OTTAWA ELECTRICAL

Panels & Breakers

Panel upgrades, circuit breakers, fuses, and service capacity

20 Expert Answers from Construction Brain

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Q1

Is a Challenger panel safe or should I replace it?

Challenger electrical panels are generally considered safe and do not require immediate replacement, unlike the notorious Federal Pacific or Zinsco panels that pose serious fire hazards. However, there are some important considerations for Ottawa homeowners with Challenger panels.

What Makes Challenger Panels Different

Challenger panels were manufactured by Challenger Electric from the 1980s through the early 2000s. While they don't have the widespread safety issues of Federal Pacific panels, they do have some known concerns. The main issue is with certain Challenger breakers that may not trip properly during overload conditions, though this problem is not as severe or widespread as with Federal Pacific breakers.

The bigger concern for most Ottawa homeowners is that **Challenger Electric went out of business**, making replacement breakers increasingly difficult and expensive to find. When you need to add a circuit or replace a faulty breaker, you may face challenges sourcing compatible parts, and aftermarket breakers may not perform to the same standards.

ESA and Insurance Considerations

The Electrical Safety Authority (ESA) does not require Challenger panels to be replaced, and most insurance companies in Ontario will still provide coverage for homes with Challenger panels. This is a significant difference from Federal Pacific panels, which many insurers now refuse to cover or require replacement as a condition of coverage.

However, if you're planning any electrical work that requires ESA permits - such as adding circuits for an EV charger, finishing a basement, or installing a hot tub - this might be an ideal time to consider upgrading to a modern panel. A **100A to 200A upgrade typically costs $2,000-$3,500 in Ottawa**, and you'll have a modern panel with readily available breakers and improved safety features.

When to Consider Replacement

You should prioritize panel replacement if you notice any signs of problems: breakers that won't stay reset, burning smells, scorch marks, or if you frequently experience nuisance tripping. Additionally, if your Challenger panel is only 100 amps and you're planning to install an EV charger or major appliances, upgrading to a 200-amp service makes practical sense.

For most Ottawa homeowners, a Challenger panel can continue operating safely with proper maintenance, but planning for eventual replacement is wise given the parts availability issues.

Q2

What is the difference between 100 amp and 200 amp service?

The main difference between 100 amp and 200 amp electrical service is the total amount of power your home can safely use at one time. A 100 amp service provides 24,000 watts of power (100 amps × 240 volts), while a 200 amp service delivers 48,000 watts - exactly double the capacity.

Practical Differences in Your Home

With 100 amp service, you might experience breaker trips when running multiple high-demand appliances simultaneously - like your electric dryer, air conditioning, electric water heater, and oven all at once. A 200 amp service eliminates this problem by providing much more electrical headroom. This extra capacity becomes crucial when adding modern electrical loads like **EV chargers** (typically requiring a dedicated 40-50 amp circuit), **hot tubs** (30-50 amps), or **whole-home generators**.

The physical differences are also significant. A 100 amp panel typically has 20-24 circuit breaker spaces, while 200 amp panels usually offer 40-42 spaces. This means more circuits for dedicated appliances, additional outlets, and future electrical needs. The main electrical cables feeding your home are also larger with 200 amp service - typically 4/0 AWG copper or 250 MCM aluminum versus 2/0 AWG for 100 amp service.

When You Need to Upgrade

In Ottawa's housing market, **most homes built before 1980 have 100 amp service**, which was adequate for the electrical demands of that era. However, modern homes typically require 200 amp service due to increased electrical loads from central air conditioning, multiple large appliances, home offices with computer equipment, and electric vehicle charging. The **Ontario Electrical Safety Code requires 200 amp minimum service for new home construction**.

If you're planning to install an **EV charger**, the math becomes important. A typical Level 2 EV charger draws 32-40 amps continuously. On a 100 amp service, this represents 30-40% of your total capacity, leaving little room for other appliances. Most electricians recommend upgrading to 200 amp service before installing EV charging equipment.

Upgrade Costs and Process

In Ottawa, upgrading from 100 amp to 200 amp service typically costs **$2,000 to $3,500**, depending on the complexity of your installation and whether the main electrical cables from the street need replacement. This work requires an **ESA permit and inspection**, and must be performed by a licensed electrician. Hydro Ottawa may need to upgrade the transformer and meter base, which they handle at no charge to you.

The upgrade process involves installing a new 200 amp panel, upgrading the main electrical cables if necessary, and having ESA inspect the work. Most upgrades are completed in one day, though you'll experience a power outage of several hours during the installation.

For a free assessment of whether your home needs a service upgrade, Electrical Ottawa provides consultations to help Ottawa homeowners understand their electrical capacity needs and upgrade options.

Q3

Why would a breaker feel hot?

A hot breaker is a serious safety concern that indicates dangerous electrical problems requiring immediate attention from a licensed electrician. This isn't normal and can lead to fires or electrical failure.

Overloaded Circuit is the most common cause of hot breakers. When you draw more current through a circuit than it's designed to handle, the breaker heats up from the electrical resistance. This often happens when too many high-draw appliances are plugged into one circuit - think space heaters, hair dryers, or multiple kitchen appliances running simultaneously. A 15-amp breaker should only carry about 12 amps continuously (80% rule under the Ontario Electrical Safety Code), but homeowners often exceed this without realizing it.

Loose connections inside the electrical panel create dangerous arcing and heat buildup. Over time, wire connections can work loose due to thermal expansion and contraction, vibration, or poor initial installation. These loose connections create resistance, which generates heat - potentially enough to start a fire. This is particularly common in older panels or installations where connections weren't properly tightened initially.

