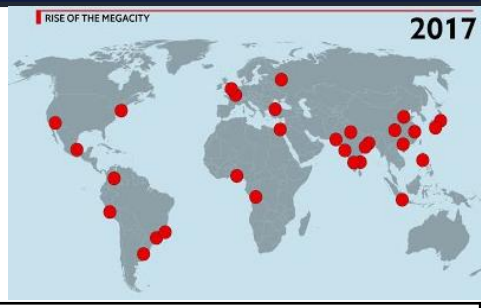
Term 1 - Section A: Urban Issues and Challenges (Parts 1-5)

- *Case study of a major city in a LIC or NEE:* ***Rio de Janeiro***
- *An example of how urban planning improves the quality of life for the urban poor:* ***Favela Bairro Project***
- *Case study of a major city in the UK:* ***Bristol***
- *An example of an urban regeneration project:* ***The Harbourside***

Urbanisation is…..	**The increase in people living in towns and cities**
More specifically…..	In 1950 33% of the world's population lived in urban areas, whereas in 2015 55% of the world's population lived in urban areas.
By 2050…..	It is predicted 70% will be living in urban areas.
Urban growth	**The increase in land covered by cities**
Urban growth is caused by…..	Natural increase and rural to urban migration.
Urbanisation results in the creation of….	Megacities
A **megacity** is…	An urban area with over 10 million people living in it. For example Mumbai, Tokyo and Mexico City.
Natural increase is…..	If a country has a higher birth rate than death rate, the population will naturally increase. This type of population is often found in stages 2 and 3 of the DTM where there is a high number of young adults (18-35 years) who are having lots of children and few older people who are dying due to improved healthcare. Therefore urban growth is common in NEEs.
Rural to urban migration is…	The movement of people from the countryside to cities. It is caused by push factors (pushing people out of rural areas) and pull factors (pulling people to cities).
Push factors are….	Factors that push people out of an area. Negative factors that make people want to leave an area.
Pull factors are….	Factors that pull people out of an area. Negative factors that make people want to leave an area.
Rural to urban migration push factors make people want to leave rural areas. Examples include…..	• Farming is hard and poorly paid • Increased use of machinery in farming = less people needed to word = unemployment • Dry land in rural areas caused by desertification = land cannot be farmed • Fewer doctors, hospitals, schools and transportation routes
Rural to urban migration pull factors make people want to move to urban areas. Examples include…..	• More highly skilled, better paid jobs • Range of entertainment opportunities • More and better doctors and hospitals • More schools and better education • Better transportation routes/public transport



Three are currently 34 megacities in the world.

Most megacities are located…	In LICs and NEEs
More specifically……	65% of all megacities are located in LICs and NEEs.
Urban growth is happening more in LICs/NEEs due to….	Industrialisation
More specifically…..	As a country develops their economy changes from agriculture (primary) to manufacturing (secondary) and services (tertiary). This occurs during the industrial revolution. Most of the secondary and tertiary jobs are in towns and cities. When this occurs, lots of people move from rural to urban areas = rapid urbanisation. HICs went through their industrial revolution a long time ago, whereas LICs and NEEs are going through their industrial revolution now. As a result more people in LICs and NEEs are currently moving to urban areas.
Urban growth is happening more in LICs/NEEs due to….	Natural increase
More specifically…..	LICs and NEEs are in stages 2 and 3 of the demographic transition model. In these stages there is a high birth rate and lower death rate = more people are born than are dye = the population naturally increases. In HICs there is a low death rate and even lower birth rate = the population is declining.
Urban growth is happening more slowly in HICS due to…	Counter-urbanisation.
More specifically……	In HICS, people are deciding to leave cities and live in the surrounding countryside to get a better quality of life (less pollution, quieter, more space). They can commute to work due to improved transportation.
Case studies:	**Rio de Janeiro and Bristol**

RIO DE JANEIRO is located in Guanabara Bay, on the south-east coast of Brazil. It lies next to the Atlantic Ocean. It is the cultural capital of Brazil and 2nd largest city, with a population of 12.5 million.

It is globally important due to:

- Industrial businesses – produces 5% of Brazil's GDP.
- Financial centre – banking, finance and insurance.
- It hosted the 2014 World Cup, 2016 Olympics and annually the Rio Carnival.

