

# Clean Jobs Midwest

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*Clean Jobs Midwest is a survey of clean energy employment in 12 Midwestern states. The region currently employs 568,979 workers in sectors including renewable energy generation, clean transmission, energy efficiency, clean fuels, and advanced transportation.*

# Midwest *Story*

Quick Facts

The clean energy economy is growing in every Midwestern state — Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. But we know clean energy can grow even faster. By implementing good public policy — such as state renewable portfolio standards and energy efficiency standards — we can create even more clean energy jobs across the region.

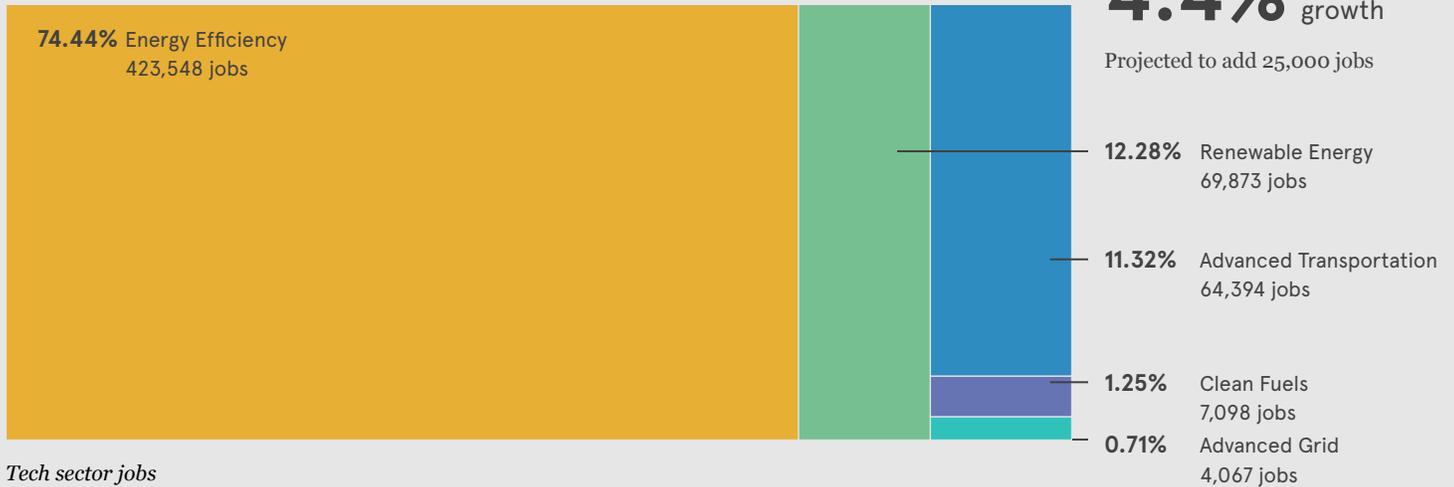
# 568,979

clean energy workers in various sectors in the Midwest

## 4.4%

 projected growth

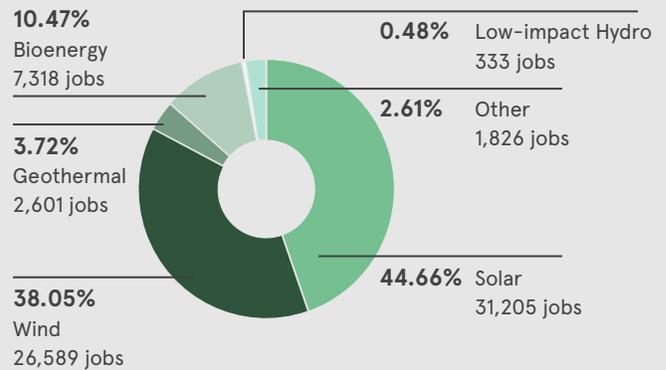
Projected to add 25,000 jobs



Tech sector jobs

This survey illustrates clean energy’s size and importance. Data indicates Ohio and Illinois each have more than 100,000 clean energy jobs, while Michigan is home to over 85,000. Regardless of how many clean energy workers a state employs, though, every Midwestern state is playing a role in our changing energy landscape. We’re moving toward more renewable energy generation and helping make traditional industries more energy efficient. Several factors, including policies that incentivize renewable energy and energy efficiency investments, are correlated with this growth — and the resulting job growth benefits both individual citizens and the entire region.

Three out of four clean energy workers in the Midwest work in energy efficiency, the region’s largest clean energy industry. About 13 percent of the area’s jobs are in renewable energy like wind and solar, while a similar amount are employed in the advanced transportation industry. This highlights a shift within traditional automotive industries toward more alternative and advanced vehicles throughout the supply chain.



Renewable generation subsectors

|      | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other  |
|------|----------------------------|---------------|----------------------|------------------------|--------------|--------|
| Jobs | 337,323                    | 65,964        | 58,649               | 18,002                 | 51,417       | 37,623 |
| %    | 59.29%                     | 11.59%        | 10.31%               | 3.16%                  | 9.04%        | 6.61%  |

*Value chain*

In the next 12 months, the region’s clean energy employers project a growth rate of about 4.4 percent, for an additional 25,000 jobs. A changing economy means once-traditional businesses like HVAC (Heating, Ventilation, and Air Conditioning) and the building trades are increasingly modernizing operations by incorporating more clean energy into their work. With this shift comes increased demand for workers with diverse skill-sets. Employers increasingly seek candidates who are well-trained in new technologies and are prepared to evolve and grow within the clean energy industry.

For employers in the Midwest, finding trained workers has been challenging — about 80 percent of employers surveyed reported hiring difficulty over the past year. Almost a third found hiring “very difficult,” and oft-reported reasons included: lack of experience, training, and technical skills; insufficient qualifications; and a lack of soft skills. Many firms reported also had difficulty hiring in departments including sales, marketing, customer service, management, and technical support roles.

About three-quarters of Midwestern clean energy businesses serve customers primarily located within their own state, and just over half source technologies from in-state vendors. About 36 percent of businesses report vendors located within the U.S., but outside of a bordering state.

| MSA   | Total CJ | RE    | EE     | Other  |
|---|----------|-------|--------|--------|
| Chicago-Naperville-Joliet, IL-IN-WI MSA     | 81,642   | 9,763 | 65,821 | 6,057  |
| Minneapolis-St. Paul-Bloomington, MN-WI MSA | 38,076   | 4,213 | 32,655 | 1,208  |
| Detroit-Warren-Livonia, MI MSA              | 37,269   | 4,885 | 20,327 | 12,056 |

*Top 3 MSAs in the region*

When questioned about specific policies that have contributed to a firm’s success, almost half — 45 percent — mentioned the federal renewable energy Investment Tax Credits (ITC). These tax credits drive renewables deployment and scale up markets by lowering total development costs. As part of a broader tax package, these credits were extended at the end of 2015. One of the few pieces of recent legislation with bipartisan agreement in Congress, their extension underscores that clean energy is not a partisan issue.

As this survey shows, the Midwest is at the forefront of our nation’s clean energy future. The industry is bringing new jobs and economic growth to our own backyards.



# Illinois *Story*

# IL *Quick Facts*

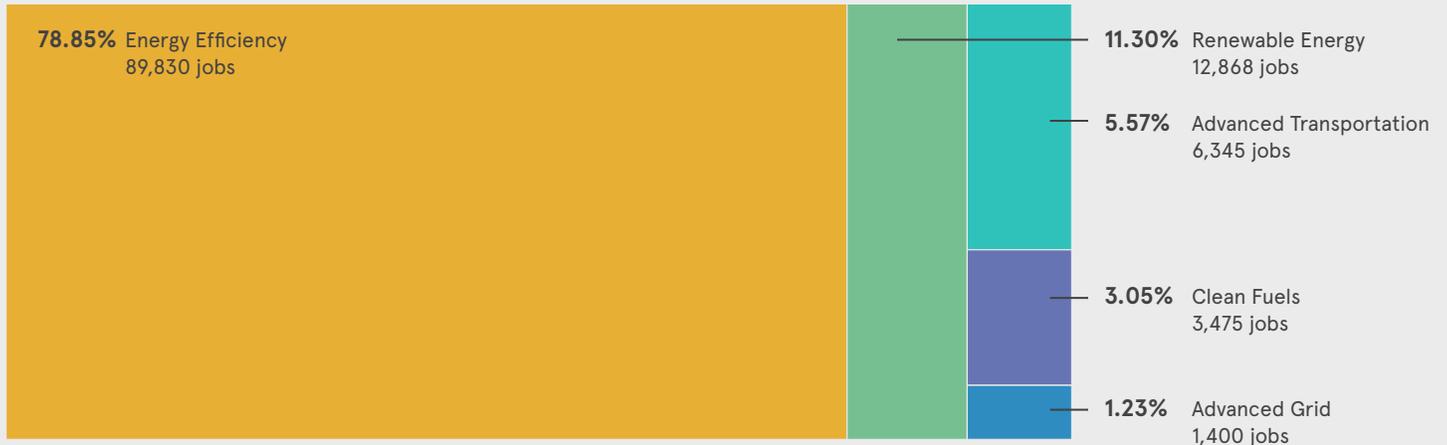
**Illinois is first in the Midwest with over 113,000 clean jobs and has grown beyond expectations.** In 2015, Clean Jobs Illinois projected clean energy jobs would grow by 7.5%; employment in the sector actually grew at 9%, exceeding projections. The industry represents an important part of the Illinois economy, and is significantly **larger than the fossil fuel industry** in the state. The energy efficiency sector, in keeping with the region, employs the most clean energy workers in the state. The state’s renewable energy sector is also robust and diverse. Further, small businesses are driving the clean energy sector, with **nearly 70% of businesses employing fewer than 25 individuals.** However, Illinois’ clean energy sector is only **projected to grow at 5.3% over the next 12 months. Some key subsectors such as wind and solar lost jobs.** Illinois can continue to grow the number of jobs in the clean energy sector significantly by enacting common sense clean energy policies.

# 113,918 jobs

Highest clean energy jobs number in the Midwest, but lost wind and solar jobs in the last year

# 5.3% projected growth

Last year Illinois projected growth was 7.5% and actual growth was 9%

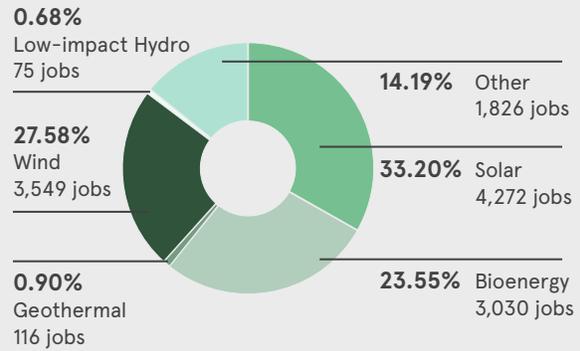


Tech sector jobs

In energy efficiency, we see traditional sectors such as HVAC workers increasingly transitioning to embrace the clean energy economy as a business decision. Energy efficiency is an important part of their business and often requires special training, even if it does not occupy a majority of their time. 49% of energy efficiency workers spend at least 50% of their time conducting energy efficiency work. 32% of energy efficiency workers spend all of their time conducting energy efficiency work. Following HVAC, efficient lighting is a close second in efficiency jobs.

## Clean Jobs Midwest

Illinois' renewable energy generation sector is well diversified across solar, wind, bioenergy, and other technologies. Illinois has 4,272 solar jobs, of which 3,488 spend a majority of their time on solar. Overall, 88% of renewable energy workers spend a majority of their time, and 78% spend all of their time, on renewable energy work. Unfortunately, with Illinois' broken RPS, the state lost more than 150 solar jobs and more than 400 wind jobs.



