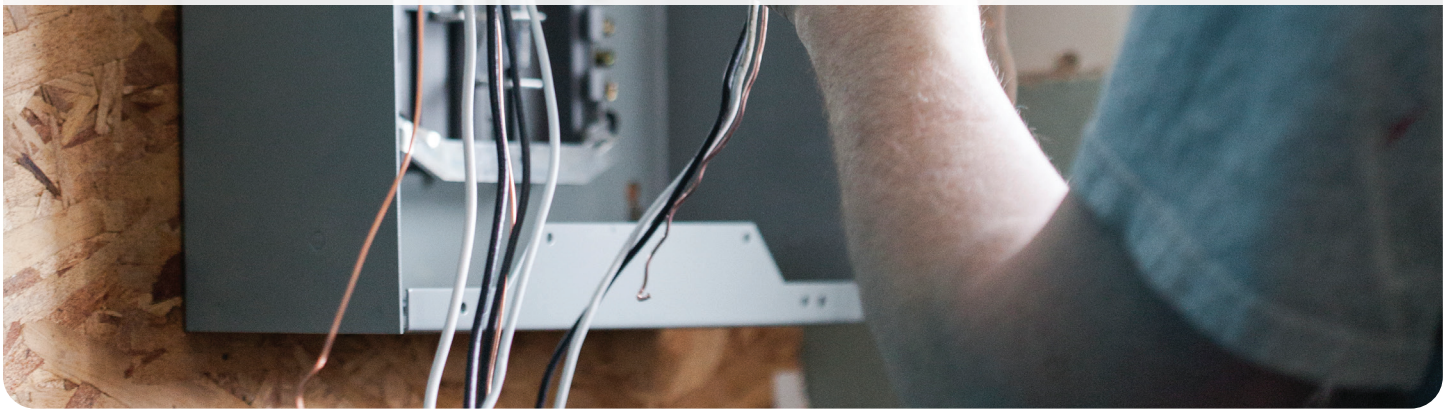
NEW YORK STATE | NYSERDA

The Heat Pump Installer's Guide to Assessing Residential Electrical Service

Best practices and procedures for assessing a home's electrical capacity prior to heat pump installation.



Contents

Understanding Heat Pumps

Heat pumps often lead to increased amperage. Therefore, before installing a heat pump, it is critical to assess the home's electric system capacity. One or more of these additional options may need to be completed. These options can add to the overall cost of the project.

To meet increased demand for heat pumps, installers may need to:

- Upgrade the electrical service amperage from the utility
- Rearrange breakers to create open breaker space in the electric panel
- Replace an outdated electrical distribution panel
- Add a subpanel
- Perform a combination of these options.

What This Guide Will Do

This guide will assist HVAC installers in assessing a home's electrical system before engaging with an electrician or starting the heat pump installation process. This guide includes steps to:

01.
Determine the home's electrical service capacity

02.
Discuss long-term plans for the home

03.
Estimate existing and future peak electrical loads

04.
Provide options to install clean heat in electric-system-constrained homes

05.
Anticipate the electrical work

Important

At no time during your electrical assessment should the protective cover on the home's electrical distribution panel be removed without meeting National Fire Protection Association (NFPA) 70E, the standard for everyone working around electrical equipment, and all applicable OSHA regulations.

Step 01: Determine the Home's Electrical Service Capacity (Amperage)

Every home connected to the power grid receives a specific electrical service capacity from the local utility. It is measured in amperage (amps) and based on the conductor size.

Types of homes that may need more amperage to meet electrical demands of a heat pump:

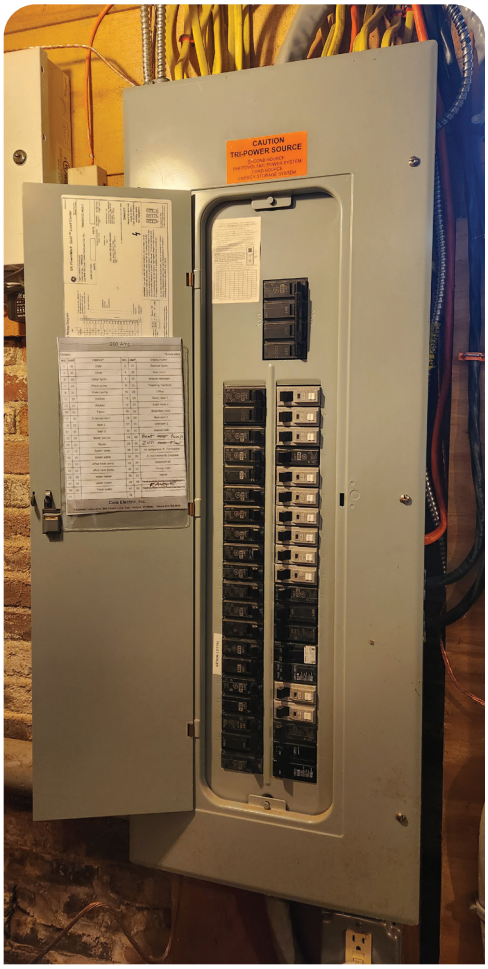
Existing Amperage/Age	Likelihood to Need an Upgrade
<100A or built prior to 1965	Likely needs more amperage
100A, 150A, 200A	Possibly needs more amperage
>200A	Unlikely to need more amperage