Defective breakers can also run hot, especially in aging panels. Federal Pacific and some older Square D breakers are known for this problem. The internal mechanism may be failing, creating resistance even under normal loads. **If you have a Federal Pacific panel, this is a known fire hazard** that insurance companies often refuse to cover, and the entire panel should be replaced immediately.

Undersized breakers for the connected load will run hot constantly. Sometimes previous homeowners or unqualified individuals install the wrong amperage breaker for a circuit. A 15-amp breaker on a circuit that legitimately needs 20 amps will overheat trying to carry the load.

What you should do immediately: Turn off the hot breaker and don't use that circuit until a licensed electrician can inspect it. **Never ignore a hot breaker** - this is how electrical fires start. Check if the breaker is overloaded by unplugging devices on that circuit, but don't attempt any electrical work yourself.

ESA requirements mandate that electrical work addressing these issues requires permits and professional installation. Attempting DIY repairs on panel components is illegal in Ontario and extremely dangerous.

For immediate assessment of your hot breaker situation, contact Electrical Ottawa for emergency electrical service. We're available 24/7 for dangerous electrical conditions and can quickly diagnose whether you're dealing with an overload, loose connection, or defective equipment requiring immediate replacement.

Q4

What size electrical panel do I need for my house?

Most modern homes need a 200-amp electrical panel, while older homes with basic electrical needs may function adequately with 100 amps. However, the right size depends on your home's square footage, electrical appliances, and future plans like EV chargers or hot tubs.

Calculating Your Electrical Load

The Ontario Electrical Safety Code requires specific calculations to determine proper panel sizing. A licensed electrician performs a **load calculation** that considers your home's heated square footage, major appliances, and planned additions. For a typical 1,500 square foot home with standard appliances (electric range, dryer, air conditioning), you're looking at roughly 150-180 amps of calculated load, making a 200-amp panel the safe choice.

When 100 Amps Might Be Sufficient

Smaller homes under 1,200 square feet with gas heating, gas water heater, and no major electric appliances might operate fine on 100 amps. However, this leaves little room for growth. Adding an EV charger (typically requiring a 40-50 amp circuit) or central air conditioning often pushes you over 100 amps capacity. Many insurance companies and mortgage lenders also prefer seeing 200-amp service in modern homes.

Why 200 Amps Is Usually Better

A 200-amp panel provides flexibility for modern electrical demands. You can add EV chargers, hot tubs, workshop circuits, or upgraded HVAC systems without immediately needing another panel upgrade. The cost difference between installing 100-amp versus 200-amp service is relatively small - typically $300-500 more for the 200-amp option - making it worthwhile future-proofing.

Ottawa-Specific Considerations

In Ottawa's climate, many homes rely heavily on electric heating or heat pumps during winter, significantly increasing electrical load. ESA inspectors frequently see undersized 100-amp panels struggling with modern demands. A **panel upgrade from 100A to 200A typically costs $2,000-3,500** in Ottawa, including permits and ESA inspection.

Safety Warning: Professional Assessment Required

Never guess at electrical panel sizing - undersized panels create fire risks and code violations. Only ESA-licensed electricians can legally perform load calculations and install panels in Ontario. DIY electrical work voids insurance and violates provincial law.

Next Steps

Contact a licensed electrician for a proper load calculation specific to your home. They'll assess your current usage, planned additions, and ensure compliance with Ontario Electrical Safety Code requirements. For a free consultation on panel sizing for your Ottawa home, Electrical Ottawa's ESA-licensed electricians can provide accurate load calculations and upgrade estimates.

Q5

Can I connect a generator to my electrical panel myself?

No, you cannot legally connect a generator to your electrical panel yourself in Ontario. Generator connections require an ESA permit, must be installed by a licensed electrician, and need proper inspection to ensure safe operation.

Why Professional Installation is Required

Generator connections involve complex electrical work that poses serious safety risks if done incorrectly. The installation requires a **transfer switch** - either manual or automatic - that prevents your generator from back-feeding electricity into Hydro Ottawa's power lines. This back-feeding can electrocute utility workers and damage equipment. Additionally, improper connections can cause fires, carbon monoxide poisoning, or damage to your home's electrical system.

The **Ontario Electrical Safety Code** requires that all generator installations be performed by ESA-licensed electricians and inspected by the Electrical Safety Authority. This isn't just a legal requirement - it's essential for your family's safety and your home insurance coverage. DIY generator connections will void your insurance and could result in significant fines.

What's Involved in Professional Installation

A licensed electrician will install a **transfer switch** near your electrical panel, run appropriate wiring to an exterior generator connection point, and ensure proper grounding and bonding. For whole-home backup generators, they'll also install an automatic transfer switch that starts the generator when power fails. The work typically costs **$1,500 - $3,500** for a manual transfer switch installation, or **$3,000 - $6,000** for automatic systems, depending on your panel's capacity and the generator size.

Generator Sizing and Safety Considerations

Your electrician will help determine the right generator size based on your essential circuits - typically 7,500 to 22,000 watts for most Ottawa homes. They'll ensure proper placement (generators must be at least 5 feet from windows and doors), install required disconnect switches, and verify that your electrical panel can handle the generator's output safely.

ESA Permit and Inspection Process

The licensed electrician will pull the necessary ESA permit before starting work, complete the installation to code, and schedule the required inspection. The ESA inspector will verify proper transfer switch operation, grounding, and that the installation meets all safety requirements before issuing a Certificate of Inspection.

For a free consultation on generator installation for your Ottawa home, Electrical Ottawa connects you with ESA-licensed electricians who can assess your needs and provide proper, code-compliant installation.

