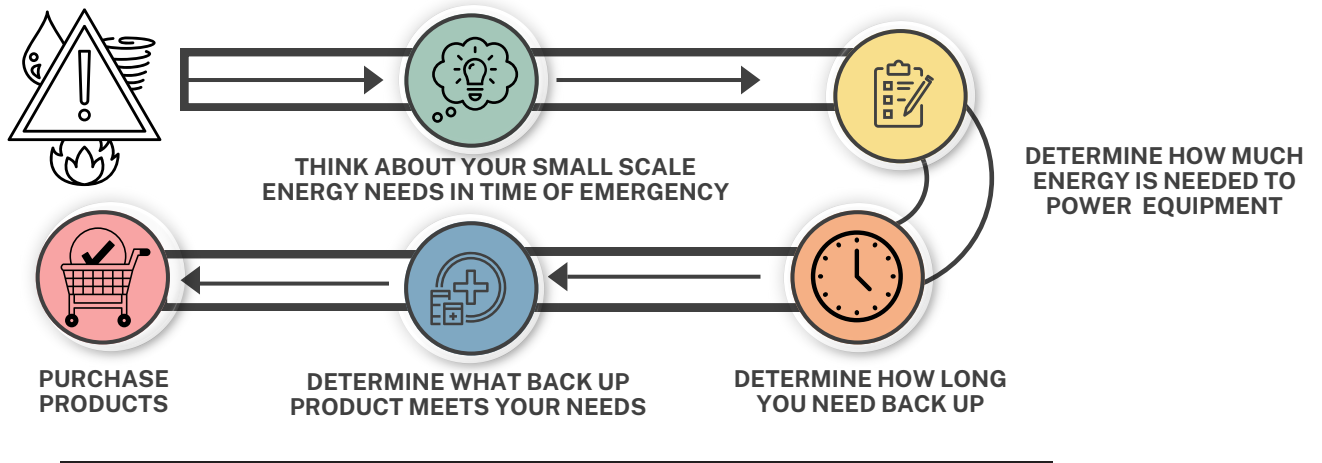


# Small-scale ENERGY BACK UP GUIDE



## 1 Find your small-scale energy needs in times of an emergency.

1. Using the [calculator sheet](#) included, look for the total wattage of the appliances you want to power during an emergency outage (**Critical Load**).
2. Determine the amount of power needed to run your devices (**Running Wattage**).
3. Decide how much battery storage you will need (**Battery Capacity**).

## 2 Understand the product specifications.

<p><b>Running or “Rated” Wattage (Power Output)</b></p>	<p>The amount of power needed to continuously run an electrical device or appliance.</p>	<p>Find the appliance (or sum of appliances) wattage running time. This number can not exceed the power source’s running wattage.</p>	<p><b>Phone Charger:</b> 10 watts  <b>LED Lights:</b> 5 watts  <b>Laptop:</b> 50 watts  <b>Internet Router:</b> 6 watts  <b>TOTAL = 71 Watts</b></p>
<p><b>Peak or “Starting” Watts</b></p>	<p>Peak wattage represents the maximum power a device can produce for a brief moment, i.e. when starting up.</p>	<p>Find the peak wattage on the devices you are running at one time on the tool’s specification sheet. This number can not exceed the power source’s peak wattage.</p>	<p>Example .5 HP Electric Water Pump:            Continuous Running wattage: 375  <b>Starting/Peak wattage: 1000 Watts</b></p>
<p><b>Wh or kWh (Battery Capacity)</b></p>	<p>The amount of energy a battery can store. This number determines the length of time you can run your appliance (s).</p>	<p>Determine Wh needed by finding the wattage and amount of hours you will be running those devices.            *if the Wh number exceeds 1000, it will be expressed in kWh</p>	<p><b>Phone Charger:</b> 10 watts x 2hrs= 20 Wh  <b>Laptop:</b> 50 watts x 2 hrs= 100 Wh  <b>Internet Router:</b> 6 watts x 8 hrs= 42 Wh  <b>TOTAL= 187 Wh</b></p> <p><b>Fridge:</b> 600 watts x 8hrs = 4.8 kWh  <i>(Fridges typically run 50-75% of the time, and more when open)</i></p> <p><b>Sump Pump:</b> 1000 watts x 2hrs= 2 kWh  <b>TOTAL= 6.8 kWh</b></p>

# 3

Select a small scale back up product that will meet your needs.

