Wind Development Training in Maine

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Mapping available training

- Review of course listings at 32 academic institutions in Maine
  - 4-year; 2-year; Certificate programs
- Email survey to 46 Maine companies
  - 26 responses
  - Small support firms to full-service engineering firms
- Interviews with 20 individuals
  - Educators
  - Engineers
  - Company owners
  - Wind industry experts
An emerging industry

- The wind industry nationally and internationally is a highly dynamic field – with an emerging understanding of the skills needed
- Definitions vary – e.g. “small” or “community” wind vs. commercial scale; onshore / near shore / offshore / deep water installations; one-time vs. permanent jobs; direct vs. indirect jobs
- Quality of data to assess transferable training is variable
= Direct Training
= Transferable Skills
Academic programs

- Four directly relevant to wind technology (one is in development)
- Eight with at least one course in wind energy, or the overall program is heavily focused on energy / power
- 50+ where skills are directly applicable to wind or may be transferable
Maine programs that focus on the wind sector

- **Wind Power Technology** – Northern Maine Community College; 2-year AAS
- **Renewable Energy and the Environment** – Online MS; in development by U Maine Orono
- **Composites** – Maine Advanced Technology Center; focus on blades
- **High altitude safety and rescue** – private companies collaborate to train Maine companies and fire departments using NFPA standards
Examples of programs that include *courses* on energy / wind

- **Electrical Engineering Technology** – U Maine at Orono: electrical controls, power engineering
- **Power Engineering Operations, and Power Engineering Technology** – Maine Maritime Academy: turbines & power plants, power control electronics
- **Department of Civil Engineering** – U Maine at Orono: includes a course on materials / blades
- **Small Vessel Operators** – Maine Maritime Academy: workboat operations, ocean survival, and other skills for servicing oil rigs
- **Electrical Technology / Safety & Rescue** – Kennebec Valley Community College: installation of small wind towers, including tower climbing safety.
Academic institutions with direct or transferable training

- University of Maine Orono – UMO
- University of Southern Maine – USM
- College of the Atlantic – COA
- Maine Maritime Academy – MMA
- Husson University
- Unity College
- Central Maine Community College – CMCC
- Eastern Maine Community College – EMCC
- Kennebec Valley Community College – KVCC
- Maine Advanced Technology Center – MATC
- Northern Maine Community College – NMCC
- Southern Maine Community College – SMCC
- Washington County Community College – WCCC
- The Landing School
- New England School of Metalwork
Examples of programs with transferable skills

- **Advanced Composites** – Husson, MATC, USM, UMO
- **Automotive / Engines** – CMCC, EMCC, NMCC, SMCC, WCCC
- **Construction Management** – UMO, USM
- **Control Systems & Design** – NMCC, USM, UMO
- **Electrical Engineering Technology** – CMCC, EMCC, KVCC, NMCC, SMCC, USM, UMO
- **Foundations** – EMCC, SMCC, UMO
- **Industrial Technology / Precision Manufacturing** – CMCC, EMCC, KVCC, NMCC, SMCC, UMO, USM
- **Marine Sciences & Engineering / Offshore** – COA, MMA, MMA/BIW, The Landing School
- **Safety & Rescue** – NMCC, MMA, construction firms
- **Welders & Fabricators** – NE School of Metalwork, NMCC, WCCC, EMCC, construction firms
- **Wildlife Ecology / Environmental Monitoring** – Unity, UMO, engineering firms
# Catalog of Training

