

***IEEE Power Engineering Society:
2007 Switchgear Committee Spring Meeting***

Preparing for Membership of the Future

Wanda Reder

IEEE PES President-Elect



Vice President — Power Systems Services
S&C Electric Company



Overview

- Understand the Power Industry Talent Challenge
- Recommended Employer Actions
- Meet the IEEE PES Governing Board
- IEEE PES Long Range Plan and 2007 Goals
- What's New at IEEE PES?
- Recommended IEEE PES Tech. Committee Actions



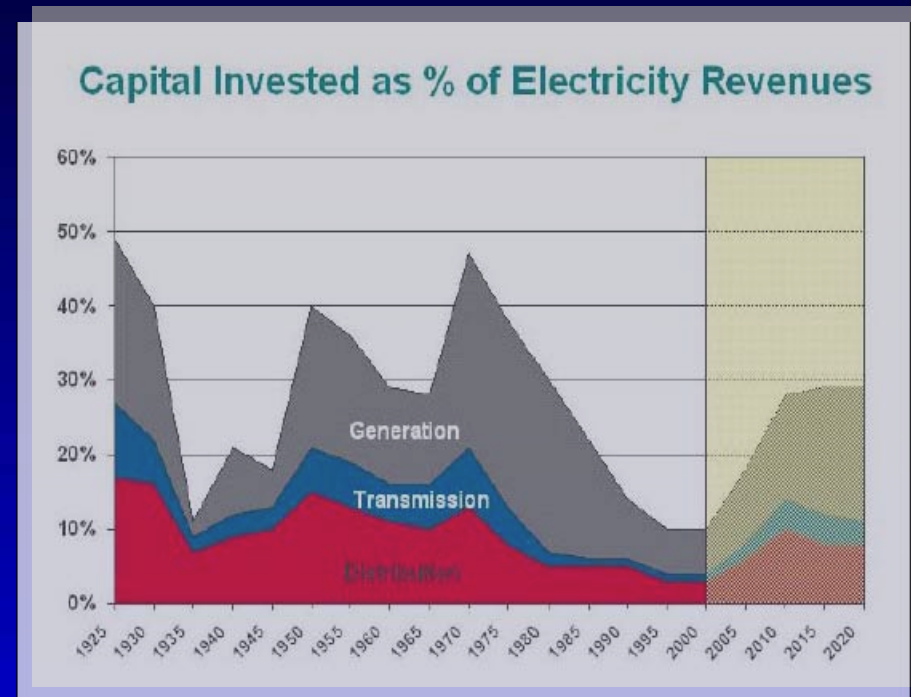
Numbers We Cannot Ignore (United States)

- Workers are getting older
 - By 2010, one in three U.S. workers will be age 50 or older
 - Utility executives estimate $\frac{1}{2}$ of the technical workforce will reach retirement age in 5 – 10 years
 - At 50+, utility craft workers have highest average age of any industry
- Demand is increasing
 - In 2015, a 15% decline of ages 35 – 44; demand increases 25%
 - 2010 demand for U.S. electrical engineers in construction will be up from 150,000 today to 175,000
- Supply is decreasing
 - Reduction in graduating engineers during the past 15 years
 - Decrease in power engineering graduates



Infrastructure Needs and Expertise Impact

- Emerging needs
 - Increased maintenance
 - Adaptation of technology
 - Integration of new with old
 - Increased capital spending
 - Increased environmental and political interests



Will experience to do basic utility work be available?

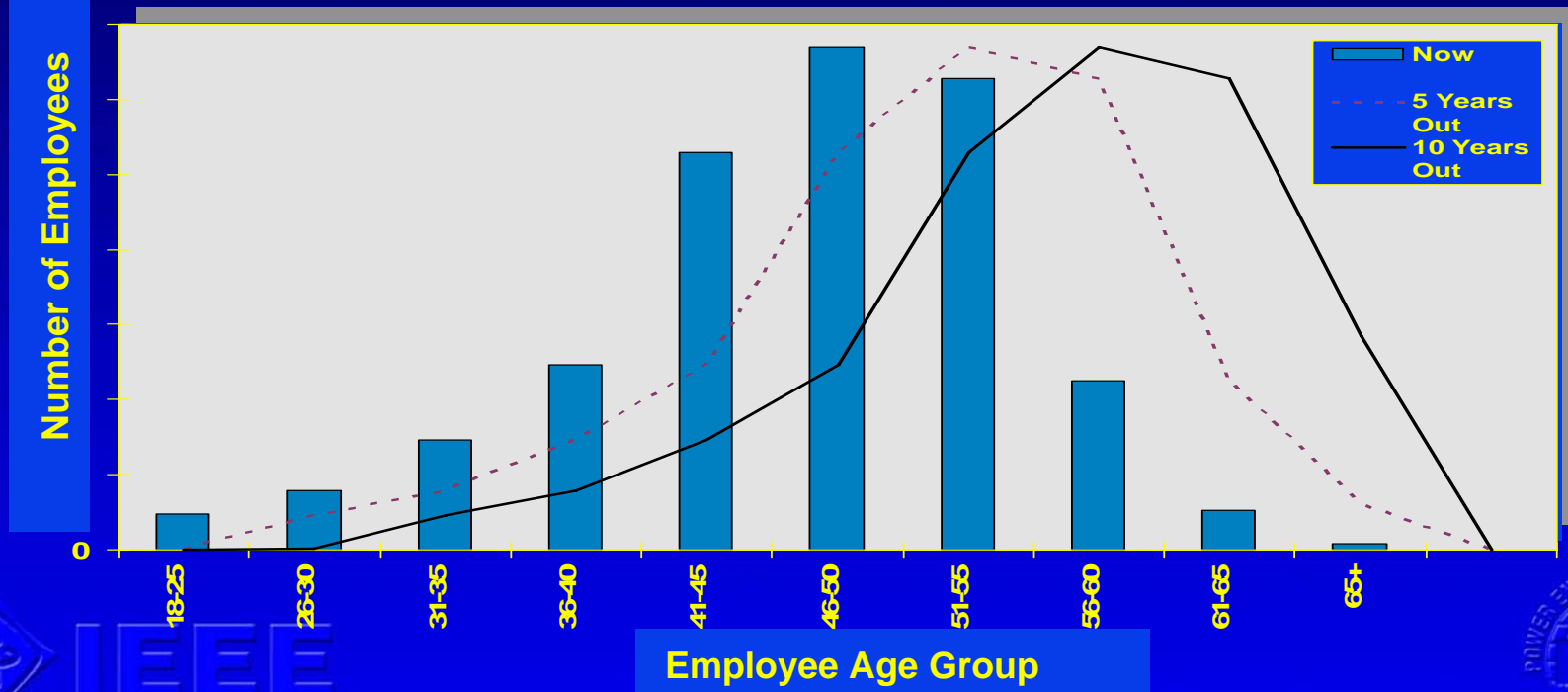
Will infrastructure be available to attract and train enough talent?