These factors have attracted a multicultural population, with people from all over the world moving to Rio to live: *South Korea, China, UK, USA, Portugal, Argentina and Bolivia.*

Urban growth in Rio de Janeiro has created many social and economic opportunities:

Opportunity	Evidence in Rio
JOBS	• Rio provides >6% of all jobs in Brazil. • Rio is home to many manufacturing industries, (pharmaceuticals, clothing, furniture and processed foods) and service industries (banking, insurance). • As Rio grows there are many jobs in construction
BUSINESS OPPORTUNITIES	• The growth of urban industrial areas can increase economic development. It will attract businesses to the area.
EDUCATION	• Rio provide grants to poor families to encourage children to attend school. • Rio have many volunteers who help in schools. • There are adult classes to help adults gain skills = better jobs
SERVICES	• Rio has a new nuclear generator and hydro-electric power station = more energy produced. • 60km of new electricity lines = better access to energy • By 2014, 95% of Rio had access to a mains water supply. This was due to 7 new water treatment plants and 300km of new water pipes being laid. • 12 new sewage works have been built and 5km of sewage pipes installed in badly polluted areas.
HEALTHCARE	• Some areas in Brazil (Barra de Tijuna) have a life expectancy of 80 years old. Brazil (as a country) has an average life expectancy of 63 years. • Medical staff go into favelas and offer emergency medication to people's homes.
ENTERTAINMENT	• One of the world's top tourist destinations - The Statue of Christ the Redeemer, stunning natural surroundings and entertainment.
TRANSPORT	• It has two major airports and five shipping ports • Public transport, toll roads and one way systems to control traffic

Urban growth in Rio has also created many social, economic & environmental challenges

Challenge	Evidence in Rio
Lack of healthcare	In 2013 only 55% of the city had a local family health clinic.
Lack of education	Not enough schools, teachers or funding for education.
Lack of water supply	Around 12% of Rio does not have access to running water.
Lack of energy	Due to illegal tapping onto electricity lines = blackouts.
Unemployment and informal sector jobs	Many people are unemployed or work in the informal sector (e.g. street vendor), which are poorly paid, no contract, no taxes paid.
Air pollution	caused by too many cars and growth of factories = 5000 deaths per year.
Water pollution	caused by sewage running into rivers (200 tonnes/day) and industrial waste from factories and oil spills.
Waste pollution	a lack of waste disposal = rubbish on streets.
Creation of squatter settlements (favelas)	These are illegal settlements on the outskirts of cities Characteristics: • Poorly built homes using basic materials • Houses built on steep slopes = landslides (e.g. 2010: 224 killed and 13,000 lost their homes) and limited road access • 30% no electricity, 50% no sewage system and 12% no running water. • 20% are unemployed. Those who are, are employed in informal sector • Drug gangs are common & police is rare (murder rate is 20 per 1000ppl) • Infant mortality rate: 50 per 1000 people due to high population densities (37,000 per km²), lack of waste disposal, spread of disease and lack of health care.

URBAN PLANNING: improving quality of life in favelas.

Favela Bairro Project is a site and service scheme that improves quality of life in Complexo de Alemao (favela in north Rio).

- Roads have been improved and paved
- Improved access to water pipes and sanitation
- Hillsides strengthened to prevent landslides
- New healthcare, leisure and education facilities
- Cable car has been installed that connects favela to centre of Ipanema (central Rio). Favela residents given free return daily ticket.
- 100% mortgages provided for locals to buy homes
- A Pacifying Police Unit (UPP) was set up = less crime

Successful because: access/mobility is better = access to jobs in city centre, improved healthcare, education, access to services, 100% mortgages = more people can buy homes, less crime, fewer landslides.

Unsuccessful because: new infrastructure not maintained and residents did not have skills to fix it, area improved = increase in demand to live there = increase in rent = poorest had to move, budget of US$1 billion could not help all favelas.

URBANISATION – BRISTOL – Part 3 Bristol's location and oportunities

Population Distribution	The way something is spread out over an area.
Industrialisation	Growth of secondary manufacturing
De-industrialisation	Decline of secondary manufacturing
Post industrial economy	Economy is mainly tertiary and quaternary industries
Brownfield site	Land that has previously been built on
Greenfield site	Land that has never previously been built on
International Migration	The movement of people across countries.
Urban Growth	The increase in the proportion of people living in urban areas.
Urban Sprawl	Unplanned growth of urban areas into the surrounding rural area
Urban Greening	Increasing the amount of green space in a city.
Social Inequalities	Some areas have more opportunities than others.
Rural-urban Fringe	The area on the edge of a city, where it meets the countryside.
Green Belt	Protected land at the rural-urban fringe where building is restricted.
Dereliction	Areas that are abandoned and become run down
Urban Regeneration	The reversal of urban decline through redevelopment, aiming to improve the local economy
Social Deprivation	When a person or area is deprived of services and amenities.

The UK's population is unevenly distributed.

- *82% of people live in urban areas*
- *32% live in London and the South East*
- *Sparse populations – Scotland and Wales*

Why do more people live in urban areas?

- *Higher paid jobs and better working conditions in tertiary and quaternary sector, more entertainment options, better transport, more housing, better healthcare and education.*

Why do more people live in the south-east?

