ENERGY. TOOL KIT

LEVEL 1
Energy and sustainability.

The tools needed for teaching are:

- Power Point presentation.
- Activity sheets.
- Computers with Internet connection.
- Projector or digital whiteboard.

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1. General concept of energy.
2. Types of energy.
3. Electrical energy.
   3.1. Concept of electrical energy.
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   4.2. Types and characteristics of non-renewable energies.
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5. Environmental impact of energy.
   5.1. Clean energy.
   5.2. Effects on the environment.
   5.3. Other forms of environmental impact.

Power Point presentation:

Linked to this link (click on the picture)

1. GENERAL CONCEPT OF ENERGY.
2. TYPES OF ENERGY.
3. ELECTRICAL ENERGY

Sessions 1 and 2.

Activity Sheet:

Activity 1:

Based on the example given in point 1 of the topic, explain the energies applied in the use of:

Instrument	Energies
Electric razor:	
Hair iron:	
Hair dye:	

Discuss it with the rest of the class.

Activity 2:

Search in your area of residence or business, what is the primary energy from which the electricity is obtained, where the power plant is located, and which company it belongs to.

Share with the class.

Activity solution book:

Solution activity 1:

Instrument	Energies
Electric razor:	The electrical energy moves the motor and is transformed into mechanical energy that moves the blades, thanks to the pressure of which the hair is cut.
Hair iron:	Electrical energy is converted into heat (thermal energy) by applying a resistor in contact with a surface, which is then applied to the hair.
Hair dye:	the internal energy of the chemical compounds, once they are mixed and applied to the hair, is transformed into chemical energy that achieves the modification of the hair colour.

Other resources:

Video 1	https://www.youtube.com/watch?v=FpgqQDJ01K0 Introductory video on Europe's transition to a green energy future.
Article	https://www.conserve-energy-future.com/advantages_disadvantages_hydrogenenergy.php Article in English on the advantages and disadvantages of hydrogen as an alternative fuel.

4. ENERGY SOURCES

Sessions 3, 4 and 5.

Activity sheet:

Activity 3:

Research how fossil fuels originated and why they are important.

Share it with the rest of the class.

Activity 4:

Research the amount of electrical energy that currently comes from renewable energy sources and reflect on why humanity still relies mostly on non-renewable energy sources. Have a group discussion.

Activity solution book:

Solution activity 3:

Websites in Spanish where you can find information:
https://www.ecologiaverde.com/que-son-los-combustibles-fosiles-y-como-se-formaron-1349.html
https://es.wikipedia.org/wiki/Combustible_f%C3%B3sil
https://concepto.de/combustibles-fosiles/
https://www.nationalgeographic.es/medio-ambiente/explicacion-que-son-combustibles-fosiles
https://solar-energia.net/energias-no-renovables/combustibles-fosiles

Websites in English where you can find information:
https://ocean.si.edu/conservation/gulf-oil-spill/what-are-fossil-fuels
https://education.nationalgeographic.org/resource/fossil-fuels
https://en.wikipedia.org/wiki/Fossil_fuel
https://www.snexplores.org/article/explainer-where-fossil-fuels-come
https://studentenergy.org/source/fossil-fuels/

Other resources:

Video 2	https://www.youtube.com/watch?v=Giek094C_l4 Very entertaining and easy-to-follow video summarizing information on renewable energies.
Video 3	https://www.youtube.com/watch?v=MpEJnnpye-k Very entertaining and easy-to-follow video summarizing information on non-renewable energies.
Video 4	https://www.youtube.com/watch?v=5UxCUuk4CEs Video in English about blue energy.

5. ENVIRONMENTAL IMPACT OF MINING

Sessions 6-13

Activity sheet:

Activity 5:

Look for information and discuss as a group whether the following renewable energies are considered clean, justifying your answers:

- Hydroelectric power
- Solar energy
- Ocean energy
- Bioenergy.
- Nuclear energy.

Activity 6:

Search for information on the Internet and explain the following terms:

- Greenhouse gas.
- Acid rain.
- Smog.
- Soil acidification.
- Parasites.
- Avifauna.
- Deforestation.
- Biomass
- Radioactivity.

