U.S. Department of Energy

Office of Electricity Delivery and Energy Reliability

Electricity Advisory Committee

Workforce Ad Hoc Committee Panel Discussion

Wanda Reder

June 11, 2012

2012 Workforce Ad-Hoc Background

DOE EAC create an EAC Workforce Ad Hoc Working Group to review the workforce needs and make recommendations to ensure those with appropriate skills sets are available to support the future grid.

- Consists EAC members and invited participants
- Coordinate with others
- Committee activity will sunset after their recommendations
- Participants:
  - Chairs: Wanda Reder; Vice-Chair: Tom Sloan
  - DOE Point of Contact: David Meyer, Gil Bindewald, Anjan Bose
  - Members: Barbara Kenny, NSF; Ann Randazzo, CEWD, Dennis Ray, PSERC, Barbara Tyran, EPRI; Elaine Ulrich, DOE;
- Additional EAC participation is encouraged!

Drivers of Workforce Requirements

- Electric demand growing via electrification to serve an emerging digital economy
- Infrastructure is aging
- Retirements are increasing while less experienced, culturally divergent workers, are entering
- Grid modernization has become a priority
- Societal needs are changing
- Major investments are needed
- Workforce readiness and preparedness is a national concern: ownership is varied
- Landscape is changing: many initiatives and recommendations

Why does DOE care?

The reliability of the North American electric utility grid is dependent on the accumulated experience and technical expertise of those who design and operate the system. As the rapidly aging workforce leaves the industry over the next five to ten years, the challenge to the electric utility industry will be to fill this void…

2006 Long-Term Reliability Assessment

North American Electric Reliability Corp.

Landscape is Changing

- Significant attrition
- Changing business needs
- Economic impact and resulting trends
  - Workers continue to delay their retirement
  - Jobs that were anticipated have not incrementally been added
  - Out-sourcing is becoming more prevalent
- Many new programs
- Hiring and retaining the best and brightest can be challenging in lieu of a decreasing workforce
- Fewer new applicants can meet pre-employment requirements

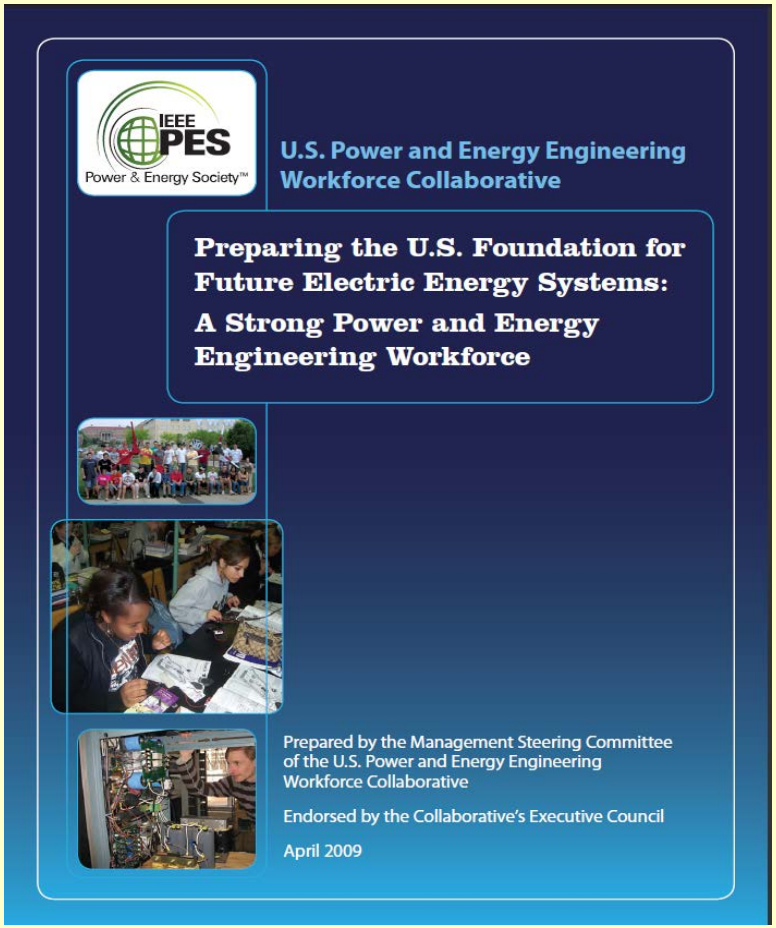
Landscape is Changing

- Aging demographic of power engineering academics
- Emerging student interest in green jobs with large societal impact
- Many new initiatives -- scholarships, internships, career awareness, surveys, curriculum developed from stimulus funding
- Emerging competency requirements for the future grid (like cyber security)
- New curriculum has been developed
- Efforts to allocate research through Centers for Excellence

IEEE PES Workforce Collaborative Goals

Published April, 2009

1. Double the number of power graduates
2. Provide $4 million undergraduate power engineering scholarships
3. Create 2,000 internship opportunities
4. Hire 80 new power faculty members in the US over the next five years
5. Raise annual university research funding to $50 million per year
6. Create five University Centers of Excellence to conduct power research and education



In easy-to-reference lists, the report outlines specific steps for industry, government and educators to meet these goals.

