

BUILDINGENERGY BOSTON

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

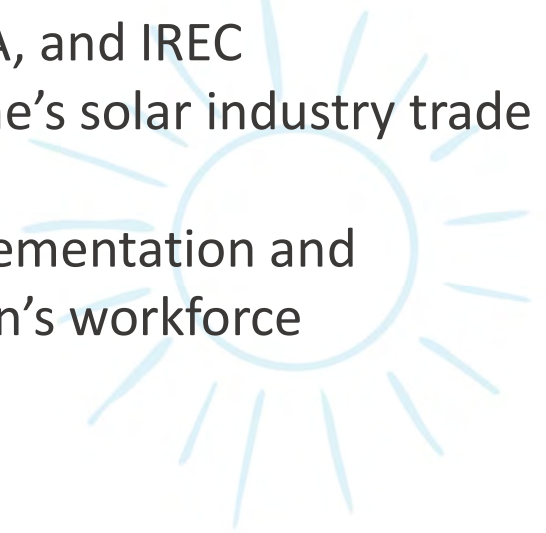
- Talent & Culture Development Coordinator
- Leads hiring efforts
- Orients new hires
- Liaison between apprentices and State Dept. of Labor
- HR support for apprentices
- Maintains key documentation for REEAP and apprentices
- Key facilitator of companywide Justice, Equity, Diversity, and Inclusion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





