

Counting the Big Five: Panel, Generator, EV Charger, Surge, Lighting

YES Electric • NEC 2026 with NEC 2023 numbers in parentheses

Draft 1 (October 2026). This chapter is under review. Code numbers are NEC 2026. Your local inspector may use an earlier edition, so ask your journeyman which one applies. Boxes marked "Picture coming" will get drawings and photos in a later version.

Phase 3, Estimating and Scoping Residential Service Work. Read R3.1 first. This module uses R3.1's scope sheet, factors, and hand-off for the five jobs YES sells most.

Before this module: R3.1. For each job you count here, you should have read the install module first: R1.5 (panel upgrades and service changes), R1.10 (standby and portable generators), R1.11 (EV chargers), R1.9 (whole-house surge protection), and R1.7 (lighting). This module teaches how to count those jobs. It does not re-teach how to install them.

What this module does not teach. No prices, rates, or margins. You produce counts, hours, photos, and a sketch. The office prices in its estimating program under the service job class. Techs never quote prices and never collect payment.

Code edition. Code references are NEC 2026. Where a section moved, the NEC 2023 number is in parentheses. The local inspector (the AHJ) may enforce an earlier edition, and some items in this module change between editions. Ask your journeyman which edition applies before you put a code item on a count.

Learning Objectives

When you finish this module you will be able to:

1. Walk a house and produce a complete count for each of the five jobs YES sells most: a panel upgrade or service change, a standby generator, an EV charger, a whole-house surge protective device (SPD), and a lighting package.
 2. Catch the items that get missed: utility coordination and fees, permit and inspection, trenching, gas line and pad by others, drywall repair, the meter base, grounding electrodes, the SPD, the emergency disconnect, and smoke alarm upgrades the building department may require.
 3. Produce a photo set and a sketch the office can price from without sending anyone back to the house.
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Background: Why These Five Get Their Own Module

These five jobs are larger than a service repair, they are sold more often than anything else on the residential side, and each one has a list of parts and side tasks that are easy to forget. A dead-outlet repair that misses one receptacle costs a few minutes. A panel change that misses the grounding electrodes, the SPD, and the utility's reconnect lead time costs a day and an awkward phone call to the customer.

Commercial Module 3.1 teaches the discipline that fixes this: count everything once, sweep the whole job and not just the obvious part, and remember that the money is lost in what you forget to count. The residential version of "sweep the whole set" is a checklist for each job, walked in the same order every time.

Most of what gets missed falls into four groups:

Group	Examples
Utility	Disconnect and reconnect scheduling, the meter socket, the external disconnect Alabama Power requires on a new meter base, reconnection charges
Code items that come with the job	Grounding electrodes, the SPD on a service replacement, the outdoor emergency disconnect, AFCI protection on extended circuits, standby signs
Other trades	Gas line, generator pad, trenching, drywall and paint, roofing around a new mast
Paperwork and time	Permit, inspection visits, load calculation, startup and customer training

Part A: The Count Visit, Step by Step

Do this the same way for every one of the five jobs.

Step A1. Prepare

1. Read the ticket. Note which job or jobs the customer asked about.
2. Bring the count checklist for each job (Parts B through F).
3. Bring a 25 ft tape, a 100 ft tape or measuring wheel, your meter, a clamp meter, a flashlight, and your phone.
4. If the job is a panel or service change or a generator, ask the office for the house's electric bill or account information if the customer has shared it. The office uses it for the load calculation (R-LOAD).

Step A2. Walk the outside first

1. Photograph each side of the house from the yard, wide enough to show the whole wall.

2. Find the service: overhead drop or underground lateral. Photograph the drop or riser, the weatherhead or riser conduit, and the meter base.
3. Find the gas meter if there is one. Photograph it with the house wall in the frame.
4. Find the AC condenser(s), the water heater vent, the dryer vent, windows, doors, and anything else near the likely generator spot.
5. Look at the yard between the service, the gas meter, and any detached garage or likely charger spot. Note slopes, driveways, sidewalks, sprinklers, trees, and fences that a trench would cross.

Step A3. Walk the inside

1. Find the panel(s). Photograph the panel door closed, open, and with the dead front on. Do not remove the dead front unless your journeyman OKs it on this visit.
2. Photograph the panel label so the brand, model, bus rating, main rating, and allowed breaker types can be read.
3. Count the breakers and open spaces. Write the panel schedule: each breaker's size, poles, type (standard, AFCI, GFCI, dual-function, tandem), and label.
4. Find where the grounding electrode conductor goes: water pipe, ground rods, or nothing you can see. Photograph it.
5. Find the water and gas bonding. Photograph it.
6. Note the path from the panel to wherever the new work goes: attic, crawl, basement, garage wall.
7. Note the smoke alarms: how many, where, hardwired or battery, interconnected or not, and the date on the back if you can reach one safely.

Step A4. Measure

Measure every run with the method from R3.1, Step B4: route length, drops, slack, routing allowance, round up to 5 ft. For underground runs, measure the trench length, not the cable length, and add the vertical rise at each end separately.

Step A5. Sketch

Draw a site sketch for any job that involves the outside of the house. A phone photo of a hand sketch on graph paper is fine. It must show:

- The house outline with north marked.
- The service location (drop or lateral) and meter.
- The panel location inside.
- The gas meter, if any.
- The proposed location of new equipment: generator, ATS, charger, disconnect.
- Each conduit or cable route, with its length in feet.
- Windows, doors, vents, and the AC unit near any generator.
- Driveways, walks, and anything a trench crosses.

Picture coming: Site sketch for a standby generator on graph paper, top-down view. A rectangle house outline with "N" arrow. On the left side wall: "Meter / main (overhead drop)" and just inside, "Panel, garage." On the back wall near the left corner: "Gas meter." A small rectangle in the back yard labeled "Gen pad 3 ft x 5 ft (by others)" with dimension lines showing "6 ft to gas meter," "5 ft from bedroom window" (window shown), and "18 in. from wall." A dashed line labeled "1¼ in. PVC, 32 ft, 24 in. cover" runs from the generator to an "ATS" box mounted beside the meter. A dotted line labeled "Gas line by others, 8 ft" runs from the gas meter to the generator. The AC condenser is shown 10 ft to the right of the pad. A note box in the corner reads "Photos 1-14 on job board."

Step A6. Fill in the count checklist

Use the checklist for the job (Parts B through F). Every line gets a count, "not needed," or "by others." A blank line means you did not check it.

