

From Pittsburgh to Paris: Manufacturing, Energy Efficiency, and Jobs

Deborah D. Stine, PhD
Associate Director for Policy Outreach
Professor of the Practice, Engineering and Public Policy
Carnegie Mellon University
dstine@andrew.cmu.edu

Scott Institute for Energy Innovation Leadership



Jay Whitacre,
Director
Professor of Materials Science
and Engineering and
Engineering and Public Policy



Deborah Stine,
Associate Director for
Policy Outreach
Professor of the
Practice, Engineering
and Public Policy



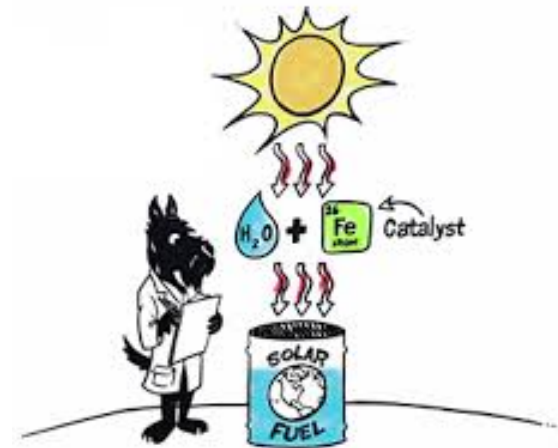
Andrew Gellman,
Co-Director
Lord Professor of Chemical
Engineering, Chemistry
(Courtesy), Materials Science
and Engineering (Courtesy)



Anna J. Siefken,
Associate Director for
Innovation and
Strategic Partnerships

Mission

The Scott Institute for Energy Innovation works through the academic units of Carnegie Mellon University to find solutions for the nation's and world's energy challenges through research, strategic partnerships, public policy outreach and education.





Sean Spicer ✓

@PressSec



.@POTUS "I was elected by voters of Pittsburgh, not Paris. I promised I wld exit or renegotiate any deal which fails to serve US interests"

RETWEETS

3,476

LIKES

9,873



12:54 PM - 1 Jun 2017

↩ 2.5K ↻ 3.5K ❤ 9.9K ✉



bill peduto ✓

@billpeduto



As the Mayor of Pittsburgh, I can assure you that we will follow the guidelines of the Paris Agreement for our people, our economy & future.

Sean Spicer ✓ @PressSec

.@POTUS "I was elected by voters of Pittsburgh, not Paris. I promised I wld exit or renegotiate any deal which fails to serve US interests"

RETWEETS

36,532

LIKES

57,363



1:03 PM - 1 Jun 2017

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Pittsburgh's Smoky Past and Bright Present and Future



Source: U. of Pittsburgh; Welcome Pittsburgh



Pittsburgh's Steel Workers of the Past and High-Tech Workers of Today and the Future

Steel Workers on Labor Day



Google Pittsburgh Worker

Allegheny Conference: "over 40,000 postsecondary students graduate every year in the region."

Source: Pittsburgh Post-Gazette; CMU



Pennsylvania Energy Sector Employment is Less than the National Average

Location	% Employment in Energy Sector
National	2.4%
PA	1.8%
OH	1.9%
WV	5.4%

Data Source: Department of Energy. (2017). *U.S. Energy and Employment Report State Charts*. D.C.: U.S. Department of Energy.
https://energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report%20State%20Charts%20_0.pdf

