UNIT 6: RESOURCE MANAGEMENT

DEFINING NATURAL RESOURCES

A natural resource is any feature or part of the environment that can be used to meet human needs.

- **Abiotic:** non-living resources obtained from the lithosphere (e.g. minerals), atmosphere (e.g. wind power), and hydrosphere (e.g. water).
- **Biotic:** living resources obtained from the biosphere (e.g. animals and plants).
- **Renewable:** naturally replenished and last forever (e.g. solar energy).
- **Non-renewable:** finite as take millions of years to form (e.g. oil).

IMPACTS OF RESOURCE EXPLOITATION

DEFORESTATION

10 million hectares are cut down each year. Brazil has the highest rate.

- **Resources:** Allows access to resources such as food, minerals, water, energy and more.
- **Income & employment:** Forestry sector generates $539bn globally, employing 18 million people.
- **Threatens biodiversity:** Around 1 million plants and animals at risk of extinction due to deforestation.
- **Contributes to climate change:** Contributes approximately 20% of global greenhouse gas emissions.
- **Soil erosion:** Soils are at increased risk of erosion, reducing nutrients available and increasing flood risk.

OVERFISHING

1-2tn wild fish are caught each year. China catches the most.

- **Resources:** More than 3bn people are reliant on wild-caught and farmed fish for protein.
- **Income & employment:** Fishing generates $246bn globally, employing 58.5 million people.
- **Threatens biodiversity:** Largest threat for 67% of marine species, especially sharks and rays.
- **Threatens corals:** Corals are damaged by drag netting and algae blooms caused by a lack of fish.
- **Reduced food security:** Industrial fishing can lead to reduced catches for small scale fishing.

FOSSIL FUEL EXTRACTION

15bn tonnes of fossil fuels are consumed yearly. China consumes the most.

- **Resources:** 4/5 of global energy is generated through the burning of coal, oil, and natural gas.
- **Income & employment:** Mineral extraction generates $4tn globally, employing 12.6 million people.
- **Contributes to climate change:** around 35bn tonnes of CO_2 are released annually from burning fossil fuels.
- **Threatens biodiversity:** Land use change and the risk of contamination is leading to a loss of biodiversity.
- **Threatens energy security:** At current rates of consumption, oil and gas will only last around 50 years.

FARMING

There are approximately 570 million farms globally. Ireland consumes the most KJ per capita per day.

- **Resources:** Better farming practice and increased income has seen global calory intake increase by 20% over 50 years.
- **Income & employment:** Agriculture generates $14tn globally, employing 1/4 of the world's population.
- **Threatens biodiversity:** Primary driver with 24,000 (86%) of species at risk of extinction due to agriculture.
- **Toxic chemicals:** Pesticides and fertilisers can be toxic to workers, contaminate soils and water, and further reduce biodiversity..
- **Monocultures:** planting of crops such as soybean and oil palm cause habitat loss.

DISTRIBUTION OF RESOURCES IN THE UK

The UK has used natura resources since early occupation. Industrialisation allowed better access to the resources within our shores:

- **Soil & agriculture:** Nutrient rich soils, flatter land, and a better climate mean arable farming (crops) is mostly in the SE. Beef and dairy farming is found in lowland western areas, whilst sheep farming is found in upland areas of the west.
- **Forestry:** Mainly in NW areas where land and climate make it difficult to farm. Large amount of low biodiversity, coniferous plantations.
- **Fossil fuels:** Coal was found deep underground in South Wales and the Midlands but has stopped. Oil and gas are drilled for in the North Sea.
- **Water supply:** Rain mostly falls in NW rather than densely populated SE. Stored in reservoirs and pumped to cities in summer.
- **Rocks and minerals:** Clay, limestone, steel, and oil extracted for construction (157m tonnes), industry (24.6m tonnes), and fossil fuels (13.9m tonnes). Further 90.1m tonnes extracted from under the sea.

