# Closing the Skills Gap for Coal Mine Workers

#### **Voinovich School of Leadership and Public Affairs**

#### June 28, 2018



## **Webinar Overview**

- Project Overview and Project Team
- Recap of Webinar #1
- •Trends in Ohio coal generation and employment
- Workforce analysis of coal mine workers
- careeronestop
- •Final Observations
- •Q&A



### **Project Overview**

 Ohio University's Voinovich School is assessing the skills of displaced coal economy workers and matching those skills to emerging occupations in the Appalachian region

#### Supported by generous investment from U.S. EDA



## **Project Team**



G. Jason Jolley, Ph.D. Associate Professor of Rural Economic Development



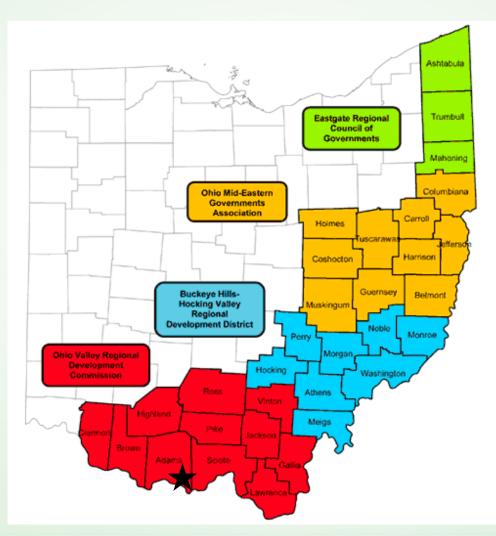
Gilbert Michaud, Ph.D. Assistant Professor of Practice



Christelle Khalaf, Ph.D. Economic Development Specialist



#### **Project Scope**



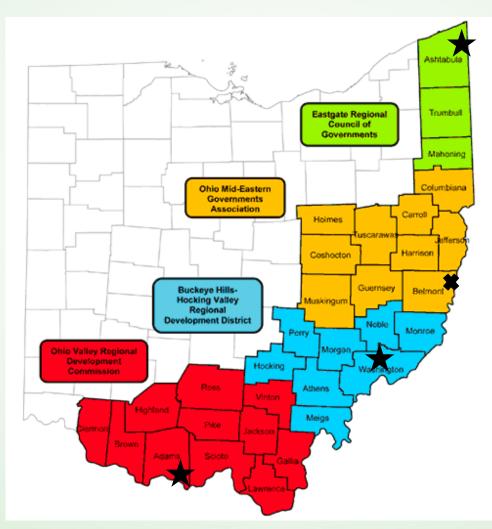


# **Key Findings from Webinar #1**

- •For every DP&L job lost, another 2 jobs will be lost in regional economy
- Tax base loss will have detrimental impact on local government budgets, especially the local school system
  - —Even if Adams County can replace these jobs, it will be extremely difficult to replace the tax base
  - -State and/or Federal government assistance will be required
- Transition to new employment opportunities will require retraining
- Most emerging occupations pay less than the lost DP&L jobs