Q6

Do I need arc fault breakers in my bedrooms in Ontario?

Yes, arc fault circuit interrupters (AFCIs) are required for bedroom circuits in Ontario under the Ontario Electrical Safety Code (OESC), specifically Rule 26-656. This requirement applies to new construction, renovations involving new circuits, and when electrical panels are upgraded.

AFCI protection is mandatory for all 15A and 20A branch circuits supplying outlets in bedrooms. The code recognizes that bedrooms are where many electrical fires start due to damaged extension cords, faulty lamps, and other electrical hazards that can create dangerous arcing conditions. AFCI breakers detect these arc faults and shut off power before a fire can start.

When AFCI protection is required in Ontario:

- New home construction (all bedroom circuits)
- Adding new bedroom circuits during renovations
- Panel upgrades where bedroom circuits are being reconnected
- Converting spaces to bedrooms (basement finishing, additions)

The ESA (Electrical Safety Authority) enforces this requirement during inspections. If you're doing any electrical work that requires a permit, the inspector will verify AFCI protection is installed on bedroom circuits. Standard circuit breakers won't pass inspection for these applications.

AFCI breakers cost more than standard breakers - typically $80-120 each compared to $15-25 for regular breakers. However, this is a small price for the fire protection they provide. Many insurance companies also look favorably on homes with modern electrical safety features like AFCI protection.

Important exceptions exist - AFCI protection isn't required for existing bedroom circuits that aren't being modified. If you're just replacing an outlet or switch in an existing bedroom circuit, you don't need to upgrade to AFCI breakers. However, if you're adding outlets or extending the circuit, AFCI protection becomes mandatory.

For your specific situation, a licensed electrician can determine exactly which circuits need AFCI protection and ensure your installation meets current ESA requirements. The Ontario Electrical Safety Code is updated regularly, so professional guidance ensures compliance with the latest standards.

If you're planning electrical work in bedrooms - whether adding outlets, upgrading your panel, or finishing a basement - factor AFCI breaker costs into your budget. It's not optional equipment; it's a code requirement that protects your family and property from electrical fires.

Q7

Why does my circuit breaker feel warm?

A warm circuit breaker is a warning sign that shouldn't be ignored - it indicates the breaker is working harder than it should and could lead to failure or fire if not addressed.

Circuit breakers generate some heat during normal operation, but they should never feel noticeably warm to the touch. When a breaker feels warm, it's typically experiencing **electrical resistance** due to loose connections, overloading, or internal deterioration. This resistance converts electrical energy into heat, which is both inefficient and dangerous.

Loose connections are the most common cause of warm breakers. Over time, the connections between the breaker and the panel's bus bar can loosen due to thermal expansion and contraction. This creates resistance at the connection point, generating heat. Similarly, if the wire connections to the breaker terminals are loose, this will also cause warming. These loose connections can eventually lead to arcing, which is a serious fire hazard.

Circuit overloading is another frequent culprit. If you're drawing more current through the circuit than the breaker is rated for, it will generate excess heat. This often happens gradually - you might add more devices to a circuit over time without realizing you're approaching its capacity. A 15-amp circuit running at 12-13 amps continuously will generate more heat than one running at 8-10 amps.

Breaker deterioration can also cause warming, especially in older panels. Federal Pacific and Zinsco panels, common in Ottawa homes from the 1960s-1980s, are notorious for this issue. These breakers can develop internal problems that increase resistance and heat generation, and they may fail to trip properly during an overload - a dangerous combination that has caused house fires.

In Ottawa's climate, **temperature cycling** from our cold winters and hot summers can accelerate the loosening of electrical connections. The Ontario Electrical Safety Code requires proper torque specifications for all electrical connections, but these can loosen over time without proper maintenance.

Immediate safety steps: Don't ignore a warm breaker. First, reduce the load on that circuit by unplugging non-essential devices. If the breaker continues to feel warm even with reduced load, this indicates a connection or breaker problem that requires professional attention. Never attempt to tighten connections yourself - this work must be done by an ESA-licensed electrician with the proper tools and safety procedures.

Professional diagnosis is essential because determining whether the issue is loose connections, an overloaded circuit, or a failing breaker requires proper testing equipment and expertise. An electrician will check connection torque, measure actual current draw, test the breaker's performance, and inspect for signs of arcing or heat damage.

For Ottawa homeowners, this is particularly important if you have an older panel or have noticed other electrical issues like flickering lights or outlets that don't work consistently. A warm breaker often indicates broader electrical system problems that could affect your home's safety and insurance coverage.

Want a professional assessment of your electrical panel? Electrical Ottawa's ESA-licensed electricians can diagnose warm breaker issues and ensure your electrical system meets current safety standards. We offer free consultations to evaluate your specific situation and recommend the safest, most cost-effective solution.

Q8

What causes a breaker to trip repeatedly?

A breaker that trips repeatedly is protecting your home from a dangerous electrical problem that needs immediate attention. The most common causes are overloaded circuits, short circuits, ground faults, or a failing breaker itself.

When a circuit breaker trips, it's doing its job - cutting power to prevent overheating, fires, or electrocution. **If it keeps tripping after you reset it, don't keep resetting it.** This indicates a persistent problem that could be dangerous.

Overloaded circuits are the most common cause, especially in older Ottawa homes with 15-amp circuits trying to handle modern electrical demands. If you're running a space heater, hair dryer, and microwave on the same circuit, you'll likely trip a 15-amp breaker. The solution is either redistributing the load or having an electrician install additional circuits. In Ottawa's older neighborhoods like the Glebe or Westboro, we frequently see homes where kitchen appliances are overloading circuits that were adequate in the 1960s but insufficient today.