Renewable generation subsectors

| IL   | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other  |
|------|----------------------------|---------------|----------------------|------------------------|--------------|--------|
| Jobs | 62,269                     | 5,192         | 10,856               | 3,933                  | 17,882       | 13,787 |
| %    | 54.66%                     | 4.56%         | 9.53%                | 3.45%                  | 15.70%       | 12.10% |

### Value chain

Installation services continue to make up over half of the clean jobs value chain at 55%. Employment growth over the last year was a robust 9%, but more than half of employers reported difficulty finding highly skilled workers to fill positions. Further, the sector is projected to grow more slowly in the coming year.

| Industry | 2015  | 2016  | Jobs Losses |
|----------|-------|-------|-------------|
| Solar    | 4,424 | 4,272 | -152        |
| Wind     | 3,980 | 3,549 | -431        |

### Renewables subsectors

Illinois has both a Renewable Portfolio Standard (RPS) of 25% by 2025-2026 and an Energy Efficiency Standard. However, the RPS is currently broken and not driving new investment in renewables, and the state is not currently reaching its energy efficiency goals as the result of a spending cap on energy efficiency. This is unfortunate, since energy efficiency is the lowest cost resource available and saves consumers money on their electricity bills. Nonetheless, Illinois has benefited significantly from investments in energy efficiency and ranks in the top ten (#10 out of 51) on ACEEE's Energy Efficiency Scorecard.

## Clean Jobs Midwest

| MSA                                     | Total CJ | RE    | EE     | Other |
|---|----------|-------|--------|-------|
| Chicago-Naperville-Joliet, IL-IN-WI MSA | 81,642   | 9,763 | 65,821 | 6,057 |
| St. Louis, MO-IL MSA                    | 3,987    | 381   | 2,972  | 634   |
| Peoria, IL MSA                          | 2,935    | 288   | 2,168  | 478   |

*Top 3 MSAs in the region*

Although the clean energy sector in Illinois continues to grow and leads the Midwest's clean jobs economy, the state must act in order to continue to create a strong, diverse workforce and give small businesses the tools and resources they need to excel. Illinois has a robust clean energy sector, built on investments in fundamental research and development at our national labs and universities. Enacting new clean energy policy is key to this state's continued success as a clean jobs leader in the Midwest. We can reverse the wind and solar sector's job losses in Illinois and grow our economy by fixing the RPS and making Illinois a better place for clean energy businesses to thrive.

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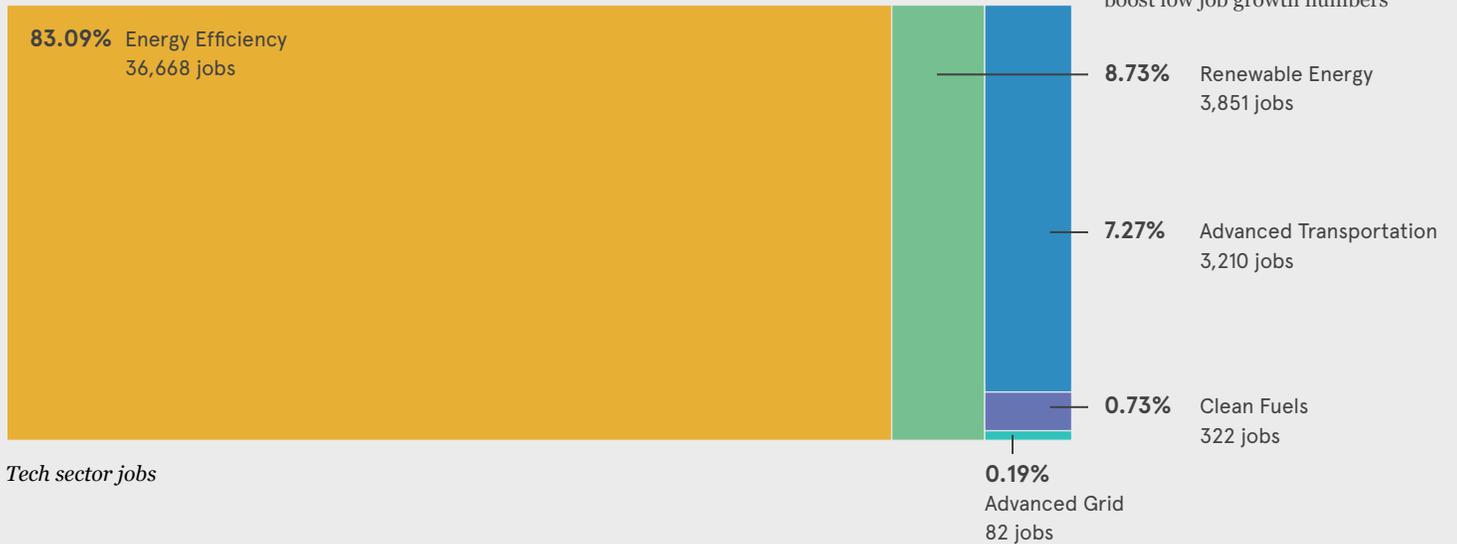
# Indiana *Story*

# IN *Quick Facts*

Indiana is home to just over 44,000 clean energy jobs, of which 83% are in energy efficiency. While Indiana’s projected growth is the lowest in the Midwest at 1.3%, there are promising sectors like energy efficiency, and specifically advanced building materials, which make up a significant portion of Indiana’s clean jobs. Half of energy efficiency jobs are in HVAC, in line with the region, but 18% of Indiana’s efficiency jobs are also in advanced building materials, which is one of the higher portions of advanced building material jobs in the Midwest.

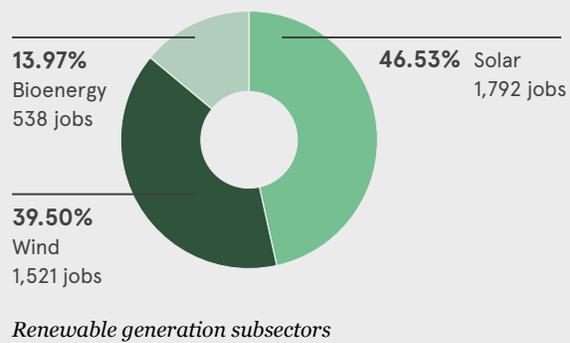
**44,133** jobs  
Indiana lags its neighbors in clean energy jobs

**1.3%** projected growth  
Improving state policies will help boost low job growth numbers



Installation is 65% of the value chain in Indiana, and traditional HVAC goods and services account for half of the state’s energy efficiency sector, with these firms employing just over 18,000 workers. Indiana also has fairly significant representation in advanced building materials and insulation, with 18% of the energy efficiency workforce working with these technologies. Nearly all employees spend the majority of their time supporting the energy efficiency portion of business; 62% spend all of their time conducting energy efficiency work.

Renewable energy generation in Indiana is supplied by solar, wind, and biomass. Almost nine in ten employees work primarily with solar and wind technologies, with solar representing a slightly larger portion of companies. Indiana has 1,792 solar jobs, of which 1,567 (86%) spend a majority of their time on solar work. Overall, 85% of renewable energy generation employees spend the majority of their time doing clean energy work; seven in ten spend all of their time on renewable energy.



## Clean Jobs Midwest

| IN   | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other |
|------|----------------------------|---------------|----------------------|------------------------|--------------|-------|
| Jobs | 28,803                     | 2,901         | 5,727                | 958                    | 3,384        | 2,360 |
| %    | 65.26%                     | 6.57%         | 12.98%               | 2.17%                  | 7.67%        | 5.35% |

### Value chain

As with many other states in the Midwest, Indiana is struggling with a lack of skilled and specialized workers. Almost 9 in 10 employers cite hiring difficulties, 46% mention lack of experience & skill, and 36% cite lack of education & training.

| MSA                                     | Total CJ | RE  | EE     | Other |
|---|----------|-----|--------|-------|
| Indianapolis-Carmel, IN MSA             | 11,981   | 989 | 10,006 | 986   |
| Chicago-Naperville-Joliet, IL-IN-WI MSA | 4,716    | 444 | 3,888  | 383   |
| Fort Wayne, IN MSA                      | 2,993    | 247 | 2,500  | 246   |

### Top 3 MSAs in the region

Businesses in Indiana listed federal renewable energy Investment Tax Credits (ITC) as very positive. Unprompted, 57.1% of businesses mention those credits as having contributed to their firm's success. When specifically asked to rate the effect of the credits, 72.8% of businesses that were aware of the credits say that they increased business prospects. At the same time, 30% of businesses mention policy uncertainty or insufficiency as a barrier or obstacle that is hindering their business. Indiana lacks a mandatory RPS, and in 2014 eliminated its energy efficiency standard. As a result, the state ranks 38 out of 51 on ACEEE's Energy Efficiency scorecard.

Although Indiana's clean energy sector growth is slow today, there is a clear path to creating new clean energy jobs in the state. New energy policy such as a RPS or EERS that provides certainty for clean energy businesses would drive investment and job creation if it were enacted.

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Iowa *Story*

Iowa is home to 28,451 clean energy jobs, and leads the Midwest in number employed in the wind industry. The clean energy sector is projected to grow at 3% over the next 12 months in Iowa. The majority of jobs, 68%, are in energy efficiency. Installation dominates the value chain, employing 70% of workers. Small businesses are a driving force in the clean energy sector, as more than 75% of businesses in the sector employ fewer than 25 people.

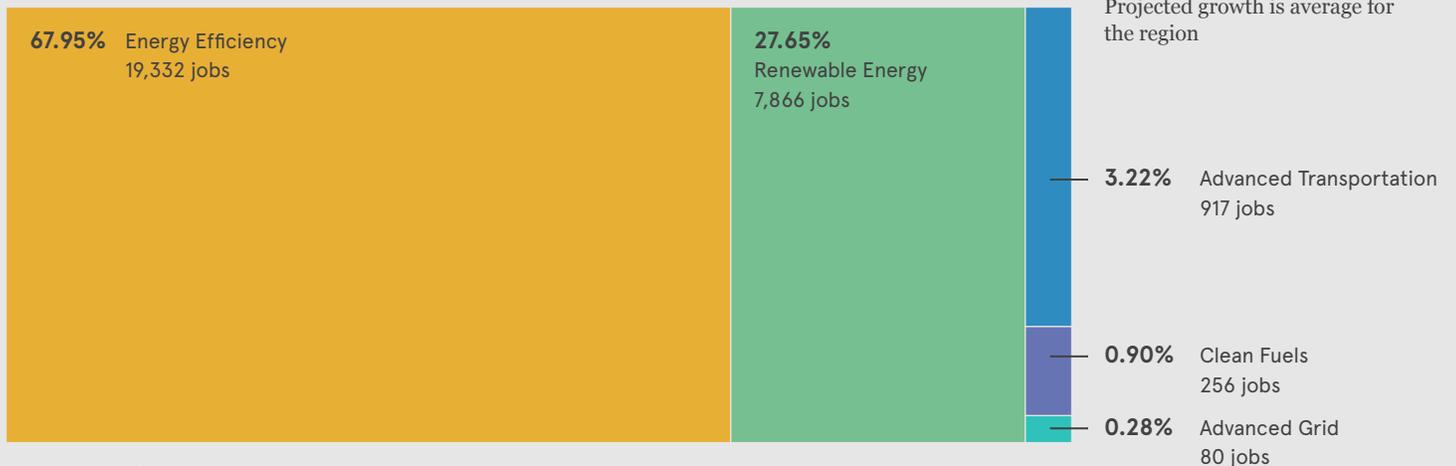
IA *Quick Facts*

**28,451** jobs

Iowa leads the region in wind power generation jobs

**3%** projected growth

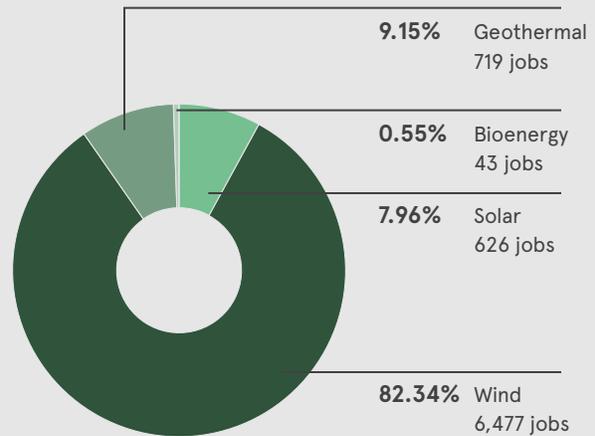
Projected growth is average for the region



Tech sector jobs

Renewable energy generation is a strong sector in Iowa. With vast expanses of farmland, wind turbines are becoming a common site on the landscape. 82% of Iowa’s renewable energy jobs come from wind power, or more than 6,400 jobs. While 70% of clean jobs employment is in installation, almost 20% are in sales & distribution.