Additionally, an upgrade to the utility service may be necessary if these situations are found:

- ***Older homes***, typically built before 1950, **with a fuse box panel** which at most will have 100-amp capacity. Even with 100-amp capacity, this type of panel indicates an underserviced home that may be hiding other electrical issues.
- ***Apartments*** without shared community loads, manufactured homes, and older single-family homes built before 1965 **with less than 100-amp panels**.
- ***Newer homes*** with 100-amp service **with no available breaker slots**. Although load-sharing, tandem breakers, or a subpanel may assist with this issue, a service upgrade is best practice.
- ***Large homes*** with many electrical loads or planning additions may require more than 200-amp service.

To assess service capacity:

- Inspect the main breaker panel.
- Check the amperage on the main breaker switch.
- More than one switch in the leading breaker position? Add up the amperage.



200-amp panel with 40 breaker spaces

Determining if the Home Has at Least 100-Amp Service

When determining service capacity, the panel may not provide sufficient information. If this happens, refer to the chart on the following page.

PRO TIP

Providing Superior Service

Consider the customer's current upgrade and ask about future electrification plans. If the customer is planning electrical upgrades such as solar panels or vehicle charging stations, it will impact the assessment.

Determining 100-Amp Minimum Service Capacity at a Glance

LOOK AT...	YES IF: (ALL OF THE BELOW)	NO IF: (ANY OF THE BELOW)
WEATHER HEAD[1]	THROUGH ROOF OR HIGH ON FLAT WALL	UNDER SOFFITS OR LOW ON FLAT WALL[2]
OUTSIDE METER PANEL	SQUARE/RECTANGULAR	ROUND
ELECTRICAL PANEL	100+AMP MAIN BREAKER EXISTS	MAIN BREAKER ABSENT OR 60/70-AMP MAIN BREAKER

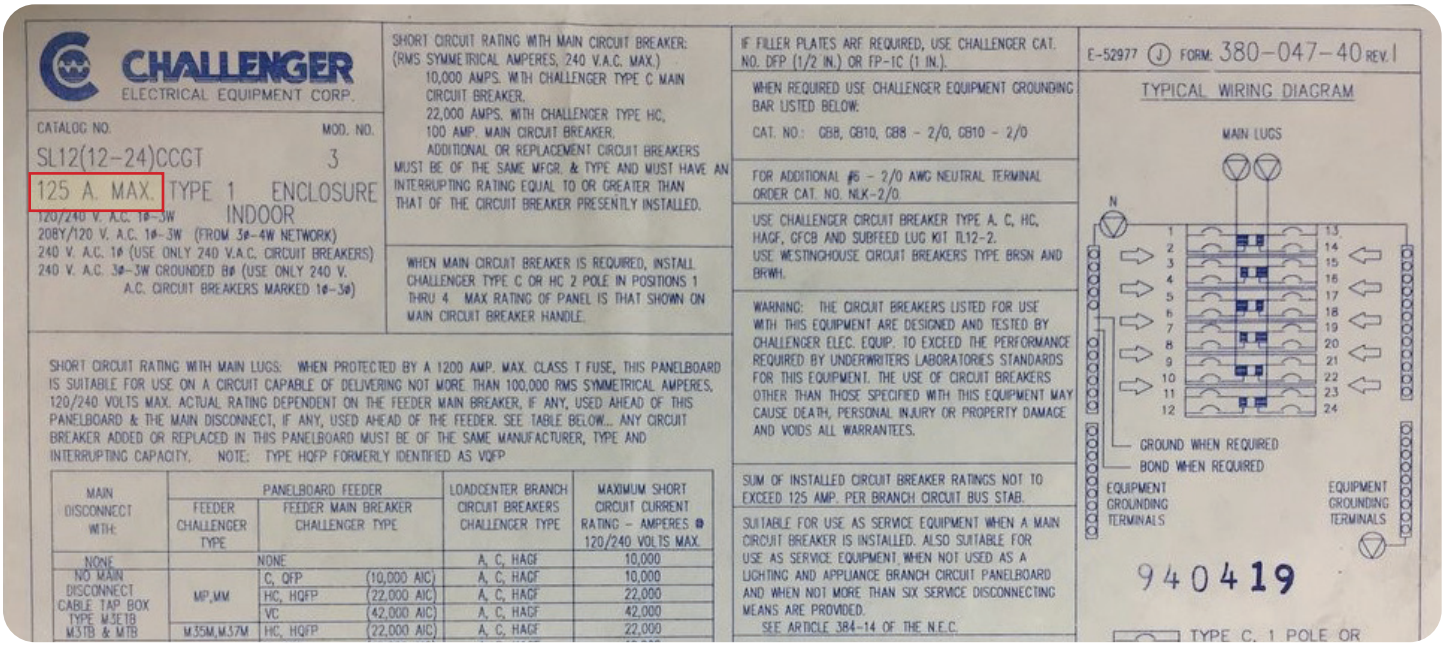
1. Weather head is a weatherproof service drop entry point where overhead power enters a home.
2. This chart may not be sufficient to determine service capacity and an electrician should be contacted for an accurate assessment.

