



GWL

Your complete power solutions.

7 WAYS YOUR LIFEPO4 BATTERY KICKS ASS AND LEAVES OTHERS IN THE DUST



LiFePO₄ (or LFP, lithium-iron-phosphate) is a type of lithium-ion battery with a LiFePO₄ cathode and carbon anode (graphite), which has very favorable properties for use in energy storage, industry electromobility and photovoltaics.

Hundreds of thousands of companies and consumers have switched to these 10x longer-lasting batteries over the past 15 years. Why should you?

[1. Your Children Might Grow Up and It's Still Running](#)

[2. 4X Cheaper. Save Your Money](#)

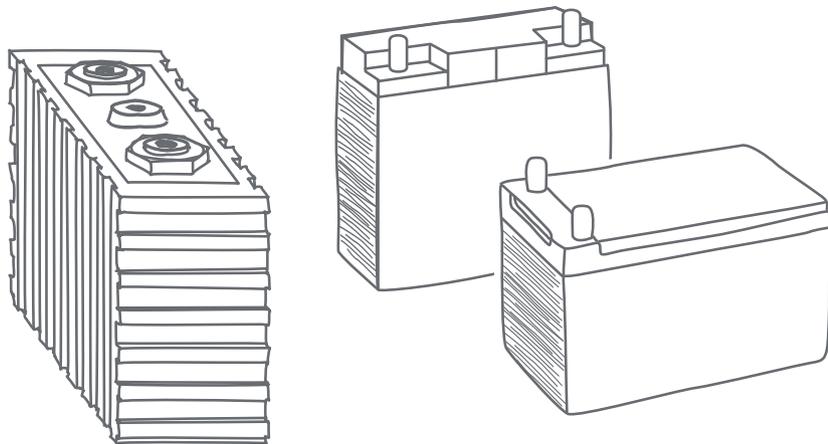
[3. It Won't Explode](#)

[4. A BIG, Simple Boost](#)

[5. Stop Worrying about Charging](#)

[6. Almost Zero Work](#)

[7. Save the Forest, Save the Planet](#)



1. YOUR CHILDREN MIGHT GROW UP AND IT'S STILL RUNNING

LiFePO₄ cells have a service life of more than 10 years and a high number of operating cycles: a minimal lifespan of LiFePO₄ batteries is 2000 cycles with a standard service life of 8000 cycles.

When treated well, LiFePO₄ cells still retain up to 80% of their original capacity after 8000 cycles.

The technical service life of LiFePO₄ batteries is up to 30 years provided that the battery is regularly charged and discharged with small currents up to 1C in a mode of 1 full cycle in 1 day, i.e. 8000 cycles = 22 years of operation. A full cycle here means discharging up to 70% DoD (depth of discharge).

[The battery lasts 10–30 years.]

Conventional lithium-polymer (Li-Pol) or lithium-ion (Li-Ion) batteries based on Cobalt, Mangan and Nickel (NMC) chemically degrade after approximately 1000–2000 charging cycles. Lead-acid batteries keep their maximum for 300–500 cycles but then their capacity begins to decline sharply.

Also, the capacity does not change even if the battery is not used for some time because self-discharge and internal degradation are very slow with this type of cell. A fully charged battery will self-discharge in approximately 10 years.

