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How to Choose the Right **Generator** for Your Application

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It's Not Just a Generator — It's Peace of Mind

Now more than ever, power is synonymous with success in the business world. Since 98% of businesses report that just a single hour of downtime can cost them upwards of $100,000, your investment in a generator is a smart decision for your team, your customers and your bottom line.

A standby generator is a considerable investment for your business, so you want to do it right. This guide will walk you through the most important aspects of generator sizing, selection, customization and installation — including tips on how to ensure you're getting a high quality generator that's built to last.

In this ebook, you will learn how to:

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Terms to Know

To understand how your generator works, you'll need to have some knowledge of terms commonly used within the backup power industry. Look out for these terms when selecting your generator:

AIR-COOLED SYSTEM
Air-cooled backup power systems use airflow to cool your generator's engine and components. Air-cooled systems are generally less expensive, but there's a limit to how large an air-cooled system can be, which can limit their use for industrial applications.

ALTERNATOR
An alternator turns mechanical energy into electrical power in the form of an alternating current.

EMISSIONS RATING
Generators are rated by the U.S. Environmental Protection Agency (EPA) from Tier 1 to Tier 4 Final, with Tier 4 Final meeting the highest emissions standards. There are very specific regulations that dictate how generators may be used depending on the exact horsepower of the engine, the year of manufacture, the manufacturer's EPA compliance program, and the exact application.

ENCLOSURE
An enclosure houses your generator set and is designed to prevent unauthorized use, protect the generator from weather and debris, and significantly reduce sound levels. Different types of enclosures may do one or all of these things, depending on its design.

GENSET
Also known as a generator set, a genset is the combination of an engine, an alternator, a cooling system, and minimum protection/control components. It has the primary purpose of converting the chemical energy of fuel into electricity.

LIQUID-COOLED SYSTEM
Like a car, the liquid-cooled system incorporates a radiator with coolant to absorb heat from your generator's engine. This system is common on all medium and large generators and is much quieter than an air-cooled system. Diesel generators of all sizes should be equipped with liquid-cooled systems for maximum reliability and performance.

POWER RATING
Depending on the application, a generator's power can be rated as one or more of the following. The importance of each varies by your application.

- **STANDBY POWER RATING**
  The electrical output for a standby or backup generator used when utility power fails. Under non-emergency situations, this system usually operates less than 60 hours per year and operates no more than 200 hours per year. Prime power unit has a 10% overload capability.

- **PRIME POWER RATING**
  The rating for a generator used as a primary source of power, running up to 24 hours per day with a varying electrical load. This rating is approximately 90% of the standby rating.

- **CONTINUOUS POWER RATING**
  The rating for a generator used as a primary source of power, running up to 24 hours per day with a fixed electrical load. This rating is approximately 70% of the prime rating.

PEAK / OFF-PEAK / PEAK SHAVING
You can use a generator to reduce your utility electrical load during peak pricing periods (also called peak shaving). This setup requires very complex coordination between the generator configuration, the system installation, and the utility company.

RATED VOLTAGE
A rated voltage is the voltage at which your generator set is meant to function, according to its specifications.

TRANSFER SWITCH
A type of circuit breaker panel, a transfer switch allows the connection of the load to two or more power sources. By installing a transfer switch, the user can safely switch between the sources manually or automatically depending on the installation and features of the transfer switch.

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Types of Generators

Generators are manufactured in a range of sizes and formats for particular types of applications. Each generator type has its own benefits and drawbacks, so it's a good idea to work with a backup power expert if you aren't sure which type of generator is right for your business.

