

Q1: Define sustainable development. Give two examples of things that might need to be developed sustainably. (1.1)

Sustainable development involves satisfying the needs of the present population of the world without negatively affecting the ability of future generations to satisfy their needs.

There are 3 main aspects of sustainable development that all governments should SEE. Social, Environmental and Economic. The social aspect involves the lives of people, their culture, health and education; the environmental aspect involves the atmosphere, the biosphere and the hydrosphere; and the economic aspect involves the use and availability of energy and resources and the livelihood of the population.

The UN has set 17 sustainability goals addressing all the issues that must be targeted by all the countries of the world.

Two things that need to be developed sustainably are cities and energy. As the total population of the earth living in cities rises above 50% making cities sustainable concerns many aspects of sustainability including waste reduction and management, transport systems, energy provision, preventing urban sprawl to protect ecosystems and biodiversity, urban drainage systems and urban microclimates.

Energy provision needs to move away from the burning of fossil fuels which are finite resources that cause the release of greenhouse gases, notably carbon dioxide, which enhances the greenhouse effect causing global warming and climate change. Renewable energy sources such as wind, solar, hydro and tidal must be the focus for countries in the future, as well as policies to reduce energy use.

Q2: Name three of the human and global issues that have an impact on sustainability and summarise why they have an impact. (1.2) Issues that have an impact on sustainability concern the needs of people, the air/atmosphere, food and water supplies and shelter. Three important issues impacting sustainability are:- Overpopulation and waste management, our reliance on fossil fuels and global warming due to human activities.

1. Overpopulation means too great a population for a given area to support, this may be due to rapid population growth outstripping the available resources in an area, or a depletion of resources. This can lead to malnutrition and famine, unemployment, low standards of living and low life expectancy. Any area will have a certain carrying capacity, the total population that it can support, and it may be that the world and certain rapidly expanding developing countries are approaching or indeed are beyond this point. Overpopulation, particularly the rapid growth of urban areas leads to serious waste management problems. This involves sewage, household rubbish, industrial waste that may be toxic, and increasingly and problematically plastic waste including microplastics. All of these can have severe negative and long term consequences for both people and the environment. These material should be reduced, re-used where possible and if not recycled, this will in turn have a positive impact on the economic aspect of sustainability. It should be remembered that the earth has finite resources and that our futures depend on using those resources sustainably.

2. There is no doubt that most countries are still too reliant on fossil fuels, coal, oil and natural gas, particularly for transport, industry and the production of electricity. It must be stressed that these fossil fuels are finite resources as only so much is available worldwide despite the fact that discoveries are still being made and exploited. Use of these fossil fuels has a negative affect on the atmosphere in particular leading to health problems and climate change. Countries must move as quickly as possible towards alternative methods of producing electricity, heating homes and transporting goods and people. Renewable energy sources, wind, hydro, solar and tidal must be used to produce electricity, use of electric vehicles should be encouraged and heat pumps should be used in homes instead of gas boilers. The movement of many countries towards renewable sources and a reduction in the use of and reliance on fossil fuels is too slow due to doubts about the economic cost, and people, organisations and governments with a vested interest.

Global warming caused by human activities, particularly transport and energy production, is and will continue to be a major sustainability issue. Greenhouse gases continue to be release by our activities, enhancing the greenhouse effect and causing global temperatures to rise. This is causing and will continue to cause climate change across the world. This climate change is having many impacts, including more droughts, heats waves and associated heatstroke, ecosystem stress, damage and biodiversity loss, desertification, soil degradation and associated food production problems and the higher incidence of extreme weather events such as flooding, increased storminess and wildfires. The increased temperatures will also lead to sea level rises which will drown low lying coastal regions, perhaps obliterate some low lying island nations and make adequate food production even harder to achieve.

Q3: Name the four discourses of climate delay as objections to sustainable development, and give a short summary of each. (1.3) The 4 discourses of climate delay as objections to sustainable development are:-

1. Surrender

This argument states that there is nothing we can do to reverse the inevitable global warming and climate change that we are causing by our use of fossil fuels. The greenhouse gases have already risen as a percentage of the atmosphere and global warming is already happening and is inevitable. Proponents suggest that anything we do or attempt to do now would be too little and too late and even if we did implement new policies they would create more problems than they solve. Any attempts to

mitigate the impacts of climate change would be too costly and ineffective.

2. Emphasise the downsides

This argument aims to stress and overplay the negative aspects that might be related to climate change policies. It suggests that doing something about climate change by introducing these policies would involve greater costs and hardships for people and societies than actually trying to solve the problem. It suggests that the cost of buying and running cars will be greater, flights will be only for the very rich and that economic growth will stagnate or decline leading to job losses, falling prosperity and standards of living.

3. Redirect responsibility

This argument questions who is responsible for taking action against climate change and who should take the lead. Is it the UN, governments of the individual countries, large companies especially Trans-National Corporations, urban councils, local communities or individuals? Large organisations may put the pressure on smaller entities or individuals stressing their need to take action. The UN goals, for instance, set targets, but the responsibility is on individual nations to implement policies to achieve them. Progress has been patchy. Shouldn't countries such as China and USA who produce the most greenhouse gases be most responsible for making cuts? In the UK we produce only a very small percentage of greenhouse gas emissions so any efforts and sacrifices made will have little impact. Some would also argue that the countries that make the least effort will still feel the same benefits.