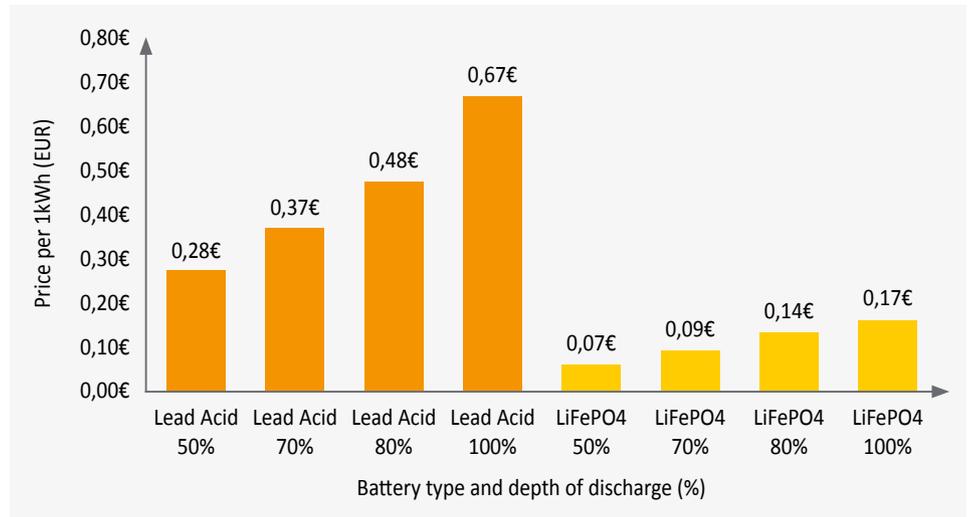
2. 4X CHEAPER. SAVE YOUR MONEY

If you compare the price/performance ratio with the long lifespan of a LiFePO₄, you will get a price that is around four times cheaper per one cycle (charge and discharge) than the cost of lead-acid batteries.

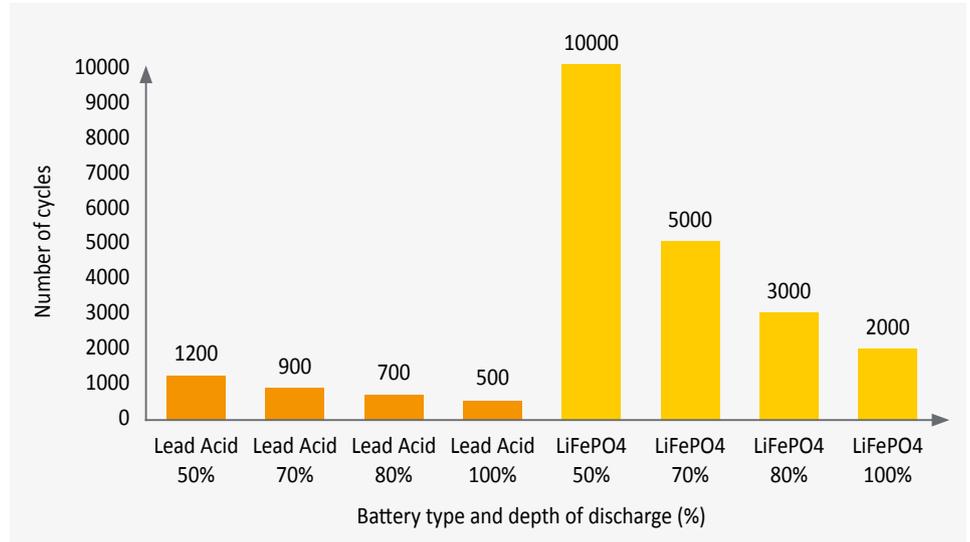
It's four times cheaper
than a lead-acid battery
in terms of lifespan.



NMC and Li-Pol batteries are still somewhat cheaper than lead-acid but LiFePO₄ batteries are the cheapest. How is that possible?



Because you can charge and discharge the LiFePO₄ up to 8000 times and the battery will still function.



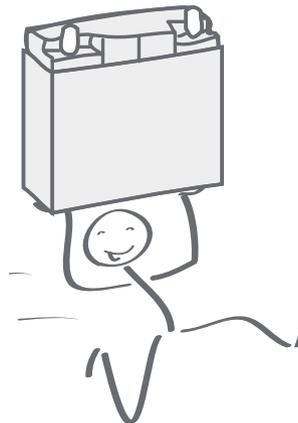
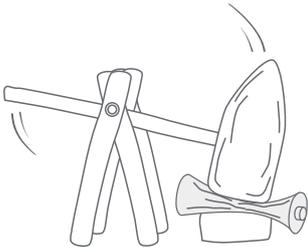
3. IT WON'T EXPLODE

While other types of Li-Ion batteries with a cathode based on cobalt and manganese can easily combust or even explode in the event of a short circuit or overcharging, such reactions are a non-issue when it comes to LiFePO₄. This is because the cathode material is essentially a natural mineral very similar to olivine. It does not release oxygen (it is difficult to disrupt its chemical bonds) even at high temperatures and is oxidation resistant.

If you want to see for yourself, check out this video > <https://youtu.be/Qzt9RZ0FQyM> where we compare Li-Pol, LTO and LiFePO₄ batteries in a state of overcharge, short-circuit, puncture and ignition.



It won't burn
or explode.



4. A BIG, SIMPLE BOOST

LiFePO₄ cells have a large capacity which offers up to 10,000 Ah per cell, which greatly simplifies the installation process. It thus increases the reliability and robustness of the solution unlike others, where it is necessary to use up to thousands of small cells to achieve higher capacities.

