

GREEN ENERGY!

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GREEN ENERGY!

CSE YEAR 3

INTRODUCTION

We all know the current importance of the knowledge and investigation in new energies. For the new generations there are a lot to do about it, so this teaching team has decided that it was a good topic to be treated from different subjects, in this case participate apart from technology, mathematics and English subjects.

" The energy" , unit from the curriculum of the technology subject has been then our reference point . The contents are explained in the class of technology, being its treatment less formal in the other subjects, approaching it to the real life and listening to the numbers, they don´ t talk, they shout.

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CONTENTS

A) CONCEPTS

- Sources of energy: renewable energy and non-renewable energy sources.
- Nuclear power.
- Nuclear power station.
- Energy of fossil fuels: oil, coal, and natural gas power plants.

- Hydropower, hydraulic power types.
- Solar Energy. Features. Solar Power Systems.
- Wind energy. Systems.
- Geothermal energy. Types.
- Tidal energy. Modes of production.
- Biomass energy.
- Types of biomass energy.
- Conversion of biomass.
- Solid waste.
- Energy and climate change.

B) PROCEDURES

- Graphical representation of energy power plants.
- Performing analysis and description schemes and working drawings.
- Comparison of different types of energy.
- Identification of different systems of energy use.
- Geographic location of energy production centers. (Thermal power plants).
- Statistical analysis of the use of renewable energies in Spain and Andalusia compared with the use of non-renewable energy.
- Search and processing of information in books, magazines, etc., and from people of students' surroundings.

B) ATTITUDES

- Interest in understanding the concepts raised in the unit.
- Interest in graphical representation of objects and operating processes.
- Reflective attitude in analyzing patterns and working drawings.

- Identification of different forms of energy use.
- Interest to work neatly and in a logical sequence.
- Opened and flexible attitude to explore and to develop their own ideas.
- Interest in using the correct vocabulary acquired.
- Reflection about finding balance between individual needs and collective interest.
- Assessment of the need for recycling of waste generated by human activity, for possible reuse.
- Reflective and critical attitude of the disadvantages of the technology.
- Attitude faced with environmental impact.

OBJECTIVES

- To distinguish between renewable and non renewable energies.
- To know the advantages and disadvantages of non renewable and renewable sources of energy.
- To identify the main types of non renewable energies.
- To describe the basic functioning of hydraulic power , nuclear and heat energy stations.
- To identify the characteristics, extraction and applications of the fossil fuels.
- To describe the ways of exploitation of the hydraulic, wind, solar, tidal and geothermal energies. Alternative power stations.
- To describe the processes of extraction of energy from the biomass and from the urban solid waste.

BASIC COMPETENCES

A) Linguistic competence

- Analyse and describe objects that require the use and interpretation of technical terminology to increase the students' vocabulary.
- Read and analyse different types of texts as sources of information.
- Write reports.

B) Social competence.

- Appreciate the limitation of natural resources and the necessity of study that look for new technologies to satisfy human needs which are respectful with the environment.
- Be aware of the necessity of recycling waste generated by the human activity for its possible reuse.
- Knowledge and interaction of the physical world competence
- Know how to explain the information we receive and learn how to make decisions with personal autonomy in the processes of building objects.
- Learn how to distinguish and appreciate the scientific knowledge against other ways of knowledge , and use values and ethical criteria associated to science and technological development.

C) Mathematical competence

- Use procedures and mathematical reasoning related to the different types of energy used in our countries.
- Make statistic calculation about the use of the different energies.
- Digital competence
- Use the Internet as a vehicle of searching information, and use the computer as a tool of elaboration of documents which cooperate with the constructive process.

D) Personal initiative and autonomy

- Participate in group activities which involve the making of personal decisions.
- Justify and discuss individual gathered material and the way of using it.
- Decide how to carry out the presentation of works and justify the procedure and the content used in the task.
- Imagine, develop and build wood objects choosing the correct tools to carry out the task with creativity, confidence, responsibility and critical sense.