Manufacturing and Energy Efficiency

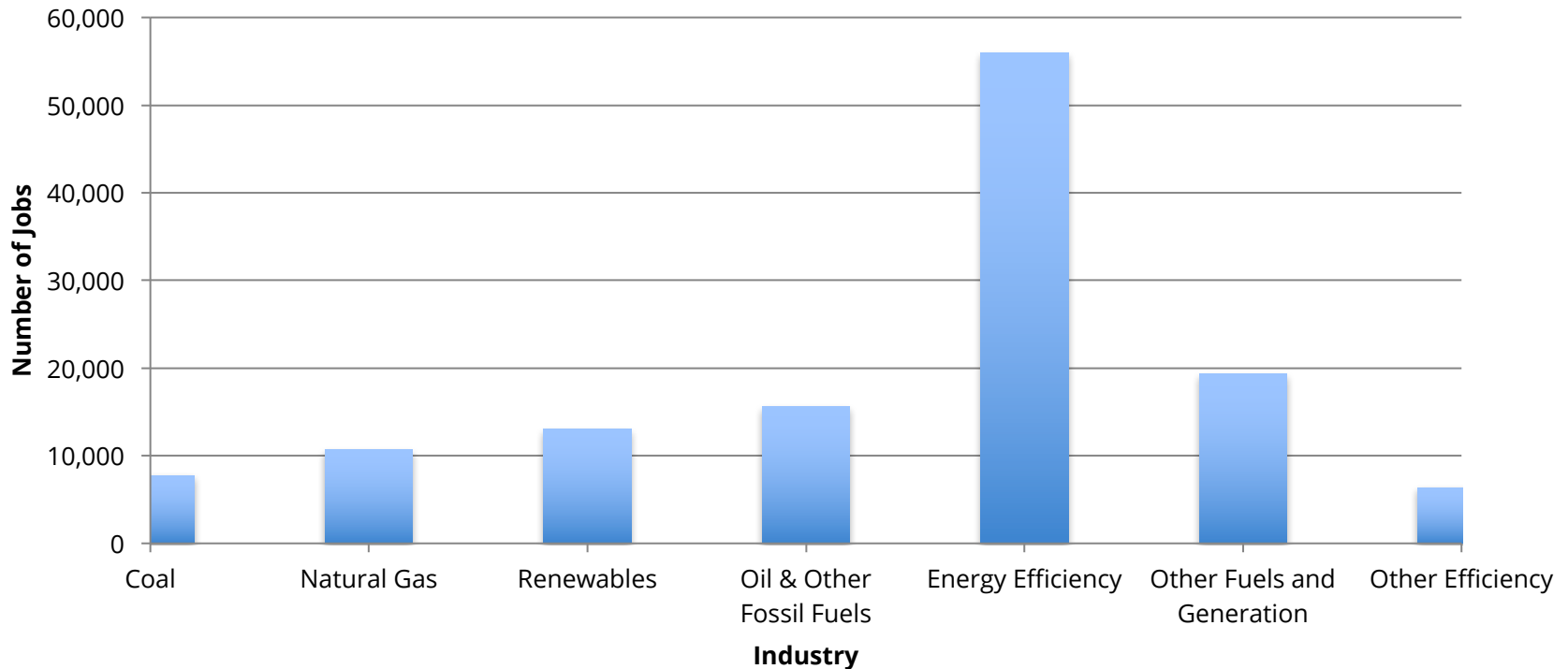
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graph TD; A[Manufacturing and Energy Efficiency] --- B[Manufacturing of Energy Efficient Goods]; A --- C[Improving Energy Efficiency in Manufacturing of All Goods]
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Manufacturing of Energy Efficient Goods

