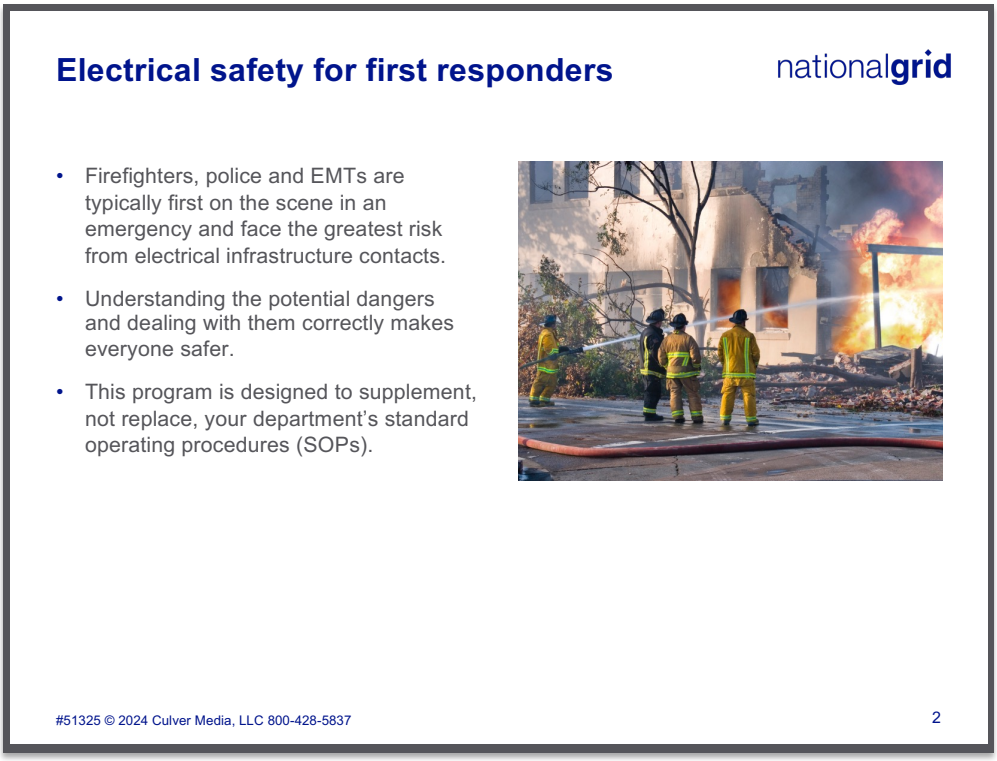
Presenter's notes

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.
- Darken the room.
- Click for the next slide. (Throughout this presentation, you will need to click for text and graphics on each slide and to bring up new slides.)