Mobile

Any generator that can be moved from one location to another is considered a mobile generator. Most often, mobile generators are used as backup generators for facilities or temporary sites, including:

Construction job sites • Special events • Food trucks
Paper shredders • Emergency vehicles

Benefits of a Mobile Generator:

- Can be used in difficult-to-reach locations
- Can be mounted on a trailer for greater mobility
- Great for temporary power needs

Drawbacks of a Mobile Generator:

- Enclosures not as capable of reducing noise
- Limitations in terms of application scope

Standby or Stationary

Standby generator units are primarily used for emergency power when the utility power goes out. These units are used in a wide range of applications including:

Healthcare facilities • Emergency services offices
Server farms • Government buildings • Office buildings
Permanent work sites

Benefits of a Stationary Generator:

- Wide range of sizes for a variety of industrial applications
- Can be customized with a wide range of accessories
- Can provide standby power for demanding applications
- Liquid-cooled for quieter operation
- Can operate automatically with the use of a transfer switch

Drawbacks of a Stationary Generator:

- Larger financial investment
- Not easily moved to a new location
- Requires a more complex installation process

What's a rental-grade generator?

Rental-grade generators are highly adaptable generators that feature a very wide range of features in comparison to other types of industrial-grade generators. Unlike many industrial generators, rental-grade generators must be able to adapt to many different types of environments and applications without add-ons. Therefore, they often have multiple quick-connectors and multiple selectable voltage outputs, as well as a comprehensive list of convenience and safety features to provide maximum flexibility and versatility no matter the application or the skill set of the operator.

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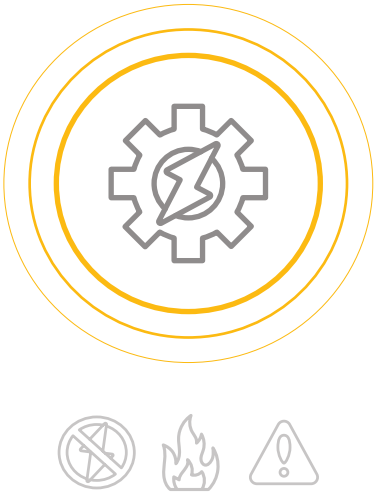
How to Determine What Size Generator You Need

Generators are highly complex and require appropriate sizing to work well. Generators that aren't sized correctly can damage the devices, appliances and systems they are meant to power, and may even translate to costly repairs down the line.



A generator that doesn't provide enough power:

- Generator shutdown
- Generator damage or overheating
- Damage to your devices, appliances or equipment
- Unexpected loss of backup power

A generator that provides too much power:

- Unneeded investment
- Unnecessary maintance costs
- Unnecessary fuel consumption costs
- Short and long term damage to the engine

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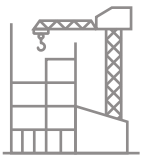
Generally, you'll need the help of a backup power expert to select the right size generator, but you can get an estimate of your generator size by following these steps.

Step 1.

Itemize Your Power Requirements

The desired generator output will vary by the size and type of your facility. Different types of businesses may require power for different systems, some of which might not be needed during a temporary loss of power.



Construction or work site:

- Tools
- Light towers or balloon lighting
- Safety systems

Retail establishment:

- Payment terminals
- Lights
- Security systems
- Data servers
- Computers

Office building:

- Lights
- Telecommunications
- Security and safety systems

Restaurant or food establishment:

- Refrigeration
- HVAC systems
- Appliances

Healthcare facility or clinic:

- Lights
- Breathing machines
- Life support systems
- Security systems

To calculate your power requirements, you will need to itemize which systems and equipment you want to power during a blackout. This process helps you determine which systems and equipment are critical to your business continuity plan.

Use this information to begin estimating your total power needs. Remember: Some systems and devices might not be included on this chart, so review your power needs carefully.