- *Warmer, less rainfall, flatter land in the SE. In central Scotland and Wales its is colder, more rainfall and mountainous.*

Bristol is located in the south-west of England. It's population is 440,500 people, which is expected to grow to 500,000 by 2029.

International migration has accounted for 50% of Bristol's population growth. There are 50 countries represented in its population.

They impact on the city by:

- ➢ Hard working workforce that bring new skills = contribute to local/national economy
- ➢ Enrich the culture of the city
- ➢ Young migrants balance aging population
- ➢ Pressure on housing, healthcare and education
- ➢ Language barrier and different religions= challenge to integrate into wider community

Why do people migrate to Bristol?

- Culture/entertainment– sport venues, theatres, music venues, cathedrals
- Two cathedrals – religious importance
- Two universities – higher education
- Transport (M4, M5, rail) link Bristol to UK
- Transport (ports/airports) link Bristol to Europe and USA.
- Economic growth – in tertiary and quaternary industries = jobs (finance, technology, aerospace, media, defence)
- Economic growth due to inward investment from companies such as airbus (France) and BMW (Germany).

OPPORTUNITIES IN BRISTOL

Bristol is constantly changing (*population, economy, industrialisation, de-industrialisation, regeneration*) . These changes create a number of social, economic & environmental opportunities.

SOCIAL OPPORTUNITIES

- Increase in migration = diverse population = range of food, festivals and cultural experiences.
- Entertainment: new theatres and music venues (the Old Vic, Bristol Arena and Tobacco Factory)
- Recreation: lots of sport teams (rugby, cricket, football) are developing their opportunities for people in Bristol. *Bristol Rovers are building new football stadium on the outskirts of the city*.
- New shopping centres: Cabot's Circus in the city centre and Cribbs Causeway on the outskirts of the city offer residents shops, cinemas, restaurants, accommodation, jobs…etc.
- Improved transportation links (e.g. an integrated transport system, metrobus, electrification of the trains to London and improved public transport) = people can get around Bristol faster and the air is cleaner (due to less cars = less pollution).

ECONOMIC OPPORTUNITIES

- Growth in tertiary and quaternary industries = employment opportunities (85% of jobs are in tertiary, 6% in quaternary, 8% in secondary and 1% in primary).
- Redevelopment of brownfield sites (e.g. the Temple Quarter) has attracted new tertiary and quaternary companies = jobs = higher disposable income = money spent in local area and therefore reinvested into the area = further economic development.
- Growth of high-tech industries due to *access to highly skilled university graduates, research facilities, clean non-polluted environment, cheaper land, superfast broadband speeds (the government gave £100million to create a super connected city).* Companies include: Hewlett-Packard, Toshiba, Aardman Animations (clay films), Defence Procurement Agency (DPA) (employs 10,000 people to make army and navy products) and aerospace (14 of the 15 main aircraft companies are in Bristol (e.g. Rolls Royce and Airbus) who produce aircraft parts and navigation/communication systems.

ENVIRONMENTAL OPPORTUNITIES

As the city has grown, Bristol has created transport systems to reduce traffic congestion.

- Bristol's *Integrated Transport System* links different forms of public transport. (e.g. part of the ITS is the Rapid Transit Network which connects three bus routes, the Temple Meads railway station and park and ride network).
- They have also improved the rail links through electrification of the line to London = greener energy and faster connection to London.

As the city has grown and redeveloped, Bristol has focused on urban greening, to increase and preserve open green spaces.

- Urban Greening: Bristol has worked and its continuing to work very hard. Currently in Bristol:
  - ✓ 90% of people live within 350m of parkland with 300 parks in the city
  - ✓ 27% of the city is part of a wildlife network and 30% of the city is covered in trees
  - ✓ Brownfield sites are turned into green spaces *(Queen Square was a dual-carriageway)*

In 2015 Bristol became the first UK city to be awarded the status of: **European Green Capital**.
Their current goals and achievements include:

- To ***reduce energy use by 30%*** *and* ***CO_2 emissions by 40%*** *by 2020; In 2015* ***100 electric car*** *charging points were installed.*
- *Increase the use of* ***brownfield sites*** *for businesses and housing.*
- *In 2015 every primary pupil in Bristol* ***planted a tree*** *to increase Bristol's green coverage.*
- *Increase the use of* ***renewable energies*** *from 2%.*

URBANISATION – BRISTOL – Part 4 – Bristol's environmental challenges

CHALLENGES IN BRISTOL

Bristol is constantly growing. These changes have created a number of challenges in Bristol, such as urban sprawl, derelict buildings, waste disposal, air pollution, social inequalities and urban sprawl.

CHALLENGE: RISE IN DERELICT AREAS:

Industrial decline in the 20th century was caused due to an increase in manufacturing abroad, closure of many inner city ports and rise in tertiary and quaternary industries. As a result many inner city areas, such as Stokes Croft, became abandoned, run-down and deprived.

