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Energy Center of Excellence

# Careers in Energy and Natural Resources

**EXPLORE THE CLUSTER**



Published May 2025





### Careers in Energy and Natural Resources

- Energy and Natural Resources (ENR) is **one of 14** Career and Technical Education (CTE) **clusters** in the National Career Clusters Framework
- Approximately **187,240 people** are employed in roles aligning to Energy and Natural Resources (ENR) statewide, including core occupational employment and industry-related employment
- Employment in core ENR occupations saw a **strong recovery** from the pandemic, but baseline forecasts show **modest future growth**
- The **unemployment** rate for core ENR occupations is **low**, at 1.7%
- While the two industries aligned with the ENR cluster are 1) Utilities and 2) Mining, Quarrying, Oil and Gas Extraction, most people employed in core occupations in this cluster work for **other industries**
- Job **postings are down 3%** from the prior year, with the most common job title in postings being Maintenance Technician / Mechanic
- ENR contains **six sub-clusters**:
  - Clean & Alternative Energy
  - Conservation & Land Management
  - Ecological Research & Development
  - Environmental Protection
  - Resource Extraction
  - Utilities

### About This Report



The Minnesota State Energy Center of Excellence commissioned this report from RealTime Talent, a statewide nonprofit dedicated to providing custom labor market insights to employers, education systems, and workforce and economic development organizations.



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### Introducing an Updated Career Clusters Framework

The past two decades have seen seismic shifts in our economy, labor market, and the nature of work. In response, Advance CTE led two-year multi-method research process aimed at modernizing the 2003 Career and Technical Education Framework—often referred to as the Career Wheel—to increase alignment to industry needs and better represent new workforce realities.

This report was developed by the team at RealTime Talent utilizing the new Modernized Career Clusters Framework by AdvanceCTE to refine, define, and activate insights about the core occupations within the Energy and Natural Resources Cluster and the Interdisciplinary Cluster needs aligned to Energy and Natural Resources industries. According to AdvanceCTE, the updated Framework has the following benefits which more effectively reflect the real world of work:<sup>1</sup>

- Emphasizes the truly interdisciplinary nature of work through more intersectionality across Clusters
- Updates language and groupings of occupations to better bridge industry's organization of work with education
- Includes emphasis on new sectors, skills, and approaches from the entire world of work, while providing flexibility for the future by leaning more on industry classifications
- Serves as a bridge for education to reflect the real world of work
- Provides learners with more personalized paths to living wage jobs and skills gains for a variety of careers
- Offers educational leaders and educators a means to align and design programs that better prepare learners for these careers
- Encourages industry has learners of all ages with interests, skills, and experiences that match their hiring needs

The Energy Center of Excellence strives to ensure that Minnesota businesses have access to talent that is prepared for the full range of careers in Energy and Natural Resources today and tomorrow. This Framework provides a model for organizing workforce needs and related programs.

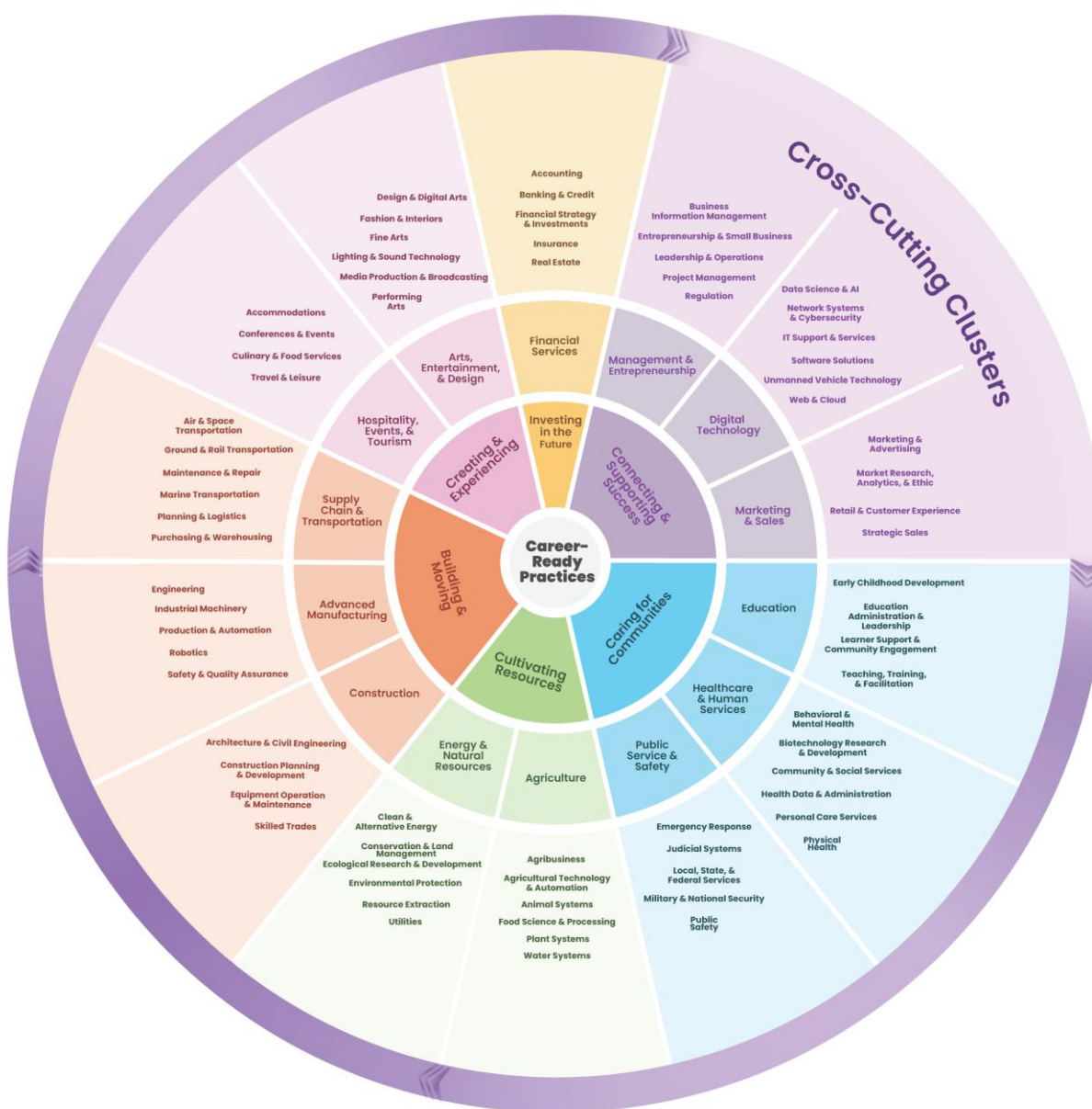
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## The National Career Clusters Framework

The National Career Clusters Framework developed by Advance CTE consists of 14 Clusters and 72 Sub-Clusters that serve as the primary organizing structures for CTE programs. These structures are supported by five Cluster Groupings aligned to purpose and impact of included careers, and three Cross-Cutting Clusters that provide both skills and careers that can stand alone and intersect with all other Clusters.



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# Energy & Natural Resources Cluster



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### Exploring Clusters and Sub-Clusters

The National Career Cluster Framework's Sub-Clusters are major groupings of career areas within a given Cluster that have similar skills as defined by industry area. In Energy and Natural Resources, there are six Sub-Clusters.



### Interdisciplinary Careers

#### Cross-Cutting Clusters



#### Related Clusters



While the Cross-Cutting Career Clusters are designed to be applicable to all other Career Clusters, many other Career Clusters are closely connected. For Energy and Natural Resources, other Related Clusters include **Advanced Manufacturing; Agriculture; Construction; Public Service & Safety; Supply Chain & Transportation.**

Given the increasingly interdisciplinary nature of the world of work, programs may be designed to bridge across two or more Career Clusters.

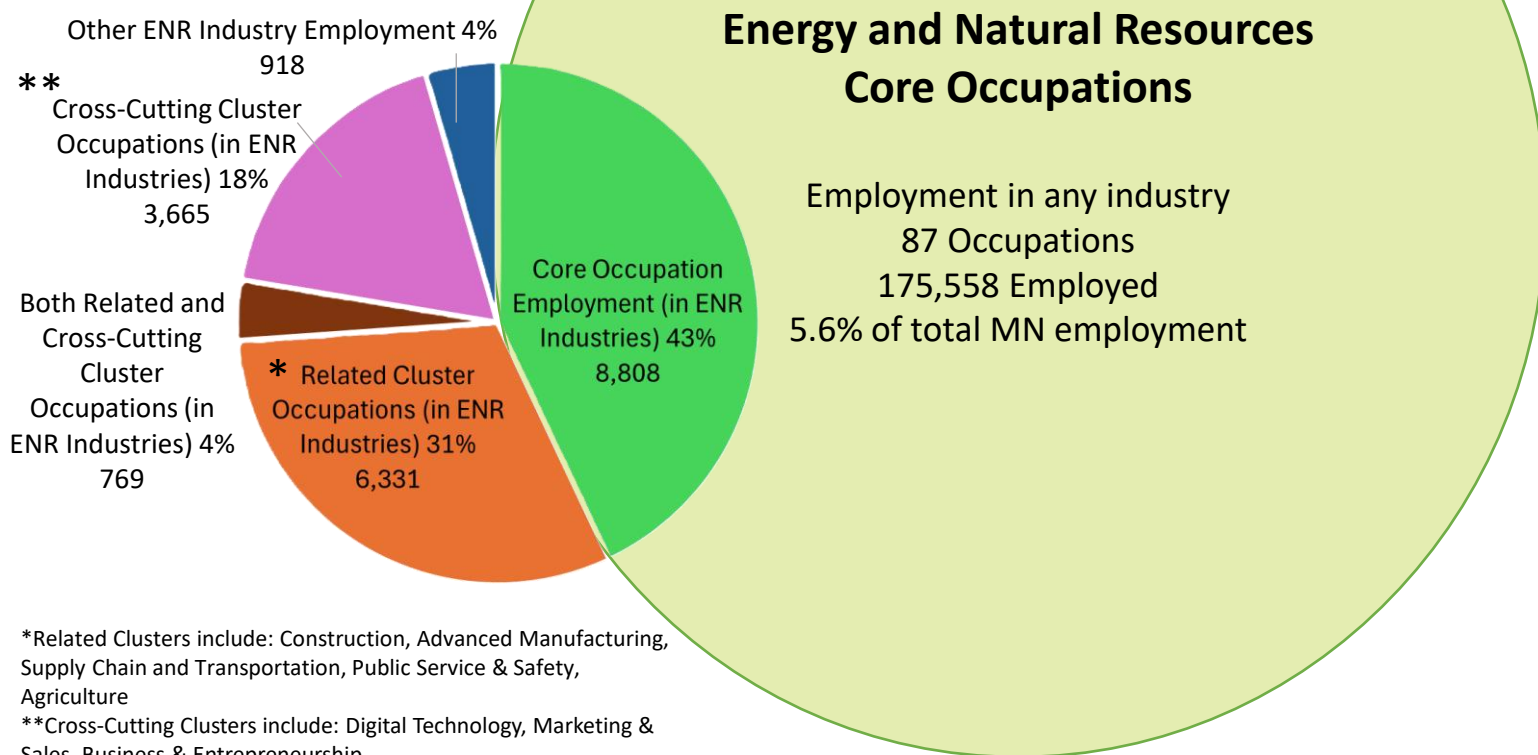


### The Energy and Natural Resources Career Cluster

The Energy and Natural Resources Cluster is comprised of 87 core occupations employed in a wide range of industries, as well as all employment in the Utilities (NAICS 22) and Mining, Quarrying, and Oil and Natural Gas Extraction (NAICS 21) industries. An estimated 187,240 people are employed in roles aligning to this Cluster statewide.

**88%** of all core occupational employment in the Energy and Natural Resources Cluster are shared with other career clusters.

**About 21,231 workers** in 36 essential core occupations are aligned solely to Energy and Natural Resources and no other clusters.



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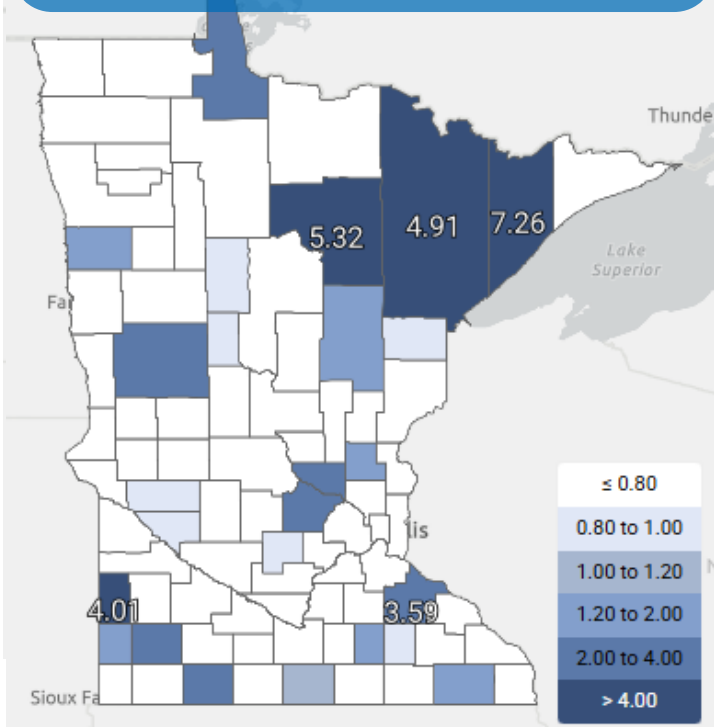
## Core Industry Market Demand Overview

| Industry                                                     | Employed | Mean Annual Wages | LQ   | 5-Year Historic Employment Trend | GRP     | 5-Year Forecast                            |
|--------------------------------------------------------------|----------|-------------------|------|----------------------------------|---------|--------------------------------------------|
| <b>Utilities (NAICS 22)</b>                                  | 14,678   | \$129,033         | 0.91 |                                  | \$8.2B  | Annual growth: 0.2%<br>Total demand: 6,548 |
| <b>Mining, Quarrying, Oil and Gas Extraction (NAICS 21)</b>  | 5,848    | \$109,317         | 0.51 |                                  | \$2.1B  | Annual growth: 0.2%<br>Total demand: 2,774 |
| <b>All Energy &amp; Natural Resources Cluster Industries</b> | 20,526   | \$123,416         | 0.75 |                                  | \$10.3B | Annual growth: 0.2%<br>Total demand: 9,322 |

**0.75**

Location quotient

These industry sectors are less concentrated in Minnesota than the United States overall



**794**

Employers in 2023  
(up from 614 in 2016)

**92.5%**

Private employers  
(0.4% self-employed  
7.1% local government)

**0.7%**

Of total MN  
employment

**Top Five Counties**  
By number of employees

|           |       |
|-----------|-------|
| St. Louis | 4,361 |
| Hennepin  | 4,239 |
| Ramsey    | 1,509 |
| Wright    | 1,038 |
| Itasca    | 853   |



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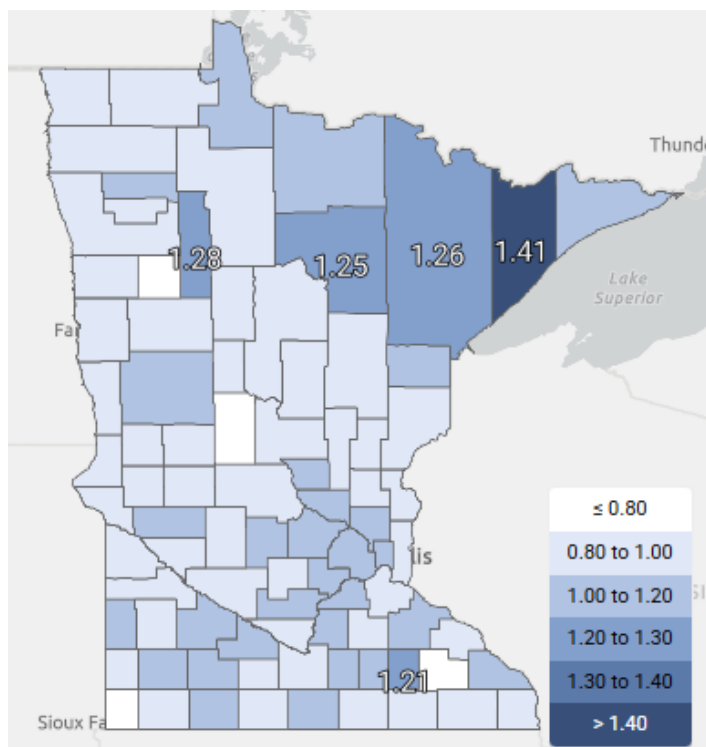
## Core Cluster Occupational Market Demand Overview

| Core Cluster Occ Empl | Mean Entry-Level Wages | Mean Annual Wages | LQ  | Unempl | Unempl Rate | 5-Year Hist Avg Ann Empl Change | 5-Year Forecast Avg Ann Empl Change | 5-Year Total Demand Estimate |
|-----------------------|------------------------|-------------------|-----|--------|-------------|---------------------------------|-------------------------------------|------------------------------|
| 175,558               | \$53,900               | \$103,500         | 1.0 | 3,001  | 1.7%        | 1.6%                            | 0.2%                                | 73,646                       |

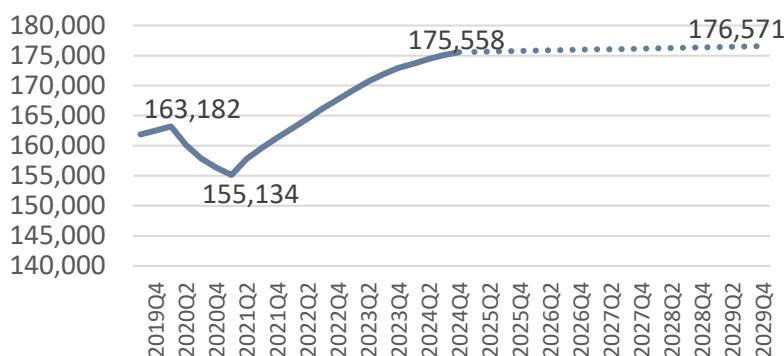
**1.0**

### Location quotient

The Core Careers in Energy & Natural Resources are similarly concentrated in Minnesota to the rest of the United States, and are evenly distributed statewide



### Strong Recovery, Flattening Employment Outlook



— Historical Employment  
..... Forecast

**84.8%**

Private employers  
(1.4% self-employed  
13.8% government)

**175,558**  
Employed

### Top Five Counties By number of employees

|           |        |
|-----------|--------|
| Hennepin  | 53,937 |
| Ramsey    | 19,513 |
| Dakota    | 11,239 |
| Anoka     | 8,194  |
| St. Louis | 7,171  |

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## Top Ten Core Cluster Occupations by Number Employed, All Industries

| #  | Core Cluster Occupation (SOC)                                                  | Empl             | Mean Annual Wages | LQ          | Unempl        | Unempl Rate | 5-Year Hist Avg Ann Empl Change | 5-Year Avg Ann Forecast Empl Change | 5-Year Total Demand Estimate |
|----|--------------------------------------------------------------------------------|------------------|-------------------|-------------|---------------|-------------|---------------------------------|-------------------------------------|------------------------------|
| 1  | General and Operations Managers (11-1021)                                      | 75,479           | \$122,500         | 1.12        | 854           | 1.1%        | 3.1%                            | 0.2%                                | 31,194                       |
| 2  | First-Line Supervisors of Construction Trades and Extraction Workers (47-1011) | 14,227           | \$95,900          | 0.87        | 353           | 2.4%        | 2.1%                            | 0.4%                                | 5,743                        |
| 3  | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011)       | 9,514            | \$89,400          | 0.84        | 88            | 0.9%        | 1.6%                            | 0.1%                                | 3,837                        |
| 4  | Industrial Machinery Mechanics (49-9041)                                       | 7,532            | \$72,800          | 0.94        | 105           | 1.4%        | 2.4%                            | 1.3%                                | 3,594                        |
| 5  | Compliance Officers (13-1041)                                                  | 6,909            | \$88,100          | 0.95        | 101           | 1.4%        | 3.4%                            | 0.2%                                | 2,774                        |
| 6  | Firefighters (33-2011)                                                         | 5,310            | \$49,600          | 0.90        | 86            | 1.6%        | 1.0%                            | 0.1%                                | 1,955                        |
| 7  | Industrial Engineering Technologists and Technicians (17-3026)                 | 4,334            | \$72,600          | 3.13        | 65            | 1.5%        | 0.3%                            | 0.1%                                | 1,845                        |
| 8  | Architectural and Engineering Managers (11-9041)                               | 4,147            | \$178,800         | 1.05        | 92            | 2.2%        | 1.0%                            | 0.1%                                | 1,341                        |
| 9  | Facilities Managers (11-3013)                                                  | 2,796            | \$111,300         | 1.07        | 19            | 0.7%        | -4.0%                           | 0.2%                                | 1,167                        |
| 10 | Refuse and Recyclable Material Collectors (53-7081)                            | 2,663            | \$58,100          | 0.97        | 70            | 2.6%        | 0.8%                            | 0.1%                                | 1,582                        |
|    | <b>Energy &amp; Natural Resources Cluster – Core Occupations</b>               | <b>175,558</b>   | <b>\$103,500</b>  | <b>1.00</b> | <b>3,001</b>  | <b>1.7%</b> | <b>1.6%</b>                     | <b>0.2%</b>                         | <b>73,646</b>                |
|    | <b>Total – All Occupations</b>                                                 | <b>3,124,097</b> | <b>\$70,600</b>   | <b>1.00</b> | <b>96,601</b> | <b>3.0%</b> | <b>0.2%</b>                     | <b>0.1%</b>                         | <b>1,691,667</b>             |

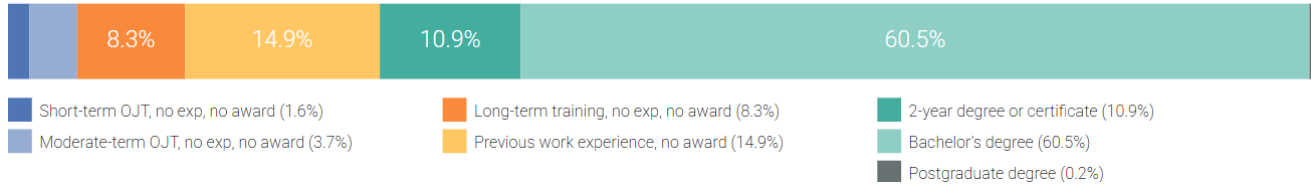
Top occupations are forecast to grow at a much lower rate than historically seen but frequently exceeding the typical forecast across all occupations.

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## Education and Training Requirements of Top Core Cluster Occupations, All Industries



| #  | Core Cluster Occupation (SOC) with Interdisciplinary Alignments                | Employed | Mean Annual Wages | Typical Entry-Level Education | Previous Work Experience | Typical On-the-Job Training |
|----|--------------------------------------------------------------------------------|----------|-------------------|-------------------------------|--------------------------|-----------------------------|
| 1  | General and Operations Managers (11-1021)                                      | 75,479   | \$122,500         | Bachelor's degree             | 5 years or more          | None                        |
| 2  | First-Line Supervisors of Construction Trades and Extraction Workers (47-1011) | 14,227   | \$95,900          | HS or equivalent              | 5 years or more          | None                        |
| 3  | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011)       | 9,514    | \$89,400          | HS or equivalent              | Less than 5 years        | None                        |
| 4  | Industrial Machinery Mechanics (49-9041)                                       | 7,532    | \$72,800          | HS or equivalent              | None                     | Long-term OJT               |
| 5  | Compliance Officers (13-1041)                                                  | 6,909    | \$88,100          | Bachelor's Degree             | None                     | Mod-term OJT                |
| 6  | Firefighters (33-2011)                                                         | 5,310    | \$49,600          | PS Certificate                | None                     | Long-term OJT               |
| 7  | Industrial Engineering Technologists and Technicians (17-3026)                 | 4,334    | \$72,600          | Associate Degree              | None                     | None                        |
| 8  | Architectural and Engineering Managers (11-9041)                               | 4,147    | \$178,800         | Bachelor's Degree             | 5 years or more          | None                        |
| 9  | Facilities Managers (11-3013)                                                  | 2,796    | \$111,300         | Bachelor's Degree             | Less than 5 years        | None                        |
| 10 | Refuse and Recyclable Material Collectors (53-7081)                            | 2,663    | \$58,100          | None                          | None                     | Short-term OJT              |

### Inter-disciplinary Clusters\*



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## Education and Training Requirements of Top Essential Core Cluster Occupations

13.8%

18.5%

33.0%

13.3%

21.3%

Short-term OJT, no exp, no award (13.8%)

Long-term training, no exp, no award (33.0%)

2-year degree or certificate (13.3%)

Moderate-term OJT, no exp, no award (18.5%)

Previous work experience, no award (0.1%)

Bachelor's degree (21.3%)

| #  | Core Cluster Occupation (SOC) with Interdisciplinary Alignments     | Empl  | Mean Annual Wages | 5-Year Total Demand Estimate | Typical Entry-Level Education | Previous Work Experience | Typical On-the-Job Training | Current (C) or Future (F) MN State ENR Program |
|----|---------------------------------------------------------------------|-------|-------------------|------------------------------|-------------------------------|--------------------------|-----------------------------|------------------------------------------------|
| 1  | Refuse and Recyclable Material Collectors (53-7081)                 | 2,663 | \$58,100          | 1,582                        | None                          | None                     | Short-term OJT              |                                                |
| 2  | Telecommunications Equipment Installers and Repairers (49-2022)     | 2,298 | \$70,800          | 993                          | PS Certificate                | None                     | Mod-term OJT                |                                                |
| 3  | Water and Wastewater Treatment Plant and System Operators (51-8031) | 2,147 | \$72,900          | 827                          | HS or equivalent              | None                     | Long-term OJT               | F                                              |
| 4  | Electrical Power-Line Installers and Repairers (49-9051)            | 2,005 | \$104,400         | 944                          | HS or equivalent              | None                     | Long-term OJT               | C                                              |
| 5  | Telecommunications Line Installers and Repairers (49-9052)          | 1,500 | \$67,800          | 641                          | HS or equivalent              | None                     | Long-term OJT               |                                                |
| 6  | Environmental Engineers (17-2081)                                   | 1,327 | \$106,300         | 446                          | Bachelor's Degree             | None                     | None                        | F                                              |
| 7  | Electronics Engineers, Except Computer (17-2072)                    | 1,301 | \$122,100         | 394                          | Bachelor's Degree             | None                     | None                        |                                                |
| 8  | Surveying and Mapping Technicians (17-3031)                         | 940   | \$66,200          | 599                          | HS or equivalent              | None                     | Mod-term OJT                |                                                |
| 9  | Outdoor Power Equipment and Other Small Engine Mechanics (49-3053)  | 793   | \$51,700          | 405                          | HS or equivalent              | None                     | Mod-term OJT                |                                                |
| 10 | Power Plant Operators (51-8013)                                     | 765   | \$99,100          | 242                          | HS or equivalent              | None                     | Long-term OJT               | F                                              |

Utilities

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## Core Cluster Occupation Industry Staffing Pattern Overview

Only one of the top ten detailed industries employing talent in the core Energy and Natural Resources occupations is part of one of the cluster's focused industries (Utilities, NAICS 22).

| #  | NAICS Code* | Industry Title                                                                 | % of Occ Empl | Empl      | Mean Ann Wages | 5-Year Exits | 5-Year Job Transfers | 5-Year Forecast Avg Ann Empl Change | 5-Year Total Demand Estimate |
|----|-------------|--------------------------------------------------------------------------------|---------------|-----------|----------------|--------------|----------------------|-------------------------------------|------------------------------|
| 1  | 9211        | Executive, Legislative, and Other General Government Support                   | 5.8%          | 10,153    | \$75,700       | 1,288        | 2,824                | -52                                 | 4,060                        |
| 2  | 5511        | Management of Companies and Enterprises                                        | 4.1%          | 7,130     | \$159,200      | 869          | 1,924                | 48                                  | 2,841                        |
| 3  | 5413        | Architectural, Engineering, and Related Services                               | 3.7%          | 6,550     | \$107,700      | 856          | 1,741                | -8                                  | 2,588                        |
| 4  | 2382        | Building Equipment Contractors                                                 | 3.2%          | 5,649     | \$101,800      | 796          | 1,500                | 90                                  | 2,386                        |
| 5  | 2211        | Electric Power Generation, Transmission and Distribution                       | 2.9%          | 5,080     | \$116,800      | 730          | 1,394                | 103                                 | 2,228                        |
| 6  | 5416        | Management, Scientific, and Technical Consulting Services                      | 2.4%          | 4,227     | \$128,200      | 488          | 1,269                | 186                                 | 1,944                        |
| 7  | 3345        | Navigational, Measuring, Electromedical, and Control Instruments Manufacturing | 1.9%          | 3,349     | \$127,600      | 433          | 814                  | -16                                 | 1,231                        |
| 8  | 9221        | Justice, Public Order, and Safety Activities                                   | 1.6%          | 2,727     | \$84,000       | 333          | 761                  | -37                                 | 1,058                        |
| 9  | 4238        | Machinery, Equipment, and Supplies Merchant Wholesalers                        | 1.6%          | 2,725     | \$93,900       | 402          | 705                  | 87                                  | 1,193                        |
| 10 | 7225        | Restaurants and Other Eating Places                                            | 1.5%          | 2,646     | \$81,000       | 297          | 780                  | 53                                  | 1,129                        |
|    |             | All Other                                                                      | 71.4%         | 125,321   |                |              |                      |                                     |                              |
|    |             | Energy & Natural Resources Cluster – Core Occupations                          | 100%          | 175,558   | \$103,500      | 23,116       | 48,498               | 2,032                               | 73,646                       |
|    |             | Total – All Occupations                                                        | N/A           | 3,124,097 | \$70,600       | 694,283      | 984,741              | 12,643                              | 1,691,667                    |

Inter-disciplinary Clusters\*



Digital Technology



Marketing & Sales



Management & Entrepreneurship



Agriculture



Advanced Manufacturing



Construction



Supply Chain & Transportation



Public Service & Safety



### Energy and Natural Resources Cluster Skill and Credential Demand Overview

#### Job Posting Analysis (Core and Related Industry Roles)

Advertised May 2024 – April 2025

##### Top Job Titles

- 1) Maintenance Technician / Mechanic
- 2) Master Electrician - Industrial
- 3) NOAA Basic / Commissioned Officer
- 4) Signal Support Systems Specialist
- 5) Truck Driver
- 6) Post Doctoral Associate
- 7) General Manager
- 8) Electrical Engineer
- 9) Field Service Technician
- 10) Project Manager

81,943 Posts

-3% from prior year

\$75-\$120K

Posted Salary Range

##### Top Essential Skills

- 1) Communication
- 2) Collaboration
- 3) Analysis
- 4) Leadership
- 5) Planning

Hiring Difficulty: **Moderate**

Share Remote Postings: 2%

Share Hybrid Postings: 10%

##### Top Employers Hiring

- 1) University of Minnesota
- 2) M.A. Mortenson Company
- 3) State of Minnesota
- 4) Army
- 5) Thomson Reuters
- 6) Cargill
- 7) Navy
- 8) Andersen Windows
- 9) Xcel Energy
- 10) Honeywell

