UNIT 4: CHANGING CITIES- GLOBAL TRENDS

GLOBAL TRENDS OF URBANISATION

The world is increasingly urbanised and the trend towards cities shows no sign of slowing. At present, 55% of the global population live in urban areas and this is expected to rise to 68% by 2050. This growing trend towards living in towns and cities has resulted in the formation of **megacities**, which have populations more than 10 million people. They include cities such as Tokyo, Sao Paulo, Shanghai and Lagos.

Most of this growth is occurring in **emerging** and **developing** countries, where the growth of towns and cities has been more recent than in developed countries. Moreover, the speed at which these changes are occurring is far more rapid than when **developed** countries underwent the same process in the 19th century during the Industrial Revolution. Improvements to transport, specifically affordable train and plane travel, have also meant that people in today's world are far more mobile (able to move) and thus both **national** and **international migration** have become more accessible.

A lack of employment opportunities in the countryside and poor crop yields act as a **push factor** for rural-urban migration, whilst better paid jobs, healthcare provision and education opportunities in urban areas also act as a **pull factor** in encouraging people to move to the city. Furthermore, better healthcare has also led to a **natural increase** in the population.

By contrast, cities in developed countries have experienced far slower rates of population growth over the past 50-60 years and in some instances, there have been significant levels of decline. This is due in part to already high rates of urbanisation, but factors such as deindustrialisation have disproportionately hit cities which were heavily dependent upon manufacturing, such as Detroit, USA. Falling birth rates and ageing populations may also result in a **natural decrease** of the population too.

URBANISATION IN THE UK

Economic factors tend to be the main driver of urban population growth, and this is true of the UK's cities too. Thus, the areas experiencing the greatest rates of urbanisation are those that are also seeing the greatest economic growth rates.

Fast urban growth:
- Around half of all international migrants move to London/South East
- Most investment occurs in London and surrounding areas, encouraging national and international migration for job opportunities
- London is home to several of the world's most reputable universities

Slow urban growth
- Deindustrialisation has affected the north to a greater extent, leading to higher rates of unemployment e.g. North East England.
- This, combined with lower wages, act as a deterrent for migration.

DEINDUSTRIALISATION IN UK CITIES

The UK has experienced **deindustrialisation**, with a significant decrease in the amount of manufacturing taking place in the country. Traditional industries, such as ship building, textiles and perhaps most significantly, coal mining, have witnessed widespread closure and decline.
There are four key causes of deindustrialisation:

Transport improvements: Goods can be transported more easily making it more possible for goods to be manufactured overseas.

Decentralisation: Cheaper land outside cities or abroad mean offices/factories move to lower production costs.

Technological advances: The mechanisation of many process that occur in the production process means fewer people are required.

Cheaper overseas labour: Lower incomes and fewer requirements such as pensions/paid holiday mean greater profits can be made.

Impacts may include higher unemployment; decrease in family incomes; increase in brownfield sites; loss of community cohesion.

RETAIL CHANGE AND THE IMPACT ON UK CITIES

Growth of edge of town shopping: Retail parks and shopping centres offer cheap rents compared to the CBD for shops. Customers benefit from greater choice of shops, parking facilities, being able to shop indoors and from the broad array of entertainment facilities found here e.g. cinemas, bars and restaurants.

Increased popularity of internet shopping: More people shopping online compared to visiting shops in the CBD e.g. Amazon, ASOS. This was further boosted during the pandemic when physical shops closed.

CAUSES AND IMPACTS OF MIGRATION IN UK CITIES

CAUSES OF MIGRATION

The decision to move from rural-urban areas or to migrate overseas is motivated by a range of different factors. These can be split into **push factors** (which encourage someone to move away from an area) and **pull factors** (which encourage someone to move towards and area).

Push factors may include deindustrialisation, the mechanisation of farming, poverty, lower quality of life, fewer amenities, limited higher education opportunities and higher rates of unemployment.