Storm / Emergency Use

Essentials	Estimated Running Watts	Additional Starting Watts
Lamp (60 watt bulb)	60	0
Refrigerator/Freezer	600	2200
Sump Pump 1/3HP	800	1300
Sump Pump 1/2HP	1050	2200
Water Well Pump 1/3HP	1000	2100
Electric Water Heater	4000	0
Heating / Cooling		
Space Heater	1800	0
Humidifier 13 Gal	175	0
Furnace Fan Blower 1/2HP	800	2350
Furnace Fan Blower 1/3HP	700	1400
Window AC 10,000 BTU	1200	3600
Window AC 12,000 BTU	3250	3950
Central AC 10,000 BTU	1500	3000
Central AC 24,000 BTU	3800	4950
Central AC 40,000 BTU	6000	6700
Heat Pump	4700	4500

Job Site

Construction	Estimated Running Watts	Additional Starting Watts
Quartz Halogen Work Light (300)	300	0
Circular Saw	1200	2400
Disc Sander (9")	1200	1200
Paint Sprayer	360	1080
Electric Drill (1/4")	300	300
Cordless Hand Drill Charger	70	150
Lawn Care		
Electric Lawn Mower	1400	4320
Electric Pressure Washer	1200	3600
Electric Chainsaw	1200	2400
Electric String Trimmer	600	1500
Electric Weed Trimmer	500	500

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Step 2.

Measure Power Consumption

After identifying which items you will need to power during an outage, the next step is to measure your total power consumption during peak usage. There are a number of methods to do this, including:

Real-Time Measurement

1. Use a clamp-on ammeter on each leg of the electrical service and add the measurements together to provide the total amps used by the facility.
2. Divide the total amps by three for three-phase current, and by two for single-phase current. Multiply the result by the supply voltage, and again by 1,000 for kilowatts required.
3. Add the power in kilowatts used by each emergency safety system according to articles 700, 701, 702 and 708 of the NEC to the kilowatts required to obtain full load kilowatts (kW).

Full Load Capacity with Extensive Motor Use

1. Multiply the starting current for the largest motor that turns on and off by the voltage for the number of watts required.
2. For all other motor and non-motor loads, multiply the current by the voltage for watts.
3. Calculate total watts used by the largest motor and all remaining motor and non-motor loads and multiply by 1000 for kilowatts.
4. Add 25% for reserve/surge capacity and size the generator accordingly.

Full Load Capacity by Billing History

1. Utilize your utility company's billing system to find your maximum power usage.
2. Review your utility bill for the peak demand each month.
3. Find the highest peak demand over the previous year and then add 25% for reserve capacity.