4. Push non-transformative solutions

This argues that we should rely on technological progress. This technological optimism suggests that we will soon have viable carbon capture technology or nuclear fusion or nitrogen fuelled vehicles and there is no need to take serious action now. Proponents often think that the free market economy will stimulate these innovations and that government policies and regulations are irrelevant. Companies involved in fossil fuels often stress how much cleaner the exploitation and use of their product is becoming. Governments may also set targets without generating or implementing the policies required to reach them, and some would attempt to bring about change only through incentives and encouragement rather than using the regulations and compulsory measures that are actually required.

Q4: What are the two major benefits of sustainable development? Summarise why each one is so beneficial. (1.4) The presentations state that there are three (not 2) major benefits of sustainable development. These are the environment, social well being and the economy. They are all interrelated and can be summarised as Planet, People, and Production, usually the importance of each is also seen in the same order.

Planet, environmental sustainability

This is considered the most important as we only have one home world, planet earth. By developing sustainably we will preserve ecosystems, maintain biodiversity and maintain or enhance the biocapacity which goes beyond the productivity of a natural ecosystem to include the ability of the land to provide for people through farming and fishing. This will then determine the carrying capacity of the land, the maximum population that can live well and sustainably on that land. As such it concerns maintaining the natural capital, particularly air, water, soil and minerals to enable people to live well and economies to continue to be healthy.

People, social sustainability

This concerns the well being of people both now and in the future, enabling them to live happy, safe and healthy lives. Sustainable development will provide people with clean water supplies and good sanitation, plentiful, wholesome food and freedom from want and poverty, warm, dry housing, access to first class health and good education services, a decent job and role in the society, and importantly peace, justice and freedom from repression. A happy, healthy and well motivated society is also likely to benefit the economy and help it prosper.

Production, economic sustainability

A healthy economy is one that is not based on finite resources and is therefore more likely to continue to grow. This allows the country to maintain its wealth that can be invested in services like housing, health and education which in turn benefits the population. The people also benefit through the provision of better well paid jobs and much lower unemployment which leads to a better overall standard of living and fewer socio-economic inequalities. The healthy economy will also produce less waste and less pollution which will have a beneficial effect on the environment.

Q5: State what an Environmental Management System (EMS) is and explain at least four benefits of implementing one.

(1.5) Environmental Management Systems (EMS) are set up by companies to assess their environmental impact and to attempt to reduce that environmental impact. Companies attempt to introduce nationally and internationally recognised standards through a number of processes, policies and procedures that involve training personnel and monitoring levels of impact. This often follows a Plan Do Check Act (PDCA) protocol; planning what is required, implementing the necessary training and documentation, monitoring and recording the results and levels of success, and finally auditing the data and responding to bring further improvements.

The benefits of introducing Environmental Management Systems include :-

1. Reputational gain.

The company will introduce internationally recognised environmental standards that will enhance the reputation of the company with all the stakeholders. Customers will have greater trust in the company and the system may even help it gain new customers and increase profit. By increasing its reputation the company may also find it is looked on more favourably when tendering for new contracts.

2. Holistic approach.

Some companies may concentrate on critical aspects and processes, but most will address all aspects of the company. As such, all levels levels of management and employees may be involved in the planning and implementation and this will increase employee awareness, fostering more teamwork, improving internal communications and increasing staff morale. This also may make it easier to attract and appoint high calibre new staff.

3. Lower costs.

Companies introducing an EMS are more likely to comply with regulations regarding environmental issues and will pay fewer fines and have lower legal costs. They are also more likely to make savings on resources through resource conservation, resource efficiency and by using low impact materials.

4. Greater efficiency.

By stressing the importance of inputs such as energy, water and materials, using them more efficiently, and by making continuous improvements, savings will be made. Health and safety should improve through the introduction of risk management procedures, leading to greater employee efficiency.

Q6: Explain the impact that organisations can have on the environment. Give at least four examples. (2.1) Impact an organisation can have on the environment. I present 4 negative impacts (direct or indirect) organisations, be they large or small, trans-national or family concerns can have, but of course some organisations may occasionally have a positive impact on the environment.

1. Pollution.

Organisations cause pollution in many forms, including air pollution, water pollution and noise pollution. Many large organisations and companies particularly heavy industry can cause disturbing noise pollution that can have a marked impact in nearby areas especially residential areas. The noise, particularly at night, can cause sleeping issues, stress and ill-health, and may even have a detrimental effect on the quality of life and the house prices in the neighbourhood. This can be noticeable with inner city and edge of town retail parks where heavy goods vehicles (HGV's) may make deliveries at night. During the day local roads may be congested with employees and customers making it extremely difficult for local residents to commute to and from work, this can have an economic impact on the commuters and the firms they work for as well as causing stress and possible ill-health. Retail parks and surrounding areas often have a litter problem, which again can lower the reputation of the nearby neighbourhoods.

