



Clean Energy Employment Impacts

Wind (land-based), **solar** (photovoltaics), and **energy efficiency** (buildings) are three key clean energy technologies identified in the *NREL State-Level Employment Projections for Four Clean Energy Technologies in 2025 and 2030* report with continued growth potential. This document outlines how communities and regions will experience differing levels of employment impacts due to resource, labor market, and geographic factors.

Clean Energy Technologies

Land-Based Wind

While most land based wind electricity generation is found in the middle of the country, technical advancements are making wind energy viable in more regions.

Solar PV

Solar PV is widely deployed across the US despite disparities in brightness and availability of sunlight. Many buildings and sites across the US are suitable for solar PV deployment.

Energy Efficiency

Upgrading the nation's building stock with efficiency measures such as air sealing and efficient appliances lowers energy consumption and presents opportunities for real savings.

Understanding Factors that Influence Local Workforce

Each community and region will experience different levels of long-term workforce resulting from these clean energy and sustainability projects. There are many factors that impact whether jobs will occur locally as well as the frequency of new projects, and, consequently, whether regions will feel local impacts and if they should attempt to develop long-term workforce capacity for clean energy projects. Three key factors are described below.

Supply Chain

Supply chains are networks of assembly, transportation, and delivery of products and services in their entirety. Whether there are existing regional supply chains will affect the magnitude of local economic impacts, especially if materials and equipment need to be imported for projects.

In regions with expected consistent long-term project activity, investing in industrial development can generate higher local impacts and create a regional hub for technology specific supply chains.

Labor Market

Existing labor market capacity is highly variable based on the type of clean technology deployed and the skills required.

The competitiveness of local wages and the proximity to existing regional employment hubs and opportunities will affect whether jobs are kept within the community.

In regions with expected consistent long-term project activity, investment into workforce development programs can sustain jobs.

Job Characteristics

Jobs created in different phases of clean energy projects vary in specialization, duration, and in-person requirements.

While construction, installation, and operations and management jobs may be captured locally, specialized professional services and remote positions may be out-of-region, or may have impacts only during the initial phase of projects.

Land-Based Wind Employment Profile

Land-Based Wind:


Land-based wind projects have substantial out-of-region costs and employment impact in the project planning phase related to manufacturing, site selection, engineering, and professional services that are typically outsourced to specialized firms.

Local impacts come from specialized installers who will often temporarily relocate during the construction phase. In regions without consistent long-term project activity, there are little lasting employment benefits outside of a limited operations and management (O&M) workforce.

Data is accessed from the Bureau of Labor Statistics and US D.O.E.'s Wind Career Map.

Graphic representations are ICF's interpretation of industry trends and data.

Land-Based Wind Local Impact:

 (likely out-of-region)



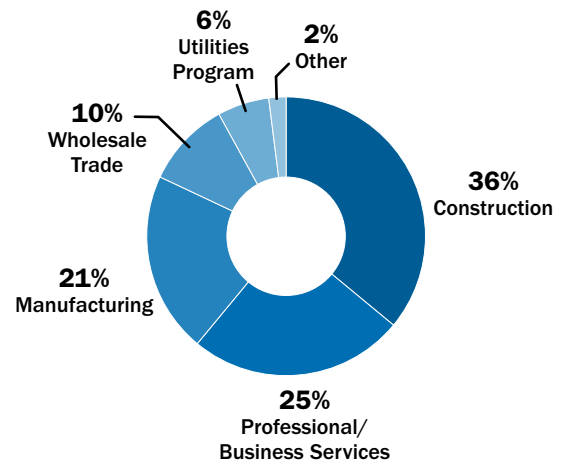
Sample Job Profiles:

Wind Resource Engineer (Project Planning)
salary range: \$48,600 - \$150,760

Wind Technician (Construction/O&M)
salary range: \$46,420 - \$77,810

Site/Plant Manager (O&M)
salary range: \$49,680 - \$125,340

Land-Based Wind Employment by Industry:



Solar PV Employment Profile

Utility-Scale Projects:

Utility-scale projects (i.e. large ground-mount solar developments) have a longer project planning phase that incorporates manufacturing, site selection, engineering, and other professional services. A larger, limited-duration construction workforce is expected initially during the construction phase, with a smaller long term O&M workforce, which may be a local subset of the initial construction workforce.