##### Top Knowledge Areas and Technical Skills

- 1) Operations
- 2) Scheduling
- 3) Supervision
- 4) Customer Service
- 5) Project Management

##### Top Credentials

- 1) Driver's License (CDL)
- 2) OSHA
- 3) HAZMAT
- 4) EPA Certification
- 5) Professional Engineer License



### Core Cluster Supply Overview

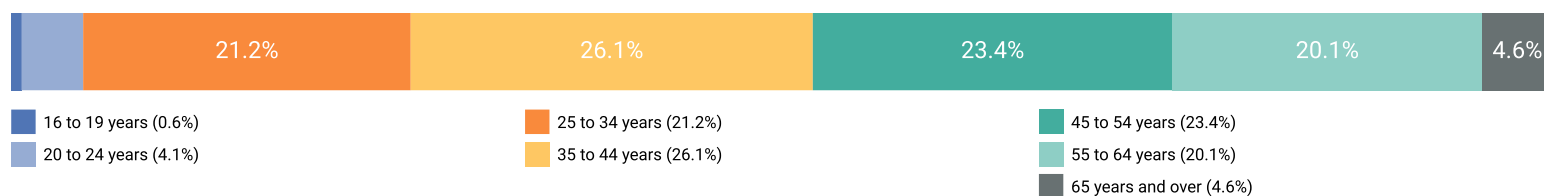
#### Energy and Natural Resources Core Cluster Occupation Talent Pool Diversity (Across all industries statewide)

Underrepresentation of talent who are:

- Female
- Black or African American

- Asian
- Hispanic or Latine
- Under 25 or over 64 years old

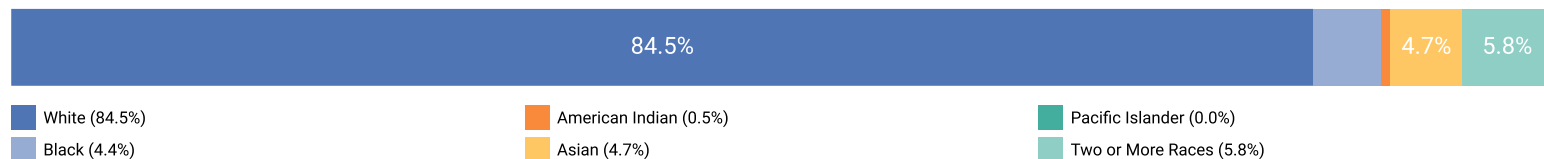
#### Age



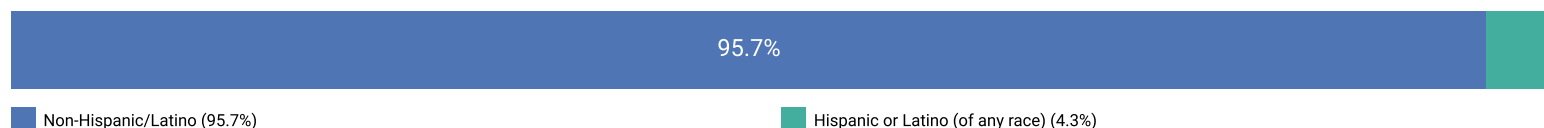
#### Gender



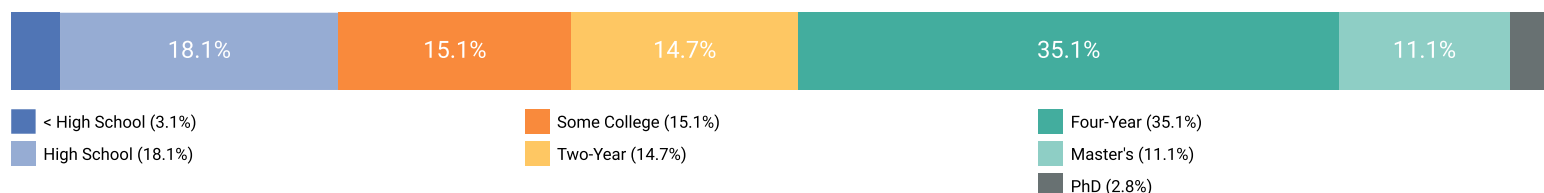
#### Race



#### Ethnicity



#### Educational Attainment



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# Sub-Clusters



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## Sub-Cluster Market Demand Overview

| # | Sub-Clusters                                                                      | Empl             | Mean Annual Wages | LQ          | Unempl        | Unempl Rate | 5-Year Avg Ann Hist Empl Change | 5-Year Avg Ann Forecast Empl Change | 5-Year Total Demand Estimate |
|---|-----------------------------------------------------------------------------------|------------------|-------------------|-------------|---------------|-------------|---------------------------------|-------------------------------------|------------------------------|
| 1 | <b>Clean &amp; Alternative Energy (Core)</b>                                      | 20,223           | \$112,200         | 0.90        | 381           | 1.8%        | 1.0%                            | 0.2%                                | 7,705                        |
|   | + Related by Industry                                                             | 1,296            |                   |             |               |             |                                 |                                     | 677                          |
| 2 | <b>Conservation &amp; Land Management (Core)</b>                                  | 87,899           | \$119,600         | 1.10        | 1,110         | 1.3%        | 2.6%                            | 0.2%                                | 36,512                       |
| 3 | <b>Ecological Research &amp; Development (Core)</b>                               | 17,542           | \$116,000         | 1.04        | 538           | 3.0%        | 0.6%                            | 0.1%                                | 7,129                        |
| 4 | <b>Environmental Protection (Core)</b>                                            | 20,826           | \$100,400         | 0.92        | 371           | 1.8%        | 1.6%                            | 0.1%                                | 7,653                        |
| 5 | <b>Resource Extraction (Core)</b>                                                 | 57,365           | \$93,900          | 0.92        | 1,136         | 1.9%        | 1.3%                            | 0.3%                                | 23,660                       |
|   | + Related by Industry                                                             | 2,787            |                   |             |               |             |                                 |                                     | 1,310                        |
| 6 | <b>Utilities (Core)</b>                                                           | 52,548           | \$95,700          | 0.88        | 1,019         | 1.9%        | 0.5%                            | 0.2%                                | 21,913                       |
|   | + Related by Industry                                                             | 7,566            |                   |             |               |             |                                 |                                     | 3,106                        |
|   | <b>Energy &amp; Natural Resources Cluster – Core Occupations</b>                  | <b>175,558</b>   | <b>\$103,500</b>  | <b>1.00</b> | <b>3,001</b>  | <b>1.7%</b> | <b>1.6%</b>                     | <b>0.2%</b>                         | <b>73,646</b>                |
|   | <b>Energy &amp; Natural Resources - All Industry</b>                              | <b>20,526</b>    | <b>\$123,416</b>  | <b>0.75</b> | <b>n/a</b>    | <b>n/a</b>  | <b>1.1%</b>                     | <b>0.2%</b>                         | <b>9,322</b>                 |
|   | <b>All ENR Employment (Core, Interdisciplinary, &amp; Cross-Cutting Combined)</b> | <b>187,240</b>   |                   |             |               |             |                                 |                                     | <b>78,739</b>                |
|   | <b>Total – All Occupations</b>                                                    | <b>3,124,097</b> | <b>\$70,600</b>   | <b>1.00</b> | <b>96,601</b> | <b>3.0%</b> | <b>0.2%</b>                     | <b>0.1%</b>                         | <b>1,691,667</b>             |

The subclusters within the Energy and Natural Resources Cluster overlap with one another, and with other related and cross-cutting clusters. Related clusters sharing core occupations with Energy and Natural Resources include Construction, Advanced Manufacturing, Supply Chain and Transportation, Public Service and Safety, and Agriculture. In addition, employment in occupations within the cross-cutting clusters of Digital Technology, Marketing and Sales, and Business and Entrepreneurship are represented in industry-specific employment (NAICS 21 and 22) where noted.

# Careers in Energy



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## Sub-Cluster Wage Overview

| # | Sub-Clusters                                                     | Mean Wage  |           |                  |                  | Location Quotient |           |                  |                  |
|---|------------------------------------------------------------------|------------|-----------|------------------|------------------|-------------------|-----------|------------------|------------------|
|   |                                                                  | State wide | MSP Metro | Urban Greater MN | Rural Greater MN | State wide        | MSP Metro | Urban Greater MN | Rural Greater MN |
| 1 | <b>Clean &amp; Alternative Energy (Core)</b>                     | \$112,200  | \$121,300 | \$96,500         | \$98,900         | 0.90              | 0.88      | 0.78             | 0.98             |
|   | + Related by Industry                                            | \$122,543  | \$142,271 | \$115,238        | \$123,336        | 1.62              | 0.61      | 0.78             | 4.82             |
| 2 | <b>Conservation &amp; Land Management (Core)</b>                 | \$119,600  | \$128,500 | \$105,600        | \$99,300         | 1.10              | 1.16      | 0.93             | 0.93             |
| 3 | <b>Ecological Research &amp; Development (Core)</b>              | \$116,000  | \$124,800 | \$102,000        | \$96,500         | 1.04              | 1.11      | 0.78             | 0.90             |
| 4 | <b>Environmental Protection (Core)</b>                           | \$100,400  | \$110,200 | \$82,300         | \$79,000         | 0.92              | 0.98      | 0.78             | 0.82             |
| 5 | <b>Resource Extraction (Core)</b>                                | \$93,900   | \$100,900 | \$84,800         | \$82,600         | 0.92              | 0.89      | 1.00             | 0.96             |
|   | + Related by Industry                                            | \$109,317  | \$141,250 | \$107,005        | \$109,440        | 0.51              | 0.09      | 2.27             | 0.55             |
| 6 | <b>Utilities (Core)</b>                                          | \$95,700   | \$102,900 | \$86,900         | \$84,600         | 0.88              | 0.84      | 0.85             | 0.98             |
|   | + Related by Industry                                            | \$128,099  | \$144,124 | \$116,622        | \$102,554        | 0.83              | 0.73      | 0.78             | 1.19             |
|   | <b>Energy &amp; Natural Resources Cluster – Core Occupations</b> | \$103,500  | \$112,500 | \$91,400         | \$86,900         | 1.0               | 1.0       | 0.94             | 0.99             |
|   | <b>Energy &amp; Natural Resources - All Industry</b>             | \$123,416  | \$136,256 | \$109,674        | \$114,236        | 0.75              | 0.46      | 1.40             | 1.15             |
|   | <b>Total – All Occupations</b>                                   | \$70,600   | \$75,400  | \$67,100         | \$60,100         |                   |           |                  |                  |

## Cost of Living by Region

|                  | Annual Average Salary | Cost of Living Index (Base US) | US Purchasing Power |
|------------------|-----------------------|--------------------------------|---------------------|
| Minnesota        | \$72,473              | 93.6                           | \$77,405            |
| MSP Metro        | \$79,039              | 94.1                           | \$83,961            |
| Urban Greater MN | \$62,386              | 95.5                           | \$65,322            |
| Rural Greater MN | \$54,276              | 91.9                           | \$59,072            |
| USA              | \$73,145              | 100.0                          | \$73,145            |

The Cost of Living Index estimates the relative price levels for consumer goods and services. When applied to wages and salaries, the result is a measure of relative purchasing power.

# Careers in Energy



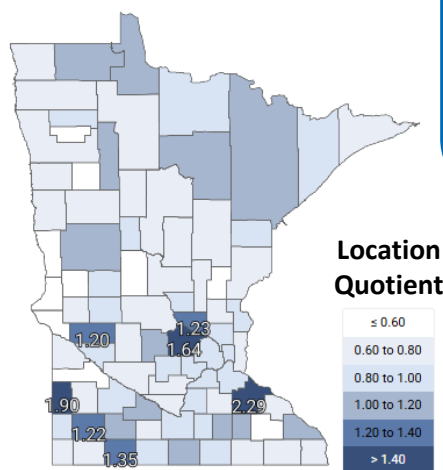
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## Clean and Alternative Energy

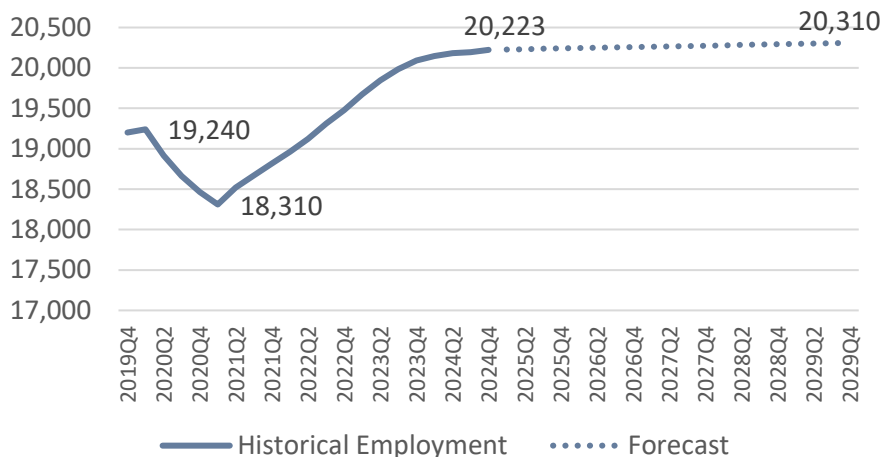
### Sub-Cluster Demand

#### Summary

Support energy generation and infrastructure development from clean energy sources such as low carbon fuels, natural gas, nuclear, biofuels, hydrogen processes, and other alternative sources. Develop and implement technologies that harness natural elements including solar, nuclear, wind, and hydro power, while advancing efforts in electrification and energy storage solutions. Recycling, carbon capture, and other energy and mineral reuse and reclamation.



#### Core Sub-Cluster Employment Forecast



#### Core Occupation Summary Statistics (Across all industries statewide)

**1.8%**  
Unemployment  
rate

**0.90**  
Location  
Quotient

**0.2%**  
Forecast Annual  
Growth

**1,577**  
Online job ads  
(March 2025)

# Careers in Energy



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## Clean and Alternative Energy Sub-Cluster Demand – Core Occupations

| #  | Occupation (SOC)                                                         | Empl             | Mean Annual Wages | LQ          | Unempl        | Unempl Rate | 5-Year Hist Avg Ann Empl Change | 5-Year Avg Ann Forecast Empl Change | 5-Year Total Demand Estimate | % of Total Empl in Ind |
|----|--------------------------------------------------------------------------|------------------|-------------------|-------------|---------------|-------------|---------------------------------|-------------------------------------|------------------------------|------------------------|
| 1  | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011) | 9,514            | \$89,400          | 0.84        | 88            | 0.9%        | 1.6%                            | 0.1%                                | 3,837                        | 1%                     |
| 2  | Architectural and Engineering Managers (11-9041)                         | 4,147            | \$178,800         | 1.05        | 92            | 2.2%        | 1.0%                            | 0.1%                                | 1,341                        | 1%                     |
| 3  | Engineers, All Other (17-2199)                                           | 2,300            | \$123,100         | 0.78        | 35            | 1.5%        | -1.9%                           | 0.2%                                | 675                          | 1%                     |
| 4  | Engineering Technologists and Technicians (17-3029)                      | 992              | \$77,700          | 0.81        | 15            | 1.5%        | 0.3%                            | 0.1%                                | 425                          | 1%                     |
| 5  | Commercial and Industrial Designers (27-1021)                            | 832              | \$86,100          | 1.34        | 22            | 2.6%        | -1.7%                           | 0.0%                                | 264                          | <1%                    |
| 6  | Power Plant Operators (51-8013)                                          | 765              | \$99,100          | 1.24        | 16            | 2.1%        | 2.6%                            | -2.0%                               | 242                          | 23%                    |
| 7  | Solar Photovoltaic Installers (47-2231)                                  | 393              | \$66,200          | 0.75        | 43            | 9.9%        | 6.3%                            | 2.9%                                | 267                          | 6%                     |
| 8  | Wind Turbine Service Technicians (49-9081)                               | 316              | \$75,300          | 1.28        | 20            | 5.9%        | 10.6%                           | 5.6%                                | 293                          | 45%                    |
| 9  | Nuclear Engineers (17-2161)                                              | 289              | \$131,700         | 1.16        | 5             | 1.8%        | 0.1%                            | -0.5%                               | 71                           | 63%                    |
| 10 | Power Distributors and Dispatchers (51-8012)                             | 197              | \$118,000         | 1.09        | 4             | 2.1%        | 0.9%                            | 0.5%                                | 96                           | 4%                     |
| 11 | Nuclear Power Reactor Operators (51-8011)                                | 195              | \$134,700         | 1.34        | 4             | 2.1%        | 3.2%                            | -0.9%                               | 77                           | 92%                    |
| 12 | Nuclear Technicians (19-4051)                                            | 162              | \$99,800          | 1.37        | 31            | 16.4%       | 2.3%                            | -0.7%                               | 80                           | 81%                    |
|    | <b>Clean &amp; Alternative Energy – Core</b>                             | <b>20,223</b>    | <b>\$112,200</b>  | <b>0.90</b> | <b>381</b>    | <b>1.8%</b> | <b>1.0%</b>                     | <b>0.2%</b>                         | <b>7,705</b>                 | <b>5%</b>              |
|    | <b>Total – All Occupations</b>                                           | <b>3,124,097</b> | <b>\$70,600</b>   | <b>1.00</b> | <b>96,601</b> | <b>3.0%</b> | <b>0.2%</b>                     | <b>0.1%</b>                         | <b>1,691,667</b>             |                        |

# Careers in Energy



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## Clean and Alternative Energy

Nuclear Power Reactor Operators have the highest median and average wage rates at all levels of experience. However, total employment volumes are low in Minnesota.

### Sub-Cluster Wages

#### Core Sub-Cluster Wage Distribution

Mean

\$112,200

Entry Level

\$78,500

Experienced

\$129,100

| # | Sub-Cluster Occupation (SOC) with Requirements for an Associate Degree or Less  | Wages     |             |             |            |                               |           |                |
|---|---------------------------------------------------------------------------------|-----------|-------------|-------------|------------|-------------------------------|-----------|----------------|
|   |                                                                                 | Mean      | Entry Level | Experienced | 50% Median | Typical Entry-Level Education | Empl      | Under employed |
| 1 | Nuclear Power Reactor Operators (51-8011)                                       | \$134,700 | \$106,700   | \$148,700   | \$133,500  | HS or equivalent              | 195       | 46             |
| 2 | Power Distributors and Dispatchers (51-8012)                                    | \$118,000 | \$88,900    | \$132,600   | \$121,100  | HS or equivalent              | 197       | 54             |
| 3 | Nuclear Technicians (19-4051)                                                   | \$99,800  | \$68,300    | \$115,500   | \$101,900  | Associate degree              | 162       | -              |
| 4 | Power Plant Operators (51-8013)                                                 | \$99,100  | \$74,000    | \$111,700   | \$100,000  | HS or equivalent              | 765       | 190            |
| 5 | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011)        | \$89,400  | \$61,200    | \$103,500   | \$85,900   | HS or equivalent              | 9,514     | 1,923          |
| 6 | Engineering Technologists and Technicians, Except Drafters, All Other (17-3029) | \$77,700  | \$55,700    | \$88,700    | \$79,200   | Associate degree              | 992       | 299            |
| 7 | Wind Turbine Service Technicians (49-9081)                                      | \$75,300  | \$58,300    | \$83,800    | \$73,000   | PS Certificate                | 316       | 39             |
| 8 | Solar Photovoltaic Installers (47-2231)                                         | \$66,200  | \$48,900    | \$74,900    | \$62,400   | HS or equivalent              | 393       | 86             |
|   | Clean & Alternative Energy – Core                                               | \$112,200 | \$78,500    | \$129,100   | \$108,400  | -                             | 20,223    | 2,637          |
|   | Total - All Occupations                                                         | \$70,600  | \$35,100    | \$88,300    | \$55,300   | -                             | 3,124,097 | 518,636        |

# Careers in Energy



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## Clean and Alternative Energy Sub-Cluster Demand – Related Industry Occupations

### Related Industries with Demand

- Hydroelectric Power Generation
- Nuclear Electric Power Generation
- Solar Electric Power Generation
- Wind Electric Power Generation
- Biomass Electric Power Generation

| #  | Occupation (SOC)                                                     | Ind Empl         | Mean Annual Wages | 5-Year Total Demand Estimate | Cross-Cutting Clusters | Inter-disciplinary Clusters | % of Total Empl in Ind |
|----|----------------------------------------------------------------------|------------------|-------------------|------------------------------|------------------------|-----------------------------|------------------------|
| 1  | Security Guards (33-9032)                                            | 126              | \$50,200          | 67                           | -                      | ●                           | 1%                     |
| 2  | First-Line Supervisors of Production and Operating Workers (51-1011) | 100              | \$150,400         | 45                           | -                      | ●                           | 1%                     |
| 3  | Electrical Engineers (17-2071)                                       | 96               | \$119,100         | 31                           | -                      | ●                           | 2%                     |
| 4  | Industrial Engineers (17-2112)                                       | 54               | \$108,700         | 19                           | -                      | ●                           | <1%                    |
| 5  | Training and Development Specialists (13-1151)                       | 53               | \$83,900          | 25                           | ○                      | -                           | 1%                     |
| 6  | Project Management Specialists (13-1082)                             | 47               | \$120,500         | 26                           | ○                      | -                           | <1%                    |
| 7  | Electricians (47-2111)                                               | 47               | \$117,400         | 29                           | -                      | ●                           | <1%                    |
| 8  | Business Operations Specialists, All Other (13-1199)                 | 46               | \$101,800         | 24                           | ○                      | -                           | <1%                    |
| 9  | Industrial Production Managers (11-3051)                             | 31               | \$170,500         | 12                           | ○                      | ●                           | 1%                     |
| 10 | Office Clerks, General (43-9061)                                     | 29               | \$69,500          | 22                           | ○                      | -                           | <1%                    |
|    | <b>Clean &amp; Alternative Energy – Related Industries</b>           | <b>2,661</b>     | <b>-</b>          | <b>1,384</b>                 | <b>-</b>               | <b>-</b>                    | <b>-</b>               |
|    | <b>Total – All Occupations</b>                                       | <b>3,124,097</b> | <b>\$70,600</b>   | <b>1,691,667</b>             | <b>-</b>               | <b>-</b>                    | <b>-</b>               |

### Inter-disciplinary Clusters\*

Digital Technology  
 Marketing & Sales  
 Management & Entrepreneurship  
 Agriculture  
 Advanced Manufacturing  
 Construction  
 Supply Chain & Transportation  
 Public Service & Safety

**20,223**  
Core Occupation Employment

**1,296**  
Related Career Employment

**8,382**  
New Talent by 2029Q4

**High**  
Talent Shortage Severity

# Careers in Energy



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## Clean and Alternative Energy

**Job Posting Analysis**  
Advertised May 2024 – April 2025

### Top Job Titles

- 1) Nuclear Engineer
- 2) Nuclear Operations
- 3) System Maintainers
- 4) Design Phase Managers
- 5) Maintenance Supervisors
- 6) Quality Engineers II
- 7) Quality Power Managers
- 8) Wind Turbine Technicians
- 9) Entry Level Nuclear Engineer
- 10) Hydrogen Design Phase Managers

### Top Employers Hiring

- 1) U.S. Navy
- 2) M.A. Mortenson Company
- 3) Xcel Energy
- 4) U.S. Army
- 5) Black & Veatch
- 6) Metropolitan Council
- 7) Vestas
- 8) ABM Industries
- 9) Sky Climber Renewables
- 10) Walmart

**1,129 Posts**

+62% from prior year

**\$93-\$151K**

Posted Salary Range

Hiring Difficulty: **Difficult**

Share Remote Postings: 2%

Share Hybrid Postings: 10%

### Top Essential Skills

- 1) Communication
- 2) Troubleshooting
- 3) Analysis
- 4) Leadership
- 5) Scheduling

### Top Knowledge Areas and Technical Skills

- 1) Operations
- 2) Turbines
- 3) Power Plants
- 4) Electronics / Electrical Systems
- 5) Mathematics

### Top Credentials

- 1) Engineer-In-Training
- 2) Total Quality Management Certification
- 3) Driver's License (CDL)
- 4) HVAC Certification
- 5) CIP Compliance



### Clean and Alternative Energy

### Job Posting and Profile Gap Analysis Advertised May 2024 – April 2025

#### Top 10 Skill Gaps in Minnesota

| Name                                     | Candidates | Openings | Gap |
|------------------------------------------|------------|----------|-----|
| Blueprint Reading                        | 0          | 24       | -24 |
| Personal Computers (PC)                  | 12         | 30       | -17 |
| Boilers                                  | 80         | 95       | -15 |
| Mathematics                              | 21         | 31       | -10 |
| Word Processing                          | 3          | 12       | -8  |
| Autodesk Revit                           | 6          | 15       | -8  |
| Dassault Systemes<br>SolidWorks Software | 37         | 45       | -8  |
| Yardi                                    | 0          | 8        | -8  |
| Welding                                  | 24         | 32       | -7  |
| Team Leadership                          | 15         | 22       | -7  |

#### Top 10 Certification Gaps in Minnesota

| Name                                                    | Candidates | Openings | Gap |
|---------------------------------------------------------|------------|----------|-----|
| First Aid Certification                                 | 6          | 13       | -7  |
| EPA Universal Certification                             | 0          | 5        | -5  |
| Certification in Cardiopulmonary Resuscitation (CPR)    | 6          | 11       | -5  |
| Class A Commercial Driver's License (CDL-A)             | 4          | 8        | -5  |
| Certified Welding Inspector (CWI)                       | 7          | 11       | -4  |
| Industry Radiography Radiation Safety Personnel (IRRSP) | 0          | 3        | -3  |
| Medical Physics                                         | 0          | 3        | -3  |
| Transportation Worker Identification Credential (TWIC)  | 0          | 3        | -3  |
| Project Management Professional (PMP)                   | 11         | 13       | -3  |
| Commercial Driver's License (CDL)                       | 10         | 12       | -2  |

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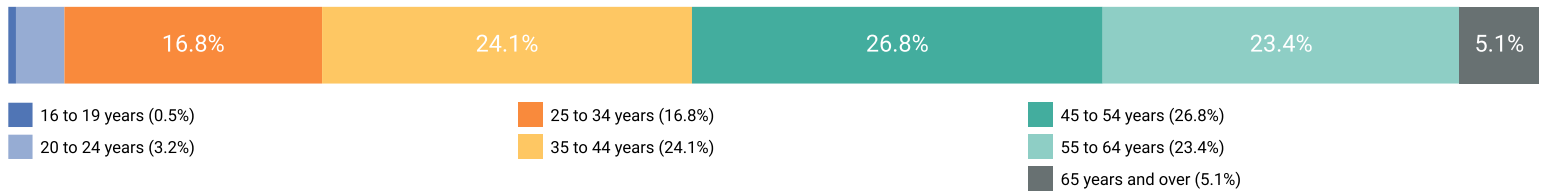
## Clean and Alternative Energy

### Estimated Talent Pool Diversity (Across all industries statewide)

Underrepresentation of talent who are:

- Female
- Black or African American
- More than one race
- Hispanic or Latine
- Under 35 years old

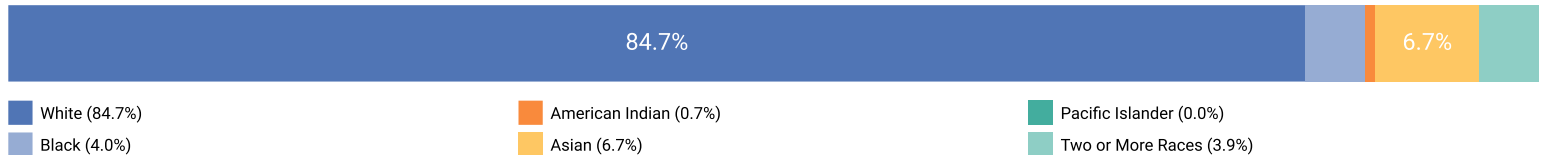
#### Age



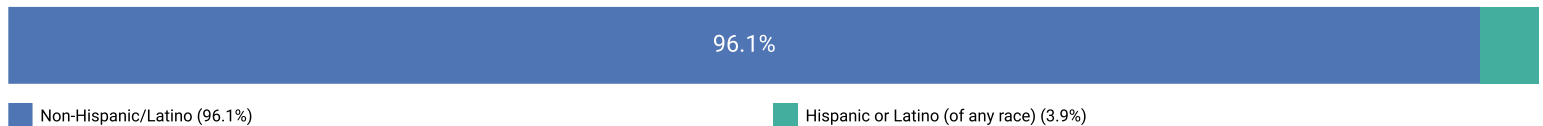
#### Gender



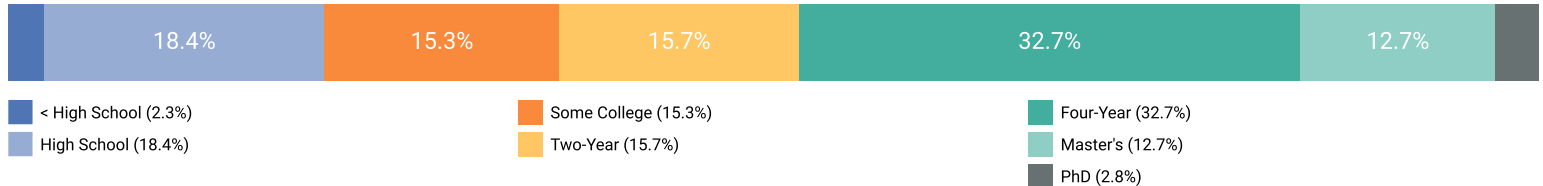
#### Race



#### Ethnicity



#### Educational Attainment



# Careers in Energy



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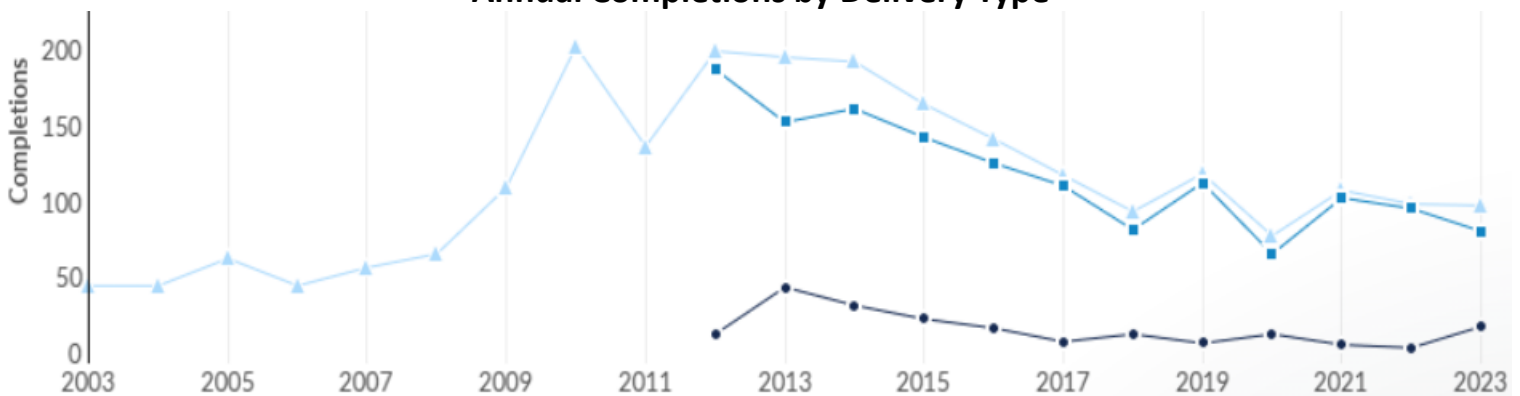
## Clean and Alternative Energy