IEEE PES Scholarship Plus Initiative ™

- Scholarship: $2000, $2000 and $3000 in year 1, 2 and 3
- Up to two years of career experience
- For US citizen or permanent residents with one year of completed undergraduate study
- Attending ABET accredited school with undergraduate power classes

IEEE

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SCHOLARSHIP PLUS INITIATIVE™
Preparing the Next Generation of Power & Energy Engineers

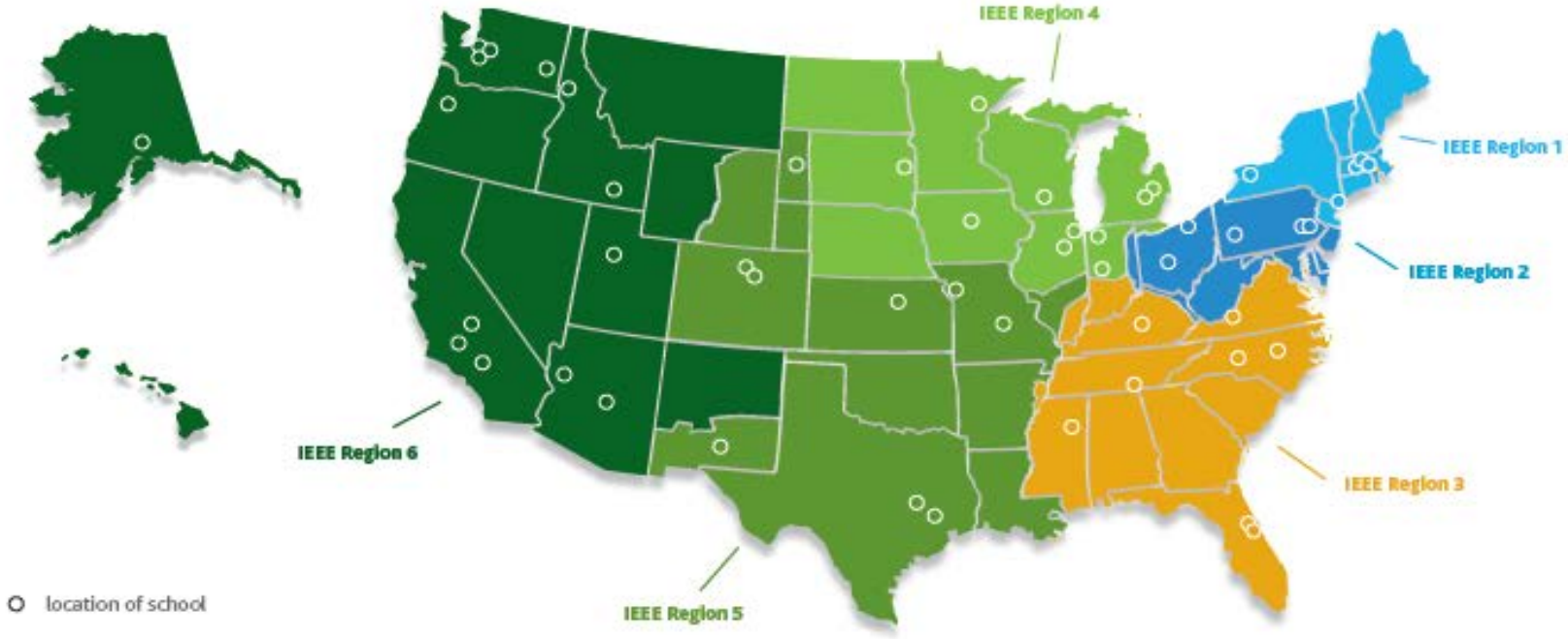
Awarded scholarships to 93 undergraduate students at 51 universities across the U.S. in 2011

Online application:

- www.ee-scholarship.org

PES SCHOLARSHIPS AWARDED 2011-2012

IEEE Region 1	IEEE Region 2	IEEE Region 3	IEEE Region 4	IEEE Region 5	IEEE Region 6
12 Scholarships Awarded	12 Scholarships Awarded	18 Scholarships Awarded	18 Scholarships Awarded	13 Scholarships Awarded	20 Scholarships Awarded
5 Schools	5 Schools	8 Schools	10 Schools	9 Schools	14 Schools



Total national percentage: 77% Male Students 23% Female Students

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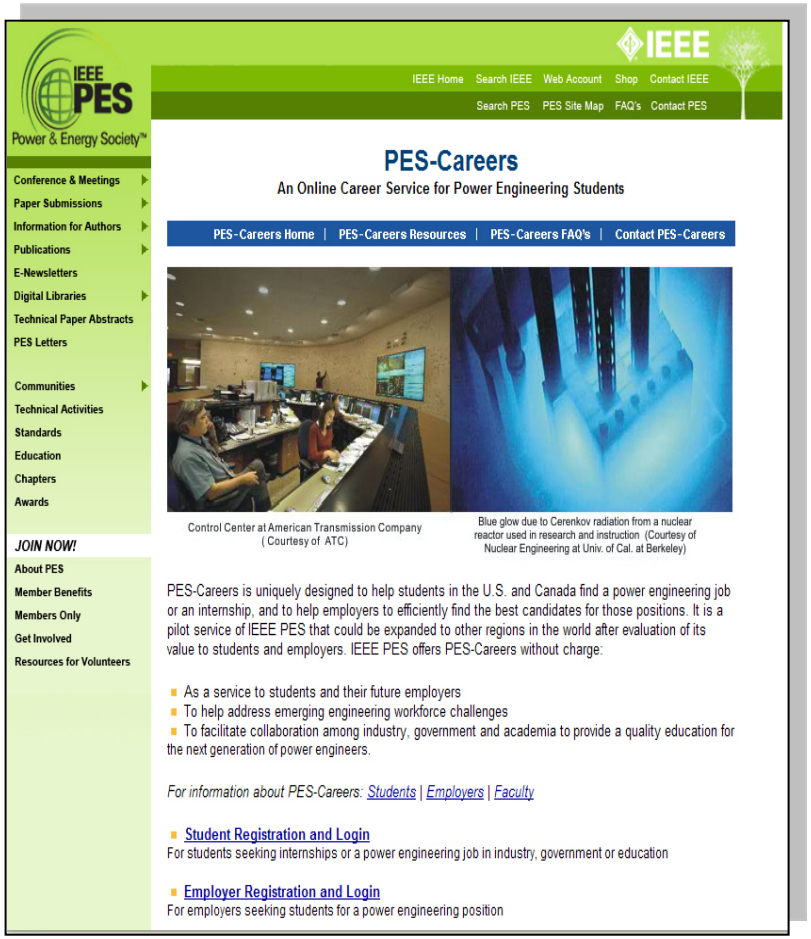
Career Experience - Uses PES-Carreers.org

- PES-Careers is an online resource with subscribers
  - Students us it up to one year after graduation
  - Employers post employment opportunities and provide mentors
  - It's free!
- Generally available to industry and students
- Used to facilitate career and mentorship for PES Scholarship Plus recipients



www.ieee-pes.org/workforce/pes-careers

PES Scholarship Plus Capital Campaign

Thank You For Your Generous Support!

You have made the IEEE PES Scholarship Plus Initiative™ possible.

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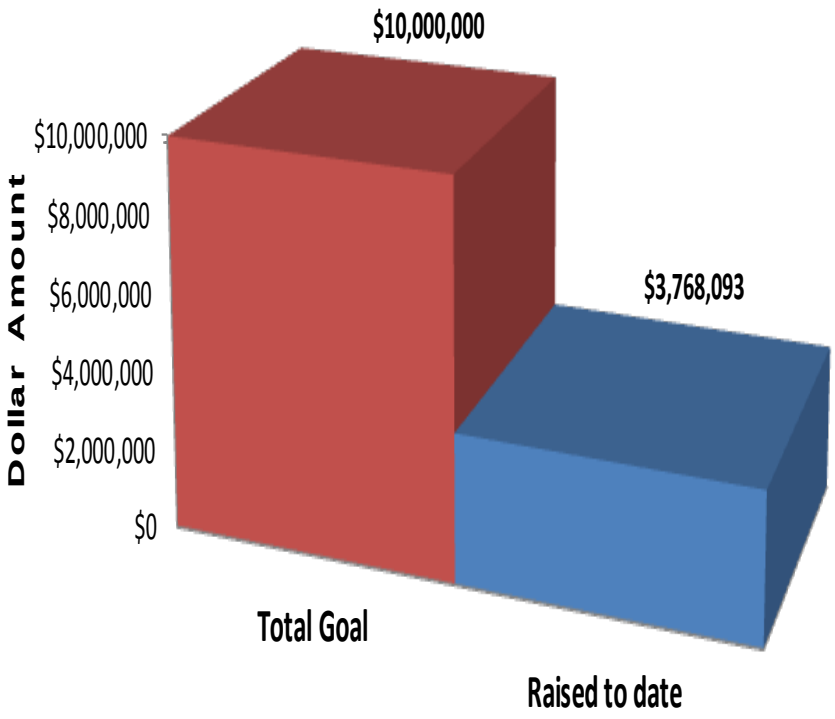