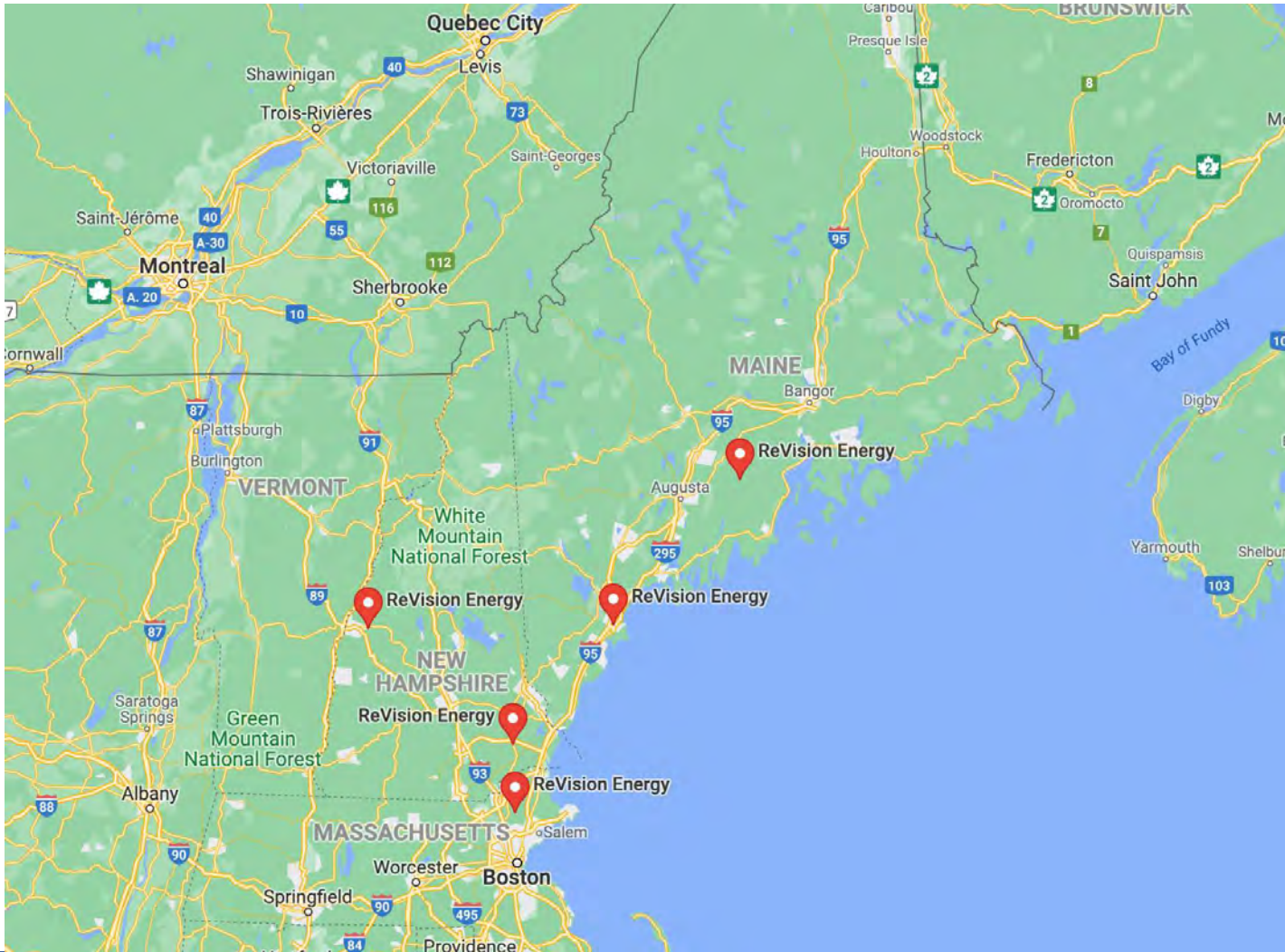
VAUGHAN WOODRUFF

- Director, ReVision Energy Training Center
- Former founder and CEO of Insource 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





