Bridging the Gap: Business/Industry Needs and Educational/Training Programs in the Energy Field
Bio for Melonee Docherty:

Melonee Docherty joined the Advanced Technology Environmental and Energy Center (ATEEC) as an instructional designer in 1995. ATEEC is a National Science Foundation-funded organization whose mission is the advancement of environmental and energy technician-level education through curriculum, professional, and program development and improvement. Ms. Docherty is responsible for the analysis, design, development, implementation, and evaluation of environmental and energy technology educational projects and instructional materials. She works with clients in academia, industry, government, and non-profit organizations. Additionally, Ms. Docherty participates in program and project management and evaluation activities, including Principal Investigator and National Visiting Committee duties for National Science Foundation grants. Recent activities in the area of environment, energy, and green jobs initiatives include development and facilitation of:

- ATEEC’s online Energy Resources clearinghouse and educator network
- “National Energy Technician Education” summit and resulting report, providing a collaborative overview of business/industry, government, nonprofit, and educational needs for 21st century energy technicians
- National forums and resulting reports on “Defining the Fields” of energy and environmental technology
- Regional forums and report, “Regional Energy Conversations,” outlining industry needs for educating energy technicians across the country
- Sustainable Energy Education and Training (SEET) project, professional development educator workshops on sustainable energy technology in partnership with the National Renewable Energy Laboratory
- Occupational and task analyses for energy and environmental technician jobs
- Advisory activities, needs analyses, and formal evaluations for improving energy and environmental programs at the community college level
Bio Slide: 2

Bio for Kirk Laflin:

Mr. Laflin currently serves as the Executive Director for the National Partnership for Environmental Technology Education (PETE), a national 501 (c) (3) non-profit organization. PETE’s mission is to provide leadership in environmental, health, safety and energy education and training through community and technical college partnerships with business, industry, government, and other educational providers. PETE supports a national network of community and technical colleges that deliver quality environmental education and training. PETE has a combined community and technical college network totaling over 400 colleges nationwide. PETE is an Affiliated Council of the American Association of Community Colleges. PETE is also a strategic partner with the Advanced Technology Environmental & Energy Center.

Prior to assuming the position of PETE Executive Director, Mr. Laflin served as the Regional Director of Northeast PETE. As the PETE Executive Director, Mr. Laflin is responsible for the day-to-day management which includes: fundraising; project and program facilitation; developing and maintaining contacts, and grant/contract management. NPETE currently has grants/projects with U.S. Environmental Protection Agency, National Science Foundation, U.S. Department of Labor – OSHA, U.S. Homeland Security Agency – FEMA, National Institute of Environmental Health Sciences, Maine Department of Environmental Protection, Maine Center for Disease Control, Maine State Planning Office and the Advanced Technology Environmental & Energy Center. Before joining the PETE organization Mr. Laflin has over 25 years of environmental technology training and technical assistance through the New England Interstate Environmental Training Institute and Southern Maine Community College.
Abstract Slide:

In 2009-2010, ATEEC was funded by the National Science Foundation to hold a series of Regional Energy Conversations across the country to bring together energy stakeholders from business and industry, government, non-profit organizations, and education. Partnering with PETE, the resulting report, *Regional Energy Conversations*, has proved a valuable tool that provides information on:

- Energy jobs that are in demand in different regions of the U.S.
- Top five high-demand energy jobs in each region
- Future jobs
- Cross-cutting technical skills
- Cross-cutting employability skills
- Labor market analysis data
- Existing collaborative efforts in technician education

In 2010, ATEEC was again asked by the National Science Foundation to partner with the America Association of Community Colleges to design and facilitate a national conference to bring together different sectors in the energy field to discuss the current and future status of the industry and of the education requirements to fulfill workforce training needs. This conference differed from the regional conversations in that it backed up to obtain a “30,000-foot view” of the energy industry workforce needs, and the education and training that can most effectively achieve the result of providing an appropriate and highly skilled energy technician workforce. The resulting report is available online, along with the Regional Energy Conversations report, at www.ateec.org.