### Aligned Postsecondary Programs With Awards Conferred, SY2023



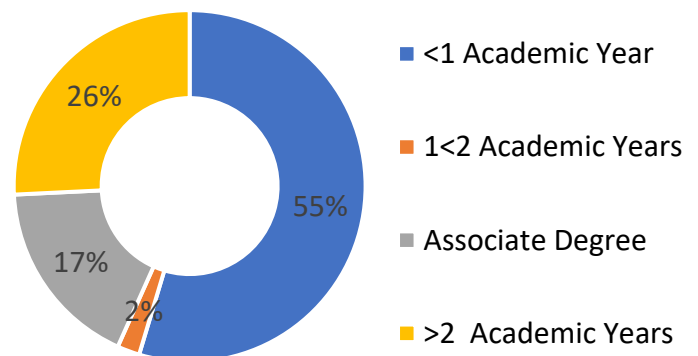
| Institution Type | Completions (2023) | Market Share |
|------------------|--------------------|--------------|
| Public, 2-year   | 97                 | 100.0%       |

### Annual Completions by Delivery Type



|                               |        |
|-------------------------------|--------|
| Distance Offered Programs     | +41.7% |
| Non-Distance Offered Programs | -57.2% |
| All Programs                  | -51.3% |

### Completions SY2023



**9**

Institutions with aligned programs

# Careers in Energy

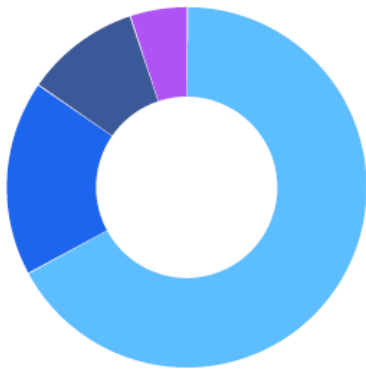


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## Clean and Alternative Energy

## Aligned Postsecondary Programs With Awards Conferred, SY2023

### Market Share by Program



| Program                                                              | Completions (2023) | Market Share |
|----------------------------------------------------------------------|--------------------|--------------|
| Industrial Mechanics and Maintenance Technology/Technician (47.0303) | 65                 | 67.0%        |
| Energy Systems Technology/Technician (15.1701)                       | 17                 | 17.5%        |
| Solar Energy Technology/Technician (15.1703)                         | 10                 | 10.3%        |
| Nuclear Engineering Technology/Technician (15.1401)                  | 5                  | 5.2%         |

| Institution                                    | Completions (2023) | Growth % YOY (2023) | Market Share (2023) | IPEDS Tuition & Fees (2023) | Completions Trend (2019-2023) |
|------------------------------------------------|--------------------|---------------------|---------------------|-----------------------------|-------------------------------|
| Riverland Community College                    | 35                 | 59.1%               | 36.1%               | \$6,249                     |                               |
| Minnesota North College                        | 16                 | 23.1%               | 16.5%               | \$6,004                     |                               |
| Hennepin Technical College                     | 13                 | -53.6%              | 13.4%               | \$5,881                     |                               |
| Century College                                | 12                 | -42.9%              | 12.4%               | \$6,182                     |                               |
| Dakota County Technical College                | 11                 | 1,000.0%            | 11.3%               | \$6,419                     |                               |
| Alexandria Technical & Community College       | 5                  | Insf. Data          | 5.2%                | \$6,213                     |                               |
| Minnesota West Community and Technical College | 3                  | -72.7%              | 3.1%                | \$6,484                     |                               |
| Pine Technical & Community College             | 1                  | Insf. Data          | 1.0%                | \$4,681                     |                               |
| St Cloud Technical and Community College       | 1                  | 0.0%                | 1.0%                | \$4,957                     |                               |

# Careers in Energy



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## Clean and Alternative Energy

### Aligned Postsecondary Programs With Awards Conferred, SY2023

#### Graduate Demographics, All Programs



- White
- American Indian
- Pacific Islander
- Hispanic or Latine
- Black or African American
- Asian
- Two or More Races

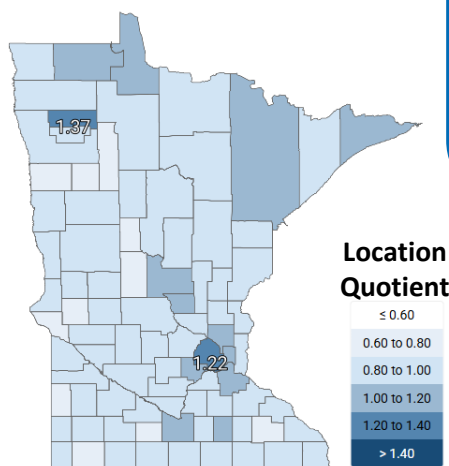
| # | Description                                    | Total Completions | Male       | Female    | Black or African American | Asian     | Hispanic or Latine | White      | Two or More Races |
|---|------------------------------------------------|-------------------|------------|-----------|---------------------------|-----------|--------------------|------------|-------------------|
| 1 | Riverland Community College                    | 35                | 94%        | 6%        | 6%                        | 0%        | 29%                | 66%        | 0%                |
| 2 | Minnesota North College                        | 16                | 94%        | 6%        | 0%                        | 0%        | 0%                 | 100%       | 0%                |
| 3 | Hennepin Technical College                     | 13                | 92%        | 8%        | 0%                        | 8%        | 8%                 | 77%        | 8%                |
| 4 | Century College                                | 12                | 92%        | 8%        | 33%                       | 17%       | 0%                 | 50%        | 0%                |
| 5 | Dakota County Technical College                | 11                | 100%       | 0%        | 0%                        | 9%        | 18%                | 73%        | 0%                |
| 6 | Alexandria Technical & Community College       | 5                 | 80%        | 20%       | 0%                        | 0%        | 0%                 | 100%       | 0%                |
| 7 | Minnesota West Community and Technical College | 3                 | 100%       | 0%        | 0%                        | 0%        | 0%                 | 100%       | 0%                |
| 8 | Pine Technical & Community College             | 1                 | 100%       | 0%        | 0%                        | 0%        | 0%                 | 100%       | 0%                |
| 9 | St Cloud Technical and Community College       | 1                 | 100%       | 0%        | 0%                        | 0%        | 0%                 | 100%       | 0%                |
|   | <b>Total</b>                                   | <b>97</b>         | <b>94%</b> | <b>6%</b> | <b>6%</b>                 | <b>4%</b> | <b>13%</b>         | <b>75%</b> | <b>1%</b>         |

# Careers in Energy



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## Conservation and Land Management



### Top Five Counties

By number of employees

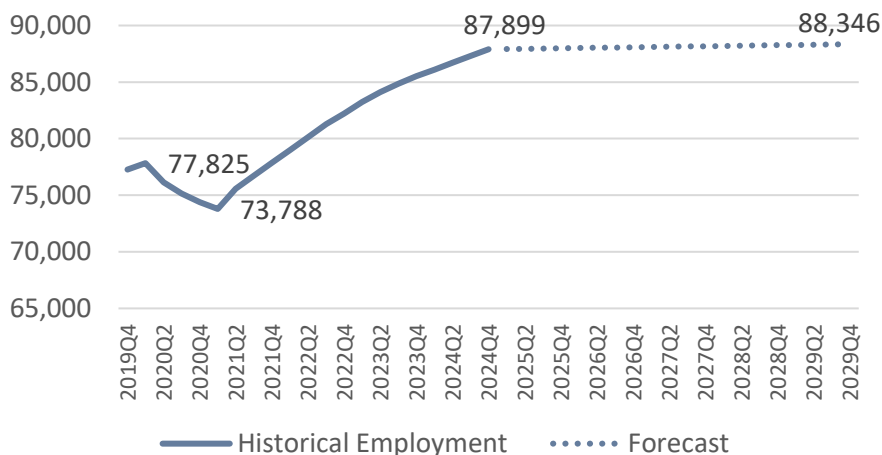
|            |        |
|------------|--------|
| Hennepin   | 30,167 |
| Ramsey     | 10,278 |
| Dakota     | 5,763  |
| Anoka      | 3,856  |
| Washington | 2,640  |

## Sub-Cluster Demand

### Summary

With knowledge rooted in environmental and natural sciences, focus on protecting and managing natural resources and landscapes. Operate local, state, and national parks; safeguard forests and waterways; maintain national lands and rangelands; and manage wildlife and marine life. Merge ecological conservation with recreational spaces, preserving nature while enhancing community well-being and environmental stewardship by public accessibility.

### Core Sub-Cluster Employment Forecast



### Core Occupation Summary Statistics (Across all industries statewide)

**1.3%**  
Unemployment  
rate

**1.10**  
Location  
Quotient

**0.2%**  
Forecast Annual  
Growth

**1,085**  
Online job ads  
(March 2025)

# Careers in Energy



**MINNESOTA STATE**  
Energy Center of Excellence

## Conservation and Land Management Sub-Cluster Demand – Core Occupations

| #  | Occupation (SOC)                                                     | Empl             | Mean Annual Wages | LQ          | Unempl        | Unempl Rate | 5-Year Hist Avg Ann Empl Change | 5-Year Avg Ann Forecast Empl Change | 5-Year Total Demand Estimate | % of Total Empl in Ind 21, 22 |
|----|----------------------------------------------------------------------|------------------|-------------------|-------------|---------------|-------------|---------------------------------|-------------------------------------|------------------------------|-------------------------------|
| 1  | General and Operations Managers (11-1021)                            | 75,479           | \$122,500         | 1.12        | 854           | 1.1%        | 3.1%                            | 0.2%                                | 31,194                       | <1%                           |
| 2  | Facilities Managers (11-3013)                                        | 2,796            | \$111,300         | 1.07        | 19            | 0.7%        | -4.0%                           | 0.2%                                | 1,167                        | 2%                            |
| 3  | Environmental Scientists and Specialists, Including Health (19-2041) | 1,590            | \$86,500          | 1.04        | 22            | 1.4%        | -0.2%                           | 0.2%                                | 733                          | 3%                            |
| 4  | Natural Sciences Managers (11-9121)                                  | 1,394            | \$153,700         | 0.76        | 36            | 2.5%        | 4.6%                            | 0.4%                                | 537                          | 1%                            |
| 5  | Surveying and Mapping Technicians (17-3031)                          | 940              | \$66,200          | 0.88        | 9             | 1.0%        | -1.2%                           | 0.3%                                | 599                          | 8%                            |
| 6  | Surveyors (17-1022)                                                  | 904              | \$89,200          | 0.90        | 7             | 0.8%        | 0.6%                            | 0.1%                                | 314                          | 4%                            |
| 7  | Biological Scientists, All Other (19-1029)                           | 782              | \$97,300          | 0.65        | 13            | 1.6%        | 4.9%                            | 0.3%                                | 303                          | <1%                           |
| 8  | Conservation Scientists (19-1031)                                    | 673              | \$85,800          | 1.48        | 20            | 3.0%        | 3.1%                            | 0.3%                                | 309                          | <1%                           |
| 9  | Physical Scientists, All Other (19-2099)                             | 650              | \$167,400         | 1.13        | 14            | 2.1%        | -1.0%                           | -0.1%                               | 205                          | 2%                            |
| 10 | Forest and Conservation Technicians (19-4071)                        | 561              | \$60,700          | 0.93        | 12            | 2.2%        | 2.4%                            | -0.1%                               | 342                          | 1%                            |
| 11 | Zoologists and Wildlife Biologists (19-1023)                         | 533              | \$79,200          | 1.59        | 9             | 1.7%        | -0.1%                           | 0.0%                                | 196                          | 0%                            |
| 12 | Social Scientists and Related Workers, All Other (19-3099)           | 517              | \$91,500          | 0.75        | 19            | 3.6%        | 1.4%                            | 0.1%                                | 219                          | 0%                            |
|    | <b>Conservation &amp; Land Management – Core</b>                     | <b>87,899</b>    | <b>\$119,600</b>  | <b>1.10</b> | <b>1,110</b>  | <b>1.3%</b> | <b>2.6%</b>                     | <b>0.2%</b>                         | <b>36,512</b>                | <b>1%</b>                     |
|    | <b>Total – All Occupations</b>                                       | <b>3,124,097</b> | <b>\$70,600</b>   | <b>1.00</b> | <b>96,601</b> | <b>3.0%</b> | <b>0.2%</b>                     | <b>0.1%</b>                         | <b>1,691,667</b>             |                               |

# Careers in Energy



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## Conservation and Land Management

Physical Scientists have the highest median and average wage rates overall, but Natural Sciences Managers have the highest average entry-level wages in Minnesota. There are only four occupations in the sub-cluster that typically do not require a Bachelor's or Master's Degree.

### Sub-Cluster Wages

#### Core Sub-Cluster Wage Distribution

Mean

\$119,600

Entry Level

\$56,200

Experienced

\$151,400

|   |                                                                                | Wages     |             |             |            |                               |           |                |
|---|--------------------------------------------------------------------------------|-----------|-------------|-------------|------------|-------------------------------|-----------|----------------|
| # | Sub-Cluster Occupation (SOC) with Requirements for an Associate Degree or Less | Mean      | Entry Level | Experienced | 50% Median | Typical Entry-Level Education | Empl      | Under employed |
| 1 | Surveying and Mapping Technicians (17-3031)                                    | \$66,200  | \$49,900    | \$74,300    | \$63,800   | HS or equivalent              | 940       | 132            |
| 2 | Hydrologic Technicians (19-4044)                                               | \$64,300  | \$42,200    | \$75,300    | \$60,000   | Associate degree              | 36        | 16             |
| 3 | Forest and Conservation Technicians (19-4071)                                  | \$60,700  | \$44,400    | \$68,800    | \$57,000   | Associate degree              | 561       | -              |
| 4 | Forest Fire Inspectors and Prevention Specialists (33-2022)                    | \$68,200  | \$40,500    | \$82,100    | \$62,000   | HS or equivalent              | 39        | 11             |
|   | Conservation and Land Management – Core                                        | \$119,600 | \$56,200    | \$151,400   | \$102,000  | -                             | 87,899    | 39,683         |
|   | Total - All Occupations                                                        | \$70,600  | \$35,100    | \$88,300    | \$55,300   | -                             | 3,124,097 | 518,636        |

# Careers in Energy



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## Conservation and Land Management Sub-Cluster Demand – Related Industry Occupations

With less than 1% of employment of sub-cluster talent within the two industries aligned to Energy and Natural Resources, most talent works in industries associated with interdisciplinary clusters.

| #  | NAICS Code* | Industry Title                                            | % of Occ Empl | Empl          | Mean Ann Wages | 5-Year Exits | 5-Year Job Transfers | 5-Year Forecast Avg Ann Empl Change | 5-Year Total Demand Estimate |
|----|-------------|-----------------------------------------------------------|---------------|---------------|----------------|--------------|----------------------|-------------------------------------|------------------------------|
| 1  | 5511        | Management of Companies and Enterprises                   | 5.2%          | 4,596         | \$183,300      | 518          | 1,326                | 33                                  | 1,877                        |
| 2  | 5416        | Management, Scientific, and Technical Consulting Services | 3.4%          | 2,977         | \$144,200      | 320          | 938                  | 133                                 | 1,391                        |
| 3  | 7225        | Restaurants and Other Eating Places                       | 3.0%          | 2,636         | \$81,000       | 295          | 777                  | 53                                  | 1,125                        |
| 4  | 5413        | Architectural, Engineering, and Related Services          | 3.0%          | 2,625         | \$111,900      | 354          | 777                  | 7                                   | 1,138                        |
| 5  | 9211        | Executive, Legislative, and General Government Support    | 2.5%          | 2,222         | \$104,700      | 240          | 693                  | -5                                  | 929                          |
| 6  | 5415        | Computer Systems Design and Related Services              | 1.8%          | 1,546         | \$165,500      | 182          | 478                  | 115                                 | 775                          |
| 7  | 2382        | Building Equipment Contractors                            | 1.7%          | 1,481         | \$122,400      | 165          | 429                  | 6                                   | 600                          |
| 8  | 5221        | Depository Credit Intermediation                          | 1.6%          | 1,449         | \$122,200      | 163          | 421                  | 12                                  | 595                          |
| 9  | 7139        | Other Amusement and Recreation Industries                 | 1.4%          | 1,244         | \$76,300       | 148          | 365                  | 40                                  | 553                          |
| 10 | 8111        | Automotive Repair and Maintenance                         | 1.4%          | 1,215         | \$86,900       | 134          | 352                  | 3                                   | 488                          |
|    |             | <b>All Other</b>                                          | <b>73.6%</b>  | <b>65,908</b> |                |              |                      |                                     |                              |

### Inter-disciplinary Clusters\*

Digital Technology  
 Marketing & Sales  
 Management & Entrepreneurship  
 Agriculture  
 Advanced Manufacturing  
 Construction  
 Supply Chain & Transportation  
 Public Service & Safety

**87,899**  
Core Occupation Employment

**50**  
Institutions with aligned programs

**36,512**  
New Talent by 2029Q4

**High**  
Talent Shortage Severity

# Careers in Energy



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## Conservation and Land Management

**Job Posting Analysis**  
Advertised May 2024 – April 2025

### Top Job Titles

- 1) General Manager
- 2) Director of Operations
- 3) Environmental Specialist
- 4) Operations Manager
- 5) Environmental Scientist
- 6) Hydrologist
- 7) Naturalist
- 8) Forester
- 9) Survey Technician
- 10) Wildlife Biologist

### Top Employers Hiring

- 1) University of Minnesota
- 2) State of Minnesota
- 3) Minnesota DNR
- 4) Minnesota DHS
- 5) Bolton & Menk, Inc.
- 6) Westwood Professional Services
- 7) Natural Resources Conservation Services
- 8) HERC
- 9) The Nature Conservancy
- 10) Minnesota Pollution Control Agency

**4,610 Posts**

-24% from prior year

**\$75-\$120K**

Posted Salary Range

Hiring Difficulty: **Difficult**  
Share Remote Postings: 5%  
Share Hybrid Postings: 20%

### Top Essential Skills

- 1) Communication
- 2) Leadership
- 3) Collaboration
- 4) Analysis
- 5) Relationships

### Top Knowledge Areas and Technical Skills

- 1) Operations / Operations Management
- 2) Research
- 3) Marketing
- 4) Continuous Improvement
- 5) Forecasting

### Top Credentials

- 1) American Council on Exercise
- 2) FINRA Series 7
- 3) Professional Wetland Scientist
- 4) Certified Facility Manager
- 5) Accreditation Board for Engineering and Technology



### Conservation and Land Management

### Job Posting and Profile Gap Analysis Advertised May 2024 – April 2025

#### Top 10 Skill Gaps in Minnesota

| Name                                  | Candidates | Openings | Gap  |
|---------------------------------------|------------|----------|------|
| Operations Management                 | 442        | 628      | -186 |
| Manufacturing                         | 398        | 502      | -104 |
| Personal Computers (PC)               | 117        | 214      | -97  |
| Microsoft Office                      | 109        | 183      | -74  |
| Performance Management                | 263        | 331      | -67  |
| Cash Handling (Cashier)               | 126        | 183      | -56  |
| Finance                               | 314        | 365      | -52  |
| Manufacturing Resource Planning (MRP) | 7          | 49       | -43  |
| Calculators                           | 1          | 36       | -35  |
| Asset Management                      | 60         | 95       | -35  |

#### Top 10 Certification Gaps in Minnesota

| Name                                                 | Candidates | Openings | Gap |
|------------------------------------------------------|------------|----------|-----|
| Commercial Driver's License (CDL)                    | 17         | 36       | -19 |
| AED Essentials                                       | 1          | 17       | -16 |
| Class A Commercial Driver's License (CDL-A)          | 2          | 12       | -10 |
| Class B Commercial Driver's License (CDL-B)          | 1          | 5        | -5  |
| Certified Arborist                                   | 7          | 11       | -4  |
| Certified Revenue Management Executive (CRME)        | 0          | 4        | -4  |
| Certification in Cardiopulmonary Resuscitation (CPR) | 66         | 70       | -4  |
| HAZMAT                                               | 3          | 7        | -4  |
| OSHA 10                                              | 3          | 6        | -3  |
| Chartered Property Casualty Underwriter (CPCU)       | 0          | 3        | -3  |

# Careers in Energy



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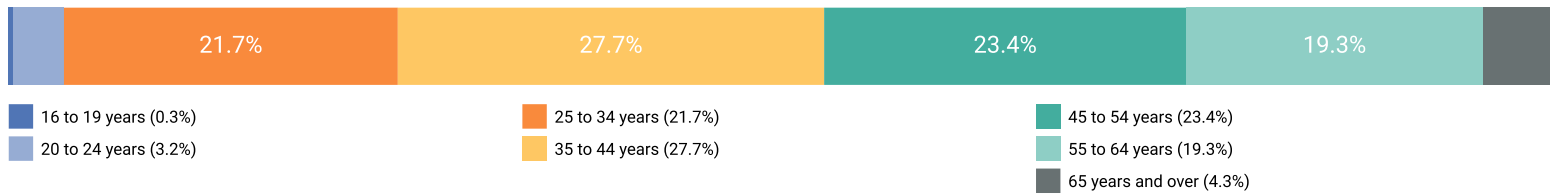
## Conservation and Land Management

### Estimated Talent Pool Diversity (Across all industries statewide)

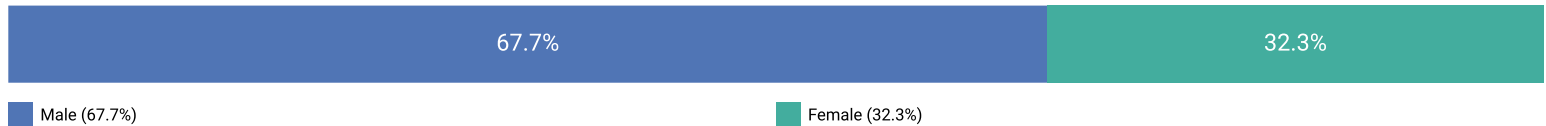
Underrepresentation of talent who are:

- Female
- American Indian
- Asian
- Hispanic or Latine
- Under 25 years old

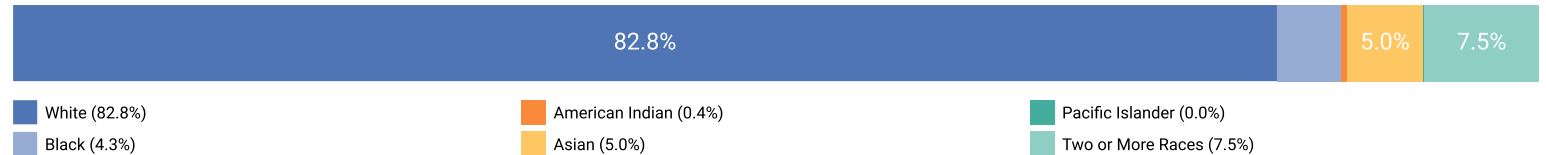
#### Age



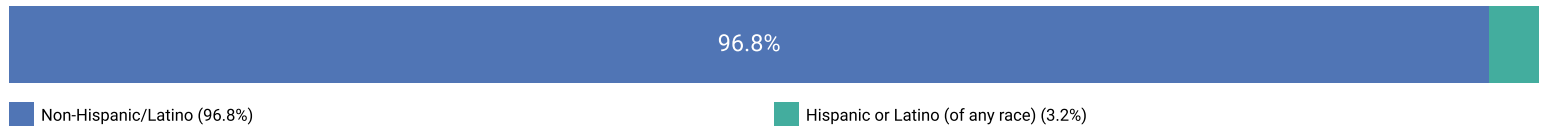
#### Gender



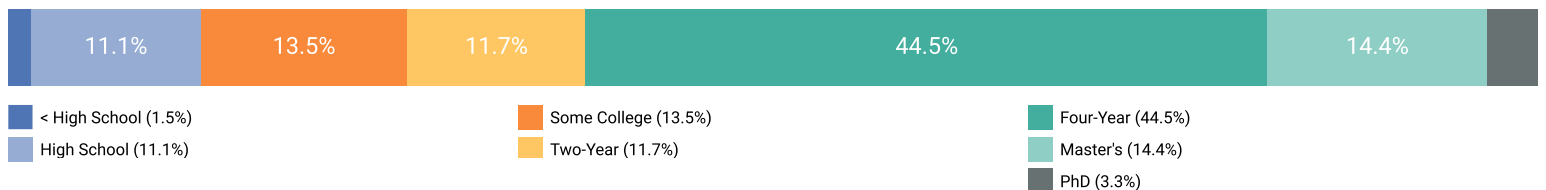
#### Race



#### Ethnicity



#### Educational Attainment



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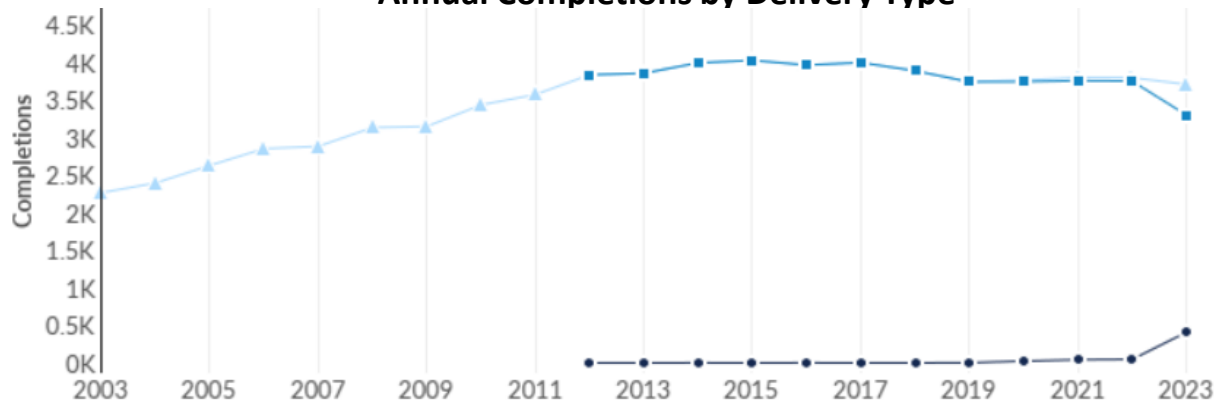
## Conservation and Land Management

### Aligned Postsecondary Programs With Awards Conferred, SY2023



| Institution Type                        | Completions (2023) | Market Share |
|-----------------------------------------|--------------------|--------------|
| Public, 4-year or above                 | 2,184              | 59.0%        |
| Private not-for-profit, 4-year or above | 1,288              | 34.8%        |
| Public, 2-year                          | 231                | 6.2%         |

### Annual Completions by Delivery Type

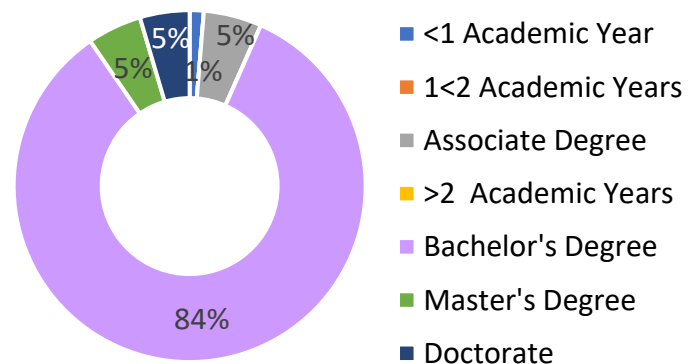


|                               |        |
|-------------------------------|--------|
| Distance Offered Programs     | N/A    |
| Non-Distance Offered Programs | -13.9% |
| All Programs                  | -3.3%  |

**50**

Institutions with aligned programs

### Completions SY2023



# Careers in Energy

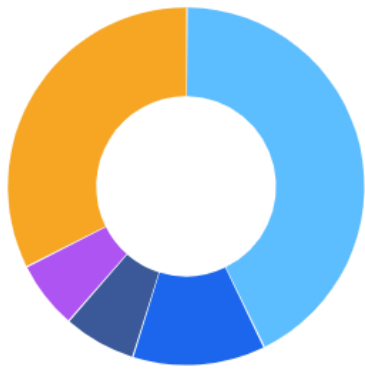


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## Conservation and Land Management

### Aligned Postsecondary Programs With Awards Conferred, SY2023

#### Market Share by Program



| Program                                        | Completions (2023) | Market Share |
|------------------------------------------------|--------------------|--------------|
| Biology/Biological Sciences, General (26.0101) | 1,582              | 42.7%        |
| Chemistry, General (40.0501)                   | 446                | 12.0%        |
| Biochemistry (26.0202)                         | 244                | 6.6%         |
| Physics, General (40.0801)                     | 228                | 6.2%         |
| Other                                          | 1,203              | 32.5%        |

| Institution                         | Completions (2023) | Growth % YOY (2023) | Market Share (2023) | IPEDS Tuition & Fees (2023) | Completions Trend (2019-2023) |
|-------------------------------------|--------------------|---------------------|---------------------|-----------------------------|-------------------------------|
| University of Minnesota-Twin Cities | 1,181              | -1.2%               | 31.9%               | \$16,488                    |                               |
| University of Minnesota-Duluth      | 342                | 7.9%                | 9.2%                | \$14,318                    |                               |
| St Olaf College                     | 164                | 3.8%                | 4.4%                | \$56,970                    |                               |
| Minnesota State University-Mankato  | 161                | -6.9%               | 4.3%                | \$9,490                     |                               |
| University of St Thomas             | 132                | -16.5%              | 3.6%                | \$52,284                    |                               |
| Carleton College                    | 126                | -8.7%               | 3.4%                | \$65,457                    |                               |
| Macalester College                  | 116                | -10.1%              | 3.1%                | \$64,908                    |                               |
| Winona State University             | 105                | -9.5%               | 2.8%                | \$10,498                    |                               |
| Minnesota North College             | 104                | -9.6%               | 2.8%                | \$6,004                     |                               |
| Gustavus Adolphus College           | 100                | -5.7%               | 2.7%                | \$54,310                    |                               |

# Careers in Energy



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## Conservation and Land Management

### Aligned Postsecondary Programs With Awards Conferred, SY2023

#### Graduate Demographics, All Programs



- White
- Black or African American
- American Indian
- Asian
- Pacific Islander
- Two or More Races
- Hispanic or Latine
- International Students
- Unknown Race/Ethnicity

| # | Description                         | Total Completions | Male       | Female     | Black or African American | American Indian | Asian     | Hispanic or Latine | White      | Two or More Races | Unknown Race/Ethnicity | International Students |
|---|-------------------------------------|-------------------|------------|------------|---------------------------|-----------------|-----------|--------------------|------------|-------------------|------------------------|------------------------|
| 1 | University of Minnesota-Twin Cities | 1,181             | 42%        | 58%        | 5%                        | 0%              | 10%       | 5%                 | 65%        | 5%                | 1%                     | 10%                    |
| 2 | University of Minnesota-Duluth      | 342               | 43%        | 57%        | 2%                        | 0%              | 6%        | 2%                 | 83%        | 4%                | 1%                     | 2%                     |
| 3 | St Olaf College                     | 164               | 42%        | 58%        | 2%                        | 0%              | 9%        | 5%                 | 74%        | 4%                | 0%                     | 5%                     |
| 4 | Minnesota State University-Mankato  | 161               | 44%        | 56%        | 9%                        | 1%              | 4%        | 3%                 | 74%        | 2%                | 0%                     | 8%                     |
| 5 | University of St Thomas             | 132               | 43%        | 57%        | 3%                        | 0%              | 5%        | 8%                 | 74%        | 5%                | 3%                     | 2%                     |
| 6 | Carleton College                    | 126               | 47%        | 53%        | 2%                        | 0%              | 15%       | 6%                 | 55%        | 7%                | 4%                     | 11%                    |
| 7 | Macalester College                  | 116               | 36%        | 64%        | 6%                        | 0%              | 1%        | 7%                 | 62%        | 12%               | 0%                     | 12%                    |
| 8 | Winona State University             | 105               | 33%        | 67%        | 2%                        | 0%              | 3%        | 4%                 | 83%        | 7%                | 0%                     | 2%                     |
| 9 | Minnesota North College             | 104               | 82%        | 18%        | 0%                        | 0%              | 2%        | 2%                 | 94%        | 1%                | 1%                     | 0%                     |
|   | Others                              | 1,272             | 40%        | 60%        | 6%                        | 1%              | 7%        | 5%                 | 71%        | 4%                | 2%                     | 3%                     |
|   | <b>Total</b>                        | <b>3,703</b>      | <b>42%</b> | <b>58%</b> | <b>5%</b>                 | <b>1%</b>       | <b>8%</b> | <b>5%</b>          | <b>71%</b> | <b>4%</b>         | <b>1%</b>              | <b>6%</b>              |

# Careers in Energy



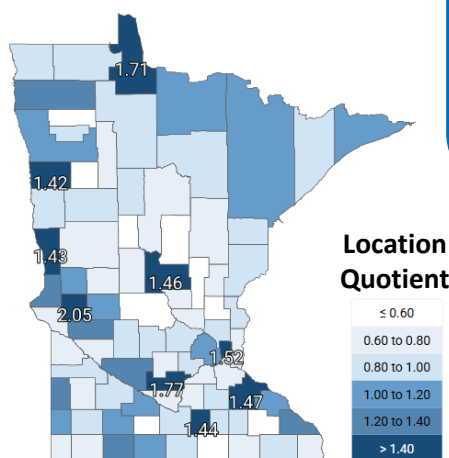
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## Ecological Research and Development

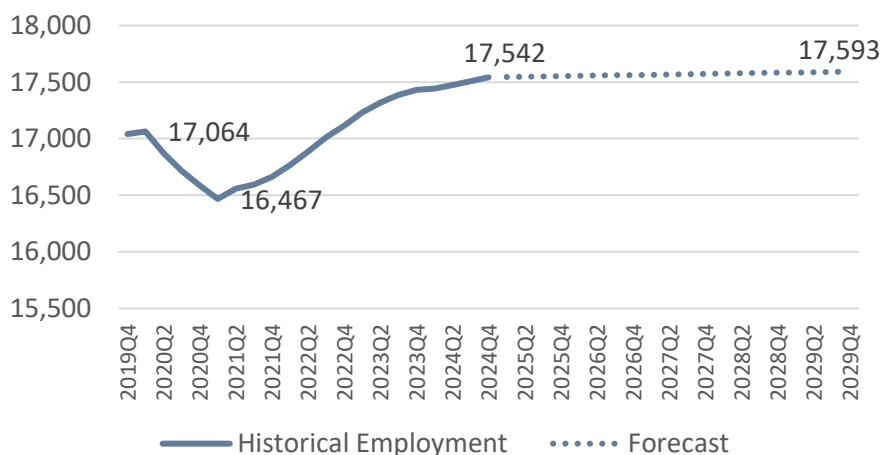
### Sub-Cluster Demand

#### Summary

Careers emphasizing the scientific study of and research in ecological, geological, electrical, chemical, nuclear, biological, environmental engineering, and other sciences as they relate to energy production, sustainability, and the management of natural resources; Employ scientific methods to understand ecosystems, biodiversity, and the impacts of energy systems on the environment.



