

NETL RWFI Webinar:

The Future of Work

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- Slides will be posted on netl.doe.gov/rwfi on the Webinar Archive Section
 - Also- subscribe to NETL RWFI E-Note at (<u>netl.rwfi@netl.doe.gov</u>)

Disclaimer: The analysis presented and conclusions drawn herein represent solely those views of the author(s), and do not represent the views of the United States Department of Energy

- I. NETL Background Anthony Armaly
 - II. NETL RWFI Background
- III. The Future of Work- Gabrielle Gonzalez; Melanie Zaber- RAND Corporation

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NETL Regional Workforce Initiative (NETL RWFI)

A Focus on Appalachia and the future of Energy and Advanced Manufacturing Regional Workforce Readiness and Economic Development



Core Competencies & Technology Thrusts





NETL RWFI Mission Statement



NETL RWFI is a platform for engagement and collaboration with key stakeholders who are critical for the deployment of U.S. DOE and NETL Energy and Advanced Manufacturing technological research.

Supporting Regional Economic and Workforce Development opportunities.





U.S. DEPARTMENT OF

Collaboration, Coordination, and Communication In the Energy and Advanced Manufacturing workforce

Collaboration around workforce readiness and economic opportunities

Coordinating across economic development and workforce development initiatives

Communicating activities, research, and funding opportunities to stakeholders







Connecting R&D investment to economic growth, job growth, and development of a skilled technical workforce.

- Establishing the President's Council for the American Worker
- Establishing Apprenticeships in America
- Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure





Key NETL RWFI Metrics



400 +

individual stakeholders



organizations represented



subscribed to the NETL RWFI e-Note Monthly Newsletter

registrants to the NETL RWFI Webinar Series



Appalachia at a Glance



- critical region for U.S. energy production, and will continue to be so
- a strategically important area for related technologies in advanced manufacturing and supercomputing
- expected to enjoy a manufacturing renaissance
- an area that has been adversely affected by changes in energy extraction and related manufacturing activity







Key Outcomes to Date



Establishment of a new network of regional stakeholders
Consistent engagement with key regional partners
Integration of Workforce Workplan
Increased communication of NETL mission
Increased growth for potential collaborative opportunities



RWFI Outreach, Meetings, Webinars, and Workshops



Consistent, meaningful, outcome driven, engagement







You Tube



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RAND EDUCATION AND LABOR

A System That Works:

Reimagining the Energy and Advanced Manufacturing Workforce of the Future

RAND is a non-profit, non-partisan research organization committed to the public interest



RAND...

- Tackles the most difficult social problems of our time
- Helps make communities throughout the world safer and more secure, healthier and more prosperous
- Delivers fact-based, objective, actionable solutions grounded in rigorous analysis

Times have changed:

likely an understatement

Ford factory, 1970

Automation and globalization are

only two big changes

Ford factory, 2018

Changes in the world of work require a new approach to workforce development and employment





Current workers find their skills are obsolete but are not readily able to retrain Many new labor market entrants do not have the skills demanded by employers

Changes in the world of work require a new approach to workforce

development and employment





The changing nature of employer-employee relationships places more risk on workers

Education and training institutions are often slow to respond to needs for lifelong learning

Changes in the world of work require a new approach to workforce

development and employment



Information is siloed and often outdated

Increasing disparities in employment outcomes and access to education/training

Energy and advanced manufacturing sectors

also grapple with a unique set of issues

- Employer demands outpace supply
 - Rapid state of technological innovation
 - Insufficient numbers of working-age adults to fill open positions
- Fragmented workforce development system
 - Continued reliance on "one-off" workforce development programs
 - Region-specific or school district-specific
- Geography gap
 - Where talent live, compared to where education/training or employment are
- Information/ perception gap
 - High school guidance counselors
 - Parents/ talent

Today's Talk



Energy and advanced manufacturing workforce

Envisioning a new paradigm

An evidence-based approach to get there

Today's Talk



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U.S. energy and advanced manufacturing sectors continue to evolve

• Market forces

- Production and extraction cycles impacting supply and demand, and thus employment opportunities
- Evolution in business models
 - Vertically integrated companies \rightarrow specialty companies with diverse supply chains
- Tax policies
- Regulations
 - Declining federal regulation
 - Increasing regulation in some states (e.g., emissions reduction requirements)
- Technology development and maturation
 - New technologies entering the market
 - Training, upskilling, or reskilling on new technologies



Source: The U.S. Energy and Employment Report (2019). Results are based on a 15-minute survey of approximately 30,000 employers that enriches the employment data published by the U.S. Bureau of Labor Statistics (BLS) in its Quarterly Census on Employment and Wages (QCEW). See https://www.usenergyjobs.org

Technology shifts impact workforce and employment opportunities

- Electrical power generation employment declined (solar, nuclear)
- CHP and renewables such as geothermal increased
- Alternative fuels and hybrid vehicles employment increased
- Energy infrastructure jobs continue to grow
 - Construction jobs increased due to infrastructure and utility investments and energy efficiency
 - Battery storage jobs increased
 - Importance of storage in a gird that relies on distributed sources of generation or microgrids

Employment in energy fuel production continues to increase

Figure 2. Fuels Sector – Employment by Detailed Technology Application, 2017-2018



Source: The U.S. Energy and Employment Report (2019)

Figure 6.

Fuels Sector – Expected Employment Growth by Detailed Technology (Q4 2018 - Q4 2019)



EPG employment overall dropped from 2017 to 2018, but wind and natural gas continue to increase

Figure 29.

