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*The Emerging Technical Talent is our Future...  
Are we Ready?*

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*Overview*

- US Electric Industry Challenge
- Technical Workforce Supply
- Recognition of the Workforce Challenge
- Power Engineering Trends and Concerns
- Workshop and Recommendations
- Organizing for Implementation

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## The US Electric Industry Challenge

- US electric demand predicted to increase 40% by 2030\*
  - Capacity margins eroding
  - Requires additional generation and delivery investments
- Aging infrastructure:
  - More maintenance
  - Increased equipment replacement
- Complex systems:
  - More reliant on technology
  - Convergence of communications, computing and energy systems
- Changing societal needs and global concerns

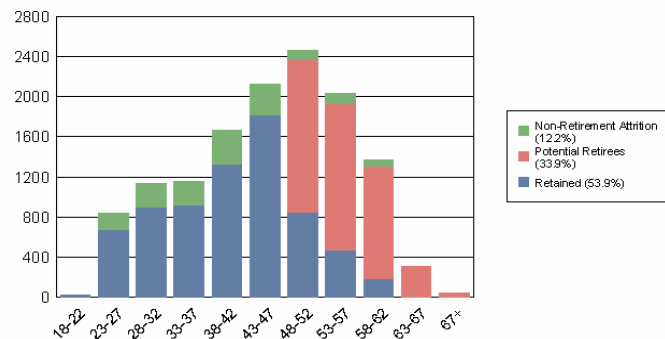
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\* Source: US Department of Energy, Annual Energy Outlook 2007 Early Release

## Technical Workforce Supply

46% of engineering jobs could be vacated by 2012 \*

### All Engineers



Potential Retirees are defined as older than 53 with 25+ years of service, or older than 63 with 20 years of service, or older than 67 within the next five years

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\*Source: Gaps in the Energy Workforce Pipeline: A 2007 Workforce Survey Report From the Center for Energy Workforce Development Center

## *Recognition of the Workforce Challenge*

### **Workforce Trends in the Electric Utility Industry: DOE, 2006**

*“Today, the power engineering education system in the United States is at a critical decision point. Without strong support for strategic research in power systems engineering and without qualified replacements for retiring faculty, the strength of our Nation’s university-based power engineering programs will wane, and along with them, the foundation for innovation in the power sector to meet our energy challenges in the 21st century.”*

### **Long-Term Reliability Assessment: NERC, 2007**

*“The loss of industry workers and their years of accumulated expertise due to retirements is a serious threat to the bulk power system reliability, exacerbated by the lack of new recruits entering the field.*

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## *Power Engineering Trends*

- From 2001-02 to 2005-06 enrollments\* ...
  - Electrical engineering enrollment: declined
  - Undergraduate elective power class students: declined 3500 to 3300
  - Graduating Masters students in power: declined 1600 to 1400
  - Graduating power-related Ph.D.s: rose slightly 800 to 900
- Untenured faculty decline: 20% in early 90s to 12% now
- Research funding decline: 17% compared to 2001-02
- Not all retiring professors are being replaced
- Major university power programs ending
- Increasing international graduate students: now 59%

\*Source: IEEE Power Engineering Education Committee Survey Results for 2005-06 Academic Year.

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## *Power Engineering Concerns*

### *The Emerging Technical Talent is our Future...*

Need more:

- Increasing demand for technical talent and experience
- Rapid forecasted attrition

Supply is questionable:

- Students in the pipeline are declining
- Retiring faculty are not being replaced
- Education infrastructure needed to capture emerging interest in 'energy,' 'sustainability', and saving the earth

*Are we Ready?*

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## *Future Power Engineering Workshop*

- Workshop held in November 2007 with 75 attending
  - Sponsor: National Science Foundation
  - Co-Sponsor: NERC, IEEE PES, PSERC
  - Attendance from industry, government, universities
  - Included an Executive Summit comprised of key leaders
- Purpose: explore how to build university infrastructure for the upcoming power engineering demand
  - Making the case for building, enhancing and sustaining programs
  - Accepting ownership of the problems
  - Building the student pipeline
  - Communicating an exciting image
  - Teaching to motivate
  - Supporting research for innovation and faculty hiring
  - Committing to work for solutions

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## *Key Recommendations*

- Create a single, collaborative voice on solutions
- Paint future challenges to enhance the image and increase interest in related careers
- Stimulate interest and prepare students for a post-high school engineering education
- Make the higher education experience relevant, stimulating and effective
- Strengthen the case to build, enhance and sustain university programs
- Increase university research funding by government and industry to find innovative solutions and to enhance student education

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## *Organize for Implementation*

- Begin Power and Energy Engineering Workforce Collaboration Initiative
- Define a structure to implement recommendations
  - Build more collaboration for outreach, education and research
  - Complement existing efforts of others to the extent possible
  - Get all stakeholders to realize their roles in the solutions
- Proposed interim structure
  - Executive Council:
    - Lead working group activities
    - Plan activities and advocate for solutions
  - Working groups
    - Outreach & Image: Create and communicate exciting image
    - Education : Enhance at K-12 and university levels
    - Research Support : Expand funding of university research

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## *Conclusions*

- The emerging technical talent is our future
  - Demand is increasing
  - Supply is decreasing
- Opportunity to capture interest 'energy' and 'sustainability'
- Collaboration and organization is key for success
  - Outreach and Image
  - Education
  - Research Support
- We will be ready!

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## *For More Information:*

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