High, Low, and Rated Capacity

If a home was built in the last 50 years, there may be electrical panels that can accommodate higher-capacity service but are wired from lower capacity. For example, an electrical panel with a 200-amp capacity may only be wired from 100-amp service. In such cases, the existing panel can stay when upgrading the service capacity, saving the homeowner replacement costs.

The rated potential capacity of the panel can be found on a sticker or tag inside the door. Alternatively, you can count the breaker spaces.

Twenty spaces indicate 100-amp rated capacity, 30 spaces indicate 150-amp rated capacity, and 40 spaces indicate 200-amps. There are 200-amp panels explicitly designed for tandem or half-space breakers.



Label inside electrical panel

Step 02: Discuss the Homeowner's Long-Term Plans

Before doing work, discuss the homeowner's plans for upgrades and electrification over the next five to ten years.

Consider the peak electrical load of the home, especially if the homeowner is planning to:

- Purchase an electric vehicle
- Install solar panels
- Replace gas appliances with electrical ones

As New York State moves toward electrification, upgraded electrical service may be eligible for upfront rebates and tax incentives and add value to the home at resale.

A homeowner may need to replace a broken or old appliance quickly. If so, the homeowner may be reluctant to upgrade their existing electrical service. Electrical system modifications may provide options for handling the heat pump load in some of these cases.

Current and Future Electrical Service

If the installer notices problems with the home's current electrical system, including scorch marks around outlets, light switches that do not function as expected, lights flickering, or the lack of grounded plugs, bring these items to the homeowner's attention. Tell the homeowner they should seriously consider having an electrician conduct a full assessment and upgrade of the electrical system.

It is more cost-effective to do all necessary electrical work at once.

Step 3: Estimate Existing and Future Peak Electrical Load

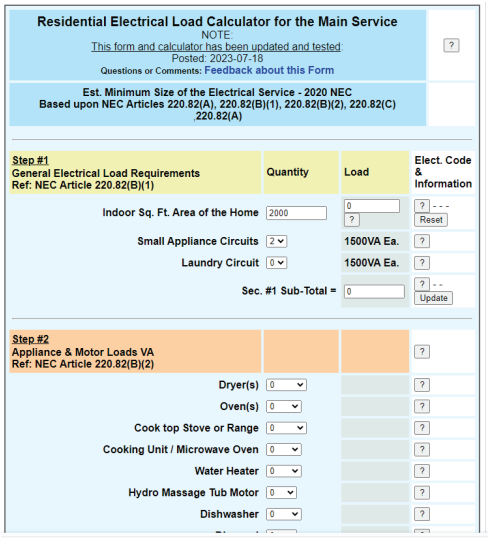
To determine a home's peak electrical load:

- Examine the **branch circuits and electrical loads of existing appliances** throughout the house.
- Access and use an online Electrical Load Calculator aligned to the current NEC guidelines to sum up the existing load.

Although the project's electrician will also perform this calculation, it can be helpful for the HVAC contractor to obtain preliminary results to guide the project scope.

- Enter the anticipated electrical load of the planned heat pump(s) into the calculator. Depending on the heat pump size and style, it can draw up to 60-amps during startup.
- Compare the total peak load with the existing service capacity.