Electric Power Generation Sector – Employment by Detailed Technology Application, 2017-2018²⁸



Figure 36. Electric Power Generation Sector — Expected Employment Growth by Industry (Q4 2018 – Q4 2019)



Source: The U.S. Energy and Employment Report (2019)

Yet employers continue to have difficulty filling positions

Table 7.

Fuels Sector - Reasons for Hiring Difficulty by Industry, Q4 2018

Mining & Extraction	Manufacturing	Wholesale Trade, Distribution, and Transport	Professional and Business Services	Other	
Lack of experience, training, or technical skills (42%)	Lack of experience, training, or technical skills (40%)	Lack of Insufficient non-experience, technical skills training, or (32%) technical skills (63%)		Location (40%)	
Insufficient non- technical skills (19%)	Insufficient non- technical skills (21%)	Insufficient qualifications, certifications, education (26%)	Insufficient non- technical skills (13%)	Lack of experience, training, or technical skills (30%)	
Difficulty findingInsufficientCannot provideindustry-specificqualifications,competitiveknowledge, skills,certifications,wages (26%)and interest (17%)education (21%)wages (26%)		Insufficient qualifications, certifications, education (13%)	Difficulty finding industry-specific knowledge, skills, and interest (20%)		

Table 20.

Electric Power Generation Sector — Reasons for Hiring Difficulty by Industry, Q4 2018

Utilities	Construction	Manufactur- ing	Wholesale Trade, Distribution, and Transport	Professional and Business Services	Other
Lack of experience, training, or technical skills (40%)	Lack of experience, training, or technical skills (50%)	Lack of experience, training, or technical skills (46%)	Lack of experience, training, or technical skills (44%)	Lack of experience, training, or technical skills (50%)	Lack of experience, training, or technical skills (67%)
Location (30%)	Difficulty finding industry- specific knowledge, skills, and interest (20%)	Competition/ small applicant pool (25%)	Difficulty finding industry- specific knowledge, skills, and interest (29%)	Difficulty finding industry- specific knowledge, skills, and interest (28%)	Location (20%)
Difficulty finding industry-specific knowledge, skills, and interest (21%)	Competition/ small applicant pool (18%)	Location (20%)	Location (21%)	Competition/ small applicant pool (20%)	Competition/ small applicant pool (17%)

Source: The U.S. Energy and Employment Report (2019)

What exactly are those "technical" skills employers demand?

- Performance skills
 - Hands-on application
- Content skills
 - Knowledge
- "Cross-cutting" skills
 - Problem-solving, teamwork, critical thinking
- Skills "hybridization"
 - Multiple, *adaptable* skills (e.g., drafting, coding, computation)

Today's Talk



Energy and advanced manufacturing workforce

Envisioning a new paradigm

An evidence-based approach to get there

We need a coherent 21st century workforce development and employment system



Education and training institutions prepare workers for today's jobs and support lifelong learning as skill requirements evolve Employers interact with leaders in P–12 schools, higher education, and the training sector to plan for and satisfy future skill and occupation needs

Q





Current and prospective workers have equal access to opportunities for human capital acquisition throughout their working lives The ongoing process of matching workers to jobs is driven by real-time information on the skills of the available workforce and firms' needs for employees Barriers to worker mobility are reduced to support optimal job matching

The current system follows a 20th century, linear model



The current system is also fragmented, with limited information flow



How a new 21st century system might operate



How a new 21st century system might operate



21st century system for energy and advanced manufacturing sectors



Key objectives for a 21st-century system

Ensure individuals have equitable access to opportunities for human capital acquisition throughout their working lives

> Ensure timely and appropriate matching and re-matching of workers and jobs

2



Key objectives for a 21st-century system

Desired system features

Ensure individuals have equitable access to opportunities for human capital acquisition throughout their working lives

> 2 Ensure timely and appropriate matching and re-matching of workers and jobs

Greater connectivity for information exchange

- Flexible and responsive to changes
- **3** Aligned incentives through policy
- Data-driven governance

What strategies are needed

to achieve these goals?

Ensure individuals have equitable access to opportunities for human capital acquisition throughout their working lives

Ensure timely and appropriate matching and re-matching of workers and jobs

2



Desirable features of education and training institutions



P-12 education system teaches a broad base of fundamentals and technology competencies



Secondary and postsecondary E&T institutions are responsive to current and evolving workforce needs via CTE and career education



Multiple on-ramps for displaced and transitioning workers to develop and advance in-demand skills



Educator pipelines have incentives for continuous professional development

/	
\ \	/

Specialized E&T curricula are aligned with labor market needs and advance in-demand skills





Addressing costs, risks, and returns of skill acquisition





Income sharing agreements between education and training institutions to align incentives



Holding education and training institutions accountable for participant outcomes





What strategies are needed

to achieve these goals?

Ensure individuals have equitable access to opportunities for human capital acquisition throughout their working lives

Ensure timely and appropriate matching and re-matching of workers and jobs

2



Meeting information needs of workers and employers



Collecting and disseminating real-time information on local industry and occupational trends



Use of standardized language describing skill requirements and demonstrated competencies



Use of a workforce version of the electronic health record

- Portable •
- Recognized credentials •
- **Privacy-protected**





Addressing worker mobility









Access to telecommuting





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What can you do to support the energy and advanced manufacturing workforce of the future?



Identify where current policies hinder the transition to a 21st century system and those that can facilitate the transition



Partner to maximize opportunities to create policyrelevant evidence

- Evaluating pilot initiatives and continuously refining based on the evidence
- Scaling-up small-scale initiatives with attention to loss of fidelity and variation attributable to local context



Collaborate across the system to test new approaches and share knowledge of what works



Questions and Discussion

Thank You!



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