

Climate Hero Spotlight: Electricians

Opening Activity: Electrician's Toolbox

Notes:

The Big Question

How do electricians play a critical role in implementing climate solutions?

My Climate Goals

When you complete this lesson, you'll be able to:

1. Explore the range of clean energy projects that electricians work on
2. Identify the skills, training, and experience needed to become an electrician
3. Discuss what aspects of a career as an electrician are aligned with your skills, interests, and desired work environment.

Notes:

Electrician Project Planning Challenge

Instructions

Your team is responsible for planning an important project in your town as part of a local push for clean energy and electrification. Read the details of your assigned project on the following pages. Then, use the prompts below to identify your project's main goal and anticipated impact.

Project Planning Prompts

Key steps: What steps will your team need to take to complete your project?

What tools or resources will you need?

How will this project affect the community?

Briefly summarize your project plan:

Solar Panel Installation

Group 1

Objective: Install a 10-kilowatt (kW) rooftop solar panel system in the community center to reduce electricity costs and support clean energy goals. The building's current electrical system is over a decade old and not designed for renewable energy, so an assessment is required to determine if upgrades are needed.

Location: The project site is a two-story community center with a flat, rubber-coated roof. The building is connected to the city's power grid, but there are no current connections for renewable energy. A nearby electrical panel can connect to the solar inverters, but upgrades may be required to handle additional power safely.

Challenges:

Assessing power compatibility: The building's electrical panel may need upgrades to accommodate solar power, as the current setup may not be able to handle the additional load.

Grid connection: Safely connecting the solar system to the city grid requires specialized equipment, such as a solar inverter that manages power fluctuations.

Special tools and equipment: Electricians may need specialized tools, such as a solar inverter and a DC disconnect, to ensure safe integration with the grid.

Notes:

EV Charging Station Setup

Group 2

Objective: Plan and install an EV charging station with two charging ports at the high school parking lot to support staff, students, and the school's green initiatives. The school's current power system was not designed for high-energy chargers, so electricians must evaluate the feasibility of installation.

Location: This outdoor parking area is close to the school's main entrance, with nearby electrical lines that could be accessed for connection. The location is open and exposed to the elements, so waterproofing and protection from weather conditions are necessary. There is also moderate foot and vehicle traffic in this area.

Challenges:

Power demand: The chargers require a substantial amount of power, which may exceed the current system's capacity, necessitating an evaluation of load handling and possibly an upgrade to the electrical panel.

Weather protection: Outdoor installation requires weatherproofing, including weather-resistant enclosures and connections, to prevent water or dust damage.

Traffic management: Electricians must consider foot and vehicle traffic when choosing charger placement to ensure safety for users.

Specialized equipment: High-power charging requires specialized tools and heavy-duty circuit breakers for safe installation.

Notes:

Wind Turbine Maintenance

Group 3

Objective: Perform a comprehensive maintenance check on a 1.5-megawatt (MW) wind turbine located on a hill that supplies power to the local water treatment plant. Maintenance includes checking the turbine's electrical components for wear to ensure continued safety and efficiency.

Location: The wind turbine is situated on elevated terrain, exposed to high winds and fluctuating temperatures. Access is limited, as the turbine is located away from main roads, requiring a specialized team for safety and logistics. Power cables run from the turbine to the water treatment facility nearby.

Challenges:

Safety at height: The turbine requires safety harnesses and fall-protection gear for electricians working on the blades and nacelle.

Electrical check: High-voltage components, including the inverter and transformer, must be inspected for signs of wear and safe operation.

Access issues: The remote location requires special transportation of tools and equipment, making logistics a priority.

Weather conditions: The elevated site is subject to high winds, limiting safe working hours to periods of low wind.

Notes:

Energy-Efficiency Retrofit

Group 4

Objective: Plan an energy-efficient electrical retrofit for a 50-year-old, multi-story office building with outdated lighting, a heating, ventilation, and air conditioning (HVAC) system, and a lack of modern energy monitoring. The retrofit aims to reduce energy consumption and improve occupant comfort.

Location: The office building is downtown, with a high occupancy rate and limited opportunity for disruptive work. The current electrical system needs to be updated and may only support modern energy-efficient appliances with upgrades. There is restricted access to the main electrical panel, which is in the basement.

Challenges:

Limited electrical capacity: The building's existing panel may need to be replaced with a larger panel to handle additional load from new lighting and HVAC systems.

Compatibility with older infrastructure: Integrating modern, energy-efficient systems with older infrastructure may pose challenges and require additional equipment or adapters.

Minimizing disruption: Electricians must plan to work during off-hours or in stages to avoid disturbing the building's occupants.

Compliance with updated codes: The building must meet current electrical and safety codes, which may require additional work and inspections.

Notes:

Lesson Key Points

- Electricians are essential to installing, maintaining, and upgrading systems for clean energy transition.
- Electricians work in residential, commercial, and industrial settings.
- To become an electrician, one must have problem-solving skills, technical expertise, and adaptability to new technologies.
- The shift to clean energy creates a growing demand for electricians.

Additional key points:

Closing Activity

What challenges will we face if we don't have enough electricians for clean energy projects?

How can we encourage more people to enter the electrician field?

How do electricians help build climate resilience?