



Install Guidance for LiFePo4 Batteries

By Paul Sumpner
(NB Old Nick)



Goals of the presentation

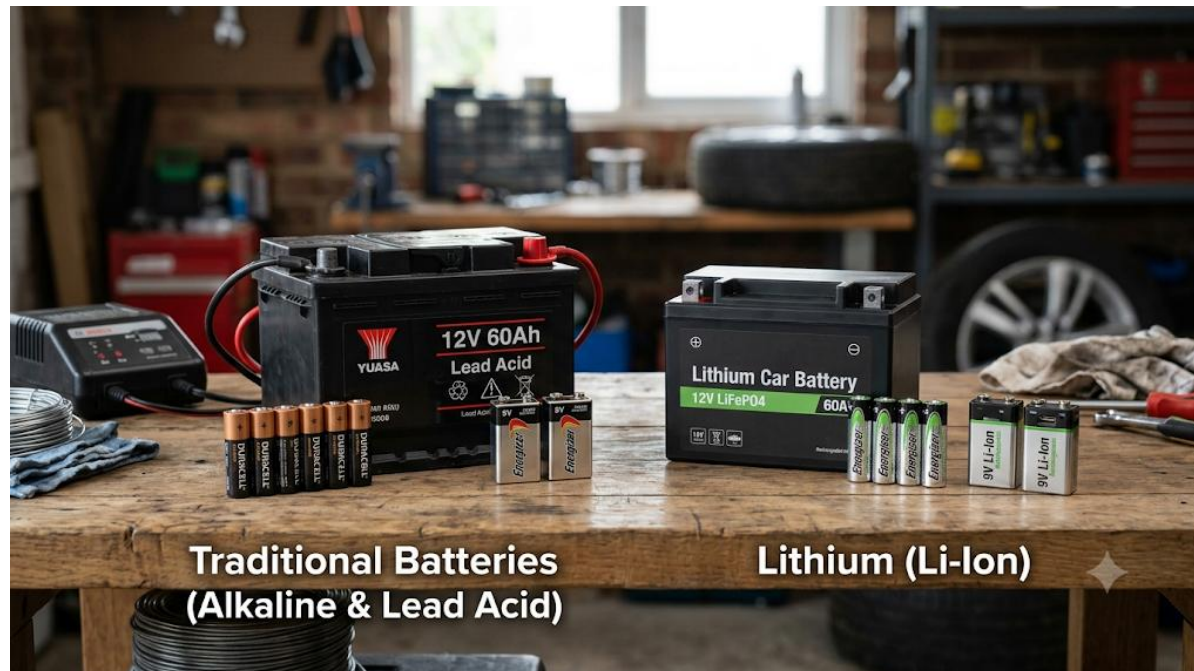
- Look at recent changes in battery technology
- Understand Lithium chemistries and which are popular for marine
- Look at what recommendations already exist
- Introduce the IWA/CA's Guide to Safe Lithium Battery Installation
- Highlight barriers to adoption and the need for pragmatism

And, for my own personal interest....

