

1984 -6

Geography Test Energy & Resources 19, Name: Tuttmann Nick

1. Define following words in one sentence each: (2p)

Secondary Energy:

Energy that is transported from the power plant to the end-user.

Reserves:

All currently known and probably ~~exploitable~~ <sup>exploitable</sup> oil or gas etc. reservoirs.

Blow out:

Spill of oil at a borehole due to the enormous pressure of the oil.

Statistical life of reserves:

The amount of time the known and probably <sup>or unknown</sup> exploitable reservoirs will last without considering the future <sup>or unknown</sup> use or consumption.

2. Answer with yes or no: to oil: (1p)

- The expenses to produce a barrel of crude oil is higher than it used to be 20 years ago yes
- The statistical live of oil reserves is much longer than the dynamic live of oil resources no
- The theory of peak oil was claimed by a scientist in the last century no
- Peak oil is the time when costs for oil extraction start to increase no

3. And again: (1p)

- If the crude oil price rises, oil reserves change to oil resources yes
- If the technology of oil production improves, the oil price will therefore fall yes
- The amount of useful energy is bigger than the amount of secondary no
- The advanced technology in oil production will enlarge the total oil reserves yes

4. How do you think the oil price can be influenced by the following topics: (1.5p)

Speculation: Speculation leads to huge fluctuations in the oil price, but in both ways (up and down). This is due to the nature of speculation: They are very unstable and react drastically to the smallest events.

OPEC-States agreements: The OPEC-States can basically determine the price of oil because they have the majority of oil. Without them the price would be about 25 dollars per barrel, but nowadays it is actually 80 dollars per barrel.

Holiday season: = Weihnachten, weil da die meisten (industriellen) demand for electricity (Wohnungsbeleuchtung etc.) → higher price for energy and thus oil. Many Holiday presents are made out of plastic, which requires oil to be produced.

Nick



5. Why do you think the electricity consumption in Switzerland is not rising any more? (1p)

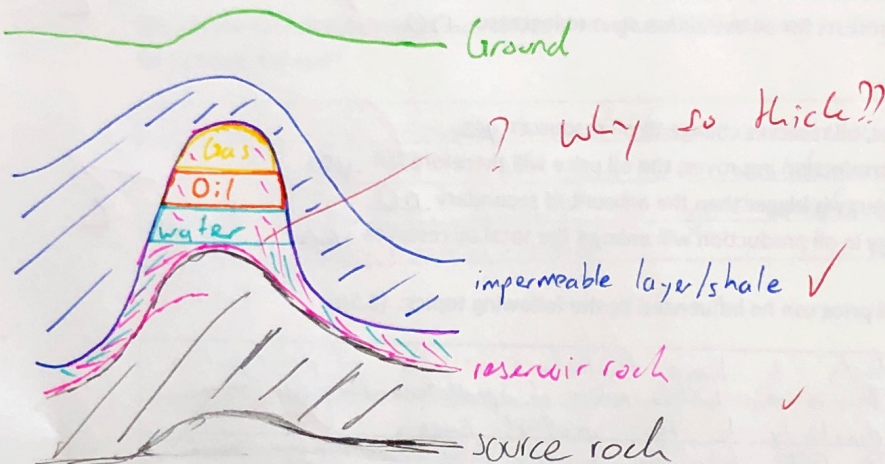
Our population only grows slowly. We are aware of the problems and use energy efficient devices. We (try) to use less energy because we are aware of the problem.

6. What are the risks of the future arctic oil exploitation? Explain two of them. (2p)

An oil spill would have huge effects on the environment. Many species would die. Because it is so cold, the oil would remain basically forever. And the ecosystem in the arctic is very, very sensitive.

The cost of oil or petrol could drastically sink, thus encouraging the use of carbon based energy. It would also attract many other companies to work in the arctic.

7. Draw an anticline oil trap and name the important layers. Mark with colours the area where water, gas and oil can be found. (2p)





8. Why are the conversion losses in a diesel engine much bigger than in a hydropower generator?  
(1p)

In a diesel engine, heat is used to transform energy. Because heat is a low energy carrying form of energy, the losses are big. Secondly, in diesel engines there are two energy conversions (chemical  $\rightarrow$  heat  $\rightarrow$  mechanical), where as in hydropower there is only 1 ~~transformation~~ (kinetic/potential  $\rightarrow$  mechanical).

Answer with "Yes" or "No" to your presentations.

9. OTEC and Wind Power: (1p)

- Open cycle OTECs produce as side products salt and water yes
- Ammonia is used in some OTECs as a fluid to convey the heat flow yes
- In Switzerland only around 10% of the total energy is produced by wind power no
- Horizontal-axis wind turbines have the higher efficiency than vertical axis turbines yes

10. Waves and tidal energy / geothermal energy (1p)

- There are only experimental tidal energy power plants at present yes
- <sup>delta</sup>Estuaries are good places to install tidal barrages yes
- The best places for geothermal energy use in Switzerland are in the northern parts yes
- A major problem of geothermal energy is the fact that it cools down the inner of the earth no

11. Nuclear fusion / solar power plants (1p)

- At a nuclear fusion helium cores change to deuterium and tritium no
- The first nuclear fusion power plant was installed in 1951 no
- The energy of a solar updraft tower is produced by steam pressure no
- CSP stand for concentrated solar power yes

12. Hydrogen / photovoltaic energy (1p)

- An on-grid photovoltaic system is cheaper and more often installed than off-grid systems yes
- Only one year after photovoltaic cells are installed, the installation costs are smaller than the gain from the electricity they produce no
- The energy in hydrogen fuel cells is gained by nuclear fusion no
- It is easier for cars to have zero-fuel emission than zero-emission yes

13. Yes and no once again: (1p)

- Below Switzerland the temperature is around 200°C in a depth of 5000 meters yes
- Hydropower in Switzerland produces more energy than atomic power yes
- Switzerland uses its nuclear material for the production of nuclear weapons no
- There are plans of the Swiss government to install more wind energy plants yes

3 400

15 500

15 1000



ground

14. What is meant by ambient heat? Give an example how it is used normally in Switzerland. (2p)

Ambient heat is warmth that is normally around us. This can be in the form of warm air, water or warm ground. In Switzerland, geothermal energy usage (using the ambient heat of the ground) is the most common. It is mainly used for heating of homes.

2

→ airguns

15. Why could the **exploration** of oil below sea ground damage the environment? Explain. (1.5p)

Because in seismic operations, which are most common below sea ground, an airgun is used to produce shockwaves. These shockwaves however can erupt fish bladders and interfere with communication of certain animals like whales. The large ships and hydrophones can also be problematic for the marine life.

Me

**Bonus Question: (1p)**

Why is the CO<sub>2</sub>-problem even not solved if the global CO<sub>2</sub>-emission is reduced to zero? What would be needed instead?

Because we already moved huge amounts of carbon from the big to the small cycle. We would need to put it back into the ground to get back to the time before the industrialisation.

1

Bonus Point from homework

1