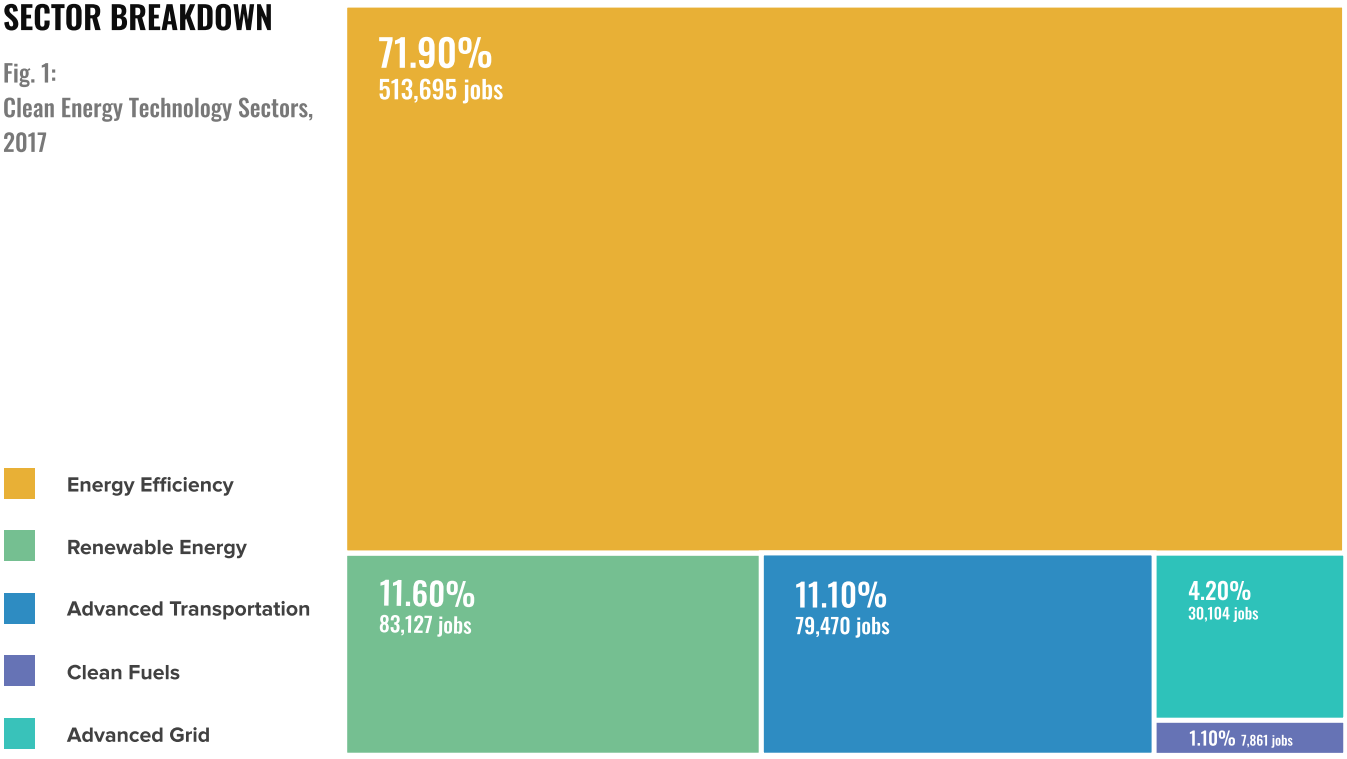
The Midwest is Home to **714,257** Clean Energy Jobs

Renewable Energy and Energy Efficiency Grow Despite Overall Job Declines

Clean energy is a major employer in the Midwest with 714,257 jobs.[1] The two largest clean energy industries – energy efficiency and renewables – experienced strong growth. In fact, led by industries like wind and solar, renewable energy jobs in the Midwest grew 5 percent over the previous year. Given that across the U.S. renewable energy actually lost jobs, the over 3,900 workers added to the Midwest's renewable energy payrolls are indicative of the sector's relative health in the region. However, when taking into account all clean energy industries, jobs in the Midwest's clean energy sector declined by 8,375, or 1.2 percent. Still, Midwestern clean energy employers maintain a positive outlook, projecting over 32,000 jobs will be added this year, a 4.5 percent growth rate.

SECTOR BREAKDOWN

Fig. 1:
Clean Energy Technology Sectors, 2017

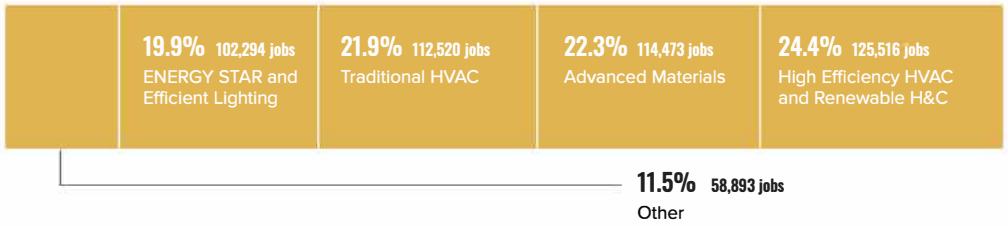


1. Unless otherwise stated, all data is based on the 2018 U.S. Energy and Employment Report (Source: National Association of State Energy Officers; Energy Futures Initiative). The report incorporates an updated methodology that captures more energy efficiency manufacturing jobs than in previous years. Unlike past Clean Jobs Midwest reports, this year's report does not count fossil fuel industry workers who also spend a portion of their time on renewable energy or energy efficiency as clean energy jobs. See the About section at cleanjobsmidwest.com/about for full details.

Bright Future for Energy Efficiency

More Midwesterners work in energy efficiency (513,695) than any other clean energy sector. Energy efficiency added 7,611 jobs last year in the region, a 1.5 percent growth rate. What do energy efficiency workers do? They manufacture ENERGY STAR-rated appliances and install efficient lighting systems; tweak traditional heating, ventilation, and air conditioning (HVAC) systems; design high-efficiency HVAC units; build renewable heating and cooling systems; and handle advanced building materials. Other jobs employ people who implement software and contractors who diagnose, adjust, and verify HVAC efficiency. While the Midwest's energy efficiency sector grew, it fell short of the nation's overall 3.1 percent growth rate, suggesting potential for future growth.

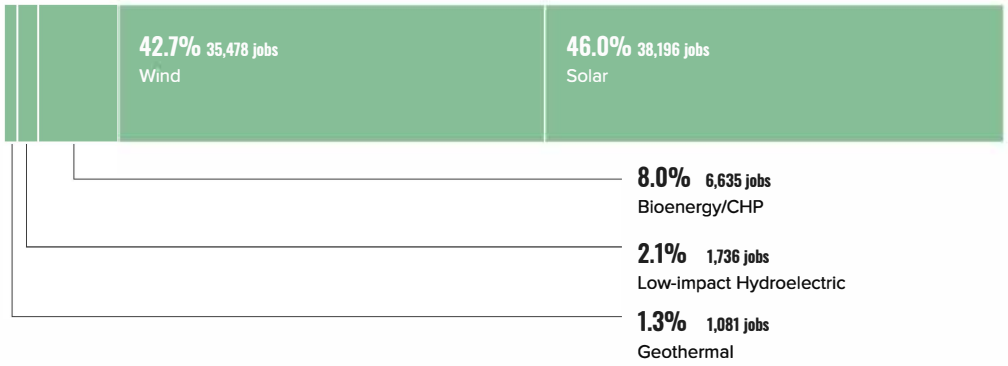
Fig. 2:
Energy Efficiency Subsectors, 2017



Renewables Overcome Solar's Sluggish Year

Renewable energy employs over 83,127 workers, second-highest in the Midwest's clean energy sector and over 3,900 more than the previous year (a 5 percent growth rate). Zooming in on specific industries, there are 35,478 wind workers and 38,759 solar workers. While wind grew 4.3 percent (adding 1,504 jobs), solar moved in a different direction. The solar industry lost 1.4 percent of its workers, or 562 jobs. This came as companies rushed to complete projects in 2016 to qualify for expiring tax credits, then cut jobs in 2017. Solar also struggled with uncertainties around tariffs at the federal level. Jobs in renewables encompass diverse industries including geothermal, bioenergy, and low-impact hydroelectric power. Despite solar's performance, the Midwest's renewables sector appears strong compared to the rest of the U.S., which shed 3,800 renewables jobs overall.

Fig. 3:
Renewable Energy Subsectors, 2017



18-Percent Decline in Advanced Transportation – But EV Jobs Rev Up

Advanced transportation is the Midwest's No. 3 clean energy sector with 79,470 jobs. The sector includes jobs building and developing hybrid and plug-in electric vehicles (EVs), alternative fuels vehicles, and fuel cell vehicles. Competition from Japanese and European automakers in advanced transportation is fierce, and in the Midwest this sector lost 17,363 jobs, an 18 percent decline that included job losses in hybrid-electric, plug-in hybrid electric, natural gas, and hydrogen and fuel-cell vehicles. EVs were a bright spot, however: the industry grew 28 percent, to 20,080 jobs.

Advanced Grid Employs over 30,000

Advanced grid jobs employ 30,104 Midwesterners. As the fourth-largest clean energy employer in the region, the sector includes jobs in energy storage, smart grid, microgrid, and other grid modernization work. In 2017, there were 18,174 energy storage jobs – a nearly 4 percent decline. Advanced grid jobs fell by 2.9 percent overall, with Michigan alone losing 1,299 jobs, more than any other Midwestern state.

Nearly 8,000 Clean Fuels Jobs

7,861 Midwesterners work in clean fuel jobs. The clean fuels sector encompasses non-corn ethanol, non-woody biomass, and other technologies not yet in wide commercial production, including algal biofuel, syngas, bioheat blends, landfill gas, and advanced biofuels. Clean fuel jobs declined in all Midwestern states. Overall across the region, the sector experienced a 16.8-percent decline.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
Chicago-Naperville-Joliet, IL-IN-WI MSA	95,288	14,262	68,016
Detroit-Warren-Livonia, MI MSA	53,477	5,208	36,520
Minneapolis-St. Paul-Bloomington, MN-WI MSA	36,813	5,549	27,200

CLEAN ENERGY INDUSTRY OUTLOOK

Challenges to Clean Energy Growth

Clean energy jobs are nearly 2.1 percent of all jobs in the region. However, clean energy jobs declined 1.2 percent while the overall Midwestern job market grew by 0.8 percent.[2] The clean energy industry faced several headwinds including hiring difficulties and federal policy uncertainty. In 2017, more than three-quarters of Midwestern clean energy businesses reported difficulty hiring qualified employees; about a third said hiring was "very difficult."One reason hiring may be difficult right now is the tight national labor market due to relatively low unemployment.

Other headwinds include federal policy uncertainty caused by the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA's attempt to roll back fuel economy standards in the auto industry, and the anticipation of a tariff levied on solar panels. Together, these factors created general market uncertainty for many clean energy businesses in the Midwest. But even with these headwinds, business owners predict industry growth next year and project a 4.5 percent growth in Midwestern clean energy jobs.

2. 2017 Bureau of Labor Statistics Current Employment Statistics (CES)

Comparing Clean Energy Jobs to Fossil Fuel Jobs

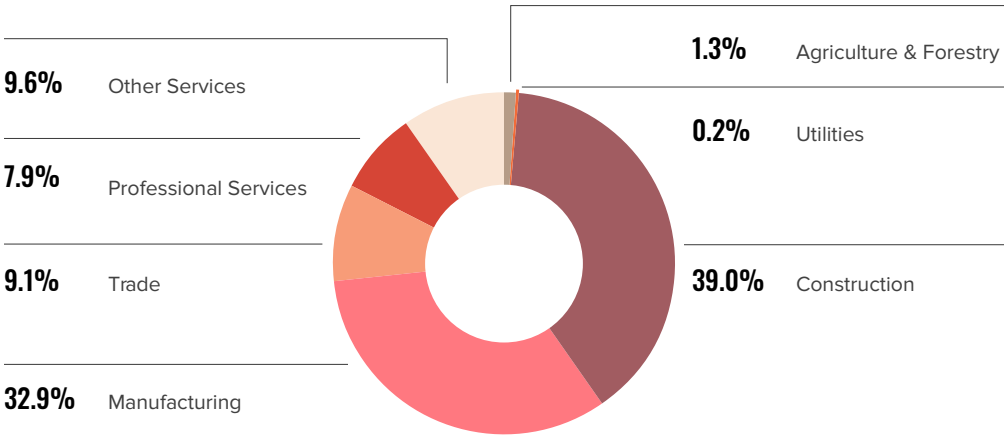
In 2017, about 179,000 Midwesterners worked in fossil fuel energy jobs in industries like coal, natural gas, and oil.[3] Electric power generation jobs using fossil fuels employed 65,000 people, while there were 83,120 jobs in renewable energy generation. While coal jobs dropped by 3.8 percent, renewable energy jobs grew by 5 percent.

3. 2018 U.S. Energy and Employment Report

VALUE CHAIN

Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service, and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs.

Fig. 5:
Clean Energy Jobs Value Chain, 2017



When Midwestern clean energy jobs are broken down by their placement in the value chain, construction is home to 39 percent of the jobs while manufacturing is home to 33 percent.

SUMMARY

Business Optimism, Policy Uncertainty Will Shape Future For Midwest

Clean energy workers in the Midwest do much more than just install solar panels on rooftops. Broad and diverse, the sector encompasses workers who develop software for smart grids, install ultra-efficient boilers in high school basements,and fix broken wind turbine gearboxes hundreds of feet above a cornfield in Michigan's Gratiot County. There are more than 714,000 clean energy jobs in the Midwest. In the two largest sectors – energy efficiency and renewable energy – these jobs are growing. However, policy uncertainty and macroeconomic trends have triggered modest job losses in the sector overall. Still, employers remain optimistic and project 4.5 percent clean energy job growth in the next year in the Midwest.

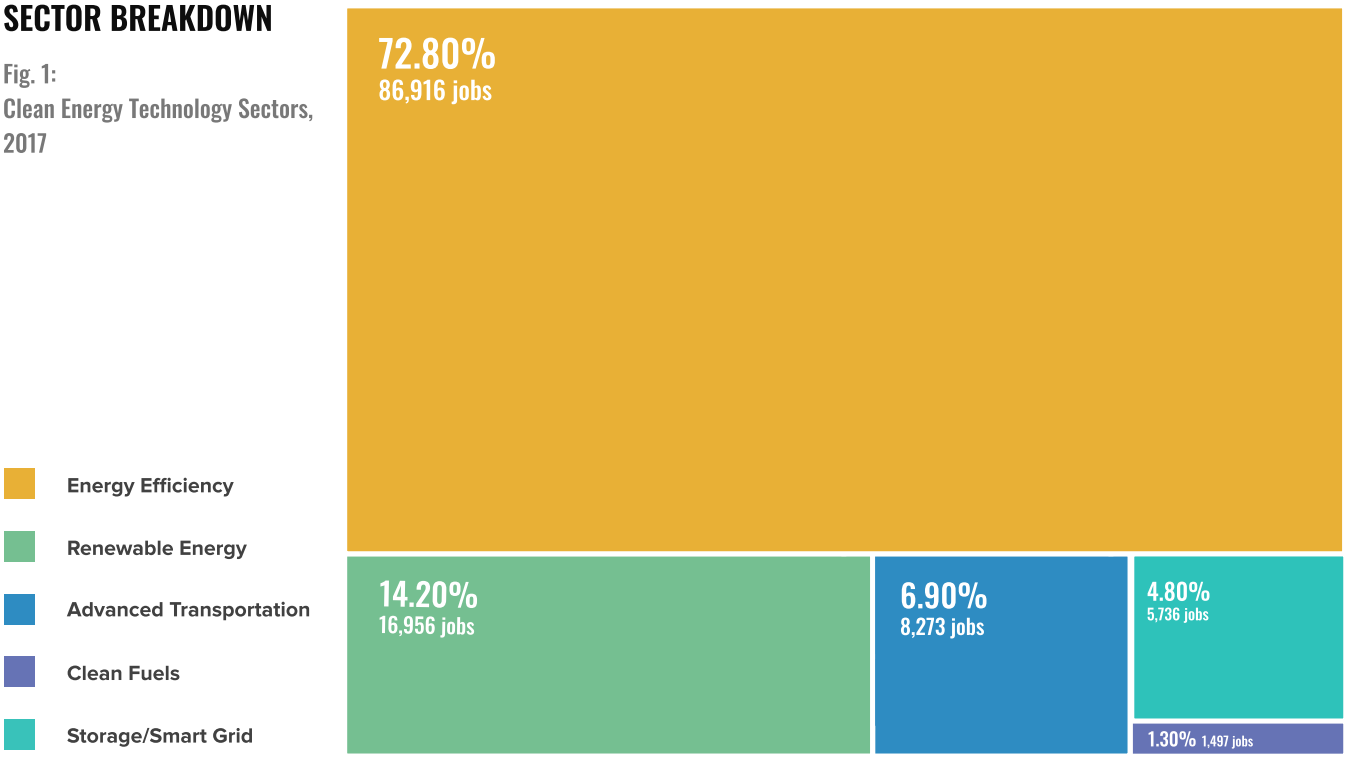
Illinois is home to **119,377** clean energy jobs

Energy Efficiency, Renewables Top Clean Energy Industries in Illinois

Illinois' clean energy industry continues to grow and is home to 119,377 clean energy jobs.[1] From 2016 to 2017, overall clean energy jobs grew by just less than 1 percent. Illinois leads the Midwest in energy efficiency jobs (86,916 jobs, 3.5 percent growth rate) and renewable energy jobs (16,956, 7.6 percent). Renewable energy job growth in Illinois accounted for nearly one-third (30%) of the entire region's growth in renewable jobs. By comparison, Illinois is home to just 31,821 fossil fuel jobs.

SECTOR BREAKDOWN

Fig. 1:
Clean Energy Technology Sectors, 2017



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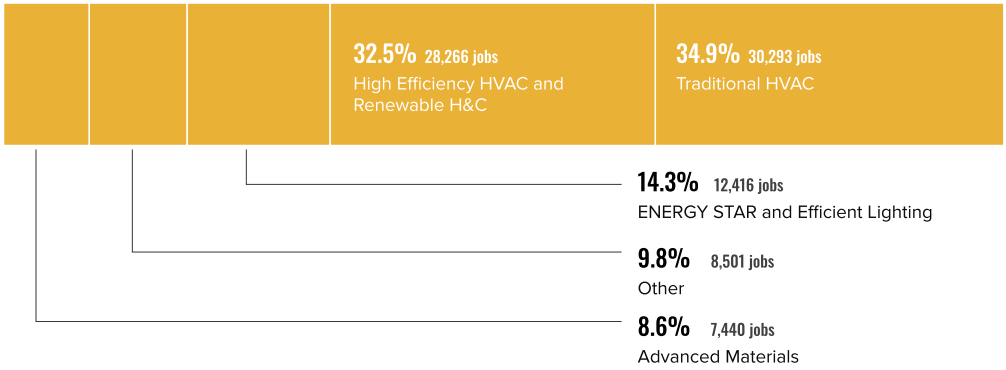
Bulk of Illinois' Clean Energy Jobs in Energy Efficiency

Energy efficiency has the biggest clean energy workforce in the state with 86,916 jobs. Over the past year, 2,929 energy efficiency jobs were added in Illinois, more than any other state in the region and good enough for a 3.5 percent growth rate. These jobs include software developers in Chicago, contractors who diagnose, adjust, and verify the efficiency of heating, ventilation, and air conditioning (HVAC) systems in rural high schools, and factory workers who manufacture energy efficient appliances.

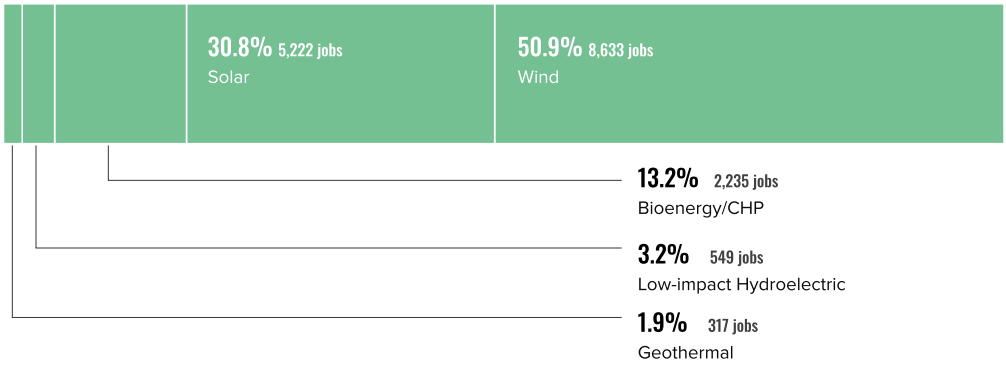
Fig. 2:
Energy Efficiency Subsectors, 2017



Renewable Energy Jobs Tick Upward

Over the past year, Illinois renewable energy jobs spiked 7.6 percent to 16,956. Looking at individual industries, there are 8,633 wind jobs and 5,222 solar jobs. From 2016 to 2017, wind jobs grew nearly 4 percent; solar jobs, meanwhile, dropped nearly 2 percent. Renewable energy jobs also include diverse industries like geothermal, bioenergy, and low-impact hydroelectric power.

Fig. 3:
Renewable Energy Subsectors, 2017



Job Losses in Advanced Transportation, but EV Hiring Revs Up

Advanced transportation jobs are the third-largest clean energy sector in Illinois with 8,273 jobs. However, the sector experienced the biggest jobs decline in Illinois and across the region. In Illinois, advanced transportation shed 2,528 jobs, a 23.4 percent decline. Losses were felt across the Midwest as jobs in hybrid-electric, plug-in hybrid electric, natural gas and hydrogen, and fuel-cell vehicles all declined. Competition from Japanese and European automakers in

advanced transportation has also been increasing. So, although electric and plug-in vehicles are more popular than ever, these foreign automakers have been out-competing American autos. One bright spot, however, was electric vehicles (EVs), which grew nearly 20 percent, or by 344 jobs, reaching 2,092 in total. Advanced transportation jobs help build and develop hybrid and plug-in electric vehicles, alternative fuels vehicles, and fuel cell vehicles.

