CleanEnergy States Alliance

Supporting States and Communities:

NREL's Workforce Development Tools and Technical Assistance

September 9, 2025

Webinar Logistics

All attendees are in **“listen only” mode** – your webcam and microphone are disabled.
The Chat function is also disabled for attendees.

Submit questions and comments via the Q&A panel 

Automated **captions** are available 

Speakers' bios will be made available in the chat

This webinar is being recorded. We will email you a webinar recording within 48 hours. This webinar will be posted on CESA’s website at **www.cesa.org/webinars**

Celebrating 20 Years of State Leadership

Clean Energy States Alliance

The Clean Energy States Alliance (CESA) is a national, nonprofit coalition of public agencies and organizations working together to advance clean energy.

CESA members—mostly state agencies—include many of the most innovative, successful, and influential public funders of clean energy initiatives in the country.

www.cesa.org

CleanEnergy States Alliance

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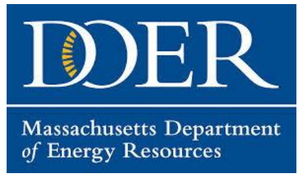


Federal Initiatives

Provides opportunities for CESA-member organizations and all US states to:

- Learn about federal energy developments
- Exchange information to advance energy deployment in their state

www.cesa.org/projects/federal-initiatives

WEBINAR SPEAKERS

SUPPORTING STATES AND COMMUNITIES: NREL's Workforce Development Tools and Technical Assistance

Kristin Wegner Guilfoyle
Project Manager IV - Research
NREL

Jennifer Daw
Group Manager & Senior Researcher
NREL

Jeremy Stefek
Researcher IV - Environmental Engineering
NREL

Alexandra Kramer
Researcher II - Decision Support Analysis
NREL

Elise DeGeorge
Senior Project Leader
NREL

Anna Ziai
Project Director
Clean Energy States Alliance
(Moderator)

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

CleanEnergy States Alliance

Thank You

Anna Ziai

Project Director

Clean Energy States Alliance

anna.ziai@cleanegroup.org

www.cesa.org

CleanEnergy States Alliance

info@cleanegroup.org

www.cesa.org

Upcoming Webinars

Solar+Storage for Community Health Centers: CrescentCare Case Study (Sept 11)

Labor Unions and Offshore Wind 101 (Sept 16)

Front-of-Meter vs. Behind-the-Meter Batteries: An Economic Comparison for Massachusetts (Oct 8)

Read more and register at www.cesa.org/webinars

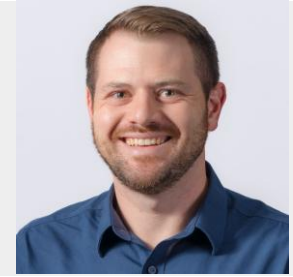
Transforming the Workforce: The Path to Growth and Energy Impact

CESA Presentation
September 9, 2025

NREL Workforce Presenters

Kristin Wegner Guilfoyle

Jennifer Daw



Jeremy Stefek

Alexandra Kramer

Elise DeGeorge

NREL Workforce Mission Statement

"NREL strengthens the energy workforce needed for an affordable, secure, and reliable energy future by analyzing industry needs, fostering key partnerships, developing education resources, and building capacity."

Agenda

- NREL Overview
- Workforce Analysis, Resources, Pathways and Engagement
- Ways for States To Engage

NREL Overview

Kristin Wegner Guilfoyle

Who Is NREL?

The National Renewable Energy Laboratory (NREL) is the U.S. Department of Energy's primary national laboratory for energy systems research and development.

16
Research Programs

$1B
Business Volume FY24

1,100+
Active Partnerships

74
R&D 100 Awards

NREL strives to achieve our vision of an affordable and secure energy future through our mission: leading research, innovation, and strategic partnerships to deliver integrated solutions for an affordable and secure energy future.

What Does NREL Do in Workforce Research?

NREL researchers combine technology insights with workforce assessments to project critical skills and roles needed to meet growing energy demand.

NREL researchers generate robust energy workforce supply and demand insights for a wide range of occupations to equip stakeholders with information needed to grow a reliable and skilled U.S. workforce.

NREL collaborates with industry, educators, and community leaders to strengthen pathways to energy workforce opportunities and drive innovation across the energy sector.