Step A7. Write the scope and hand off

Write the scope sheet from R3.1, Part D, with the count, hours, factors, assumptions, and options. Attach the photos and the sketch. Tell the office it is ready the same day.

Part B: Panel Upgrade or Service Change

What the two jobs are

Job	What changes	Utility involved?
Panel change (panel swap)	The panel is replaced. The meter base and service entrance conductors stay.	Usually yes, to disconnect and reconnect, because the service conductors feeding the panel stay live until the utility cuts power.
Service change	The panel, the meter base, the service entrance conductors, and often the mast or riser are replaced. Often goes from 100 A to 200 A.	Yes. The utility disconnects, may set a new meter or socket, and reconnects.

R1.5 and R-SERVICE teach the install. Here you count it.

Step B1. Decide what the job is

1. Read the load calculation the office or your journeyman ran (R-LOAD). It decides the service size. Do not pick a size by feel.
2. Look at the existing meter base. Note its amp rating from the label inside the cover (photograph only; do not open it), its condition, and whether it is a combination meter-main.
3. Look at the service entrance conductors. Note type (SE cable or conduit), size if printed, and condition. Kuhlman notes that SE cable on the outside of a house lets water into the

meter socket and panel over time (Kuhlman, Residential Electrical Troubleshooting, pp. 41–42), and his photo pages show panels ruined that way (p. 107).

4. If the meter base, SE conductors, or mast are damaged, undersized for the new service, or not accepted by the utility, the job is a service change.

Step B2. Know the Alabama Power items

Alabama Power is the utility for most of YES's service area. These items come from its public pages and rules. Confirm current requirements with the office before each job.

Item	What Alabama Power says	Source
Disconnect and reconnect	Contractors request it through Alabama Power's Business Service Center. Allow up to three business days, weather permitting. Have the 911 address, meter number, or account number ready.	Alabama Power, "Builders & Developers," https://www.alabamapower.com/business/business-customers-and-services/builders-developers.html
External disconnect on a new meter base	Since January 1, 2022, Alabama Power requires an external disconnect on the load side of a new residential meter base, across its whole service territory, whether or not the area has electrical inspections.	Alabama Power, "Residential Metering Procedure," https://www.alabamapower.com/content/dam/alabama-power/pdfs-docs/business/Residential-Metering-Procedure.pdf
Meter socket	Alabama Power's rules say the company provides a meter socket for the premises, or the customer may provide one from the company's approved list (self-contained metering only). The customer replaces a self-contained socket that is deteriorated or damaged.	Alabama Power, Rules and Regulations for Electric Service, sec. 1.13, https://www.alabamapower.com/content/dam/alabama-power/pdfs-docs/Rates/APCRulesRegulations.pdf
Service entrance conductors	Installed by and at the expense of the customer, and must extend at least 18 in. outside the building for the company's connection.	Same, sec. 1.11
Reconnection charge	A service charge applies to reconnections of existing service, per the rules' Appendix A.	Same, sec. 4.5
Meter height	4 to 5 ft to the center of the meter socket.	"Builders & Developers" page, above
Relocating the meter	Tell Alabama Power's Business Service Specialist if the meter socket will be relocated.	"Builders & Developers" page, above
Inspection release	The electrical inspection release must match the 911 address exactly.	"Builders & Developers" page, above
Underground service conduit	Conduit 24 in. below grade up to the meter socket, at least three straps on the riser.	"Builders & Developers" page, above

The office handles the utility call and any utility fee. Your count must say which utility actions the job needs, so the office can schedule them and the price includes them.

Step B3. Know the code items that come with a new service

Item	Requirement	NEC 2026
Surge protective device	All services supplying dwelling units must have an SPD, Type 1 or Type 2, rated at least 10 kA nominal discharge current, integral to or immediately adjacent to the service equipment. Where service equipment is replaced, the rule applies.	230.67(A) through (E)
Outdoor emergency disconnect	One- and two-family dwellings must have an emergency disconnecting means in a readily accessible outdoor location, on the dwelling or within sight of it, marked "EMERGENCY DISCONNECT" with white letters on red, at least ½ in. high. No separate emergency disconnect is required if the service disconnect itself is outdoors on or within sight of the house.	225.41 (2023: 230.85)
Service disconnect location, replacements	NEC 2026 requires the service disconnect for one- and two-family dwellings in a readily accessible outdoor location, unless an emergency disconnect is installed under 225.41. When the service equipment of a one- or two-family dwelling is replaced, this rule applies, so the replacement must put the disconnect outdoors or add a 225.41 emergency disconnect. If only the meter socket, service entrance conductors, or raceways are replaced, it does not. Count the outdoor disconnect or the emergency disconnect on every service replacement.	230.70(A)(1) and its exception; 230.70(E)
Service conductor size	For a 120/240 V single-phase dwelling service supplying the whole house, Table 310.12(A) allows 2/0 copper or 4/0 aluminum for 200 A, and 4 copper or 2 aluminum for 100 A, when no adjustment or correction factors apply.	310.12(A), Table 310.12(A)
Grounding electrode conductor	Sized from Table 250.66. To rod electrodes only, it need not be larger than 6 AWG copper.	250.66, 250.66(A)
Rod electrodes	At least 8 ft in contact with soil. A single rod needs a supplemental electrode unless it measures 25 ohms or less. Multiple rods at least 6 ft apart.	250.53(A)(2) through (A) (4)
Bonding of water and gas piping	Metal water piping and other metal piping likely to become energized must be bonded.	250.104
AFCI on extended circuits	If moving the panel means extending branch circuits more than 6 ft, or adding outlets or devices, those circuits in AFCI areas need AFCI protection.	210.12(E) (2023: 210.12(D))
Working space	Clear space in front of the new panel.	110.26

Alabama Power and NEC together. Alabama Power's external-disconnect rule and NEC 225.41 point the same way. In practice, YES's usual service change in Alabama Power territory

uses a meter-main or a meter base with an outdoor disconnect. Your journeyman will tell you which equipment YES uses. Count it accordingly.

Step B4. Panel and service count checklist

Every line gets a count, "not needed," or "by others."

