

Generator & Backup Power Decision Guide

A Comprehensive Evaluation Tool for Choosing the Right Backup Power System

Introduction to Backup Power Planning

Power outages are increasing nationwide due to severe weather, overloaded grids, aging infrastructure, and rising electrical demand. For homes, schools, commercial buildings, and critical facilities, a reliable backup power solution is no longer simply a convenience — it's an operational necessity. The right generator system can prevent data loss, protect refrigeration, maintain heating/cooling, ensure safety, keep security systems online, and maintain essential operations during outages ranging from minutes to days.

This decision guide helps homeowners, facility directors, operations managers, and administrators determine which type of backup power system best fits their needs. Whether you're considering a portable generator, a manual transfer switch, a whole-home standby system, or a commercial automatic backup generator, this worksheet provides the detailed considerations required to make a confident investment.

This document walks you through load requirements, fuel options, startup behavior, space constraints, maintenance expectations, and long-term operating costs — all in clear, practical language.

Understanding the Purpose of Backup Power

Before selecting a generator, it's important to clearly define what you want the system to accomplish. Backup power can serve many different roles depending on your environment. For homeowners, it may be keeping heat, lighting, and refrigeration running. For schools, it may be maintaining emergency lights, servers, security, and fire pumps. For commercial facilities, it may be preserving manufacturing equipment, communications, or mission-critical systems.

Defining your backup power purpose will dictate system size, fuel type, installation type, and control system requirements. Under-sizing a generator can cause system failure during peak usage, while over-sizing wastes money and fuel.

Purpose Definition Checklist

Homeowners

- Keep heat or AC functioning
- Preserve refrigeration and food storage
- Power lights and essential outlets
- Maintain well pump / sump pump operation
- Keep medical equipment online
- Power work-from-home systems

Schools & Facilities

- Maintain emergency lighting
- Power security systems and cameras

- Keep servers and IT networks operational
- Ensure fire pump and safety equipment remain active
- Maintain HVAC for shelter or operations
- Support cafeteria refrigeration

Commercial or Industrial

- Prevent production downtime
- Protect sensitive equipment
- Maintain critical refrigeration
- Preserve communications infrastructure
- Support life safety & code-required systems

Assessing Electrical Load Requirements

One of the most important steps in selecting a generator is accurately determining your power load. Backup systems must be sized according to the total wattage or amperage needed to support essential devices. This includes starting loads (surge wattage) for large equipment like air conditioners, compressors, and pumps, which can demand up to three times their running wattage.

For schools and facilities, load calculations often include lighting circuits, HVAC systems, refrigeration, servers, fire suppression pumps, PA systems, and emergency egress lighting. For residential properties, load calculations typically include appliances, HVAC equipment, well pumps, sump pumps, and essential outlets.

Record each device and its wattage or breaker size. A licensed electrician can convert these values into a precise generator requirement.

Load Calculation Checklist

Identify Critical Circuits

- Heating system
- Air conditioning system
- Refrigeration
- Sump/well pumps
- Medical equipment
- Server racks
- Security systems
- Cash registers / POS
- Classroom or office essentials

Measure Power Requirement

- Running wattage
- Starting / surge wattage
- Total amperage of critical circuits
- Future capacity needs

Common Tools

- Breaker panel audit

- Appliance wattage plates
 - Load calculation worksheet
 - Professional electrician review
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Selecting the Right Type of Generator

Backup power systems come in several forms, each offering different capabilities, costs, and levels of automation. Choosing the right one depends on how long you need to run, what equipment you must power, your available space, your budget, and your tolerance for manual operation.

Below are the primary categories of generators and who they best serve.

Portable Generators

Portable generators are affordable and flexible but require manual operation. They are ideal for homeowners with short outages but not recommended for full-building support in commercial settings.

Portable Generator Checklist

Pros

- Low cost
- Easy to move
- Works for small loads
- Good for temporary or rare outages

Cons

- Manual startup
- Requires fuel storage
- Limited run time
- Cannot power entire buildings
- Must use transfer switch to avoid backfeeding hazards

Best For

- Homeowners needing essential loads
 - Temporary job sites
 - Facilities needing emergency stopgap power
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Standby Whole-Home Generators

Standby generators (typically natural gas or propane) automatically start when grid power fails. These systems provide seamless backup with no manual involvement and can run for days at a time.

Whole-Home Standby Checklist

Advantages

- Fully automatic
- Powers entire home or facility
- Runs on natural gas or propane
- No refueling required

- Best reliability and performance

Limitations

- Higher upfront cost
- Requires professional installation
- Space required for unit + clearances

Best For

- Homes with frequent outages
- Schools for critical circuits
- Offices with essential infrastructure
- Medical or assisted living facilities

Commercial Automatic Generators

These systems support large buildings, multiple circuits, mission-critical equipment, and code-required emergency loads. They often run on diesel or natural gas and integrate with Automatic Transfer Switches (ATS).

