



FINULENT SOLUTIONS  
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# THE BATTERY TECH



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# REGULAR BATTERY VS SOLAR BATTERY

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Regular rechargeable batteries and solar batteries may appear similar because both can be recharged. However, there are notable differences between the two.

Firstly, a regular rechargeable battery is typically made from **Nicad (Nickel-Cadmium)** or **NiMH (Nickel-Metal Hydride)**. These batteries are used in various fields, including recreational vehicles, boats, and backup power systems. They store electricity through a chemical reaction and can be recharged using a generator or the grid.

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On the other hand, a solar battery is made from three different chemical compositions: Lithium-ion, Lead Acid, or Saltwater. These batteries are specifically designed to store excess electricity generated by solar energy systems. Solar batteries are deep-cycle batteries that can endure multiple charges and discharge cycles (**unlike regular batteries, which are not intended for deep cycling and have a shorter lifespan**).

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# TYPES OF SOLAR BATTERIES

## Lead acid batteries

Lead acid batteries have been used since 1959 and were the first rechargeable batteries for commercial use. They contain metallic lead, lead dioxide, lead sulfate, and sulfuric acid. Additionally, these batteries are the cheapest option for energy storage, making them cost-efficient. Lead acid batteries are among the most used electrical energy storage technologies worldwide. They are excellent for off-grid solar systems or emergency backup storage.



Deep cycle batteries are designed to deliver power over a long period of time and run reliably until they reach 80% charge, after which they need to be recharged.

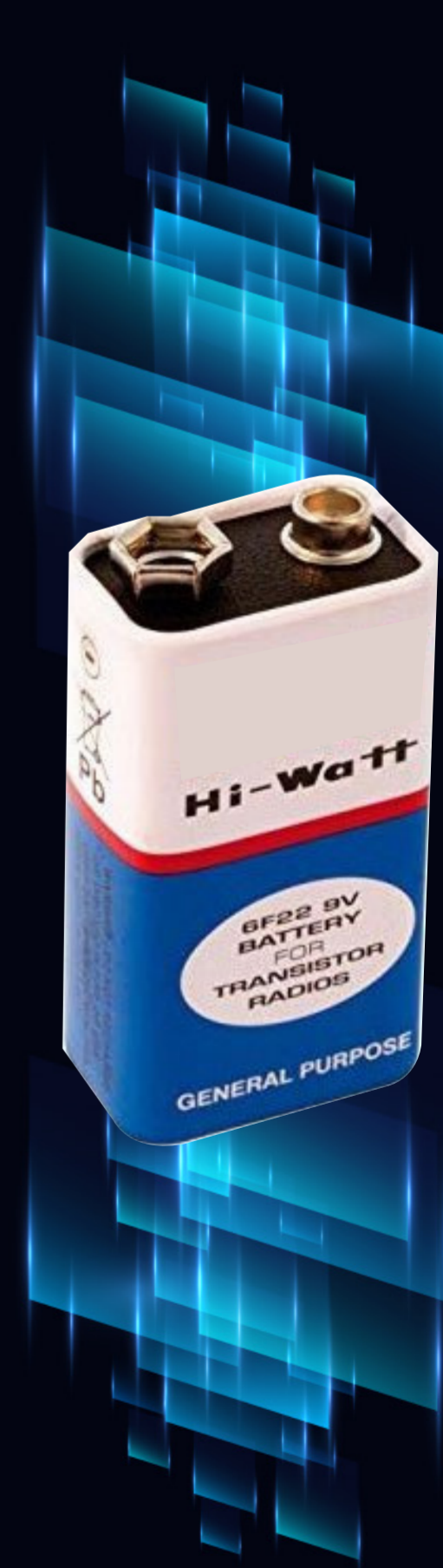
## Lithium-ion batteries

The first commercial lithium-ion battery was introduced in 1991. They consist of lithium metal oxides in the positive electrode, where lithium ions can be stored, and carbon in the negative electrode. The electrolyte used is lithium salts dissolved in organic carbonates. Lithium-ion batteries are utilized in electric vehicles (EVs) as potential energy storage solutions and require minimal regular maintenance. They have a higher battery energy density, which means they can store more energy in a smaller space.



## Nickel-based batteries

Nickel-based batteries (NiFe) were invented in 1899. These batteries use an iron anode and an oxide-hydroxide cathode with a potassium hydroxide electrolyte. These materials generate a cell voltage of 1.20V. One of the advantages of NiFe batteries is their resilience to overcharge and over-discharge. This characteristic gives nickel-based batteries a longer life cycle (over 20 years in standby applications). Additionally, these batteries can withstand extreme temperatures and do not require complex battery management systems.



## Flow batteries

Flow batteries were invented in the 1980s.

These batteries contain a water-based electrolyte liquid that flows between two separate chambers or tanks within the battery. Once they are charged, the chemical reaction allows the energy to be stored and discharged. Additionally, flow batteries have the advantage of 100% depth of discharge, which allows consumers to utilize all the energy stored without causing damage to the battery's health.



# INSIDES OF A SOLAR BATTERY



## Battery Pack

A battery pack in the context of a solar battery refers to a collection of individual batteries that are combined together to store electrical energy generated from solar panels. Depending on the requirement, they are made up of different battery types including lead-acid, lithium-ion, or saltwater batteries. The battery pack capacity is measured in ampere-hours (Ah) and represents the amount of energy the pack can store. The lifespan of the battery pack depends on factors such as battery chemistry, depth of discharge, temperature, and maintenance practices.