Air pollution caused again by heavy industry in particular, such as petrochemical plants, steel works, plastic manufacture and cement manufacture. Many polluting gases including greenhouse gases, which will be discussed later, and particulates are emitted directly by the industries negatively affecting air quality and leading to respiratory problems. Other indirect sources of air pollution include those in the supply chain, particularly deliveries, and even non-polluting organisations will contribute to air pollution through travel by employees to and from work. Gases such as carbon dioxide, nitrogen dioxide and carbon monoxide, and particulates will have a negative effect along commuter routes.

Water pollution can come from many organisations including agriculture where chemicals may be release into local watercourses. Some industries also produce chemical and toxic effluent that can be released or leak to contaminate soils and streams, this can include some of the heavy metals like mercury, lead and oil spills that may destroyed the aquatic life in nearby streams and rivers. Building on greenfield sites increases overland flow since there is little infiltration leading to flooding and the release of sewage into rivers.

2. Habitat destruction.

The pollution mentioned in the first point can also have a negative impact on surrounding ecosystems and habitats, perhaps endangering species, but certainly lowering biodiversity. The use of greenfield sites, perhaps around urban areas adding to urban sprawl, is a major problem and today Environmental impact Assessments (EIA's) must be undertaken by any organisation building on previous unused land. This will be more important in the future as governments in the UK seek to relax planning regulation for building on the green belt as they push to meet housing targets set to overcome a housing crisis. Brownfield sites should be chosen for new developments before greenfield.

It is not only industry but also agriculture that can have a negative impact on the environment. As many farmers push towards more intensive farming the use of fertilisers, pesticides and herbicides increases and these can leak into local areas and water courses lowering biodiversity. Farmers may be less likely to leave land fallow or wild and therefore flora and fauna will be under pressure. Agriculture in many parts of the world involves deforestation. This obviously has a marked impact on ecosystems and habitats almost destroying local biodiversity. As the soil is now no longer protected by vegetation overland flow increases, soil erosion and soil degradation increase, in some cases leading to desertification.

3. Greenhouse gases.

The main greenhouse gases are carbon dioxide, methane and nitrous oxide and there is no doubt that they have increased in the atmosphere since the beginning of the industrial revolution. These gases are important to the greenhouse effect which is, on the whole beneficial, as the atmosphere is relatively transparent to the incoming short wave solar radiation warming the earth up, but makes the atmosphere less transparent to the outgoing long wave radiation from the earth. This has kept the world warm enough, at an average temperature of around 15C, to allow life to exist and flourish. The problem of global warming is caused by the fact that the greenhouse gases have increased to the extent that even less radiation is being let out to space by the atmosphere and world temperatures are increasing to the extent that they will cause major climatic problems and possibly devastating sea level rises. The issue now is that the percentage of greenhouse gases is so high that positive feedback loops may cause us to reach a tipping point of no return even is we manage to reduce greenhouse gas emissions.

The burning of fossil fuels, coal, oil and natural gas, to produce electricity is the main source of carbon dioxide, the most

important greenhouse gas, and this is both a direct source at the point of electricity production and indirectly through any organisation that uses the electricity.

Methane is also an important greenhouse gas, it is responsible for less global warming than carbon dioxide, but by itself it is a more powerful greenhouse gas. This is a by-product of waste disposal and is emitted by landfill sites, but it can also be the result of various forms of agriculture, rice farming and cattle ranching are notable sources of methane. There are also vast amounts of methane stored as gas hydrates in the arctic and in permafrost areas, and here again a feedback loop of increased global warming may increase methane release which in turn will stimulate more warming.

4. Waste disposal.

This includes waste from industry, businesses and homes, and it is usually the responsibility of the individual organisations and the council to deal with this waste. Traditionally waste has been taken to landfill sites often located on the edge of urban areas, but in many sites rainwater can leach through the layers of waste producing toxic leachate that can leak into the water table and perhaps the water supply. This leachate can contain chemicals, heavy metals and plastics that can have a detrimental effect on human health.

Some waste in the UK is incinerated, but in states such as California a great deal of biomass waste is incinerated to produce electricity. Incineration of waste, however, produces greenhouse gases and often the resulting ash will contain chemical toxins. Persistent Organic Pollutants (POP's) such as dioxins can be found in the atmosphere near incinerators and the resulting ash, these are very long lasting and can have a negative impact on habitats, ecosystems, flora and fauna, and have been found to attack the immune and nervous systems of the local human population.

Household waste often goes to the same sites as other waste, but recently councils have attempted to recycle paper, glass, plastic and garden waste with varying degrees of success. Disposing of plastic waste is increasingly problematic. Modern society produces and uses vast amounts of plastic and it is now a major polluter, particularly in the oceans. Plastic is difficult to deal with because it takes an extremely long time to decompose. Microplastics are now seen as a major problem as they have been found in the food chain and recently even detected in living coral reefs. Microplastics are harmful to plants and wildlife and have even been found in drinking water, so they are also a threat to human health, having been found to cause cancers and endanger the health of new-born babies.