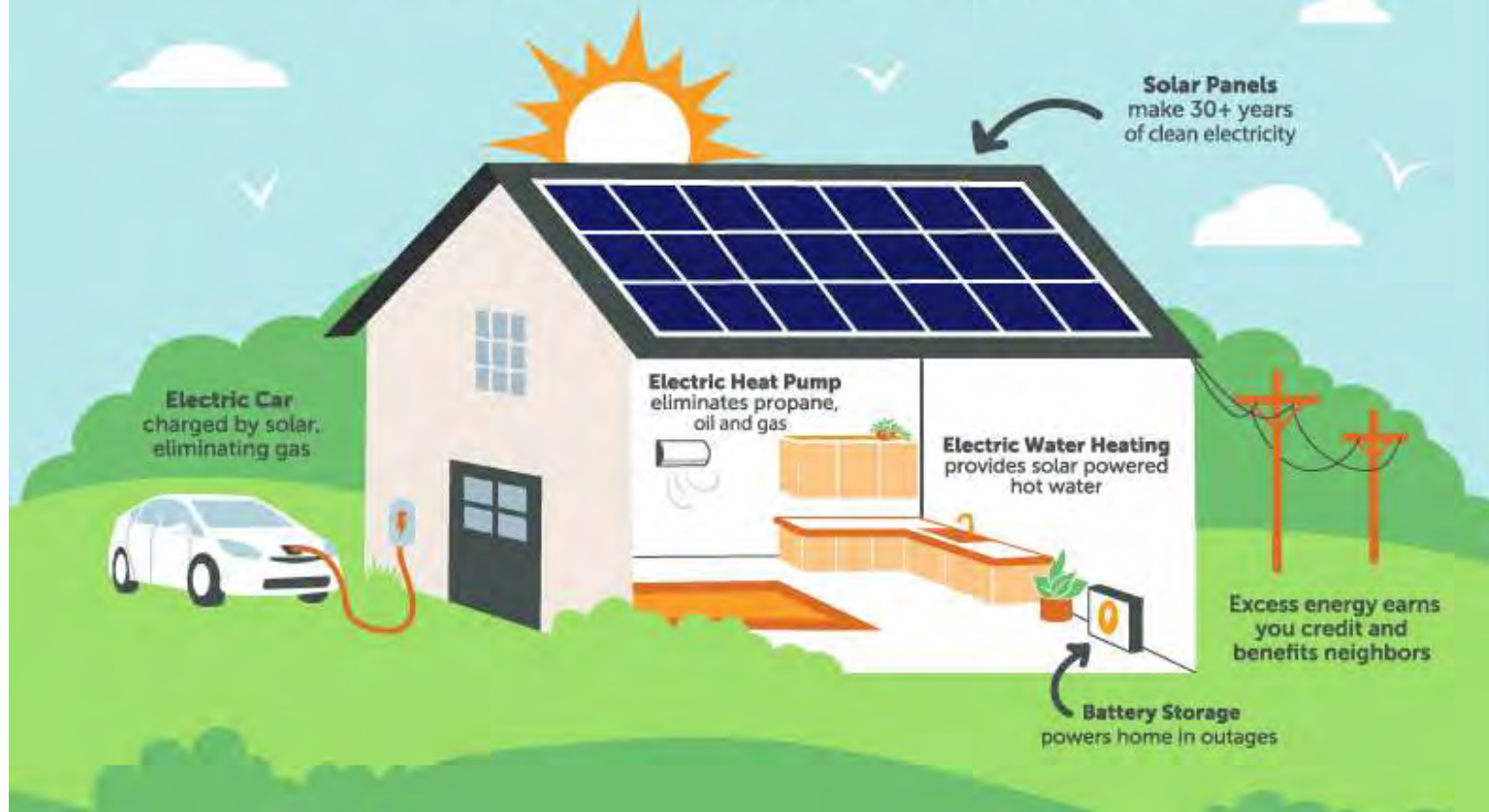
REVISION ENERGY



Branch Offices

The 100% Solar Household

Affordable Technology Replaces Fossil Fuels



Technologies

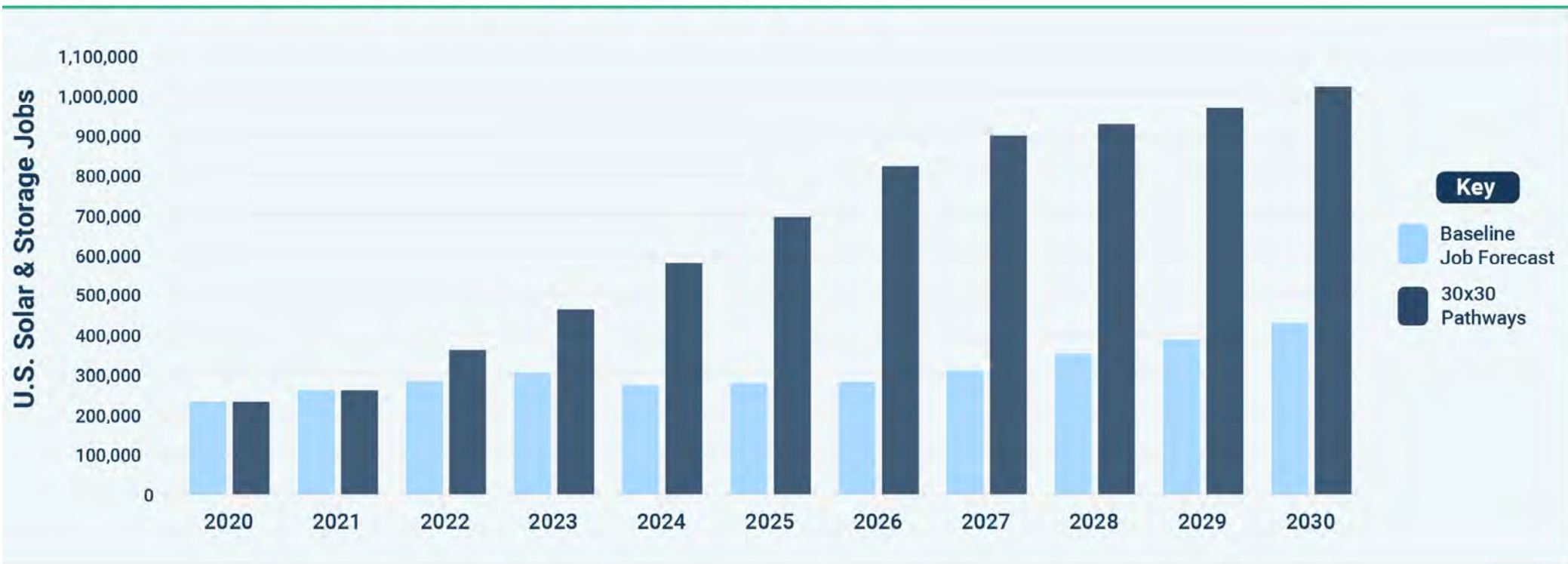
Electrical Licensing

Northern New England



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TRAINING CENTER

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 Requirements



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

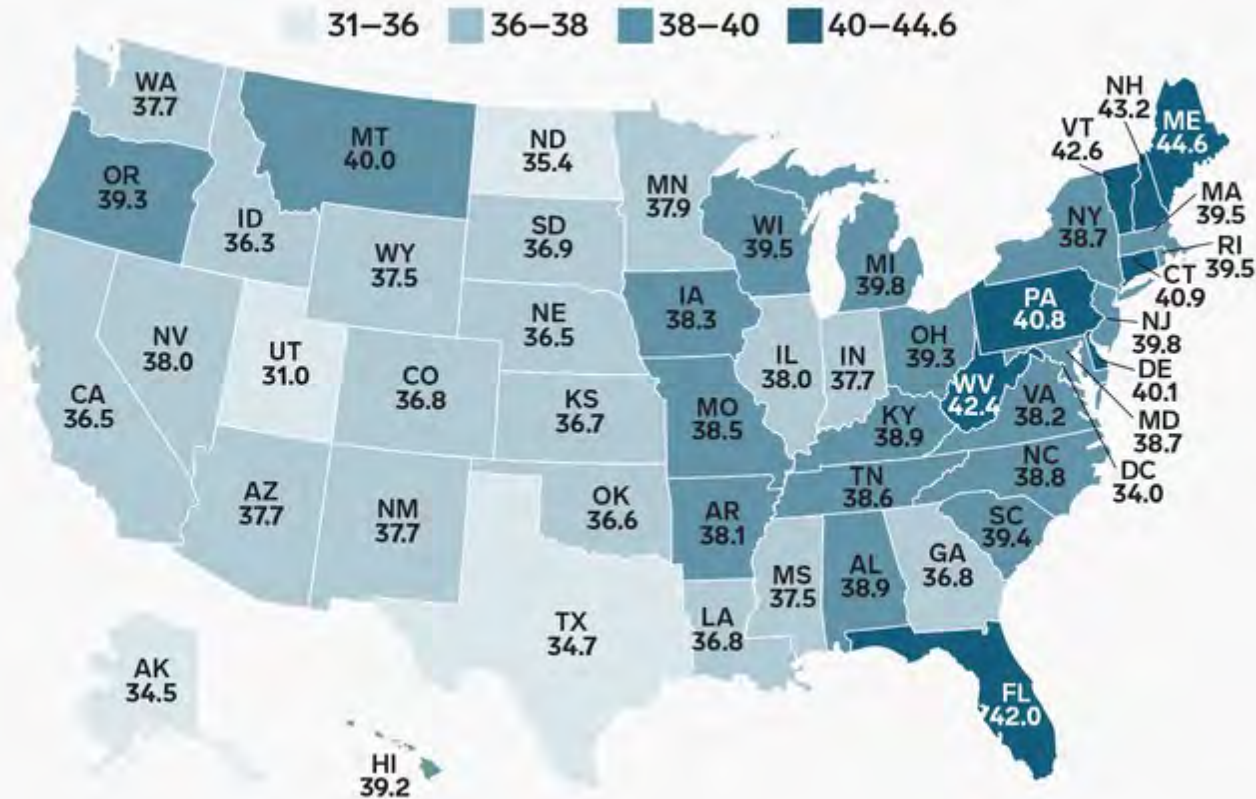
