Northeast Sustainable Energy Association (NESEA)
March 1, 2022

ReVision Energy Training Center: An Innovative Workforce Development Program

Vaughan Woodruff (ReVision Energy)
Astrid Blanco (Revision Energy)

Curated by Maria Washington (Byggmeister) and Heather Iworsky (ReVision Energy)

Northeast Sustainable Energy Association (NESEA)
March 1, 2022
SESSION AGENDA

• Electrical licensing in northern New England
• History of REEAP
• Implementing a clean energy apprenticeship
• ReVision Energy’s apprenticeship progress
• Lessons learned and future plans
• Q&A
ASTRID BLANCO

• Talent & Culture Development Coordinator
• Leads hiring efforts
• Orients new hires
• Liaison between apprentices and State Dept. of Labor
• HR support for apprentices
• Maintains key documentation for REEAP and apprentices
• Key facilitator of companywide Justice, Equity, Diversity, and Inclusion (JEDI) efforts
VAUGHAN WOODRUFF

• Director, ReVision Energy Training Center
• Former founder and CEO of Insorce Renewables
• Lead Instructor in DOE’s Solar Instructor Training Network in mid-00s
• Developed and delivered curriculum for SEI, Heatspring, NYSERDA, and IREC
• Former chair of Maine’s solar industry trade association
• Responsible for implementation and expansion of ReVision’s workforce development efforts
The 100% Solar Household
Affordable Technology Replaces Fossil Fuels

- Solar Panels make 30+ years of clean electricity
- Electric Car charged by solar, eliminating gas
- Electric Heat Pump eliminates propane, oil and gas
- Electric Water Heating provides solar powered hot water
- Battery Storage powers home in outages
- Excess energy earns you credit and benefits neighbors
Electrical Licensing
Northern New England
Figure 6: Solar Industry Workforce Path to 30% by 2030

from *The Solar+ Decade: Leading the Energy Transition*, Solar Energy Industries Association

Workforce Projections
“Electrical Installations”

• Installation, repair, alteration, and maintenance of electrical equipment
• In Maine, racking is not considered electrical equipment for the purposes of defining “electrical installations”
• In New Hampshire and Massachusetts, racking that is part of the bonding system is considered electrical installations
• State laws and rules define licensing requirements for electrical installations
Licensing Ratios

• Journeyperson and Master Electrician licenses allow for supervision of electrical apprentices or electrical helpers
• In Maine, two apprentices can be supervised by a Journeyperson or Master; only one helper can be supervised
• In New Hampshire, up to two apprentices can be supervised by a Journeyperson or Master
• In Massachusetts, a Journeyperson or Master can supervise one unlicensed worker
Why Should We Focus on DEI Efforts?

- Human rights for all
- Aligned with company mission and B Corp values
- Value in diverse experiences and perspectives
- Representing the communities we serve
- Expanding customer base
- Labor constraints
Population Demographics
Population Demographics
Population Demographics
Figure 3. Trades Education Enrollment Relative to U.S. High School and CTE Students 2016-17 \(^2\) (n=32 states)

- Public high school students*: 11,324,122
- Perkins secondary enrollment**: 6,365,613
- Students enrolled in skilled trades***: 872,452


**Perkins Data Explorer. [https://perkins.ed.gov/pims/DataExplorer/CTEParticipant](https://perkins.ed.gov/pims/DataExplorer/CTEParticipant):**

***JFF research. Based on data from 32 states for 2016-17.
## Figure 7. Trades Education Enrollments 2016-17 in Relation to Job Openings 2018-2028

