Training the Distribution Workforce

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Introduction to EPRI

EXPERTISE

Staff with backgrounds in technology development, lab testing, field deployment, and commercial operation

INFORMATION

Actionable information derived from deep investigation and analysis of primary data and secondary sources

COLLABORATION

Close personal links with utilities, government agencies, national labs, universities, technology developers, and others

KNOW-HOW

Practical knowledge derived from first-hand experience in lab and field

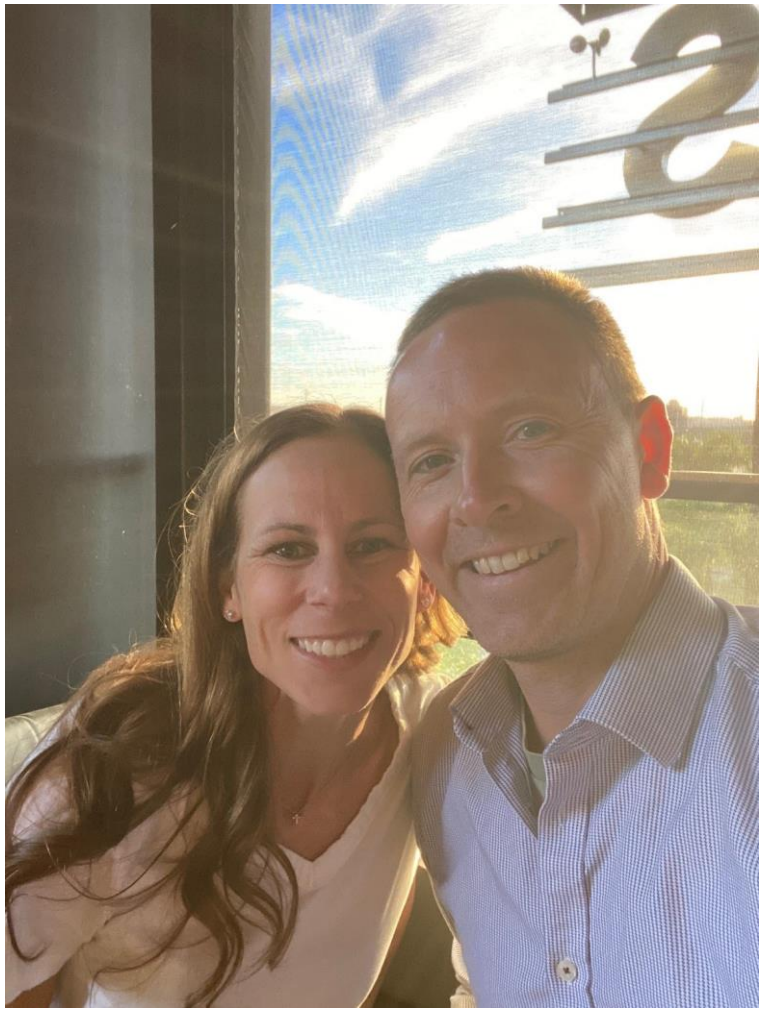
Who We Are

Founded in 1972, the Electric Power Research Institute (EPRI) is the world's preeminent independent, non-profit energy research and development organization, with offices around the world.