NREL creates resources and programs that build capacity and connect job seekers with in-demand skills and careers.

Workforce Development Is Critical To Meeting Energy Demand

Growing Electricity Demand[1]

- 20% increase by 2050 compared to 2018
- Data centers, electric vehicles, and building electrification
- Requires rapid deployment of energy sources, which needs a workforce.

Workforce Gaps for Key Occupations[2]

- Skilled labor shortage in key industries
- Competing demand for qualified workers
- Emerging technology needs innovative skill sets.

Cost of Inaction

Staffing misalignment that could lead to:

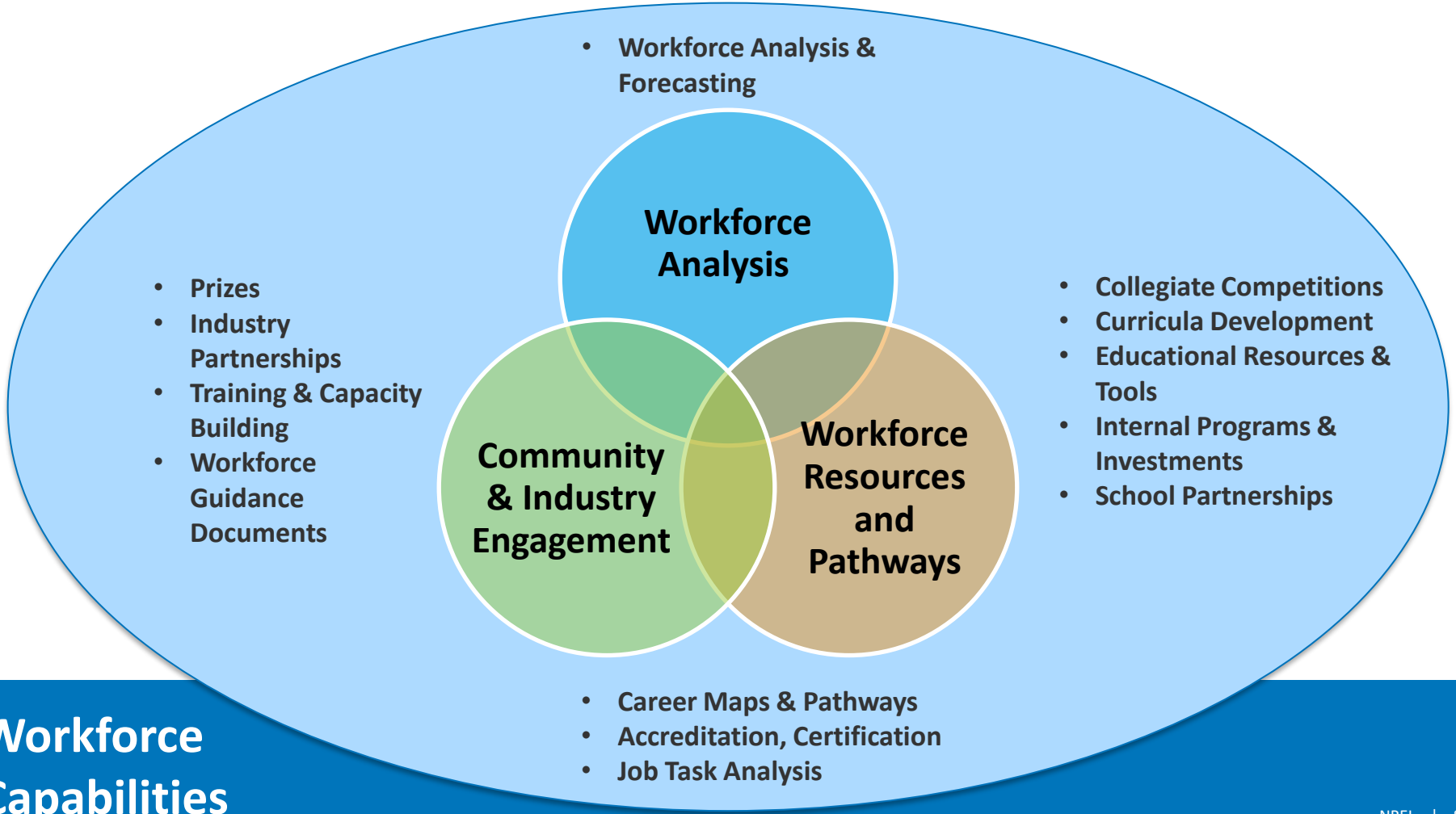
- Lost productivity
- Increased overtime and hiring
- Missed economic opportunities.