In addition to over 6,400 wind energy workers, Iowa has 626 solar energy jobs, of which 349 spend a majority of their time working on solar.



Renewable generation subsectors

## Clean Jobs Midwest

| IA   | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other |
|------|----------------------------|---------------|----------------------|------------------------|--------------|-------|
| Jobs | 20,083                     | 1,250         | 5,319                | 381                    | 1,287        | 130   |
| %    | 70.59%                     | 4.39%         | 18.69%               | 1.34%                  | 4.53%        | 0.46% |

### Value chain

Changes to traditional industries mean new demand for workers with advanced skill sets. Three-quarters of surveyed employers report hiring difficulty over the past 12 months, and about four in ten reported hiring has been “very difficult”. Highest reported reasons for difficulty include lack of experience, training, and technical skills, as well as competition or a small applicant pool. Interestingly, the majority of firms, 56%, report difficulty hiring for administrative positions, followed by sales and marketing positions and engineers.

| MSA                                   | Total CJ | RE    | EE    | Other |
|---------------------------------------|----------|-------|-------|-------|
| Des Moines-West<br>Des Moines, IA MSA | 4,772    | 1,319 | 3,243 | 210   |
| Cedar Rapids, IA MSA                  | 2,026    | 560   | 1,377 | 89    |
| Waterloo-Cedar Falls,<br>IA MSA       | 1,563    | 432   | 1,062 | 69    |

### Top 3 MSAs in the region

Policy plays a role in Iowa’s transition towards a clean energy future. 62% of survey respondents recognized federal renewable energy Investment Tax Credit (ITC) as a tool for increased success. Iowa has a Renewable Portfolio Standard (RPS) and an Energy Efficiency Resource Standard (EERS). Iowa was the first state to require an RPS, and, other than Texas, Iowa is the only state whose RPS requires specific amounts of renewable energy generating capacity from Investor-Owned Utilities (IOUs). Iowa has taken a progressive policy stance toward clean energy, and they’ve earned a rank of 12 out of 51 on the ACEEE Energy Efficiency scorecard.

### About the Survey

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# Kansas *Story*

# KS *Quick Facts*

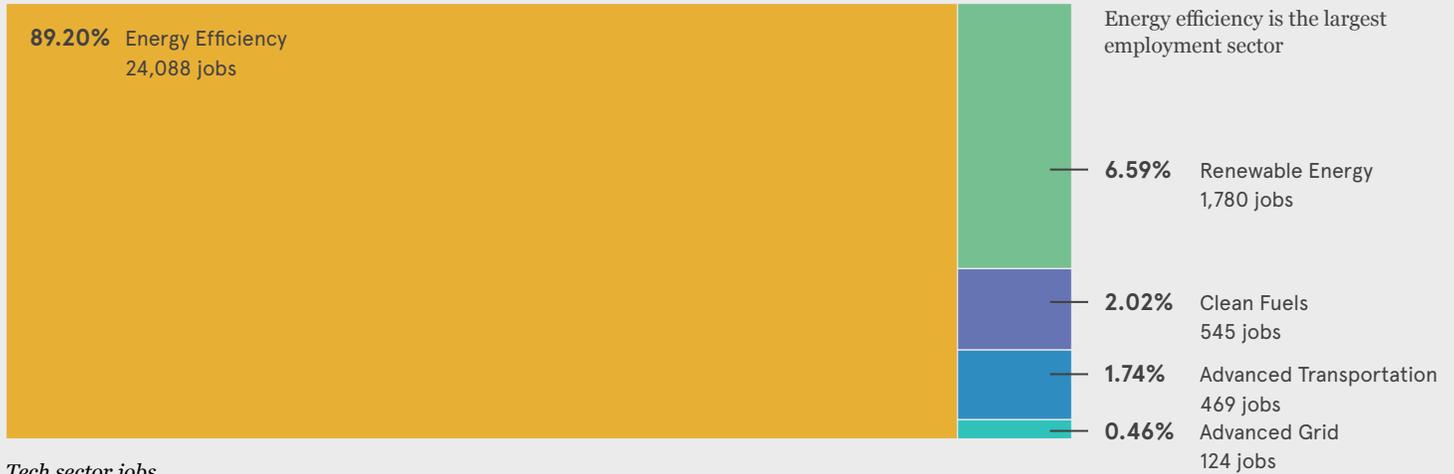
Kansas is home to just over 27,000 clean energy jobs, with projected growth at 2.3%. Clean energy sector growth in Kansas lags the region, but could be improved significantly by implementing sensible clean energy policies in the state. 89% of clean jobs are in energy efficiency, with 58% of the value chain in installation. Small businesses drive the clean energy sector in Kansas. Over 80% of businesses employ fewer than 25 individuals, and traditional industries are adopting new clean energy technology.

**27,005** jobs

Kansas has a highly diverse energy efficiency sector

**2.3%** projected growth

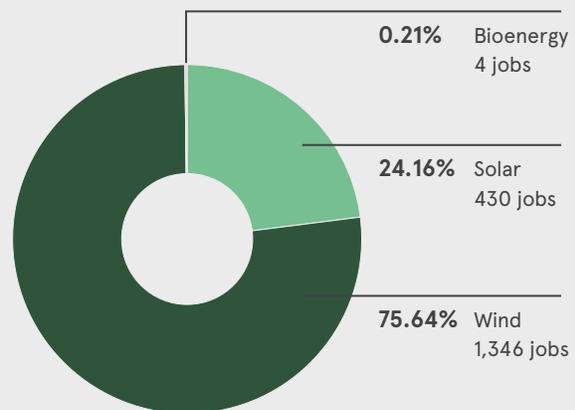
Energy efficiency is the largest employment sector



*Tech sector jobs*

Energy efficiency is the largest sector, with highly diverse subsectors across HVAC, lighting, energy star appliances, and advanced building materials. Though the largest portion of workers, 37%, is allocated to traditional HVAC goods and services, there is significant representation across other sub-sectors. Energy star appliances employ 20%, energy star and high AFUA HVAC employ 17%, advanced building materials employ 12%, and efficient lighting employs 11%. Nearly three quarters of employees spend most of their time supporting the energy efficiency portion of business.

Renewable energy generation is small, only 6.6%, but 75% of that is in wind and 35% in solar. Kansas has 430 solar jobs, of which 282 spend a majority of their time working on solar. The state's renewable energy generation sector consists solely of wind and solar technologies. Wind generation dominates renewable energy in Kansas, representing three-quarters of employment. Sixty-one percent of renewable energy employees spend all of their time working with renewable generation technologies.



*Renewable generation subsectors*

## Clean Jobs Midwest

| KS   | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other  |
|------|----------------------------|---------------|----------------------|------------------------|--------------|--------|
| Jobs | 15,750                     | 520           | 1,969                | 1,246                  | 3,645        | 3,875  |
| %    | 58.32%                     | 1.93%         | 7.29%                | 4.61%                  | 13.50%       | 14.35% |

### Value chain

Three-quarters of employers report hiring difficulty over the past 12 months; 25% note it was “very difficult”. Almost half of surveyed employers (44%) mentioned insufficient qualifications, certifications, or education. A third of firms reported difficulty hiring managers, supervisors, or directors.

| MSA                    | Total CJ | RE  | EE    | Other |
|------------------------|----------|-----|-------|-------|
| Kansas City, MO-KS MSA | 6,534    | 473 | 5,788 | 273   |
| Wichita, KS MSA        | 5,124    | 327 | 4,581 | 216   |
| Topeka, KS MSA         | 1,758    | 112 | 1,572 | 74    |

### Top 3 MSAs in the region

63% of firms mentioned federal renewable energy Investment Tax Credits (ITC), unaided, when questioned about specific policies that have contributed to firm success. Three in ten firms mentioned red tape regulations to be a significant barrier to success; 21% noted policy uncertainty or insufficiency. With an aided question, 67% of firms are aware of the ITC and 62% are aware of EPA’s Clean Power Plan (CPP). Only 32% are familiar with the state-level Renewable Portfolio Standard (RPS), which calls for 20% of peak demand to come from renewables by 2020. Half of surveyed employers feel the REITC has increased business prospects. Thirty-six percent of firms expect EPA’s CPP to increase business prospects. Kansas has an ACEEE scorecard of 45 out of 51, the second lowest rank in the Midwest.

Although Kansas’ clean energy sector is only growing slowly today, new energy policy such as a RPS or EERS that provides certainty for clean energy businesses would drive investment and job creation if it were enacted, boosting the overall sector growth rate.

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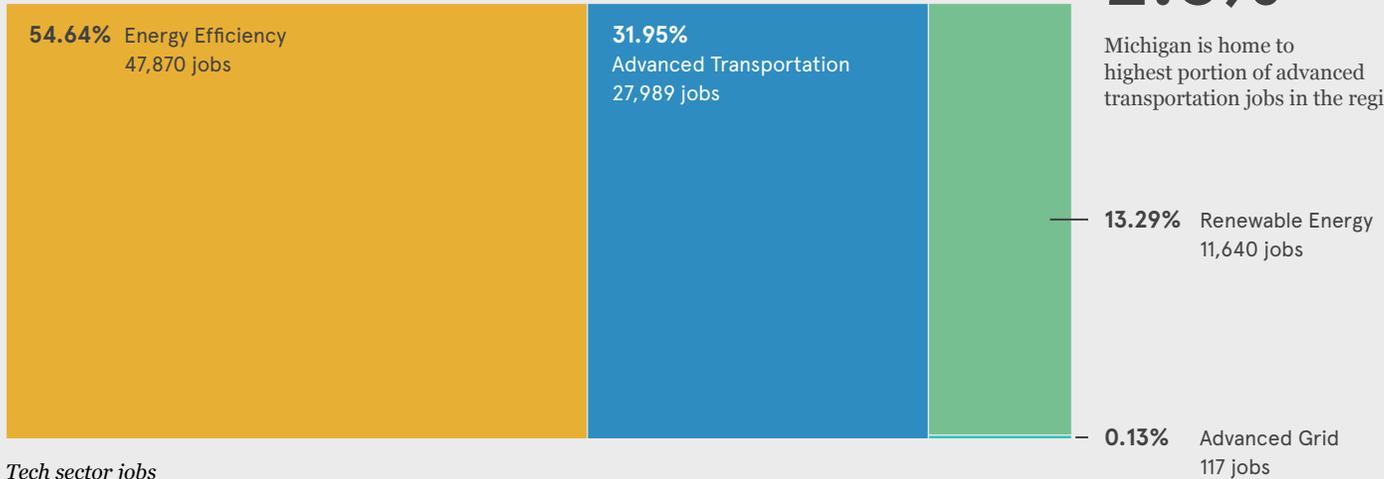
# Michigan *Story*

# MI *Quick Facts*

Michigan represents the Midwest’s evolution from traditional manufacturing and automotive jobs toward advanced transportation and clean energy technology. The state’s iconic automotive industry is now leading the region in advanced transportation jobs, employing more people than the state’s entire fossil fuel sector. With over 87,000 clean energy jobs, Michigan has the second highest percentage of clean jobs in the Midwest, marked by a diverse workforce with specialized training.

