

# EMERGENCY POWER PLANNER:

**Your PRACTICAL GUIDE to restoring electric power and protecting your business during utility outages.**

When the power goes down, you want it back—fast. Preparation for power failure is a must, and a contingency plan is an essential tool. With a solid contingency plan in place, you'll know what to do and whom to call to restore your power as soon as possible, to keep your business functioning and your revenue stream flowing.

This Emergency Power Planner will guide you and your team through the basic steps of building a contingency plan. The checklist format will help you cover the key elements quickly and easily. To fill in the details, consult with an established supplier of rental power generating equipment, supplies and service.

Sooner or later power outages affect everyone. Don't wait for the inevitable to happen. The time to plan is now, and Carter Machinery is ready to assist you.

**Step 1: DETERMINE YOUR POWER REQUIREMENTS.** In a utility outage, you can provide power for your entire facility and equipment, or for critical loads only. Your emergency standby generator powers only life-safety equipment required by code. After that, you must choose which loads are critical and which are not:

- |   |          |                                      |          |
|---|----------|--------------------------------------|----------|
| <input type="checkbox"/> Production machinery                   | _____ kW | <input type="checkbox"/> Pumps       | _____ kW |
| <input type="checkbox"/> Computers and servers                  | _____ kW | <input type="checkbox"/> Other _____ | _____ kW |
| <input type="checkbox"/> Process controls                       | _____ kW | <input type="checkbox"/> _____       | _____ kW |
| <input type="checkbox"/> Plant and office lighting              | _____ kW | <input type="checkbox"/> _____       | _____ kW |
| <input type="checkbox"/> Heating, ventilating, air conditioning | _____ kW |                                      |          |
| <input type="checkbox"/> Compressed air systems                 | _____ kW |                                      |          |
|   |          | <b>TOTAL</b>                         | _____ kW |

**Step 2: PLAN FOR THE LOGISTICS OF DELIVERY AND OPERATION.** Your equipment supplier must be able to deliver and park the generator set, so that it is easily accessible for connecting, operating, servicing and fueling. Planning considerations must include:

- |   |  |
|---|--|
| <input type="checkbox"/> Environmentally sound location away from drains, work areas and residences | <input type="checkbox"/> Identification of connection points         |
| <input type="checkbox"/> Location with adequate surrounding open space                              | <input type="checkbox"/> Designated access route for delivery        |
| <input type="checkbox"/> Location away from traffic, trees and obstructions                         | <input type="checkbox"/> Opening for cable access to the building    |
| <input type="checkbox"/> Level, paved area for parking  | <input type="checkbox"/> Planned route for cable inside the building |
|   | <input type="checkbox"/> Security fencing                            |

# 3

**Step 3: SELECT APPROPRIATE GENERATOR SET FEATURES.** Choose from a variety of features to suit your site's specific requirements, including:

- Sound attenuation. Ask for ratings below 92 db(A) at full load. Ratings as low as 70-72 db(A) are available.
- Auto start-stop capability. Automatically starts a rental unit if a standby unit goes down.
- Vertical radiator and exhaust discharge. Directs discharges up and away from buildings and people. Important in populated or high-traffic areas.
- Electronic governor. Necessary for critical loads that cannot tolerate frequency fluctuation (computers, motor-driven equipment, machines backed by UPS).
- Charging alternator. Ensures that batteries are charging when the unit is operating.
- Sight gauges. Simplify monitoring of fuel and critical fluid levels.
- Security features. Lockable doors, interior-mounted oil/water drains, and hidden exterior fuel drains help prevent tampering.
- Distribution panel labeling. Helps inexperienced operators safely identify output voltages.
- Output bus bars. Spacing of bus bars for multiple output cable hookups allows one generator set to run several loads.
- Fuel priming pump. Facilitates startups after transport.
- EPA and local emissions certifications. Ensures compliance with emissions regulations.