Q7: Explain the impact that the environment can have on organisations. Give at least four examples. (2.2)

1. Reputation
Organisations can suffer reputational damage if they are seen to damage the environment. This will affect the morale of staff at the organisation, reduce its ability to attract high calibre staff and even affect sales and the ability to win contracts.

There are some large scale examples of this. Exxon an oil company had a tanker, the Exxon Valdez, go aground in Prince William Sound on the Alaskan coast and the resulting oil spill caused severe and long term damage to sea life, birds and coastal ecosystems. The damage was costly and long term, not only to Exxon but also to the local economy and the reputation of the company is still affected by this. BP suffered a similar fate when it was deemed responsible for a massive oil spill in the Gulf of Mexico just off the coast of the USA, which caused its stock price to fall by half, its market value to plummet, and cost the company around \$50 billions in settlements, fines and clean-up costs.

Monsanto, an agrochemical corporation recently taken over by Bayer, has been involved in many costly and reputationally damaging lawsuits through its production and sale of herbicides, pesticides and genetically modified crops some of which have reportedly serious carcinogenic effects.

On a more local scale reputational damage can also occur if organisations have a negative impact on nearby urban environments through air pollution, heavy goods vehicle noise and traffic congestion.

Sometimes an organisation will overstate the beneficial environmental measures it is taking in a bid to distract from its faults. This 'greenwashing' is often recognised, especially by environmental groups, and called out, damaging the reputation of the company.

An organisation that makes efforts to preserve, restore or enhance its surrounding environment may enhance its reputation and create a healthy environment enjoyed by the workforce, potential employees and customers. Some recently built trading, business and industrial estates are being built on brownfield sites and have paid particular attention to integrating biodiversity banks, green spaces and urban river re-wilding schemes. Out of town estates make similar efforts to consider environmental implication, but they have often been built on pre-existing greenfield sites so there may be a degree of greenwashing in this process.

Finally, some organisations such as Nike are introducing more eco-friendly practices and considering the full life cycle of products they make. The premise here is that their reputation with customers will grow increasing sales, and that customers will pay more for sustainable brands.

2. Extreme weather

Certain organisations can be significantly and negatively affected by extreme weather events. This is obviously the case with agricultural enterprises and it can be a particularly dominant factor in mediterranean and semi-arid regions such as southern California. Here market gardening (fruit and veg) agricultural organisations or agri-businesses must manage the natural variability of the rainfall regime and the fact that summers often bring drought conditions. This has been made more difficult as global warming and climate change, along with the El Nino Southern Oscillation (ENSO) can cause more extreme periodic summer droughts and extreme rainfall events in the winter months.

Farming is only possible in the summer months through an extensive and expensive irrigation scheme that moves water from areas of surplus to areas of deficit, made more difficult and expensive through climate change. During these summer months water insecurity may increase, causing water restrictions and wildfires that cause damage and costs to farmers and other organisations.

The more extreme winter storms brought to southern California by the ENSO and climate change can cause flooding, mudflows and landslides that can have a serious negative impact across the region and on any organisations affected.

The same meteorological phenomena also have a significant impact on water supply companies and hydro-electric power generators. In extremely dry summers the extensive system of reservoirs show substantial drops in water levels. This has created a number of water crises and water companies have been restricting supplies to homes, farms and industries, and have to consider large scale and expensive additions or enhancements to their water storage capabilities. In the driest years the amount of electricity generated by HEP stations in California which is normally over 20% of the total can drop by over half and this will affect profits for the companies and increase prices for customers.

3. Resource depletion

This can have a severe negative impact on an organisation. There is a strong link in many organisations between the resources they exploit and the manufacture and use of products they manufacture and sell. If resources are exploited unsustainably and depleted this will increase the cost of the resources and materials required for the manufacturing process which will in turn increase costs and may decrease sales. If organisations are unable to access their usual resources this may lead to the decline of some industries and others may have to alter their production methods to cater for alternative resources and materials involving extra costs in new machinery, equipment and staff training.

Water is a vital resource in nearly all organisations and its availability is being reduced by overpopulation, increased use in more affluent societies, and the impact of climate change which brings greater rainfall and temperature variability and cycles of excess and scarcity. Water conservation must be a major concern of all organisations, not only in times of water scarcity, but increasingly as a long term corporate ethos. This will require increased costs in adapting manufacturing machinery, processes and procedures, and in increasing employee awareness and these costs may need to be passed on to customers and users which may hit profits.

This increasing worldwide water insecurity can affect the population of an area, increasing health problems and even leading to population migration and displacement from the region. Organisations within that area will obviously suffer.

Within certain businesses these water shortages can limit production and negatively impact on supply chains. In some parts of the world increasing affected by severe droughts and water shortages such as the sugar cane growing and processing companies in Brazil lack of water has limited sugar cane growing which has shut down many processing plants.

Finite fossil fuels such as oil and gas are being depleted as newly discovered reserves are not keeping pace with consumption. These fossil fuels are still a major contributor to electricity generation and plastics manufacture, so any organisation involved in those activities will be affected. Electricity generation companies must move towards sustainable sources of energy such as hydro, solar, and onshore and offshore wind farms which will also provide opportunities for new organisations to flourish and make a mark. The plastics industry is beginning to move towards polymers and bioplastics which are made from sustainable sources of biomass, again costs to organisations will increase, but new enterprises may open and flourish.

