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## Environmental and Land-based Studies

### Level 2 Unit 8: Sources and uses of energy

#### Sample scheme of work

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This is an example of a scheme of work. You can adjust it or extract content to create a scheme of work to suit your delivery needs. It can also be adjusted by adding theory workshops to support learners who have/need additional learning time.

This unit is assessed through a centre set and marked assignment, which will be externally moderated.

<b>Total GLH</b>	30
<b>Delivery model</b>	Based on teaching 1.5 hours per session.
<b>Aim</b>	Learners will gain an understanding of the sources of energy used within the ELB sector and their impact upon the environment. They will be able to conduct an energy audit, draw conclusions and make recommendations to reduce energy consumption and pollution.
<b>Notes</b>	<p>If this unit is planned to run parallel to the work placement, learners will be able to conduct their energy audits on these enterprises.</p> <p>All guest speakers will need detailed guidance on the material you wish them to cover to ensure that the requirements of the course are met.</p> <p>The three functional skills units for ICT (use ICT appropriately, find and select information, and develop, present and communicate information) are abbreviated as follows: Use ICT, F&amp;S ICT and DPC ICT.</p>

Topic	Activities, assignments, assessments	LO and AC	PLTS	FS	GLH	Resources and other comments
<b>1</b> Introduction to the unit	<p>Learners must define ‘renewable energy sources’ and ‘non-renewable energy sources’.</p> <p>Ask learners to identify energy sources they are aware of. Working in groups of three, learners should research the advantages and disadvantages of each energy source. They should then list which of these energy sources are being used within the UK and Europe, and which are predominantly used in each country around the world.</p> <p>For three given ELB businesses, ask learners to state the energy sources that will be used.</p>	AC1a	CT1 IE4 TW1	R1, 2 SL1 W1, 3 Use ICT 1.1–1.4 F/S 2.1, 2.2	1.5	Resources required: SMART Board and internet access.
<b>2</b> Energy source comparison	<p>Ask learners to each choose an ELB business. For their chosen enterprise, learners need to produce a report, detailing the comparison of energy usage between one century and another. They must consider the difference in energy consumption between, for example, windmills, offshore wind farms, watermills, hydroelectricity and turbines.</p> <p>If time allows, ask learners to write a report for reusing waste energy, eg trapping heat energy from dung heaps.</p>	AC1a	CT1, 2 IE4 SM1, 2	R1, 2 SL1 W1, 3 Use ICT 1.1–1.4 F&S 2.1, 2.2	1.5	Resources required: energy usage data for a range of local enterprises.
<b>3</b> Wood, coal, gas, oil, and nuclear energy	<p>Ask learners to produce an annotated poster for all five fuel types that explains the cost of building/de-commissioning power plants, the cost of transporting the energy, the charges for using that energy, any waste created by the energy and the efficiency of the power plant.</p>	AC1a, b AC2c	CT1, 2 IE1, 4 SM1, 2	R1, 2 W1, 3 Use ICT 1.1–1.4 F&S 2.1, 2.2	1.5	Resources required: poster materials, computers for research, data detailing the cost of building and decommissioning the power plants.

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<b>4</b> How energy is produced nuclear	<p>Invite two guest speakers, one for and one against nuclear energy.</p> <p>Ask learners to write a report that explains the cost of building/de-commissioning power plants, the cost of transporting the energy, the charges for using that energy, any waste created by the energy and the efficiency of the power plant. Learners must also include environmental issues.</p>	AC1a, b AC2c	CT1, 2, 4 IE1, 3, 4 SM1, 2	SL1 W2–6	1.5	Resources required: depends on guest speakers, computers.
<b>5</b> Wind, solar and wave energy	<p>Invite a guest speaker to explain the cost of building/de-commissioning power plants, the cost of transporting the energy, the charges for using that energy, any waste created by the energy and the efficiency of the power plant.</p> <p>For tidal and geothermal energy and bio-fuels, ask learners to research and explain the cost of building/de-commissioning power plants, the cost of transporting the energy, the charges for using that energy, any waste created by the energy and the efficiency of the power plant.</p>	AC1a AC2d	CT1, 2 IE4 SM1, 2	R1, 2 SL1 W1, 3 Use ICT 1.1–1.4 F&S 2.1, 2.2	1.5	
<b>6</b> How is energy produced	<p>Discuss the term ‘return on investment’.</p> <p>Give learners three scenario cards, each detailing the location and energy consumption of three ELB enterprises.</p> <p>Learners will then need to present a persuasive argument for use of the energy sources, with the quickest return on investment and the lowest environmental impact.</p>	AC1b AC2a	CT1, 2 IE4 SM1, 2	R1, 2 SL1, 2 W1, 3	1.5	Resources required: scenario cards.