# 4

**Step 4: IDENTIFY REQUIRED ANCILLARY EQUIPMENT AND ACCESSORIES.** Your installation may require a variety of accessory equipment. Consider whether you need any of the items listed below. If so, determine the required quantities.

- |  |       |                                       |       |
|--|-------|---------------------------------------|-------|
| <input type="checkbox"/> Cable               | _____ | <input type="checkbox"/> Fuses        | _____ |
| <input type="checkbox"/> Switchgear          | _____ | <input type="checkbox"/> Outlets      | _____ |
| <input type="checkbox"/> Controls            | _____ | <input type="checkbox"/> Spider boxes | _____ |
| <input type="checkbox"/> Circuit breakers    | _____ | <input type="checkbox"/> Cable ramps  | _____ |
| <input type="checkbox"/> Transformers        | _____ | <input type="checkbox"/> Other _____  | _____ |
| <input type="checkbox"/> Quad boxes          | _____ | <input type="checkbox"/> _____        | _____ |
| <input type="checkbox"/> Load banks          | _____ | <input type="checkbox"/> _____        | _____ |
| <input type="checkbox"/> Bus bars            | _____ | <input type="checkbox"/> _____        | _____ |
| <input type="checkbox"/> Distribution panels | _____ | <input type="checkbox"/> _____        | _____ |

# 5

**Step 5: CHOOSE YOUR RENTAL GENERATOR SET SUPPLIER.** To implement a successful plan, look for a rental dealership that offers the following qualifications and capabilities:

- Well maintained and pre-tested equipment.
- Rental units in stock that meet your load requirements.
- Modern, emissions-compliant equipment designed for rental use.
- Complete ancillary equipment in stock.
- Ability to deliver to meet your time constraints.
- Quick, efficient delivery and pickup.
- Complete fuel service.
- Spare parts inventory in stock.
- Staff qualified to deliver turnkey service and technical support.
- Experience in your industry.
- Capability to train your staff.
- Flexible financial options that include weekly and monthly rental contracts; Rental Purchase Options.
- Pre-approved credit arrangements.
- 24-hour response including weekends and holidays.

# 6

**Step 6: PROVIDE FOR FUELING.** A reliable fuel supply is essential for emergency operation. You should arrange for fuel service in advance, ideally through your rental equipment supplier, or through another source if necessary. Considerations include:

- Tank capacity. Determine the fuel consumption rate of the generator set. The unit should be able to operate for at least eight hours between refuelings.
- Auxiliary fuel. Having an auxiliary fuel tank enables longer runs between refuelings.
- Delivery access. Make sure you can provide a clear and easily navigable access route for fuel delivery vehicles.
- Spill containment. Regulations typically require containment equal to the tank capacity.
- Credit approval. Prior credit approval from the fuel supplier is essential to keep emergency operations on track.

# 7

**Step 7: CONDUCT A DRY RUN.** Practice makes perfect. If you want your plan to work in a real emergency, you must practice its execution beforehand. Stage a drill in which your team and, ideally, your equipment supplier run through the plan step by step, just as if an emergency were really happening.

- Make sure that each person fully understands his or her role in the event of an actual power outage.
- Estimate how long it takes from the time the power fails until your emergency power supply is on line.
- Verify the voltage from the transformer breakdown. Knowing the voltage from the transformer breakdown is essential to the safety of people around the generator and will allow the service provider to fit the generator with the right size connections.

# 8

**Step 8: DESIGNATE EMERGENCY PERSONNEL.** Make a list of the key emergency contacts who will be in charge during outages. Make this list accessible to your team members and keep it up-to-date. Be sure to include a primary contact and alternate for each of the following job functions:

- In-house operations and maintenance
- IT, security, data recovery
- Electric utility representative
- Rental equipment representative
- Generator set hookup
- Generator set operation
- Electrical engineer or contractor
- Fuel supplier

NAME & FUNCTION	E-MAIL	OFFICE PHONE	MOBILE PHONE	HOME PHONE

**A FINAL WORD.** We are a supplier of complete generation systems for emergency power. Our engineers and field technicians are experienced in applications of every size, in every sector. We are prepared to answer your questions about electric power contingency planning and to be your business partner in the next power emergency.