**87,616** jobs  
Third highest clean energy jobs number in the Midwest and a large manufacturing sector

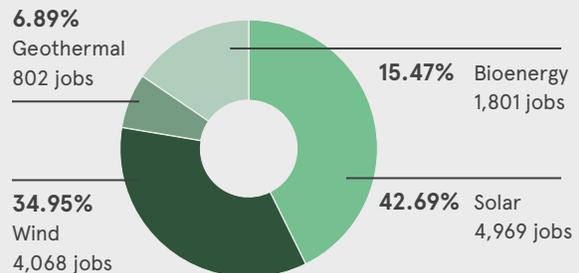
**2.6%** projected growth  
Michigan is home to highest portion of advanced transportation jobs in the region



Tech sector jobs

Of the employment sectors in Michigan, energy efficiency makes up the largest share of the workforce, in keeping with the rest of the Midwest. In energy efficiency, we see traditional sectors such as the HVAC industry increasingly transitioning to embrace the clean energy economy as a business decision. Energy efficiency is an important part of their business and often requires special training, even if it does not occupy a majority of their time. 38% of energy efficiency workers spend at least 50% of their time conducting energy efficiency work. 27% of energy efficiency workers spend all of their time conducting energy efficiency work.

Renewable energy also plays an important role in the state’s clean energy economy. Michigan has a strong base in solar manufacturing, and as a result has the second largest number of solar jobs in the Midwest (second only to Illinois). 54% of renewable energy workers spend at least 50% of their time conducting renewable energy work. 44% of renewable energy workers spend all of their time conducting renewable energy work. Within renewable energy, Michigan has 4,969 solar jobs, of which 2,779 (56%) spend more than half their time on solar.



Renewable generation subsectors

## Clean Jobs Midwest

The key story is Michigan’s leadership role in advanced transportation. The century-old auto industry is undergoing a transition toward clean energy vehicles, and Michigan is adapting to new technology to keep the industry competitive. Advanced transportation employment is strong, leading the Midwest at 32%. Those jobs are an even split between electric and hybrid vehicles, and with this growth comes additional manufacturing jobs creating batteries for those vehicles.

| MI   | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other |
|------|----------------------------|---------------|----------------------|------------------------|--------------|-------|
| Jobs | 43,877                     | 19,309        | 8,949                | 5,288                  | 8,025        | 2,168 |
| %    | 50.08%                     | 22.04%        | 10.21%               | 6.04%                  | 9.16%        | 2.47% |

### Value chain

That added manufacturing component plays an important role in the advanced transportation sector, and in the evolution of Michigan’s traditional industries. Early adoption of clean energy technology has allowed Michigan to take the lead in advanced transportation, and the sector now has more jobs than the fossil fuel industry in the state.

| MSA                            | Total CJ | RE    | EE     | Other  |
|--------------------------------|----------|-------|--------|--------|
| Detroit-Warren-Livonia, MI MSA | 37,269   | 4,885 | 20,327 | 12,056 |
| Grand Rapids-Wyoming, MI MSA   | 7,298    | 957   | 3,980  | 2,361  |
| Lansing-East Lansing, MI MSA   | 4,056    | 532   | 2,212  | 1,312  |

### Top 3 MSAs in the region

In total, Michigan is home to over 19,000 clean energy manufacturing jobs — more than the number of jobs in the state’s fossil fuels sector. Keeping up with the growing demand for skilled workers poses a significant challenge in Michigan. 9 in 10 employers report hiring difficulty, and 48% of those are due to lack of qualifications and education. With a rapidly changing industry, new skill sets are needed and businesses are seeking candidates who are up to the challenge. Diversity in the workforce is evident in the state’s clean energy economy. Women represent more than 36% of clean energy workers, and make up 46% of recent hires.

Michigan’s renewable portfolio standard of 10% by 2015 was met and plateaued at the end of 2015. Michigan’s ranking for energy efficiency from an American Council for Energy-Efficient Economy (ACEEE) has slipped as other states embrace policies to reduce energy waste.

Extending Michigan’s renewable energy and energy efficiency standards could drive further growth and investment in the state’s thriving clean energy economy and once again make Michigan a leader in this sector.

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# Minnesota *Story*

# MN *Quick Facts*

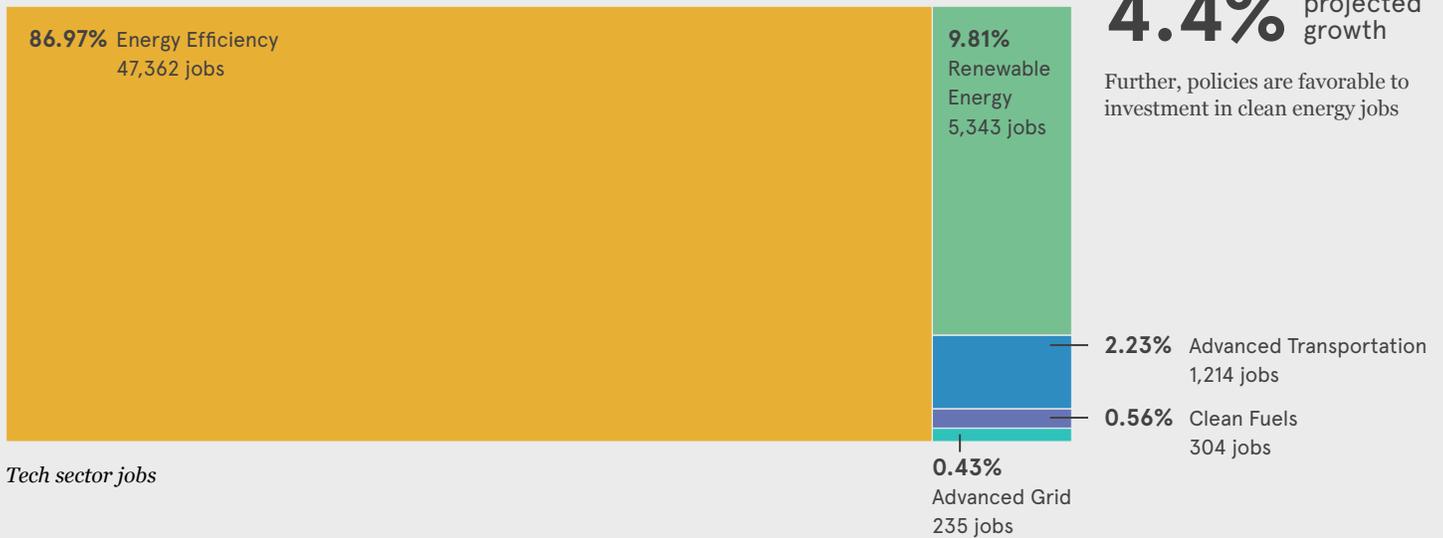
Minnesota’s clean energy sector is substantial, with over 54,000 clean energy jobs located across the state. Further, jobs in the sector are projected to grow by 4.4% over the next 12 months. 87% of the workforce is involved in energy efficiency, and 77% of the value chain is in installation jobs. Small businesses drive the clean energy sector in Minnesota, with nearly 80% of businesses employing fewer than 25 individuals.

# 54,458 jobs

Minnesota has a large energy efficiency sector, with HVAC playing a strong role

# 4.4% projected growth

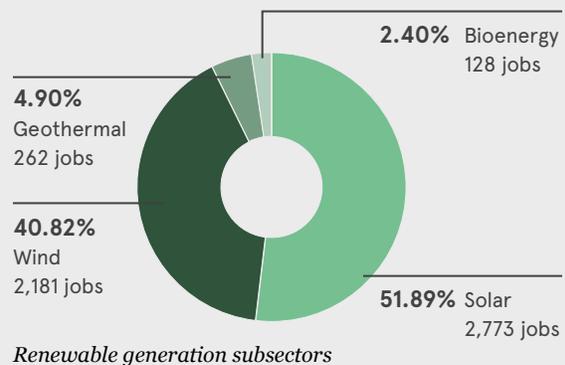
Further, policies are favorable to investment in clean energy jobs



Tech sector jobs

HVAC is the largest portion of energy efficiency jobs at over 25,000. These include hardware and software implementers, contractors who can diagnose, adjust and verify the efficiency of HVAC systems, and system technicians. The shift in traditional sectors such as HVAC illustrates a transition to embrace the clean energy economy as a business decision. Energy efficiency is an important part of the HVAC business and often requires special training, even if it does not occupy a majority of workers’ time. 24% of energy efficiency workers spend at least 50% of their time conducting energy efficiency work. 21% of energy efficiency workers spend all of their time conducting energy efficiency work.

Renewable energy generation follows energy efficiency as the second largest clean energy job sector in Minnesota with 5,343 jobs. Renewable energy includes solar (51.9% of renewable generation jobs), wind (40.8%), geothermal (4.9%), and bioenergy (2.4%). 70% of renewable energy workers spend at least 50% of their time conducting renewable energy work, and 58% of renewable energy workers spend all of their time conducting renewable energy work. Minnesota has 2,773 solar jobs, of which 1,995 spend a majority of their time on solar.



Renewable generation subsectors

## Clean Jobs Midwest

| MN   | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other |
|------|----------------------------|---------------|----------------------|------------------------|--------------|-------|
| Jobs | 41,866                     | 1,984         | 6,879                | 725                    | 2,458        | 546   |
| %    | 76.88%                     | 3.64%         | 12.63                | 1.33%                  | 4.51%        | 1.00% |

### Value chain

Currently, women make up 18.6% of the clean jobs workforce, and 39% of recent hires were women. Racial and ethnic minorities make up 26.3% of clean energy employees, and 9.5% of the workforce are veterans. This range and diversity is encouraging for a growing business sectors. Despite a diverse workforce, three quarters of employers surveyed report difficulty hiring. Factors include lack of experience, as well as training and education. This is a common theme across the Midwest's clean energy economy, with new technology and specialized roles increasing the demand for new skill sets.

| MSA   | Total CJ | RE    | EE     | Other |
|---|----------|-------|--------|-------|
| Minneapolis-St. Paul-Bloomington, MN-WI MSA | 38,076   | 4,213 | 32,655 | 1,208 |
| Duluth, MN-WI MSA                           | 1,527    | 100   | 1,380  | 48    |
| St. Cloud, MN MSA                           | 1,180    | 77    | 1,066  | 37    |

### Top 3 MSAs in the region

Minnesotans are familiar with state and federal clean energy policies, with the majority of survey respondents indicating that they are aware of the federal renewable energy Investment Tax Credit (ITC) and consider it beneficial to business prospects. Minnesota has an active Renewable Portfolio Standard, set for 26.5% by 2025 for Investor-Owned Utilities and 25% by 2025 for other utilities. The state also has an Energy Efficiency Resource Standard (EERS), and is ranked 10th (out of 51) in ACEEE's Energy Efficiency Scorecard - tied with Illinois for the top state in the region. Minnesota's RPS and EERS have contributed to job growth in renewable generation and energy efficiency, helping to provide market certainty for these sectors to grow and become more established.

### About the Survey

*Clean Jobs Midwest is a survey of clean energy employment in 12 Midwestern states. The region currently employs 568,979 workers in sectors including renewable energy generation, clean transmission, energy efficiency, clean fuels, and advanced transportation.*

Missouri *Story*

MO *Quick Facts*

Missouri has 52,479 jobs, and this number is projected to grow by 8.3% over the next 12 months: the highest growth rate in the region. A majority of these jobs are in Energy efficiency, but clean vehicles is a fast growing sub-sector and Missouri is leading the region with energy storage jobs. Over 80% of businesses employ fewer than 25 individuals, illustrating the importance of small businesses in the clean energy sector.

