

Renewables from a different angle

A high-level overview on present and future energy sources

Athbi Alfarhan

EGEE 497: Sustainable Energy in New Zealand

Introduction

1.1 Brief Definition of Renewable energy



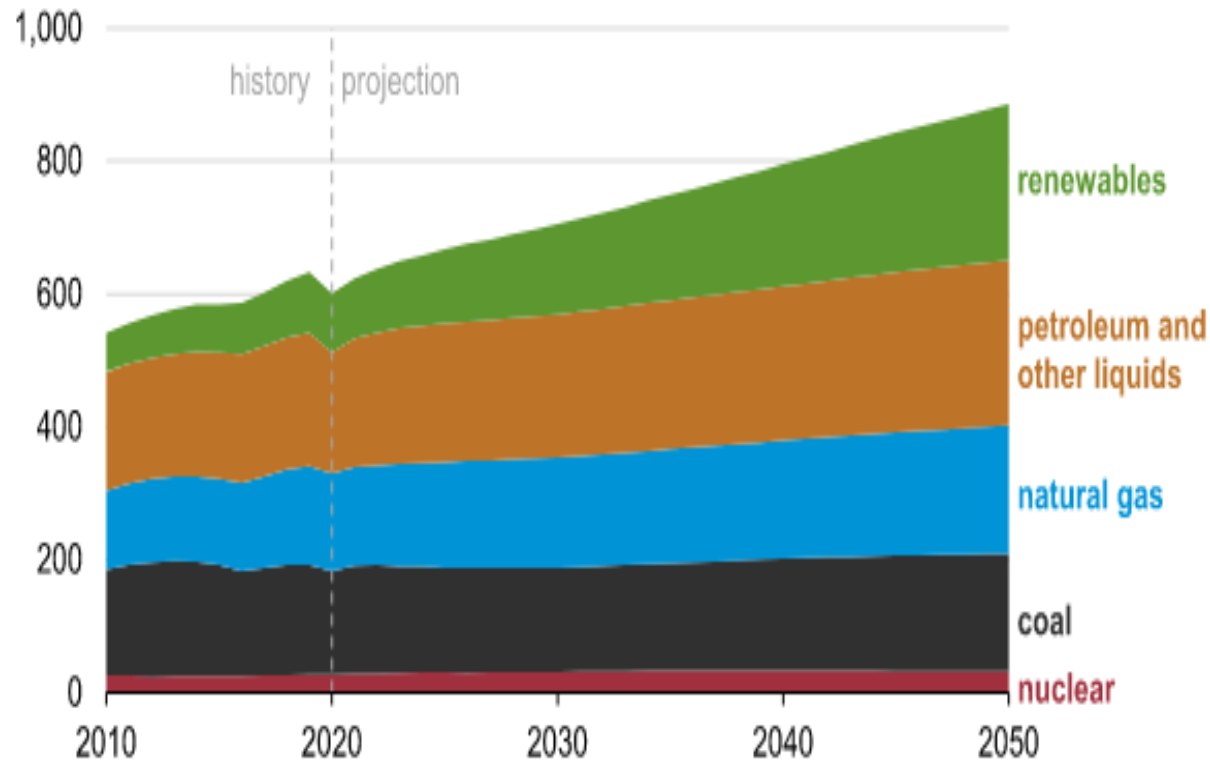
Renewable energy is energy derived from natural sources that are replenished at a higher rate than they are consumed.



Nuclear and biomass do not fit that description

1.2 The Growing Energy Demand

Global primary energy consumption by energy source (2010–2050)
quadrillion British thermal units



The energy demand is expected to grow by ≈ 50% !!!

Solar Energy



3.1 Solar Energy

- **Solar Panel Production**

- Toxic emissions:

The production of solar panels involves the use of various chemicals, including solvents, acids, and heavy metals.

- Carbon emissions:

The production process uses energy

- Water consumption:

The production of solar panels requires large amounts of water for cooling and cleaning. This can put pressure on water resources in areas where water scarcity is an issue.