#	Item	What to count or note
1	Load calculation	Done? By whom? Result in amps. (R-LOAD)
2	New panel or meter-main	Brand, series, bus amps, main amps, number of spaces, indoor or outdoor
3	Branch breakers	List every existing circuit and the new breaker for it: amps, poles, type. Note which circuits get AFCI, GFCI, or dual-function breakers and why. Check the AC condenser circuit: 210.8(F) outdoor-outlet GFCI applies to it in NEC 2026 now that Exception No. 2 has expired (September 1, 2026). Ask your journeyman how the AHJ is handling it.
4	Meter base	Reuse, replace, or provided by utility. Amps. Ring or ringless.
5	Outdoor disconnect or 225.41 emergency disconnect	Required on a service replacement by 230.70(A)(1) and (E) unless the service disconnect itself is outdoors. Type and rating.
6	Service entrance conductors	Type, size, length (meter to disconnect, disconnect to panel), copper or aluminum
7	Mast, weatherhead, riser	Overhead: mast size, length, roof flashing, guy if required. Underground: riser conduit size and length.
8	Service drop clearance	Note anything that looks too low or too close to a window. The utility decides; flag it.
9	Grounding electrodes	Number of rods, clamps, length of GEC. Concrete-encased electrode present or not.
10	Water and gas bonding	Length and size of bonding jumper, clamps, water meter jumper
11	SPD	Type 1 or Type 2, breaker if it lands on one
12	Emergency disconnect label	Count labels and the location plaque if other sources exist (generator, solar)
13	Branch circuit extensions	Count circuits that must be extended because the panel moves or the conductors are short. Count splices, junction boxes, and feet of wire.
14	Circuits needing AFCI because they are extended	Count (210.12(E))
15	Panel location changes	Feet moved, new wall framing, new backer
16	Drywall, paint, siding repair	YES or by others; size of the opening
17	Temporary power	Does the customer need power during the change (medical equipment, freezer)? Generator rental?
18		Office handles; note anything the AHJ is known to require

#	Item	What to count or note
	Permit and inspection	
19	Utility actions	Disconnect, reconnect, new meter, meter socket from utility, relocation
20	Smoke alarm upgrades	Note existing alarms. Ask the office whether the AHJ requires alarm upgrades with this permit. (Part G)
21	Panel directory and labels	New directory, "SERVICE DISCONNECT" marking, arc-flash or other labels the AHJ wants
22	Disposal	Old panel, meter base, cable

Step B5. Hours for panel and service work

Break the hours into these tasks. Write the number of people for each.

Task	Notes
Pre-job: protect floors, set up, confirm utility disconnect	
Demo: remove breakers, wires, old panel	Label every circuit before removal
Set new panel or meter-main	Include backer board and framing if needed
Service entrance conductors, mast or riser, meter base	Service change only
Land and dress branch circuits	Count circuits. Old houses with short wires take longer per circuit.
Extend short circuits	Count splices
Grounding electrodes and bonding	Rod driving depends on soil; Birmingham red clay with rock is slow
SPD	
Labeling, directory	
Inspection	Time on site with the inspector
Utility reconnect, test every circuit, restore	
Cleanup, walkthrough	

YES does not have published labor units for this course. Ask the office for actual hours on the last five panel changes and service changes before you write hours, and apply R3.1 factors for the panel's location, the house's age, and occupancy.

Part C: Standby Generator

What the job includes

A home standby generator system has the generator on a pad outside, a fuel supply (natural gas or propane), an automatic transfer switch (ATS), the wiring between them, and often load-management modules that keep large loads such as AC units and water heaters from overloading the generator. R1.10 teaches the install. The manufacturer's installation manual controls clearances, pad, fuel, and wiring (NEC 110.3(B)).

The curriculum's field exercise counts a 22 kW standby with an ATS and two load-shed modules. That is a common setup for an average house. The office decides the size from the load calculation and the customer's goals.

Step C1. Pick the location with the manufacturer's rules in hand

1. Open the installation manual for the generator model the office expects to use. Find the clearance section: distance from windows, doors, vents, and other openings; distance from the house wall; space for service access; and anything about combustible materials above.
2. Find a spot that meets those clearances and is as close as practical to both the gas meter and the electrical service.
3. Measure from the spot to each window, door, and vent within about 10 ft, and to the gas meter and the service. Write each measurement on the sketch.
4. Check what is overhead: eaves, a deck, a window above.
5. Check drainage. Avoid low spots where water stands.

Safety: carbon monoxide. A generator's exhaust contains carbon monoxide. The manufacturer's clearances from windows, doors, and vents exist to keep exhaust out of the house. Never propose a spot that violates them to shorten a run.

Step C2. Generator count checklist

#	Item	What to count or note
1	Generator	Size (kW), fuel type, model the office expects. Note that a generator's natural gas output rating is usually lower than its propane rating; read the spec sheet.
2	Pad	Manufacturer pad or poured pad; who provides; site prep. Usually by others or included with the unit.
3	Fuel	Gas line from meter to generator: by others (licensed gas contractor or plumber). Note distance. Note whether the gas meter is large enough; the gas utility decides. For propane, tank size and location by others.
4	ATS	Amp rating, service-rated or not, indoor or outdoor, where it mounts. Whole-house (service-rated, at the meter) or load-side (feeding a subpanel).
5	Load management	Number of load-shed modules and what each controls: AC 1, AC 2, water heater, range, dryer. Note thermostat-based load control if the system uses it.
6	Generator output conductors	Size and length, generator to ATS. Conduit type and size. Underground or surface.
7	Control wiring	Number of conductors and length, generator to ATS. Separate conduit if the manual requires it.
8	Trench	Length, depth (Part H), what it crosses, who digs.
9	Conduit and fittings	Feet, size, elbows, LBs, straps, sealing at the house
10	Disconnect at the generator	Most units have one built in; confirm
11	Battery	Usually not included with the unit; count it
12	Utility 120 V circuit to generator	Many units need a 120 V circuit for the battery charger and heaters; count breaker, cable, and route. An outdoor outlet on a dwelling needs GFCI protection under 210.8(F); count a GFCI breaker or device unless the manual and your journeyman say otherwise.
12a	Outdoor HVAC outlets touched by the job	If the job replaces or rewires the AC condenser circuit (for example, adding a load-shed module or moving it to a new panel), check GFCI protection for that outdoor outlet. 210.8(F) Exception No. 2 for outdoor HVAC equipment expired September 1, 2026, and 210.8 says that when equipment supplied by a covered outlet is replaced, the outlet must be GFCI protected. Count the GFCI breaker.
13	Panel changes	If the existing panel must be replaced or rearranged for the ATS, that is a Part B count too
14	Grounding	GEC and bonding at the ATS if it is service equipment
15	Signs and plaque	702.7 sign at the service showing the standby system and its disconnect; 225.41(B) plaque if the disconnects are not together