Why Should We Focus on DEI Efforts?

- 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



Justice, Equity, Diversity, Inclusion

Median age



Source: US Census Bureau. 2017 American Community Survey

Insider Inc.

Population Demographics

Race and Ethnicity in the United States: 2010 Census and 2020 Census

Pick a topic. →

Race by Ethnicity

Hispanic Origin

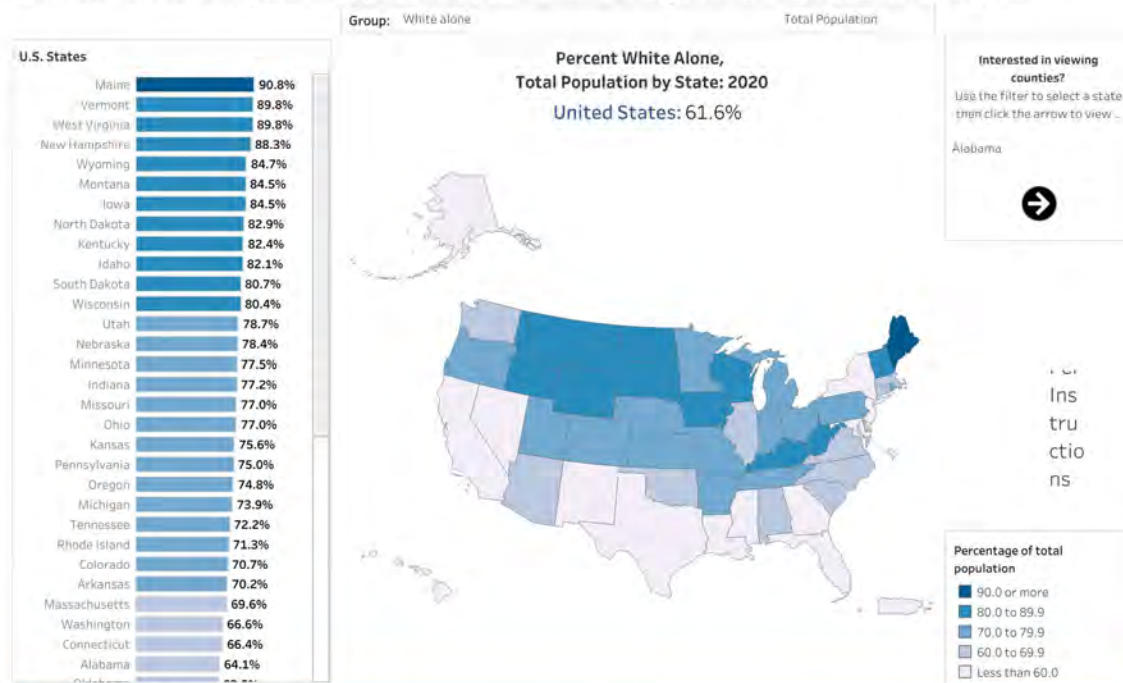
Select a question:

What percentage was each group in 2020?

How has each group changed since 2010?

What are facts for my state or county?

To view specific groups: (1) Use the first drop-down filter to select a race group, (2) Use the second drop-down filter to select Total Population, Hispanic or Latino, or Not Hispanic or Latino, and (3) Hover over the map to view statistics for each state. The list on the left shows states (or state equivalents) ranked by the percentage for the selected group out of the total population, Hispanic or Latino population, or not Hispanic or Latino population. Use the filter on the right of the map to view county-level statistics for your state.



United States[®]
Census
Bureau

U.S. Department of Commerce
U.S. CENSUS BUREAU
census.gov

Note: U.S. total and state rank do not include Puerto Rico. Ranking based on unrounded numbers. Percentages may not add to 100 due to rounding.

Source: 2010 Census Redistricting Data (Public Law 94-171) Summary File; 2020 Census Redistricting Data (Public Law 94-171) Summary File. Additional information is available for Race, Ethnicity, Race and Ethnicity Data in the 2020 Census.

Population Demographics

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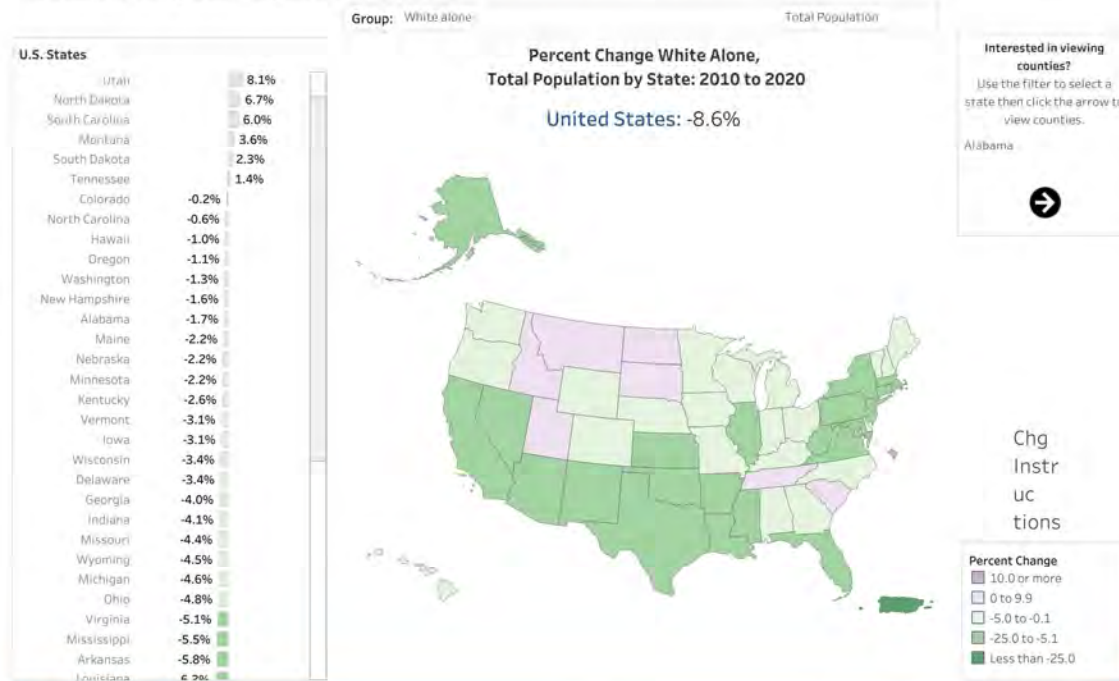
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Bureau

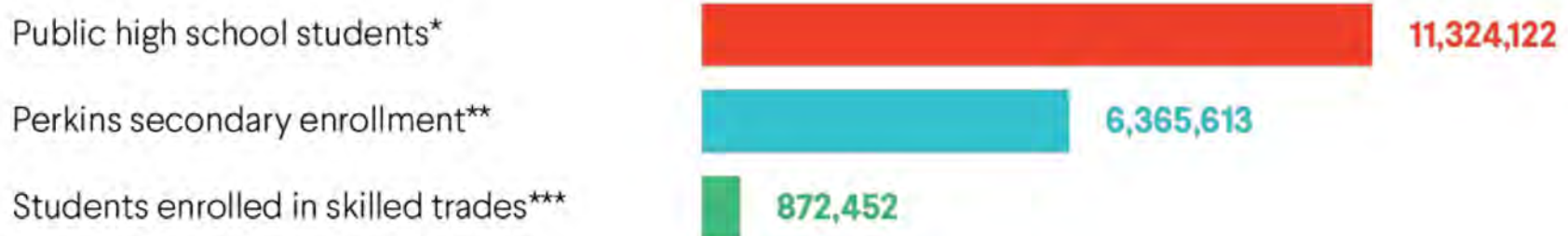
U.S. Department of Commerce
U.S. CENSUS BUREAU
census.gov