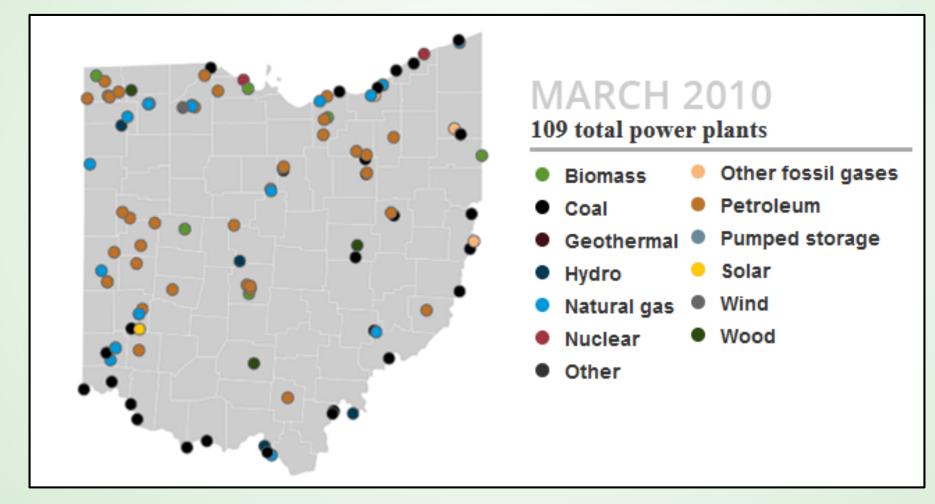


#### **Project Scope**





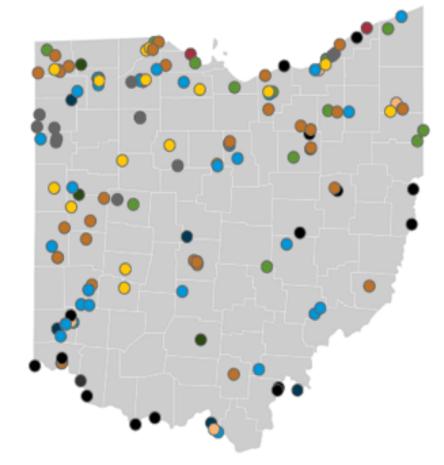
#### **Ohio Energy Generation, 2010**



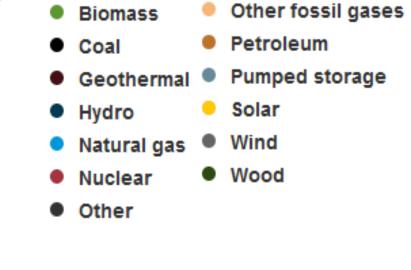
Source: E&E News. (2017). Ohio's economy: A test case for Trump's climate decision. Retrieved from https://www.eenews.net/stories/1060055447



#### **Ohio Energy Generation, 2017**



#### MARCH 2017 146 total power plants



Source: E&E News. (2017). Ohio's economy: A test case for Trump's climate decision. Retrieved from https://www.eenews.net/stories/1060055447



# **Ohio Electricity Generation Capacity, 2015**

Solar Wind •Coal = 15,260 MW 1.6% 0.4% Other 8.4% •Oil & Gas = 10,575 MW •Wind = 455 MW •Solar = 120 MW Coal •Other (nuclear, biomass, 52.9% Oil & Gas & hydro) = 2,413 MW 36.7% Total Electric Source: Developed by author from the United States Energy Generating Capacity: Information Administration (2016). Electric power industry capability by 28,821 MW primary energy source, 1990 through 2015. Retrieved from

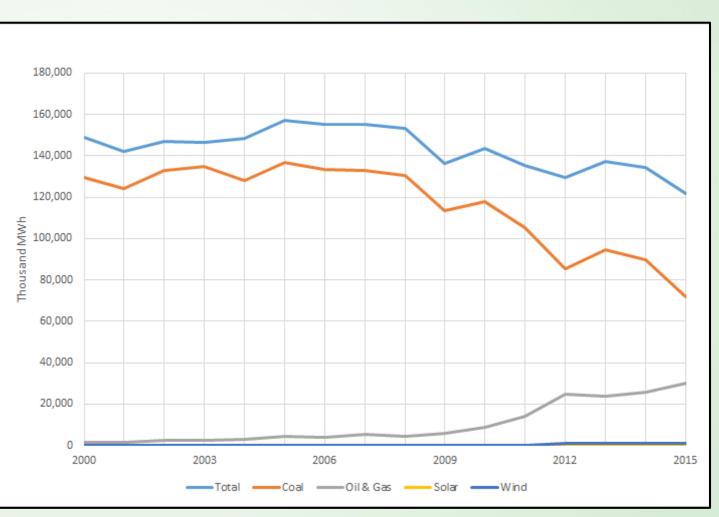
http://www.eia.gov/electricity/state/Ohio/state\_tables.cfm

## **Ohio Annual Electricity Generation, 2000-2015**

Source	Generation (MWh)	Growth Rate 2010-2015
Coal	71,709,530	-9.5%
Oil & Gas	30,295,764	+27.9%
Wind	1,203,008	+34.3%
Solar	56,072	+148.9%
Nuclear	17,376,736	+1.9%
Biomass	472,855	+11.4%
Hydro	456,669	+1.3%

Source: Developed by author from the United States Energy Information Administration (2016). *Electric power industry generation by primary energy source, 1990 through 2015 [Data file].* Retrieved from http://www.eia.gov/electricity/state/Ohio/state\_tables.cfm