Presenter's notes

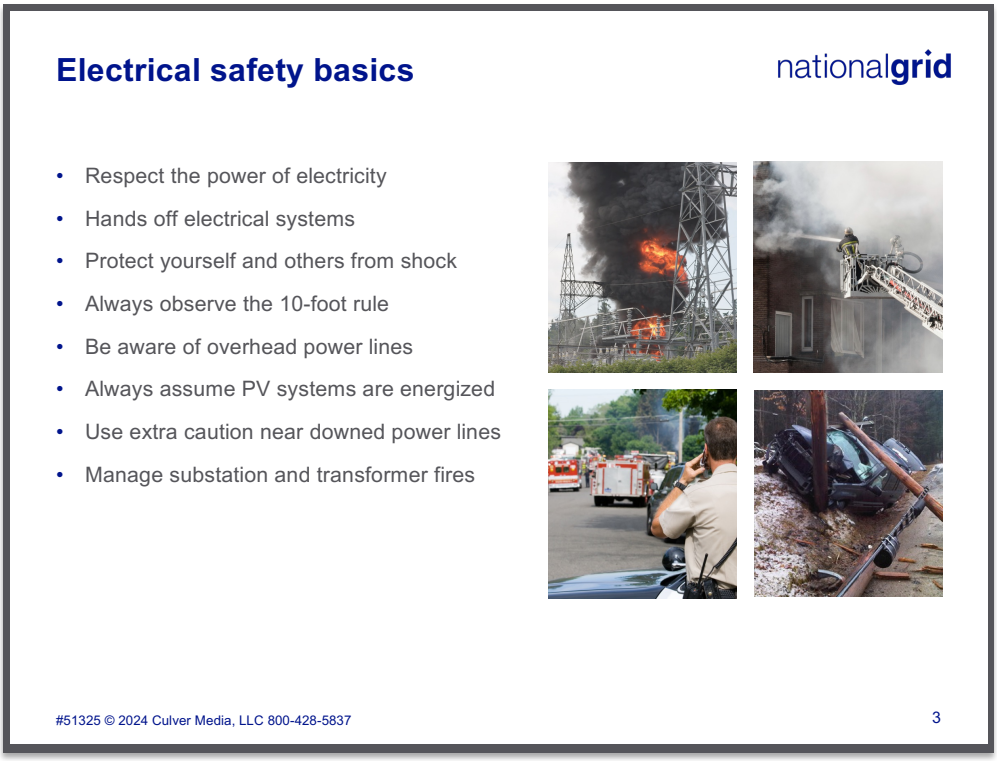


- Firefighters, police and EMTs are typically first on the scene in an emergency and face the greatest risk from electrical infrastructure contacts.
- Understanding the potential dangers and dealing with them correctly makes everyone safer.
- This program is designed to supplement, not replace, your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

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

Presenter's notes

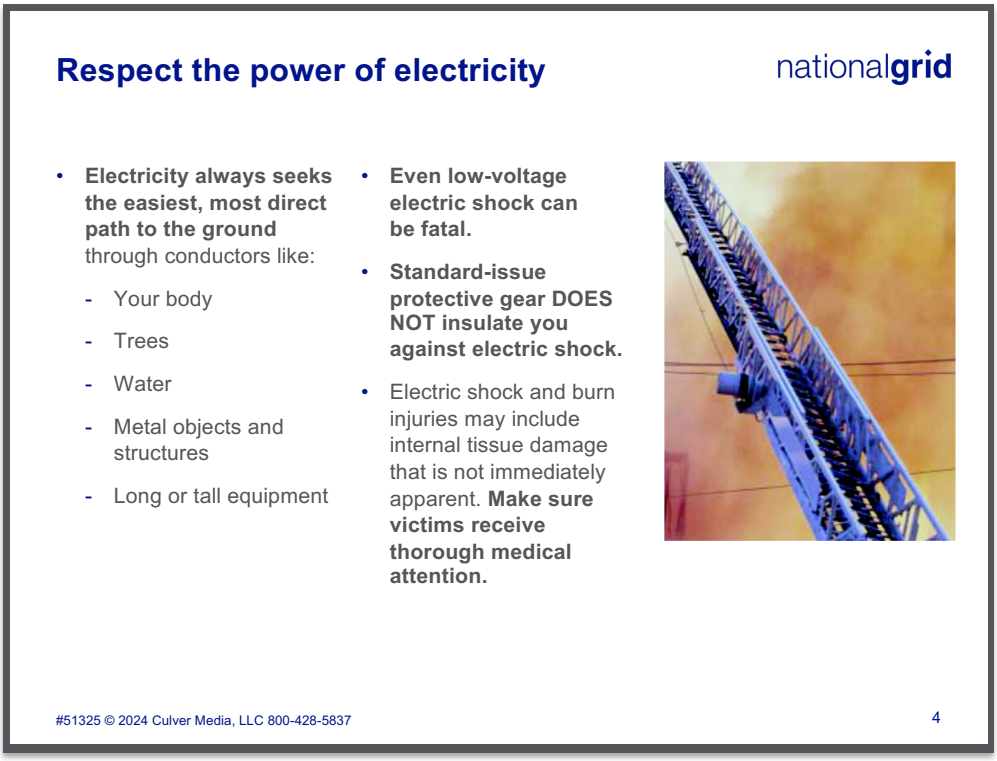


Electrical safety basics.

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 10-foot rule
- Be aware of overhead power lines
- Always assume PV systems are energized
- Use extra caution near downed power lines
- Manage substation and BESS emergencies

