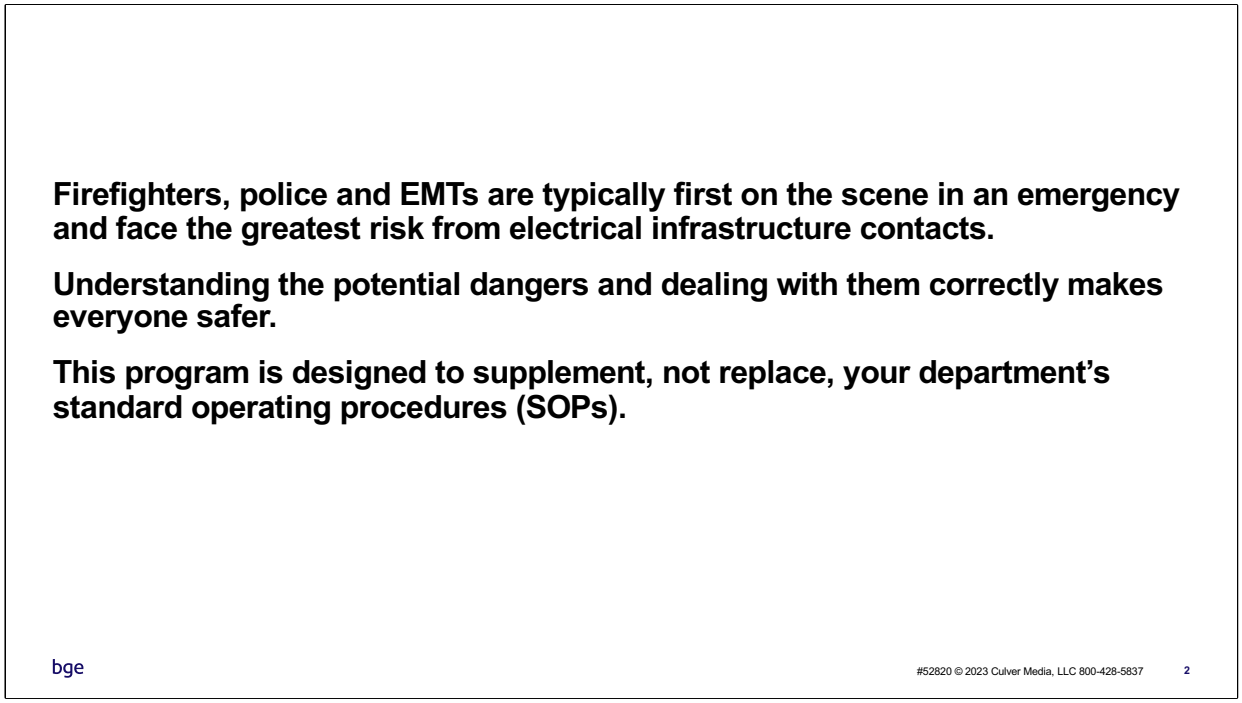
Before darkening the room, offer a welcome and overview. Begin by introducing the program and its topic:

Welcome to the *First Responder Beware®* session, *Staying safe while protecting others: Electrical safety for first responders*. Today's session will share strategies for working safely around electric power lines and for handling certain emergencies involving electricity. By following the procedures we'll cover here today, you can keep yourself, your fellow first responders and the public safe. Now I know that some of you will have heard this information before, and so for you, this program will be a refresher. For others, this may be the first time you're hearing about this topic, but I hope everyone will find the program valuable.

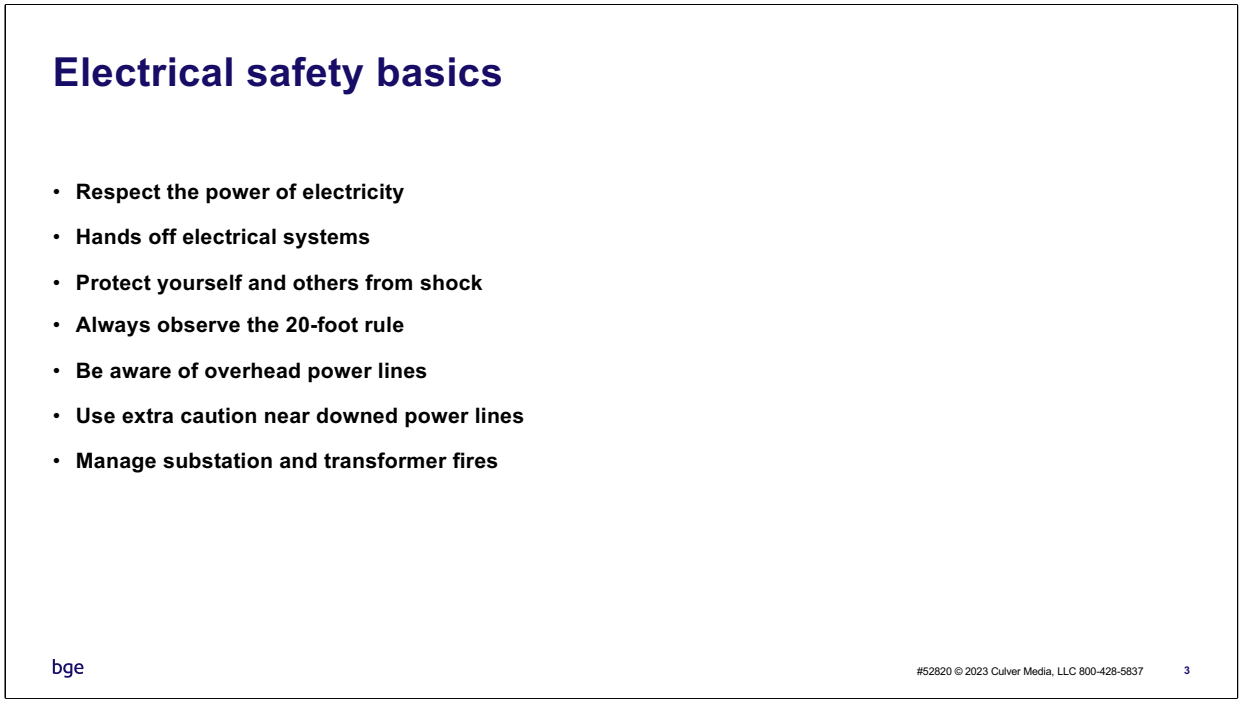
Darken the room and begin the presentation.