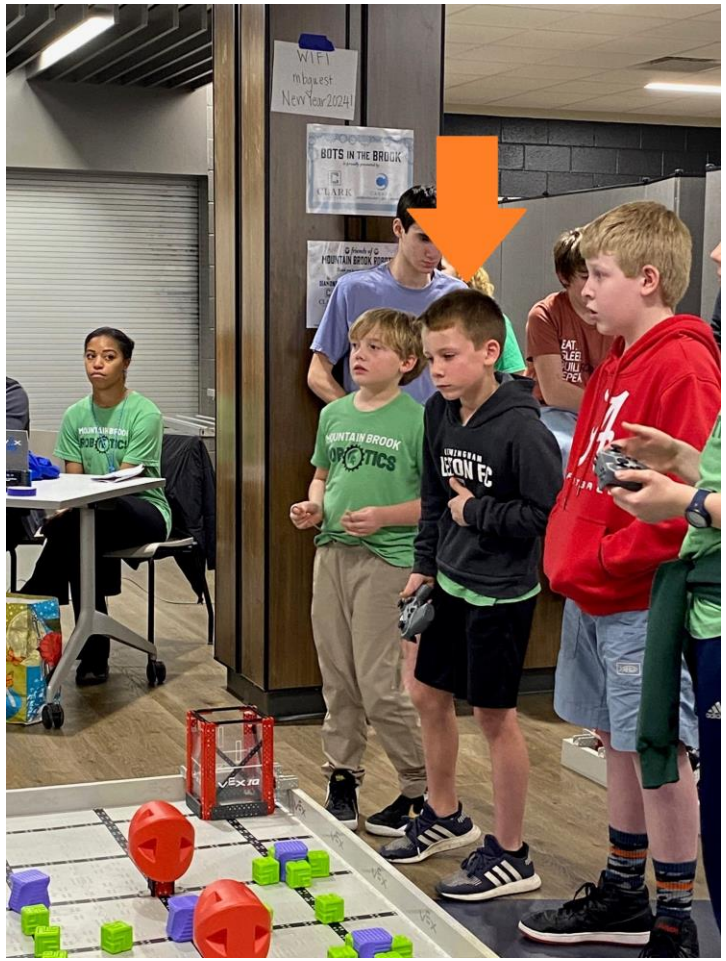
Our Experts

EPRI's trusted experts collaborate with more than 450 companies in 45 countries, driving innovation to ensure the public has clean, safe, reliable, affordable, and equitable access to electricity across the globe.