Improving Energy Efficiency in Manufacturing of All Goods

More PA Energy Workers in Energy Efficiency Than Fuel Production

Breakdown of Pennsylvania Energy Employment, by Industry: Q1 2016



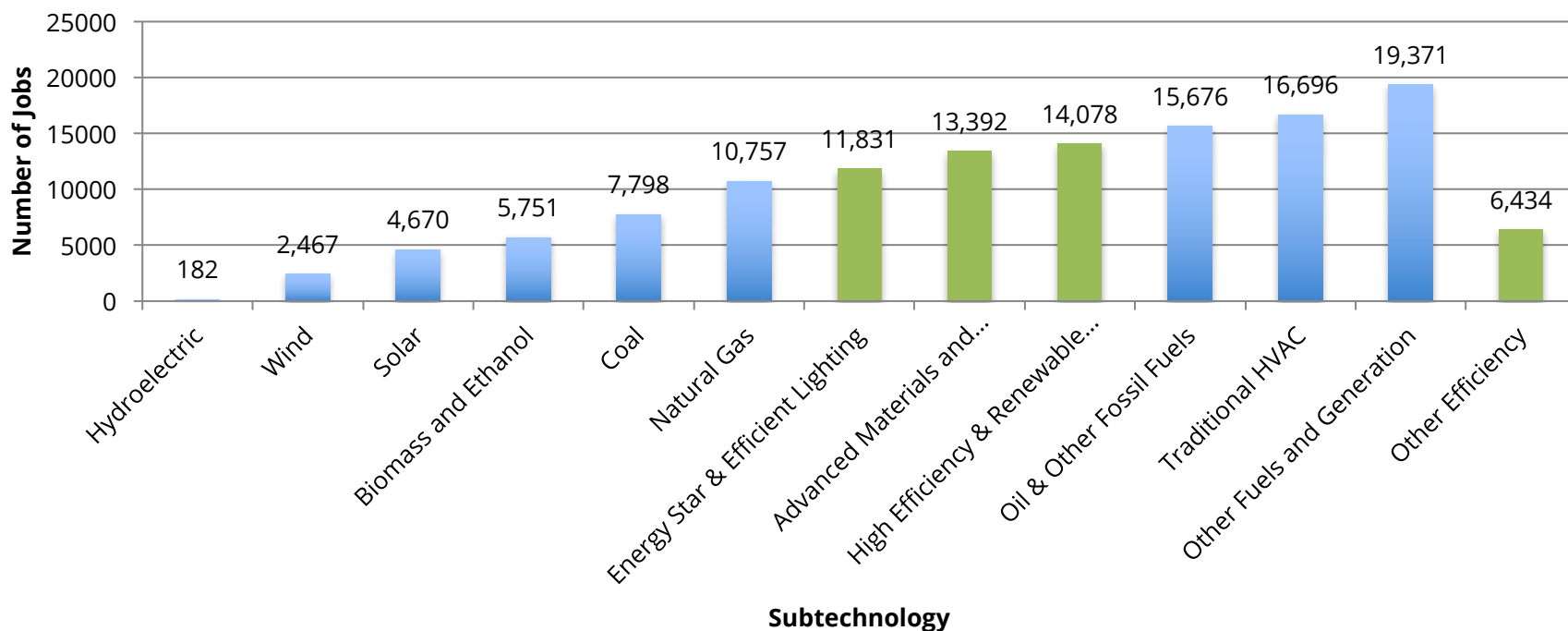
Notes: Renewables consist of hydroelectric, solar, wind, biomass, and ethanol fuels and generation jobs. Coal, Natural Gas, and Oil & Other Fossil Fuels consist of both electric generation and fuels jobs.

Source: Department of Energy. (2017). *U.S. Energy and Employment Report State Charts*. D.C.: U.S. Department of Energy.

https://energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report%20State%20Charts%202_0.pdf

Most PA Energy Efficiency Workers in Efficient Lighting, Advanced Manufacturing, HVAC

