Energy Symposium – Meeting Notes

*Purpose of the Energy Symposium*
*Break-out Discussions – Observations and Insights*
*Overall Conclusion*
*Next Steps*
*Appendix – Mike Ahern’s Presentation Slides*

*October 22, 2012*

Corporate and Professional Education
508-831-6563
mfahern@wpi.edu
cpe.wpi.edu
Purpose of the Energy Symposium

• This Symposium was held to conduct a broader dialogue about industry demographics, developments and educational needs

• The Symposium brought together representatives from electric and gas utilities, independent electric system operators, manufacturers, contract firms, and educational organizations

• Break-out groups discussed 4 current industry challenges - cyber security, smart grid implementation, operational risk and building a pipeline of well qualified people
Breakout Discussion – Cyber Security

How can we increase the industry’s expertise on this important issue?

• Observation: Mandatory Compliance Standards are rapidly evolving at the same time that the complexity and range of affected devices is increasing.

• Insight: To keep up, the industry needs regular, updated training tailored to different groups:
  – Technicians
  – Engineers
  – Managers
  – Policy-Makers
Breakout Discussion – Smart Grid Implementation

How can we better educate engineers and other stakeholders on the optimum integration of smart grid elements?

• Observation: Engineering students should have the view to the “End Game”

• Insight: Ideally, over 4 years, students of Power Engineering should learn about:
  – Fundamentals of circuit analysis and design (e.g. radial feeds)
  – Industry Issues (via Internships)
  – Micro-grids and Distributed Generation, including renewables
  – Database Structures (e.g. Geographic Information Systems)
  – Protection & Controls
  – Telecommunications and related cyber security challenges
  – Utility Regulation and Finance
Breakout Discussion – Operational Risk

How can we help minimize the operational risk from the region’s growing dependence on a single fuel, natural gas, to supply electric generation?

• Observation: Due to the impacts of economic incentives along with limited pipeline capacity and firm residential demand, electricity production is at risk at peak loads

• Insight: While energy efficiency, renewables, fuel storage and hydro-power from Canada all help; electric ISO’s should consider requirements for generators to purchase firm gas which would drive increases in pipeline capacity
Breakout Discussion – Building a Pipeline of Well Qualified People

How can we better assure that the industry can attract and retain sufficient numbers of well-qualified people at all levels? While this pipeline is being developed, how can the industry meet its current needs?

• Observation: The industry and its education providers have not effectively communicated its attractive combination of high pay, societal contributions, and a broad range of creative opportunities to young students, their teachers or their guidance counselors.
Breakout Discussion – Building a Pipeline of Well Qualified People
(continued)

• Insights:
  – The industry and its education providers should conduct sustained outreach to middle and high schools through ambassador programs, internships and scholarships
  – The outreach programs should communicate the industry’s combination of high pay, societal contributions, and a broad range of creative opportunities
  – Near term, the industry should continue its efforts to retain its employees using visible support from leadership, public emphasis on making a difference for society, professional development, and competitive pay
Overall Conclusion

- The Energy Symposium was successful in that it:
  - brought together a broader group of stakeholders;
  - shared information about important industry challenges;
  - produced new insights for its participants; and
  - facilitated professional networking.
Next Steps

• WPI will schedule a conference call with the smaller Energy Strategy Board to discuss:
  – the insights from this Symposium
  – logical next steps based on these insights

• Anticipating that the Board will want to continue this dialogue, WPI will send “save the date” appointments for a meeting of the Energy Strategy Board in April, 2013 and a larger Energy Symposium in September, 2013
Appendix

Mike Ahern’s Presentation Slides from the Energy Symposium

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mfahern@wpi.edu
cpe.wpi.edu
Power Program Overview – A Record of Success

Program History
Recent Developments
Today’s Symposium
Appendix

October 22, 2012

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About WPI

- Worcester Polytechnic Institute is a well-respected, top quartile national university (U.S. News and World Report 2013 ranking)

- Founded on “Theory and Practice”:
  - the emphasis is on educating students to apply the theory to produce real world results
  - students can take what they learn in the classroom and immediately apply it on the job
  - project work is included throughout the curriculum
WPI’s History in Power

• 1907: Atwater Kent Laboratories was built to study power on campus

• 1999: Our 1st Corporate Power System Graduate Certificate Program
  • Introduction to Power Systems
  • Organizational Behavior
  • Operations Risk Management
  • Fundamentals of Power Delivery
  • Transients in Power Systems
  • Project Management
More Recent Developments in WPI’s Power Systems Programs