Firefighters, police and EMTs are typically first on the scene in an emergency and face the greatest risk from electrical infrastructure contacts. Understanding the potential dangers and dealing with them correctly makes everyone safer. This program is designed to supplement, not replace, your department's standard operating procedures (SOPs).

This is a good time to reiterate the importance of this information. It can protect first responders, incident victims and bystanders from electricity-related injury or death.

Please note: *Each local department will have its own standard operating procedures about electrical safety. Emphasize to participants that this program is not designed to replace these procedures, only to supplement them.*



Electrical safety basics. This presentation will cover key practices you need to know to keep yourself safe around electric power lines and on the scene of emergencies involving electricity. Here are the topics we will focus on today:

- Respect the power of electricity
- Hands off electrical systems
- Protect yourself and others from shock
- Always observe the 20-foot rule
- Be aware of overhead power lines
- Use extra caution near downed power lines
- Manage substation and transformer fires

Respect the power of electricity

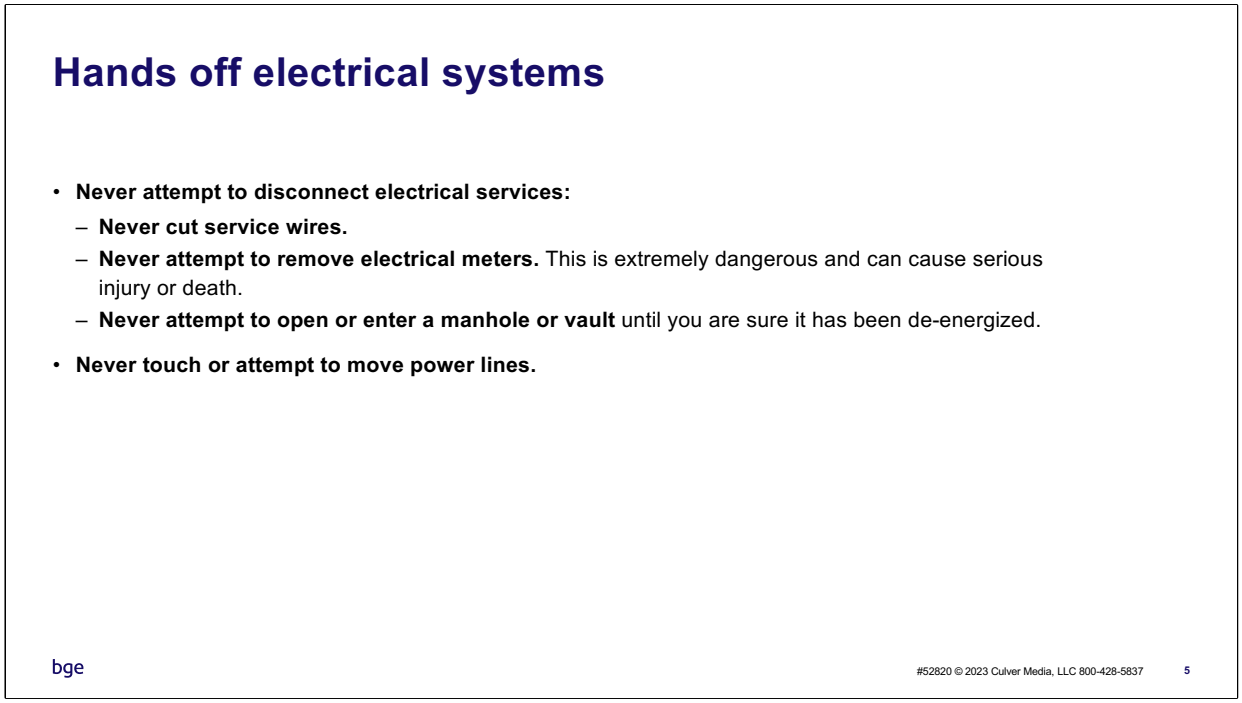
- **Electricity always seeks the easiest, most direct path to the ground through conductors:**
  - Your body
  - Trees
  - Water
  - Metal objects and structures
  - Long or tall equipment
- **Even low-voltage electric shock can be fatal.**
- **Standard-issue protective gear DOES NOT insulate you against electric shock.**
- **Electric shock and burn injuries may include internal tissue damage that is not immediately apparent.** Make sure victims receive thorough medical attention.

bge

 4

Respect the power of electricity. First of all, we need to know a few basic things about electricity.