Advanced Grid Jobs Employ over 5,000

Advanced grid jobs represent the fourth-largest clean energy employer in Illinois with 5,736 jobs. They also encompass cutting-edge industries like energy storage, smart grid, microgrid, and other grid-modernization work. Combined, jobs in these industries dipped 4.1 percent, losing 246 jobs.

Small Clean Fuels Sector Endures Job Losses

In Illinois, 1,497 people work in clean fuels jobs. The clean fuels sector encompasses non-corn ethanol, non-woody biomass, and other technologies not yet in wide commercial production, including algal biofuel, syngas, bioheat blends, landfill gas, and advanced biofuels. The fifth-biggest clean energy jobs sector in the state, clean fuels jobs, fell 18 percent, a loss of 328 jobs.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
Chicago-Naperville-Joliet, IL-IN-WI MSA	83,654	12,298	60,561
St. Louis, MO-IL MSA	5,863	680	4,399
Peoria, IL MSA	3,539	449	2,621

CLEAN ENERGY INDUSTRY OUTLOOK

State and Federal Policies Sending Mixed Messages to Clean Energy Businesses

Passed in December 2016, the Future Energy Jobs Act puts Illinois on track to acquire a quarter of its electricity from renewable energy by 2025 and also strengthens the state's energy efficiency standards. This likely triggered business expansion and related job growth in the state's two biggest clean energy sectors – energy efficiency and renewables. In fact, Illinois outpaced all other Midwestern states in those sectors.

Illinois' clean energy jobs are still growing just marginally faster than the rest of the state's economy. While the overall state job market grew by just 0.72 percent,[2] clean energy jobs grew 0.93 percent. A slow growth rate can be credited to several factors. Tops on the list may be hiring difficulties facing employers. In 2017, nearly 84 percent of Illinois clean energy businesses reported it was "very difficult" or "somewhat difficult" to hire qualified employees.

One reason hiring may be difficult right now is the tight national labor market due to relatively low unemployment. Other potential factors include federal policy uncertainty caused by the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA's attempt to roll back fuel economy standards in the auto industry, and the anticipation of a tariff levied on solar panels. Together, these factors created general market uncertainty for many clean energy businesses in the Midwest.

2. 2017 Bureau of Labor Statistics Current Employment Statistics (CES)

Even with these headwinds, business owners see the industry growing next year. The American Council of an Energy-Efficient Economy ranks Illinois No. 11 in its latest ACEEE State Energy Efficiency Scorecard, up one spot from the previous ranking. As the Future Energy Jobs Act is implemented over the next year, it will likely continue to help create clean energy jobs. Across the Midwest, clean energy employers are optimistic; they project a 9 percent clean energy job growth next year.

Comparing Clean Energy Jobs to Fossil Fuel Jobs

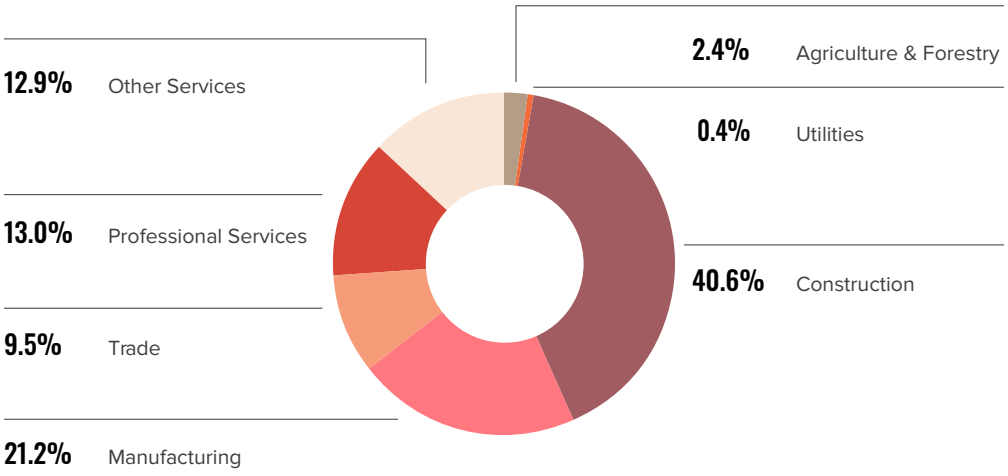
In 2017 in Illinois, 31,281 people worked in fossil fuel energy jobs in industries like coal, natural gas, and oil.[3] There were 7,601 jobs generating electric power from fossil fuels in Illinois, a fraction of the 16,956 jobs in the state involved in renewable energy generation. While coal jobs dropped by 13.5 percent, renewable energy jobs grew 7.6 percent.

3. 2018 U.S. Energy and Employment Report

VALUE CHAIN

Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service, and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs.

Fig. 5:
Clean Energy Jobs Value Chain, 2017



When Illinois clean energy jobs are broken down by their placement in the value chain, construction is home to 40.6 percent of the jobs while manufacturing is home to 21.2 percent.

Small businesses drive Illinois' clean energy sector – 75 percent of Illinois' clean energy businesses employ fewer than 20 individuals.

In Illinois, 11.2 percent of the state's clean energy workers are veterans. By comparison, 6 percent of all workers nationwide are veterans.[4] The large ratio of veterans transitioning to clean energy jobs is the result of the U.S. Department of Defense's long-standing commitment to investing in renewable energy, energy efficiency and training programs that prepare veterans for private-sector employment in industries like solar.

4. 2018 Bureau of Labor Statistics Current Population Survey (CPS)

SUMMARY

Illinois' clean energy industry continues to grow. As of 2017, it employs 119,377 jobs. Thanks to the Future Energy Jobs Act, renewable energy and energy efficiency are bright spots in Illinois' economy, and job growth is expected to continue in both sectors. To become the dominant player in clean energy jobs in the Midwest, however, the state must jumpstart job growth in additional industries, including advanced transportation, advanced grid, and clean fuels.

Indiana is home to **83,752** clean energy jobs

Energy Efficiency, Renewables Lead the Way

Clean energy employs 83,752 people in Indiana.[1] The energy efficiency and renewable energy sectors each experienced strong growth from 2016 to 2017, but in that same time clean energy jobs in Indiana overall declined by 1,067, or 1.3 percent.

Though clean energy faces policy and macroeconomic challenges, Indiana's clean energy employers project they will add more than 5,000 jobs in the next year, a 6.1 percent growth rate.

SECTOR BREAKDOWN

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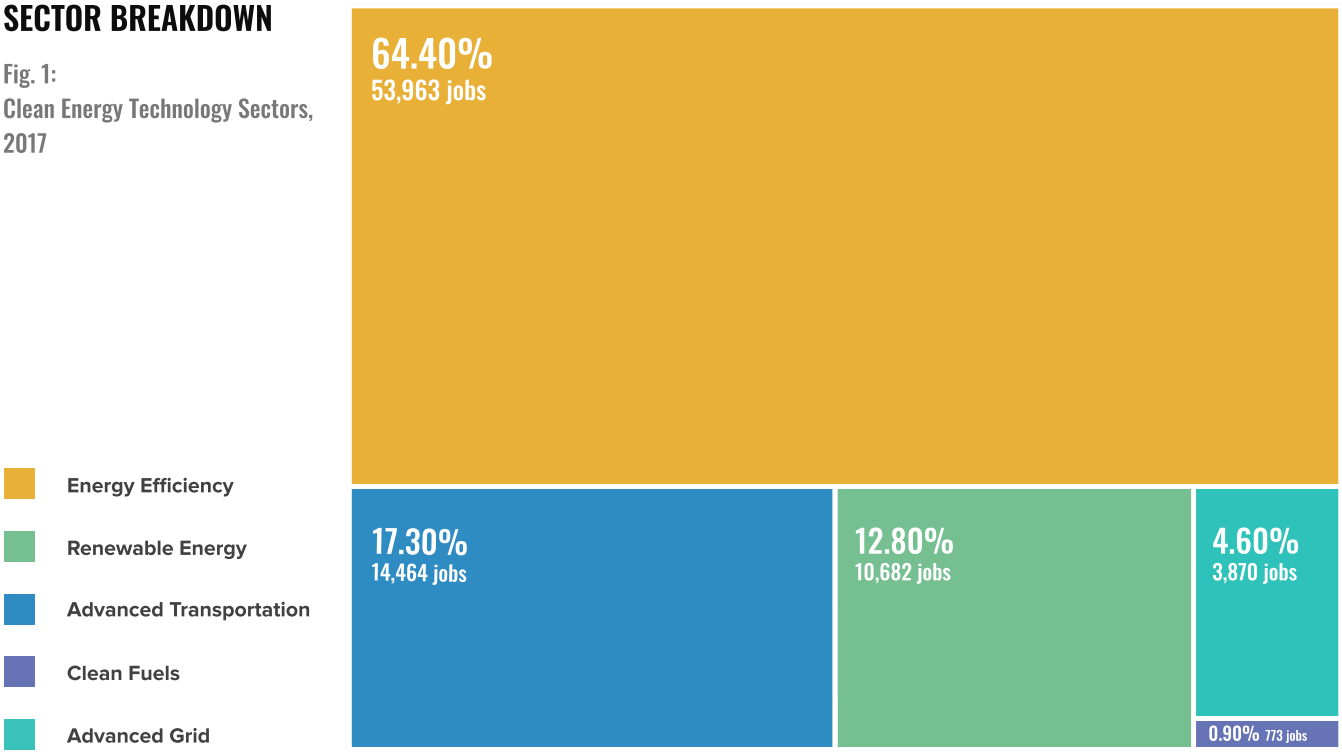
Clean Energy Technology Sectors, 2017



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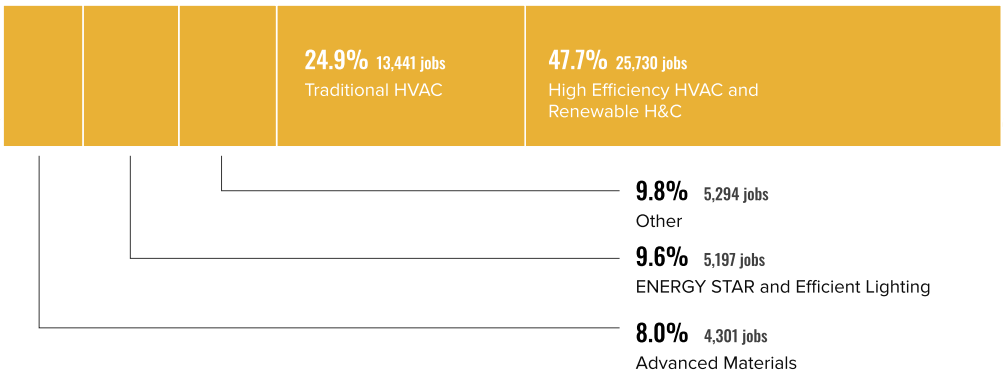
2.6 Percent Growth in Energy Efficiency Jobs

In Indiana, energy efficiency jobs are the largest clean energy employment sector with 53,963 jobs. The sector added 1,385 jobs and grew by 2.6 percent. Energy efficiency employs a wide range of jobs including factory jobs which manufacture parts for high efficiency lighting, construction jobs whose retrofits save money on heating, ventilation, and air conditioning (HVAC) costs in municipal buildings and commercial buildings in Indianapolis. Compared to the rest of the region, energy efficiency jobs are growing at a healthy clip; overall in the Midwest, energy efficiency jobs grew just 1.5 percent. Still, there's plenty of room for improvement as Indiana was ranked No. 40 on the American Council for an Energy Efficient Economy's State Energy Efficiency Scorecard, up two spots from the previous year.

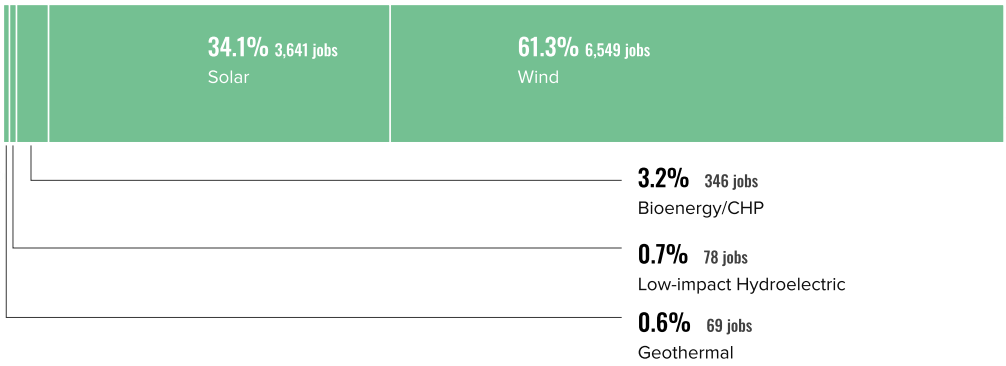
Fig. 2:
Energy Efficiency Subsectors, 2017



EV Jobs Up, But Competition Takes Toll On Advanced Transportation

Advanced transportation is Indiana's No. 2 clean energy employer with 14,464 jobs. This sector includes jobs building and developing hybrid and plug-in electric vehicles, alternative fuels vehicles, and fuel cell vehicles. Facing competition from Japanese and European automakers, advanced transportation experienced the second-largest job decline of all the clean energy sectors in the state, losing 2,162 jobs, a 13 percent decrease. Losses were seen across the Midwest as jobs in hybrid-electric, plug-in hybrid electric, natural gas, hydrogen, and fuel-cell vehicles all declined. One bright spot in the sector, however, is that jobs in electric vehicles (EVs) in Indiana total 3,658. That's 967 more than last year, a massive 36 percent growth rate.

Fig. 3:
Renewable Energy Subsectors, 2017



Wind, Solar Account For Majority of Renewables Jobs

Renewable energy jobs are the third-largest clean energy job sector in Indiana with 10,682 jobs. That's 229 jobs more than the previous year, a 2.2 percent growth rate. There are 6,549 wind jobs, nearly 5 percent more than last year. Solar jobs, however, declined almost 6 percent to 3,641. Most Midwestern states experienced solar jobs declines as companies rushed to complete projects in 2016 in order to qualify for expiring tax credits, then subsequently reduced jobs in the following year. The solar industry also encountered uncertainties regarding tariffs at the federal level. Beyond wind and solar, renewable energy generation jobs also include jobs in geothermal, bioenergy, and low-impact hydroelectric power.

Nearly 4,000 Advanced Grid Jobs; Majority In Energy Storage Industry

Advanced grid jobs are the fourth-largest sector with 3,870 jobs. Advanced grid jobs include jobs in energy storage, smart grid, microgrid, and other grid modernization work. In 2017, there were 2,500 energy storage jobs in Indiana, a decline of around 5 percent from the previous year. Overall, Midwestern advanced grid jobs fell 8.5 percent.

Clean Fuels Smallest Clean Energy Employer, But Still Home to 700 Jobs

The clean fuel sector was Indiana's fifth-largest clean energy employer with 773 jobs. The clean fuels sector encompasses non-corn ethanol, non-woody biomass, and other technologies not yet in wide commercial production, including algal biofuel, syngas, bioheat blends, landfill gas, and advanced biofuels. Clean fuel jobs dropped by 17.3 percent in Indiana, which was not unusual for the region as all Midwestern states.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
Indianapolis-Carmel, IN MSA	24,265	2,004	16,422
Chicago-Naperville-Joliet, IL-IN-WI MSA	9,089	1,310	5,798
Fort Wayne, IN MSA	8,402	3,706	3,520

CLEAN ENERGY INDUSTRY OUTLOOK

Policy Uncertainty, Broader Economic Trends Hurt Hiring, But Optimism Remains

Clean energy jobs in Indiana represent 2.5 percent of all jobs in the state.

In 2017, nearly three-quarters of Indiana clean energy establishments reported difficulty hiring qualified employees; about a third of those went on to say hiring was "very difficult."

One reason hiring may be difficult right now is the tight national labor market due to relatively low unemployment. Other potential factors include federal policy uncertainty caused by the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA's attempt to roll back fuel economy standards in the auto industry, and the anticipation of a tariff levied on solar panels. Together, these factors created general market uncertainty for many clean energy businesses in the Midwest.

But even with these headwinds, Indiana business owners see clean energy job opportunities growing by a projected by 6.1 percent.

Comparing Clean Energy Jobs to Fossil Fuel Jobs

In 2017 in Indiana, 16,582 people worked in fossil fuel energy jobs in industries like coal, natural gas, and oil.[2] There were 6,954 jobs generating electric power from fossil fuels in Indiana, nearly half of the 10,682 jobs in the state involved in renewable energy generation. While coal jobs dropped by 4.2 percent, renewable energy jobs grew 2.2 percent.

2. 2018 U.S. Energy and Employment Report

VALUE CHAIN

Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service, and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs. When Indiana clean energy jobs are broken down by their placement in the value chain, manufacturing is home to nearly half of the jobs while construction is home to nearly one-third.

Small businesses drive Indiana's clean energy sector – 72 percent of Indiana's clean energy businesses employ fewer than 20 individuals.

In Indiana, 14 percent of clean energy jobs are filled by veterans – a higher percentage than any other state in the Midwest. By comparison, 6 percent of all jobs nationwide are veterans.[3] The large ratio of veterans transitioning to clean energy jobs is the result of the U.S. Department of Defense's long-standing commitment to investing in renewable energy, energy efficiency, and training programs that prepare veterans for private-sector employment in industries like solar.

3. 2018 Bureau of Labor Statistics Current Population Survey (CPS)

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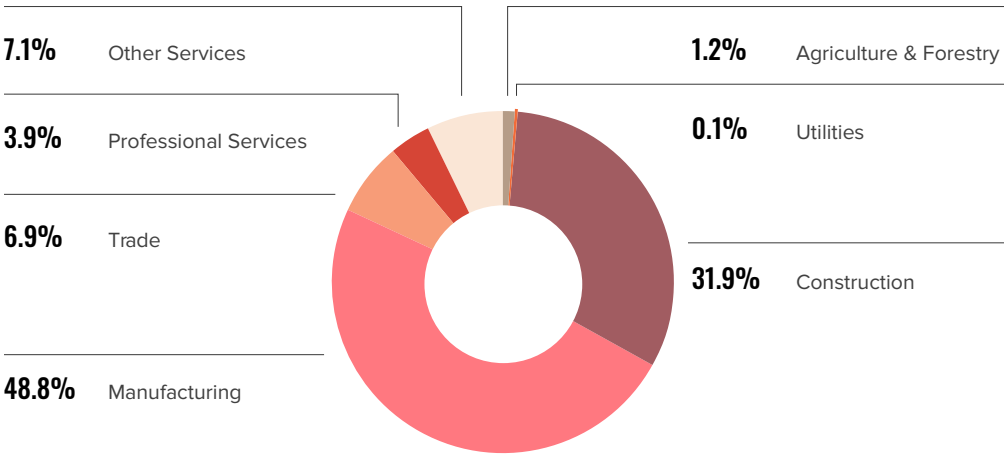

SUMMARY

Indiana's clean energy sector employs 83,752 people whose jobs encompass everything from manufacturing and construction to professional services. Renewable energy and energy efficiency are two of the largest clean energy employers in the state, and each experienced job growth over the previous year. While clean energy is a large employer in the state, policy uncertainty and macroeconomic trends have led to modest job losses in the sector overall. Nevertheless, employers in the sector remain optimistic and project 6.1 percent clean energy job growth in 2018 in Indiana.

Iowa is home to **30,537** clean energy jobs

Energy Efficiency, Wind Energy Top Clean Energy Sectors

There are 30,537 people employed in Iowa's clean energy economy.[1] Jobs in the renewable energy sector grew by 9.2 percent, fourth-highest in the region. This includes 3,951 jobs in wind, 858 in solar and 126 in geothermal. While wind may be the most conspicuous clean energy sector in Iowa thanks to the state's location and smart state policies, energy efficiency actually employs more Iowans – 19,964 – than any other sector, which is 4.5 percent more than last year. However, legislation passed this spring threatens these high-skilled jobs in energy efficiency and guts several related programs. Despite an 18.2 percent decrease in jobs in the clean fuels sector, Iowa still ranks fourth in the Midwest in that sector, which employs 891 people in the state.

