






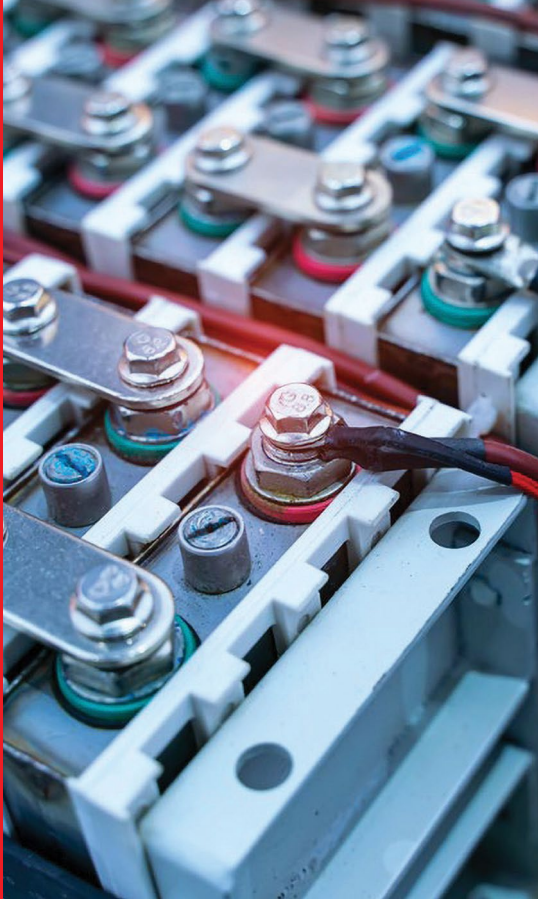
Choosing the right electric energy source for your materials handling fleet:

Lead acid vs Advanced lead Acid vs Lithium Ion.

 **Toyota Material Handling Australia** 8 Secombe Place, Moorebank NSW 2170
 **1800 425 438**
 www.toyotamaterialhandling.com.au











When choosing electric materials handling equipment it is important to be aware of the options you have, typically there are three energy sources: lead acid, advanced lead acid and lithium-ion batteries.



However, each of these power sources has its pros and cons, varies in cost and provides different levels of energy efficiency. It is important to choose the right energy source for your business to meet long-term goals, such as driving profitability and ensuring longterm business growth.

But where do you even start?

We want to make choosing the right energy source for your fleet as seamless as possible. That is why we have created this comparison guide. We have included a matrix that compares a range of factors related to battery types, including:

-  Initial costs
-  Ongoing costs
-  Performance
-  Recharge time
-  Energy efficiency
-  Maintenance requirements
-  Environmental impact
-  Storage requirements



Energy sources for your fleet:

Factors to consider.

The choice of energy used to power trucks has been an increasingly important factor for businesses to consider in recent years.

Not only can the correct type of energy source positively impact your business, but it can also offer environmental benefits.

Of course, choice can be a good thing — but it can also be a little overwhelming. Especially when you are strapped for time and do not have the time to read through exhaustive articles weighing up pros and cons.

We wanted to make it easy for you. Below, you will find a matrix that offers a straightforward comparison of the energy solutions available so you can choose the right energy source for your forklift fleet.

Flooded Lead acid (FLA)

Advanced lead acid (ALA)

Lithium-ion (Li-ion)



Initial costs.

The initial purchase price of lead acid trucks is much lower than other solutions.

Higher initial investment than standard lead acid and lower than lithium - a balance of affordability and technology.

The initial purchase price of Li-ion batteries is currently around two - three times higher than lead acid.



Operating costs.

Whilst operating costs are fairly low, consideration for lost time due to maintenance and battery care in busy applications can be a factor.

Reduced energy costs compared to FLA. Reduced maintenance needs (no watering) and improved uptime reduces operating costs

The energy costs are much more affordable for Li-ion. They are more energy efficient than lead acid, so energy use is lower, but opportunity charging at breaks is crucial.



Performance.

