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CLIL LESSON PLAN

Power and Planet: Shaping the Future through Renewable Energies

LESSON OVERVIEW

Subject(s)	Economics · Technology
Age Group	11–14 years old
Duration	60 minutes (10' warm-up + 30' main activities + 10' wrap-up + 10' evaluation)
CEFR Level	B1+ / B2

LEARNING OBJECTIVES

Content Objectives

- To differentiate between the energy densities and efficiencies of fossil fuels (coal, oil, gas) and renewable sources (solar, wind, hydroelectric), and to identify their respective conversion processes.
- To evaluate the long-term environmental impact of carbon combustion versus clean energy infrastructure, using the life-cycle assessment concept.
- To determine the feasibility of an energy source based on specific geographic and climatic factors (e.g., solar radiation intensity vs. coastal wind potential).
- To design a simplified energy mix for a hypothetical city that minimises the carbon footprint while maintaining the stability of the electricity supply.
- To justify the need for a global energy transition as a response to anthropogenic climate change, integrating economic and environmental perspectives.

Language Objectives

- To accurately use technical terms such as photovoltaic cells, carbon sequestration, power grid, energy efficiency, intermittent energy and fossil fuel combustion. Support: bilingual visual glossary displayed throughout the lesson; choral pronunciation practice of high-risk terms (photovoltaic, sequestration, intermittent, combustion) before writing and speaking tasks.
- To build complex sentences explaining environmental impact using academic connectors (e.g., Due to the excessive combustion of fossil fuels, greenhouse gases have increased exponentially). Support: connector reference card (due to, as a result of, consequently, therefore, given that) with examples provided before the writing task; teacher models two or three sentences aloud first.
- To use contrast and concession structures to evaluate the energy mix (e.g., In contrast to natural gas, solar energy is inexhaustible; however, its production is intermittent). Support: grammar reference poster with construction formulas and examples, displayed throughout; brief contextualised review before the Energy Mix Challenge.

- To use modal verbs (might, could, may) and first and second conditionals to model the future of energy. Support: grammar reference poster includes modals and conditionals with content-specific examples and a note on the distinction between first (realistic) and second (hypothetical) conditional.
- To describe technical processes using the passive voice (e.g., Electricity is generated when kinetic energy is converted…). Support: writing frame for the Carbon Auditor paragraph specifies where the passive voice is required; two model sentences displayed on the board.
- To interpret and explain a graph representing global energy consumption orally. Support: teacher models a graph explanation using the BICS data analysis phrases; students practise with a partner before presenting to the group.

COMMUNICATION SKILLS

Reading:

- To identify and classify the advantages and disadvantages in a comparative text on fossil fuels and renewable energies.
- To analyse a 'Global Energy Mix' chart to extract percentages of non-renewable resource consumption.
- To follow technical instructions to complete a diagram on the operation of a wind turbine or photovoltaic panel.

Listening:

- To listen to a brief academic lecture on 'decarbonisation' and complete a concept map of the main ideas.
- To identify contrast linkers (e.g., however, on the other hand) in a recorded debate on the use of nuclear versus solar energy.
- To take structured notes on the three pillars of sustainability mentioned in a teacher's explanation.

Writing:

- To write a comparative paragraph using contrasting connectors (e.g., While coal is highly polluting, wind energy…).
- To develop a hypothesis about the future of the climate using conditionals: 'If we replace 50% of fossil fuels with renewables, then carbon emissions will…'.
- To label and briefly describe the components of a renewable energy system in a technical diagram.

Speaking:

- To explain orally the concept of 'carbon footprint' using precise academic definitions.
- To participate in a guided discussion defending the feasibility of a specific energy source based on geographic factors.
- To present a group conclusion on which energy source is the most sustainable using the passive voice (e.g., 'Renewable sources are considered more sustainable because…').

