

The trade-offs of lithium-ion batteries

Lithium-ion batteries offer many benefits, but they also come with many risks. Due to their chemistry, lithium-ion batteries can be very small and very powerful at the same time. They can also store a large amount of energy and be recharged many times. On the other hand, this same chemistry can also be volatile and result in thermal runaway.

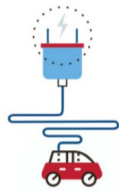
A **trade-off** is a relationship between multiple desired outcomes that are at odds with each other. This relationship is resolved through compromise. Trade-offs include factors like cost, convenience, safety, reliability, and aesthetics. They also include potential social, cultural, and environmental impacts.

Consider the benefits and risks related to lithium-ion batteries. What do you think is a reasonable trade-off?

Lithium-ion benefits:

Electrifying our vehicles

We can replace the burning of fossil fuels with a safer, more sustainable alternative.



Empowering flexibility in electricity

Devices like electric vehicles can double as banks of stored energy for our homes and for use during a disaster like a flood or earthquake.



Building a smarter city

With lithium-ion batteries, we can use devices to monitor and manage our energy usage.



Storing renewable energy

Lithium-ion batteries can store energy from renewable sources, even when they aren't available.



Lithium-ion risks:

Extraction risks

Lithium-ion batteries require raw minerals be extracted which has major environmental and health impacts.



Production risks

Lithium-ion batteries are volatile — hidden defects can cause internal short circuits, which can be dangerous.



Disposal risks

Toxins from lithium-ion batteries can seep into water, soil, and air causing major health and environmental risks.



Transportation risks

If not designed and used properly, lithium-ion batteries can smoke, catch fire, and explode, making them risky to transport.