Short circuits occur when hot and neutral wires touch, creating a dangerous surge of electricity. This can happen due to damaged wire insulation, loose connections, or faulty appliances. You might notice a burning smell, scorch marks around outlets, or hear a popping sound when the breaker trips. **This is a serious fire hazard** that requires immediate professional attention.

Ground fault issues happen when electricity finds an unintended path to ground, often through water or damaged wiring. GFCI breakers are especially sensitive to this and will trip to prevent electrocution. In Ottawa's climate, moisture infiltration in basements or outdoor circuits commonly causes ground faults, particularly during spring thaw or heavy rains.

Failing breakers can also cause repeated tripping. Older breakers, especially Federal Pacific or Zinsco panels common in 1970s Ottawa homes, may not trip reliably or may trip unnecessarily. These panels are known fire

hazards and should be replaced immediately. Even standard breakers can wear out after 20-30 years of service.

Arc faults in newer homes with AFCI breakers can cause tripping when damaged wiring creates dangerous arcing conditions. While frustrating, these breakers are preventing house fires by detecting electrical arcs that standard breakers miss.

Under the Ontario Electrical Safety Code, investigating repeated breaker trips typically requires an ESA permit since it often involves circuit modifications or repairs. **Never bypass a tripping breaker or use a higher-rated breaker** - this removes the safety protection and creates a serious fire risk.

What you should do: First, unplug everything on the affected circuit and try resetting the breaker once. If it stays on, plug devices back in one at a time to identify what's causing the overload. If the breaker trips immediately when reset, or trips again without any load, **stop resetting it and call a licensed electrician immediately.** This indicates a short circuit or ground fault that poses immediate danger.

For persistent breaker tripping issues in Ottawa, Electrical Ottawa's ESA-licensed electricians can diagnose the problem safely and provide code-compliant solutions, whether that's circuit additions, panel upgrades, or emergency repairs.

Q9

Why does my kitchen outlet keep tripping the breaker?

Your kitchen outlet is likely tripping the breaker due to an overloaded circuit, a ground fault, or a faulty GFCI outlet. Kitchen circuits are particularly prone to tripping because they handle high-power appliances and are required to have GFCI protection near sinks.

The most common cause is **circuit overload**. Kitchen outlets in Ottawa homes often share circuits, and when you run multiple high-wattage appliances simultaneously - like a microwave (1,200W), coffee maker (1,000W), and toaster (1,500W) - you can easily exceed the circuit's 15A or 20A capacity. A 15-amp circuit can handle about 1,800 watts safely, while a 20-amp circuit handles about 2,400 watts.

GFCI-related issues are another frequent culprit. Under the Ontario Electrical Safety Code, all outlets within 1.5 meters of a kitchen sink must have GFCI protection. These sensitive devices can trip from moisture, worn appliances with minor ground faults, or simply age-related failure. If your GFCI outlet is more than 10-15 years old, it may be tripping unnecessarily and need replacement.

Faulty appliances can also cause repeated tripping. An appliance with a damaged cord, internal short, or ground fault will trip the breaker every time it's plugged in. Try unplugging everything and testing each appliance individually to identify the problem device.

In older Ottawa homes, **inadequate kitchen wiring** is common. The current Ontario Electrical Safety Code requires at least two 20-amp circuits for kitchen countertop outlets, but many homes built before the 1990s have insufficient circuits. If your kitchen has only one circuit serving multiple outlets, you'll experience frequent tripping with normal appliance use.

Safety warning: Never ignore a tripping breaker or try to "fix" it by installing a larger breaker. A breaker that trips repeatedly is protecting your home from electrical fire. If the problem persists after trying different appliances, or if you smell burning or see sparking, shut off the circuit immediately and call for emergency electrical service.

The solution typically involves having a licensed electrician add dedicated 20-amp circuits for your kitchen appliances, replace aging GFCI outlets, or upgrade your electrical panel if it lacks capacity. In Ottawa, adding a kitchen circuit typically costs $400-800, while GFCI outlet replacement runs $150-250 including the ESA permit.

For persistent tripping issues, Electrical Ottawa can diagnose the problem and ensure your kitchen wiring meets current safety standards. We're available 24/7 for electrical emergencies throughout Ottawa and the surrounding area.

Q10

Why is there a burning smell coming from my electrical panel?

A burning smell from your electrical panel is a serious electrical emergency that requires immediate action. This typically indicates overheating components, arcing, or electrical connections breaking down - all of which can lead to electrical fires.

Immediate steps you should take right now: Turn off your main breaker if you can safely access it, avoid touching the panel if it feels hot, and evacuate your home if the smell is strong or getting worse. Call a licensed electrician immediately - this is not something to wait on or investigate yourself.

Common causes of burning smells from electrical panels include loose wire connections that create resistance and heat, overloaded circuits drawing more current than they're designed for, or failing breakers that can't properly interrupt electrical flow. In Ottawa, we frequently see this issue with older Federal Pacific and Zinsco panels, which are known fire hazards due to their breakers failing to trip properly. These panels should be replaced immediately regardless of age.

Why this happens and the dangers involved: When electrical connections become loose, they create resistance that generates heat. Over time, this heat can melt wire insulation, carbonize connections, and ignite surrounding materials. The burning smell you're detecting is likely melting plastic insulation or carbonizing electrical components. In Ontario's older homes, we also see this with aluminum wiring connections that weren't properly maintained, as aluminum expands and contracts more than copper, leading to loose connections over time.