Pull factors may be more job opportunities, higher paying jobs, better quality of life, more amenities (e.g. entertainment) and higher quality education provision – London has 400k students.

IMPACTS OF MIGRATION

Housing: Increase in house prices and rentals as supply cannot keep up with increasing demand. Overcrowding and poor living conditions are common in rented homes.

Age structure: Large, youthful population. Median age of London is 35.8 years, whilst England/Wales is 40.2.

Services: Greater demand on services such as schools and GPs, with bigger class sizes and longer waits for appointments.

Brain gain: The UK benefits from highly-skilled workers to the UK, such as doctors and nurses.

Diversity: Celebrations of culture e.g. Notting Hill Carnival and more amenities e.g. Polish supermarkets, cultural centres etc.

UNIT 4: CHANGING CITIES- PORTSMOUTH (TO BE USED WITH CASE STUDY BOOKLET)

SITE, SITUATION AND CONNECTIVITY OF PORTSMOUTH

✓ Major international transport hub (ferries to Europe)
✓ Easy transport links (M275 and trains) to London and Hampshire
✓ International port- transport of goods
✓ University of Portsmouth
✓ Gunwharf Quays- tourism

STRUCTURE AND FUNCTION OF PORTSMOUTH

① Central Business District

② Inner city

③ Suburbs

④ Rural-urban fringe

Central Business District: The centre of the city and original settlement site. Expensive land leads to vertical construction. Building density is high. Main function is work and entertainment, with flagships shops, business headquarters, museums, universities, bars and restaurants found in this area.

Inner city: The main function is residential. Land is still expensive, so house prices are high. Most housing stock is Victorian terraced properties. Former sites of industry (deindustrialisation) have been regenerated and turned into luxury apartment and living complexes. Services include 'express' supermarkets, pubs and GP surgeries. Popular amongst younger professionals.

Suburbs: The main function here is also residential. Cheaper land and the expansion of the railways led to semi-detached and detached houses being built here in 1930s/40s. Services include larger supermarkets, parks and retail parks. Large roads and main roads favour car ownership, but railway, tram and bus links connect to Portsmouth city centre.

Rural-urban fringe: Found where a city meets greenbelt countryside. A mixture of functions including housing, out of town shopping centres, business parks and airports. Large, detached houses with big gardens and garages. Strong transport links e.g., motorways, railway and trams.

SEQUENCE OF URBANISATION IN PORTSMOUTH

Stage	Explanation
Urbanisation	The city grew around the naval dockyard and people moved in from local countryside areas to work there.
Suburbanisation	After the second world war, new homes were needed to be rebuilt and areas to the north of the city, e.g. Paulsgrove were developed.
Counter-urbanisation	Due to poor air, lack of open green space, etc..., people moved away from the city to areas such as Whiteley and Wickham.
Re-urbanisation	Areas in the city centre are popular with students. Gunwharf redevelopment has improve this area and made it a popular place to live.

IMPROVING SUSTAINABILITY AND QUALITY OF LIFE IN PORTSMOUTH

Sustainability: Meeting the needs of the present without negatively impacting the needs of future generations.
Quality of life: Subjective evaluation of positive and negative aspects of life.

Households provided with food caddies which is collected weekly. Waste recycled and turned into fuel and fertiliser. Improving recycling by 6%.

City council won a bid of £6.2 million to help with energy efficient measures for 900 properties. Council trying to make 150 affordable homes every year.

Portsmouth has low percentage of people attending university. Council has come up with 'Skills and Labour Market Strategy 2020-2025'. It aims to improve opportunities for work and to match local economic Needs.

RETAILING IN PORTSMOUTH

Port Solent- Off the Island and centred around a Marina. Shops, cinema and restaurants.

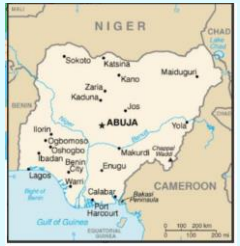
✓ Commercial Road- Traditional city centre shopping area. Many chain stores located here and close to transport links, e.g., Southsea railway station.

