

Missouri's Advantages for Wind Energy



Currents. It's how we describe the flow of air moving around us...and the flow of electricity powering our homes and businesses. In Missouri, we're working to blur the line between the two by making our wind resources a big part of our energy picture.

Located on the eastern edge of the U.S. wind corridor, Missouri contributes to the Midwest's significant wind resources. An advanced supply chain, a highly-ranked transportation network, and a business-friendly environment further the state's ability to compete for wind energy projects.

With each new turbine that's built, with each new component that rolls off the line, Missouri is putting into motion that which is already stirring in the air.

“Finding new energy solutions and protecting our natural resources are the keys to Missouri’s environmental and economic future. Here in Missouri, we’re perfectly positioned to harness multiple new forms of energy, including wind, solar, nuclear, hydro-electric and bio-fuels. These energy solutions will lessen our dependence on foreign oil, create next-generation jobs, and help turn this economy around.”

— Governor Jeremiah W. “Jay” Nixon



Top five reasons to locate in Missouri:

1 A low-cost, pro-business environment helps companies prosper.

- Missouri ranked among the top 10 states in the nation for low business energy costs overall (*Small Business and Entrepreneurship Council*) and regulatory environment (*Forbes*) in 2012.
- Missouri also ranked among the top 10 pro-business states for the third year in a row (*Pollina Corporate Real Estate, 2013*).
- Missouri ranks in the top ten states for property tax index, unemployment insurance tax index, and corporate income tax index (*Tax Foundation, 2013*).

2 Missouri’s proximity to the wind corridor and major OEMs ensures efficient access to vendors and customers.

- OEMs near Missouri include Acciona, Nordex, Siemens, and Suzlon.
- The top 10 states for existing wind capacity include four of Missouri’s neighboring states. Missouri and surrounding states have a combined existing capacity of 15,498 MW—more than 25 percent of the U.S. total current wind power capacity.
- The growing wind industry supply chain in Missouri includes companies like ABB, FAG Bearings, Emerson Electric, and Milbank Manufacturing.

3 Missouri’s aggressive renewable portfolio standard and wind energy potential ensure a growing market for wind manufacturers.

- Missouri’s Clean Energy Initiative, a citizen-initiated state statute passed in 2008, requires that utility companies increase usage of renewable energy to 15 percent by 2021.
- Missouri currently has seven wind farms that have a combined generation capacity of 459 MW, higher than 26 other states.
- Missouri’s potential wind power installed capacity is 274,355 MW for areas greater than or equal to 30 percent gross capacity factor at 80 m, ranked 13th in the U.S.

4 Missouri's extensive transportation system is a dependable delivery system for goods and services.

- Missouri has one of the best and least congested transportation networks in the United States, and the 6th largest public road and highway system (*Federal Highway Administration*).
- Two of the largest rail terminals in the U.S. are located in Missouri, providing rail access to both east and west coasts.
- Missouri has the northernmost ice-free ports and the southernmost lock and dam on the Mississippi river.
- The airport system in Missouri consists of approximately 130 public airports, with two supporting international traffic: Lambert-St. Louis International and Kansas City International.

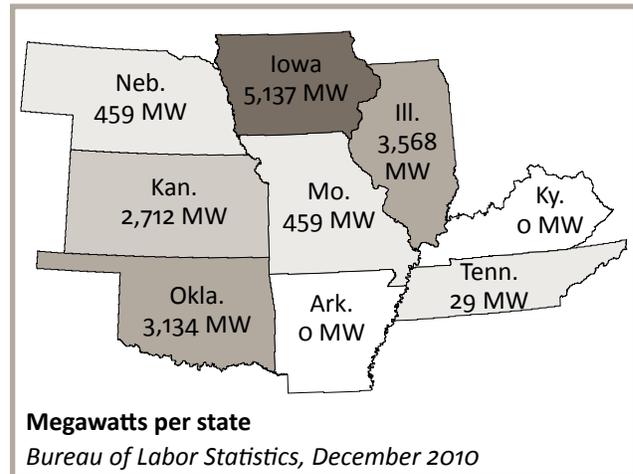
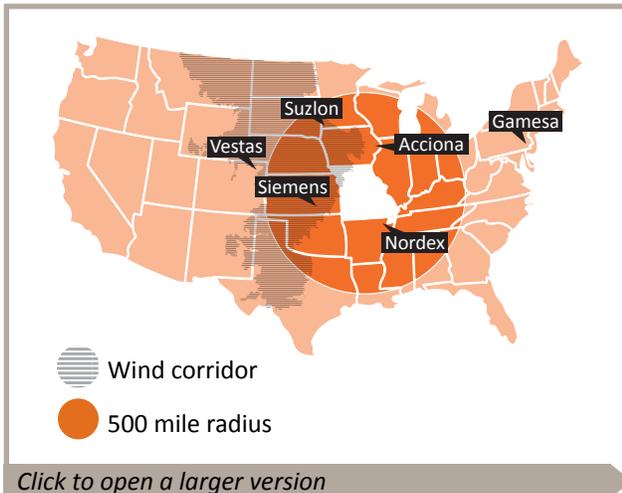
5 Missouri has a large, highly educated, and low-cost labor force.

