

# Safety around power lines

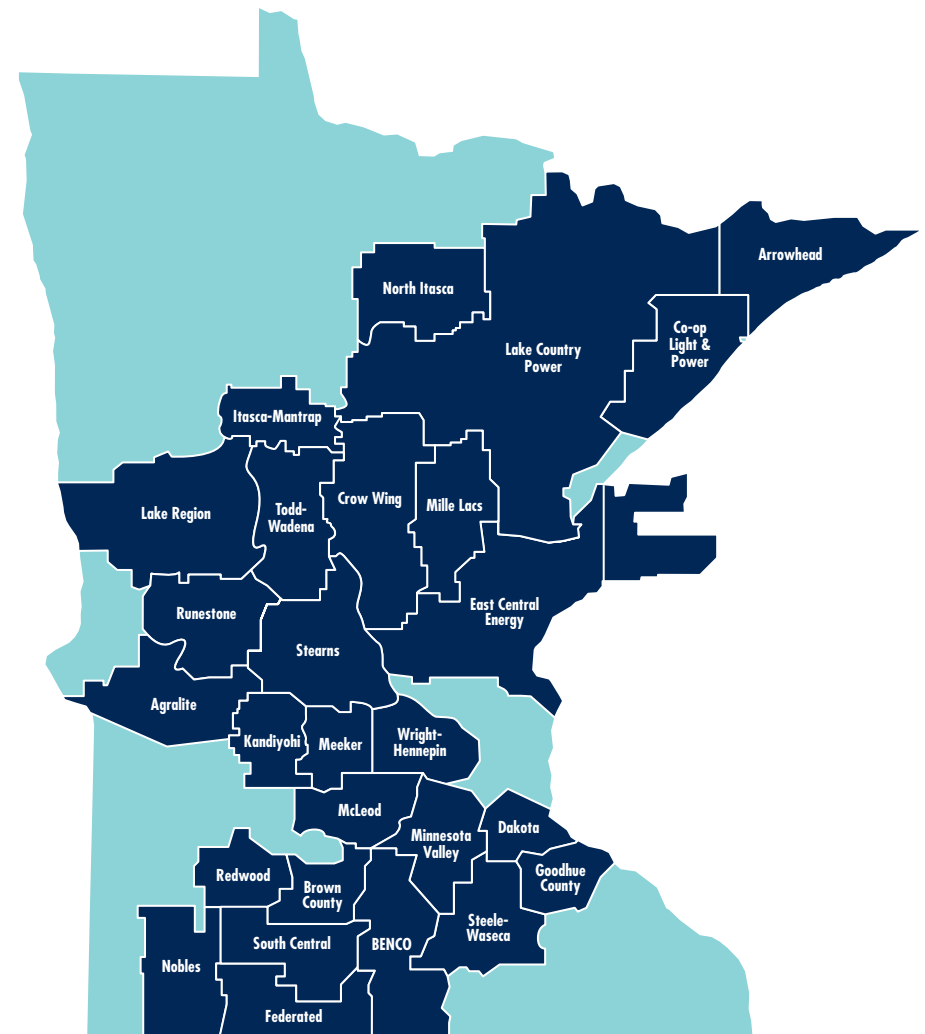
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Frequently asked questions about power lines on or near your property



**GREAT  
RIVER  
ENERGY®**

Great River Energy is a not-for-profit wholesale electric power cooperative which provides electricity to the 27 distribution cooperatives shown below.



*Our system provides power to approximately 2/3 of Minnesota geographically and parts of Wisconsin, serving 1.7 million people.*



*Learn and follow the safety precautions discussed in this booklet to safely live, work and play near power lines.*

Great River Energy's transmission lines meet or exceed safety standards, such as those specified by the National Electrical Safety Code (NESC) and the North American Electric Reliability Corporation (NERC).

However, power lines and other electrical installations still must be treated with caution, respect and common sense. By following safety precautions, you can safely live, work and play near power lines. Please save this guide for future reference.

