

# Renewable Energy and Batteries

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# Outline

- Introduce each other
- What is electric current, why do we need it, and where do we get it from?
- What are the sources of energy?
  - Conventional
  - Renewable
- Solar power: basic explanation
- Wind power
- Batteries- Electric cars

# Introduction

- What is your name?
- What do you want to be when you grow up?
  - Teacher?
  - Engineer?
  - Doctor?
  - Scientist?
  - Politician?

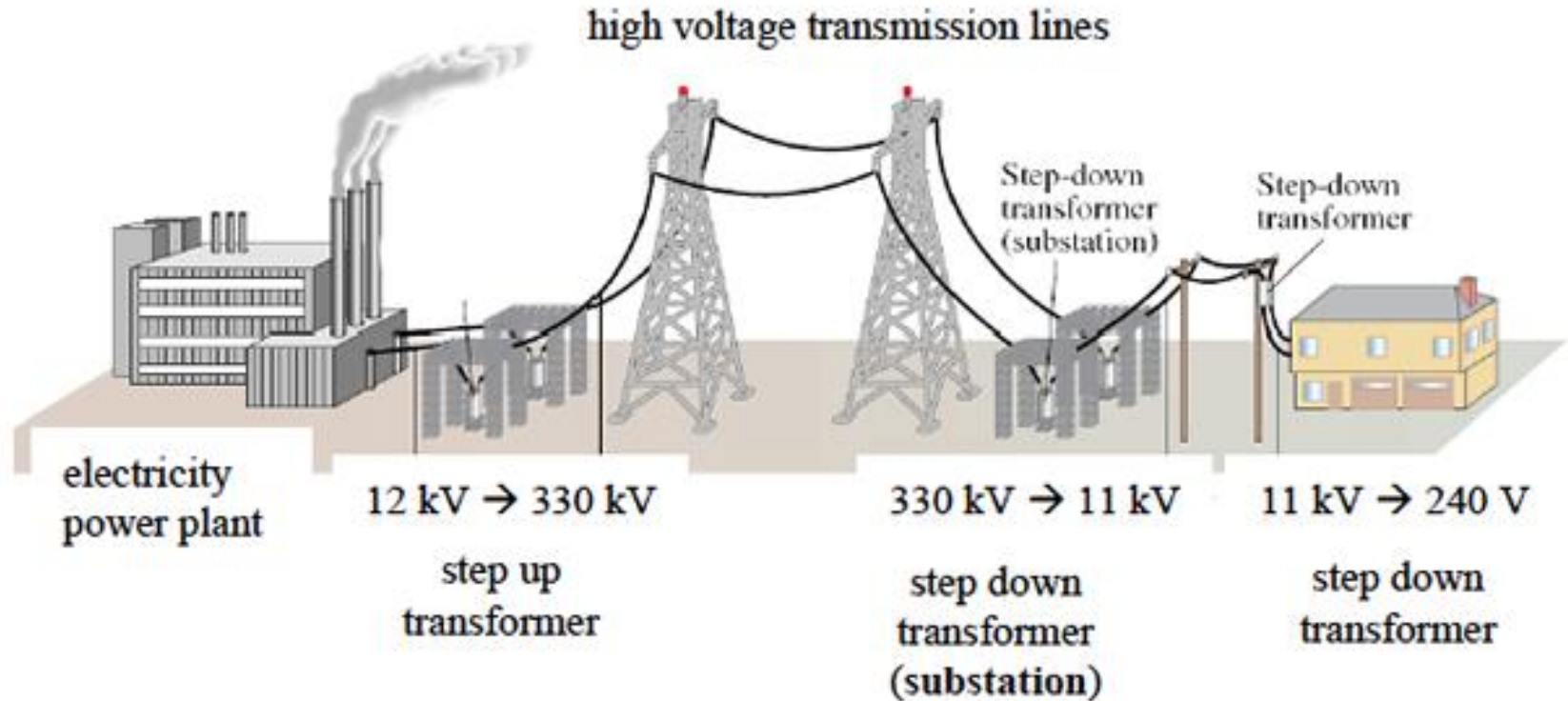
# What is electric current and why do we need it?