- Electricity always seeks the easiest, most direct path to the ground through conductors, such as:
  - Your body
  - Trees
  - Water
  - Metal objects and structures, including fences and even gutters
  - And long or tall equipment, such as ladders
- Even low-voltage electric shock can be fatal. Protecting yourself means always remembering that there are no minor risks when dealing with electricity.
- Standard-issue protective gear does not insulate you against electric shock.
- Electric shock and burn injuries may include internal tissue damage that is not immediately apparent. Make sure victims receive thorough medical attention. Shock victims often show no visible injuries or only minor burns on the skin, but the internal organs can be critically wounded. Treat these injuries as serious regardless of their appearance.

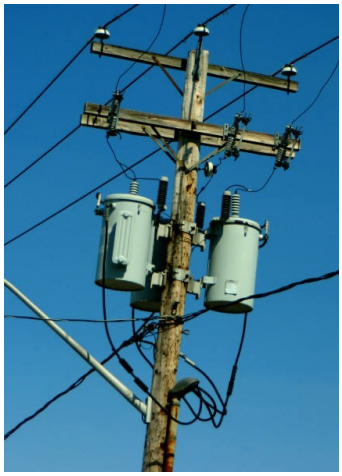


Hands off electrical systems. Remember that even low-voltage electric shock is potentially fatal. To avoid this risk, keep away from electrical equipment and systems.

- Never attempt to disconnect electrical services. This can be an extremely dangerous, even deadly, mistake.
  - Never cut service wires or power lines.
  - Never attempt to remove electrical meters. This is extremely dangerous and can cause serious injury or death.
  - Never attempt to open or enter a manhole or vault until you are sure it has been de-energized.
- Never touch or attempt to move power lines. Remember, your protective gear does not insulate you against electric shock. In dealing with electrical systems, employ a hands-off policy and call BGE at 800.685.0123.

Protect yourself and others from shock

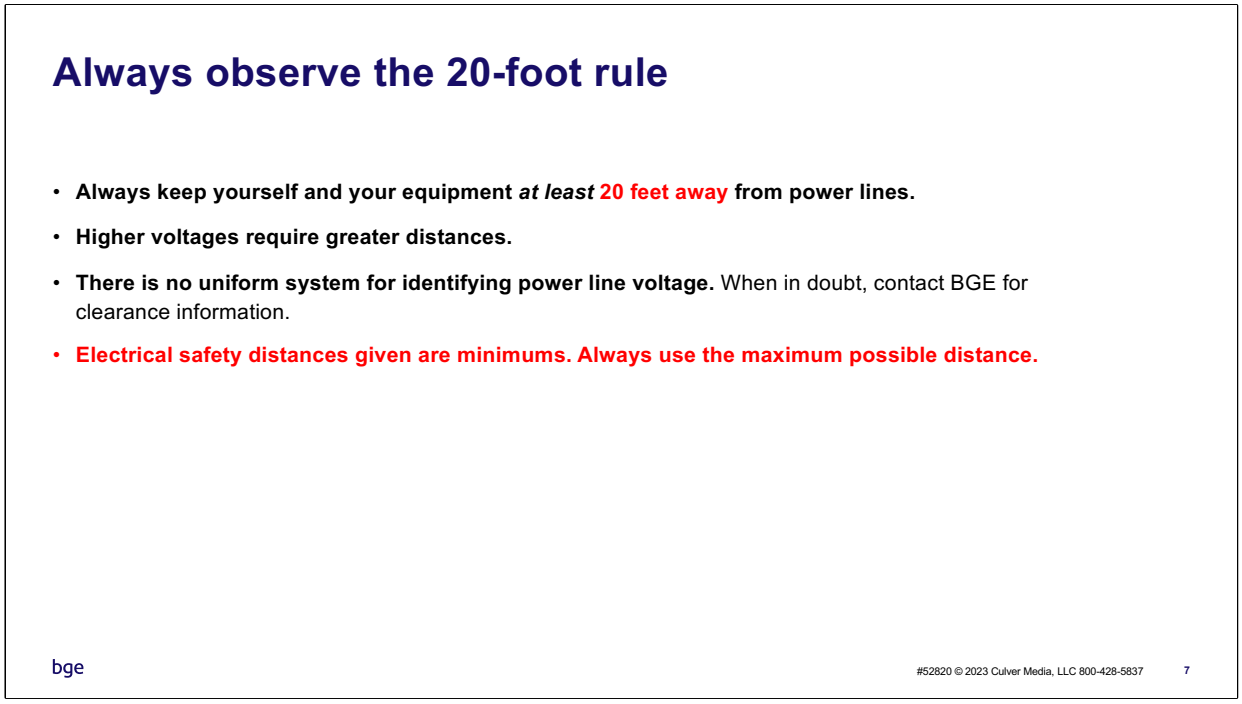
- **Always identify power lines and electrical equipment upon arrival at an incident scene.**
- **Assume all lines are energized as well** as all objects in contact with power lines.
- **If power lines or electrical equipment are involved in an incident,** have your dispatcher contact BGE immediately.
- **Provide the best possible directions** to the location.
- **Secure the area.**



bge

Protect yourself and others from shock. Adhering to some simple best practices can minimize the risk of electric shock.