# **Ohio Energy Industry Employment Trends**

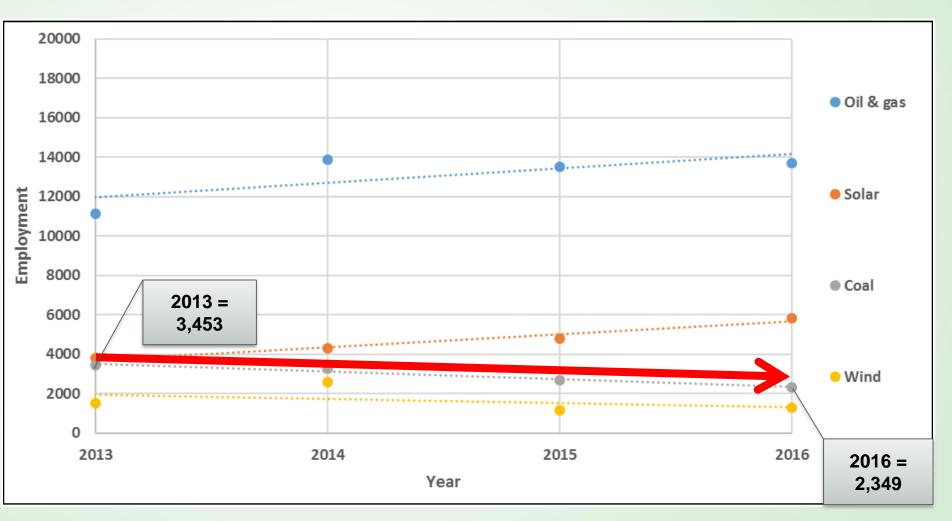
•Energy Efficiency = 78,764 (2016)

Source:

https://www.energy.gov/sites/prod/files/20 17/01/f34/us-energy-jobs-states-2017.pdf

*Source:* Developed by author from the Bureau of Labor Statistics. (2016). *Quarterly census of employment and wages, NAICS 6-digit industries, one area.* Retrieved from

https://data.bls.gov/cew/apps/data\_views /data\_views.htm#tab=Tables. Solar data from TSF; Wind data from GEO, CJO, & CJM reports.



#### **Workforce Impacts**

Mining occupations

Skill identification

Mapping to emerging occupations

#### Using careeronestop "compare occupations" tool



# **Mining Occupations**

Occupation	% Occupation	Employment Projections 2014-2024	Median Hourly wage	Education
Roof bolters, mining	88.7%	-9.09%	\$26.42+	High school diploma / eq.
Continuous mining machine operators	26.7%	-3.85%	\$20.05	No formal ed. credential
Excavating and loading machine and dragline operators	5.9%	0.00%	\$19.43	High school diploma / eq.
Mobile heavy equipment mechanics, except engines	2.0%	3.88%	\$22.83	High school diploma / eq.
Heavy and tractor-trailer truck drivers	0.1%	4.83%	\$19.65	Postsecondary non- degree award
Mine cutting and channeling machine operators	26.8%	-2.63%	\$20.17	High school diploma / eq.
Helpersextraction workers	8.4%	-6.02%	\$19.52	High school diploma / eq.
Mine shuttle car operators	86.9%	-22%+	\$27.35+	High school diploma / eq.
Loading machine operators, underground mining	47.2%	-6.67%	\$25.15+	No formal ed. credential
Maintenance and repair workers, general	0.1%	4.65%	\$18.04	High school diploma / eq.



# **O\*NET** Data

- Create Occupational Transition maps using 110 variables describing 3 types of skills and the corresponding job zone
  - •Knowledge: Obtained through formal education (e.g., biology)
  - •Work activities: Job experience (e.g., assisting and caring for others)
  - •Capacities: Basic and cross-functional skills (e.g., social perceptiveness)
  - Job zone: Grouping of occupations based on required education, experience, and on the job training
- •Each skill (i.e., knowledge, work activities, and capacities) is associated with a value that represents the level of the skill needed in an occupation (0-7)