ESA requirements and safety considerations: Under the Ontario Electrical Safety Code, any electrical work on panels requires proper permits and ESA inspection. However, in emergency situations like this, safety comes first. A licensed electrician can assess whether this is an immediate fire hazard requiring emergency service or if it can wait until morning. Never ignore burning electrical smells - they're often the only warning you get before an electrical fire starts.

What happens next: Once you've secured the immediate safety situation, a licensed electrician will need to inspect your panel to identify the source of the burning smell. This might involve thermal imaging to detect hot spots, checking all connections, and testing breakers. Depending on what's found, you may need anything from tightening connections ($200-400) to a complete panel replacement ($2,000-4,000 for a typical 200A upgrade in Ottawa).

For immediate emergency electrical service in Ottawa, contact Electrical Ottawa's 24/7 emergency line. Don't wait until morning if the smell persists or worsens - electrical fires can develop rapidly and without warning.

Q11

How much does it cost to move an electrical panel?

Moving an electrical panel in Ottawa typically costs $2,500 to $5,000, depending on the distance moved and complexity of the relocation. This is considered a major electrical project that requires ESA permits, inspections, and coordination with Hydro Ottawa.

The cost breakdown includes several key components that make panel relocation more expensive than a simple replacement. **Labor represents the largest expense** since your electrician must safely disconnect all circuits, install new conduit runs, relocate the main service entrance, and reconnect everything to code. The **distance moved significantly impacts cost** - moving a panel 10 feet within the same room costs much less than relocating it to a different floor or exterior wall.

Material costs vary based on your specific situation. You'll need new conduit (typically $3-8 per foot), wire for extended circuits that can't reach the new location ($2-4 per foot), and potentially a new meter base if the service entrance changes significantly. If your current panel is outdated (like Federal Pacific or Zinsco), many homeowners combine the move with an upgrade to a modern 200-amp panel, adding $800-1,500 to the project cost.

ESA permit and inspection fees add $150-300 to your total cost. In Ontario, panel relocation always requires permits since you're modifying the electrical service. **Hydro Ottawa coordination** may be necessary if the meter location changes, potentially requiring a temporary disconnect ($200-400) during the work.

Common reasons for panel relocation include basement finishing projects, kitchen renovations where the panel blocks cabinet installation, or moving panels from bedrooms or bathrooms to meet current code requirements. The Ontario Electrical Safety Code requires panels to be accessible with proper clearances - 1 meter in front and specific side clearances depending on the installation.

Several factors can increase costs beyond the base range. If your home has knob and tube wiring or aluminum wiring that needs updating during the move, expect additional costs of $400-800 per circuit. Moving a panel to an exterior wall often requires weatherproof equipment and additional conduit protection. **Structural modifications** like cutting through walls or installing new support brackets add to both material and labor costs.

This is definitely not a DIY project. Panel relocation involves working with the main electrical service and requires extensive code knowledge. Only ESA-licensed electricians can legally perform this work, and attempting it yourself creates serious safety risks and insurance issues.

For a detailed quote on your panel relocation project, Electrical Ottawa offers free consultations to assess your specific situation and provide accurate pricing based on your home's layout and electrical needs.

Q12

Can I add more circuits to my full electrical panel?

No, you cannot safely add more circuits to a full electrical panel. If all the breaker slots are occupied, you'll need either a panel upgrade to a larger panel or a subpanel installation to accommodate additional circuits.

When your main electrical panel is full, you have several options depending on your specific situation and electrical needs. The most common solution is installing a **subpanel**, which acts as an extension of your main panel. A subpanel connects to your main panel through a feeder circuit and provides additional breaker slots for new circuits. This typically costs between $800 - $1,500 in Ottawa, including the ESA permit and inspection.

However, before adding circuits, it's crucial to ensure your **electrical service has adequate capacity**. Many older Ottawa homes have 100-amp services, which may already be at or near capacity even if there are empty breaker slots. Adding more circuits to an overloaded service creates safety risks and code violations. A licensed electrician can perform a **load calculation** to determine if your current service can handle additional circuits safely.

Panel upgrade to 200-amp service might be the better long-term solution, especially if you're planning multiple additions like EV charger installation, hot tub wiring, or finishing a basement. Panel upgrades in Ottawa typically range from $2,000 - $3,500 and provide significantly more capacity for future electrical needs. This is often more cost-effective than multiple subpanels if you anticipate ongoing electrical expansion.

Under the **Ontario Electrical Safety Code**, any new circuits require ESA permits and inspections. This includes both subpanel installations and individual circuit additions. Licensed electricians must pull permits before starting work, and ESA inspectors verify code compliance within 3-5 business days of completion.

Never attempt to add circuits yourself - this work requires electrical expertise to ensure proper sizing, connections, and code compliance. Improper electrical work can cause fires, electrocution, or insurance claim denials. Additionally, only licensed electricians can legally pull ESA permits for this type of work in Ontario.

The best approach is having a licensed electrician assess your current electrical system, calculate your existing load, and recommend whether a subpanel or service upgrade makes more sense for your specific needs and future plans.

For a free assessment of your electrical panel capacity and options for adding circuits, Electrical Ottawa's ESA-licensed electricians can evaluate your system and provide recommendations that meet Ontario Electrical Safety Code requirements.

Q13

Why does my hot tub keep tripping the breaker?

Your hot tub is likely tripping the breaker due to an overloaded circuit, a ground fault, or a failing heating element. Hot tubs draw significant power (typically 30-50 amps), and even small electrical issues can cause breaker trips.

The most common cause is **circuit overload**. Hot tubs require dedicated circuits sized specifically for their amperage draw. If your hot tub is on an undersized breaker or sharing a circuit with other devices, it will trip when the heating element and pumps run simultaneously. A typical 240V hot tub needs a 40-50 amp dedicated circuit, but many older installations used smaller breakers that can't handle the full load.

