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Project number: 2021-1-IE01-KA220-SCH-000027825

Energy Resources & Light Pollution Mitigation

Topic: Light Pollution in a nutshell

Lesson Plan for Teachers - Age Group 6 - 12

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Project Information

PROJECT: CliC-PoliT

PROJECT TITLE: Engaging students and the society in environmental and climate change activities to raise awareness and strengthen responsible citizenship.

ACRONYM: Climate Action and Light Pollution Threat

PROJECT WEBSITE: https://www.clicpolit.eu/

PROJECT NO.: 2021-1-IE01-KA220-SCH-000027825

PROJECT COORDINATOR: CIT Blackrock Castle Observatory, Cork, Ireland

Project Partners

BLACKROCK CASTLE OBSERVATORY
The Space For Science

NUCLIO
Núcleo Interativo de Astronomia e Inovação em Educação

FAULKES TELESCOPE

ΑΙΕΝ ΑΡΙΣΤΕΥΕΙΝ
ELLINOGERMANIKI AGOGI

WROHellas
ΟΡΓΑΝΙΣΜΟΣ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΡΟΜΠΟΤΙΚΗΣ & ΕΠΙΣΤΗΜΗΣ

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Module: Energy Resources & Light Pollution Mitigation	
Topic: Light Pollution in a nutshell	
Lesson Plan – Light Pollution hunters	
Duration: 2 school hours (45 + 45 minutes).	
Short Description of the Lesson	Students will gain an understanding of what light pollution is, how it impacts our environment and how we can reduce it. Also, students realize how light pollution is directly linked to energy consumption patterns and energy conservation.
Learning Goals	• Describe different types of light pollution • To recognise some sources of light pollution and describe how these affect how we see stars in the night sky • Identify sources of light pollution around you • Develop a plan to reduce light pollution around you • To conduct an experiment to find out how artificial light can be directed and which materials and shapes would help do this
Green Competences Linked	• Knows that when human demand for resources is driven by greed, indifference and unfettered individualism, this has negative consequences for the environment. • Knows which aspects of personal lifestyle have higher impacts on sustainability and require adapting. • Can bring personal choices and action in line with sustainability values and principles. • Listens actively and shows empathy when collaborating with others to frame current and potential sustainability challenges.
Target Group	Primary school students aged 6-12 years old
Educational Approach	Inquiry-based learning
Link to School Curricula (if applicable)	Earth and Space science, English classes
Facility/ Equipment	• Classroom • Internet access • Projector
Tools/ Materials	• Computers with internet access • Printed worksheets • Pencils/Pens • Worksheet 1 • Teacher's Handbook • Student's Presentation

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Main Tasks	 **Text to introduce the problem…….** **Task 1: Introduction to light pollution (15 minutes)** **1.1 Start the lesson with a video** https://www.youtube.com/watch?v=5gYIeT6GrkA (3 mins) Discussion questions for the video (10 mins) • Explain what Light Pollution is, its reasons and effects • Ask students *'What if we close the lights every day for 1 hour? Isn't it that a solution?'* **1.2 Show to students the following video** https://www.youtube.com/watch?v=h1PZd6rA_eU (5 mins) Explain to students that turning off the lights for 1 hour is not a viable solution. But what can we do? LET'S FIND OUT! **Task 2: Understanding light pollution (15 mins)** **2.1** Provide your students with sticky-notes and ask them to provide answers to the following: ***(see worksheet 1-online)*** • What is light pollution? • Which are the sources of light pollution? • Can you define the types of light pollution? **Task 3: Light pollution mitigation measures (45 minutes)** **Let's take a look at the outdoor lights we have around us**. **Activity steps:** **4.1 Divide participants into groups of 2 - 4.** **4.2 Provide each group with an outdoor lighting survey form**, **outdoor lighting ID form (also below), clipboard, and writing utensil**. Colored pencils work well to allow groups to distinguish types of lights on their maps (e.g. walkway or streetlights, lights on buildings, floodlights). Provide insect viewers and gloves if a dead insect survey is possible around outdoor lights. **4.3 Divide the available outdoor space** into areas each group is responsible for surveying. **4.4 Encourage groups to look high and low, and imagine how the area would look at night.** Review survey form together. Conduct survey in groups. **4.5 Bring the groups back together** to share their findings, one at a time. Facilitator will collate recommendations on how to reduce light pollution. Useful recommendations for dark sky-friendly outdoor lighting are available here. **4.6 Discuss these ideas as a larger group.** Make an action plan on priority steps.