SECTOR BREAKDOWN

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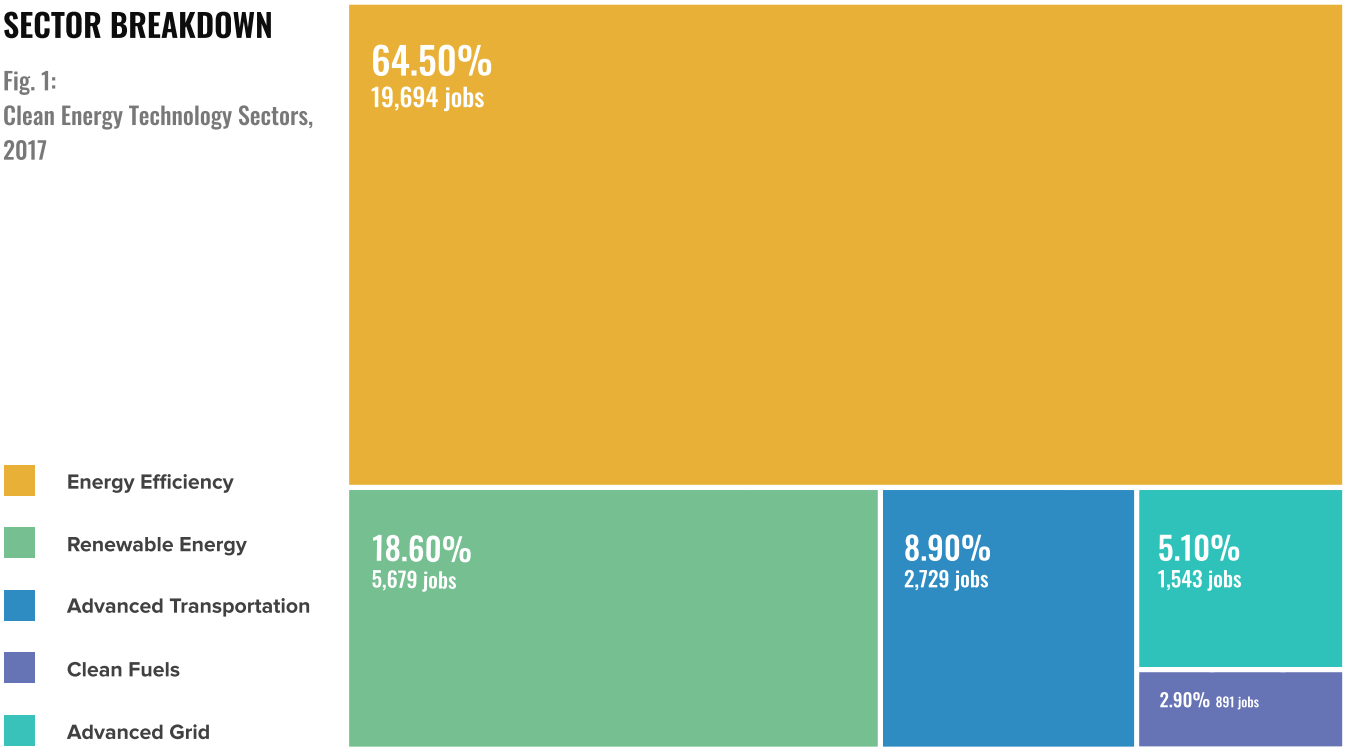

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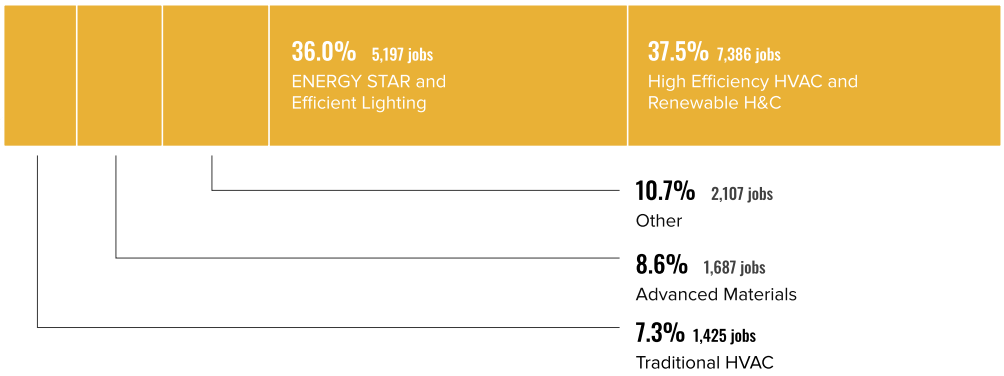
Two in Three Iowa Clean Energy Jobs in Energy Efficiency

With 19,964 jobs, energy efficiency employs more Iowans than any other sector. Taking a closer look at specific industries, 7,386 Iowans work with high-efficiency HVAC and renewable heating and cooling systems, while 7,089 work with ENERGY STAR appliances and efficient lighting systems. Another 1,687 have jobs in advanced building materials. Energy efficiency employs a wide range of Iowans, from factory workers who manufacture energy efficient windows and doors, to construction workers whose retrofits save money on HVAC costs in municipal and commercial buildings in Des Moines and across the state.

Fig. 2:
Energy Efficiency Subsectors, 2017



Wind Dominates Renewables Sector

Renewable energy jobs are the second largest clean energy jobs creator in Iowa with 5,679 jobs. The sector grew by 9.2 percent, adding 477 jobs over last year. Beyond wind (3,951 jobs, growing at 2 percent) and solar (858 jobs, growing at 15 percent), renewable energy workers are employed in technology areas such as geothermal, bioenergy, and low-impact hydroelectric power.

There is a significant amount of wind development underway in the state, including one of the largest single U.S. wind projects in the country, a 2,000 megawatt project which will be built between 2017 to 2019. There are also many more jobs that contribute to the wind generation sector but are not included in it, such as those that manufacture control systems for wind and other energy sources.[2]

2. 2018 U.S. Energy and Employment Report

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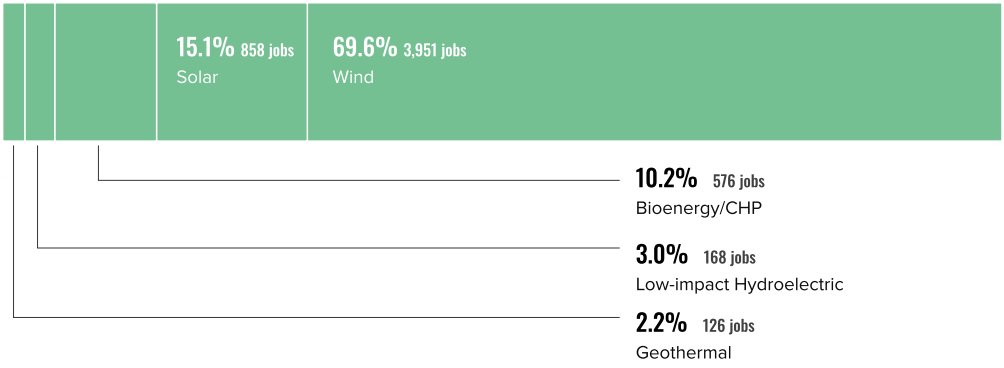
Renewable Energy Subsectors, 2017



EV Jobs Up, But Competition Takes Toll on Advanced Transportation Jobs
Advanced transportation employs 2,729 Iowans who build and develop hybrid and plug-in electric vehicles, alternative fuels vehicles, and fuel-cell vehicles. While competition from Japanese and European automakers has led to a decline in advanced transportation jobs across the region, no other Midwestern state took as big a hit as Iowa, where advanced transportation jobs decreased by 31 percent – more than 1,200 jobs. One bright spot in the sector was electric vehicle (EV) jobs, which added nearly 50 jobs between 2016 and 2017 and now employs 690 Iowans.

1,500 Advanced Grid Jobs; Majority in Energy Storage
Of the 1,543 advanced grid jobs in Iowa, 977 were in energy storage. Other grid industries employing Iowans include smart grid, micro grid, and other grid modernization work.

Nearly 900 Iowans Work in Clean Fuels
Iowa ranks fourth in the region with 891 clean fuels jobs. The clean fuels sector encompasses the non-corn based ethanol industry and other non-woody biomass-based fuels. Clean fuel jobs dropped by 18.2 percent, which was not unusual for the region as all Midwestern states.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
Des Moines-West Des Moines, IA MSA	6,199	1,077	4,036
Cedar Rapids, IA MSA	2,629	498	1,687
Davenport-Moline-Rock Island, IA-IL MSA	1,540	267	1,005

CLEAN ENERGY INDUSTRY OUTLOOK

How Will Energy Efficiency Policies Affect Iowa Job Opportunities?
Recent legislation – SF 2311 – was passed and could curtail investment in energy efficiency, which is by far the state's largest clean energy employer. In 2017, the American Council for an Energy Efficient Economy (ACEEE) State Energy Efficiency Scorecard ranked Iowa as the No. 19 state nationally; however, following this recent legislation, this ranking will likely fall.

Compounding these state-level challenges to job growth in Iowa's massive energy efficiency sector is the ongoing uncertainty around several federal policies. These policies, which could impact multiple sectors and industries, include the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA's attempt to roll back automotive fuel economy standards, and the levying tariffs on solar panels.

These policy roadblocks contributed to Iowa's clean energy industry declining by 0.3 percent against a backdrop of overall Midwestern job market growth of 0.8 percent.[3] On top of these challenges, clean energy businesses were forced to compete for talent in a tight national labor market with relatively low unemployment. Indeed, Iowa's clean energy employers experienced

3. 2017 Bureau of Labor Statistics Current Employment Statistics (CES)

general hiring difficulties; in 2017, more than 87 percent of Iowa's clean energy establishments reported difficulty hiring qualified employees- and more than 12 percent of those said hiring was "very difficult."

Comparing Clean Energy Jobs to Fossil Fuel Jobs

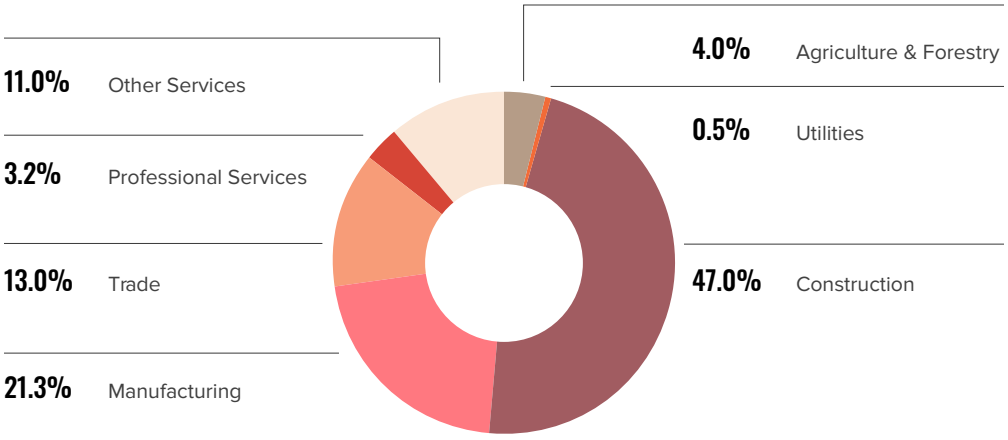
In Iowa, there were 6,904 fossil energy jobs including jobs working with coal, natural gas, and oil.[4] Electric power generation in Iowa's fossil fuels industry employs 2,445 people; by comparison 5,679 work in renewable energy jobs including wind and solar. While coal jobs fell 3.8 percent, renewable energy jobs grew more than 9 percent.

4. 2018 U.S. Energy and Employment Report

VALUE CHAIN

Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service, and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs.When Iowa clean energy jobs are broken down by their placement in the value chain, construction is home to 47 percent of the jobs while manufacturing is home to 21 percent.

Fig. 5:
Clean Energy Jobs Value Chain, 2017



Small businesses drive Iowa's clean energy sector – 82 percent of Iowa's clean energy businesses employ fewer than 20 individuals.

In Iowa, 10.1 percent of the state's clean energy workers are veterans. By comparison, 6 percent of all workers nationwide are veterans.[5] The large ratio of veterans transitioning to clean energy jobs is the result of the U.S. Department of Defense's long-standing commitment to investing in renewable energy, energy efficiency, and training programs that prepare veterans for private-sector employment in industries like solar.

5. 2018 Bureau of Labor Statistics Current Population Survey (CPS)

SUMMARY

Iowa's clean energy sector employs 30,537 people whose jobs encompass everything from manufacturing and construction to professional services. Renewable energy, energy efficiency, and clean fuels continue to provide economic opportunity for tens of thousands of Iowans. However, a lack of policy certainty in the energy efficiency sector could lead to job losses over the next year.

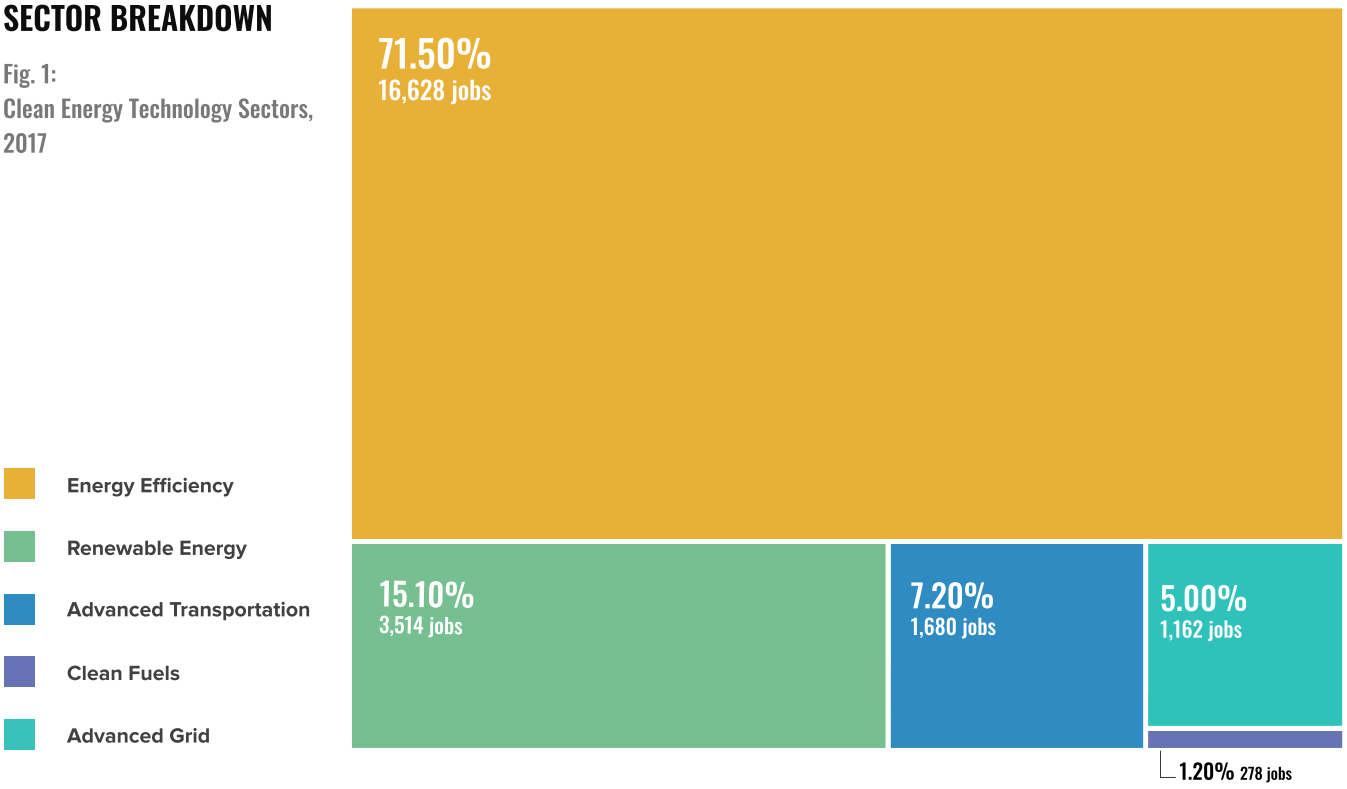
Kansas is home to **23,262** clean energy jobs

Kansas Renewable Energy Growth Rate 2nd in Midwest

There are 23,262 people employed in the clean energy economy in Kansas.[1] The state's renewable energy sector has the second highest growth rate in the Midwest, at 12.1 percent. Renewables in Kansas now employ 3,514. Kansas also saw double-digit growth in advanced grid sector which now accounts for 1,162 jobs. The clean energy sector employing the most Kansans is energy efficiency with 16,628 jobs, almost 2 percent more than the previous year.

SECTOR BREAKDOWN

Fig. 1:
Clean Energy Technology Sectors, 2017

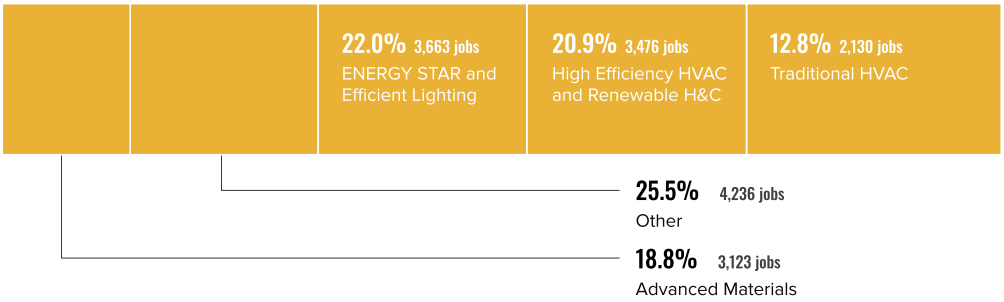


1. Unless otherwise stated, all data is based on the 2018 U.S. Energy and Employment Report (Source: National Association of State Energy Officers; Energy Futures Initiative). The report incorporates an updated methodology that captures more energy efficiency manufacturing jobs than in previous years. Unlike past Clean Jobs Midwest reports, this year's report does not count fossil fuel industry workers who also spend a portion of their time on renewable energy or energy efficiency as clean energy jobs. See the About section at cleanjobsmidwest.com/about for full details.

Seven In Ten Clean Energy Workers Involved In Energy Efficiency

Energy efficiency is the leading clean energy employer in Kansas with 16,628 jobs. Nearly 3,700 Kansans work in ENERGY STAR and efficient lighting systems, around another 3,500 work with high efficiency HVAC, and roughly 3,100 have jobs in advanced building materials. Energy efficiency employs a wide range of Kansans including construction workers whose retrofits save money on HVAC costs in municipal buildings and commercial buildings in Topeka and elsewhere across the state.

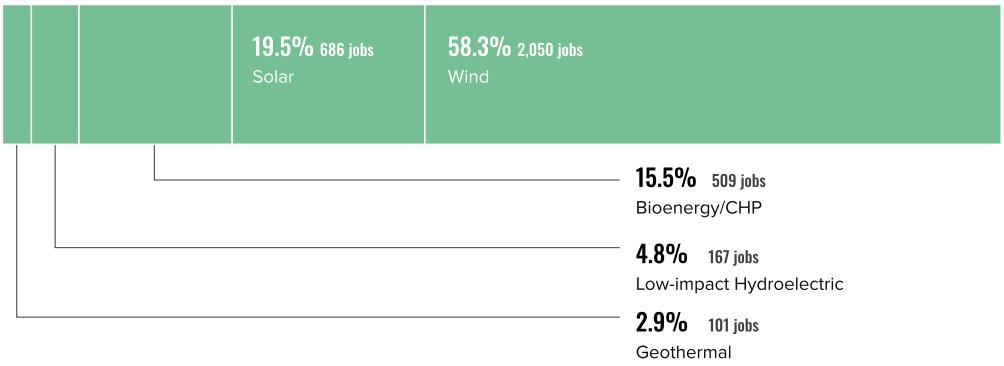
Fig. 2:
Energy Efficiency Subsectors, 2017



Wind, Solar Are Top Employers In Renewables

Renewable energy generation jobs in Kansas had a higher growth rate – 12.1 percent – than any other Midwestern state except for Minnesota. Most are in wind with 2,050 jobs, solar with 686 jobs, and bioenergy/CHP with 509 jobs. Renewable energy generation jobs in Kansas also include geothermal (101 jobs) and low-impact hydroelectric power (167). According to the U.S. Energy Information Administration wind energy generated more than one-third of the state's electricity in 2017.

Fig. 3:
Renewable Energy Subsectors, 2017



Advanced Transportation Provides Jobs For Nearly 1,700 Kansans

Advanced transportation employs 1,680 people in Kansas. This sector includes jobs building and developing hybrid and plug-in electric vehicles, alternative fuels vehicles, and fuel cell vehicles. Facing competition from Japanese and European automakers, advanced transportation saw the biggest sector job decline across the region and in the state with Kansas losing over 600 jobs (or more than 27 percent) in the sector. Similar losses were seen across the Midwest. One bright spot was electric vehicle jobs, which added about 50 jobs to bring the total to 425 EV workers in Kansas in 2017.

Grid and Energy Storage Employs Nearly 1,200

Of the 1,162 grid and energy storage jobs in Kansas, most – about 652 – were in energy storage. Another 194 Kansans work in smart grid while 158 work with micro-grids.

Clean Fuels a Small Sector But Important

Kansas ranks fourth in the region with 278 clean fuels jobs. The clean fuels sector encompasses non-corn ethanol, non-woody biomass and other technologies not yet in wide commercial production, including algal biofuel, syngas, bioheat blends, landfill gas, and advanced biofuels. Clean fuel jobs dropped by 16.8 percent, which was not unusual for the region as all Midwestern states lost jobs in the sector.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
Kansas City, MO-KS MSA	7,247	1,269	5,053
Wichita, KS MSA	4,946	686	3,580
Topeka, KS MSA	1,748	238	1,275

CLEAN ENERGY INDUSTRY OUTLOOK

Untapped Resources In Wind and Energy Efficiency; Federal Policy Landscape Uncertain

Clean energy jobs in Kansas alone represent 1.6 percent of all the Midwestern region's jobs, regardless of sector or industry. In 2017, all clean energy businesses surveyed in Kansas reported difficulty hiring qualified employees; half of those employers went on to say hiring was "very difficult."

Kansas has a goal to source 20 percent of its electricity from renewable energy by 2020, and the state has vast untapped wind resources – some of the best in the nation.

There's also plenty of potential in energy efficiency. The American Council for an Energy-Efficient Economy's (ACEEE) State Energy Efficiency Scorecards ranks Kansas No. 48 in the country.

One reason hiring may be difficult right now is the tight national labor market due to relatively low unemployment. Other potential factors include federal policy uncertainty caused by the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA's attempt to roll back fuel economy standards in the auto industry, and the anticipation of a tariff levied on solar panels. Together, these factors created general market uncertainty for many clean energy businesses in the Midwest.

Comparing Clean Energy Jobs and Fossil Fuel Jobs

In Kansas, there were 21,156 fossil energy jobs including jobs working with coal, natural gas, and oil.[3] There were 9,956 jobs generating electric power from fossil fuels in Kansas. While coal jobs dropped by 4.4 percent, renewable energy jobs grew 12.1 percent.

2. 2017 Bureau of Labor Statistics Current Employment Statistics (CES)

3. 2018 U.S. Energy and Employment Report

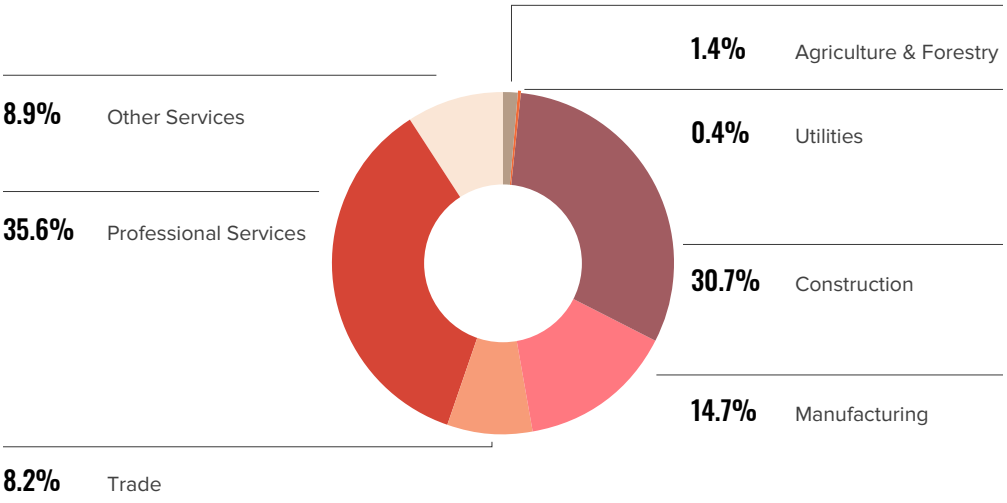
VALUE CHAIN

Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service, and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs. When Kansas clean energy jobs are broken down by their placement in the value chain, professional services are home to 36 percent of the jobs while construction is home to 31 percent.