DISTRIBUTION OF RESOURCES IN THE GLOBE

The globe provides resources however, the distribution of these is not even:

- **Soil & agriculture:** Soil is impacted by climate and vegetation in an area. Chernozem and forest soils have more nutrients than arid soils so are therefore more agriculturally productive.
- **Forestry:** Most of the forestry industry can be found in USA, China, Brazil, and India; areas with a suitable climate and soil.
- **Fossil fuels:** Oil reserves are highest in Venezuela, Saudi Arabia, and Canada. Natural gas reserves are highest in Russia, Iran, and Qatar. USA, Russia, and China have the highest reserves of coal.
- **Water supply:** Availability of water is highest in countries at higher latitudes such as Canada and Norway, however it is lowest around 30° north and south of the equator or in areas of high population.
- **Rocks and minerals:** Sedimentary rock abundant across globe, above a layer of igneous/metamorphic rock. Iron found across globe except Africa so is cheap. Diamonds mostly found in Africa so are expensive.

GLOBAL PATTERNS OF CONSUMPTION

Resource	Top 3 consumers	Bottom 3 consumers
Food consumption (KJ per capita per day)	Ireland (16,500), USA (15,820), Belgium (15,770)	Madagascar (8,110), Zimbabwe (7,980), Central African Republic (7,470)
Energy Consumption (kWh per capita)	Qatar (194,222), Iceland (165, 871), Bahrain (161,111)	Burundi (294), Central African Republic (286), Somalia (217)
Water consumption (m^3 per capita)	Guyan (1,905), USA (1,543), Estonia (1,310)	Mozambique (53), Uganda (18), Maldives (17)

It is important to note that these statistics are influenced by the population of a country. Total resource consumption generally sees the USA, China, and India topping the list.

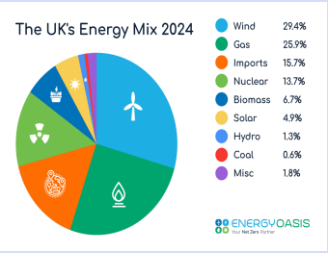
REASONS FOR GLOBAL PATTERNS OF CONSUMPTION

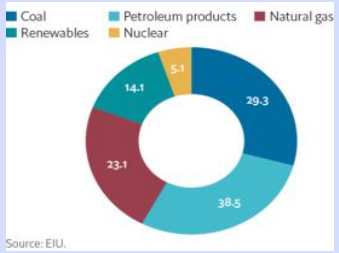
Reason	Explanation
Resource availability	Regions rich in resources may consume more due to easier access and lower costs. Once these countries start to deplete their own resources, they may look to other nations where reserves of resources have yet to be exploited. Scarcity will yield lower consumption rates, however, may drive individuals to alternative resources that may be more or less sustainable.
Population increase	More people require more resources for food, water, energy, and housing, leading to increased consumption. If this population then becomes increasingly developed, the consumption rates are likely to grow again.
Development levels	Developed countries with higher incomes tend to consume more resources per capita, such as energy and raw materials for manufacturing. Emerging middle classes have a want for more resources to fuel a better quality of life. Development also drives a countries ability to exploit further resources as they can invest into the development of technologies for resource extraction and utilisation. For example, abundant oil reserves have driven the development of oil extraction technologies.

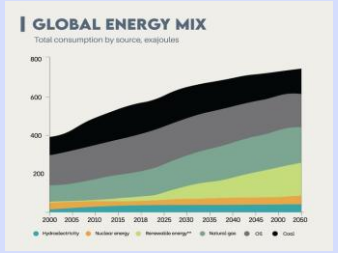
UNIT 6: RESOURCE MANAGEMENT- ENERGY RESOURCES

ENERGY MIX

The energy mix refers to the way that countries use energy in different proportions. Energy mix is influenced by the availability of resources, as well as the technology and finance available in a country. In 2024, the UK's energy mix was 29% wind, 26% Gas, 14% Nuclear, 7% Biomass, 5% solar, 1 % Hydro, 1% Coal, with the rest coming from other sources or imports of electricity from other countries.