Solution

- Intentional workforce planning based on analysis of skills, occupations, and training
- Alignment of education provided and industry goals.

1. Mai et al. 2018. *Electrification Futures Study: Scenarios of Electric Technology Adoption and Power Consumption for the United States.* Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20-71500. https://www.nrel.gov/docs/fy18osti/71500.pdf.
2. NREL. 2025. "Workforce Analysis." https://www.nrel.gov/workforce/analysis.

Workforce Capabilities

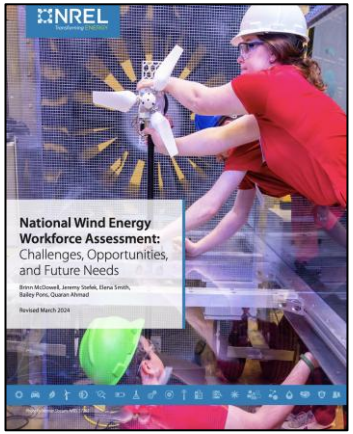


Workforce Analysis, Resources, Pathways and Engagement

Jennifer Daw
Jeremy Stefek
Kristin Wegner Guilfoyle
Alexandra Kramer
Elise DeGeorge

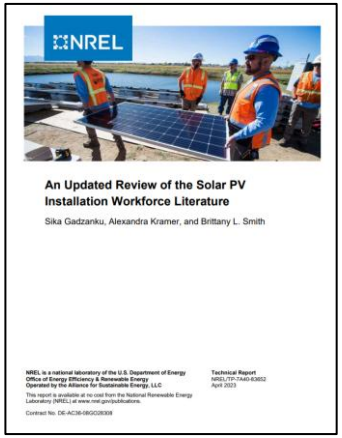
Workforce Analysis – National Workforce Assessments

- NREL combines technology and workforce expertise to provide state decision makers with information about the gaps and opportunities facing energy industries.
- We evaluate the country's labor market and education and training ecosystem to better understand how workforce supply can meet the workforce demands of an industry across occupations and skill levels.



Wind Energy
https://docs.nrel.gov/docs/fy24osti/87670.pdf

Hydropower Energy
https://docs.nrel.gov/docs/fy23osti/83817.pdf



Solar Energy
https://docs.nrel.gov/docs/fy23osti/83652.pdf

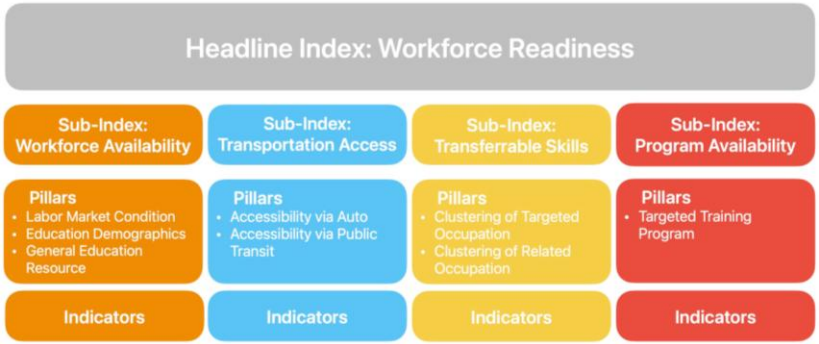
State Job Data
https://docs.nrel.gov/docs/fy22osti/81486.pdf