Presenter's notes

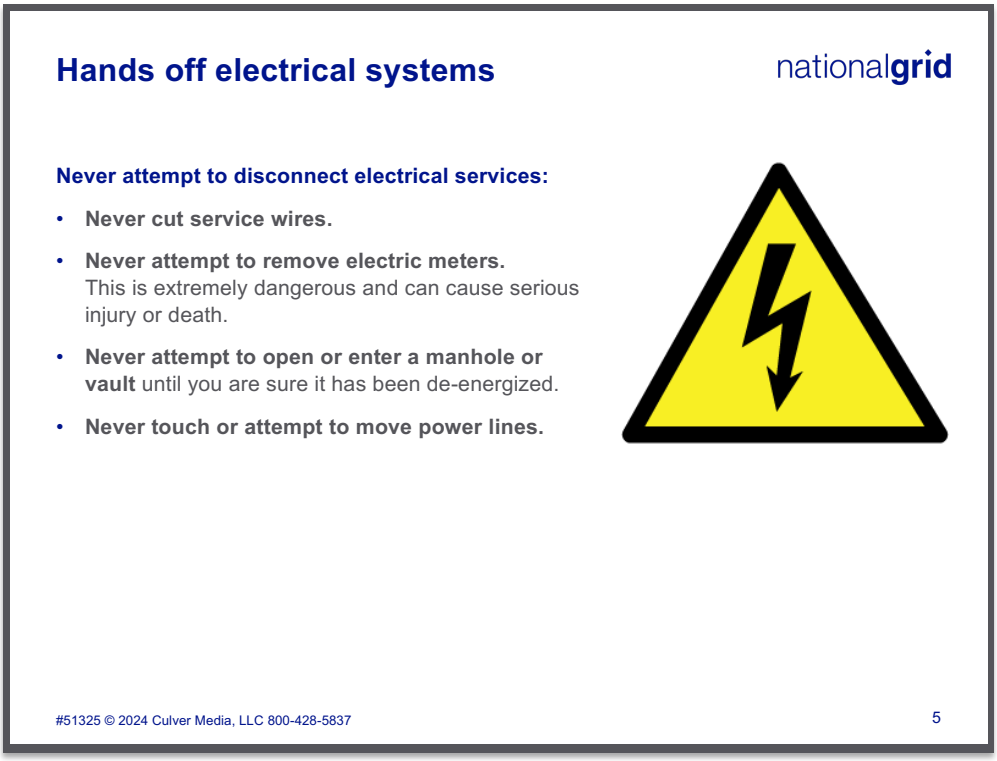


Respect the power of electricity.

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 like:
    - Your body
    - Trees
    - Water
    - Metal objects and structures, including fences and gutters
    - Long or tall equipment, such as ladders
- Even low-voltage electrical 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 electrical shock.
- Electrical 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 damaged. Treat these injuries as serious regardless of their appearance.

Presenter's notes

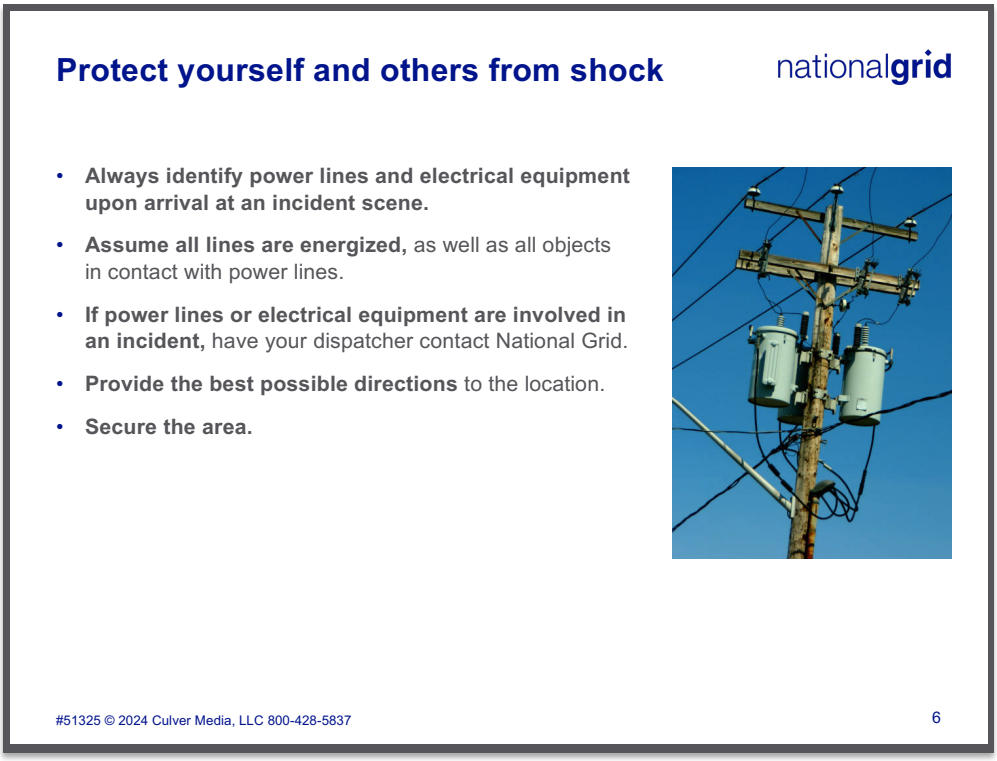


Hands off electrical systems.