#	Item	What to count or note
16	Permit and inspection	Electrical, and gas (by the gas contractor)
17	Startup	Manufacturer startup procedure, exercise schedule, Wi-Fi or app setup, customer training
18	Smoke alarm upgrades	Ask the office whether the AHJ requires them with this permit (Part G)

Step C3. Code items that come with a generator

Item	Requirement	NEC 2026
Transfer equipment	Required for every optional standby system, listed, and installed so the sources cannot be connected together. A transfer switch mounted between the meter and the meter enclosure must be a listed meter-mounted transfer switch and approved.	702.5(A), 702.5(B)
Capacity with automatic transfer	If load connects automatically, the generator must carry the full load connected, or an energy management system must manage the load.	702.4(A)(2)
Signs	One- and two-family dwellings need a permanent label at the service location showing where the standby system disconnect or shutdown is.	702.7(A)(1)
Other-source plaque	Where other-source disconnects are not next to the emergency disconnect, a plaque or directory showing where they are.	225.41(B)
Burial depth	Per Table 300.7(A) (2023: Table 300.5). Part H below.	300.7

Step C4. Hours for a generator

Break hours into: layout and pad check, setting the unit (often with a second person and a dolly or small equipment), ATS mounting and service-side work, conduit and trench work (if YES digs), conductor pull and terminations, control wiring, load-shed modules (count each), battery and 120 V circuit, startup and testing, signs and labels, customer training, cleanup. Ask the office for actual hours on the last five generator jobs.

Part D: EV Charger

What the job includes

A Level 2 charger is either hardwired or plugged into a 240 V receptacle (commonly a NEMA 14-50). R1.11 teaches the install. The charger's installation manual sets the breaker size, the conductor size, and whether the unit must be hardwired at a given current setting.

The curriculum's field exercise counts a 48 A charger in the garage.

Step D1. Know the numbers for a 48 A charger

Item	Rule	NEC 2026
Individual branch circuit	Each outlet supplying EVSE over 16 A or over 120 V gets its own branch circuit.	625.40
Continuous load	EVSE is a continuous load. The breaker and conductors must be sized at 125 percent of the charger's rated current. For 48 A, $48 \times 1.25 = 60$ A.	625.41, with 210.19 and 210.20
Conductors	Must have ampacity of at least 60 A at the termination temperature the equipment allows. From Table 310.16: 6 AWG copper is 55 A at 60°C and 65 A at 75°C. 4 AWG copper is 70 A at 60°C. NM cable is limited to the 60°C column (334.80), so 6 AWG NM-B does not work for 60 A; 4 AWG NM-B or 6 AWG THHN/THWN-2 in conduit with 75°C terminations at both ends does. Follow the charger manual.	310.16, 334.80, 110.14(C)
Service and feeder capacity	The service and feeders must be able to carry the charger load, or a listed power control system must limit it.	625.42
Load calculation	The EVSE load is counted in the dwelling load calculation.	120.57 (2023: 220.57)

Why 6 AWG NM-B fails here. NM cable must use the 60°C ampacity column no matter what the conductor insulation is rated (334.80). At 60°C, 6 AWG copper is 55 A. A 60 A breaker on 55 A conductors leaves the wire unprotected. This is one of the most common mistakes on charger counts.

Step D2. EV charger count checklist

#	Item	What to count or note
1	Charger	Customer-supplied or YES-supplied, brand and model, max amps, hardwired or plug-in
2	Charger setting	The current setting the charger will be set to, which decides breaker and wire
3	Breaker	Amps, 2-pole, brand and type matching the panel. GFCI if the outlet type or the AHJ requires it (R1.11).
4	Panel capacity	Load calc result (R-LOAD). Open spaces for a 2-pole breaker.
5	Conductors or cable	Type and size from Step D1 and the manual, length measured along the route
6	Raceway	Conduit type, size, length, fittings, if not cable
7	Receptacle (if plug-in)	NEMA type, heavy-duty rated, cover
8	Mounting	Height and location from the manual, cord reach to the car's charge port
9	Disconnect	Required by the manual or 625.43 for higher-rated EVSE; confirm (R1.11)
10	Load management	If the panel cannot carry the load, a power control system or load-share device is an option the office can price
11	Panel upgrade	If the load calc fails, the job includes Part B
12	Outdoor or detached garage	Trench, burial depth (Part H), feeder or branch circuit, grounding at the outbuilding
13	Drywall repair	If the route crosses finished walls
14	Wi-Fi and app setup	Who does it; customer training
15	Permit and inspection	Office handles
16	Utility rebate paperwork	If any; office handles

Step D3. Hours for an EV charger

Break hours into: panel work and breaker, the cable or conduit run (with R3.1 factors for attic, finished walls, or trenching), mounting, terminations, setup and commissioning, testing with the car if available, cleanup.

Part E: Whole-House Surge Protective Device

What the job includes

A Type 1 or Type 2 SPD installed at the service equipment. On a service replacement, it is required (230.67). On an existing service, it is an add-on the customer may want. R1.9 teaches the install.

Step E1. SPD count checklist

#	Item	What to count or note
1	SPD	Type 1 or Type 2, nominal discharge current rating of at least 10 kA (230.67(E)), brand and model. Panel-brand plug-in type or separate unit.
2	Breaker	If the SPD lands on a breaker: size and type the SPD manual calls for, and an open 2-pole space
3	Location	Inside the panel, or mounted beside it. Leads as short and straight as the manual requires.
4	Knockout and nipple	If mounted outside the panel
5	Open spaces	If the panel is full, a tandem or rearrangement plan, or a panel job
6	Grounding check	Confirm the service has a working grounding electrode system and bonding. An SPD with a poor ground does less. (R1.6, R1.9)
7	Point-of-use protection	Customer may want plug-in surge strips for electronics. Note it; do not sell it as a replacement for the service SPD.

Step E2. Hours for an SPD

On an existing panel with an open space, this is a short job: shutdown or live work per YES rules (R1.1), mount, land, label, restore, test the status light. Add time if the panel needs rearranging or the grounding needs repair.

Part F: Lighting Package

What the job includes

The curriculum's field exercise counts a six-can kitchen lighting package. A "can" here means a recessed luminaire: either a housing with a trim, or a canless LED wafer that mounts in a hole in the drywall with a remote driver box. R1.7 teaches the install.