#### Core Sub-Cluster Employment Forecast



### Core Occupation Summary Statistics (Across all industries statewide)

3.0%  
Unemployment  
rate

1.04  
Location  
Quotient

0.1%  
Forecast Annual  
Growth

2,165  
Online job ads  
(March 2025)

# Careers in Energy



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## Ecological Research and Development Sub-Cluster Demand – Core Occupations

| #  | Occupation (SOC)                                                           | Empl             | Mean Annual Wages | LQ          | Unempl        | Unempl Rate | 5-Year Hist Avg Ann Empl Change | 5-Year Avg Ann Forecast Empl Change | 5-Year Total Demand Estimate | % of Total Empl in Ind 21, 22 |
|----|----------------------------------------------------------------------------|------------------|-------------------|-------------|---------------|-------------|---------------------------------|-------------------------------------|------------------------------|-------------------------------|
| 1  | Architectural and Engineering Managers (11-9041)                           | 4,147            | \$178,800         | 1.05        | 92            | 2.2%        | 1.0%                            | 0.1%                                | 1,341                        | 3%                            |
| 2  | Environmental Scientists and Specialists (19-2041)                         | 1,590            | \$86,500          | 1.04        | 22            | 1.4%        | -0.2%                           | 0.2%                                | 733                          | 3%                            |
| 3  | Natural Sciences Managers (11-9121)                                        | 1,394            | \$153,700         | 0.76        | 36            | 2.5%        | 4.6%                            | 0.4%                                | 537                          | 1%                            |
| 4  | Environmental Engineers (17-2081)                                          | 1,327            | \$106,300         | 1.77        | 12            | 0.9%        | -2.0%                           | 0.3%                                | 446                          | 4%                            |
| 5  | First-Line Supervisors of Farming, Fishing, and Forestry Workers (45-1011) | 1,246            | \$68,200          | 1.07        | 45            | 3.5%        | 0.9%                            | -0.2%                               | 834                          | <1%                           |
| 6  | Technical Writers (27-3042)                                                | 977              | \$83,800          | 1.07        | 81            | 7.7%        | -1.9%                           | 0.0%                                | 377                          | 1%                            |
| 7  | Biological Scientists, All Other (19-1029)                                 | 782              | \$97,300          | 0.65        | 13            | 1.6%        | 4.9%                            | 0.3%                                | 303                          | <1%                           |
| 8  | Conservation Scientists (19-1031)                                          | 673              | \$85,800          | 1.48        | 20            | 3.0%        | 3.1%                            | 0.3%                                | 309                          | <1%                           |
| 9  | Physical Scientists, All Other (19-2099)                                   | 650              | \$167,400         | 1.13        | 14            | 2.1%        | -1.0%                           | -0.1%                               | 205                          | 2%                            |
| 10 | Environmental Science & Protection Technicians (19-4042)                   | 569              | \$61,200          | 0.93        | 24            | 4.1%        | -0.3%                           | 0.3%                                | 321                          | 4%                            |
| 11 | Forest and Conservation Technicians (19-4071)                              | 561              | \$60,700          | 0.93        | 12            | 2.2%        | 2.4%                            | -0.1%                               | 342                          | 1%                            |
| 12 | Zoologists and Wildlife Biologists (19-1023)                               | 533              | \$79,200          | 1.59        | 9             | 1.7%        | -0.1%                           | 0.0%                                | 196                          | 0%                            |
|    | <b>Ecological Research &amp; Development – Core</b>                        | <b>17,542</b>    | <b>\$116,000</b>  | <b>1.04</b> | <b>538</b>    | <b>3.0%</b> | <b>0.6%</b>                     | <b>0.1%</b>                         | <b>7,129</b>                 | <b>3%</b>                     |
|    | <b>Total – All Occupations</b>                                             | <b>3,124,097</b> | <b>\$70,600</b>   | <b>1.00</b> | <b>96,601</b> | <b>3.0%</b> | <b>0.2%</b>                     | <b>0.1%</b>                         | <b>1,691,667</b>             |                               |

# Careers in Energy



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## Ecological Research and Development

Of the 25 occupations found in the sub-cluster, six typically require an Associate degree, certificate, or high school diploma as the highest level of education. All of these careers have average annual wages over \$61,000, with Supervisors of Farming, Fishing, and Forestry Workers offering the highest average annual wages.

### Sub-Cluster Wages

#### Core Sub-Cluster Wage Distribution

Mean

\$116,000

Entry Level

\$79,600

Experienced

\$134,200

|   |                                                                                | Wages            |                 |                  |                  |                               |                  |                |
|---|--------------------------------------------------------------------------------|------------------|-----------------|------------------|------------------|-------------------------------|------------------|----------------|
| # | Sub-Cluster Occupation (SOC) with Requirements for an Associate Degree or Less | Mean             | Entry Level     | Experienced      | 50% Median       | Typical Entry-Level Education | Empl             | Under employed |
| 1 | First-Line Supervisors of Farming, Fishing, and Forestry Workers (45-1011)     | \$68,200         | \$45,500        | \$79,600         | \$62,100         | HS or equivalent              | 1,246            | 196            |
| 2 | Environmental Engineering Technologists and Technicians (17-3025)              | \$68,000         | \$51,400        | \$76,300         | \$67,200         | Associate degree              | 234              | 71             |
| 3 | Environmental Science and Protection Technicians, Including Health (19-4042)   | \$61,200         | \$37,900        | \$72,800         | \$57,800         | Associate degree              | 569              | -              |
| 4 | Geological Technicians, Except Hydrologic Technicians (19-4043)                | \$61,900         | \$51,100        | \$67,300         | \$57,400         | Associate degree              | 140              | 67             |
| 5 | Hydrologic Technicians (19-4044)                                               | \$64,300         | \$42,200        | \$75,300         | \$60,000         | Associate degree              | 36               | 16             |
| 6 | Forest and Conservation Technicians (19-4071)                                  | \$60,700         | \$44,400        | \$68,800         | \$57,000         | Associate degree              | 561              | -              |
|   | <b>Ecological Research &amp; Development – Core</b>                            | <b>\$116,000</b> | <b>\$79,600</b> | <b>\$134,200</b> | <b>\$110,500</b> | <b>-</b>                      | <b>87,899</b>    | <b>1,052</b>   |
|   | <b>Total - All Occupations</b>                                                 | <b>\$70,600</b>  | <b>\$35,100</b> | <b>\$88,300</b>  | <b>\$55,300</b>  | <b>-</b>                      | <b>3,124,097</b> | <b>518,636</b> |

# Careers in Energy



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## Ecological Research and Development Sub-Cluster Demand – Related Industry Occupations

With about 3% of employment of sub-cluster talent within the two industries aligned to Energy and Natural Resources, most talent works in industries associated with interdisciplinary clusters.

| #  | NAICS Code* | Industry Title                                            | % of Occ Empl | Empl         | Mean Ann Wages | 5-Year Exits | 5-Year Job Transfers | 5-Year Forecast Avg Ann Empl Change | 5-Year Total Demand Estimate |
|----|-------------|-----------------------------------------------------------|---------------|--------------|----------------|--------------|----------------------|-------------------------------------|------------------------------|
| 1  | 5413        | Architectural, Engineering, and Related Services          | 12.0%         | 2,112        | \$120,800      | 206          | 569                  | 1                                   | 777                          |
| 2  | 5416        | Management, Scientific, and Technical Consulting Services | 7.3%          | 1,280        | \$91,200       | 123          | 414                  | 55                                  | 592                          |
| 3  | 9211        | Executive, Legislative, and Other Government Support      | 6.7%          | 1,179        | \$92,800       | 103          | 400                  | -11                                 | 492                          |
| 4  | 5517        | Scientific Research and Development Services              | 6.3%          | 1,100        | \$141,700      | 100          | 310                  | 45                                  | 455                          |
| 5  | 5511        | Management of Companies and Enterprises                   | 5.2%          | 905          | \$154,300      | 86           | 241                  | 6                                   | 333                          |
| 6  | 3345        | Navigational, Measuring, and Electromedical Manufacturing | 4.6%          | 803          | \$164,500      | 74           | 194                  | -3                                  | 265                          |
| 7  | 9231        | Administration of Human Resource Programs                 | 4.4%          | 774          | \$95,100       | 66           | 257                  | -10                                 | 313                          |
| 8  | 9221        | Justice, Public Order, and Safety Activities              | 4.1%          | 719          | \$94,300       | 62           | 239                  | -6                                  | 295                          |
| 9  | 6113        | Colleges, Universities, and Professional Schools          | 4.0%          | 701          | \$107,400      | 52           | 212                  | -7                                  | 256                          |
| 10 | 2211        | Electric Power Generation, Transmission and Distribution  | 2.8%          | 493          | \$131,800      | 46           | 112                  | -30                                 | 128                          |
|    |             | <b>All Other</b>                                          | <b>42.6%</b>  | <b>7,478</b> |                |              |                      |                                     |                              |

### Inter-disciplinary Clusters\*

Digital Technology  
 Marketing & Sales  
 Management & Entrepreneurship  
 Agriculture  
 Advanced Manufacturing  
 Construction  
 Supply Chain & Transportation  
 Public Service & Safety

**17,542**  
Core Occupation Employment

**50**  
Institutions with aligned programs

**7,129**  
New Talent by 2029Q4

**Moderate**  
Talent Shortage Severity

# Careers in Energy



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## Ecological Research and Development

**Job Posting Analysis**  
Advertised May 2024 – April 2025

### Top Job Titles

- 1) Engineering Manager
- 2) Engineering Project Manager
- 3) Management Analyst Specialist
- 4) Environmental Health Manager
- 5) Program Manager
- 6) Technical Writer
- 7) Laboratory Technician
- 8) Fire Protection Engineering PM
- 9) Environmental Specialist
- 10) Water Systems Engineering Specialist

### Top Employers Hiring

- 1) University of Minnesota
- 2) State of Minnesota
- 3) M. A. Mortenson Company
- 4) Boston Scientific Corporation
- 5) Medtronic
- 6) MN Pollution Control Agency
- 7) MN Department of Human Services
- 8) Clean Harbors, Inc.
- 9) Baxter
- 10) Burns & McDonnell

**5,397 Posts**

+23% from prior year

**\$93-\$151K**

Posted Salary Range

Hiring Difficulty: **Difficult**  
Share Remote Postings: 5%  
Share Hybrid Postings: 32%

### Top Essential Skills

- 1) Communication
- 2) Leadership
- 3) Analysis
- 4) Planning
- 5) Relationships

### Top Knowledge Areas and Technical Skills

- 1) Project Management
- 2) Scheduling
- 3) Monitoring
- 4) Environmental Science
- 5) Federal Law

### Top Credentials

- 1) Driver's License (D)
- 2) OSHA
- 3) Professional Engineer License
- 4) Project Management Professional (PMP)
- 5) Hazardous Waste Operations and Emergency Response



### Ecological Research and Development

### Job Posting and Profile Gap Analysis Advertised May 2024 – April 2025

#### Top 10 Skill Gaps in Minnesota

| Name                                                  | Candidates | Openings | Gap |
|-------------------------------------------------------|------------|----------|-----|
| Animal Care/Animal Handling                           | 54         | 81       | -26 |
| Microsoft Office                                      | 136        | 162      | -26 |
| English                                               | 16         | 33       | -17 |
| Presentation                                          | 29         | 45       | -16 |
| Microsoft Outlook                                     | 24         | 39       | -15 |
| Geographic Information System Software (GIS Software) | 2          | 13       | -10 |
| Autodesk AutoCAD                                      | 46         | 56       | -10 |
| Microsoft Project                                     | 16         | 25       | -9  |
| Machine Learning                                      | 13         | 20       | -8  |
| Sterilization                                         | 3          | 10       | -7  |

#### Top 10 Certification Gaps in Minnesota

| Name                                                 | Candidates | Openings | Gap |
|------------------------------------------------------|------------|----------|-----|
| Registered Environmental Manager (REM)               | 0          | 10       | -10 |
| Engineer in Training (EIT)                           | 11         | 14       | -3  |
| Certified Hazardous Materials Manager (CHMM)         | 1          | 4        | -3  |
| Project Management Professional (PMP)                | 11         | 14       | -3  |
| Certified Arborist                                   | 7          | 9        | -3  |
| Licensed Practical Nurse (LPN)                       | 0          | 2        | -2  |
| Certification in Cardiopulmonary Resuscitation (CPR) | 9          | 10       | -1  |
| Certified Clinical Exercise Physiologist (CEP)       | 0          | 1        | -1  |
| Certified in Clinical Genetics                       | 1          | 2        | -1  |
| Regulatory Affairs Certification - US (RAC)          | 0          | 1        | -1  |

# Careers in Energy



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## Ecological Research and Development

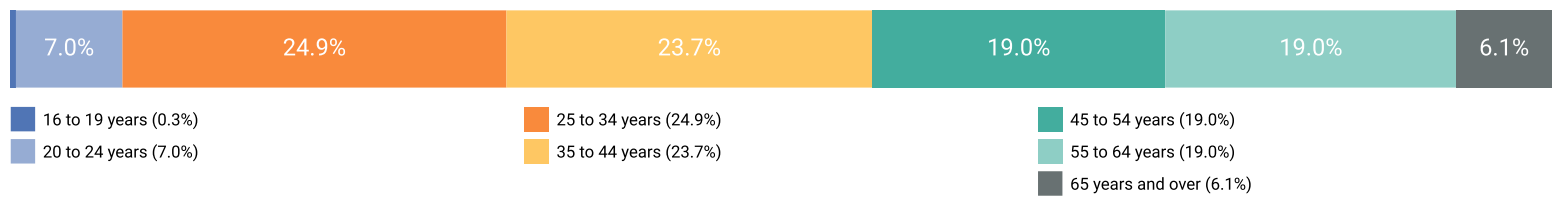
### Estimated Talent Pool Diversity (Across all industries statewide)

Underrepresentation of talent who are:

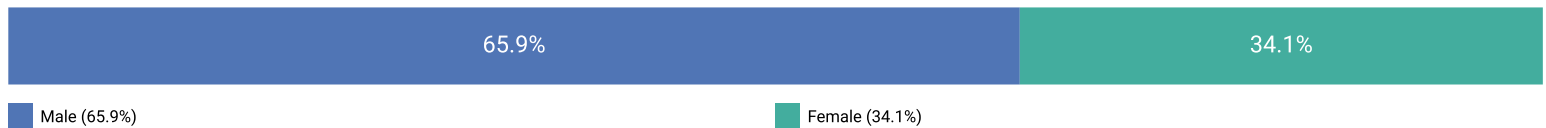
- Female
- Black

- American Indian
- Hispanic or Latine
- Under 25 years old

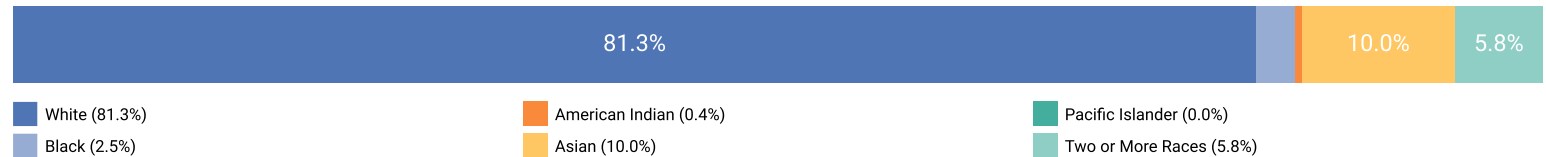
#### Age



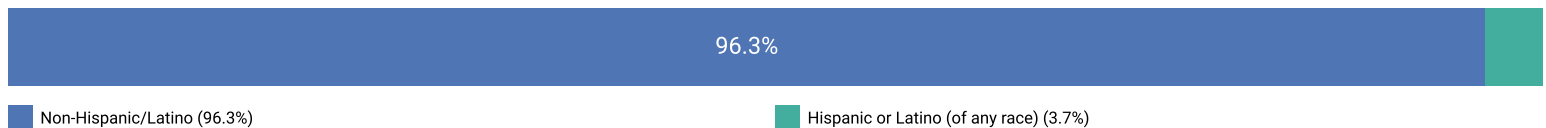
#### Gender



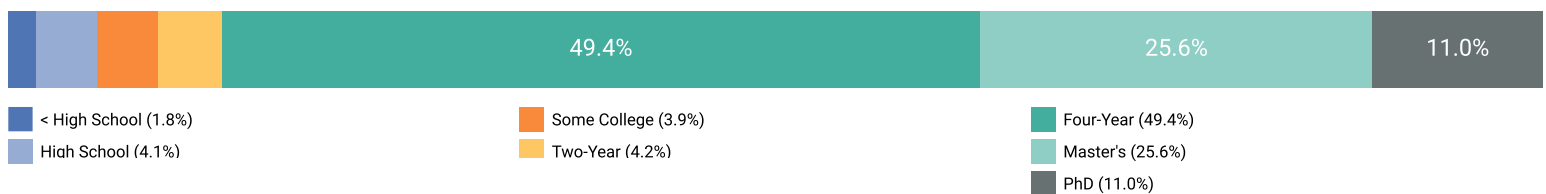
#### Race



#### Ethnicity



#### Educational Attainment



# Careers in Energy



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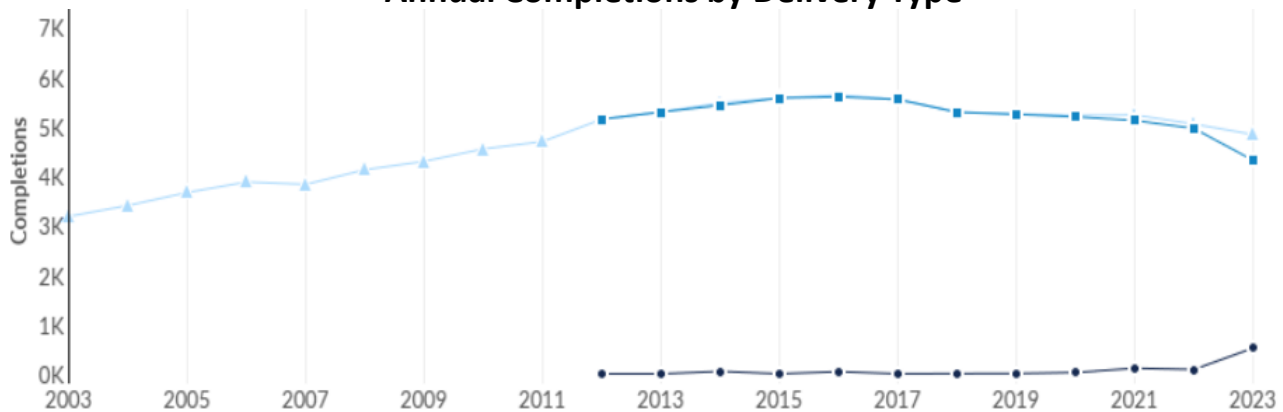
## Ecological Research and Development

### Aligned Postsecondary Programs With Awards Conferred, SY2023



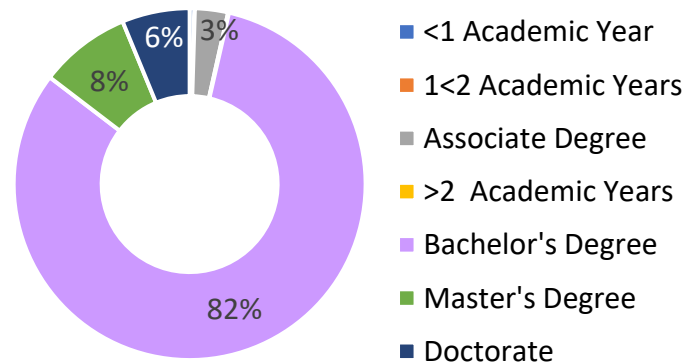
| Institution Type                        | Completions (2023) | Market Share |
|-----------------------------------------|--------------------|--------------|
| Public, 4-year or above                 | 2,863              | 59.2%        |
| Private not-for-profit, 4-year or above | 1,820              | 37.6%        |
| Public, 2-year                          | 153                | 3.2%         |

### Annual Completions by Delivery Type



|                               |        |
|-------------------------------|--------|
| Distance Offered Programs     | N/A    |
| Non-Distance Offered Programs | -16.2% |
| All Programs                  | -6.0%  |

### Completions SY2023



**50**

Institutions with aligned programs

# Careers in Energy



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## Ecological Research and Development

### Aligned Postsecondary Programs With Awards Conferred, SY2023



#### Market Share by Program

| Program                                        | Completions (2023) | Market Share |
|------------------------------------------------|--------------------|--------------|
| Biology/Biological Sciences, General (26.0101) | 1,582              | 32.7%        |
| Chemistry, General (40.0501)                   | 446                | 9.2%         |
| Economics, General (45.0601)                   | 344                | 7.1%         |
| Biochemistry (26.0202)                         | 244                | 5.0%         |
| Other                                          | 2,220              | 45.9%        |

| Institution                         | Completions (2023) | Growth % YOY (2023) | Market Share (2023) | IPEDS Tuition & Fees (2023) | Completions Trend (2019-2023) |
|-------------------------------------|--------------------|---------------------|---------------------|-----------------------------|-------------------------------|
| University of Minnesota-Twin Cities | 1,712              | -3.0%               | 35.4%               | \$16,488                    |                               |
| University of Minnesota-Duluth      | 391                | -2.3%               | 8.1%                | \$14,318                    |                               |
| University of St Thomas             | 315                | -13.5%              | 6.5%                | \$52,284                    |                               |
| St Olaf College                     | 247                | 2.1%                | 5.1%                | \$56,970                    |                               |
| Macalester College                  | 182                | -2.2%               | 3.8%                | \$64,908                    |                               |
| Minnesota State University-Mankato  | 173                | -7.5%               | 3.6%                | \$9,490                     |                               |
| Carleton College                    | 163                | -5.2%               | 3.4%                | \$65,457                    |                               |
| Gustavus Adolphus College           | 160                | 9.6%                | 3.3%                | \$54,310                    |                               |
| Winona State University             | 115                | -8.0%               | 2.4%                | \$10,498                    |                               |
| Saint Cloud State University        | 105                | -17.3%              | 2.2%                | \$10,117                    |                               |

# Careers in Energy



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## Ecological Research and Development

### Aligned Postsecondary Programs With Awards Conferred, SY2023

#### Graduate Demographics, All Programs



■ White

■ Black or African American

■ American Indian

■ Asian

■ Pacific Islander

■ Two or More Races

■ Hispanic or Latine

■ International Students

■ Unknown Race/Ethnicity

| # | Description                         | Total Completions | Male       | Female     | Black or African American | American Indian | Asian     | Hispanic or Latine | White      | Two or More Races | Unknown Race/Ethnicity | International Students |
|---|-------------------------------------|-------------------|------------|------------|---------------------------|-----------------|-----------|--------------------|------------|-------------------|------------------------|------------------------|
| 1 | University of Minnesota-Twin Cities | 1,712             | 45%        | 55%        | 5%                        | 0%              | 10%       | 5%                 | 60%        | 4%                | 1%                     | 15%                    |
| 2 | University of Minnesota-Duluth      | 391               | 44%        | 56%        | 2%                        | 0%              | 5%        | 2%                 | 83%        | 3%                | 1%                     | 4%                     |
| 3 | University of St Thomas             | 315               | 47%        | 53%        | 3%                        | 0%              | 7%        | 4%                 | 69%        | 3%                | 5%                     | 7%                     |
| 4 | St Olaf College                     | 247               | 43%        | 57%        | 2%                        | 0%              | 7%        | 6%                 | 76%        | 3%                | 0%                     | 6%                     |
| 5 | Macalester College                  | 182               | 38%        | 62%        | 5%                        | 0%              | 5%        | 6%                 | 63%        | 9%                | 0%                     | 12%                    |
| 6 | Minnesota State University-Mankato  | 173               | 45%        | 55%        | 9%                        | 1%              | 3%        | 3%                 | 65%        | 2%                | 0%                     | 16%                    |
| 7 | Carleton College                    | 163               | 48%        | 52%        | 2%                        | 0%              | 17%       | 7%                 | 52%        | 7%                | 4%                     | 12%                    |
| 8 | Gustavus Adolphus College           | 160               | 42%        | 58%        | 6%                        | 0%              | 4%        | 3%                 | 83%        | 3%                | 2%                     | 1%                     |
| 9 | Winona State University             | 115               | 37%        | 63%        | 2%                        | 0%              | 3%        | 3%                 | 83%        | 6%                | 0%                     | 3%                     |
|   | Others                              | 1,378             | 43%        | 57%        | 7%                        | 2%              | 7%        | 5%                 | 68%        | 4%                | 2%                     | 4%                     |
|   | <b>Total</b>                        | <b>4,836</b>      | <b>44%</b> | <b>56%</b> | <b>5%</b>                 | <b>1%</b>       | <b>8%</b> | <b>5%</b>          | <b>67%</b> | <b>4%</b>         | <b>2%</b>              | <b>9%</b>              |

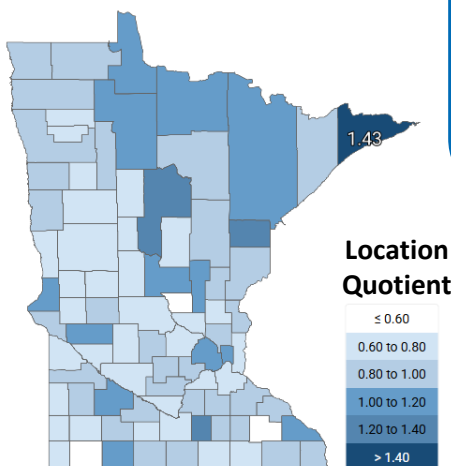
# Careers in Energy



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## Sub-Cluster Demand

### Environmental Protection



#### Top Five Counties

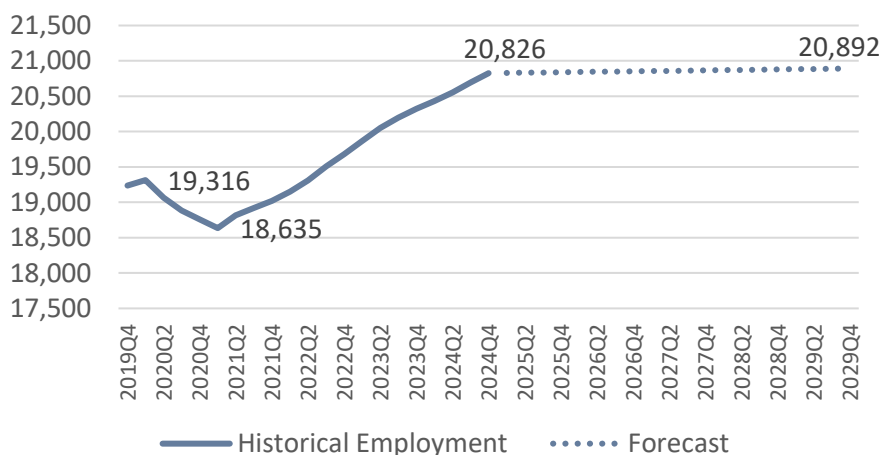
By number of employees

|           |       |
|-----------|-------|
| Hennepin  | 7,022 |
| Ramsey    | 2,959 |
| Dakota    | 1,157 |
| Anoka     | 918   |
| St. Louis | 745   |

#### Summary

Regulating and managing the impacts of natural processes and human activities, such as resource production and consumption; Developing and enforcing policies to protect ecosystems, including space, air, land, and water, from natural disasters, pollution, and degradation; Conservation of natural habitats and biodiversity and applying scientific and engineering principles to solve environmental problems and improve climate resilience.