- Always identify power lines and electrical equipment upon arrival at an incident scene. The first thing to do is to survey the area for overhead power lines, downed lines and equipment such as transformers. Especially during or after a storm, look for downed lines in trees or on fences. Proper electrical-safety procedures should figure into any operational planning.
- Assume all lines are energized as well as all objects in contact with power lines. Even if lines appear to be insulated, the coating you see is not designed to protect you from shock. Additionally, areas around power lines and electrical equipment or objects in contact with them (such as trees, fences or vehicles) should also be treated as energized. This includes the ground. Approach with caution.
- If power lines or electrical equipment are involved in an incident, have your dispatcher contact BGE immediately. Calling is always the right thing to do whether you identify electrical infrastructure or are just unsure. They want you and the public to be safe and will respond quickly. BGE personnel will switch off the power and tell you when the area is safe and de-energized.
- As simple as it sounds, provide the best possible directions to the location. Intersections, landmarks and specific buildings will help.
- Secure the area. When dealing with electricity, your priority is to protect yourself and the public. Utility personnel will tell you when it is safe to approach.



Always observe the 20-foot rule. The minimum safe distance from power lines is 20 feet.

- Always keep yourself and your equipment at least 20 feet away from power lines. Maintain a minimum 20-foot clearance for power lines of 50 kV or less.
- Higher voltages require greater distances.
- There is no uniform system for identifying power line voltage. When in doubt, contact BGE for clearance information. Their line workers get a lot of specialized training that teaches them to recognize the voltages they're dealing with at any given site. Don't make the mistake of thinking you can know the appropriate voltage and clearance by looking at a line.
- Electrical safety distances given are minimums. Always use the maximum possible distance. Your best practice is always to stay as far away as possible from power lines and electrical infrastructure.

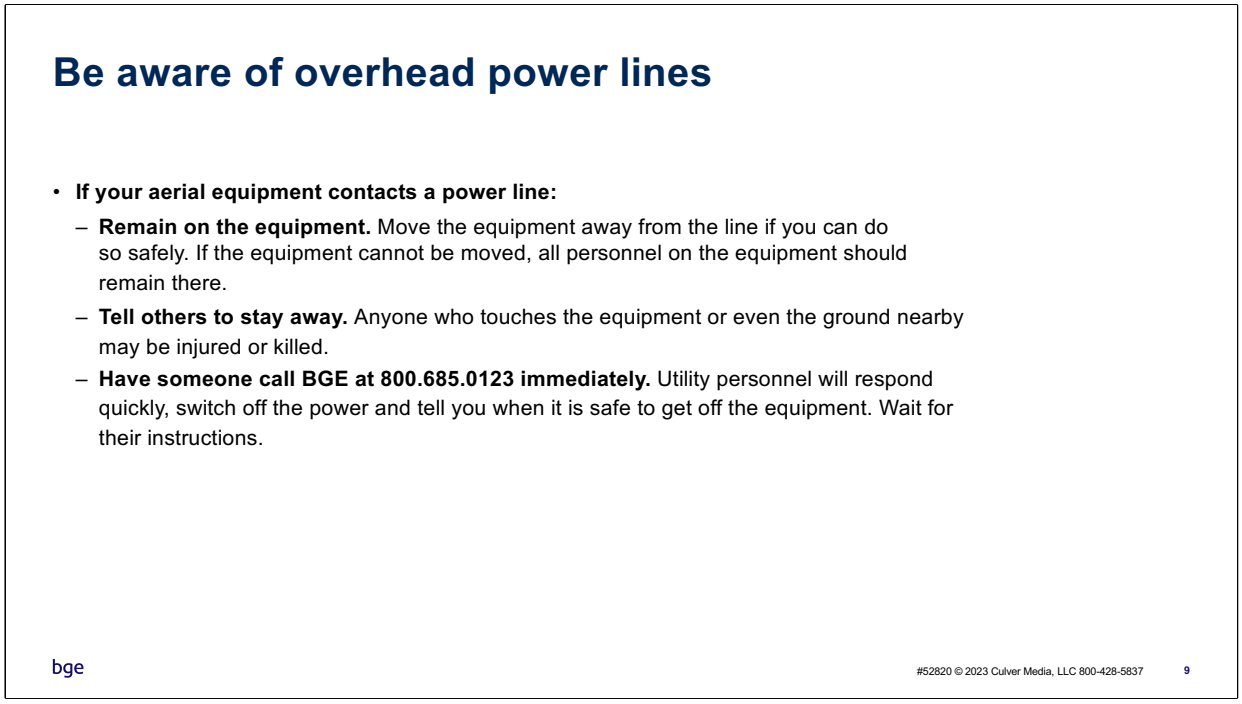
Be aware of overhead power lines

- **Park emergency vehicles as far away as possible** from overhead power lines.
- Keep aerial equipment *at least* **20 feet away** from overhead lines.
- **Use a spotter.** An equipment operator working alone cannot safely judge the distance from the equipment to overhead power lines.
- **Never use a solid water stream** to fight fires near overhead power lines.

bge

Be aware of overhead power lines. When overhead lines are present at an incident scene, remember a few simple safety rules.