GRAMMAR, VOCABULARY & PRONUNCIATION

Language of Learning (CALP)

Before introducing the English terms, the teacher elicits prior knowledge: 'Do you know this concept in your language?' The teacher writes the English term alongside the L1 equivalent on the board. Students likely know many of these concepts conceptually — the challenge is the English academic form, not the underlying idea. Pronunciation of high-risk terms is modelled by the teacher and practised chorally. Students are not expected to self-correct independently; the teacher circulates during tasks and offers reformulation rather than explicit correction.

Technical terminology: Photovoltaic effect, thermodynamic efficiency, carbon sequestration, hydroelectric dam, fossil fuel combustion, power grid infrastructure.

Sustainability concepts: Intermittency, decarbonisation, energy density, lifecycle assessment, net-zero emissions.

Scientific process verbs: To harvest, to convert, to deplete, to mitigate, to distribute.

Language for Learning (BICS)

All BICS phrases are provided on a printed reference card (one per student) and displayed on a classroom poster visible to all students throughout the lesson — both target language native and non-native speakers benefit from having the phrases in writing during complex academic tasks.

Scientific argumentation:

- 'There is compelling evidence that...' • 'While [X] is more efficient, [Y] is more sustainable.' • 'From a geographical perspective, we can conclude that...'

Data analysis:

- 'The graph illustrates a steady increase in...' • 'A significant correlation exists between...' • 'Comparing the two matrices, it is evident that...'

Debate and consensus:

- 'I see your point; however, have you considered...?' • 'Let's synthesise our findings into a single model.'

Language Through Learning (not planned)

- Emergent language when explaining complex physical concepts using everyday analogies (e.g., comparing the electrical grid to a circulatory system).
- Vocabulary related to current events brought by students (e.g., gas price crisis, new local environmental laws).
- Linguistic curiosities about etymologies (e.g., the origin of photo- and -voltaic).

COGNITION

LOTS — Remembering, Understanding, Applying

- To define key terms such as energy efficiency, intermittency and combustion using a technical glossary provided.
- To identify and label renewable and non-renewable energy sources in a global flowchart.
- To classify different types of energy according to their origin (kinetic, thermal, chemical, solar) and renewability.
- To illustrate the basic process of energy transformation in a solar panel or a coal-fired power plant.

HOTS — Analysing, Evaluating, Creating

- To analyse comparative graphs on the energy density of fossil fuels versus renewables to understand why the transition is a technical challenge. (Analysing)
- To evaluate the suitability of installing a specific energy infrastructure (e.g., an offshore wind farm) in different geographical areas based on actual climate data. (Evaluating)
- To create an 'Ideal Energy Mix' for a future city, justifying the choice of each source through sustainability and cost arguments. (Creating)
- To discuss the economic dilemma: Should developing countries stop using cheap coal in favour of expensive renewables? (Critical thinking and global perspective)

GUIDING QUESTIONS FOR TEACHERS

Pre-lesson and in-lesson self-reflection:

- Have I displayed the bilingual visual glossary and the BICS reference card before the lesson begins, and are they visible from all seats in the room?
- Do my students know the key energy concepts in their first language, and have I planned an elicitation moment before introducing the English technical terms?
- Have I modelled the target structures — academic connectors, contrast phrases, passive voice, conditionals — with content-specific examples before students are expected to produce them independently?
- Have I provided sufficient opportunities for students to use subject-specific terminology in both writing (Carbon Auditor paragraph) and speech (Energy Summit presentation) before asking them to perform in front of the group?
- Have I assigned roles within groups for the Energy Mix Challenge to ensure equitable participation, and do I have a contingency plan if a group cannot reach a consensus within the allocated time?
- After the lesson, do the Carbon Auditor reports and the peer-assessment exchanges provide sufficient evidence that students have achieved both the content and the language objectives?

CULTURE

How does this topic relate to everyday life or current events?

It connects directly to household electricity bills and transportation costs, topics of daily discussion in the news. It analyses international agreements such as the Paris Agreement and climate summits (COP) that affect national legislations. It relates everyday technology (smartphones, electric cars) to the demand for rare minerals and energy.

Are there intercultural, citizenship, or global perspectives included?

