Electric Vehicles
A New Way to Power

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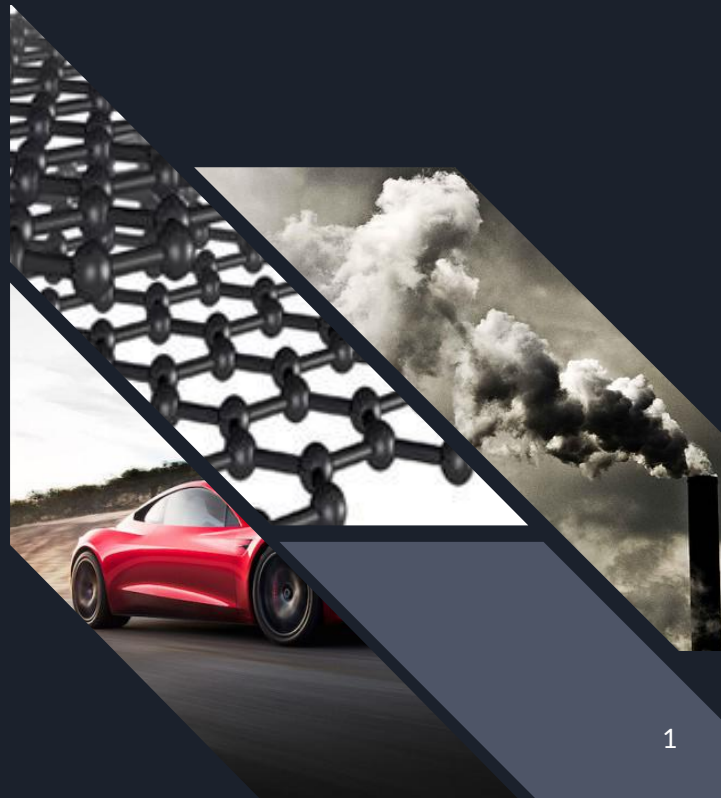
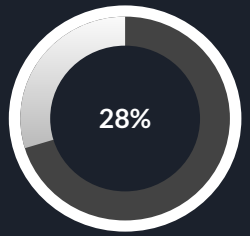


Cars are our transportation

- From walking to camels to cars
- Internal combustion
- Environmental damage (acquiring fuel, global warming)



Energy consumption

Our Problem: Pollution

- Cars cause 20% of world’s pollution
- Health risks
- The greenhouse effect: global warming

Solution: Electric Cars

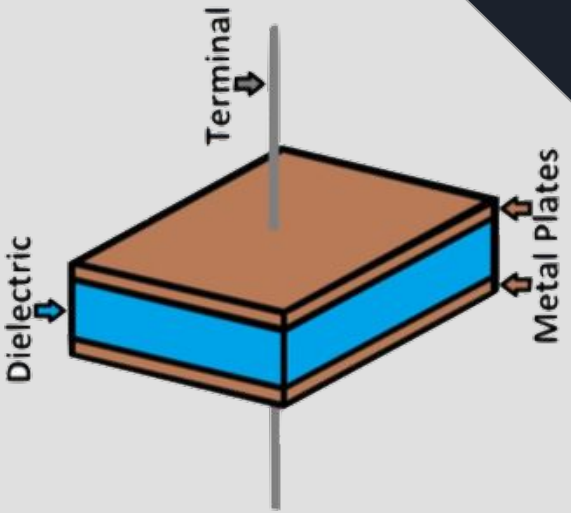
- Renewable energy
- Reduced environmental harm
- Technical limitations prevent broad deployment

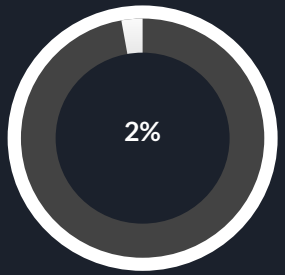
The Challenge: Batteries

- Lithium Ion
- Pollution
- Long charge time (4-10 hr)
- Cost (~$5000)