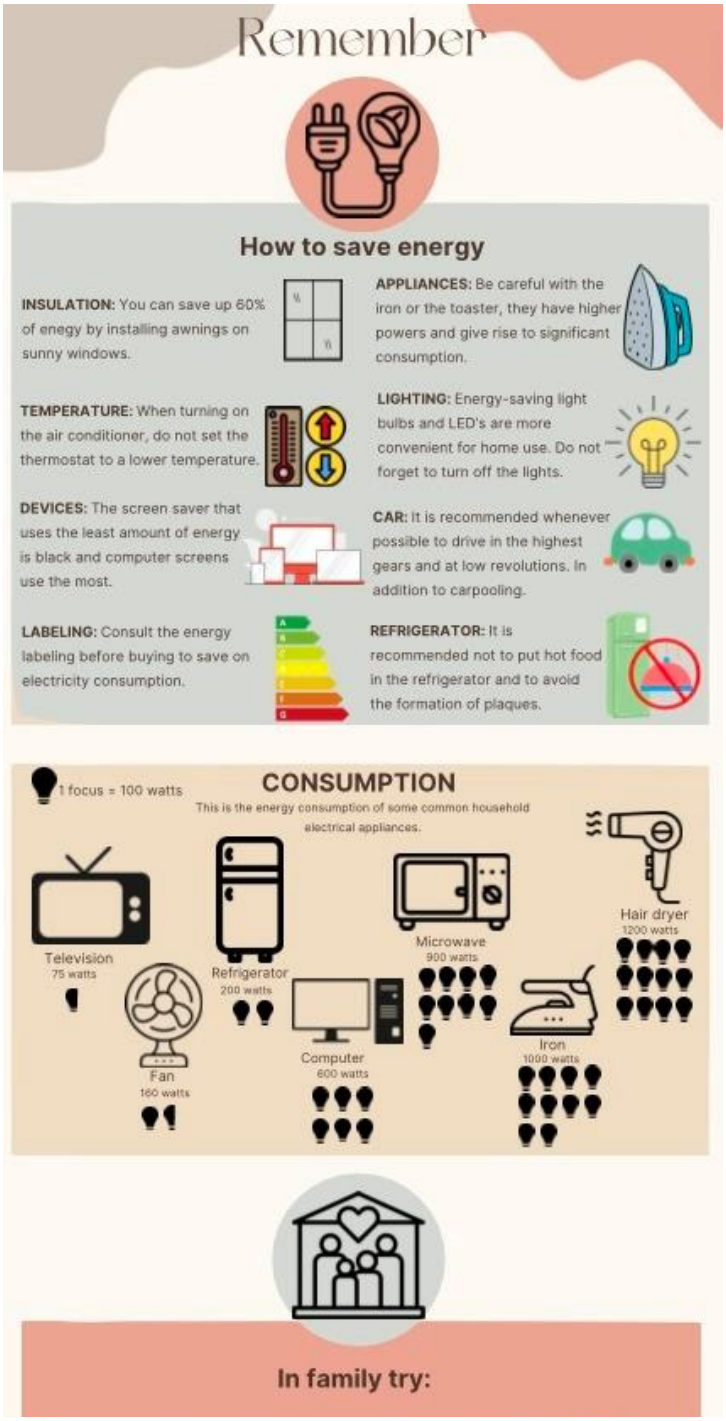
Answer the questions that the teacher will ask about these terms

Activity 7:

In a group, make an infographic with tips for responsible energy consumption in 3 areas of the home:

- Family
- Study/telework
- Leisure.

Use this one as an inspiration:



Activity 8:

Make a checklist of day-to-day actions to reduce our electricity consumption and share it with the rest of your colleagues.