Simple installation thanks to cells with a large capacity.

You can charge a 100 Ah battery in 30 minutes.

LiFePO₄ batteries have very low internal resistance so they can be charged and discharged with high currents for a long time without significantly shortening their life or overheating (unlike the others). The maximum peak discharge current is 10C (ten times the capacity of the battery) and the charging current is 3C. A cell with a capacity

of 100 Ah can therefore be discharged with a current of up to 1000 A (6 minutes) and charged with a current of 300 A (20 minutes).

The charge and discharge are eight times more efficient than a lead-acid battery. You therefore need a smaller battery for the same amount of consumption.

You need a smaller battery for the same amount of consumption.

5. STOP WORRYING ABOUT CHARGING

You've experienced this while using your mobile phone: with each charge, the battery fills with energy but as the energy is used up, the battery essentially becomes clogged (solidified electrolyte settles on the electrodes). The battery capacity drops slightly with each charge and you get less energy. After a few hundred charge cycles, the battery is completely worn out.

This is not the case with LiFePO4 cells: they have no memory effect. LiFePO4 batteries do not mind regular lighter discharges in smaller cycles.

You don't need to worry about how many times you charge it.

6. ALMOST ZERO WORK

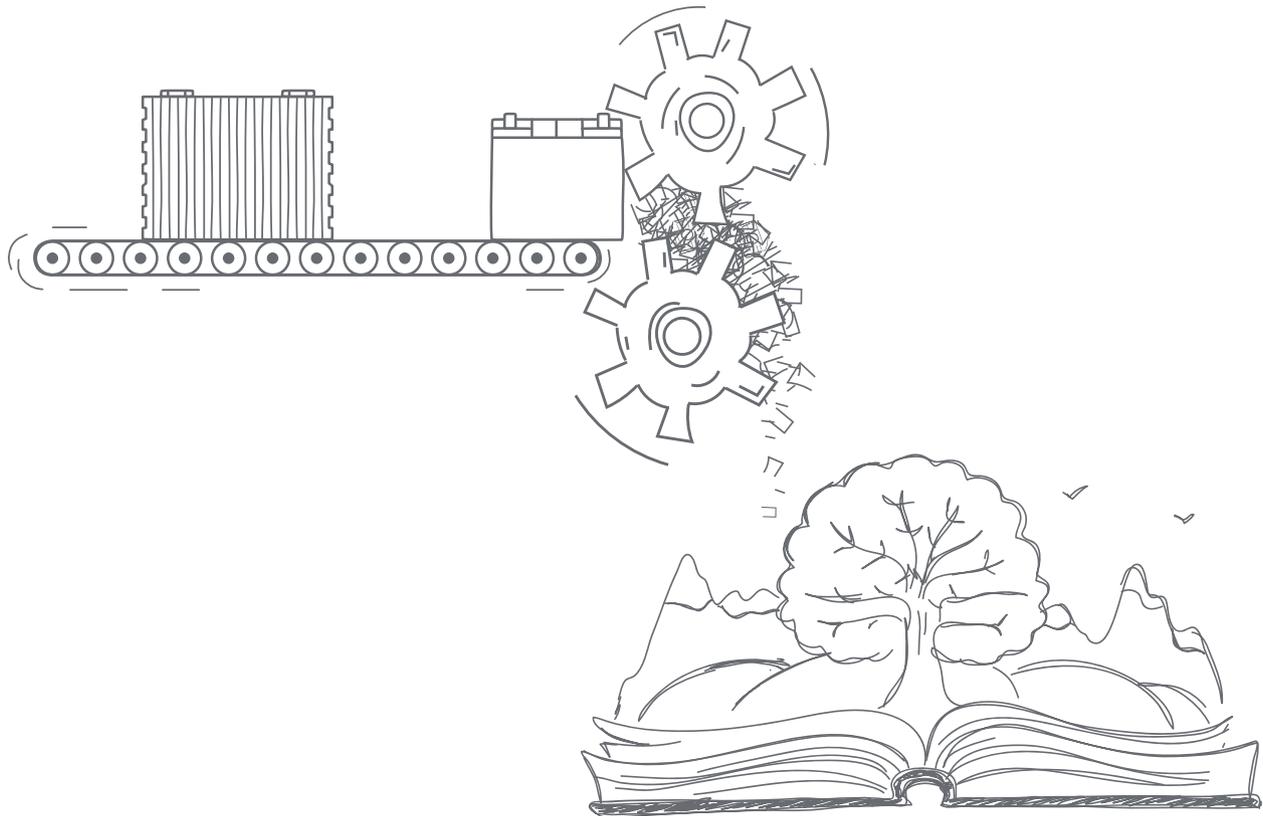
LiFePO4 cells do not require reformatting nor do they need to top up the electrolyte as other types of batteries do. Simply put, they do not require any operational maintenance per se.