3.2 Solar Energy

- **Implementation**

- The clearing and use of large areas of land for solar power facilities can adversely affect native vegetation and wildlife in many ways, including loss of habitat and interference with rainfall and drainage.
- Water consumption for maintenance and cooling. This issue can be made worse when we consider that most solar farms are installed in communities where water is not very abundant.

Wind Energy



4.1 Wind power



Disturbance to wildlife



wind turbines are loud



Low Land use to energy production ratio



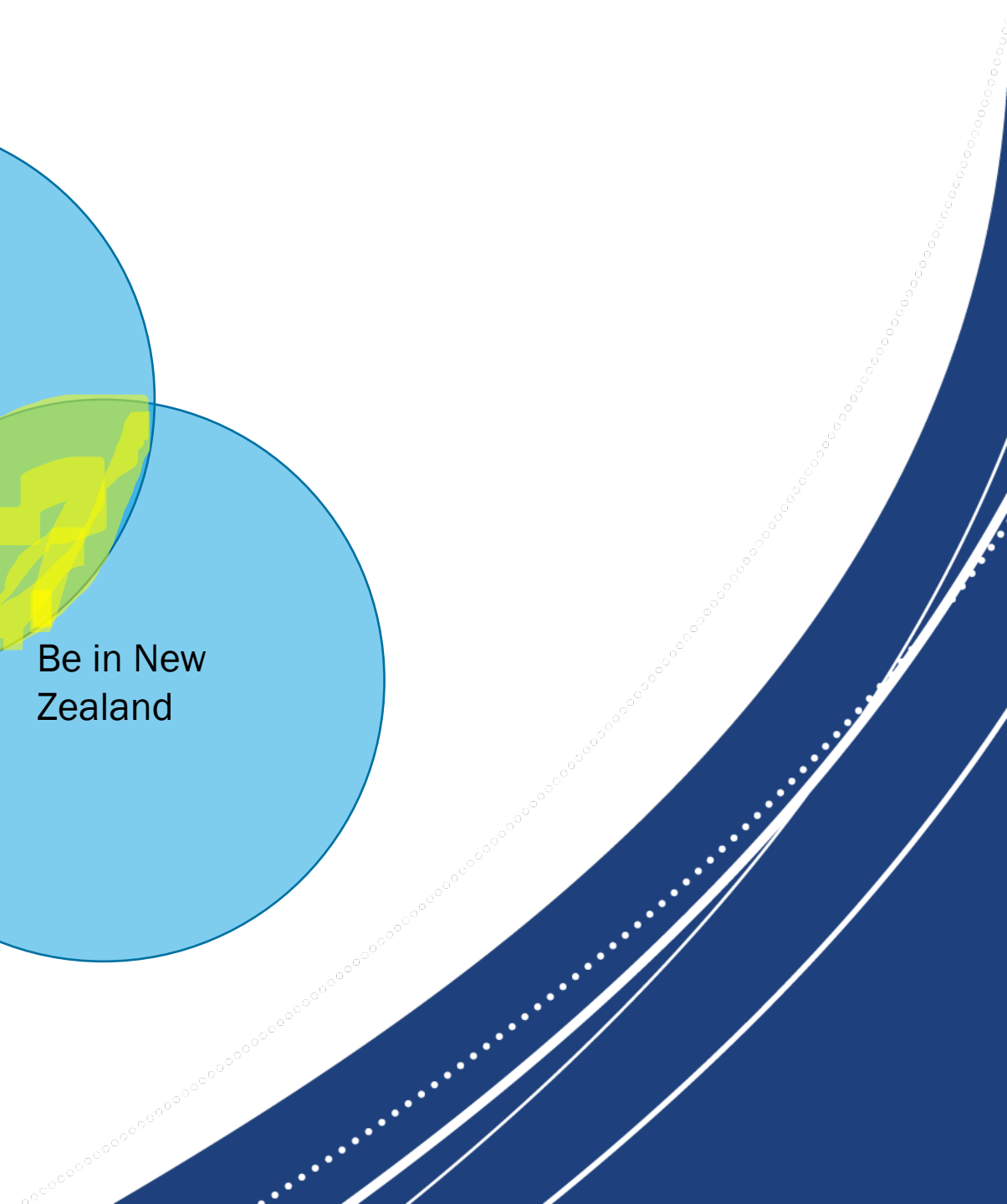
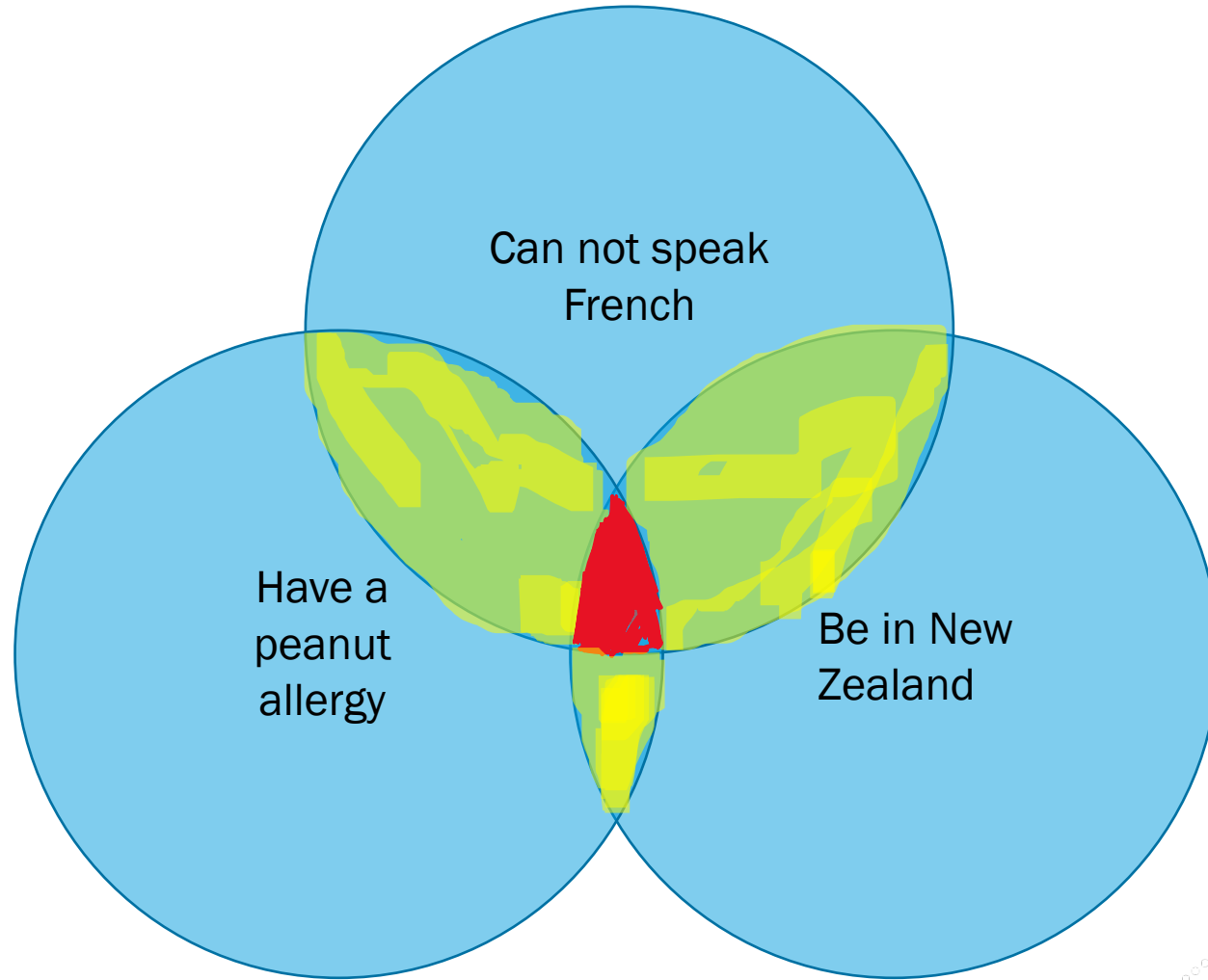
Unsightly to some