**52,479** jobs

Missouri leads the Midwest in energy storage jobs



Tech sector jobs

In energy efficiency, we see traditional sectors such as HVAC workers increasingly transitioning to embrace the clean energy economy as a business decision. Energy efficiency is 72.7% of the clean jobs workforce, and is an important part of their business and often requires special training, even if it does not occupy a majority of their time. 23% of energy efficiency workers spend at least 50% of their time conducting energy efficiency work. 17% of energy efficiency workers spend all of their time conducting energy efficiency work.

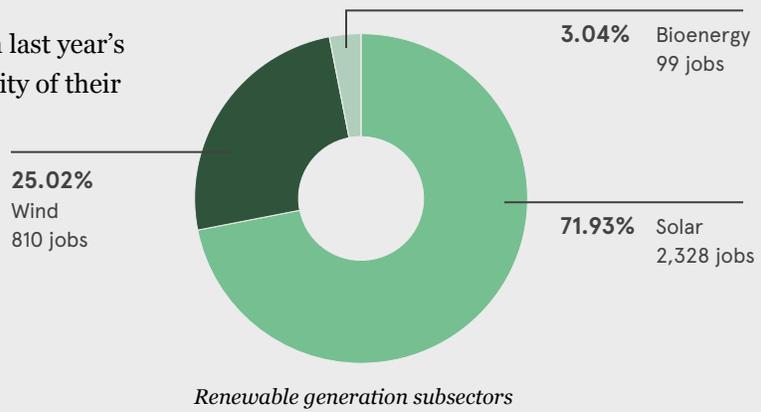
| MO   | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other |
|------|----------------------------|---------------|----------------------|------------------------|--------------|-------|
| Jobs | 37,879                     | 3,927         | 6,007                | 1,196                  | 2,882        | 589   |
| %    | 72.18%                     | 7.48%         | 11.45%               | 2.28%                  | 5.49%        | 1.12% |

Value chain

Following energy efficiency, clean vehicles has 18% of sector jobs, and is growing fast. Within clean vehicles, 87% are natural gas vehicles. Additionally, energy storage is a very strong sector, with 1,175 storage jobs in the region. Accounting for the size of the state, this puts Missouri in the lead for energy storage jobs.

## Clean Jobs Midwest

Missouri has 2,328 solar jobs, down 25% from last year's survey. Of those, 1,854, or 80%, spent a majority of their time on solar work.



| MSA                    | Total CJ | RE    | EE     | Other |
|------------------------|----------|-------|--------|-------|
| St. Louis, MO-IL MSA   | 23,880   | 1,767 | 16,105 | 6,008 |
| Kansas City, MO-KS MSA | 8,287    | 466   | 6,404  | 1,417 |
| Springfield, MO MSA    | 3,213    | 159   | 2,481  | 573   |

### Top 3 MSAs in the region

With rapidly growing clean jobs sectors comes the demand for workers with specialized skills. Most employers report hiring difficulties due to training and skills. Federal policies were very popular in Missouri with 71.9% of businesses aware of the federal renewable energy Investment Tax Credit believing it increased business prospects and 70.8% believe the EPA's Clean Power Plan will increase business prospects. State policies are also considered effective by most firms, and seen as positive factors in business prospects. Missouri has a Renewable Portfolio Standard of 15% by 2021 for Investor-Owned Utilities. While Missouri has the highest projected clean job growth in the region, it still lags behind with an ACEEE Energy Efficiency Scorecard rank of 44.

### About the Survey

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# Nebraska *Story*

# NE *Quick Facts*

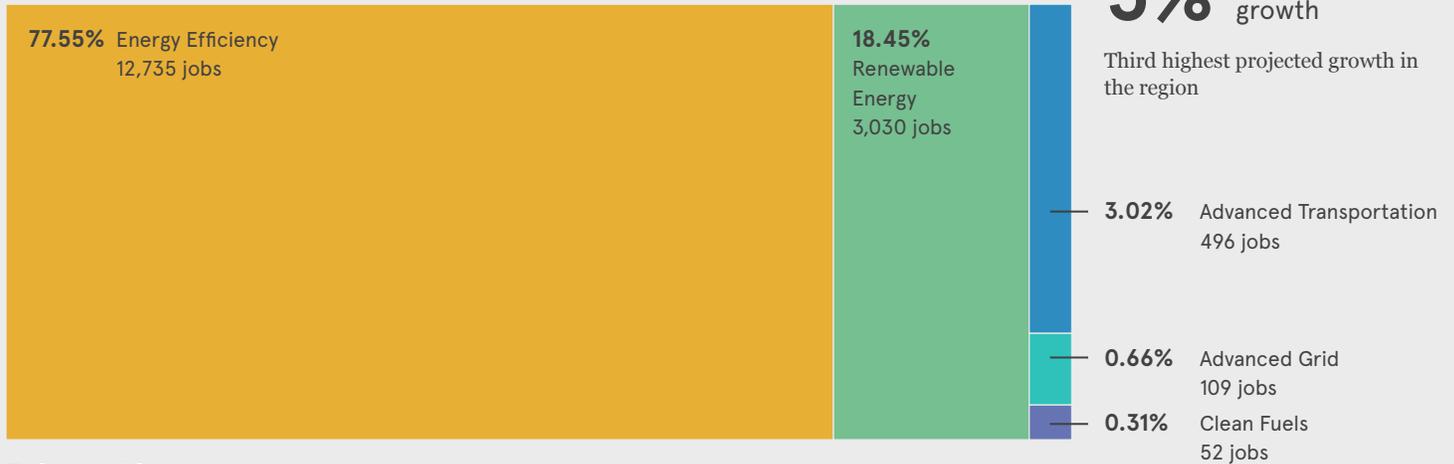
Nebraska has 16,422 clean energy jobs. The sector is projected to grow by 5% over the next 12 months — the third highest rate of clean energy jobs growth in the Midwest. Consistent with the rest of the Midwest, small businesses drive the clean energy sector. Nearly 85% of businesses employ fewer than 25 individuals, reinforcing the idea that traditional jobs, like HVAC installation work, are transitioning toward the adoption of clean energy technology.

**16,422** jobs

Improving state policies will help boost low clean jobs numbers

**5%** projected growth

Third highest projected growth in the region



Tech sector jobs

Energy efficiency leads with 77.5%, and has a diverse proportion of efficiency jobs. Nebraska’s energy efficiency sector is dominated by HVAC, with 36% of the workers, followed by Energy Star appliances at 18%, Energy Star and AFUE HVAC at 17%, advanced building materials at 14%, and then efficient lighting at 10%. 34% of energy efficiency workers spend a majority of their time on energy efficiency, while only 8% spend all of their time on energy efficiency.

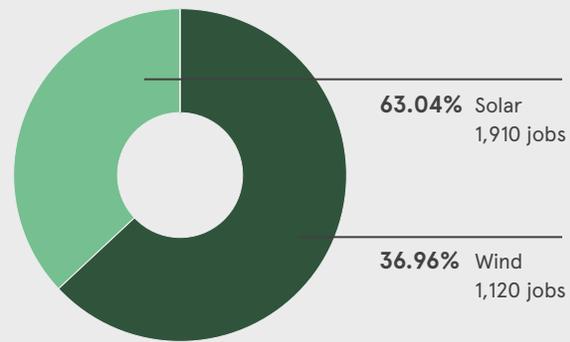
| NE   | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other |
|------|----------------------------|---------------|----------------------|------------------------|--------------|-------|
| Jobs | 12,722                     | 461           | 1,589                | 270                    | 1,117        | 263   |
| %    | 77.47%                     | 2.81%         | 9.68%                | 1.65%                  | 6.80%        | 1.60% |

Value chain

Clean vehicles is a small but diverse sector as well. Natural gas vehicles makes up just over half of the sector at 55%, hybrid vehicles at 22%, and electric vehicles at 14%. The remaining jobs are split almost evenly between hydrogen and fuel cell vehicles.

## Clean Jobs Midwest

Renewable energy generation represents 17% of the clean energy workforce in Nebraska. 84% of renewable energy workers spend a majority of their time, and 69% spend all of their time, working on renewable energy. These workers are divided between wind and solar. Nebraska has 1,910 solar jobs, of which 776 spend a majority of their time on solar.



Renewable generation subsectors

| MSA                             | Total CJ | RE    | EE    | Other |
|---------------------------------|----------|-------|-------|-------|
| Omaha-Council Bluffs, NE-IA MSA | 5,519    | 1,018 | 4,280 | 221   |
| Lincoln, NE MSA                 | 2,218    | 409   | 1,720 | 89    |
| Sioux City, IA-NE-SD MSA        | 218      | 40    | 169   | 9     |

### Top 3 MSAs in the region

Nebraska’s clean jobs numbers are tenth out of the twelve states surveyed, but with promising growth projections and transitioning industries, future surveys may tell a different story. However, 28.6% of businesses noted red tape as hindering their firm and another 28.6% identified financing and material costs as their main barrier. Nebraska is one of the few states in the region without either a Renewable Portfolio Standard or an Energy Efficiency Resources Standard, and Nebraska ranks 42 out of 51 in ACEEE’s Energy Efficiency scorecard. New energy policy in Nebraska, such as a RPS or EERS that provides certainty for clean energy businesses, would drive investment and job creation if it were enacted, increasing the number of Nebraskans working in clean energy.

### About the Survey

Clean Jobs Midwest is a survey of clean energy employment in 12 Midwestern states. The region currently employs 568,979 workers in sectors including renewable energy generation, clean transmission, energy efficiency, clean fuels, and advanced transportation.

# North Dakota *Story*

# ND *Quick Facts*

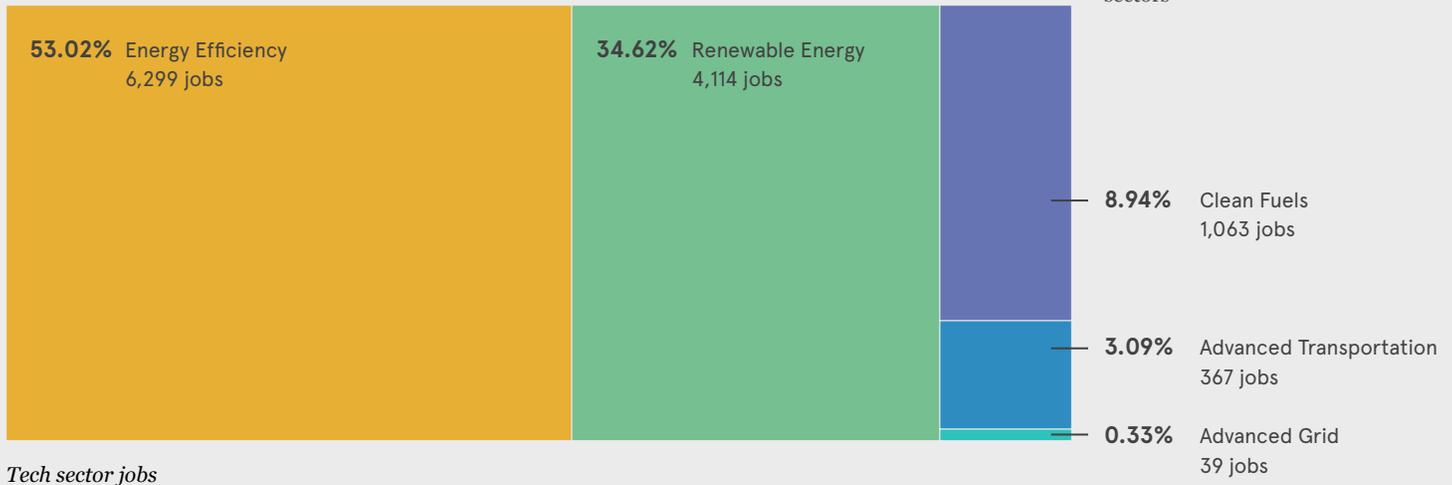
North Dakota is home to 11,882 clean energy jobs. Further, the sector is projected to grow by 4.1% over the next 12 months. Despite having the second lowest number of clean energy jobs in the region, North Dakota actually has the highest percentage of clean jobs in their workforce in the region, including the highest portion of renewable energy generation jobs in the region. 34.6% of clean energy jobs in North Dakota come from renewable energy generation. Over 80% of businesses employ fewer than 25 individuals, illustrating the importance of small business in the state.