- Nearly 4,000 degrees in engineering related fields are awarded each year in the state.
- Missouri's labor force exceeds the entire populations of 20 states, including neighboring Kansas, Arkansas, and Nebraska.
- 9.3 percent of Missouri's workforce is currently employed in manufacturing.
- Missouri offers alternative energy educational programs and specialized industry centers across the state.

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- Missouri also ranked among the top 10 pro-business states for the third year in a row (*Pollina Corporate Real Estate, 2012*).
- Missouri ranks in the top ten states for property tax index, unemployment insurance tax index, and corporate income tax index (*Tax Foundation, 2013*).
- Missouri is one of only seven states to receive the highest bond rating by all three rating agencies—Fitch Ratings, Standard & Poors and Moody's Investor Service—in 2012. Missouri has held an AAA rating for over 45 years and is one of just five states to maintain such a record.
- 9 Missouri companies were included in 2012's Fortune 500: Express Scripts, Emerson Electric, Monsanto, Reinsurance Group of America, Peabody Energy, Ameren, O'Reilly Automotive, Graybar Electric, and Centene.
- Missouri is also the headquarters for 10 of America's Largest Private Companies according to Forbes: Enterprise, Graybar Electric, Edward Jones, Apex Oil, World Wide Technology, Bass Pro Shops, Hallmark Cards, Schnuck Markets, McCarthy Holdings, and JE Dunn Construction.
- Missouri has the third most diversified economy in the U.S. with a GDP over \$249 billion (*BEA*) and exports totaling over \$14.2 billion (*WiserTRADE*).

2 Missouri's proximity to the wind corridor and major OEMs ensures efficient access to vendors and customers.



Four of the top 10 states for existing capacity are Missouri's neighbors. Missouri and surrounding states have a combined existing capacity of 15,498 MW—more than 25 percent of the current national total wind power capacity.

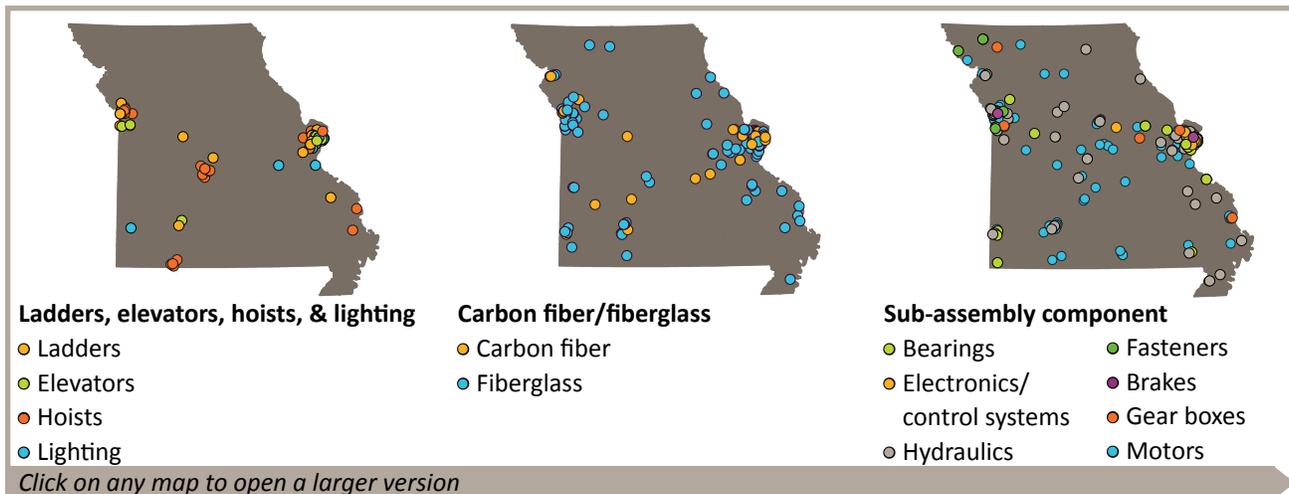
Companies recently located or expanded in Missouri

Click on [orange](#) text for a link to more information.