Commercial Generator Checklist

Capabilities

- Supports multi-panel electrical systems
- Runs for long durations
- Integrates with building automation
- Protects life-safety systems (alarms, pumps, egress)

Considerations

- Highest installation and maintenance cost
- Requires engineered planning
- Needs a secure fuel source
- May require enclosure or sound reduction

Best For

- Schools
 - Factories
 - Hospitals
 - Government facilities
 - Large commercial buildings
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Fuel Options and Choosing the Right Source

The type of fuel your generator uses dramatically affects runtime, maintenance, reliability, and cost. Understanding your options ensures you choose a system compatible with your environment and emergency needs.

Fuel Type Checklist

Natural Gas

- Unlimited supply (pipeline)
- Low maintenance

- Quiet operation
- Not available in all areas

Propane

- Clean burning
- Long shelf life
- Requires onsite tank
- Good for rural homes and schools

Diesel

- High output for commercial systems
- Best for long-duration outages
- Requires fuel maintenance
- Must store fuel securely

Gasoline (Portable Units)

- Readily available
- Short shelf life
- Risk of improper storage
- Not ideal for long outages

Transfer Switches & Power Switching Methods

A generator alone is not enough — you need a safe and reliable method to switch power between the grid and the generator. Transfer switches prevent backfeeding, protect utility workers, and ensure safe distribution of backup power.

There are two main types:

Manual Transfer Switches (MTS) for portable generators, and **Automatic Transfer Switches (ATS)** for standby or commercial systems.

Transfer Switch Checklist

Manual Transfer Switch (MTS)

- For portable generators
- Requires manual operation
- Less expensive
- Good for essential loads

Automatic Transfer Switch (ATS)

- Starts generator automatically
- Transfers loads seamlessly
- Required for whole-home systems
- Standard for schools and commercial buildings

Critical Features to Look For

- Load shedding capability
- UL listing

- Whole-panel vs. selected-circuit control
 - Compatible breaker sizing
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Location, Installation & Space Requirements

Backup generators must be placed in locations that comply with building codes, fire separation requirements, noise restrictions, and ventilation clearances.

Proper placement prevents carbon monoxide exposure, overheating, and hazard conditions. Whole-home or commercial generators typically require concrete pads, secure mounting, and safe routing of fuel and electrical lines.

Placement & Installation Checklist

Placement Requirements

- Minimum clearance from windows and doors
- Proper ventilation for exhaust
- Solid, level concrete or composite pad
- Protection from weather and flooding
- Proper security enclosure

Installation Considerations

- Local code requirements
- Fuel line routing

- Conduit or trenching requirements
 - Noise level considerations
 - Future access for maintenance
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Maintenance, Testing & Long-Term Operation

Backup power systems must be tested and maintained regularly to ensure they perform during emergencies. Standby generators should run weekly or biweekly self-tests. Commercial generators typically require monthly load testing and annual fuel polishing (for diesel).

Maintenance Checklist

Routine Tasks

- Oil, air filter, and spark plug changes
- Battery inspections
- Fuel system checks
- Cooling system inspection
- Exercise cycles

Testing

- Monthly run tests
- Full-load testing for commercial units
- Annual professional inspection

Records

- Maintenance logs
 - Test logs
 - Fuel storage logs
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Cost Considerations & Budget Planning

Generator systems vary dramatically in cost depending on size, fuel source, installation scope, and building type. Large commercial systems may require engineering, permitting, site preparation, trenching, and full panel integration.

Cost Planning Checklist

Upfront Costs

- Generator unit
- Transfer switch
- Installation labor
- Fuel system setup
- Concrete pad

Long-Term Costs

- Maintenance and servicing
- Fuel costs
- Battery replacement
- Testing requirements

- Repair or part replacement

Budget Planning

- Evaluate ROI
 - Consider uptime value
 - Identify grants or education funding
 - Determine operational risk of downtime
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Final Decision Summary & Recommendation Framework

Once you've completed the worksheet, you should have a clear understanding of your power requirements, system type, fuel preferences, installation constraints, and budget range. Use this summary to determine which generator best fits your environment.

Backup power is an investment in safety, security, and operational reliability. Whether you're supporting a home, school, medical office, data room, or entire facility, the right system ensures comfort, continuity, and preparedness during outages of any duration.

Final Decision Checklist

System Type

- Portable
- Standby / Whole-home
- Commercial Automatic
- Industrial High-Capacity

Fuel Preference

- Natural Gas
- Propane
- Diesel
- Gasoline (limited use)

Installation Readiness

- Clear, code-compliant location
- Panel compatibility
- Transfer switch type selected
- Budget approved

Confidence Factors

- System sized correctly
- Meets operational goals
- Provides desired runtime
- Within maintenance capacity