CREATE International
Renewable Energy Education Project

ASEE 2016
New Orleans, LA
Panelists

Kenneth Walz
Andrew McMahan
Roger Ebbage

Mary Slowinski - Moderator
Session Agenda

• Provide overview of project
• Present study and results
• Hear from panelists on study findings, their experiences of impact of participating in CREATE’s international education experience
Problem Statement

Preparing students for jobs in the renewable energy and efficiency sector involves:

• Rapid technological changes
• Energy policy influences
• Increasingly global workforce
• Need for international literacy in teachers to increase global literacy in students
• Need for industry involvement
Project Overview

• Community college renewable energy educators from across the U.S. applied to participate.

• Participants selected were nationally recognized for their work in energy technician education and specific discipline expertise

• Rigorous study tour to meet technical educators, visit teaching labs, review industry partnerships, meet policy makers and government representatives and report on all the above.
Project Objectives

• To obtain first-hand knowledge of renewable energy international policies and educational practices
• To expand awareness of approaches to educating technicians for the renewable energy sector
• To increase international perspectives in existing programs of study
Site Visit Goals

**Academic Sites:** Meet educators and visit schools to learn about post-secondary training programs in RE.

**Policy Sites:** Gain an understanding of national renewable energy policies and their impacts.

**Industry Sites:** Tour facilities, meet employers and learn about desired skills and technologies being used.
Australia/New Zealand

March 12 – 26, 2013
Australia/New Zealand

Participants
Eleven educators selected to provide expertise in Wind, Solar, Bio-fuel, Building Efficiency, Geothermal & RE Policy
Australia/New Zealand Sites Visited

8 academic, 2 government/policy, 4 industry
TAFEs (Technical and Further Education) are run by the states and are the equivalent of public community and technical colleges.

Students pay 20% of costs; government reimburses TAFEs for 80% of the remaining 80%.
Australia/New Zealand
Education System

• Eleven industry councils comprised of labor and industry determine national quotas for programs to meet workforce needs

• TAFE directors in the individual states vie for programs
Shortly before our visit, a shift away from the traditional centralized program planning and allocation was made in favor of allowing student choice to determine programming.

These changes were resulting in drastic funding cuts, dramatic increases in tuition, and generally an unstable environment for educational institutions.
Australia/New Zealand

National Energy Policy

• The national Green Skills Agreement (2009) ushered in renewable energy incentives and stimulus spending, a dramatic increase in RE use, and the installation of solar in particular.

• Technical education needs increased further with the advent of solar installer qualifications and advances in water conservation, re-use, and capture/storage technologies.
Australia/New Zealand

National Energy Policy

• Political change has now reversed much of the Green Skills Agreement.

• As a result, renewable energy jobs are in decline and many TAFE programs are in jeopardy.
Germany/Denmark

May 29 – June 12, 2014
Germany/Denmark

Participants
Germany/Denmark

Participants

Ten returnees, 3 new educator/experts in Wind, Solar, Bio-fuel, Building Efficiency, Geothermal & Policy
Germany/Denmark

Sites Visited

June 1 – Berufsschule Gross-Gerau
June 2 - Darmstadt Univ.
June 2 - Hessian State Office for Technology Training
June 3 - Berufsschule Butzbach
June 3 - Wallerstädten Biogas Plant
June 4 - Insheim ORC Geothermal Plant
June 5 - RENAC
June 5 - Life e.V.
June 6 - BMWi (Federal Ministry of Economic Affairs and Energy)
June 6 - German Association of Solar Energy (DGS)
June 6 - Agora Energiewende
June 7 – Feldheim Renewable Village
June 8 – Bundestag
(The Reichstag building)
June 10 – BZEE Wind Training Facility
June 10 - Senvion (formerly REpower)
June 11 – Folkecenter Renewable Energy Education Center

7 education, 6 government/policy, 4 industry
German Education System

- Education is free for students (all the way through PhD); government and industry share costs.

- “Tracking” begins at age 10
German Education System

• Renewable energy topics are woven into standard coursework

• General education topics are contextualized and incorporated into technological coursework.
German Education System

• Post-secondary pathways & supports are varied and numerous and include traditional university degrees, multiple vocational and technical education programs (including “dual system” apprenticeships), and courses of study for workers seeking advancement
German Energiewende

National Energy Policy

• Germany has a comprehensive set of national policies – the Energiewende or “energy transition” – intended to eliminate the nuclear power base and increase energy independence
German Energiewende

National Energy Policy

• Three primary goals:
  – expand & improve renewable energy generation
  – improve energy efficiency
  – enhance the transmission infrastructure.
German Energiewende

National Energy Policy

• Establishes aggressive national targets into 2020 and beyond

• Has created a culture-wide shift

• Supports the development of educational pathways and programs in renewable energy and energy efficiency
Learning Activities
Learning Activities

Prior to Travel

• Pre-Travel Survey
• Participation in online shared environment
• Readings & online discussion of key topics
• Monthly webinars
• Pre-visit Site Reports
Learning Activities