## Portable Power Stations

The numbers in this table are approximate to existing products on the market. These numbers are only to be used as a high-level guide when exploring products. Look at product specifications for accurate information and contact us for additional support!



Small



X Large

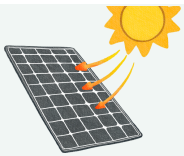


	Running Watts	Peak/Max Output Watts	Battery Capacity	Charging time	Price Range	Running Time <i>(based on broad estimations from manufacturer website)</i>
Small	500 W	~1000 W	~510 Wh	Home Outlet: 7.5 hrs. (1) 200 Watt Solar: 5-7 hrs. <i>*based on Jackery Explorer 500</i>	\$300-\$500	(6 W) Wifi Router - 26.5 hrs (10 W) Lights - 21.2 hrs (50 W) Desktop Computer - 7.1 hrs. <i>*based on Jackery Website</i>
	1000 W	~1500 W	~1264 Wh	Home Outlet: 1.7 hrs.** (1) 200 Watt Solar: 9-11 hrs. <i>*based on Jackery Explorer 1000 v2 **fast charging capabilities</i>	\$800-\$1200	(6 W) Wifi Router - 43.2 hrs. (10 W) Lights - 37 hrs. (600 W) Fridge -1.7 hrs. <i>*based on Jackery Website</i>
	2000 W	~2200 W	~2042 Wh	Home Outlet: 1.7 hrs.** (1) 200 Watt Solar: 9-11 hrs. <i>*based on Jackery Explorer 2000 v2 **fast charging capabilities</i>	\$1000-\$1500	(10 W) Lights - 59.8hrs. (600 W) Fridge -2.7 hrs. (750 W) Electric Water Pump -2.2 hrs <i>*based on Jackery Website</i>
X Large	3600 W	~ 6000 W	~3840 Wh	Home Outlet: 2.7 hrs. (1) 200 Watt Solar 18-20 hrs. <i>*based on Anker Solix 3800</i>	\$2500-\$3500	(600 W) Fridge= 6 hrs (750 W) Electric Water Pump = 5 hrs <i>*based on wattage calculations</i>



### Not enough battery storage?

Consider power stations with the option to add or "stack" additional battery storage. Stacking batteries have the ability to triple battery capacity.



### Should I get solar panels to generate my power station?

This is a great option for re-charging your power bank if you do not have access to car or home electric for more than one day or if you're looking for an off-grid renewable way to recharge your battery. Be sure that your power station has a "solar Input" option.

## Portable Generators

### Gas Generators



In addition to petrol gas and diesel, primary generator fuel types include bi-fuel (gas or diesel) and propane. They run at a constant speed; they may consume more fuel, especially under lighter loads; and can be loud.

### Inverter Generators



Inverter generators run off of gasoline, propane, or natural gas. They are more efficient, quieter, and produce fewer emissions than gas generators.

Small



Large

Running Watts	Price Range	Application
6500 W	~\$650-1100	Sized to power lights, fans, a sump pump, and a refrigerator or freezer
8000 W	~\$800-1300	Sized to power lights, fans, a sump pump, and a refrigerator or freezer.
10-12000 W	~\$1200-3000	Sized to power fans, a sump pump, a refrigerator or freezer, a television, entertainment system, and heating or cooling system and additional devices.



Have more questions regarding your energy needs?

Looking for a system larger than what a portable power system or generator can provide?

Please visit Mountain Association's Energy Team page or email us at [info@mtassociation.org](mailto:info@mtassociation.org)!



