

Splash

"Renewable Energy" - Generating energy without producing carbon dioxide is required if we want to prevent the most catastrophic effects of climate change. We'll discuss renewable sources you've probably seen, like solar panels and wind turbines, as well as lesser known systems like ocean wave energy, geothermal, nuclear fusion, and hydrogen fuel cells. Learn the science behind these technologies and the engineering involved in building them at scale.

0-5 introduce myself and the class

5-10 climate change

- What is climate change? Explain the effect on biodiversity, population displacement, weather, respiratory disease.
- What is the greenhouse effect?
- What is the IPCC? What are some other big organizational names to be familiar with?

10-15 renewables big picture

- What are the current and projected future sources of energy? What are the current biggest uses of energy? What are the biggest barriers to implementation (policy)?
- Other technologies that won't be covered here: electric cars, carbon capture and storage

15-20 solar

- Science of solar energy capture
- Different types of solar cells
- Scale up: utility scale arrays vs small arrays vs rooftop
- Briefly mention concentrated solar power

20-25 wind

- Equation for power of a wind turbine
- Explain the Betz limit

25-30 ocean (wave and tidal)

- Explain principle of resonance and types of wave energy converters
- Explain state of industry and challenges (cost, ocean environment)

30-35 geothermal

- Working principle and equation for heat transfer
- Difference between sites: utilities require high temp, home heating requires lower temp
- Geology that remains to be worked out

35-40 fusion

- What is fusion? Difference between fusion and fission
- Projects to be aware of: ITER and CFS

40-45 hydrogen

- What is electrolysis and what is a fuel cell
- Hydrogen used as a fuel
- Hydrogen used as energy storage for the grid

45-50 summary and call to action (what can you do about it)