During Travel

• Pre-Visit Site Report presentations
• Site Visit Reports
• “Top Two Take-Away” presentations *(AU only)*
Learning Activities

**Post-Travel**

- Sector Reports
- Individual Inquiry Reports *(Germany only)*
- Post-Survey
- Follow-up Impact Survey *(6 months post-Australia)*
- Long-term Impact Survey *(January 2016)*
Lasting Impacts Study & Results
Study Intent

• Three years since project inception
• Measured lasting impact of involvement on:
  • Teaching practice
  • Curriculum, program, institution
  • Professional development
• Also captured information on dissemination activities
Study Design

- Web-based survey administered using Survey Monkey
- Mix of Likert-formatted and open-ended response items measuring
- Invitations sent to all participants across the two phases of the project
- Twelve completions, response rate of 86%
Results Analysis

• Likert items were interpreted using descriptive statistics and frequency table

• Open-ended items coded independently by study authors, conclusions compared to discern patterns and emergent themes
Key Findings

• Impact on Teaching Practice
• Impact on Curriculum, Program, Institution
• Impact on Professional Development
Lasting Impacts on Teaching Practice

• Developed new presentations, lectures & written materials for my existing courses
• Incorporated or increased the international perspective in my existing courses
• Adopted new instructional techniques.
Lasting Impacts on Curriculum, Program, Institution

• nearly all reported that the international experience shaped the curriculum of their renewable energy programs
• adapted or expanded existing courses
• adapted or expanded existing degrees/certificates
• shifted how students are recruited
• integrated renewable energy into other courses
Lasting Impacts – Professional Development

• developed an understanding of energy policy outside the U.S.

• acquired new ideas about how education & industry can interact

• learned about unique or new technologies

• developed collaborative professional relationships with peers
**Lasting Impact – Professional Development**

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Very much (2)</th>
<th>Somewhat (1)</th>
<th>No change (0)</th>
<th>Wtd. Ave.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am more likely to engage in discussions related to international advances in renewable energy</td>
<td>11</td>
<td>1</td>
<td>0</td>
<td>1.92</td>
</tr>
<tr>
<td>I am more attentive to international events and development in renewable energy</td>
<td>10</td>
<td>2</td>
<td>0</td>
<td>1.83</td>
</tr>
<tr>
<td>I am more likely to engage in conversations about international energy policy</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>1.75</td>
</tr>
<tr>
<td>I am more likely to be active as an energy policy advocate in political arenas.</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>1.33</td>
</tr>
</tbody>
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Dissemination of Knowledge Gained

• shared with peers and institutional admin

• delivered lectures or presentations as part of conference or symposium, to other energy professionals or other faculty
Dissemination of Knowledge Gained

Please estimate the number of people from the following groups with whom you have shared information, insights, or details about your international experience.

<table>
<thead>
<tr>
<th>Answer Options</th>
<th>Total</th>
<th>Average Number</th>
</tr>
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<tbody>
<tr>
<td>Students</td>
<td>925</td>
<td>84</td>
</tr>
<tr>
<td>Educators</td>
<td>330</td>
<td>30</td>
</tr>
<tr>
<td>Energy Professionals</td>
<td>167</td>
<td>15</td>
</tr>
<tr>
<td>General Community members</td>
<td>157</td>
<td>14</td>
</tr>
<tr>
<td>Business and Industry Contacts</td>
<td>150</td>
<td>14</td>
</tr>
<tr>
<td>School Administrators</td>
<td>67</td>
<td>6</td>
</tr>
<tr>
<td>Govt Agency or Regulatory Officials</td>
<td>50</td>
<td>5</td>
</tr>
<tr>
<td>Elected Officials</td>
<td>21</td>
<td>2</td>
</tr>
</tbody>
</table>
Conclusions
Provide educators with opportunities to develop global literacy and acquire knowledge of international policy and trends so that they can adequately prepare graduates for the multinational renewable energy industry.
Participant Key Take Away

Working, learning & traveling with professional peers results in the deep sharing of knowledge, strategies and resources and has significant lasting impact on participant teaching and professional practices.
Participant Key Take-Away

Develop core programs of study that apply across sectors rather than “specialty” degrees or certificates.
Strengthen interdependent relationships between education, industry and trade associations to allow for the co-development of technological education solutions.
Encourage cultural shift and personal responsibility in regards to energy conservation and the use of renewable energy sources.
Establish and implement a long-term national agenda for renewable energy development, use, incentives, and deployment.
Other Projects, Next Steps

• Additional Faculty Professional Development
  The Geysers Geothermal Site, Bonneville Lock and Dam
  Lane CC, Columbia Gorge CC

• CREATE support center funded through 2020.
  Newsletter, webinars, and new faculty programs planned for 2017
Questions?
Thank you!

For more info:

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Support for this project was provided by the National Science Foundation Advanced Technological Education Program (NSF ATE Grant Award # 1239631 & 1345306). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.