Inside you will find a number of safety precautions and answers to frequently asked questions about:

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The following guidelines apply to any power line, including smaller distribution lines that serve electricity to your home or business, and transmission lines such as those Great River Energy owns and operates.

***If you see a broken power line, DO NOT touch it. Stay away from it and call 911.***

## Terms

Throughout this guide, we will refer to transmission lines, arc flash, grounding, induced charge and volts.

**Transmission line** – A transmission line is a set of wires, called conductors, that carry large or “bulk” amounts of electricity. When you think of the power line system that delivers electricity to you, think of the large transmission lines as interstate freeways, and the distribution lines that carry electricity to homes, farms and businesses as the smaller state or county highways.

**Arc flash** – An arc flash is a short circuit through air that flashes over from an energized conductor to another conductor, producing intense heat and light.



*Transmission lines, such as those Great River Energy builds, deliver large or “bulk” amounts of electricity. Pictured is a common structure for 69-kV and 115-kV transmission lines.*

Power lines and people can be conductors of electricity, meaning electricity can flow through them. If a person gets too close to a power line that is energized – even without actually touching the power line – an arc of electricity can form in the air connecting the two and cause very serious burns. Arcs heat the air around them to up to four times the surface temperature of the sun. Serious burns are not uncommon even 10 feet from an electric arc.

**Grounding** – A conducting path between an electrical circuit or equipment and the earth is known as a ground. Because electricity typically follows the path of least resistance to the ground, an easy path from the circuit to the ground must be in place to help prevent the risk of electrical shock, fires and damage to appliances and motors.

**Induced charge** – An induced charge is a charge that forms on an area of a neutral object when a charged object is placed near it. For instance, because electric fences are specially insulated from the ground, they can sometimes pick up an electrical charge if they are near a power line.

**Volts** – The force of an electrical current is measured in volts. The voltage at which a transmission line operates is expressed in kilovolts (kV). One kilovolt equals 1,000 volts.

## Machinery and vehicles

One of the most important rules to follow when working around power lines with tall equipment is simple ... LOOK UP. Know where the power lines are and stay away from them.

### Q. How can farm equipment and other machinery be safely operated near power lines?

**A.** If you are considering operating a vehicle within a height greater than 14 feet, please contact your local electric utility or Great River Energy. Be sure to call first even if it appears the line is more than 14 feet above the ground.



*Look up! Equipment that can be extended, such as a grain elevator or stack mower, requires the utmost care when near a power line.*

And always remember...

- Physical contact with a power line is extremely hazardous and may cause a lethal shock. Equipment **SHOULD NOT** be operated under a power line in a manner that would cause contact or near-contact with the wires.
- DO NOT lift, elevate, build or pass under a power line any object, tool or vehicle that may make contact or near-contact with the wires.
- To help prevent an arc flash from occurring, it is recommended that equipment, antennas and people stay at least 25 feet away from any energized power line wire. If you are unsure you can stay away, contact your local utility.
- Equipment that can be extended, such as a stack mower or grain elevator, requires the utmost care when in the vicinity of a power line.

### Q. Can I put fuel in my machinery safely near a power line?

**A.** Fueling vehicles under transmission lines is not recommended. If you must fuel a vehicle under a transmission line, both the fuel container and the vehicle should be grounded in order to eliminate any source of sparks.