Capacitors:
What they are and how they work

- Renewable energy
- Simpler structure
- Twice the battery cycle life

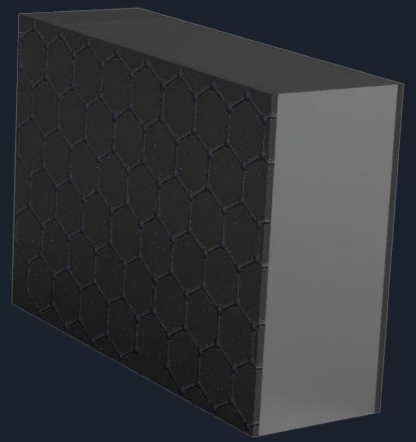




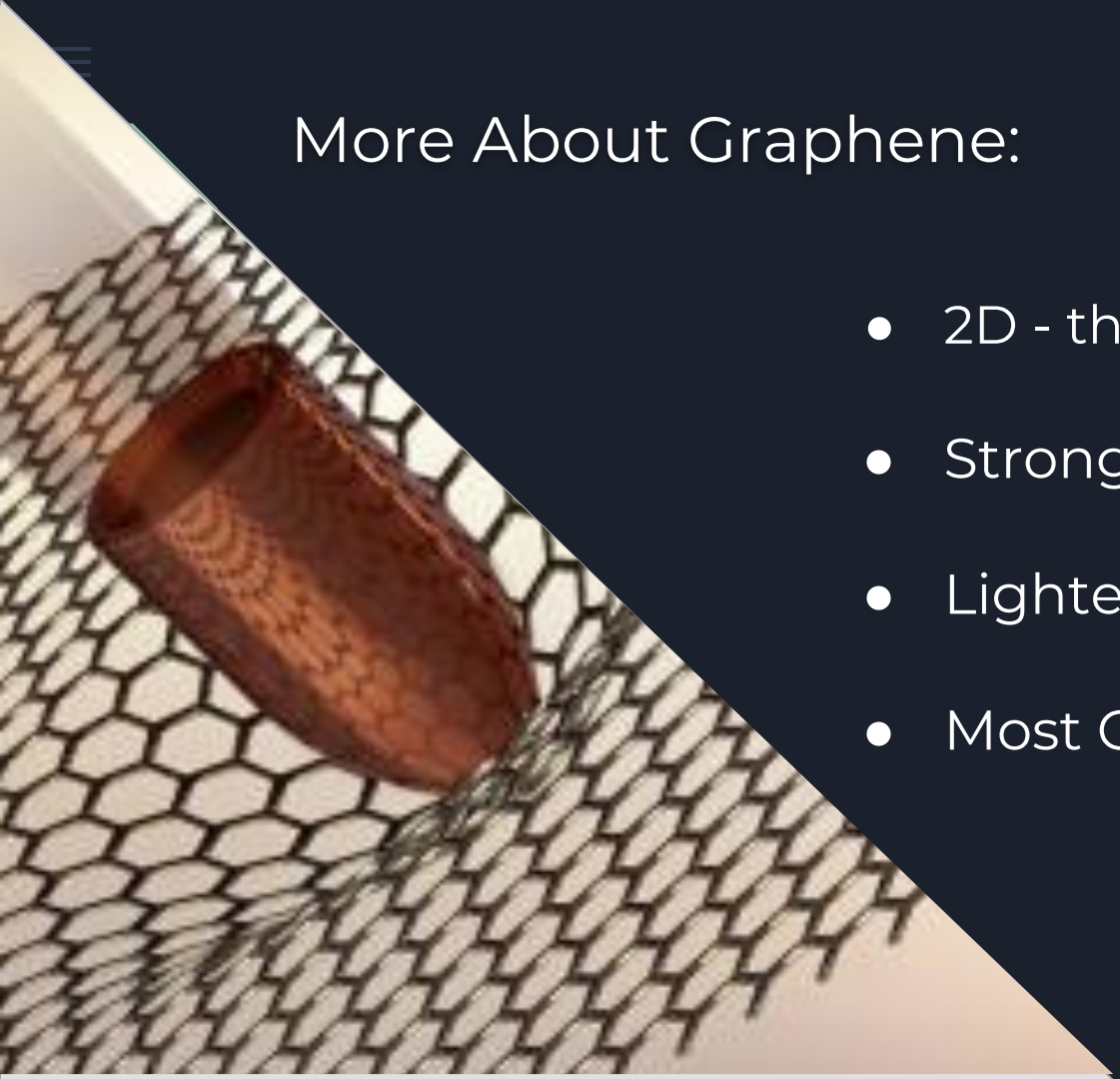
Energy density
compared to batteries

The Solution: Graphene Supercapacitors!

- Capacitance: More than 2000 times
- Energy: 100 times more than batteries
- Cost: $2/unit



More About Graphene:

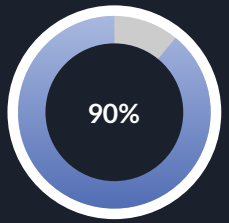


- 2D - thinnest
- Strongest - 130 GPa
- Lightest - 0.77 mg/m^2
- Most Conductive

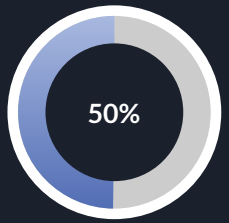
Prototype

Prototype - promising results

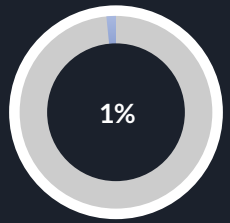
Graphene aluminum supercapacitors greatly outperform conventional electric car batteries:



Space



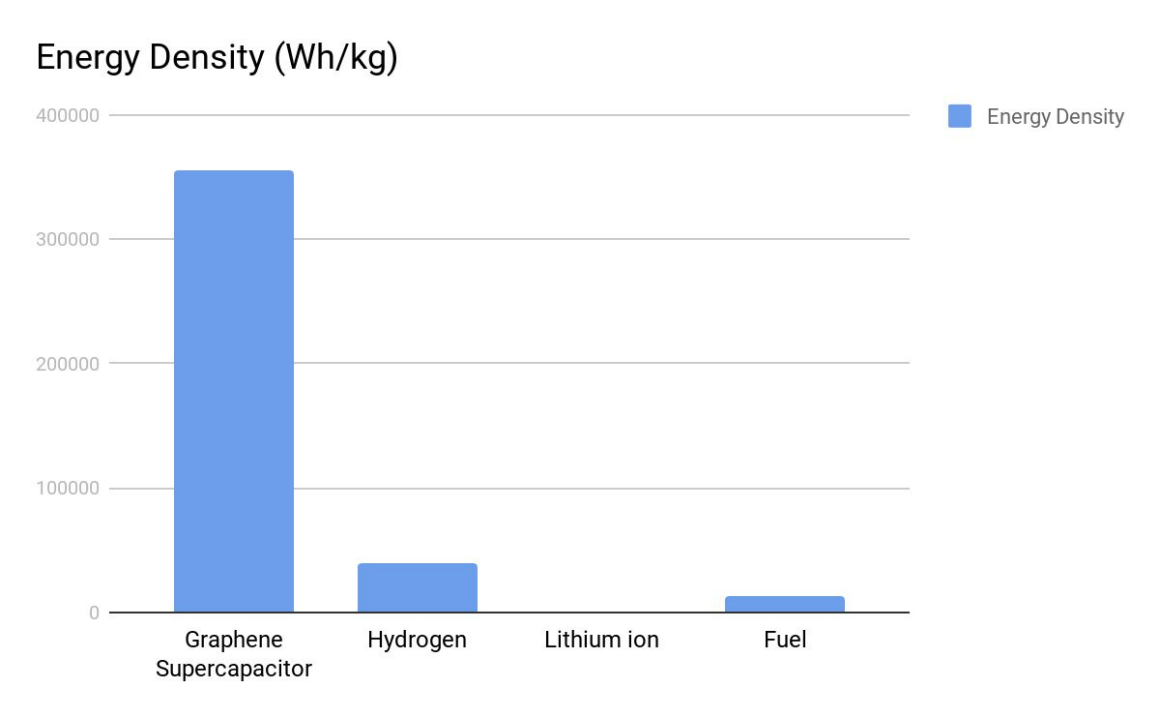
Cost



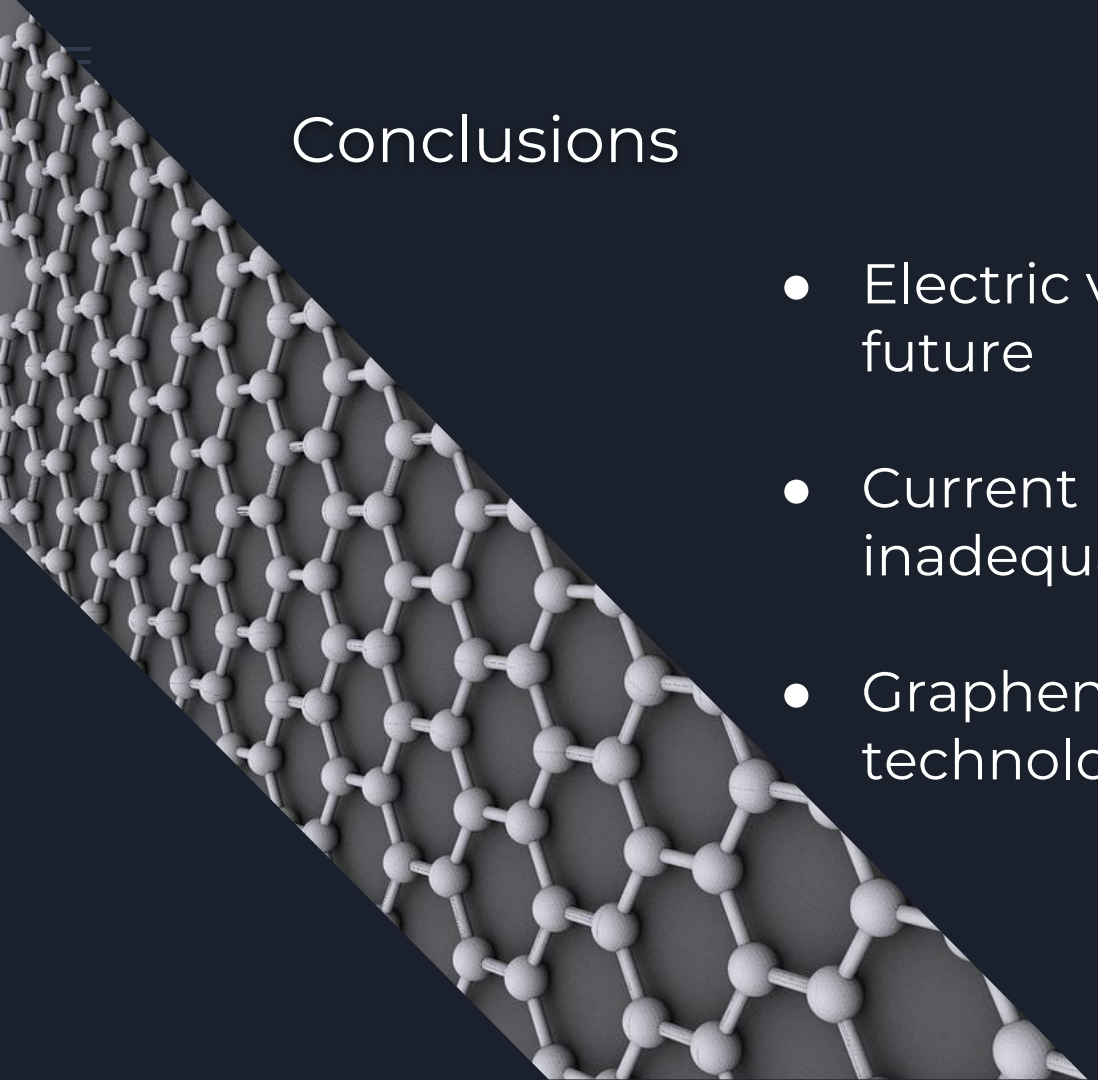
Charge time

Environmentally Friendly

Alternative Energy Storage



Conclusions



- Electric vehicles are vital for our future
- Current battery technology is inadequate
- Graphene supercapacitor technology is an exciting alternative

Thank you!

Bibliography

https://www.theguardian.com/environment/2017/may/15/diesel-emissions-test-scandal-causes-38000-early-deaths-year-study
http://www.dft.gov.uk/vca/fcb/cars-and-air-pollution.asp
https://avt.inl.gov/sites/default/files/pdf/fsev/compare.pdf
https://cleantechnica.com/2017/07/30/europe-electric-car-sales-54/
https://www.washingtonpost.com/news/innovations/wp/2017/01/04/americans-bought-more-cars-than-ever-last-year-in-2017-things-could-get-bumpy/?utm_term=.9dfa0de5b10a
https://arstechnica.com/cars/2018/01/2017-was-the-best-year-ever-for-electric-vehicle-sales-in-the-us/
https://www.theguardian.com/sustainable-business/2017/aug/10/electric-cars-big-battery-waste-problem-lithium-recycling
http://www.kitco.com/ind/Albrecht/2014-12-16-How-Green-is-Lithium.html
http://batteryuniversity.com/learn/article/whats_the_role_of_the_supercapacitor