Exergonix (HQ Lee's Summit) manufactures storage systems to bridge the gap between energy production and consumption by storing excess energy from power generators, then distributing it when needed. In 2011, Exergonix selected Lee's Summit for their \$90 million headquarters, creating 275 jobs. ([more](#))

Milbank Manufacturing (Kansas City) announced in 2011 its plans to invest \$2.7 million to set up new production lines for renewable energy products, primarily for the purpose of integrating power from wind, solar, water, and generators. ([more](#))

VestFiber (Moberly) is a supplier of fiberglass products and services primarily supporting the wind turbine industry. In December 2010, the Danish company announced that Moberly would be the location of its new manufacturing facility. VestFiber's investment of \$2 million helped create 50 local jobs. ([more](#))



Supply chain companies

A123 Energy Solutions (St. Louis) designs and manufactures high performance, efficient, safe and reliable advanced battery systems for electric grid, backup power, and lead acid replacement applications. They have an office in Missouri. ([more](#))

ABB (Jefferson City and St. Louis) built the transformers for General Electric's wind turbines and supplied the electrical transformers used in wind turbines at Lost Creek Wind Farm in DeKalb County, Missouri. ([more](#))

Able Manufacturing & Assembly, Co. (HQ Joplin) manufactures fiberglass composite and metal enclosures and hubs for wind turbines. ([more](#))

Aero Transportation Products (Independence) manufactures a specially designed wind turbine tower for smaller-scale wind installations. The company uses its patented GridCORE technology for the tower construction. Aero Transportation Products normally manufactures fiberglass covers for railcars, so any wind industry components are not part of the company's usual production process. ([more](#))

CG Power Systems USA (Washington) manufactures distribution and power transformers for various industrial applications, including in the wind power generation. The company's products are being used in numerous wind farm developments in the U.S. ([more](#))

Clemco Industries (HQ Washington) manufactures air-blast equipment and accessories for cleaning, surface preparation, and finishing of industrial components. The company is a service provider to companies who manufacture wind turbine components. ([more](#))

Composites One (Kansas City) is a leading distributor of composite materials for the wind industry. They have a distribution center in Kansas City. ([more](#))

Continental Disc Corp. (HQ Liberty) is a leading manufacturer of rupture disc devices for a variety of process industries throughout the world: chemical, petrochemical, petroleum refining, pharmaceutical, beverage, food and dairy, aerospace, gases, and electronics. ([more](#))

EaglePicher Technologies (Joplin) manufactures alternative energy storage systems for utility grid enhancement at the regional, community, project, home, and industrial scale. ([more](#))

Emerson Electric (HQ St. Louis) is a major manufacturer of wind turbine components: Leroy-Somer generators, SSB Wind Systems' positioning drives, Jaure couplings, and Emerson Process Management monitoring and control systems. Emerson's Leroy-Somer division was one of the first manufacturers of generators for wind turbines and now makes generators up to 5 MW as well as a range of control motors for the wind industry. Leroy-Somer has a network of global plants—including their new Fuzhou, China facility which supplies three of China's largest wind turbine manufacturers—and supplies generators and other technology to wind turbine manufacturers in Europe, North America, and Asia. ([more](#))

FAG Bearings (Joplin) a division of German-based Schaeffler Group, manufactures large-scale bearings for wind turbines. ([more](#))

GlenMartin (HQ Boonville) designs, manufactures, and installs vertical support structures and shelters for use in the telecommunications, electrical power transmission, and alternative wind power sectors. ([more](#))

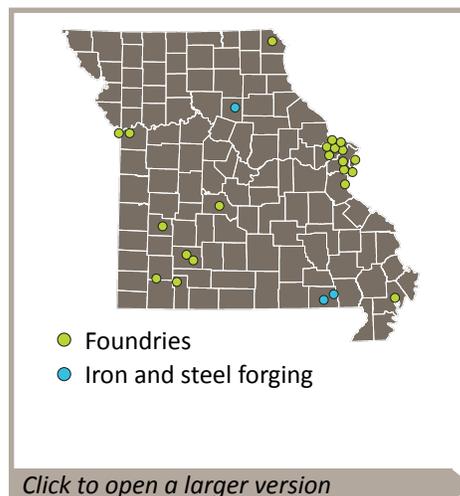
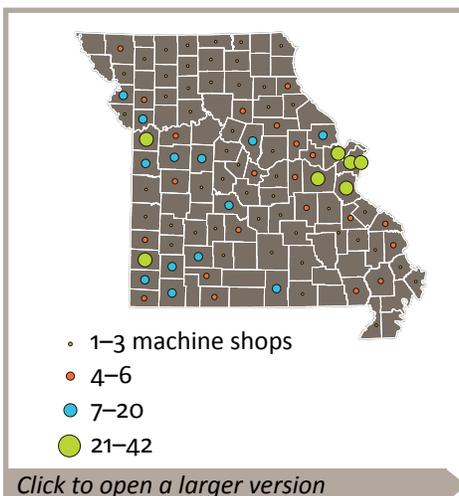
Reed Rubber Products (St. Louis) is a diversified manufacturer of precision thermoplastic rubber extrusions for various industrial applications. The company manufactures extruded parts for the wind industry, including gaskets and seals. ([more](#))

Zoltek (HQ St. Louis) supplies carbon fiber to wind industry manufacturers like DeWind Inc., Vestas Wind Systems, and Gamesa Eolica. ([more](#))

Wind farm developers

Affinity Wind (St. Louis) is an independent wind energy company focused exclusively on the development, ownership, and management of wind energy projects. ([more](#))