Meet the Presenter



Meet the Presenter



Meet the Presenter

Arsenal

Challenges Facing the Distribution Workforce

Retirements

+

Competition for Talent

+

Load Growth

+

DERs

+

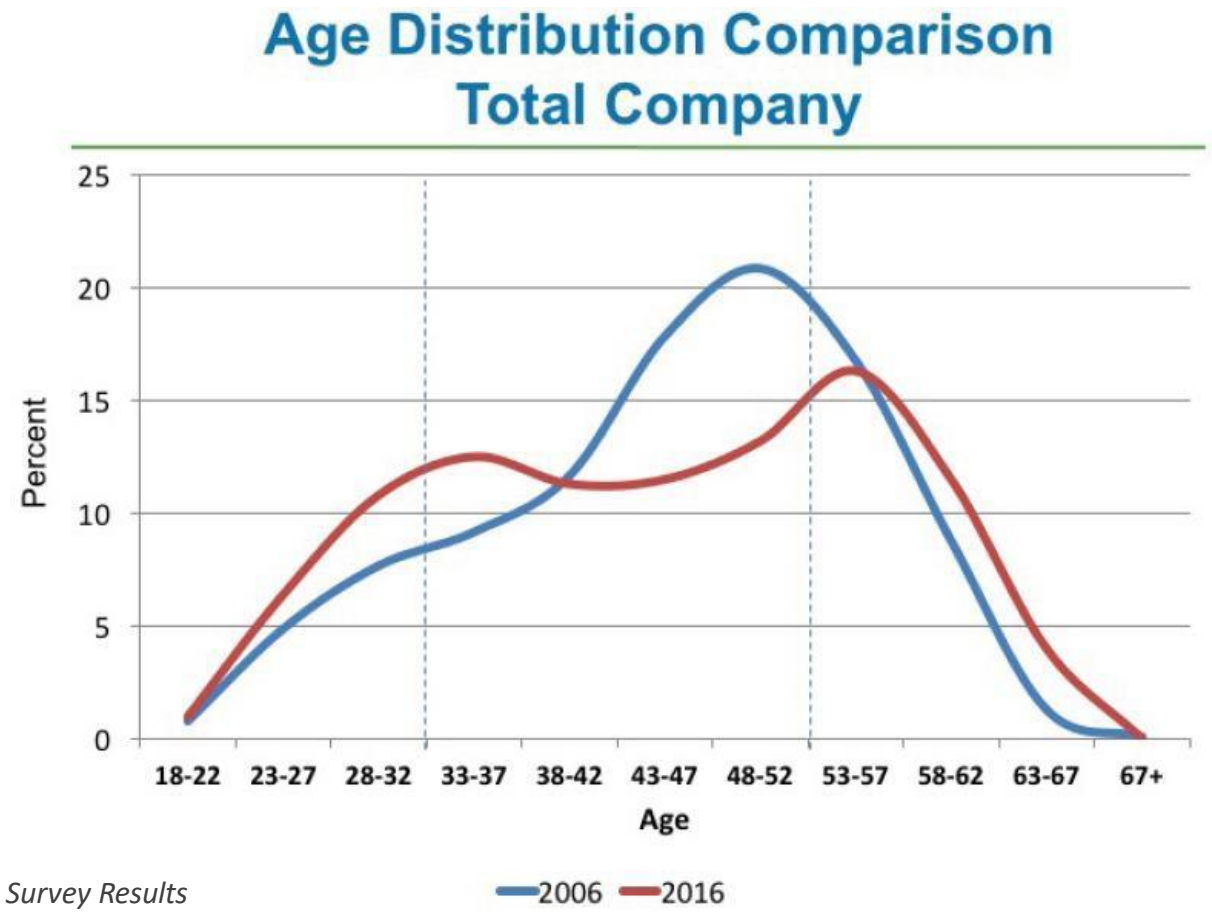
IT <> OT

The industry faces a workforce development challenge

Where are we today?

Electric Power Educational Challenges Amid Industry Transformation

1. Early career workforce



Source: Gaps in the Energy Workforce Pipeline,
2017 Center for Energy Workforce Development Survey Results

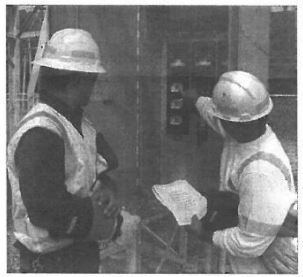
Where are we today?

Electric Power Educational Challenges Amid Industry Transformation

1. Early career workforce
2. Many new hires lack power systems education

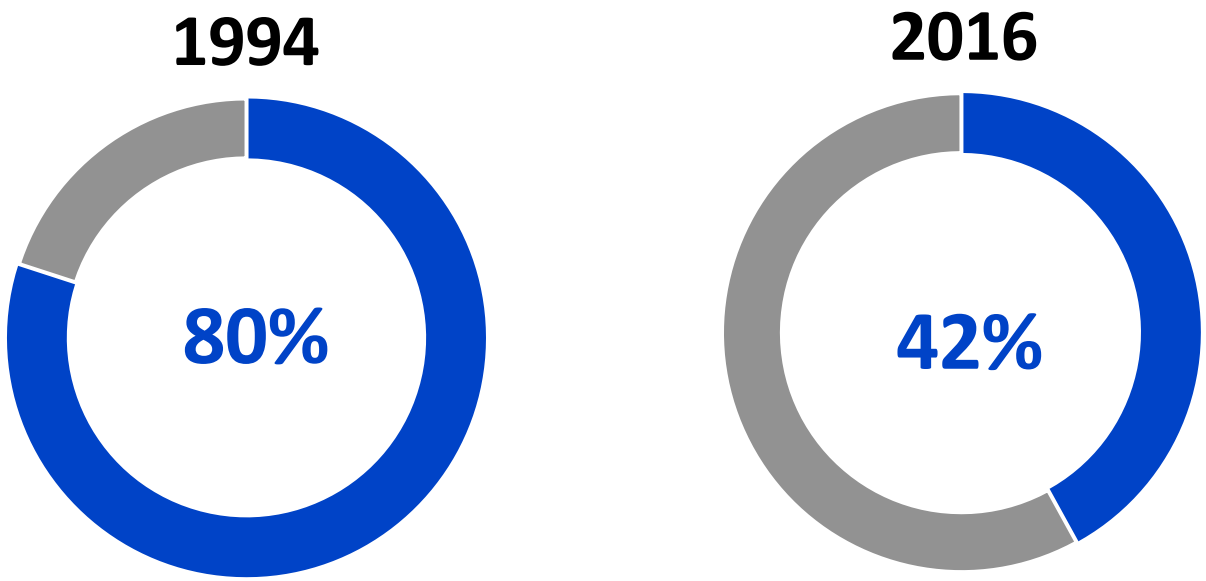
What is FirstEnergy experiencing?