Action	Frequency	Target	Achieved
E.g.: Mobile charger plugged into the grid	Permanently plugged in	Unplug it when charging is complete.	Yes

Activity solution book:

Solution activity 6:

- Greenhouse gas: a gas that absorbs and emits radiation in the infrared range. This process is the fundamental cause of the greenhouse effect, without which the average temperature of the earth's surface would be -18°C instead of the current average of 15°C.
- Acid rain: rain with dissolved acids, mainly sulphuric and nitric acid, from fossil fuels and combustion engines.
- Smog: also called photochemical smog or toxic fog, is an air pollution that occurs when fog is combined with smoke and other pollutant particles floating in the atmosphere. It can irritate the lungs causing breathing difficulties and can often be seen over cities on the horizon, appearing as a brown haze.
- Soil acidification: Soil acidification is the lowering of soil pH, which negatively affects crops, native flora and wildlife. Soil and subsoil become less fertile and less favourable for crops and soil micro-organisms.
- Parasite: an organism that feeds on substances produced by a living being of a different species, living inside or on the surface of the organism, often causing damage or disease.
- Avifauna: all the birds of a country or region.
- Deforestation: a phenomenon, caused by the impact of human activities or natural causes, resulting in the loss of forests and woodlands.
- Biomass: biomass is understood as all organic matter that can be used as a source of energy and whose origin can be either animal or vegetable and may have been obtained naturally or come from artificial transformations carried out in biomass plants. The energy it produces is called bioenergy.
- Radioactivity: is a natural physical phenomenon, by which certain substances or chemical elements, known as radioactive, emit radiation that has the property of impressing photographic plates, ionizing gases, producing fluorescence, passing through bodies that are opaque to ordinary light, etc. The danger of these forms of radiation is that they can damage DNA and cause cancer.

Solution activity 7:

Example of an infographic:

https://twitter.com/aeselsalvador/status/1242184700657127426?lang=de

Solution activity 8:

Possible actions to be considered:

Action	Frequency	Target	Achieved
Mobile charger plugged into the mains	Permanently plugged in	Unplug it when charging is complete.	Yes
Insulation of windows against heat.	Once	Installation of awnings or protective vinyls on windows where the sun shines.	
Insulation of windows against the cold.	Once	Installation of windows with Climalit type cold-proof protection®	
Correct use of the air conditioning thermostat.	Every time it is started.	Do not set the thermostat at a higher or lower temperature than desired.	
Car use	Every use.	Drive whenever possible in the higher gears and at low revs.	
Luminaire check	Once	Change household light bulbs to energy-saving and LED bulbs.	
Use of the refrigerator		Do not put hot food in and avoid the formation of plaque.	
Others…			

Other resources:

Video 5	https://www.youtube.com/watch?v=1hmQhsDbVG4 Video summarising information on the impact of energy.
Video 6	https://www.youtube.com/watch?v=psoxx38rhL8

	Video in English about dirty and clean energies explained in a very educational and approachable way.
Video 7	https://www.youtube.com/watch?v=LZXUR4z2P9w Video in English and subtitled in Spanish on why the fear of nuclear energy is further damaging the environment.
Video 8	https://www.youtube.com/watch?v=N-yALPEpV4w Video in English and subtitled in Spanish on facts and figures on why renewable energy is not the answer to climate change.

Theoretical test:

It reviews and reinforces the concepts. It is recommended to do the quiz using digital tools such as google forms, kahoot or any other application to improve students' digital competences.

Which of the following basic properties does energy NOT have?

a) Energy is transformed
b) Energy is degraded
d) Energy is destroyed
(e) Energy is transported

2. The energy generated by the movement of positive and negative electrons within conductive materials is the energy:

a) Electromagnetic
b) Electrical
c) Luminosa
(d) Nuclear

3. Energies derived from natural sources that take millions of years to form are:

a) Renewable energies
(b) Non-renewable energies

4. True or false:

a) Biomass is a type of renewable energy. True
b) Carbon is the common element of all non-renewable energies. True.
c) Renewable energies are only available to the richest countries. False.

5- Point out at least 4 types of renewable energy:
Solution: Solar, wind, hydro, ocean, bioenergy, geothermal, aerothermal, green hydrogen, blue energy, biomass.

6. True or false:

a) Nuclear power does not emit greenhouse gases into the atmosphere. True.
b) Renewable energies have no negative impact on the environment. False.

7. Here are some of the effects that energy production has on the environment. You must indicate what type of energy source has produced them:

a) Emission of greenhouse gases into the atmosphere.

Solution: Non-renewable energy

b) Impact on the landscape and local wildlife

Solution: Renewable energy

(d) Water pollution through discharges

Solution: Non-renewable energy.