**Keyed to supply chain**

**Contact info**

**Degrees & grads**

<table>
<thead>
<tr>
<th>Provider</th>
<th>Program Name or Department</th>
<th>Keywords: Wind Industry Supply Chain</th>
<th>Wind Industry Occupations</th>
<th>Website</th>
<th>Address</th>
<th>Contact</th>
<th>Degree(s) awarded</th>
<th>Prerequisites</th>
<th>Number of Graduates</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Maine, Orono</td>
<td>Mechanical Engineering</td>
<td>Mechanical Engineering: Components; Design; Precision Manufacturing</td>
<td>Mechanical Engineering; Component Designers</td>
<td><a href="http://www.maine.edu/">http://www.maine.edu/</a></td>
<td>1771 Bramhall Hall, Orono, ME 04469</td>
<td>William H. Shafroth, Ph.D.</td>
<td>MS, PhD</td>
<td>All 1-year programs</td>
<td>16</td>
<td>10-20 students</td>
</tr>
<tr>
<td>University of Maine, Orono</td>
<td>Composite Technology, Complex Manufacturing</td>
<td>Composites: Engineering, Composite Technology, Precision Manufacturing &amp; Machining</td>
<td>Composite Design, Manufacturing, Machining</td>
<td><a href="http://www.maine.edu/">http://www.maine.edu/</a></td>
<td>301 Divelays Hall, Orono, ME 04469</td>
<td>Samuel M. T魔法, Ph.D.</td>
<td>MS</td>
<td>All</td>
<td>100</td>
<td>10 students</td>
</tr>
<tr>
<td>University of Maine, Orono</td>
<td>Power Engineering Technology</td>
<td>Power Plant Turbine &amp; Engineering, Turbine Operation &amp; Maintenance</td>
<td>Power Engineering Technology</td>
<td><a href="http://www.maine.edu/">http://www.maine.edu/</a></td>
<td>301 Divelays Hall, Orono, ME 04469</td>
<td>Mark E. Goodwin, Ph.D.</td>
<td>BS</td>
<td>All</td>
<td>100</td>
<td>10 students</td>
</tr>
<tr>
<td>University of Maine, Orono</td>
<td>Maritime Engineering Technology</td>
<td>Maritime Engineering: Watershipping, Watershipping Operations</td>
<td>Maritime Engineering Technology</td>
<td><a href="http://www.maine.edu/">http://www.maine.edu/</a></td>
<td>301 Divelays Hall, Orono, ME 04469</td>
<td>Mark E. Goodwin, Ph.D.</td>
<td>BS</td>
<td>All</td>
<td>100</td>
<td>10 students</td>
</tr>
<tr>
<td>University of Maine, Orono</td>
<td>Marine Technology</td>
<td>Marine Engineering: Watershipping, Watershipping Operations</td>
<td>Marine Engineering Technology</td>
<td><a href="http://www.maine.edu/">http://www.maine.edu/</a></td>
<td>301 Divelays Hall, Orono, ME 04469</td>
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Under development by UMaine and UMP, the program will eventually offer a degree in Marine Technology. The Master of Science in Renewable Energy & Environmental Engineering offers a full-time program in renewable energy and environmental engineering. This program will be applicable to all in development.

Includes courses on turbines as well as marine and other renewable topics. It covers aspects of renewable technologies. Safety of workers included. The program is currently in a state of development. It is planned to be offered in the near future. Students can pursue a graduate degree in renewable energy and environmental engineering. This program will be applicable to all in development.
Keyed to wind supply chain