- Park emergency vehicles as far away as possible from overhead power lines. You don't want to be surprised by a falling power line.
- Keep all aerial equipment at least 20 feet away from overhead lines. Remember the 20-foot rule and that metal ladders conduct electricity. Be aware that wind can move aerial equipment and power lines. Remember that higher voltages require greater distances, and always use the maximum possible distance. (A good rule of thumb is to maintain a safety clearance that is greater than the length of the equipment when extended.)
- Assign a spotter to monitor your equipment's proximity to power lines. An equipment operator working alone cannot safely judge the distance from the equipment to overhead power lines. Your spotter's ONLY job should be to keep you and your equipment a safe distance from overhead power lines and other hazards.
- Never use a solid water stream to fight fires near overhead power lines. A solid stream can create a clear path for electric current. When overhead lines are in the vicinity of a fire, you can, with extreme care, use a spray or mist. But remember that ALL water is a conductor, and always be extremely cautious when using water around overhead lines.



Remember, anything touching a power line will become energized, including your vehicle or aerial equipment.

- If your aerial equipment contacts a power line, take these steps:
  - Remain on the equipment. Move the equipment away from the line if you can do so safely. If the equipment cannot be moved, all personnel on the equipment should remain there.
  - Tell others to stay away. Anyone who touches the equipment or even the ground nearby may be injured or killed.
  - Have someone call BGE at 800.685.0123 immediately. Utility personnel will respond quickly, switch off the power and tell you when it is safe to get off the equipment. Wait for their instructions.

Be aware of overhead power lines

- **If fire or other imminent danger forces you off energized equipment:**
  - **Do not touch the equipment and the ground at the same time.**
  - **Jump clear.** Land with your feet together and take very short hops, keeping feet close together and making contact with the ground at the same time.
  - **Do not run or take large steps.** When equipment contacts a line, electricity spreads out in the ground like ripples in a pond and the voltage decreases with distance from the point of contact. If your legs bridge two areas of different voltage, you could be killed.

bge

 10

In some cases, other hazards such as fire make it impossible to stay on the energized equipment until utility personnel give the all clear.

- If fire or other imminent danger forces you off the equipment:
  - Do not touch the equipment and the ground at the same time.
  - Jump clear. Land with your feet together and take very short hops, keeping feet together and making contact with the ground at the same time.
  - Do not run or take long steps. When equipment contacts a line, electricity spreads out in the ground like ripples in a pond and the voltage decreases with distance from the point of contact. If your legs bridge two areas of different voltage, you could be killed.

Demonstrate the jump-off procedure.

Use extra caution near downed power lines

- **Park emergency vehicles away from fallen lines.**
- **Secure the area:**
  - **Keep yourself and the public *at least* 35 feet away from fallen power lines.**
  - **Transmission lines from large towers require a distance of 100 feet.**
- **Never touch or attempt to move fallen lines or objects touching them.**
- **Never use a solid water stream to fight fires near downed lines.**

bge

Use extra caution near downed power lines. Dealing with downed lines requires additional measures to protect life and property.

- Park emergency vehicles away from fallen lines. The ground and objects in the vicinity of a fallen power line may be energized.
- Secure the area.
  - Keep yourself and the public at least 35 feet away from fallen power lines. Always remember that objects and even the ground near downed lines may also be energized.
  - Transmission lines from large towers require a minimum distance of 100 feet. In any incident involving downed lines, recall that wind as well as electric charge can cause lines to whip and move. Observing these expanded clearances can help protect everyone from the unexpected.
- Never touch or attempt to move fallen lines or objects touching them. Doing so endangers you and incident victims. Contact BGE immediately so they can de-energize the scene.
- Never use a solid water stream to fight fires near downed lines.