## **Top Skills for Roof Bolters**

Skill type	Skill	Level	Explanation
Work activities	Monitor Processes, Materials, or Surroundings	5.5	Minimum of 2-4 years training or experience
Work activities	Controlling Machines and Processes	5.4	Minimum of 2-4 years training or experience
Work activities	Handling and Moving Objects	5.3	Minimum of 2-4 years training or experience
Work activities	Repairing and Maintaining Mechanical Equipment	5.2	Minimum of 2-4 years training or experience
Work activities	Operating Vehicles, Mechanized Devices, or Equipment	4.9	At least 1 year of training or experience
Work activities	Communicating with Supervisors, Peers, or Subordinates	4.9	At least 1 year of training or experience
Work activities	Performing General Physical Activities	4.9	At least 1 year of training or experience
Work activities	Training and Teaching Others	4.8	At least 1 year of training or experience
Work activities	Identifying Objects, Actions, and Events	4.7	At least 1 year of training or experience
Work activities	Making Decisions and Solving Problems	4.7	At least 1 year of training or experience
	Job Zone	2	Requires HS Some experience On the job training (few months to a year)



## **Occupation Level Comparison**

Skill Type	Skill	Roof Bolters Level	Registered Nurses Level	Gap
	Top 5 skills for roof bolters			
Work activities	Monitor Processes, Materials, or Surroundings	5.5	5.6	0.1
Work activities	Controlling Machines and Processes	5.4	2.7	-2.7
Work activities	Handling and Moving Objects	5.3	3.8	-1.5
Work activities	Repairing and Maintaining Mechanical Equipment	5.2	0.9	-4.3
Work activities	Operating Vehicles, Mechanized Devices, or Equipment	4.9	1.2	-3.7
	Top 5 skills for registered nurses			
Work activities	Assisting and Caring for Others	3.4	6.1	2.7
Knowledge	Psychology	1.0	5.9	4.9
Work activities	Monitor Processes, Materials, or Surroundings	5.5	5.6	0.1
Work activities	Updating and Using Relevant Knowledge	4.3	5.6	1.3
Work activities	Identifying Objects, Actions, and Events	4.7	5.4	0.7
	Job zone	2	3	1



#### **Regional Economic Drivers**

APEG	OMEGA
Polymers & Plastics	Agriculture
Energy Production	Mining
Food	Manufacturing
Transportation & Aerospace	
Forestry & Wood Products	
Metals	
Logistics	
Consumer Products	



#### Mine Occupations into Top Growing Occupations

		Continuous mining machine operators	Mine cutting and channeling machine operators	Roof bolters, mining	Helpersextraction workers	Mobile heavy equipment mechanics, except engines	Maintenance and repair workers, general	Heavy and tractor-trailer truck drivers	Excavating and loading machine and dragline operators	Loading machine operators, underground mining	Mine shuttle car operators
		\$20.05	\$20.17	\$26.42	\$19.52	\$22.83	\$18.04	\$19.65	\$19.43	\$25.15	\$27.35
Construction laborers	\$17.66	-\$2.39	-\$2.51	-\$8.76	-\$1.86	-\$5.17	-\$0.38	-\$1.99	-\$1.77	-\$7.49	-\$9.69
Industrial machinery mechanics	\$22.61	\$2.56	\$2.44	-\$3.81	\$3.09	-\$0.22	\$4.57	\$2.96	\$3.18	-\$2.54	-\$4.74
Computer-controlled machine tool operators, metal and plastic	\$17.71	-\$2.34	-\$2.46	-\$8.71	-\$1.81	-\$5.12	-\$0.33	-\$1.94	-\$1.72	-\$7.44	-\$9.64
Software developers, applications	\$40.83	\$20.78	\$20.66	\$14.41	\$21.31	\$18.00	\$22.79	\$21.18	\$21.40	\$15.68	\$13.48
Heating, air conditioning, and refrigeration mechanics and installers	\$21.23	\$1.18	\$1.06	-\$5.19	\$1.71	-\$1.60	\$3.19	\$1.58	\$1.80	-\$3.92	-\$6.12
Computer user support specialists	\$20.65	\$0.60	\$0.48	-\$5.77	\$1.13	-\$2.18	\$2.61	\$1.00	\$1.22	-\$4.50	-\$6.70



