

3.1: CONSERVATION OF ENERGY

Systems

In a closed system with no energy transfers in or out, the total energy is constant

Energy cannot be created or destroyed, only transferred from one form to another

Law of Conservation

Higher thermal conductivity means greater rate of energy transfer

Thermal conductivity

Reduces heat loss to surroundings

Insulation

Lubrication

Reduces heat loss due to friction

Less waste energy means a more efficient appliance

Efficiency

Waste Energy

Some supplied energy transformed into non-useful forms

Efficiency =

$$\frac{\text{Useful Energy Transferred}}{\text{Total energy supplied}}$$

Doubling speed quadruples KE

Moving objects have KE

$$KE = \frac{1}{2} \times \text{Mass} \times \text{Velocity}^2$$

Kinetic Energy

Objects at a height have GPE

$$GPE = \text{Mass} \times \text{Gravitational Field Strength} \times \text{Height}$$

Gravitational Potential Energy

Energy Transfers

Bungee jumper

GPE → KE as jumper falls

As cord stretches, KE → Elastic Potential Energy, slowing down the jumper

Electric kettle

Electrical energy → heat energy

Energy wasted as sound & heat to surroundings

Vehicle braking

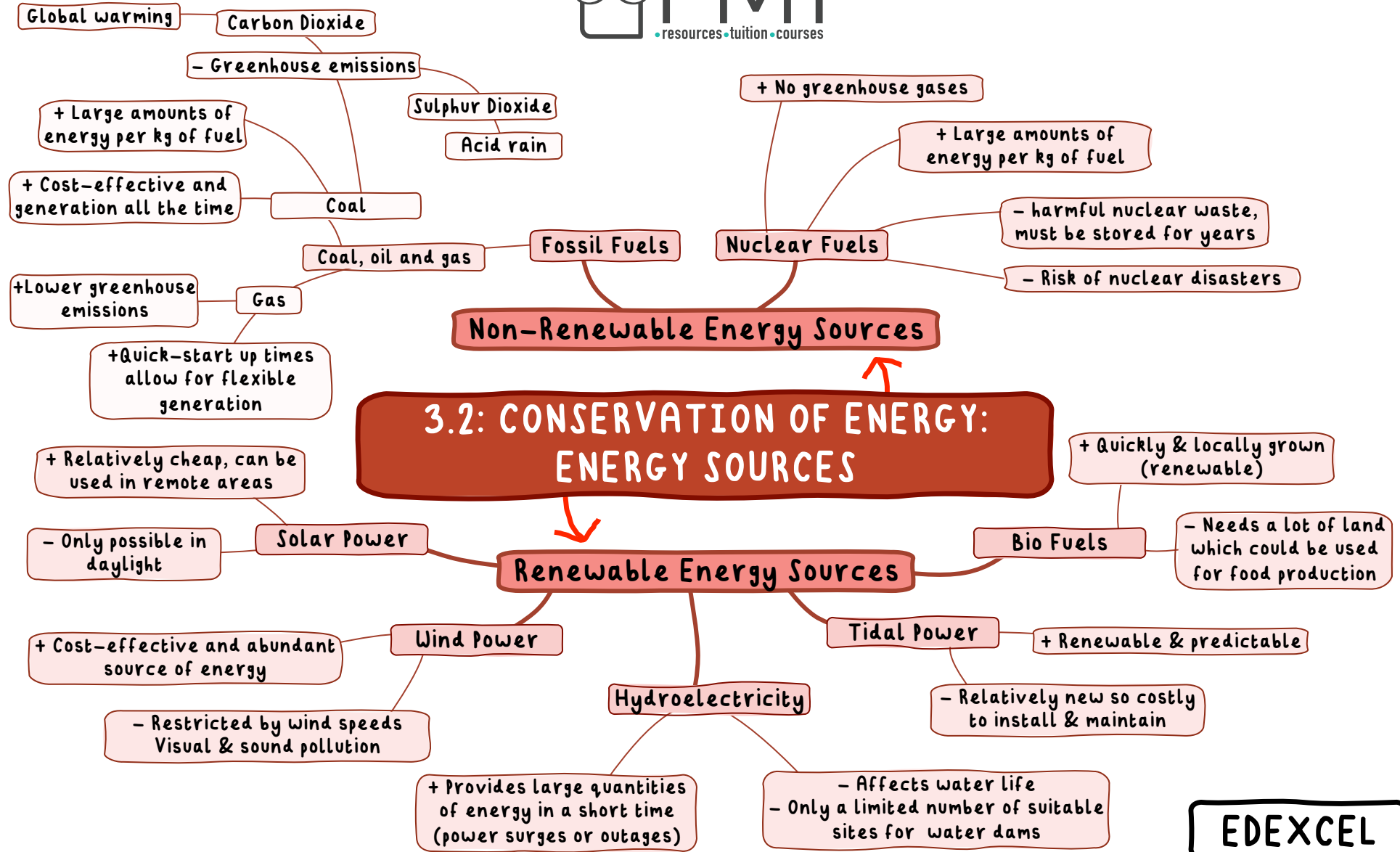
KE → heat energy by friction in the brakes

Vehicle slows down

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3.2: CONSERVATION OF ENERGY: ENERGY SOURCES



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