Small businesses drive the clean energy sector in Kansas – 66 percent of the state's clean energy businesses employ fewer than 20 individuals.

In Kansas, 11.5 percent of clean energy jobs are filled by veterans.[4] By comparison, 6 percent of all workers nationwide are veterans. The large ratio of veterans transitioning to clean energy jobs is the result of the U.S. Department of Defense's long-standing commitment to investing in renewable energy, energy efficiency, and training programs that prepare veterans for private-sector employment in industries like solar.

Fig. 5:
Clean Energy Jobs Value Chain, 2017



SUMMARY

Kansas' clean energy economy grew faster than the overall Midwest job market and outpaced the rest of the region in growth in both renewable energy generation and grid and storage.

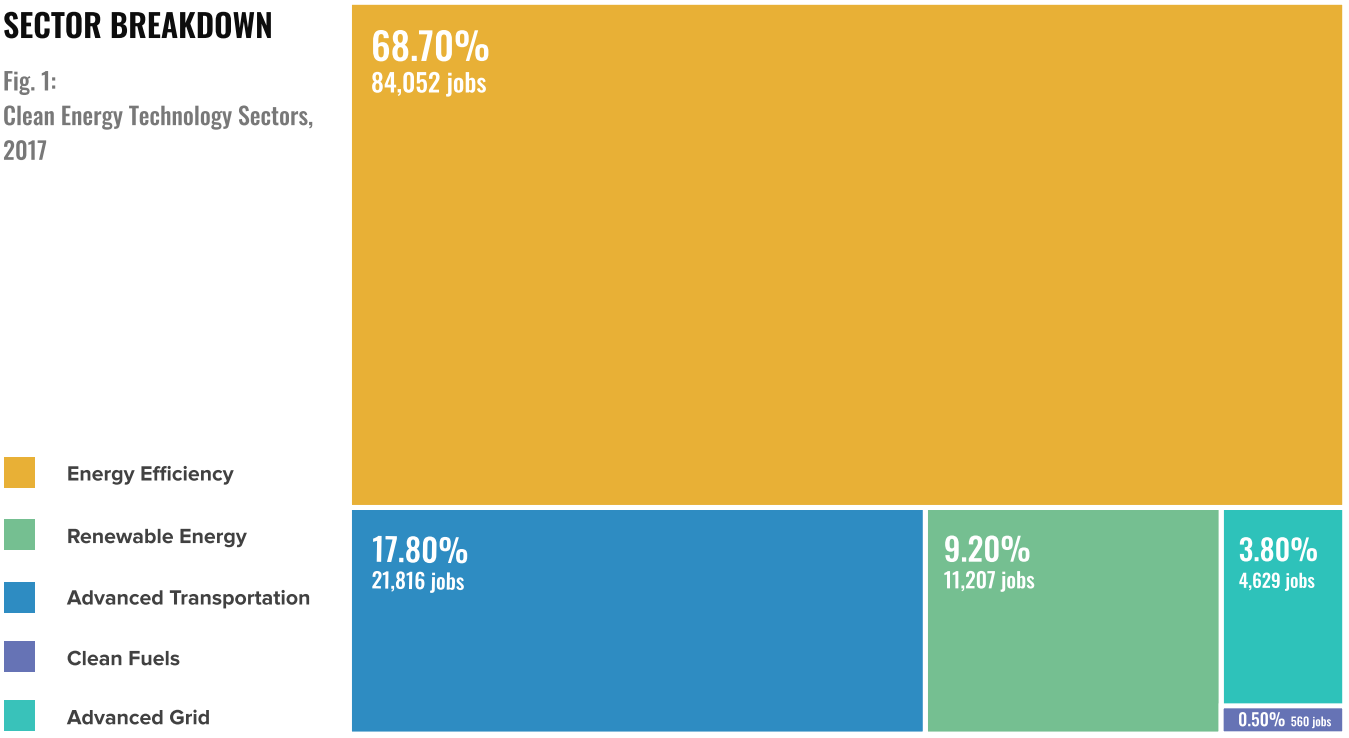
Michigan: **122,264** clean energy jobs

Michigan Tops Midwest in Clean Energy Jobs

Michigan leads the Midwest with 122,264 clean energy jobs.[1] The largest employer is energy efficiency, with 84,052 jobs. Like other Midwestern states, Michigan's alternative transportation jobs experienced a decline – to 21,816 jobs, a 12.5-percent fall. This decline is also a big reason why overall clean energy jobs in the state fell 5.7 percent. Nevertheless, Michigan remains on top in the region in alternative transportation jobs. Thanks in part to its rich history in the automotive industry, Michigan's alternative transportation jobs decline was not as sharp as the region as a whole, where there was a 17.9-percent drop. For comparison, fossil fuels, employ 13,268 people in Michigan.

SECTOR BREAKDOWN

Fig. 1:
Clean Energy Technology Sectors, 2017

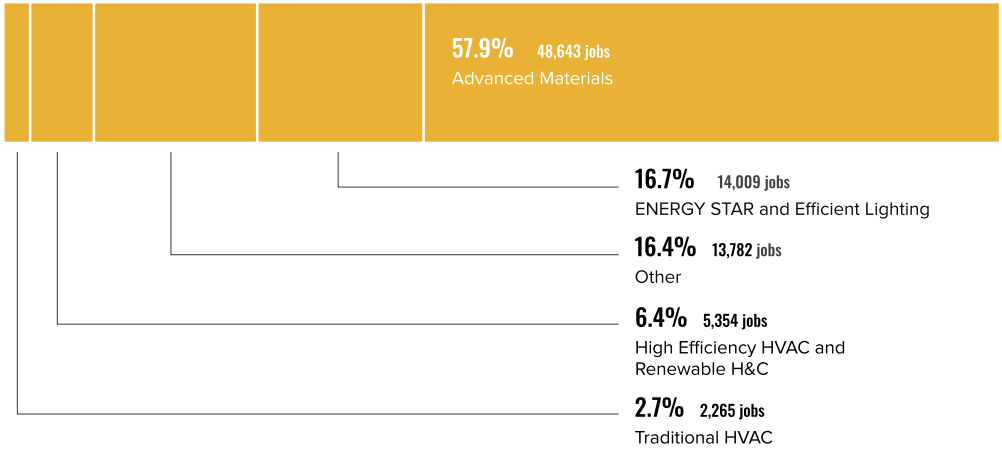


1. Unless otherwise stated, all data is based on the 2018 U.S. Energy and Employment Report (Source: National Association of State Energy Officers; Energy Futures Initiative). The report incorporates an updated methodology that captures more energy efficiency manufacturing jobs than in previous years. Unlike past Clean Jobs Midwest reports, this year's report does not count fossil fuel industry workers who also spend a portion of their time on renewable energy or energy efficiency as clean energy jobs. See the About section at cleanjobsmidwest.com/about for full details.

Bulk of Michigan's Clean Energy Jobs in Energy Efficiency

Energy efficiency makes up the largest share of the clean energy workforce with 84,052 jobs, but jobs in the sector fell 3.4 percent compared to last year. Energy efficiency employs a wide range of Michiganders including workers who make auto factories run on less electricity, as well as save municipalities money on HVAC costs and replace windows on homes in the Upper Peninsula. Other reports have noted the role energy efficiency plays in the state's economy; The ACEEE State Energy Efficiency Scorecard ranks Michigan as the No. 11 state in the entire country in energy efficiency.

Fig. 2:
Energy Efficiency Subsectors, 2017



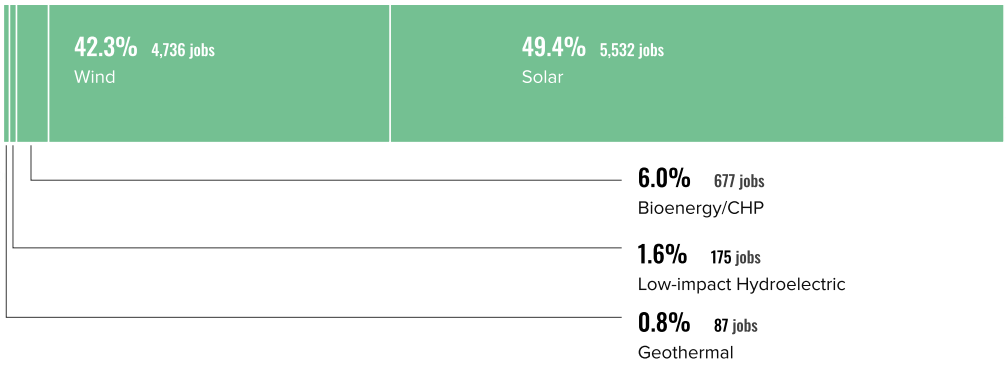
Job Losses in Advanced Transportation, but EV Hiring Revs Up

Advanced transportation is Michigan's second-largest clean energy employer, with 21,816 jobs. The number of jobs fell by 3,112, or 12.5 percent. Losses were felt across the Midwest in hybrid-electric, plug-in hybrid electric, natural gas, hydrogen and fuel-cell vehicles. Competition from Japanese and European automakers in advanced transportation has been increasing. So, although electric and plug-in vehicles are more popular than ever, these foreign automakers have been out-competing American autos. One bright spot, however, was jobs in the electric vehicle (EV) industry, which revved up hiring by nearly 37 percent, to 5,517 jobs. The advanced transportation industry also includes workers who design and build hybrid and plug-in electric vehicles, alternative fuels vehicles, and fuel cell vehicles.

Renewable Energy Jobs Tick Upward

Renewable energy is the No. 3 clean energy employer in Michigan, with 11,207 jobs. In the past year, renewable jobs ticked up by 1 percent. In fact, renewables was the only clean energy sector in Michigan to add jobs. Michigan is home to 5,532 solar jobs and 4,736 wind jobs. From 2016 to 2017, wind jobs grew by nearly 4 percent while solar jobs dropped by close to 6 percent. Renewable energy jobs also include diverse industries like geothermal, bioenergy, and low-impact hydroelectric power.

Fig. 3:
Renewable Energy Subsectors, 2017



Advanced Grid Jobs Employ 4,600

Michigan's fourth-largest clean energy employer is advanced grid – 4,629 jobs. Advanced grid jobs encompass cutting-edge industries like energy storage, smart grid, microgrid, and other grid-modernization work. Combined, jobs in these industries fell nearly 22 percent, losing 1,300 jobs.

Clean Fuels: Tiny Sector with Big Growth Potential

Clean fuels is the smallest clean energy employer in Michigan with just 57 jobs and added 13 new jobs. The clean fuels sector encompasses the non-corn based ethanol industry and other non-woody biomass-based fuels.

Clean Fuels Smallest Clean Energy Employer, But Still Home to 500 Jobs

Clean fuels is the smallest clean energy employer in Michigan with just 560 jobs. The clean fuels sector encompasses non-corn ethanol, non-woody biomass, and other technologies not yet in wide commercial production, including algal biofuel, syngas, bioheat blends, landfill gas, and advanced biofuels.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
Detroit-Warren-Livonia, MI MSA	53,477	5,208	36,520
Grand Rapids-Wyoming, MI MSA	10,468	894	7,252
Lansing-East Lansing, MI MSA	5,230	476	3,597

CLEAN ENERGY INDUSTRY OUTLOOK

Tight Labor Market, Federal Policy Uncertainty Slow Job Growth

In Michigan, clean energy jobs declined 5.7 percent while the overall Midwest clean energy job market declined 1.2 percent as the clean energy industry faced headwinds. One issue is difficulty hiring workers. In 2017, nearly 60 percent of Michigan's clean energy businesses reported it was "very difficult" to hire qualified employees.

In addition, businesses were uncertain about the direction of federal policies like the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA's

attempt to roll back fuel economy standards in the auto industry, and tariffs on solar panels. These challenges were compounded by a tight national labor-market due to relatively low unemployment. Even with these headwinds, clean energy employers in Michigan project 8 percent clean energy job growth in the state over the next year.

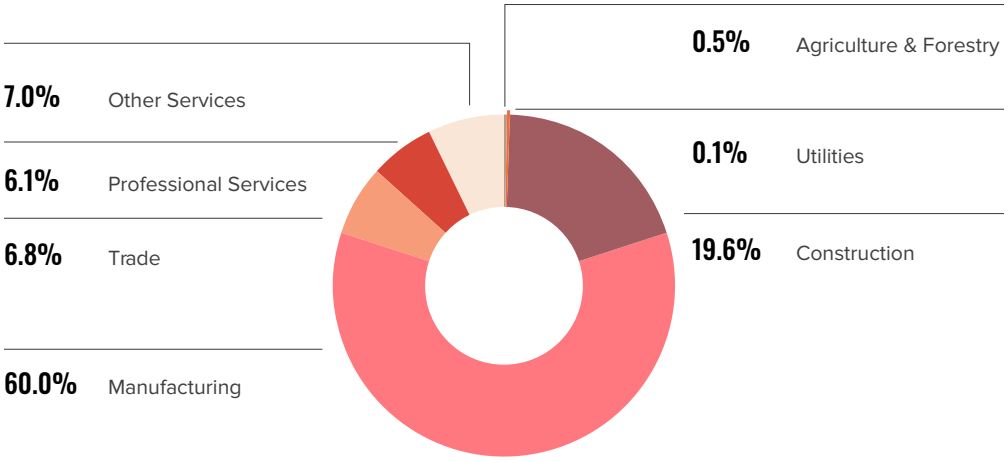
Comparing Clean Energy Jobs to Fossil Fuel Jobs

In 2017 in Michigan, 13,268 people worked in fossil fuel energy jobs in industries like coal, natural gas, and oil. There were 7,407 jobs generating electric power from fossil fuels in Michigan, a fraction of the 11,207 workers in the state involved in renewable energy generation.

VALUE CHAIN

Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service, and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs.

Fig. 5:
Clean Energy Jobs Value Chain, 2017



When Michigan clean energy jobs are broken down by their placement in the value chain, manufacturing is home to 60 percent of the jobs while construction is home to 20 percent.

In Michigan, 11.2 percent of the state's clean energy workers are veterans. By comparison, 6 percent of all workers nationwide are veterans.The large ratio of veterans transitioning to clean energy jobs is the result of the U.S. Department of Defense's long-standing commitment to investing in renewable energy, energy efficiency, and training programs that prepare veterans for private-sector employment in industries like solar.

Small businesses drive Michigan's clean energy sector – 78 percent of Michigan's clean energy businesses employ fewer than 20 individuals.

SUMMARY

There are 122,264 clean energy jobs in Michigan, the top in the Midwest. These jobs include wind turbine technicians in Gratiot County, factory workers in Detroit who build parts for advanced vehicles, and high-efficiency HVAC installers who help school districts in the Upper Peninsula save money on winter heating bills. As Michiganders look toward the future, clean energy is likely to play a bigger role in the state's economy each year, with more job opportunities being created in manufacturing, advanced transportation, renewable energy and other sectors and industries.

Minnesota

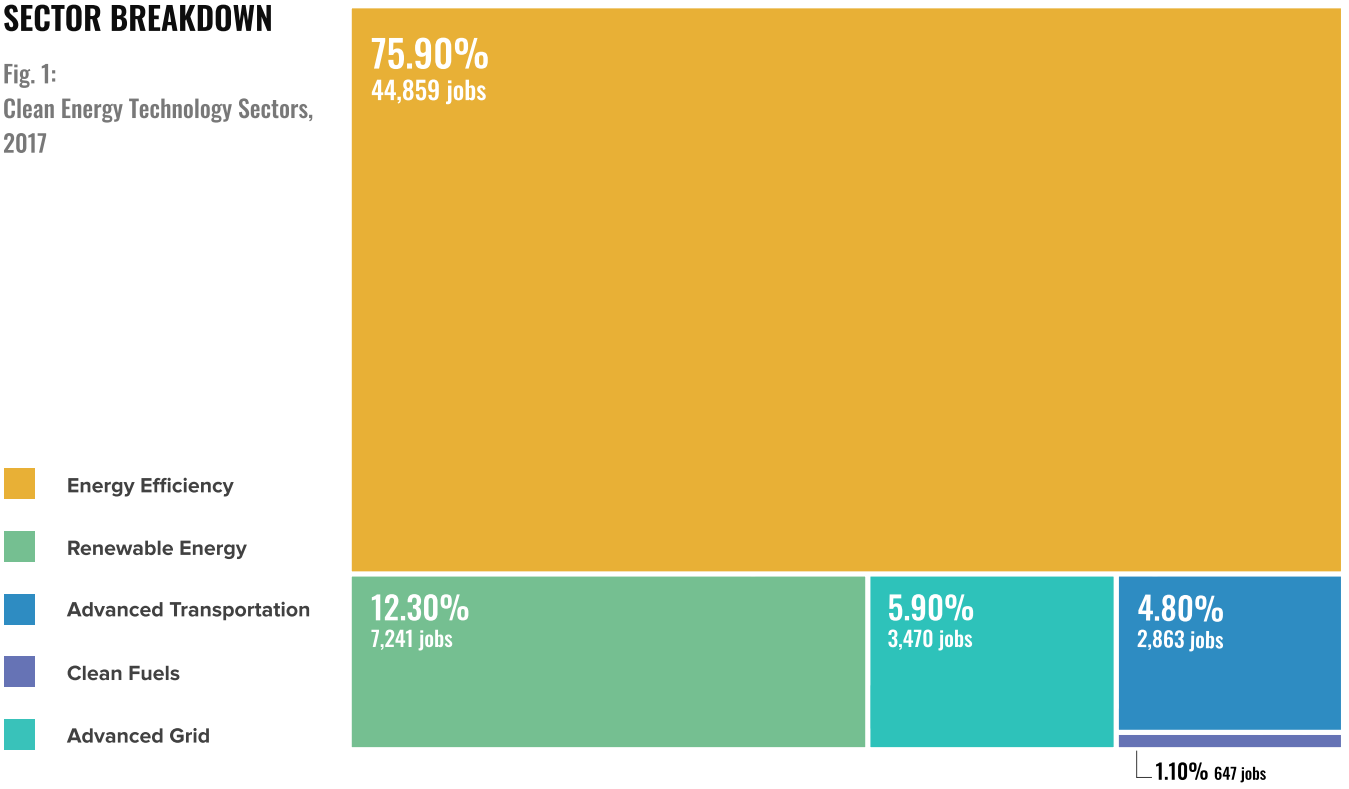
Minnesota is home to **59,079** clean energy jobs

Three Largest Clean Energy Industries All Grew in Minnesota 2016-2017

Clean energy employs 59,079 Minnesotans.[1] That represents a 2.6 percent growth rate with 1,521 jobs added. Even as overall clean energy jobs declined in the Midwest, Minnesota experienced growth in the sector's three largest industries – energy efficiency, renewables and advanced grid. And while the Midwest's clean energy economy faced policy uncertainty and saw overall clean energy job numbers decline, Minnesota clean energy employers project they will add almost 2,700 jobs in the next year - growth rate of 4.6 percent.

SECTOR BREAKDOWN

Fig. 1:
Clean Energy Technology Sectors, 2017

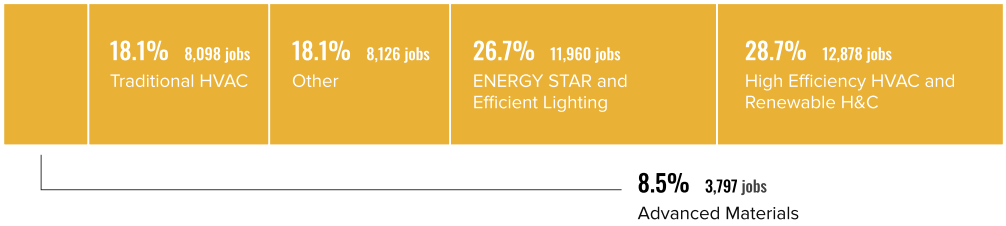


1. Unless otherwise stated, all data is based on the 2018 U.S. Energy and Employment Report (Source: National Association of State Energy Officers; Energy Futures Initiative). The report incorporates an updated methodology that captures more energy efficiency manufacturing jobs than in previous years. Unlike past Clean Jobs Midwest reports, this year's report does not count fossil fuel industry workers who also spend a portion of their time on renewable energy or energy efficiency as clean energy jobs. See the About section at cleanjobsmidwest.com/about for full details.

Energy Efficiency Job Growth in Minnesota Outpaces Rest of Midwest

Energy efficiency is Minnesota's largest clean energy employer with 44,859 jobs. The sector grew at a 2.4-percent clip by adding 1,050 jobs. Energy efficiency employs a wide range of Minnesotans including factory workers who manufacture energy efficient windows and doors and construction workers whose retrofits save money on HVAC costs in municipal buildings and commercial buildings in Minneapolis, Duluth, and elsewhere. Energy efficiency jobs grew faster in Minnesota than the rest of the Midwest; efficiency jobs in the Midwest were added at a 1.5 percent rate.