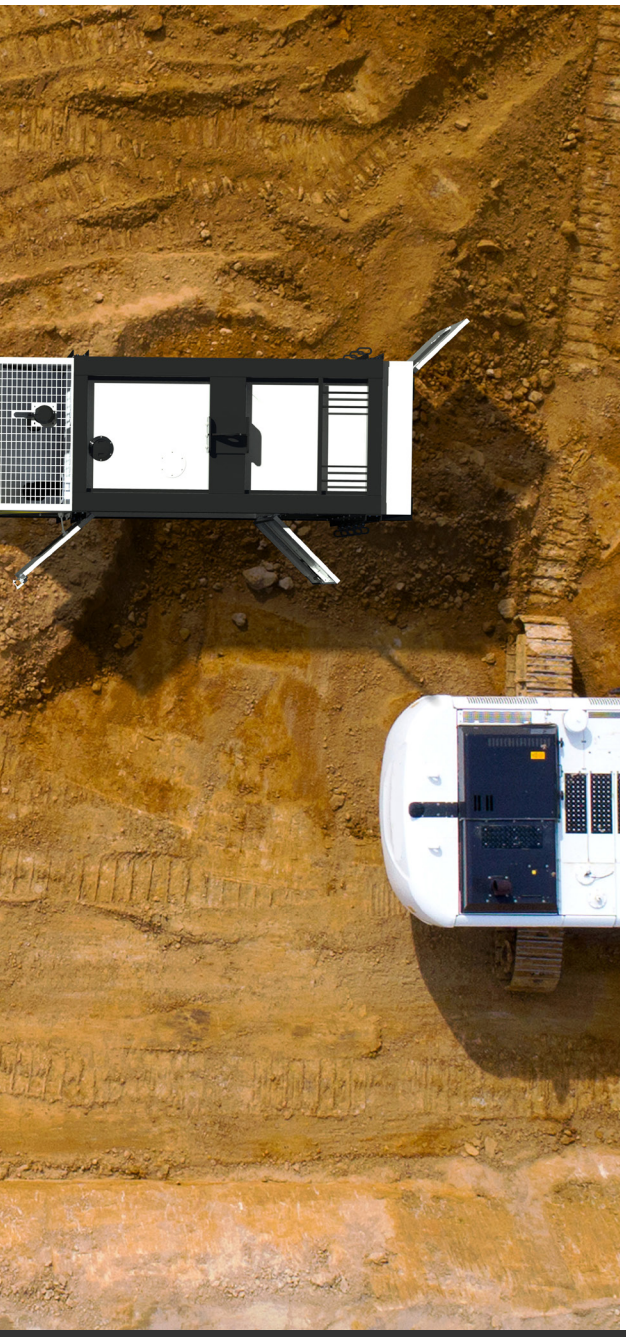
Square Footage Measurement

This is a popular method for measurement in retail spaces, restaurants or grocery stores. Use the following formulas to calculate your electrical load:

- **Retail application:**
  50 kW + 10 watts per square foot
- **Other commercial application:**
  50 kW + 5 watts per square foot

Tip

Be sure to include mandated emergency safety systems. Add a 25% reserve capacity to your calculated consumption.



Step 3.

Determine Starting and Running Wattage

Some electrical equipment such as compressors and motors require an initial surge of power to get started. Following startup, demand corresponds with rated power output and the electrical load.

For standby generator use, calculate the load on a staggered start for multiple units to spread out the load. Use the highest Locked Rotor (LR) rating from among all the items you want to run.

1. Select the items that will run at the same time, and add the rated wattage together for the total running watts.
2. Select the item with the highest number of starting watts.
3. Add the two numbers together for total watts needed.

If you can't determine the running watts of an item, use the formula of ***watts = volts x amperes*** to calculate from volts and amps ratings on the equipment labels.

Step 4.

Examine Generator Performance Charts for Load Requirements

Once you have determined the power requirements for your commercial generator, use information from generator manufacturers to identify a unit that fits your specific needs. Generators are usually rated in kilowatts and come in a wide range of capacities. If your needs fall between common ratings, choose the next highest capacity.

Remember

You'll need to have any generator sizing results verified by an electrical contractor or another type of certified electrician for safety, accuracy and compliance. If you aren't sure how to get in contact with an electrician, the company sizing your generator should be able to help.

Step 5.

Consult With an Expert

Before you invest in a commercial generator, seek the assistance of a backup power expert. Tell the expert about your facility and the type and number of items you'd like to power. A site visit may be necessary to design a system that fits your needs.

Other Considerations: Generator Noise, Lifespan and Emissions

Your generator selection should include more than power requirements and fuel types. Factors like noise, lifespan, reliability and emissions are also vital aspects of choosing the right kind of generator and enclosure.

Noise

Depending on how much you plan to use your generator, sound can be a factor to consider for your investment. However, with the right enclosures and systems, a generator can be as quiet as a central air conditioning unit.

Lifespan

Certain types of generators last longer than others, whereas some require more frequent maintenance to continue operating well. Generally, generators with diesel engines last longer and are more reliable than natural gas or propane generators.

Reliability

The reliability of your generator is crucial to its performance as a backup power solution. Without reliable access to continuous power, your business continuity will suffer. Everything from manufacturer to fuel type will impact the reliability of a generator.

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Generator Fuel Sources: The Benefits of Diesel

One of the most crucial considerations when selecting a generator is fuel source. While generators can run on propane or gasoline as well as diesel fuel, diesel generators have a number of benefits that make them a premium choice for commercial and industrial applications. This includes:

Easier Maintenance

Diesel generators don't have spark plugs or carburetors, and therefore require less frequent maintenance than other types of generators.