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Source: 2010 Census Redistricting Data (Public Law 94-171) Summary File; 2020 Census Redistricting Data (Public Law 94-171) Summary File. Additional information is available for Race, Ethnicity, Race and Ethnicity Data in the 2020 Census.

Population Demographics

Figure 3. Trades Education Enrollment Relative to U.S. High School and CTE Students 2016-17₂₈ (n=32 states)



*NCES https://nces.ed.gov/programs/digest/d18/tables/dt18_203.10.asp.

**Perkins Data Explorer. <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

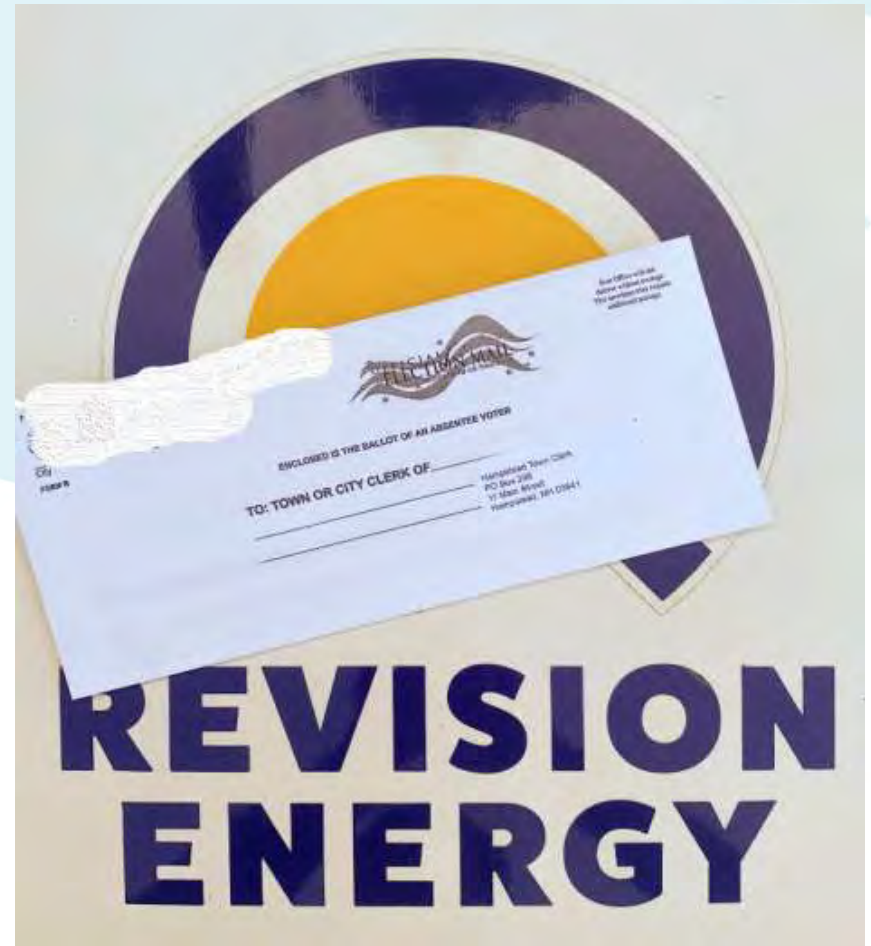
Trade Area	Total Job Openings 2018-2028 (n = 32 states)	Enrollments 2016-17 (n varies by trade)*	Enrollments as a Percentage of Openings
Construction	3,992,744	191,907	5%
Advanced Manufacturing	2,149,971	161,828	8%
Automotive	876,778	235,968	27%
Carpentry	817,878	84,766	10%
Electrical	700,721	41,446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

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

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
- LGBTQ+ advocacy and Support

