



An Extended Guide · No. 1667

Battery Basics for Backup Power

How a battery stores power,
and the words worth knowing

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! Read this first — a few battery-safety basics

A battery stores a lot of energy in a small package, so a few plain habits keep everyone safe — no matter the chemistry. Charge with the charger made for that exact battery, on a hard, non-flammable surface, and never charge one that is swollen, cracked, leaking, hot, or wet. Keep batteries away from open flame, sparks, and high heat, and give a lead-acid battery plenty of fresh air while it charges, because it can give off explosive hydrogen gas. Never puncture, crush, short the two terminals together, or throw a battery in a fire. Around lead-acid batteries wear eye protection — the acid inside can burn skin and eyes. And when any battery finally wears out, it does not belong in the household trash: batteries are recycled at the right drop-off, never thrown away. The reassuring part is that the LiFePO₄ chemistry — also written LFP — inside most of today's power stations and backup batteries is one of the safest and most stable there is. This guide is the friendly overview; the charging, storing, and safety guides in this series go deeper on each habit.

Batteries, in plain English

A battery is just a bucket for electricity — you fill it up when power is cheap and plentiful, and you pour it back out when you need it. That's the whole idea behind battery backup.

I'm Bill, and I run Bill's Home Tech here in Portage County, Ohio. More and more of the folks I visit have a power station in the closet, a backup battery in the garage, or are just wondering whether one of these would help during our Ohio storms. The words on the box can feel like alphabet soup, so let's clear the fog.

This guide is the gentle on-ramp for the whole set. It won't turn you into an electrician — it'll just leave you comfortable with what a battery is, the two big kinds, and the few terms worth knowing. Every other guide in this series builds on this one.

★ No question is too basic

If any of this feels over your head, it isn't — it's new, that's all. Call or text me at (330) 200-8042 and I'll walk you through it at your pace.

The whole guide, on one page

If you read nothing else, these are the ideas that make the rest of the series make sense.

- ❑ A battery stores energy and gives it back later — that's all it does.
- ❑ There are two big families: older lead-acid, and modern lithium (the safe, long-lived kind is called LiFePO₄, or LFP).
- ❑ Watt-hours (Wh) tell you how much energy is inside; it's the number worth comparing.
- ❑ A 'cycle' is one charge-and-use; using less of the battery each time makes it last longer.
- ❑ Lithium packs have a built-in 'brain' called a BMS that keeps them safe — lead-acid does not.
- ❑ The right care — charging, storing, and handling — is simple, and it's what the rest of this series covers.

✓ You don't have to memorize any of this

Skim it once so the words aren't strangers. Then keep the guide on the shelf and come back to a page whenever you actually need it.

What a battery actually does

Underneath all the jargon, every battery does the same simple job.

When you charge a battery, you're storing energy inside it as a chemical change. When you use it, that change runs in reverse and hands the energy back as electricity. Fill it up, pour it out, fill it up again — over and over, for years, if you treat it kindly.

For backup power, that's exactly what you want: something that quietly holds a reserve of electricity, ready for the moment the grid goes dark. Unlike a generator, a battery makes no exhaust and no noise, so it's safe to use indoors.

✓ Charging and using are two sides of one coin

Everything in battery care comes back to being gentle on those two steps — not overfilling, not draining it bone-dry, and not cooking it in the heat. Simple habits, long life.

The two big families of battery

Almost every battery you'll meet in backup power is one of two kinds, and knowing which is which explains most of the differences.

Lead-acid — the old, proven workhorse

Lead-acid is the original rechargeable battery, and it's still all around us — in most cars, in many alarm and backup boxes, and in budget power setups. It's the least expensive to buy, it's proven, and it's everywhere. The trade-offs are that it's heavy, it doesn't last as long, and it needs a bit more care.

Lithium — the modern, long-lived kind

Lithium batteries store more energy for their weight and last far longer. The type used in most of today's power stations and home backup batteries is called LiFePO4 (say 'life-o-four'), or LFP for short — and it's prized for being especially safe and stable. It costs more upfront, but it earns that back over a much longer life.