#### **Mine Occupations into Engineering and Technology**

\$28.71

\$28.96

\$40.86

\$35.10

\$36.63

Continuous mining machine operators	Mine cutting and channeling machine operators	Roof bolters, mining	Helpersextraction workers	Mobile heavy equipment mechanics, except engines	Maintenance and repair workers, general	Heavy and tractor-trailer truck drivers	Excavating and loading machine and dragline operators	Loading machine operators, underground mining	Mine shuttle car operators
\$20.05	\$20.17	\$26.42	\$19.52	\$22.83	\$18.04	\$19.65	\$19.43	\$25.15	\$27.35
\$8.66	\$8.54	\$2.29	\$9.19	\$5.88	\$10.67	\$9.06	\$9.28	\$3.56	\$1.36
\$8.91	\$8.79	\$2.54	\$9.44	\$6.13	\$10.92	\$9.31	\$9.53	\$3.81	\$1.61
\$20.81	\$20.69	\$14.44	\$21.34	\$18.03	\$22.82	\$21.21	\$21.43	\$15.71	\$13.51
\$15.05	\$14.93	\$8.68	\$15.58	\$12.27	\$17.06	\$15.45	\$15.67	\$9.95	\$7.75
\$16.58	\$16.46	\$10.21	\$17.11	\$13.80	\$18.59	\$16.98	\$17.20	\$11.48	\$9.28

First-line supervisors of construction trades and extraction workers First-line supervisors of mechanics, installers, and repairers
Construction managers
Mechanical engineers

Civil engineers



#### **Mine Occupations into Mechanical**

		Continuous mining machine operators	Mine cutting and channeling machine operators	Roof bolters, mining	Helpersextraction workers	Mobile heavy equipment mechanics, except engines	Maintenance and repair workers general	Heavy and tractor-trailer truck drivers	Excavating and loading machine and dragline operators	Loading machine operators, underground mining	Mine shuttle car operators
		\$20.05	\$20.17	\$26.42	\$19.52	\$22.83	\$18.04	\$19.65	\$19.43	\$25.15	\$27.35
Carpenters	\$21.05	\$1.00	\$0.88	-\$5.37	\$1.53	-\$1.78	\$3.01	\$1.40	\$1.62	-\$4.10	-\$6.30
Electricians	\$23.88	\$3.83	\$3.71	-\$2.54	\$4.36	\$1.05	\$5.84	\$4.23	\$4.45	-\$1.27	-\$3.47
Plumbers, pipefitters, and steamfitters	\$24.90	\$4.85	\$4.73	-\$1.52	\$5.38	\$2.07	\$6.86	\$5.25	\$5.47	-\$0.25	-\$2.45
Bus and truck mechanics and diesel engine specialists	\$21.12	\$1.07	\$0.95	-\$5.30	\$1.60	-\$1.71	\$3.08	\$1.47	\$1.69	-\$4.03	-\$6.23
Packaging and filling machine operators and tenders	\$14.38	-\$5.67	-\$5.79	-\$12.04	-\$5.14	-\$8.45	-\$3.66	-\$5.27	-\$5.05	-\$10.77	-\$12.97



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## **Relatively Easy Transition**

Type of skill	Skills	Roof bolters	Electricians	Gap
Knowledge	Building and Construction	1.6	5.5	3.8
Work activities	Performing for or Working Directly with the Public	0.2	3.7	3.5
Knowledge	Mathematics	1.7	4.3	2.6
Capacities	Installation	1.5	3.6	2.1
Knowledge	Physics	1.6	3.6	2.0
Knowledge	Telecommunications	1.1	3.0	1.9
Knowledge	Design	2.3	4.0	1.8
Knowledge	Customer and Personal Service	2.1	3.8	1.7
	Job Zone	2	3	1
	Median hourly wage	\$26.42	\$23.88	-\$2.54

