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

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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.
@POTUS "I was elected by voters of Pittsburgh, not Paris. I promised I'd exit or renegotiate any deal which fails to serve US interests"
Pittsburgh’s Smoky Past and Bright Present and Future

Source: U. of Pittsburgh; Welcome Pittsburgh
Steel Workers on Labor Day

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

<table>
<thead>
<tr>
<th>Location</th>
<th>% Employment in Energy Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>2.4%</td>
</tr>
<tr>
<td>PA</td>
<td>1.8%</td>
</tr>
<tr>
<td>OH</td>
<td>1.9%</td>
</tr>
<tr>
<td>WV</td>
<td>5.4%</td>
</tr>
</tbody>
</table>

Manufacturing and Energy Efficiency

- Manufacturing of Energy Efficient Goods
- Improving Energy Efficiency in Manufacturing of All Goods
More PA Energy Workers in Energy Efficiency Than Fuel Production


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.

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


Most Energy Efficiency Jobs in Construction and Manufacturing.

Figure 9. Energy Efficiency Employment by Industry Sectors

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)

Apprenticeships are Important to Employer’s Workforce Strategy

Catalyst Connection Analysis

**Does your company currently have an apprenticeship program?**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>31.3%</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>68.8%</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

56% of respondents said it is important or very important
Industrial Energy Efficiency Potential is High

![Graph showing Industrial Energy (MWh) and Demand (MW) Savings Potential by Scenario by Year.](image)
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](http://www.cmu.edu/energy)
- Newsletter Signup: [tinyurl.com/scottnews](http://tinyurl.com/scottnews)
- Funding Opportunities Newsletter Signup (CMU only): [tinyurl.com/ScottFundingNews](http://tinyurl.com/ScottFundingNews)
- Seed Grant Proposals: [tinyurl.com/Scott-Seed-2016](http://tinyurl.com/Scott-Seed-2016) (CMU only)
- Energy Week: [cmuenergyweek.org](http://cmuenergyweek.org)
- CleanTech Competition: [cleantechprize.org](http://cleantechprize.org)
- Energy Bite: [energybite.org](http://energybite.org)
- Jay Whitacre: [whitacre@andrew.cmu.edu](mailto:whitacre@andrew.cmu.edu)
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BACKUP SLIDES
WORKFORCE

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

<table>
<thead>
<tr>
<th>Industry</th>
<th>#Employed</th>
<th>% of Regional Workers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthcare and social assistance</td>
<td>198,05</td>
<td>16.9%</td>
</tr>
<tr>
<td>Professional and business services</td>
<td>171,517</td>
<td>14.6%</td>
</tr>
<tr>
<td>Retail trade</td>
<td>135,569</td>
<td>11.5%</td>
</tr>
<tr>
<td>Government</td>
<td>125,150</td>
<td>10.7%</td>
</tr>
<tr>
<td>Leisure and hospitality</td>
<td>121,004</td>
<td>10.3%</td>
</tr>
</tbody>
</table>

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

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

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
- 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
- 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

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)


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)

<table>
<thead>
<tr>
<th>End Use</th>
<th>2015 MMBTU</th>
<th>2020 MMBTU</th>
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<tbody>
<tr>
<td>Conventional Boiler Use</td>
<td>1,193,821</td>
<td>1,203,720</td>
</tr>
<tr>
<td>Process Heating</td>
<td>2,311,256</td>
<td>2,330,422</td>
</tr>
<tr>
<td>Facility HVAC</td>
<td>503,692</td>
<td>507,869</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,008,769</strong></td>
<td><strong>4,042,011</strong></td>
</tr>
</tbody>
</table>
Source: Bhaskaran Gopalakrishnan, Industrial Assessment Center, Statler College of Engineering, West Virginia University