



# LiFePO<sub>4</sub> Battery Life Cycle Explained

*'The bigger the number is not always better!'*

## Understanding the Cycle Life of Lithium Iron Phosphate (LiFePO<sub>4</sub>) Batteries

Lithium Iron Phosphate (LiFePO<sub>4</sub>) batteries are favoured for their safety, longevity, and reliability, making them ideal for various energy storage applications. A key aspect of their performance is their **cycle life**, which refers to the battery's ability to undergo charge and discharge cycles before significant capacity loss occurs. Understanding the factors affecting cycle life can help users maximize the efficiency and lifespan of these batteries.

### 1. Quality of the Battery Cell:

- o Higher-quality cells tend to have better cycle life due to superior materials and manufacturing processes. Investing in reputable brands can yield better long-term performance.

### 2. Charge and Discharge Rate:

- o Charging and discharging at high rates can generate excess heat and stress the battery, leading to faster degradation. It's generally advisable to use recommended charge rates to enhance longevity.

### 3. Operating Environment:

- o The conditions under which the battery operates play a significant role in its cycle life. Dust, moisture, and exposure to harmful substances can all negatively affect performance.

### 4. Ambient Temperature:

- o Extreme temperatures can impact battery efficiency. High temperatures can accelerate chemical reactions, leading to faster degradation, while very low temperatures can reduce capacity and increase internal resistance.

### 5. Depth of Discharge (DoD):

- o Regularly discharging the battery to zero state of charge (SoC) can significantly shorten its cycle life. It's best to keep the discharge level within moderate limits to maintain health and performance.



## Best Practices for Storage and Usage

- **Partial State of Charge:** If a battery will not be used for a long time, store it at around 50% charge in a cool, dry place. This minimizes self-discharge and degradation during storage.
- **Monitor Performance:** Keep an eye on the battery's capacity and performance over time. Gradual degradation is normal, but significant drops may indicate misuse or environmental stress.
- **Avoid Full Discharges:** Try to avoid frequently discharging the battery to its limits. Maintaining a higher charge level will help prolong its life.

## End of Lifecycle Considerations

As a LiFePO<sub>4</sub> battery approaches the end of its lifecycle, users will notice decreased capacity and performance. Eventually, the battery will no longer hold sufficient charge or deliver the necessary power. At this point, it's important to dispose of or recycle the battery properly to mitigate environmental impact.

*Extract from our LiFePO<sub>4</sub> battery manufacturer laboratory test report:*

	Max – Charging Current 2.5A (Cell)	'C' Rating (1C nominal) Charge & Discharge at 0.5C	Standard Test Condition: C1 at 25°C ±2°C
Cycle Performance	25°C	5000 Cycles	Capacity Retention ≥80%
	35°C	3500 Cycles	
	45°C	2000 Cycles	

As you can see, there are a variety of factors influencing the life cycle of Lithium Iron Phosphate (LiFePO<sub>4</sub>) batteries, making it challenging to provide a precise lifespan. While laboratory tests can yield specific figures under controlled conditions, real-world performance often varies due to several variables.

## Cycle Life Expectations

- **Typical Range:** Most documented averages suggest that LiFePO<sub>4</sub> batteries can achieve around **2000 cycles** under normal usage conditions, with the potential to reach **5000 cycles** in ideal circumstances. This range accounts for the variables mentioned above.
- **Plausibility of Higher Cycles:** Claims of **6000+ cycles** by one retailer, should be approached with scepticism, as such figures often assume perfect conditions that are rarely achievable in practical applications. For example, achieving such longevity would likely require extreme care and optimal usage scenarios.

## Real-World Considerations

To truly understand the life cycle of a LiFePO<sub>4</sub> battery, monitoring through a BMS can provide valuable insights into the battery's health and performance over time. Without this data, users can only estimate cycle life based on general usage patterns.

## Conclusion

Regarding the Explore Planet Earth Power Packs, based on our battery manufacturers information and laboratory testing, it's reasonable to expect a life cycle between **2000 and 5000 cycles**. This expectation underscores the importance of recognising the factors that impact battery longevity and making informed decisions regarding usage and care. Proper management and understanding of these variables can significantly enhance the performance and lifespan of LiFePO<sub>4</sub> batteries. So, keep in mind that...

**'The bigger the number is not always better!'**

For further general information on LiFePO<sub>4</sub> Batteries, click on the article link below.

["A better understanding of LiFePO<sub>4</sub> Batteries"](#)