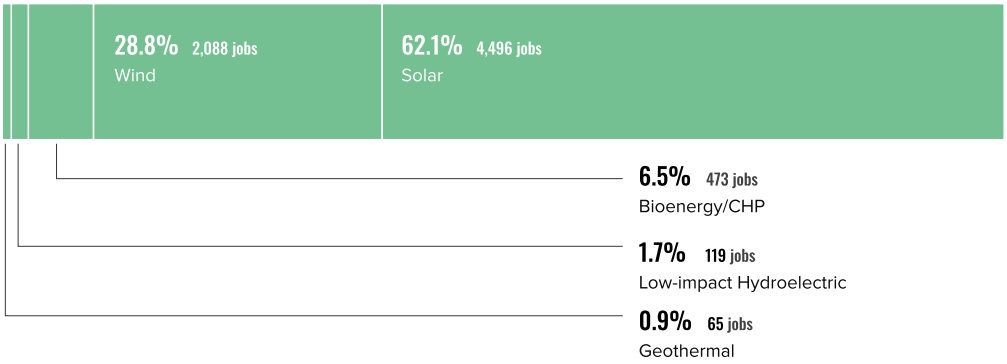
Fig. 2:
Energy Efficiency Subsectors, 2017



Minnesota Bucks Regional Trend By Adding Solar Jobs

Renewable energy is Minnesota's No. 2 sector for clean energy jobs with 7,241. The sector added 1,026 jobs for a 16.5 percent annual growth rate – highest in the Midwest. Beyond wind (2,088 jobs, more than 6 percent growth rate) and solar (4,496, 18 percent), renewable energy workers are employed in industries like geothermal, bioenergy, and low-impact hydroelectric power. Most Midwestern states shed solar jobs as companies rushed to complete projects in 2016 to qualify for expiring tax credits, then subsequently reduced jobs in the following year. Not so in Minnesota. The solar industry was also forced to navigate uncertainties regarding federal-level tariffs.

Fig. 3:
Renewable Energy Subsectors, 2017



EV Jobs Rev Up

Advanced transportation employs 2,863 Minnesotans who build and develop hybrid and plug-in electric vehicles, alternative fuels vehicles, and fuel-cell vehicles. Competition from Japanese and European automakers led to a decline in advanced transportation jobs across the region, and Minnesota was not spared, losing 659 jobs for a 19 percent drop. One bright spot in the sector was electric vehicle (EV) jobs, which added 154 jobs between 2016 and 2017. The EV industry now employs 724 people for a 27 percent growth rate.

Advanced Grid Employs More than 3,400 Minnesotans

Advanced grid is the third-largest clean energy employer in Minnesota with 3,470 jobs. These jobs work in energy storage, smart grid, microgrid, and other grid modernization technologies. The majority of these jobs – 2,612 – are in energy storage, though that's nearly 6 percent fewer than last year. Advanced grid added 233 jobs for a 7.2 percent growth rate, third-most in the Midwest.

Minnesota Clean Fuels Jobs Fall, Mirroring Regional Trend

Minnesota has 647 clean fuels jobs. The clean fuels sector encompasses non-corn ethanol, non-woody biomass, and other technologies not yet in wide commercial production, including algal biofuel, syngas, bioheat blends, landfill gas, and advanced biofuels. Clean fuel jobs dropped by 16.5 percent, or 128 jobs, which was not unusual for the region as all Midwestern states lost jobs in the sector.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
Minneapolis-St. Paul-Bloomington, MN-WI MSA	34,900	5,429	25,554
St. Cloud, MN MSA	2,412	405	1,732
Duluth, MN-WI MSA	2,056	122	1,670

CLEAN ENERGY INDUSTRY OUTLOOK

Despite Federal Policy Uncertainty, Minnesota Businesses Project Future Clean Energy Job Growth

Nearly two percent of all the jobs in Minnesota are in the clean energy sector and these jobs grew more than two times faster than the state's overall job growth.[2] However, the sector's growth was limited for two primary reasons – difficulties hiring and ongoing federal policy uncertainty.

In 2017, about 85 percent of Minnesotan clean energy businesses reported difficulty hiring qualified employees, 39 percent of which said hiring was "very difficult." One reason hiring may be difficult right now is the tight national labor market due to relatively low unemployment. Other potential factors include federal policy uncertainty caused by the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA's attempt to roll back fuel economy standards in the auto industry, and the anticipation of a tariff levied on solar panels. Together, these factors created general market uncertainty for many clean energy businesses in the Midwest.

Despite these headwinds, Minnesota clean energy establishments project 4.6 percent growth in clean energy jobs next year.

Minnesota also saw positive policy trends with the American Council for an Energy Efficient Economy (ACEEE) raising the State Energy Efficiency Scorecard ranking from 10th in the country to 9th. Minnesota is the highest ranked Midwestern state.

2. 2017 Bureau of Labor Statistics Current Employment Statistics (CES)

Comparing Clean Energy Jobs and Fossil Fuel Jobs

In Minnesota, there were 9,427 fossil energy jobs including jobs working with coal, natural gas, and oil.[3] Electric power generation in Minnesota's fossil fuels industry employs 2,308 people; by comparison 7,241 work in renewable energy generation jobs like wind and solar. While coal jobs in Minnesota rose only 1 percent, renewable jobs grew nearly 16.5 percent.

3. 2018 U.S. Energy and Employment Report

VALUE CHAIN

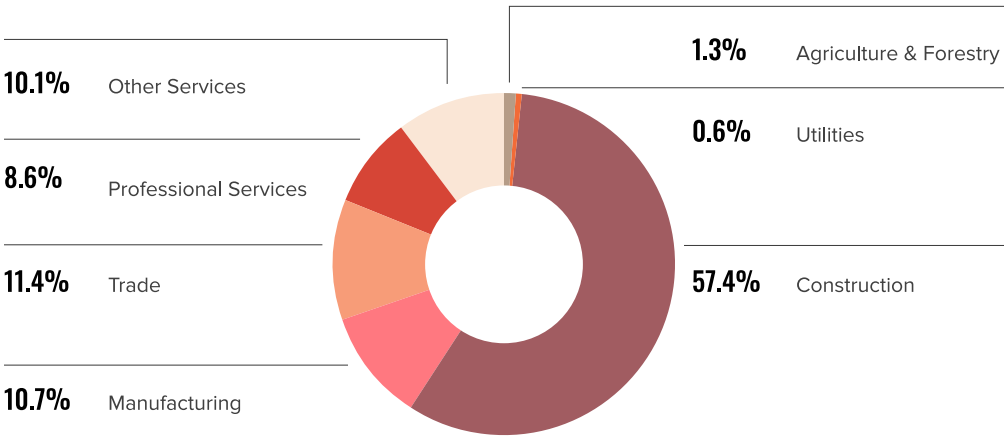
Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service, and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs. When Minnesota clean energy jobs are broken down by their placement in the value chain, construction is home to 57 percent of the jobs while the trades are home to 11 percent.

Small businesses drive Minnesota's clean energy sector – 74 percent of Minnesota's clean energy businesses employ fewer than 20 individuals.

In Minnesota, nearly 12 percent of clean energy jobs are filled by veterans. By comparison, 6 percent of all workers nationwide are veterans.[4] The large ratio of veterans transitioning to clean energy jobs is the result of the U.S. Department of Defense's long-standing commitment to investing in energy efficiency, renewable energy, and training programs that prepare veterans for private-sector employment in industries like solar.

4. 2018 Bureau of Labor Statistics Current Population Survey (CPS)

Fig. 5:
Clean Energy Jobs Value Chain, 2017



SUMMARY

Minnesota's clean energy sector employs more than 59,000 people whose jobs encompass everything from manufacturing and construction to professional services. Energy efficiency, renewable energy, and advanced transportation continue to provide economic opportunity for tens of thousands of Minnesotans. While a lack of policy certainty could cloud future growth, clean energy establishments remain positive in their outlook and project 4.6 percent job growth over the next year.

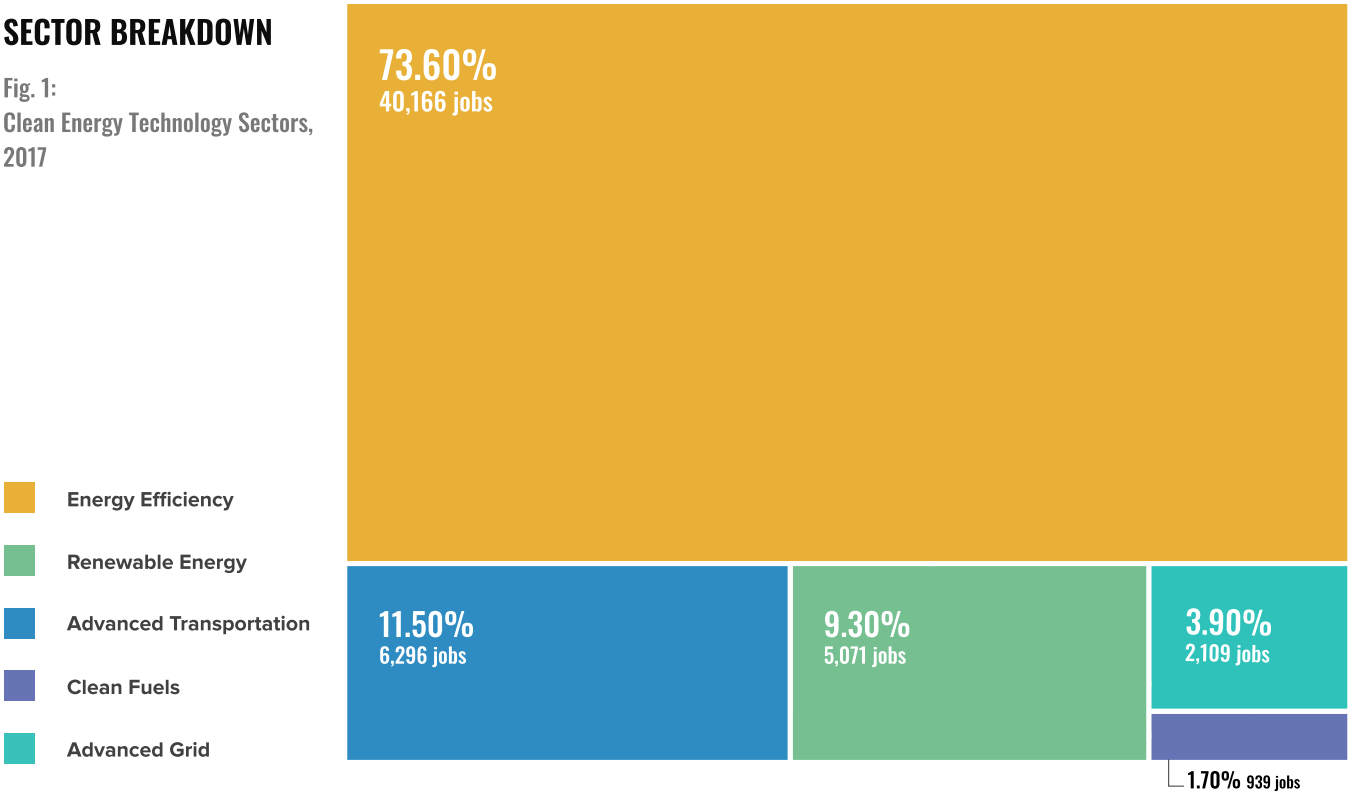
Missouri is home to **54,581** clean energy jobs

Missouri Adding Clean Energy Jobs at 3 Percent Clip

Missouri is home to 54,581 clean energy workers.[1] The Show Me State has the largest growth rate in clean energy jobs in the region – 3.1 percent. While energy efficiency employs more clean energy workers than any other sector (40,166 jobs), jobs in advanced grid technologies are growing rapidly. The state is now home to 2,109 jobs in the advanced grid sector, nearly 25 percent more than the previous year.

SECTOR BREAKDOWN

Fig. 1:
Clean Energy Technology Sectors, 2017

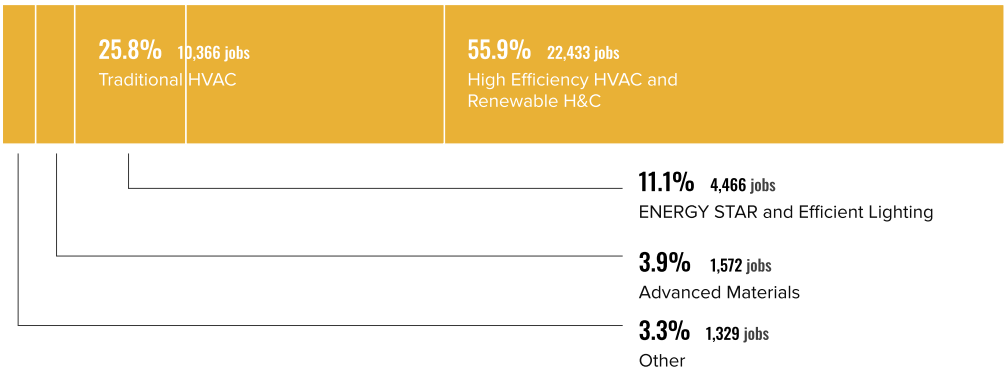


1. Unless otherwise stated, all data is based on the 2018 U.S. Energy and Employment Report (Source: National Association of State Energy Officers; Energy Futures Initiative). The report incorporates an updated methodology that captures more energy efficiency manufacturing jobs than in previous years. Unlike past Clean Jobs Midwest reports, this year's report does not count fossil fuel industry workers who also spend a portion of their time on renewable energy or energy efficiency as clean energy jobs. See the About section at cleanjobsmidwest.com/about for full details.

Three in Four Missouri Clean Energy Jobs in Energy Efficiency

Energy efficiency makes up the largest share of the clean energy workforce with 40,166 jobs – about 2,332 more than the previous total. Energy efficiency employs a wide range of Missouri residents including high-efficiency HVAC technicians who help municipalities and commercial building owners save money on energy bills.

Fig. 2:
Energy Efficiency Subsectors, 2017



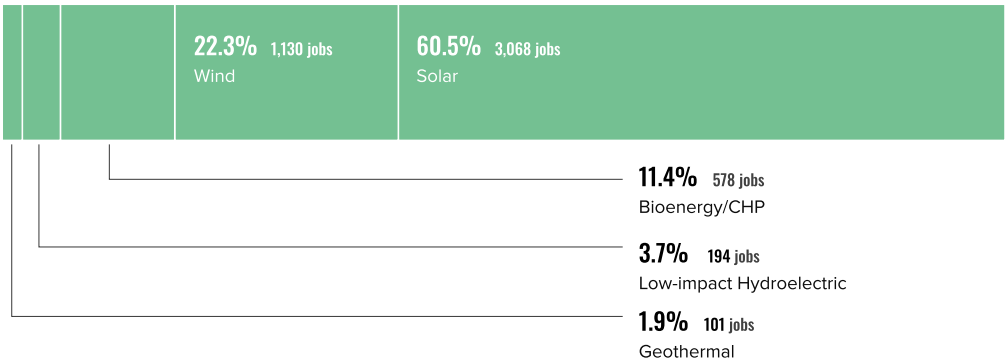
Advanced Transportation No. 2 Sector; EV Jobs Grow One-Third

Advanced transportation jobs are Missouri's second-largest clean energy sector with 6,296 jobs. However, mirroring a region-wide trend, jobs in this sector declined by 1,181, or nearly 16 percent. While jobs in hybrid-electric, plug-in hybrid electric, natural gas, hydrogen, and fuel-cell vehicles all declined, the electric vehicles industry bucked the trend. Competition from Japanese and European automakers in advanced transportation has been increasing. So, although electric and plug-in vehicles are more popular than ever, these foreign automakers have been out-competing American autos, except for in the fully-electric vehicle segment. One bright spot, however, is that EV jobs grew by nearly a third to 1,592.

Wind Lifts Missouri Renewable Energy Jobs

Renewable energy is Missouri's third-largest clean energy employer. The sector grew 6 percent last year to 5,071 jobs. The solar industry boasts the most renewable energy jobs (3,068), but jobs in the industry fell around 3 percent from 2016 to 2017. Wind, meanwhile, has 1,130 jobs and grew more than 9 percent. Renewable energy jobs also include diverse industries like geothermal, bioenergy, and low-impact hydroelectric power.

Fig. 3:
Renewable Energy Subsectors, 2017



Advanced Grid Jobs Up 25 Percent

Missouri has 2,109 advanced grid jobs making the sector the No. 4 clean energy employer in the state.[2] Advanced grid jobs encompass cutting-edge industries like energy storage, smart grid, microgrid, and other grid-modernization work. Combined, employment in these industries grew by nearly 25 percent, adding 421 jobs to the sector.

2. 2017 Bureau of Labor Statistics Current Employment Statistics (CES)

Clean Fuels Sector Employs 700+

Clean fuels jobs are Missouri's smallest clean energy employer with 939 jobs. The clean fuels sector encompasses non-corn ethanol, non-woody biomass, and other technologies not yet in wide commercial production, including algal biofuel, syngas, bioheat blends, landfill gas, and advanced biofuels. These industries shed 206 jobs for a nearly 18 percent decline.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
St. Louis, MO-IL MSA	20,374	1,811	15,059
Kansas City, MO-KS MSA	11,190	1,090	8,203
Springfield, MO MSA	4,381	362	8,203

CLEAN ENERGY INDUSTRY OUTLOOK

Clean Energy Businesses Project Job Growth, But Policy Landscape is Uncertain

Clean energy jobs constitute 1.79 percent of all the jobs in the state. While the overall job market in the Midwest grew barely more than 1 percent, jobs in Missouri's clean energy industry grew 3.1 percent between 2016 and 2017. Clean energy employers in the state anticipate another 2.2 percent growth in the next year.

Challenges to adding clean energy jobs in Missouri include hiring difficulties and federal policy uncertainty. In 2017, 60 percent of Missouri clean energy businesses reported it was "very" or "somewhat" difficult to hire qualified employees. One reason hiring may be difficult right now is the tight national labor market due to relatively low unemployment. Other potential factors include federal policy uncertainty caused by the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA's attempt to roll back fuel economy standards in the auto industry, and the anticipation of a tariff levied on solar panels. Together, these factors created general market uncertainty for many clean energy businesses in the Midwest.

While Missouri's clean energy industry has a competitive advantage over other states thanks to its renewable portfolio standard, the state comes up short in energy efficiency. Missouri was ranked as the No. 37 state by the American Council for an Energy Efficient Economy's (ACEEE) State Energy Efficiency Scorecard, five spots lower than last year.

Comparing Clean Energy Jobs and Fossil Fuel Jobs

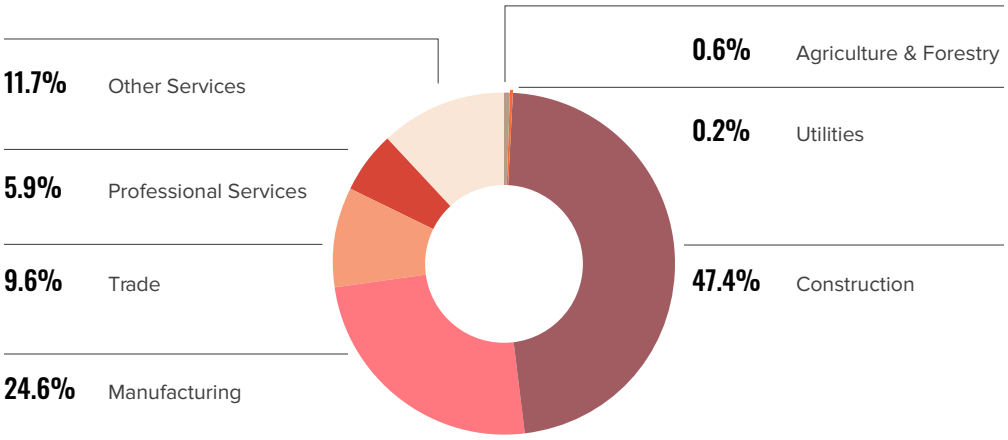
In 2017, 7,058 people worked in fossil fuel energy jobs in industries like coal, natural gas, and oil in Missouri.[3] Of those, 3,345 workers were involved in generating electric power from fossil fuels, which was thousands less than the 5,071 workers in the state involved in renewable energy generation. While coal jobs fell 3.2 percent, renewable energy jobs grew 6 percent.

3. 2018 U.S. Energy and Employment Report

VALUE CHAIN

Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service, and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs.

Fig. 5:
Clean Energy Jobs Value Chain, 2017



When Missouri clean energy jobs are broken down by their placement in the value chain, construction is home to 47 percent of the jobs while manufacturing is home to nearly 25 percent.

In Missouri, 11.1 percent of the state's clean energy workers are veterans.[4] By comparison, 6 percent of all workers nationwide are veterans. The large ratio of veterans transitioning to clean energy jobs is the result of the U.S. Department of Defense's long-standing commitment to investing in renewable energy, energy efficiency, and training programs that prepare veterans for private-sector employment in industries like solar.

4. 2018 Bureau of Labor Statistics Current Population Survey (CPS)

SUMMARY

Missouri's clean energy labor market grew three times faster than the state's overall job market. Energy efficiency makes up nearly three-quarters of Missouri's 54,581 clean energy jobs. Jobs in advanced grid industries like energy storage, smart grid, microgrid, and other grid modernization work grew by nearly 25 percent over the previous year.

While Missouri adds clean energy jobs faster than every other state in the Midwest, state and federal policy changes can deliver more market certainty to the clean energy sector, driving additional investment and helping create more job opportunities for Missourians.