• Driven by industry input, the Program was customized with the development of specialized courses in:
  – Protection and Controls (2 courses)
  – Power System Dynamics
  – Power Transmission

• National demand is growing rapidly:
  – Beginning in 2009, the Program was offered online
  – Online enrollment has grown 800% from 2009 to 2012 (14 → 115)
  – Only Master’s Degree power programs offered through the industry’s Energy Provider’s Coalition for Education (EPCE) organization
WPI’s Proven Track Record in Power

- Over 450 Master’s Degrees and Graduate Certificates have been earned and awarded

- A total of 131 Students are currently enrolled and taking courses (Fall, 2012)

Power Systems Programs
Master’s Degrees and Graduate Certificates
- National Grid
- Northeast Utilities
  - NSTAR
  - PSNH
- ISO - New England
- United Illuminating
- Unitil
- Central Maine Power - online
- Bangor Hydro Electric - online
- Open Enrollment - online
  - Students from across the U.S., Canada, Mexico and other countries
Why Are Energy Companies Conducting Graduate Programs with WPI?

• Better serve customers
  – Use improved understanding to produce more reliable designs
  – Reduce operational risk
  – Find more cost-effective engineered solutions
  – Retain employees with key skill sets

• Prepare future leaders for more strategic responsibilities

• Quality of WPI’s academic programs
  – Recent Student Survey Results in the Appendix
Building to Today’s Symposium

• Building on our Record of Success, WPI was asked to host an Energy Symposium

• In April, WPI hosted a Symposium of regional electric industry firms

• Industry Needs were identified and a smaller “Energy Strategy Board” was formed to begin to address them

  – Participants included representatives from National Grid, Northeast Utilities, Unitil, Bangor Hydro Electric, VELCO, ISO-NE, NYISO and WPI
April Energy Symposium
Identified Industry Needs

– Talent pipeline to provide qualified replacement employees at all levels

– Relevant and current curriculum, especially for educating people for specialties which are in short supply (e.g. Protection and Controls, Transmission Planners)

– Improved human performance (i.e. fewer errors)

– Professional Development to groom future leaders
Energy Strategy Board
Results of Follow-up Meetings and Conference Calls

– Reaffirmed industry needs from the April Symposium
– Reviewed WPI’s commitment to the industry
  • Existing, graduate-level degrees and programs
  • New Non-Tenure Track faculty position approved - teach 6-8 courses/year
  • New CPE position approved and filled
– Shared WPI’s longer term goals including for research support, sponsored PhD’s and endowment
  - Agreed to a long term Industry/WPI partnership
  - Agreed to collaborate to develop a 10 year view of regional hiring demand for power systems engineers
  - Agreed to identify top contractors & manufacturers for inclusion in this partnership
Energy Strategy Board
Demographic Analysis

Forecast Attrition Rate of Employees
(Sum of Participating Company-Specific Projections)

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<th>Education</th>
<th>0-3 Years</th>
<th>4-7 Years</th>
<th>8-10 Years</th>
<th>Annually &gt;10</th>
<th>10 Year Total</th>
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<td>86</td>
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<td>16</td>
<td>18</td>
<td>24</td>
<td>6</td>
<td>58</td>
</tr>
</tbody>
</table>

Conclusions:

• Regional Forecast indicates an Annual Demand for 25+ Replacement Power Engineers Per Year
• Forecast Demand for ME’s and Technicians is Far Lower
Building to Today’s Symposium

• The Energy Strategy Board reviewed the regional demographic results

• The discussion identified that the future electric system will be more complex than today’s

• The Board decided that a broader dialogue with more stakeholders would be beneficial

• Topics were identified for today’s Symposium
Today’s Symposium

Selected Challenges for Today’s Dialogue:

• **Cyber Security** - How can we increase the industry’s expertise on this important issue?

• **Smart Grid Implementation** - How can we better educate engineers and other stakeholders on the optimum integration of smart grid elements?

• **Operational Risk** - How can we help minimize the operational risk from the region’s growing dependence on a single fuel, natural gas, to supply electric generation?

• **Building a Pipeline of Well Qualified People** - How can we better assure that the industry can attract and retain sufficient numbers of well-qualified people at all levels? While this pipeline is being developed, how can the industry meet its current needs?
Next – Breakouts for each Challenge

• Discuss your selected challenge
• Collaborate on initiatives to meet these challenges
• Report out at 10:30 a.m.