Electric current is flow of electrons in a conductor (similar to water flowing through pipes)

We need electricity for

- Heating/cooling
- Lighting
- Cooking
- Other (tvs, fans, computers)
- Industries need electricity to make products

# Where do we get our electric current from?



Generator is a rotating machine that converts the mechanical work into electrical energy



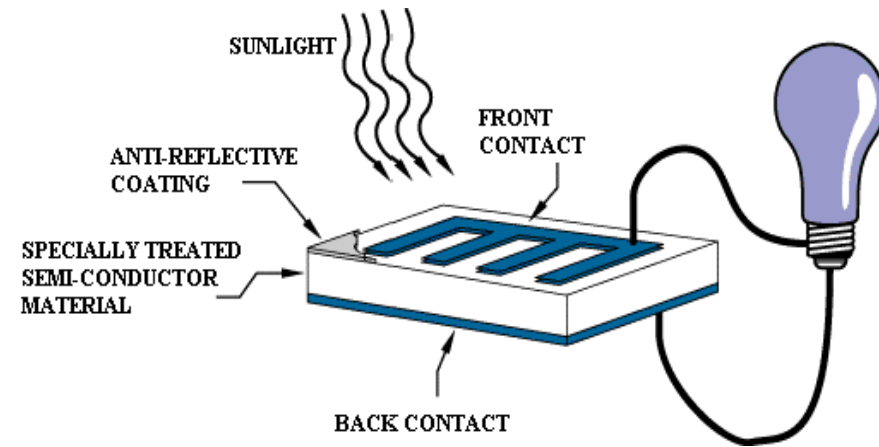
# What are the sources of energy?

- Conventional power plants use different sources to generate electricity
  - Coal
  - Oil
  - Natural gas
  - Hydro
- Renewable energy sources
  - Sun (solar)
  - Wind
  - Tidal



# Solar power

<http://vimeo.com/60122172>



<http://vimeo.com/70881405>

# Wind power

<http://vimeo.com/60122173>



GE Wind Turbine Testing Facility,  
The Netherlands





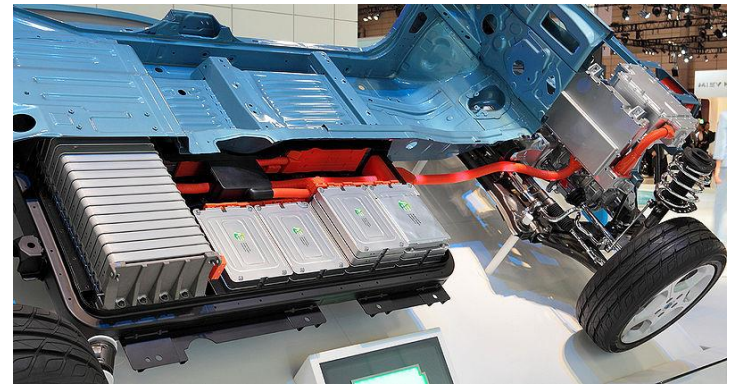
# Battery Applications

- Wind and solar power can be more efficient with an energy storage device
- Electric car application



[www.extremetech.com](http://www.extremetech.com)

[http://de.wikipedia.org/wiki/Nissan\\_Leaf](http://de.wikipedia.org/wiki/Nissan_Leaf)