✓ Ocean Retail Park- Mix of popular stores including fashion, homeware and food. It is a large area on the edge of the city. Free parking.

✓ Gunwharf Quays- Opened in 2001 as part of a regeneration project. Mix of high-end shops, restaurants and entertainment.

UNIT 4: CHANGING CITIES- LAGOS (TO WORK WITH CASE STUDY BOOKLET)

SITE, SITUATION AND CONNECTIVITY OF LAGOS

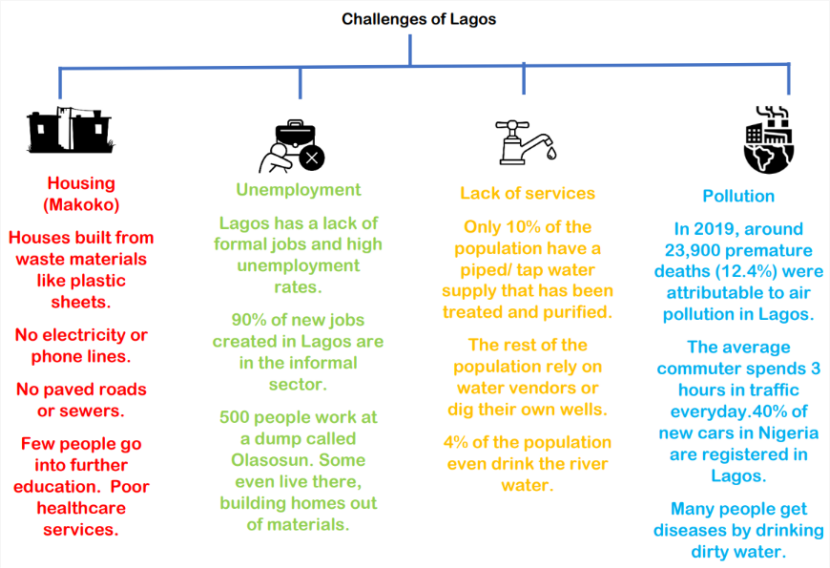


- Home to 10% of Nigeria's population
- 80% of Nigeria's imports come through the docks
- 80% of flights in West Africa go into Lagos airport
- Main financial centre for West Africa

WHY ARE PEOPLE LEAVING THE COUNTRYSIDE?

Education and healthcare services are poor in rural areas.	Changing climate makes weather less predictable for farming.
Few job opportunities exist other than farming.	Political unrest creates insecurity. E.g., Boko Haram in North of Nigeria.

CHALLENGES OF LAGOS



QUALITY OF LIFE IN LAGOS

BANANA ISLAND

- Has some of the most expensive homes in Nigeria.
- Residents are provided with first class utilities, including street lighting, sewage treatment and telecommunications.
- Gated community.

MAKOKO

- 2 out of 3 residents live in the city's slums.
- Poor quality of life often moved to get away from poverty.

WHY DO THESE INEQUALITIES EXIST?

- Housing deficit of more than 17 million units.
- Properties are pricey and landlords require annual rent, not monthly.
- Lower levels of education often lead to living in squatter settlements.
- Major issues with traffic congestion.

STRATEGIES TO IMPROVE QUALITY OF LIFE IN LAGOS

	STRATEGIES	+/-
TOP-DOWN	**Eko Atlantic** New development 10km2 in area and has been created from 3,000,000 m3 of sand. Provide luxury homes for 250,000 residents with world class sewage and waste disposal systems. Want to welcome 150,000 daily commuters.	• The project will bring significant direct investment to Lagos. • Will create economic benefits due to increasing employment opportunities. • Neighbouring communities will have difficulty dealing with increase pressure on services. • Some fishermen will have their livelihoods disrupted.
BOTTOM-UP	**We cyclers** Project to aid both employment issues and waste issues. Works by issuing jobs for people to collect recycling on bikes. Provides an income for those collecting. People gain points for the amount of household waste they collect. Points can be turned into prizes.	• Recycles 525 tonnes of waste a day. • Generates income for 3,400 families. • Able to use technology to track points and manage large volumes of people. • Only works if people are all invested in the idea.

