

Question 27 (4 marks)

There are two areas in which energy savings can be made by the use of superconductors. These are:

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- electricity generation and transmission;
- transportation.

Discuss how energy savings can be achieved in each of these two areas.

If superconductors were used in electrical generation, no energy is lost in the form of heat and so energy is saved. In electricity transmission, power is lost according to $P = I^2R$, but if resistance was zero, then no power is lost. Therefore power stations can be built in areas not affecting civilisation, and energy can still be transmitted through ^(superconducting) wires without any power loss.

The Maglev train uses superconductors and contemporary electromagnets to "lift" or levitate the train. This is because superconductors expel all magnetic fields.

This way, the train can travel at amazing speeds because there is no friction, and ~~this allows~~ also less maintenance and repair is required since there are no parts in contact.