<table>
<thead>
<tr>
<th>Trade Area</th>
<th>Total Job Openings 2018-2028 (n = 32 states)</th>
<th>Enrollments 2016-17 (n varies by trade)*</th>
<th>Enrollments as a Percentage of Openings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>3,992,744</td>
<td>191,907</td>
<td>5%</td>
</tr>
<tr>
<td>Advanced Manufacturing</td>
<td>2,149,971</td>
<td>161,828</td>
<td>8%</td>
</tr>
<tr>
<td>Automotive</td>
<td>876,778</td>
<td>235,968</td>
<td>27%</td>
</tr>
<tr>
<td>Carpentry</td>
<td>817,878</td>
<td>84,766</td>
<td>10%</td>
</tr>
<tr>
<td>Electrical</td>
<td>700,721</td>
<td>41,446</td>
<td>6%</td>
</tr>
<tr>
<td>Plumbing</td>
<td>490,302</td>
<td>16,501</td>
<td>3%</td>
</tr>
<tr>
<td>Welding</td>
<td>403,684</td>
<td>121,050</td>
<td>30%</td>
</tr>
<tr>
<td>HVAC</td>
<td>318,589</td>
<td>18,986</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9,750,667</strong></td>
<td><strong>872,452</strong></td>
<td><strong>10%</strong></td>
</tr>
</tbody>
</table>

*Total Job Openings are provided for the 32 states that provided enrollment data.39

*Enrollment n for states reporting varies by trade area: Construction (29), Advanced Manufacturing (27), Automotive (31), Carpentry (26), Electrical (26), Plumbing (19), Welding (29), HVAC (21)

Sources: Total Job Openings: Emsi 2019; Enrollment: JFF research.
ReVision Energy Launched JEDI in 2020

Climate Justice = Social Justice
THE FIVE PILLARS OF JEDI

**Culture and Talent Development**
- Diversity goals
- Employ Veterans, Women, Minorities, those with Disabilities
- Help company culture transition

**Education and Training**
- Environmental Education
- Bias training for employees
- Apprentice Training (RETC)
- Courageous Conversations

**Expanding Access to Solar**
- Power Purchase Agreements
- Community Solar Projects
- Solar on Schools
- Solar on non-profits
- LMI Solar

**Advocacy and Partnerships**
- Voter registration
- Policy awareness
- Tools to make your voice heard

**Retention and Mentorship: ALECTRONA**
- Support women in at ReVision
- Encourage women to be a part of the Industry
- LGTBQ+ advocacy and Support

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Electrical Apprenticeship History
2018-2021
RETC Startup in New Hampshire

• RETC was established in 2018 as the ReVision Energy Technical Center
• Established to help fill the need for Apprentices and Electricians
• Provides a career path within clean energy
• Minimize turnover
• Allow Apprentice opportunities to those who would not have had the chance otherwise
• Started in New Hampshire
• Allowed for a self-paced learning model - first of its kind
Expanding to Maine

- In 2019 RETC expanded into Maine and we registered with the Department of Labor
- First year setting Diversity hiring numbers for hiring Apprentices
- Learned new lessons from offering Apprenticeship in more than one state
- Started building a training facility at our South Portland location
COVID Response & A Broader Vision

• Rebranded in 2020 from the ReVision Energy Technical Center to the ReVision Energy Training Center
• Goal of expanding the program further and provide training for those outside of electrical apprenticeship
• The self-paced hybrid model helped us adjust to the global pandemic
• Co-owner led virtual classes were used to supplement OJT hours and replace in-person learning
Expanding Workforce Development

- In February 2021, employee-owned B Corp Insource Renewables joined forces with ReVision Energy
- Transitioned RETC leadership to Vaughan
- Delineated electrical apprenticeship program from RETC through rebranding as ReVision Energy Electrical Apprenticeship Program (REEAP)
- Building additional onboarding and training tracks for those outside of REEAP, including Design, Sales, and Service teams
Program Implementation
Electrical Apprenticeship
Apprenticeship Structure

• On-the-Job Learning (OJL) aligned with federally-approved electrician occupation title
Electricians

Install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes. May install or service street lights, intercom systems, or electrical control systems.

**Approved Occupations Titles**

The occupation title(s) listed below have been vetted by industry and approved by the U.S. Department of Labor for use in a Registered Apprenticeship Program. In some instances, there may be more than one occupational title to select from based on specific employer foci and needs. Each title includes a set of occupational Work Process Schedules (WPS) that provide employers with an approved set of work activities and educational coursework to help you get started creating your program.