- Geothermal
- Transmission Expansion
- Marine Energy Supply Chain

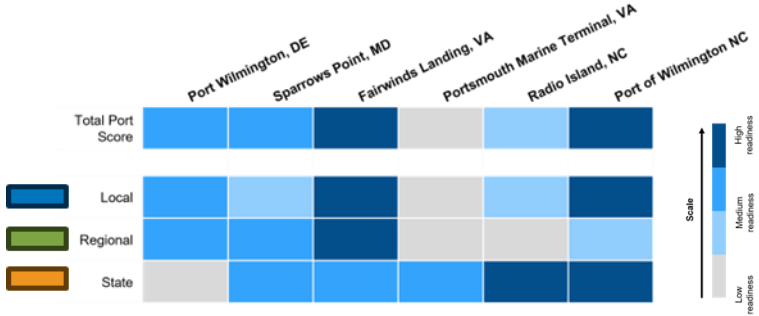
Coming Soon

Workforce Analysis – Workforce Readiness Index

- Evaluated workforce readiness to produce towers, monopiles, and blades at six different ports across Delaware, Maryland, Virgina, and North Carolina.
- The index is used to assess the occupational readiness of a geographic area's labor market and education/training to support various energy deployment.
- Results of the index identify areas with lower barriers to investment, providing support to stakeholders to make more informed workforce decisions.



Shows the method framework

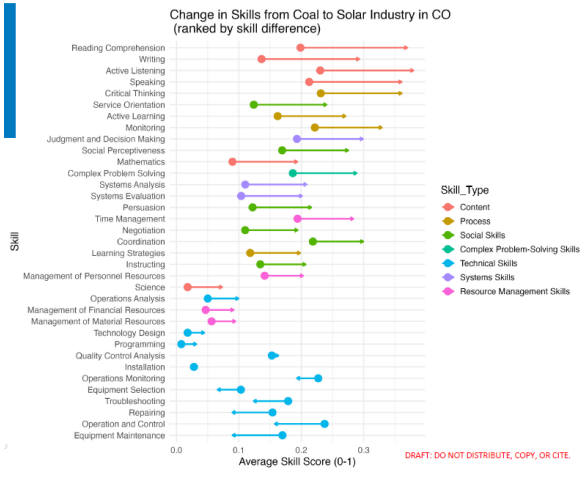


Example results from the report, *A Regional Approach to Offshore Wind Energy Manufacturing in the Central Atlantic: Workforce* report (in print)

Workforce Analysis – Local Technical Assistance from Communities Leap Program

Descriptive examples of state-focused workforce projects (not comprehensive):

- **Coal/Fossil-Dependent Economies in Colorado:** Conducted a job transferability analysis at the occupational and skill level of coal mine and coal power workers transitioning to other energy technologies.
- **Native Village of Kongiganak:** Conducted a local skill set assessment and a compilation, mapping, and analysis of available clean energy and building-efficiency-related workforce development programs in Alaska.
- **Maryland Department of the Environment:** Assessed workforce impacts of potential initiatives identified through SLOPE analysis within high-impact communities, both with WIRED job demand modeling and supply-side workforce assessment.
- **Offshore substructure fabrication:** Conducted a strengths, weakness, opportunities, and threats analysis on workforce needs in CA, OR, and WA for heavy steel floating offshore wind substructures.



COMMUNITIES LEAP
U.S. DEPARTMENT OF ENERGY

Resources for Workforce Pathways – Occupational and Career Maps

Capabilities

- Interactive maps correlating skills, education experience, and potential compensation with degreed careers and vocational careers covering all role types and skill levels.

Applications

- Explore potential career pathways and transferable skills
- Support upskilling
- Inform hiring managers and industry stakeholders of job connections and employee needs to drive accountability.

Occupational lists for:
Land- based and offshore wind, geothermal, solar
e.g.: https://openei.org/wiki/Wind_Workforce/Offshore_Wind_Energy_Occupational_Maps

Career maps examples:
Green Buildings
Hydropower
Marine Energy
Wind Energy
Last Mile Lab Industrialized Construction Career Map

Resources for Workforce Pathways – Education and Connection Maps

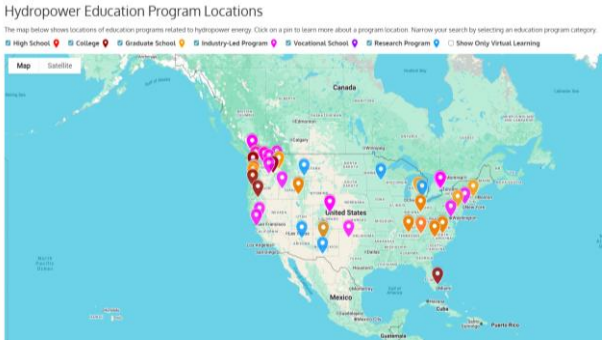
Capabilities

- Interactive, data-driven maps of education and workforce training programs for a range of energy technologies across the United States.