„I just use it and don't worry about it. That's the main thing for me,“ says Martin Chenicek from [PimpYourLife](#) about the Winston LiFePO4 batteries [we've mounted into his self-made camper.](#)

7. SAVE THE FOREST, SAVE THE PLANET

LiFePO₄ batteries contain significantly less amount of heavy or rare metals (like manganese and cobalt) and are well-suited for future easy recycling. They are non-toxic, non-polluting and compliant with European RoHS regulations.

Even if there is an accidental leak into the environment, there will be no damage – just a loss of valuable raw materials.



SO...?

Lead-acid batteries are suitable for undemanding purposes only. If you need a lightweight solution and do not require a long service life, use NMC or Li-Pol (hand tools, aviation models). The best life span available although more expensive and using heavier technology is LTO (lithium titanate cells).

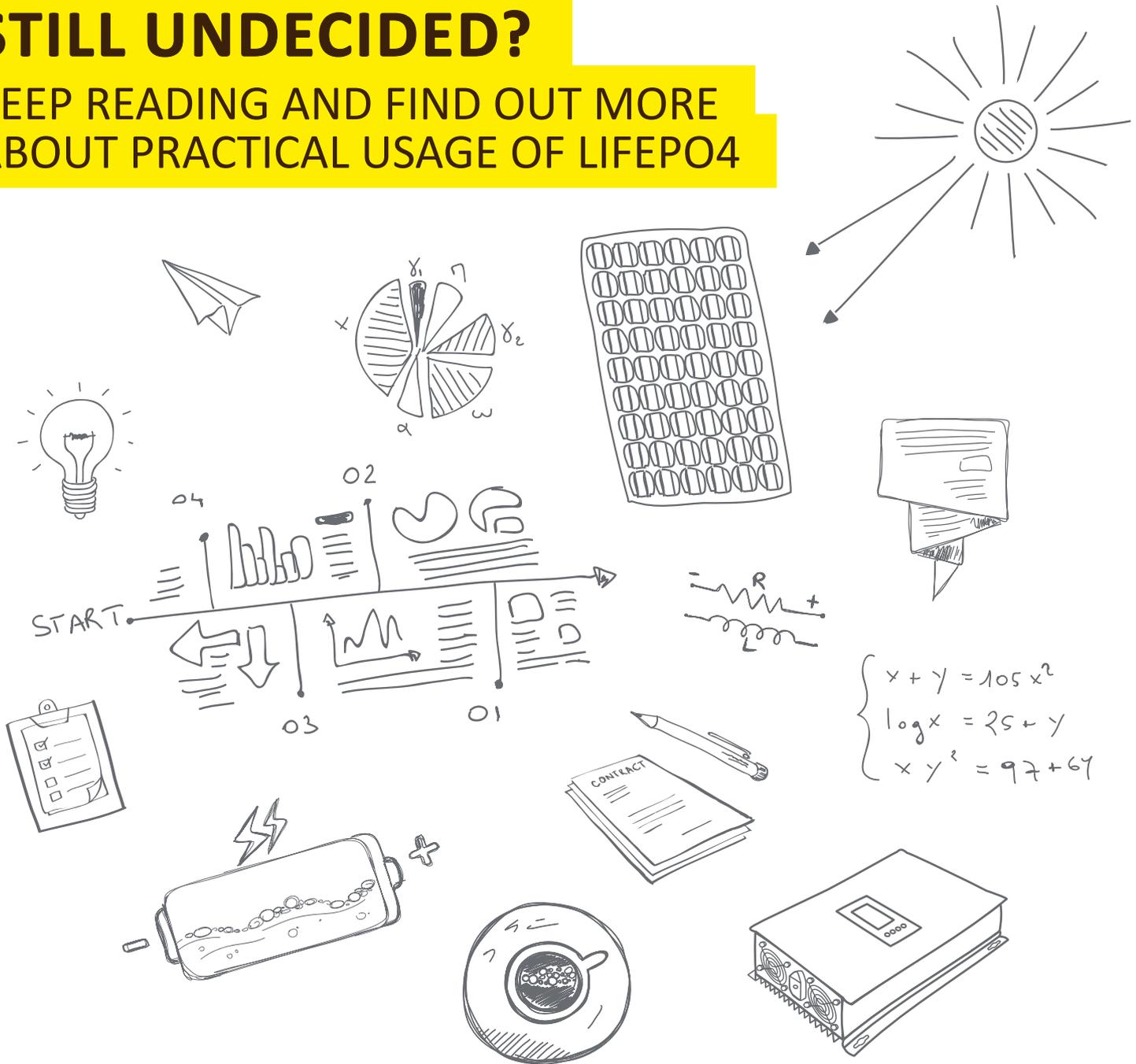
In all other instances, always choose LiFePO4 batteries!