UNIT 5: GLOBAL DEVELOPMENT

DEFINING DEVELOPMENT

Development is a process through which people, a region or country make economic, social or political progress. This may be evidenced by increased wealth, improvements in living conditions, higher educational outcomes and prolonged life expectancies, but can also be seen through free and fair elections (democracy) and equal access to opportunities. Nevertheless, no country in the world can be considered to be 'fully developed' as of yet, thus global development remains a global issue. .

MEASURING DEVELOPMENT

The complications of development cannot be understood using one measure alone. Instead, a range of different indicators are used together to draw comparisons and see how living standards vary between countries.

INDIVIDUAL INDICATORS

- Birth rate
- Infant mortality rate
- Death rate
- Life expectancy

} Show variations in **healthcare**

- Literacy rates
- Years of schooling

} Show variations in **education**

- GDP per capita
- GNI per capita

} Show variations in the **economy**

HUMAN DEVELOPMENT INDEX

A composite measure that draws upon multiple factors influencing human development, HDI is widely used globally to draw comparisons between countries. It combines three key indicators – **average years of schooling**, **GNI per capita** and **life expectancy** – to produce a HDI score.

Based upon a country's score, it can then be classified into four different levels of development:

- **Very high:** ≥ 0.800
- **High:** 0.700 – 0.799
- **Medium:** 0.550 – 0.699
- **Low:** ≤ 0.549

UK, USA, Japan, China, Mexico, Brazil
India, Namibia, Ethiopia, Chad, Haiti

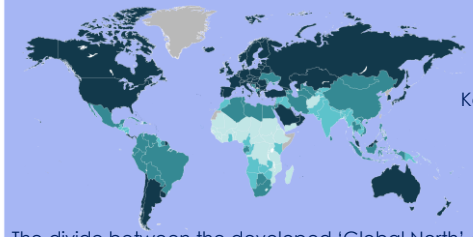
OTHER MEASURES OF DEVELOPMENT

Other measures of development that can give further insight into living standards in a country include:

GINI coefficient: A measure of income inequality. The higher the value, the more unequal the distribution of income is. Some of the most highly developed countries e.g. USA also have high GINI coefficients.

Corruption Perception Index: Perceived corruption in governments and the public sector. Countries are graded from 'highly corrupt' to 'clean' - countries with high corruption will receive less investment into infrastructure.

UNEVEN GLOBAL DEVELOPMENT



World map showing Human Development Index (HDI) scores globally (2019 data).

Key:
- Very high (≥ 0.800)
- High (0.700 – 0.799)
- Medium (0.550 – 0.699)
- Low (≤ 0.549)

The divide between the developed 'Global North' and the developing/emerging 'Global South' can be attributed to a range of different factors:

- **Historical:** colonialism and conflict has led to exploitation of resources..
- **Physical:** being landlocked can inhibit trade, and extreme climates may lead to poor agricultural production.
- **Economic:** trade deals often act in the best interests of wealthy countries.

UNEVEN UK DEVELOPMENT

A spatial divide in development can also be witnessed in the UK, known as the '**north-south divide**'. The exact placing of the dividing line is widely disputed by geographers, and many consider it to move over time.

The factors contributing to this are:

Physical: Warmer climate and flatter relief in south allowed agricultural industry to grow.

Resources: Coal mining once a major industry in south Wales and northern England, but resources now exploited.

Politics: Businesses located close to the seat of government (London) had influence over decision making historically.

Infrastructure: London and the south east benefit from the most established transport networks and services, encouraging more growth.

IMPACTS OF UNEVEN DEVELOPMENT

Food security: as a country develops, agricultural production will intensify to meet the needs of the population. Developed countries are also able to afford to import food items they cannot produce.