Cyber Security - How can we increase the industry’s expertise on this important issue?

Smart Grid Implementation - How can we better educate engineers and other stakeholders on the optimum integration of smart grid elements?

Operational Risk - How can we help minimize the operational risk from the region’s growing dependence on a single fuel, natural gas, to supply electric generation?

Building a Pipeline of Well Qualified People - How can we better assure that the industry can attract and retain sufficient numbers of well-qualified people at all levels? While this pipeline is being developed, how can the industry meet its current needs?
Thank You

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Appendix

*Mike Ahern Bio (Slide 15)*
*Recent Student Survey and Results (Slides 16-20)*
*More About WPI (Slides 21-23)*

*October 22, 2012*

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Mike Ahern Bio

Director, Power Systems
Worcester Polytechnic Institute

• Retired Vice-President, Northeast Utilities
• Former Director, Transmission Operations and Planning at Northeast Utilities
• B.S. from WPI
• M.S. and M.B.A. from RPI
• Professional Engineer
• NERC Certified Transmission Operator
In August, 2012, WPI conducted a survey of the overall effectiveness of its graduate Power Systems Engineering Programs delivered through Corporate and Professional Education.

In all, 113 students from 7 cohorts (4 companies) were surveyed in September, 2012.

- 25 students from all 4 companies responded (22% response rate).

All 25 students had successfully completed an instructor led, cohort based Power Systems Engineering Program delivered near their work location.
Survey Results

✓ 100% rated the Overall Program as either Excellent (32%), Very Good (48%), or Good (20%)
   ➢ None rated the Program as either Fair or Poor

✓ 100% rated Instructor Quality as Excellent (28%), Very Good (48%), or Good (24%)
   ➢ None rated the Instructors as either Fair or Poor

✓ 100% agreed that they can apply the learning to their current position

✓ 70% said the Program encouraged them to stay with their current employer
Notable Quotes

- “I certainly have applied what I learned to reduce costs”
- “Some of the technical knowledge that I gained from courses helped me in problem solving for issues on our power system.”
- “Several of the courses, specifically advanced relaying, switching transients, and power systems dynamics were immediately useful in my day to day work.”
Notable Quotes

- “Yes my power systems protection courses have assisted me in avoiding miss operations of the system protection.”
- “It was a very focused program related to power engineering.”
- “Management courses were extremely helpful.”
Summary

• These survey results confirm the quality of our Power Systems Engineering Programs

• Results demonstrated that the Program is:
  o Relevant to current work assignments
  o Adding value for both the students and their employers
  o Positive for student retention at their current employer
More About WPI

- Our faculty members are authorities in their respective fields and have gained their expertise through real-world practice. They create the curriculum in collaboration with our industry partners to assure immediate relevance, lead classes and mentor students.

- Part Time M.B.A. program is a particular strength - rated #1 in the Northeast region and #8 nationally (Business Week).

- Now offers over 50 graduate science, engineering and management programs plus over 60 professional development workshops and technical short courses.
WPI is Widely Recognized for Excellence and Results

PayScale
“Best-Paid Graduates”
7th Highest Starting Median
9th Highest Mid-Career Median

FISKE
2011
"BEST BUY SCHOOL"
GUIDE TO COLLEGES

"One of ‘10 Engineering Schools That Should Be on Your Radar”

BusinessWeek

#1 Part-Time MBA in the Northeast
Top 20 “Colleges Worth Your Investment”

Forbes.com
Top Colleges for Getting Rich
#9 in the Country

parchment
“Top-Choice” College

The Princeton Review
“A Best in the Northeast” program
20th in the Nation for Career Services
Accreditation for WPI Programs

• Worcester Polytechnic Institute is accredited by the New England Association of Schools and Colleges, Inc., a nongovernmental, nationally recognized organization whose affiliated institutions include elementary schools through collegiate institutions offering post-graduate instruction.

• In addition, the programs leading to majors in chemical engineering, civil engineering, electrical engineering, industrial engineering, manufacturing engineering and mechanical engineering are accredited by the Accreditation Board for Engineering and Technology (ABET).

• The bachelor's and master's degree programs in business offered by the Department of Management are accredited by AACSB International - The Association to Advance Collegiate Schools of Business.