Can AI create good images for a presentation? Let us see how Gemini gets on

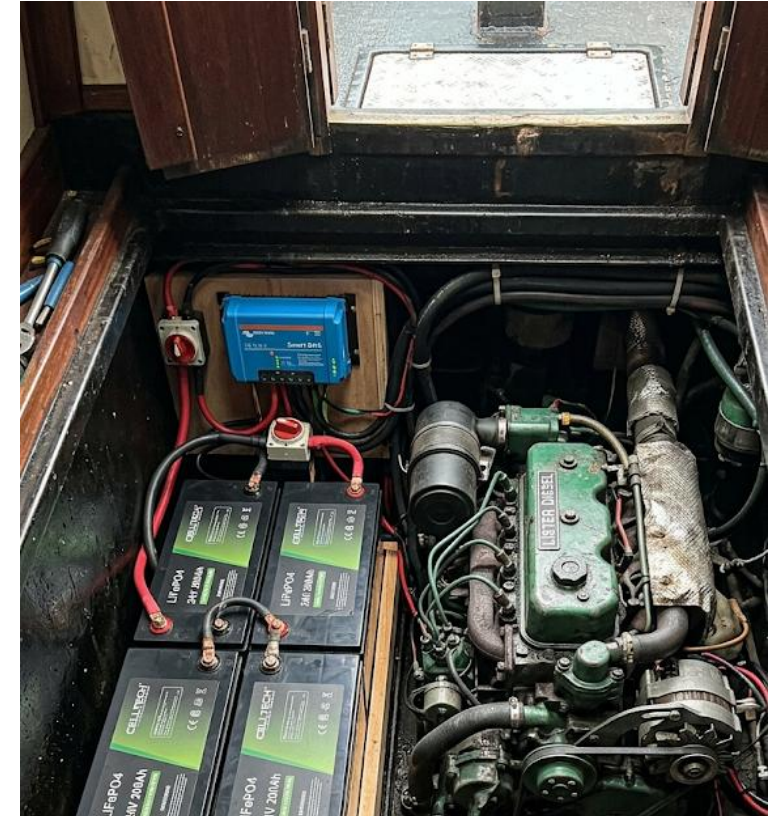
The Energy Revolution

- 20th Century battery technology pretty much stayed the same
- Since the early 2000s Lithium batteries have become ubiquitous
- From portable devices to electric vehicles, they are everywhere



What About Marine?

- Adoption has been slightly slower than some industries
- After fitting solar, changing to Lithium seems to be the next trend
- Whether professionally installed or DIY - it is happening



Why Lithium?



WEIGHT REDUCTION

Up to 70% lighter than lead-acid banks, improving boat trim and efficiency in shallow canals.



FAST CHARGING

High charge acceptance rates allow for shorter generator run times or faster solar replenishment.