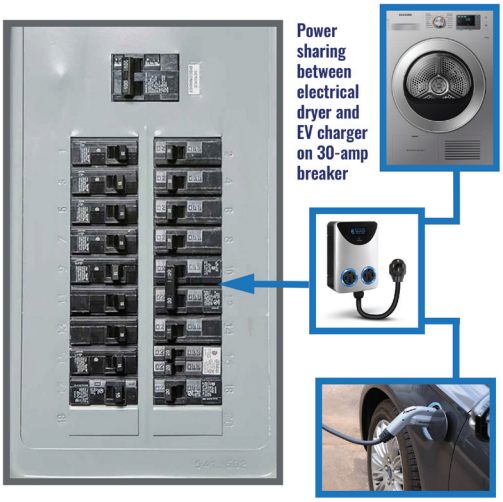
The tool also accepts inputs for any other electrical service upgrades, such as EV chargers. It helps assess if future electrification plans will require service upgrades.



US Department of Energy recommended electrical load assessment

Step 04: Provide Options to Install Clean Heat in an Electric-System Constrained Home

A home may have sufficient electrical capacity to cover the estimated electrical load but no space for new breakers. If so, installing a **sub-panel or load-sharing smart splitter installation** may be a viable solution.



Example of load sharing

Active Load Management

If the estimated post-install electrical load is similar to the service capacity, there are several ways to potentially avoid a service upgrade through active load management.

Explore the following options. Learn the advantages and disadvantages of each, especially if installers and/or homeowners are unfamiliar with them.

- Load-sharing smart splitters
- Smart electrical distribution panels or smart breakers
- Low-load ENERGY STAR® electrical appliances

240-volt load sharing smart splitter

SMART SPLITTERS

When electrical loads are not in constant use, a load-sharing smart splitter can reduce the maximum total electrical load on the home. A smart splitter is a device that can convert a 240-volt socket into two sockets capable of powering two devices asynchronously based on user-programmed prioritization.

The splitter allows two devices to share one circuit. The splitter allows power to one device while preventing the other device from drawing power simultaneously. Each device must have a power draw equal to or less than the associated breaker. An example of such a pairing is an electric clothes dryer and an EV charger. The load-sharing smart splitter prevents the EV charger from operating if the dryer is in use.

Smart electrical distribution panel

SMART PANELS AND SMART BREAKERS

A smart electrical distribution panel or smart breaker offers technology-enabled solutions for more comprehensive control of a home's power distribution.

These types of products:

- Enable the homeowner to manage power distribution
- Focus on load management through smartphone applications
- Automatically prioritize which loads receive power and when, providing real-time response

ENERGY-EFFICIENT APPLIANCE UPGRADES

A homeowner can significantly reduce electricity usage and peak amperage by upgrading to smaller, newer appliances with ENERGY STAR® certification or eliminating unused appliances. These actions can create substantial additional electrical capacity for installing a heat pump if the new heat pump is appropriately sized to replace a heating and cooling system with a similar or higher amperage rating.

PRO TIP

Appliances such as refrigerators, clothes washers, clothes dryers, or dishwashers over 15 years old are ideal for replacement.

Removing extra refrigerators and freezers, especially those in unconditioned spaces, significantly reduces energy load.

Smart power strips for appliances with phantom loads, such as computers, cable boxes, and gaming systems, also help save energy.

Step 05: Anticipate the Electrical Work

The image below shows the average cost for electrical and distribution panel upgrades. This is important when discussing the scope of work with the homeowner. The HVAC contractor will use this information to determine the equipment to be installed and plan for any future homeowner projects.

The electrician will be engaged in the upgrade, but their work scope will primarily be based on the information provided by the HVAC contractor.