4.2 Wind Energy



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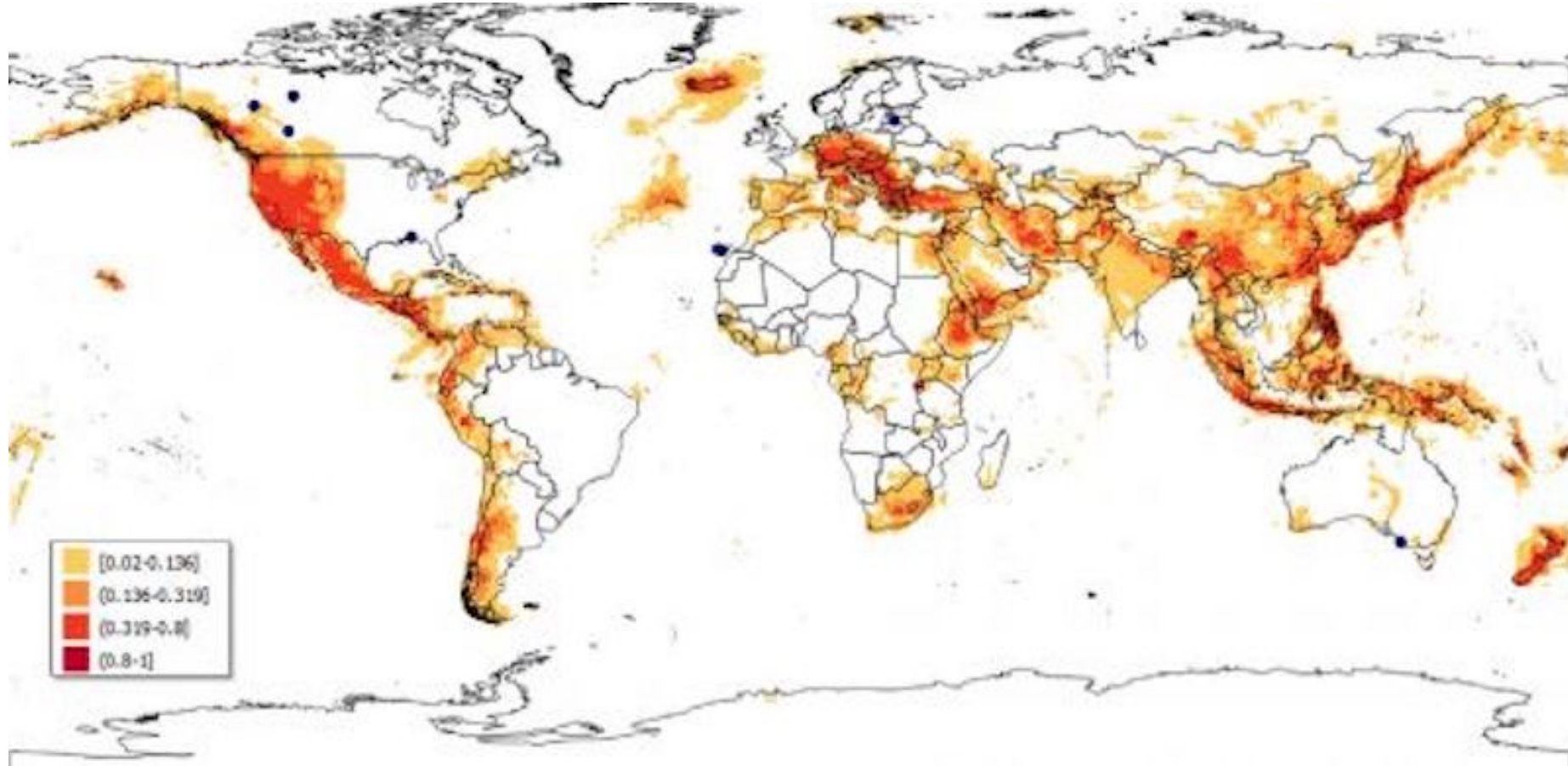