Ground faults are another frequent culprit, especially with outdoor hot tubs exposed to moisture. Water intrusion into electrical connections, damaged wiring, or a failing GFCI breaker can cause immediate trips. The Ontario Electrical Safety Code requires GFCI protection for all hot tub circuits, and these sensitive devices will trip at the first sign of electrical leakage to protect you from electrocution.

Failing heating elements often cause breaker trips as they age. When heating elements develop internal shorts or ground faults, they draw excessive current and trip the breaker. Similarly, pump motors can fail and cause overcurrent conditions. If your hot tub is older than 10-15 years, component failure becomes increasingly likely.

In Ottawa's climate, **thermal cycling** from our extreme temperature swings can stress electrical connections, causing loose wires that create arcing and breaker trips. Ice and snow can also affect outdoor electrical connections if they're not properly weatherproofed according to ESA requirements.

Safety warning: Never attempt to "fix" this by installing a larger breaker - this creates a serious fire hazard. Hot tub electrical systems operate at 240V and can be lethal. Always shut off the breaker and avoid using the hot tub until the issue is resolved.

Immediate steps: Turn off the hot tub breaker and don't reset it repeatedly - this can damage the breaker and create safety hazards. Check if the problem occurs immediately when you turn on power (suggesting a ground fault) or only when heating/pumps run (suggesting overload or component failure).

For proper diagnosis and repair, you'll need an ESA-licensed electrician who can safely test the circuit, inspect connections, and verify your installation meets current Ontario Electrical Safety Code requirements. Hot tub electrical work requires permits and ESA inspection to ensure safety and insurance compliance.

For a professional assessment of your hot tub electrical system, Electrical Ottawa's licensed electricians can diagnose the issue and ensure your installation meets all ESA safety requirements.

Q14

How do I know if my electrical panel needs to be replaced?

Your electrical panel likely needs replacement if it's over 25-30 years old, frequently trips breakers, shows signs of corrosion, or is a known fire-hazard brand like Federal Pacific or Zinsco. Modern homes require more electrical capacity than older panels can safely provide.

Age and Capacity Issues

Most electrical panels installed before 1990 struggle to meet today's electrical demands. If your panel is rated for 60-100 amps and you're adding modern appliances, EV chargers, or home additions, you'll need an upgrade to 200 amps. Signs your panel is undersized include frequent breaker trips when running multiple appliances, dimming lights when large appliances start up, or having to carefully manage which devices you use simultaneously.

Dangerous Panel Brands

Certain panel manufacturers are known fire hazards that should be replaced immediately. **Federal Pacific Electric (FPE) panels**, common in homes built between 1950-1980, have breakers that may not trip during overloads, creating serious fire risks. **Zinsco panels** have similar issues with breakers welding shut instead of tripping. Insurance companies often require replacement of these panels, and the ESA strongly recommends immediate replacement.

Physical Warning Signs

Look for **rust, corrosion, or burn marks** around breakers or the panel box - these indicate moisture intrusion or overheating. **Warm or hot breakers** that frequently trip, **buzzing or crackling sounds**, or a **burning smell** near the panel are emergency situations requiring immediate professional attention. Breakers that won't stay reset or feel loose also signal internal problems.

ESA Requirements and Safety

In Ontario, panel replacement requires an ESA permit and inspection. The work must be performed by a licensed electrician who will ensure proper grounding, bonding, and clearances per the Ontario Electrical Safety Code. Modern panels must have **1 meter of clear space** in front and specific side clearances for safe access.

Ottawa Market Costs

Panel replacement in Ottawa typically costs **$2,000-$3,500 for a 100A to 200A upgrade**, including permits and ESA inspection. Same-amperage panel replacement runs **$1,500-$2,500**. Federal Pacific or Zinsco replacement often costs **$2,500-$4,000** due to additional safety requirements and potential wiring updates.

If you notice any warning signs or your panel is over 25 years old, have it evaluated by a licensed electrician. Electrical Ottawa connects you with ESA-licensed electricians who can assess your panel's condition and provide a free estimate for replacement if needed.

Q15

How much does a 200 amp panel upgrade cost in Ottawa?

A 200 amp panel upgrade in Ottawa typically costs between $2,000 and $3,500, depending on your current electrical setup and any additional work required.

The price variation depends on several key factors. If you're upgrading from a 100 amp service, the cost is generally on the lower end since the main service wire from the street can often handle the increased capacity. However, if you're upgrading from an older 60 amp service, Hydro Ottawa may need to upgrade the service drop from the transformer, which can add $500-$1,000 to your project cost.

Panel location and accessibility significantly impact pricing. A panel in an easily accessible basement location costs less than one requiring extensive rewiring or relocation. If your current panel is a **Federal Pacific or Zinsco brand**, expect costs toward the higher end due to additional safety considerations and potential wiring updates required by ESA inspectors.

The upgrade process involves several components that affect total cost. The new 200 amp panel itself runs $300-$600, while the electrical labor typically accounts for $1,200-$2,000. You'll also need an ESA permit (around $150-$200) and mandatory ESA inspection. Some homes require a new meter base or grounding upgrades to meet current Ontario Electrical Safety Code requirements, adding $200-$500.

Additional costs to consider include any necessary circuit rewiring if your current wiring doesn't meet code, which can add $200-$400 per circuit. If you're planning to add high-demand appliances like EV chargers or hot tubs, discuss this during the upgrade to ensure proper circuit allocation.