FLA batteries can be used for 8 hours depending on the application or environment before needing a charge or change.

Improved power delivery over FLA combined with opportunity charging allows continuous shifts without battery changes.

Li-ion batteries are typically smaller and run for less than lead acid. But with opportunity charging can keep going all day.



Recharge time.

FLA batteries can typically be recharged in 8-12 hours. May also require a cool down period.

Compatible with standard or fast charging ALA provides a flexible solution. Typically 2.5 hours fast charge returns battery to $\geq 90\%$ charge.

The complete charge time is typically 1-2 hours for a lithium battery.



Energy efficiency.

FLA batteries usually have a cycle life of 1,200 - 1,500 cycles if maintained correctly. This offers a medium level of energy efficiency.

With life cycles equivalent to lead acid and reduced internal resistances energy consumption is improved by up to 10%

Li-ion batteries are up to 30% more energy efficient and usually have 2-3 times the cycle life of FLA

Flooded Lead acid (FLA)

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Maintenance requirements.

FLA requires electrolyte topping on a routine basis. Good battery management is required to keep it at its best.

Virtually maintenance free with no electrolyte topping required.

Li-ion batteries are truly maintenance free operationally, only needing a periodic health check by a battery provider.



Environmental impact.

FLA batteries are 99% recyclable and depending on the energy source, the environmental impact can be very low operationally.

99% recyclable materials with increased service life means less waste and lower lifecycle impact.

Whilst Li-ion is not quite as recyclable as lead, operational energy usage is lower and they have a much longer life cycle.

Go green – charge with renewable energy for zero emissions



Storage requirements.

Due to the chemicals and gases produced due to charging, lead acid batteries often need dedicated charging areas, potentially with ventilation.

Minimal gases emitted during charging which generally permits charging anywhere.

Li-ion batteries have no by-products when charging, so can literally be charged virtually anywhere, even within food industries.

Read on to learn more about the different electric energy sources available for your forklift fleet, including performance benefits and the situations they would be useful in.



Flooded lead acid battery solutions.

Electric powered forklifts have historically derived power from lead acid batteries.

Below, we have provided a breakdown of the key advantages and disadvantages of lead acid battery solutions.

What are the advantages of lead acid battery powered trucks?



Low investment costs: Lead acid batteries have the lowest initial cost. They can be purchased for significantly less than other solutions, which make them a great option if you are looking to stretch your budget.



A recyclable product: These batteries are also 99% recyclable. This means that they can positively contribute to your waste management goals and support you when building a green operation.



High durability: Although lead acid batteries require regular maintenance, with proper care, they can be used for up to more than five years.



What are the disadvantages of lead acid solutions?



Regular maintenance: While lead-acid batteries have the lowest initial cost, they do require regular maintenance to remain in peak condition. This can result in downtime and higher maintenance costs each month.



Longer charging times: Lead acid batteries require a separate charging room and take 8-12 hours to be fully charged. The battery also requires water top-ups regularly.



Lower performance in cold environments: This solution is not as versatile as some of the other options. With a lead acid battery, capacity can decrease when used in colder environments.





Advanced Lead acid battery solutions.

Advanced Lead acid batteries combine the proven dependability of traditional Lead acid technology with the modern performance benefits of high-efficiency pure-lead engineering. They deliver faster charging, higher energy efficiency, and maintenance-free operation and all within a familiar, 99% recyclable cost-effective platform.

If you're looking to improve uptime and energy efficiency without investing in new infrastructure, an advanced lead acid solution is a smart evolution for your electric fleet.

What are the advantages of Advanced Lead acid solutions?

 **High efficiency power delivery:** Advanced lead acid batteries offer up to 10% lower energy consumption than conventional FLA. Their pure lead design minimizes internal resistance, increasing charge acceptance and ensuring more energy goes directly into productive work.

 **Maintenance free operation:** Unlike FLA batteries, advanced lead acid batteries are sealed and valve-regulated, eliminating the need for water topping, acid handling, or ventilation systems. This means less downtime and safer, cleaner charging areas.