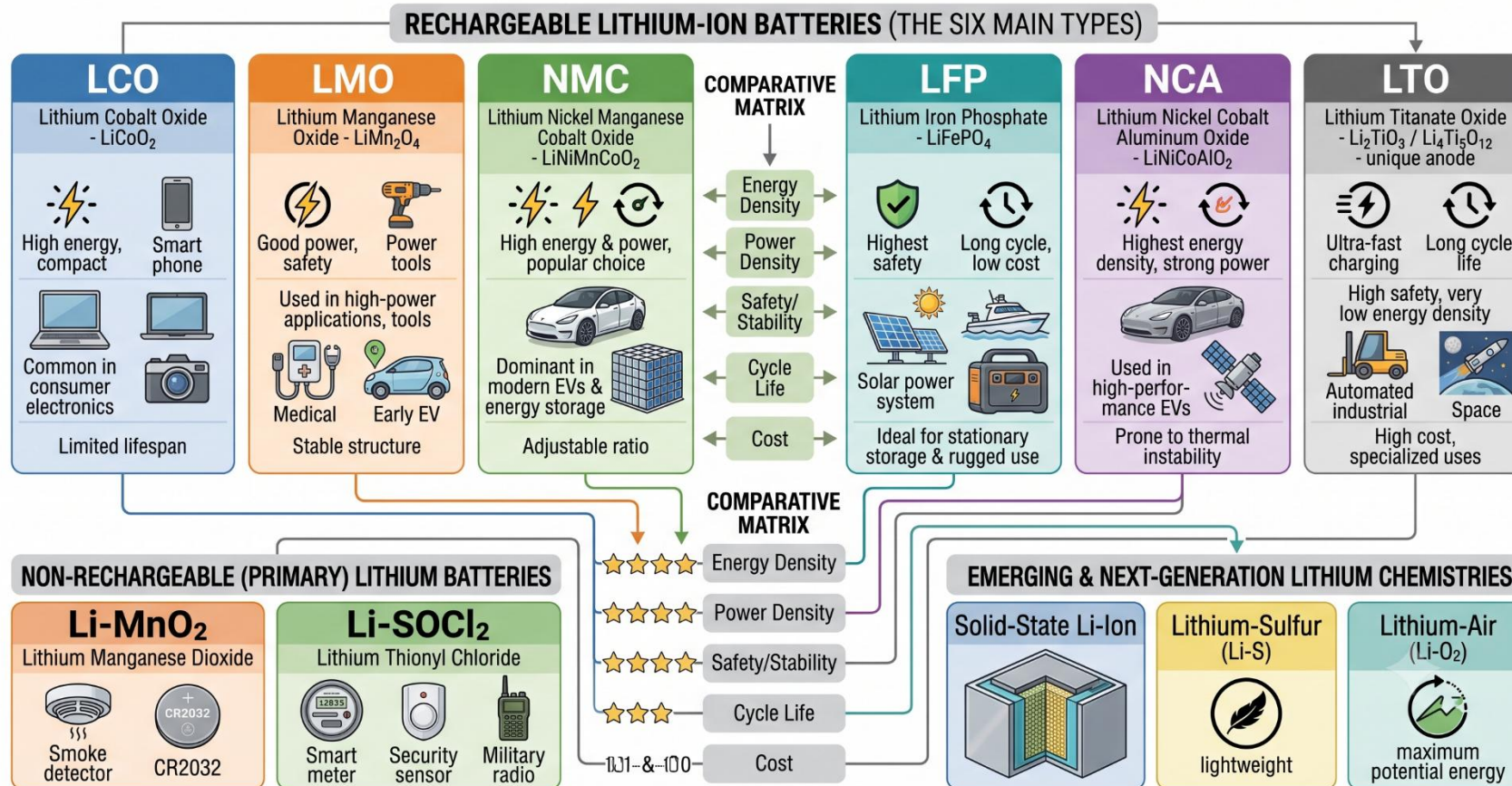


LONG CYCLE LIFE

Expect 3,000 to 5,000 cycles at 80% DOD—lasting 10+ years of regular cruising.

“Not All Lithium Batteries Are Created Equal”

EXPLORING LITHIUM BATTERY CHEMISTRIES: TYPES, APPLICATIONS & KEY CHARACTERISTICS



LiFePo4 (LFP) the Only Solution for Marine

- Greater Safety and Stability
- Extremely Long Lifespan
- High Depth of Discharge (DoD) up to 90%
- Weight and Space Efficiency
- Flat Discharge Curve (Consistent Voltage)
- Fast Charging and Efficiency
- No “Partial State of Charge” Damage
- Maintenance Free and Eco-Friendly