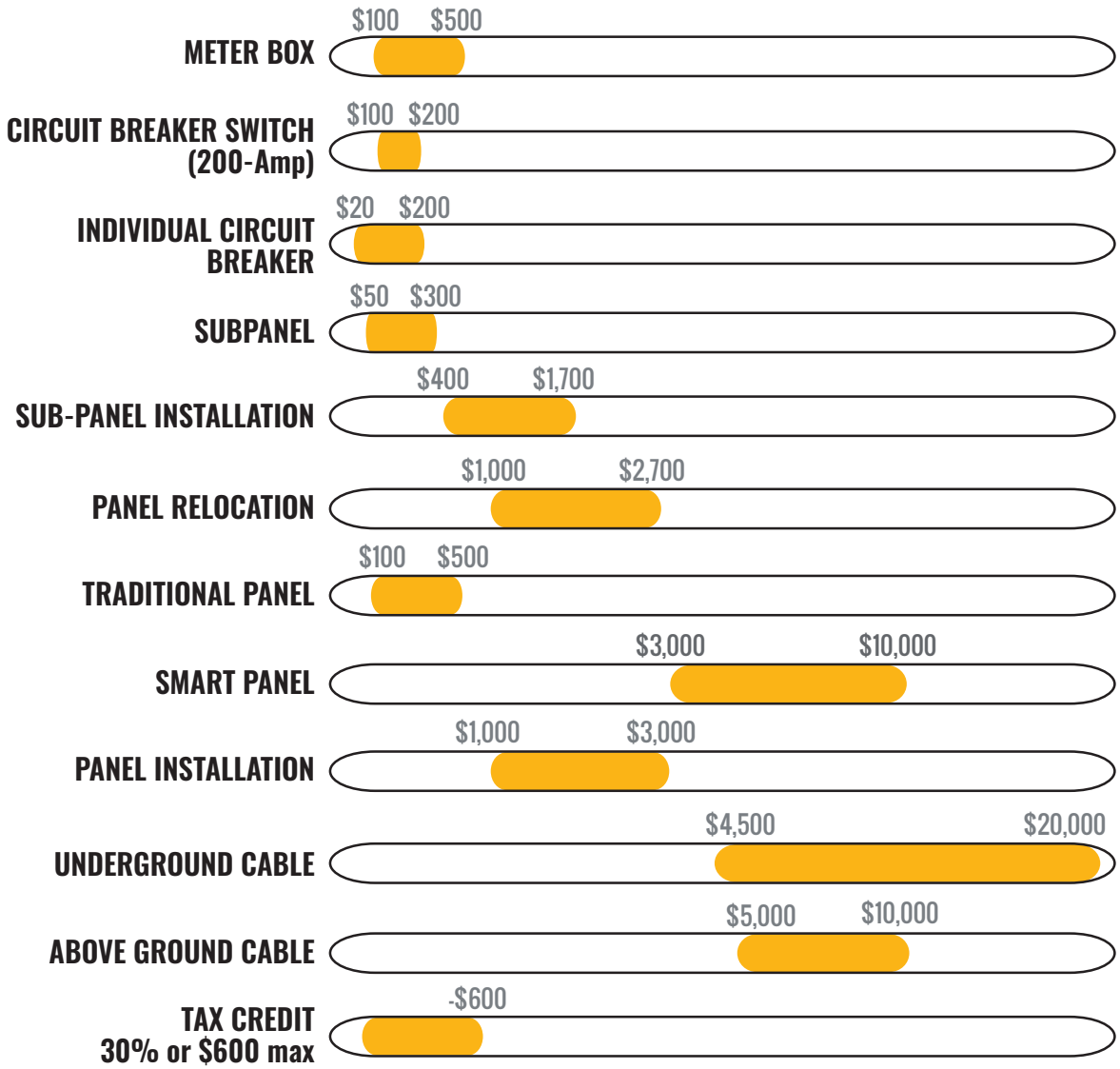
PRO TIP

HVAC contractors must know and comply with building codes, which may vary by location.

Fuse box style panel

AVERAGE COSTS FOR UPGRADING ELECTRICAL SERVICE AND DISTRIBUTION PANELS

The costs provided are not a comprehensive list and vary by location.



Considerations for Upgrade Costs

Some costs are quite sensitive to specific aspects of the site — like the distance of underground trenching, location of the breaker panel, or proximity to the utility power supply. Consider the costs only directly relevant to your planned upgrade.

PANEL LOCATION

In some jurisdictions, new panel installations must be accessible from the home's exterior. Exterior panels must be weather-resistant, which can increase the cost.

AGE OF EXISTING ELECTRICAL SERVICE

Newer installations within the past 25 years may allow adding a subpanel instead of requiring an entirely new panel.

CONDITION OF EXISTING ELECTRICAL WORK

Worn-out wiring, damaged circuits, or receptacles must be replaced to meet building code requirements. Alternatively, a well-maintained 100-amp panel can be converted to a subpanel of a new 200-amp main panel to save on rewiring costs.

THE AMPERAGE OF THE NEW SERVICE

Higher amperage service – such as 400 amps – requires costlier wire to upgrade, although labor costs are unaffected. Check with the utility provider for available upgrades.

Reach out to your Clean Heat Connect participating distributor for additional information about assessing the electrical service related to heat pump installations.

Go to NYSERDA's Clean Heat Connect page for more information and resources on Heat Pump Installation.