Workforce Overview

- Financial and plant focus: Intellectual set aside
- Knowledge is leaving
- Number pursuing power-related careers has dwindled

Typical Electric Utility Employee Age Distribution

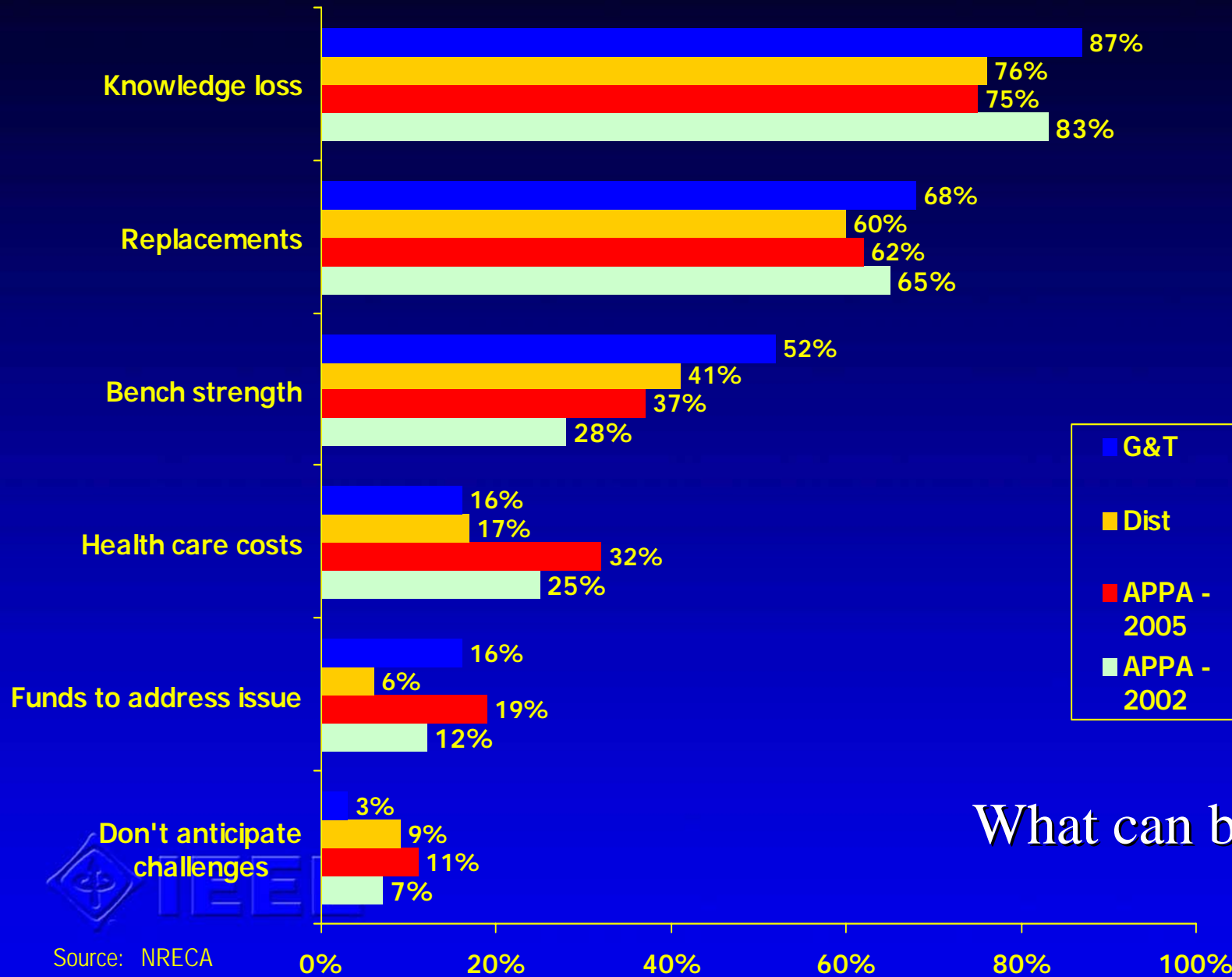


The Challenge

- Demand is UP
 - Significant forecasted attrition
 - Increasing workload
- Supply is DOWN
 - Declining expertise and practical knowledge
 - Limited workforce pipeline
 - Declining academic and training infrastructure
- Additional Complications
 - Challenges from international reliance
 - Suffering industry image
 - Shifting to address long-term needs



Concerns From Anticipated Retirements



What can be done?