## (BMS) Solar Battery Management System

BMS is an essential component in a solar battery system as it monitors, controls, and protects the battery pack. The BMS monitors parameters such as voltage, current, temperature, state of charge (SOC), and state of health (SOH). This helps determine the battery's performance and condition. Additionally, the BMS provides a user interface or display panel for users to monitor battery parameters, change settings, or receive notifications. This enables users to have visibility and control over the battery system's operation. The specific features and capabilities of a Solar Battery Management System can vary depending on the manufacturer and the complexity of the battery system.

## Inverter

An inverter converts DC power from batteries into AC power for appliances. They come in various power ratings, from small inverters for a few devices to large ones for entire buildings. Inverters produce different waveforms, such as pure sine waves and modified sine waves. Pure sine wave inverters offer high-quality AC power for all electronics, while modified sine wave inverters may not be suitable for sensitive equipment. Inverters have built-in protection features like overvoltage and overload protection. Some inverters provide monitoring capabilities to display battery voltage, output power, and system status.

## Connection point

The connection point refers to the physical interface where external devices or components can be connected to the battery. A battery has two terminals: the positive (+) terminal and the negative (-) terminal. The positive terminal is the connection point through which current flows out of the battery when it's discharging to external devices. The negative terminal is the point through which current flows into the battery when it's receiving power. These locations and design points on a battery can vary depending on the battery type and manufacturer.

# TOP SUSTAINABLE BATTERY RECYCLING CO.



## QuantumScape, India

Founded in 2010 by Jagdeep Singh, QuantumScape is a leading company that developed a technology for fast charging, safer, and long-lasting batteries. They specialize in solid-state

lithium-metal batteries with a unique cathode and solid ceramic electrolyte separator. In 2020, QuantumScape received total funding of USD 1.2 billion through investments from Volkswagen and a merger with Kensington Capital Acquisition. The company's batteries aim to achieve an impressive target of around 1000 Watt-hours per litre (Wh/L). This remarkable energy density provides electric vehicles with a significantly improved range of 50-80%, contributing to their increased efficiency and performance.



## StoreDot, Israel

Founded in 2012 by Doron Myersdorf, StoreDot is a company that develops batteries to replace lithium-ion components. The company is an innovator in EV batteries that recharge faster, are more

sustainable, and are safer. These batteries run on patented organic nano-materials that are fully optimized by artificial intelligence (AI) and packed into high-energy cells. With funding of around USD 226 million and a strong team of scientists, StoreDot is positioned to reshape the world.

## 24m Technologies, United States of America

Founded in 2010 by Throop Wilder, 24M Technologies Inc. specializes in developing energy storage systems for guide and transportation applications. The

company's groundbreaking 24M SemiSolid cell manufacturing process and platform have given rise to a new generation of lithium-ion cells with remarkable attributes, including low-cost, high energy density, exceptional safety, and unmatched reliability. With approximately USD 135 million in funding, 24M Technologies Inc. is well-positioned to advance its innovative solutions in the energy storage industry.



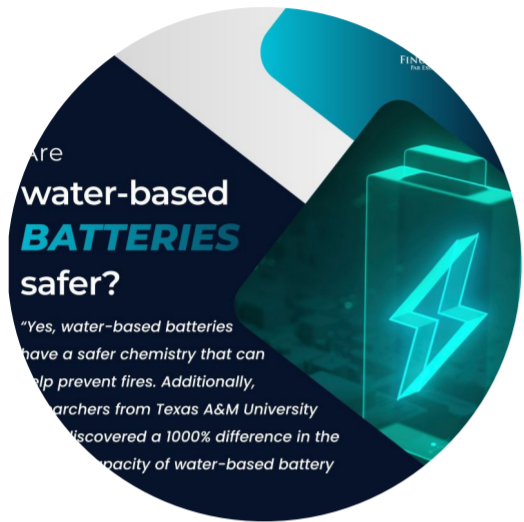
## Cygni Energy, India

Founded in 2014 by Venkat Rajaraman, Cygni Energy is a prominent app-based platform specializing in smart solar generators and EV batteries. The company is committed to

developing tailored energy storage solutions for EVs, with a focus on alternative technologies. Additionally, Cygni Energy provides solar energy systems and solar hybrid solutions. The company's user-friendly Android app enhances accessibility and ease of use for its customers. With an impressive funding of USD 29 million, Cygni Energy is well-equipped to continue driving innovation in the renewable energy sector.

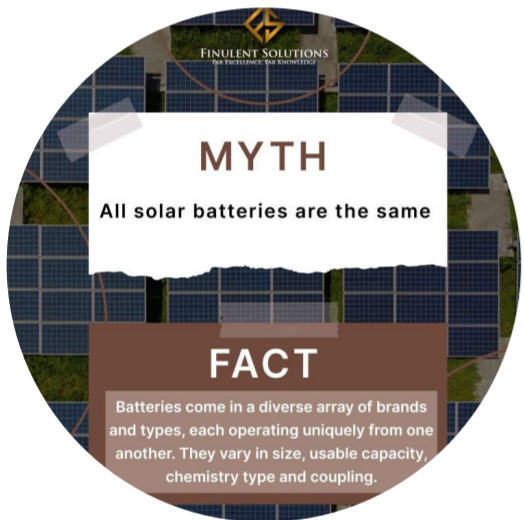


# FINUShots



**Water-based batteries have a 1000% difference in their storage capacity**

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**Solar batteries are an essential component of a home that relies on solar power.**

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