Skilled Work Force Issues

Presentation to the
U.S. Department of Energy
by the IEEE Joint Task Force on QER
Background

• Increased dependence on electricity
• Aging workforce
• Power System going through rapid changes
• Renewal generation and storage operations
• New technologies
• Growing threats: Cyber and Physical
• Increased use of automation - but need to train when automation fails
How do we train for mission critical jobs?

- High Schools
- Community Colleges
- Universities

- Vocational Training
- Certification Programs
- Degree Programs

High school and Community College Grads

Military Veterans
Opportunities

• DOE can be catalyst and convener to form partnerships within education, labor, industry and government sectors
• Develop shared curricula for community colleges and universities that aligns with industry needs with a published roadmap
• Develop annual recognition programs for examples of excellent programs
• Address work force issues as part of DOE and NSF projects
• Introduce certification programs for needed skills
• Increase programs for veterans
Certification Programs

• Lower barriers to entry
• Awards are made based on competency not seat time
• NERC System Operator Program is a successful example
• Needs a recognized body (e.g. IEEE) to award the certificates.
• Strong demand for Substation and System Protection Technicians
• Would provide opportunities for veterans and women
Military Veterans

- Traditionally joined energy industry through informal networks
- Bring valuable skills for leadership, teamwork, discipline, safety, watchfulness, attentiveness to detail and adaptive to change
- Handle routine shifts and quickly transition to emergency operations
- Average age on technically sophisticated Aircraft Carrier – 19 years
- Formal programs (CEWD Troops to Energy and IncSys Power4Vets) provide clear pathways and support for veterans
- More formal transition programs are needed
Soft Skills are Critical

- Agile Reasoning
- Ability to Plan
- Attention to Detail
- Grasps Big Picture Overview
- Excellent Communicator
- Team Player

- Capability to Lead
- Flexible
- Has Emotional Control under Stress
- Adapts to changing environment
Curriculum

- Develop roadmap of curriculum for utility engineer
- Need to address fundamentals of utility planning, operation and control across generation, T&D, and Smart Grid and Renewable technologies
- US Power and Energy Engineering Workforce Collaborative to agree on curriculum and jobs, tasks and competencies
  - Australian Power Institute Collaborative as example
- Encourage Massive On-line Open Courses
  - On-line demonstrations of experiments and lectures
  - Support studies with open source or low cost software tools on openly published sample power system models
Example: Placing Veterans as System Operators

- Power4Vets Program - Launched by IncSys as part of DOE Smart Grid Workforce Training Program
- Recruits veterans with strong background in electrical systems (e.g. navy nuclear, army prime power)
- Provides on-line self paced training with realistic web based simulation of the same generic power system that is also used widely to train NERC certified operators
- 63 Veterans obtained their NERC System Operator Certification.
- Program is sustained after the DOE project with 76 veterans enrolled
- Success depends a close match between job requirements and military record, industry recognized certification and full time recruiter at Norfolk Navy Base
Example: Humanitarian Outreach

- Seattle University EE Department Humanitarian Outreach program attracts students, especially women to EE
- Students design and build small PV, Wind and Hydro based microgrids
- Students travel to Zambia and Kenya to implement their projects
- Students practice mechanical and electrical trade skills as they put theories and concepts into practice both in the university workshops and in the field
- Students develop soft skills as they work as a team and with villagers in a remote region without running water and electricity.
- In 2013 was awarded 80,000 Euros by Alstom to build a micro grid and community charging station at a school in Muhuru Bay, Kenya
- in 2014 received the Grand Prize in the NCEES Engineering Award competition for the Muhuru Bay project
Summary Recommendations

- Partnerships: Education, labor, industry and government sectors > new curriculum development
- Certification programs: Competency based to demonstrate student skill level
- Assess Workforce Issues at federal level
- Develop Annual recognition programs for excellence
- Coordinate to share curriculum
- Support Transition of military veterans
- DOE and NSF Energy R&D to address workforce issues
IEEE REPORT TO DOE QER ON PRIORITY ISSUES

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