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<b>7</b> Energy usage in production, processing and distribution	<p>Divide the class into groups of three. Allocate each group an ELB enterprise. Ask learners to look at the total energy consumption in bringing an ELB product to market.</p> <p>Learners must include all energy sources and usage, including transportation of the product and the energy required to take it to the site of use. Learners should comment on any waste energy produced and if it is or isn't recycled.</p> <p>This work can be presented in a storybook format.</p>	AC1b AC3a	CT1–3 IE1–3 TW1, 2	R1, 2 SL1 W1, 3 Use ICT 1.1–1.4 F&S 2.1, 2.2 DPC ICT 1.1, 2.1	1.5	Resources required: energy usage information to be obtained from a range of ELB businesses.  Links to Unit 7: Monitoring the environment.
<b>8</b> Sociological and environmental impacts of energy usage	<p>Invite a guest speaker from either Friends of the Earth or Greenpeace.</p> <p>Ask learners to write a persuasive report on the benefits of the reduction in energy usage. This should cover the social, environmental and economic benefits.</p>	AC1c, e AC2a, b	CT1–3 EP2 SM1-3	SL1 W2, 4–6	1.5	Resources required: dependent on guest speaker, computers.
<b>9</b> Global energy sources and usage	<p>As a class, discuss energy usage in developing nations and the environmental impact of the use of global energy sources. For example, transporting oil from Saudi Arabia to the site of use, dangers of pollution, economic price rigging of the OPEC countries. Another example is coal: it has cheaper set-up costs but has a high environmental impact.</p> <p>Ask learners to write a letter to their local MP calling on him or her to support underdeveloped countries to produce environmentally friendly energy plants.</p>	AC1d AC2a, b, c	CT1–3 EP2–6 SM1–3	SL1 W2–6	1.5	Resources required: SMART Board, computers.

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10 Bio-fuels	Discuss a case study, such as one on Brazil examining the impact of the use of ethanol/bio-fuel. Discuss the lessons to be learned and whether this type of energy is transferable to other parts of the world.	AC1e AC2c, d	CT1–3 IE–3	R1, 2 SL1 W2, 4–6 Use ICT 1.1–1.4 F&S 2.1, 2.2 DPC ICT 1.1, 2.1	1.5	Resources required: case studies, SMART Board.
11 Waste energy and global warming	Define the term ‘global warming’ and its sources, and discuss its effects.  Also define ‘efficiency’, ‘short-term cost’, ‘long-term cost’ and ‘return on investment’.  Ask learners to list the highest sources of waste energy that contribute to global warming. Learners can then produce a poster on the methods to reduce the production of waste energy.	AC1c	CT1–3 TW1, 2	SL1, 3, 4 W1, 3	1.5	Resources required: world map, multimedia presentations of the effects of global warming.
12 Carbon footprint	Define the term ‘carbon footprint’. Ask learners to work out their carbon footprint. They must take into account travel, light, heat and entertainment. Define the following terms: ‘technology fix’, ‘polluter pays’ and ‘carbon exchange’.  As a class, discuss how world leaders (G8) are trying to implement methods to reduce carbon production in energy generation and usage.	AC1e AC2b, c	CT1–3 IE1, 2 TW1, 2	SL1, 3, 4 W1, 3	1.5	Resources required: computers.  Learners should be able to calculate energy usage and convert it into a common measure.