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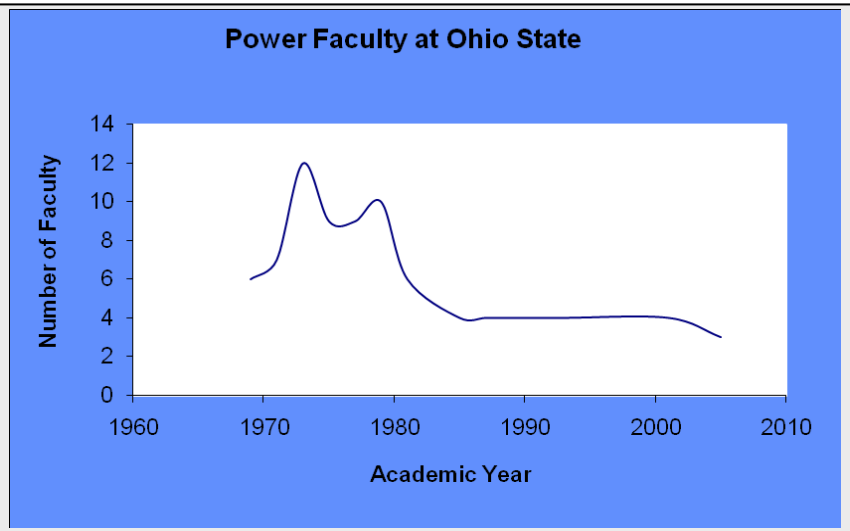
The Power Engineering Education Dilemma

- Undergraduate specialization is becoming less prevalent
  - More power electives are needed
  - The average age of faculty is increasing
  - Funds are limited for recruiting new faculty
  - The reduction in elective credit hours

- A need for more:
  - “Power” faculty for teaching and research
  - Frequent monitoring of academic supply and demand
  - Frequent monitoring of Power Engineering program availability
  - Stackable, modular curriculum for flexibility to meet evolving needs

Power Systems Engineering Programs

- Weakening programs:
  - Of 48 university programs surveyed in 1987/8 and 2005/6, 50% declined and 15% grew Former strong programs declining or ending
- Increasing ECE interest in power to rebuild (What? Where? When?)
- IEEE PES is developing an on-line power program survey instrument



Power Engineering Faculty

Carnegie Mellon University:
1975: 8 faculty; 2007: 1

Cornell University:
1975: 7 faculty; 2007: 1

University of Michigan*:
1971: 5 faculty; 2007: 0

UC Berkeley:
1971: 4 faculty; 2007: 1

Univ. of Missouri-Columbia:
1975: 8 faculty; 2007: 0

*** Recent decision to rebuild program**

Source: IEEE Power Engineering Education Committee Survey Results for Various Academic Years.

Questions for Workforce Preparedness

- What's known about attrition? What is needed?
- What are the impacts from the changing landscape?
- What are the new programs? Are they working and sustainable?
- Is there more or less stress about the workforce outlook?
- How are past recommendations impacted?
- Is the pipeline adequate with appropriate skills?
- Are coordinated plans needed?
- Are collaboration efforts effective?

Recommendations

- Add EAC members to the Workforce Ad-Hoc Committee
- Review and approve the white-paper outline
- Recommendations:
  - Clarify roles of stakeholders
  - Increase coordination
    - Training curricula, programs, and partnerships between utilities, unions, education centers
  - Better monitor and measure supply and demand
  - Determine range of impact based upon measures taken. Develop and coordinate messaging
  - Utilize findings from Smart Grid stimulus projects to understand workforce development needs

Workforce Panel

- Panelists:
  - Barbara Kenny, National Science Foundation
  - Ann Randazzo, Center for Energy Workforce Development
  - Gil Bindewald, DOE-OE

- Focus
  - What exists?
  - Where are there gaps?
  - What can and should be done?
  - Implications?