Wind Capital Group (St. Louis) Wind Capital has completed five projects totaling over 300 MW in Missouri. ([more](#))



Construction and engineering services companies

Black & Veatch (Kansas City and St. Louis) provides wind resource evaluation, production estimates, review of advanced technologies, project development, and implementation assistance to companies in the wind sector. ([more](#))

Burns & McDonnell (HQ Kansas City and St. Louis) is a full-service engineering and consulting firm that assists with every phase of development: energy forecasting and planning, siting, preliminary design, environmental studies, regulatory permitting, land acquisition, transmission interconnection, engineering, procurement, construction, and operation. ([more](#))

ESI Contracting Corp (HQ Kansas City) is a general contractor specializing in heavy civil construction including wind farm site preparation. ([more](#))

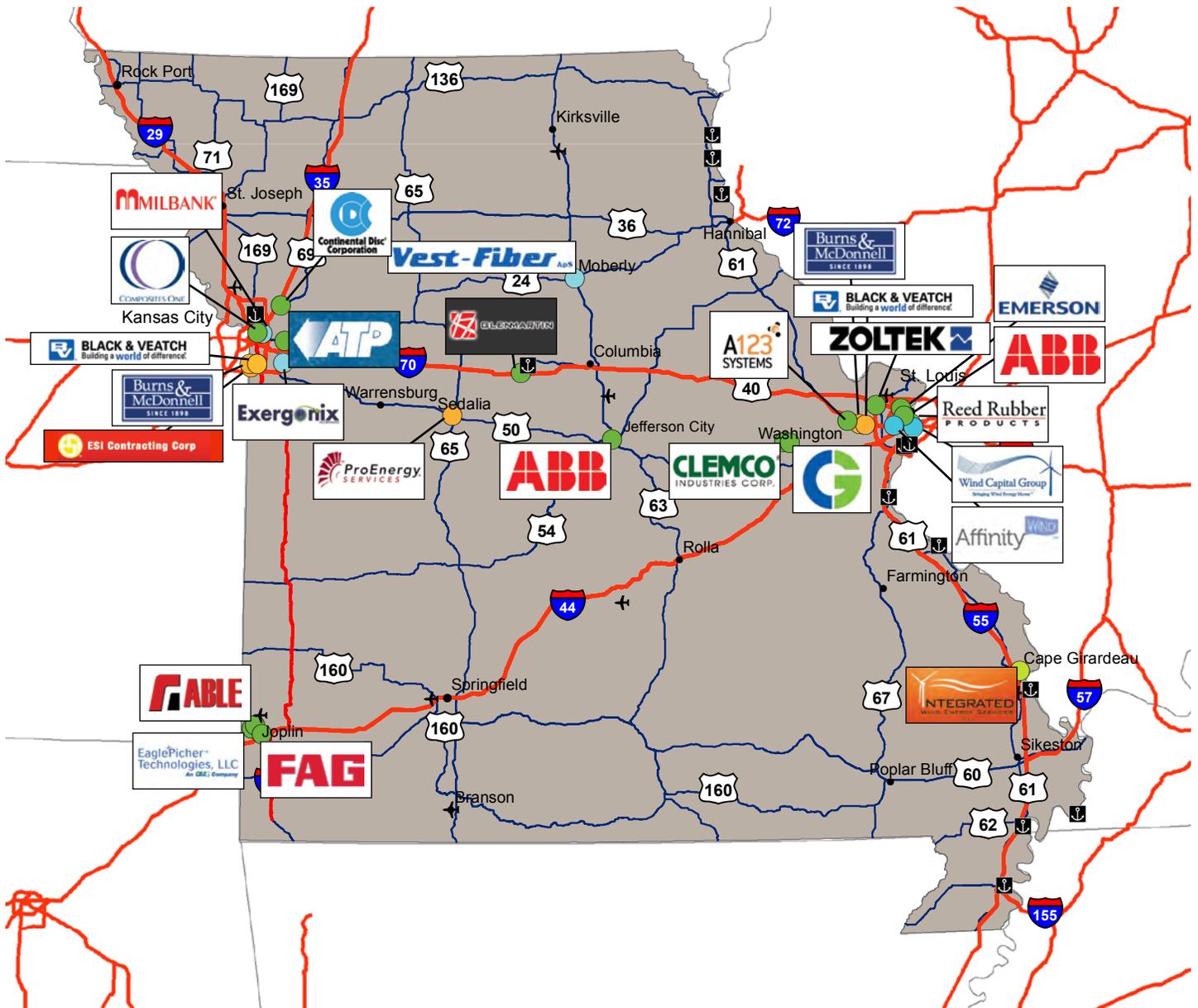
Pro-Energy Services (HQ Sedalia) provides a variety of services including technology development, project siting, planning and management, overhaul/repair services, startup and commissioning, EPC services, turnkey O&M, and staffing augmentation. ([more](#))

Transportation services

Integrated Wind Energy Services LLC (HQ Cape Girardeau) uses a highly-specialized fleet of transportation equipment to ship wind energy components throughout North America. ([more](#))

Wind industry supply chain

- Companies recently located or expanded
- Supply chain companies
- Construction and engineering services
- Transportation services
- Wind farm developers



3 Missouri's aggressive renewable portfolio standard and wind energy potential ensure a growing market for wind manufacturers.