For more information, call or click today.  
**800.835.1166**  
[www.CarterMachinery.com/power-systems/power-rentals/](http://www.CarterMachinery.com/power-systems/power-rentals/)



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## ANSWER THE BASICS, SAVE TIME AND MONEY

### Think about the following before the power goes off at your facility:

- How will the generator sets get from the dealership to the facility? Most dealerships deliver, but if you pick up the equipment yourself, you need to determine what size truck you will need. Most generator sets are towed on semi-trailers and pull trailers. Others are skid-mounted and require lifting equipment for loading and unloading.
- Where will you put the generator sets? The largest generator sets measure 8 feet wide by 40 feet long (2.5 meters wide by 12 meters long). If tight quarters are a consideration, two or more smaller units will perform just as efficiently.
- When it comes to accessory requirements, cable must be provided to connect the generator sets to the building's electrical system. Transformers, load banks, bus bars, distribution panels, feeder plants, fuses, outlets, load centers and other accessories may also be necessary.
- How will you get cable from the generator sets outside your building to electrical distribution boxes inside? Consider installing a weatherhead, or a cable access door in an outside wall of your facility that can be closed when not in use. Then, you won't need to route cable through windows and doors that should remain shut during off-hours or inclement weather.
- Can you store enough fuel close to the area where you plan to keep the generator sets? During extended generator set runs, an auxiliary tank of fuel with capacity for at least 24 hours of run-time will reduce service calls from your fuel supplier.
- Do you have people on staff who can hook up the generator sets and check to ensure they will operate properly? If not, make sure your dealership or an electrical contractor can do the hookup, or have the dealership walk your staff through the procedure.

**Carter Machinery has the staff to help you plan out your fuel capacity, cabling needs, and on-site support.**

## FOR YOUR REFERENCE USEFUL ELECTRICAL FORMULAS

To check ampacity of cable types, see local regulations for proper cable sizing, which differ by region.

TO OBTAIN	SINGLE PHASE*	THREE PHASE*
Kilowatts	$\frac{V \times I \times pf}{1000}$	$\frac{1.732 \times V \times I \times pf}{1000}$
kVA	$\frac{V \times I}{1000}$	$\frac{1.732 \times V \times I}{1000}$
Horsepower required when generator kW known (if generator efficiency is known, use 0.93)	$\frac{kW}{0.746 \times \text{Efficiency (Generator)}}$	$\frac{kW}{0.746 \times \text{Efficiency (Generator)}}$
kW input when motor hp known (if motor efficiency unknown, use 0.85 x hp)	$\frac{hp \times 0.746}{\text{Efficiency (Motor)}}$	$\frac{hp \times 0.746}{\text{Efficiency (Motor)}}$
Amperes when motor hp known	$\frac{hp \times 0.746}{V \times pf \times \text{Efficiency}}$	$\frac{hp \times 0.746}{1.732 \times V \times pf \times \text{Efficiency}}$
Ampered when kW known	$\frac{kW \times 1000}{V \times pf}$	$\frac{kW \times 1000}{1.732 \times V \times pf}$
Ampered when kVA known	$\frac{kVA \times 1000}{V}$	$\frac{kVA \times 1000}{1.732 \times V}$