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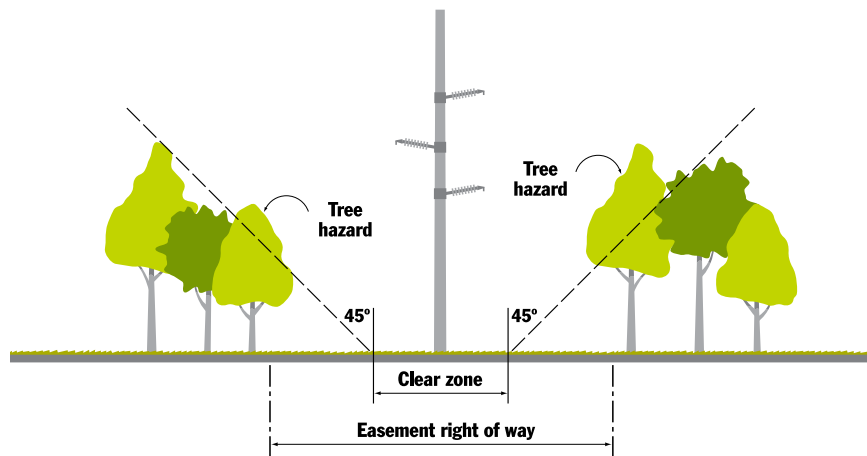
## Building or planting

The North American Electric Reliability Corporation (NERC) requires electric utilities to meet hundreds of requirements which are designed to keep our electrical system safe and reliable. Among the requirements are standards for maintaining proper clearances. In other words, it is our responsibility to keep a certain amount of distance around power lines clear of anything that may make contact or near-contact with a power line. This includes buildings and tall-growing trees.

*You must call Great River Energy before planting any trees or building any structures in transmission line right-of-way areas. We are required to maintain a proper clearance, and we do not want to have to remove your new addition.*

### Q. How much of a clearance do you need for safe operation?

**A.** The larger the power line, the larger the clearance required. Transmission lines operate at high enough voltages that actual contact with an object may not be necessary to cause an outage. Additionally, summer temperatures and higher electric use cause lines to sag, sometimes as much as 5 to 10 feet. We need to maintain 15- to 20-foot clearances between transmission lines and trees or other objects, and sometimes more.



*For safety, reliability and compliance, utilities maintain proper clearances along transmission rights of way.*

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### Q. Can I plant anything in the right-of-way area?

**A.** DO NOT plant any trees in the right-of-way area before talking to Great River Energy. Great River Energy is obligated to maintain proper clearances within the right of way and we do not want to have to remove your new tree.

Activities in the right of way that do not interfere with the safe construction, operation and maintenance of the line are permitted. For example, you can use the land for:

- Pastureland
- Farming
- Gardening

### Q. Can buildings be built beneath a power line?

**A.** Generally, buildings are not permitted within the right of way because:

- The building may interfere with access to the line for maintenance and emergency repairs.
- A fire in a building within the right of way could damage the transmission line.
- A building may be closer to a line than electrical codes allow.

### Q. Are there any hazards to existing metal buildings after a power line is constructed?

**A.** Again, Great River Energy designs transmission lines to meet or exceed safety codes and standards, including those specified in the NESC and required by NERC. If you plan to construct, or have constructed, a metal building near a transmission line, contact Great River Energy. If you have concerns as to whether or not a building is properly grounded or need information on proper grounding requirements, contact your local electric utility or Great River Energy.

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## Fences

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Fence wires that are mounted on wood posts can build up an electrical charge near power lines. Important factors are:

- Length of fence paralleling the line
- Distance between the line and the fence
- Amount of moisture in the fence posts and the ground
- Presence of grounding devices such as metal fence posts or weeds growing next to the fence

### Q. What do I need to know about non-electric fences?

**A.** Non-electric fences made of barbed wire or similar material that is directly attached to steel posts are adequately grounded and will not collect an electric charge. If you are planning to install a wire fence parallel to and near a power line, use at least one steel post every 150 to 200 feet to ground the fence.

### Q. Can electric fences build up an electrical charge?

**A.** Electric fences, being specially insulated from the ground, can pick up a charge from transmission lines. Usually, the charge will drain off when



*Electric fences are specially insulated from the ground and can pick up an induced charge from transmission lines.*

the charger unit is connected to the fence; however, when the charger is disconnected either for maintenance or when the fence is being built, a small shock may be produced. Contact your local electric utility for assistance. Typically such a shock can be prevented by:

- Shorting out one or more of the fence insulators to the ground with a wire when the charger is disconnected, or
- Installing an electric filter which will ground charges induced from a power line while still allowing the charger to be effective.