Use extra caution near downed power lines

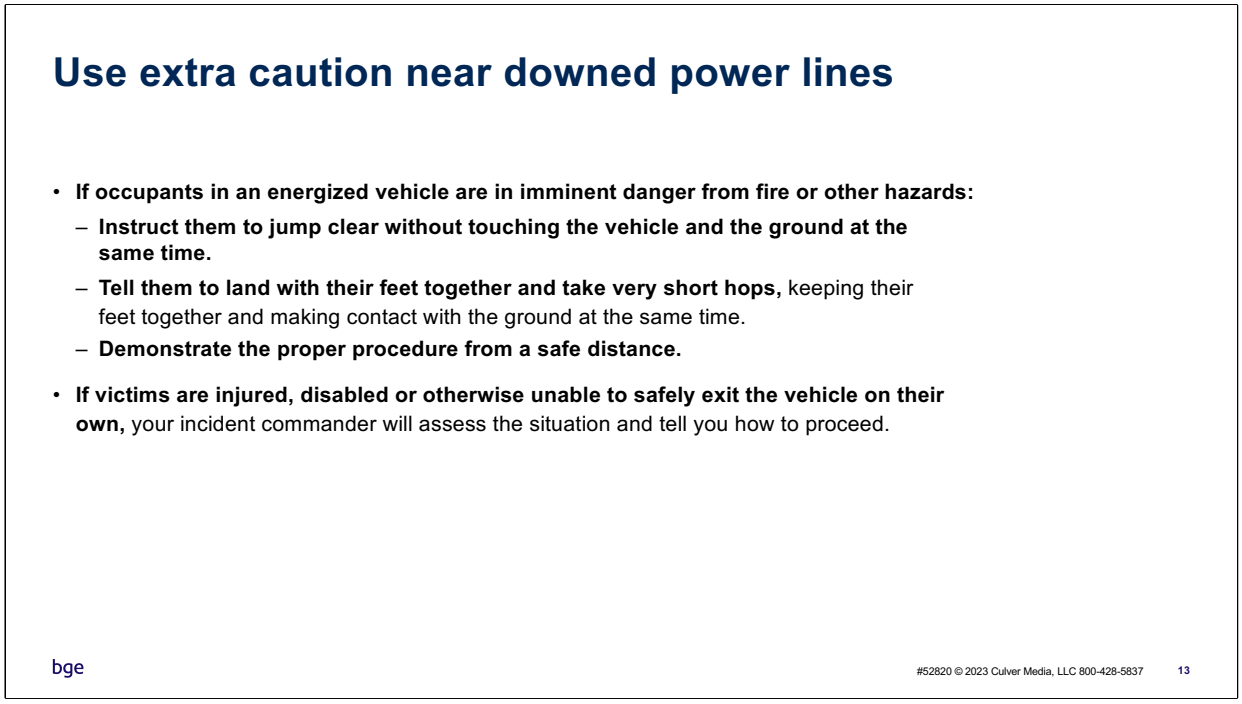
- **DO NOT enter, approach or touch areas or vehicles that may be energized.**
  - **Call BGE immediately.**
  - **Instruct occupant to drive the vehicle away from the line if this can be done safely.**
  - If the vehicle cannot be safely moved, **instruct all occupants to stay put until utility personnel give the all clear.** Staying in the vehicle is their **BEST** protection against electric shock.

bge

 12

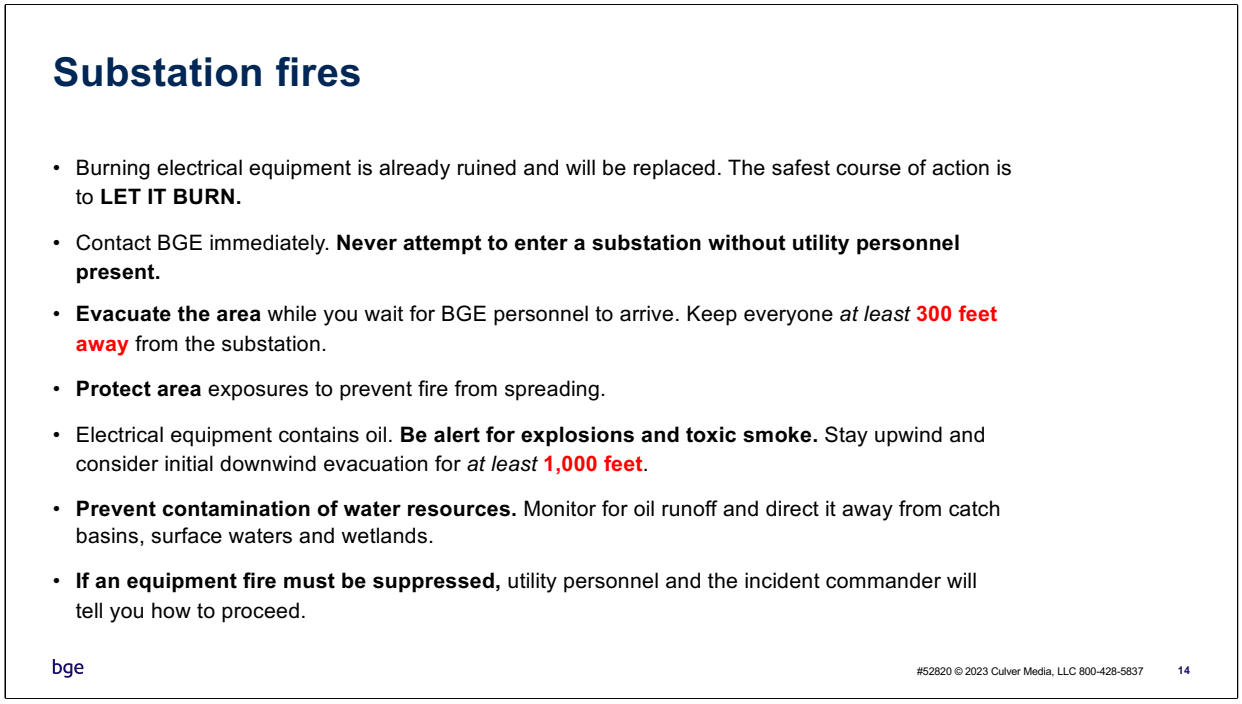
When incident victims are in or around the energized area, particularly in vehicles that have contacted power lines, remember that both you and they are safest staying put.