Housing: in some developing and emerging countries, a lack of housing supply can result in the formation of informal settlements characterised by poor quality housing and low levels of sanitation.

Education: average years of schooling and literacy rates are directly linked to levels of investment into education. Primary education is now universal, but quality and access to learning beyond this can be limited in developing countries. There are considerable gender inequalities attached to this.

Employment: Many in developing/emerging countries work in the primary and secondary sectors, which pay less and provide less stable employment than jobs in tertiary/quaternary sectors.

Health: There are more people per doctor in developing countries. A lack of access to affordable and quality healthcare can lead to serious illness or death from preventable illnesses.

TOP DOWN VS. BOTTOM UP DEVELOPMENT STRATEGIES

TOP DOWN (GOVERNMENT LED)

Positives:
- Projects are often large-scale, thus have the potential to benefit many people
- May encourage further FDI into a city/region
- Brings new infrastructure and knowledge that has not previously been utilised by the country

Negatives:
- Country may end up in debt due to borrowed loans to fund top-down projects
- Lack of consultation can mean that end product does not meet the needs of the community
- Environmental damage e.g. HEP dam construction

BOTTOM UP (COMMUNITY LED)

Positives:
- Use appropriate technology that is accessible to local people
- NGOs leading on these projects consult local people meaning the specific needs of the community are likely to be met
- Low set up costs mean schemes are often quick to get started

Negatives:
- Funding can be unreliable
- Small-scale, often run on a community by community basis
- Unable to positively impact a large number of people
- NGOs may be conflicted in strategy when working together, delaying the project's ability to make a difference

UNIT 5: GLOBAL DEVELOPMENT- INDIA

UNEVEN DEVELOPMENT IN INDIA

- Much of India forms a peninsula which narrows to the south, and which divides the Indian Ocean into the Bay of Bengal and the Arabian Sea.
- India shares international borders with six countries, including Nepal, Pakistan and Bangladesh.

Mumbai
Mumbai is India's biggest and wealthiest city.
It is the capital of commerce, finance and entertainment, and accounts for 7% of India's total GDP.
The city has attracted migrants from all over India.

Bihar
Bihar has a population of over 100 million people and is India's most densely populated state.
Many people in Bihar live below the poverty line, and most people (80%) continue to work in agriculture and farming.

GEOPOLITICS OF INDIA

USA: Defence agreement to provide shared logistics for warships and fighter planes. Can assist with disaster relief.

China: India is in competition with China over water resources. Building dams could limit each other's supply of HEP.

TNCS in INDIA

Large companies provide employment and training of skills.	Higher paid management jobs are often held by foreign nationals.	Companies often invest in the local area, improving services (e.g. roads and electricity) and social amenities.
TNCs can exploit the low wage economy and avoid paying local taxes.	Modern technology is introduced and funded by the TNCs.	Most of the profit goes abroad rather than benefiting the host country.

Transnational corporations (TNCs) are companies that operate in more than one country. They often have factories in countries that are not as economically developed because labour is cheaper.

WHY HAS INDIA BECOME MORE DEVELOPED?

Aid	Short term aid for 2001 earthquake did not give locals' new skills and did not help with rebuilding. India has received top-down aid which has been used for big infrastructure projects.
Foreign direct investment	FDI increased from US$17,800million in 2005 to US$34,400million in 2014. The Indian government is keen to encourage FDI into the country as it develops the infrastructure.
Public investment	Public investment in education, health, transport and housing is essential to social and economic development. E.g., India's well-educated workforce has been vital in the IT sector.
Trade	Until the early 1990s, India was a relatively closed economy as there were very high tariffs (charges) on imports along with other restrictions.

