Science
Year 7: Energy

Assessment Opportunities	Literacy/Reading opportunities	CEIAG Links
• Regular low stakes quizzing of AO1- self marked. • In class past paper questions where – self / peer marked • Extended writing is teacher marked with personalised feedback provided. • End of unit assessment self & teacher marked with collective feedback provided.	**Reciprocal reading:** Comparing renewable and non-renewable energy resources **Key vocab is highlighted in the SOL**	**Spotlight on careers: Mechanical engineer** Other careers: • Renewable energy sector • Environmental sector • Civil engineer • Research physicist – energy

Curriculum vision:

"Our aim is to deliver a curriculum that is inclusive, relevant and progressive for all learners."

- **KS3 Energy**

Big Picture:
This unit on Energy gives the students an insight into the different stores of energy. This unit plays a pivotal role at KS3 in developing the understanding of energy using subject specific vocabulary, real-life examples, and links to careers/sectors where the idea of energy is used. Students arrive with many misconceptions surrounding energy, therefore the intention behind this unit being studied in Y7 is to address these, whilst also setting the students up for other units whereby an understanding of energy is required as foundation knowledge to build ideas upon.

Lesson sequence	**Learning outcomes / Key knowledge (including NC KS3)** Interleave / review. Scaffold	**Skills development:** Reading / writing / data / numeracy / graph work	**Spec / book reference**
1. **TBAT:** Describe energy and how we use it.	• Develop a concrete definition of energy. • Discuss real-life examples of what energy is and how we use it. • Link the concept of energy to work done. • Recognise the units of energy being Joules. Link to biology cells unit and how the mitochondria release energy – address this common misconception again. ○ Use visual aids – including prac demonstration and pictures to prompt discussion. ○ Provide knowledge organisers / key vocab with definitions.	• Practical demo for boiling of water to visualise how energy is transferred between objects and what more/less energy may look like.	**Spec NC pos <u>here</u> pg9-10** **Boost book 1 page 103**
2. TBAT: Identify energy stores in different objects.	• Define what an energy store is. • Describe ways that energy stores can be changed. • Link this to the concept of energy conservation. • Use a mnemonic to help remember the different energy stores. ○ Use visual aids – including pictures and examples to prompt discussion about energy stores. ○ Define key vocab associated with the energy stores ○ Use of timed information hunt task to get students moving – can also be done differently (research task)	• Optional development of table drawing skills – template has been provided to support.	**Spec NC pos <u>here</u> pg9-10** **Boost book 1 page 103**

3. **TBAT:** Describe the conservation and dissipation of energy.	• Define the law of conservation of energy. • State the 4 energy transfer pathways with examples. • Describe how energy may change between the stores via the pathways. • Draw energy transfer diagrams using the correct stores and pathways. ○ Use of diagrams for energy transfers and pathways to provide a visual aid ○ Scaffolded for students using examples ○ Template provided for energy transfer diagram task		**Spec NC pos here pg9-10** **Boost book 1 page 103**
4. **TBAT:** Describe changes to energy stores.	• Describe how energy changes between stores within a system. • Apply the law of conservation of energy too energy transfers. • Use the idea of energy stores filling up and emptying to help understand the idea of energy transfers ○ Use of energy stores filling and emptying to help visualise energy transfers ○ Use of images and videos to support		**Spec NC pos here pg9-10** **Boost book 1 page 103**
5. **TBAT:** Investigate the energy stored in food.	• Evaluate the energy requirements of a person based on their activity level. • Give the units for energy from food. • Demonstrate that different foods provide differing amount of energy Link to biology unit on food and nutrition – further links to DT dept with calorific value of different foods ○ Table template to use. ○ Option to run as a slow practical. ○ Breakdown the use of language associated with method. ○ Reading rulers used to read method ○ Modelling of practical	• Practical to investigate the amount of energy from different foods. • Evaluation and conclusion of practical inquiry • Recording results in a table and using equipment (thermometer)	**Spec NC pos here pg9-10** **Boost book 1 page 103**
6. **TBAT:** Describe advantages & disadvantages of renewable and non-renewable energy resources.	• Define what renewable and non-renewable energy resources. • Describe the difference between energy resources • Explain how basic energy resources produce electricity • Evaluate the advantages and disadvantages of different energy resources Link to climate change and environment – possible links to geography.	• Extracting information about different energy resources • Table drawing (optional)	**Spec NC pos here pg9-10**