Minerals and metals are also finite resources and they are not equally distributed around the world. A good example are the metals required in the manufacture of batteries used in the growth sector of electric vehicles, notably lithium, cobalt and nickel. The unequal distribution and concentration of these resources, such as lithium in China may hinder the electric vehicle manufacture in other countries particularly if trade wars, increased tariffs or trading restrictions are introduced.

4. Deforestation

The still rapidly increasing population of the world and the associated overpopulation is leading to rapid deforestation worldwide, but especially in equatorial forest areas like Amazonia, as land is cleared for settlement, agriculture, transport networks, mining and hydro-electric plants. This not sustainable and has certain feedback impacts on global warming as the ability of the biomass to absorb carbon dioxide decreases. Global warming and climate change have also impacted on the coverage of forests across the world with the increase of drought and associated wildfires and climate change that has destroyed woodland ecosystems and promoted desertification.

It has been stated that 'forests are at the heart of our economy' and this is certainly true for organisations that are directly involved in exploiting the forests, but it can also have a detrimental effect on other organisation down the supply chain. If we take the timber supply industry for example, it includes landowners, harvesters of the timber, transport contractors and mills, so the whole of a supply chain is impacted. Any organisation involved in paper and packaging, construction, furniture manufacture, biomass energy production and increasingly the biomass production industry may be negatively impacted by rapid and unsustainable deforestation.

Q8: Define what a carbon footprint is and summarise how it is calculated. (3.1) The carbon footprint is the total amount of carbon released into the atmosphere by human activities. It is important because greenhouse gases such as carbon dioxide and methane (which is CH₄) have been increasing in the atmosphere since the industrial revolution and it is now known that these gases are enhancing the greenhouse effect which prevents the earth's long wave radiation from being lost into space causing global warming and climate change. It can be assessed on a number of scales from individuals to a product, companies and industries. It is usually measured in tonnes of carbon dioxide emissions per year. The USA has one of the largest figures per person (per capita) of any country at 16 tonnes per annum, the UK produces 5-6 tonnes per person per annum and these figures can be compared with developing countries such as Brazil at around 3 tonnes and Nigeria at less than 1 tonne per capita.

Looking at carbon footprints by country does, however, throw up some anomalies. Normally the more developed a country the higher the carbon emissions per capita, but this is not the case when we look at some developing countries such as Kuwait and Qatar. Kuwait has carbon emissions per capita of around 24 tonnes per annum and Qatar registers over 35 even though both countries have a proportion of citizens with a low standard of living and socio-economic inequalities are profound. This is caused

by the fact that both countries are rich in oil and gas and produce the vast majority of their electricity by burning these fossil fuels.

It has been estimated that 75% of all greenhouse gas emissions are caused by the burning of fossil fuels, but the emissions are often divided into 3 scopes one direct and two indirect. Scope 1, the direct source of emissions are all those that are owned and run by the company, scope 2, an indirect source are the emissions caused by the production of electricity used by the company, and scope 3, also indirect, are those both up and down the supply chain from suppliers to the company to those people who use or dispose of the product produced by the company.

Carbon footprint can be calculated in a number of ways and at a number of scales. At the smallest scale it can be calculated for individuals and households and on a larger scale for cities and countries, it is also possible to measure the footprint of individual companies, industries and particular products. For individuals and households the measurement must take into account all aspects of an individuals or households life, on the WWF calculator this would include housing factors, transport, food and the goods and services used. The UN has a measure that looks at energy consumption, transport, lifestyle and handling of waste. Although the measures are called calculations they are in reality broad assessments.

When carbon footprints are being calculated for a company or a product it is important to consider all 3 of the scopes, both direct and indirect as outlined above. This will involve an entire Life Cycle Assessment (LCA) from manufacture to disposal; considering material production, supply chains, services required, manufacture, use, and the disposal, re-use or recycling of the product or products.

The procedure for measuring a carbon footprint must involve identifying direct and indirect sources, collecting and calculating the existing footprint in tonnes of carbon per year, later, organisations need to begin setting targets, measuring progress and developing an improvement plan.

Q9: Identify ways to manage carbon footprint in an organisation. (3.2) Organisations must designate members of staff and teams to build an organisation wide carbon strategy. This should involve creating a management plan that collects data on the present circumstances regarding the carbon footprint (carbon assessment), assesses the needs of the organisation and areas where the impact can be greatest, introduces policies and procedures to reduce carbon emissions and implements a continuous cycle of checking, reporting and remedial action. This will produce a map of the emissions footprint of the organisation and encourage it to follow the measure - reduce - report protocol.

The planning needs to take into account and track all 3 scopes of carbon emissions. Increasingly organisations are paying particular attention to scope 3, the carbon emissions caused both up and down the supply chain, even though these indirect sources are not really owned by the organisation they can be a very large carbon source. The transnational corporation (TNC) Apple, for instance, has committed to making its supply chain carbon neutral by 2030. This may become easier in the future as consumers are becoming increasingly aware of sustainability issues and ideas around carbon footprints, and this awareness may make them willing to pay more for a 'clean' product.