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<th>Wind Industry Occupations</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Maine, Orono</td>
<td>Civil Engineering</td>
<td>Civil Engineering; Construction; Towers &amp; Structures; Blades; Composites</td>
<td>Civil Engineers; Composites Engineers</td>
</tr>
<tr>
<td>University of Maine, Orono</td>
<td>Construction Management Technology</td>
<td>Site Preparation; Road Construction; Construction; Foundations; Installation &amp; Operations; Project Management</td>
<td>Project Managers; Construction Project Managers; Wind Development Directors</td>
</tr>
<tr>
<td>Maine Maritime Academy</td>
<td>Marine Transportation Operations</td>
<td>Offshore; Marine Transport</td>
<td>Marine Transportation Operators; Marine Transport Specialists</td>
</tr>
<tr>
<td>Maine Maritime Academy and Bath Iron Works</td>
<td>Ship Design and Ship Production</td>
<td>Offshore; Marine Engineering</td>
<td>Design Engineers</td>
</tr>
<tr>
<td>Husson University</td>
<td>Marine Composites</td>
<td>Composites</td>
<td>Skilled tradesmen</td>
</tr>
<tr>
<td>Eastern Maine Community College</td>
<td>Diesel, Truck and Heavy Equipment; Marine Transport</td>
<td>Engines &amp; Turbines; Vehicle Operations &amp; Maintenance; Generators; Heavy Equipment; Marine Engines</td>
<td>Heavy equipment operations &amp; maintenance; Engine installation, maintenance, repowering; Marine Engine operations &amp; maintenance</td>
</tr>
<tr>
<td>Kennebec Valley Community College</td>
<td>Electrical Lineworker Technology</td>
<td>Field Work</td>
<td>Lineworkers with high-altitude / harsh environment experience; Field Workers</td>
</tr>
<tr>
<td>Southern Maine Community College</td>
<td>Heavy Equipment Operations</td>
<td>Heavy Equipment Operations &amp; Maintenance; Construction</td>
<td>Heavy Equipment Operators</td>
</tr>
<tr>
<td>Bath Iron Works (Cross listed with Maine Maritime Academy)</td>
<td>Ship Production- Machinist Concentration</td>
<td>Machining; Precision Manufacturing; Component Manufacture</td>
<td>Machinists; Precision Manufacturers</td>
</tr>
<tr>
<td>Maine company</td>
<td>Training related to construction, precision manufacturing, and marine transport.</td>
<td>Offshore; Marine Transport; Composites; Precision Manufacturing; Components</td>
<td></td>
</tr>
</tbody>
</table>
Insights about academic training

- The Maine community college and university system offers a broad array of courses that are transferable to the wind industry sector.
- Many programs already have strong internship, co-op, or on-site training components. Examples:
  - Bath Iron Works and Maine Maritime Academy offer joint training in power plants, and marine engineering.
  - Kennebec Valley Community College has developed a Machinist Development Program with a local firm that has made turbine components.
  - A number of Maine academic programs provide internships with New England power and utility firms such as Bangor Hydro and Central Maine Power.
- Very little instruction today is specific to wind, with Northern Maine Community College’s Wind Power Technology program the exception.
- Despite absence of “wind” programs, at the community college level there is strong interest and a track record of providing instruction specific to the needs of employers.
- At the university level programs relevant to wind are in development.
Survey of training at Maine firms

- Survey sent to 46 members of the Maine Wind Industry Initiative and other companies involved in Maine wind installations
- 26 responses received (57%)
- Survey conducted by email December, 2009
- Companies range from small firms hoping to offer support services if the wind industry develops, to full-service national engineering firms already involved
- Survey questions based on twelve “skill sets” – areas of expertise associated with the wind industry
Summary of training at firms

- Project Management is the skill set where the most firms – 38% of survey respondents – offer training.
- The three skill sets that are next “most trained” are:
  - Precision Manufacturing and Machining
  - Welding and Metal Fabricating
  - Site Planning / Surveying
- However well over 50% of respondents across all twelve skill sets indicate they do not train in that area, or the skill set is not applicable to their current business.
- Most training is internal.
Number of companies offering training – across 12 skill sets
(26 respondents)
Number of companies indicating training not offered/applicable – across 12 skill sets (26 respondents)
Percent of companies having difficulty finding trained workforce

Has your company experienced difficulty finding trained workforce in any of the job categories listed above?

- Yes we have
- No, we have resources internally or have successfully secured them when needed

15.8% of companies have difficulty finding trained workforce.

