

*Before darkening the room, offer a welcome and overview.*

*Begin by introducing the program and its topic:*

Welcome to *First Responder Beware: Staying Safe while Saving 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.

- 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) on electrical safety.

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) on electrical safety.

*This is a good time to reiterate the importance of this information: that 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


- **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**

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. The topics we are going to focus on are:

- 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 ground through conductors like:
  - 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 evaluation.



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Respect the power of electricity.

- Electricity always seeks the easiest, most direct path to ground through conductors like:
  - Your body
  - Trees
  - Water
  - Metal objects and structures, including fences and even gutters
  - 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 evaluation.

## Hands Off Electrical Systems

- **Never attempt to disconnect electrical services:**

- **Never cut service wires.**
- **Never attempt to remove electrical meters.** This is extremely dangerous and can cause serious injury or death. Call PPL Electric Utilities to de-energize the electric service.
- **Never attempt to open or enter a manhole, underground vault, or substation.**

- **Never touch or attempt to move power lines.**

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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:
  - Never cut service wires.
  - Never attempt to remove electrical meters. This is extremely dangerous and can cause serious injury or death. Call PPL Electric Utilities to de-energize the electric service.
  - Never attempt to open or enter a manhole, underground vault, or substation.
- 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 PPL Electric Utilities.

## 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 PPL Electric Utilities.
- **Provide the best possible directions** to the location.
- **Secure the area.**

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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 lines down 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 PPL Electric Utilities. 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. Their 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

- Keep yourself and your equipment **AT LEAST 20 feet away** from overhead power lines.
- Higher voltages require greater clearances.
- There is no uniform system for identifying power line voltage. When in doubt, contact PPL Electric Utilities for clearance information.
- **Electrical safety distances given are minimums. Always use the maximum possible distance.**

The minimum safe distance from overhead power lines is AT LEAST 20 feet.

- For your safety, keep yourself, your ladders and fully extended aerial equipment at least 20 feet from overhead power lines up to 50,000 volts.
- Higher voltages require greater clearances. For example, overhead power lines on large transmission towers may require additional clearances of up to 50 feet.
- There is no uniform system for identifying power line voltage. When in doubt, contact PPL Electric Utilities 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.
- Never use a solid water stream to fight fires near overhead power lines.

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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 are conductors. Be aware that wind can move aerial equipment, and when possible, assign a spotter to monitor your equipment's proximity to power lines. Remember that higher voltages require greater clearances, 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.)
- 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.



## Be Aware of Overhead Power Lines

- If your equipment contacts a power line:
  - The equipment should be considered energized.
  - **Call PPL Electric Utilities.**
  - If you can do so safely, **move the equipment away from the line.**
  - If the equipment cannot be moved, **stay put, and warn others to stay away** until PPL Electric Utilities personnel give the all-clear.

Remember that anything touching a power line may be energized.

- If your equipment contacts a power line, the most important thing to do is remain calm and stay put.
  - The equipment should be considered energized, as should the power line.
  - Call PPL Electric Utilities immediately.
  - If you can do so safely, move the equipment away from the power line.
  - If the equipment cannot be moved, stay put, and warn others to stay away until PPL Electric Utilities personnel give the all-clear. All personnel on the equipment should remain there. This is your safest course of action. Utility personnel will respond quickly, switch off the power, and tell you when it is safe to get off. Wait for their instructions.

## Be Aware of Overhead Power Lines

- If fire or other imminent danger forces you off the equipment:
  - **Jump clear**, keeping both feet together and without touching the equipment and the ground at the same time.
  - **Shuffle away with small movements**, keeping your feet close together and on the ground at all times.
  - **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.




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:
  - Jump clear, keeping both feet together and without touching the equipment and the ground at the same time. If you do, you will become electricity's path to the ground and you will be seriously—or fatally—shocked. Make every attempt to land on both feet at the same time.
  - Shuffle away with small movements, keeping both feet close together and on the ground at all times.
  - 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.

*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 100 feet away** from ALL downed power lines and objects that may be energized.
- Never touch or attempt to move fallen lines or objects contacting them.
- Never use a solid water stream to fight fires near downed lines.

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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. Wait for utility personnel to give the all-clear.
- Secure the area.
  - Keep yourself and the public at least 100 feet away from ALL downed power lines. Always remember that objects and even the ground near downed lines may also be energized.
  - In any incident involving downed lines, recall that wind as well as electric charge can cause lines to whip and move. Observing expanded clearances can help protect everyone from the unexpected.
- Never touch or attempt to move fallen lines or objects contacting them. Doing so endangers you and incident victims. Contact PPL Electric Utilities immediately so they can de-energize the scene.
- Never use a solid water stream to fight fires near downed lines. If you must use water to extinguish a fire near downed lines, use only a fog or spray, and be extremely cautious.

### Use Extra Caution Near Downed Power Lines

- **DO NOT** approach, enter, or touch areas or vehicles that may be energized.
  - Call PPL Electric Utilities.
  - 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 PPL Electric Utilities personnel give the all-clear.** Staying in the vehicle is their **BEST** protection against electric shock.