Organisations must adhere to national and international rules and regulations that apply to carbon emissions and would be advised to appoint a compliance officer who may prevent the organisation from receiving government sanctions. Most countries now have a net zero carbon emissions deadline, in the case of the UK this is 2050, and organisations are encouraged to develop their own net zero initiatives. In an attempt to enforce this governments have set up various initiatives, grants and penalties to 'encourage' organisations to follow the regulations.

Initiatives that organisations should follow include the Energy Transition Commission which encourages organisations to transition to net zero emissions and the Emissions Trading Scheme where a company buys carbon allowances, can sell them on if emissions are below target, and will be fined by the UK government if it does not comply. Carbon offsetting allows organisations to sponsor carbon cutting initiatives elsewhere, this allowance can be used to offset against the organisation's carbon emission reductions that they haven't been able to make themselves.

Q10: Complete the questions below.

a) Identify ways to reduce carbon footprint in an organisation. Give two examples for each way mentioned. (3.3) Ways to reduce carbon footprint in an organisation.

1. Use renewable energy.

If an organisation only takes its electricity directly from the national grid the amount of renewable energy it consumes is determined by the country and its government. Increasingly organisations are using micro-generation techniques and schemes to produce their own renewable energy, and this often involves placing photo-voltaic cells on exposed areas such as a roof and producing their own solar power. Micro-generation of renewable electricity can also be achieved by using small wind turbines to harness the power of the wind on exposed positions on the site, these can be roof mounted, on poles or free standing.

2. Reduce Energy use.

Reducing energy use will cut costs and reduce the carbon footprint of an organisation. Organisations should only use energy efficient appliances and machinery in offices and factories. Light bulbs should be low energy, LED where possible and controlled by sensors to only switch on when required. Heating can be turned down and programmable thermostats could be used, effective insulation would also prevent heat loss. A member of staff may be made responsible for planning and implementing policies to reduce energy use, educating the workforce and conducting regular audits.

b) Identify four ways individuals can reduce their carbon footprint at home. (3.4) 4 ways individuals can reduce their carbon footprint at home.

1. Prevent heat loss from homes, especially older houses. This could involve installing double or triple glazing, and loft and cavity wall insulation. Residents should make use of grants and incentives that are available from the government and councils to help reduce heat loss.
 2. Generate electricity at the house, micro-generation, to cut down reliance on energy generated using fossil fuels. This could include photovoltaic cells on a south facing roof, miniature wind turbines and air source, ground source and geothermal heat pumps that are seen by the UK government as a replacement for gas-fired central heating boilers that are being phased out.
 3. Reducing energy use by buying and using energy saving household white goods such as washing machines, dishwashers and refrigerators. Turn down central heating thermostats, use energy saving light bulbs and stop leaving appliances on standby.
 4. Follow modern trends in housing and house building, including super-insulation, airtight houses and heat recovery systems. Residents may also install smart meters to be more aware of energy use and even computer systems to manage energy use more efficiently. Introduce passive house standards to reduce the need for heating or air conditioning and energy star homes, an energy saving project based in sub-saharan Africa.
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Q11: Explain the meaning of the term 'resource efficiency'. (4.1) The earth has finite resources and resource efficiency aims to prevent depletion of those resources. It attempts to use the earth's resources in a sustainable way and try to minimise the environmental impact of human activities.

By using fewer resources the aim is to introduce ways to further protect the environment. Resource efficiency reduces the use of raw materials, energy and water by increasing efficiency in a company or organisation by using modern systems, modern technology and a suitably educated and motivated workforce.

Introducing Environmental Management Systems (EMS's) to check and reduce the impact on the environment, reducing, reusing and recycling will conserve energy, water and materials. Raw materials should be supplied from sustainable sources and organisations should introduce a circular economy.

A circular economy, unlike a linear economy which has a concept of take, make and dispose, does not deplete resources as it considers the entire product life cycle from raw material supply, to transport, manufacturing, consumption of the product and disposal. This will help lower costs, reduce waste and protect the environment.

Q12: Summarise the benefits of efficient use of resources. (4.2) Efficient use of resources reduces the chances that serious resource depletion will occur as would the unsustainable exploitation of resources. This applies to all the world's resources including water, soils, minerals and energy. If organisations use resources efficiently they are likely to use less which will lower running and production costs and increase profit. They are also less likely to go out of business through an inability to access the required resources, or need to incur the costs needed to innovate and implement major changes in their production facilities and equipment to accommodate the use of different materials.

An organisation that has an ethos that conserves resources and uses resources efficiently may allow these ideas to permeate through all sections of employees, leading to increased teamwork, better awareness of their roles and higher morale.

Efficient use of resources will reduce the waste generated by the organisation and this will cut the cost of waste disposal and lessen the impact on the environment. This will help them hit their targets, address national and international regulations which will lower the legal costs and fines they have to pay. Re-use and recycling within the organisation will cut costs and policies to allow the collection and recycling of waste can also create opportunities and jobs outside the organisation.