IMPACTS OF RAPID GROWTH AND STRATEGIES TO IMPROVE QUALITY OF LIFE IN INDIA

	POSITVE IMPACTS	NEGATIVE IMPACTS
Social	• Better access to healthcare • lower infant mortality • Improved community spirit	• Worse public health due to air pollution • Lack of housing
Economic	• Larger workforce • Increase in tourism – jobs created plus, income through tax for the economy	• Cost of installing new infrastructure • Pressure to provide more services = costs increased.
Environmental		• Air pollution-13 of the 20 most air polluted cities in the world are found in India • Water pollution-Less than 1/3 of sewage generated in urban areas is treated, most just flows directly into rivers.

The Smart Cities Mission aims to boost economic growth and increase people's quality of life by facilitating local area growth and using technology. → Basic aspects of a smart city include sufficient water supply, uninterrupted power, affordable housing and education and health. → The aim is to turn all Indian cities into smart cities using these aspects. it initially started with 100 communities.

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: A**llows 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.

DISTRIBUTION OF RESOURCES IN THE UK

The UK has used natural 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.

FRACKING

Fracking, short for hydraulic fracturing, is a method used to extract oil and natural gas from deep underground rock formations.
A hole is drilled down into the ground and then sideways into a layer of rock called shale. Then, a mixture of water, sand, and chemicals is pumped into the hole at high pressure. This breaks the rock and creates small cracks. The gas trapped inside the rock escapes through these cracks and is collected at the surface.

- Creates more oil and gas
- Provides jobs for people
- Cheaper energy
- Creates earthquakes
- Contaminates drinking water and habitats

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.

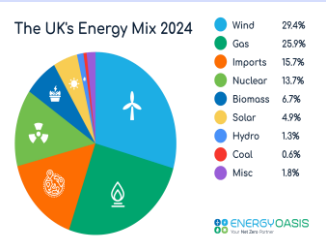
REASONS FOR GLOBAL PATTERNS OF CONSUMPTION

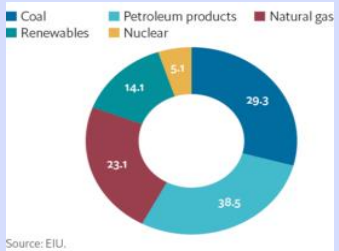
Reason	Explanation
Resource availability	Regions rich in resources may consume more due to easier access and lower costs. Once these countries start to deplete their own resources, they may look to other nations where reserves of resources have yet to be exploited. Scarcity will yield lower consumption 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.

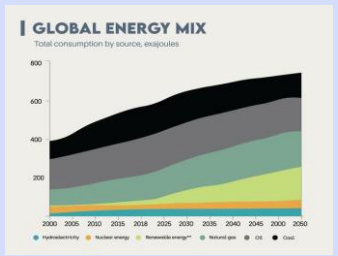
UNIT 6: RESOURCE MANAGEMENT- ENERGY RESOURCES

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.

CHANGING 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 to meet the increased demand.

Technological advances: Historically, extracting resources came from mining or logging. This was very low in technology and produced 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

GERMANY

Since 2001, Germany has been planning to replace nuclear power with renewable energy and to reduce the country's greenhouse gas emissions.

- Germanys solar energy comes from a group of large solar farms. Bavaria Solar Park is one example, which uses nearly 60,000 solar panels.
- It is predicted that Germany can house 20 gigawatts of solar energy on water.
- In 2014, the majority of Germany's wind energy was being produced onshore.
- In 2021, wind power accounted for 22.6% of the total grid load, meaning it is very important for Germany.

CHINA

Due to China becoming the world's biggest producer of CO2, the government have been forced to become more sustainable in managing their non-renewable energy.

- The three gorges dam became the worlds largest HEP producer in 2012. The volume of this clean electricity is the equivalent to a reduction of 31 million tons of coal.
- The creation of the dam forced over 1 million people to relocate in 2009, when they flooded 13 cities and hundreds of villages.
- Become one of the worlds leaders in generating solar energy.
- Currently building a solar farm in the Gobi Desert. It plans to build 450 gigawatts of solar and wind power on the Gobi.