ASSESSMENT CRITERIA

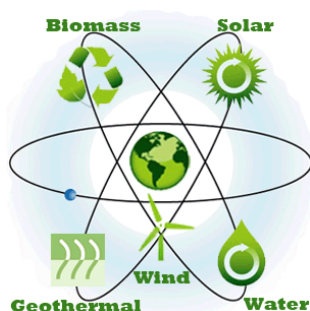
- Knows the difference between renewable and non renewable energies.
- Describes the pros and cons of using non renewable sources of energy as against the renewable.
- Identifies the main types of non renewable energies.
- Describes how a thermal power station and a nuclear central work.
- Identifies the fossil fuels characteristics and explains how to get them and their uses.
- Describes different types of hydraulic centrals, mentioning their effects over the environment.
- Differentiates between hydroelectric central and mini hydraulic central.
- Explains the difference between solar thermal energy and solar thermal photovoltaic.
- Resumes how an aerogenerator works to produce electricity.
- Describes geothermal energy applications.
- Knows about systems for mareomotriz energy exploitation.
- Explains the process for making compost.
- Sets out thoughtfully the biomasa virtues as an renewable source of energy.

- Lists energetic products made from solid waste, and the way they are obtained.

GREEN ENERGY!

INTRODUCTION

During these two sessions, we are going to reflect about the importance of energy in our lives nowadays and we are going to know the relatively recent use of the so called "Green and Renewable Energy" with its surprising results. Are you ready? Let's go!



ACTIVITY 1

Energy is all around us. Think on all the activities you have done today and you have used energy. Make a list and be concrete. Explain why you needed energy in that precise activity. When you finish, we will share the lists.

Examples:

I had a shower- the shower uses gas or electricity to heat the water.

I had two toasts for breakfast- the toaster uses electricity.

I came to the school by car- the car uses petrol

ACTIVITY 2**SPEAKING**

WITHOUT ENERGY, LIFE IS MERELY
A LATENT POSSIBILITY. THE WORLD
BELONGS TO THE ENERGETIC.

-Ralph Waldo Emerson (1803 - 1882), U.S. poet and essayist

Life without energy is difficult to imagine for us. We are so used to energy that we think we cannot survive without energy however; two billion people lack access to electricity. As a class, discuss how easy access to energy and electricity in our country has improved our standard of living. Be specific and think on:

- a) Transport of people and goods
- b) Communication
- c) Computers and Access to Communication
- d) More comfortable homes
- e) Better medical care

Now, think about different countries in the world. People's lives in other countries are different because they do not have easy access to energy and electricity. How can they live without....?

- 1) Computers
- 2) Telephones and Mobile Phones
- 3) Televisions
- 4) Cars
- 5) Light bulbs
- 6) Heaters or Air Conditioners

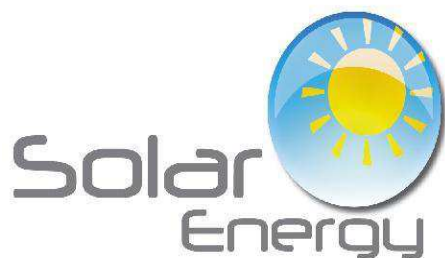
ACTIVITY 3**READING**

Where does your energy come from? You have already studied different sources of energy and basically, there are two types of sources:

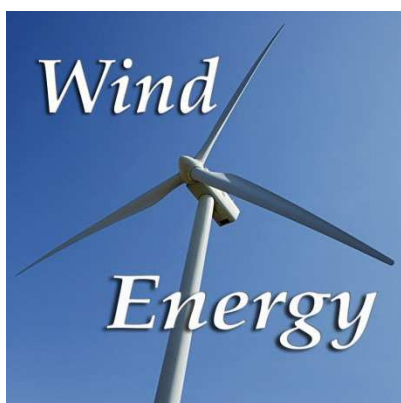
- A) Renewable
- B) Nonrenewable

We are going to focus on Nonrenewable energies also called Green Energies. Read the following text about different nonrenewable sources of energy.

Renewable energy sources are replaced naturally. There is not a fixed supply that can eventually be used up.