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

- Never attempt to disconnect electric 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 electrical shock. In dealing with electrical systems, employ a hands-off policy and call National Grid.

Presenter's notes



Protect yourself and others from shock.

Adhering to some simple best practices can minimize the risk of electrical 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 photovoltaic (also known as "PV") systems, batteries and 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 National Grid. 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.

Presenter's notes

Always observe the 10-foot rule

nationalgrid

- **ALWAYS keep yourself and your equipment *at least* 10 feet away from overhead power lines.**
- **Higher voltages require greater clearance distances.**
- **There is no uniform system for identifying power line voltage.** When in doubt, contact National Grid for clearance information.
- ***Electrical safety distances given are minimums. Always use the maximum possible distance.***

7

For your safety, always observe the 10-foot rule.

- ALWAYS keep yourself and all ladders, drones and aerial equipment AT LEAST 10 feet away from overhead power lines.
- Higher voltages require greater clearance distances.
- There is no uniform system for identifying power line voltage. When in doubt, contact National Grid 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.

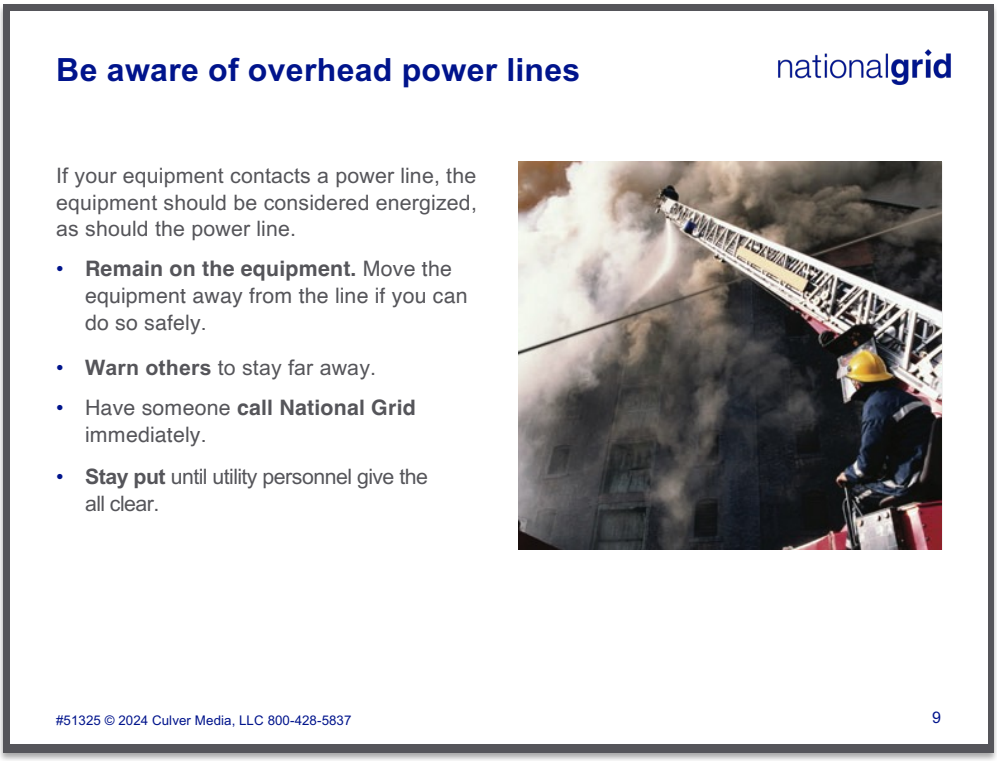
Presenter's notes

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 10 feet away from overhead lines. Remember the 10-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 30-degree fog pattern with nozzle pressure of at least 100 psi. But remember that ALL water is a conductor and always be extremely cautious when using water around overhead lines.
- Never try to retrieve a drone that has crashed into power lines or other electrical facilities. Call National Grid immediately.