*Again, contact Great River Energy or your local electric utility for assistance if you have any questions. Every situation is unique.*

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## Irrigation and Watering

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The potential for water and metal to conduct electricity makes it necessary to take safety precautions when irrigating near power lines. Additionally, fertilizers and pesticides tend to increase the conductivity of water, making extra precautions necessary. Watering the lawn at your home or business is not problematic but you still must prevent a direct, solid stream of water from contacting a transmission line.

### Q. Can I irrigate near transmission lines?

**A.** Yes, as long as you take these precautions:

- **Prevent a solid stream of water from hitting the wires.** Equipment with nozzles that are small in diameter or spray a fine mist are typically not problematic because the solid part of the water stream will not reach the power line wires. Also, an intermittent spray of water will not conduct significant amounts of electricity. Even large diameter nozzles operating at their normal spray angle typically will not reach the wires with a solid stream.
  - However, at no time should the solid part of a water stream touch power line wires. Should that happen, turn the water off by switching the pump off before trying to correct the problem. Large nozzles should be at least 150 feet from the outside wires of power lines.



- **Make sure the irrigation system is well grounded.** If you have questions as to whether or not your irrigation system is adequately grounded, contact an electrician.
- **Do not let irrigation pipes touch power lines.** Each system should be reviewed on a case-by-case basis. Questions about the installation and operation of an irrigation system adjacent to or under a power line should be directed to your electric utility or Great River Energy.
- **Do not install long lengths of pipe parallel and adjacent to transmission lines.** They should be laid out at right angles to power lines, if possible, to reduce risk of the pipes building up an induced charge.
- **Be careful when moving the pipes.** When unloading irrigation pipes, stay at least 50 feet from power lines to avoid any chance of raising them too close to the wires.



*Never allow a solid stream of water to hit a transmission line wire.*

## Recreation

When the weather is nice, we want to get outside and play. You can enjoy many recreational activities near power lines, but some activities require caution. Flying kites, building fires or hunting are all activities that require you to be aware of your proximity to power lines. Additionally, never climb towers, fences or any other structure near a power line or an electrical substation. During storms, stay away from all tall objects.



*DO NOT fly kites or model planes near any power line.*

### Q. Can I play with a kite, model planes or drones near a power line?

A. No. Here are some rules to follow:

- Do not fly kites, model planes or drones near any power line.
- Flying near power lines may cause interference with a drone's navigation system and could cause it to crash.
- Always fly kites and planes so the wind carries them away from power lines and away from television or radio antennas.
- Call Great River Energy or your electric utility if a kite, model plane or drone becomes snagged in a power line. DO NOT pull the string or climb a tower or pole to get it down.
- If a model plane is caught in the line, let go of the control line immediately and call Great River Energy or your electric utility for assistance. DO NOT attempt to retrieve it yourself.

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### Q. Can I hunt in areas where there is a power line?

**A.** Power lines cross many remote areas so be sure to look for them before aiming or firing a gun. Additionally, shooting at power lines is illegal. Shooting insulators or conductors can break a wire or cause hazards such as an electrical discharge or arc through the air.

**If you see a broken power line, DO NOT touch it. Stay away from it and call 911.**

### Q. Can I build a bonfire, burn leaves or build another type of fire under a power line?

**A.** No. Fires should not be started under a power line. Smoke and hot gases from fires can create a conductive path for electricity.

- A fire could damage the poles or wires and result in an outage.
- It is possible that the power line could flash to the ground through hot air and smoke, which is a serious safety hazard.