RENEWABLE VS NON-RENEWABLE ENERGY

	ADVANTAGES	DISADVANTAGES
Renewables (e.g. wind)	• Wind itself is a free and limitless resource. • Turbines are relatively cheap costing £1,500 for a 1kW wind turbine. • No greenhouse gas emissions in energy production. • Can be located both on land and at sea.	• Some greenhouse gases produced during the construction and erecting of wind turbines. • Wind speed needs to be more than 6m/s to generate power. • Can be deemed unsightly. • Can lead to bird deaths.
Non-renewable (e.g. natural gas)	• Found in multiple regions globally including in the North Sea, Middle East, and Russia. • Cheap to extract if found within permeable rocks close to the surface. • Easy to convert into energy by burning it.	• Supplies only expected to last 50 years. • Burning it releases CO_2 leading to global warming and resulting impacts of climate change. • Importing it can reduce energy security as reliant on market costs and exports reaching your country.

CHANGING ENERGY DEMANDS

Population growth: In 1916 the global population was 2 billion. 100 years later it reached 7.5 billion. This increase during the 20th century has resulted in an increase in demand for energy. This has mostly been in developing and emerging countries where more industry is occurring.

Increased wealth: The world is increasingly wealthy which has enabled more to afford technology requiring energy. Tis includes cars, central heating/air conditioning, and electrical devices. In developing and emerging countries, as wealth increases as a middle class emerges, so does the resulting demand for energy.

Technological advances: In the 19th and 20th century, there were significant technological breakthroughs that demanded more energy. These included transports (cars, planes, trains); and household devices (TVs, computers, ovens, freezers, boilers). In the 21st century, more people demanding these, plus further improvements (AI and electrical cars), continue to increase demand even though energy efficiency has improved.

CHAGNING ENERGY SUPPLIES

Increased wealth: Increased wealth has allowed the development of new energy sources and therefore increased energy supply. It has paid for the development of new technologies which have been used to exploit different reserves as well as renewable sources in order to meet the increased demand.

Technological advances: Historically, extracting resources came from mining or logging. This was very low in technology, and also yielded the least efficient resources. Technological advancements have allowed the reserves of oil and gas stored under the sea to be discovered and extracted. Technological advances have opened new sources of energy such as wind, solar, hydrological; and nuclear power. These have the benefit of being more reliable for the future whilst also producing less CO_2 emissions.

SUSTAINABLE ENERGY USE

NORWAY

Norway's energy consumption has increased from 215TWh in 1965 to 553TWh in 2023. However, since 2000 this has remained between 500 and 600TWh. Over 60% of Norway's energy comes from hydro power, 20% from oil, 7% from wind and gas, respectively.

Enova SF is a Norwegian government run organisation whose goal is to reduce energy consumption. As part of this Norway is aiming to cut emissions compared to 1990 levels by 55% by 2030. It is aiming to achieve this by:

- **Households-** No instillation of oil boilers, grants for energy efficiency measures in houses, education programme for adults and children.
- **Industry-** Grants to use waste heat in industrial processes, grants to install heat pumps and other renewable energy sources.
- **Transport-** No taxes for electric cars, free charging for electric cars, electrification of rail network, grants for cities to improve public transport.

BHUTAN

Bhutan's energy consumption has increased from less than 1TWh in 1980 to 22TWh on 2021. This has risen quickest since 2005 and continues to increase. 99% of Bhutan's installed energy capacity comes from hydroelectricity, however 1.2 tons per capita per year of fuelwood is consumed.

- **HEP-** Any excess electricity from Bhutan's HEP installations is sold to neighbouring India, providing 40% of the government's income. HEP can also improve agriculture and water access, whilst also being a low carbon source of energy.
- **Solar-** With 56% of the population living in rural areas, the government has invested in small scale solar scheme's part funded by the Asian Development Bank. Because of this 100% of the population have access to electricity.
- **Fuelwood-** With Bhutan having large amounts of forest, fuelwood use is still high as it is free. It is mainly used in domestic settings for heat and cooking. The government and the UN have worked together to educate i14% of the population in the use of energy efficient biomass stoves to reduce emissions and improve health. The government is also working to replant deforested areas.