**11,882** jobs

Highest percentage of clean energy jobs based on workforce

**4.1%** projected growth

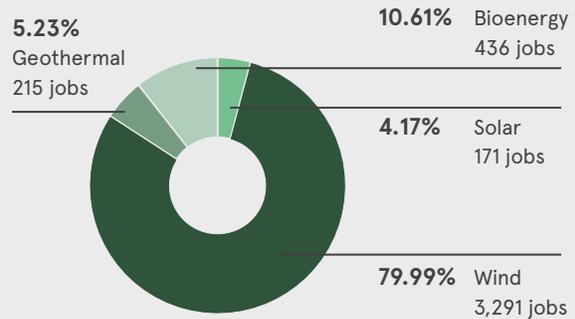
Robust wind energy and clean fuels sectors



Tech sector jobs

As the leader in renewable energy generation jobs per capita, North Dakota is diversifying its energy generation sector. Within renewable generation, 80% is wind power. North Dakota has 171 solar jobs, of which 117 spend a majority of their time on solar.

Energy efficiency jobs numbers represent the lowest percentage of clean energy jobs in the region at 53%. However, North Dakota also leads in the clean fuels sector, with the second highest number of jobs in that sector, following Illinois, and highest clean fuels jobs based on workforce in the Midwest. Most clean fuels jobs consist of non-corn ethanol and non-woody biomass.



Renewable generation subsectors

## Clean Jobs Midwest

| ND   | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other  |
|------|----------------------------|---------------|----------------------|------------------------|--------------|--------|
| Jobs | 2,997                      | 69            | 932                  | 435                    | 792          | 6,656  |
| %    | 25.22%                     | 0.58%         | 7.85%                | 3.67%                  | 6.67%        | 56.02% |

### Value chain

| MSA                    | Total CJ | RE  | EE  | Other |
|------------------------|----------|-----|-----|-------|
| Fargo, ND-MN MSA       | 1,949    | 730 | 989 | 231   |
| Bismarck, ND MSA       | 1,545    | 527 | 826 | 193   |
| Grand Forks, ND-MN MSA | 547      | 186 | 292 | 68    |

### Top 3 MSAs in the region

50% of North Dakota clean energy businesses list finding qualified employees as a barrier to firm success, highest in the region by far, while 25% list financing and material costs as a strong barrier. Businesses also reported limited awareness of policies in place for renewable energy and clean jobs incentives. So while the industry has been doing well for a relatively small state, there is a lot of room for clean energy policy to help drive investment and job growth in the industry. For example, North Dakota has no Renewable Portfolio Standard driving investments and no Energy Efficient Resources Standard. The current ACEEE Energy Efficiency scorecard ranks them last in the nation.

### About the Survey

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Ohio *Story*

OH *Quick Facts*

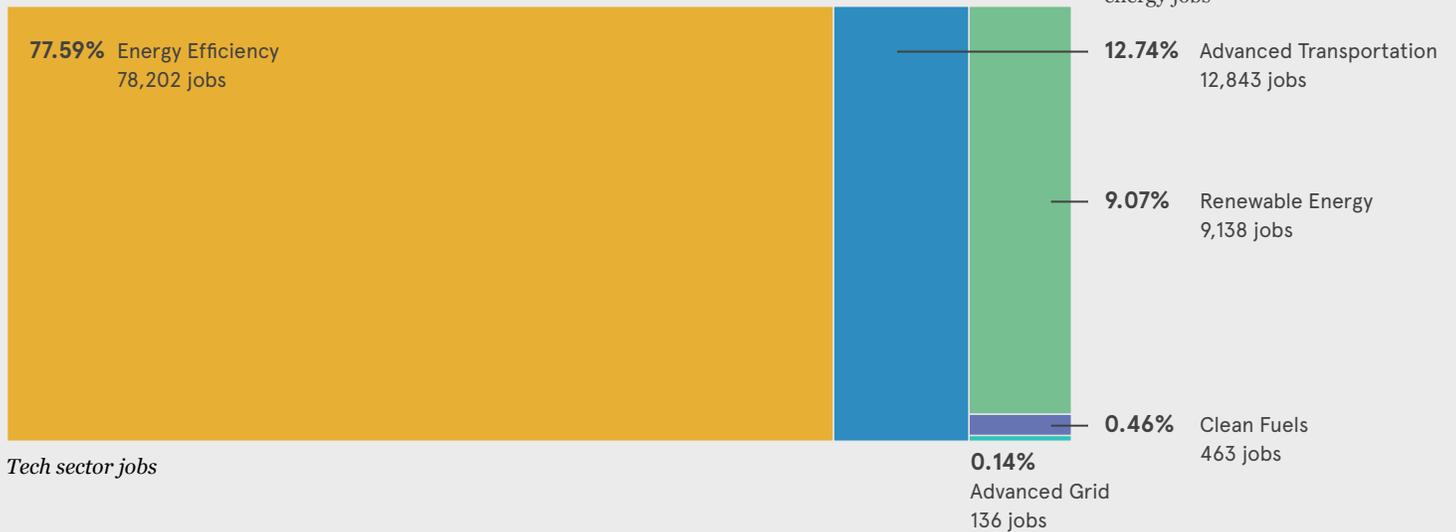
Ohio is now home to over 100,000 clean energy jobs. The state is second in the region in clean energy jobs, at 100,782, and the sector grew by more than 10,000 people last year, exceeding expectations. While the industry continues to grow, growth is now expected to slow to 4.9%. Further, the state saw significant declines in wind energy jobs following a rollback of state clean energy policy, which injected uncertainty into the sector. A strong energy efficiency sector is helping to offset some of those negative impacts, with growth at 39% in that sector. While the clean energy sector in Ohio faces policy uncertainty, it continues to be a significant contributor to the state’s economy, particularly in manufacturing.

**100,782** jobs

Leads the Midwest in clean energy manufacturing jobs

**4.9%** projected growth

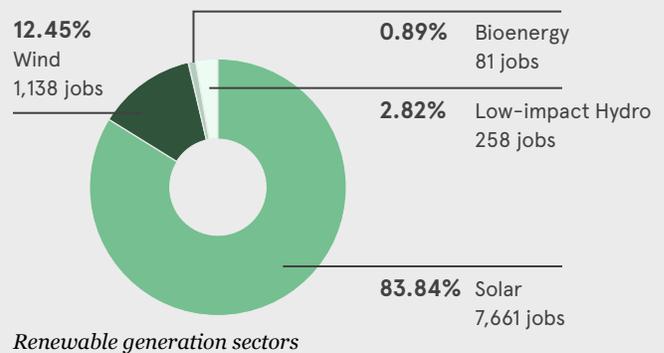
Exceptional growth in energy efficiency offset declines in wind energy jobs



Tech sector jobs

Ohio is embracing clean energy. A rising tide of clean energy adoption is positively benefiting Ohio, but challenges remain. Small businesses drive the clean energy sector with more than 75% of businesses employing fewer than 25 individuals.

Energy efficiency is the largest sector and has grown by 39%, balancing the large losses in renewable energy generation. Within the energy efficiency sector, advanced building materials in Ohio holds a significant share of clean energy jobs. Ohio manufacturers play an important role in the clean energy economy, employing local Ohioans and producing energy efficiency and other products for the entire country. Manufacturing jobs make up nearly 30% of the clean energy value chain in the state, employing over 28,000 people—the largest clean energy manufacturing jobs segment in the Midwest. Indeed, Ohio has more jobs in clean energy manufacturing than in the fossil fuels sector.



Renewable generation sectors

## Clean Jobs Midwest

| OH   | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other |
|------|----------------------------|---------------|----------------------|------------------------|--------------|-------|
| Jobs | 48,688                     | 28,534        | 6,680                | 2,615                  | 7,348        | 6,918 |
| %    | 48.31%                     | 28.31%        | 6.63%                | 2.59%                  | 7.29%        | 6.86% |

### Value chain

In energy efficiency, we see traditional sectors, such as HVAC, increasingly transitioning to embrace the clean energy economy to remain competitive. Energy efficiency work and the advanced training needed to provide these services are increasingly penetrating the market. The data on worker time spent suggests fewer specialized energy efficiency firms as most firms begin to offer these services. 30% of energy efficiency workers spend a majority of their time conducting energy efficiency work and 25% of energy efficiency workers spend all of their time conducting energy efficiency work.

Ohio is also home to nearly 13,000 advanced vehicles jobs, including many in the auto manufacturing supply chain.

In renewables, wind energy generation jobs dropped significantly (down 56% from 2,589 to 1,138), corresponding to uncertainty in renewable energy policy. Despite policy headwinds, solar energy jobs grew by almost 3,000, from 4,846 up to 7,661. Of those 7,661 solar workers, 4,811, or 63%, spend a majority of their time working on solar projects.

Throughout the region, traditional manufacturing jobs are shifting toward clean energy technology and new worker skill sets are needed. About a third of firms report hiring issues due to experience and training.

| MSA                                 | Total CJ | RE    | EE     | Other |
|-------------------------------------|----------|-------|--------|-------|
| Cleveland-Elyria-Mentor, OH MSA     | 17,723   | 1,339 | 13,802 | 2,581 |
| Cincinnati-Middletown, OH-KY-IN MSA | 16,909   | 1,999 | 13,116 | 1,793 |
| Columbus, OH MSA                    | 9,807    | 946   | 7,638  | 1,223 |

### Top 3 MSAs in the region

Federal policies were popular in Ohio. Of Ohio businesses aware of federal renewable energy Investment Tax Credits, 52.5% believed that the credits increased business prospects. 43.9% expect that the EPA's Clean Power Plan will increase business prospects. In contrast, 55.3% believe that the local RPS and EERS had no effect on their business. Ohio has a Renewable Portfolio Standard (RPS) and an Energy Efficiency Resource standard (EERS); however, these policies have been rolled back and are currently not driving new investment in renewables and energy efficiency. The ACEEE energy efficiency scorecard ranks Ohio 27th out of 51. The significant loss of wind energy jobs was dramatic and emphasizes the need for good public policy in order to support steady business growth. Even as Ohio's clean energy jobs grew to more than 100,000, we know we can make this sector much more robust by re-implementing the state's RPS and EERS.

