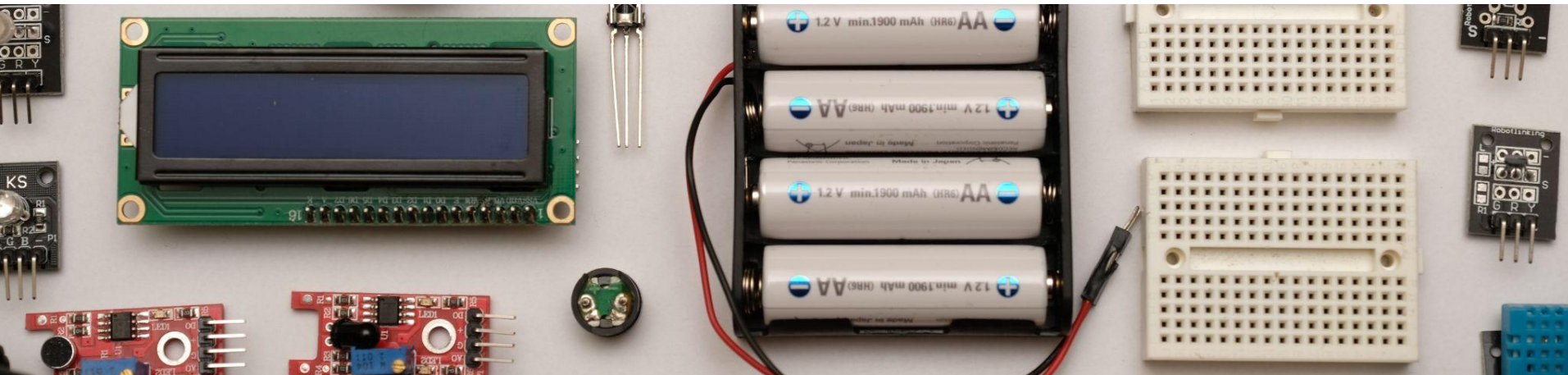


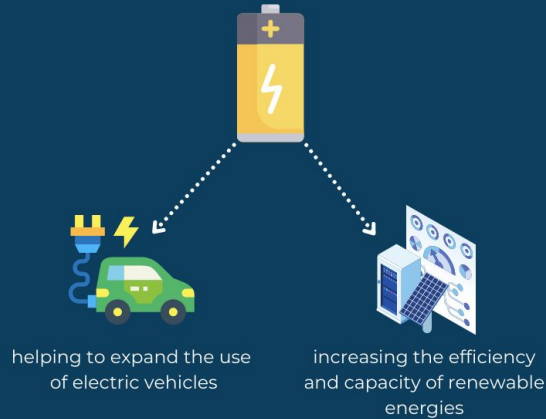
Battery Problem



Warm-up

1. What items are powered by lithium-ion batteries?
2. Where is lithium extracted?
3. How is lithium-ion battery important to the future of energy?

Lithium-ion Batteries



Cambridge University, Cambridge Zero
<https://www.zero.cam.ac.uk/who-we-are/blog/lithium-ion-batteries-infographic>

More than half the world's reserves of lithium are in salt flats in Bolivia, Argentina + Chile



Lithium will be needed for batteries. But, its mining has some environmental concerns such as water use and biodiversity loss



Involving Local Communities

Ask the community what they think of the mining project. Some are happy with them and others are not



Approval

Implement the **free, prior and informed consent** consultation mechanism with indigenous communities.



Indigenous Groups + Communities

Consider the local environmental impact of mining projects. Many salt flats are close to important RAMSAR sites



Environmental Impact

<https://doi.org/10.1080/00139157.2019.1662659>
Sanchez Lopez (2019)

CAMBRIDGE
ZERO



Freighter ship on-route from Germany to Egypt, carrying over 300 electric vehicles on fire, July 28th, 2023
(<https://www.dw.com/en/burning-ship-off-dutch-coast-has-more-e-cars-than-thought/a-66375203>)

Let's find out!

“Burning ship off Dutch coast has more e-cars than thought” ,
DW

<https://p.dw.com/p/4UVDn>

1. How long had the ship been on fire?
2. How are electric vehicle fires different from those of diesel or gasoline cars?
3. Why can't the freighter fire be put out with more water?
4. Have you heard of similar fires in recent years?



“Lithium-ion batteries 'keeping the fire alive' on burning cargo ship carrying luxury cars”, ABC news, posted 21st Feb, 2022, <https://www.abc.net.au/news/2022-02-21/nats-firefighters-struggle-to-douse-felicity-ace-fire/100848822>

Li-ion battery fires caused \$78 million in damage in 4 years across Japan, posted Aug 8th, 2023, The Mainichi

<https://mainichi.jp/english/articles/20230807/p2a/00m/0na/010000c#:~:text=Japanese%20version-,Li%2Dion%20battery%20fires%20caused%20%2478%20million%20in,in%204%20years%20across%20Japan&text=TOKYO%20%2D%2D%20Fires%20caused%20by,environment%20ministry%20is%20urging%20caution.>



A fire is seen at Togari Clean Center, a waste disposal facility in Toyota, Aichi Prefecture, in February 2023. (Photo courtesy of Toyota City Hall)

Case study: Lithium-ion battery fires are up. Are firefighters ready?
CBS updated 15th Aug. 2023

[-https://youtu.be/wjH_ehpmLso](https://youtu.be/wjH_ehpmLso)

Questions

1. What causes of lithium-ion battery fires are mentioned in the video?
2. How many hours after the fire was put out, did the lithium-ion fire **re-ignite**?
3. What do thermal-runaway and off-gassing mean?
4. What percentage of firefighters have received hands-on training?
5. What is GM doing to help?

Full article

Lithium-ion battery fires from electric cars, bikes and scooters are on the rise. Are firefighters ready?, CBS News, Updated Aug. 15th 2023

<https://www.cbsnews.com/news/lithium-ion-battery-fires-electric-cars-bikes-scooters-firefighters/>

Lithium extraction and the environment

<https://www.euronews.com/green/2022/02/01/south-america-s-lithium-fields-reveal-the-dark-side-of-our-electric-future>

1. Why is lithium extraction bad for the environment?
2. What happens to local communities' water source?
3. Are there alternative batteries to lithium-ion?

Discussion

1. What do you think will happen as more electric vehicles are used around the world?
2. With the increased risk of lithium-ion fires on freighters, what might happen to the international trade and supply of electronic goods?
3. Are Japanese firefighters and regulatory bodies prepared for lithium-ion battery fires and their dangers?
4. What can we do to prevent these fires?