Global Perspective: 'Energy Justice' concept — is it fair to require developing countries not to use fossil fuels when developed countries built their growth on them?

Citizenship: Consumer responsibility in choosing green energy suppliers and home efficiency.

Cultural Awareness: Different cultural approaches to nature and resources (e.g., the vision of 'sustainable community' in different parts of the world).

Are life skills (e.g. collaboration, decision-making) addressed?

Decision-making: Evaluate financial and ethical pros and cons when choosing an energy source.

Critical Thinking: Ability to detect 'greenwashing' (false green advertising) in energy companies.

Social Responsibility: Understanding that individual energy savings contribute to collective and environmental safety.

21ST-CENTURY SKILLS

BICS-Related Skills

Collaboration and Socialisation: To work in pairs to share initial impressions on how they save energy at home, using fluent and natural language.

Interpersonal Communication: To participate in the Energy Summit and Gallery Walk dynamics on known energy sources, maintaining the flow of the conversation.

Basic Digital Literacy: To navigate through interactive platforms to visualise maps of wind farms or solar plants intuitively.

CALP-Related Skills

Critical Thinking: To analyse the validity of CO2 emissions data and detect possible biases in reports from the fossil fuel industry compared to environmental organisations.

Complex Problem Solving: To calculate and propose a technical 'energy storage' solution to compensate for the intermittency of renewable energy sources in an electrical grid.

Scientific Communication: To present structured arguments using cause-and-effect connectors and technical terminology to justify a low-carbon energy transition.

Information Literacy: To synthesise information from multiple academic sources (graphs, scientific articles, technical reports) to create a sustainable energy mix model.

	Global Responsibility: To evaluate the ethical impact of materials extraction (such as lithium for batteries) on the transition to clean energy.

METHODOLOGY

Duration	Lesson Flow	Activities	Materials Needed	AI Tools Integration
10'	**Warm-up Activities**	**'The 2050 Vision' — Structured Visual Observation** Phase 1 — Whole class (coal-dependent city): The teacher projects the first image only. Students observe silently for thirty seconds, then the teacher leads a brief whole-class description, eliciting vocabulary and writing student contributions on the board (smog, pollution, grey skies, carbon emissions, industrial landscape). This first image is done as a shared activity to model the type of language expected and to build a visible vocabulary bank. Phase 2 — Think, Pair, Share (100% renewable city): The teacher projects the second image. Students first work individually for one to two minutes, noting down all words that come to mind — nouns, verbs and adjectives — in any language. They then compare their lists with a partner, teaching each other any words the other has missed and finding the English equivalent for any L1 terms noted. Finally, pairs report their observations to the class. Quick Contrast: Using the two vocabulary lists on the board, students construct one or two contrast sentences using the B1+ structures from the BICS reference card (e.g., 'While the coal city is covered in smog, the renewable city has clear skies').	Projector. • Comparative images (coal city vs. renewable city).	**Image Generator:** Use of DALL·E to create a 'Cyberpunk-Fossil' vs. 'Solarpunk-Green' version of the students' own city.
30'	**Main Activities**	**1. Energy Mix Challenge (15')** Each group receives a regional data card specifying the geographical and climatic characteristics of their	Regional data cards (one per group). • Calculation procedure card with	**Gemini (Data Analysis):** Groups consult Gemini to obtain the installation cost per megawatt of