Building-Scale Projects:

A local workforce skilled in both construction and maintenance will be expected, supported by project development jobs in inspection, procurement, and sales.

Data is accessed from the Bureau of Labor Statistics and IREC's Solar Career Map.


Graphic representations are ICF's interpretation of industry trends and data.

Utility-Scale Projects Local Impact:

 (likely out-of-region)



Small-Scale Projects Local Impact:

 (potentially out-of-region)



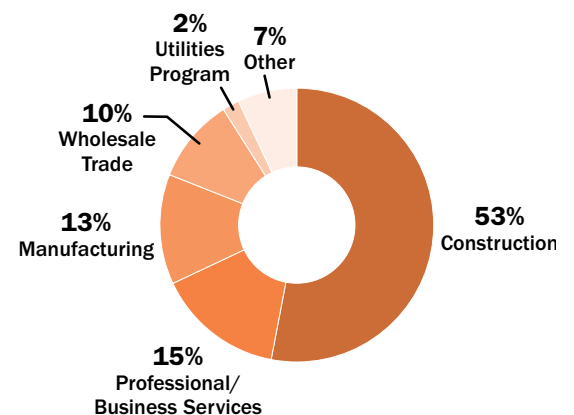
Sample Job Profiles:

Project Developer (Project Planning)
median salary: \$105,060

Solar PV Installer (Construction)
salary range: \$36,320 - \$72,080

Solar PV Technician (O&M)
salary range: \$36,320 - \$72,080

Solar PV Employment by Industry:



Energy Efficiency Employment Profile ⚡

Residential:

New Construction / Major Renovations:

New construction and major renovation projects require professional services and sales, which may not be local depending on the size of the project, and a local planning, construction, and inspection workforce.

Small-Scale Upgrades:

Small-scale retrofits will engage a continuous local sales, planning, construction, and inspection workforce.

Commercial:

Large-scale commercial energy efficiency installations, whether through new construction or renovations, will require support from architectural, engineering, and other professional services. These services may not be local, such as in the case of a high profile new construction project with outsourced design and engineering work. A local construction and inspection workforce will be needed for installation and review. A very limited operations and management workforce, depending on the size of commercial projects, will be needed to ensure consistent energy management of commercial projects.

Smaller commercial projects will have similar impacts to residential projects with similar footages.

Data is accessed from the Bureau of Labor Statistics and IREC's Green Buildings Career Map.

Graphic representations are ICF's interpretation of industry trends and data.

New Construction / Major Renovation Local Impacts:

↙ (potentially out-of-region)



Small-Scale Retrofit Local Impacts:

↙ (potentially out-of-region)



Sample Job Profiles:

Junior Architect (Professional Services)

salary range: \$42,000 - \$78,000

Residential Energy Efficiency Technician (Installation)

salary range: \$37,440 - \$52,000

Residential Energy Auditor (Inspection & Review)

salary range: \$43,000 - \$106,000

Commercial Energy Efficiency Local Impacts

↙ (potentially out-of-region)

O&M ↘



Sample Job Profiles:

Registered Architect (Professional Services)

salary range: \$48,700 - \$137,620

Commercial Energy Efficiency Technician (Installation)

salary range: \$31,200 - \$52,000

Commercial Energy Auditor (Inspection & Review)

salary range: \$55,000 - \$105,000

Facilities Manager (O&M)

salary range: \$55,000 - \$175,000

Overall Energy Efficiency Employment by Industry:

