

Year 3 Physics HT2

HT2 **Energy – Conservation of Energy and Efficiency; Energy Resources**

4.1.2 Conservation and dissipation of energy

4.1.2.1 Energy transfers in a system

Content

Energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed.

Students should be able to describe with examples where there are energy transfers in a closed system, that there is no net change to the total energy.

Students should be able to describe, with examples, how in all system changes energy is dissipated, so that it is stored in less useful ways. This energy is often described as being 'wasted'.

Students should be able to explain ways of reducing unwanted energy transfers, for example through lubrication and the use of thermal insulation.

The higher the thermal conductivity of a material the higher the rate of energy transfer by conduction across the material.

Students should be able to describe how the rate of cooling of a building is affected by the thickness and thermal conductivity of its walls.

Students do not need to know the definition of thermal conductivity.

Required practical activity 2 (physics only): investigate the effectiveness of different materials as thermal insulators and the factors that may affect the thermal insulation properties of a material.

4.1.2.2 Efficiency

Content

The energy efficiency for any energy transfer can be calculated using the equation:

$$efficiency = \frac{useful\ output\ energy\ transfer}{total\ input\ energy\ transfer}$$

Efficiency may also be calculated using the equation:

$$efficiency = \frac{useful\ power\ output}{total\ power\ input}$$

(HT only) Students should be able to describe ways to increase the efficiency of an intended energy transfer.

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4.1.3 National and global energy resources

Content

The main energy resources available for use on Earth include: fossil fuels (coal, oil and gas), nuclear fuel, bio-fuel, wind, hydro-electricity, geothermal, the tides, the Sun and water waves.

A renewable energy resource is one that is being (or can be) replenished as it is used.

The uses of energy resources include: transport, electricity generation and heating.

Students should be able to:

- describe the main energy sources available
- distinguish between energy resources that are renewable and energy resources that are non-renewable
- compare ways that different energy resources are used, the uses to include transport, electricity generation and heating
- understand why some energy resources are more reliable than others

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- describe the environmental impact arising from the use of different energy resources

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- explain patterns and trends in the use of energy resources.

Descriptions of how energy resources are used to generate electricity are **not** required.

Students should be able to:

- consider the environmental issues that may arise from the use of different energy resources
- show that science has the ability to identify environmental issues arising from the use of energy resources but not always the power to deal with the issues because of political, social, ethical or economic considerations.

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