Title

What's the science story?

Introduction to energy and energy equations. The SOW is linked throughout towards a design/build of an eco-house, to decrease energy transfer and think about renewable energy resources.

Previous knowledge:

Links to Energy at KS4

Next steps…

Knowledge of particles, energy transfer and how particles behave in 3 stages of matter.

Keywords

Energy
Tranfer
Wasted
Useful
Power
Renewable
Fossil fuels

Insulator
Conductor
Conduction
Convection
Radiation
Absorb
Emit

Potential
Nuclear
Thermal
Efficiency

KS3 – Year 9

Working scientifically skills:	**Assessments:**
WS1 scientific method WS 3 Make predictions WS9 Variables WS10 Selecting equipment WS13 Constructing tables WS14 Graphs WS15 Data WS16 Using equations WS18 Converting units	Exit tickets x 2/3 (formative) • Comparison based on information, including equations. • Evaluate renewable/non renewable energy source.

Lesson No. and Title	Learning objectives	National Curriculum	Practical equipment
1. Energy Transfer - Conduction	ARE – Explain conduction in terms of particles and plan how to test conduction in different materials. AGD – Link understanding of conduction to materials and their uses.	• heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators	
2. Conduction- practical	ARE – Conduct practical and make conclusions. AGD – Link understanding and observations to materials and their uses.	• heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators	Rods of different materials Vaseline Stop watches Drawing pins

KS3 – Year 9

3. Energy Transfer – Convection	ARE – Explain convection in terms of particles. AGD – Link understanding of convection to different contexts.	• heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators	Demo – convection tube
4. Energy transfer - Radiation	ARE – Explain how energy is transferred via radiation. AGD – Link understanding of radiation to methods in reducing heat transfer.	• heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators	Huddling penguins. Beakers, test tubes, kettle, thermometers, stop watches, elastic bands.
5. Energy transfer - insulation	ARE – Compare different materials as thermal insulators. AGD – Evaluate data on thermal insulators and link to design.	• heating and thermal equilibrium: temperature difference between 2 objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference; use of insulators	Beakers, various insulation materials, lids, thermometers, stop watches.

KS3 – Year 9

6. More energy transfers	ARE – Define different types of energy and apply to everyday objects. AGD – Apply knowledge to unknown situation.	• other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels	
7. Efficiency	ARE – Apply the efficiency equation. AGD – Explain why appliances cannot be 100% efficient.	• energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change	
8. Power and Work Done	ARE – use the equation for power and work done AGD – re-arrange the equation and apply to appliances	• energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change • comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions	

KS3 – Year 9

9. Energy in Food	ARE – Explain the importance of eating a variety of food groups. AGD – Conduct an experiment to investigate the amount of energy in foods. Compare theory to practical results. Evaluate.	• comparing energy values of different foods (from labels) (kJ) •	Boiling tubes, stop watches, different foods, thermometer. Food labels
10. Cost of electricity	ARE – Calculate electricity use from an electricity bill. AGD – Explain ways to reduce energy usage.	• comparing power ratings of appliances in watts (W, kW) • comparing amounts of energy transferred (J, kJ, kW hour) • domestic fuel bills, fuel use and costs •	Fuel bills
11. Energy demands	ARE – Describe the operation of power stations. AGD – Compare energy use from different sources and different societies from available data.	• fuels and energy resources •	Power stations to stick in

KS3 – Year 9

12. Design and build an eco house	ARE – Use previous knowledge to design an eco house. AGD – Apply equations and evaluation of previous knowledge to a deeper level when applying to house design.	•	A3 paper, building materials (optional), help sheets.