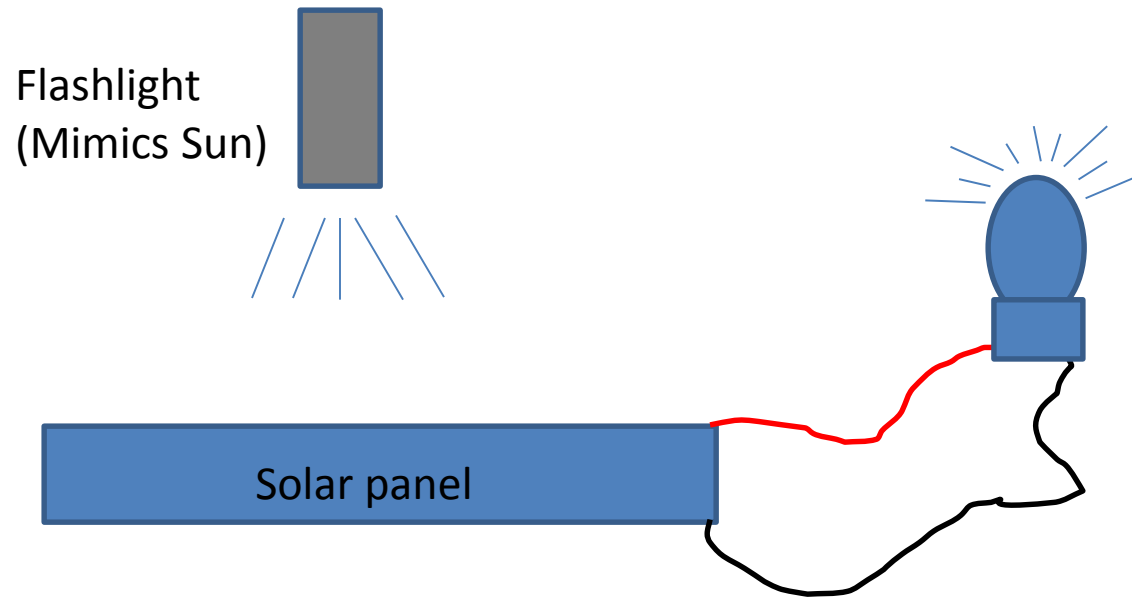


Nissan Leaf battery: mass = 600 lb,  
battery cost ~ \$18,000  
range ~ 100 miles

# Hands-on Activities

- Solar panel demonstration
- Tour of Micro and Nano Mechanics Laboratory
- Making lithium-ion coin cells