- Electrician, Maintenance
- Lightning Protection Technician (Conventional System)
- Residential Wireman
- Protective-Signal Reapirer
### Federal-Approved Apprenticeship Occupations

#### Work Process Schedule

**Electrician**

**Job Description:** Install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes. May install or service street lights, intercom systems, or electrical control systems.

**RAPIDS Code:** 0159  
**O*NET Code:** 47-2111.00

**Estimated Program Length:**

**Apprenticeship Type:**  
- [ ] Competency-Based  
- [X] Time-Based  
- [ ] Hybrid

#### Suggested On-the-Job Learning Outline

<table>
<thead>
<tr>
<th>Plan layout of construction, installation, or repairs.</th>
<th>Approximate Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Plan layout and installation of electrical wiring, equipment, or fixtures, based on job specifications and local codes.</td>
<td></td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Install electrical components, equipment, or systems.</th>
<th>Approximate Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Connect wires to circuit breakers, transformers, or other components.</td>
<td></td>
</tr>
<tr>
<td>B. Install ground leads and connect power cables to equipment, such as motors.</td>
<td></td>
</tr>
<tr>
<td>C. Assemble, install, test, or maintain electrical or electronic wiring, equipment, appliances, apparatus, or fixtures, using hand tools or power tools.</td>
<td></td>
</tr>
<tr>
<td>D. Fasten small metal or plastic boxes to walls to house electrical switches or outlets.</td>
<td></td>
</tr>
<tr>
<td><strong>Total Hours</strong></td>
<td></td>
</tr>
</tbody>
</table>
Apprenticeship Structure

• On-the-Job Learning (OJL) aligned with federally-approved electrician occupation title
• Apprenticeships are registered with state Department of Labor
• Apprentices are registered with state Department of Labor
### Registered Programs

<table>
<thead>
<tr>
<th>Program Number</th>
<th>Sponsor Name</th>
<th>Assigned ATR</th>
<th>State</th>
<th>County</th>
<th>Status</th>
<th>Registered Date</th>
<th>Last Updated Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH011125419</td>
<td>ReVision Energy, Inc.</td>
<td>young.wynn.bbh@lhr</td>
<td>NH</td>
<td>Rockingham County</td>
<td>Registered</td>
<td>9/11/2012</td>
<td>1/17/2021</td>
</tr>
<tr>
<td>2019-ME-73669</td>
<td>Revision Energy, Inc.</td>
<td><a href="mailto:kristine.mcallister@maine.gov">kristine.mcallister@maine.gov</a></td>
<td>ME</td>
<td>Cumberland County</td>
<td>Registered</td>
<td>6/17/2019</td>
<td>11/30/2021</td>
</tr>
</tbody>
</table>
Apprenticeship Structure

• On-the-Job Learning (OJL) aligned with federally-approved electrician occupation title
• Apprenticeships are registered with state Department of Labor
• Apprentices are registered with state Department of Labor
• Related Technical Instruction (RTI) approved by state electrician licensing boards in Maine and New Hampshire
Electrician's Examining Board

Welcome to the website of the Office of Professional and Occupational Regulation, an agency within the Department of Professional and Financial Regulation. We appreciate your visit to our homepage and we look forward to assisting you.

Although our building in Gardiner, Maine is not open to the public due to the COVID-19 health emergency, our staff remains available to resolve your complaints, answer your questions, and continue to deliver high-quality services to consumers and regulated industries.

Please contact us by email or by phone or through our other online services, and we will assist you.

You may follow this link to the Secretary of State's office to view a list of board members. Members of the public should not contact board members with questions or comments. All questions, comments or any other board-related matters must be directed to the Board's administrator. (Catherine_M.Carroll@maine.gov, 207-624-6605)

Purpose

The Electricians' Examining Board was established to protect the public from hazards arising from the use of electricity for light, heat, power and other purposes through the regulation of electricians in Maine.

The primary responsibility of the Board is to ensure the competency of electricians through examination; to issue licenses to those qualified to hold the title of Master electrician, Journeyman electrician, Limited electrician, Apprentice electrician, Journeyman-in-training electrician or Helper electrician; to investigate complaints of noncompliance with or violations of the law and board rules; and to issue permits.