Longer Lifespan

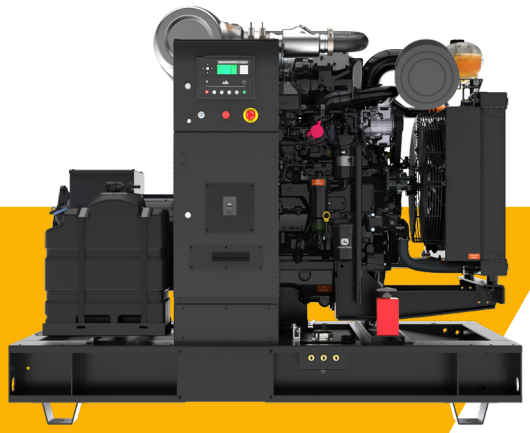
Diesel generators tend to last longer than other types of generators. When well-maintained, diesel generators can last three times longer than their propane or natural gas counterparts.

More Efficient Performance

Diesel generators are generally more efficient with fuel than other types of generators, meaning they can run for longer without the need to refuel.

Controlling for Noise and Weather: Generator Enclosures

The easiest and most effective way to control for operational noise and damage is by selecting the right generator enclosure. Common types of enclosures include:



Open Skid

An open skid generator is mounted on a skid for portability by a forklift. The open skid may facilitate placement in rough terrain or a tight fit where the generator can't be placed in any other way. An open skid generator can be installed as a packaged genset, rather than assembling components on site. Keep in mind that a skid-mounted generator may also need vibration isolation systems for quiet operation.

Open skid are often used for generators used in:

Construction sites • Work sites • Man camps
Buildings with dedicated generator rooms

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Weather Enclosure

This type of enclosure solely protects from the basic elements (light dust, rain, and sunlight), but does not include most of the sound attenuating materials, components, and design features required to significantly reduce sound levels.

Weather enclosures are often used for generators in:

- *Areas prone to extreme weather or high winds*
- *Locations prone to extreme cold or heat*
- *Areas where a large amount of debris is produced*
- *Applications where operational noise isn't an issue*

Silent Enclosure

Generators can be virtually silent, or at least operate in a decibel range low enough to hold a normal conversation next to one. To achieve this level of quietness requires a sound attenuation enclosure, which uses sound absorption layers to block sound from moving from the machinery to the enclosure wall.

These types of enclosures work because of two features: Noise silencers or mufflers control noise coming from engine combustion, fans and blowers; and foam wrapping on pipes and conduits can stop vibrations that cause significant noise

Silent enclosures are often used for generators in:

Office buildings • Residential areas
Shopping areas or retail centers

Wind- and Impact-Rated Enclosures

Some generator enclosures have certain weather-protective variations, referred to as wind- or impact-rated enclosures.

These types of enclosures are often custom and require a much bigger investment, sometimes five to 20 times the cost of a standard enclosure. If you aren't sure if you need a weather-protective enclosure, ask a backup power expert.

Wind-rated enclosures can withstand winds higher than other types of enclosures — sometimes as high as 150 mph. These are especially useful in areas where severe weather is common.

Impact-rated enclosures are specifically designed to withstand the impact of debris or other materials, and are best suited for heavy duty applications that might need enhanced protection against the elements.

Generator Emissions

The EPA classes diesel generators in Tiers 1 to Tier 4 Final , which each rating attached to a certain maximum for emissions. Certain areas require generators to have a certain rating in order to be used. A generator's horsepower will determine its emissions classification, which may impact where it can be used, how often and for how long.

For up-to-date information about generator emission regulations, visit the EPA site.

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Generator Features Worth the Investment

Your investment doesn't stop with your generator. Certain accessories and add-ons can significantly improve your generator's operations and longevity, and may even enhance the safety of your backup power system.

Safety Switches

Your commercial generator should have a transfer switch that automatically senses a power outage and transfers power from your utility system to your generator. With an automatic transfer switch, the unit will start to power your system after 10 to 12 seconds, so critical systems will be able to resume operating when you are not around. Generators with automatic transfer switches are safer for your personnel as well as utility workers.