# Solar panel demonstration



# Lithium-ion coin cells

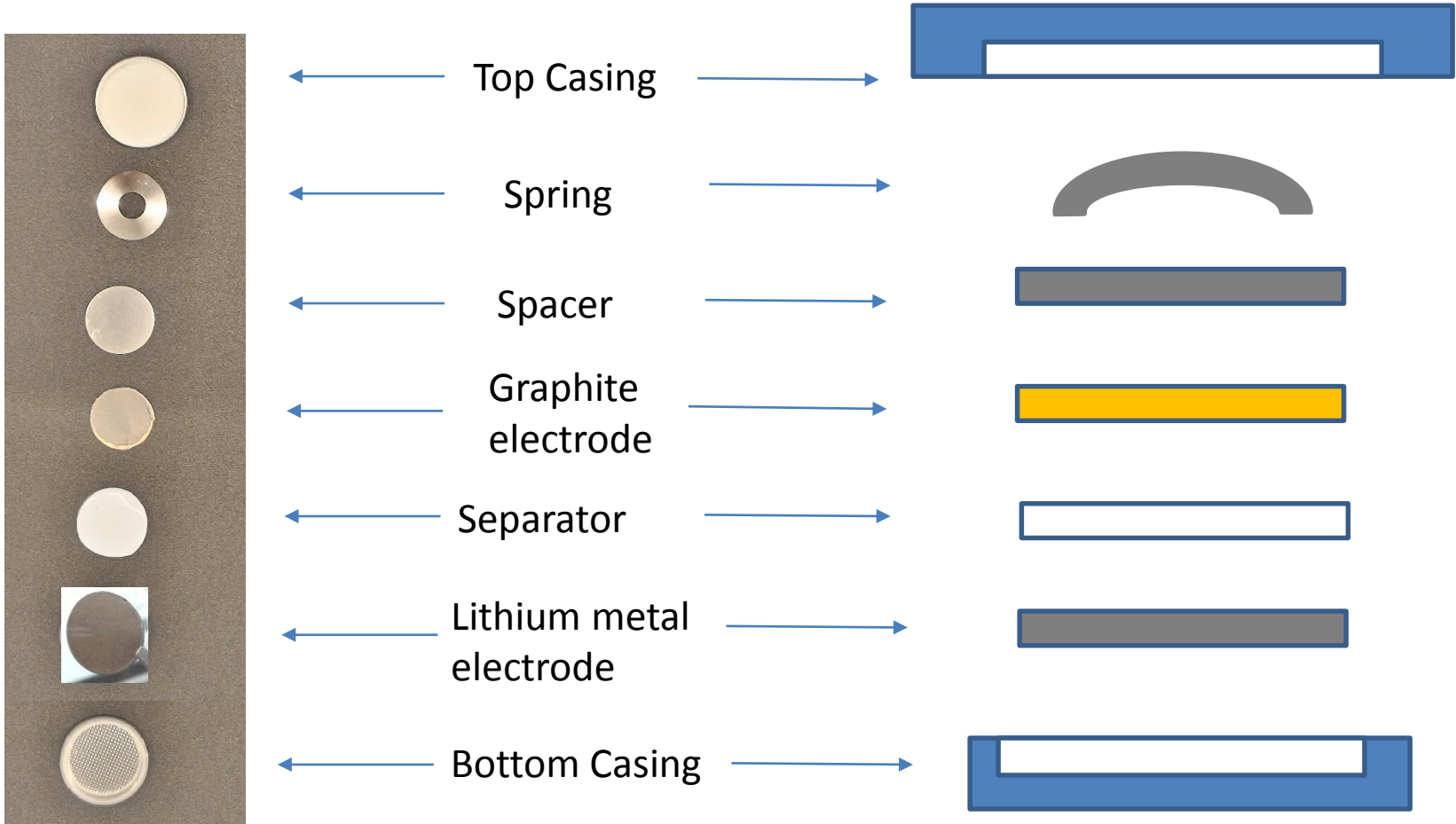


Front view

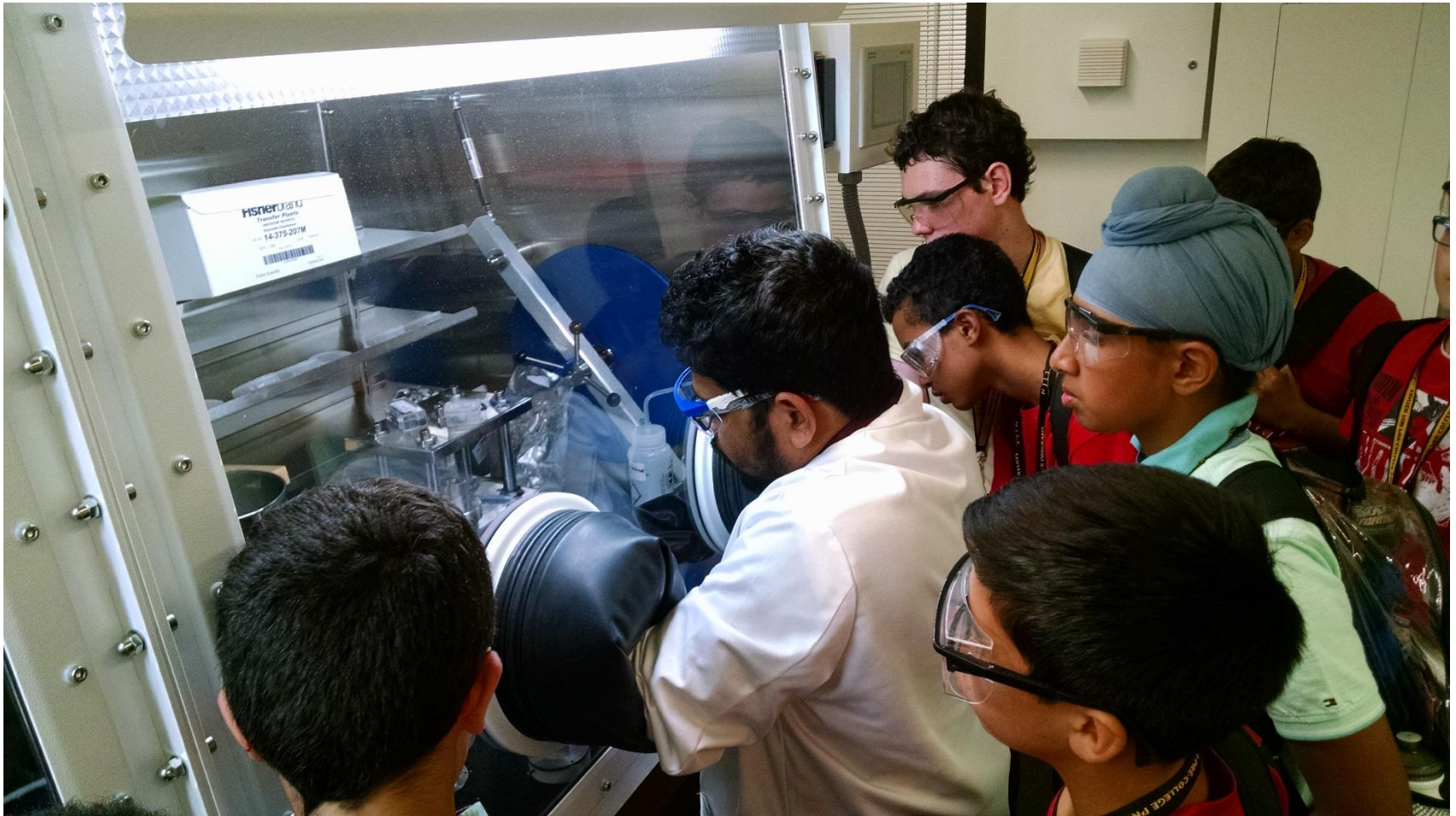


Back view

# Parts of a coin cell



# Fabrication of coin cell in the lab



Lecture notes by Dr. Siva Nadimpalli,  
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