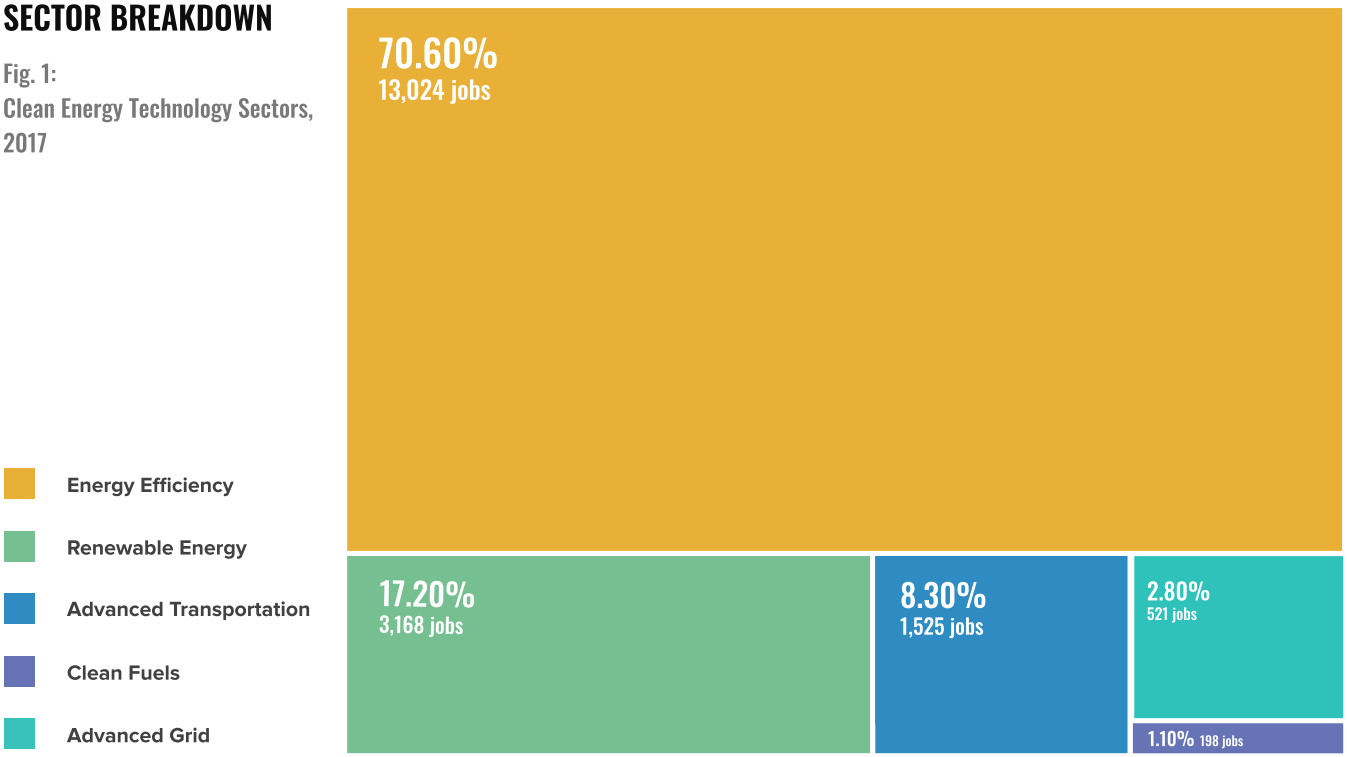
Nebraska: **18,436** clean energy jobs

Strong Jobs Growth in Efficiency, Renewable Sectors

Clean energy employs 18,436 Nebraskans.[1] From 2016 to 2017, clean energy jobs in Nebraska fell by 204, a roughly 1.1 percent decline. However, the two largest sectors, energy efficiency and renewable energy, each experienced strong growth.

SECTOR BREAKDOWN

Fig. 1:
Clean Energy Technology Sectors, 2017

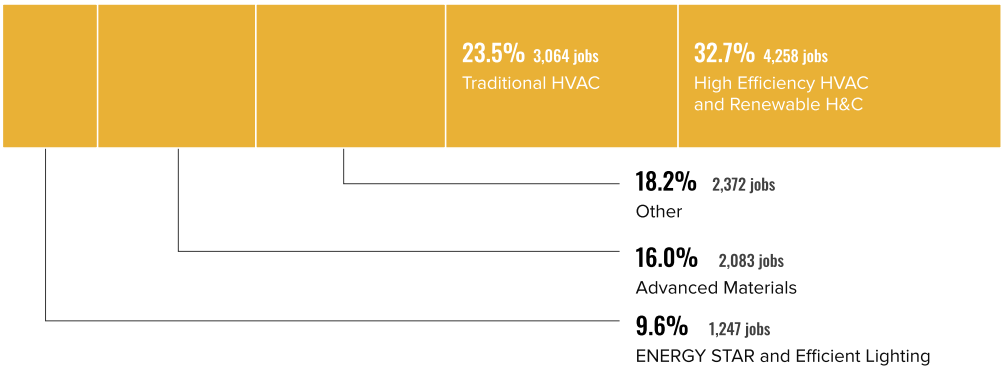


1. Unless otherwise stated, all data is based on the 2018 U.S. Energy and Employment Report (Source: National Association of State Energy Officers; Energy Futures Initiative). The report incorporates an updated methodology that captures more energy efficiency manufacturing jobs than in previous years. Unlike past Clean Jobs Midwest reports, this year's report does not count fossil fuel industry workers who also spend a portion of their time on renewable energy or energy efficiency as clean energy jobs. See the About section at cleanjobsmidwest.com/about for full details.

Energy Efficiency No. 1 Clean Energy Employer in Nebraska

Energy efficiency is Nebraska's largest clean energy employer with 13,024 jobs. Last year, the sector added 364 jobs and grew by nearly 3 percent, which is double the Midwestern region's rate. Energy efficiency industries include ENERGY STAR and efficient lighting, traditional heating, ventilation, and air conditioning (HVAC), high-efficiency HVAC, renewable heating and cooling systems and advanced building materials. A wide range of Nebraskans work in energy efficiency including construction workers whose window and door retrofits save money on energy costs in municipal buildings and commercial buildings in cities like Scottsbluff, Lincoln and Omaha.

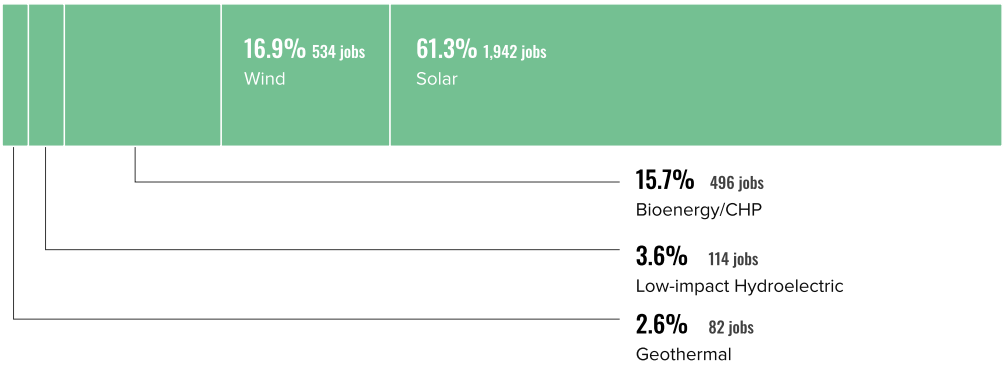
Fig. 2:
Energy Efficiency Subsectors, 2017



Renewables: Fastest-Growing Sector

3,168 people work in renewable energy in Nebraska. Renewable energy jobs grew by about 100 jobs, or 3.2 percent, making it the fastest-growing clean energy jobs sector in the state. Wind jobs grew by nearly 7 percent and now account for 534 jobs. Solar, meanwhile, experienced a 7 percent job decline to 1,942 solar workers overall. Similar to other states in the Midwest, solar businesses in Nebraska rushed to complete projects in 2016 to qualify for expiring tax credits, then subsequently reduced jobs last year. Nebraska's solar industry also dealt with uncertainties regarding tariffs at the federal level. The renewable energy generation sector also includes jobs in geothermal, bioenergy and low-impact hydroelectric power.

Fig. 3:
Renewable Energy Subsectors, 2017



Advanced Transportation Employs 1,500+

Advanced transportation is the third-largest clean energy sector in the state. It employs 1,525 Nebraskans who build and develop hybrid and plug-in electric vehicles, alternative fuels vehicles, and fuel-cell vehicles. Competition from Japanese and European automakers led to a decline in advanced transportation jobs across the region, and Nebraska was not spared as it shed 374 jobs in the sector – a nearly 20 percent decline. One bright spot was employment in the electric vehicle (EV) industry, which grew by a quarter and now employs 386 Nebraskans.

Energy Storage Leads Way In Advanced Grid Jobs

Of the 521 advanced grid jobs in Nebraska, nearly half – about 229 – were in energy storage, an industry that added jobs at a 1.8 percent rate. Other grid industries employing Nebraskans include smart grid, micro grid, and other grid modernization work. Overall, however, advanced grid jobs in Nebraska declined by nearly a third.

Clean Fuels Employs 198 Nebraskans

Clean fuels is the fifth-largest clean energy sector with 198 jobs in Nebraska. The clean fuels sector encompasses non-corn ethanol, non-woody biomass and other technologies not yet in wide commercial production, including algal biofuel, syngas, bioheat blends, landfill gas, and advanced biofuels. Nebraska clean fuel jobs dropped by 17 percent, which was not unusual for the region as all Midwestern states lost jobs in the sector.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
Omaha-Council Bluffs, NE-IA MSA	7,314	1,196	5,225
Lincoln, NE MSA	3,130	499	2,227
Sioux City, IA-NE-SD MSA	137	30	92

CLEAN ENERGY INDUSTRY OUTLOOK

Federal Policy, Macroeconomic Trends Check Clean Energy Job Growth

While Nebraska clean energy jobs declined by just over 1 percent, the overall job market in the Midwest grew 1.2 percent. The clean energy sector faced several headwinds, including difficulties hiring qualified workers and federal policy uncertainty.

In 2017, two-thirds of Nebraska clean energy establishments reported difficulty hiring qualified employees; a third of those establishments went on to say hiring was “very difficult.” A tight national labor-market due to relatively low unemployment is a potential cause of these hiring difficulties.

Another factor influencing growth was federal policy uncertainty caused by the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA’s attempt to roll back fuel economy standards in the auto industry, and the anticipation of a tariff levied on solar panels. Together, these factors created general market uncertainty for many clean energy businesses in the Midwest.

Additionally, the American Council for an Energy Efficient Economy lowered the state's energy efficiency scorecard by two spots, to 44th in the country.

Despite these headwinds, business owners project clean energy jobs will grow slightly next year, by 0.2 percent.

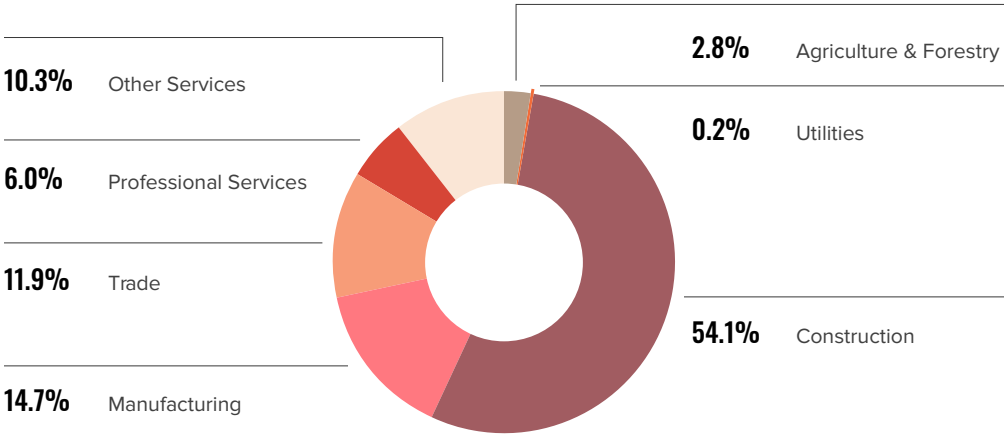
Comparing Clean Energy Jobs and Fossil Fuel Jobs

In Nebraska, there are 2,801 fossil fuel jobs in industries like coal, natural gas and oil. Electric power generation jobs using fossil fuels employed 1,127 people, compared to the 3,168 jobs in renewable energy generation. While coal jobs dropped by 2.5 percent, renewable energy jobs grew by 3.2 percent.

VALUE CHAIN

Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service, and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs.

Fig. 5:
Clean Energy Jobs Value Chain, 2017



When Nebraska clean energy jobs are broken down by their placement in the value chain, construction is home to 54 percent of the jobs while manufacturing is home to 14 percent.

Small businesses drive Nebraska's clean energy sector – 69 percent of Nebraska's clean energy businesses employ fewer than 20 individuals.

In Nebraska, 10.3 percent of clean energy jobs are filled by veterans. By comparison, 6 percent of all workers nationwide are veterans. The large ratio of veterans transitioning to clean energy jobs is the result of the U.S. Department of Defense's long-standing commitment to investing in renewable energy, energy efficiency and training programs that prepare veterans for private-sector employment in industries like solar.

SUMMARY

Nebraska's clean energy sector employs 18,436 people whose jobs encompass everything from manufacturing and construction to professional services. Renewable energy, energy efficiency and clean fuels continue to provide economic opportunity for thousands of Nebraskans. While a lack of policy certainty could create headwinds for clean energy hiring over the next year, clean energy establishments in the state are projecting a slight uptick in jobs.

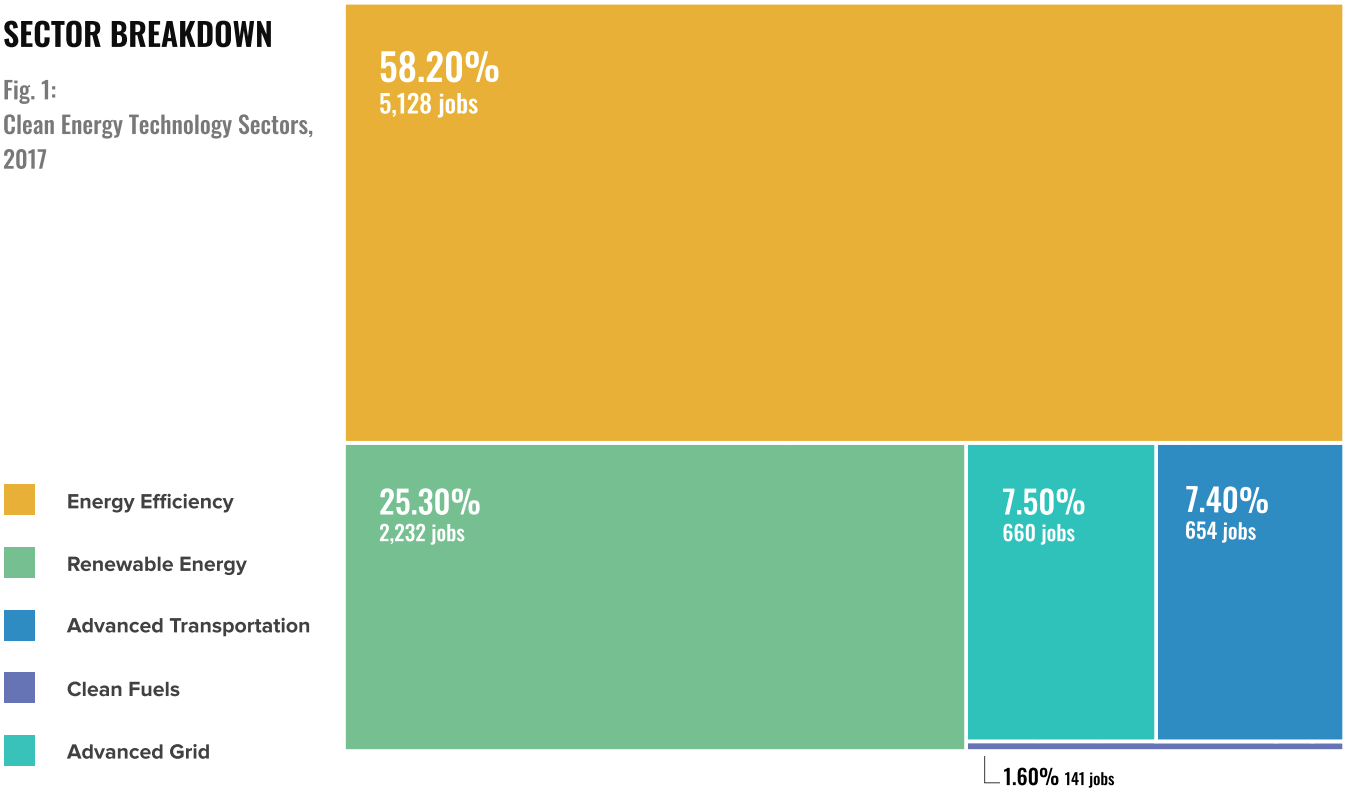
North Dakota is home to **8,816** clean energy jobs

Clean Energy Jobs Tick Upward

North Dakota's clean energy economy employs 8,816 workers and grew a shade under 1 percent last year.[1] Energy efficiency jobs surged 7.7 percent to 5,128, a more robust growth rate than another state in the Midwest. Renewable energy jobs added over 100 jobs, a 5% growth rate. Clean energy now accounts for 2.13 percent of the state's overall labor force.[2]

SECTOR BREAKDOWN

Fig. 1:
Clean Energy Technology Sectors, 2017



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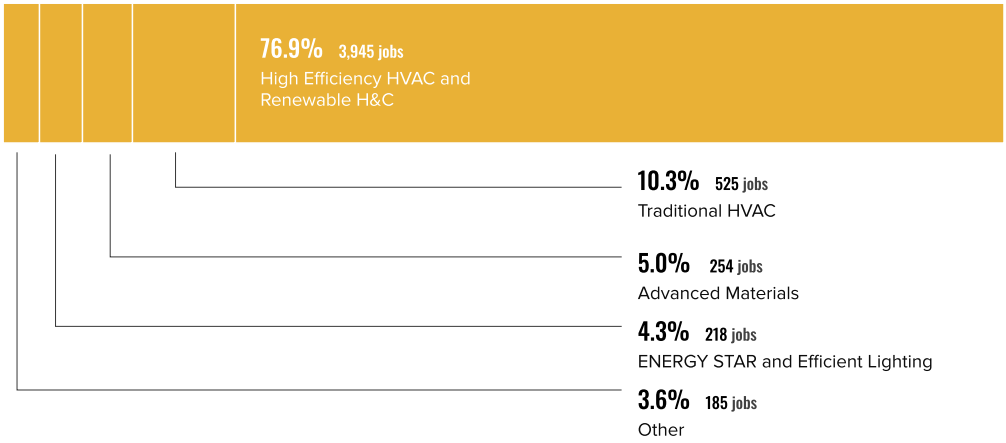
2. 2017 Bureau of Labor Statistics Current Employment Statistics (CES)

Energy Efficiency Jobs Surging

Energy efficiency constitutes the largest share of North Dakota's clean energy workforce with 5,128 jobs. The sector added 365 jobs to grow by 7.7 percent. Energy efficiency employs a wide range of North Dakotans including construction workers whose retrofits save money on brutal winter heating costs in municipal buildings and commercial buildings in cities like Fargo, Devils Lake, and Grand Forks.

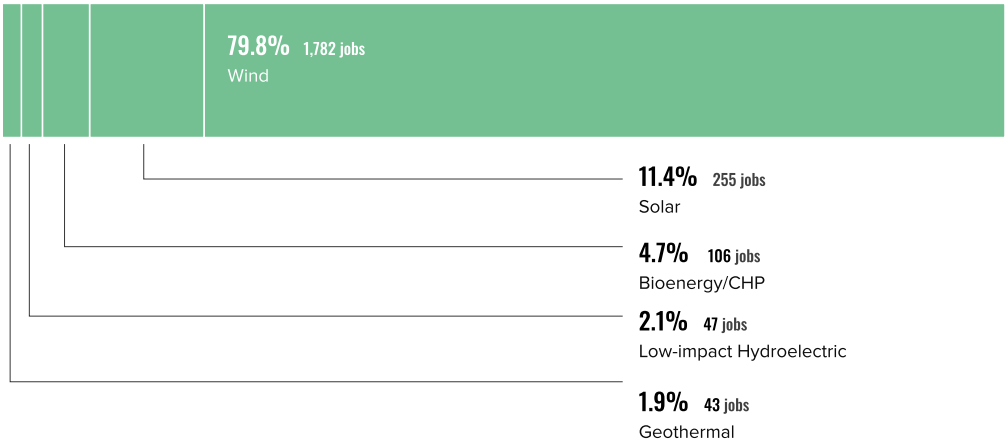
Fig. 2:
Energy Efficiency Subsectors, 2017



Wind Industry Dominates Renewables Sector

Renewable energy is North Dakota's second-largest clean energy employer with 2,232 jobs. In the last year, North Dakota renewable energy jobs increased 5 percent. Beyond wind (1,782 jobs, more than 2 percent growth rate) and solar (255, 2 percent), renewable energy workers can be employed in industries like geothermal, bioenergy, and low-impact hydroelectric power.

Fig. 3:
Renewable Energy Subsectors, 2017



Advanced Grid Employs 660 North Dakotans

The advanced grid sector is the third-largest clean energy employer in the state with 660 jobs. Advanced grid includes jobs in energy storage, smart grid, microgrid and other grid modernization work. These jobs fell by nearly 12 percent, a loss of 88 jobs.

North Dakota Mirrors Regional Job Losses in Advanced Transportation

Advanced transportation is the fourth-largest clean energy sector in North Dakota with 654 jobs. Throughout the region, advanced transportation was the sector with the steepest drop in jobs. North Dakota was no exception. The state lost 315 jobs for a nearly 33 percent decline

in industries like hybrid-electric, plug-in hybrid, electric, natural gas, and hydrogen and fuel-cell vehicles declined. Competition from Japanese and European automakers in advanced transportation has been increasing. So, although electric and plug-in vehicles are more popular than ever, these foreign automakers have been out-competing American autos. One bright spot, however, was electric vehicles (EVs), which grew 5 percent to 165 jobs.

Clean Fuels Employs 141

The clean fuels sector declined by 9.6 percent last year and now employs 141 people. The clean fuels sector encompasses non-corn ethanol, non-woody biomass and other technologies not yet in wide commercial production, including algal biofuel, syngas, bioheat blends, landfill gas, and advanced biofuels.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
Fargo, ND-MN MSA	2,051	518	1,189
Bismarck, ND MSA	1,300	328	759
Grand Forks, ND-MN MSA	661	162	384

CLEAN ENERGY INDUSTRY OUTLOOK

Opportunities Remain to Bolster Renewables, Energy Efficiency

In North Dakota, clean energy jobs constitute 2.13 percent of all jobs in the state. While the state's job market shrunk by just under 1 percent, clean energy jobs grew by just under 1 percent. While clean energy continues to have potential in North Dakota's economy, business owners project they will only hire 0.6 percent more workers this year.

Across the Midwest, clean energy jobs fell 1.2 percent last year. The industry faced several headwinds, including hiring difficulties and federal policy uncertainty.

In 2017, nearly 80 percent of North Dakota's clean energy businesses reported it was "very" or "somewhat" difficult to hire qualified employees. One reason hiring may be difficult right now is the tight national labor market due to relatively low unemployment.

Another issue is federal policy uncertainty caused by the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA's attempt to roll back fuel economy standards in the auto industry, and the anticipation of a tariff levied on solar panels. Together, these factors created general market uncertainty for many clean energy businesses in the Midwest. Despite these headwinds, North Dakota clean energy business establishments envision the industry growing slightly next year.