By using resources efficiently an organisation will produce less waste, particularly toxic waste that may damage the local environment, local watercourses, local habitats, ecosystems, flora and fauna. A corresponding reduction in pollution, such as air pollution, with fewer greenhouse gases emitted, may benefit employees and the local population in terms of health benefits, and the wider world in terms of combatting global warming and climate change. All of this may enhance the reputation of the organisation which itself brings social and financial benefits to the company.

This will allow the organisation to embrace the circular economy which will bring growth and economic benefits, increase competitiveness, sustain growth and create more jobs.

Innovation and innovative initiatives are a major benefit of trying to use resources more efficiently and in recent years has stimulated rapid job growth. Many of these innovations are also eco-friendly and therefore have less impact on the environment. Innovation is itself a new growth sector and many new industrial estates and science parks concentrate on high-tech industries, research and development. Cambridge science park, located just to the north of Cambridge is a good example, having close ties to the world renowned research departments at the university many firms use this research and have access to an academic, educated workforce and concentrate on new areas for development such as bio-science and battery technology.

Q13: Summarise the concept of circular sustainability in relation to use of resources. (4.3) Circular sustainability is a system to reduce the use of resources, especially unsustainable ones, reduce waste and by doing so reduce environmental impact. The system aims to re-use materials which means less exploitation of new resources, protecting natural environments. It follows the reduce, re-use, recycle, recover protocol and attempts to use waste as a resource and prolong the life of a product through repair and renovation.

In the UK local home refuse collection systems help by collecting paper, card, plastic, glass and garden waste which can then be recycled. Industry and companies are now designing products both to prolong life and also for ease of re-use and recycling.

Adidas, for example, has introduced a new range of running shoe designed to be returned, taken apart and renovated.

Q14: Describe the responsibilities of organisations to use resources efficiently. (4.4) Organisations are becoming increasingly aware that they must use resources efficiently since it is clear that at the moment, 'the exploitation of resources in manufacturing and the waste generated as products reach the end of their life cycle is unsustainable.'

Organisations must adopt a circular economic model, follow it closely and make significant reductions in their use of resources and production of waste. New business models stress this and suggest a collaborative approach between companies, supply chains and customers. Some organisations are setting up ambassadors, some organisations are becoming ambassadors to promote and educate about the benefits of a circular economic approach to conserve resources.

A Lincolnshire firm CorrBoard, based in Scunthorpe, is a packaging firm that is pioneering resource recovery, resource efficiency and the circular economy. In conjunction with another local firm Omni-Pac it is taking previously unwanted materials and making moulded fibre packaging that is bio-degradable, compostable and recyclable. Re-manufacturing, re-purposing and recycling are at the heart of their operations. Both companies are taking on an 'ambassador' role encouraging others to follow suit, become more sustainable and challenge the concept of waste.

Q15: Describe the potential consequences if organisations pollute the environment. Include consequences for the environment, the local community and the organisation in your answer. (5.1) Pollution fits into a simple classification of Air, Land and Water. It is a little more complex than this as I hope to illustrate below.

1. Environment

Major consequences include emissions of greenhouse gases and the human induced global warming and climate change that results. Global warming is causing extreme droughts and desertification in areas such as the Sahel in sub-saharan Africa and this can lead to habitat damage, soil erosion and soil degradation.

Extreme and long lasting droughts may also cause an increase in wildfires that can destroy large areas of distinctive habitats and the flora and fauna they contain, perhaps endangering certain species. In general it will lead to an increase in the vulnerability of ecosystems and a loss of biodiversity.

Global warming caused by the emissions of greenhouse gases can also melt ice caps and ice sheets resulting in global sea level rises which inundate coastal areas and may destroy small, low lying island nations and coastal habitats. Acidification of oceans is also a consequence of increased atmospheric carbon dioxide and this can endanger sea life.

Coral reefs are particularly susceptible to oceanic acidification, and rises in ocean temperatures can also lead to the loss of large areas of coral reef and the immense biodiversity of fauna they house through the process of coral bleaching.

2. Local community

The local community can also be affected adversely by pollution, which may cause respiratory problems and illnesses among local residents. Noise and litter can also be a problem for surrounding residential areas and along with increased traffic caused by many organisations nearby neighbourhoods may suffer reputational damage and house prices may fall causing an economic hit to some residents. It is also possible that toxic chemicals from more industrial organisations or landfill sites may enter the food chain and cause serious health problems.

Organisations on retail parks, either built on brownfield sites or greenfield sites on the rural urban fringe adjacent to housing estates are a prime example of how local neighbourhoods and communities can be affected. Traffic congestion can be a major problem on the local road system due to both employees and customers. This is exacerbated by the extended hours of modern retail outlets and deliveries by HGV's that can occur through the night, disturbing sleep patterns among nearby residents and causing associated health problems.

Retail parks, trading and industrial estates built in close proximity to urban areas can also put a strain on local water and sewage systems. The problems this may cause during periods of intense and heavy rainfall are the increased incidence of flooding and the contamination of water supplies with sewage.