- New hires lack the important theories for power system engineers – Per Unit System, Load Flow, Short Circuit Analysis, Symmetrical Components, (what else?)
- Once hired, some struggle to learn these topics on their own
- FirstEnergy actions to address shortfall
  - Develop new FE training program for engineers
  - Co-op and summer internships
  - Utilization of EPRI



Source: Rodney Philips, Director, Transmission Operations, FirstEnergy. IEEE PES General Meeting. July 19, 2017.

Percentage of U.S. Universities with a Required Undergraduate Power Systems Course



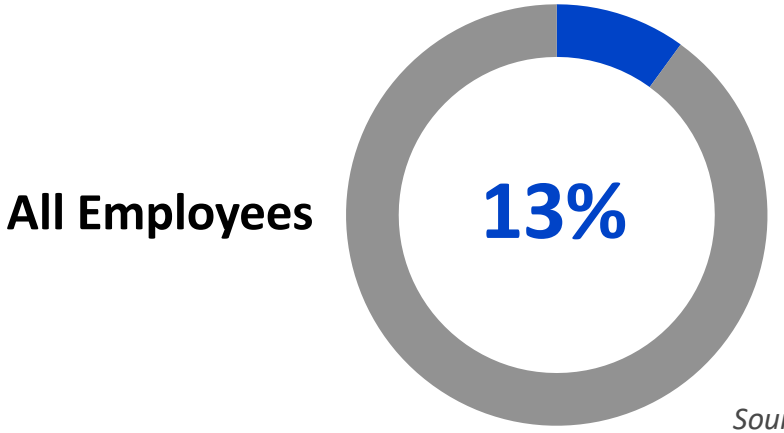
Source: Electric Power Engineering Education Resources: 2015-16 US and Canadian University Survey Results. Report from the Power and Energy Education Committee of the IEEE Power & Energy Society. November 2017.

Where are we today?

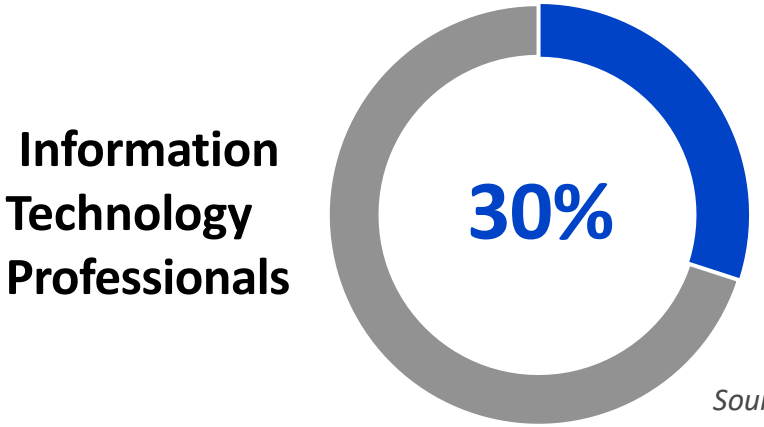
Electric Power Educational Challenges Amid Industry Transformation

1. Early career workforce
2. Many new hires lack power systems education
3. Difficult to hire and retain top data science professionals

Employee Turnover Rates



Source: LinkedIn



Source: ADP

Where are we today?