#### Core Sub-Cluster Employment Forecast



#### Core Occupation Summary Statistics (Across all industries statewide)

1.8%  
Unemployment  
rate

0.92  
Location  
Quotient

0.1%  
Forecast Annual  
Growth

1,435  
Online job ads  
(March 2025)

# Careers in Energy



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## Environmental Protection Sub-Cluster Demand – Core Occupations

| # | Occupation (SOC)                                           | Empl             | Mean Annual Wages | LQ          | Unempl        | Unempl Rate | 5-Year Hist Avg Ann Empl Change | 5-Year Avg Ann Forecast Empl Change | 5-Year Total Demand Estimate | % of Total Empl in Ind 21, 22 |
|---|------------------------------------------------------------|------------------|-------------------|-------------|---------------|-------------|---------------------------------|-------------------------------------|------------------------------|-------------------------------|
| 1 | Compliance Officers (13-1041)                              | 6,909            | \$88,100          | 0.95        | 101           | 1.4%        | 3.4%                            | 0.2%                                | 2,774                        | 0%                            |
| 2 | Firefighters (33-2011)                                     | 5,310            | \$49,600          | 0.90        | 86            | 1.6%        | 1.0%                            | 0.1%                                | 1,955                        | 0%                            |
| 3 | Architectural and Engineering Managers (11-9041)           | 4,147            | \$178,800         | 1.05        | 92            | 2.2%        | 1.0%                            | 0.1%                                | 1,341                        | 3%                            |
| 4 | Engineers, All Other (17-1299)                             | 2,300            | \$123,100         | 0.78        | 35            | 1.5%        | -1.9%                           | 0.2%                                | 675                          | 0%                            |
| 5 | Biological Scientists, All Other (19-1029)                 | 782              | \$97,300          | 0.65        | 13            | 1.6%        | 4.9%                            | 0.3%                                | 303                          | <1%                           |
| 6 | Conservation Scientists (19-1031)                          | 673              | \$85,800          | 1.48        | 20            | 3.0%        | 3.1%                            | 0.3%                                | 309                          | <1%                           |
| 7 | Social Scientists and Related Workers, All Other (19-3099) | 517              | \$91,500          | 0.75        | 19            | 3.6%        | 1.4%                            | 0.1%                                | 219                          | 0%                            |
| 8 | Fish and Game Wardens (33-3031)                            | 151              | \$73,500          | 1.13        | 4             | 2.5%        | 1.3%                            | -1.3%                               | 58                           | 0%                            |
| 9 | Hydrologic Technicians (19-4044)                           | 36               | \$64,300          | 0.70        | 2             | 4.2%        | -2.4%                           | 0.0%                                | 19                           | 2%                            |
|   | <b>Environmental Protection – Core</b>                     | <b>20,826</b>    | <b>\$100,400</b>  | <b>0.92</b> | <b>371</b>    | <b>1.8%</b> | <b>1.6%</b>                     | <b>0.1%</b>                         | <b>7,653</b>                 | <b>1%</b>                     |
|   | <b>Total – All Occupations</b>                             | <b>3,124,097</b> | <b>\$70,600</b>   | <b>1.00</b> | <b>96,601</b> | <b>3.0%</b> | <b>0.2%</b>                     | <b>0.1%</b>                         | <b>1,691,667</b>             |                               |

# Careers in Energy



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## Sub-Cluster Wages

### Environmental Protection

Of the 9 occupations found in the sub-cluster, only two—Hydrologic Technicians and Firefighters—typically require an Associate degree, certificate, or high school diploma as the highest level of education. Other roles in the sub-cluster may have flexible education requirements due to high talent shortage.

### Core Sub-Cluster Wage Distribution

Mean

\$100,400

Entry Level

\$68,400

Experienced

\$116,400

|   |                                                                                | Wages     |             |             |            |                               |           |                |
|---|--------------------------------------------------------------------------------|-----------|-------------|-------------|------------|-------------------------------|-----------|----------------|
| # | Sub-Cluster Occupation (SOC) with Requirements for an Associate Degree or Less | Mean      | Entry Level | Experienced | 50% Median | Typical Entry-Level Education | Empl      | Under employed |
| 1 | Hydrologic Technicians (19-4044)                                               | \$64,300  | \$42,200    | \$75,300    | \$60,000   | Associate degree              | 36        | 16             |
| 2 | Firefighters (33-2011)                                                         | \$49,600  | \$31,000    | \$58,900    | \$42,500   | Postsecondary Certificate     | 5,326     | 1,526          |
|   | Environmental Protection – Core                                                | \$100,400 | \$68,400    | \$116,400   | \$95,000   | -                             | 20,826    | 1,612          |
|   | Total - All Occupations                                                        | \$70,600  | \$35,100    | \$88,300    | \$55,300   | -                             | 3,124,097 | 518,636        |

# Careers in Energy



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## Environmental Protection Sub-Cluster Demand – Related Industry Occupations

With about 1% of employment of sub-cluster talent within the two industries aligned to Energy and Natural Resources, most talent works in industries associated with interdisciplinary clusters.

| #  | NAICS Code* | Industry Title                                            | % of Occ Empl | Empl         | Mean Ann Wages | 5-Year Exits | 5-Year Job Transfers | 5-Year Forecast Avg Ann Empl Change | 5-Year Total Demand Estimate |
|----|-------------|-----------------------------------------------------------|---------------|--------------|----------------|--------------|----------------------|-------------------------------------|------------------------------|
| 1  | 9211        | Executive, Legislative, and Other Government Support      | 21.5%         | 4,468        | \$59,500       | 486          | 1,171                | 12                                  | 1,669                        |
| 2  | 5511        | Management of Companies and Enterprises                   | 6.3%          | 1,312        | \$129,100      | 174          | 299                  | 9                                   | 482                          |
| 3  | 5413        | Architectural, Engineering, and Related Services          | 6.2%          | 1,281        | \$148,700      | 128          | 280                  | 1                                   | 408                          |
| 4  | 9221        | Justice, Public Order, and Safety Activities              | 5.2%          | 1,085        | \$71,600       | 128          | 277                  | -12                                 | 393                          |
| 5  | 9231        | Administration of Human Resource Programs                 | 4.5%          | 941          | \$77,900       | 114          | 239                  | -9                                  | 344                          |
| 6  | 3345        | Navigational, Measuring, and Electromedical Manufacturing | 4.5%          | 927          | \$160,800      | 96           | 200                  | -1                                  | 295                          |
| 7  | 5417        | Scientific Research and Development Services              | 2.3%          | 489          | \$131,100      | 47           | 131                  | 21                                  | 199                          |
| 8  | 9241        | Admin. of Environmental Quality Programs                  | 2.2%          | 468          | \$76,100       | 55           | 118                  | -9                                  | 164                          |
| 9  | 5241        | Insurance Carriers                                        | 2.2%          | 458          | \$92,600       | 74           | 103                  | 1                                   | 177                          |
| 10 | 5416        | Management, Scientific, and Technical Consulting Services | 2.1%          | 443          | \$101,200      | 59           | 109                  | 20                                  | 188                          |
|    |             | <b>All Other</b>                                          | <b>43.0%</b>  | <b>8,954</b> |                |              |                      |                                     |                              |

### Inter-disciplinary Clusters\*

Digital Technology  
 Marketing & Sales  
 Management & Entrepreneurship  
 Agriculture  
 Advanced Manufacturing  
 Construction  
 Supply Chain & Transportation  
 Public Service & Safety

**20,826**  
Core Occupation Employment

**9**  
Institutions with aligned programs

**7,653**  
New Talent by 2029Q4

**Moderate**  
Talent Shortage Severity

# Careers in Energy



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## Environmental Protection

**Job Posting Analysis**  
Advertised May 2024 – April 2025

### Top Job Titles

- 1) Engineering Manager
- 2) Engineering Project Manager
- 3) Fire Protection Engineering PM
- 4) Program Manager
- 5) Driver and Dealer Examiner
- 6) Design Phase Manager
- 7) Quality Engineer
- 8) Senior Principal Systems Engineer
- 9) Project Controls Professional
- 10) Quality Manager - Power

### Top Employers Hiring

- 1) M. A. Mortenson Company
- 2) Medtronic
- 3) Boston Scientific Corporation
- 4) State of Minnesota
- 5) University of Minnesota
- 6) Honeywell
- 7) Wells Fargo
- 8) Baxter
- 9) HDR, Inc.
- 10) Abbott Laboratories

**2,600 Posts**

+101% from prior year

**\$127-\$207K**

Posted Salary Range

Hiring Difficulty: **Difficult**  
Share Remote Postings: 6%  
Share Hybrid Postings: 31%

### Top Essential Skills

- 1) Communication
- 2) Leadership
- 3) Collaboration
- 4) Planning
- 5) Analysis

### Top Knowledge Areas and Technical Skills

- 1) Project Management
- 2) Scheduling
- 3) Monitoring
- 4) Operations
- 5) Research

### Top Credentials

- 1) Driver's License (D)
- 2) Project Management Professional (PMP)
- 3) Professional Engineer License
- 4) OSHA
- 5) Data Encryption Standard



### Environmental Protection

### Job Posting and Profile Gap Analysis Advertised May 2024 – April 2025

#### Top 10 Skill Gaps in Minnesota

| Name                                          | Candidates | Openings | Gap |
|-----------------------------------------------|------------|----------|-----|
| Microsoft Outlook                             | 72         | 87       | -15 |
| Word Processing                               | 3          | 17       | -14 |
| Adobe Illustrator                             | 2          | 15       | -13 |
| Yardi                                         | 6          | 16       | -10 |
| IT Support                                    | 4          | 13       | -9  |
| Computer Aided Design Software (CAD Software) | 33         | 42       | -9  |
| Autodesk Revit                                | 6          | 15       | -8  |
| SAP                                           | 27         | 35       | -8  |
| Linux                                         | 13         | 20       | -7  |
| Adobe Photoshop                               | 2          | 8        | -7  |

#### Top 10 Certification Gaps in Minnesota

| Name                                              | Candidates | Openings | Gap |
|---------------------------------------------------|------------|----------|-----|
| First Aid Certification                           | 18         | 28       | -10 |
| Project Management Professional (PMP)             | 10         | 16       | -6  |
| AED Essentials                                    | 1          | 4        | -4  |
| OSHA 10                                           | 2          | 4        | -2  |
| Certified Regulatory Compliance Manager (CRCM)    | 0          | 2        | -2  |
| Engineer in Training (EIT)                        | 4          | 5        | -1  |
| Certified Professional Property Specialist (CPPS) | 0          | 1        | -1  |

# Careers in Energy



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Energy Center of Excellence

## Environmental Protection

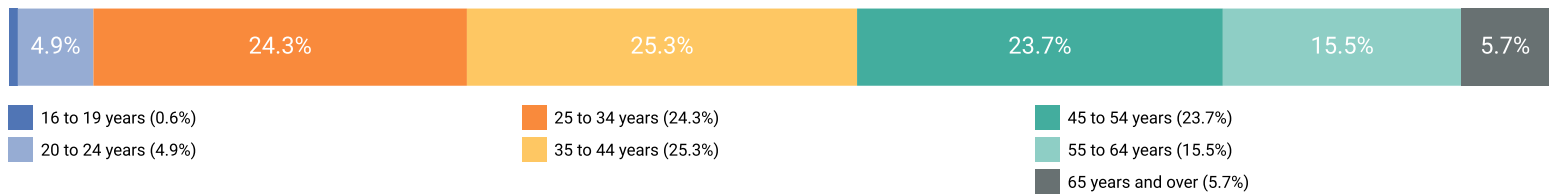
### Estimated Talent Pool Diversity (Across all industries statewide)

Underrepresentation of talent who are:

- Female
- Black

- American Indian
- Hispanic or Latine
- Under 25 years old and 55+

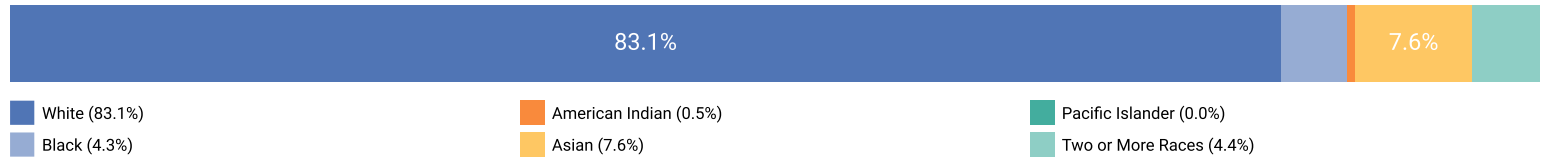
#### Age



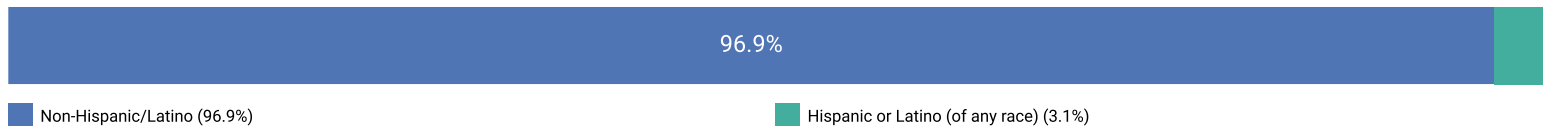
#### Gender



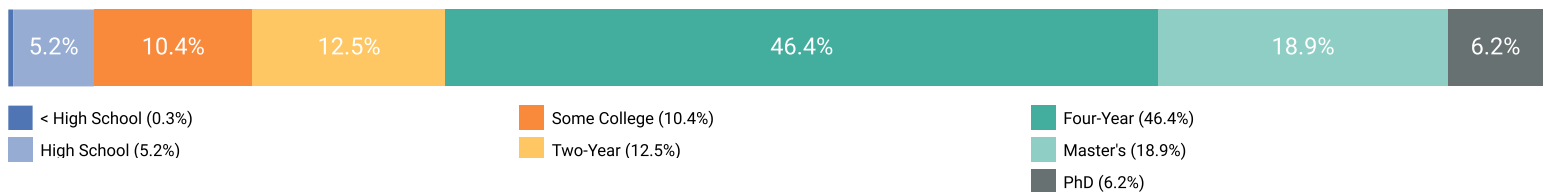
#### Race



#### Ethnicity



#### Educational Attainment



# Careers in Energy



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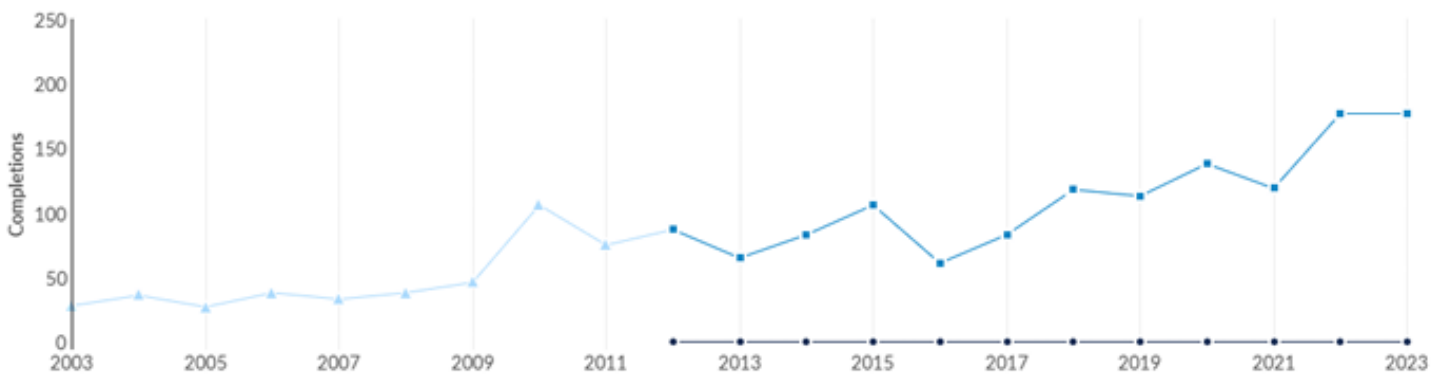
## Environmental Protection



### Aligned Postsecondary Programs With Awards Conferred, SY2023

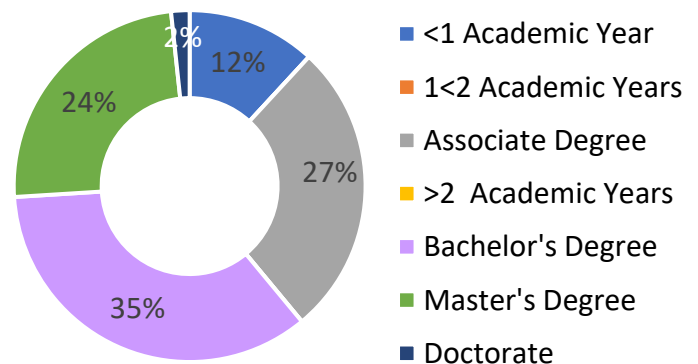
| Institution Type                        | Completions (2023) | Market Share |
|-----------------------------------------|--------------------|--------------|
| Public, 4-year or above                 | 109                | 61.6%        |
| Public, 2-year                          | 67                 | 37.9%        |
| Private not-for-profit, 4-year or above | 1                  | 0.6%         |

### Annual Completions by Delivery Type



|                               |       |
|-------------------------------|-------|
| Distance Offered Programs     | N/A   |
| Non-Distance Offered Programs | +103% |
| All Programs                  | +103% |

### Completions SY2023



**9**

Institutions with aligned programs

# Careers in Energy



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## Environmental Protection

### Aligned Postsecondary Programs With Awards Conferred, SY2023

#### Market Share by Program



| Program                                                                           | Completions (2023) | Market Share |
|-----------------------------------------------------------------------------------|--------------------|--------------|
| Wildlife, Fish and Wildlands Science and Management (03.0601)                     | 44                 | 24.9%        |
| Environmental/Natural Resources Law Enforcement and Protective Services (03.0208) | 43                 | 24.3%        |
| Ecology and Evolutionary Biology (26.1310)                                        | 33                 | 18.6%        |
| Hydrology and Water Resources Science (40.0605)                                   | 19                 | 10.7%        |
| Other                                                                             | 38                 | 21.5%        |

| Institution                              | Completions (2023) | Growth % YOY (2023) | Market Share (2023) | IPEDS Tuition & Fees (2023) | Completions Trend (2019-2023) |
|------------------------------------------|--------------------|---------------------|---------------------|-----------------------------|-------------------------------|
| Minnesota North College                  | 57                 | -20.8%              | 32.2%               | \$6,004                     |                               |
| University of Minnesota-Twin Cities      | 46                 | 35.3%               | 26.0%               | \$16,488                    |                               |
| Bemidji State University                 | 27                 | -18.2%              | 15.3%               | \$10,114                    |                               |
| Saint Cloud State University             | 22                 | 10.0%               | 12.4%               | \$10,117                    |                               |
| Minnesota State University Moorhead      | 12                 | -7.7%               | 6.8%                | \$10,336                    |                               |
| Central Lakes College-Brainerd           | 5                  | 150.0%              | 2.8%                | \$6,209                     |                               |
| Saint Paul College                       | 5                  | Insf. Data          | 2.8%                | \$6,318                     |                               |
| Fond du Lac Tribal and Community College | 2                  | Insf. Data          | 1.1%                | \$5,999                     |                               |
| The College of Saint Scholastica         | 1                  | -66.7%              | 0.6%                | \$40,454                    |                               |

# Careers in Energy



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## Environmental Protection

### Aligned Postsecondary Programs With Awards Conferred, SY2023

#### Graduate Demographics, All Programs



- White
- Black or African American
- American Indian
- Asian
- Pacific Islander
- Two or More Races
- Hispanic or Latine
- International Students
- Unknown Race/Ethnicity

| # | Description                              | Total Completions | Male       | Female     | Black or African American | American Indian | Asian     | Hispanic or Latine | White      | Two or More Races | Unknown Race/Ethnicity | International Students |
|---|------------------------------------------|-------------------|------------|------------|---------------------------|-----------------|-----------|--------------------|------------|-------------------|------------------------|------------------------|
| 1 | Minnesota North College                  | 57                | 75%        | 25%        | 0%                        | 0%              | 2%        | 2%                 | 93%        | 2%                | 2%                     | 0%                     |
| 2 | University of Minnesota-Twin Cities      | 46                | 43%        | 57%        | 2%                        | 2%              | 0%        | 4%                 | 67%        | 7%                | 0%                     | 17%                    |
| 3 | Bemidji State University                 | 27                | 63%        | 37%        | 0%                        | 0%              | 0%        | 0%                 | 96%        | 0%                | 4%                     | 0%                     |
| 4 | Saint Cloud State University             | 22                | 27%        | 73%        | 0%                        | 0%              | 9%        | 0%                 | 91%        | 0%                | 0%                     | 0%                     |
| 5 | Minnesota State University Moorhead      | 12                | 33%        | 67%        | 0%                        | 0%              | 8%        | 0%                 | 83%        | 8%                | 0%                     | 0%                     |
| 6 | Central Lakes College-Brainerd           | 5                 | 60%        | 40%        | 0%                        | 0%              | 0%        | 0%                 | 100%       | 0%                | 0%                     | 0%                     |
| 7 | Saint Paul College                       | 5                 | 60%        | 40%        | 0%                        | 0%              | 20%       | 0%                 | 80%        | 0%                | 0%                     | 0%                     |
| 8 | Fond du Lac Tribal and Community College | 2                 | 0%         | 100%       | 0%                        | 100%            | 0%        | 0%                 | 0%         | 0%                | 0%                     | 0%                     |
| 9 | The College of Saint Scholastica         | 1                 | 100%       | 0%         | 0%                        | 0%              | 0%        | 100%               | 0%         | 0%                | 0%                     | 0%                     |
|   | <b>Total</b>                             | <b>177</b>        | <b>55%</b> | <b>45%</b> | <b>0%</b>                 | <b>0%</b>       | <b>0%</b> | <b>2%</b>          | <b>84%</b> | <b>3%</b>         | <b>1%</b>              | <b>5%</b>              |

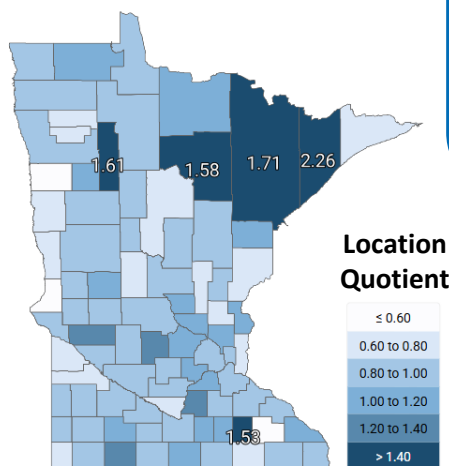
# Careers in Energy



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## Sub-Cluster Demand

### Resource Extraction



### Top Five Counties

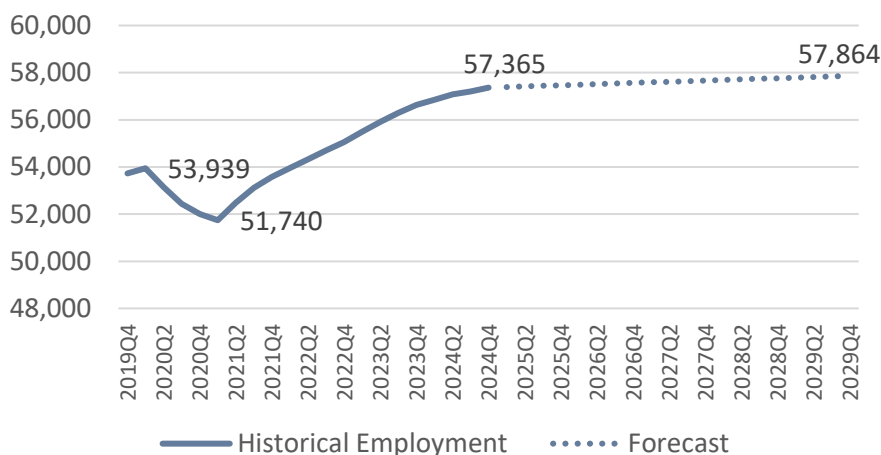
By number of employees

|           |        |
|-----------|--------|
| Hennepin  | 16,148 |
| Ramsey    | 6,214  |
| Dakota    | 3,554  |
| St. Louis | 3,442  |
| Anoka     | 2,933  |

### Summary

The efficient removal of natural materials including fossil fuels, minerals, natural gas, and geothermal resources that are essential for fuel production in energy and manufacturing; Fields of work include resource exploration, drilling, mining, fracking, mineral processing, geoscience, quarrying, and petroleum engineering.

### Core Sub-Cluster Employment Forecast



### Core Occupation Summary Statistics (Across all industries statewide)

1.9%  
Unemployment  
rate

0.92  
Location  
Quotient

0.3%  
Forecast Annual  
Growth

3,098  
Online job ads  
(March 2025)

# Careers in Energy



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## Resource Extraction Sub-Cluster Demand – Core Occupations

| #  | Occupation (SOC)                                                    | Empl             | Mean Annual Wages | LQ          | Unempl        | Unempl Rate | 5-Year Hist Avg Ann Empl Change | 5-Year Avg Ann Forecast Empl Change | 5-Year Total Demand Estimate | % of Total Empl in Ind |
|----|---------------------------------------------------------------------|------------------|-------------------|-------------|---------------|-------------|---------------------------------|-------------------------------------|------------------------------|------------------------|
| 1  | Supervisors of Construction Trades and Extraction Workers (47-1011) | 14,227           | \$95,900          | 0.87        | 353           | 2.4%        | 2.1%                            | 0.4%                                | 5,743                        | 2%                     |
| 2  | Supervisors of Mechanics, Installers, Repairers (49-1011)           | 9,514            | \$89,400          | 0.84        | 88            | 0.9%        | 1.6%                            | 0.1%                                | 3,837                        | 7%                     |
| 3  | Industrial Machinery Mechanics (49-9041)                            | 7,532            | \$72,800          | 0.94        | 105           | 1.4%        | 2.4%                            | 1.3%                                | 3,594                        | 5%                     |
| 4  | Compliance Officers (13-1041)                                       | 6,909            | \$88,100          | 0.95        | 101           | 1.4%        | 3.4%                            | 0.2%                                | 2,774                        | 2%                     |
| 5  | Industrial Engineering Techs (17-3026)                              | 4,334            | \$72,600          | 3.13        | 65            | 1.5%        | 0.3%                            | 0.1%                                | 1,845                        | 1%                     |
| 6  | Architectural and Engineering Managers (11-9041)                    | 4,147            | \$178,800         | 1.05        | 92            | 2.2%        | 1.0%                            | 0.1%                                | 1,341                        | 3%                     |
| 7  | Engineers, All Other (17-2199)                                      | 2,300            | \$123,100         | 0.78        | 35            | 1.5%        | -1.9%                           | 0.2%                                | 675                          | 2%                     |
| 8  | Civil Engineering Technologists and Technicians (17-3022)           | 1,424            | \$77,500          | 1.15        | 21            | 1.5%        | -0.4%                           | -0.3%                               | 565                          | 1%                     |
| 9  | Engineering Techs (17-3029)                                         | 992              | \$77,700          | 0.81        | 15            | 1.5%        | 0.3%                            | 0.1%                                | 425                          | 3%                     |
| 10 | Surveyors (17-1022)                                                 | 904              | \$89,200          | 0.90        | 7             | 0.8%        | 0.6%                            | 0.1%                                | 314                          | 4%                     |
| 11 | Continuous Mining Machine Operators (47-5041)                       | 754              | \$73,900          | 2.32        | 82            | 9.8%        | 3.5%                            | 0.2%                                | 437                          | 98%                    |
| 12 | Underground Mining Machine Operators, All Other (47-5049)           | 743              | \$77,400          | 13.77       | 80            | 9.9%        | -6.8%                           | 0.3%                                | 431                          | 97%                    |
|    | <b>Resource Extraction – Core</b>                                   | <b>57,365</b>    | <b>\$93,900</b>   | <b>0.92</b> | <b>1,136</b>  | <b>1.9%</b> | <b>1.9%</b>                     | <b>0.3%</b>                         | <b>23,660</b>                | <b>7%</b>              |
|    | <b>Total – All Occupations</b>                                      | <b>3,124,097</b> | <b>\$70,600</b>   | <b>1.00</b> | <b>96,601</b> | <b>3.0%</b> | <b>0.2%</b>                     | <b>0.1%</b>                         | <b>1,691,667</b>             |                        |

# Careers in Energy



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## Sub-Cluster Wages

### Resource Extraction

Construction Trades Supervisors have the highest average wages among careers in this sub-cluster that have no postsecondary education requirements.

