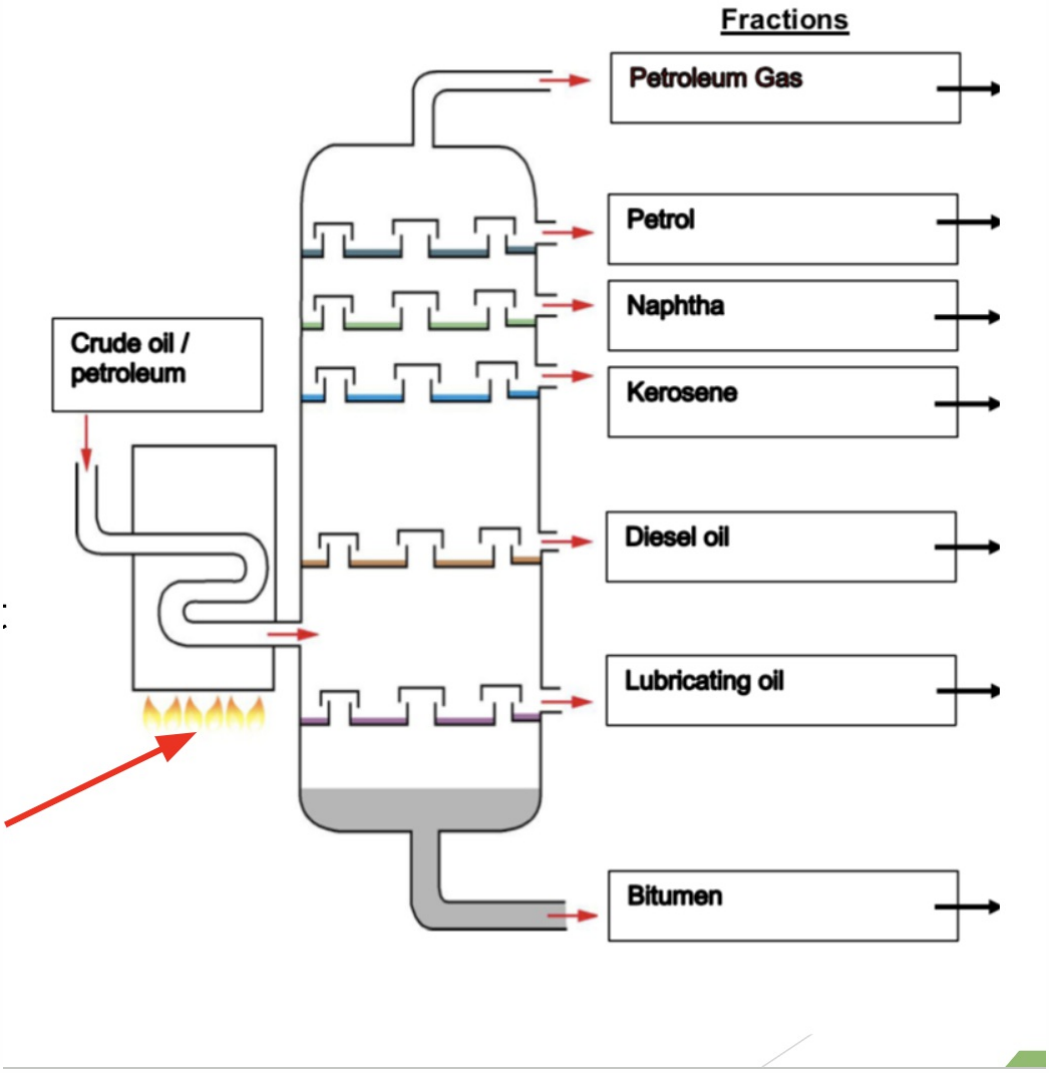
Fuels and Crude Oil

> *Editor's note: wtf is this topic*

Introduction to Fuels

- Fossil fuels are formed from decayed plants and animals from millions of years ago.
- They are mainly organic compounds that contain only carbon and hydrogen, known as **hydrocarbons**
- Fossil fuels are important as they are the largest sources of energy for powering transport and electrical appliances, which are essential for us to function in our daily lives.
- When fossil fuels undergo combustion, heat is released as the reaction is an exothermic one. The thermal energy can then be converted to other forms of energy.
- **Crude oil** and **natural gas** are forms of fossil fuel.

Fractional Distillation of Crude Oil



- The different compounds in crude oil have different boiling points.
- Generally, hydrocarbons with larger relative molecular mass have higher boiling and melting points.
- As one moves up the fractionating tower, the temperature decreases.
    - Hydrocarbons boil and rise up the column until they reach the trays that are cool enough for them to condense (into liquids).
    - The liquids are siphoned off at different levels. Hence, hydrocarbon compounds with the highest boiling points will condense in trays **near the bottom of the fractionating column.**
        - Note that the liquid siphoned off at each level is called a

fraction.
    - Every fraction comprises a **mixture** of compounds, instead of pure substance.
- The lightest hydrocarbon (petroleum gas, which has the smallest relative molecular mass), does not condense and is collected at the top of the fractionating tower. It can also be used as a fuel.

> Mixture of crude oil is heated so that **it enters the fractionating column as a *gaseous mixture*** → ALL the fractions exist as vapour at the same time and then **separate out by selectively condensing Note:** During fractional distillation the liquids **DO NOT 'boil' or 'evaporate' one at a time**

Difference between bioresources and biofuels

Bioresources are raw materials from human or animal activity that are renewable and biodegradable, however, biofuels are fuels that may be derived from bioresources, to be used as alternatives to conventional fossil fuels.

Government's Plan to Support Domestic Power Generation

It's plan is to blend the use of biomethane in larger quantities with natural gas in the piped networks to support domestic power generation.

Three Factors for Consideration before Extensive Implementation of Use of Biofuels in Singapore.

- Cost effectiveness in emissions reduction
- Existing infrastructure for fuels and feedstocks
- Suitability of applications for deployment by 2050.

Suggest one negative impact of the use of biofuel and bioresources on the biodiversity, land use and carbon cycle.

- Biodiversity : With the need for biofuel, there might be a tendency to increase the production of certain types of crops. This will lead to the loss of biodiversity and possible disruption in the natural eco-systems.
- Land use: With the demand for biofuel, there might be demand for land use to grow such crops to meet the demand. There will be competing uses for the land such as for agricultural needs to support food compared to the fuel industry.
- Carbon cycle: Deforestation and land conversion programmes to clear and prepare the lands required to produce biofuel, may release significant amount of CO_2. This can offset the environmental sustainability factor of biofuels of being carbon-neutral.

Possible Contribution of Singapore in Future of Biofuel

Singapore could possibly be a leader in the importing of biofuels and refining them for export.

Biofuels

- Biofuels are alternative renewable energy sources to crude oil and natural gas.
    - Biofuels are a renewable energy source that is derived from plant, algal or animal biomass.

Carbon-Intensive Sectors

- Electricity generation
- Transport industry
- Heavy industry
    - Types of businesses that carry a high capital cost, high barriers to entry and low transportability, e.g. petrochemical industry, oil refining, aerospace and aviation.

Organisation and Understanding of Biofuel

Biofuel is a renewable energy source that is derived from plant, algal, or animal biomass.

Solid Biofuel:

- Wood chips

Liquid biofuel:

- Biodiesel (from vegetable oil)
- Bioethanol (from sugarcane and corn) **Gaseous biofuel**
- Biogas (from animal waste)

Bioresources are raw materials from human or animal activity that are renewable and biodegradable.

Examples of bioresources are wood chips, vegetable oil, animal fats.