Plans to fix the challenge of derelict areas.

- *Lottery grants have helped improve the area of Stokes Croft. The money has been used to redevelop buildings, attract new businesses and create green spaces.*
- *Artists are used public to make the area more appealing*
- *New music venues, independent shops and nightclubs have opened in the area = improving the area's environment.*

CHALLENGE: URBAN SPRAWL

Urban sprawl is caused by a rise in population and a lack of housing (4000 homes were damaged or destroyed in WW2).

The demand for new housing has resulted in many people moving to the suburbs (outskirts of the city). This puts pressure on the rural-urban fringe for new housing = development of greenfield sites.

e.g. Bradley Stokes and Harry Stokes are examples of new developments on greenfield sites. 1200 new homes have been built at Harry Stokes, with 2000 more planned.

Building on greenfield sites is often cheaper and provides a clean environment, however it results in congestion, air pollution, loss of farmland and habitats, loss of green space and increases the risk of flooding (rise in impermeable surfaces)

Plans to reduce urban sprawl

Focus on building new homes on brownfield sites. Between 2006 – 2013 only 6% of new housing developments were on greenfield sites. By 2026, over 30,000 new homes are planned on brownfield sites. Redeveloping brownfield sites is more expensive as land must be cleared and decontaminated from previous industrial use. However, it is the best option.

- *Bristol's Harbourside was a derelict area in Bristol city centre. They have spent 40 years redeveloping the area, building flats and culture and leisure facilities.*
- *Finzels Reach is a 2 hectare brownfield site near the CBD. The abandoned factories and warehouses were redeveloped to create new offices, shops and 400 apartments.*

CHALLENGE: WASTE DISPOSAL

Bristol produces 500,000 tonnes of waste/year and is currently produces the most food waste in the UK.

Plans to reduce issues with waste disposal:

- *Reduce the waste sent to landfill sites. In 2004/05 88% of waste was sent to landfills. In 2012/13 it was only 27%.*
- *Increase recycling by making it easier to recycle by using roadside collections. In 2004/o5 12% of waste was recycled. In 2012/13 it was 51%.*
- *Increase the amount of waste that is sent to waste treatment plants where the waste is used to generate energy. (e.g. Avonmouth treatment plant makes electricity for 25,000 homes).*

CHALLENGE: AIR POLLUTION

Bristol is the most congested city in England = air pollution = 200 deaths per year.
The prevailing winds from the south-west blow pollution from the industrial area at Avonmouth over the city.

Plans to reduce air pollution:

- *Integrated Transport Network*
- *Frome Gateway: a walking/cycling route to the city centre.*
- *Electrical vehicle charging points in 40 car parks*
- *Poo bus: buses between Bath and Bristol Airport will fun on bio-methane gas produced from human waste.*

CHALLENGE: SOCIAL INEQUALITY

Some areas in Bristol are more deprived than others in Bristol. This is know as ***social inequalities.*** It is due to a lack of investment from the government.

FILWOOD	STOKE BISHOP
➢ 1/3 of people live in low-income homes ➢ Over 1300 crimes per year ➢ 36% of students get top GCSEs ➢ Life expectancy is 78 years old ➢ 1/3 of people aged 16-24 are unemployed ➢ Poor access to fresh fruit & veg. ➢ 62% of people feel unsafe at night	➢ Fewer than 4% live in poverty ➢ Less than 30 crimes per year ➢ 94% of students get top GCSEs and 50% have a degree ➢ Life expectancy is 83 years old ➢ 3% of people are unemployed ➢ Highest level of car ownership in the city

EXAMPLE OF REGENERATION: THE HARBOURSIDE, BRISTOL.

The Harbourside is located in central Bristol. It is one of the first parts of the city that visitors see when driving from the south/south-east or visiting the centre.

It was developed in the 18th century as a port area for international trade. In 1809 the floating Harbour was created to maintain the height of the water, as ships often got stuck in the River Avon when the tide went out

The Harbour finally closed in the 1970's when modern ships were too big to entre the lock gate. A new port was built in Avonmmouth. Many factories and port facilities closed and The area became rundown, abandoned and derelict, with high unemployment and social deprivation

The government decided to do something and began the largest Urban Regeneration project in Europe. Successful urban regeneration must improve an area socially economically and environmentally.

Redeveloping brownfield sites is often more expensive as the land must be cleared first and it might be contaminated from previous industrial use. However, it is always the preferred option.