Electric Power Educational Challenges Amid Industry Transformation

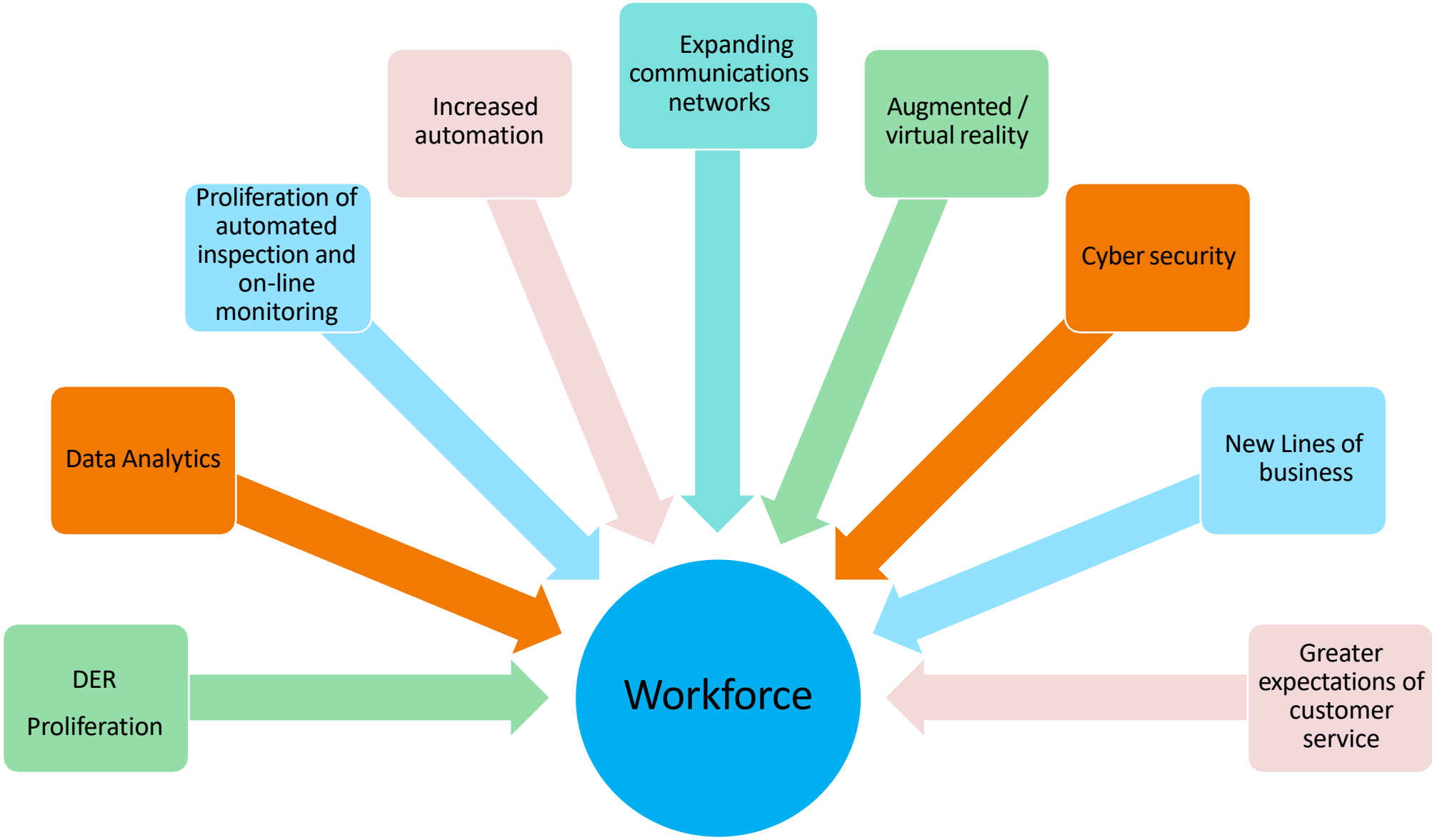
1. Early career workforce
2. Many new hires lack power systems education
3. Difficult to hire and retain top data science professionals
4. Power system transformation:
   - Renewables and distributed energy resources
   - Digital communication, cyber security, and data analytics

Overarching Issues

IT / OT Convergence – will require a better understanding of technologies and principles on both sides. Information Technology (IT) people will need to better understand the Operating Technology world and vice-versa.