Meet LiFePO4 (LFP), the modern favorite

If you've bought a power station or backup battery lately, odds are it's this chemistry — and that's good news.

LiFePO4 is one branch of the lithium family. It gives up a little of the ultra-compact size you'd find in a phone or laptop battery, and in exchange it's far more stable and much longer-lived. That's exactly the trade you want in something that sits in your home holding energy.

- It's very safe and stable — much less prone to overheating than the older lithium types you hear about in rare fire stories.
- It lasts a long time — many more charge-and-use cycles than lead-acid.
- It's light for the amount of energy it holds.
- It's happy being used deeply, again and again.
- It needs very little fuss thanks to its built-in safety brain.

✓ Why the odd name?

LiFePO4 is just the chemistry's recipe written out — lithium, iron, phosphate. You'll see it and 'LFP' used to mean the same thing. Both are a good sign on a spec sheet.

A word worth knowing: amp-hours (Ah)

You'll see 'Ah' on a lot of batteries. Here's what it's telling you, without the math.

Amp-hours (Ah) are a rough measure of how much a battery can deliver over time — think of it loosely as the size of the bucket. A bigger amp-hour number generally means a bigger battery that can run something longer.

The catch is that amp-hours only tell the full story when you're comparing batteries at the same voltage. Two batteries with the same amp-hours but different voltages do not hold the same amount of energy. That's why the next word — watt-hours — is the one I really trust.

! Don't compare amp-hours across voltages

A battery at one voltage and a battery at another can share the same amp-hour number and still be very different sizes. To compare apples to apples, use watt-hours.

The number I trust: watt-hours (Wh)

Watt-hours are the honest measure of how much energy is actually inside a battery.

A watt-hour (Wh) tells you the real amount of stored energy, no matter the battery's voltage. That makes it the fair way to compare one battery against another. Power stations are usually rated in watt-hours for exactly this reason — it's the number that tells you how much you can actually run and for how long.

There's also a difference between a battery's 'rated' capacity and the part you can actually use. With lead-acid, you should only use a portion of the rating; with LiFePO₄, most of it is usable. So a lithium battery often does more real work than its number alone suggests. We dig into all of this in our guide on reading capacity.

✓ One number to remember

If you only remember one term from this guide, make it watt-hours (Wh). It's the closest thing to a true 'how much can this run' number.

Cycles, and how far you drain it

Two more ideas explain why some batteries last for years and others tire out quickly.

A cycle

A cycle is roughly one full charge and use. A battery's life is often thought of in cycles — how many times you can fill it and empty it before it starts to tire. LiFePO4 offers many more cycles than lead-acid, which is a big part of why it lasts so long.

Depth of discharge

Depth of discharge just means how far down you drain a battery before recharging. Draining it a little each time is gentle; draining it all the way, over and over, wears it out faster — and lead-acid is especially sensitive to that. Our depth-of-discharge guide covers this one in full, because it's the habit that most affects lifespan.

✓ Shallow sips beat deep gulps

As a rule, topping a battery up before it runs low is kinder than running it to empty every time — most of all for lead-acid.

The BMS: a little guardian inside

Modern lithium batteries come with a built-in helper that does a lot of the worrying for you.

BMS stands for Battery Management System — think of it as a tiny electronic brain built into a lithium battery or power station. It keeps an eye on things and steps in to protect the battery from being overcharged, over-drained, pushed too hard, or run when it's too hot or too cold.

This is a big reason modern lithium packs are so safe and so easy to live with — you don't have to babysit them the way folks once did. Lead-acid batteries generally have no such brain, which is part of why they're easier to accidentally ruin. We give the BMS its own guide, because it's worth understanding.

★ The BMS is a feature, not a gimmick

When you're comparing batteries, a good management system is part of what you're paying for. It's quietly protecting your investment every day.

Where batteries show up in backup power

The same basic ideas apply whether the battery is the size of a lunchbox or a refrigerator.

Where you'll see it	What it's for
A portable power station	An all-in-one box for phones, medical gear, a fridge
A home backup battery	A large, installed unit for whole circuits or the house
A UPS box	Rides out blips for a computer or internet
A car or deep-cycle battery	Starting an engine, or steady power for an RV or boat

Each of these has its own guide in this series. What's nice is that once you understand the basics here, you understand the battery in all of them — the care is more alike than different.