North Dakota is lags behind the rest of the region in adopting clean energy policies to encourage industry expansion. For example, North Dakota has no renewable portfolio standard driving investments and no energy efficiency resource standard. In fact, the 2017 American Council for an Energy Efficient Economy (ACEEE) State Energy Efficiency Scorecard ranks North Dakota last in the nation.

Comparing Clean Energy Jobs and Fossil Fuel Jobs

Unlike much of the Midwest, North Dakota remains a stronghold for fossil fuel jobs. Last year, there were 20,855 fossil energy jobs in North Dakota.[3] In electric power generation jobs specifically in North Dakota, 1,286 people are employed compared to the 2,232 who work in renewable energy generation. Coal jobs dropped 3.8 percent last year while renewable energy jobs grew by 5 percent.

3. 2018 U.S. Energy and Employment Report

VALUE CHAIN

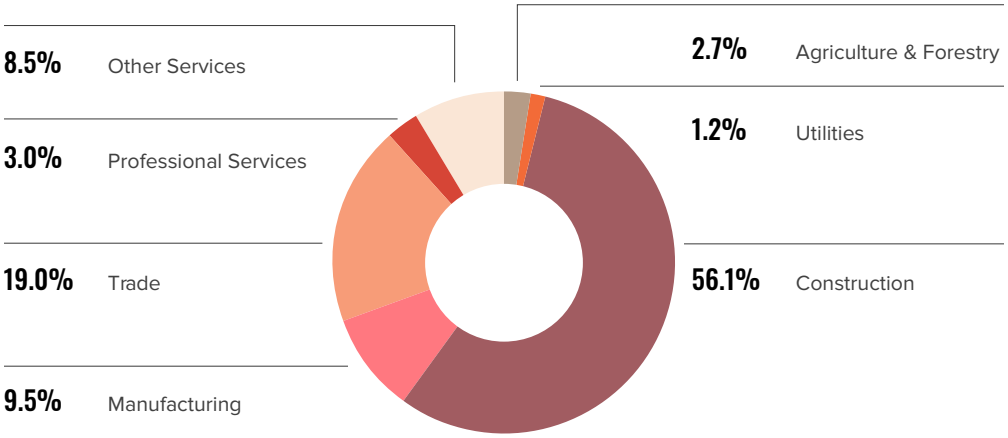
Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs. When North Dakota clean energy jobs are broken down by their placement in the value chain, construction is home to 56 percent of the jobs while the trades are home to 19 percent.

Small businesses drive North Dakota's clean energy sector – 67 percent of North Dakota's clean energy businesses employ fewer than 20 individuals.

In North Dakota, 10.6 percent of the state's clean energy workers are veterans.[4] By comparison, 6 percent of all workers nationwide are veterans. The large ratio of veterans transitioning to clean energy jobs is the result of the U.S. Department of Defense's long-standing commitment to investing in renewable energy, energy efficiency and training programs that prepare veterans for private-sector employment in industries like solar.

4. 2018 Bureau of Labor Statistics Current Population Survey (CPS)

Fig. 5:
Clean Energy Jobs Value Chain, 2017



SUMMARY

The clean energy sector has performed relatively well compared to North Dakota's overall economy. However, stronger clean energy policies could help drive additional private-sector investment thereby fueling additional job growth in modern industries in the state. Renewable portfolio standards and energy efficiency standards are two simple policy mechanisms that could grow the economy, create jobs and help save homeowners, businesses, municipalities and schools money on their energy bills.

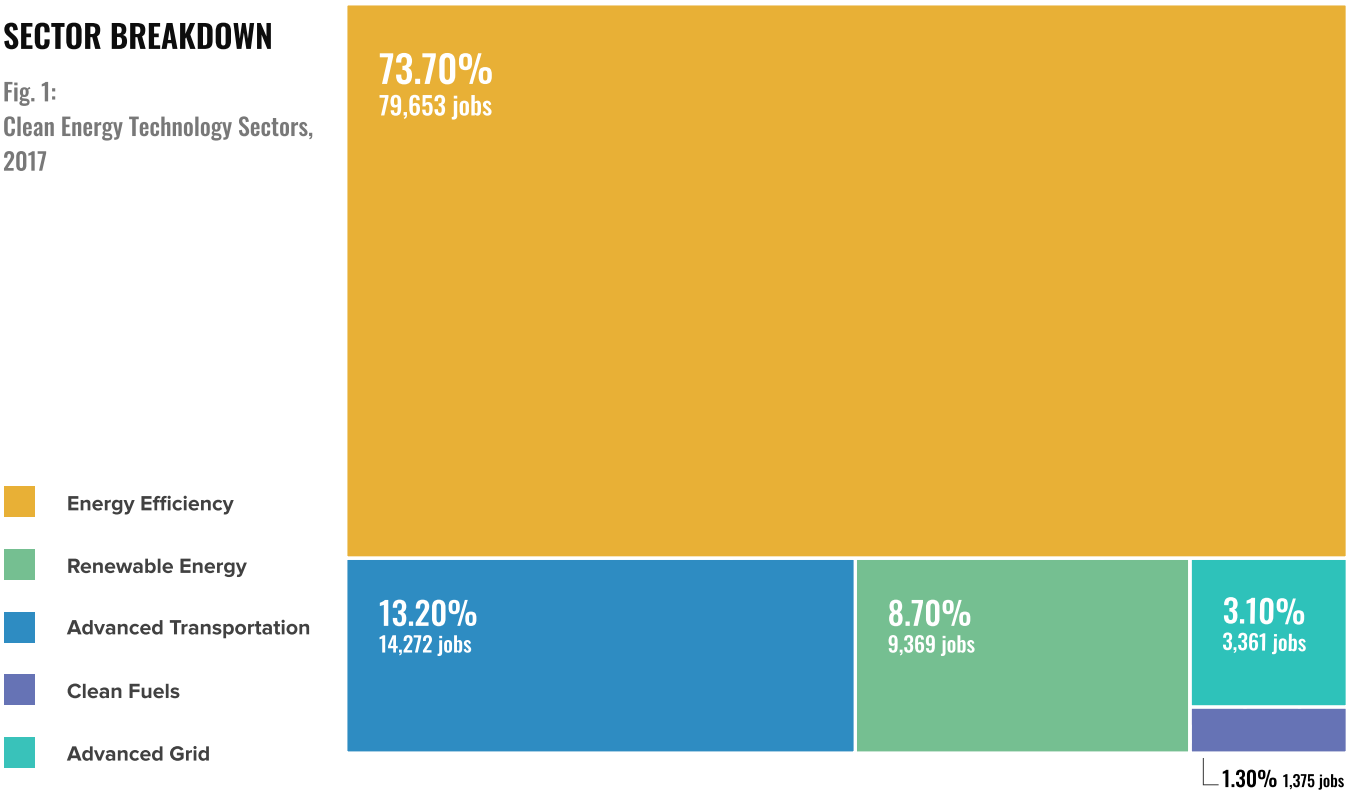
Ohio is home to **108,030** clean energy jobs

Ohio is No. 3 in Midwest in Clean Energy Jobs

Ohio is home to 108,030 clean energy jobs, third-most in the Midwest and eighth most in the whole country.[1] Energy efficiency is by far the biggest clean energy employer with 79,653 jobs. However, due to a large drop in jobs in the alternative transportation industry and as one of two Midwestern states that did not add renewable energy jobs, Ohio clean energy jobs declined 2.7 percent overall. Advanced grid jobs grew 8.2 percent and Ohio is now home to 3,361 jobs.

SECTOR BREAKDOWN

Fig. 1:
Clean Energy Technology Sectors, 2017



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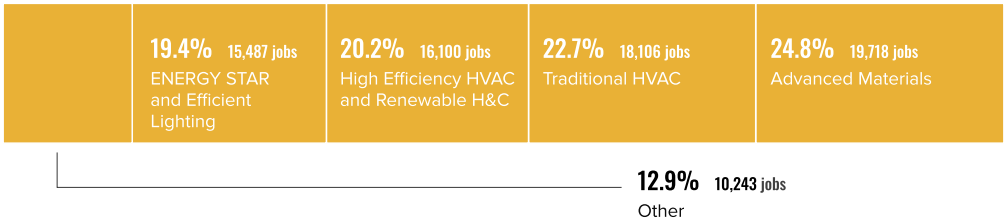
Bulk of Ohio's Clean Energy Jobs in Energy Efficiency

Energy efficiency makes up the largest share of the clean energy workforce with 79,653 jobs. Energy efficiency employs a wide range of Ohioans including workers who manufacture ENERGY STAR-rated appliances and who help lower energy bills by weatherizing windows and entrances at municipal and commercial buildings in cities like Columbus, Cleveland, and Cincinnati.

Fig. 2:
Energy Efficiency Subsectors, 2017



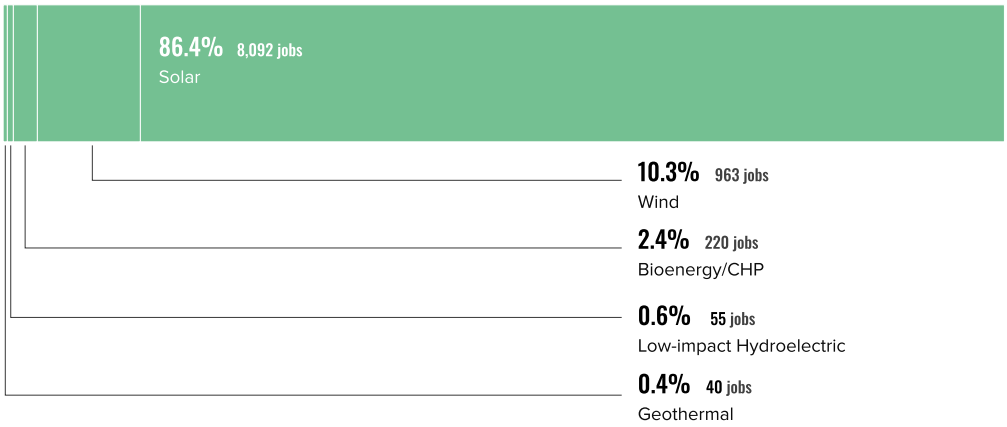
Rising EV Jobs Buck Downward Transportation Trend

Advanced transportation is Ohio's second-largest clean energy employer with 14,272 jobs in the sector. Advanced transportation was the sector that experienced the biggest drop in jobs in Ohio – 3,852 jobs lost, and a 21.3 percent decline. The sector similarly struggled across the Midwest as jobs in hybrid-electric, plug-in hybrid electric, natural gas and hydrogen, and fuel-cell vehicles all declined. Competition from Japanese and European automakers in advanced transportation has also been increasing. So, although electric and plug-in vehicles are more popular than ever, these foreign automakers have been out-competing American autos. One bright spot, however, was that electric vehicles (EVs) bucked the trend, which grew by 4.1 percent and now employs 3,597 Ohioans.

Solar Dominates Renewable Energy Sector

Renewable energy is Ohio's third-largest clean energy employer with 9,369 jobs. Ohio is one of two Midwestern states to experience a decrease in the sector – renewable energy jobs shrunk 0.2 percent. There are 8,092 solar jobs, a 3 percent decrease over the previous year, and 963 wind jobs, which is nearly identical to last year's total. Beyond wind and solar, Ohio's renewable energy sector employs workers in the geothermal, bioenergy, and low-impact hydroelectric power industries.

Fig. 3:
Renewable Energy Subsectors, 2017



Gains in Advanced Grid Jobs

Advanced grid jobs is Ohio's fourth-largest clean energy employer with 3,361 jobs. Advanced grid jobs are involved in energy storage, smart grid, microgrid and other grid modernization work. Employment in these industries grew by a combined 254 jobs, an 8.2 percent growth rate.

Clean Fuels Sector Endures Job Losses

Clean fuels is the smallest clean energy employer in Ohio with 1,375 jobs. The clean fuels sector encompasses non-corn ethanol, non-woody biomass and other technologies not yet in wide commercial production, including algal biofuel, syngas, bioheat blends, landfill gas, and advanced biofuels. Jobs in these industries declined 17.9 percent.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
Cleveland-Elyria-Mentor, OH MSA	21,659	2,047	15,866
Columbus, OH MSA	16,820	1,038	12,747
Cincinnati-Middletown, OH-KY-IN MSA	15,606	1,375	11,442

CLEAN ENERGY INDUSTRY OUTLOOK

Reinstatement of Clean Energy Standards Counteracted By Federal Policy Uncertainty

Since the Ohio legislature reinstated the state's energy efficiency and renewable energy standards, those sectors have either experienced modest growth or remained relatively flat. It's been a similar situation with advanced grid jobs. However, the combined small growth of these sectors fails to counteract significant drops in advanced transportation and clean fuels jobs. While the overall Ohio job market grew 0.8 percent, clean energy jobs shrunk nearly 3 percent. Despite reinstating the standards, Ohio lawmakers have continued to consider legislation that would roll back the existing standards, sending a message of uncertainty to the clean energy industry.

The industry faced several headwinds, including hiring difficulties and federal policy uncertainty. In 2017, 81 percent of Ohio clean energy businesses reported it was "very" or "somewhat" difficult to hire qualified employees. One reason hiring may be difficult right now is the tight national labor market due to relatively low unemployment. Other potential factors include federal policy uncertainty caused by the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA's attempt to roll back fuel economy standards in the auto industry, and the anticipation of a tariff levied on solar panels. Together, these factors created general market uncertainty for many clean energy businesses in the Midwest.

Despite these headwinds, clean energy jobs in Ohio remain vitally important. They constitute nearly 2 percent of all jobs in the state,[2] and Ohio clean energy business owners see industry jobs growing 5.5 percent next year.

The American Council for an Energy-Efficient Economy's State Energy Efficiency Scorecard, meanwhile, dropped Ohio two spots in its statewide ranking. The Buckeye State is down to No. 31.

2. 2017 Bureau of Labor Statistics Current Employment Statistics (CES)

Comparing Clean Energy Jobs and Fossil Fuel Jobs

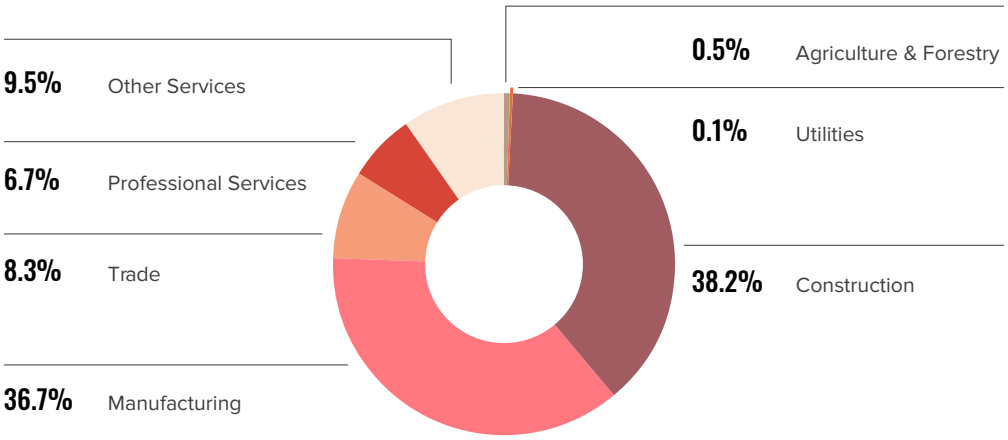
In 2017 in Ohio, 38,839 people worked in fossil fuel energy jobs in industries like coal, natural gas, and oil.[3] While coal jobs dropped nearly 6 percent, renewable energy jobs dropped by less than 1 percent.

3. 2018 US Energy and Employment Report

VALUE CHAIN

Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service, and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs.

Fig. 5:
Clean Energy Jobs Value Chain, 2017



When Ohio clean energy jobs are broken down by their placement in the value chain, construction is home to 38 percent of the jobs while manufacturing is home to 37 percent.

Small businesses drive Ohio's clean energy sector – 63 percent of clean energy businesses in the state employ fewer than 20 people.

Veterans make up a higher percentage of the clean energy work force – 12.3 percent – than the rest of the economy. By comparison, 6 percent of all workers nationwide are veterans.[4] The large ratio of veterans transitioning to clean energy jobs is the result of the U.S. Department of Defense's long-standing commitment to investing in renewable energy, energy efficiency, and training programs that prepare veterans for private-sector employment in industries like solar.

4. 2018 Bureau of Labor Statistics Current Population Survey (CPS)

SUMMARY

There are 108,030 clean energy jobs in Ohio, third-most in the Midwest. These jobs include wind turbine technicians in Van Wert County and high-efficiency heating, ventilation, and air conditioning (HVAC) installers, who help school districts and commercial building owners from Cincinnati to Youngstown save money on winter heating bills. As Ohioans look toward the future, clean energy is likely to play a bigger role in the state's economy each year, with more job opportunities being created in construction, energy efficiency, solar energy and other sectors and industries.

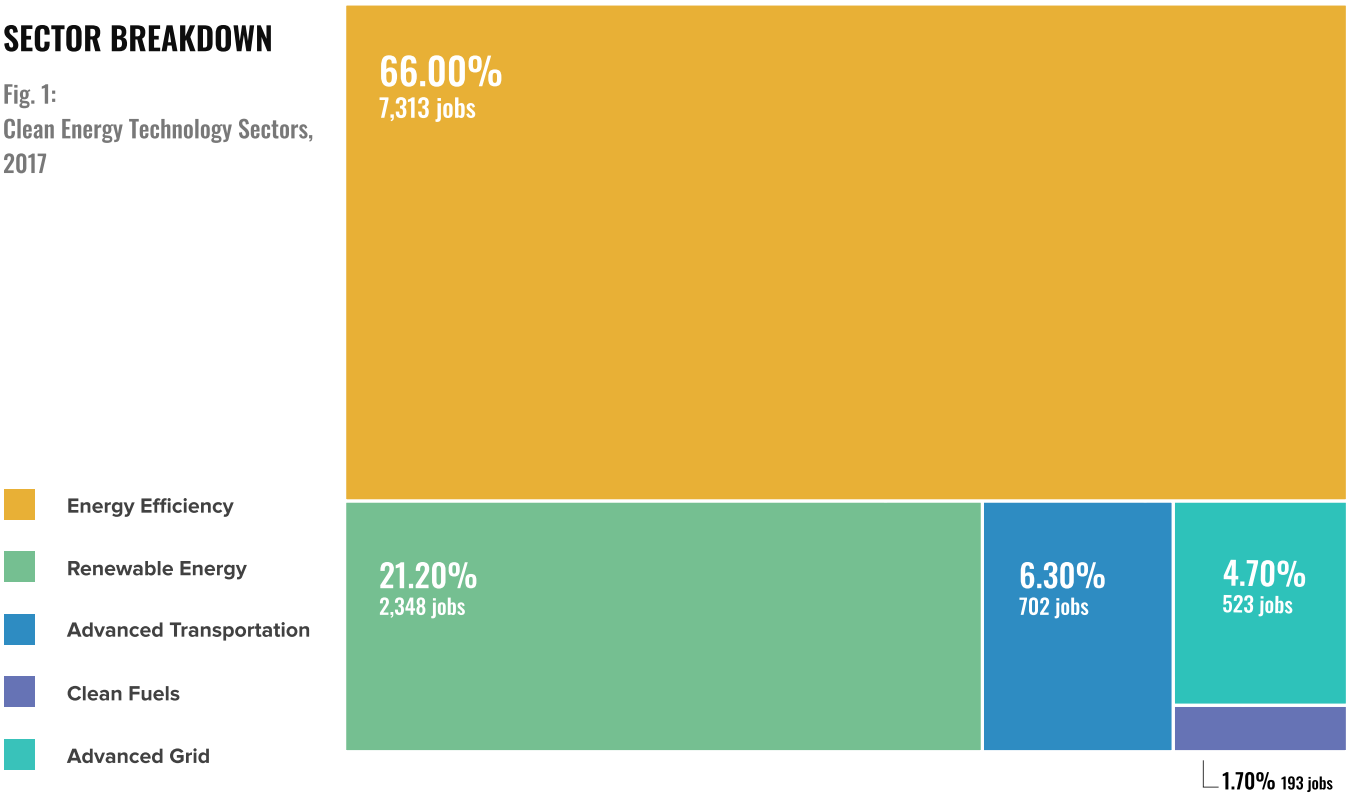
South Dakota is home to **11,078** clean energy jobs

Energy Efficiency, Renewable Generation, Advanced Grid are Adding Clean Energy Jobs

Clean energy employs 11,078 South Dakotans.[1] From 2016 to 2017, clean energy jobs in South Dakota declined by 143, or 1.3 percent. While overall clean energy jobs fell, individual sectors – especially energy efficiency, renewable energy, and advanced grid – all grew.

SECTOR BREAKDOWN

Fig. 1:
Clean Energy Technology Sectors, 2017

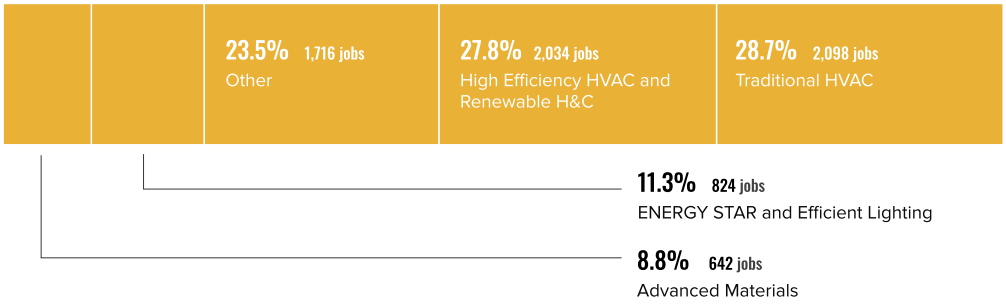


1. Unless otherwise stated, all data is based on the 2018 U.S. Energy and Employment Report (Source: National Association of State Energy Officers; Energy Futures Initiative). The report incorporates an updated methodology that captures more energy efficiency manufacturing jobs than in previous years. Unlike past Clean Jobs Midwest reports, this year's report does not count fossil fuel industry workers who also spend a portion of their time on renewable energy or energy efficiency as clean energy jobs. See the About section at cleanjobsmidwest.com/about for full details.