### Core Sub-Cluster Wage Distribution

Mean

\$93,900

Entry Level

\$66,400

Experienced

\$107,600

| # | Sub-Cluster Occupation (SOC) with Requirements for an Associate Degree or Less  | Wages    |             |             |            |                               |           |                |
|---|---------------------------------------------------------------------------------|----------|-------------|-------------|------------|-------------------------------|-----------|----------------|
|   |                                                                                 | Mean     | Entry Level | Experienced | 50% Median | Typical Entry-Level Education | Empl      | Under employed |
| 1 | First-Line Supervisors of Construction Trades and Extraction Workers (47-1011)  | \$95,900 | \$68,100    | \$109,800   | \$96,200   | HS or equivalent              | 14,227    | 2,327          |
| 2 | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011)        | \$89,400 | \$61,200    | \$103,500   | \$85,900   | HS or equivalent              | 9,514     | 1,923          |
| 3 | Industrial Machinery Mechanics (49-9041)                                        | \$72,800 | \$54,400    | \$82,000    | \$70,800   | HS or equivalent              | 7,532     | 765            |
| 4 | Industrial Engineering Technologists and Technicians (17-3026)                  | \$72,600 | \$53,400    | \$82,200    | \$69,500   | Associate degree              | 4,334     | 1,271          |
| 5 | Civil Engineering Technologists and Technicians (17-3022)                       | \$77,500 | \$63,200    | \$84,600    | \$75,900   | Associate degree              | 1,424     | 417            |
| 6 | Engineering Technologists and Technicians, Except Drafters, All Other (17-3029) | \$77,700 | \$55,700    | \$88,700    | \$79,200   | Associate degree              | 992       | 299            |
| 7 | Continuous Mining Machine Operators (47-5041)                                   | \$73,900 | \$51,300    | \$85,200    | \$73,100   | None                          | 754       | 41             |
| 8 | Underground Mining Machine Operators, All Other (47-5049)                       | \$77,400 | \$57,200    | \$87,500    | \$76,100   | None                          | 743       | 39             |
|   | Resource Extraction– Core                                                       | \$93,900 | \$66,400    | \$107,600   | \$91,400   | -                             | 57,365    | 7,430          |
|   | Total - All Occupations                                                         | \$70,600 | \$35,100    | \$88,300    | \$55,300   | -                             | 3,124,097 | 518,636        |

# Careers in Energy



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## Resource Extraction Sub-Cluster Demand – Related Industry Occupations

### Related Industry with Demand

- NAICS 21 – Mining, Quarrying, and Oil and Gas Extraction

| #  | Occupation (SOC)                                                   | Ind Empl         | Mean Annual Wages | 5-Year Total Demand Estimate | Cross-Cutting Clusters | Inter-disciplinary Clusters | % of Total Empl in Ind |
|----|--------------------------------------------------------------------|------------------|-------------------|------------------------------|------------------------|-----------------------------|------------------------|
| 1  | Operating Engineers and Construction Equipment Operators (47-2073) | 429              | \$72,800          | 188                          | -                      |                             | 5%                     |
| 2  | Mobile Heavy Equipment Mechanics, Except Engines (49-3042)         | 274              | \$85,100          | 118                          | -                      |                             | 9%                     |
| 3  | Heavy and Tractor-Trailer Truck Drivers (53-3032)                  | 268              | \$69,100          | 132                          | -                      |                             | 1%                     |
| 4  | Electricians (47-2111)                                             | 103              | \$97,600          | 47                           | -                      |                             | 1%                     |
| 5  | Maintenance and Repair Workers, General (49-9071)                  | 100              | \$75,600          | 47                           | -                      |                             | <1%                    |
| 6  | Construction Laborers (47-2061)                                    | 94               | \$68,500          | 42                           | -                      |                             | <1%                    |
| 7  | Crushing, Grinding, and Polishing Machine Operators (51-9021)      | 89               | \$75,300          | 43                           | -                      |                             | 12%                    |
| 8  | Maintenance Workers, Machinery (49-9043)                           | 71               | \$82,500          | 32                           | -                      |                             | 5%                     |
| 9  | Office Clerks, General (43-9061)                                   | 61               | \$55,100          | 33                           |                        | -                           | <1%                    |
| 10 | Laborers and Freight Movers (53-7062)                              | 55               | \$65,800          | 38                           | -                      |                             | <1%                    |
|    | <b>Resource Extraction – Related Industries</b>                    | <b>2,787</b>     | <b>-</b>          | <b>1,310</b>                 | <b>-</b>               | <b>-</b>                    | <b>&lt;1%</b>          |
|    | <b>Total – All Occupations</b>                                     | <b>3,124,097</b> | <b>\$70,600</b>   | <b>1,691,667</b>             | <b>-</b>               | <b>-</b>                    | <b>-</b>               |

### Inter-disciplinary Clusters

Digital Technology  
 Marketing & Sales  
 Management & Entrepreneurship  
 Agriculture  
 Advanced Manufacturing  
 Construction  
 Supply Chain & Transportation  
 Public Service & Safety

**57,365**  
Core Occupation Employment

**2,787**  
Related Career Employment

**24,970**  
New Talent by 2029Q4

**High**  
Talent Shortage Severity

# Careers in Energy



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## Resource Extraction

## Job Posting Analysis

Advertised May 2024 – April 2025

### Top Job Titles

- 1) Maintenance Manager / Supervisor
- 2) Quality Engineer
- 3) Systems Maintainer
- 4) Engineering Manager
- 5) Quality Technician
- 6) Field Service Technician
- 7) Assistant Project Manager
- 8) Maintenance Mechanic
- 9) Directional Drill Bore Foreman
- 10) Program Manager

### Top Employers Hiring

- 1) Boston Scientific Corporation
- 2) M.A. Mortenson Company
- 3) U.S. Army
- 4) Honeywell
- 5) Medtronic
- 6) State of Minnesota
- 7) Xcel Energy
- 8) Michael Page
- 9) 3M
- 10) GPAC

**10,136 Posts**

-9% from prior year

**\$88-\$143K**

Posted Salary Range

Hiring Difficulty: **Moderate**  
Share Remote Postings: 4%  
Share Hybrid Postings: 16%

### Top Essential Skills

- 1) Communication
- 2) Leadership
- 3) Scheduling
- 4) Collaboration
- 5) Analysis

### Top Knowledge Areas and Technical Skills

- 1) Operations
- 2) Project Management
- 3) Research
- 4) Continuous Improvement
- 5) Mathematics

### Top Credentials

- 1) American Society for Testing Materials
- 2) Total Quality Management Certification
- 3) SCI Clearance
- 4) Six Sigma Black Belt
- 5) ISO 14001



### Resource Extraction

### Job Posting and Profile Gap Analysis Advertised May 2024 – April 2025

#### Top 10 Skill Gaps in Minnesota

| Name                                  | Candidates | Openings | Gap  |
|---------------------------------------|------------|----------|------|
| Telecommunications                    | 10         | 179      | -169 |
| Google                                | 5          | 160      | -155 |
| Power Tools                           | 85         | 167      | -82  |
| Boilers                               | 78         | 135      | -57  |
| Lathes                                | 17         | 66       | -48  |
| Metal Inert Gas Welding (MIG welding) | 14         | 54       | -41  |
| Reading Schematics                    | 44         | 78       | -34  |
| Roofing                               | 15         | 46       | -31  |
| Gauges                                | 59         | 86       | -26  |
| Personal Computers (PC)               | 60         | 85       | -25  |

#### Top 10 Certification Gaps in Minnesota

| Name                                                    | Candidates | Openings | Gap |
|---------------------------------------------------------|------------|----------|-----|
| Commercial Driver's License (CDL)                       | 12         | 39       | -26 |
| Class A Commercial Driver's License (CDL-A)             | 5          | 20       | -15 |
| Project Management Professional (PMP)                   | 10         | 17       | -6  |
| EPA Universal Certification                             | 0          | 5        | -5  |
| Certified Production Technician (CPT)                   | 0          | 4        | -4  |
| Transportation Worker Identification Credential (TWIC)  | 0          | 4        | -4  |
| Certified Welding Inspector (CWI)                       | 7          | 11       | -4  |
| Industry Radiography Radiation Safety Personnel (IRRSP) | 0          | 3        | -3  |
| Certified Welder                                        | 10         | 13       | -2  |
| Certified Landscape Irrigation Auditor (CLIA)           | 0          | 2        | -2  |

# Careers in Energy



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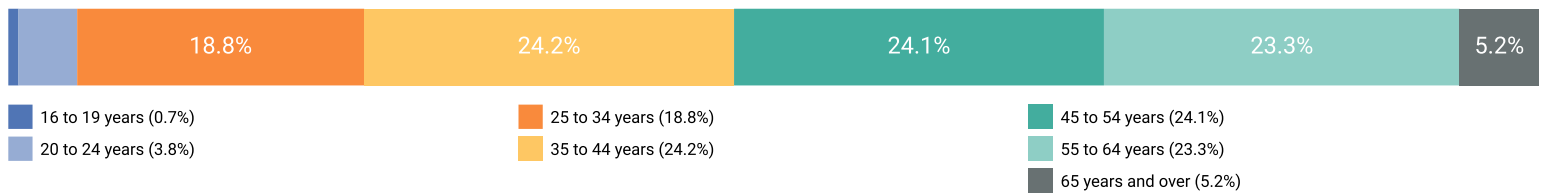
## Resource Extraction

## Estimated Talent Pool Diversity (Across all industries statewide)

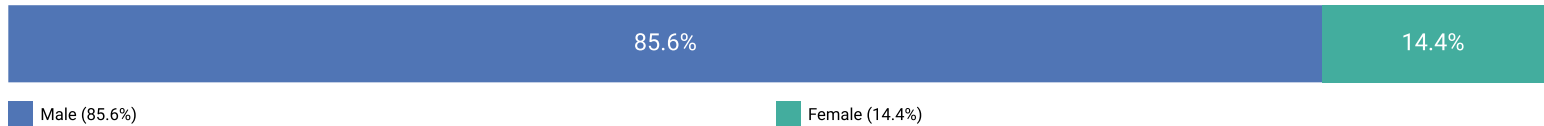
Underrepresentation of talent who are:

- Female
- Black or African American
- Asian
- More than one race
- Hispanic or Latine
- Under 35 years old

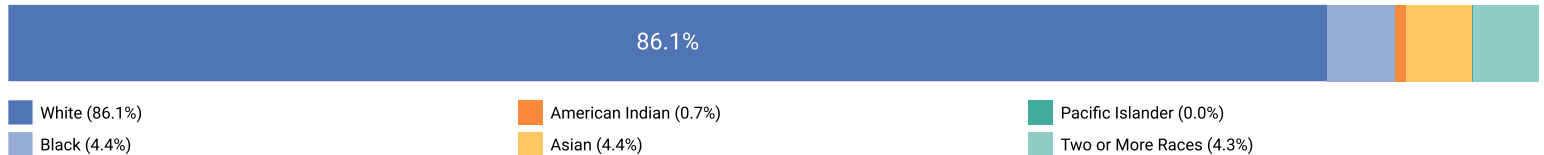
### Age



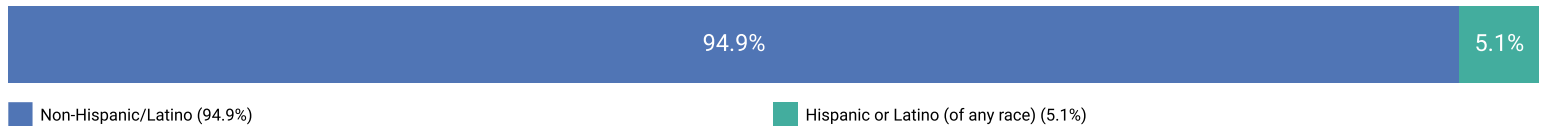
### Gender



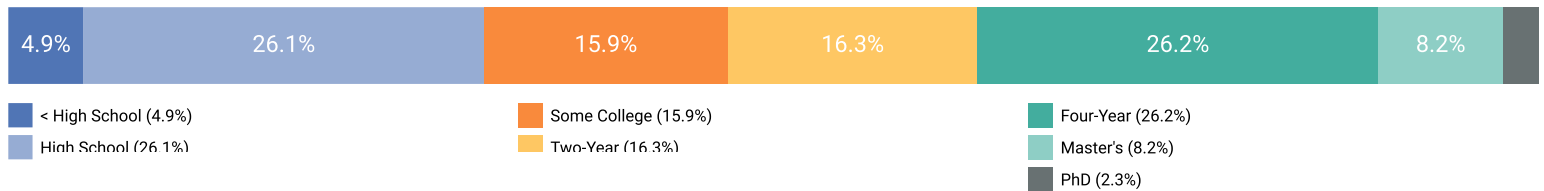
### Race



### Ethnicity



### Educational Attainment



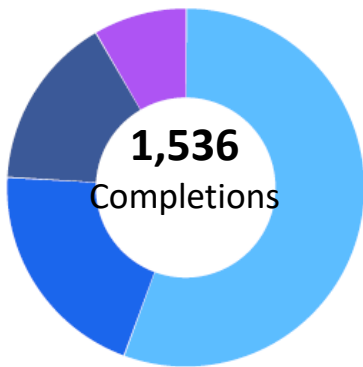
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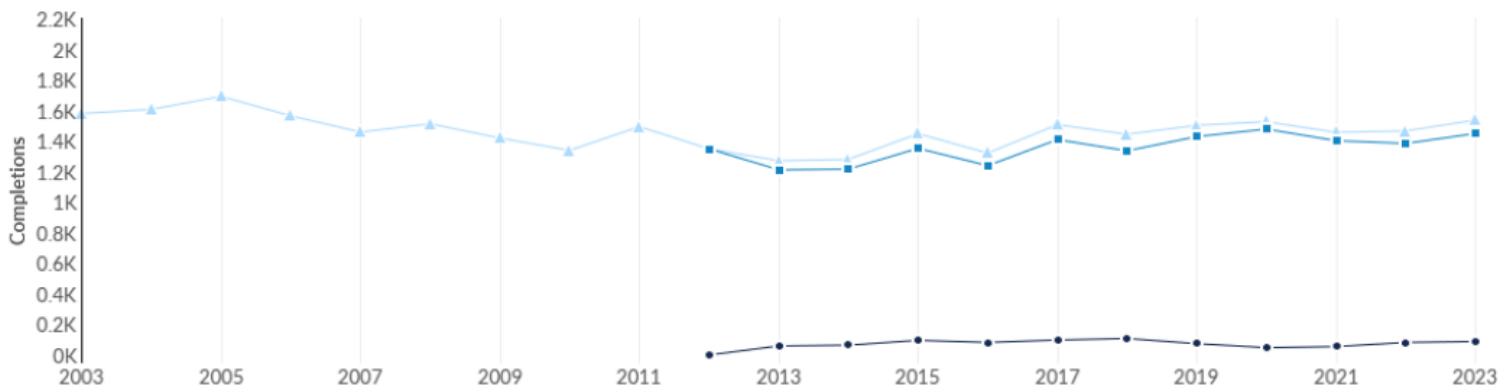
## Resource Extraction

## Aligned Postsecondary Programs With Awards Conferred, SY2023



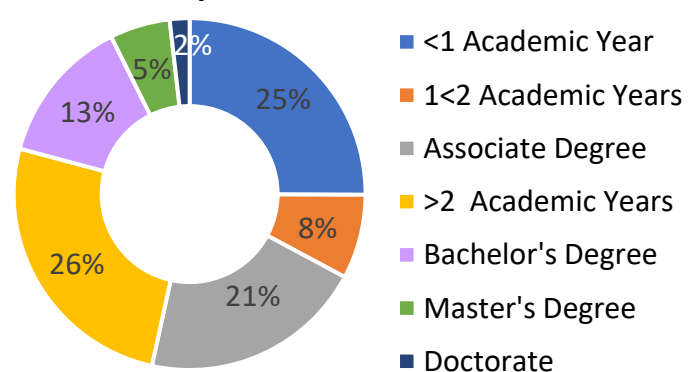
| Institution Type                         | Completions (2023) | Market Share |
|------------------------------------------|--------------------|--------------|
| Public, 2-year                           | 853                | 55.5%        |
| Public, 4-year or above                  | 312                | 20.3%        |
| Private not-for-profit, less-than-2-year | 241                | 15.7%        |
| Private not-for-profit, 4-year or above  | 130                | 8.5%         |

## Annual Completions by Delivery Type



|                               |        |
|-------------------------------|--------|
| Distance Offered Programs     | N/A    |
| Non-Distance Offered Programs | +7.4%  |
| All Programs                  | +13.9% |

## Completions SY2023



**39**

Institutions with aligned programs

# Careers in Energy



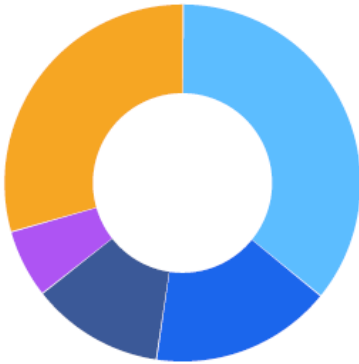
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## Resource Extraction

## Aligned Postsecondary Programs With Awards Conferred, SY2023

### Market Share by Program

| Program                                  | Completions (2023) | Market Share |
|------------------------------------------|--------------------|--------------|
| Electrician (46.0302)                    | 550                | 35.8%        |
| Construction Trades, General (46.0000)   | 253                | 16.5%        |
| Carpentry/Carpenter (46.0201)            | 185                | 12.0%        |
| Geology/Earth Science, General (40.0601) | 95                 | 6.2%         |
| Other                                    | 453                | 29.5%        |



| Institution                                           | Completions (2023) | Growth % YOY (2023) | Market Share (2023) | IPEDS Tuition & Fees (2023) | Completions Trend (2019-2023) |
|-------------------------------------------------------|--------------------|---------------------|---------------------|-----------------------------|-------------------------------|
| Summit Academy Opportunities Industrialization Center | 241                | 13.1%               | 15.7%               | N/A                         |                               |
| University of Minnesota-Twin Cities                   | 153                | 7.7%                | 10.0%               | \$16,488                    |                               |
| Dunwoody College of Technology                        | 87                 | 22.5%               | 5.7%                | \$25,659                    |                               |
| Saint Paul College                                    | 78                 | 8.3%                | 5.1%                | \$6,318                     |                               |
| Lake Superior College                                 | 71                 | 2.9%                | 4.6%                | \$5,785                     |                               |
| Ridgewater College                                    | 65                 | 54.8%               | 4.2%                | \$6,109                     |                               |
| St Cloud Technical and Community College              | 62                 | -23.5%              | 4.0%                | \$4,957                     |                               |
| Riverland Community College                           | 61                 | -3.2%               | 4.0%                | \$6,249                     |                               |
| Anoka Technical College                               | 55                 | -9.8%               | 3.6%                | \$6,267                     |                               |
| Dakota County Technical College                       | 55                 | -23.6%              | 3.6%                | \$6,419                     |                               |

# Careers in Energy



MINNESOTA STATE  
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## Resource Extraction

## Aligned Postsecondary Programs With Awards Conferred, SY2023

### Graduate Demographics, All Programs



White

Black or African American

American Indian

Asian

Pacific Islander

Two or More Races

Hispanic or Latine

International Students

Unknown Race/Ethnicity

| # | Description                                           | Total Completions | Male       | Female     | Black or African American | American Indian | Asian     | Hispanic or Latine | White      | Two or More Races | Unknown Race/Ethnicity | International Students |
|---|-------------------------------------------------------|-------------------|------------|------------|---------------------------|-----------------|-----------|--------------------|------------|-------------------|------------------------|------------------------|
| 1 | Summit Academy Opportunities Industrialization Center | 241               | 83%        | 17%        | 37%                       | 1%              | 10%       | 19%                | 21%        | 9%                | 2%                     | 0%                     |
| 2 | University of Minnesota-Twin Cities                   | 153               | 51%        | 49%        | 1%                        | 1%              | 5%        | 4%                 | 61%        | 7%                | 1%                     | 19%                    |
| 3 | Dunwoody College of Technology                        | 87                | 94%        | 6%         | 1%                        | 0%              | 2%        | 2%                 | 79%        | 3%                | 11%                    | 0%                     |
| 4 | Saint Paul College                                    | 78                | 92%        | 8%         | 5%                        | 0%              | 21%       | 9%                 | 59%        | 3%                | 1%                     | 3%                     |
| 5 | Lake Superior College                                 | 71                | 96%        | 4%         | 8%                        | 0%              | 1%        | 11%                | 73%        | 4%                | 1%                     | 0%                     |
| 6 | Ridgewater College                                    | 65                | 89%        | 11%        | 0%                        | 2%              | 0%        | 8%                 | 88%        | 0%                | 3%                     | 0%                     |
| 7 | St Cloud Technical and Community College              | 62                | 87%        | 13%        | 2%                        | 0%              | 0%        | 0%                 | 95%        | 0%                | 3%                     | 0%                     |
| 8 | Riverland Community College                           | 61                | 97%        | 3%         | 3%                        | 0%              | 7%        | 15%                | 72%        | 0%                | 2%                     | 0%                     |
| 9 | Anoka Technical College                               | 55                | 93%        | 7%         | 0%                        | 0%              | 2%        | 4%                 | 89%        | 5%                | 0%                     | 0%                     |
|   | Others                                                | 663               | 84%        | 16%        | 2%                        | 1%              | 2%        | 6%                 | 82%        | 4%                | 2%                     | 1%                     |
|   | <b>Total</b>                                          | <b>1,536</b>      | <b>83%</b> | <b>17%</b> | <b>8%</b>                 | <b>1%</b>       | <b>5%</b> | <b>8%</b>          | <b>69%</b> | <b>4%</b>         | <b>2%</b>              | <b>3%</b>              |

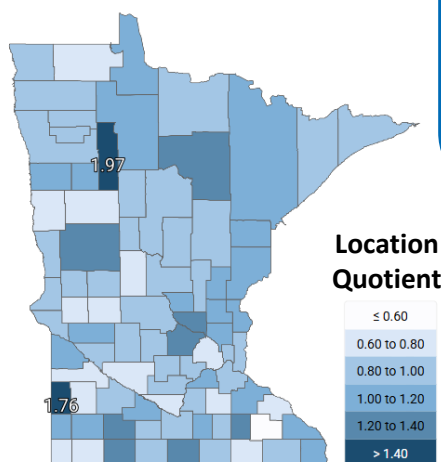
# Careers in Energy



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## Sub-Cluster Demand

### Utilities



### Top Five Counties

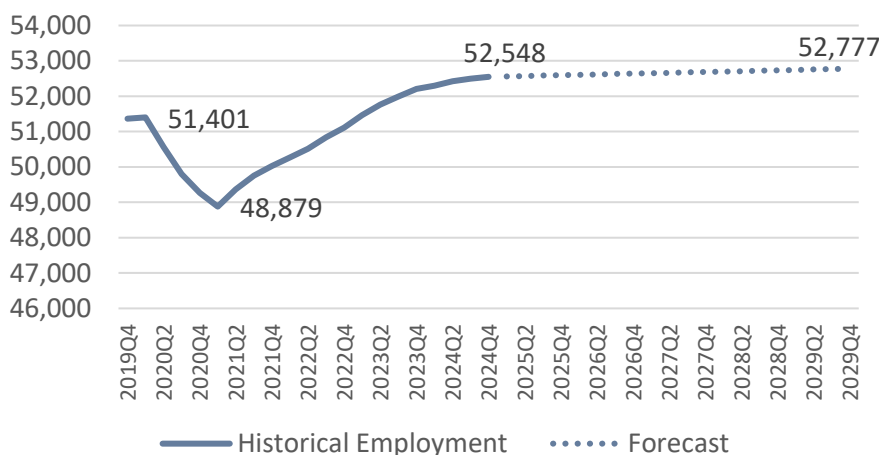
By number of employees

|           |        |
|-----------|--------|
| Hennepin  | 14,338 |
| Ramsey    | 5,417  |
| Dakota    | 3,460  |
| Anoka     | 2,798  |
| St. Louis | 2,072  |

### Summary

Manage the transmission and maintenance of utility systems for clean and alternative energy, electricity, water, waste remediation, and telecom/broadband, distribution and infrastructure development, and storage; Ensure reliable connectivity to energy sources, energy efficiency, and other essential services; Focus on operations, maintenance, and security of systems to guarantee uninterrupted access to vital resources.

### Core Sub-Cluster Employment Forecast



### Core Occupation Summary Statistics (Across all industries statewide)

1.9%  
Unemployment  
rate

0.88  
Location  
Quotient

0.2%  
Forecast Annual  
Growth

2,514  
Online job ads  
(March 2025)

# Careers in Energy



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## Utilities Sub-Cluster Demand – Core Occupations

| #  | Occupation (SOC)                                                               | Empl             | Mean Annual Wages | LQ          | Unempl        | Unempl Rate | 5-Year Hist Avg Ann Empl Change | 5-Year Avg Ann Forecast Empl Change | 5-Year Total Demand Estimate | % of Total Empl in Ind |
|----|--------------------------------------------------------------------------------|------------------|-------------------|-------------|---------------|-------------|---------------------------------|-------------------------------------|------------------------------|------------------------|
| 1  | First-Line Supervisors of Construction Trades and Extraction Workers (47-1011) | 14,227           | \$95,900          | 0.87        | 353           | 2.4%        | 2.1%                            | 0.4%                                | 5,743                        | 2%                     |
| 2  | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011)       | 9,514            | \$89,400          | 0.84        | 88            | 0.9%        | 1.6%                            | 0.1%                                | 3,837                        | 7%                     |
| 3  | Architectural and Engineering Managers (11-9041)                               | 4,147            | \$178,800         | 1.05        | 92            | 2.2%        | 1.0%                            | 0.1%                                | 1,341                        | 3%                     |
| 4  | Refuse and Recyclable Material Collectors (53-7081)                            | 2,663            | \$58,100          | 0.97        | 70            | 2.6%        | 0.8%                            | 0.1%                                | 1,582                        | <1%                    |
| 5  | Engineers, All Other (17-2199)                                                 | 2,300            | \$123,100         | 0.78        | 35            | 1.5%        | -1.9%                           | 0.2%                                | 675                          | 2%                     |
| 6  | Telecommunications Equipment Installers and Repairers (49-2022)                | 2,298            | \$70,800          | 0.78        | 46            | 2.0%        | -3.6%                           | -0.5%                               | 993                          | 3%                     |
| 7  | Water and Wastewater Treatment Plant and System Operators (51-8031)            | 2,147            | \$72,900          | 0.89        | 8             | 0.4%        | 1.2%                            | -1.0%                               | 827                          | 13%                    |
| 8  | Electrical Power-Line Installers and Repairers (49-9051)                       | 2,005            | \$104,400         | 0.84        | 34            | 1.6%        | 1.2%                            | 1.3%                                | 944                          | 67%                    |
| 9  | Electrical and Electronic Engineering Technologists and Technicians (17-3023)  | 1,985            | \$76,700          | 1.09        | 9             | 0.4%        | -3.1%                           | -0.1%                               | 892                          | 8%                     |
| 10 | Telecommunications Line Installers and Repairers (49-9052)                     | 1,500            | \$67,800          | 0.80        | 22            | 1.4%        | -5.3%                           | -0.3%                               | 641                          | 3%                     |
|    | <b>Utilities – Core</b>                                                        | <b>52,548</b>    | <b>\$95,700</b>   | <b>0.88</b> | <b>1,019</b>  | <b>1.9%</b> | <b>0.5%</b>                     | <b>0.2%</b>                         | <b>21,913</b>                | <b>9%</b>              |
|    | <b>Total – All Occupations</b>                                                 | <b>3,124,097</b> | <b>\$70,600</b>   | <b>1.00</b> | <b>96,601</b> | <b>3.0%</b> | <b>0.2%</b>                     | <b>0.1%</b>                         | <b>1,691,667</b>             |                        |

# Careers in Energy



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## Utilities

Electrical Power Line Installers have the highest average wage rates at all levels of experience among careers in the sub-cluster that do not require a four-year degree or higher.