Workforce Planning: Modeling

- Workforce planning / modeling / standardize reporting
 - How many employees will retire in the next 5 years?
 - Which departments will be most affected?
 - What are the risks?
 - What will it cost to replace lost talent?



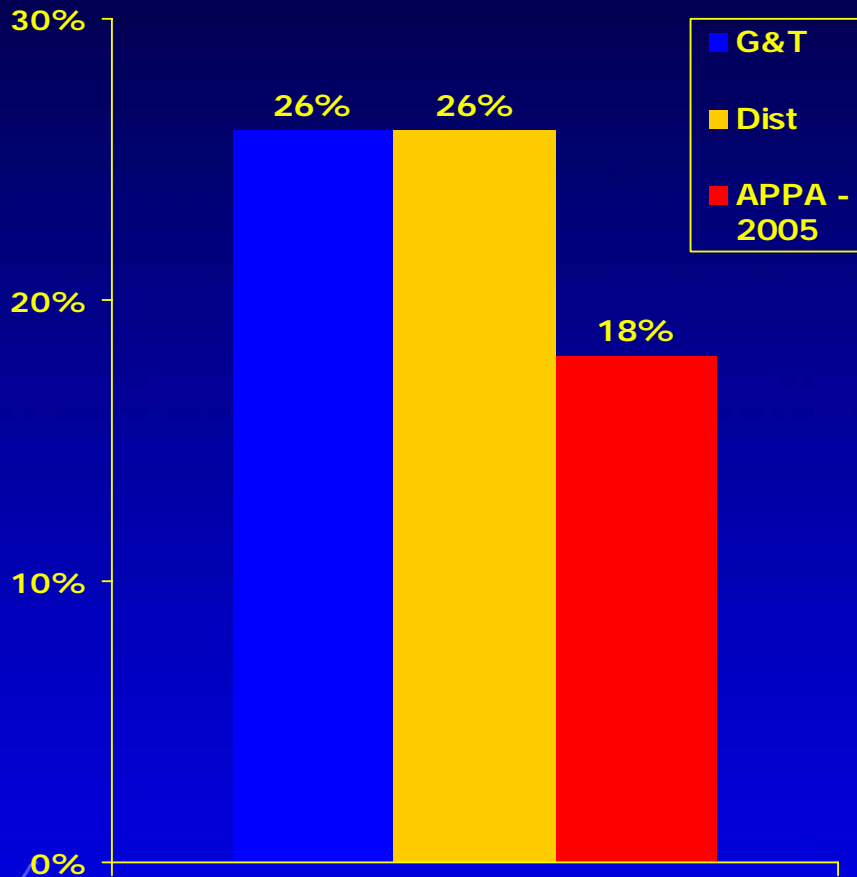
Workforce Planning: Succession

- What organizational level does succession planning occur?
 - Results
 - All for Senior Management
 - Two-thirds for Middle Management
 - Isolated for key technical, individual contributors and first line managers
 - How are Succession plans being used?
 - Planning for attrition continuity
 - Identify bench strength
 - Generate training requirements
 - Create developmental plans
 - Create visibility of talent
 - Identify talent gaps
 - Identify successors