Step F1. Lay out before you count

1. Measure the room: length, width, ceiling height.
2. Mark the cabinets, island, sink, range hood, and any beams or soffits.

3. Look above the ceiling. Is there an attic over the kitchen, or a second floor? If a second floor, every hole is a fishing job (R3.1, Part F3).
4. Note the joist direction. It decides how cable runs between holes.
5. Note insulation in contact with the ceiling. Any recessed housing in contact with insulation must be IC-rated, and non-IC housings need clearance from insulation (410.116). Canless wafers are usually rated for insulation contact; confirm on the product.
6. Mark the six locations on a sketch with dimensions from walls.
7. Note the switch location(s). One switch or two (3-way)? Dimmer? The dimmer must be compatible with the fixtures (R2.6).

Step F2. Lighting package count checklist

#	Item	What to count or note
1	Fixtures	Count: 6. Type: housing plus trim, or canless wafer with junction box. Size (4 in., 6 in.). IC rated. Color temperature if the customer chose.
2	Dimmer or switch	Model compatible with the fixtures; 3-way pair if two locations
3	Switch box	New or existing; old-work box if new; extension ring if box fill requires (314.16)
4	Circuit	Existing lighting circuit with capacity, or new circuit. Clamp or total the existing load.
5	AFCI	Kitchen lighting circuits need AFCI protection when modified, replaced, or extended (210.12(E)). Count the breaker or device.
6	Cable	Feet from switch to first fixture and between fixtures, measured along joists
7	Connectors	Per fixture junction box
8	Removal of existing fixture	The old kitchen fixture, the old box, a blank cover or patch
9	Ceiling holes	Count holes to cut. Count extra access holes if fishing.
10	Drywall patch and paint	By YES or by others. Count patches.
11	Attic work	Insulation to move and restore, temperature factor (R3.1)
12	Under-cabinet lights	If the customer adds them, they are a separate count (R3.3)

Step F3. Hours for a lighting package

Break hours into: layout and marking, cutting holes, cable runs (attic or fishing), installing each fixture (count 6), switch and dimmer, removing the old fixture, testing and dimmer trim adjustment, cleanup of drywall dust. Apply the occupied-house factor if the kitchen is in use.

Part G: Smoke Alarm Upgrade Triggers

Smoke and CO alarm requirements in houses come from the building code the AHJ has adopted, not from the NEC. The NEC covers how the alarms are wired. R1.8 covers the install. Many building departments require existing alarms to be brought up to the current rules when a permit is pulled for certain work, and the rules differ by jurisdiction and edition.

For every one of the five jobs:

1. Note every smoke and CO alarm in the house: location, hardwired or battery, interconnected or not, and age if you can read the date.
2. Ask the office whether the AHJ requires smoke or CO alarm upgrades with this permit.
3. If it does, count the alarms needed to meet the requirement: locations, type (hardwired interconnected or listed wireless interconnected), and any new circuit or cable runs.

Do not tell the customer an upgrade is required unless the office has confirmed it for that AHJ.

Part H: Trenching and Burial Depth

Generators, detached garages with chargers, and underground services all involve trenches. Count the trench separately from the wire.

Step H1. Minimum cover from Table 300.7(A)

Cover means the distance from the top of the cable or raceway to the finished grade. Table 300.7(A) (2023: Table 300.5) sets the minimum for 0 to 1000 V.

Wiring method	"All locations not specified" in the table
Direct-burial cable (such as UF)	24 in.
Rigid metal conduit or IMC	6 in.
Nonmetallic raceway listed for direct burial (such as Schedule 40 or 80 PVC)	18 in.
Residential branch circuit, 120 V or less, GFCI protected, 20 A or less	12 in.
Irrigation and landscape lighting, 30 V or less, UF or identified cable	6 in.

Other rows in the table (under a driveway, under a building, in a trench below 2 in. of concrete) have different numbers. Read the whole table for your route.

Alabama Power's own requirement for a permanent underground service is conduit 24 in. below grade up to the meter socket ("Builders & Developers" page, cited in Part B).

Step H2. Trench count

Item	What to count
Length	Feet, measured along the route
Depth	From Table 300.7(A) for the wiring method, plus the conduit size
What it crosses	Driveway, walk, sprinkler lines, other utilities
Who digs	YES, a subcontractor, or by others
Locate request	Underground utilities must be marked before digging. The office handles the request through Alabama 811 (Part I).
Restoration	Sod, gravel, concrete patch; who does it

Safety: dig safely. Never dig until the underground utilities have been marked. Gas lines, power, water, and communications cables can be at any depth. Hand-dig near marks.

Part I: The Missed-Items Sweep

Before you hand off any of the five counts, read this list and mark each line "counted," "not needed," or "by others." Commercial Module 3.1 calls this sweeping the whole set.

#	Item	Applies to
1	Utility disconnect and reconnect, and lead time (up to 3 business days per Alabama Power)	Panel, service, generator (whole-house ATS)
2	Utility reconnection charge	Panel, service
3	Meter socket: reuse, replace, utility-provided	Service, generator (meter-mounted ATS)
4	External disconnect on new meter base (Alabama Power since 1/1/2022); outdoor service disconnect or 225.41 emergency disconnect on a service replacement (230.70(A)(1), 230.70(E))	Service
4a	GFCI for outdoor outlets the job installs or touches, including AC condenser circuits and the generator's 120 V circuit (210.8(F); Exception No. 2 for outdoor HVAC expired September 1, 2026)	Service, generator, panel
5	Permit and inspection; number of inspection visits	All
6	Load calculation	Panel, service, generator, EV charger
7	Grounding electrodes and bonding	Service, generator (service-rated ATS)
8	SPD (230.67 on service replacement)	Service; option on all others
9	Emergency disconnect and other-source plaque (225.41)	Service, generator
10	Standby sign (702.7)	Generator
11	AFCI on extended or modified circuits (210.12(E))	Panel, lighting
12	Trenching, locate request, restoration	Generator, detached garage charger, underground service
13	Gas line, gas meter capacity, pad: by others	Generator
14	Battery and 120 V circuit to generator	Generator
15	Drywall, paint, siding, roofing repair	All
16	Smoke and CO alarm upgrades if the AHJ requires them	All permitted work
17	Temporary power during the work	Panel, service
18	Startup, app setup, customer training	Generator, EV charger, smart dimmers
19	Disposal of old equipment	Panel, service, lighting
20	Labels and directory	All

Part J: The Photo Set

The office should be able to price the job without a second visit. Take these photos for every count, plus the job-specific ones.