### Sub-Cluster Wages

#### Core Sub-Cluster Wage Distribution

Mean

\$95,700

Entry Level

\$69,000

Experienced

\$109,100

| # | Sub-Cluster Occupation (SOC) with Requirements for an Associate Degree or Less          | Wages           |                 |                  |                 |                               |                  |                |
|---|-----------------------------------------------------------------------------------------|-----------------|-----------------|------------------|-----------------|-------------------------------|------------------|----------------|
|   |                                                                                         | Mean            | Entry Level     | Experienced      | 50% Median      | Typical Entry-Level Education | Empl             | Under employed |
| 1 | First-Line Supervisors of Construction Trades and Extraction Workers (47-1011)          | \$95,900        | \$68,100        | \$109,800        | \$96,200        | HS or equivalent              | 14,227           | 2,327          |
| 2 | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011)                | \$89,400        | \$61,200        | \$103,500        | \$85,900        | HS or equivalent              | 9,514            | 1,923          |
| 3 | Refuse and Recyclable Material Collectors (53-7081)                                     | \$58,100        | \$40,700        | \$66,800         | \$60,300        | None                          | 2,663            | 259            |
| 4 | Telecommunications Equipment Installers and Repairers, Except Line Installers (49-2022) | \$70,800        | \$51,300        | \$80,600         | \$70,100        | PS Certificate                | 2,298            | 470            |
| 5 | Water and Wastewater Treatment Plant and System Operators (51-8031)                     | \$72,900        | \$57,800        | \$80,400         | \$72,700        | HS or equivalent              | 2,147            | 396            |
| 6 | Electrical Power-Line Installers and Repairers (49-9051)                                | \$104,400       | \$82,700        | \$115,300        | \$104,800       | HS or equivalent              | 2,005            | 233            |
| 7 | Electrical and Electronic Engineering Technologists and Technicians (17-3023)           | \$76,700        | \$58,300        | \$86,000         | \$75,700        | Associate degree              | 1,985            | 485            |
| 8 | Telecommunications Line Installers and Repairers (49-9052)                              | \$67,800        | \$50,300        | \$76,600         | \$64,000        | HS or equivalent              | 1,500            | 242            |
|   | <b>Utilities – Core</b>                                                                 | <b>\$95,700</b> | <b>\$69,000</b> | <b>\$109,100</b> | <b>\$94,100</b> | -                             | <b>52,548</b>    | <b>7,666</b>   |
|   | <b>Total - All Occupations</b>                                                          | <b>\$70,600</b> | <b>\$35,100</b> | <b>\$88,300</b>  | <b>\$55,300</b> | -                             | <b>3,124,097</b> | <b>518,636</b> |

# Careers in Energy



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## Utilities Sub-Cluster Demand – Related Industry Occupations

### Related Industries with Demand

- NAICS 2212 – Natural Gas Distribution
- NAICS 2213 – Water, Sewage and Other Sys.
- NAICS 221122 – Electric Power Distribution
- NAICS 221112 – Fossil Fuel Electric Power
- NAICS 221121 – Electric Bulk Power Transmission and Control
- NAICS 221118 – Other Electric Power Gen.

| # | Occupation (SOC)                                                             | Ind Empl         | Mean Annual Wages | 5-Year Total Demand Estimate | Cross-Cutting Clusters | Inter-disciplinary Clusters | % of Total Empl in Ind |
|---|------------------------------------------------------------------------------|------------------|-------------------|------------------------------|------------------------|-----------------------------|------------------------|
| 1 | Customer Service Representatives (43-4051)                                   | 734              | \$54,900          | 472                          |                        | -                           | 1%                     |
| 2 | Electrical Engineers (17-2071)                                               | 542              | \$119,400         | 200                          | -                      |                             | 13%                    |
| 3 | Control and Valve Installers and Repairers, Except Mechanical Door (49-9012) | 524              | \$76,000          | 235                          | -                      |                             | 52%                    |
| 4 | Office Clerks, General (43-9061)                                             | 237              | \$68,400          | 99                           |                        | -                           | <1%                    |
| 5 | Electricians (47-2111)                                                       | 220              | \$117,900         | 41                           | -                      |                             | 2%                     |
| 6 | Project Management Specialists (13-1082)                                     | 215              | \$119,200         | 31                           |                        | -                           | 1%                     |
| 7 | Accountants and Auditors (13-2011)                                           | 200              | \$106,500         | 48                           | -                      | -                           | 1%                     |
| 8 | Plumbers, Pipefitters, and Steamfitters (47-2152)                            | 186              | \$87,700          | 69                           | -                      |                             | 2%                     |
|   | <b>Utilities – Related Industries</b>                                        | <b>7,566</b>     | <b>-</b>          | <b>3,106</b>                 | <b>-</b>               | <b>-</b>                    | <b>&lt;1%</b>          |
|   | <b>Total – All Occupations</b>                                               | <b>3,124,097</b> | <b>\$70,600</b>   | <b>1,691,667</b>             | <b>-</b>               | <b>-</b>                    | <b>-</b>               |

### Inter-disciplinary Clusters\*

Digital Technology  
 Marketing & Sales  
 Management & Entrepreneurship  
 Agriculture  
 Advanced Manufacturing  
 Construction  
 Supply Chain & Transportation  
 Public Service & Safety

**52,548**  
Core Occupation Employment

**7,566**  
Related Career Employment

**25,019**  
New Talent by 2029Q4

**High**  
Talent Shortage Severity

# Careers in Energy



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## Utilities

**Job Posting Analysis**  
Advertised May 2024 – April 2025

### Top Job Titles

- 1) Maintenance Manager
- 2) Field Technician
- 3) Electronics Engineer
- 4) Engineering Manager
- 5) Utility Locator
- 6) Electronics /Electrical Technician
- 7) Electrical Project Manager
- 8) Utilities Equipment Repairer
- 9) Maintenance Director
- 10) Power Generation Equipment Repairer

### Top Employers Hiring

- 1) Honeywell
- 2) U.S. Army
- 3) M. A. Mortenson Company
- 4) Navy
- 5) Boston Scientific Corporation
- 6) Xcel Energy
- 7) DISH Network Corporation
- 8) Medtronic
- 9) Michael Page
- 10) Midco

**9,464 Posts**

-10% from prior year

**\$88-\$143K**

Posted Salary Range

Hiring Difficulty: **Moderate**  
Share Remote Postings: 4%  
Share Hybrid Postings: 13%

### Top Essential Skills

- 1) Communication
- 2) Leadership
- 3) Scheduling
- 4) Collaboration
- 5) Analysis

### Top Knowledge Areas and Technical Skills

- 1) Operations
- 2) Project Management
- 3) Electronics / Electrical Systems
- 4) Preventive Maintenance
- 5) Computer Usage (Mid-Level)

### Top Credentials

- 1) Driver's License (CDL)
- 2) Project Management Professional (PMP)
- 3) Professional Engineer License
- 4) EPA Certification
- 5) National Electrical Code



### Utilities

### Job Posting and Profile Gap Analysis Advertised May 2024 – April 2025

#### Top 10 Skill Gaps in Minnesota

| Name                        | Candidates | Openings | Gap  |
|-----------------------------|------------|----------|------|
| Telecommunications          | 115        | 277      | -162 |
| Google                      | 4          | 159      | -155 |
| Power Tools                 | 91         | 154      | -63  |
| Autodesk AutoCAD            | 122        | 159      | -37  |
| Roofing                     | 17         | 47       | -30  |
| Reading Schematics          | 22         | 47       | -25  |
| Procore                     | 25         | 48       | -24  |
| Boilers                     | 92         | 115      | -23  |
| Project Management Software | 3          | 23       | -20  |
| Forklifts                   | 44         | 64       | -20  |

#### Top 10 Certification Gaps in Minnesota

| Name                                                    | Candidates | Openings | Gap |
|---------------------------------------------------------|------------|----------|-----|
| Commercial Driver's License (CDL)                       | 135        | 196      | -61 |
| Class A Commercial Driver's License (CDL-A)             | 36         | 71       | -35 |
| Registered Environmental Manager (REM)                  | 0          | 8        | -8  |
| Engineer in Training (EIT)                              | 9          | 15       | -5  |
| EPA Universal Certification                             | 0          | 5        | -5  |
| Class B Commercial Driver's License (CDL-B)             | 11         | 16       | -5  |
| Certified Welding Inspector (CWI)                       | 7          | 11       | -4  |
| Transportation Worker Identification Credential (TWIC)  | 0          | 4        | -4  |
| Industry Radiography Radiation Safety Personnel (IRRSP) | 0          | 3        | -3  |
| Project Management Professional (PMP)                   | 11         | 14       | -3  |

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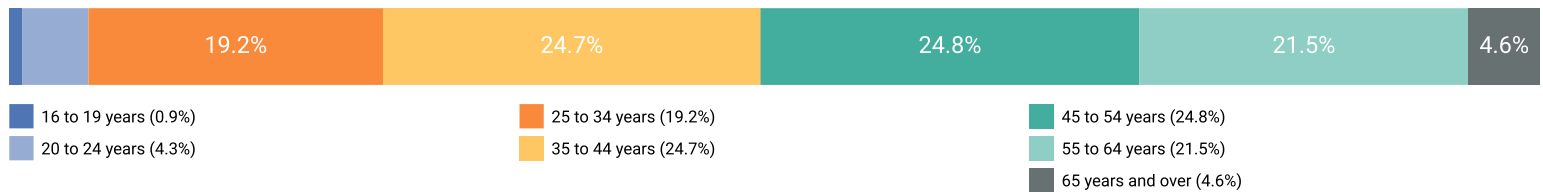
## Utilities

### Estimated Talent Pool Diversity (Across all industries statewide)

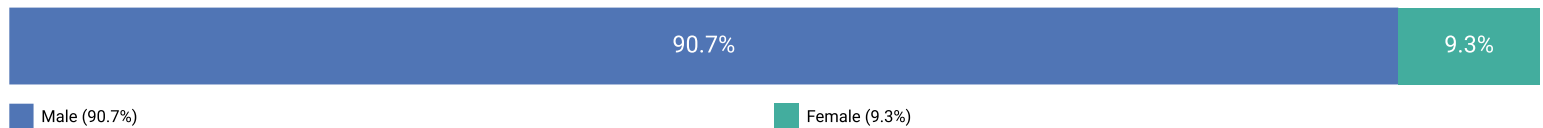
Underrepresentation of talent who are:

- Female
- Black or African American
- Asian
- More than one race
- Hispanic or Latine
- Under 35 years old or over 65

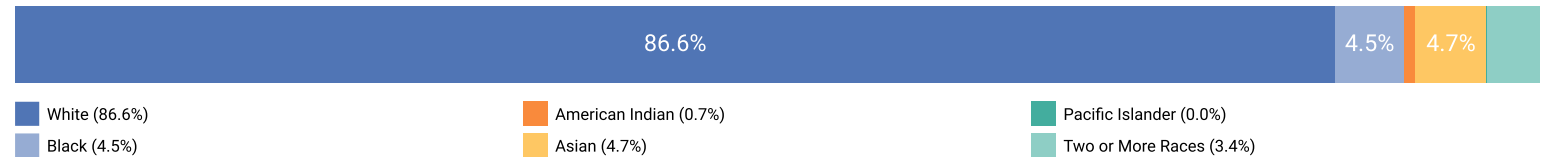
#### Age



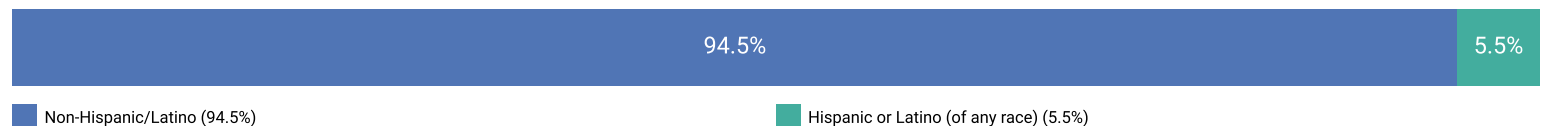
#### Gender



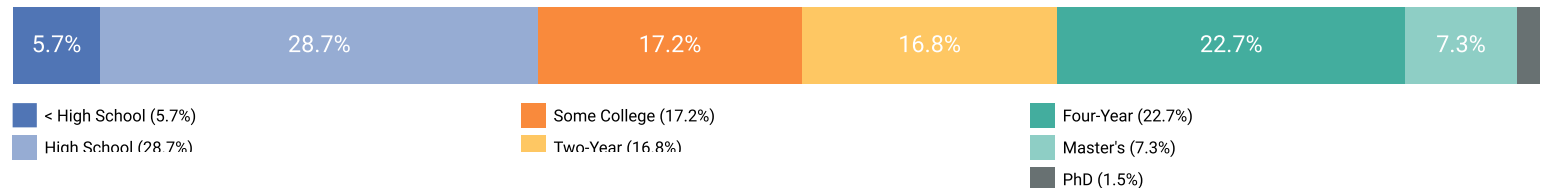
#### Race



#### Ethnicity



#### Educational Attainment



# Careers in Energy



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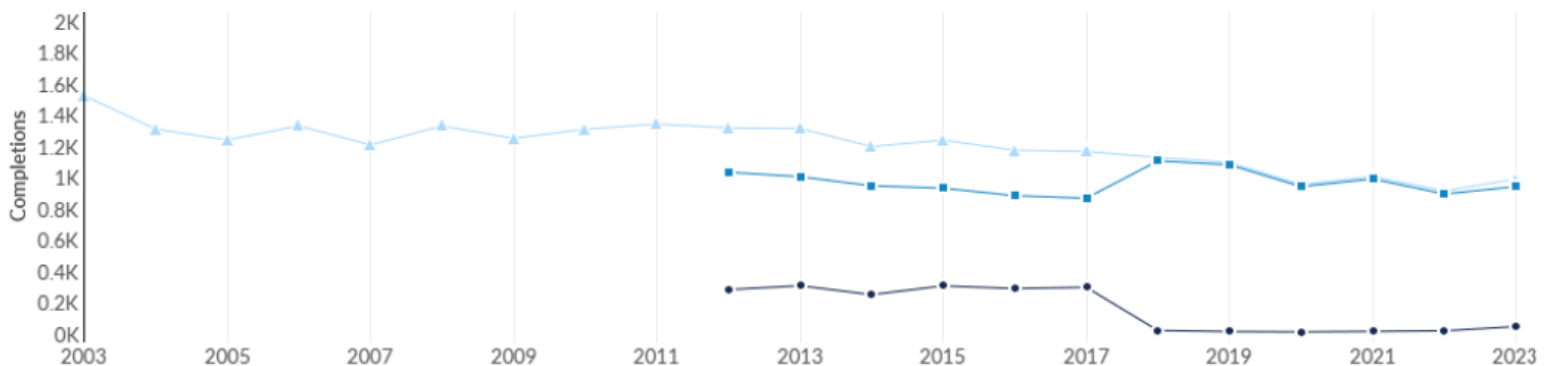
## Utilities

### Aligned Postsecondary Programs With Awards Conferred, SY2023



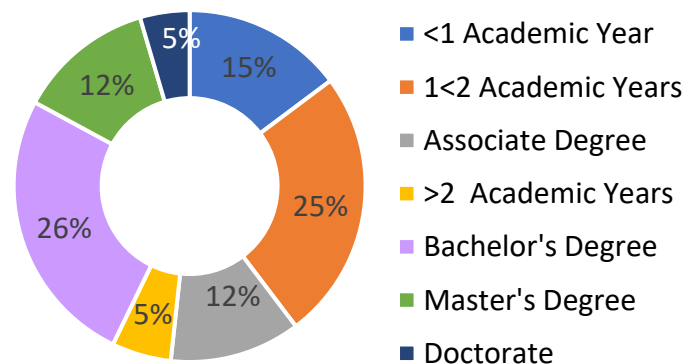
| Institution Type                        | Completions (2023) | Market Share |
|-----------------------------------------|--------------------|--------------|
| Public, 2-year                          | 510                | 51.6%        |
| Public, 4-year or above                 | 390                | 39.5%        |
| Private not-for-profit, 4-year or above | 88                 | 8.9%         |

### Annual Completions by Delivery Type



|                               |        |
|-------------------------------|--------|
| Distance Offered Programs     | -83.4% |
| Non-Distance Offered Programs | -8.9%  |
| All Programs                  | -24.9% |

### Completions SY2023



**30**

Institutions with aligned programs

# Careers in Energy



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## Utilities



## Aligned Postsecondary Programs With Awards Conferred, SY2023

### Market Share by Program

| Program                                                                                | Completions (2023) | Market Share |
|----------------------------------------------------------------------------------------|--------------------|--------------|
| Electrical and Electronics Engineering (14.1001)                                       | 275                | 27.8%        |
| Lineworker (46.0303)                                                                   | 157                | 15.9%        |
| Plumbing Technology/Plumber (46.0503)                                                  | 135                | 13.7%        |
| Electrical, Electronic, and Communications Engineering Technology/Technician (15.0303) | 105                | 10.6%        |
| Other                                                                                  | 316                | 32.0%        |

| Institution                                     | Completions (2023) | Growth % YOY (2023) | Market Share (2023) | IPEDS Tuition & Fees (2023) | Completions Trend (2019-2023) |
|-------------------------------------------------|--------------------|---------------------|---------------------|-----------------------------|-------------------------------|
| University of Minnesota-Twin Cities             | 207                | 8.4%                | 21.0%               | \$16,488                    |                               |
| Minnesota State Community and Technical College | 88                 | 18.9%               | 8.9%                | \$5,900                     |                               |
| Hennepin Technical College                      | 88                 | -14.6%              | 8.9%                | \$5,881                     |                               |
| Minnesota State University-Mankato              | 66                 | -13.2%              | 6.7%                | \$9,490                     |                               |
| Minnesota West Community and Technical College  | 61                 | -12.9%              | 6.2%                | \$6,484                     |                               |
| University of Minnesota-Duluth                  | 58                 | 9.4%                | 5.9%                | \$14,318                    |                               |
| University of St Thomas                         | 48                 | -18.6%              | 4.9%                | \$52,284                    |                               |
| Saint Cloud State University                    | 47                 | 38.2%               | 4.8%                | \$10,117                    |                               |
| Dakota County Technical College                 | 42                 | 5.0%                | 4.3%                | \$6,419                     |                               |
| Anoka Technical College                         | 35                 | 150.0%              | 3.5%                | \$6,267                     |                               |

# Careers in Energy



MINNESOTA STATE  
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## Utilities

### Aligned Postsecondary Programs With Awards Conferred, SY2023

#### Graduate Demographics, All Programs



White

Black or African American

American Indian

Asian

Pacific Islander

Two or More Races

Hispanic or Latine

International Students

Unknown Race/Ethnicity

| # | Description                                     | Total Completions | Male       | Female     | Black or African American | American Indian | Asian     | Hispanic or Latine | White      | Two or More Races | Unknown Race/Ethnicity | International Students |
|---|-------------------------------------------------|-------------------|------------|------------|---------------------------|-----------------|-----------|--------------------|------------|-------------------|------------------------|------------------------|
| 1 | University of Minnesota-Twin Cities             | 207               | 74%        | 26%        | 4%                        | 0%              | 8%        | 2%                 | 43%        | 4%                | 1%                     | 38%                    |
| 2 | Hennepin Technical College                      | 88                | 94%        | 6%         | 13%                       | 0%              | 17%       | 7%                 | 53%        | 9%                | 1%                     | 0%                     |
| 3 | Minnesota State Community and Technical College | 88                | 99%        | 1%         | 14%                       | 1%              | 1%        | 2%                 | 81%        | 1%                | 0%                     | 0%                     |
| 4 | Minnesota State University-Mankato              | 66                | 79%        | 21%        | 5%                        | 0%              | 8%        | 5%                 | 67%        | 3%                | 0%                     | 14%                    |
| 5 | Minnesota West Community and Technical College  | 61                | 100%       | 0%         | 0%                        | 0%              | 0%        | 7%                 | 93%        | 0%                | 0%                     | 0%                     |
| 6 | University of Minnesota-Duluth                  | 58                | 83%        | 17%        | 5%                        | 0%              | 5%        | 7%                 | 71%        | 3%                | 2%                     | 5%                     |
| 7 | University of St Thomas                         | 48                | 69%        | 31%        | 10%                       | 0%              | 4%        | 6%                 | 54%        | 10%               | 6%                     | 8%                     |
| 8 | Saint Cloud State University                    | 47                | 85%        | 15%        | 11%                       | 0%              | 0%        | 0%                 | 70%        | 0%                | 0%                     | 19%                    |
| 9 | Dakota County Technical College                 | 42                | 100%       | 0%         | 0%                        | 0%              | 0%        | 0%                 | 98%        | 2%                | 0%                     | 0%                     |
|   | Others                                          | 283               | 84%        | 16%        | 3%                        | 1%              | 4%        | 8%                 | 79%        | 2%                | 1%                     | 1%                     |
|   | <b>Total</b>                                    | <b>988</b>        | <b>85%</b> | <b>15%</b> | <b>6%</b>                 | <b>1%</b>       | <b>5%</b> | <b>8%</b>          | <b>68%</b> | <b>3%</b>         | <b>1%</b>              | <b>11%</b>             |

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Enhancing education.  
Inspiring students.



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# Interdisciplinary Clusters



**RealTime Talent**

# Careers in Energy



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## Digital Technology – Cross-Cutting Cluster Demand in the Industry

| #  | Cross-Cutting Cluster Occupation (SOC)                    | Total Empl | NAICS 21-22 Ind Empl | % Empl in NAICS 21-22 | 5-Year Total Industry Demand Estimate | Other Inter-disciplinary Clusters | Typical Entry-Level Edu |
|----|-----------------------------------------------------------|------------|----------------------|-----------------------|---------------------------------------|-----------------------------------|-------------------------|
| 1  | Software Developers (15-1252)                             | 35,595     | 88                   | <1%                   | 21                                    | -                                 | Bachelor's degree       |
| 2  | Computer User Support Specialists (15-1232)               | 13,037     | 70                   | 1%                    | 23                                    | -                                 | Some college, no degree |
| 3  | Computer Systems Analysts (15-1211)                       | 11,423     | 135                  | 1%                    | 48                                    | -                                 | Bachelor's degree       |
| 4  | Computer and Information Systems Managers (11-3021)       | 10,868     | 73                   | 1%                    | 31                                    | -                                 | Bachelor's degree       |
| 5  | Computer Network Support Specialists (15-1231)            | 4,853      | 49                   | 1%                    | 17                                    | -                                 | Associate degree        |
| 6  | Computer Occupations, All Other (15-1299)                 | 4,780      | 40                   | 1%                    | 14                                    | ●                                 | Bachelor's degree       |
| 7  | Network and Computer Systems Administrators (15-1244)     | 4,590      | 57                   | 1%                    | 15                                    | -                                 | Bachelor's degree       |
| 8  | Information Security Analysts (15-1212)                   | 3,119      | 36                   | 1%                    | 16                                    | -                                 | Bachelor's degree       |
| 9  | Software Quality Assurance Analysts and Testers (15-1253) | 2,954      | 5                    | <1%                   | 2                                     | -                                 | Bachelor's degree       |
| 10 | Computer Network Architects (15-1241)                     | 2,519      | 29                   | 1%                    | 9                                     | -                                 | Bachelor's degree       |
|    | All Other                                                 | 11,931     | 53                   | <1%                   | 17                                    | -                                 |                         |
|    | Total – All Occupations                                   | 3,124,097  | 20,526               | <1%                   | 9,322                                 | -                                 | -                       |



Energy & Natural Resources

**Inter-disciplinary Clusters\***



Digital Technology



Marketing & Sales



Management & Entrepreneurship



Agriculture



Advanced Manufacturing



Construction



Supply Chain & Transportation



Public Service & Safety

**105,672**

Total Cluster Employment

**633**

Related Energy Industry Employment

**35,734**

Total New Talent by 2029Q4

**High**

Talent Shortage Severity

# Careers in Energy



**MINNESOTA STATE**  
Energy Center of Excellence

## Marketing and Sales – Cross-Cutting Cluster Demand in the Industry

| #  | Cross-Cutting Cluster Occupation (SOC)                                                                     | Total Empl       | NAICS 21-22 Ind Empl | % Empl in NAICS 21-22 | 5-Year Total Industry Demand Estimate | Other Inter-disciplinary Clusters | Typical Entry-Level Edu |
|----|------------------------------------------------------------------------------------------------------------|------------------|----------------------|-----------------------|---------------------------------------|-----------------------------------|-------------------------|
| 1  | Retail Salespersons (41-2031)                                                                              | 69,428           | 6                    | <1%                   | 5                                     | -                                 | None                    |
| 2  | Cashiers (41-2011)                                                                                         | 62,856           | 20                   | <1%                   | 18                                    | -                                 | None                    |
| 3  | Customer Service Representatives (43-4051)                                                                 | 59,637           | 744                  | 1%                    | 478                                   | -                                 | HS or equivalent        |
| 4  | Sales Representatives, Wholesale and Manufacturing (41-4012)                                               | 31,315           | 37                   | <1%                   | 17                                    | -                                 | HS or equivalent        |
| 5  | First-Line Supervisors of Retail Sales Workers (41-1011)                                                   | 25,535           | 2                    | <1%                   | 1                                     | -                                 | HS or equivalent        |
| 6  | Market Research Analysts and Marketing Specialists (13-1161)                                               | 22,639           | 100                  | <1%                   | 31                                    | -                                 | Bachelor's degree       |
| 7  | Sales Representatives of Services, Except Advertising, Insurance, Financial Services, and Travel (41-3091) | 19,253           | 104                  | 1%                    | 40                                    | -                                 | HS or equivalent        |
| 8  | Sales Managers (11-2022)                                                                                   | 10,666           | 29                   | <1%                   | 10                                    | -                                 | Bachelor's degree       |
| 9  | Marketing Managers (11-2021)                                                                               | 8,368            | 41                   | <1%                   | 17                                    | -                                 | Bachelor's degree       |
| 10 | Purchasing Agents, Except Wholesale, Retail, and Farm Products (41-4011)                                   | 7,228            | 110                  | 2%                    | 48                                    | -                                 | Bachelor's degree       |
|    | All Other                                                                                                  | 36,983           | 65                   | <1%                   | 44                                    | -                                 | None                    |
|    | <b>Total – All Occupations</b>                                                                             | <b>3,124,097</b> | <b>20,526</b>        | <b>&lt;1%</b>         | <b>9,322</b>                          | <b>-</b>                          | <b>-</b>                |



Energy & Natural Resources

**Inter-disciplinary Clusters\***



Digital Technology



Marketing & Sales



Management & Entrepreneurship



Agriculture



Advanced Manufacturing



Construction



Supply Chain & Transportation



Public Service & Safety

**353,911**

Total Cluster Employment

**1,259**

Related Energy Industry Employment

**209,470**

Total New Talent by 2029Q4

**Average**

Talent Shortage Severity

# Careers in Energy



**MINNESOTA STATE**  
Energy Center of Excellence

## Management and Entrepreneurship – Cross-Cutting Cluster Demand in the Industry

| #  | Cross-Cutting Cluster Occupation (SOC)                                                    | Total Empl       | NAICS 21-22 Ind Empl | % Empl in NAICS 21-22 | 5-Year Total Industry Demand Estimate | Other Inter-disciplinary Clusters | Typical Entry-Level Edu |
|----|-------------------------------------------------------------------------------------------|------------------|----------------------|-----------------------|---------------------------------------|-----------------------------------|-------------------------|
| 1  | General and Operations Managers (11-1021)                                                 | 75,479           | 627                  | 1%                    | 196                                   |                                   | Bachelor's degree       |
| 2  | Office Clerks, General (42-9061)                                                          | 57,093           | 326                  | 1%                    | 154                                   | -                                 | HS or equivalent        |
| 3  | Secretaries and Administrative Assistants, Except Legal, Medical, and Executive (43-1011) | 35,150           | 186                  | 1%                    | 101                                   | -                                 | HS or equivalent        |
| 4  | Supervisors of Office and Admin. Support Workers (43-1011)                                | 25,260           | 185                  | 1%                    | 73                                    | -                                 | HS or equivalent        |
| 5  | Management Analysts (13-1111)                                                             | 22,326           | 206                  | 1%                    | 71                                    |                                   | Bachelor's degree       |
| 6  | Business Operations Specialists, All Other (13-1199)                                      | 18,270           | 241                  | 1%                    | 107                                   | -                                 | Bachelor's degree       |
| 7  | Project Management Specialists (13-1082)                                                  | 17,574           | 278                  | 2%                    | 63                                    | -                                 | Bachelor's degree       |
| 8  | Human Resources Specialists (13-1071)                                                     | 17,032           | 100                  | 1%                    | 36                                    | -                                 | Bachelor's degree       |
| 9  | Managers, All Other (11-9199)                                                             | 16,752           | 132                  | 1%                    | 50                                    |                                   | Bachelor's degree       |
| 10 | Financial Managers (11-3031)                                                              | 16,734           | 112                  | 1%                    | 31                                    | -                                 | Bachelor's degree       |
|    | All Other                                                                                 | 107,868          | 4,431                | 4%                    | 447                                   | -                                 |                         |
|    | <b>Total – All Occupations</b>                                                            | <b>3,124,097</b> | <b>20,526</b>        | <b>&lt;1%</b>         | <b>9,322</b>                          | -                                 | -                       |



Energy & Natural Resources

**Inter-disciplinary Clusters\***



Digital Technology



Marketing & Sales



Management & Entrepreneurship



Agriculture



Advanced Manufacturing



Construction



Supply Chain & Transportation



Public Service & Safety

**409,676**

Total Cluster Employment

**6,823**

Related Energy Industry Employment

**183,506**

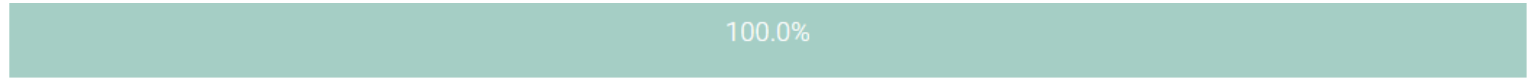
Total New Talent by 2029Q4

**High**

Talent Shortage Severity



### Management and Entrepreneurship –Shared Core Occupations



■ Short-term OJT, no exp, no award (0.0%)
 ■ Long-term training, no exp, no award (0.0%)
 ■ 2-year degree or certificate (0.0%)
 ■ Moderate-term OJT, no exp, no award (0.0%)
 ■ Previous work experience, no award (0.0%)
 ■ Bachelor's degree (100.0%)

| # | Core Cluster Occupation (SOC) with Interdisciplinary Alignments | Empl   | Mean Annual Wages | 5-Year Total Demand Estimate | Typical Entry-Level Education | Previous Work Experience | Typical On-the-Job Training | Current (C) or Future (F) MN State ENR Program |
|---|-----------------------------------------------------------------|--------|-------------------|------------------------------|-------------------------------|--------------------------|-----------------------------|------------------------------------------------|
| 1 | General and Operations Managers (11-1021)                       | 75,479 | \$122,500         | 31,194                       | Bachelor's degree             | >5 years                 | None                        |                                                |
| 2 | Compliance Officers (13-1041)                                   | 6,909  | \$88,100          | 2,774                        | Bachelor's degree             | None                     | Mod-term OJT                | C                                              |
| 3 | Facilities Managers (11-3013)                                   | 2,796  | \$111,300         | 1,167                        | Bachelor's degree             | <5 years                 | None                        | C                                              |
| 4 | Mathematical Science Occupations, All Other (15-2099)           | 66     | \$83,200          | 22                           | Bachelor's degree             | None                     | None                        |                                                |
| 5 | Mathematicians (15-2021)*                                       | 23     | \$118,800         | 7                            | Master's degree               | None                     | None                        |                                                |

\*Both Digital Technology and Marketing and Sales only share the Mathematician occupation with the Energy and Natural Resources Core Cluster Occupations.