Social improvements:

- Tourist industries attracted to the area e.g. SS Great Britain, Industrial museum, We the Curious, Aquarium, M Shed, improving quality of life for Bristolians
- Area developed as a leisure and tourism centre attracting 500 000 tourists per year and creating 1.4 billion in income for the city. E.g. Harbourside festival
- Run-down historic buildings restored e.g. Anolfini and Industrial museum
- 1000 new apartments and homes built e.g. Wapping Warf, reducing housing shortage

Economic improvements:

- Over 3000 jobs created reducing unemployment in the area
- New creative businesses attracted e.g. Ardman Animations
- Other major businesses attracted e.g.Lloyd's bank headquarters

Environmental improvements:

- Improved public transport (ITS, RTN, improved Temple Meads station) = encourages people to use it and not drive = less air, noise and visual pollution.
- Area pedestrianised to allow for safe transport on foot and by bike.

URBANISATION – BRISTOL – Part 5 Sustainable urban planning and transport Feeiburg and Bristol

SUSTAINABLE URBAN PLANNING

Sustainable cities are cities that meet the needs of the people who live in them today, without meaning that future generations do not have their needs met. Basically it means behaving in a way that does not irreversibly damage the environment or use up resources faster than they can be replaced. There are many things that cities can do to be more sustainable.

FREIBERG: A SUSTAINABLE CITY

Freiburg is located in the south-west of Germany. In 1970 is set a goal to become a sustainable urban area.

Preventing the overuse of water: water conservation – collecting and recycling water to prevent overuse.

Collecting and recycling water:

- Green roof gardens with water harvesting systems, which collect rainwater to reuse.
- Inhabitants are given incentives to use less water.
- Waste water systems allows rainwater to be retained, reused or to seep back into the ground (e.g. permeable pavements).
- Water in the River Dreisam, which flows through Freiburg, is managed using flood retention basins. These reduce the danger of flooding by storing excess water, which is used in the city.

Prevent overuse of water:

- Toilets installed that use less water to flush = people use less water.
- Water meters that remind residents how much water they are using = people use less water

Preventing the overuse of energy and increasing the production of energy from renewable sources.

Freiburg plans to be 100% powered by renewable energy by 2050. This will require many residents to half their current use of energy.

Renewable energies

- It is one of the sunniest cities in Germany so solar power is used. There are approximately 400 solar panels installations in the city, including at the railway station and football stadium. These produce 10 million kilowatts of electricity per year. *Freiburg's solar valley employs 1000 people in solar technology, in the production of solar panels, developing solar technology, such as solar cooling technology.*
- Other renewable energies that Freiburg uses include biomass and biogas.

Prevent overuse of energy:

- The government provide incentives to encourage people to become more energy efficient, by allowing homeowners to sell any excess energy to the national grid.

Increasing the amount of green spaces. Green spaces are environmentally sustainable as they provide clean air, habitats and prevent flooding during intense rainfall. They are also socially sustainable as they create a calm, relaxing space for people to spend time and encourage exercise.

- Afforestation – 75% of the deforested trees are re-grown every year.
- River Dreisam does not have any flood management strategies and provides natural habitats for animals and vegetation.
- 44,000 trees have been planted in the city = 40% of the city is forested. Of these areas, 56% are nature conservation areas.
- In the Riselfield District, 78 hectares are built on and 240 hectares are open space.

TRAFFIC MANAGEMENT STRATEGIES

Traffic congestion can lead to a number of problems:
Air pollution,(climate change) health problems (e.g. asthma), accidents, increased journey times

- 200 people die each year in Bristol from air pollution related causes
- Bristol is the most congested city in England
- Journeys take an average 31% longer in the rush hour in Bristol

CYCLE ROUTES are often provided alongside existing main roads, with some new cycle paths that exclude cars. There are many benefits of cycling.

- *Increase exercise, improve health, reduce air pollution, reduce stress, reduce congestion*.

The number of people cycling to work in Bristol is now 15%. To encourage even more people Bristol has: *made 20mph speed limits, increased cycle routes, installed cycle maps and signs and increased bike parking zones. You can hire a YoBike for £1 and leave it where you want*

METROBUS is a new express bus service in Bristol. It is made up of three routes that link key areas in Bristol. It will encourage more people to use public transport by improving the service it provides.

- *Faster and more reliable journeys than current buses, next stop announcements, bus stops with real time information and full accessibility*.

In Bristol the MetroBus is made up of 3 routes that link key areas of Bristol. They have priority over other transport = quicker journey times. *e.g. Long Ashton Park and Ride to Hengrove currently takes 50 minutes. The MetroBus will take 12 minutes.*

PARK AND RIDE: Free car parks are available on the outskirts of the city. People then take the bus into the city centre. One bus with 40 passengers causes less congestion than 20 cars with 2 people in each. A ticket costs £4.50 and is reduced if paying using an app or for a weekly pass.