Energy Efficiency: Two-thirds of All South Dakota Clean Energy Jobs

Energy efficiency is the largest clean energy employer in the state with 7,313 jobs. That's 1.5 percent more than the previous year, an increase of 110 jobs. Energy efficiency employs a wide range of South Dakotans such as construction workers whose retrofits to windows and doors tighten building envelopes. They also employ high-efficiency HVAC installers whose work helps municipalities and commercial building owners in places like Pierre, Rapid City, and Sturgis save money on energy bills.

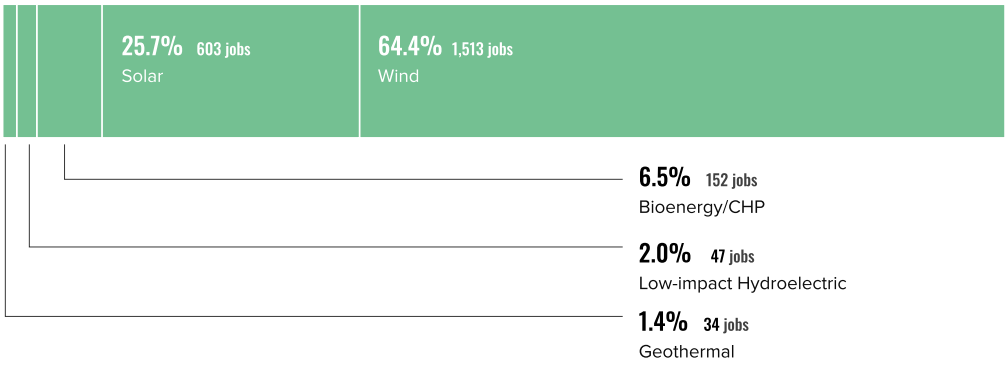
Fig. 2:
Energy Efficiency Subsectors, 2017



Wind, Solar Top Renewable Energy Industries

Renewable energy is the second-largest sector in South Dakota for clean energy with 2,348 jobs. About 74 jobs were added over the past year in renewables, good for a 3.2 percent growth rate. Wind employs 1,513 people for a 2.1 percent growth rate. Solar jobs, meanwhile, experienced a 4.6 percent decline to 603 solar workers overall. Similar to other states in the Midwest, solar businesses in South Dakota rushed to complete projects in 2016 to qualify for expiring tax credits, then subsequently reduced jobs last year. South Dakota's solar industry also dealt with uncertainties regarding tariffs at the federal level. The renewable energy generation sector also includes jobs in geothermal, bioenergy, and low-impact hydroelectric power.

Fig. 3:
Renewable Energy Subsectors, 2017



Advanced Transportation Employs 700+

Advanced transportation is the third-largest clean energy sector in the state. It employs 702 South Dakotans who build and develop hybrid and plug-in electric vehicles, alternative fuels vehicles, and fuel-cell vehicles. Competition from Japanese and European automakers led to a decline in advanced transportation jobs across the region, and South Dakota was not spared as it shed 347 jobs in the sector – a 33 percent decline. One bright spot was employment in the electric vehicle (EV) industry, which grew by 4.1 percent and now employs 177 South Dakotans.

Energy Storage Dominant Industry in Advanced Grid Sector

Of the 523 advanced grid jobs in South Dakota, more than half – about 346 – were in energy storage. Overall, South Dakota advanced grid jobs bucked the regional trend, adding 62 jobs for a 13 percent growth rate. Region-wide, advanced grid jobs declined nearly 3 percent.

Clean Fuels Jobs Fall, Following Regional Trend

Clean fuels is the fifth-largest clean energy sector with 193 jobs in South Dakota. The clean fuels sector encompasses non-corn ethanol, non-woody biomass and other technologies not yet in wide commercial production, including algal biofuel, syngas, bioheat blends, landfill gas, and advanced biofuels. South Dakota clean fuel jobs dropped by 17.5 percent, which was not unusual for the region as all Midwestern states lost jobs in the sector.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
Sioux Falls, SD MSA	4,387	678	2,060
Rapid City, SD MSA	1,704	438	1,323
Sioux City, IA-NE-SD MSA	197	50	154

CLEAN ENERGY INDUSTRY OUTLOOK

Federal Policy, Macroeconomic Trends Check Clean Energy Job Growth

Clean energy jobs constitute 2.43 percent of all jobs in the state. However, while the overall South Dakota job market ticked upward by about a half a percent,[2] the clean energy industry declined by 1.3 percent.

The sector's decline in jobs is due to several factors, including difficulties hiring qualified workers and federal policy uncertainty.

In 2017, 72 percent of South Dakota clean energy establishments reported difficulty hiring qualified employees; 43 percent of those establishments went on to say hiring was "very difficult." A tight national labor-market due to relatively low unemployment is a potential cause of these hiring difficulties.

One reason hiring may be difficult right now is the tight national labor market due to relatively low unemployment. Other potential factors include federal policy uncertainty caused by the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA's attempt to roll back fuel economy standards in the auto industry, and the anticipation of a tariff levied on solar panels. Together, these factors created general market uncertainty for many clean energy businesses in the Midwest.

Despite these headwinds, business owners project clean energy jobs will grow slightly next year, by 0.2 percent. This lags the projected regional clean energy job growth rate of 4.5 percent.

2. 2017 Bureau of Labor Statistics Current Employment Statistics (CES)

Comparing Clean Energy Jobs and Fossil Fuel Jobs

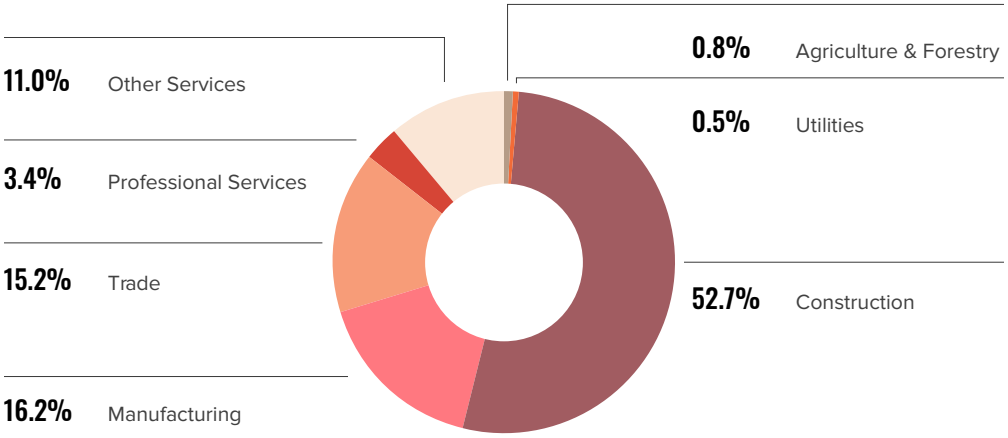
There are 1,765 people in South Dakota working in fossil fuel jobs in industries like coal, natural gas, and oil.[3] Electric power generation jobs using fossil fuels employed 261 people, compared to the 2,348 jobs in renewable energy generation.

3. 2018 US Energy and Employment Report

VALUE CHAIN

Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service, and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs.

Fig. 5:
Clean Energy Jobs Value Chain, 2017



When South Dakota clean energy jobs are broken down by their placement in the value chain, construction is home to 53 percent of the jobs while manufacturing is home to 16 percent.

Small businesses drive South Dakota's clean energy sector – 61 percent of South Dakota's clean energy businesses employ fewer than 20 individuals.

In South Dakota, 10.6 percent of clean energy jobs are filled by veterans. By comparison, 6 percent of all workers nationwide are veterans.[4] The large ratio of veterans transitioning to clean energy jobs is the result of the U.S. Department of Defense's long-standing commitment to investing in renewable energy, energy efficiency, and training programs that prepare veterans for private-sector employment in industries like solar.

4. 2018 Bureau of Labor Statistics Current Population Survey (CPS)

SUMMARY

South Dakota's clean energy sector employs 11,078 people whose jobs encompass everything from manufacturing and construction to professional services. Jobs in renewable energy, energy efficiency, and beyond continue to provide economic opportunity for thousands of South Dakotans. While a lack of policy certainty could create headwinds for clean energy hiring over the next year, clean energy establishments in the state are projecting a slight uptick in jobs.

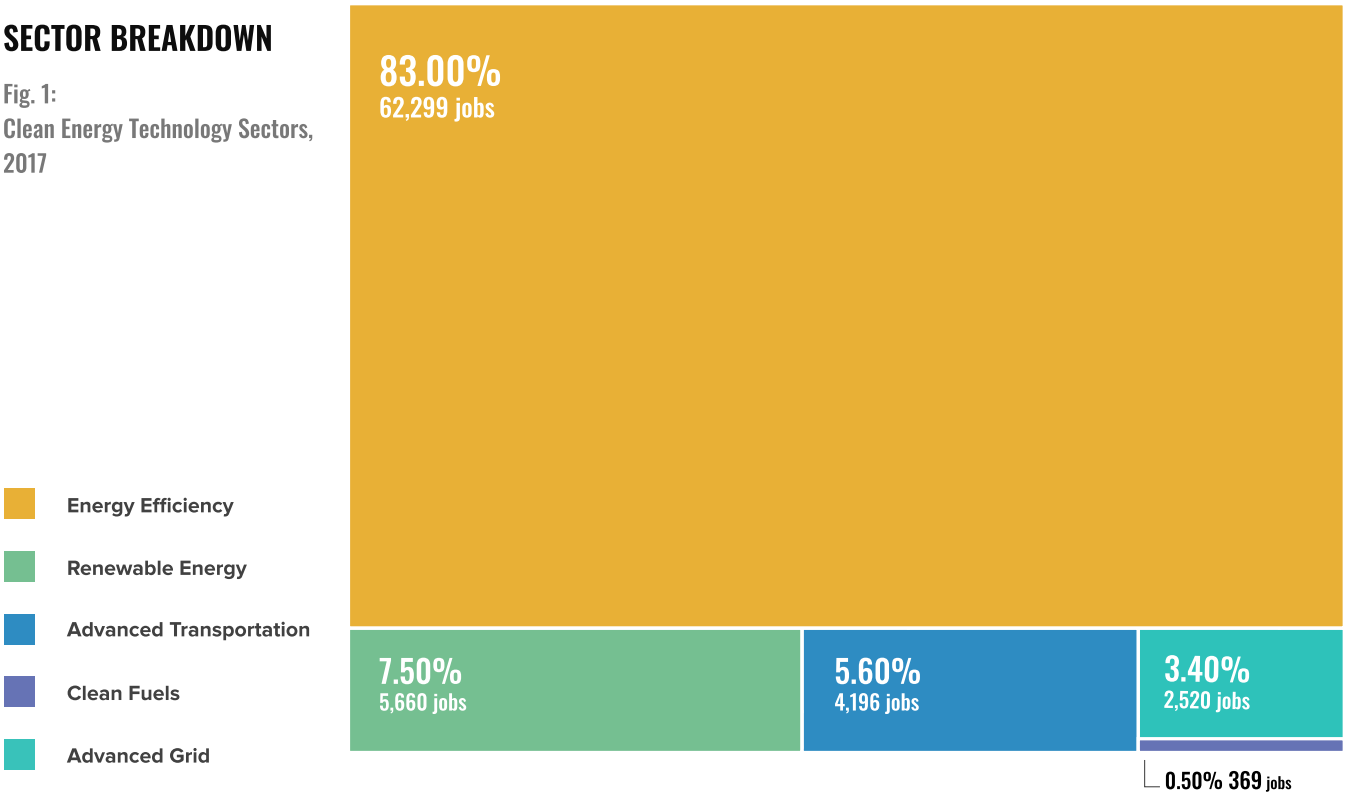
Wisconsin is home to **75,044** clean energy jobs

Clean Energy Employers Strike Optimistic Tone

Clean energy employs 75,044 people in Wisconsin[1]. From 2016 to 2017, Wisconsin clean energy jobs fell by 863, a 1 percent decline. Bucking this trend, advanced grid jobs saw strong growth. Despite the slight decrease in statewide clean energy jobs – and an uncertain policy environment, particularly at the federal level – clean energy employers in Wisconsin remain optimistic, projecting they will add more than 1,500 jobs in the next year, a 2 percent growth rate.

SECTOR BREAKDOWN

Fig. 1:
Clean Energy Technology Sectors, 2017

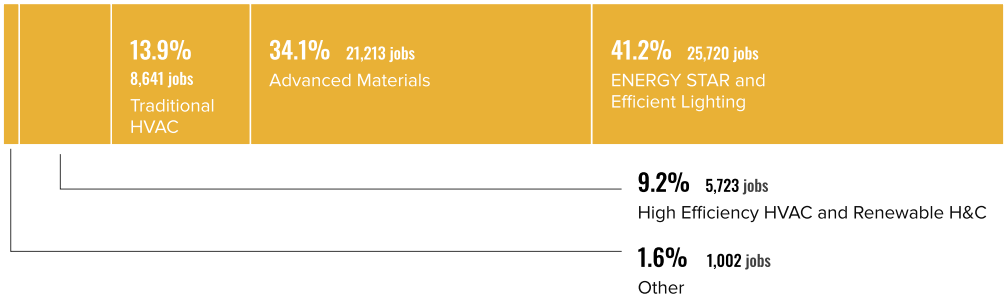


1. Unless otherwise stated, all data is based on the 2018 U.S. Energy and Employment Report (Source: National Association of State Energy Officers; Energy Futures Initiative). The report incorporates an updated methodology that captures more energy efficiency manufacturing jobs than in previous years. Unlike past Clean Jobs Midwest reports, this year's report does not count fossil fuel industry workers who also spend a portion of their time on renewable energy or energy efficiency as clean energy jobs. See the About section at cleanjobsmidwest.com/about for full details.

Energy Efficiency Growth in Wisconsin Lags Region – But Still Employs 62,000

Energy efficiency is Wisconsin's largest clean energy employer with 62,299 jobs, just 10 more than last year. Energy efficiency job growth in Wisconsin lags the rest of the Midwest, where efficiency jobs grew 1.5 percent by adding 7,612 jobs. Still, energy efficiency employs a wide range of workers in Wisconsin, including construction workers whose retrofits to windows and doors tighten building envelopes. They also employ high-efficiency HVAC installers whose work helps municipalities and commercial building owners in places like Milwaukee, Green Bay, and Eau Claire save money on energy bills.

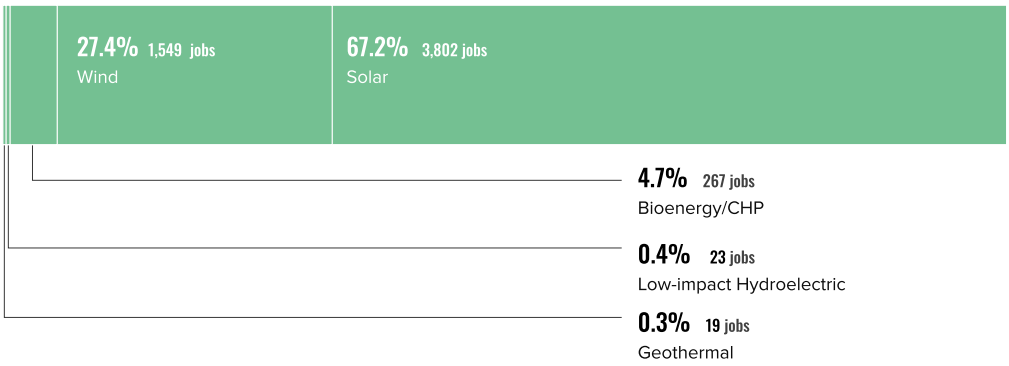
Fig. 2:
Energy Efficiency Subsectors, 2017



Wind Jobs Up, Solar Jobs Down In Shifting Policy Landscape

Renewable energy is the No. 2 sector for clean energy jobs in Wisconsin with 5,660. That's 38 jobs fewer than the previous year, for a 0.7 percent loss. Within renewable energy jobs, wind jobs grew by 6 percent and now employ 1,549 people. Solar, meanwhile, experienced a nearly 6 percent job decline to 3,802 solar workers overall. Similar to other states in the Midwest, solar businesses in Wisconsin rushed to complete projects in 2016 to qualify for expiring tax credits, then subsequently reduced jobs last year. Wisconsin's solar industry also dealt with uncertainties regarding tariffs at the federal level. The renewable energy generation sector also includes jobs in geothermal, bioenergy, and low-impact hydroelectric power.

Fig. 3:
Renewable Energy Subsectors, 2017



Rising EV Jobs Buck Trend As Advanced Transportation Jobs Fall

Advanced transportation is the third-largest clean energy sector in the state. It employs 4,196 people in Wisconsin who build and develop hybrid and plug-in electric vehicles, alternative fuel vehicles, and fuel-cell vehicles. Competition from Japanese and European automakers led to a decline in advanced transportation jobs across the region, and Wisconsin was not spared as it shed 956 jobs in the sector – an 18.6 percent decline. One bright spot was employment in the electric vehicle (EV) industry, which grew by 27 percent and now employs 1,057 people statewide.

Energy Storage Leads Way In Advanced Grid Jobs

Advanced grid is the fourth-largest sector for clean energy jobs in Wisconsin with 2,520, 8.2 percent more than in 2016. Advanced grid workers are involved in energy storage, smart grid, microgrid and other grid modernization work. Last year, there were 1,519 energy storage jobs in Wisconsin, around 4 percent fewer than 2016.

Clean Fuels Employs 369

Clean fuels is the fifth-largest Wisconsin clean energy sector with 369 jobs, down 70 jobs since 2016. The clean fuels sector encompasses non-corn ethanol, non-woody biomass and other technologies not yet in wide commercial production, including algal biofuel, syngas, bioheat blends, landfill gas, and advanced biofuels.

Fig. 4:
Top 3 MSAs in Clean Energy Employment, 2017

Metro Area (MSA)	Clean Energy Employment	Renewable Energy Employment	Energy Efficiency Employment
Milwaukee-Waukesha-West Allis, WI MSA	20,127	1,405	16,836
Madison, WI MSA	8,723	631	7,220
Green Bay, WI MSA	3,747	141	3,239

CLEAN ENERGY INDUSTRY OUTLOOK

Federal Policy, Macroeconomic Trends Check Clean Energy Job Growth

Clean energy jobs represent 2.4 percent of all jobs in Wisconsin. While clean energy jobs declined by 1 percent, the state's overall job market ticked upward 0.6 percent. The sector's decline in jobs is due to several factors, including difficulties hiring qualified workers and federal policy uncertainty.

In 2017, 60 percent of Wisconsin clean energy establishments reported difficulty hiring qualified employees; 10 percent of those establishments went on to say hiring was "very difficult." One reason hiring may be difficult right now is the tight national labor market due to relatively low unemployment. Other potential factors include federal policy uncertainty caused by the potential expiration of the 179D Commercial Building Energy Efficiency Tax Deduction, the U.S. EPA's attempt to roll back fuel economy standards in the auto industry, and the anticipation of a tariff levied on solar panels. Together, these factors created general market uncertainty for many clean energy businesses in the Midwest.

The American Council for an Energy Efficient Economy also lowered the state's energy efficiency scorecard two notches, down to 24th in the country.

Despite these headwinds, business owners project clean energy jobs will grow slightly next year, by 2 percent.

Comparing Clean Energy Jobs and Fossil Fuel Jobs

There are 8,562 fossil fuel jobs in Wisconsin, which employs people in coal, natural gas, and oil. Electric power generation jobs using fossil fuels employed 3,593 people, compared to the 5,660 jobs in renewable energy generation.

VALUE CHAIN

Clean energy jobs can also be categorized by the role they play in the value chain. This report divides the clean energy jobs value chain into the following categories: agriculture, utility, construction, manufacturing, trade, professional service, and other service jobs. Each category captures jobs from multiple different clean energy sectors. For example, construction jobs can include energy efficiency jobs and renewable energy jobs.

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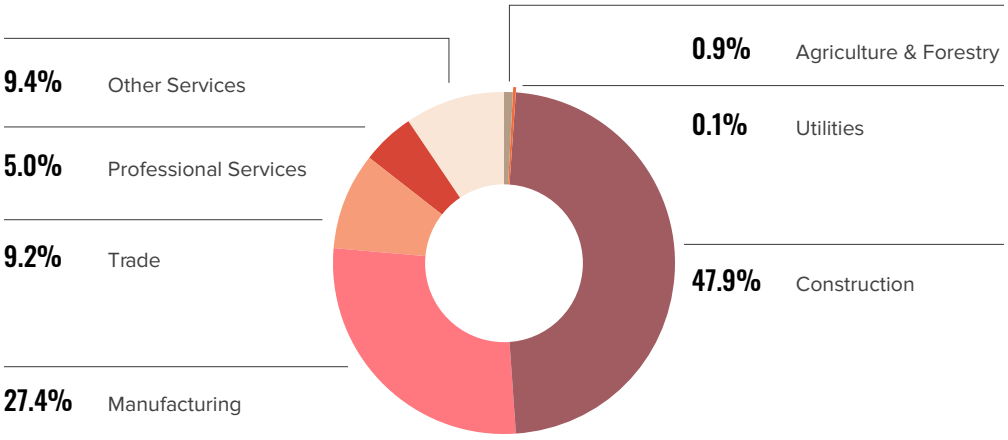

When Wisconsin clean energy jobs are broken down by their placement in the value chain, construction is home to 48 percent of the jobs while manufacturing is home to 27 percent.

Small businesses drive Wisconsin clean energy sector – 68 percent of Wisconsin's clean energy businesses employ fewer than 20 individuals.

In Wisconsin, 11 percent of clean energy jobs are filled by veterans. By comparison, 6 percent of all workers nationwide are veterans. The large ratio of veterans transitioning to clean energy jobs is the result of the U.S. Department of Defense's long-standing commitment to investing in renewable energy, energy efficiency and training programs that prepare veterans for private-sector employment in industries like solar.

SUMMARY

Wisconsin's clean energy sector employs 75,044 people whose jobs encompass everything from manufacturing and construction to professional services. Jobs in renewable energy, energy efficiency, and clean fuels continue to provide economic opportunity for thousands of Wisconsinites. While a lack of policy certainty could create headwinds for clean energy hiring over the next year, clean energy establishments in the state are projecting a slight uptick in jobs.