These projects, along with a variety of others, have been integral additions to the ongoing development of ATEEC’s online energy resources clearinghouse, which provides a centralized resource-sharing site supporting technician education and training in sustainable energy. The clearinghouse is designed to provide curricula and networking support for all sustainable energy stakeholders, including:

- Green jobs (environmental & energy) programs database
- Online forums: technical, networking, and professional development
- Resource-sharing: contribute & review materials and images
- Sustainable energy image gallery
- Recommended Web resources
- Environmental and Energy Resources Library
- ATEEC Products section, free downloadable energy & environmental materials (educational presentations, workforce analysis, learning activities, DACUMs (occupational analysis), curricula, and instructional materials)
Bridging the Gap: Business/Industry Needs and Educational/Training Programs in the Energy Field

Melonee Docherty, ATEEC Energy Resources Coordinator

Kirk Laflin, PETE Executive Director
ATEEC was established in 1994 as an NSF Advanced Technology Education (ATE) Center of Excellence to advance environmental and energy technology education through curriculum development, professional development, and program improvement in the nation's community colleges and secondary schools.
What ATEEC Does:

- Professional development
- Program improvement
- Curriculum design
- Instructional materials development
- Online resources clearinghouse
Partnership for Environmental Technology Education (PETE)

The National Partnership for Environmental Technology Education (PETE), is a nonprofit 501(c)3 organization that helps facilitate, partnerships with educational institutions, industry, and government. Serving the 50 states, Tribal Nations, U.S. territories, and insular areas, the PETE network includes more than 400 community, tribal, and technical colleges, representing one-third of America's two year institutions. Business, industry, and governmental agency partnerships are integral to this network.
What is a technician?

A technician applies knowledge, skills, and abilities to perform scientific, technical, communication, and regulatory tasks.
What is the Energy Technologies and Services Field?

Energy Technologies and Services is a career field that applies the principles of science, engineers, communication, economics, management, and law to optimize the sustainable production, delivery, and use of energy resources.
Defining Energy Technology and Services
Occupational Categories—Energy

- Buying and Selling Energy
- Energy Assessment
- Energy Efficient Building Construction, Project Engineering, and Implementation
- Exploration
- Generation and Utility-Scale Construction
- Operations and Maintenance
- Regulatory Affairs
- Transmission and Distribution
- Transportation
Energy Efficient Building Construction, Project Engineering, and Implementation

• Architecture Technician
• Commissioning Technician: verification of system operations and interoperations, measurement and verification
• Energy Efficient Construction Tradesperson/Site Foreman
• Energy Project Developer/Manager: scheduler; engineering technician, CAD/CAM tech/draftsperson, GIS technician
• Renewable Energy Systems Installer
• Site and Building Manager: xeri-scaping, shading
• Testing, Adjusting, Balancing Technician
• Testing/Commissioning Technician
Commissioning Technician

- Verify systems operation and interoperations.
- Perform measurement and verification tasks.
- Support engineering, construction, and sales staff in designing energy management system (e.g., scope of work, estimating project costs).
- Develop project measurement and verification plan.
- Supervise installation of building and process systems.
- Help create sequence of operation for building and process systems.
- Execute sequence of mechanical systems operation.
- Program the building’s energy management system, including control strategies.
- Test and troubleshoot building and process systems.
- Verify field data.
- Train on-site staff in usage of system.
- Install and troubleshoot data acquisition equipment (i.e., data loggers)

………..
2009/2010 Regional Energy Conversation Forums

Goal—to develop a snapshot identifying...

- Emerging regional energy workforce needs for technicians
- Documentation of those needs
- Existing projects & resources
- Essential skill sets
- Certification/licensure
- Best practices
- Emerging trends

...for technician-level jobs.
Fastest-Growing Energy Jobs—by Region
Regional Commonalities

• Many of the upcoming positions are existing jobs/programs—just need to be “tweaked” with the insertion of green technology skills.

• Much of the training for new jobs can build on a foundation (approx 50%) of existing programs (e.g., wind technology program built from 1st year of electro-mechanical program, 2nd year specialized wind technology).

• Employers want the core foundational courses to be transferable to a variety of career fields.
Regional Commonalities (cont.)

• Employers see the importance of short-term credit and noncredit certificates that emphasize skills.
• Many of these jobs will not require a college degree.
• Utilities have an urgent need to replace retiring workers (linemen, etc.) within the next 5 – 10 years.
• Smart grid technology will initially require 4-year degreed personnel, but those positions will rapidly evolve into 2-year degree requirements.
Regional Commonalities (cont.)

Huge area of growth is tied to energy efficiency initiatives/building trades/facilities maintenance:

• Need **energy auditors** to find inefficiencies—highest ranked occupation
• Need **system verification technicians** (third party to verify efficiencies)—commissioning agents
• Knowledge of **LEED** important
• Once buildings are efficient, will need **building operators** to maximize efficiencies
Regional Target Areas

Regions have general, targeted areas of growth:

• *Alternative Fuel Vehicle (AFV)*: Northwest, Southeast, & Southwest
• *Building trade workers*: Mid-Atlantic & North Central
• *Geothermal*: North Central & South Central
• *Large-scale solar*: Southeast & Southwest
• *Large-scale wind*: North Central, South Central, & Southwest
Regional Target Areas (cont.)