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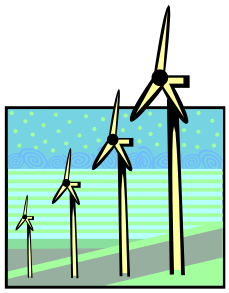
ANNEXES

Energy Vocabulary Worksheet



What is energy?

- Ability to do work or cause change
buildings
- Start motion

Uses for energy:

- Heat houses and

- Provide light
- Break down food

Vocabulary Words	Definitions
Chemical energy	
Light energy	
Potential energy	
Kinetic energy	
Renewable energy	
Electrical energy	
Sound energy	
Thermal energy	

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Energy Vocabulary Quiz

Choose the answer that best matches the definitions below.

	Definitions	Match
1	The ability to do work.	
2	The energy stored on the chemical bonds of molecules, which is released during a chemical reaction.	
3	_____ energy examples include computer screens, lamps and the sun.	
4	_____ energy is the sum of an object's kinetic energy and potential energy.	
5	A roller coaster at the top of a hill has high _____ energy.	
6	A roller coaster at the bottom of a hill has high _____ energy.	
7	_____ energy is the energy produced when the molecules of an object vibrate.	
8	_____ energy is released when the nucleolus of an atom is split.	
9	Radios, vocal chords and guitars all produce _____ energy	
10	A person who designs safe energy systems.	
11	For example, logs burning in a fireplace.	

Possible Answers
a. Light
b. Sound
c. Kinetic
d. Thermal
e. Engineer
f. Chemical
g. Potential
h. Energy
i. Biomass
j. Mechanical
k. Nuclear

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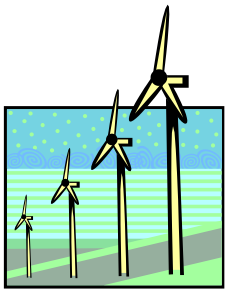
Energy Vocabulary Worksheet Answers



What is energy?
- Ability to do work or cause change
- Start motion

Uses for energy:
- Heat houses and buildings
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- Break down food

Vocabulary Words	Definitions
Chemical energy	**The energy stored on the chemical bonds of molecules released during a chemical reaction. For example, a car engine uses chemical energy stored in gasoline, and moving people use chemical energy from food.**
Light energy	**Visible light energy or light bulb energy.**
Potential energy	**The energy stored by an object as a result of its position. For example, a roller coaster at the top of a hill has potential energy.**
Kinetic energy	**The energy of motion. For example, a spinning top, a falling object, and a rolling ball.**
Renewable energy	**Energy that is made from sources that can be regenerated. Sources include solar, wind, geothermal, biomass, ocean and hydro (water).**
Electrical energy	**Electrical energy exists when charged particles attract or repel each other. For example, television sets, computers and refrigerators use electrical energy.**
Sound energy	**Audible energy. For example, when you talk, play musical instruments or slam a door, it releases sound energy.**
Thermal energy	**Heat energy produced when the molecules of a substance vibrate.**

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Energy Vocabulary Quiz Answers

Choose the answer that best matches the definitions below.

	Definitions	Match
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2	The energy stored on the chemical bonds of molecules, which is released during a chemical reaction.	f
3	_____ energy examples include computer screens, lamps and the sun.	a
4	_____ energy is the sum of an object's kinetic energy and potential energy.	j
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6	A roller coaster at the bottom of a hill has high _____ energy.	c
7	_____ energy is the energy produced when the molecules of an object vibrate.	d
8	_____ energy is released when the nucleolus of an atom is split.	k
9	Radios, vocal chords and guitars all produce _____ energy	b
10	A person who designs safe energy systems.	e
11	For example, logs burning in a fireplace.	i

Possible Answers
a. Light
b. Sound
c. Kinetic
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