Two kinds of homes, two sets of needs

The battery basics are the same everywhere, but how much you need — and how you'll use it — depends on where you live.

If you live in town or the suburbs

In town or the suburbs, outages tend to be shorter, and a modest battery or power station often covers the essentials until the lights come back.

- A smaller power station can keep phones, the internet, and a medical device going through a typical outage.
- You can recharge from the wall between storms, so you rarely start an outage empty.
- Stores and battery-recycling drop-offs are close by when you need them.
- A battery's silence and safe-indoor use are a real plus in close quarters.

If you are out in the country on a well

Out in the country on a private well, outages run longer, and when the power stops the well pump stops — so no running water until it's back. That changes the math.

- Longer outages argue for more stored energy, and often for pairing with solar to refill during the day.
- A well pump is a big, demanding load — a small power station won't run it; see our well-pump and sizing guides.
- Stores and recycling are farther off, so it pays to keep spares and plan ahead.
- Barns and outbuildings swing hot and cold, which matters for how you store and care for a battery.

★ Not sure how much battery you'd need?

That's one of my favorite questions to help with — no sales pitch, just an honest look at your home and your must-run list. Call (330) 200-8042.

Charging, in brief

Charging is where a lot of battery life is won or lost, and the basics are simple.

The single most important rule is to use the charger meant for that battery's chemistry — lead-acid and lithium want to be charged differently. A good, modern charger does the thinking for you and eases off when the battery is full.

- Match the charger to the chemistry, or use one with a chemistry setting.
- Charge on a hard, non-flammable surface with some air around it.
- Never charge a battery that's swollen, cracked, leaking, wet, or ice-cold.

✓ There's a whole guide on this

Our charging guide walks through chargers, maintainers, and safe charging step by step. This page is just the headline.

Storing, in brief

How you put a battery away decides whether it's ready — or ruined — when you next reach for it.

Batteries like a cool, dry spot out of direct sun. The charge level you leave them at matters, and it's different for the two families: lead-acid should be stored fully charged and topped up now and then, while lithium is happiest stored at a partial charge — not bone-empty, and not necessarily full for months on end.

Both kinds slowly lose charge just sitting there, so a battery you rely on deserves an occasional check. Our storage guide gives you the full routine for the off-season.

! Never store a lead-acid battery empty

A lead-acid battery left discharged for a long stretch can quietly ruin itself. If you store one, store it charged and keep it that way.

Staying safe, in brief

Batteries are safe when treated with a little respect, and the rules are easy to remember.

- Keep them away from heat, flame, and sparks — heat is a battery's worst enemy over time.
- Don't let a metal tool or object touch both terminals at once; that short can spark and burn.
- A lithium battery that's swelling, hissing, or very hot is telling you to stop and stay away from it.
- When any battery wears out, recycle it — never put it in the household trash.

! A swollen battery is a stop sign

If a lithium battery ever looks puffy or bulged, don't use it, don't charge it, and don't puncture it. Set it somewhere safe away from anything that burns and arrange to recycle it — our disposal guide explains how.

Lead-acid, on one page

The old workhorse still has its place — as long as you know what you're signing up for.

- **Cheapest to buy** and available everywhere.
- **Heavy** for the energy it holds.
- **Shorter life** — fewer cycles before it tires out.
- **Dislikes deep draining** and dislikes sitting empty.
- **Needs a little care** — some types need water top-ups, and all like clean terminals and a full charge.
- **Very recyclable** — one of the most recycled products there is.

If budget is tight, the battery mostly sits ready as a backup, or you already own the charger for it, lead-acid can be a sensible choice. Our maintenance guide covers keeping one healthy.

Lithium (LFP), on one page

The modern favorite, and for most backup uses today, the one I point people toward.

- **Long life** — many more cycles than lead-acid.
- **Light** for the energy it holds.
- **Safe and stable** chemistry, with a built-in BMS looking after it.
- **Happy being used deeply**, again and again.
- **Low maintenance** — no watering, little fuss.
- **Costs more upfront**, but often less over its whole life.