### About the Survey

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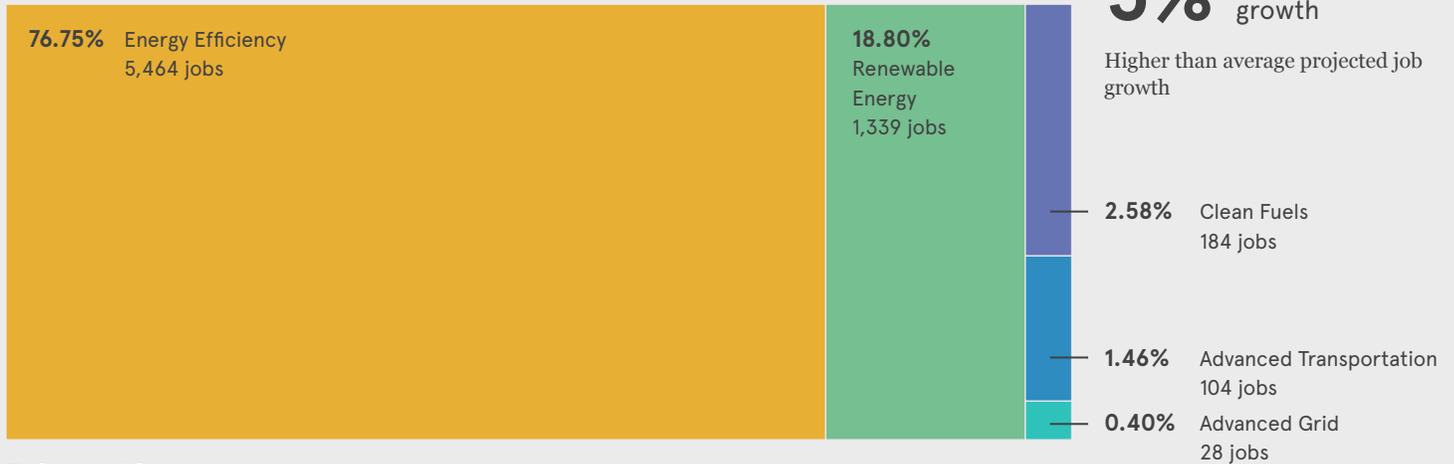
South Dakota is home to 7,118 clean energy jobs, and the sector is projected to grow by 5% over the next 12 months. While jobs numbers are lower than other more populated states in the region, the growth rate is higher than average, a signal that the clean energy sector is driving economic growth in the state. South Dakota has a strong small business base in clean energy, with 75% of businesses surveyed employing less than 25 workers.

**7,118** jobs

Improving state policies will help boost low clean jobs numbers

**5%** projected growth

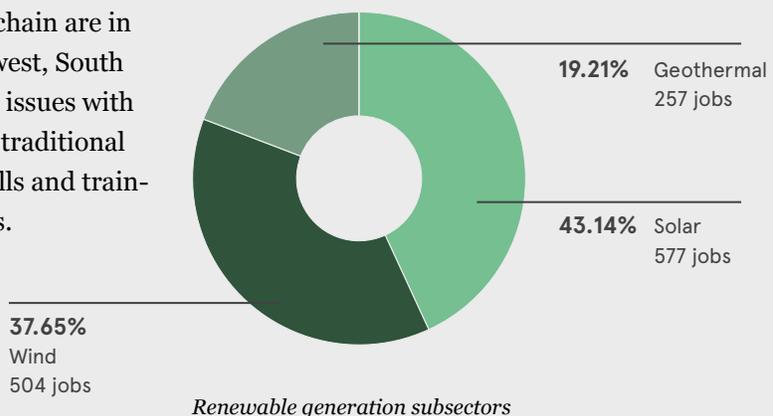
Higher than average projected job growth



Tech sector jobs

Energy efficiency makes up 76% of the clean energy jobs in the state, with renewable energy jobs representing another 18.8%. 56% of renewable energy workers spend a majority of their time working in renewable energy, while 27% spend all their time on renewable energy work. Renewable energy jobs are split between solar, wind, and geothermal energy. South Dakota has 577 solar jobs, of which 319 spend a majority of their time on solar energy work.

Nearly three quarters of jobs across the value chain are in installation. Similar to most states in the Midwest, South Dakota reports that the majority of firms cited issues with hiring due to lack of experience & training. As traditional industries evolve, workers with specialized skills and training are in demand to fill clean technology roles.



Renewable generation subsectors

## Clean Jobs Midwest

| SD   | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other |
|------|----------------------------|---------------|----------------------|------------------------|--------------|-------|
| Jobs | 5,231                      | 103           | 927                  | 248                    | 486          | 123   |
| %    | 73.48%                     | 1.44%         | 13.03%               | 3.49%                  | 6.83%        | 1.73% |

### Value chain

| MSA                      | Total CJ | RE  | EE    | Other |
|--------------------------|----------|-----|-------|-------|
| Sioux Falls, SD MSA      | 2,192    | 412 | 1,682 | 97    |
| Rapid City, SD MSA       | 1,229    | 231 | 943   | 55    |
| Sioux City, IA-NE-SD MSA | 162      | 30  | 124   | 7     |

### Top 3 MSAs in the region

South Dakota lags the region with regards to clean energy policy – it lacks a RPS or an energy efficiency standard, and the state ranks 48 out of 51 on ACEEE’s Energy Efficiency scorecard, one of the lowest in the nation. South Dakota would benefit from these clean energy policies – enacting a RPS or EERS would drive investment and job creation if it were enacted, providing a boost to the state.

### About the Survey

*Clean Jobs Midwest is a survey of clean energy employment in 12 Midwestern states. The region currently employs 568,979 workers in sectors including renewable energy generation, clean transmission, energy efficiency, clean fuels, and advanced transportation.*

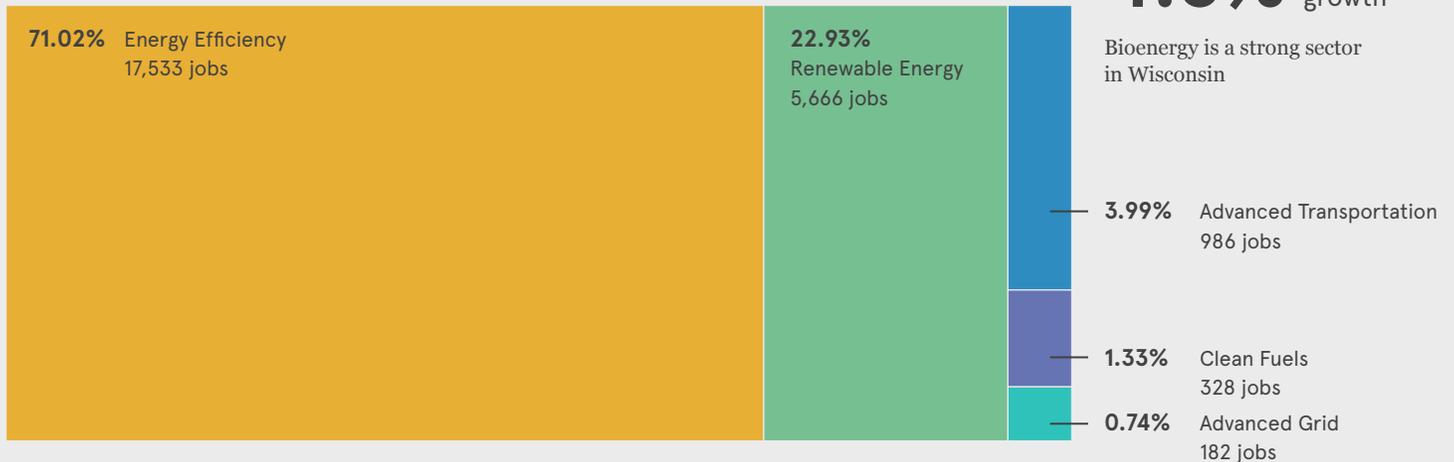
Wisconsin is home to 24,714 clean energy jobs. Over the next 12 months, the sector is projected to grow by 4.8%, an increase of 1,000 new clean energy jobs. Clean energy jobs are mostly concentrated in energy efficiency, although there's also a significant renewable energy generation sector, namely solar and bioenergy. While the size of the clean energy sector is significant, Wisconsin has a lot of room to grow — the state has the smallest clean energy workforce in the region as a percentage of the state's workforce.

**24,714** jobs

Improving state policies will help boost relatively low clean jobs numbers

**4.8%** projected growth

Bioenergy is a strong sector in Wisconsin



Tech sector jobs

Small businesses drive the clean energy sector in Wisconsin. More than 70% of businesses employ fewer than 25 individuals, and most energy efficiency jobs are in HVAC industries. This trend is typical of the region, with traditional industries adapting to new technology and growing the clean jobs market. Energy efficiency is an important part of their business and often requires special training, even if it does not occupy a majority of their time. 34% of energy efficiency workers spend at least 50% of their time conducting energy efficiency work. 31% of energy efficiency workers spend all of their time conducting energy efficiency work. Installation makes up nearly 70% of the clean jobs value chain.

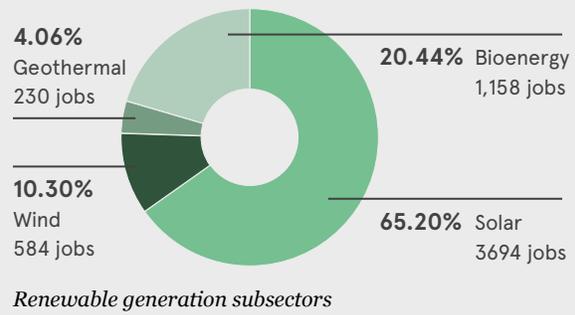
| WI   | Installation & Maintenance | Manufacturing | Trade & Distribution | Engineering & Research | Professional | Other |
|------|----------------------------|---------------|----------------------|------------------------|--------------|-------|
| Jobs | 17,159                     | 1,714         | 2,814                | 707                    | 2,111        | 209   |
| %    | 69.43%                     | 6.94%         | 11.39%               | 2.86%                  | 8.54%        | 0.84% |

Value chain

On the renewable energy generation front, more than 65% of renewable energy jobs are in solar. 75% of renewable energy workers spend at least 50% of their time conducting renewable energy work. 60% of renewable energy workers spend all of their time conducting renewable energy work.

## Clean Jobs Midwest

Wisconsin has one of the strongest bioenergy sectors in the region. It's the largest relative to total clean energy workers, as 4.69% of all WI clean energy workers work in bioenergy. Wisconsin is one of only two states, along with Illinois, to have over 20% of renewable energy generation jobs in the bioenergy sector, such as people who work with biodigesters. Wisconsin has 3,694 solar jobs, of which 1,941 spend a majority of their time working on solar.



| MSA                                   | Total CJ | RE    | EE    | Other |
|---------------------------------------|----------|-------|-------|-------|
| Milwaukee-Waukesha-West Allis, WI MSA | 6,474    | 1,459 | 4,519 | 496   |
| Madison, WI MSA                       | 2,820    | 651   | 2,015 | 154   |
| Green Bay, WI MSA                     | 1,164    | 269   | 832   | 64    |

### Top 3 MSAs in the region

While the clean jobs workforce is small compared to other states in the Midwest, respondents cited less problems with hiring than other states. 23% report difficulty hiring due to lack of experience & training, and most firms were aware of federal and state policies geared toward clean energy jobs. 60% of Wisconsin clean energy businesses note that renewable energy investment tax credits increased business prospects. In contrast to the governor's policy, opposing the EPA's Clean Power Plan (CPP), 67.8% of clean energy businesses believe that the CPP would increase business prospects. And while Wisconsin met its Renewable Portfolio Standard (RPS) of 10% by 2015, the legislation is no longer driving new growth in the sector. The state does have an Energy Efficiency Resource Standard (EERS), and ranks #22 on the ACEEE Energy Efficiency scorecard.

We know how to grow the clean energy economy in Wisconsin. Strengthening and increasing the state's RPS and EERS would drive investment and job creation in the state and provide a boost to the clean energy sector.

### About the Survey

*Clean Jobs Midwest is a survey of clean energy employment in 12 Midwestern states. The region currently employs 568,979 workers in sectors including renewable energy generation, clean transmission, energy efficiency, clean fuels, and advanced transportation.*

## About the Survey

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*Strategic partnerships were formed to survey clean energy jobs across the midwest.*

Clean Energy Trust partnered with BW Research and Environmental Entrepreneurs to facilitate a comprehensive survey of clean jobs throughout the midwest and within individual states in the region. Clean Jobs Midwest draws on the same survey data utilized for the U.S. Department of Energy's National Energy Jobs Report, the BW Research Energy Employment Index (the "Index"), as well as for The Solar Foundation's National Solar Jobs Census. Solar employment numbers courtesy of The Solar Foundation/BW Research Partnership.