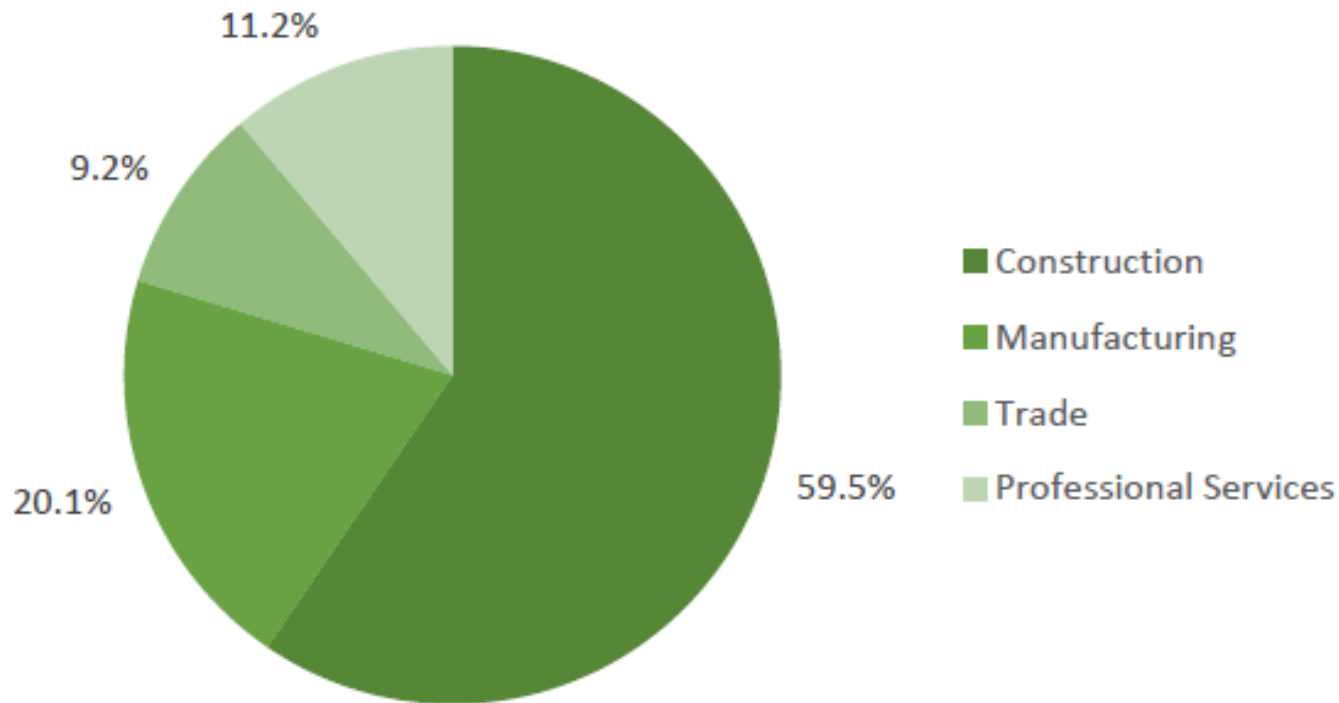
Pennsylvania Energy Employment Breakdown, by Subtechnology: Q1 2016



Source: Department of Energy. (2017). *U.S. Energy and Employment Report State Charts*. D.C.: U.S. Department of Energy.
https://energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report%20State%20Charts%202_0.pdf

Most Energy Efficiency Jobs in Construction and Manufacturing.

Figure 9. Energy Efficiency Employment by Industry Sectors



Source: Department of Energy. (2017). *U.S. Energy and Employment Report State Charts*. D.C.: U.S. Department of Energy.
https://energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report%20State%20Charts%20_0.pdf

Hiring Difficulty in Pennsylvania for Energy Efficiency Jobs is Very or Somewhat Difficult Most of the Time

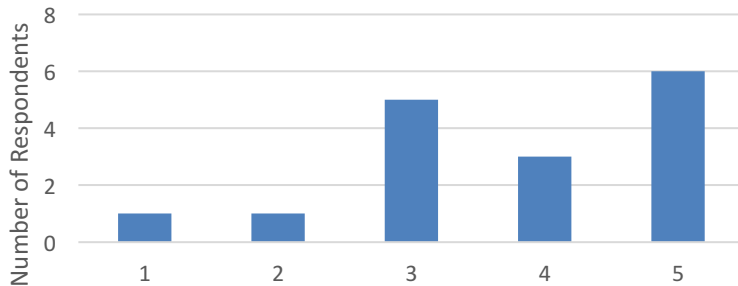
- **73% of all surveyed employers reported difficulty hiring qualified workers over the last 12 months; 26% noted it was very difficult.**
- **Employer projected hiring rates for 2017:**
 - **Energy Efficiency—9% growth or 198,000 jobs** (133,000 in 2016)
 - **Transmission, Wholesale Distribution and Storage—6% growth or 78,000 jobs** (65,000 in 2016)
 - **Solar—7% growth or 26,000 jobs** (51,000 full-time jobs in 2016)
 - **Wind—4% growth or 4,000 jobs** (25,000 jobs in 2016)
 - **Fuels—2% decline** projected for 2017 (8% decline in 2016).
 - **Motor Vehicles—3.4% growth or 81,000 jobs**, but all in wholesale trade, professional services, and maintenance. (12,000 in 2016)