For a power station, a home backup battery, or a modern deep-cycle setup, LiFePO₄ is usually the one worth the extra upfront cost. Our comparison guide lays the two families side by side in detail.

How long does a battery last?

The honest answer is 'it depends' — but on things you can actually influence.

Two things wear a battery down: how much you use it (the cycles) and simply getting older (the years). Every battery loses a little capacity over its life — that's normal, not a defect. Lithium generally outlasts lead-acid by a wide margin on both counts.

I won't quote you a number of years or cycles, because it varies so much by the exact battery and how it's treated — and any specific figure belongs to that product's own spec and warranty. What I can tell you is that good habits, especially avoiding heat and deep draining, stretch the life of any battery. Our warranty-and-lifespan guide explains what to expect and what the paperwork covers.

✓ You have more control than you'd think

Keeping a battery cool, charging it properly, and not running it to empty every time are the levers that most affect how long it lasts.

Common beginner mistakes

A handful of avoidable slip-ups account for most batteries that die before their time.

- **Letting the heat cook it** — storing or charging in a hot car, attic, or sunny spot.
- **Draining it to empty every time**, especially a lead-acid battery.
- **Storing lead-acid discharged** for months, which quietly ruins it.
- **Using the wrong charger** for the chemistry.
- **Tossing a dead battery in the trash** instead of recycling it.

! Most battery deaths are preventable

Almost every one of these is a habit, not bad luck. The rest of this series is really just those habits, explained gently and one at a time.

Common Questions

The questions I hear most from folks just getting started with batteries.

Q: Is a battery safer than a generator?

In the sense that matters most, yes — a battery makes no carbon monoxide and no exhaust, so it's safe to use indoors, which a generator never is. Batteries have their own simple safety habits, which this series covers.

Q: Do I need to understand all these terms?

No. Skim them once so they aren't strangers, then let the guide do the remembering. If you grasp watt-hours and 'be gentle charging and draining,' you're most of the way there.

Q: Is lithium worth the higher price?

For most backup uses today, yes — it lasts far longer, weighs less, and needs little care, so it often costs less over its whole life. Lead-acid still makes sense on a tight budget or for a battery that mostly waits.

Q: What does LFP mean?

It's shorthand for LiFePO₄, the safe, long-lived lithium chemistry in most modern power stations and home batteries. Seeing 'LFP' on a spec sheet is a good sign.

Q: Where do I start if I'm thinking about backup power?

Start with what you'd want to keep running, then read our comparison and sizing guides. Or call me — I'll help you sort out what fits your home, with nothing to sell you.

★ Still have a question I didn't cover?

That's what I'm here for. Call or text (330) 200-8042 and ask away — there's no such thing as a silly battery question.

A simple starting checklist

If batteries are new to you, here's a gentle way to get your footing.

- ☐ Learn the one number that matters most: watt-hours (Wh).
- ☐ Know which family you're dealing with — lead-acid or lithium (LFP).
- ☐ Use the charger made for that chemistry.
- ☐ Keep it cool, and don't run it to empty every time.
- ☐ Store lead-acid charged; store lithium at a partial charge.
- ☐ When it wears out, recycle it — never the trash.

✓ Tape this list inside a cabinet door

You don't have to hold it all in your head. A printed copy where you keep your battery gear is worth a dozen memorized facts.

Where to go next

Now that the basics aren't strangers, here's how the rest of the series fits together.

- Want the honest head-to-head? See our LiFePO4 vs lead-acid vs AGM comparison.
- Curious how to read the label? Our capacity guide covers amp-hours and watt-hours.
- Ready to care for one? The charging, storing, and battery-life guides are your next stops.
- Wondering about safety? The safety-and-fire-prevention and disposal guides have you covered.

You don't have to read them in order, and you don't have to read them all. Follow whatever question is on your mind today — each guide stands on its own.

You don't have to do this alone

You just have to remember that a friendly, patient person is one call away.

I hope this guide made the basics of batteries for backup power feel a little less daunting and a lot more doable. Keep it in a drawer with your other home papers, come back to a page whenever you need it, and don't worry about memorizing anything.

