Name: _____

Date: _____

Class: _____

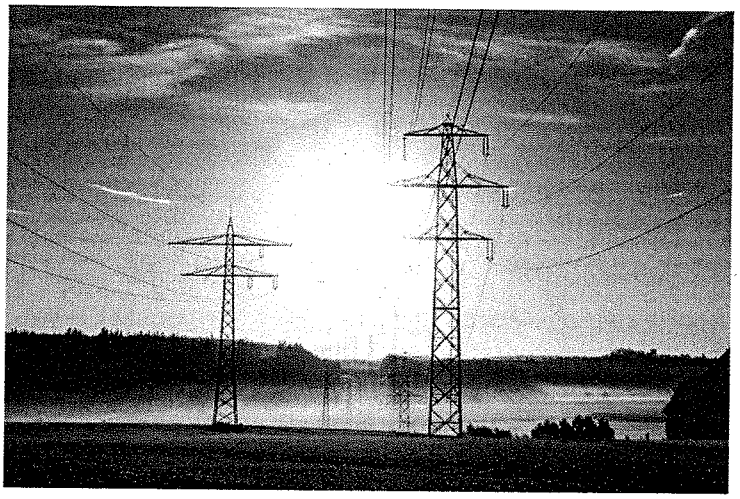
IB ESS

7.1 Energy Choices and Security

Significant ideas:

There is a range of different energy sources available to societies that vary in their sustainability, availability cost and socio-political implications.

The choice of energy source is controversial and complex. Energy security is an important factor in making energy choices.



Energy Supply

1. Complete the table below listing the energy sources in the relevant row.

solar *biomass* *fossil fuels* *hydropower* *nuclear fission*
wind *wave* *tidal* *geothermal*

Energy Source	Pollution	Renewable/Non-renewable?
solar	Little/no pollution	Renewable
Hydropower	Little/no pollution	Renewable
Wind	Little/no pollution	Renewable
Wave	Little/no pollution	Renewable
tidal	Little/no pollution	Renewable
geothermal	Little/no pollution	Renewable
Biomass	Releases greenhouse gases, but this is offset by new growth	Potentially renewable
Fossil fuels	Releases greenhouse gases contributing to global warming	Non-renewable
Nuclear fission	Generates radioactive waste	Non-renewable

2.

a) It is predicted that fossil fuel use will continue to rise in the future. Explain why this might be.

Population numbers are increasing and as our wealth increases each of us are using more energy.

b) State roughly how many more years of supply there is estimated to be of fossil fuels:

Coal: 230 years

Oil: 100 years

Natural Gas: 170 years

Rutherford and Williams

3. Give reasons why consumption of fossil fuels *might* decrease in future, even before these resources run out.

Countries will increase their use of renewable energy. We now have technology to reduce our energy consumption and to increase its efficiency of use.

Energy Choices and Security

1. Societies must make choices as to how they provide their required energy. List the factors that may influence a nation's energy choices.

availability of supply, technological developments, politics, economics, cultural attitudes, sustainability, environmental consideration

2. Explain how energy choices might influence the independence of a nation.

The more self-sufficient a country is in terms of its energy use/need the more independent it will be.

3. Define "Energy Security".

is the ability to secure affordable, reliable and sufficient energy supplies for the needs of a particular community.

4.

a) Complete the table on the next page listing reasons why a nation may have greater or lower energy security. Use the phrases listed, but also add your own ideas.

- Most energy from fossil fuel imports
- A windy climate
- Large oil fields present in the country
- A cold climate: little sunlight and wind
- Advanced knowledge and of and technology for nuclear fission
- A sunny climate
- A nation with a wide coastline
- Most energy supplied via renewable from a slightly politically hostile nation
- Geologically active land
- An MEDC

Factors that give a nation greater energy security	Factors that give a nation lower energy security
A windy climate - use wind power	Most energy from fossil fuel imports
Large oil fields present in the country	A cold climate: little sunlight and wind
Advanced knowledge of and technology for nuclear fission	Most energy supplied via renewable from a slightly politically hostile nation
A sunny climate: use solar power	
A nation with a wide coastline (use wind, wave or tidal power)	
Geologically active land (can use geothermal power)	
An MEDC	

b) Explain your decision to put MEDC in the category you have chosen.