Creating "cultures" for Cyber Security and Data – similar to the safety culture that is now common within the industry, utilities will need to create both cyber security and data cultures. All workers will need to have a heightened awareness of cyber security and how it can impact their jobs. Workers also need to understand the value that data will have for the company and what their role is in obtaining, maintaining and using high-quality data

Drivers Impacting the Distribution Workforce



First…

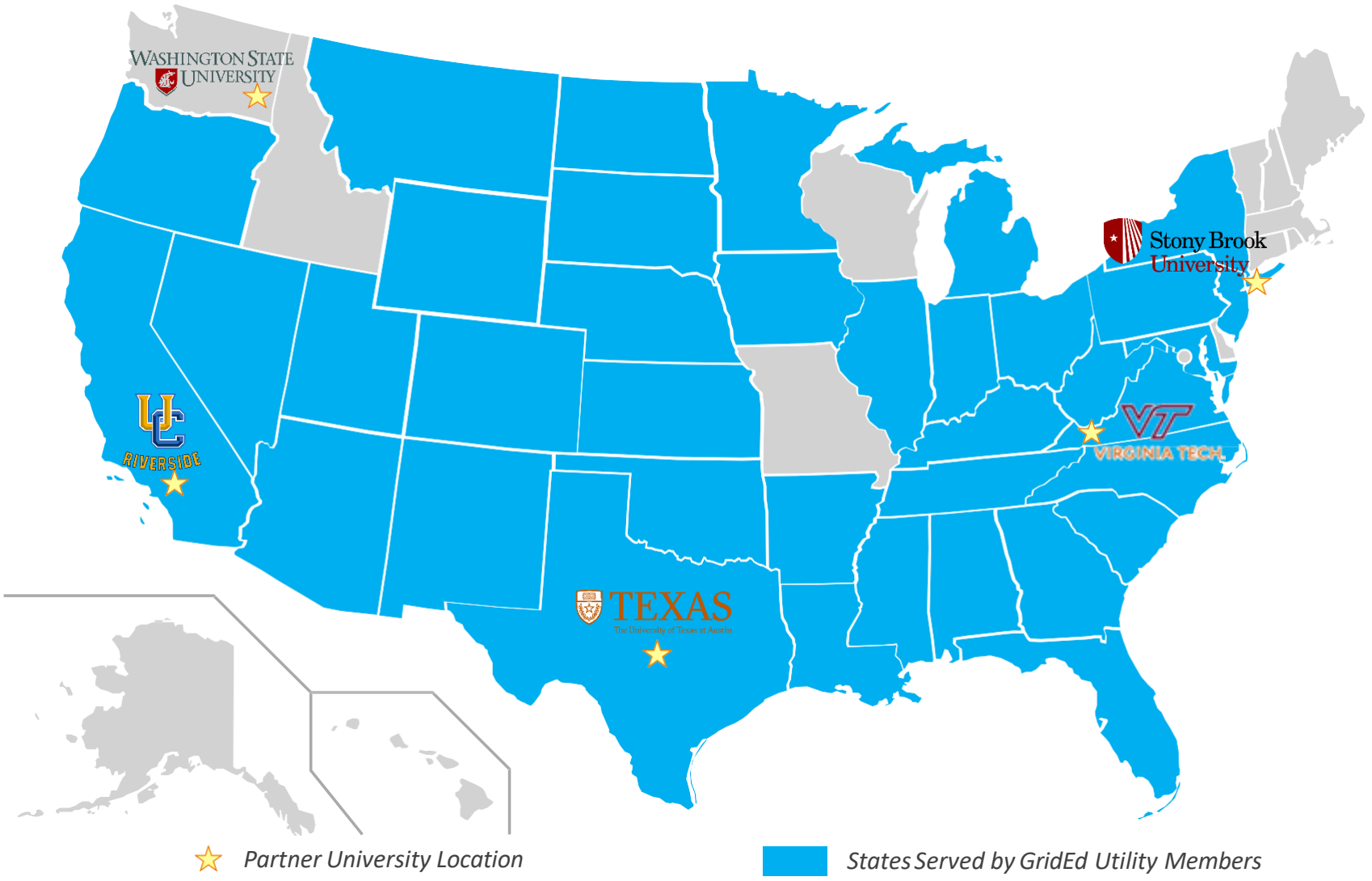
GridEd 2014-2018 | Power Systems Education

Then…

GridEd 2019-2023 | Intersection of Digital & Grid

Utility Members

AEP ENERGY
AUSTIN ENERGY
DUKE ENERGY
FirstEnergy
LES Lincoln Electric System
New York Power Authority
PGE
SRP SALT RIVER PROJECT
SOUTHERN CALIFORNIA EDISON
Southern Company
TVA
Western Area Power Administration