Source: Department of Energy. (2017). *U.S. Energy and Employment Report State Charts*. D.C.: U.S. Department of Energy
https://energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report%20State%20Charts%20_0.pdf

Apprenticeships are Important to Employer's Workforce Strategy

Catalyst Connection Analysis

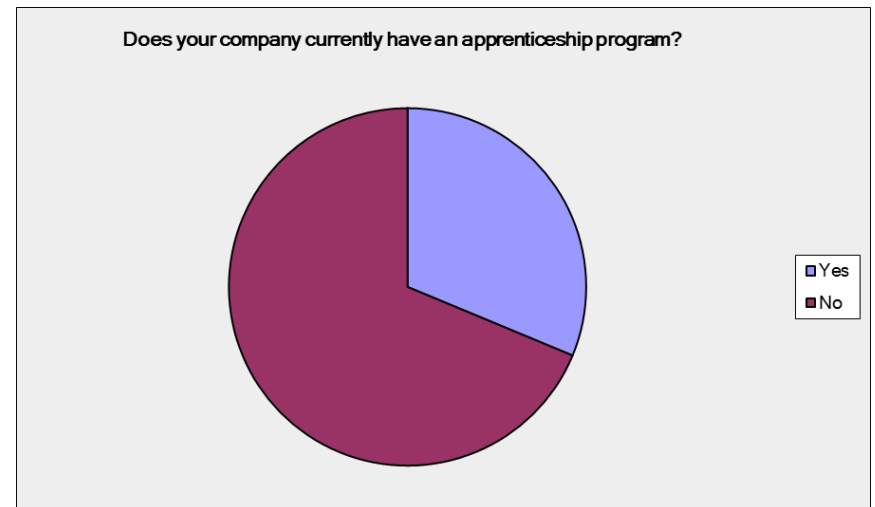
How Important is an Apprenticeship Program to Your Company?