They have social, economic and environmental impacts: *Less cars in the city = less congestions = less pollution (air, visual, noise), less time wasted in traffic, less accidents, less space needed in the city centre for car parks.*
Bristol has three Park and Ride Schemes around the city. Long Ashton, Portway and Brislington

AN INTEGRATED TRANSPORT NETWORK is a system that links different forms of public transport within the city and the surrounding area to make journeys smoother and easier. It is a sustainable transport system that reduces congestion as more people are travelling by public transport by making it easier and more convenient.
e.g. The MetroBus is a Rapid Transit Network and part of the ITS. It connects 3 bus routes, the Temple Meads railway station and all three Park and Ride stations.

Bio-methane buses . Buses are the second most polluting form of transport in Bristol. In 2020 First bus introduced the first 27 of a new fleet of 77 Bio-methane buses. These buses produce 85% less pollution than diesel buses so are good for air pollution

Term 2 - Section C: The Challenge of Resource Management (Parts 1 -2)

- *Example of a large scale water management scheme:* ***Lesotho***
- *Example of a local scheme in an LIC to increase water sustainability:* ***The Wakel river basin project***

WORLD'S ESSENTIAL RESOURCES

Food
Food is important because it affects your health. The World Health Organisation says we need 2000-2400 calories per day to be healthy. If you do not have sufficient food you become malnourished or suffer from undernutrition.
- Food surplus: North America, Europe, Australia, Russia, UK, USA
- Food deficit: Africa (e.g. Chad, Congo, Ethiopia)

Water
Water is important as we need it for our health and for economic development (agriculture, manufacturing, cleaning, drinking).
- Water surplus: areas where there is high rainfall and water storage (aquifers/reservoirs). E.g. USA, Canada, Europe, Russia
- Water deficit: areas where there is low rainfall and a lack of water storage. E.g. Africa, Brazil, Argentina, Australia, China.

Energy
Energy is important because it is used to build homes, heat homes, power machinery, make food…etc. It is also traded between countries and so helps a country develop.

HICs consume (use) far more energy than LICs and NEEs.
- LICs – use very little energy (few machines, lack of processed foods, few families use power in their homes).
- NEEs – use more energy (increase in factories = increased use of machines = more energy used).
- HICs – use the most energy (lots of energy used in industries and homes, people eat a lot of processed foods.

FOOD in the UK

40% OF FOOD IN THE UK IS IMPORTED.

Why?	➢ Food is cheaper to make food in LICs. ➢ Demand for exotic foods (mangoes, bananas) ➢ Demand for seasonal foods all year round. ➢ Some foods cannot be grown in the UK.
Problem:	Increase in food miles (distance travelled by food to our plate) = increase in carbon footprint (the amount of CO_2 a country produces.

SOLUTION

Organic Farming	Small scale farming that produce local, seasonal food without the use of chemicals. • Uses natural predators instead of pesticides • Crop rotation is used instead of fertilisers • Grows seasonal food locally.
Disadvantage	It is usually more expensive because yields are low (less food is produced) and more people are employed, due to lack of machinery used. This means they need to charge a lot to make a profit.
Agribusiness	Large scale intensive farms that use lots of machinery and chemicals to increase food production. • Hedges are cut down = large fields • Machinery (combine harvester, tractors) • Fertilizers used to add nutrients to the soil • Technology – GM crops, hydroponics, high yielding varieties
Advantage	More food can be produced = less needs to be imported. Use of machinery = fewer people employed = cheap food.
Disadvantage	It can harm the ecosystem due to use of chemicals = water pollution.

WATER in the UK

Water surplus	Areas with high rainfall and low population (*Wales & Scotland*)
Water deficit	Low rainfall and high population (*south east England and parts of central England*).
Water transfer scheme	Water is moved from areas of surplus to areas of deficit. The government proposed a UK wide water grid in 2006, however it was not built due to high costs and impact on ecosystems. Some water transfer schemes do exist.

The demand for water in the UK has increased in recent years. In fact households use 70% more water. This is because:
- More wealth = more household appliances that use water
- Population increase & people wash more often

HOWEVER ONLY 27% OF WATER IN THE UK IS CLASSIFIED AS CLEAN.

Causes	• Fertilizers in farming go into rivers • Chemical waste from factories pollutes rivers • Sewage is pumped into the sea • Oil from cars and boats goes into rivers/sea
Impacts	• Waste from factories = toxic water = harm wildlife & humans • Fertilizers get into water = growth of algae = lack of oxygen and light in the pond = wildlife die (eutrophication) • Bacteria from sewage plants = diseases in river
Management	• UK has strict laws to control waste production and disposal • Chlorine added to water to remove bacteria. • Water treatment plants remove bacteria, algae and chemicals • Sewage systems are improved (e.g. the Tideway project in London)

ENERGY in the UK

The UK's energy mix is…	• 52.6% fossil fuels, 21% nuclear energy, • 24.7 renewable energies
Fossil fuels will be used less because…	a) 75% of oil and gas reserves are gone b) 100% of coalfields are closed down c) The EU fines companies who release too many greenhouse gases
Renewable energies will be used more because…	The government has been investing in these sources.
Fossil fuels will continue to be used because…	a) Coal is cheap to import b) New nuclear stations and renewable energy infrastructure is expensive