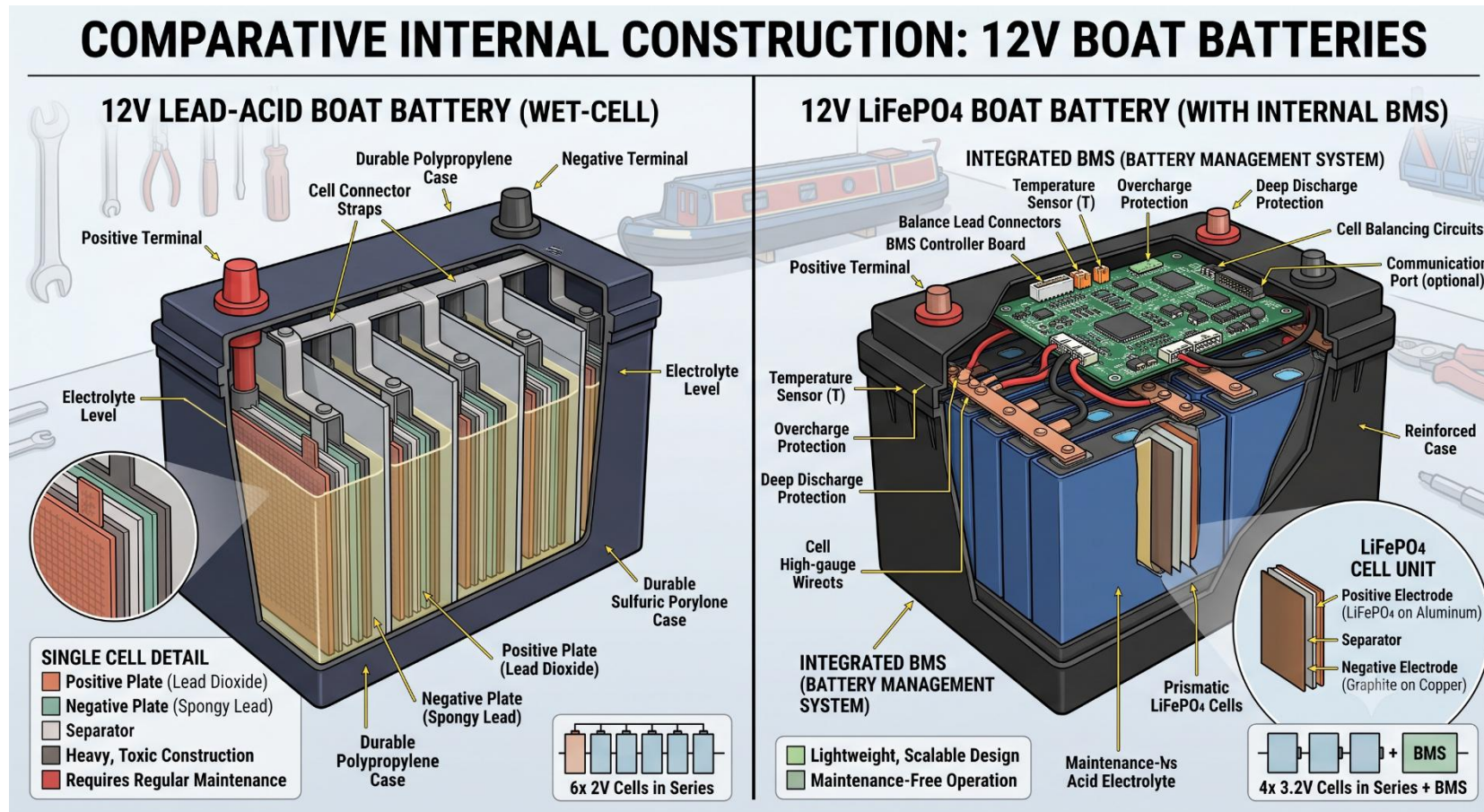


Lead Acid Out...LiFePo4 In

- Easy.....
- Google “LiFePo4 drop in replacement for Lead Acid”.....
- Buy the cheapest sponsored product result.....

NO!