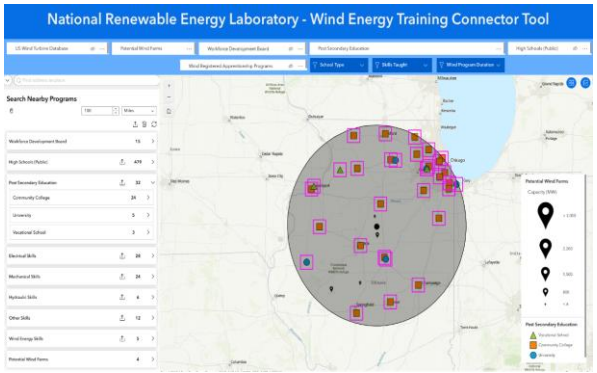
Applications

- Find relevant, accessible programs to support career advancement.
- Access data on energy-focused universities, community colleges, apprenticeship programs, and more.
- Connect industry employers to training programs, workforce development boards, and high schools.

Source: US Department of Energy



Resources:
[Wind Energy]
[Hydropower]
[Marine Energy]



Resource: [Energy Training Connector Tool]

Resources for Workforce and Economic Impact Models

Capabilities:

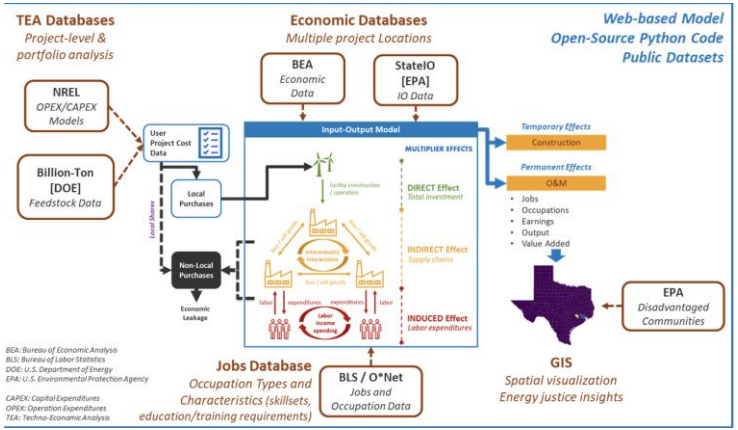
- Tools assess how investments in supply chain or energy infrastructure impact at local, regional, or national labor levels. Metrics include:
  - Job creation
  - Income and wages
  - Workforce readiness levels.

Applications

- Evaluate the workforce and economic impacts of energy investments
- Support strategies for workforce readiness and program development.

- **WIRED** estimates potential economic and workforce impacts, for technologies, including geothermal, offshore wind, biofuels, coal, and natural gas.
- **EMPLOY** applies a life-cycle-based environmentally extended input-output (EEIO) framework across 16 environmental and two socioeconomic metrics.

WIRED economic framework



Example offshore wind WIRED results

	Jobs FTE/yr	Earnings $ MM/yr	Output $ MM/yr	Value Added $ MM/yr
Direct	65	10	26	12
On-Site	48	7	0	7
Water Transportation	17	3	23	6
Others	0	0	3	0
Indirect	75	5	13	7
Induced	15	1	7	2
Total	**155**	**16**	**46**	**21**

Resources for Awareness – Education and Outreach Materials

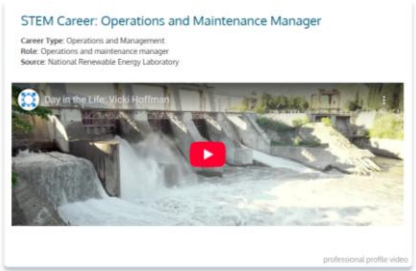
Capabilities

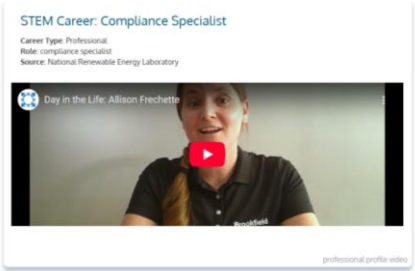
- Educational and outreach resources* used to help teach specific skills, knowledge, or competencies for the energy sector
  Formats include comic books, day-in-the-life professional videos, educational apps, K–12 curricula and lesson plans, and more.