Photo	All jobs	Panel/ service	Generator	EV charger	SPD	Lighting
House, each side, wide	✓					
Panel: closed, open, label	✓					
Panel schedule and open spaces	✓					
Meter base and drop or riser		✓	✓		✓	
Mast and roof penetration		✓				
Grounding electrode conductor and connection		✓	✓		✓	
Water and gas bonding		✓	✓			
Gas meter with house wall			✓			
Proposed generator spot, with tape showing distances to windows and vents			✓			
AC condenser(s) and nameplates		✓	✓	✓		
Water heater, range, dryer nameplates		✓	✓	✓		
Charger location with the car's charge port side				✓		
Route: attic, crawl, garage wall		✓	✓	✓		✓
Kitchen ceiling, wide, and the attic above						✓
Existing switch box with cover off (power off)						✓
Smoke and CO alarms	✓					

Number the photos in the order the sketch refers to them.

Worked Example: The Five Counts on One House

The house. 1978 brick ranch, about 1,800 sq ft, attached two-car garage, crawl space, attic over the whole house with pull-down stairs in the garage. Overhead service on the left side wall, 100 A meter base and a 100 A main panel in the garage. Gas meter on the back wall near the

left corner. One 3-ton AC condenser on the right side. Electric water heater, gas range, electric dryer. Six battery smoke alarms, not interconnected. The customer wants prices on all five jobs.

Count 1: Service change, 100 A to 200 A

Load calc. The office's calculation (R-LOAD) supports 200 A with the planned generator and EV charger.

#	Item	Count
2	Meter-main, 200 A, outdoor, with spaces for the SPD	1 (type per journeyman)
2	Indoor 200 A main-lug panel in the garage at the existing location, 40 spaces	1
3	Branch breakers	18 existing circuits re-landed: 11 single-pole 15 A, 3 single-pole 20 A, 4 two-pole (dryer 30 A, water heater 30 A, AC 40 A, spare). New breaker types per panel brand.
4	Meter base	Replaced by the meter-main; ask office whether Alabama Power supplies the socket portion or YES provides from the approved list
5	Outdoor disconnect	Part of the meter-main
6	Service entrance conductors	Meter-main to the indoor panel feeder: 4 conductors (2 hots, neutral, ground), 12 ft through the wall into the garage
7	Mast	New 2 in. mast through the roof, 10 ft, roof flashing boot, weatherhead
9	Grounding electrodes	2 rods, 6 ft apart minimum, 2 acorn clamps, 25 ft of 6 AWG copper GEC
10	Water bonding	4 AWG copper to the water service (copper piping found in crawl), 30 ft; water meter jumper not needed (meter at street)
10	Gas bonding	Per AHJ and R1.6
11	SPD	1 Type 2 in the meter-main or panel, 2-pole breaker if required
12	Labels	"EMERGENCY DISCONNECT" label at meter-main, "SERVICE DISCONNECT" marking, directory
13	Circuit extensions	None; indoor panel stays at the same location
16	Siding and brick	Core through brick for the new feeder: 1 hole
17	Temporary power	Customer has a chest freezer; plan the outage for one morning
19	Utility	Disconnect, reconnect, new meter. Reconnection charge per Alabama Power rules. Lead time up to 3 business days.
20	Smoke alarms	Office to confirm whether the AHJ requires upgrades with this permit
22	Disposal	Old panel, meter base, SE cable

Count 2: 22 kW standby generator with ATS and two load-shed modules

#	Item	Count
1	Generator	22 kW air-cooled, natural gas, model per office
2	Pad	Manufacturer composite pad, included with unit; site leveling by YES (0.5 hours)
3	Gas line	By others, 8 ft from gas meter; gas utility to confirm meter capacity
4	ATS	200 A service-rated, outdoor, mounted beside the meter-main, or a meter-main/ATS combination if the journeyman chooses that equipment
5	Load management	2 modules: AC condenser and water heater
6	Output conductors	32 ft run, sized per manual and ATS rating
7	Control wiring	Per manual, same trench, separate raceway if required
8	Trench	32 ft, 18 in. cover for PVC (Table 300.7(A)), crosses no driveway; YES to hand dig; locate request by office
9	Conduit	32 ft PVC plus 2 risers, 4 elbows, LB at house, straps
11	Battery	1
12	120 V circuit to generator	1 single-pole 20 A breaker, cable in the same trench per manual
15	Signs	702.7 standby label at service; 225.41(B) plaque if not grouped
17	Startup	Manufacturer startup, exercise schedule, app setup, customer training

Sketch: as in the Part A5 image. Photos 1 to 14 on the job board.

Count 3: 48 A EV charger in the garage

#	Item	Count
1	Charger	Customer-supplied, hardwired, 48 A max
3	Breaker	1 two-pole 60 A, panel brand ($48 \times 1.25 = 60$)
4	Panel capacity	Covered by the 200 A service change and load calc
5	Conductors	6 AWG THHN/THWN-2 copper (65 A at 75°C) in conduit, terminations rated 75°C at both ends per manual, 2 hots plus ground (no neutral per manual): 3 conductors $\times$ 22 ft
6	Raceway	22 ft $\frac{3}{4}$ in. EMT on the garage wall, connectors, straps
8	Mounting	Garage front wall, driver side, 48 in. to bottom of unit per manual
14	Setup	Wi-Fi setup and current setting at 48 A

Count 4: Type 2 SPD

Included in Count 1 because the service change requires it (230.67(D)). If the customer does not do the service change, the SPD is a separate count on the existing 100 A panel: 1 Type 2 SPD, 1 two-pole breaker, and a panel space. The existing panel has one open space; the SPD needs two. The count says: "Requires moving circuit 18 to a tandem if the panel label allows tandems in that slot. Label checked: not allowed. SPD on the existing panel requires a panel job."