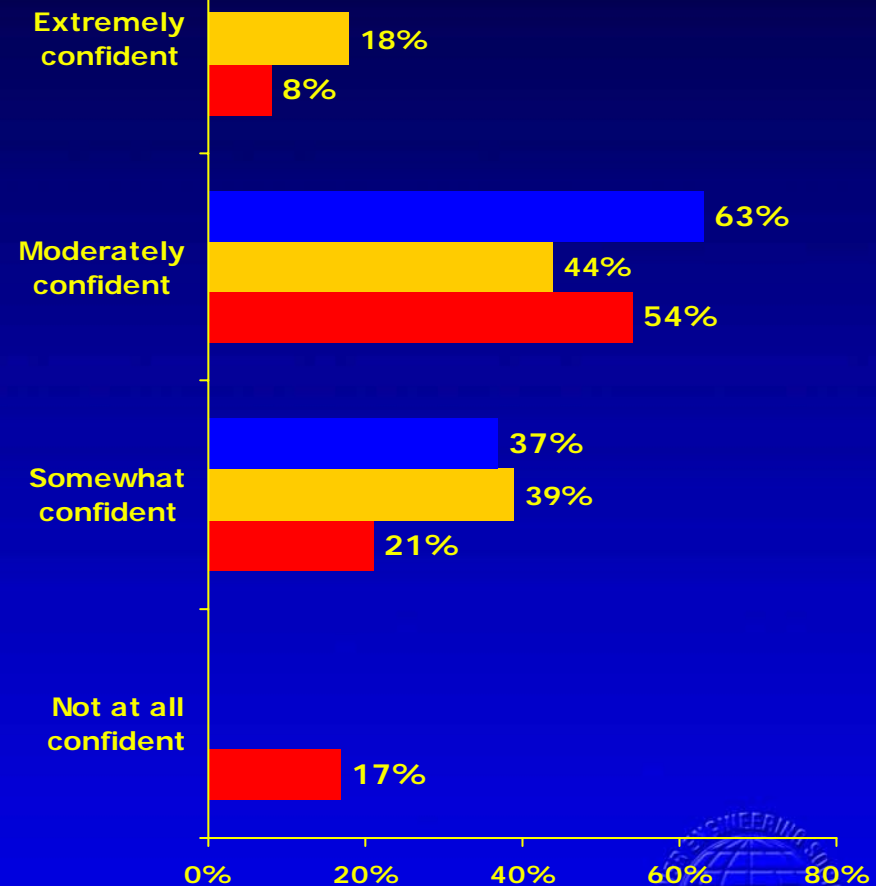


Workforce Planning: Effectiveness

Have Plan



IF YES: Confidence in Co-op's Plan In Meeting Projected Workforce Needs

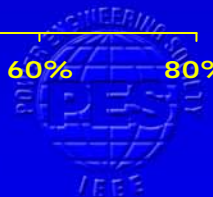


IEEE Yes

Source: Succession Planning Survey

Combined G&T/Distribution Survey targeting HR Community

Sample 321 of 785 Systems: 41% Response Rate



Acknowledge Changing Expectations

Baby Boomers



- 20+ years experience
- Comfortable with print
- Well established networks
- Take work seriously
- Loyal, employed for life
- Serve as mentors
- Less diverse

Generation X



- Upwardly mobile
- Computer savvy
- Prefer on-line media
- Strive for life-balance
- Expect job shifts, training
- Varying needs, flex time
- More diverse

Technology for Knowledge Retention

- SCADA
- Residential Load Control
- Distribution Automation
- Automated Meter Reading



Device Control & Data Gathering

- Geographic Info
- Customer Systems
- Reliability Focus
- Dist. Management Systems
- Trending

Communication and Computing Evolution & Information Developing

- Design Tool
- Auto Planning Tool
- Reliability Web
- Mobile Communications
- Work & Supply Management



Information Integration, Web, Process / Technology Linkage to Get More for Less, Rapid Change



Technology can aid in retention, knowledge transfer, training and efficiency



Knowledge Retention Requires Training

- Entry level employees need some education and advanced skills
 - Engineers will not have power backgrounds
 - Retirees will exit before tribal knowledge can be transferred
- Approaches
 - Maintain a “chief” to coach and mentor
 - Arrange corporate university programs
 - Re-invest in power and trades educational development
 - Support participation in professional societies
 - Develop e-training focusing on practical application

Supporting Quotations

Workforce Trends in the Electric Utility Industry, DOE, August 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.”

2006 Long-Term Reliability Assessment. NERC

“The electric utility industry as a whole has not...established the needed cooperative programs with academia to reinvigorate the power engineering education in North America.”



Power Engineering Academic Status

Inside USA

- Retirements outpacing new professor hires
 - Average age increasing
 - Power faculties have ~3 professors
- Viable programs are down
- Students
 - Attracted to other areas
 - Many are non-US

Outside USA

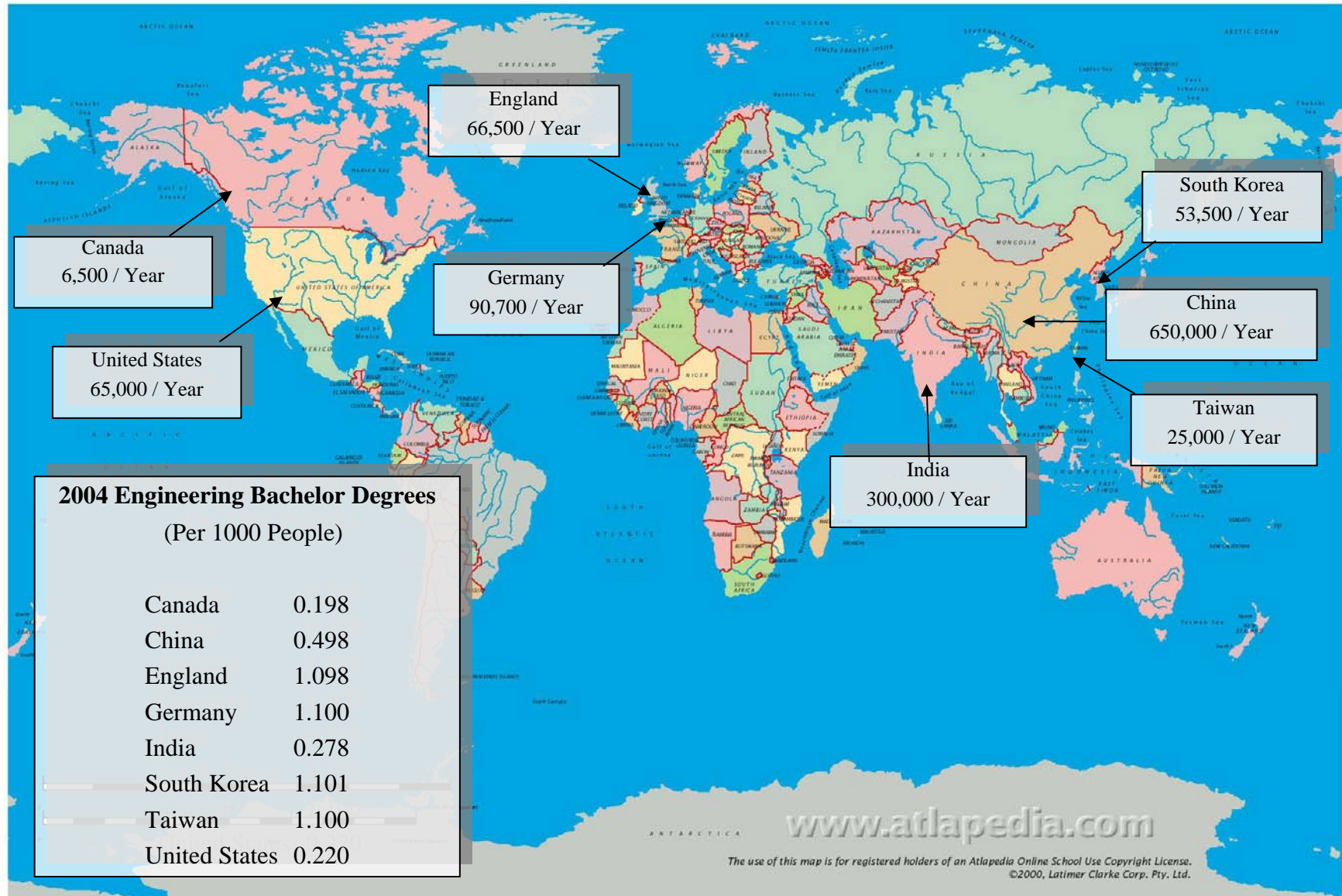
- New professor hires outpace retirements
 - Power faculties have ~ 10 professors
- Growing enrollment
- Students
 - Positive image
 - Potential provider for U.S. needs