Applications

- Build awareness of energy careers across all age groups, including K–12 grades, post-secondary students, and the general public of all ages
- Support skill development and career exploration through engaging, accessible content
- Introduce clean energy technologies and potential careers early in education process.

Spark Squad comic books: https://www.energy.gov/energysaver/spark-squad-comic-books





Hydropower Portal – Career Profiles: https://openei.org/wiki/Hydropower/STEM/Career_Profiles

*Renewable Energy Discovery Island (REDi Island): https://www.nrel.gov/water/redi-island
Hydropower STEM Portal – Educational Resources: https://openei.org/wiki/Hydropower/STEM/Career_Profiles
PRIMRE Educational Resources Library: https://openei.org/wiki/PRIMRE/STEM/Educational_Resources

Resource for Workforce Pathways – Collegiate Competitions

The collegiate competitions are multidisciplinary competitions that engage teams of college students to solve real-world energy challenges. The competitions focus on engineering, policy, and community planning events.

Examples:

- Collegiate Wind Competition
- EnergyTech University Prize
- Geothermal Collegiate Competition
- Hydropower Collegiate Competition
- Marine Energy Collegiate Competition
- Solar District Cup

https://www.nrel.gov/about/compete.html

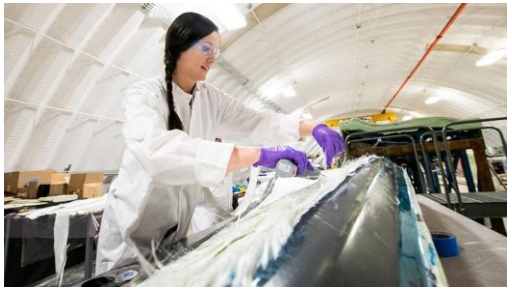
Resources for Workforce Pathways – Student Opportunities

Energy Works Forum

- Partnership between NREL, CEWD, and ACP-CPI; the forum is a virtual career exploration event, providing students with:
  - An understanding of the modern energy landscape and the breadth of careers available
  - Opportunity to learn about the skills and training/education needed for various energy careers.

Composite Technician Program

- Program building skills for Colorado community college students to learn more about wind composites.
- Provides hands-on training experience in the Composites Manufacturing Education and Technology (CoMET) facility at NREL's Flatirons Campus.



Workforce Pipeline – School Partnerships

K–12

- On-site classes and tours
- Virtual programs and tours
- Visits to classrooms
- Curriculum building
- High school Science Bowl*
- Job shadowing
- Outreach kits

Pre-Career

- Pathway Summer School*
- Collegiate day
- Lab tours
- Internships
- Postdoctoral engagement
- Boot camps
- Apprenticeships
- Career and technical education

Higher Education

- University partnerships
- Community colleges
- Visiting faculty program*
- Alliance universities
- Local, state, regional, national, and international outreach
- Workshops and conferences

Highlighted Programs

- Take Our Kids to Work Day
- SULI/CCI internships*
- Director's postdoc fellowship
- DoD SkillBridge
- Sci3 Showcase*
- Colorado School of Mines Advanced Energy Systems graduate program

* DOE Office of Science Workforce Development for Teachers and Scientists (WDTS) Programs

Stakeholder Convenings, Working Groups & Outputs

Description

Projects related to the gathering of various key individuals, institutions, and organizations to discuss workforce-related opportunities, challenges, and barriers within the energy space.

Examples

- Energy workforce advisory boards
- National energy workforce strategy development
- Community college convenings.

Networks & Industry Engagement

Description

Foster and strengthen national and regional tech-specific networks to further research, innovation, and sector- or technology-specific priorities. Networks span national labs, industry, academia.

Examples

- Industry and private sector organizations
- Project developers
- Economic development organizations
- Foundations
- Labor unions
- Community colleges; universities
- Community-based organizations
- Workforce development boards
- Federal, state, and local agencies.

