**Describe some of the problems associated with supplying energy. To what extent can managing energy demand sustainably help overcome problems of energy supply? [45]**

**This essay can be matched with the following focus boxes in C3:**

* **3.4.5 Problems associated with extraction, transport and use of energy**
* **3.4.7 The need for sustainable solutions to meet the demand for energy**

**A comparable essay would not be set as ‘describe’ is not an AO2 command word and the essay question is unlikely to be in 2 parts. This G4 (Legacy Specification) essay is used for illustrative purposes.**

The demand for energy has been increasing due to rapid population growth in places such as India, where the population has quadrupled since independence. This is due to a growing rich middle class, that has put strains on manufacturers to produce more products, thus using more energy, but also more individuals now invest in more luxury items, such as air conditioning, which puts a strain on energy demand. Economic growth has increased demand. Since independence, India's GDP has been growing by 8% each year. This is due to the fact that more industry is moving to India, as they provide a cheap workforce. However, in the UK energy demand has dwindled since the 1970s.

An example of an energy source is coal, using this source is economically sustainable as it is cheap to extract and relatively widely available - 600 years worth is stored in the ground. However, it is not environmentally friendly, as it produces carbon dioxide, which contributes to the greenhouse effect. Also, it emits sulphur dioxide which can cause acid rain, increasing the acidity levels of lakes and rivers, which is not enhancing or preserving environments, but risking native wildlife. It’s also socially unsustainable, as coal mines can be eysores and cause huge damage to the natural environment. Also, socially, living in close proximity of burning fossil fuel can be highly dangerous, e.g, many workers in Jharia coalfield, Jharkhand suffer from respiratory diseases such as bronchitis, as sulphur dioxide reaches their lungs. Many of these individuals are informal employees, so will not be given any medicine or a sick pay, meaning they will be most unlikely to work again and provide for their family, which is significantly unsustainable. Coal is currently India's biggest energy source of 42%, while less signifi cant for the UK at 15%.

Gas makes up 40% of UK’s energy supply and 7% of India’s. Gas is socially sustainable as it is useful to run transport vehicles, such as trains, cars etc and useful to heat homes. Gas can be seen as environmentally friendly, as it emits 45% less carbon dioxide and methane, compared with any other unrenewable energy source. However, it is economically unsustainable, as it is expensive due to its limited supply. Socially it can be seen as unsustainable as countries are reliant on others to supply energy: e.g. : Ukraine relies on Russia. However, political issues, can mean this supply can be used as a weapon against other countries.

Although, these supplies have some positive sustainability aspects, they are still mostly environmentally unsustainable. This is the main issue that threatens the sustainability of the planet, as our future currently looks dim, due to global warming. Therefore, I believe more renewable energy sources should reinvested in. Energy saving appliances, such as energy saving lightbulbs, LED TV’s instead of flat screens and electric cars instead of petrol cars, would cut emissions, however, these changes would only minorly contribute to decreasing demand.

An example of renewable energy is Tide energy/wave energy e.g: Tidal Lagoon in Swansea. It uses the energy from the sea to power 120,000 homes for 120 years. It has a generator capacity of 240 MW. It is therefore socially sustainable and environmentally sustainable as it generates no harmful gases that contribute to the greenhouse effect. It can be viewed a little economically unsustainable, as the plant cost £850 million. However, it is socially sustainable, as 86% of residents invested and supported the scheme; which involves community spirit and participation which will mean the scheme will last longer. Also, environmentally sustainable, as it can be used as a flood protection for Wales where some areaa are prone to severe flooding. Overall, this is a balanced use of resources.

However, I think it is most important to educate residents about their energy use and what harm it does to the planet. With increased awareness energy demand will be decreased and the need for a energy supply that is sustainable decreases. More schemes such as ‘Act on CO2’ and ‘Fossil Free' are needed. The 'Act on CO2' promotional advert, showed the devastation of global warming through a child's book, highlighting the unstableness of our childrens future. Emotive adverts like these may decrease demand and alleviate the demand for sustainable energy.

The government has contributed £8 million in order for smart meters to be implemented in people's homes by 2020. It allows residents to see how much energy they’re using. With awareness they should decrease consumption, however these are economically unsustainable, as they are costly and are estimated only to decrease annual spend by £28. Also, they are socially unsustainable, as they are not prominent or effi cient enough to alert residents attention to their energy use; many are prone to malfunction.

Treaties such as Kyoto Protocol, were implemented to suggest that 198 countries by 2009, would cut emissions by 5.2%. However, this is not enough to drastically decrease demand and created a carbon market, where carbon credits could be exchanged in order to cut how much they have to reduce emissions and also to disguise increases in emissions. Socially, it is not sustainable as it was liable to corruption.

Biomass could be more widely used, such as in India, Himalayas where cow dung/slurry is placed into an anaerobic digester, it thus produces methane energy, which can be burned.

In conclusion, I believe governments need to put more investment into educating and promoting awareness of our energy use, but most importantly further investments are needed to contribute to renewable energy schemes, such as the Tidal Lagoon in Swansea. In order for biomass to become more popular in the UK, investment must be implemented to increase the energy source.

**Examiner Commentary:**

**AO1 (17/20)**

**Wide ranging, thorough and accurate knowledge, high order of conceptual understanding**

*Evidence – detailed knowledge of changing demand for energy; clear, specific problems associated with supplying energy; clear, but brief, demand management, some argument for alternative sources*

Wholly appropriate, accurate and well-developed examples

*Evidence – exemplification from India and UK, but Swansea tidal lagoon not operational yet*

Accurate and relevant supporting geographical terminology

*Evidence – carbon credits, biomass, tidal lagoon*

Well-directed and well-annotated sketch maps/diagrams

*No evidence*

**AO2 (18/20)**

**Sophisticated application either to analyse or interpret or evaluate**

*Evidence – critical comment on ‘how far’ and sustained reference to environmental, social and economic sustainability*

Synthesis of the connections between different elements of the response to the question

*Evidence – good range; integrated problems and management*

Confident application of the specialised concepts

*Evidence –causality (problems associated with coal and gas), inequality (exploitation of Indian coal miners), interdependence (carbon trading), globalisation (Kyoto Protocol), mitigation and adaptation (Kyoto Protocol, smart meters), risk (gas supplies from Russia), sustainability (problems and management of energy supply/demand)*

**AO3 (4/5)**

**Clear, coherent and logical response; appropriately structured**

*Evidence – generally well-structured answer with a mostly good standard of spelling, punctuation and grammar*