Revitalization of power engineering infrastructure is needed

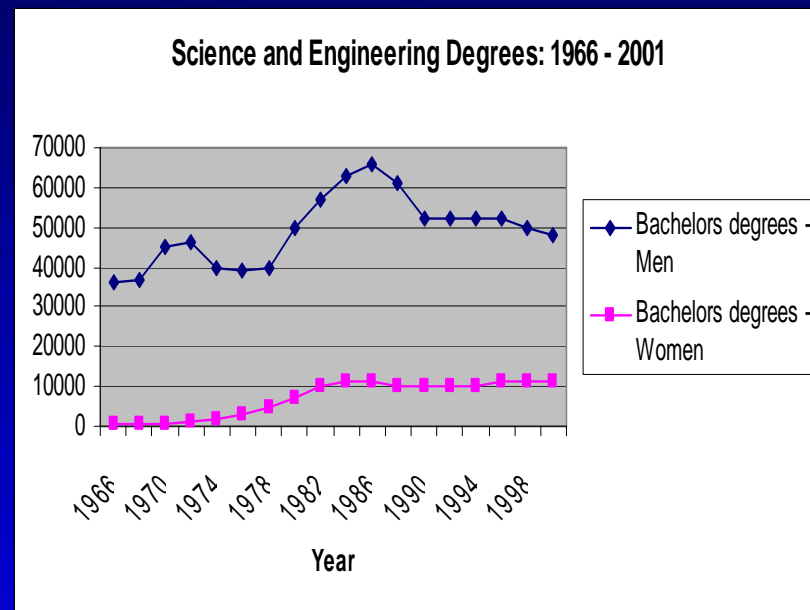


2004 Engineering Bachelor Degrees



Students in Science and Engineering

- 50% of workforce is women
- In the U.S. women are:
 - 11% of engineering workforce
 - 20% of the undergraduate engineering degrees
- U.S. engineering enrollment
 - Women enrollment is steady
 - Men enrollment is declining



E-mentoring network for diversity in engineering and science

www.mentornet.net



Engineering Advocacy

- U.S. Department of Education Reports
 - Nearly 25% of 12th grade students read at a below basic level
 - 35% score below basic in mathematics
 - 47% score below basic in science

Source: Utility Business Education Coalition (UBEC)

- Web Site Development: www.tryengineering.org
 - Resource for students (ages 8-18), teachers, parents
 - Portal about engineering and engineering careers
 - Engineering life profiles
 - Tips on engineering course selection
 - Global engineering university finder
 - Lesson plans
 - Games



Recommended Employer Actions

- ✓ Anticipate retirement and non-retirement attrition risks
- ✓ Create a workforce plan
- ✓ Implement succession planning
- ✓ Extend selected individuals as a ‘chief’ to mentor
- ✓ Utilize technology and process change for efficiency
- ✓ Refine recruitment practices: monitor hiring pool
- ✓ Position for diversity and generational characteristics
- ✓ Establish relationships with schools
- ✓ Migrate to e-learning and formalized training
- ✓ Encourage continuous learning
- ✓ Promote industry image



IEEE PES Actions

- Showcase technology and innovation
- Advocate collaborate actions to mitigate workforce challenges
- Increase training opportunities
- Build IEEE PES chapter and employer channels
- Develop the web-site for recruitment and ease of use
- Incorporate image and development into planning