Presenter's notes



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 remain on the equipment. The equipment should be considered energized, as should the power line.

- 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 stay there.
- Warn others to stay far away. Anyone who touches the equipment or even the ground nearby may be injured or killed.
- Have someone call National Grid 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.

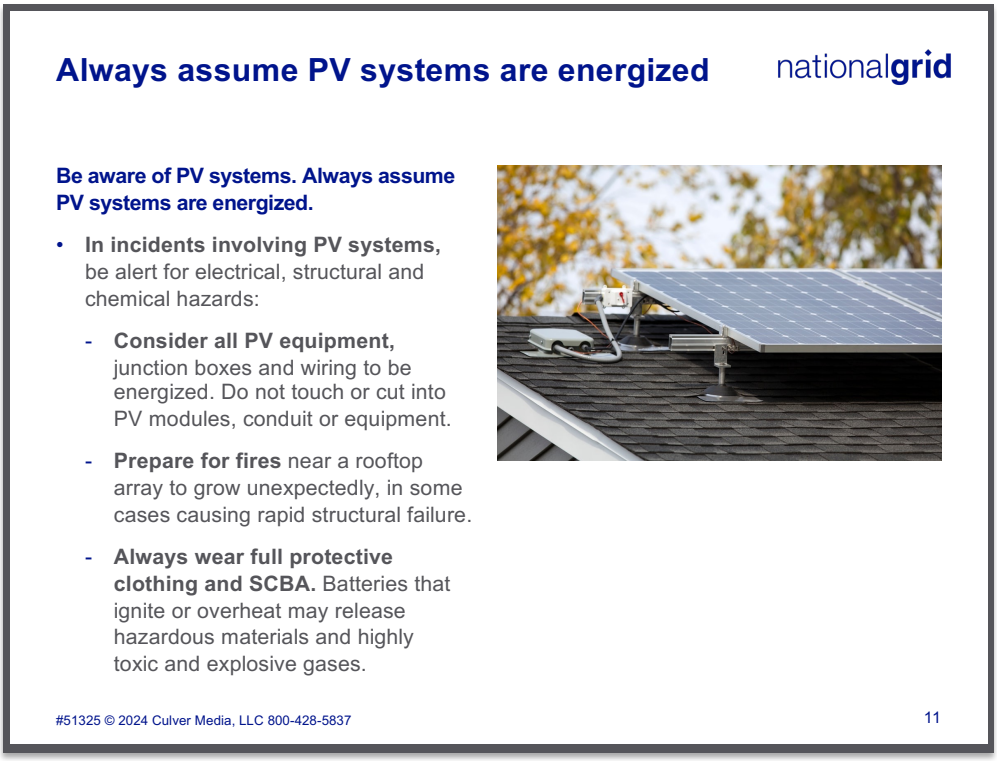
Presenter's notes

In some cases, hazardous conditions may make it impossible to stay on the energized equipment until utility personnel give the all clear.

If imminent danger forces you off the equipment:

- Jump clear, landing far enough away from the equipment that you don't touch 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.
- Land with your feet together and shuffle away with small steps, keeping your feet together and on the ground.
- 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.