General, targeted areas of growth (cont.):

- **Nuclear**: Mid-Atlantic
- **Ocean energy**: Northwest & South Central
- **Oil & gas**: South Central & West
- **Small-scale solar & wind**: North Central & Southeast
- **Solar & wind equipment manufacturing**: West
- **Utility & smart-grid workers**: Northwest & Southeast
Summit on National Energy Technician Education

December 8–10, 2010 in Washington, DC

Goal—to develop a blueprint identifying...

- Current and projected energy industry workforce needs
- Financial opportunities and constraints
- Educational programs currently providing workforce training
- Essential skill sets
- Certification/licensure
- Recommendations to help shape the future direction of energy workforce training

...for technician-level jobs.
Energy Summit Overview

- Participants: National cross section of the energy industry, community colleges, universities, government agencies, and non-profit organizations

- Panel presentations & discussion in four sectors
  - Traditional
  - Renewable
  - Energy-efficiency in building technologies
  - Transportation

- Facilitated large- and small-group discussions

- Recommendations
Participating Organizations

Business/industry
• Anderegg Consulting
• Baltimore Gas and Electric
• Biomass Consulting Services, LLC
• Building Intelligence Group
• The Cadmus Group
• DK Innovative Solutions
• Entergy Services Inc.
• Exelon Nuclear - Quad Cities
• Ford Motor Company
• GE Energy Renewables
• General Motors
• Good Company Associates
• Great Lakes Ag Energy
• Hampden Engineering
• Imani Energy, Inc.
• Lab-Volt
• Namaste Solar
• Pacific Gas & Electric Company
• PHAT ENERGY, Inc.
• PiControl Solutions, LLC
• Pure Energy
• Savannah River Nuclear Solution

• SolarCity Corp
• Talascend, LLC
• WindIngen

Professional Orgs/Nonprofits
• Advanced Technology Environmental & Energy Center
• American Wind Energy Association
• AmericaSpeaks
• Center for Automotive Research
• Center for Energy for Workforce Development
• Energy Center of Wisconsin
• Gulf Coast Process Technology Alliance
• Independent Electrical Contractors Chesapeake
• Interstate Renewable Energy Council
• Midwest Renewable Energy Association
• National Partnership for Environmental Technology Education
• North American Board of Certified Energy Practitioners
• Nuclear Energy Institute
• Renewable Energy Stewardship
Participating Organizations (cont)

**Education**
- Austin Community College
- Bismarck State College
- Butte College
- Cape Cod Community College
- College of the Canyons
- College of the Mainland
- Community College of Baltimore County
- Colorado School of Mines
- Houston Community College
- Indian River State College
- Kennebec Valley Community College
- Lane Community College
- Laney College
- Laramie County Community College
- Macomb Community College
- Madison Area Technical College
- Massachusetts Institute of Technology
- Montana State University
- Oregon Institute of Technology
- Portland Community College
- Red Rocks Community College

**Government**
- Colorado Department of Higher Education
- Idaho National Lab
- Lawrence Berkeley National Lab
- National Renewable Energy Lab
- National Science Foundation
- New York State Energy Research & Development Authority
- Office of the Governor, Emerging Technologies Fund
- Oregon Dept of Energy
- U.S. Department of Education
- U.S. Department of Energy
- U.S. Department of Labor
- U.S. Environmental Protection Agency
- U.S. Senate Committee on Health, Education, Labor & Pensions
Panel Presentations/Discussion

• Panel presentations by industry experts with followup discussion was held in four energy sectors.
  o Traditional
  o Renewable
  o Energy-efficiency in building technologies
  o Transportation
Large- and Small-Group Discussion

Group discussions targeted key questions:

- **Biggest Growth Areas:** Given your own experiences and what we’ve heard from the panelists, what are the biggest growth areas for technicians in all of the energy fields nationally?

- **Top Technical and Soft Skills:** What are the top technical skills and top soft skills that energy technicians need now? In what ways will they differ five years from now?

- **Collaboration to Develop Technical Workforce:** How could community colleges collaborate with other key stakeholders (i.e. education, business/industry, nonprofits, and government) to develop the energy technician workforce needed locally? How do you believe this could be done effectively at the national level?
Large- and Small-Group Discussion (cont)

• **Effective Ways to Prepare for Green:** What are the most effective ways that community colleges, in collaboration with other key stakeholders, can prepare for the increased interest in emerging green occupations and the increased demand for technicians with green-enhanced skills?