# Energy Calculator for Businesses

## ① Determine emergency energy needs

Battery storage can be very expensive. Be sure to only list items that you will absolutely need and be prepared to eliminate items that may not fit your battery or generator budget. If your needs exceed the small scale options listed, you may need to explore stackable batteries or additional energy sources.

### Critical Load

Find your running and starting wattage then add the items you expect to use at one time.  
(You can find these numbers on the specification plate on the tool or equipment)

Tool or Appliance	Running Wattage	Starting/ Peak Watts
Fridge	300	1200
ex. Phone Charger	5	5

### Battery Storage

Transfer wattage from the critical load table and list how many hours you plan to use each item in one day. Next, multiply expected hours used each day by running wattage.

Tool or Appliance	Running Wattage	Hours used in 1 day	Wh
ex. Fridge	300	8	2400
ex. Phone Charger	5	4	20

Add running wattage of items you expect to use at one time

Highest starting wattage on the list

Add highest starting watts and total running watts you plan to use at one time

Total watt-hours (Wh) per day

How to convert Watt hours (Wh) to kilowatt-hour (kWh):  
Take the number of Wh and divided by 1000.

(Wh) / 1000 =  kilo watts (kWh)

## ② Determine Power Station Battery or Generator Wattage Size

Total Running Wattage

Peak wattage

\*If your small scale energy needs exceed 2,000 running watts, we encourage you to reach out to our Energy Team for a more in-depth consultation.

## ③ Determine Battery Bank Size for Power Station

You will need to know your minimum watt - hour **OR** kilowatt hour needed and multiply by how long you need the battery to last before recharging.

Wh x \_\_\_\_\_ (number of days needed) = \_\_\_\_\_Wh

kWh x \_\_\_\_\_ (number of days needed) = \_\_\_\_\_kWh

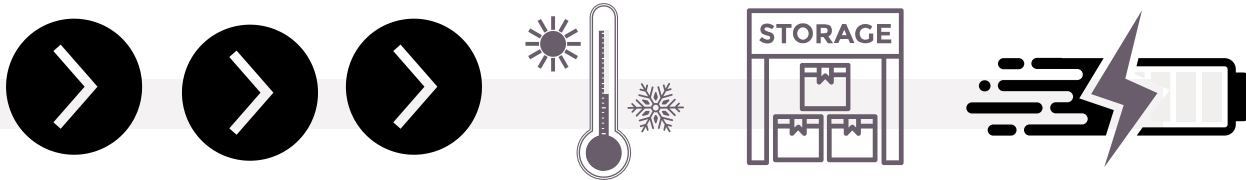
# Safety and Care of Back Up Energy Devices

## Portable Power Stations

**Safety:** Portable power stations are generally safe to use, but they can be a fire hazard if not used and maintained properly.

**Maintenance:** How to maintain the charge and longevity of your power station over time:

- Always consult your power station's user manual for specific storage instructions.
- Store your battery in a climate controlled space (55-80 degrees).
- Periodically recharge it every 1-3 months even if you aren't using it regularly; this helps maintain the battery health and prevent significant charge loss when not in use.



## Portable Fuel-Powered Generators

### Safety:

- Read and follow all manufacturer operating instructions.
- Keep your generator outside and fuel your generator outside; **due to the high risk of carbon monoxide poisoning, never operate a generator indoors or in an enclosed space.**
- Keep a generator dry; do not use it in the rain or wet conditions.
- "Backfeeding" a gas generator (plugging it directly into a wall outlet to power your home electricity) is **extremely dangerous and should never be done** as it can electrocute utility workers, your neighbors and yourself by sending electricity back onto the power lines.
- It is possible to safely power your home's electrical system with a generator by installing a transfer switch. Be sure to consult with a licensed professional for this..

### Maintenance:

- At least once a quarter, run your generator at a significant load to verify it can handle the power demands you might need during an outage.
- At least once a quarter, check the oil level, clean the air filter, and keep the fuel fresh.
- Store it in a cool dry place, never overload it, and always follow the manufacturer's maintenance instructions, including proper shutdown procedures.



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