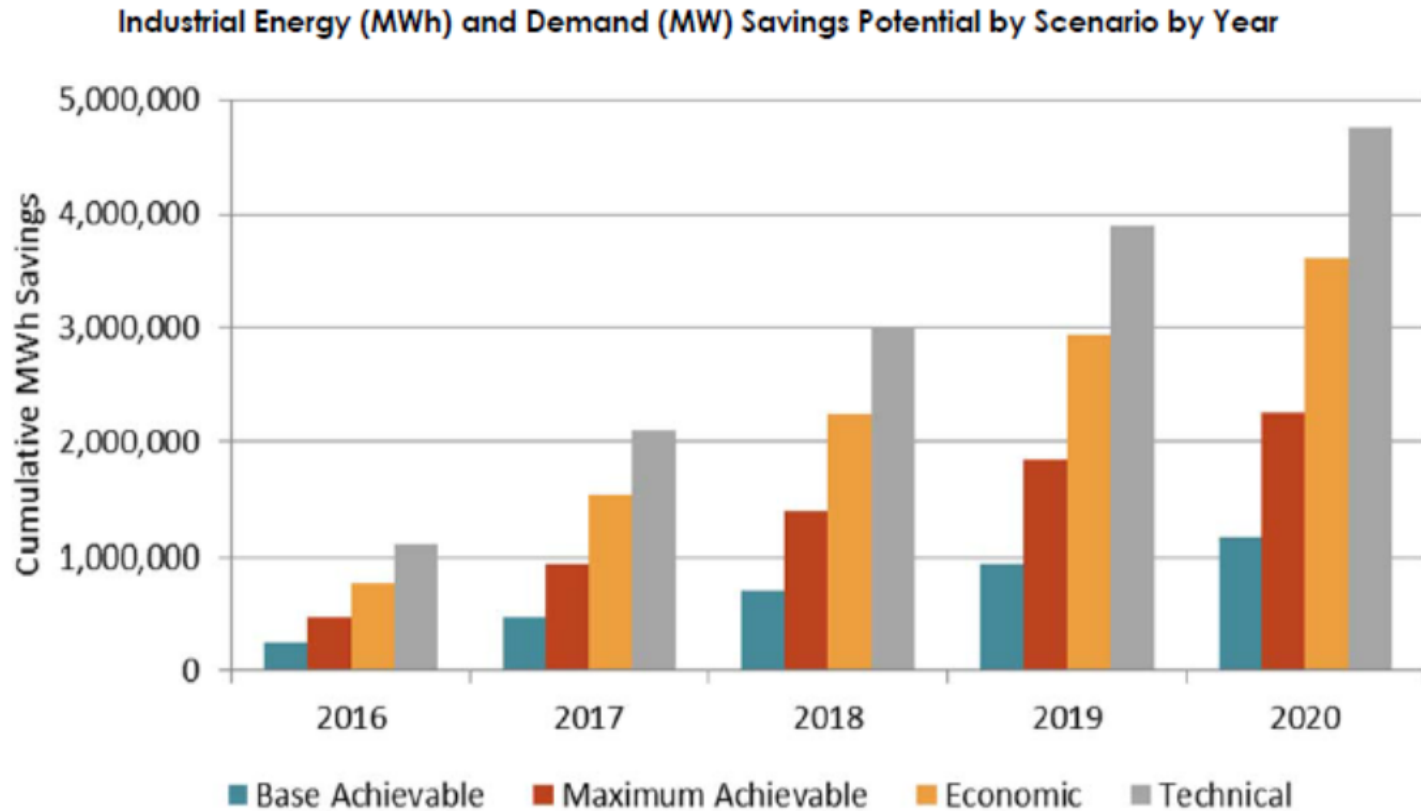
56% of respondents said it is important or very important

Does your company currently have an apprenticeship program?

Yes	31.3%	5
No	68.8%	11



Industrial Energy Efficiency Potential is High



Findings

- Energy Workforce Demand in Pittsburgh Region is Not in Energy Supply, but in Energy Efficiency.
- Federal Agency Programs are Available, But Are They Sufficiently Supported.
- Manufacturers Can Save Approximately 30% of their Energy Consumption Through Energy Efficiency Measures, But Risk Aversion is A Barrier.

Illustrative Policy Option Suggestions from Scott Institute Energy Efficiency Workshops

- **Encourage Apprenticeships and Internships:**
Review Implementation of the Workforce Innovation and Opportunity Act of 2014 Relative to Regional Needs.
- **Support Energy and Advanced Manufacturing Workforce Initiative of 5 Federal Agencies:**
Check Status of Funding of These Programs.
- **Advance Manufacturing Energy Efficiency**
Actions: *Assess Barriers to Companies Willing to Undertake Manufacturing Energy Efficiency Actions and Reduce Financial Risks.*

For More Information

- Website: www.cmu.edu/energy
- Newsletter Signup: tinyurl.com/scottnews
- Funding Opportunities Newsletter Signup (CMU only): tinyurl.com/ScottFundingNews
- Scott Institute Affiliate Signup (CMU only): <http://bit.ly/scott-institute-affiliate>
- Seed Grant Proposals: tinyurl.com/Scott-Seed-2016 (CMU only)

- Energy Week: cmuenergyweek.org
- CleanTech Competition: cleantechprize.org
- Energy Bite: energybite.org

- Jay Whitacre: whitacre@andrew.cmu.edu
- Andrew Gellman: gellman@cmu.edu
- Deborah Stine: dstine@andrew.cmu.edu
- Anna J. Siefken: asiefken@andrew.cmu.edu

BACKUP SLIDES

WORKFORCE

Scale: Labor force exceeds 1.2 million people | 1.1 million jobs

Top 5 Industries in 10-County Region by Employment (2015)