When you'd rather have a hand, that's exactly what I do. I come to your home, work at your pace, and never make you feel rushed or silly for asking. A first visit is a flat \$99, and for the parts that don't need me on-site I can often help right on your screen for \$49. Every visit comes with a 30-day, come-back-free guarantee. I don't do licensed electrical work or open up sealed battery packs myself — for anything hardwired, or for panel work, I'll help you line up a trustworthy local pro.

★ Bill's Home Tech — real help, close to home

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The Two Big Families

Lead-acid and lithium (LFP), side by side

	Lead-Acid	Lithium (LFP)
Upfront cost	Lower	Higher
Weight	Heavy	Light
Lifespan	Shorter	Much longer
Deep draining	Hard on it	Handles it well
Upkeep	More care	Very little

Neither wins for everyone — match the battery to the job.

How Battery Backup Works

Fill it up, pour it back out



The same simple idea, from a lunchbox size to a whole house.

A Few Words Worth Knowing

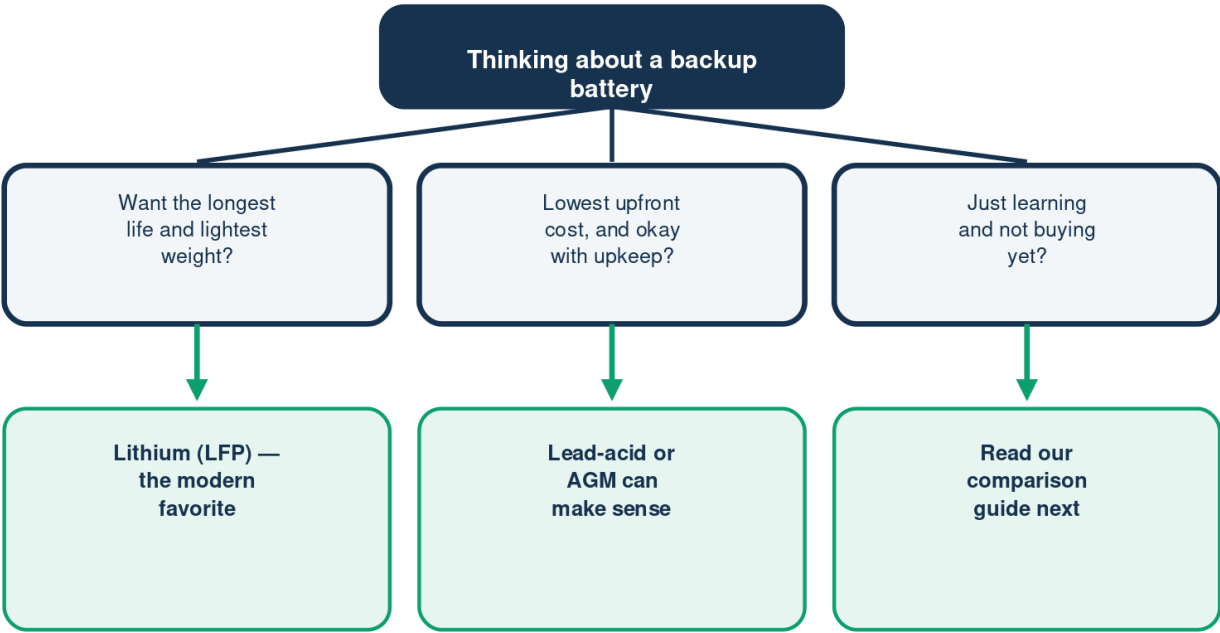
The plain-English version

	What it is	Why you care
Amp-hours (Ah)	A rough size	Same voltage only
Watt-hours (Wh)	The real energy	Compare anything
Cycle	One charge + use	More = longer life
BMS	A safety brain	Keeps lithium safe

If one term sticks, make it watt-hours.

Which Battery Mindset Fits?

A starting point, not the final word



Match the battery to the job — our other guides go deeper on each.

Illustration - a schematic, not to scale. Your setup may differ.



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A Note From Bill

A quick note from Bill.

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