# Careers in Energy



**MINNESOTA STATE**  
Energy Center of Excellence

## Agriculture – Related Cluster Demand in the Industry

| #  | Cross-Cutting Cluster Occupation (SOC)                            | Total Empl       | NAICS 21-22 Ind Empl | % Empl in NAICS 21-22 | 5-Year Total Industry Demand Estimate | Other Inter-disciplinary Clusters                                                                                                                                                                                                                           | Typical Entry-Level Edu |
|----|-------------------------------------------------------------------|------------------|----------------------|-----------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 1  | Farmers, Ranchers, and Other Agricultural Managers (11-9013)      | 22,594           | -                    | -                     | -                                     |                                                                                                                                                                                                                                                             | HS or equivalent        |
| 2  | Farmworkers and Laborers, Crop, Nursery, and Greenhouse (45-2092) | 6,710            | 1                    | <1%                   | 1                                     |                                                                                                                                                                                                                                                             | None                    |
| 3  | Animal Caretakers (39-2021)                                       | 6,085            | -                    | -                     | -                                     |                                                                                                                                                                                                                                                             | HS or equivalent        |
| 4  | Farmworkers, Farm, Ranch, and Aquacultural Animals (45-2093)      | 5,566            | -                    | -                     | -                                     |                                                                                                                                                                                                                                                             | None                    |
| 5  | Architectural and Engineering Managers (11-9041)                  | 4,147            | 141                  | 3%                    | 29                                    |    | Bachelor's degree       |
| 6  | Meat, Poultry, and Fish Cutters and Trimmers (51-3022)            | 3,773            | -                    | -                     | -                                     |                                                                                                                                                                                                                                                             | None                    |
| 7  | Veterinary Technologists and Technicians (29-2056)                | 3,741            | -                    | -                     | -                                     |                                                                                                                                                                                                                                                             | Associate degree        |
| 8  | Slaughterers and Meat Packers (51-3023)                           | 2,566            | -                    | -                     | -                                     |                                                                                                                                                                                                                                                             | None                    |
| 9  | Food Processing Workers, All Other (51-3099)                      | 2,548            | -                    | -                     | -                                     |                                                                                                                                                                        | None                    |
| 10 | Butchers and Meat Cutters (51-3021)                               | 2,470            | -                    | -                     | -                                     |                                                                                                                                                                                                                                                             | None                    |
|    | All Other                                                         | 18,819           | 395                  | 2%                    | 61                                    | -                                                                                                                                                                                                                                                           |                         |
|    | <b>Total – All Occupations</b>                                    | <b>3,124,097</b> | <b>20,526</b>        | <b>&lt;1%</b>         | <b>9,322</b>                          | -                                                                                                                                                                                                                                                           | -                       |



Energy & Natural Resources

**Inter-disciplinary Clusters\***



Digital Technology



Marketing & Sales



Management & Entrepreneurship



Agriculture



Advanced Manufacturing



Construction



Supply Chain & Transportation



Public Service & Safety

**79,019**

Total Cluster Employment

**538**

Related Energy Industry Employment

**45,968**

Total New Talent by 2029Q4

**Moderate**

Talent Shortage Severity

# Careers in Energy



MINNESOTA STATE  
Energy Center of Excellence

## Agriculture – Shared Core Occupations



■ Short-term OJT, no exp, no award (0.0%) 
 ■ Long-term training, no exp, no award (0.0%) 
 ■ 2-year degree or certificate (7.8%) 
 ■ Moderate-term OJT, no exp, no award (0.0%) 
 ■ Previous work experience, no award (11.6%) 
 ■ Bachelor's degree (80.6%)

| #  | Core Cluster Occupation (SOC) with Interdisciplinary Alignments            | Empl  | Mean Annual Wages | 5-Year Total Demand Estimate | Typical Entry-Level Education | Previous Work Experience | Typical On-the-Job Training | Current (C) or Future (F) MN State ENR Program |
|----|----------------------------------------------------------------------------|-------|-------------------|------------------------------|-------------------------------|--------------------------|-----------------------------|------------------------------------------------|
| 1  | Architectural and Engineering Managers (11-9041)                           | 4,147 | \$178,800         | 1,341                        | Bachelor's degree             | >5 years                 | None                        | F                                              |
| 2  | Engineers, All Other (17-2199)                                             | 2,300 | \$123,100         | 675                          | Bachelor's degree             | None                     | None                        | F                                              |
| 3  | First-Line Supervisors of Farming, Fishing, and Forestry Workers (45-1011) | 1,246 | \$68,200          | 834                          | HS or equivalent              | <5 years                 | None                        | C                                              |
| 4  | Biological Scientists, All Other (19-1029)                                 | 782   | \$97,300          | 303                          | Bachelor's degree             | None                     | None                        |                                                |
| 5  | Forest and Conservation Technicians (19-4071)                              | 561   | \$60,700          | 342                          | Associate degree              | None                     | None                        | C                                              |
| 6  | Microbiologists (19-1022)                                                  | 462   | \$99,700          | 178                          | Bachelor's degree             | None                     | None                        |                                                |
| 7  | Soil and Plant Scientists (19-1013)                                        | 383   | \$74,500          | 146                          | Bachelor's degree             | None                     | None                        |                                                |
| 8  | Foresters (19-1032)                                                        | 367   | \$77,700          | 156                          | Bachelor's degree             | None                     | None                        | F                                              |
| 9  | Environmental Engineering Technologists and Technicians (17-3025)          | 234   | \$68,000          | 96                           | Associate degree              | None                     | None                        | F                                              |
| 10 | Hydrologists (19-2043)                                                     | 187   | \$91,100          | 68                           | Bachelor's degree             | None                     | None                        |                                                |

# Careers in Energy



**MINNESOTA STATE**  
Energy Center of Excellence

## Advanced Manufacturing – Related Cluster Demand in the Industry

| #  | Cross-Cutting Cluster Occupation (SOC)                                   | Total Empl       | NAICS 21-22 Ind Empl | % Empl in NAICS 21-22 | 5-Year Total Industry Demand Estimate | Other Inter-disciplinary Clusters | Typical Entry-Level Edu |
|----|--------------------------------------------------------------------------|------------------|----------------------|-----------------------|---------------------------------------|-----------------------------------|-------------------------|
| 1  | Team Assemblers (51-2092)                                                | 27,379           | 2                    | <1%                   | 2                                     | -                                 | HS or equivalent        |
| 2  | Industrial Engineers (17-2112)                                           | 17,371           | 136                  | 1%                    | 45                                    | -                                 | Bachelor's degree       |
| 3  | First-Line Supervisors of Production and Operating Workers (51-1011)     | 13,770           | 331                  | 2%                    | 122                                   | -                                 | HS or equivalent        |
| 4  | Inspectors, Testers, Sorters, Samplers, and Weighers (51-9061)           | 11,182           | 72                   | 1%                    | 33                                    | -                                 | HS or equivalent        |
| 5  | Machinists (51-4041)                                                     | 10,374           | 19                   | <1%                   | 8                                     | -                                 | HS or equivalent        |
| 6  | Welders, Cutters, Solderers, and Brazers (51-4121)                       | 10,015           | 80                   | 1%                    | 31                                    | ●                                 | HS or equivalent        |
| 7  | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011) | 9,514            | 677                  | 7%                    | 316                                   | ● ● ●                             | HS or equivalent        |
| 8  | Industrial Machinery Mechanics (49-9041)                                 | 7,532            | 372                  | 5%                    | 117                                   | ●                                 | HS or equivalent        |
| 9  | Mechanical Engineers (17-2141)                                           | 5,901            | 38                   | 1%                    | 15                                    | -                                 | Bachelor's degree       |
| 10 | Printing Press Operators (51-5112)                                       | 5,546            | 1                    | <1%                   | 0                                     | -                                 | HS or equivalent        |
|    | All Other                                                                | 132,153          | 2,620                | 2%                    | 1,126                                 | -                                 |                         |
|    | <b>Total – All Occupations</b>                                           | <b>3,124,097</b> | <b>20,526</b>        | <b>&lt;1%</b>         | <b>9,322</b>                          | -                                 | -                       |



Energy & Natural Resources

**Inter-disciplinary Clusters\***



Digital Technology



Marketing & Sales



Management & Entrepreneurship



Agriculture



Advanced Manufacturing



Construction



Supply Chain & Transportation



Public Service & Safety

**250,743**

Total Cluster Employment

**4,346**

Related Energy Industry Employment

**117,157**

Total New Talent by 2029Q4

**High**

Talent Shortage Severity

# Careers in Energy



MINNESOTA STATE  
Energy Center of Excellence

## Advanced Manufacturing – Shared Core Occupations



| #  | Core Cluster Occupation (SOC) with Interdisciplinary Alignments               | Empl  | Mean Annual Wages | 5-Year Total Demand Estimate | Typical Entry-Level Education | Previous Work Experience | Typical On-the-Job Training | Current (C) or Future (F) MN State ENR Program |
|----|-------------------------------------------------------------------------------|-------|-------------------|------------------------------|-------------------------------|--------------------------|-----------------------------|------------------------------------------------|
| 1  | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011)      | 9,514 | \$89,400          | 3,837                        | HS or equivalent              | <5 years                 | None                        | C                                              |
| 2  | Industrial Machinery Mechanics (49-9041)                                      | 7,532 | \$72,800          | 3,594                        | HS or equivalent              | None                     | Long-term OJT               | F                                              |
| 3  | Industrial Engineering Technologists and Technicians (17-3026)                | 4,334 | \$72,600          | 1,845                        | Associate degree              | None                     | None                        |                                                |
| 4  | Architectural and Engineering Managers (11-9041)                              | 4,147 | \$178,800         | 1,341                        | Bachelor's degree             | >5 years                 | None                        | F                                              |
| 5  | Engineers, All Other (17-2199)                                                | 2,300 | \$123,100         | 675                          | Bachelor's degree             | None                     | None                        | F                                              |
| 6  | Electrical and Electronic Engineering Technologists and Technicians (17-3023) | 1,985 | \$76,700          | 892                          | Associate degree              | None                     | None                        | C                                              |
| 7  | Environmental Scientists and Specialists, Including Health (19-2041)          | 1,590 | \$86,500          | 733                          | Bachelor's degree             | None                     | None                        | C                                              |
| 8  | Natural Sciences Managers (11-9121)                                           | 1,394 | \$153,700         | 537                          | Bachelor's degree             | >5 years                 | None                        | F                                              |
| 9  | Engineering Technologists and Technicians, Except Drafters (17-3029)          | 992   | \$77,700          | 425                          | Associate degree              | None                     | None                        | C                                              |
| 10 | Commercial and Industrial Designers (27-1021)                                 | 832   | \$86,100          | 264                          | Bachelor's degree             | None                     | None                        | C                                              |

# Careers in Energy



MINNESOTA STATE  
Energy Center of Excellence

## Construction – Related Cluster Demand in the Industry

| #  | Cross-Cutting Cluster Occupation (SOC)                                   | Total Empl       | NAICS 21-22 Ind Empl | % Empl in NAICS 21-22 | 5-Year Total Industry Demand Estimate | Other Inter-disciplinary Clusters | Typical Entry-Level Edu |
|----|--------------------------------------------------------------------------|------------------|----------------------|-----------------------|---------------------------------------|-----------------------------------|-------------------------|
| 1  | Maintenance and Repair Workers, General (49-9071)                        | 30,867           | 308                  | 1%                    | 159                                   | -                                 | HS or equivalent        |
| 2  | Construction Laborers (47-2061)                                          | 28,428           | 153                  | 1%                    | 60                                    | -                                 | None                    |
| 3  | Carpenters (47-2031)                                                     | 18,245           | 8                    | <1%                   | 4                                     | -                                 | HS or equivalent        |
| 4  | Supervisors of Construction Trades and Extraction Workers (47-1011)      | 14,227           | 294                  | 2%                    | 107                                   |                                   | HS or equivalent        |
| 5  | Electricians (47-2111)                                                   | 12,094           | 370                  | 3%                    | 117                                   | -                                 | HS or equivalent        |
| 6  | Welders, Cutters, Solderers, and Brazers (51-4121)                       | 10,015           | 80                   | 1%                    | 31                                    |                                   | HS or equivalent        |
| 7  | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011) | 9,514            | 677                  | 7%                    | 316                                   |                                   | HS or equivalent        |
| 8  | Plumbers, Pipefitters, and Steamfitters (47-2152)                        | 9,139            | 204                  | 2%                    | 79                                    | -                                 | HS or equivalent        |
| 9  | Construction Managers (11-9021)                                          | 8,216            | 75                   | 1%                    | 23                                    |                                   | Bachelor's degree       |
| 10 | Operating Engineers and Other Construction Equipment Operators (47-2073) | 8,123            | 510                  | 6%                    | 209                                   | -                                 | HS or equivalent        |
|    | All Other                                                                | 93,864           | 23,586               | 4%                    | 1,824                                 | -                                 |                         |
|    | <b>Total – All Occupations</b>                                           | <b>3,124,097</b> | <b>20,526</b>        | <b>&lt;1%</b>         | <b>9,322</b>                          | -                                 | -                       |



Energy & Natural Resources

**Inter-disciplinary Clusters\***



Digital Technology



Marketing & Sales



Management & Entrepreneurship



Agriculture



Advanced Manufacturing



Construction



Supply Chain & Transportation



Public Service & Safety

242,728

Total Cluster Employment

6,265

Related Energy Industry Employment

105,151

Total New Talent by 2029Q4

High

Talent Shortage Severity

# Careers in Energy



MINNESOTA STATE  
Energy Center of Excellence

## Construction – Shared Core Occupations

5.4% 67.5% 6.6% 20.6%

Short-term OJT, no exp, no award (0.0%)

Long-term training, no exp, no award (0.0%)

2-year degree or certificate (6.6%)

Moderate-term OJT, no exp, no award (5.4%)

Previous work experience, no award (67.5%)

Bachelor's degree (20.6%)

| #  | Core Cluster Occupation (SOC) with Interdisciplinary Alignments                 | Empl   | Mean Annual Wages | 5-Year Total Demand Estimate | Typical Entry-Level Education | Previous Work Experience | Typical On-the-Job Training | Current (C) or Future (F) MN State ENR Program |
|----|---------------------------------------------------------------------------------|--------|-------------------|------------------------------|-------------------------------|--------------------------|-----------------------------|------------------------------------------------|
| 1  | Supervisors of Construction Trades and Extraction Workers (47-1011)             | 14,227 | \$95,900          | 5,743                        | HS or equivalent              | >5 years                 | None                        | C                                              |
| 2  | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011)        | 9,514  | \$89,400          | 3,837                        | HS or equivalent              | <5 years                 | None                        | C                                              |
| 3  | Architectural and Engineering Managers (11-9042)                                | 4,147  | \$178,800         | 1,341                        | Bachelor's degree             | >5 years                 | None                        | F                                              |
| 4  | Engineers, All Other (17-2199)                                                  | 2,300  | \$123,100         | 675                          | Bachelor's degree             | None                     | None                        | F                                              |
| 5  | Civil Engineering Technologists and Technicians (17-3022)                       | 1,424  | \$77,500          | 565                          | Associate degree              | None                     | None                        |                                                |
| 6  | Engineering Technologists and Technicians, Except Drafters, All Other (17-3029) | 992    | \$77,700          | 425                          | Associate degree              | None                     | None                        | C                                              |
| 7  | Surveyors (17-1022)                                                             | 904    | \$89,200          | 314                          | Bachelor's degree             | None                     | Internship/residency        |                                                |
| 8  | Continuous Mining Machine Operators (47-5049)                                   | 754    | \$73,900          | 437                          | None                          | None                     | Mod-term OJT                | F                                              |
| 9  | Underground Mining Machine Operators, All Other (47-5049)                       | 743    | \$77,400          | 431                          | None                          | None                     | Mod-term OJT                | F                                              |
| 10 | Excavating and Loading Machine and Dragline Operators, Surface Mining (47-5022) | 728    | \$76,600          | 385                          | HS or equivalent              | <5 years                 | Mod-term OJT                | F                                              |

# Careers in Energy



**MINNESOTA STATE**  
Energy Center of Excellence

## Supply Chain and Transportation – Related Cluster Demand in the Industry

| #  | Related Cluster Occupation (SOC)                                         | Total Empl       | NAICS 21-22 Ind Empl | % Empl in NAICS 21-22 | 5-Year Total Industry Demand Estimate | Other Inter-disciplinary Clusters                                                                                                                                                                                                                                 | Typical Entry-Level Edu |
|----|--------------------------------------------------------------------------|------------------|----------------------|-----------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|
| 1  | Laborers and Freight, Stock, and Material Movers, Hand (53-7062)         | 53,026           | 122                  | <1%                   | 65                                    | -                                                                                                                                                                                                                                                                 | None                    |
| 2  | Stockers and Order Fillers (53-7065)                                     | 43,755           | 93                   | <1%                   | 83                                    | -                                                                                                                                                                                                                                                                 | HS or equivalent        |
| 3  | Heavy and Tractor-Trailer Truck Drivers (53-3032)                        | 41,001           | 302                  | 1%                    | 144                                   | -                                                                                                                                                                                                                                                                 | PS Certificate          |
| 4  | Light Truck Drivers (53-3033)                                            | 18,677           | 11                   | <1%                   | 6                                     | -                                                                                                                                                                                                                                                                 | HS or equivalent        |
| 5  | Shipping, Receiving, and Inventory Clerks (43-5071)                      | 15,155           | 38                   | <1%                   | 19                                    | -                                                                                                                                                                                                                                                                 | HS or equivalent        |
| 6  | Automotive Service Technicians and Mechanics (49-3023)                   | 13,855           | 67                   | <1%                   | 31                                    | -                                                                                                                                                                                                                                                                 | PS Certificate          |
| 7  | Bus Drivers, School (53-3051)                                            | 10,518           | -                    | -                     | -                                     | -                                                                                                                                                                                                                                                                 | HS or equivalent        |
| 8  | Supervisors of Transportation and Material Moving Workers (53-1047)      | 9,553            | 34                   | <1%                   | 21                                    | -                                                                                                                                                                                                                                                                 | HS or equivalent        |
| 9  | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011) | 9,514            | 677                  | 7%                    | 316                                   |    | HS or equivalent        |
| 10 | Driver/Sales Workers (53-3031)                                           | 8,744            | 1                    | <1%                   | 1                                     | -                                                                                                                                                                                                                                                                 | HS or equivalent        |
|    | All Other                                                                | 130,037          | 854                  | 1%                    | 393                                   | -                                                                                                                                                                                                                                                                 |                         |
|    | <b>Total – All Occupations</b>                                           | <b>3,124,097</b> | <b>20,526</b>        | <b>&lt;1%</b>         | <b>9,322</b>                          | -                                                                                                                                                                                                                                                                 | -                       |



Energy & Natural Resources

**Inter-disciplinary Clusters\***



Digital Technology



Marketing & Sales



Management & Entrepreneurship



Agriculture



Advanced Manufacturing



Construction



Supply Chain & Transportation



Public Service & Safety

**353,833**

Total Cluster Employment

**2,198**

Related Energy Industry Employment

**203,948**

Total New Talent by 2029Q4

**Moderate**

Talent Shortage Severity



### Supply Chain and Transportation – Shared Core Occupations

71.4%

18.1%

10.5%

Short-term OJT, no exp, no award (0.0%)

Long-term training, no exp, no award (0.0%)

2-year degree or certificate (18.1%)

Moderate-term OJT, no exp, no award (0.0%)

Previous work experience, no award (71.4%)

Bachelor's degree (10.5%)

| # | Core Cluster Occupation (SOC) with Interdisciplinary Alignments          | Empl  | Mean Annual Wages | 5-Year Total Demand Estimate | Typical Entry-Level Education | Previous Work Experience | Typical On-the-Job Training | Current (C) or Future (F) MN State ENR Program |
|---|--------------------------------------------------------------------------|-------|-------------------|------------------------------|-------------------------------|--------------------------|-----------------------------|------------------------------------------------|
| 1 | First-Line Supervisors of Mechanics, Installers, and Repairers (49-1011) | 9,514 | \$89,400          | 3,837                        | HS or equivalent              | <5 years                 | None                        | C                                              |
| 2 | Civil Engineering Technologists and Technicians (17-3022)                | 1,424 | \$77,500          | 565                          | Associate degree              | None                     | None                        |                                                |
| 3 | Natural Sciences Managers (11-9121)                                      | 1,394 | \$153,700         | 537                          | Bachelor's degree             | >5 years                 | None                        | F                                              |
| 4 | Engineering Technologists and Technicians, Except Drafters (17-3029)     | 992   | \$77,700          | 425                          | Associate degree              | None                     | None                        | C                                              |

# Careers in Energy



**MINNESOTA STATE**  
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## Public Service and Safety – Related Cluster Demand in the Industry

| #  | Related Cluster Occupation (SOC)                | Total Empl       | NAICS 21-22 Ind Empl | % Empl in NAICS 21-22 | 5-Year Total Industry Demand Estimate | Other Inter-disciplinary Clusters | Typical Entry-Level Edu |
|----|-------------------------------------------------|------------------|----------------------|-----------------------|---------------------------------------|-----------------------------------|-------------------------|
| 1  | Management Analysts (13-1111)                   | 22,326           | 206                  | 1%                    | 71                                    |                                   | Bachelor's degree       |
| 2  | Managers, All Other (11-9199)                   | 16,752           | 132                  | 1%                    | 50                                    |                                   | Bachelor's degree       |
| 3  | Security Guards (33-9032)                       | 14,088           | 159                  | 1%                    | 84                                    | -                                 | HS or equivalent        |
| 4  | Lawyers (23-1011)                               | 13,093           | 35                   | <1%                   | 6                                     | -                                 | Doctorate               |
| 5  | Police and Sheriffs Patrol Officers (33-3051)   | 10,505           | -                    | -                     | -                                     | -                                 | HS or equivalent        |
| 6  | Cooks, Institution and Cafeteria (35-2012)      | 9,365            | -                    | -                     | -                                     |                                   | None                    |
| 7  | Compliance Officers (13-1041)                   | 6,909            | 108                  | 2%                    | 29                                    |                                   | Bachelor's degree       |
| 8  | Court, Municipal, and License Clerks (43-4031)  | 6,459            | -                    | -                     | -                                     | -                                 | HS or equivalent        |
| 9  | Postal Service Mail Carriers (43-5052)          | 5,764            | -                    | -                     | -                                     | -                                 | None                    |
| 10 | Social and Community Service Managers (11-9151) | 5,733            | -                    | -                     | -                                     | -                                 | Bachelor's degree       |
|    | All Other                                       | 90,164           | 1,467                | 1%                    | 337                                   | -                                 |                         |
|    | <b>Total – All Occupations</b>                  | <b>3,124,097</b> | <b>20,526</b>        | <b>&lt;1%</b>         | <b>9,322</b>                          | -                                 | -                       |



Energy & Natural Resources

**Inter-disciplinary Clusters\***



Digital Technology



Marketing & Sales



Management & Entrepreneurship



Agriculture



Advanced Manufacturing



Construction



Supply Chain & Transportation



Public Service & Safety

**201,166**

Total Cluster Employment

**1,467**

Related Energy Industry Employment

**90,218**

Total New Talent by 2029Q4

**High**

Talent Shortage Severity

# Careers in Energy

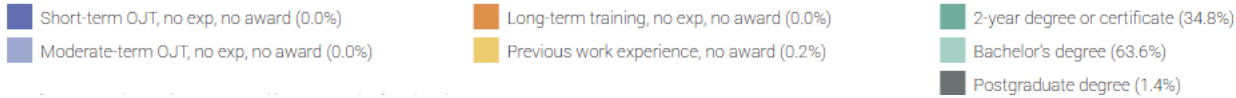


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## Public Service and Safety – Shared Core Occupations

34.8%

63.6%



| #  | Core Cluster Occupation (SOC) with Interdisciplinary Alignments                 | Empl  | Mean Annual Wages | 5-Year Total Demand Estimate | Typical Entry-Level Education | Previous Work Experience | Typical On-the-Job Training | Current (C) or Future (F) MN State ENR Program |
|----|---------------------------------------------------------------------------------|-------|-------------------|------------------------------|-------------------------------|--------------------------|-----------------------------|------------------------------------------------|
| 1  | Compliance Officers (13-1041)                                                   | 6,909 | \$88,100          | 2,774                        | Bachelor's degree             | None                     | Mod-term OJT                | C                                              |
| 2  | Firefighters (33-2011)                                                          | 5,310 | \$49,600          | 1,955                        | Postsecondary Certificate     | None                     | Long-term OJT               | F                                              |
| 3  | Facilities Managers (11-3013)                                                   | 2,796 | \$111,300         | 1,167                        | Bachelor's degree             | Less than 5 years        | None                        | C                                              |
| 4  | Environmental Scientists and Specialists, Including Health (19-2041)            | 1,590 | \$86,500          | 733                          | Bachelor's degree             | None                     | None                        | C                                              |
| 5  | Engineering Technologists and Technicians, Except Drafters, All Other (17-3029) | 992   | \$77,700          | 425                          | Associate degree              | None                     | None                        | C                                              |
| 6  | Conservation Scientists (19-1031)                                               | 673   | \$85,800          | 309                          | Bachelor's degree             | None                     | None                        | F                                              |
| 7  | Environmental Science and Protection Technicians, Including Health (19-4042)    | 569   | \$61,200          | 321                          | Associate degree              | None                     | None                        | C                                              |
| 8  | Social Scientists and Related Workers, All Other (19-3099)                      | 517   | \$91,500          | 219                          | Bachelor's degree             | None                     | None                        | F                                              |
| 9  | Life Scientists, All Other (19-1099)                                            | 239   | \$115,600         | 60                           | Bachelor's degree             | None                     | None                        |                                                |
| 10 | Cartographers and Photogrammetrists (17-1021)                                   | 212   | \$79,800          | 75                           | Bachelor's degree             | None                     | None                        |                                                |

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# Appendix

**CONTEXT & METHODOLOGY**



**RealTime Talent**



### The Impetus Behind an Updated Career Clusters Framework

Since the Career and Technical Education Framework's first creation in 2002, there have been sizeable shifts in the labor market and nature of work influenced by a changing economy and evolving influence of technology. This two-year modernization effort led by Advance CTE is an exciting opportunity to increase structural alignment and foster a common language among industry and education, state and local levels, and across Career Clusters to more fully prepare learners for the world of work.<sup>1</sup> The modernized Framework is flexible for every state and:

- Is grounded in multi-method research that engaged the CTE community at numerous stages in the development process
- Emphasizes the truly interdisciplinary nature of work through more intersectionality across Clusters
- Updates language and groupings of occupations to better bridge industry's organization of work with education
- Includes emphasis on new sectors, skills, and approaches from the entire world of work, while providing flexibility for the future by leaning more on industry classifications
- Serves as a bridge for education to reflect the real world of work in their CTE systems and programs
- Provides learners with more personalized paths to living wage jobs and skills gains for a variety of careers
- Offers CTE leaders and educators a means to align and design programs that better prepare learners for these careers
- Encourages industry has learners of all ages with interests, skills, and experiences that match their hiring needs

A modernized Framework is a step toward improving the quality of CTE programs to have more flexibility that is reflective of the real world of work, and ensuring all learners are fully prepared for the workplace no matter what career they explore.



### The Structure of the National Career Clusters Framework

The new, modernized Framework consists of 14 Clusters and 72 Sub-Clusters that serve as the primary organizing structures for CTE programs. Eleven of these Clusters are associated with specific industries, classified into five Cluster Groupings aligned to purpose and impact of included careers. Three Cross-Cutting Clusters are industry-agnostic and provide both skills and careers that can stand alone and intersect with all other Clusters. Twelve Career-Ready Practices to ensure that every program includes the skills that are essential to every career and life.

#### **Notable Updates in the New Framework for Energy and Natural Resources**

The new framework moves away from the previous Agriculture, Food, and Natural Resources Cluster structure which included eight distinct career pathways in favor of an industry-driven structure, which places Energy and Natural Resources into a new Career Cluster apart from Agriculture. According to Advance CTE, this stems from “the evolving focus and broader scope of natural resource management and energy production and transmission as validated by industry input and field research. Industry experts from Energy and Natural Resources felt that natural resource management in the 21st century was inextricably related to energy.” Distinguishing Energy and Natural Resources as its own prioritized Cluster allows for the elevation of efforts in environmental preservation and sustainability, which are increasingly central to the energy sector.<sup>2</sup>

#### **Cluster Groupings**

The broadest groupings of careers are by large, purpose-driven meta-sectors that help guide young people toward Clusters that are aligned with their interests, their sense of purpose, and the impact they want to make on their communities.

Cluster Groupings represent the roll-up employment of all occupations and industry employment represented within the Clusters beneath them. For instance, the Clusters of 1) Energy and Natural Resources and 2) Agriculture together comprise the “Cultivating Resources” Cluster Grouping.



### The Structure of the National Career Clusters Framework (continued)

#### Clusters

More detailed industry sector-driven groupings as defined by a combination of analysis of both Standard Occupational Classification (SOC) and North American Industry Classification System (NAICS) codes. There are eleven Industry-Based Clusters and three Cross-Cutting Clusters.

For determining labor market demand, wage, and skill requirement thresholds, both six-digit SOC and two-digit NAICS are used to identify occupations of analysis. First, all employment (industry-agnostic) are included as “core functions” to each Cluster. Second, industry-based staffing patterns are utilized to identify additional, Interdisciplinary Occupations of two kinds: a) related occupational employment from Related Clusters that are found in high volume among the Cluster’s relevant industries (defined by NAICS code), yet outside the core functional career path, and b) additional occupational employment from the three Cross-Cutting Clusters among the Cluster’s relevant industries (defined by NAICS code). The industry-specific employment volumes for the Interdisciplinary Occupations found within the Related and Cross-Cutting Clusters are included in the analysis of opportunities within the Cluster as a whole.

#### Sub-Clusters

The National Career Cluster Framework’s Sub-Clusters are major groupings of career areas within a given Cluster that have similar skills as defined by industry area. These groupings are industry-specific, with a core set of occupations of functional priority among each. Industry specifications are prioritized for understanding of labor market demand, while core occupations are prioritized for program evaluation or creation purposes in alignment to each Cluster. In Energy & Natural Resources, there are six Sub-Clusters.



### The Structure of the National Career Clusters Framework (continued)

#### Core Occupations

At the cluster and sub-cluster level, six-digit SOC occupations aligned directly to the cluster are considered “core occupations” regardless of the industry in which workers are employed. This is an inclusive count of all employment which frequently overlaps with other clusters.

In the case of the Energy and Natural Resources Cluster, 88% of all Minnesota employment in Core Cluster Occupations overlaps with other clusters, and only 12% (or 21,230 workers as of 2024Q4) are solely aligned with the Energy and Natural Resources Cluster.

#### Essential Core Occupations

Any Core Occupations that are solely aligned with one career cluster are referred to as Essential Core Occupations in this report. These are important occupations of focus for programming supported by Centers of Excellence due to the fact that no other clusters name these occupations as their own under the new National Career Clusters Framework.

#### Shared Core Occupations

Any Core Occupations that are matched across multiple career clusters are referred to as Shared Core Occupations. These are important occupations of focus for collaboration between Centers of Excellence for coordination of programming in support of shared industry needs.



### Clean and Alternative Energy

Careers focused on energy generation and infrastructure development from clean energy sources such as low carbon fuels, natural gas, nuclear, biofuels, hydrogen processes, and other alternative sources aimed at addressing climate change impacts. Professionals in this field develop and implement technologies that harness natural elements including solar, nuclear, wind, and hydro power, while advancing efforts in electrification and energy storage solutions. This Sub-Cluster also includes recycling of batteries and waste, carbon capture, and other energy and mineral reuse and reclamation.

#### Example Programs of Study

- Renewable Energy
- Electric Vehicle Installation & Maintenance
- Solar System Design & Installation
- Wind Turbine Installation & Maintenance

#### Industries for Related Cluster Market Analysis

- NAICS 221111 – Hydroelectric Power Generation
- NAICS 221113 – Nuclear Electric Power Generation
- NAICS 221114 – Solar Electric Power Generation
- NAICS 221115 – Wind Electric Power Generation
- NAICS 221117 – Biomass Electric Power Generation

### Conservation and Land Management

Careers rooted in environmental and natural sciences, focusing on protecting and managing natural resources and landscapes. Professionals in this field operate local, state, and national parks; safeguard forests and waterways; maintain national lands and rangelands; and manage wildlife and marine life. This field merges ecological conservation with recreational spaces, aiming to preserve nature while enhancing community well-being and environmental stewardship through public accessibility.

#### Example Programs of Study

- GIS Mapping
- Natural Resource Conservation
- Wildlife Management



### Ecological Research and Development

Careers emphasizing the scientific study of and research in ecological, geological, electrical, chemical, nuclear, biological, environmental engineering, and other sciences as they relate to energy production, sustainability, and the management of natural resources. Professionals in this field employ scientific methods to understand ecosystems, biodiversity, and the impacts of energy systems on the environment.

#### Example Programs of Study

- Environmental Engineering
- Environmental Management
- Environmental Science & Sustainability

### Environmental Protection

Careers centered on regulating and managing the impacts of both natural processes and human activities, such as resource production and consumption. This Sub-Cluster involves developing and enforcing policies to protect all ecosystems, including space, air, land, and water, from natural disasters, pollution, and degradation. This field focuses on conserving natural habitats and biodiversity and applying scientific and engineering principles to solve environmental problems and improve climate resilience.

#### Example Programs of Study

- Climate Resilience
- Sustainable Communities



### Resource Extraction

Careers focused on the efficient extraction of natural materials including fossil fuels, minerals, natural gas, and geothermal resources that are essential for fuel production in energy and manufacturing. This Sub-Cluster includes careers in exploration, drilling, mining, fracking, mineral processing, geoscience, quarrying, and petroleum engineering.

#### Example Programs of Study

- Clean Energy System Design
- Energy Transfer
- Mining Technology

#### Industries for Related Cluster Market Analysis

- NAICS 21 – Mining, Quarrying, and Oil and Gas Extraction

### Utilities

Careers involving the transmission and maintenance of utility systems for clean and alternative energy, electricity, water, waste remediation, and telecom/broadband; distribution and infrastructure development; and storage. Professionals in this field ensure reliable connectivity to energy sources, energy efficiency, and other essential services. Opportunities exist in public utilities, as well as commercial and industrial companies, with a focus on operations, maintenance, and security of systems to guarantee uninterrupted access to vital resources.

#### Example Programs of Study

- Telecommunications
- Water & Wastewater Systems
- Plant Operations
- Underground or Overhead Linework
- Utility Maintenance and Repair

#### Industries for Related Cluster Market Analysis

- NAICS 2212 – Natural Gas Distribution
- NAICS 2213 – Water, Sewage and Other Systems
- NAICS 221122 – Electric Power Distribution
- NAICS 221112 – Fossil Fuel Electric Power Generation
- NAICS 221121 – Electric Bulk Power Transmission and Control
- NAICS 221118 – Other Electric Power Generation