The Index methodology relies on the most recently available data from the Bureau of Labor Statistics Quarterly Census of Employment and Wages (QCEW, Quarter 2), together with a detailed survey of business establishments across the United States. Taken together, the data provide the most comprehensive calculation of energy-related employment available. The methodology has been used for local, state, and federal energy related data collection and analysis for nearly a decade, including The Solar Foundation's National Solar Jobs Census series, clean energy reports for state agencies in the Commonwealth of Massachusetts, State of Vermont, and State of Rhode Island, and numerous nonprofit agencies across the U.S.

The Index survey uses a stratified sampling plan that is representative by industry code (NAICS or ANAICS), establishment size, and geography. These data are then analyzed and applied to existing public data published by the Bureau of Labor Statistics, effectively constraining the potential universe of energy establishments and employment. BW Research Partnership believes that the methodology used for the Index could be adopted as a supplemental series to the QCEW with only minor revision.

The Index survey was administered by telephone (more than 300,000 outbound calls) and by web, with more than 50,000 emails sent to participants throughout the U.S. The phone survey was conducted by I/H/R Research Group and Castleton Polling Institute. The web instrument was programmed internally and each respondent was required to use a unique ID in order to prevent duplication.

The sample was split into two categories, referred to as the known and unknown universes. The known universe includes establishments that have previously identified as energy-related, either in prior research or some other manner, such as membership in an industry association or participation in government programs. These establishments were surveyed census style, and their associated establishment and employment totals were removed from the unknown universe for both sampling and for resulting employment calculations and estimates.

The unknown universe includes hundreds of thousands of businesses in potentially energy-related NAICS codes, across agriculture, mining, utilities, construction, manufacturing, wholesale trade, professional services, and repair and maintenance. Each of these segments and their total reported establishments (within the Bureau of Labor Statistics QCEW) were carefully analyzed by state to develop representative clusters for sampling. In total, approximately 20,000 business establishments participated in the survey effort, with more than 8,500 providing full responses to the survey. These responses were used to develop incidence rates among industries (by state) as well as to apportion employment across various industry categories in ways currently not provided by state and federal labor market information agencies.

For several industries, particularly transportation of goods, the Index utilized the methodology developed by the Department of Energy and the National Renewable Energy Laboratory for the Quadrennial Energy Review (QER). This methodology applies commodity flow data at the state level to employment within each transportation segment, including rail, air, truck, and water transport.

Of important note, the Index expressly excludes any employment in retail trade NAICS codes. This excludes gasoline stations, fuel dealers, appliance and hardware stores and other retail establishments.

All data in the index rely on the Bureau of Labor Statistics Quarterly Census of Employment and Wages data for the second quarter of 2015. The survey was administered between September 15, 2015 and November 24, 2015 and averaged 14 minutes in length.

This work was supported by Energy Foundation, Joyce Foundation, and McKnight Foundation.

## About the Partners

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**Clean Energy Trust (CET)** fuels clean energy innovation in the Midwest. A Chicago-based non-profit, CET helps launch, fund and grow Midwest clean energy companies to ensure a more prosperous, sustainable future for generations to come. It does this through direct investment, commercialization assistance, mentorship, access to its broad partner network and the promotion of a supportive clean energy community and business climate. For more information, visit [www.cleanenergytrust.org](http://www.cleanenergytrust.org)

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**BW Research** is an applied research firm committed to providing the most accurate, reliable data and analyses to support better investments, policies and decisions for our clients. BW Research has conducted numerous clean energy jobs reports and has developed an Energy Employment Index for the entire United States. For more information, visit [www.bwresearch.com](http://www.bwresearch.com)

**Environmental Entrepreneurs (E2)** is a national, nonpartisan group of business leaders, investors and others who promote smart environmental policies that drive economic growth. Our members, active in nearly every state in the country, have built or financed more than 1,700 companies, created more than 570,000 jobs, and manage more than \$100 billion in venture and private equity capital. For more information, visit [www.e2.org](http://www.e2.org)

## Supporters

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**Energy Foundation:** For a quarter century the Energy Foundation has worked to accelerate the transition to a clean energy economy. We support policy solutions that build robust, competitive clean energy markets, which in turn create jobs, drive innovation and productivity, and improve health. Nonpartisan and pragmatic, we work with grantees across the political spectrum to promote education and analyses of the benefits of a strong, secure clean energy economy. For more information, visit [www.ef.org](http://www.ef.org)

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**The Joyce Foundation** invests in solutions to pressing economic and social challenges that affect the quality of our lives, the well-being of our communities and the fairness of our society. Its primary geographic focus is the Great Lakes region, but it has national reach and impact. Joyce moves ideas to action by supporting the development, testing and advancement of policies to better educate our children, expand economic opportunity, increase participation and responsiveness in our democracy, clean up and restore our natural environment, diversify arts and culture and protect communities from gun violence. It also supports programs to improve the performance of institutions and systems whose actions determine if policy solutions are effective. Founded in 1948 and based in Chicago, Joyce has assets of \$950 million and distributes approximately \$45 million annually. For more information, please visit [www.joycefdn.org](http://www.joycefdn.org) or follow us at [@JoyceFdn](https://twitter.com/JoyceFdn)

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**The McKnight Foundation**, a Minnesota-based family foundation, seeks to improve the quality of life for present and future generations. We use all our resources to attend, unite, and empower those we serve. Program interests include regional economic and community development, Minnesota's arts and artists, early literacy, youth development, Midwest climate and energy, Mississippi River water quality, neuroscience research, international crop research, and rural livelihoods. Our primary geographic focus is the state of Minnesota, with significant support also directed to strategies throughout the U.S. and in Africa, Southeast Asia, and Latin America. Founded in 1953 and independently endowed by William and Maude McKnight, the foundation had assets of approximately \$2.1 billion and granted about \$88 million in 2015. For more information, visit [www.mcknight.org](http://www.mcknight.org)

## Terms & Definitions

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| ITC   | <b>Federal renewable energy Investment Tax Credits:</b> The federal government has two key tax credits for renewable energy businesses: the Production Tax Credit (PTC) and Investment Tax Credit (ITC). The PTC, which applies largely to wind, reduces federal income taxes based on the megawatts of power produced (\$0.023/kWh for wind, closed-loop biomass, and geothermal energy resources and \$0.012/kWh for open-loop biomass, landfill gas, municipal solid waste, qualified hydroelectric, and marine and hydrokinetic energy resources). The ITC, which applies largely to solar projects, reduces federal income taxes based on capital invested in a renewable energy project. (Rebate amounts: 30% of capital invested for solar, fuel cells, small wind and 10% for geothermal, microturbines, and Combined Heat and Power)   |
| CPP   | <b>EPA Clean Power Plan:</b> “The CPP is a set of regulations implemented under Section 111 of the CAA that authorizes the issuance of standards of performance for new and existing sources. The goal of the plan is to reduce power plant emissions by 32 percent (below 2005 levels) by 2030. This is significant because power plants are responsible for the lion’s share of GHG emissions (approximately one-third). Still, the CPP represents only a small step toward the ultimate U.S. policy goal of reducing GHG emissions to 80 percent below 1990 levels by 2050.<br><br>The central piece of the CPP imposes emission reduction obligations on existing power plants – those that are in operation and spewing GHGs into the atmosphere. Under Section 111(d), the EPA identifies the “Best System of Emission Reduction” that has been “adequately demonstrated” for a given source category – this becomes the standard of performance that existing sources must meet. States are then expected to develop State Implementation Plans (SIPs) that will ensure sources within each state will meet the emission targets. Under the CPP, states are supposed to begin making reductions in 2022 with an ultimate compliance date of 2030.”—The Washington Post “Placing the Clean Power Plan in Context” |
| RPS   | <b>Renewable Portfolio Standard:</b> According to the National Renewable Energy Laboratory, “A renewable portfolio standard (RPS) is a regulatory mandate to increase production of energy from renewable sources such as wind, solar, biomass and other alternatives to fossil and nuclear electric generation. It’s also known as a renewable electricity standard.”  |
| EERS  | <b>Energy Efficiency Resources Standard:</b> “An Energy Efficiency Resource Standard (EERS) establishes specific, long-term targets for energy savings that utilities or non-utility program administrators must meet through customer energy efficiency programs. An EERS can apply to either electricity or natural gas utilities, or both, depending on the state, and can be adopted through either legislation or regulation. An EERS is similar in concept to a Renewable Energy Standard (RES) or Renewable Portfolio Standard (RPS). While an RES requires that electric utilities generate a certain percentage of electricity from renewable sources, an EERS requires that they achieve a percentage reduction in energy sales from energy efficiency measures.”—American Council for an Energy-Efficient Economy  |
| ACEEE | <b>American Council for an Energy-Efficient Economy:</b> “The American Council for an Energy-Efficient Economy (ACEEE), a nonprofit, 501(c)(3) organization, acts as a catalyst to advance energy efficiency policies, programs, technologies, investments, and behaviors. We believe that the United States can harness the full potential of energy efficiency to achieve greater economic prosperity, energy security, and environmental protection for all its people.” ACEEE publishes an annual Energy Efficiency scorecard, which ranks the 50 states and the District of Columbia on their energy efficiency policies.<br>More info: <a href="http://aceee.org/overview-mission">http://aceee.org/overview-mission</a>  |

## Sectors *and the technologies that they include*

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### Renewable Energy

This is energy from wind, solar, geothermal, biomass and low-impact hydropower, all considered renewable resources because they are not finite, like coal and petroleum resources. Workers in this sector are employed in roles involved in generating energy from these renewable resources.

- Solar power, excluding solar heating
- Wind power
- Geothermal
  - Power generation, excluding geothermal steam heat
- Biomass power generation
- Low-impact hydropower

### Advanced Grid

Grid technology refers to how energy is stored and distributed to consumers from the point of generation. Within the context of the clean jobs survey, advanced grid refers to the method by which it is delivered to consumers.

- Smart grid
- Energy storage

### Energy Efficiency

Efficiency is focused on how effectively energy is used; for example, how well an HVAC system heats a building and how to reduce heat loss through building materials and smart technology.

- Energy Star appliances
  - “ENERGY STAR qualified appliances incorporate advanced technologies and use 10 to 50 percent less energy than standard appliances.”: More info: [https://www.energystar.gov/ia/new\\_homes/features/Appliances\\_062906.pdf](https://www.energystar.gov/ia/new_homes/features/Appliances_062906.pdf)
- Energy Efficient lighting
  - This includes compact fluorescent lamps (CFLs), light emitting diodes (LEDs) and other energy efficient lighting: More info: <http://energy.gov/energysaver/how-energy-efficient-light-bulbs-compare-traditional-incandescents>
- HVAC (Heating, Ventilation, and Air Conditioning)
  - This includes High-Efficiency boilers and insulation
- Building materials
  - Advanced materials that increase building envelope efficiency, and reduce energy intensity in their production
- AFUE
  - Annual Fuel Utilization Efficiency (source) High AFUE furnaces help get more heat out of the same amount of fuel
- REHC
  - Renewable Heating and Cooling, this includes Geothermal heat, Solar thermal heat

### Clean Fuels

Woody and nonwoody biofuels, including non-corn ethanol, biodiesel and wood energy are sources of fuel with a lower carbon footprint and less greenhouse gas emissions than coal and petroleum sources.

- Woody and nonwoody biofuels, including non-corn ethanol and biodiesel
- Wood energy products

### Advanced Transportation

Advanced transportation refers to vehicles using alternative and advanced fuel sources, including hybrid-electric, electric, natural gas, fuel cell, and hydrogen.

- Hybrid-electric vehicles
- Electric vehicles
- Natural gas vehicles
- Fuel cell vehicles
- Hydrogen vehicles