*During storms, stay away from ALL tall objects. Lightning tends to strike the highest point in an area and travel through it to reach the ground.*

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## Safe construction and maintenance practices



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Great River Energy's transmission lines are built and maintained to meet or exceed standards, such as those specified by the National Electrical Safety Code (NESC) and the North American Electric Reliability Corporation (NERC). Ensuring safety and reliability is our highest priority.

### Q. How do I know the lines are safe?

**A.** Our lines are built and maintained to the standards mentioned above. Every effort is made to ensure safety in construction, operation and maintenance of transmission lines. Lines and line infrastructure are designed to withstand extreme weather conditions. Protective devices such as at line terminals stop the electricity flow under abnormal operating circumstances.

### Q. How do you monitor the safety of the line?

**A.** Great River Energy follows strict transmission line maintenance standards. We inspect lines once per year by air or ground to look for:

- Tall-growing trees within the right-of-way area
- Equipment needing repair or replacement
- Right-of-way encroachments which are hazardous to safety and reliable operation
- Anything that might jeopardize safe, reliable operation of the line

We may need to visit the right-of-way area for these inspections. Visits will be minimal, and an attempt will be made to contact the landowner before entering the property for inspections. However, in cases of emergency, we may be unable to contact you first.



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## Electric and magnetic fields (EMF)

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Great River Energy follows third-party EMF research efforts closely. We recognize that those who live or work near power lines may have questions about EMF, and we have employees who work near power lines and substations every day.

### Q. What is EMF?

**A.** Electric and magnetic fields (EMF) are created by anything that conducts electricity, including transmission lines, household appliances and business equipment.

These fields are strongest closest to their source. The farther away you are from the source the less EMF. EMF exposure from transmission lines, which are high in the air, is minimal. Decades of scientific and medical research, reviewed by science organizations and government agencies, have found no cause/effect evidence of adverse health outcomes from EMF.

More detailed information on EMF is available online from:

- World Health Organization at [www.who.int](http://www.who.int)
- Minnesota Department of Health at [www.health.state.mn.us](http://www.health.state.mn.us)
- National Institute of Environmental Health Sciences – National Institute of Health at [www.niehs.nih.gov](http://www.niehs.nih.gov)



*If your vehicle touches a downed power line, stay where you are until help arrives unless there is a secondary emergency, such as a fire.*

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## Stay away from downed lines

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It's important to know how to stay safe if you encounter a downed power line.

### Q. What should you do if you are inside a vehicle and a power line has fallen on it?

**A.** If you can safely drive out from under the power line or away from the source of electricity, do so. Travel at least the length of three cars before stopping. If you can't drive the vehicle, stay where you are until help arrives.

### Q. What if your vehicle hits a power line and you must leave the vehicle?

**A.** If you absolutely must get out of the vehicle because there is a secondary emergency, like a fire, don't touch the vehicle and the ground at the same time with any part of your body or clothing. Open the door and jump away from the vehicle landing with your feet together and touching. Hop away with your feet touching each other. Don't stop until you are at least three car lengths away. Then, call 911.

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**Q. What if you are outside of a vehicle that has crashed into a power line?**

**A.** Stay at least three car lengths (40 feet) away. Tell anyone in the vehicle to stay where they are. Call 911 and ensure no other bystanders go within 40 feet of the vehicle.

## **Encroachment requirements**

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To ensure public safety by maintaining a safe distance between the public and energized lines, Great River Energy has encroachment requirements. These requirements reduce maintenance and clearance issues caused by an improvement that encroaches into Great River Energy's right of way. Encroachments typically consist of things like parking areas, grade changes, signs, driveways, fences, light poles, decks and equipment storage.

All improvements within the easement have to be submitted through Great River Energy's online application process for review. There are fees associated with the review and the online application can be found at [bit.ly/3i4jJ3T](https://bit.ly/3i4jJ3T)

## How to contact us

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To report a broken or damaged piece of transmission equipment or line, or any other unusual condition, please call 911.



**[greatriverenergy.com](http://greatriverenergy.com)**