Electricians' Board

The Board of Electricians develops and maintains the ethical, professional and educational standards for the licensure of electricians in New Hampshire to safeguard the state's citizens. The Board is responsible for the disciplinary actions for violations of these standards.

Who We Regulate:

Electrician
- Apprentice
- Journeyman
- Master
- High/Medium Voltage

Business Entity (including corporations, LLC's and partnerships)

Contact Information:

Licensing Requirements
Apprenticeship Structure

- On-the-Job Learning (OJL) aligned with federally-approved electrician occupation title
- Apprenticeships are registered with state Department of Labor
- Apprentices are registered with state Department of Labor
- Related Technical Instruction (RTI) approved by state electrician licensing boards in Maine and New Hampshire
- Approved for 2-year house wiring apprenticeship in Maine
- Approved for 4-year journeyperson apprenticeship in NH
- Massachusetts apprentices participate in NH program
Apprentice Experience

- OJL Begins Upon Hire
- Onboarding consists of Apprentice Registration, Apprentice Electrical Licensing, and Academic Enrollment
- Academic year begins in September and continues through May
- Significant portion of RTI is asynchronous
- In-person training from January-May
- Average of 5 hours per week of RTI
- Apprenticeship participation is a condition of employment for majority of participants
Licensing through REEAP

- Limited House Wiring Licensing in Maine
  - 14 have successfully passed licensing exam
  - 9 are waiting to test
  - 7 slated for completion in 2022
- Journeyperson Licensing in New Hampshire
  - First round of Apprentices completed the 4-year program in 2021
  - 4 have successfully passed licensing exam
  - 2 are waiting to test
  - 16 slated for completion in 2022
Diversity Goals - 2019

• 1% of Install hires will be female
• 1% of Install/Ops hires will be minorities
• 22.8% of hires in 2019 were women or minorities

Diversity Outcomes - 2019

• RETC Apprentices across all branches: 66
• % female apprentices: (3.03%)  
• Total Electricians across all branches: 29
• % female electricians: (6.9%)
2020 Hiring

- Total Hires: 47
  - 43% of our hires were a part of a target group for hiring
  - 25% Identified as Female
  - 8.5% Identified as Racial Minority
  - 4% Identified as having a Disability
  - 10.6% Identified as a Veteran

- 14 Apprentice Hires
  - 7% Identified as Female
  - 7% Identified as Racial Minority
  - 7% Identified as having a Disability
  - 14% Identified as a Veteran
2021 Hiring

• Total Hires: 84
  • 53.5% of our hires were a part of a target group for hiring
  • 32% Identified as Female
  • 11% Identified as Racial Minority
  • 7% Identified as having a Disability
  • 11% Identified as a Veteran

• 19 Apprentice Hires
  • 26% Identified as Female
  • 5% Identified as Racial Minority
  • 10% Identified as having a Disability
  • 10% Identified as a Veteran
Retention Efforts

- Feedback channels – surveys, open forum discussions, etc
- Mentorship
- Increasing Electrician Engagement
- Celebrating next steps
- Advisory Board
- Regular check-ins with Apprentices and Managers
Strategic Planning
Lessons Learned & Future Plans
Strengthening REEAP

• In 2021, harmonized program between New Hampshire and Maine
Year One

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSH101</td>
<td>Safety I - Introduction to PV Installation Safety</td>
<td>15</td>
</tr>
<tr>
<td>EAP101</td>
<td>Blueprint Reading</td>
<td>45</td>
</tr>
<tr>
<td>EAP102</td>
<td>Electricity I</td>
<td>45</td>
</tr>
<tr>
<td>EAP103</td>
<td>Electricity II</td>
<td>45</td>
</tr>
</tbody>
</table>