3. Organisation

Pollution by organisations can lead to the damage of the reputation of the organisation and a number of associated costs either through loss of sales or loss of engagement by the public.

Atmospheric pollution has led to global warming and climate change. One result of this has been the increased incidence of extreme storms in certain parts of the world and life threatening floods. Water companies in places such as the UK have found this out to their cost in recent years as they have been unable to deal with those intense storms. Floods and sewage contamination have damaged homes and destroyed some habitats leading to serious reputational damage and complaints about lack of adequate investment and large bonuses paid to senior staff and shareholders as well as Ofwat inflicting severe financial penalties.

Pollution within an organisation may negatively impact on employees reducing productivity and bringing higher sickness and absentee rates. Even the cognitive performance of staff has been found to be reduced by pollution and it certainly makes recruitment of new high calibre and talented staff more difficult. This is especially problematic in less developed parts of the world such as India that don't have workplace regulations as strict or as strictly monitored and enforced as in the UK.

Developed countries like the UK try to ensure that organisations take account of their responsibility for the environment with pollution strictly monitored and regulated through the Environmental Act of 2021. The Environment Agency administers severe financial penalties to organisations discharging sewage or other effluent either by mistake, unnecessarily or in breach of conditions and regulations. The Air Quality Standards Regulations control air pollution in the UK and they are backed up with associated financial penalties.

Q16: Explain how organisations can help prevent pollution. (5.2) Organisations can help prevent pollution by engaging with the Environment Agency and developing an Environmental Management Assessment (EMA), along with creating a pollution incidence report plan this will allow the organisation to address rules, regulations and targets and respond effectively to emergency pollution situations. This will also make the organisation aware of relevant environmental permits that may be required. All levels of staff within an organisation should be made aware of these policies so that they can respond appropriately.

These plans, policies and procedures will allow the organisation to deal effectively with any effluent it produces, clean water after use and prevent pollution accidents. Organisations should aim to conserve energy to help reduce energy use and lessen their use of energy produced by fossil fuels, constructing their own renewable micro-generation schemes will also prevent greenhouse gas emissions. Companies that generate electricity by burning fossil fuels can help to cut emissions of particulates and polluting gases such as carbon dioxide and sulphur dioxide by filtering systems and by introducing carbon capture. Within the organisation itself innovative efficient machinery can be introduced to cut down on pollution and waste.

Scope 3 emissions must also be considered in controlling air pollution. It has been estimated that on average this contributes 90% of emissions from all organisations. This includes emissions caused by products as they are used and disposed of and those caused by employees commuting to and from work. Organisations can address this issue by increasing home work schemes to reduce commuting, perhaps allowing them to reduce office space and running costs, sell or lease out office space or even shut down whole office complexes entirely. Trans-national corporations can cut down on the number of polluting flights taken by executives by introducing more video conferencing.

Q17: Explain how the management structure of an organisation can support environmental sustainability. What kind of things should be in place? (6.1) Only one third of the UK's largest organisations are committed to the UK target of net zero emissions by the year 2050. There is still much work to be done.

Who is responsible and accountable for planning and decision making in organisations? To some extent this is dependent on the type of organisation, its size and its structure. Family businesses tend to be smaller so it is relatively easier to make decisions and oversee the drive towards sustainability. Family enterprises tend to have an owner and under that the employees, so there is no board or shareholders that need to be informed and taken into consideration, as such the decision and implementation processes are often faster. Cooperatives are usually owned and therefore managed by members and/or employees and this more democratic system is more cumbersome and may slow down policy making. Large corporations will have a CEO, a board and possibly many shareholders to consider, this makes them powerful and influential, but profit rather than environmental sustainability (unless it is seen to affect profits) may be seen as the overriding consideration.

In many cases there is a need to appoint a specific member of staff, a sustainability officer, to develop sustainable policies and below this sustainability teams associated with particular departments, but these roles will need to be monitored by the CEO, directors and perhaps external sustainability agencies to help the review and reassessment of policies.

As well as this, sustainability and sustainability issues and policies should be embedded throughout the whole organisation, all departments and all levels of employees. The policies, monitoring and outcomes should be communicated to the entire workforce to enhance engagement and help the company progress towards its sustainability goals.

Q18: Explain how an organisation's employees can support environmental sustainability. (6.2) All employees need to realise that environmental sustainability is not just the responsibility of CEO's and board members but must be an organisation / company wide undertaking with all staff engaged and involved. Everyone must be aware of and follow sustainability initiatives, consider energy use and recycle waste office materials. Employees must take ownership of the policies and understand the concepts involved, undertaking training enthusiastically so that sustainability ideas become entrenched in the organisation. Employees that are aware of the environmental sustainability policies put in place by the organisation are more likely to recognise inadequacies and failures in the policies, feedback ideas that might increase success, and perhaps begin to take a leadership role and become champions of policies such as paperless offices.

Employees who are fully aware of and engaged in environmental sustainability policies are more likely to accept home working schemes to cut down the emissions and pollution caused by commuting. They will be amenable to flexible working hours to help break the rush hour congestion in the mornings and evenings when cars are more likely to idle and produce more emissions.