Affiliates

Arizona State University
Cal Poly
Colorado State University
Iowa State University
NM State
North Carolina Agricultural and Technical State University
OSU Oregon State University
Portland State University
Prairie View A&M University
South Dakota State University
Texas State University
Tuskegee University
University at Buffalo The State University of New York
The University of Memphis
University of Nebraska Lincoln
UNC Charlotte
University of Pittsburgh
University of South Alabama
The University of Tennessee Chattanooga

EPRI

GridEd 2019-2023 | Intersection of Digital & Grid

Train the next generation of power engineers and data scientists so they can design and develop the grid architecture and infrastructure to enable the integration of DER.

Train the future workforce on the intersection of OT and IT

Three Key Activities

Professional Training Short Courses

Workforce Development Discussion & Deliverables

University Curriculum Development

Key Milestones and Outcomes

Professional Training

- Over 40 unique short courses and self-paced trainings delivered by 33 instructors to affiliate and non-affiliate network.
- ~4,200 participants enrolled in these 40+ engagements
- ~26,000 professional development hours granted
- ~900 Certificates of Completion awarded.
- Aggregate levels of participant motivation, commitment, confidence and satisfaction all exceeded our target goal of 85% positive.

"I thought the instructor described the different ways to utilize energy storage. My understanding about the topic has increased exponentially."

"The best takeaways for this course was the way to apply ML algorithms for distribution networks."

Workforce Development Activities

- Held monthly Information Exchange Meetings to share resources for recruiting, training, retaining talent, up-skilling/re-skilling, career mapping, helping employees and supervisors navigate and embrace change (Gen Z, the gig economy).
- Facilitated implementation of a stakeholder engagement approach to update role descriptions for keeping pace with digital transformation /grid modernization.
- Published 2 whitepapers (listed to the right).
- Delivered a Webinar presenting a sample utility-specific skills taxonomy with data dictionary.

Summary Reports

Workforce Skills of the Future: A Methodological Framework for Organizations to Adapt to a Rapidly Changing Electric Sector

Workforce Skills of the Future: A Grid Modernization “Case Study" for an in-depth review of learnings

University Course Development

- 35 unique courses have created or revised by faculty at 5 universities.
- ~1,500 students enrolled in these courses (~800 undergraduates and ~700 graduate students were impacted by this project).
- More than 900 students evaluated their instructors and courses, providing ratings and feedback (~53,000 words).
- Aggregate levels of student motivation, commitment, confidence and satisfaction with courses and instructors all exceeded our target goal of 85% positive.

Partner Universities

Propagating the University Course Materials

- 25 Affiliate Universities (AUs) engaged, including 6 historically black colleges and universities (HBCUs).
- Awarded ~$210k to 44 student design projects impacting 161 students at 14 affiliate universities.
- Connected AUs to regional utilities to close gaps in training and hiring needs. Included facilitating 1½ day meetings on campus with HBCUs (Alabama A&M, Tuskegee, Tennessee State) to engage students and professors on how to strengthen partnerships between utilities and HBCUs.

Lessons

Lessons

- The ***collaborative business model*** EPRI employed works well for developing ***professional training courses***. This will be sustained with industry funding moving forward!

- ***Broader workforce development activities*** valued by HR departments may also be sustainable under this model, but the effort will likely need to be tailored to each utility and expanded to the broadest set of utility jobs possible.

Lessons (cont'd)

- There is <u>not</u> consistent interest across industry to financially support ***university course revision and new course creation***. This activity may continue in regions where there is an executive champion at the utility and a strong relationship with the local university or universities.

- There is <u>varying</u> levels of interest from industry to financially support other student engagement activities such as ***student design projects and design challenges***. Government support may continue to be needed in some regions.

Lessons (cont'd)

- ***Government funding*** for ***university curriculum development*** should focus on funding ***train-the-trainer activities***, as universities themselves are losing professors with extensive experience. Industry could support this by providing ***subject matter experts*** as well as ***source materials*** (photos, videos, case studies) that could be incorporated into courses that professors can customize.

- ***Government funding*** could also focus on expanding to ***technical college course development***.

Questions

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