	○ Table template to use. ○ Can run as an information hunt or do as a class or research practical ○ Video to support visually		**Boost book 1 page 103**
7. **TBAT:** Compare the advantages & disadvantages of renewable and non-renewable energy resources.	• Evaluate a suitable energy resource to use. • Consider the environmental, ethical, and economical implications of using each energy resource. • Justify your preferred energy resource and explain why you chose this. ○ Sentence starters for writing task ○ Go through how to plan and set out writing task ○ Model to students how to write a comparative piece of writing	• Plan a piece of extended writing. • Write a comparative piece.	**Spec** **NC pos here pg9-10** **Boost book 1 page 103**
8. **TBAT:** Engage with a scientific article.	• Discuss the environmental impact of burning fossil fuels. • Analyse a piece of text about energy and the environment. ○ Reading rulers, tracking as teacher reads ○ Larger text chunked as needed. ○ Modelling highlighting & annotation of text	• Reciprocal reading	**Spec** **NC pos here pg9-10** **Boost book 1 page 103**
9. **TBAT:** Calculate power, energy or time using an appropriate equation.	• Define power and work done • Use the equation that relates power, work done and time. • Apply the equation that relates work done, force and distance • Rearrange both equations ○ Use of modelled examples ○ EVERY (Equation, Values, Enter, Results, Units) to answer equation based problems	• Equations practice • Rearranging equations	**Spec** **NC pos here pg9-10** **Boost book 1 page 103**
10. **TBAT:** Calculate the efficiency of energy transfers.	• Define efficiency • Evaluate what makes an energy transfer efficient • Apply the equation for efficiency in terms of energy and power • Rearrange both equations ○ Use of modelled examples	• Equations practice • Rearranging equations	**Spec** **NC pos here pg9-10**

	○ EVERY (Equation, Values, Enter, Results, Units) to answer equation based problems		**Boost book 1 page 103**
11. TBAT: Describe how we can make our homes and buildings more energy efficient.	• Describe the ways we can reduce unwanted energy transfers in our homes and buildings • Evaluate the best method of keeping the houses or buildings warm • Understand what a U value is and how to is affected by thickness and material of a wall ○ Table template to use. ○ Can run as an information hunt or do as a class or research practical		**Spec NC pos here pg9-10** **Boost book 1 page 103**
12. TBAT: Calculate the cost of energy.	• Define a kilowatt hour • Use an equation to calculate the cost of energy in pence • Apply the equation to situations where we have to calculate the cost of an energy bill ○ Use of modelled examples ○ EVERY (Equation, Values, Enter, Results, Units) to answer equation based problems	• Equations practice • Rearranging equations	**Spec NC pos here pg9-10** **Boost book 1 page 103**

Vocab				**Links to previous learning / interleaving**	**Assessment & homework**
L3 Vocab Kinetic Energy Potential Energy Thermal Energy Chemical Energy Electrical Energy Energy Transfer	Work Renewable Energy Non-Renewable Energy Fossil Fuels Solar Energy Wind Energy Hydroelectric Energy Biomass Energy Heat Transfer	**L2 Vocab** Energy Power Efficiency Conduct Insulate Conserve Force Calories Transfer Dissipate Wasted Useful	**Command words focus** Label Plot Measure Predict Identify Estimate Observe Justify Evaluate Compare	**KS3 cells** ○ Mitochondria **KS3 Forces** ○ Work done ○ Pushes/pulls ○ Contact/non contact forces **KS2** ○ Forces ○ Electricity ○ Magnets	• Regular low stakes quizzing of AO1 • In class assessment of AO1, AO2, AO3 using past paper questions where appropriate • Written word is assessed with personalised feedback provided. • End of unit assessment marked with collective feedback provided. Homework is set weekly and is outlined in the half-termly homework booklet. Homework includes • online quizzes on Carousel

Conservation of Energy	construct		• Learning of content for in-class quizzes • Completion of written questions.

Independent learning Energy - KS3 Physics - BBC Bitesize Food and Fuels - YouTube Energy Stores and Transfers (youtube.com) Energy and Temperature (youtube.com) Energy Resources (youtube.com) https://www.youtube.com/watch?v=VtfLS2-jqyE&list=PLyf3QQ9ddzgngBzZiwWcEBuRoKUYaXS6N&index=28 Work, Energy and Machines (youtube.com)	**Misconceptions / common errors** • Energy can be made • We can make energy using energy resources • Energy is always about movement • Energy is a substance