Goals of RNP’s Wind Workforce Initiative

LONG TERM:
To provide long term, systematic, sustainable and effective strategies to meet the identified workforce needs and respond to existing and projected shortages.

SHORT TERM:
Offer Internship Programs and Industry Tool Kit to Expand Use/Capacity/Effectiveness of College Internship Programs
Objectives: Proper siting, advance policies promoting new renewables, expand retail markets.

Geography: OR, WA, ID, MT

Members: Business, non-profit, educational
Renewable Energy

“It is a fairly rare initiative that is good policy, good economic development, and good for the environment, but renewable energy development is that rare gem.”

- Billions in new capital being invested;
- A net increase of 1,250 new jobs with each $100 million investment in renewable energy resources.

April 2005, Oregon Renewable Energy Plan
Between 2001-07, the U.S. wind generating capacity expanded at a rate of 49% per year on average.

The U.S. has over 20,000 MW of wind capacity online, enough to power over 5.3 million homes; this represents only 2% of total US electricity mix.

The Pacific NW has the potential to generate over 137,000 average Mega Watts of electricity from wind - or enough for over 102 million homes.

965 MW of wind energy is now operating in Oregon.

Over 2,200 jobs now in Wind Energy in OR and WA.
Supporting Renewable Energy Makes Economic Sense

Oregon seeks to become a leader in the clean energy economy to:

- Provide economic benefits to communities through:
  - Construction and Operations Jobs
  - Tax revenues flowing to counties, particularly rural ones
  - Induced business activity
  - Landowner revenue - On average, $2,000-$7,000 annually for each wind turbine.
  - Carbon/Pollution Offset

- Reap economic benefits as every $100 million invested in renewable energy results in $200 million in economic benefits, and increases tax revenues by approximately $1 million.

- Capture jobs - Renewable energy and energy efficiency is currently generating 8.5 million jobs and could reach 40 million U.S. jobs by 2030.
Direct jobs and parts during construction

- Truck drivers, crane operators
- Wind Turbine Components
- Earth moving, cement pouring

Construction
Management and support
Attachment C
OR & WA Clean & Green Cluster: Good Jobs/Economic Development

Carbon-Free Prosperity 2025 Report**
Five clean-energy sectors provide high-paying jobs and vital new economic base for Oregon and Washington:

- **Solar PV Manufacturing** - up to 22,560 new jobs;
- **Wind Power Development** - up to 6,000 new jobs;
- **Green Building Design** - up to 16,834 new jobs;
- **Sustainable Bioenergy** - up to 10,419 new jobs; &
- **Smart-Grid Technologies** - up to 7,000 new jobs.

**Oct. 08 Report by two leading clean-tech organizations — Clean Edge and Climate Solutions.**
Wind industry indicated inability to meet workforce needs were among their top two business concerns.

In May 2008, a state report, recommended:

1. Increasing collaboration between key stakeholders;
2. Establishing industry internship and mentoring systems; and
3. Integrating clean energy elements into the core curriculum for conventional academic and technical programs in key areas.

*Analysis of Clean Energy Workforce Needs and Programs in Oregon (2008)*
RNP INFORMALLY SURVEYED MEMBERS AND INDUSTRY

- Ascertain the positions that are difficult to fill;
- Identify new or expanded skill sets needed in workforce;
- Assess current internship programs and interest in using internships.
RNP Takes Recommended Steps

To Increase Collaboration and Internships:

- Began setting up a series of meetings with faculty from public and private universities;
- Identifying internship coordinators and interested faculty;
- Recruiting RNP members to offer internships;
- Beginning dialogue on curriculum.
INITIAL RESPONSE: Job Openings and Needs in Every Stage of a Project

- Planning and Development – Site Identification
- Public Involvement & Outreach
- Permitting and Siting
  - Environmental Assessment
  - Design and Engineering
  - Legal and Policy Work for Permitting
- Construction Labor
- Operation and Maintenance
Types of Degree Jobs Needed in Wind Energy Industry

- **Engineering**
  - Civil, Mechanical, Electrical, Construction Management
- **Business/Economics/Math Degrees**
  - Project and Contract Management
  - Masters in Business Administration
  - Market and Economic Analysis
- **Political Science/Policy**
- **Environmental Sciences/Physics**
- **Meteorology**
Business of the Wind: Types of Jobs

- Asset Manager
- Project Manager
- Manager of Policy and Regulatory Affairs
- Wind Project Developer
- Senior Analyst/Structuring Analyst
- Senior Business Developer
STAGES OF WIND PROJECTS