Meet the Governing Board

- President

 - John McDonald



- President-Elect

 - Wanda Reder



- Secretary

 - Noel Schulz



- Treasurer

 - Alan Rotz



- Immediate Past President

 - H.B. (Teddy) Püttgen



- Division VII Director

 - W.O. (Bill) Kennedy



- Executive Director

 - Robert (Bob) Dent



- Vice President, *Technical Activities*
– Paula Traynor
- Vice President, *Membership/Chapters*
– Enrique Tejera
- Vice President, *Education/Industry Relations*
– Prabha S. Kundur
- Vice President, *Meetings*
– John Paserba
- Vice President, *Technical Information Services*
– S.S. (Mani) Venkata



Members-at-Large

- Member-at-Large
– Eduardo Arriola



- Member-at-Large
– Arun G. Phadke



- Member-at-Large
– Christopher E. Root



- Member-at-Large
– Malcolm Thaden



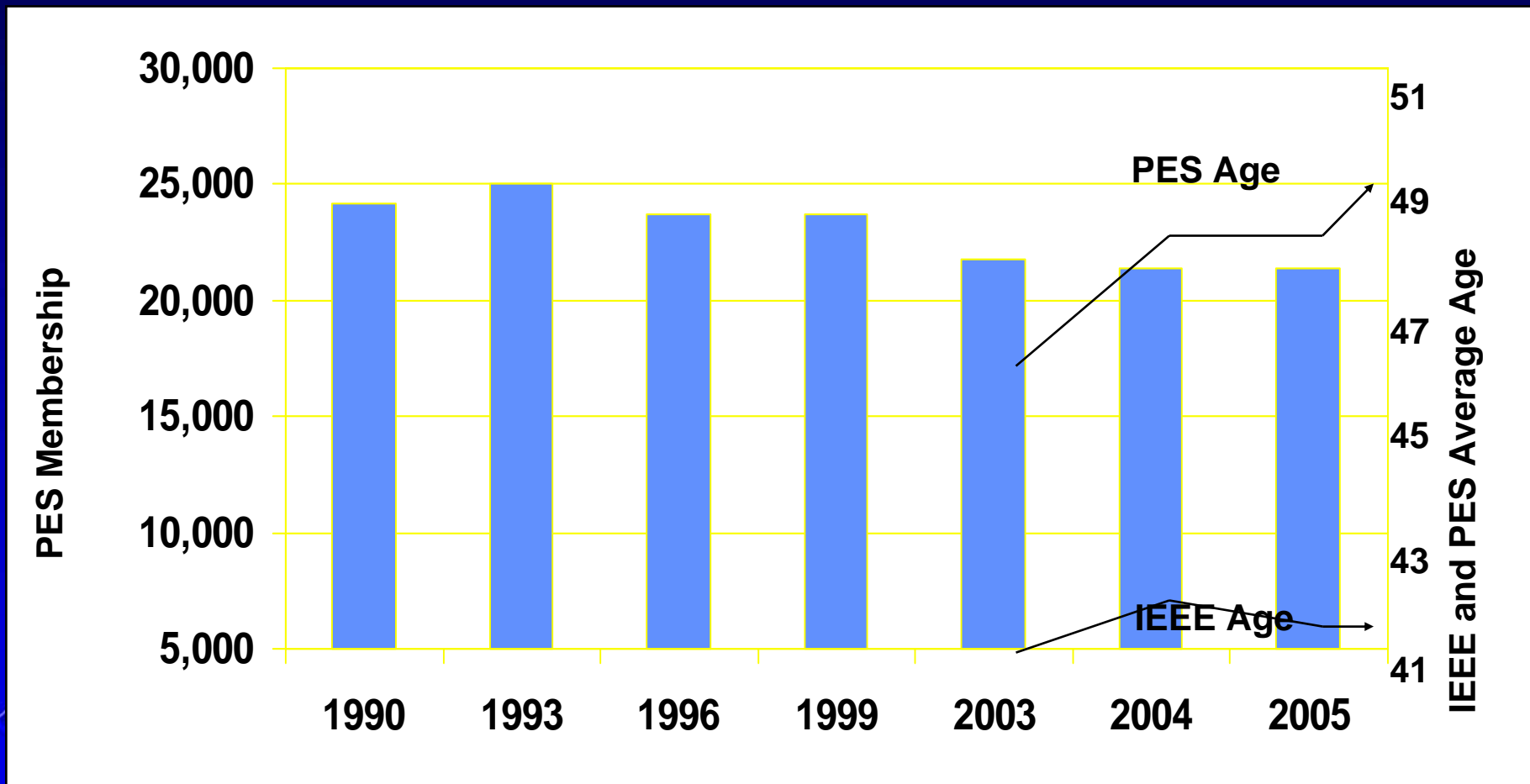
Regional Representatives

- Regional Representative, *R 1-7*
– Roland Dixon
- Regional Representative, *R 8*
– Bruno Meyer
- Regional Representative, *R 9*
– Juan Carlos Miguez
- Regional Representative, *R 10*
– Subrata Mukhopadhyay