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		assigned region. Groups use this data to select their ideal combination of energy sources and justify the choice. Instructions are given both orally and in writing. The written instruction card at each group's workspace specifies three steps: • Step 1: Read your regional data card and identify which energy sources are viable for your region. • Step 2: Select your energy mix (two or three sources) and note down one geographical justification for each. • Step 3: Prepare a one-sentence justification for each source using the frame: 'We selected [energy source] because [geographical/climatic reason].' Before groups begin, the teacher uses ICQs to verify comprehension: 'How many energy sources will you select?'; 'What do you need to justify?'; 'Are you working alone or in a group?' **2. The Carbon Auditor (15')** Carbon footprint calculation: Each group receives a calculation procedure card showing a worked example so that students follow the same procedure without needing prior knowledge of the formula. Writing the paragraph: Each student receives a writing frame with sentence starters: • Sentence 1 (context — passive voice): 'The region of [X] is characterised by…' • Sentence 2 (cause-effect — connector): 'Due to [geographical factor], [energy source] was selected because…' • Sentence 3 (carbon footprint result — passive voice): 'It is estimated that the proposed mix will reduce carbon emissions by…' • Sentence 4 (conclusion — conditional): 'If this energy mix	worked example (one per group). • Writing frames with sentence starters (one per student). • Grammar reference poster: passive voice and conditionals. • AI prompt template on the instruction card. • Calculators (one per group).	their chosen energy source. A prompt template is provided: 'What is the approximate installation cost per megawatt of [energy source] in [region/country]? Please provide the figure in USD or EUR.'

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		were implemented by [year], the region could…' Before writing, the teacher displays two model sentences using the passive voice and briefly reviews the construction formula (subject + to be + past participle) using the grammar reference poster. Maximum two minutes.		
10'	**Wrap-Up & Sharing**	**1. Energy Summit** The spokesperson for each group is assigned by the teacher — not self-selected — communicated at the start of the main activities so the designated spokesperson can prepare during group work. Before presenting, each spokesperson has 2–3 minutes of preparation time to rehearse using the speaking frame: • 'Our region is characterised by…' • 'We selected [energy source] because…' • 'Our proposal reduces carbon emissions by…' • 'If this mix were implemented, the region could…' Reading directly from the written paragraph is permitted as a support strategy for less confident speakers. While one spokesperson presents, the remaining group members complete a peer-listening task, noting one strength and one question using the BICS debate phrases. **2. Synthesis — Critical Vote** Before voting, the teacher displays three criteria: technical viability, carbon reduction, and economic feasibility. Each group rates each proposal with a score of 1–3 per criterion. The group with the highest combined score is identified as the most balanced proposal. AI Tool: The teacher inputs the key points from all group presentations into the AI tool to generate a Class Sustainability Statement — projected and read aloud as a whole-class closing activity. Students	'Critical Vote' Rubric. • Speaking frame displayed on the board.	**AI Summary:** The teacher inputs the students' key points into the AI to generate an immediate 'Class Sustainability Statement', projected at the end and copied into student notebooks.

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		copy it into their notebooks as a model of academic synthesis writing.		
10'	**Evaluation & Feedback**	**1. Teacher Assessment** • Correct selection and justification of energy sources based on the regional data card. • Accurate use of passive voice and conditional structures in the Carbon Auditor paragraph. • Use of at least three CALP terms (intermittency, carbon sequestration, net-zero emissions, photovoltaic, decarbonisation) in the written paragraph and/or the oral presentation. • Quality of argument during the Energy Summit: evidence-based reasoning, use of BICS argumentation phrases, logical structure. • Active participation during peer listening: did the student note one strength and one question for the presenting group? **2. Peer Assessment** Groups exchange Carbon Auditor reports. Each student evaluates the other group's paragraph using a checklist: • Use of passive voice: structurally correct? (e.g., 'It is estimated that...') • Use of conditionals: first or second conditional used appropriately? • Use of CALP vocabulary: at least three technical terms used accurately? • Use of academic connectors: cause-effect or contrast structures present and correctly punctuated? **3. Exit Ticket** Two or three exit ticket questions of varying complexity (students choose their level): • Level 1: What is intermittency and why does it affect the stability of the electricity grid?	Exit tickets. • Peer assessment checklist.	**Quick Quiz:** A 4-question real-time quiz on key concepts (Intermittency, Photovoltaic) to measure understanding.

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		• Level 2: What is the main technical obstacle for a 100% renewable world? Use one connector and one CALP term in your answer. • Level 3: If you were advising a government on its energy transition, what would be the single most important recommendation? Justify your answer using a conditional and the passive voice. Before writing, students discuss their chosen question with a partner for one minute (Think-Pair-Share) to rehearse their answer in the target language.		

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