Education and Training for children

- 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

Electrical Apprenticeship History

2018-2021



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TRAINING CENTER

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



2019 RETC Electrical Program NH/MA



2019 RETC Electrical Program ME



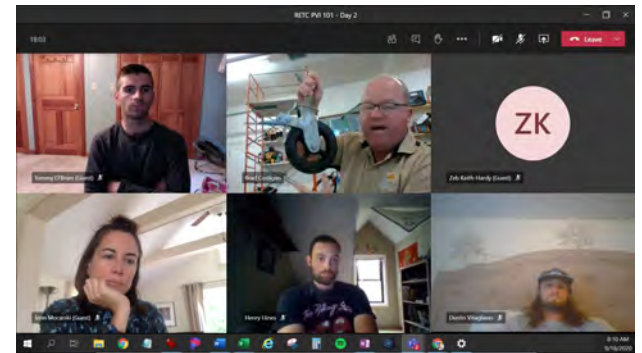


RETC's Training Center February 21st, 2020



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

Program Implementation

BROWSE BY INDUSTRY SEARCH BY OCCUPATION

Search by Occupation

SEARCH >

[Learn more about how to use the information provided here](#)

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.

★ Registered Occupation

ONET Title: Electricians

ONET Code: 47-2111.00

Alternative Occupations Titles:

Control Electrician; Electrician; Industrial Electrician; Inside Wireman; Maintenance Electrician; Mechanical Trades Specialist; Wireman; Electrician, Maintenance; Lightning Protection Technician (Conventional System); Residential Wireman; Protective-signal Repairer; Street-light Servicer; Electrician; Temporary Services Electrician (Existing Title: Electrician (Ship And Boat)); Electrician, Maintenance; Production Machinery Electrician (Existing Title: Electrician, Maintenance); Electrician, Maintenance; Neon-sign Servicer; Residential Wireman; Electrician (Water Trans); Neon-sign Servicer; Protective-signal Repairer;

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.

[Open all](#) [Close all](#)

- + Electrician, Maintenance

- + Lightning Protection Technician (Conventional System)

- + Residential Wireman

- + Protective-Signal Repairer



Office of Apprenticeship
U.S. Department of Labor

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: <input type="checkbox"/> Competency-Based <input checked="" type="checkbox"/> Time-Based <input type="checkbox"/> Hybrid	

Suggested On-the-Job Learning Outline

Plan layout of construction, installation, or repairs.	Approximate Hours
A. Plan layout and installation of electrical wiring, equipment, or fixtures, based on job specifications and local codes.	
Total Hours	

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

Federal-Approved Apprenticeship Occupations

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

Program Implementation



02/03/2022 Sprint #79 enhancements and updates have been deployed to the production environment including:

Features

RAP20-7331 SSO for Internal Staff - Auto-Enroll Futures Users into SSO
RAP20-7332 RAPIDS - SAML LOGIN.gov - Convert Users and Enroll [View more...](#)

*** This message will expire on 2/17/2022 ***

Vaughan Woodruff
Sponsor

Navigation

- Home
- My Profile
- Advanced Search
- User Messages (1)
- Email Preferences
- Pending Actions
- Occupation List
- User Guides

Actions

- Register an Apprentice

Home

Program Filter

Type to search on Program Data

State

-- Select --

County

Batch Size

250

Registered Programs

Click the column headers to sort the Program data

Program Number	Sponsor Name	Assigned ATR	State	County	Status	Registered Date	Last Updated Date
NH011125419	ReVision Energy, Inc.	young.wynn.b@dol.gov	NH	Rockingham County	Registered	6/11/2012	1/17/2021
2019-ME-73669	Revision Energy, Inc.	kristine.mccallister@maine.gov	ME	Cumberland County	Registered	6/17/2019	11/30/2021

Employer Filter

Search on your Employers

Program Employers

Program Employer Name	Employer Number	Sponsor Name	Sponsor Number
No items available			

Apprentice Registration

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

Program Implementation



Electricians' Examining Board Home

Board Meeting Information

Contact Us

Laws & Rules

File a Complaint

Licensing

Online Services

Examinations

Applications & Forms

Frequently Asked Questions

Electricians' 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 207-624-8605)

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.

[Updated Guidance and Return of Covid-19 Prevention Checklist, May 26](#)

GET NOTIFIED

Enter your email below for the latest Electricians' Examining Board news, information and updates.

ONLINE SERVICES

[File a Complaint](#)

[Apply for a License](#)

[Apply to take an Exam](#)

[Reinstate a License](#)

[Renew a License](#)

[Apply for an Electrical Permit](#)

[Apply for a Single-Family Dwelling Certification](#)

[Update Contact Information](#)

[Request a Duplicate License](#)

[Change Account Information](#)

[Verify a License](#)

CONTACT

Electricians' Examining Board
35 State House Station
Augusta, ME 04333-0035

Licensing Requirements

ALERT [Get the latest Coronavirus COVID-19 update at https://www.covid19.nh.gov](https://www.covid19.nh.gov)



New Hampshire
Office of Professional
Licensure and Certification



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:

Board Information

[Board Meeting Schedule](#)