84.2% of companies have no difficulty finding trained workforce.
Project Management insights from Maine companies

- Of twelve skill sets potentially transferable to the wind industry, Project Management is the one for which the most companies said they provide training (38%).
- Those offering Project Management training are typically the larger consulting and design firms.
- Informal conversations also support an interest in Project Management. Typical comments:
  - Yes, you can train for these skills. Professional Engineers can benefit greatly from project management training.
  - Project managers with offshore experience are in high demand and “can pretty much write their own ticket.”
  - Projects within the American Recovery and Reinvestment Act of 2009 (ARRA) will require skills/certifications in project management.
General insights from Maine companies

- Other research findings indicate several skill sets that are highly relevant to the wind industry – notably electrical, mechanical, and power plant engineering and technology; field biology; and safety & rescue skills. These were among the “least trained” at the Maine companies we surveyed.

- Training in three skill sets was offered by five or more respondents – Precision Manufacturing & Machining, Welding and Metal Fabrication, and Site Planning / Surveying. These are all skills used in multiple industries and are not unique to the wind sector.

- Internal training is often part of a national curriculum, such as the National Center for Construction Education and Research (NCCER) or the National Fire Protection Association (NFPA).

- In general the companies surveyed were not experiencing difficulty finding skilled workers in the sectors in which they currently operate.
Interviews

- Twelve Maine community college department chairs
- Three Maine department chairs in 4-year institutions
- Five Maine companies
- Conversations with companies outside Maine at industry events
Insights from interviews

- Electrical, mechanical and power plant skills – three technical areas most relevant to the wind industry – are the focus of many programs in Maine.
- All levels of technical skills in electrical engineering are strongly in demand and transferable.
- Project Managers able to handle overall coordination and complex projects are in high demand.
- “Non-academic resume” also highly valued – veterans, hobbies, ability to work in adverse conditions, hands-on experience.
- Jobs in this industry may be global – regional, national, and international placements are common.
- NMCC’s Wind Technology Program is one of ten national programs based on AWEA core curriculum.
Insights: Academic interviews

• Interviews with Department Chairs at 4-year institutions
  ● Unique training in selected areas such as composites, blade & tower design, and maritime engineering
  ● DeepCWind, Advanced Structures and Composites Center, and new blade test facility at UMO all provide focal point for academic training
  ● Master of Science in Renewable Energy and the Environment may become a focal point at the graduate level

• Interviews with Department Chairs at Maine community colleges
  ● Willing and anxious to train for the skills currently needed by local companies
  ● Regularly add modules and hands-on experiences/equipment to their programs as they see need – e.g. marine engines, generators, robotic arms, multi-axis CNC machines, wind turbine towers
  ● Department chairs consistently noted their aim is to offer programs leading to jobs for their graduates – several expressed some concern about how many sustainable jobs the wind energy sector will create
Insights: Industry interviews

- Interviews with companies in Maine
  - The current level of activity in the wind sector is small – a handful of land-based installations and the maintenance of those turbines
  - Manufacture of wind sector components has occurred in Maine, however current production appears to be minimal or at a standstill (more may be uncovered since our interviews with companies were limited)
- Conversations with companies in the wind industry outside Maine suggest employers look beyond the academic resume:
  - Veterans are valued in the wind industry – work ethic, discipline, teamwork, ability to solve problems as they arise
  - Hobbies – woodworkers, boat builders, motorcycle enthusiasts
  - Ability to work in the field in adverse conditions is highly valued – weather, steep terrain, “at height,” offshore
Summary

- The wind industry in Maine is currently small, but there is active interest and an apparent readiness to respond if the market emerges
- “Transferable skills” appear key to serving an emerging industry
- Maine institutions offer a variety of courses with transferable skills, many with co-op experiences, internships, or other “on the job” components
- Transferable skills taught in Maine are applicable to both land-based and offshore installations
- Maine has one of ten national programs at the Associate Degree level to train wind technicians in an emerging industry-standardized core curriculum
- Maine is developing graduate programs in renewable energy relevant to wind
- Maine companies offer training modules related directly and indirectly to the wind sector – most are in-house
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The project team for this study included On Point Research, Drapeau Research Services, LLC, and K. Sasser, MLS.

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