Industry	#Employed	% of Regional Workers
Healthcare and social assistance	198,05	16.9%
Professional and business services	171,517	14.6%
Retail trade	135,569	11.5%
Government	125,150	10.7%
Leisure and hospitality	121,004	10.3%

Source: <http://www.pittsburghregion.org/why/workforce/>

Major Occupations

32,000 computer programmers and software developers

24,000 skilled production workers

15,000+ engineers

Fastest Growing Occupation Groups

Occupation Groups	2015 Employment	Growth Since 2010
Computers and mathematics	33,293	12.7%
Construction and extraction	58,389	11.3%
Architecture and engineering	23,062	7.7%
Life, physical, and social science	11,191	7.1%
Personal care and service	47,007	6.5%

Source: <http://www.pittsburghregion.org/why/workforce>

Cost Competitive

Average wage in line with U.S.

Educated

42% of 25- to 44-year olds have a bachelor's or graduate degree, compared to 34% nationally

Pipeline

- 32, four-year colleges and universities; total enrollment of more than 125,000
- Strong community college system, with four separate institutions operating 23 locations with total enrollment in excess of 32,000
- More than 60 post-secondary career, technical and vocational schools
- Nearly 50,000 degrees and certificates awarded annually:
 - 2,800 in computer and information sciences
 - 3,900 in engineering, architecture and design
 - 4,900 in technical and vocational trades

Source: <http://www.pittsburghregion.org/why/workforce>

Pittsburgh's Unemployed and Underemployed

- 55 percent are men
- 9 percent are 24 years old or younger; 26 percent are older than 55
- 12 percent hold less than a high school diploma; 5 percent hold at least a master's degree
- 39 percent are minority
- 7 percent are veterans
- 6 percent have prior criminal offenses

Source: Partners for Work at <https://www.partner4work.org/40000-partners-wanted>

Energy Efficiency Workforce Definition

- Includes
 - Energy-Saving Product Manufacturing
 - But Not Energy Efficient Manufacturing Processing
 - End-use Energy Consumption Service Provision (e.g., Insulation)

Source: Department of Energy. (2017). *U.S. Energy and Employment Report*. D.C.: U.S. Department of Energy.
https://energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report_0.pdf

Industry Descriptions

- Coal
 - Consists of fuel and generation jobs
- Natural Gas
 - Consists of fuel and generation jobs
- Renewables
 - Consists hydroelectric, solar, wind, biomass, and ethanol fuels and generation jobs
- Energy Efficiency
 - Includes traditional HVAC, Energy Star and efficient lighting, advanced materials and insulation, and high efficiency and renewable heating and cooling
- Oil & Other Fossil Fuels
 - Consists of fuel and generation jobs
- Other Fuels and Generation
 - Includes nuclear, combined heat and power (CHP), among other sources
- Other Efficiency

Subtechnology Descriptions

- Biomass and Ethanol
- Renewable Generation
 - Consists of hydroelectric, solar, and wind electric generation jobs
- Coal
- Natural Gas
- Energy Star & Efficient Lighting
 - Manufacture and installation of Energy Star® appliances and high efficiency lighting, such as LED lighting, CFL lightbulbs, refrigerator, etc.
- Advanced Materials and Insulation
 - Consists of manufacturing, installation, research and development, and construction jobs that create or use efficient or energy-saving building materials or insulation
- High Efficiency & Renewable Heating & Cooling
 - Consists of manufacturing, installation, and construction jobs that make or utilize energy efficient appliances, particularly high efficiency heating and cooling appliances
- Oil & Other Fossil Fuels
- Traditional HVAC
 - Jobs associated with traditional heating, ventilation, and air conditioning, with a focus on high efficiency technologies, such as construction
- Other Fuels and Generation
- Other Efficiency



THE WORKFORCE INNOVATION AND OPPORTUNITY ACT

The Department of Labor (DOL), in coordination with the U.S. Departments of Education (ED) and Health and Human Services (HHS), has worked to prepare everyone for the implementation of WIOA. The WIOA Resource Page provides information and resources for States, local areas, non-profits and other grantees, and other stakeholders to assist with implementation of the Act. This page is updated to reflect newly developed materials, including responses to frequently asked questions.