Prizes

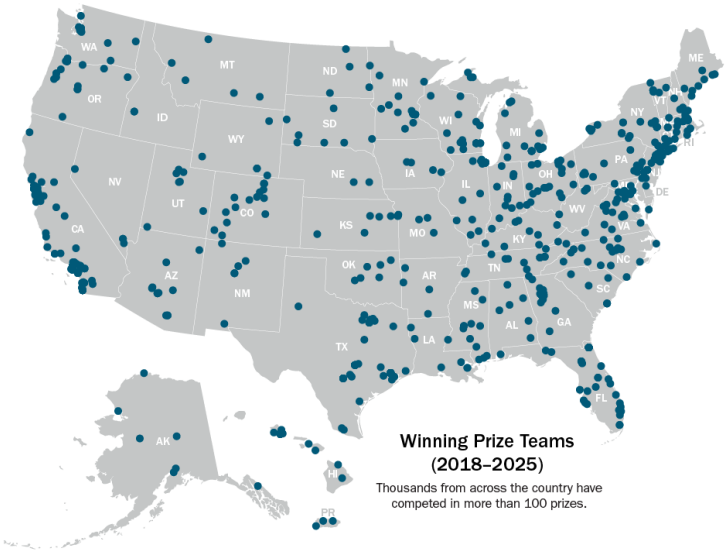
Description

Catalyze and incentivize innovation through cash prizes, national lab technical assistance vouchers, and recognition and visibility.

Examples

- Workforce prizes and technology-specific prizes
- Labs provide technical expertise; private sector provides business expertise
- **1,200+** past winners
  - Average award: $116K
  - Median award: $50K
- **300+** universities as participants, competitors, and partners
- **550+** network members.

AMERICAN MADE
U.S. DEPARTMENT OF ENERGY



https://americanmadechallenges.org

Ways for States To Engage

Alexandra Kramer

General Technical Assistance Process

Step 1

Initial Meeting

- Introductions
- Program Overview and Offerings
- Example of Past Work
- Discuss opportunities for technical assistance

Step 2

Develop Scope of Work

- Organization determines areas where NREL can support
- NREL develops a scope identifying NREL capabilities that can be leveraged
- Scope is agreed upon and finalized by both parties

Step 3

Delivery

- Meetings or check ins may be scheduled throughout development process
- Work is completed as agreed upon in the scope
- Deliverable is presented or provided to organization

Often at no cost to organizations!

Case Study – Building Business Network (B-Biz Program)

Tailored Technical Assistance

- ✓ Conduct Research
- ✓ Capacity Building and Strategic Planning
- ✓ Analysis to Inform Decision-Making
- ✓ Scaling Success and Process Replication
- ✓ Facilitate Peer Exchange
- ✓ Facilitated Trainings.

Example:

Partner: Energy Outreach Colorado

Project: Conducting research on rebate programs and methods for reducing financial burden on small business contractors.

Resource Development

Leverage **unique capabilities** as a National Lab to **develop key resources:**

- ✓ Educational resources
- ✓ Training development
- ✓ Worksheets
- ✓ Factsheets.

Examples:

- NREL Residential Energy Auditor Repository
- Building America Solution Center
- ResStock State Factsheets

Business Support

- ✓ Scale innovative business model strategies
- ✓ Strategies for communicating value.

SBA U.S. Small Business Administration

Provide connection with local branch of the U.S. Small Business Administration for support around:

- ✓ Financial Management and Cash Flow
- ✓ Building Credit
- ✓ Tax Planning and Reporting
- ✓ Insurance and Succession Planning
- ✓ Risk Management.

To learn more, email **B-biz@nrel.gov**

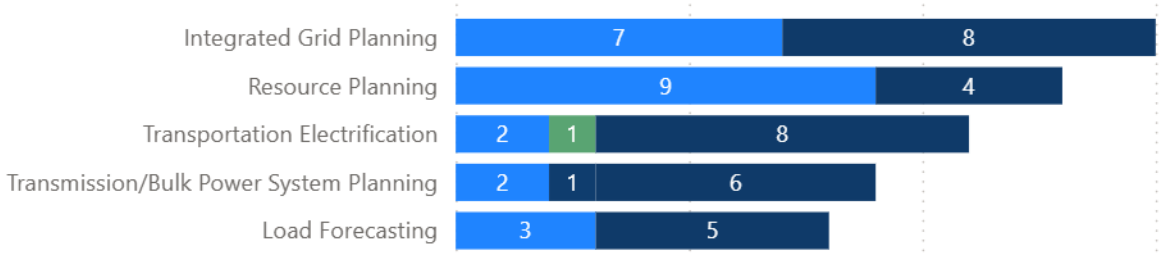
Workforce-Related Technical Assistance Requests