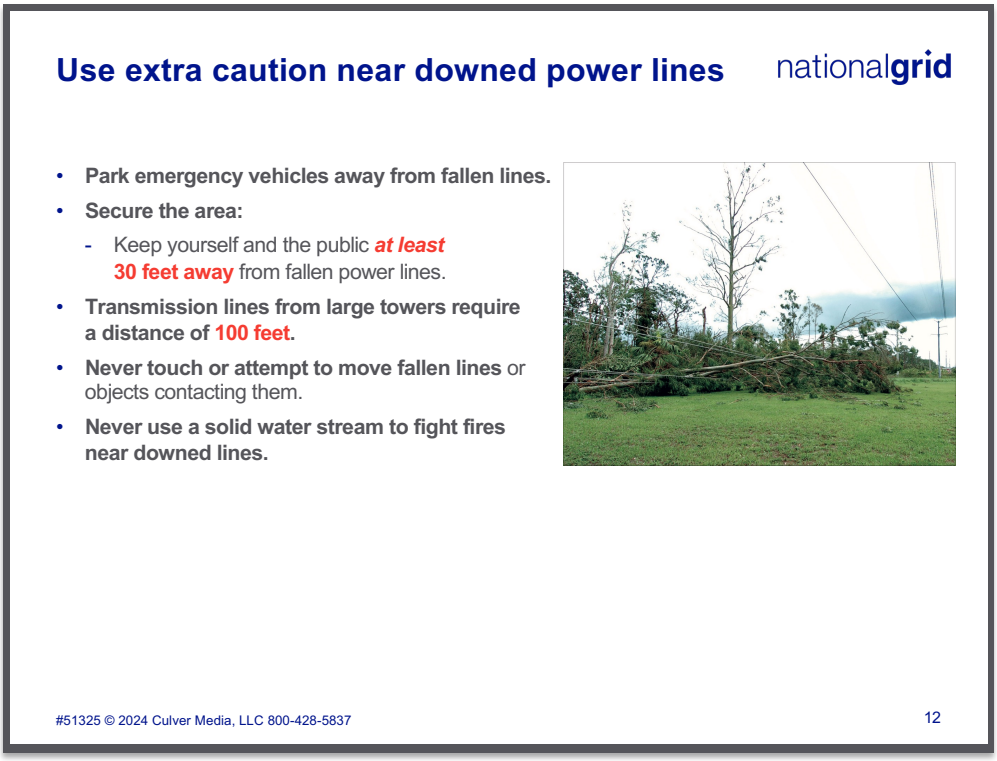
Presenter's notes



Be aware of photovoltaic, or "PV," systems. Always assume these systems are energized.

- In incidents involving PV systems, be alert for electrical, structural and chemical hazards:
    - Consider all PV equipment, junction boxes and wiring to be energized at all times. Do not touch or cut into PV modules, conduit or equipment.
    - Prepare for fires near a rooftop array to grow unexpectedly, in some cases causing rapid structural failure.
    - Always wear full protective clothing and SCBA. Batteries that ignite or overheat may release hazardous materials and highly toxic and explosive gases.

Presenter's notes



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. Wait for utility personnel to give the all clear.
- Secure the area:
    - Keep yourself and the public at least 30 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 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 contacting them. Doing so endangers you and incident victims. Contact National Grid 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 spray, and be extremely cautious.

Presenter's notes

Use extra caution near downed power lines

nationalgrid

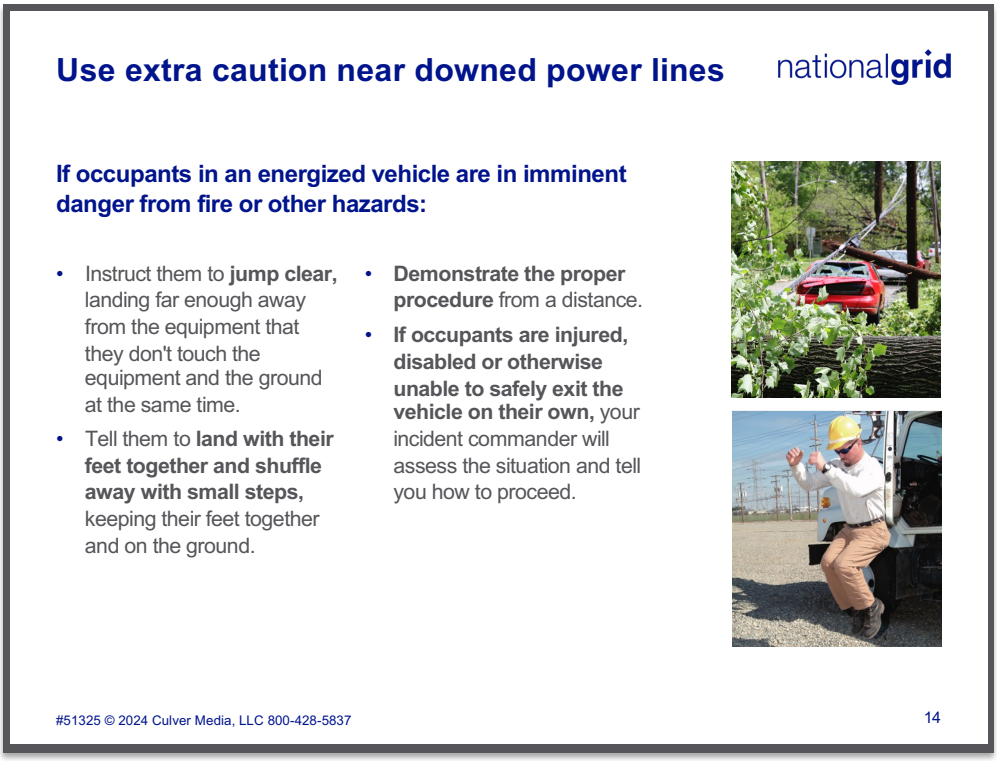
- ***DO NOT*** **enter, touch or even approach areas or vehicles that may be energized.**
- **Call National Grid.**
- **Instruct vehicle occupants to drive the vehicle away from the line if this can be done safely.**
- If the vehicle cannot be moved, **instruct the occupants to stay put until utility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