LiFePO4 batteries fully meet the requirements for the longest possible service life, reasonable energy density and unprecedented safety. These batteries are indestructible and are therefore perfectly suited for demanding applications in photovoltaics, industry electromobility and energy storage.

	LiFePO4	Lead Acid
Life Span	10 – 30 Years	3 – 5 Years
Chance of combustion	Low	Medium
Memory effect	No	Yes
Maintenance	Low	High
Ecological footprint	Low	Average
Energy density	~90 – 135Wh/kg	~30 – 60Wh/kg
Cyclelife	>3000 cycles	<900 cycles

STILL UNDECIDED?

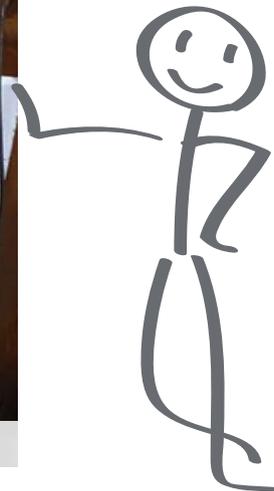
KEEP READING AND FIND OUT MORE ABOUT PRACTICAL USAGE OF LIFEPO4



WHERE I CAN USE THEM?



A robust backup power supply (UPS – Uninterruptible Power Supply) for manufacturing operations, an office, IT infrastructure, a household or municipal infrastructures such as sewage plants etc.



A battery for a photovoltaic power plant, which will charge during electrical power surplus and supply energy when it is not sunny.



Hybrid Photovoltaic System – SWPOWER

Industrial applications and selected types of electric vehicles: electric buses, industrial vehicles and machines, garden equipment, cargo vehicles, food-trucks, electric boats, motorcycles, bikes and even locomotives, submarines or ice resurfacers.



Electric Shunting Locomotive – Romania Euroest



Pinguino Electric Ice Resurfacer



Electra Premium Mower – Swardman



Czech Electric Bus – SOR Libchavy



Historical Electric Trolley Bus



Spedition Bike – MOVEBYBIKE



KOFI-KOFI Trucks

Onboard battery for ships, yachts, houseboats or RVs such as motorhomes, campervans, caravans etc. (a safer substitute for an original lead-acid battery).



Expedition Vehicle



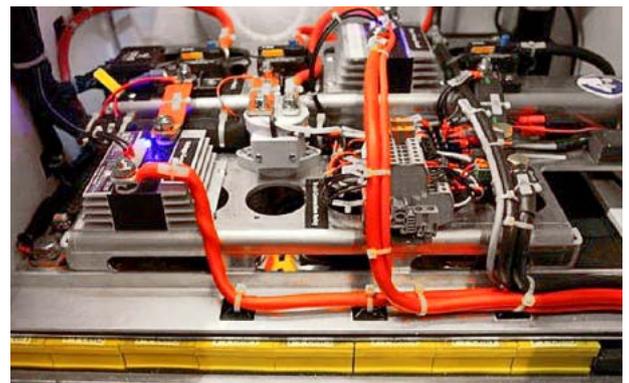
Expedition Vehicle – PimpYourLife



Utility Vehicles – TPC INDUSTRY



Off-Road Expedition Vehicle – Bliss Mobil





Fully off-grid
„Czech Sustainable Houses“

Energy storage in an off-grid house (“island” houses, cottages, garden houses, etc.), where 230 V electricity mains is out of reach.

As you can see in the Czech Sustainable Houses installation, LiFePO₄ batteries are fully compatible with the Victron Energy components.



See our references at <https://shop.gwl.eu/References/> for more information.