Fast and flexible charging: With charge efficiency above 90%, advanced lead acid batteries support rapid or opportunity charging, reaching 90% state of charge in as little as 2.5 hours. That enables multi-shift operations without battery changes.



Low total cost of Ownership: Higher efficiency, longer service life, and reduced maintenance combine to deliver meaningful cost savings over the operational lifetime of the battery all while requiring no change to existing equipment or infrastructure.

What are the disadvantages of Advanced Lead acid solutions?



Higher upfront cost than FLA: Advanced lead acid technology carries a modest premium over conventional flooded lead acid batteries, reflecting its higher performance and sealed construction. However, lower energy and maintenance costs offset this over time.



Performance sensitive to extreme heat: While more robust than FLA, prolonged exposure to high temperatures & intensity can affect ALA cycle life, requiring suitable temperature control or ventilation in hot environments. Cooling options exist for the higher intensity applications to improve performance and can be mitigated with proper battery sizing, charger setup and operator training.



Requires compatible chargers: To achieve full efficiency benefits, advanced lead acid batteries should be paired with high frequency smart chargers or approved opportunity charging systems.



Lithium-ion solutions.

Lithium-ion batteries have fast become a popular power source. This is because it is one of the most energy efficient solution available, easier and faster to charge than lead-acid and allows opportunity charging.

They also provide higher cost savings and a hassle-free maintenance schedule for your team. But this solution isn't for everyone, there are potential drawbacks to keep in mind. Read on to discover the key advantages and disadvantages of lithium-ion solutions.

What are the advantages of lithium-ion solutions?



Cost savings and lower total cost of ownership: This provides your business with cost-saving opportunities and ensures you can use the same fleet for longer periods. They may be more environmentally friendly over time, meaning you have a solution to help you meet your sustainability goals for years to come.



Zero maintenance: Unlike lead acid battery-powered trucks, lithium-ion solutions are maintenance free. They only require a periodic health check by a forklift battery provider. This can dramatically reduce downtime and help you cut back on labour costs.






A versatile solution: Lithium-ion batteries thrive in operations where trucks need to be used in cold environments. They are also highly versatile and are now capable of being operated in outside environments too.



Opportunity charging and increased productivity: Highly suited to both single and multi-shift environments, it is easier and faster to charge than lead-acid and allows opportunity charging. This eliminates the need to change batteries during the day, maximising overall truck productivity rates.



What are the disadvantages of lithium-ion solutions?

-  **Higher upfront costs:** Lithium-ion batteries cost two - three times as much as their lead-acid counterparts on average. However, they do have a lower cost of ownership.
-  **Cost more to recycle:** Lithium-ion batteries' end-of-life cycle is not as straightforward as that of lead acid batteries because there are costs associated with recycling them.
-  **Unable to connect to older forklifts:** Many older forklifts are not designed to connect with lithium-ion batteries. This means you would have to consider investing in an entirely new fleet if you decide this energy source is suitable for your business needs.

So, there you have it — a round-up of the different energy source options available for your fleet. Of course, there is plenty to consider and what you need will depend on your situation and what you are trying to achieve.

You are likely working to a budget and have unique ways of operating that leave you a little unsure about which solution is best for you. That is why it is always worth speaking to a specialist who can get to know your business and provide the guidance you need.

We understand this is a big investment. The last thing you want to do is spend money on a solution that ultimately does not reap the benefits you hoped it would. If you would like to speak to one of our specialists and feel rest assured that you make no mistakes when choosing the right energy source for your materials handling fleet, we would love to start a conversation.



Helping you do what you do best — book a consultation today.

Toyota Material Handling is the world's number one forklift brand* and excels in developing and producing innovative, high-quality material handling solutions. We are here to ensure you get the most out of your equipment and warehouse configuration — from the shop floor to the site infrastructure.

If you have more questions about forklift energy sources, talk to one of our experienced specialists.

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To get the Toyota Forklift Advantage for your business, contact us today.

CONTACT US

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