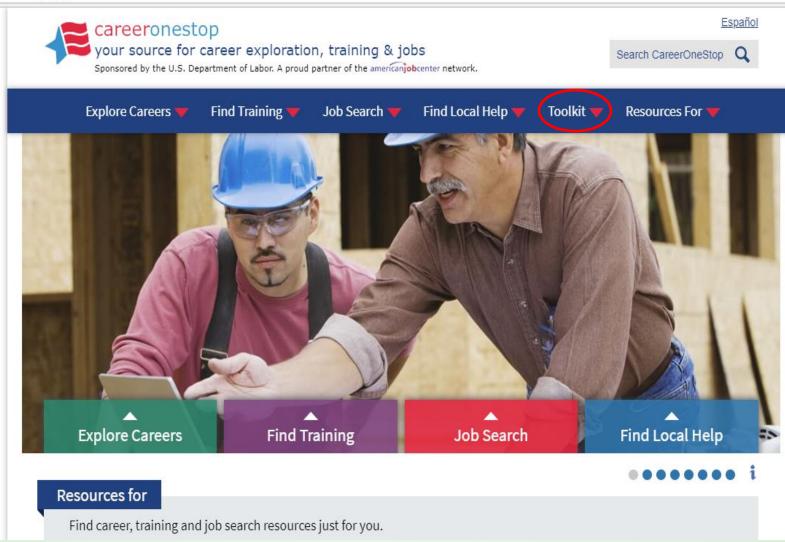


#### **More Challenging Transition**

Type of skill	Skills	Roof bolters	Software developers	Gap
Work activities	Interacting With Computers	0.9	5.8	4.9
Knowledge	Computers and Electronics	2.0	6.8	4.8
Capacities	Programming	0.0	4.8	4.8
Capacities	Operations Analysis	0.3	3.8	3.5
Capacities	Technology Design	0.1	3.6	3.5
Knowledge	Mathematics	1.7	5.0	3.3
Work activities	Thinking Creatively	2.2	5.2	3.0
Knowledge	Engineering and Technology	2.5	5.2	2.7
Work activities	Establishing and Maintaining Interpersonal Relationships	1.9	4.4	2.5