- Do not enter, approach or touch areas or vehicles that may be energized. Resist the temptation to attempt to extract passengers. You risk both your own and the victims' safety when you enter the energized area. Instead, stay away. You chose this work to save lives, and that instinct is strong. However, in this case, if you enter the energized area, you have a very high risk of electric shock. Becoming a victim yourself puts everyone in greater danger.
  - Call BGE immediately. They will respond quickly and de-energize the scene.
  - Keeping your distance, find a position where passengers can see you without exiting or moving around inside the vehicle and attempt to reassure them.
  - Instruct vehicle occupants to drive the vehicle away from the line if this can be done safely.
  - If the vehicle cannot be moved, instruct the occupants to stay put until utility personnel give the all clear. Staying in the vehicle is their best protection against electric shock. Tell them utility personnel are on the way to turn off the electricity. Tell them to stay where they are and to try to relax. If passengers are injured or panicked, talk with them, keep them calm and alert, and use the wait time to prepare medical assistance.



In some cases, fire or other hazards make it impossible for occupants to remain in the vehicle.

- If occupants in an energized vehicle are in imminent danger from fire or other hazards, you must resist the temptation to approach the vehicle. Touching an energized vehicle is a sure way to become a shock victim yourself! Find a vantage point where the vehicle occupants can see and hear you, but keep your distance. Then follow these procedures to get everyone out alive.
  - Instruct vehicle occupants to jump clear without touching the vehicle and the ground at the same time.
  - Tell them to land with their feet together and take very short hops, keeping their feet together and making contact with the ground at the same time. Emphasize that they must not run or take long steps.
  - Demonstrate the proper procedure from a visible distance before they attempt their escape.
- If victims are injured, disabled or otherwise unable to safely exit the vehicle on their own, your incident commander will tell you how to proceed. Wait for instructions before taking action, or you could become another victim.



Substation fires. Substation fires present specific risks.

- Burning electrical equipment is already ruined and will be replaced. The safest course of action is to let it burn.
- Contact BGE immediately, and wait for their personnel to arrive. Never attempt to enter a substation without utility personnel present.
- Evacuate the area and keep everyone at least 300 feet away from the substation. Your most important responsibility in these types of emergencies is to protect the public.
- Once the area is evacuated, focus on defending nearby property and green space. Protect area exposures to prevent the fire from spreading.
- Electrical equipment contains oil. Be alert for explosions and toxic smoke. Stay upwind and consider initial downwind evacuation for at least 1,000 feet.
- Prevent contamination of water resources. Monitor for oil runoff and direct it away from catch basins, surface waters and wetlands.
- If an equipment fire must be suppressed, utility personnel and the incident commander will tell you how to proceed.

Transformer fires

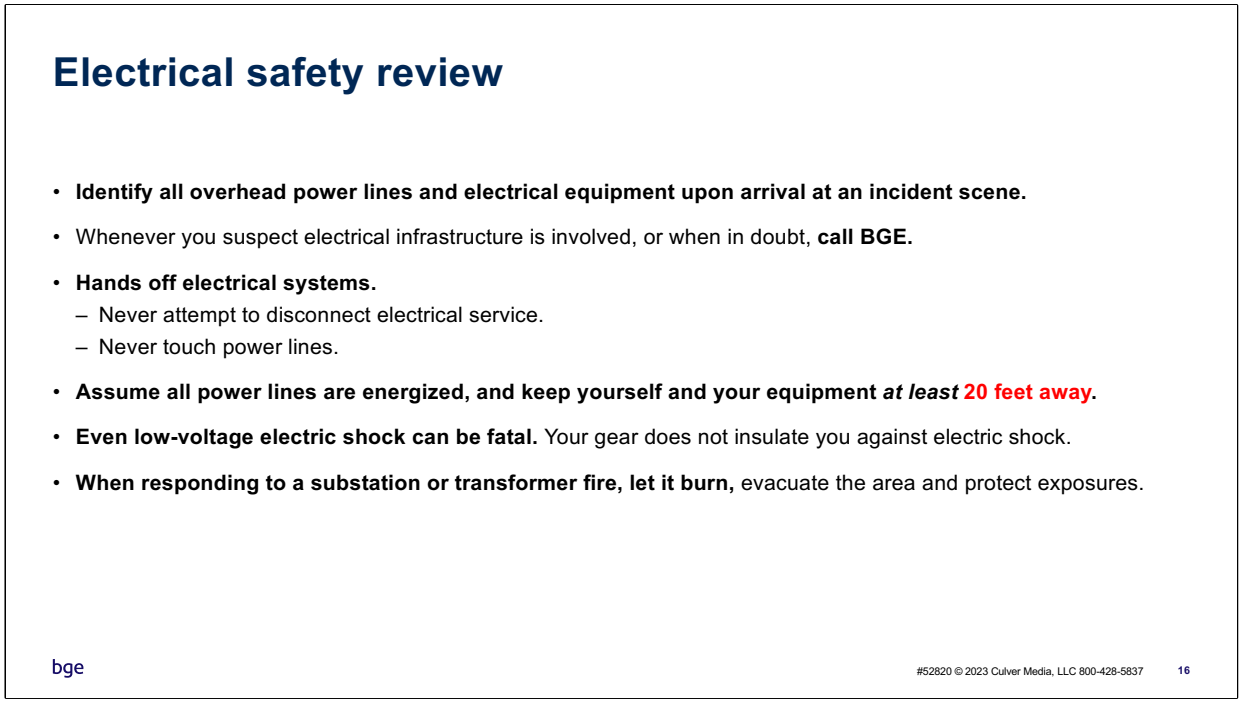
- **Do not open or enter switch cabinets or pad-mounted transformers.**
  - **Never cut locks or pry cabinets open.** Equipment contains live electrical components, and if you come into contact with them you could be killed.
- **Call BGE, evacuate the public and protect area exposures.**
- **Let transformers burn until otherwise instructed by utility personnel.**

bge

 15

Transformer fires. Burning transformers call for procedures similar to those with substation fires.