13

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, touch or even approach 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 electrical shock. Becoming a victim yourself puts everyone in greater danger.
- Call National Grid immediately. 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.
- 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 electrical shock. Keeping your distance, find a position where passengers can see you without exiting or moving around inside the vehicle and attempt to reassure them. 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.

Presenter's notes

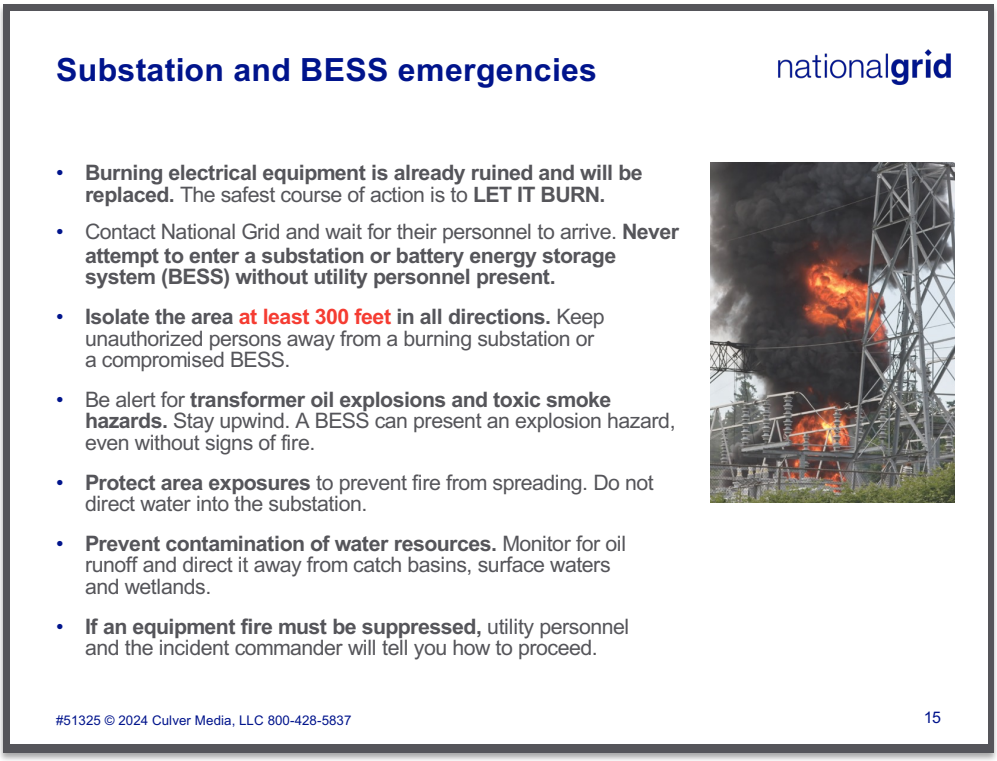


In some cases, fire or other hazards make it impossible for victims to remain in the vehicle.

If occupants in an energized vehicle are in imminent danger from fire or other hazards, you must resist the temptation to approach the vehicle. 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, landing far enough away from the vehicle that they don't touch the vehicle and the ground at the same time. Find a vantage point where victims in the vehicle can see and hear you, but keep your distance.
- Tell them to land with their feet together and shuffle away with small steps, keeping their feet together and on the ground. Emphasize that they must not run or take long steps.
- Demonstrate the proper procedure from a distance. Show occupants how to perform the jump-and-shuffle procedure before they attempt their escape.
- If 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.

Presenter's notes



Substation and BESS emergencies.

