania is most vulnerable to workforce disruption, but it is least vulnerable among Rust Belt states. This highlights the economic diversity within the Commonwealth, and requires that stakeholders fully understand these workforce forecasts in order to harness the opportunities of automation, while preparing for any disruption.

## Synthesis

As a region, Northeastern Pennsylvania possesses many natural assets necessary to build a competitive, dynamic, and diversified economy. Despite these important regional assets, however, the region also stands at an important economic inflection point. The generally production-oriented base of the region's workforce might become vulnerable to the threat of automation, for example, as nearly half of all workers in Northeastern Pennsylvania currently work in occupations that face 70-percent or greater risk of automation in some capacity over the coming decades. Sufficient preparation for such disruption and the ability to harness opportunities offered by automation will bring new hope for a region struggling to grow in a more innovative, economically competitive, and efficient 21<sup>st</sup> century labor market.

## Conclusion

All of the aforementioned challenges and opportunities are deeply intertwined, and cannot be fixed by one employer, organization, or public agency alone. Addressing these multi-faceted concerns requires the involvement of every committed stakeholder in the region, including employers, universities, community colleges, career and technology centers, workforce development boards, economic development organizations, and policymakers. The successful resolution of these challenges, however, can help every participant involved. Regional workers can build lucrative, rewarding, challenging careers with upward mobility in an area with a low cost of living. Employers can select from a wide range of talented prospective employees equipped with the skills to start work on day one. Community partners benefit from the economic enrichment of a community with fewer out-of-region commuters and out-migrants. When all relevant stakeholders collaborate toward this aim, the result is an environment that enables every participant to succeed.