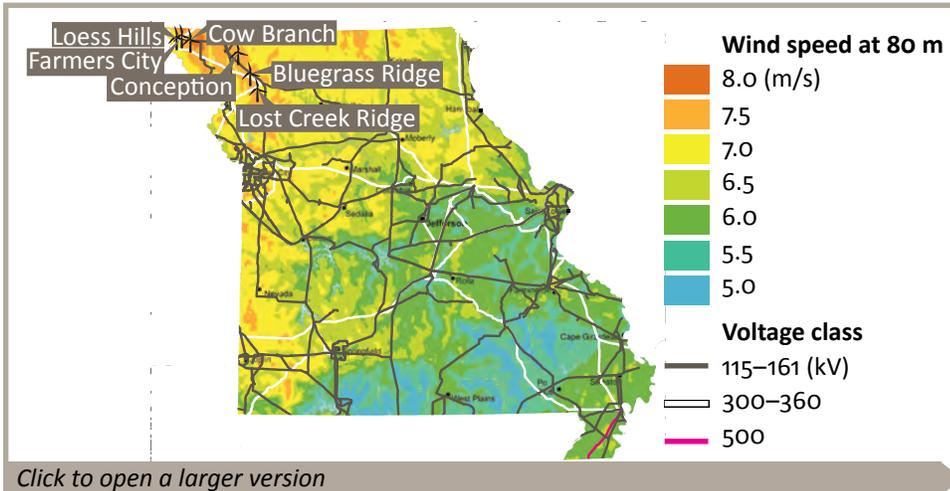
Missouri's wind energy potential

- Rockport, Missouri is the first U.S. city to operate solely on wind energy.
- Missouri's current wind power capacity is 459 MW, higher than 26 states.
- Missouri's potential wind power installed capacity is 274,355 MW for areas greater than or equal to 30 percent gross capacity factor at 80 m, ranked 13th in the U.S.

Utilities

- Missouri's Clean Energy Initiative, a citizen-initiated state statute passed in 2008, requires that utility companies increase usage of renewable energy to 15 percent by 2021.
- The Empire District Electric Company, based in Joplin, entered the wind arena in 2004 when it signed a 20-year purchase power agreement with the 150 MW Elk River wind farm. Empire expanded its portfolio in 2008 with the 105 MW Phase I Meridian Way Wind Farm. Elk River and Meridian way began operating in 2005 and 2008, respectively.
- Missouri's electric cooperatives lead in providing Missouri wind power to consumers. Cooperatives helped bring the state's first utility-scale wind farm to the state by providing transmission and long-term power purchase agreements. Today, Missouri cooperatives' wind energy totals 600 MW, including all the power from four wind farms right here in Missouri, and that's enough to power about 142,000 member households.
- In 2009 Ameren entered into a 15-year Power Purchase agreement with Horizon Wind Energy to purchase 102 MW of wind power, enough for 26,000 households.
- KCP&L, a subsidiary of Great Plains Energy Inc., has recently announced plans to add 400 MW of wind generation to their supply portfolio, bringing the company's total wind generation capacity to 939 MW.

Missouri's wind farms



Name	Location	Power Capacity (MW)	Units	Turbine Mfr.	Developer & Owner	Power Purchaser	Year Online
Lost Creek Ridge Wind Farm (2011)	DeKalb	1.5	1	GE Energy	Wind Capital Group	Associated Electric Cooperative Inc. (AECI)	2011
Lost Creek Ridge Wind Farm (2010)	DeKalb	148.5	99	GE Energy	Wind Capital Group	Associated Electric Cooperative Inc. (AECI)	2010
Farmers City	Atchison County	146.0	73	Gamesa	Iberdrola Renewables		2009
Conception Wind Project	Nodaway County	50.4	24	Suzlon	Wind Capital Group	Associated Electric Cooperative	2008
Cow Branch Wind Energy Center	Atchison County	50.4	24	Suzlon	Wind Capital Group	Associated Electric Cooperative	2008
Loess Hills Wind Energy Center	Rock Port	5.0	4	Suzlon	Wind Capital Group	Missouri Joint Municipal Electric Utility Commission	2008
Bluegrass Ridge Wind Energy Project	Gentry county	56.7	27	Suzlon	Wind Capital Group	Associated Electric Cooperative	2007