Count 5: Six-can kitchen lighting package

#	Item	Count
1	Fixtures	6 canless 6 in. LED wafers, IC rated, 3000K per customer
2	Dimmer	1 LED-compatible dimmer, single-pole
3	Switch box	Existing single-gang at the kitchen entry; box fill checked against 314.16 with the new cable: needs a 1-gang old-work box swap
4	Circuit	Existing kitchen lighting circuit 5, 15 A, clamped at 1.2 A with all lights on. Capacity fine.
5	AFCI	Circuit 5 modified: 1 AFCI breaker (or dual-function) matching the panel (210.12(E))
6	Cable	14/2 NM-B: switch to first fixture 18 ft, between fixtures 5 × 6 ft = 30 ft, plus slack and 10 percent: 55 ft
8	Removal	1 existing fluorescent fixture, box to be used as the first junction or blanked
9	Holes	6 fixture holes; attic above, no fishing holes needed
10	Patch	Old fixture footprint: by others (customer's painter)
11	Attic	Move and restore insulation at 6 locations; August: attic factor × 1.40 per R3.1

The hand-off

Five scope sheets, one per job, each with its options, factors, and assumptions, plus the shared photo set and the generator sketch. The scope for Count 1 notes that Counts 2, 3, and 4 depend on it. The office prices each one separately and as a package.

Common Mistakes

1. **Counting the panel and forgetting the service.** If the meter base, mast, or SE conductors cannot stay, it is a service change. Look outside before you count inside.
2. **Forgetting the utility.** Disconnect, reconnect, lead time, the meter socket, and the reconnection charge are all part of a service job.
3. **Missing the external disconnect.** Alabama Power has required one on new residential meter bases since January 1, 2022. NEC 2026 230.70(A)(1) and (E) require the service disconnect outdoors on a service replacement unless a 225.41 emergency disconnect is installed.

4. **Missing GFCI on outdoor outlets.** The generator's 120 V circuit and any AC condenser circuit the job replaces or rewires need GFCI protection under 210.8(F). The outdoor-HVAC exception expired September 1, 2026.
 5. **Missing the SPD on a service replacement.** 230.67(D) applies the SPD rule when service equipment is replaced.
 6. **Missing grounding electrodes and bonding.** Every service change includes them.
 7. **Sizing a charger circuit from the charger's amps instead of 125 percent.** A 48 A charger needs a 60 A circuit (625.41).
 8. **Using 6 AWG NM-B on a 60 A circuit.** NM is limited to 60°C ampacity (334.80); 6 AWG copper at 60°C is 55 A.
 9. **Placing a generator by eye.** Open the manual and measure clearances to every window, door, and vent.
 10. **Counting the gas line as YES's.** Gas piping is by others. Count the distance so the office can coordinate.
 11. **Forgetting the trench, its depth, and the locate request.**
 12. **Counting cans without looking in the attic.** A second floor above the kitchen turns six holes into a fishing job.
 13. **Forgetting AFCI on a modified lighting circuit.** 210.12(E).
 14. **Promising smoke alarm upgrades are or are not required.** That is the AHJ's call. The office confirms it.
 15. **Sending a count without a sketch.** The office cannot price a generator or trench from a list alone.
-

Field Exercise: All Five Counts in One Visit

Setup. Your journeyman picks one real house, either a customer who asked for prices or a cooperative house. You produce all five counts in one visit:

1. A panel change or service change (whichever the house needs).
2. A 22 kW standby generator with an ATS and two load-shed modules.
3. A 48 A EV charger in the garage.
4. A Type 2 SPD.
5. A six-can kitchen lighting package.

Step 1. Prepare. Print or open the five count checklists (Parts B through F), the missed-items sweep (Part I), and the photo table (Part J). Get the generator and charger manuals for the models the office expects to use.

Step 2. Walk outside. Photograph every side of the house, the service, the gas meter, the AC unit, and the likely generator and charger spots. Measure every distance the sketch needs.

Step 3. Walk inside. Photograph the panel and label, write the panel schedule, photograph the grounding and bonding, check the attic and crawl routes, note the smoke and CO alarms, and photograph the kitchen ceiling and the attic above it.

Step 4. Sketch. Draw the site sketch with every item in Part A, Step A5.

Step 5. Count. Fill in every line of every checklist with a count, "not needed," or "by others." Fill in the missed-items sweep.

Step 6. Hours. For each of the five counts, write hours by task with R3.1 factors and the reason for each factor. Write the number of people for each task.

Step 7. Scope sheets. Write five scope sheets in the R3.1 format, with options where they make sense, and note which counts depend on others (for example, the charger depending on the service change).

Step 8. Hand off. Give all five to the office the same day, with the photos and the sketch.

Step 9. What did you miss? The office prices all five and returns a list of everything it had to ask you or assume. For each item on that list, write which checklist line should have caught it. Your journeyman reviews the list with you.

Pass standard. You pass when the office can price all five counts without a second visit, every checklist line is filled in, the sketch shows every item in Step A5 with distances, the code items in Steps B3, C3, and D1 are counted where they apply, the hours are broken out by task with factors explained, and the "what did you miss" list has three items or fewer.

NEC 2026 Cross-References

Section	Topic	Used in
110.3(B)	Install per listing and manufacturer instructions	Generator, charger, SPD
110.14(C)	Terminal temperature ratings decide which ampacity column applies	Charger conductors
110.26	Working space at the panel	Panel, service
120.57 (2023: 220.57)	EVSE load in load calculations	Charger
210.12(E) (2023: 210.12(D))	AFCI on modified, replaced, or extended branch circuits	Panel, lighting
225.41 (2023: 230.85)	Outdoor emergency disconnect for one- and two-family dwellings, marking, other-source plaque	Service, generator
230.67	SPD required on dwelling services, Type 1 or 2, at least 10 kA, applies on replacement	Service, SPD
230.70(A)(1), 230.70(E)	Service disconnect location for one- and two-family dwellings; applies when the service equipment is replaced	Service
210.8(F)	GFCI for outdoor outlets at dwellings; Exception No. 2 for outdoor HVAC expired September 1, 2026	Generator, panel, service
250.53	Rod electrodes, supplemental electrode, 25 ohm exception, 6 ft spacing, 8 ft contact	Service
250.66, 250.66(A)	GEC size; 6 AWG copper maximum required to rods only	Service
250.104	Bonding metal water piping and other metal piping	Service
300.7, Table 300.7(A) (2023: 300.5, Table 300.5)	Underground cover depths	Generator, detached garage charger, underground service
310.12, Table 310.12(A)	Dwelling service and feeder conductor sizes	Service
310.16	Ampacity table	Charger, generator conductors
314.16	Box fill	Lighting switch box
334.80	NM cable ampacity at 60°C	Charger
410.116	Recessed luminaire clearance and insulation	Lighting
625.40, 625.41, 625.42	EV individual branch circuit, continuous load, rating and power control	Charger

Section	Topic	Used in
702.4(A)(2)	Standby capacity with automatic transfer	Generator
702.5	Transfer equipment; meter-mounted transfer switches	Generator
702.7(A)(1)	Standby sign at the service for dwellings	Generator

End-of-Chapter Checklist

Before the visit - ☐ Ticket read; jobs listed. - ☐ Checklists, sweep, and photo table ready. - ☐ Generator and charger manuals for the expected models in hand. - ☐ Load calculation requested from the office for panel, service, generator, or charger.