ESA permits are mandatory for all panel upgrades in Ontario. Your licensed electrician will pull the permit before starting work, and an ESA inspector will verify the installation meets code requirements. The entire process typically takes 1-2 days for the electrical work, plus 3-5 business days for ESA inspection scheduling.

Why upgrade to 200 amps? Modern homes with electric vehicles, hot tubs, air conditioning, and multiple appliances often exceed 100 amp capacity. Signs you need an upgrade include frequently tripped breakers, flickering lights when appliances start, or an electrician recommending it for new high-demand installations.

For an accurate quote on your specific 200 amp panel upgrade, Electrical Ottawa offers free consultations to assess your current electrical system and provide detailed pricing based on your home's unique requirements.

Q16

Is it worth upgrading from 100 amp to 200 amp service?

Upgrading from 100A to 200A service is often worth it for most Ottawa homes, especially if you're planning to add an EV charger, heat pump, or other high-demand appliances. The investment typically pays off in increased home value, electrical safety, and future-proofing your property.

When 200A Service Makes Sense

A 100A panel was adequate for homes built 20-30 years ago, but today's electrical demands have grown significantly. If you're frequently tripping breakers, planning to install an EV charger (which typically requires a dedicated 40A circuit), or adding major appliances like a hot tub, heat pump, or electric vehicle, your 100A service is likely maxed out. Modern homes also use more electronics, LED lighting systems, and smart home devices that collectively increase your electrical load.

In Ottawa's market, homes with 200A service are increasingly expected by buyers, especially in neighborhoods with higher-end properties. The upgrade demonstrates that your electrical system can handle modern demands safely and legally according to Ontario Electrical Safety Code requirements.

Cost vs. Value in Ottawa

A 100A to 200A upgrade in Ottawa typically costs between $2,000 - $3,500, including the ESA permit and inspection. This includes upgrading the main panel, meter base, and often the service entrance cable. If your current panel is an older Federal Pacific or Zinsco brand, the upgrade becomes even more valuable since these panels are known fire hazards that insurance companies increasingly refuse to cover.

The upgrade usually adds $3,000 - $5,000 to your home's value, making it a smart investment even before considering the practical benefits. You'll also avoid the higher costs of trying to work around a maxed-out 100A system when installing new appliances or circuits.

ESA Requirements and Safety

Any service upgrade requires an ESA permit and inspection, which ensures the work meets current Ontario Electrical Safety Code standards. This includes proper grounding, bonding, and arc fault protection that older 100A panels may lack. The inspection process typically takes 3-5 business days after completion, and you'll receive a Certificate of Inspection that's valuable for insurance and resale purposes.

Signs You Need the Upgrade

If you're experiencing frequent breaker trips, dimming lights when appliances start, or your electrician has told you there's no capacity for additional circuits, the upgrade is necessary rather than optional. Planning to install an EV

charger, electric heat pump, or finishing a basement with additional outlets also makes 200A service essential.

For a free assessment of whether your home would benefit from a 200A upgrade, Electrical Ottawa can evaluate your current electrical load and future needs. Our ESA-licensed electricians from the Ottawa Construction Network ensure all work meets current code requirements and passes inspection on the first visit.

Q17

Can I add a subpanel in my detached garage?

Yes, you can absolutely add a subpanel in your detached garage, and it's often the best solution for powering multiple circuits in an outbuilding. This is a common upgrade for Ottawa homeowners who want to run power tools, electric vehicle chargers, or multiple outlets in their garage.

Installing a garage subpanel requires running a feeder cable from your main panel to the new subpanel location. The size of this feeder depends on your power needs - typically 60A or 100A for most residential garages. The subpanel acts as a distribution point, allowing you to have multiple circuits (lighting, outlets, 240V for EV chargers or welders) without running separate cables back to the main house.

Key requirements under the Ontario Electrical Safety Code include proper grounding and bonding. The subpanel must have a separate grounding electrode (ground rod) driven at the garage, and the neutral and ground buses must be separated in the subpanel (unlike your main panel where they're bonded together). The feeder cable needs to be rated for outdoor/underground use if buried, or properly protected if run overhead.

ESA permit and inspection are mandatory for this work. The installation must be done by a licensed electrician who will pull the permit, ensure proper wire sizing, install appropriate overcurrent protection, and schedule the required ESA inspection. Typical costs in Ottawa range from $1,500 to $3,000 depending on the distance from your main panel, subpanel size, and whether trenching is needed for underground cable.

Consider your future power needs when sizing the subpanel. If you're planning an EV charger, that alone will need a 40A circuit. Add lighting, outlets, and potential workshop equipment, and a 100A subpanel often makes more sense than a smaller 60A unit, even if it costs a few hundred dollars more upfront.

For a proper assessment of your specific situation and a detailed quote, Electrical Ottawa can evaluate your main panel capacity, determine the best routing for the feeder cable, and ensure the installation meets all ESA requirements. We'll handle the permit process and coordinate the inspection to get your garage properly powered.

Q18

Do I need a permit to replace my electrical panel in Ottawa?

Yes, you absolutely need an ESA permit to replace your electrical panel in Ottawa. Panel replacement is considered major electrical work that requires both a permit and inspection by the Electrical Safety Authority (ESA).

In Ontario, the **Ontario Electrical Safety Code (OESC)** requires permits for virtually all electrical work beyond simple replacements like outlets and switches. Panel replacement falls squarely into the category of work that must be permitted, whether you're upgrading from 100A to 200A service or simply replacing an old panel with the same amperage rating.

The permit process works like this: Your licensed electrician will pull the ESA permit before starting work, typically costing $75-150 depending on the scope. Once the panel installation is complete, an ESA inspector will visit your home within 3-5 business days to ensure the work meets code requirements. Only after passing inspection will you receive your Certificate of Inspection, which is crucial for insurance purposes and future home sales.