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 National Grid and wait for their personnel to arrive. Never attempt to enter a substation or battery energy storage system without utility personnel present.
- Isolate the area AT LEAST 300 feet in all directions. Keep unauthorized persons away from a burning substation or a compromised BESS facility. Your most important responsibility in these types of emergencies is to protect the public.
- Be alert for transformer oil explosions and toxic-smoke hazards. Stay upwind.
- Protect area exposures to prevent the fire from spreading, and do not direct water into the substation. 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.
- If an equipment fire must be suppressed, utility personnel and the incident commander will tell you how to proceed.

Presenter's notes

Transformer fires

nationalgrid

- **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 National Grid, evacuate the public and protect area exposures.**
- **Let transformers burn until otherwise instructed by utility personnel.**

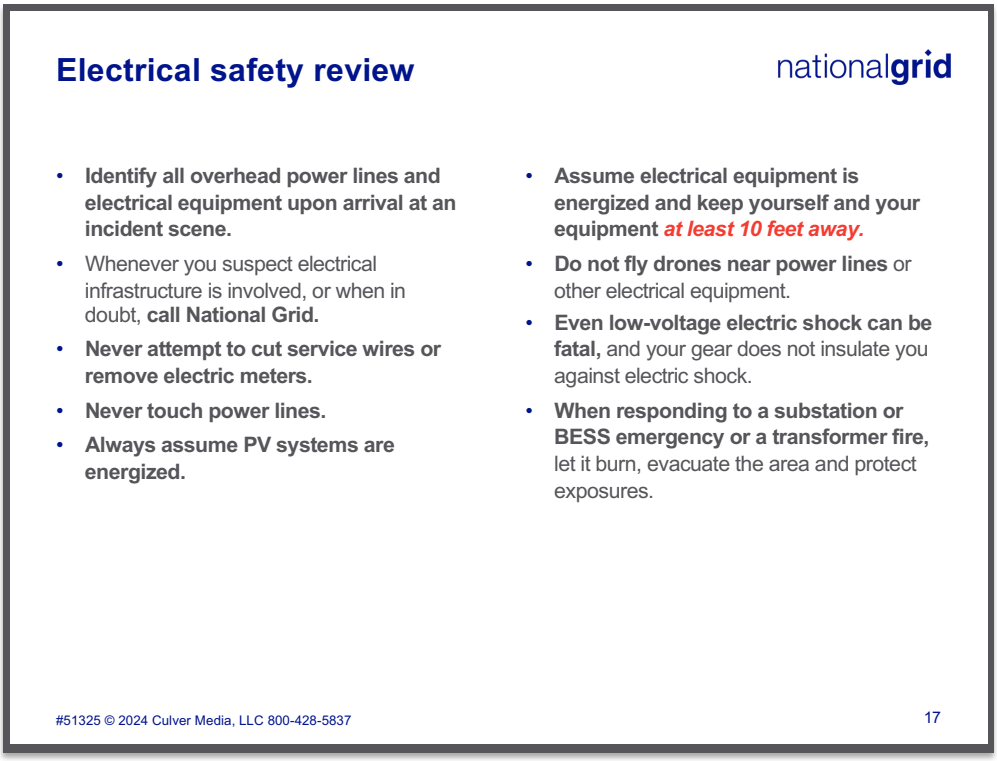
16

Transformer fires.

Burning transformers call for similar procedures as 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 National Grid, 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.

Presenter's notes



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 National Grid. They want to help you keep you and the public safe.
- Never attempt to cut service wires or remove electric meters. This is extremely dangerous!
- 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.
- Always assume PV systems are energized at all times.
- Assume electrical equipment is energized, and keep yourself and your equipment at least 10 feet away.
- Do not fly drones near power lines or other electrical equipment.
- Even low-voltage electrical shock can be fatal, and remember, your gear does NOT insulate you against electrical shock.
- When responding to a substation or BESS emergency or a transformer fire, let it burn, evacuate the area and protect exposures. Your focus should be on safeguarding life and property, not ruined equipment.

Presenter's notes

Thank you for your attention. National Grid thanks you for helping to keep yourself, your community and your fellow first responders safe.

In case of an electrical emergency, notify National Grid at the following numbers:

Massachusetts: 1-800-465-1212

Upstate New York: 1-800-867-5222

For additional information, visit National Grid's website at firstresponder.ngridsafety.com.

Presenter's notes

Take questions and begin discussion.

The trainer's guide includes more detail about how electricity works, when to contact National Grid, what sort of materials and objects conduct electricity, the 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 training before.

National Grid thanks you for helping to keep first responders safe.