4 Missouri's extensive transportation system is a dependable delivery system for goods and services.

Airports

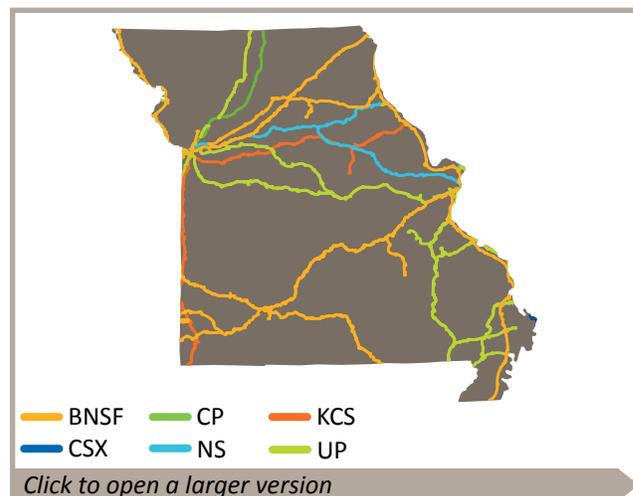
- Missouri travelers can reach most cities in the United States and Canada in less than three hours by air.
- The airport system in Missouri consists of 130 public airports, with two providing international service: Lambert-St. Louis International and Kansas City International.
- Springfield, Branson, Joplin, Columbia, Cape Girardeau, Kirksville and Waynesville (Fort Leonard Wood) also have commercial service.

Foreign trade zones

- Missouri has foreign trade zones in Kansas City, St. Louis, and Springfield.
- The FTZ at Lambert-St. Louis International Airport was recently expanded to include all of St. Louis City and St. Louis County under the Alternative Site Framework.
- The KCI Intermodal BusinessCentre includes 8,000 acres of multi-use land for development on the airfield designated FTZ and enhanced enterprise zone.

Rail

- Missouri provides efficient, low-cost shipping across the country via all Class I carriers: Burlington Northern Santa Fe (BNSF), Kansas City Southern (KCS), Norfolk Southern (NS), Union Pacific (UP), CSX, Canadian National Railway (CN), and Canadian Pacific (CP). It is one of the few states that can provide access to both east and west coasts.
- Missouri is ranked in the top ten for U.S. railroad mileage with 4,019 miles (*Association of American Railroads, 2010*).
- Missouri is ranked fourth in tons and third in rail carloads carried by state (*Association of American Railroads*).
- The 1,340 acre CenterPoint KCS Intermodal center includes a thousand acre industrial park located directly adjacent to the new Kansas City Southern Intermodal Facility. With infrastructure in place, these sites are shovel-ready for facilities up to one million square feet. KCS will offer direct rail service to CIC-KC from the natural deepwater port of Lazaro Cardenas, Mexico.



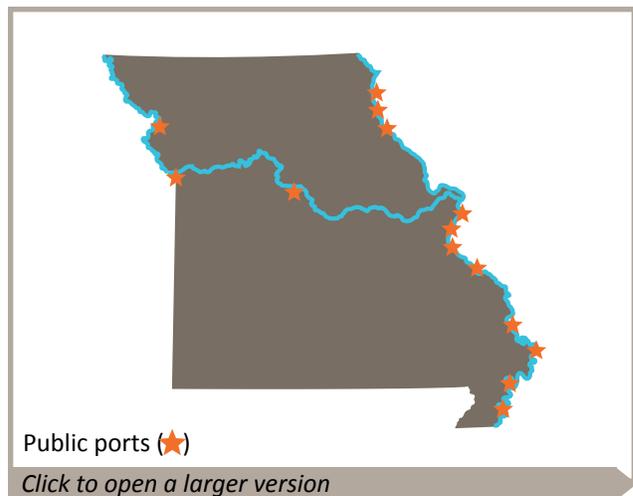
Roads

- Missouri has the sixth largest public road and highway system in the nation with 33,667 miles (*Federal Highway Administration, 2009*).
- Major interstates include I-64, I-44, I-70, I-55, I-35, I-29, and the newly designated I-49, which connects Kansas City to Joplin.
- I-70, which bisects Missouri, is over 2,000 miles long and passes through 10 states.
- Interstates 29 and 35 are located within the NAFTA corridor, providing easy access to Canada and Mexico.
- Missouri ranked in the top 10 states for Federal highway funding in 2011, with \$1.11 billion (*State Rankings, Federal Highway Administration, 2010*).
- There are more than 110,000 commercial trailers registered in Missouri (*Bureau of Transportation Statistics, 2011*).

