National Science Foundation – Advanced Technological Education

Sustainable Energy Focus Group – June 4, 2015

*Bellingham Technical College * Meeting Notes*

Participants:

- Dana Hickenbottom, Technical Support Engineer and NABCEP Certified Solar PV Technical Sales Professional, ITECK Energy
- Rodney Scharf, Chief Engineer, Sheraton Seattle Hotel[1]
- Mark Nieman, McKinstry Corporation
- Randy Ambuehl, NW Washington Electrical Joint Apprenticeship Training Council
- Joan Weiss, The Worker Center, AFL-C/O
- Matt Bryant, Grant Manager, Bellingham Technical College
- Jill Davishahl, Faculty - Mechanical Engineering, Bellingham Technical College
- Sara Bowles, Center of Excellence for Clean Energy
- Barbara Hins-Turner, Director, Center of Excellence for Clean Energy

Focus Group Questions:

A. Renewable or Sustainable Energy Systems
   1. Describe your company with regard to services, products, and markets.
   2. What are some of the sustainable business practices your company employs?
   3. What is the business rationale for implementing sustainable business practices?
   4. How is your company using, promoting, supporting or designing sustainable energy systems?
   5. What technologies have you invested in to support these systems?

B. Preferred Knowledge, Skills and Aptitudes
   1. What positions in your company have major responsibilities related to sustainable systems, services, and products?
   2. What are the key KSAs for these positions?
   3. How would you describe current supply of and demand for workers with these KSAs in your company, and in the larger energy industry?

C. Industry Trends
   1. How do you see sustainable energy systems, the related positions, and the associated KSAs evolving in the next 5-10 years?
   2. What training will workers need to keep pace with evolution in the field?
   3. How would you describe the roles of engineers in your company and in the larger energy industry?
   4. How do you see the roles of engineers in the energy industry evolving in the next 5-10 years?

[1] All numbering and lettering in this report is for ease of reference only.

5. What training will engineers need to keep pace with evolution in the field?

D. Recommendations
   1. As we seek to design a program to train workers – specifically engineers – for careers in sustainable energy, what advice or recommendations do you have for us?

<u>Focus Group Summary:</u>

Terms:
- Sustainability – ecology (environmental), equality (social), equity (economic)
  - *Key industry term, sub-concepts:
    - Clean – now necessarily renewable (ecology, equality)
    - Renewable – not necessarily clean (equity)
- Conservation – changing structures to reduce consumption
  - *Essential to achieving sustainability

Roles:

<u>Building/Design</u>
- Designers
  - Engineering – 4-year degrees
- Energy Managers
  - Project managers – 4-year degrees
- Implementation/Testing
  - Commissioning agents – 2-year degrees
- Technicians
  - Controls, systems – 2-year degrees

<u>Management/Maintenance</u>

*High demand
- Systems engineers
  - Electrical, mechanical – 4-year degrees
- Service technicians
  - HVAC, instrumentation – 2-year degrees

<u>Production/Support</u>

*High demand
- Product engineers
  - Electrical, mechanical – 4-year degrees
- Service technicians
  - Electronics, instrumentation, mechatronics, process technology, systems engineering– 2-year degrees
    - Hands-on experience w/hydraulic, pneumatic, and other systems

- Technical support
    - Electronics fundamentals, static engineering, systems design – 2-year degrees
        - Solar system design/scaling, hands-on skills for installation and maintenance

Emphases:

- Theory
    - Advanced **mathematics**
    - Core **electronics**
    - Fundamental **physics**
    - Principles of **sustainability**
        - Conservation, flow, gains/losses
- Design
    - Efficiency and integration of **systems**
- Implementation
    - Use and maintenance of **controls**
- Monitoring
    - Collection and evaluation of **data**

*Focus on *built environment*?

Attributes:

- Adaptable – to keep up with evolving technologies
    - Fundamentals
- Collaborative – working together across areas
    - **Communications**, problem solving
- Communicative – presenting ideas
    - **Technical writing**, presentation
- Ethical – inherent to sustainability
    - **Professional ethics**, safety
- Roundedness – integrated trainings
    - Systems
- Teachable – for ongoing learning
    - **Continuing education**

Evolutions:

- New materials/technologies
    - Integrated systems (e.g. solar shingles)
    - Organic materials (e.g. organic solar materials)
- New methods/processes
    - Streamlined installation
    - Reduced maintenance

Trends:

- Alternatives to solar and wind (due to cost variability)
- Demand shifting to address variability
- Efficiency vs Ecology
- Energy codes vs consumption caps
- Energy index use
- Energy storage (grid-level)
- HVAC efficiency
- Investor-owned utilities
- Lagging codes, challenged by/stifling industry development
- Lighting - economic tipping point, LED, new form factors
- Open protocols vs proprietary systems
- Rapid evolution of technology – backward compatibility as an aspect of design
- Retrofitting
- "Smart" inverters (AC-DC), coding limitations
- Substantial shifts in industry, difficult to predict
- Sustainability as marketing/sales trend
- Waste reduction

Resources:

- AEE – Certified Energy Management Certificate
- Bullitt Center
- Carbon Washington
- Cascadia BAS: Sustainable Practice
    - Managing various aspects of sustainability
- Department of Commerce
- Energy technologist programs
- OSPI
- Return on investment for implementing sustainable energy
    - https://www.energysage.com/solar/why-go-solar/earn-great-returns
    - http://www.technologyreview.com/news/422295/is-renewable-energy-a-good-investment/
- State legislative energy incentives
    - http://apps.leg.wa.gov/WAC/default.aspx?cite=458-20-273
- UW demand-response control experiment