

# Chapter 2

## Power Sources Answers



### | Batteries

Your batteries are the **central hub** of your power system.

They are the only power source that **stores** energy to be used for later when no other power sources are available.

Ways to charge batteries:

- **Shore power**
- **Generator**
- **Solar**
- **Towing**

The most common battery type is **lead-acid** or **AGM**.

These batteries are **cheap** and **dumb** (in a good way).

Qualities: They are **big, heavy, inefficient**, and they need to be **vented** to the outside.

Use **lithium** batteries for extended off-grid stays.

Qualities: They are **smaller, lighter, sustain** their power, and don't need to be **vented** to the outside.

Lithium batteries need a **brain or BMS** to protect them.

The size of your battery bank will affect which **appliances** you can run, and how **long** you can run them for.

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## | Shore Power

When connected to a 30-amp or 50-amp pedestal at a campground, it enables **120-volt** power natively throughout the rig. Here's what happens:

- All your household **outlets** are energized.
- Certain appliances switch over from **propane** and from 12 volt to 120 volt.
- You can run high draw **appliances** like air conditioner, microwave, and convection oven.
- Your **converter** converts the 120-volt into 12-volt power to run low voltage appliances.
- Your converter charges the **batteries** until full.

## | Generator

A generator is just a tiny, portable **engine** that runs on gas or propane to create energy.

**Contractor** or open frame generators create big nasty raw power.

**Inverter** generators not only have built in inverters, but create very clean and stable power.

Your generator's **wattage** output will determine what you can run inside the RV while connected.

Generators do create **noise** and **exhaust** fumes which can bother your neighbors.

Some campgrounds have specific **policies** around generator usage.

Did you know that **elevation** altitude affects your generator?

You'll lose 10 percent of the rated output every time you gain **3,000** feet in altitude.

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## Tow Vehicle Pigtail

Here's what happens when you connect your pigtail to your tow vehicle:

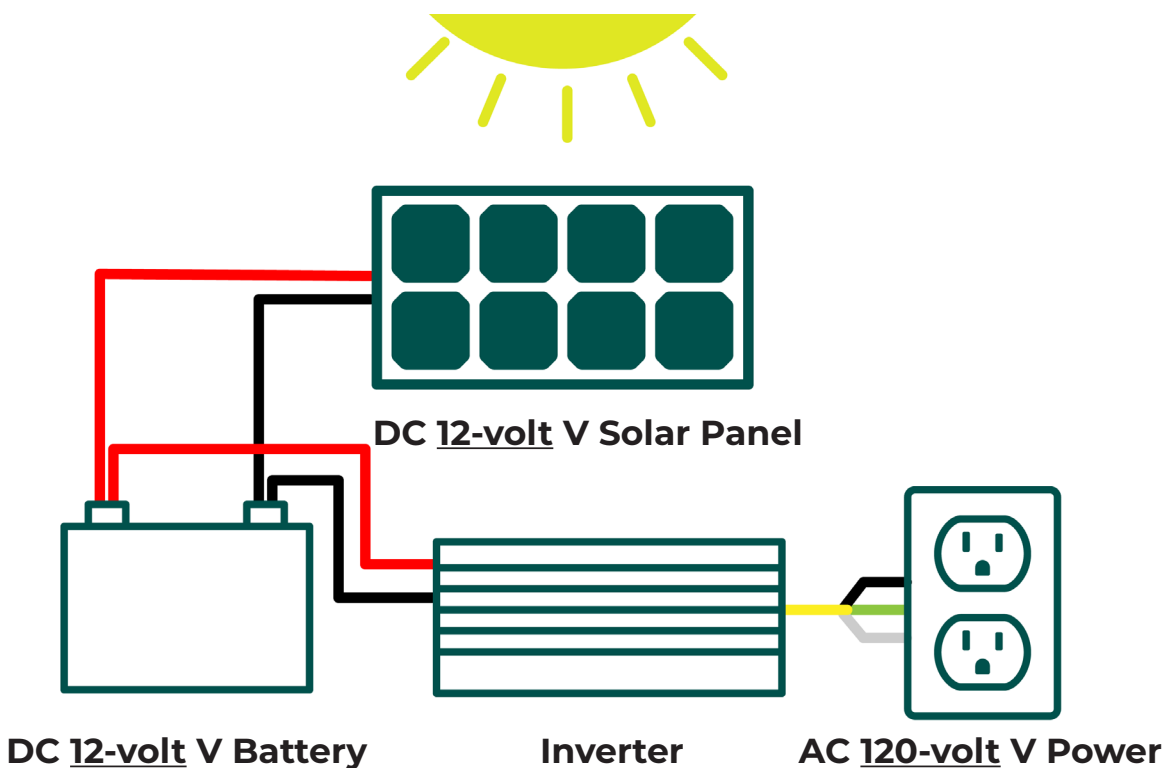
- It enables **running** lights, turn **signals**, brake lights, and **reverse** lights on the RV.
- The vehicle can communicate with your RV **brakes** to slow down more safely.
- It connects to your RV **battery** to trickle charge.

This trickle charge doesn't provide any **meaningful** charge, so don't count on it.

## Solar

Solar panels are just creating **DC** power.

AC appliances you want to run are still limited by your **battery** bank and **inverter** size.



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### | Solar (Continued)

Invest in a **solar** charge controller. This will make sure you charge and float your batteries safely at the correct voltages and don't overcharge them.

A single 100-watt panel can put out up to **5** amps per hour at its peak.

**Clouds** and **shade** will affect the output of your panels.

Can I run my air conditioner with solar? **It depends.**

Technically, you can build a power system in your RV that can run your A/C. Let's say you have a small 13,500 BTU RV air conditioner. Here's how much power it needs:

- On startup, it uses up to 3,000 watts
- It continuously uses 1,500 watts
- This translates to about 150 amps per hour from your batteries

To run A/C on solar, you'd need:

- **2,000** watts of solar panels
- **800** amp hours of lithium batteries
- A **3,500** watt inverter or larger
- All new larger gauge trunk **wires** to handle the voltage increase
- Not to mention all the other parts of the system, like a **BMS**, solar charge controller(s), and more

The easiest way to add solar is to get a **ground deploy** panel or solar **suitcase**.

The best long term solution is to **mount** as many panels as you can on the **roof**.

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### | Propane

Propane gives you the option of making food and staying warm while using virtually **no** power.

You can find propane easily at many **gas stations**.