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, approach, enter, 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 PPL Electric Utilities. They will respond quickly and de-energize the scene.
  - Instruct vehicle occupants to drive the vehicle away from the line if this can be done safely. Keeping your distance, find a position where passengers can see you without exiting or moving around inside the vehicle and attempt to reassure them.
  - If the vehicle cannot be moved, instruct the occupants to stay put until PPL Electric Utilities 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; to stay put; 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.

### Use Extra Caution Near Downed Power Lines

- If occupants in an energized vehicle are in imminent danger from fire or other hazards:
  - Instruct them to jump clear **without contacting the vehicle and the ground at the same time.**
  - Tell them to shuffle away with small movements, keeping both feet close together and on the ground at all times.
  - Demonstrate the proper procedure from a distance.
- If vehicle occupants are injured, disabled, or otherwise unable to safely exit the vehicle on their own, your incident commander will assess the situation and tell you how to proceed.

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In some cases, fire or other hazards make it impossible for occupant(s) to remain in the vehicle.

- If occupant(s) in an energized vehicle are in imminent danger from fire or other hazards, you must resist the temptation to approach the vehicle. Contacting an energized vehicle is a sure way to become a shock victim yourself! Follow these procedures to get everyone out alive.
  - Instruct them to jump clear without contacting the vehicle and the ground at the same time. Find a vantage point where occupant(s) in the vehicle can see and hear you, but keep your distance.
  - Tell them to shuffle away with small movements, keeping both feet close together and on the ground at all times. Emphasize that they must not run or take long steps.
  - Demonstrate the proper procedure from a distance. Show occupant(s) how to perform the jump-and-shuffle procedure from a visible distance before they attempt their escape.
- If vehicle occupants 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

- **Burning electrical equipment is already ruined and will be replaced. The safest course of action is to LET IT BURN.**
- Contact PPL Electric Utilities 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 500 feet away** from the substation.
- Electrical equipment may contain oil. **Be alert for explosions and toxic smoke.**
- **Protect exposures**, such as trees and buildings, to prevent fire from spreading.
- **Prevent contamination of water resources.** Monitor for oil runoff and direct it away from catch basins, surface waters and wetlands.
- **Never attempt to open, or disturb, or operate** any PPL Electric Utilities equipment or facility.



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Substations present specific risks.

- Burning electrical equipment is already ruined and will be replaced. The safest course of action is to let it burn.
- Contact PPL Electric Utilities 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 500 feet away from the substation. Your most important responsibility in these types of emergencies is to protect the public.
- Electrical equipment may contain oil. Be alert for explosions and toxic smoke.
- Protect area exposures to prevent the fire from spreading. Once the area is evacuated, focus on defending nearby property and green space.
- Prevent contamination of water resources. Monitor for oil runoff and direct it away from catch basins, surface waters and wetlands.
- Never attempt to open, disturb, or operate any PPL Electric Utilities equipment or facility.



## 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 contact them, you could be killed.
- **Call PPL Electric Utilities, evacuate the public, and protect area exposures.**
- **Let transformers burn until otherwise instructed by PPL Electric Utilities personnel.**

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

- Do not open or enter switch cabinets or pad-mounted transformers such as this one. This is very dangerous and unnecessary.
  - Never cut locks or pry cabinets open. Equipment contains live electrical components and if you contact 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 PPL Electric Utilities, 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 PPL Electric Utilities personnel. They will determine when it is safe to extinguish an equipment fire and will advise your incident commander regarding the safest procedures.



## Electrical Safety Review

- **Identify all overhead power lines and electrical equipment upon arrival at an incident scene.**
- Whenever you suspect electrical infrastructure is involved, or when in doubt, **call PPL Electric Utilities.**
- **Hands off electrical systems.**
  - Never attempt to disconnect electrical service.
  - Never touch power lines.
- **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**, and your gear does not insulate you against electric shock.
- **When responding to a substation or transformer fire, let it burn**, evacuate the area, protect exposures, and direct any oil runoff away from water resources.

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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 PPL Electric Utilities. 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, and remember, your gear does NOT insulate you against electric shock.
- When responding to a substation or transformer fire, let it burn, evacuate the area, protect exposures to keep fire from spreading, and direct any oil runoff away from catch basins, surface waters and wetlands. Your focus should be on safeguarding life and property.

## Contact Information

- In case of emergency, call PPL Electric Utilities at **1-800-342-5775 (1-800-DIAL-PPL)**
- For additional information, visit the website at **ppl.e-smartresponders.com**

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- For additional information, visit the website at ppl.e-smartresponders.com



Thank you for your attention.

*Take questions and begin discussion.*

The instructor's guide includes more detail about how electricity works, when to contact PPL Electric Utilities, what sorts of materials and objects conduct electricity, jump-off procedure, and other information about safety procedures.

*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 program before. Consider some of the suggested simulations or use your own.*

PPL Electric Utilities thanks you for helping to keep first responders safe.