

NUCLEAR FISSION - a controversial outlook

Speaker1

Stephen Stretton - "The Environmental Case for Nuclear Energy"

Stephen is a research Associate at the Cambridge Centre for Climate Change Mitigation Research (4CMR). He also founded a climate energy policy group: the Cambridge Zero Carbon Society.

Brief notes of speech:

The world is facing two major problems – (i) climate change and (ii) crisis of secure energy source, which are two inter-related problems, which could be tackled with the same solution.

Greenhouse effect

- Caused by carbon dioxide emission as a result of fossil fuel combustion, which provides 85% of the world's energy supply, and accounts for 3% global GDP
- It is predicted that energy consumption would double in 2050, and global average temperature would increase by 3 deg C
- Problems that climate change is causing to the environment include: Collapse of the Amazon rain forest, Ice melting in the Arctic
- International agreement to tackle climate change has been difficult and countries act inconsistently on related policies

Energy source

- Renewable energy resources (wind, tides *etc.*) available in the UK– can only supply 20% energy consumption of the country, therefore, it would not be enough to replace fossil fuel as the major energy source
- Large increase in demand for energy, *e.g.* in China – 2 new power stations being built each month (statistically)

Solution – nuclear energy

- Uranium – a secure energy source
- Safety – risk is small – close to zero according to studies
- Need to communicate to the public that it's not more dangerous than conventional energy sources
- Highest rate of nuclear power plant construction in the 1980's, *e.g.* in France, 5 Gigawatts of nuclear power established per year
- Total power consumption in Britain: 240 GW, can be supplied by construction of 3 nuclear power plants
- Heating and transport systems (cars and trains) – currently run by fossil fuel systems need to be converted in order to use nuclear energy as a power source

Questions:

Q: Concerns about safety issues of nuclear power plants, about the disposal of used uranium, which is highly radioactive.

A: to be stored underground in clay using metallic containers, need to develop new storage systems.

Q: i Questions about uranium abundance and how long it can last for.
ii. Would using nuclear energy to generate electricity lead to a higher cost of electricity production?

A: i. Uranium at present can provide energy for about 85 years using conventional reactors. Using fast reactors, which produces 25 x more energy, can prolong to 380 years.

ii. According to predictions, using nuclear energy to generate electricity is not likely to increase cost of electricity production.

Q: Concerns about risks of nuclear power plant

A: Wildlife is not threatened by nuclear power plants. Two types of power plants in use: Eastern (used in Russia) and Western type, the later is safer as it has a concrete shield.

Q: Concerns about the population scared of risks of nuclear power plants

A: Solution: build new plants close to existing plants, to avoid introduction of new plants to new area. Cumbria, Northern England appears to be a suitable place, as building of new plant would bring job opportunities, which would be good for the region. Also need to educate the public that the risks associated is low rather than high. Big reactors are also more suitable to be used in the UK, as it is easier to manage than small reactors.

Critics:

Uranium would not last for a long time, huge investment into nuclear technology without a guarantee.

Speaker 2

Ian Ralls - "Nuclear Power - How not to boil water"

Ian is the treasurer of the Cambridge Friends of the Earth, an organisation whose objective is to challenge environment damaging activities and policies by promoting sustainable alternatives.

Potential of using nuclear energy

Nuclear power is safe in reality, and the UK can achieve 30% cut in carbon dioxide emission if switched to nuclear power.

Downside of switching to nuclear energy

- If the world uses more nuclear power, would have to switch to lower-grade uranium or plutonium, which cannot be used in conventional reactor, and new types of reactors have not proven to work yet.
- Process of uranium extraction – emits carbon dioxide, cut emission not as much as expected.
- Large nuclear power stations – need large amount of water for cooling
- Nuclear waste has half-life of thousands of years, waste considered safe after 12 x half-life, which would be millions of years
- Even if the world double nuclear power usage, carbon dioxide emission would only decrease by 6%

Renewable energy

- should encourage the use of renewable energy
- UK has a lot of wind and wave resources
- Abundant Solar power in the Sahara, could potentially distributed by high voltage transmission
- electricity generation by nuclear energy vs. wind energy, which one is cheaper after taking account of expensive cost of nuclear plant?

Cut energy usage and improve energy efficiency

- From 1969 to 1999? – GDP of US increased by 20%, while energy use increased by 5% only, increased less in proportion because of improved efficiency in energy use.
- Improve energy efficiency in building design
- Use CHP to improve energy efficiency

Debate from Stephen:

Energy conservation is feasible in new and well-designed buildings only however expensive for old buildings to be retrofitted. It was suggested that electricity heat pumps are better solutions.