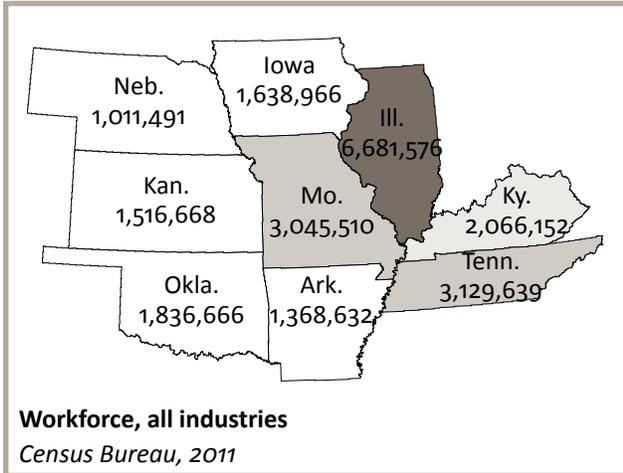


Waterways

- Missouri is ranked tenth for inland waterway mileage (1,000 miles), moving an average of \$4.1 billion in cargo annually.
- Twenty-nine industrial centers, with a combined population of 90 million, can be reached from St. Louis by barge. St. Louis is the northern-most point on the Mississippi river that normally remains ice-free and open throughout the year. The city is also the location of the southernmost lock and dam on the Mississippi (*Missouri Port Authorities*).
- Missouri has 14 strategically located public port authorities (*Missouri Port Authorities*).
- Nearly 4,500 acres are available for development adjacent to Missouri's port authorities.



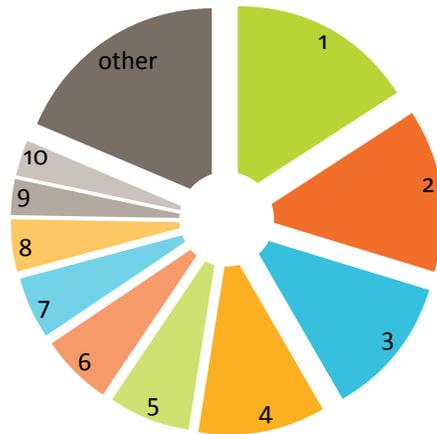
5 Missouri has a large, highly educated, and low-cost labor force.



Missouri's workforce for wind energy

- Missouri's labor force exceeds the entire populations of 20 states, including neighboring Kansas, Arkansas, and Nebraska.
- Missouri ranked 7th for growth in wind industry jobs from 2003–2010 according to a report from the Brookings Institution.
- Manufacturing contributes over \$31 billion (12.4 percent) toward Missouri's gross state product of nearly \$250 billion (BEA, 2011).
- Missouri is home to 6,697 manufacturing firms, employing 248,300 people (BLS 2012).
- Manufacturing makes up 9.3 percent of all employment in Missouri (BLS, 2012).

1. Food Products: 38,774
2. Transportation Equipment: 34,648
3. Fabricated Metals: 28,816
4. Machinery: 26,397
5. Chemicals: 17,382
6. Plastics/Rubber: 14,690
7. Printing: 12,835
8. Electrical Equipment: 11,204
9. Miscellaneous: 8,060
10. Nonmetallic mineral manufacturing: 7,666



Missouri's top 10 manufacturing employment sectors
 BLS, Quarterly Census of Employment and Wages, 2011

Manufacturing employment and wages

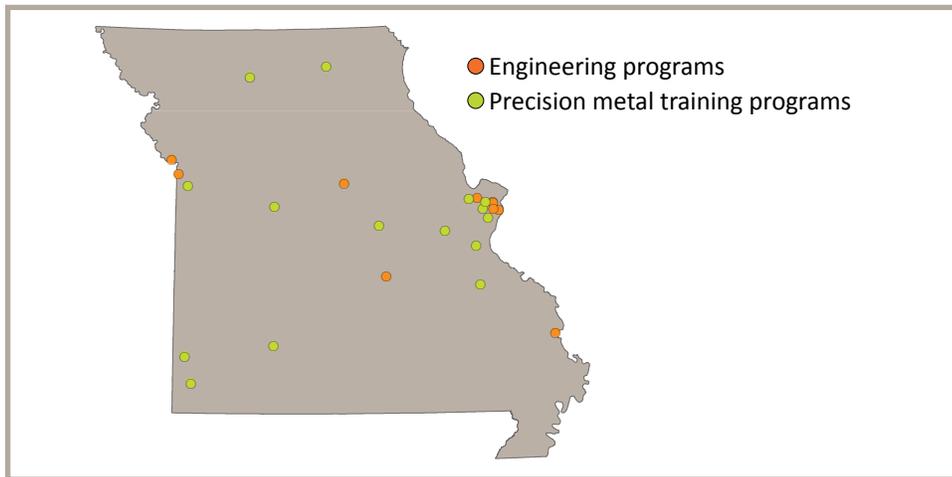
Occupation code	Occupation title	Missouri Employment	MO Median hourly wage	U.S. Median hourly wage
00-0000	All Occupations	2,605,910	\$15.21	\$16.71
11-9199	Managers, All Other	6,290	\$41.36	\$48.51
17-2071	Electrical Engineers	3,280	\$41.79	\$42.27
17-2141	Mechanical Engineers	3,530	\$36.61	\$38.74
17-2199	Engineers, All Other	1,440	\$42.49	\$44.24
49-2092	Electric Motor, Power Tool, and Related Repairers	500	\$17.76	\$17.42
49-9099	Installation, Maintenance, and Repair Workers, All Other	2,250	\$15.82	\$17.60
51-0000	Production Occupations	188,170	\$14.31	\$14.87
51-1011	First-Line Supervisors of Production and Operating Workers	11,650	\$23.33	\$25.98
51-2041	Structural Metal Fabricators and Fitters	1,910	\$16.87	\$17.19
51-2092	Team Assemblers	27,600	\$13.22	\$13.29
51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	5,140	\$13.90	\$14.27
51-4034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	910	\$14.50	\$17.57
51-4041	Machinists	5,870	\$18.10	\$18.99
51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	1,740	\$14.72	\$16.33
51-4111	Tool and Die Makers	1,550	\$25.18	\$22.60
51-4121	Welders, Cutters, Solderers, and Brazers	7,870	\$16.39	\$17.45
51-4193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic	600	\$13.50	\$14.29