1. 20% Wind Scenario
2. Turbine Technology
3. Manufacturing, Materials, & Jobs
4. Transmission & Integration
5. Siting and Environment Effects
6. Markets

RNP WIND WORKFORCE INITIATIVE
Skills Required over Project Cycle

- Site Identification
  - Meteorologists
  - Environmental
  - GIS
  - Civil Engineers
- Development & Permitting
  - Project Managers/Developers
  - Meteorologists
  - Environmental
  - GIS
  - Civil Engineers
  - Business analysts
  - Attorneys -- Land use and real estate
- Market Assessment & Power Sales
  - Business
  - Quantitative analysis
  - Policy
  - Attorneys - sales contracts
- Project Construction
  - Environmental
  - GIS
  - Engineering (civil, electrical)
  - Construction
  - Project Management
- Asset Management
  - Meteorologists
  - Mechanical Engineers
  - Quantitative analysis
  - Contract Management
  - Operations and Maint.

RNP WIND WORKFORCE INITIATIVE
### Examples of Opportunities

**Environmental Sciences, Engineering and Policy - Permit Applications**

#### Klondike III/Biglow Canyon Wind Integration Project

**PROJECT DESCRIPTION:**
BPA has decided to interconnect 300 megawatts (MW) of electricity generated from the proposed Klondike III Wind Project near Tulelake, California, and the proposed Biglow Canyon Wind Farm, owned by Portland General Electric and located north and east of the proposed Klondike III Wind Project, to the Federal Columbia River Transmission System. To interconnect these wind projects, BPA will build and own a 345/154 kV transmission line, which will interconnect to the FCRTS near Knobtop, Oregon.

**CURRENT STATUS:**
BPA prepared an Environmental Impact Statement (EIS) for the project in November 2000. The project was approved by FERC in December 2001. BPA held a public hearing in Tulelake, California, in February 2001, and in Siskiyou County, Oregon, in April 2001. The project has been approved by the Oregon Energy Facility Siting Council and the Oregon Department of Agriculture.

**CONTACT:**
Gene Lynard, Oregon 97202, 503-230-3795.

### DOCUMENTS:

<table>
<thead>
<tr>
<th>Document</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>ROD (165 KB pdf) (10/25/06)</td>
<td>ROD Cover Letter (137 KB pdf) (10/25/06)</td>
</tr>
<tr>
<td>Appendix A - Cumulative Impacts Analysis For Avian Resources From Proposed Wind Projects In Sherman County, Washington (544 KB pdf)</td>
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<td>Appendix B - Visual Resources Technical Memorandum (101 KB pdf)</td>
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<td>Appendix E - Contractor Disclosure Forms (465 KB pdf)</td>
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<td>Map 1: Project Vicinity (666 KB pdf) (04/06/06)</td>
<td>Map 2: Alternatives Eliminated from Construction (284 KB pdf) (04/06/06)</td>
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<td>Map 3: Transportation System (709 KB pdf) (04/06/06)</td>
<td>Map 4: Recreational Opportunities (273 KB pdf) (04/06/06)</td>
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<td>Map 5: Soils (1.3 MB pdf) (04/06/06)</td>
<td>Map 6: Waterway/Wetland Crossings (709 KB pdf) (04/06/06)</td>
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<tr>
<td>Map 7: Sensitive Values (298 KB pdf) (04/06/06)</td>
<td>Map 8: Visibility Analysis for Oregon (3.67 MB pdf) (07/11/06)</td>
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<td>Map 9: Visibility Analysis for Washington (2.52 MB pdf)</td>
<td>Map 10: Project Map (416 KB pdf) (03/31/05)</td>
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<tr>
<td>Draft EIS Public Letter (137 KB pdf) (05/01/06)</td>
<td>Project Scoping Letter (47 KB pdf) (02/24/05)</td>
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<td>Appendix A - Cumulative Impacts Analysis For Avian Resources From Proposed Wind Projects In Sherman County, Washington (544 KB pdf)</td>
<td>Updated Project Map (273 KB pdf) (02/15/05)</td>
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<td>Appendix B - Visual Resources Technical Memorandum (101 KB pdf)</td>
<td>Project Scoping Letter (45 KB pdf) (02/15/05)</td>
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<td>Appendix C - Electrical Effects (436 KB pdf)</td>
<td>Comment Form (13 KB pdf) (02/15/05)</td>
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<td>Appendix D - Assessment Of Research Regarding EMF And Health And Environmental Effects (142 KB pdf)</td>
<td>Notice of Intent to Prepare an EIS (27 KB pdf) (02/09/05)</td>
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<td>Appendix E - Contractor Disclosure Forms (465 KB pdf)</td>
<td>Project Map (191 KB pdf) (02/20/05)</td>
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</table>
Examples of Opportunities
Environmental Sciences - Field Studies
Examples of Opportunities
Environmental Sciences and Engineering - Permit Applications
Examples of Opportunities
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Examples of Opportunities
Environmental Sciences - Avian Studies
Examples of Opportunities
Environmental Sciences - Avian Studies
Examples of Opportunities
Environmental Sciences - Visual Analysis
Examples of Opportunities
Meteorology - Project Siting Analysis
Examples of Opportunities
Business Risk Analysis
Examples of Opportunities
Business Economic / Risk Analysis