PES Membership

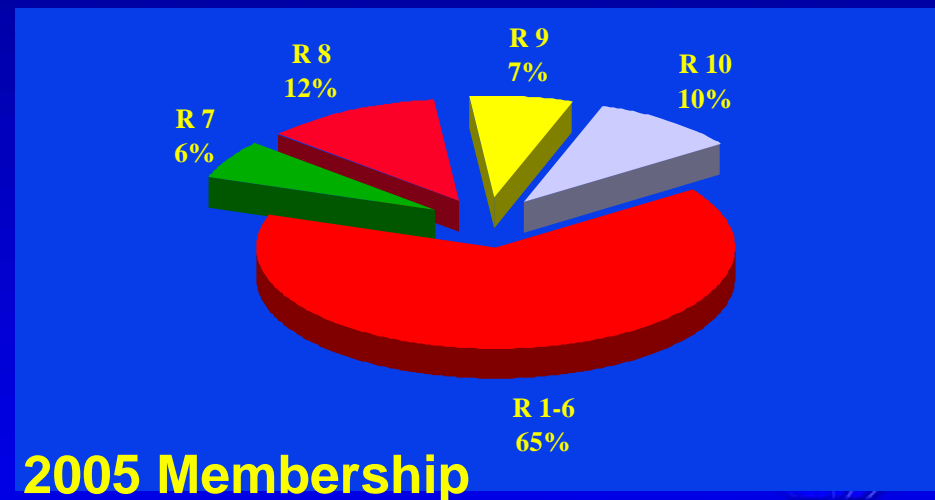
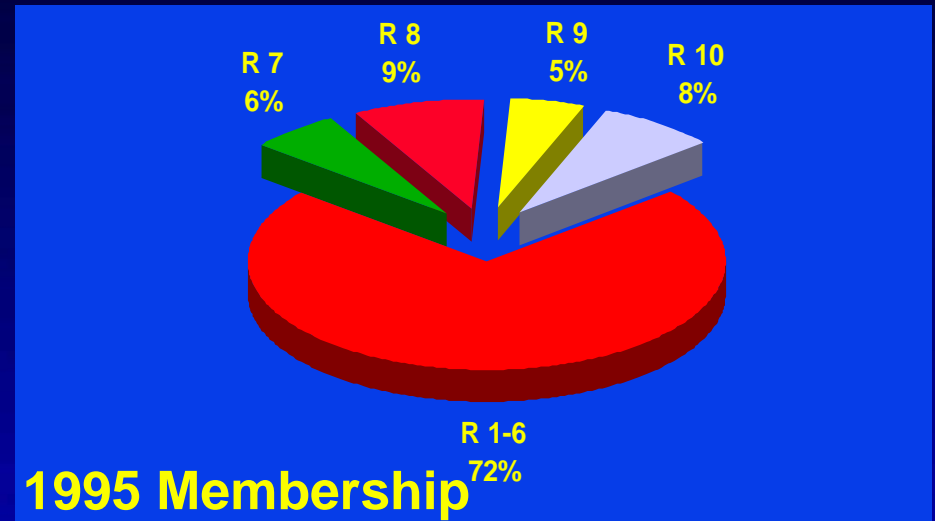
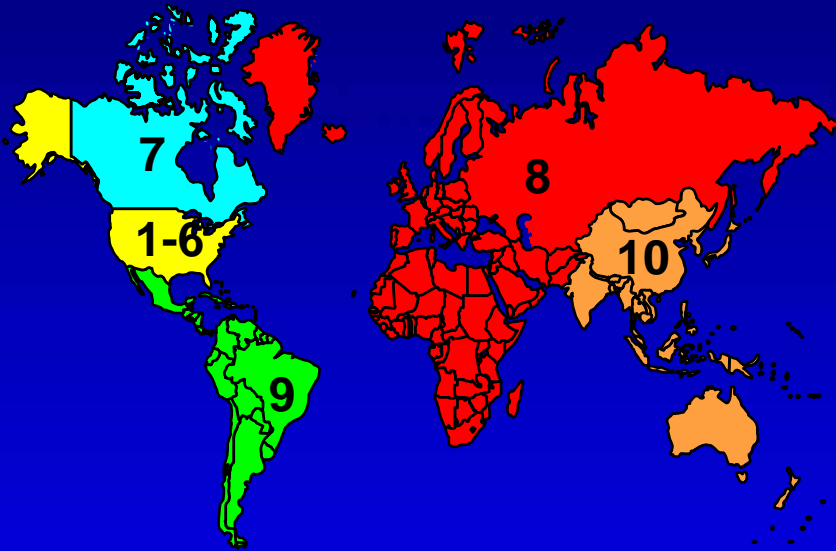
PES Membership and Ave. Age



IEEE PES Membership by Region

2005

- 21,341 members
- 66% in the United States



Long Range Planning and 2007 Goals

- IEEE PES Long Range Plan Developed
 - Committee met from 2004 – 2007
 - Report written
 - Four strategies defined
- 2007 IEEE PES Goals:
 1. Develop and deliver relevant, practical education for our Develop PES strategy to address future workforce
 2. Provide a forum where all industry participants/ perspectives come together and develop a common understanding of issues and well-rounded position papers for betterment of industry
 3. Boost the image of power engineering in the eyes of industry leadership and society
 4. Address emerging technologies in a way that accelerates their use in industry
 5. Improve PES internal efficiency to better meet industry needs



What's New – Image Building

- Improve the visibility and image of power engineering and PES
 - To attract talent to the industry and to PES
 - To ensure there is an academic infrastructure to develop a pipeline of talent
- Initiatives
 - Created a National Science Foundation workshop proposal
 - Developing a student / employer job board on PES web-site
 - Drafting a response with a proposed action plan to DOE and NERC workforce report references
 - Launched an on-line survey to understand image and value
 - Investigating changing the name of the Society to better portray our mission and embrace emerging technologies