• **Policy Changes:** What kind of national, state, or energy sector policy changes would improve the process of educating the current and future energy technician workforce?

• **Strategic Investments by Funders:** Going forward, what are the ways that funding organizations should invest strategically to support the emerging/future needs for energy technician education?
Summit Outcomes & Recommendations

• Energy efficiency and replacement of retiring workers are the biggest growth areas for technicians.

• Math, science, analysis, mechanics, electronics, and information technology are key technical skills for technicians.

• Good communication, problem solving, teamwork, social intelligence, integrity, salesmanship, and entrepreneurship are key soft skills for technicians.

• National certifications or credentials, core competencies, and national technician education standards are key actions energy sector stakeholders can collaborate on to develop the workforce.

• Revise existing programs with enhanced skills, rebrand them to make them more attractive to students and their families, and revamp their infrastructure—effective ways to prepare for emerging green occupations.
Summit Outcomes & Recommendations (cont)

- Key policy changes to improve the technician workforce:
  - Establish a national clean energy standard.
  - Reintegrate career technical education programs or classes into comprehensive high schools.
  - Make funding of science, technology, engineering, and mathematics a top priority at all education levels.

- Strategic investments by funders to support the future needs of energy technician educational projects and programs:
  - Solid labor and market intelligence
  - Partnerships with national or regional industry
  - Train-the-trainer programs
  - Industry internships for faculty
Final Advice to Stakeholders

To educators:
• Know Math, Know Success
• Green Economy Hinges on Technical Education

To business and industry:
• Join Us to Prepare YOUR Workforce
• Investment + Involvement = Profit

To funders:
• Energy Incentives—$2 Billion
• Green Manufacturing—$4 B
• Clean Energy Credits—$10 B
• New Transportation—$20 B
• Energy Security—PRICELESS

To policymakers:
• Reward Successful Results
• Provide Consistent, Incentivized, & Transparent Policy

To educators:
• Know Math, Know Success
• Green Economy Hinges on Technical Education
Environmental and Energy Reports and Wall Charts:
Available for free download at www.ateec.org/store/

Report from National Energy Technician Education Summit
Available Spring 2011
Resources—Professional Development

SEET Technology Workshops: Sustainable Energy Education and Training

• **Two major components:**
  – SEET **workshops** for high school & 2-yr college instructors
  – National SEET **network** for energy technology educators
• **Locations:** Various, including National Renewable Energy Lab and Colorado School of Mines, Golden, CO
• **Content focus:** Renewable Energy and Energy Efficiency
• Hands-on training labs, take-home equipment, instructional materials development, peer-to-peer dissemination
• Travel, accommodations, & stipend paid by NSF grant
ATEECC Fellows Institute: Environmental & Energy Themes

- **Major components:**
  - Design problem-based educational activities that emphasize opportunities for student learning within the context of their community.
  - Pilot-test the activities during the following school year.
- **Location:** Various
- **Travel, accommodations, & stipend paid by NSF grant**
Resources—Professional Development (cont.)

Agriculture-Based and Sustainable Energy: Study Abroad Program

• **Major components:**
  – Six U.S. instructors develop curricula for an international workshop in Denmark.
  – Instructors & two of their students attend workshop and develop collaborative learning modules with Danish instructors & students.
  – Establish a learning network.
  – Pilot-test the modules during the following school year.

• **Location:** Denmark

• Travel, accommodations, & stipend paid by NSF grant
ATEEC Online Energy Resources

- Programs database / model programs
- Professional forums
- Contribute / review resources
- SEET image gallery
- Recommended Web resources
- EERL
- Free downloadable resources
Programs Database & Interactive Map

- Database contains environmental & energy programs:
  - Degree programs
  - Certificate programs
  - Workforce training

- Google map shows:
  - School name, address, etc.
  - Program name
  - Direct link to program’s online curriculum

- Downloadable pdf listings of environmental & energy programs

- “Add Your Program” function to submit programs to database
Highlighting Model Programs

- Access model programs on map by location or from list by energy source
- Link to model program’s Web site
- Nominate function will take user to Energy Materials Review page where they can review & rate choices.
- As always, ATEEC News will feature a model program in each issue.
• Programs database / model programs
• **Professional forums**
• Contribute / review resources
• SEET image gallery
• Recommended Web resources
• EERL
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www.ateec.org
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www.nationalpete.org