\*Alternating Current

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# POWER OUTAGE WORKSHEET

## kVA/kW AMPERAGE CHART

80% Power Factor

kVA	kW	208V	220V	240V	380V	400V	440V	450V	480V	600V	2400V	3300V	4160V
6.3	5.	17.5	16.5	15.2	9.6	9.1	8.3	8.1	7.6	6.1			
9.4	7.5	26.1	24.7	22.6	14.3	13.6	12.3	12.	11.3	9.1			
12.5	10.	34.7	33.	30.1	19.2	18.2	16.6	16.2	15.1	12.			
18.7	15.	52.	49.5	45.	28.8	27.3	24.9	24.4	22.5	18.			
25.	20.	69.5	66.	60.2	38.4	36.4	33.2	32.4	30.1	24.	6.	4.4	3.5
31.3	25.	87.	82.5	75.5	48.	45.5	41.5	40.5	37.8	30.	7.5	5.5	4.4
37.5	30.	104.	99.	90.3	57.6	54.6	49.8	48.7	45.2	36.	9.1	6.6	5.2
50.	40.	139.	132.	120.	77.	73.	66.5	65.	60.	48.	12.1	8.8	7.
62.5	50.	173.	165.	152.	96.	91.	83.	81.	76.	61.	15.1	10.9	8.7
75.	60.	208.	198.	181.	115.	109.	99.6	97.5	91.	72.	18.1	13.1	10.5
93.8	75.	261.	247.	226.	143.	136.	123.	120.	113.	90.	22.6	16.4	13.
100.	80.	278.	264.	240.	154.	146.	133.	130.	120.	96.	24.1	17.6	13.9
125.	100.	347.	330.	301.	192.	182.	166.	162.	150.	120.	30.	21.8	17.5
156.	125.	433.	413.	375.	240.	228.	208.	204.	188.	150.	38.	27.3	22.
187.	150.	520.	495.	450.	288.	273.	249.	244.	225.	180.	45.	33.	26.
219.	175.	608.	577.	527.	335.	318.	289.	283.	264.	211.	53.	38.	31.
250.	200.	694.	660.	601.	384.	364.	332.	324.	301.	241.	60.	44.	35.
312.	250.	866.	825.	751.	480.	455.	415.	405.	376.	300.	75.	55.	43.
375.	300.	1040.	990.	903.	576.	546.	498.	487.	451.	361.	90.	66.	52.
438	350.	1220.	1155.	1053.	672.	637.	581.	568.	527.	422.	105.	77.	61.
500.	400.	1390.	1320.	1203.	770.	730.	665.	650.	602.	481.	120.	88.	69.
625.	500.	1735.	1650.	1504.	960.	910.	830.	810.	752.	602.	150.	109.	87.
750.	600.	2080.	1980.	1803.	1150.	1090.	996.	975.	902.	721.	180.	131.	104.
875.	700.	2430.	2310.	2104.	1344.	1274.	1162.	1136.	1052.	842.	210.	153.	121.
1000.	800.	2780.	2640.	2405.	1540.	1460.	1330.	1300.	1203.	962.	241.	176.	139.
1125.	900.	3120.	2970.	2709.	1730.	1640.	1495.	1460.	1354.	1082.	271.	197.	156.
1250.	1000.	3470.	3300.	3009.	1920.	1820.	1620.	1620.	1504.	1202.	301.	218.	174.
1563.	1250.	4350.	4130.	3765.	2400.	2280.	2080.	2040.	1885.	1503.	376.	273.	218.
1875.	1500.	5205.	4950.	4520.	2880.	2730.	2490.	2440.	2260.	1805.	452.	327.	261.
2188.	1750.			5280.	3350.	3180.	2890.	2830.	2640.	2106.	528.	380.	304.
2500.	2000.			6020.	3840.	3640.	3320.	3240	3015.	2405.	602.	436.	348.
2812.	2250.			6780.	4320.	4095.	3735.	3645.	3400.	2710.	678.	491.	392.
3130.	2500.			7520.	4800.	4560.	4160.	4080.	3765.	3005.	752.	546.	435.
3750.	3000.			9040.	5760.	5460.	4980.	4880.	4525.	3610.	904.	654.	522.
4375.	3500.			10550.	6700.	6360.	5780.	5660.	5285.	4220.	1055.	760.	610.
5000.	4000.			12040.	7680.	7280.	6640.	6480.	6035.	4810.	1204.	872.	695.

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