Total hours: 150
## Year Two

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAP201</td>
<td>Controls I - House Wiring</td>
<td>45</td>
</tr>
<tr>
<td>EAP202</td>
<td>Understanding the 2020 National Electrical Code I</td>
<td>45</td>
</tr>
<tr>
<td>EAP203</td>
<td>Understanding the 2020 National Electrical Code II</td>
<td>45</td>
</tr>
<tr>
<td>EAP204</td>
<td>Understanding the 2020 National Electrical Code III</td>
<td>15</td>
</tr>
</tbody>
</table>

**Total hours:** 150
## Year Three

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAP301</td>
<td>Solar PV Systems, Energy Storage, and the 2020 NEC</td>
<td>45</td>
</tr>
<tr>
<td>EAP302</td>
<td>Electrical Vehicle Charging and the 2020 NEC</td>
<td>15</td>
</tr>
<tr>
<td>OSH201</td>
<td>Safety II - Electrical Safety</td>
<td>15</td>
</tr>
<tr>
<td>MAT101</td>
<td>Electrician’s Math I</td>
<td>45</td>
</tr>
<tr>
<td>EAP303</td>
<td>Motor Controls</td>
<td>30</td>
</tr>
</tbody>
</table>

**Total hours:** 150
### Year Four

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS201</td>
<td>Business Leadership</td>
<td>30</td>
</tr>
<tr>
<td>EAP401</td>
<td>Electrical Estimating</td>
<td>30</td>
</tr>
<tr>
<td>MAT102</td>
<td>Electrician’s Math II</td>
<td>45</td>
</tr>
<tr>
<td>EAP402</td>
<td>Journeyperson Exam Preparation, 2020 NEC</td>
<td>45</td>
</tr>
</tbody>
</table>

**Total hours:** 150
Strengthening REEAP

• In 2021, harmonized program between New Hampshire and Maine
• Moved online content into new learning management system (LMS) – Moodle Workplace
Welcome to RETC!

Welcome to Moodle Workplace and the ReVision Energy Training Center (RETC) online learning portal. RETC is Revision Energy’s innovative workforce development arm that is focused on providing industry-leading training resources to our fellow co-owners to serve their professional development and to further our company’s mission.

Courses offered through the RETC Online Learning Portal include a mix of fully online courses, hybrid courses that include a combination of online instruction and in-person training, and apprenticeship training that integrates theory across our standard work activities.

If you have any questions about additional courses or navigating Moodle Workplace, please contact the RETC Director Vaughan Woodruff at (207) 487-1005, via email at vwoodruff@revisionenergy.com, or via Microsoft Teams.
Strengthening REEAP

• In 2021, harmonized program between New Hampshire and Maine
• Moved online content into new learning management system (LMS) – Moodle Workplace
• Intentionality with integrating academic content with OJT

Lessons Learned & Future Plans
Overhead Span and Feeder Activity

In this activity, you will review an existing installation to assess its compliance with Article 225 of the NEC. Be sure to work with a licensed electrician and ensure all inspection work is consistent with electrical safety rules.

Apprentice Name *

Activity Date *
12/14/2021

Overhead spans

Maximum length of overhead span *
50 feet

Conductor size of overhead span *
8 AWG

Does the overhead span have a messenger wire? *
- Yes
- No

Is the wire size adequate for the overhead span? *
- Yes
- No

Field Activities
Field Activities

Photo of overhead span

Determining the wire size
Span went over 50 ft. 225.6

Explain how you determined the size of the conductors used for the overhead span.

Point of Attachment
Photo of point of attachment

Height of attachment *

20 feet

Covering height of the installation above finished grade *

2 inches

Does the point of attachment have sufficient clearance above finished grade per NEC 225.167 *
Photo(s) of interior of feeder raceway(s) where it enters the building

Feeders*

How many feeders supply the building? 2
Strengthening REEAP

- In 2021, harmonized program between New Hampshire and Maine
- Moved online content into new learning management system (LMS) – Moodle Workplace
- Intentionality with integrating academic content with OJT
- Relaunch and expansion of in-person training
- Integration with new apprentice onboarding
- Informing hiring process
- Diversifying academic tracks – PV install, Thermal, PV O&M, crew leadership

Lessons Learned & Future Plans