Completely Different Beasts



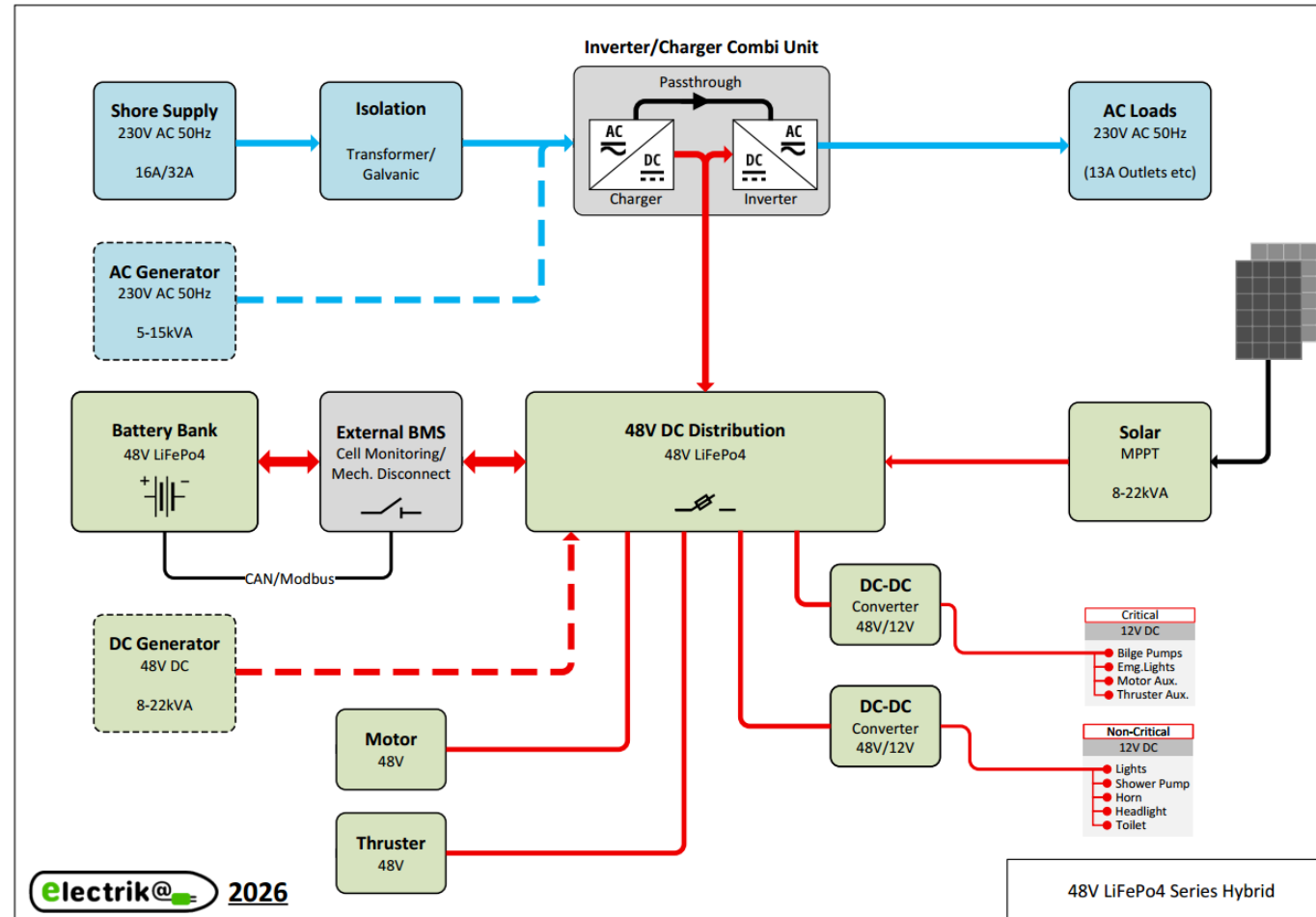
Important Considerations

- **Charging Voltages:** different charging profiles, is charger compatible?
- **Alternator Safety:** high charging currents and sudden disconnect
- **Built-In BMS:** monitors charging/discharging, temperature and cells



From Battery Bank to Battery System

“An LFP installation is not just a battery replacement, it is a complete, actively managed, engineered system, where all components must act as one”





WARNING

“The marine market for electrical installation, particularly Lithium is immature”

- In immature markets, there is a dearth of practical installation experience, information and understanding
- The marine market currently lacks training and certification in installation of this latest technology
- Owners, insurance companies and regulatory bodies are looking to manufacturers and industry “experts” to lead the way
- Currently there is no clear information or direction available to guide DIY installation of LiFePo4 batteries

① Available Information ①

- There are three ISO specifications relevant to this subject
- Also, a recently released [BSS Leaflet on Installed Lithium Batteries](#)



The Need for More Information

- Most boat owners and many installers will not buy the ISO standards, which are the principles we should all abide by
- The industry is still finding the best way to adopt and implement the ISO specs and collaboration/sharing knowledge is key
- The BSS Leaflets provide good basic information for anyone with Lithium powered devices or considering installing Lithium batteries
- There is a real need for more technical information to help installers, owners and industry stake holders to better understand this subject

The Joint Lithium Battery Safety Group

- The Inland Waterways Association (IWA) and the Cruising Association (CA) established a joint working group to provide their members with more technical information on this subject
- The group have met monthly since the beginning of the year and are about to publish a Guidance Note: ***Installing Lithium Batteries for Domestic Power on Leisure Craft***



**INLAND
WATERWAYS**
ASSOCIATION



Aim of the Guidance Note

- To give IWA/CA members a distilled summary of the recommendations from ISO, ABYC and other information sources on this complex subject
- To create a pre-installation checklist, for a boat owner to ask a professional installer when specifying a new Lithium system
- To create a post-installation checklist so the owner can check the installation, configuration and that they have suitable information for ongoing safe operation
- These check-lists could be used by competent individuals as an aid to self-installation, but IWA and CA would not recommend self-installation for the vast majority of members

Hardware & Physical Installation

- Start with an Energy Audit of your current and future electrical needs
- Decide on battery voltage (12/24/48v), chemistry and capacity
- Location, securing and environment
- Charging sources and electrical integration
- Wiring, fusing, isolation and components



Protection and Safety

- Battery Management System and safe operating limits
- Monitoring, alarms and owner information
- Fire, gas release and emergency planning
- Use, maintenance and periodic checks



“Discretion is the Better Part of Valour”

- Everyone worries about a Lithium Battery fire and some insurance policies may insist on a Lithium-Ion fire extinguisher
- In reality, a LiFePo₄ battery, due to its better thermal runaway stability, will release a lot of toxic gas* before it catches fire
- Any unusual smells, hissing, heat, swelling, alarms or vapour should be treated seriously
- Action your emergency escape plan

** 130 to 250 litres of gas from a standard 12v 100Ah LiFePo₄ battery – source ScienceDirect.com*





Industry Transition

- The change from Lead Acid to LiFePo4 batteries is happening
- The industry needs to work together to ensure installations are safe and acceptable to insurance companies
- Who will train and certify the professional “Experts”?
- Who will inspect and approve (police) installations?
- How can we collaborate and share experiences so that best practices can be established and common standards achieved?



In Summary

- LiFePo4 systems are significantly better than traditional Lead Acid
- They are not a drop-in replacement but a complete system
- Just like LPG, our industry has to evolve “best practices” for LiFePo4
- There is too much uncertainty at the moment for safe DIY install
- Learn as much as you can before embarking on a LiFePo4 install
- Most importantly - Be safe!