HOW CAN I USE IT?

BASIC INFORMATION ON RECOMMENDED OPERATION

LiFePO₄ Temperature Ranges

Datasheet theoretical range	from -45°C to +85°C
Operating range	from -20°C to +50°C
Our recommendation for operating the battery to achieve full cell performance	from +5°C to +45°C (thermal insulation pads can be used in cold climate)

LiFePO₄ Voltage Ranges

Nominal voltage	3.3 V
Deep discharge voltage	2.5 V
Maximal charge voltage	4 V
Recommended initial and subsequent charging	3.65 V

The safe voltage of standard battery systems is 48 V (i.e. 16 cells). Since they come in a voltage of 3.3 V, a 13.2 V battery can be assembled from 4 cells and be used as a direct replacement for conventional 12 V lead-acid batteries.

Thanks to the high isolation voltage capability of LiFePO₄ cells, it is also possible to build industrial systems using LiFePO₄ with a voltage up to 1500 V.

...AND WHEN SHOULDN'T I USE IT?

LIFEPO4 DISADVANTAGES

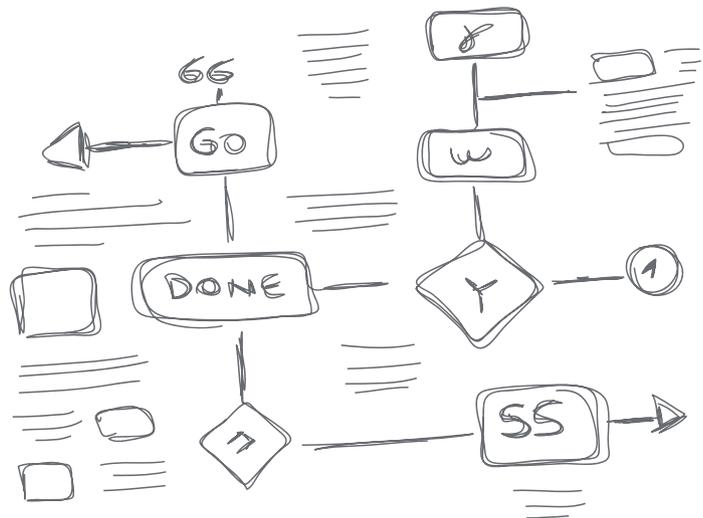
LiFePO₄ technology works with any project, however, its weight and dimensions make it less interesting for confined spaces or if you need a very lightweight solution.

Due to their rather low nominal voltage (3.3 V), LiFePO₄ cells, therefore, have a **lower energy density** per 1 kg than other lithium batteries. For Li-Ion and Li-Pol cells, the energy density reaches approximately 150–200 Wh/1 kg, while for LiFePO₄ batteries the standard is 80–100 Wh/1 kg. This technology is therefore not suitable for the aerospace industry and small cars.

LiFePO₄ cells and batteries – like all other lithium batteries – can be **easily damaged by exceeding the charging (V_{max}) and discharging (V_{min}) voltage limits**. The installation recommendations with simple protection electronics that monitor the voltage of the cells during operation apply.

They also have a **limited performance at high temperatures** (above 40°C).

In addition, LiFePO₄ batteries have different characteristics at low temperatures (below 0°C) but this is common for all batteries and can be easily avoided with a modest cooling/heating system.



A PRO-TIP: CALCULATE YOUR OWN PACK

What cells are the best for your project?

This simple tool helps you calculate the right amount and size of battery cells and its configuration > shop.gwl.eu/battery-pack-calculator/

WHY SHOULD I PREFER A MODULAR BATTERY SOLUTION RATHER THAN A „FOOL-PROOF“ READY-MADE BOX?

- ✓ easy service: easy to remove individual cells as it consists of replaceable blocks with documentation and clear functions
- ✓ ...even after the warranty expires!
- ✓ versatility: it can be refurbished and reused in the same or other configurations
- ✓ lifespan: when one part becomes non-functional, you can easily replace it, which means
- ✓ ecology and economy





Your complete power solutions.

Hundreds of pallets of batteries, solar panels and accessories are available for immediate dispatch from our logistic and office centre in Prague, Czech Republic. Within days, it can be at your doorstep anywhere in Europe, USA, Canada and India.

Jan, Barbora, Dávid and Jaroslav are ready to discuss your project with you to find a tailor-made solution. We participate in various ongoing projects and provide design solutions across Europe.

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