### RETScreen Financial Summary - Wind Energy Project

<table>
<thead>
<tr>
<th>Financial Parameter</th>
<th>Before Adjustment</th>
<th>After Adjustment</th>
<th>Cost Basis</th>
<th>Net GHG reduction</th>
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<tbody>
<tr>
<td>Avoided cost of energy (A)/kWh</td>
<td>4.16</td>
<td>3.53</td>
<td>14.717,000</td>
<td>144,365,881</td>
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<td>RE producer cost (A)/kWh</td>
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<td>GHG emission reduction credit (C)/kWh</td>
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<td>Energy cost escalation index</td>
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<td>Inflation</td>
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### Yearly Cash Flows

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<th>Year</th>
<th>Before Adjustment</th>
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<td>5</td>
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<td>(155,692,971)</td>
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<td>144,365,881</td>
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### RETScreen Reliability and Risk Analysis - Wind Energy Project

<table>
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<tr>
<th>Risk Analysis for Alternatives SII and RII</th>
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<tbody>
<tr>
<td>Parameter</td>
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<tr>
<td>-----------</td>
</tr>
<tr>
<td>Avoided cost of energy</td>
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<tr>
<td>RE delivered</td>
</tr>
<tr>
<td>Final Cost</td>
</tr>
<tr>
<td>Net Present Value</td>
</tr>
<tr>
<td>Minimum Life with lowest standard deviation</td>
</tr>
<tr>
<td>Maximum Life within standard deviation</td>
</tr>
</tbody>
</table>
Examples of Opportunities Engineering
Examples of Opportunities
Construction Management
Examples of Opportunities
Construction Management
WEBSITE LINKS TO WIND JOBS

Wind Careers  www.careersinwind.com/
Power Plant Pro  www.powerplantpro.com/power-career-builders.php
Energy jobs Network  www.energyjobsnetwork.com
Indeed.com  www.indeed.com/wind
Renewable Energy Jobs  www.energyplacement.com/jobs
enxco  www.enxco.com/employment.php
FPL Energy  www.fplcareers.com/
Horizon Wind  www.horizonwind.com/company/jobs.aspx
Iberdrola  www.ppmenenergy.com/careers.html
RES America Inc.  www.res-americas.com/jobs.aspx
Vestas  www.vestas.com/en/jobs/career-development
3Tier  www.3tiergroup.com/en/company/careers
CH2MHiIl  www.ch2m.com/corporate/work_with_us/careers/default.asp

RNP WIND WORKFORCE
INITIATIVE
WIND INDUSTRY LINKS

Renewable Northwest Project
www.rnp.org
American Wind Energy Association (AWEA)
www.awea.org/
US Dept. of Energy Wind Program
www.windpoweringamerica.gov/
National Wind Coordinating Collaborative
www.nationalwind.org/
Utility Wind Integration Group (UWIG)
www.uwig.org/
WIND RESEARCH AND RESOURCES

RESEARCH
US DOE Wind Energy Research  
National Wind Research Center at NREL  
Oregon Built Environment & Sustainable Technologies Center

EDUCATIONAL LINKS
AWEA Wind Web Tutorial  
Student and Educator Resources for Wind  
National Energy Education Development Project (NEED)  
PicoTurbine Renewable Energy Windmill and Solar Projects  
Wind Power Maps.org - Northwest Wind Maps

WIND POTENTIAL
20% Wind Energy By 2030 Report  
Wind Energy Works

www.windpoweringamerica.gov/  
www.nrel.gov/wind/  
http://oregonbest.org/  
www.awea.org/faq/  
www.nrel.gov/learning/sr_wind.html  
www.NEED.org  
www.picoturbine.com  
www.windpowermaps.org  
www.windenergyworks.org/Home/tabid/36/Default.aspx
INTERESTED IN RNP’S WIND WORKFORCE INITIATIVE

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