Geothermal Energy



5.1 Geothermal power

Highly Locationally dependent

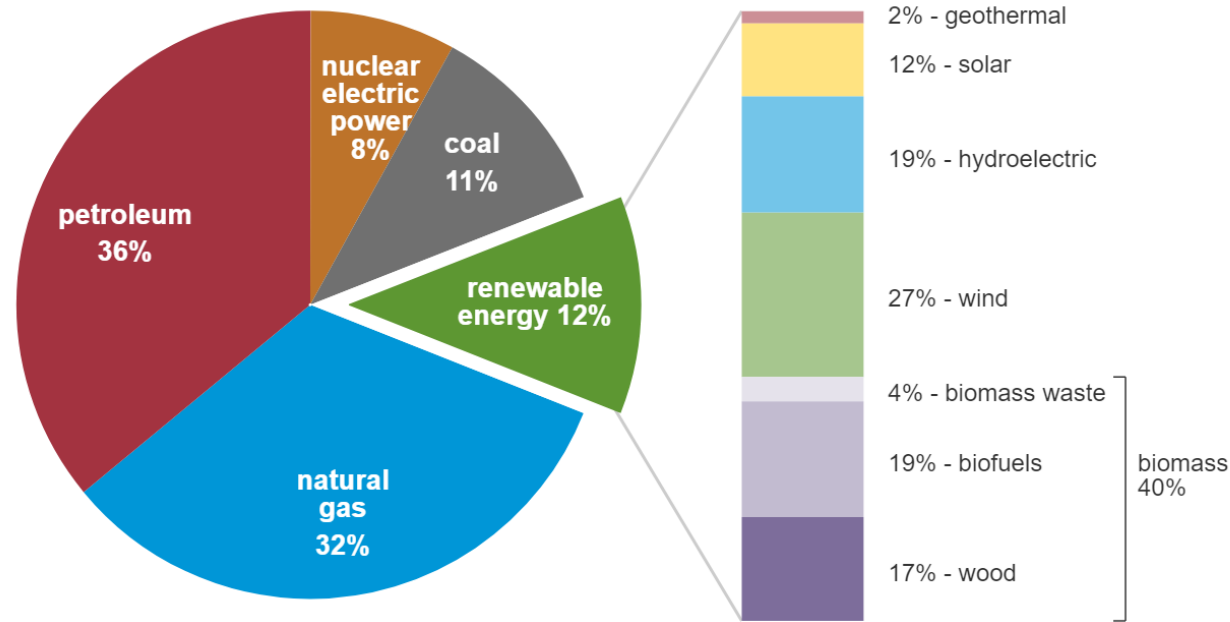


5.2 Geothermal power

U.S. primary energy consumption by energy source, 2021

total = 97.33 quadrillion
British thermal units (Btu)

total = 12.16 quadrillion Btu



Currently Geothermal power accounts for 0.0024% !!!

Due to the geolocation dependance and technology limitations this number is not likely to change

Data source: U.S. Energy Information Administration, *Monthly Energy Review*, Table 1.3 and 10.1, April 2022, preliminary data

Note: Sum of components may not equal 100% because of independent rounding.