What's New – Education / Industry Relations

- Advisory Group on Education/Industry Relations
 - Discuss Educational Needs of Electric Power Industry
 - Survey to Determine Technical Tutorial Needs
 - Identify Ways for PES To Meet the Demand
- Joint PES/AEI Short Course Offerings
 - Conducted Educational Survey for Non-Technical Audiences
 - Offered Stand-alone Course on January 23-25, 2007
 - Future Courses will be Announced

What's New – Education / Industry Relations

- IEEE Expert Now On-Line Courses
 - Jointly developed with Industry Application Society
 - “Cyber Security of Substation Control and Diagnostic Systems” - created in 2006
 - “Power Quality” - in development
 - Additional Development Anticipated in 2008
- Establish and Emphasize Additional Awards
 - Created “IEEE Robert Noberini Distinguished Contributions to Power Engineering Professionalism” Award
 - Emphasize New Fellow Category of “Application Engineer/Practitioner”
 - Proposing to replace “Power & Life” award with “Leadership in Power Award” and “Lifetime Achievement Award”



Congratulations 2007 IEEE PES Fellows!

- 268 were named IEEE Fellows for 2007
- Many are IEEE PES Members:
 - Ross Baldick
 - Richard Brown
 - Claudio Canizares
 - William Chisholm
 - Mo-Yuen Chow
 - John Estey
 - Leslie Falkingham
 - Masoud Farzaneh
 - Avelino Gonzalez
 - Xiaohong Guan
 - Daniel Kirschen
 - Loi Lei Lai
 - Massimo La Scala
 - Wei-Jen Lee
 - Steven Leeb
 - Carlo Alberto Nucci
 - Mark O'Malley
 - Antonio Orlandi
 - Dean Patterson
 - Carlos Portela
 - Nagu Srinivas
 - Peter Sutherland
 - John Tengdin
 - Kevin Tomsovic
 - Roland Watkins



General Meeting in Tampa June 24 – 28, 2007

- Super Sessions:
 - Walking Closer to the Edge
 - Impact of increasing load demands on transmission systems
 - Vision 2020
 - Transmission and Distribution
 - Digital Communication, Cyber Security & Grounding
 - Wide Area Systems
- Women in Engineering Panel Session
- Plenary: Keeping the U.S. Transmission System Reliable
 - Rick Sergel NERC - President & CEO
 - Pete Brandien ISO NE - VP, Operations
 - Linda Campbell Florida Reliability Coordinating Council – Dir. of Reliability & Compliance



What's New - Future Meetings

- General Meetings
 - July 20-24, 2008 in Pittsburgh
 - July 26-30, 2009 in Calgary, Alberta, Canada
- T and D Conference and Exposition
 - April 20-23, 2008 in Chicago
- Power System Conference and Exposition (PSCE)
 - March 15-18, 2009 in Seattle
 - March 19-20, 2009 Joint PES/CIGRE Symposium
 - Integrating Advanced Energy Supply Technologies in a Carbon Constrained Environment
- ESMO
 - March/April, 2009 in TBD
- Joint Technical Committee Meetings
 - January 7-10, 2008 in San Antonio



What's New – Membership / Chapters

- Enhanced promotion
 - New Membership Contest for IEEE PES Chapters in 2007
 - Web-site Contest: submission of nominations due May 15th
 - On-line image survey underway
 - Developing PES posters and promotional material
- Increasing global presence and strengthen Chapter leadership
 - IEEE PES Executive Committee Meetings
 - April 2006 in Delhi, India
 - October 2007 in Beijing, China
 - October 2008 in Delhi, India
 - Chapter Chair training meetings
 - Regions 1 – 7: Tampa, US in June
 - Region 8: Lausanne, Switzerland in July
 - Region 10: Beijing, China in October



What's New – Technical Activities

- Completing a Technology Assessment Report to identify emerging technologies that are starting to be actively adopted
 - Prioritize where focus should be given
 - Identify working groups to accelerate technology to market
 - Use for promotional efforts
- Collaboration for Technical Advancement
 - Electric Ship Technologies - Second Symposium in D.C. in May
 - Broadband over Power Line (BPL) Communications
 - Renewable Energy subcommittee
 - Intelligent T&D grid subcommittee - pending

What's New – Technical Information Services

- PES e-Newsletter
 - Posted on the 15th of Each Month
 - Use Input From Chapters/Membership and Technical Committees and Others
- IEEE Power & Energy Library (IPEL)
 - Launched at IEEE PES T and D in Dallas
 - Includes Publications From 3 Societies – PES, IAS, PELS
 - Targeted to Utilities, Manufacturers, and Consultants in Power and Energy: Not Intended for Academic Institutions
- IEEE Xplore Database
 - 1975 to 1977 Period Completed in 2006
 - 1952 to 1974 and 1978 to 1987 in 2007



IEEE PES Technical Committee Actions

- Identify emerging technologies
- Submit news for e-Newsletter
- Encourage active participation in Meetings
- Identify roles for GOLD members
- Plan for successors in technical committee work
- Keep the web-site up-do-date
- Collaborate across committees and societies to facilitate technology advancement
- Provide feedback ...

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S&C Electric Company



773-338-1000 x2318

WReder@sandc.com
w.reder@ieee.org