Economic and Environmental impact of each energy type

Fossil Fuels	• Ec. Coal must now be imported from South Africa. • Ec. Fossil fuels release greenhouse gases = global warming. The impacts of global warming are expensive to fix • En. Greenhouse gases = global warming. • En. Coal mines need land to be cleared = loss of habitats • En. Waste from mines = visual and noise pollution
Renewable Energies	• Ec. New infrastructure is expensive to build • Ec. They are unreliable • En. Wind turbines and solar panels = visual and noise pollution and affect ecosystems.
Nuclear Power	• Ec. Nuclear power stations are expensive to build (£18 billion) • Ec. Radioactive waste must be carefully stored = expensive. • En. Warm water waste can harm local ecosystems • En. Radioactive leaks harm people and wildlife (e.g. cancer)

Water Surplus and deficit	Areas of water surplus have plentiful supplies of water that exceeds their demand e.g. North America, Europe and parts of Asia. Many areas such as large parts of Africa have a water deficit where demand exceeds supply. This causes problems for people, industry and agriculture
Water Consumption	Water consumption is the amount of water people use. This is increasing globally as world population grows, people need to grow more food, to use for industrial development and for more energy. All energy production requires water.
Water insecurity	This is when a place does not have enough water for good well-being, health and economic development
Water stress	Water stress is when places come close to using up all their available water

CAUSES OF Water surplus or deficit

Climate	• Regions with high rainfall usually have a water surplus whereas desert areas usually have a water deficit
Geology	• Areas with permeable rocks at the surface and impermeable rocks underground can store rainwater water in underground aquifers so it doesn't evaporate away. 15% of Bristol's water comes from underground stores
Limited infrastructure	• Poorer countries have limited water storage and transfer infrastructure as it is expensive to build so even though some countries have enough rainfall they cannot get it to the people who need it
Poverty	• Many villages in poorer countries have no mains water connection so they much collect water from rivers and wells
Over abstraction	Where water is stored in the ground, if you use more than is being replaced by rainfall the underground water table falls (the level at which the soil underground is saturated with water) This causes wells and rivers to dry up

IMPACTS OF Water insecurity

Waterborn disease	Poorer countries often pollute their water supplies with sewage as there is little sanitation. Water shortage means people have to drink polluted water supplies causing disease like Cholera and dysentery. 1 billion litres of raw sewage enters the River Ganges in India each day
Food shortages	Farming uses 70% of global water supply for irrigating crops. Water shortages can lead to a drop in food production. In poor countries most people are poor subsistence farmers, growing food to survive, this leads to malnutrition and starvation
Industrial output	Industry uses huge amounts of water . By 2033 30% of all China's water will be used for industry. In times of water shortage factories shut down. This has cost China $40 billion in lost output
Water conflict	Large rivers e.g. the Nile and Ganges run through several countries. If one country takes out too much water it can affect water supply in another country. There is conflict between Egypt and other African countries over use of the river Nile.

STRATEGIES TO INCREASE Water SUPPLY

Dams and reservoirs	
Advantages	✓ Dams control the flow of rivers and water can be stored in huge man made reservoirs . This water can be released downstream when needed and extracted for use by towns and cities. ✓ Dams help to control rivers and prevent flooding
Disadvantages	X Dams are extremely expensive to construct and maintain X Reservoirs flood large areas of land where people live, forcing them to move X Dams flood large areas of land destroying habitats and bio-diversity X In hot countries, much of the water stored in reservoirs is lost through evaporation
Water transfer	
Advantages	✓ Water transfers redistribute water from areas of surplus to areas of deficit using canals, pipes and river systems. This increased their water supply. The Kielder water transfer scheme transfers water from the wetter North to the drier South East of the UK. Several schemes transfer water from central Wales to large cities like Birmingham and Liverpool
Disadvantages	X The same disadvantages occur as for dams and reservoirs as these usually need to be built to store water
Desalination	
Advantages	✓ This involves removing salt water from seawater by boiling and distilling it to produce fresh water. This increases fresh water supplies Saudi Arabia has the most desalination plants in the world, followed by the USA and UAE.
Disadvantages	X The process is extremely expensive so only happens in richer countries X Removed salt is dumped back into the sea, increasing salt levels which kill marine bio-diversity X Huge amounts of energy are used which produced greenhouse gases contributing to climate change X The huge cost of transferring water to inland areas that need it

Example Wakel River Basin Project

The exam paper will refer to this case study in an exam question as;
*'Using an example of a **small scale Water Management Scheme** that you have studied…'*

Example exam question: To what extent has a local scheme for increasing sustainable water supplies been successful?