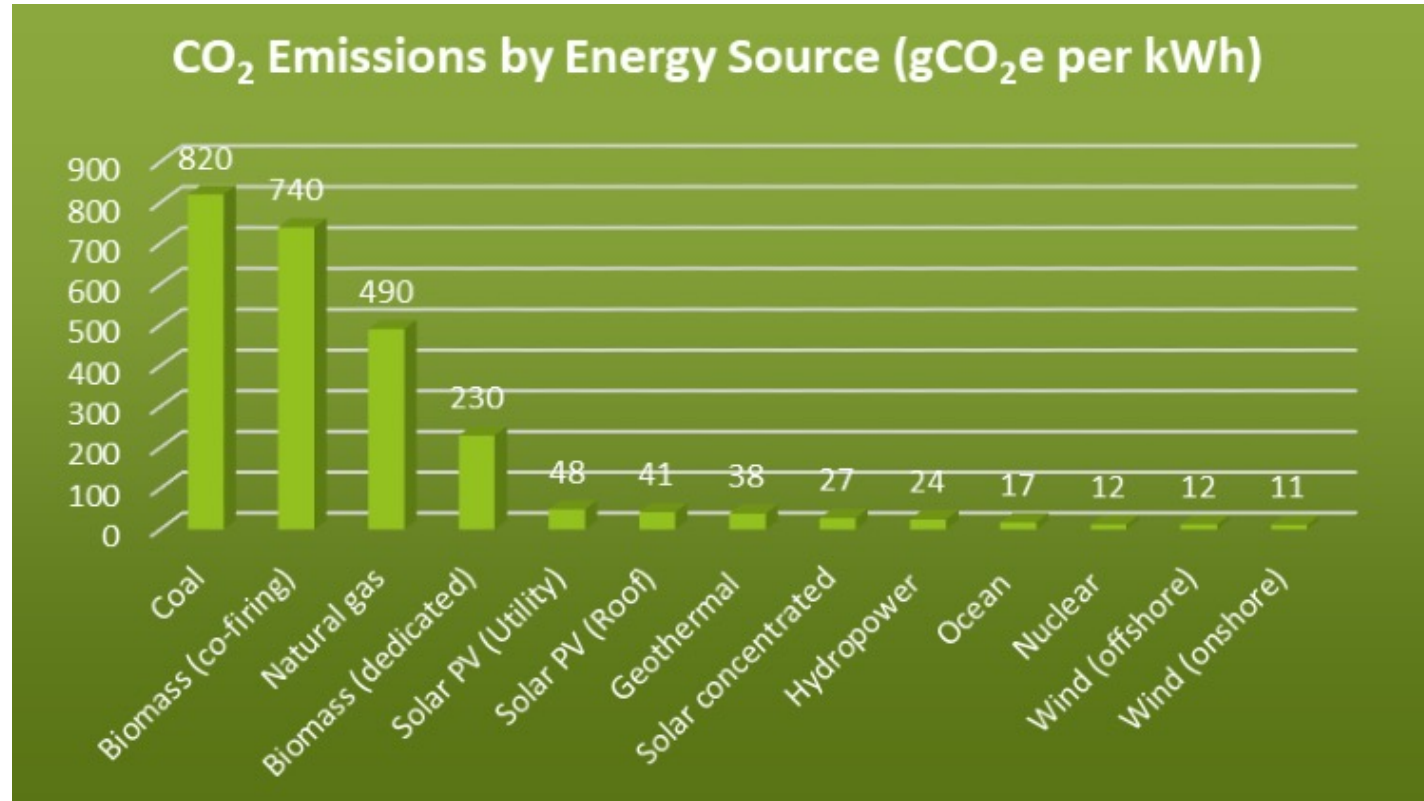
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Fossil Fuels



6.1 Fossil fuels

- Coal emits approx. **40%** more CO₂ than Natural Gas



6.2 Fossil Fuels

Fossil fuels are not the solution to climate change

New technologies Ex. Hydraulic Fracturing

Not all fossil fuels are made the same!

7. Current state of renewables



8.1 New Zealand

New Zealand has an electricity demand of 4678 MW (NZ MBIE, 2020). *My notes say 6100 MW*.

According to the EIA, PA has an electricity demand of 18014 MW.



8.2 New Zealand

Abundance
of Natural
resources

- NZ got it all from sitting on TWO plate boundaries to having easy access to ocean winds thanks to being an island (:



8.2 New Zealand



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Takeaways



Fossil fuels will still be a big contributor to our energy production



The future looks uncertain



We must have a realistic holistic outlook



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Thank you!

Discussion time!