- Do not open or enter switch cabinets or pad-mounted transformers, such as the one pictured here. This is very dangerous and unnecessary.
  - Never cut locks or pry cabinets open. Equipment contains live electrical components and if you come into contact with them, you could be killed. Once a fire has begun, the equipment is unsalvageable and will be replaced. Don't risk your life to save ruined equipment.
- Call BGE, evacuate the public and protect area exposures. Whether it's a transformer on the ground or on a pole, be alert for explosions and toxic smoke, and once the area is secure, do what you can to keep the fire from spreading.
- Let transformers burn until otherwise instructed by utility personnel. They will determine when it is safe to extinguish an equipment fire and will advise your incident commander regarding the safest procedures.

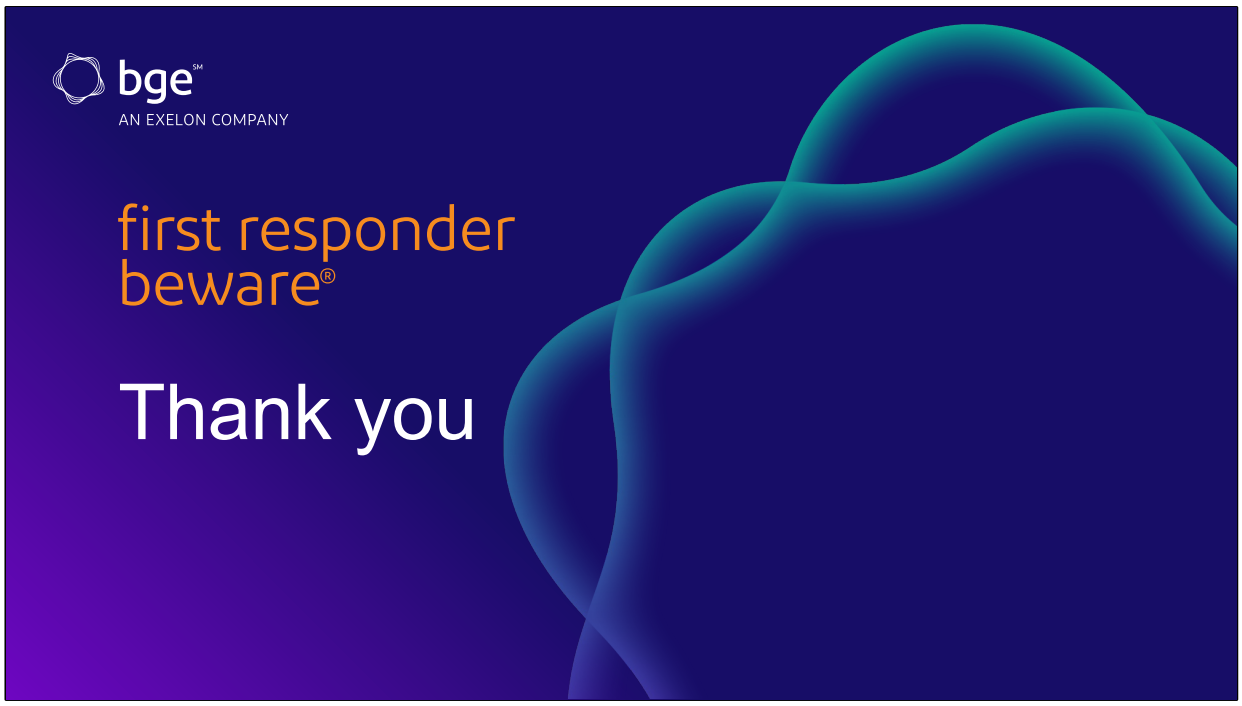


So let's review the key points of this presentation.

- Identify all overhead power lines and electrical equipment upon arrival at an incident scene. Do this as part of your initial situation survey, and include electrical infrastructure in your operational planning.
- Whenever you suspect electrical infrastructure is involved, or when in doubt, call BGE. They want to help keep you and the public safe.
- Hands off electrical systems.
  - Never attempt to disconnect electrical service.
  - Never touch power lines. Utility personnel will switch off the electricity to de-energize a scene and will inform you when the area is safe.
- Assume all power lines are energized, and keep yourself and your equipment at least 20 feet away.
- Even low-voltage electric shock can be fatal. Remember, your gear does NOT insulate you against electric shock.
- When responding to a substation or transformer fire, let it burn, evacuate the area and protect exposures. Your focus should be on safeguarding life and property.

Here is some useful contact information. You may wish to jot this down.

- In case of emergency, contact BGE at 800.685.0123**.**
- For additional information, visit BGE's website at BGE.COM/FirstResponder.



Thank you for your attention.

Take questions and begin discussion.

Discuss how this information conflicts with what your audience believed about electricity and how they may have put themselves or others at risk in the past. Ask what they would have done differently had they had this safety education session before.

The educator's guide includes more detail about the nature of electricity and how the electrical distribution system works, as well as exercises and simulations. Consider some of the suggested simulations or use your own.

BGE thanks you for helping to keep first responders safe.