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<b>13</b> Non-renewable energy sources	Ask learners to produce a timeline listing the various energy sources around the world and their expected date of expiry. They should also report on the implications this will have on the world economy and possible solutions.	AC1c, d, e AC2c	IE1–6	W2, 4–6 Use ICT 1.1–1.4 F&S 2.1, 2.2 DPC ICT 1.1	1.5	Resources required: computers, poster paper, data.
<b>14</b> Calculate energy usage	Use case studies to discuss the methods and information required to complete a detailed energy audit. This is in preparation for when learners will need to complete each stage of an audit using pre-prepared data.	AC3	CT1 IE1 SM2	M1, 2, 4–6, 9, R1, 2 SL1, 3, 4 W2, 4–6	1.5	Resources required: completed energy audits on a range of ELB companies of different sizes.
<b>15</b> Methods of energy reduction	Use case studies to discuss the methods and information required to complete a detailed energy audit.  Using scenario cards, each learner should make a detailed recommendation on methods to reduce energy consumption and wastage.	AC3a, b	CT1, 2 IE3, 4	SL1, 3, 4 W2, 4–6	1.5	Resources required: scenario cards, computers.

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<b>16</b> Possible alternative sources	<p>Use case studies to discuss the methods and information required to complete a detailed energy audit.</p> <p>Drawing on the study of renewable sources of energy within this unit, ask learners to put forward reasoned arguments as to what specific energy sources could be used to replace existing ones. Learners should highlight the positive benefits socially, environmentally and economically for given scenarios.</p>	AC3a, b	CT1, 2 EP2, 3 IE3, 4	SL1, 3, 4 W2, 4-6	1.5	Resources required: case studies, energy audits.
<b>17</b> Assessment: research	<p>Learners will now conduct an energy audit for a chosen ELB enterprise.</p> <p>A suitable venue to carry out this research would be the learners' work placements. This assumes that learners have a detailed assignment brief and the placement runs parallel to this unit.</p>	AC3	CT4, 5 IE1-4 RL3 SM2, 3, 5	M1, 2, 4-6, 9 R1, 2 W2, 4-6	1.5	Resources required: energy consumption records for all methods of energy.
<b>18</b> Assessment: preparation of presentation	<p>The first part of the learner's presentation should cover the global influences on the use of energy and the need to reduce consumption.</p> <p>The presentation must include the efficiency of the energy source, the effectiveness of waste energy reduction and all energy usage.</p> <p>They should also look at how global pressures and limited availability of non-renewable fuels have affected energy use in the UK. Learners should close with a case for renewable sources of energy and consider bio-fuels if applicable.</p>	AC1,2	CT1, 2 EP2, 3 IE3, 4	W2, 4-6 Use ICT 1.1-1.4 F&S 2.1, 2.2 DPC ICT 1.1	1.5	Resources required: computers.

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<b>19</b> Assessment: preparation of presentation (continued)	<p>Learners need to provide a detailed description of their work placement's energy supplies, including renewable and non-renewable sources. Learners should explain the production, processing and consumption of energy usage.</p> <p>Learners then need to interpret their findings from the audit and judge the relevance of these findings.</p> <p>Taking into account the environmental impact of increasing energy demands, learners need to outline the need for their chosen enterprise to reduce its energy consumption. Learners should follow this up with identifying alternative methods that would be more energy efficient and discuss the benefits if all similar UK enterprises adopted this recommendation.</p>	AC1, 2	CT1, 2 EP2–6 IE3, 4	W2, 4–6 Use ICT 1.1–1.4 F&S 2.1, 2.2 DPC ICT 1.1	1.5	Resources required: computers, notes gathered on energy.
<b>20</b> Assessment: presentation	<p>Learners will now make their presentations. If possible, invite representatives from the work placement organisations.</p>	AC3	RL6 SM5, 7	SL1–4	1.5	Resources required: computer, projector and any other resources required by the learner.