Bureau of Labor Statistics, May 2012

Educational assets for wind power

- Missouri has 138 post-secondary, degree granting institutions.
- Nearly 4,000 degrees in engineering related fields are awarded each year in the state.

Colleges and universities with engineering programs



Precision production degree programs (Associate's):

- Crowder College (Neosho)
- East Central College (Union)
- Jefferson College (Hillsboro)
- Linn State Technical College (Linn)
- Metropolitan Community College (Kansas City)
- Mineral Area College (Park Hills)
- Missouri Southern State University (Joplin)
- Moberly Area Community College (Moberly)
- North Central Missouri College (Trenton)
- Ozarks Technical Community College (Springfield)
- Ranken Technical College (St. Louis)
- St. Charles Community College (St. Charles)
- St. Louis Community College (St. Louis)
- State Fair Community College (Sedalia)
- Vatterott College (St. Louis)

Engineering degree programs (Bachelor's or higher):

- Missouri Tech (St. Charles): BS
- Missouri University of Science and Technology (Rolla): BS, MS, PhD
- Park University (Parkville): BS
- Southeast Missouri State University (Cape Girardeau): BS

- Saint Louis University: BS, MS, PhD
- University of Missouri (Columbia): BS, MS, PhD
- University of Missouri-Kansas City: BS, MS, PhD
- University of Missouri-St. Louis (joint program with Washington University in St. Louis): BS
- Vatterott College (St. Louis): BS
- Washington University in St. Louis: BS, MS, PhD

Specialized programs in alternative energy

Crowder College (Neosho) is home to the Missouri Alternative and Renewable Energy Technology (MARET) Center. The mission of the MARET Center is to expand renewable energy throughout the state with education, applied research, and economic development. The center is a net positive energy structure, producing more energy than it uses. Under ideal conditions, the building generates about six kilowatts per-hour of electricity from the 290 solar panels arrayed on its roof, and about 65 kilowatts per-hour from the large wind turbine located in front of the building. Crowder College also offers an Associate of Arts degree in Alternative Energy and a Wind Energy Technician Certificate. ([more](#))

Electrical Connection (St. Louis) is the Midwest's largest resource for training electricians and communication technicians—teaching more than 1,200 IBEW apprentices and journeymen each year. Electrical Connection contractors fund a nationally-recognized, award-winning training program at the St. Louis Electrical Industry Training Center. The center offers certified courses including programs on installation of wind turbines. ([more](#))

The International Center for Advanced Renewable Energy and Sustainability (I-CARES) at Washington University in St. Louis was created in 2007 to encourage and coordinate collaborative research on energy, environment, and sustainability that cannot be done by single disciplines alone. I-CARES fosters research on biofuels from plant and microbial systems, sustainable alternative energy, and environmental systems and practices. Washington University also has the country's only department of Energy, Environmental and Chemical Engineering. ([more](#))

Mineral Area College (Park Hills) offers both a Renewable Energy Technology certificate and an Associate of Applied Science degree. ([more](#))

Missouri University of Science and Technology's Energy Research and Development Center (Rolla) has developed a renewable energy demonstration project using a grid inter-tie hybrid wind/photovoltaic (PV) system that includes a 10 kW wind turbine and six solar panels. ([more](#))

North Central Missouri College (Trenton) and Crowder College recently signed an innovative Memorandum of Understanding to provide northwest Missouri with access to alternative energy fields training through the MARET Center, including wind turbine technician training. ([more](#))

Southeast Missouri State University (Cape Girardeau) offers a Bachelor of Science degree in Technology Management with a Sustainable Energy Systems Management specialization. The program curriculum focuses on energy efficiency and conservation, energy sustainability, renewable energy, and carbon footprint management of industrial, commercial, light-commercial, and residential systems. ([more](#))

University of Missouri (Columbia) launched the Center for Sustainable Energy to support and coordinate research, education and commercialization of renewable energy sources.

Vatterott College ([more](#)) and Pinnacle Career Institute (Kansas City) ([more](#)) offer wind turbine technician training programs.

The Missouri Partnership is a public-private, non-profit focused on recruiting new business to the state. To find out how Missouri Partnership can assist at any stage of your project, contact us by:

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