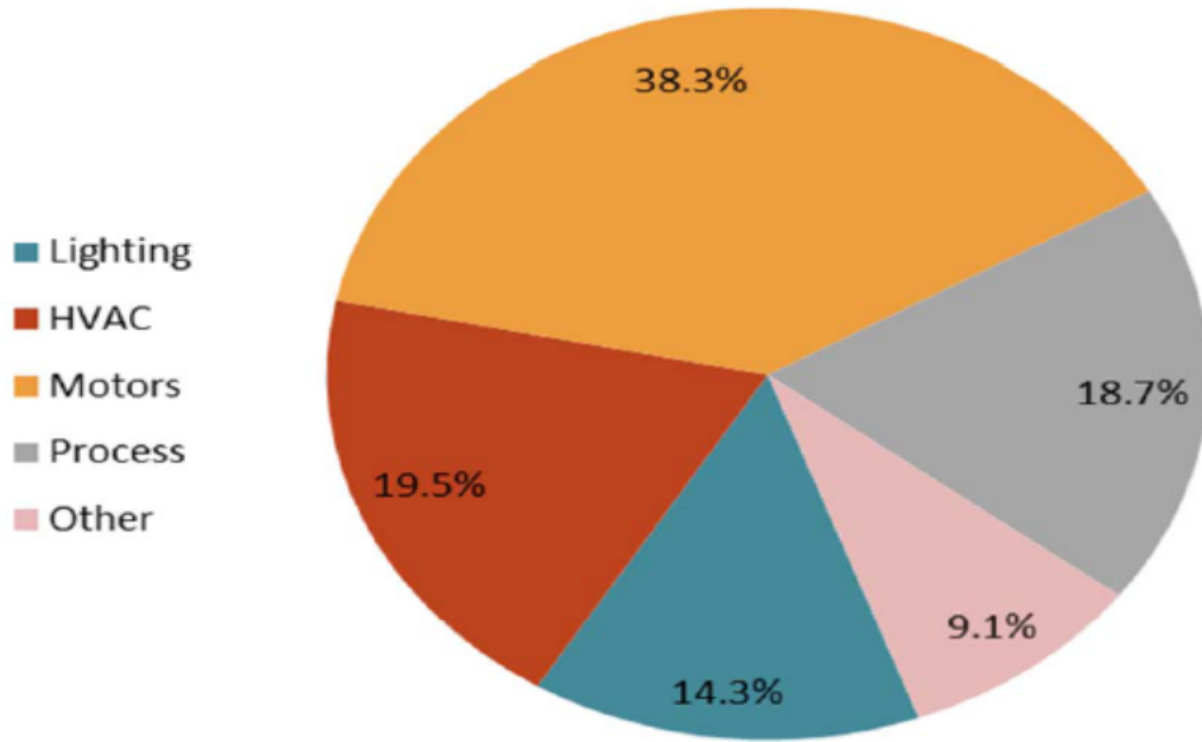
WIOA'S THREE HALLMARKS OF EXCELLENCE

- The needs of businesses and workers drive workforce solutions and local boards are accountable to communities in which they are located
- One-Stop Centers (or American Job Centers) provide excellent customer service to jobseekers and employers and focus on continuous improvement
- The workforce system supports strong regional economies and plays an active role in community and workforce development

**Industrial Sector Technical Natural Gas Savings Potential by 2015 and 2020
(60 % Market Penetration)**

Industrial Natural Gas Technical Potential Savings by End Use		
End Use	2015 MMBTU	2020 MMBTU
Conventional Boiler Use	1,193,821	1,203,720
Process Heating	2,311,256	2,330,422
Facility HVAC	503,692	507,869
Total	4,008,769	4,042,011

Industrial 2020 Cumulative Annual Base Achievable Energy (MWh) Savings Potential by End Use



Source: Bhaskaran Gopalakrishnan, Industrial Assessment Center, Statler College of Engineering, West Virginia University