Remote Monitoring

With remote monitoring, you'll be able to see the control panel on a computer or mobile device and monitor the performance of the generator any time, anywhere. You can see if it's generating the amount of power you need, and you may be able to troubleshoot issues as they arise. You can also receive alarms if the fuel is running low, the engine is running hot, or if there are power fluctuations outside of normal ranges.

Lighted Displays

With a lighted display, you can see your generator's control panel when there are no lights available, which could be useful for starting and troubleshooting. You can check on the generator's health while it's running, without a flashlight or other light source.

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How to Find the Right Generator Supplier

Selecting the best commercial-grade generator for your power needs is not always a straightforward process. More often than not, your backup power requirements may require the help of an expert that understands how to assess generator performance and quality.

Before seeking out the help of a generator expert, make sure you know what you're looking for in your backup power partner. Not all distributors are created equal, so ask yourself these questions to determine if a distributor is trustworthy:

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Can they guarantee that your generator is made with 100% genuine components?

Generators and generator parts that come from sources other than the original manufacturer may not meet quality standards outlined for your application. Even if you purchase a generator made with engines manufactured by recognized brands like John Deere or Kohler, you still risk poor performance if the other main components of that generator have cheap aftermarket or counterfeit parts.

Look for a supplier that can verify the authenticity of their products the following ways:

- Parts are individually serialized and tracked back to the original manufacturer
- Parts and products are purchased directly from the manufacturer (not a middleman)
- Manufacturers will certify the authenticity of their products
- Generators and generator parts come with at least a one-year international warranty

Are their employees and customer service representatives knowledgeable?

Understanding generators and backup power requires a much higher level of specialized knowledge than most people possess. While some distributors may hire employees who are strictly salespeople, trustworthy distributors recognize the importance of having a knowledgeable staff.

Look for distributors whose employees are certified by the Electrical Generating Systems Association. Those who pursue this certification must adhere to robust guidelines and pass a test to verify their expertise.

Do they have a proven track record of happy customers?

There are a number of organizations that help customers differentiate between quality companies and those whose business practices are subpar. One of these organizations is the Better Business Bureau (BBB), which rates companies based on a variety of important factors. Look for distributors who have at least an A rating from the Better Business Bureau.

Are they an official distributor of well-known generators or generator parts?

Many well-established distributors will create formal partnerships with generator manufacturers, and will often work as either an official distributor or an exclusive distributor for these brands. This further enhances the quality of their products and may even translate to better prices for customers. If a distributor is an official or exclusive distributor of one or more trusted brands, they can certainly be trusted with your power needs.

Beware of Cheap Aftermarket Parts

Counterfeit and cheap aftermarket parts are a common underlying factor when it comes to poor generator performance. From the outside, a fake part may be indistinguishable from a real one, but inside they don't have the same performance characteristics. Fake bolts can break and counterfeit electrical equipment can be overloaded, leading to failure of your entire backup power system.

To avoid purchasing a generator made with counterfeit or cheap aftermarket parts, work with a verified dealer for the brand of equipment you use, and purchase only brand-name replacement parts and accessories. The consequences of saving a few dollars could be catastrophic if your generator fails when you need it most.

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Why Work with General Power?

At General Power, we have over 40 years of combined industry experience and a track record of quality customer service and superior product selection. We work with brands which have over 100 years of combined industry experience.

As an exclusive distributor for many major generator brands, we offer one of the largest selections of generators and 100% genuine generator parts at competitive prices. Unlike many in the industry, many of our products are ready for same-day shipping from one of our global distribution centers.

Our experts can help you select, size and customize your generator.

Contact us or call us at 1-833-428-0674 to begin building the perfect backup power system for your business.

CONTACT US

A+

rating by the Better Business Bureau

40+ years

combined industry experience operating in both North American and South American locations

Single Source Solution:

As a certified OEM and official distributor, General Power is a single point of responsibility for the generator set and its components