Work activities	Analyzing Data or Information	2.5	4.9	2.5
Work activities	Staffing Organizational Units	0.6	3.0	2.4
Capacities	Systems Evaluation	2.1	4.5	2.4
Capacities	Science	0.8	3.0	2.3
Capacities	Systems Analysis	2.0	4.3	2.3
Knowledge	Telecommunications	1.1	3.3	2.2
	Job Zone	2	4	2
	Median hourly wage	\$26.42	\$40.83	\$14.41



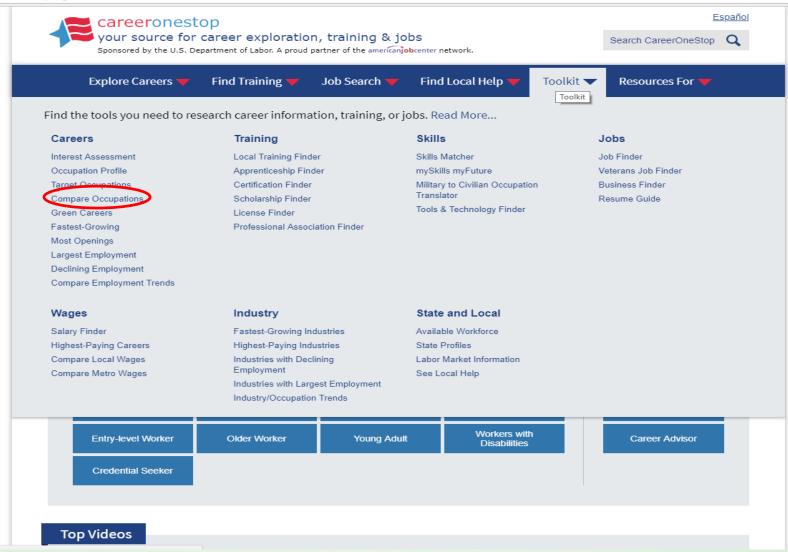
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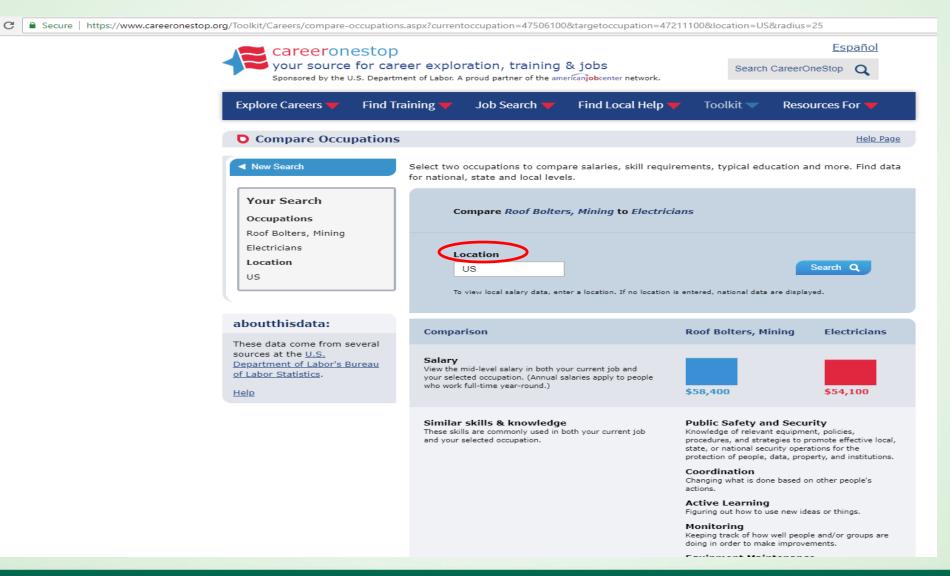
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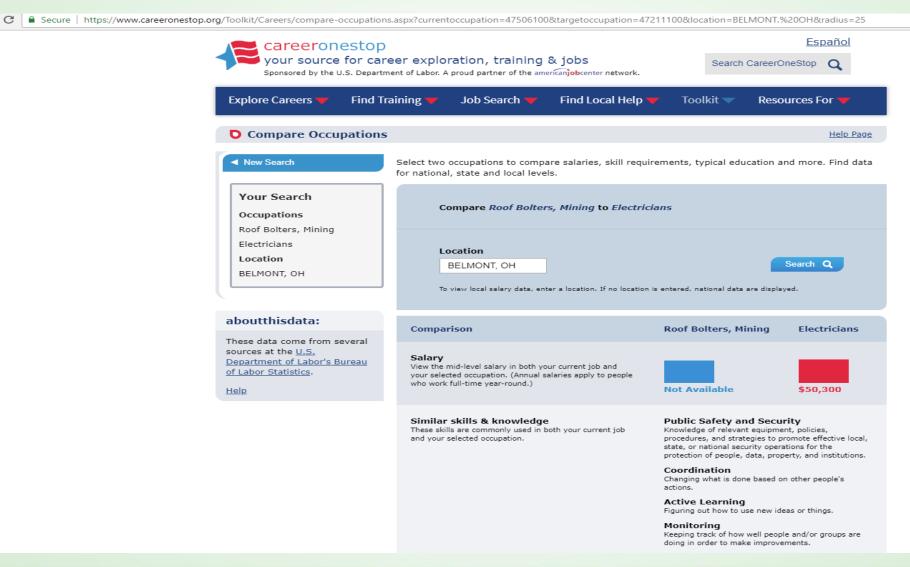