Key idea: The **Wakel River Basin** is located in the south of **Rajasthan** (**North-West India**). It is the **driest** and **poorest** part of India & largely covered by the **Thar Desert**. **Water Management in the region has been poor**, but an **NGO** (non-government organisation) has been **working with locals** to **increase water supply & storage using appropriate local solutions**. They've also **raised awareness in local communities** of **effective water management**. Therefore this is a **sustainable** project.

Water Supply Issues:

Climate. **Summer temperatures** can reach **53°C**. Rainfall is less than 250mm per year with 96% of this between June and September. There's **little surface water** as **rain quickly soaks away or evaporates**.

Poor Water Management. **Over-use of water** for **irrigation** and taking too much water from **pumps** has **reduced the water table & some wells have dried up**. This had led waster shortage leading to **water stress** and **water insecurity.**

A Johed – During the dry season in Rajasthan.

Increasing Water Supply:

The project has encouraged greater used of **rainwater harvesting** techniques to **collect & store water.** This benefits villages & families. Methods include:

Taankas - Underground storage systems about 3m in diameter & 3-4m deep. They collect water from roofs holding up to 20,000 litres.

Johed - Small earth dams capture rainwater which sinks into the ground and **raises the water table**. Wells can then collect this water. Five rivers that used to dry up once the Monsoon passed now flow all year!

Pats - Irrigation channels that **transfer water** to the fields to water crops. The villager whose turn it is to receive water makes sure the channels are repaired and working properly.

Increasing Public Awareness:

Education. Communities are **educated** to **conserve** (protect) **water**. By working together they can conserve water and **water security is increased**. This means that problems such as soil erosion, desertification & groundwater pollution are reduced.

Funding & the NGO. The Wakel River Basin Project was **funded** by The **Global Water for Sustainability Program** between 2007-2014. This NGO was created as part of the USA's International Development Agency. This NGO has worked with local people to **increase water security & to develop sustainable solutions**. Local people have been involved in the decision-making process to make this water management scheme successful.

Example: Lesotho Highland water project

The exam paper will refer to this case study in an exam question as;
*'Using an example of a **large scale water transfer scheme'***

Example question : Evaluate the sustainability of a large scale water transfer scheme

Key idea: Water transfer schemes move water from areas of **water surplus** (plenty of water) to areas of **water deficit** (water shortages) **Reservoirs store water**, and **rivers and pipes** are used to transfer it. It provides **water for farming** (irrigation) **power for industry** (HEP) and **water for drinking, sanitation and domestic use**. Dams also **control flooding**. Transfer **relieves water stress** but can cause both **social, (S) economic (E) and environmental (EN) advantages and problems.**

Key features of the scheme

Background – Lesotho is a small highland country in Southern Africa. It has few resources and high levels of poverty and food insecurity. It is a **LIC.** However it has **high rainfall** and a **water surplus**. It is completely surrounded by South Africa on which it depends economically.

What is the Highland water project – The scheme will transfer **2000 million cubic meters** of water per year from **Lesotho to South Africa**, to solve problems of water stress in drier regions. It will take **30 years to complete** and cost **$4 billion**.

Key features of the scheme:

5 huge dams and reservoirs to store water
200km of tunnels to transfer water to South Africa
Roads, bridges and infrastructure
Pumping stations to pump water
A Hydroelectric power plant to generate electricity

Advantages - Lethoso

E/S - Wealth. Provides **75% of Lethoso's GDP** which can be used for development projects.

E/S - Power. Hydroelectricity will supply Lesotho with **all its energy needs.**

S - Water supply and sanitation. Water supply will reach 90% of people in the capital Meseru and **sanitation will be improved** from 15-20%

E/S - Transport. New roads will improve transport boosting travel, **trade and industry**.

Advantages – South Africa

E/S - Water supply. Will **provide water** to regions suffering **uneven rainfall and drought**.

S - Safe water. Will provide water to **10% of the population** without access to safe water.

EN - Pollution. Extra fresh water will **reduce problems of industrial and sewage pollution** in South Africa's Vall river reservoir, which was destroying the local ecosystem.

Disadvantages - Lesotho

E/S - Loss of homes and livelihoods. 30000 people were forced to move from their land due to flooding from the first two dams

E/S - Loss of homes and livelihoods. A further **17 villages** will be flooded and **71 villages will loose farmland** when the next dam is constructed

EN - Habitat destruction. Habitats are lost due to flooding. Flood control on rivers downstream of dams have **destroyed a wetland ecosystem**.

Disadvantages – South Africa

E - Cost. The scheme will cost South Africa $**4 billion**, putting strain on South Africa's finances.

E - Leakage. 40% of water is lost through leakage, wasting huge amounts of water

E/S - Water bills. Water bills in South Africa to help pay for the scheme are too high for the poorest people who need the water most.

E - Corruption. Corruption has increased costs.