Have greater resources for development of alternatives

5.

a) Explain how the distribution of energy sources may lead to conflict.

Fossil fuel deposits are clumped in some areas eg China & Middle East and Russia. So some countries have to buy fuel from others. This only works well if it is economic to do so and there is peace

b) Explain, using specific nations as examples, how future changing energy uses could lead to conflict. You can speculate about future political relationships, but your speculations must be supported by evidence as well as sensible predictions.

The middle east is the major global focal point of oil exports. The long-running tensions in the region have caused serious concerns about the vulnerability of oilfields, pipelines and oil tanker routes.

most Middle East oil exports go by tanker through the Strait of Hormuz - this is a very narrow body of water between the Persain Gulf and the Gulf of Oman. The strait of Hormuz is vital for the main exporters in the Gulf region whose economies are built around oil and gas production. UN rules all countries to exercise control up to 12 nautical miles from their coastline. This means that at its narrowest point the strait and its shipping lanes lie entirely within Iran and Oman's territorial waters.

The US has now beefed up its military presence in the region But it has also said it keen for other countries to play a part in safeguarding the Gulf and wider region.

The UK is providing naval escort for British-flagged ships passing through the straits of Hormuz

Both of these were in response to several incidents in July 2019 in which tensions between Iran and Britain and America rose. If oil and gas continue to be the main source of energy peace in the middle east is vital.

Other examples include:
Tensions between Denmark and Russia over gas and oil reserves in the Arctic Ocean.

6. Use the information in the table to **evaluate the energy security of nations A and B.** (The information for nation C is useful background information). In your answer you should **state which nation (A or B) is "more secure"** and support your opinion.

Nation A	Nation B	Nation C
• Democratic government • Primary source of energy is from oil, traded from Nation C. • Nation A and C have similar cultures and a long history of trade and cooperation. • Very little of any fossil fuels available within its own borders. • The government previously invested in nuclear research but mass protests following a minor accident have resulted in a complete halt to all nuclear power. 0% of the energy comes from nuclear sources. • Wind turbines are used widely, though the climate varies and there are "windy seasons". • Investing heavily in solar energy, though insolation is unpredictable.	• Dictatorship. • Relies primarily on large crude oil fields within it's own borders. • About 20% of the energy supply is from nuclear energy • Climate is ideal for harvesting solar energy. Currently 2% of energy is solar, but little investment being made into solar power methods. • A heavily industrialised nation with large energy demands.	• Democratic government • Strong ties with Nation A; a long history of trade and cooperation. • Significant differences in cultural and religious ideals have resulted in a history of war with Nation B until mid 20th century. Relationship is improving and some trade agreements now exist. • Huge oil and natural gas reserves. • Investing heavily in fracking, though this has been portrayed negatively in the primarily left-wing media. Protests and social media campaigns are relatively common.

The energy choices made by a society depend on many factors

* Availability of supply - Nation A relies on Nation C for its oil whereas nation B relies on oil fields within its own borders.
* Technological advancement - Nation A developed alternate sources of energy (wind turbines and solar) whereas Nation B is not developing this as much.
* Politics - Nation A has a good relationship with nation C, Nation B although not dependent on Nation C for oil is improving their relationship.
* Cultural attitudes - Nation A and C share similar culture, Nation A seems more inclined to find safe alternatives to fossil fuels and

respond to citizens' safety concerns. Nation B does not seem as inclined to invest in alternative energy at this point.

Overall Nation A is more secure - while it does not have any oil and gas reserves of its own it has good relationship with the nation providing its gas and oil and that nation has huge reserves. It has the ability to invest in alternate energy and is responsive to any protests about safety, Nation B with its large crude oil fields within its borders is less secure as it does not invest in alternate energy, has large energy demands that may soon deplete its resources and does not have good relations with countries that could supply its gas and oil.