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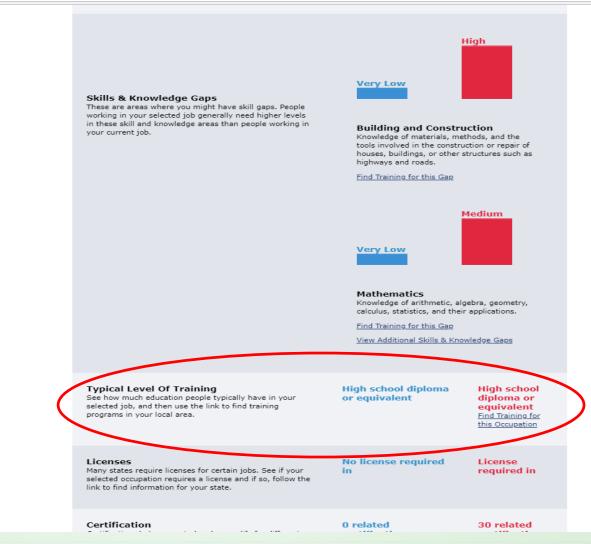


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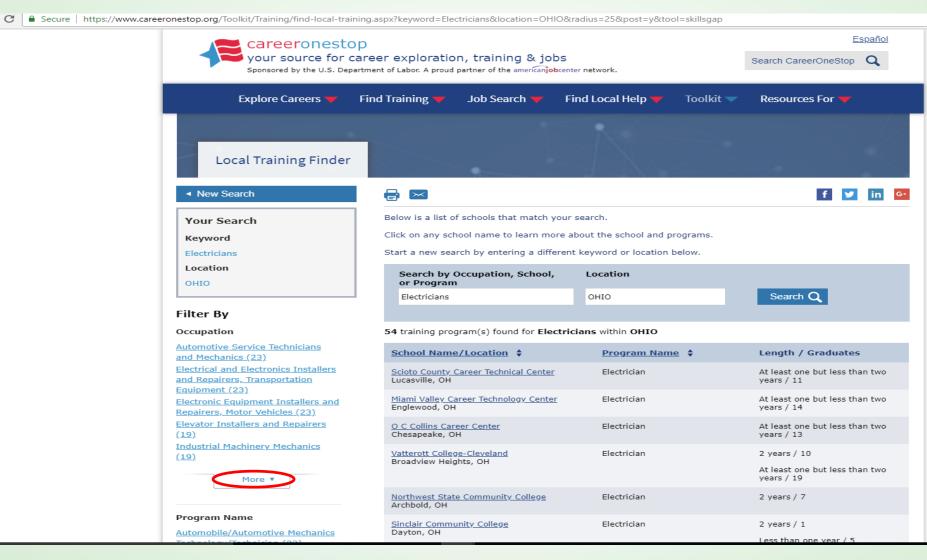
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Occupation	54 training program(s) found for Electrici	ans within OHIO	
Automotive Service Technicians and Mechanics (23)	School Name/Location \$	Program Name	Length / Graduates
Electrical and Electronics Installers and Repairers, Transportation Equipment (23)	Scioto County Career Technical Center Lucasville, OH	Electrician	At least one but less than two years / 11
Electronic Equipment Installers and Repairers, Motor Vehicles (23)	Miami Valley Career Technology Center Englewood, OH	Electrician	At least one but less than two years / 14
Elevator Installers and Repairers (19)	O C Collins Career Center Chesapeake, OH	Electrician	At least one but less than two years / 13
Industrial Machinery Mechanics (19)	Vatterott College-Cleveland	Electrician	2 years / 10
Maintenance Workers, Machinery (19)	Broadview Heights, OH		At least one but less than two years / 19
<u>Millwrights (19)</u> <u>Refractory Materials Repairers,</u> Except Brickmasons (19)	Northwest State Community College Archbold, OH	Electrician	2 years / 7
Wind Turbine Service Technicians	Sinclair Community College	Electrician	2 years / 1
(19) Electricians (11)	Dayton, OH		Less than one year / 5
First Line Supervisors of Construction Trades and Extraction	<u>Brightwood College-Dayton</u> Dayton, OH	Electrician	At least one but less than two years / 12
<u>Workers (11)</u> <u>Security and Fire Alarm Systems</u> Installers (11)	<u>Madison Adult Career Center</u> Mansfield, OH	Electrician	Less than one year / 4
Signal and Track Switch Repairers (11)	Mid-EastCTC-Adult Education Zanesville, OH	Electrician	Less than one year / 7
Electronic Home Entertainment Equipment Installers and Repairers (1)	Pickaway Ross Joint Vocational School Distri Chillicothe, OH	<u>ct</u> Electrician	At least one but less than two years / 4
Radio Operators (1) Radio, Cellular, and Tower Equipment Installers and Repairers (1)	10 ▼ Per Page Download ▼		1 2 3 4 6 >
<u>Telecommunications Equipment</u> <u>Installers and Repairers, Except</u>			



34

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Less than one year (3)	Miami Valley Career Technology Center Englewood, OH	Electrician	At least one but less than two years / 14
	O C Collins Career Center Chesapeake, OH	Electrician	At least one but less than two years / 13
About this data	Vatterott College-Cleveland	Electrician	2 years / 10
Information in this tool comes from the <u>U.S. Department of</u> <u>Education's Integrated</u> <u>Postsecondary Education Data</u> <u>System (IPEDS)</u> .	Broadview Heights, OH		At least one but less than two years / 19
	Northwest State Community College Archbold, OH	Electrician	2 years / 7
Help	Sinclair Community College	Electrician	2 years / 1
	Dayton, OH		Less than one year / 5
	<u>Brightwood College-Dayton</u> Dayton, OH	Electrician	At least one but less than two years / 12
	Madison Adult Career Center Mansfield, OH	Electrician	Less than one year / 4
	Mid-EastCTC-Adult Education Zanesville, OH	Electrician	Less than one year / 7
	<u>Pickaway Ross Joint Vocational School Dis</u> Chillicothe, OH	strict Electrician	At least one but less than two years / 4
	EHOVE Career Center Milan, OH	Electrician	At least one but less than two years / 22
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## **Final Observations**

- Transition to new employment opportunities will require retraining
- Challenges
  - Relatively easy transitions associated with a decrease in median hourly wage
    Challenging transitions are not feasible for a majority of displaced workers
  - •Transportation costs associated with retraining
  - Low digital literacy limits access to information



# Closing the Skills Gap for Coal Mine Workers

#### **Voinovich School of Leadership and Public Affairs**

#### June 28, 2018