This isn't just bureaucracy - it's essential for safety. Panel replacement involves working with the main electrical feed to your home, which carries deadly voltage even when your breakers are off. The utility company (Hydro Ottawa) must disconnect and reconnect your service, and the work must meet strict code requirements for grounding, bonding, and clearances. Improper installation can cause house fires, electrocution, or insurance claim denials.

Only ESA-licensed electrical contractors can legally perform this work in Ontario. Attempting DIY panel replacement is not only illegal but extremely dangerous. Even experienced electricians treat panel work with extreme caution due to the high voltages involved.

Typical costs for panel replacement in Ottawa range from $1,500-2,500 for same-amperage replacement, or $2,000-3,500 for upgrades to 200A service. This includes the ESA permit, inspection, and coordination with Hydro Ottawa for service disconnection/reconnection.

If you're dealing with an older panel like Federal Pacific or Zinsco, replacement becomes even more critical as these panels have known fire hazards. For a free consultation on your panel replacement needs, Electrical Ottawa connects you with ESA-licensed electricians who handle the entire permit process from start to finish.

Q19

What is a Federal Pacific panel and why is it dangerous?

Federal Pacific Electric (FPE) panels are fire hazards that should be replaced immediately. These electrical panels, manufactured from the 1950s to 1980s, have documented safety defects that can cause house fires and electrocution.

Federal Pacific panels are easily identified by their distinctive red and black Stab-Lok breakers and the "Federal Pacific Electric" nameplate on the panel door. They were installed in millions of homes across North America, including many Ottawa-area homes built during this period. The panels look similar to modern electrical panels, which is why many homeowners don't realize they have a dangerous system.

The core problem with FPE panels is breaker failure. Independent testing has shown that FPE breakers fail to trip when they should, allowing dangerous overcurrent conditions to persist. When a circuit is overloaded, the breaker should shut off power to prevent overheating and fire. FPE breakers often don't trip even when carrying double their rated current, causing wires to overheat and potentially ignite surrounding materials. Some FPE breakers also fail to shut off completely even when manually switched to the "off" position, leaving circuits energized when homeowners believe they're safe to work on.

Insurance companies increasingly refuse coverage for homes with Federal Pacific panels, and those that do provide coverage often charge higher premiums. During home sales, FPE panels are frequently flagged by home inspectors as requiring immediate replacement. The **Ontario Electrical Safety Code** doesn't specifically ban existing FPE panels, but ESA inspectors will typically require replacement during any electrical work or renovations.

Replacement is the only safe solution - there's no way to "fix" or upgrade an FPE panel safely. A complete panel replacement in Ottawa typically costs $2,500 to $4,000, depending on the home's electrical needs and whether a service upgrade is required. This involves installing a new main panel with modern breakers that meet current safety standards, often upgrading from 100A to 200A service to meet today's electrical demands.

If you have an FPE panel, treat it as an emergency. Don't wait for problems to develop - the first sign of failure could be a house fire. Avoid resetting tripped breakers repeatedly, as this indicates the breaker may not be functioning properly. Never attempt DIY work on FPE panels, as the breaker failures make them especially dangerous to work on.

For immediate Federal Pacific panel replacement in Ottawa, Electrical Ottawa's ESA-licensed electricians can assess your system and provide a free estimate. We're experienced with FPE panel replacements and can often complete the work within a day, restoring safety to your home's electrical system.

Q20

What's the difference between 100 amp and 200 amp service?

The main difference between 100 amp and 200 amp electrical service is the total amount of power your home can use simultaneously - 100 amp service provides about 24,000 watts while 200 amp service delivers 48,000 watts of available power.

Electrical Capacity and Modern Needs

A 100 amp service was standard for homes built before the 1980s and can handle basic electrical needs like lighting, standard appliances, and a central air conditioning unit. However, modern homes typically require significantly more power. With electric vehicle chargers (which need 40-50 amp circuits), hot tubs (30-50 amps), electric dryers (30 amps), electric ranges (40-50 amps), and multiple air conditioning units, a 100 amp panel quickly becomes inadequate.

The **200 amp service** has become the standard for new construction and major renovations because it provides the capacity for modern electrical demands. This service can comfortably handle multiple high-draw appliances running simultaneously, plus leaves room for future additions like EV chargers, pool equipment, or workshop tools.

When You Need to Upgrade

You'll know it's time to upgrade from 100 to 200 amp service when breakers frequently trip, lights dim when major appliances start, or you're planning to add high-power equipment like an EV charger. In Ottawa, **ESA requirements mandate that most panel upgrades need permits and inspections**. Many insurance companies also require upgrades for older panels, especially Federal Pacific or Zinsco brands which are considered fire hazards.

Cost Considerations in Ottawa

A **100 amp to 200 amp upgrade typically costs $2,000 to $3,500** in the Ottawa market, including the new panel, meter base upgrade, ESA permits, and professional installation. This involves coordinating with Hydro Ottawa to disconnect and reconnect service, which licensed electricians handle as part of the upgrade process. The investment pays off through increased home value, improved safety, and the ability to add modern electrical features.

Safety and Code Compliance

Under the **Ontario Electrical Safety Code**, panel upgrades must be performed by ESA-licensed electricians and require inspection before the new service is energized. The upgrade also provides an opportunity to add modern safety features like AFCI (arc fault) protection and ensure all GFCI requirements are met throughout your home.

For a free assessment of whether your home needs a service upgrade, Electrical Ottawa's licensed electricians can evaluate your current electrical demands and future needs to recommend the right solution for your Ottawa home.