[Board Member Directory](#)

[Laws & Rules](#)

[Board Actions](#)

License Information

[Applications](#)

[Education Requirements](#)

[Forms & Documents](#)

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 journey person apprenticeship in NH
- Massachusetts apprentices participate in NH program

Program Implementation

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

Program Implementation

Apprenticeship Progress Licensing and JEDI Goals

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

Apprenticeship Progress

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%)

DIVERSITY MAINE

A business series on inclusion in the workplace

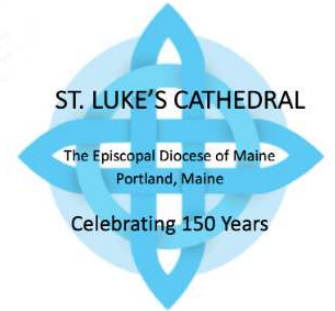


Rise & Diversify Breakfast

ST. LUKE'S CATHEDRAL

The Episcopal Diocese of Maine
Portland, Maine

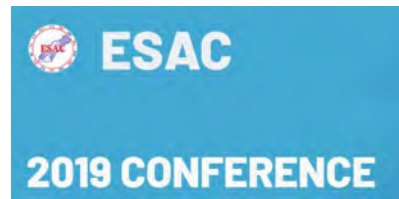
Celebrating 150 Years



JVS SKILLS . JOBS . CAREERS

[DHHS Home](#) > [Office of Health Equity](#) >

New Hampshire Refugee Program



Massachusetts
Rehabilitation
Commission (MRC)



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 Apprentices Hires
 - 7% Identified as Female
 - 7% Identified as Racial Minority
 - 7% Identified as having a Disability
 - 14% Identified as a Veteran



Apprenticeship Progress

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 Apprentices Hires
 - 26% Identified as Female
 - 5% Identified as Racial Minority
 - 10% Identified as having a Disability
 - 10% Identified as a Veteran



Apprenticeship Progress

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

Lessons Learned & Future Plans

Year One

OSH101	Safety I - Introduction to PV Installation Safety	15
EAP101	Blueprint Reading	45
EAP102	Electricity I	45
EAP103	Electricity II	45

Total hours: **150**

Year Two

EAP201	Controls I - House Wiring	45
EAP202	Understanding the 2020 National Electrical Code I	45
EAP203	Understanding the 2020 National Electrical Code II	45
EAP204	Understanding the 2020 National Electrical Code III	15
Total hours:		150

Year Three

EAP301	Solar PV Systems, Energy Storage, and the 2020 NEC	45
EAP302	Electrical Vehicle Charging and the 2020 NEC	15
OSH201	Safety II - Electrical Safety	15
MAT101	Electrician's Math I	45
EAP303	Motor Controls	30

Total hours: **150**

Year Four

BUS201	Business Leadership	30
EAP401	Electrical Estimating	30
MAT102	Electrician's Math II	45
EAP402	Journeyman Exam Preparation, 2020 NEC	45
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

Lessons Learned & Future Plans

Dashboard

training.revisionenergy.com/my/

REVISION ENERGY TRAINING CENTER

REVISION ENERGY - ENGLISH FOR WORKPLACE - UNITED STATES (EN_US_WP)


Reset page to default Stop customizing this page

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.



REVISION ENERGY TRAINING CENTER

My learning

All Search Last accessed Expanded

COURSE - REVISION ENERGY

Introduction to Enphase Energy for Service

Start date: 08/18/21 End date: Not set [Go to course](#)

COURSE - REVISION ENERGY

Introduction to SolarEdge for Service

Random glossary entry

time-of-use metering

Measuring the use of electric energy (kilowatt-hours) during different time periods, dividing each day, month, and year into various categories, with higher electricity rates at peak load periods and lower rates at off-peak load periods to facilitate a utility's load control and system planning and a customer's use of electricity either through automatic or voluntary load control.

Add a new entry
View all entries

Calendar

September 2021

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Learning Management System (LMS)

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 *

First Last

Activity Date *

MM/dd/yyyy

Overhead spans

Maximum length of overhead span *

 feet

Conductor size of overhead span *

Does the overhead span have a messenger wire? *

Yes

No

Is the wire size adequate for the overhead span? *

Yes

No

Field Activities

Photo of overhead span



image.jpg

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



image.jpg

Height of attachment *

20

feet

enter the height of the attachment above finished grade

- *

2

inches

Does the point of attachment have sufficient clearance above finished grade per NEC 225.16? *

Photo(s) of interior of feeder raceway(s) where it enters the building



image.jpg

Feeders*

How many feeders supply the building? *

2

Field Activities

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

Q&A