Outside - ☐ Each side of the house photographed. - ☐ Service, meter base, mast or riser photographed. - ☐ Gas meter, AC unit, windows, doors, vents near the generator spot measured. - ☐ Trench route walked and measured.

Inside - ☐ Panel photographed closed, open, and label. - ☐ Panel schedule written with open spaces. - ☐ Grounding and bonding photographed. - ☐ Attic and crawl routes checked in person. - ☐ Smoke and CO alarms noted.

Counts - ☐ Every checklist line has a count, "not needed," or "by others." - ☐ Utility items listed: disconnect, reconnect, lead time, meter socket, external disconnect, reconnection charge. - ☐ Code items counted: SPD, outdoor service disconnect or emergency disconnect (230.70(E)), GFCI on outdoor outlets (210.8(F)), grounding electrodes, bonding, AFCI on extended circuits, standby sign, plaque. - ☐ Charger circuit sized at 125 percent with the right conductor and ampacity column. - ☐ Generator placed by the manual's clearances, measured. - ☐ Trench length, depth from Table 300.7(A), and locate request listed. - ☐ Gas line, pad, drywall, and paint marked "by others" where they are. - ☐ Smoke alarm upgrade question sent to the office.

Hours and hand-off - ☐ Hours by task, with factors and reasons, and number of people. - ☐ Sketch with distances and photo numbers. - ☐ Five scope sheets in the R3.1 format. - ☐ Dependencies between counts noted. - ☐ Handed to the office the same day. - ☐ No prices anywhere; no payment collected.

Sources

- Alabama Power, "Builders & Developers," <https://www.alabamapower.com/business/business-customers-and-services/builders-developers.html> (disconnect and reconnect lead time, meter height, relocation notice, inspection release, underground conduit depth and straps).
- Alabama Power, "Residential Metering Procedure," <https://www.alabamapower.com/content/dam/alabama-power/pdfs-docs/business/Residential-Metering-Procedure.pdf> (external disconnect on new residential meter bases, enforced from January 1, 2022).

- Alabama Power, Rules and Regulations for Electric Service, <https://www.alabamapower.com/content/dam/alabama-power/pdfs-docs/Rates/APCRulesRegulations.pdf>, secs. 1.11, 1.13, 4.5.
 - Jesse Kuhlman, Residential Electrical Troubleshooting (2019)pp. 41–42 (SE cable and water in the meter socket), p. 107 (water-damaged panel photo). Paraphrased.
 - YES Electric commercial course, Module 3.1 (count everything once, sweep the whole set).
 - NFPA 70, National Electrical Code, 2026 edition, sections listed above.
-

Videos to watch

These videos are made by other electricians and companies, not YES Electric. Watch each one after you read the section it goes with. Where a video does something differently from this module, the caution line says so. Follow this module and your journeyman, not the video. Click a title to open it on YouTube.

Section	Video
Part B Step B1 (decide what the job is: panel only, panel and meter socket, meter-main combo, riser, service upgrade) and Step B3 (code items that come with a new service)	Panel Change Pricing!!! TOTAL Break down!!how much is a panel change service upgrade fuse box update Electrical Code Coach • 10:16 Separates the five common versions of the job (panel only; panel and meter socket; meter-disconnect combo; meter, panel, and riser with mast and weatherhead; 100 A to 200 A upgrade) and lists what comes with each, including grounding and bonding, smoke and CO alarms, and the intersystem bonding termination. Caution: Aimed at homeowners with his local 2021-2022 price ranges; ignore the dollar figures. Techs do not quote prices at YES. The Alabama Power items in Step B2 (outside disconnect, reconnect scheduling) are not covered.
Part B Step B5 (hours for panel and service work) and Part I (missed-items sweep): what makes a panel change take longer	Pricing Panel Changes, Electrical Estimating On the Electricians in Action Everyday @ 9:00 am Electrical Code Coach • 12:32 Explains why a panel change ties up a full day (permit, material pickup, ground rods, waiting on the inspector and the power company) and what adds time: a recessed panel in a finished room versus surface-mount in a garage, an occupied house, a meter or riser change, and fittings that break on old equipment. Caution: Owner's pricing talk with example day rates and a 10 to 20 percent material buffer; that part is office work. Use it for the list of conditions that drive hours, which matches the module's factors.
Part C (standby generator): Step C1 location and fuel, whole-house versus critical-load transfer switch, and the low-voltage control wiring to count	What Should You Know Before Installing a Generator? Whole Home or Critical Loads? Electrician U • 25:53 Dustin Stelzer walks a 22 kW Generac install: how the transfer switch interrupts utility power, service-rated transfer switches, battery and fuel source, the six low-voltage control conductors between generator and switch, and the four decisions to settle before installing (location, fuel, whole-home or critical loads, transfer switch type). Caution: Sponsored by Generac and filmed on a Chicago job. Gas line and pad are by others at YES (Part C and Part I). Placement distances must come from the manufacturer's manual for the model, as Step C1 says. Transcript checked for the first third (overview and planning); the install portion was not read in full.

Part D (EV charger):
Steps D1 and D2, the
questions and numbers
for the count (nameplate
amps, hardwired versus
receptacle, 125 percent
circuit sizing, GFCI,
whether the service can
take it)

[What to Know Before Installing EV Chargers](#)

Electrician U • 17:45

Lists what to ask before an EV install: which car and charger, hardwired or plug-in, the nameplate amps (a 48 A unit needs a 60 A circuit with 6 AWG), GFCI for receptacle-connected units, and checking whether the existing service can carry the new load before quoting.

Caution: One passage garbles the receptacle rule (says a 50 A receptacle on a 60 A circuit); a NEMA 14-50 goes on a 50 A circuit at most, so a 48 A charger is hardwired on 60 A as the module says. The last few minutes promote an ABB energy-management product; the module covers power control systems in R1.11 and R-LOAD.