

IEEE-USA Response: Strategic Vision for the American Power and Energy Workforce

IEEE-USA, representing approximately 150,000 technology professionals, appreciates the opportunity to provide this strategic vision for a robust, nimble workforce development program. Our vision centers on the Advanced Energy and Power Generation sector. To move from vision to execution, we must modernize the American workforce by bridging the gap between academic theory and industrial reality.

1. Workforce Needs: Navigating the Energy Crisis and "Awareness Gap."

The global power engineering workforce must grow by up to 200% by 2030 to design, implement, and operate new power infrastructure. However, current development activities face significant internal friction: many students take longer to complete engineering and science degrees, and many change majors mid-study.

A major gap exists between university curricula and the proficiencies sought by industry. To address this, we recommend integrating technician-level work into curricula and separating electrical power engineering from current electrical engineering, which often focuses on microelectronics. We also recommend that universities put greater emphasis on grid and civil engineering, potentially at the Bachelor of Science level through a specialized minor or an emphasis in power engineering, application-focused Master of Science programs integrated with industry, and short online courses that can be taken by those already in the workforce who need renewed certification or those interested in joining the workforce.

2. Capabilities and Regional Coordination: The IUCRC Model

IEEE, through groups such as the IEEE Power & Energy Society (PES), serves as a vital bridge in validating that curricula meet industry needs. We recommend that the National Academies or the National Science Foundation (NSF) collaborate with universities and industry to produce reports that identify the cutting-edge skill needs for key technology sectors to guide federal investments and inform new academic programs. To manage regional activities, NSF can facilitate "Industry-University Research Partnerships" (IUCRCs) by leveraging successful templates such as the Grid of Tomorrow and the Florida Energy Systems Consortium to scale regional ecosystems.

Coordination will involve direct engagement among the power sector, CEOs, local universities, and community colleges to guide workforce training. The federal government should also work closely with trade unions to understand evolving labor relationships. Effective execution must be channeled through state-level legislative infrastructure, leveraging State Boards of Education, Engineering Licensure Boards, and Economic Development Offices to adapt successful pilot programs demonstrated elsewhere to their unique geographic and industrial profile.

3. Applied Learning and Infrastructure: "Living Labs" and Digital Twins

IEEE-USA | 2001 L Street, N.W., Suite 700, Washington, D.C. 20036-4928 USA

Office: +1 202 785 0017 | Fax: +1 202 785 0835 | E-mail: ieeusa@ieee.org | Web: <https://ieeusa.org>

Execution must be localized even while the vision remains federal. We propose scaling paid apprenticeships and work-based learning through the IUCRC member pipeline. This includes leveraging the presence of National Labs and other federal research institutions.

We must also address site access challenges by recognizing the role of citizenship in sensitive positions at critical infrastructure. Furthermore, we advocate using Digital Twins, virtual replicas of work environments, to deliver risk-free, scalable training. These immersive environments allow users to experiment and fail safely, accelerating competency while reducing training costs. Integrating AI-enabled tutors into these environments provides real-time, personalized feedback that scales far better than human instruction alone.

4. Awareness, Metrics, and Long-Term Sustainability

To rebuild the skilled workforce pipeline, we must also inspire early-stage interest in STEM through K-12 education. The federal government should engage with professional societies and industry to expand science education, focusing on outreach to foster a passion for science among the next generation of the nation's workforce. We recommend convening annual meetings, facilitated by the Academies and NSF, in which university department chairs meet with industry representatives to better align academic goals with industry workforce needs.

Performance could be assessed by graduation rates in power engineering disciplines and by greater coordination of federal, state, and union training strategies. Long-term sustainability will be achieved by increasing research grants across a broader range of power engineering topics and by making higher education and power engineering less financially restrictive. This includes competitive salaries for postgraduate work and entry-level roles in the power sector.

5. Priority Feedback for Science and Technology

Current curriculum changes are often too slow due to constraints imposed by the Accreditation Board for Engineering and Technology (ABET). Industry collaborations are critical, yet industry advisors sometimes have limited visibility into actual practices. The federal government should signal to professional societies that active professionals should be integrated into the accreditation framework to validate student readiness for real-world challenges in a timely manner. Lastly, by addressing low retention rates for foreign-born STEM graduates, specifically by advocating for "Green Cards on Diplomas", we can ensure the world-class talent we train remains part of the American industrial base.