The NREL Workforce-Related Technical Assistance Program received workforce development-related requests in the following categories:

1. **Workforce training resources and best practices**, on areas such as strategy, engaging workforces in rural areas, upskilling opportunities and resources specifically supporting Tribes
2. **Trainings** led by NREL on topics such as installer training, industry standards training, train-the-trainer models, and contractor compliance
3. **Economic and job impact modeling** using NREL's workforce development tools like JEDI and WIRED
4. **Regional workforce landscape or market analysis**, including identifying regional training or certification programs
5. **Engaging and recruiting workforce**, including case studies or career pathways.

State Technical Assistance Program

Resources and Assistance for State Energy Offices and Regulators (RASOR) program delivers technical assistance and resources at three different levels of depth and duration: Help Desk (8h), Expert Match (80h), and Deep Dive (800h).



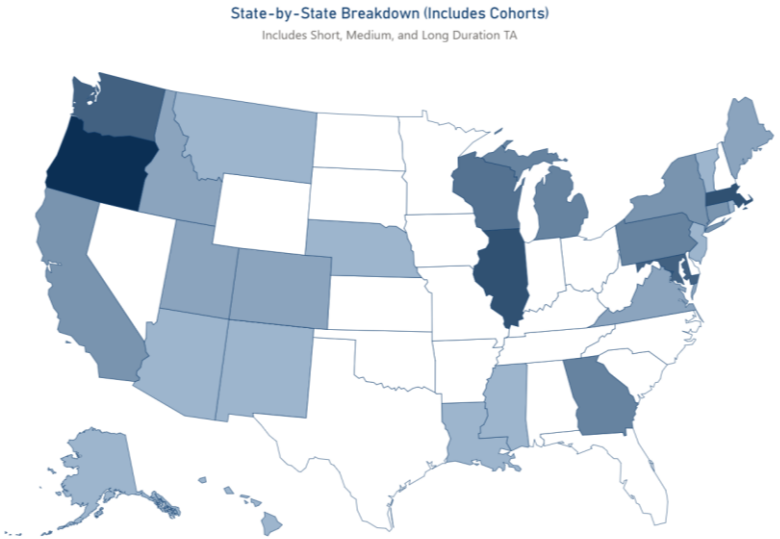
Help Desk and **Expert Match** are open now. (Deep Dive cohorts are currently underway.)

Help Desk

Expert Match

State Technical Assistance Program

Current hot-topic areas for technical assistance include integrated grid planning, data center interconnection concerns, FERC 2222 DER aggregations, vehicle grid integration, and resource adequacy.



- 30 states have received technical assistance so far.
- 69 unique topic combinations have been supported.

https://emp.lbl.gov/projects/state-TA-program

FERC 1920
RASOR Technical Assistance Program

RASOR 1920 helps states comply with **FERC Order 1920** by providing targeted support for regional grid planning and compliance by facilitating expertise sharing across national labs on long-term scenario planning, extreme weather sensitivities, and evaluation criteria for transmission projects.

NREL's role:

- Leading **7 active requests** and assisting with **2 additional requests**
- **Completed 1 request** with NJ BPU
- Anticipating more applications following opening of a utility-specific technical assistance program.

Next steps:

- Process **incoming technical assistance applications** and match them with appropriate experts
- Continue developing resources and guidance to assist states.

FERC Order 1920 requires transmission planners to conduct long-term, scenario-based regional planning to address future grid needs and establish a cost allocation framework for transmission projects.

Help Desk (≤ 4 hours): Quick consultations for immediate concerns.

Expert Match (≤ 80 hours): Short-term technical assistance from lab experts.

Deep Dive (> 80 hours): In-depth partnerships to address complex compliance challenges.

Discussion