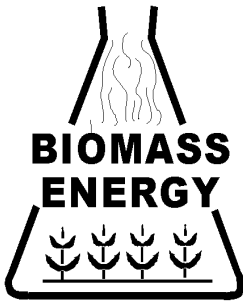
Solar Energy is power from the heat of the sun, the most plentiful source of energy known to humankind. Enough clean, renewable solar energy falls from the sky in one day to power the world for 27 years. When the sun is shining, solar cells produce electricity. The energy from sunlight can be stored in batteries to use on cloudy days. Energy from the sun can be used directly - to provide heat for living space and water, or stored in solar panels such as on calculators, watches, and rooftops.



Wind Energy produces electricity by turning blades on a *wind turbine*, or a windmill. Wind energy is very useful in places with a lot of strong winds. Wind energy can be stored in batteries for later use and is safe because it does not produce waste. Unfortunately, some wind power stations can be dangerous to certain birds, can be considered unattractive to look at, and can create excessive noise.



Geothermal Energy comes from the heat inside the Earth that causes hot springs, geysers, and volcanoes. This natural heat can be captured and used to produce electricity. Geothermal energy is limited to certain locations with a lot of volcanic activity, but is already used in places such as New Zealand, Iceland, and the United States to warm buildings and generate electricity.



Biomass Energy is produced from crops or waste materials. Heat, electricity, and transportation fuels can be made from plant materials and wastes such as banana peels, paper, and human waste - anything that was once alive or part of a living thing. While wood is still the most widely used source of biomass fuel worldwide, other biomass sources are being developed. Methane gas from landfills produces electricity while corn and vegetable oils can be converted to fuels for cars.

Hydroelectric Power takes the energy in flowing water to generate electricity. For example, a dam can collect energy from a river. Hydropower production can cause environmental harm by flooding habitats and preventing fish from spawning. We try more and more to obtain hydroelectric power in ways that are less damaging to freshwater habitats and fish.



ACTIVITY 4

After reading about different energy sources, complete the following worksheet. In the appropriate spaces, write where each form of energy comes from and one positive and one negative trait of each form of energy.

FORM OF ENERGY	SHORT DESCRIPTION	+ AND - TRAIT
Solar Energy		
Wind Energy		
Geothermal Energy		
Biomass Energy		
Hydroelectric Power		

GREEN ENERGY!

SESSION 2

WORLD ENVIRONMENT DAY: AFRICA SUSTAINABLE ENERGY

ACTIVITY 5

LISTENING

You are going to watch a video. This video is about sustainable energy projects in Africa.



https://www.youtube.com/results?search_query=world+environment+day+africa+sustainable+energy

ACTIVITY 6

WRITING

Once you have watched the video, do the quiz to test your understanding of what you have just learnt. If you get stuck on any of the questions, you can watch the video again to help you with the answers. Finally, we will check the solutions.

QUIZ

1. How many Kenyan homes in the video are supplied with electric power now?
 - A. 150 homes
 - B. 50 homes
2. In Namibia, the UN is helping to fund projects that will increase the use of...?
 - A. Solar Energy
 - B. Hydro Power
3. What type of sustainable energy are the people in central Kenya using?
 - A. Hydro Power
 - B. Wind Power

4. What type of health problems can be caused by using wood and kerosene for energy?
 - A. Skin problems
 - B. Lung problems
5. What type of energy is used in the capital of Namibia?
 - A. Hydro electric
 - B. A coal burning power plant
6. The community in central Kenya has set up...?
 - A. A hydro powered turbine
 - B. A hydro powered turban
7. Many communities in central Kenya...?
 - A. Don't have electricity
 - B. Are connected to the electric grid
8. Central Kenya....?
 - A. Has a shortage of water
 - B. Has plenty of water
9. What is the maximum capacity of the hydro power turbine they are using in central Kenya?
 - A. 40 kilowatts
 - B. 20 kilowatts
10. How many homes in central Kenya will benefit from electric power when the hydroelectric project is finished?
 - A. About 50
 - B. About 150

ACTIVITY 7

READING, SPEAKING, WRITING

The UK Guardian, in its digital version, has chosen the 10 best UK's eco homes with the help of a panel of experts. In groups of four, have a look to the different options and vote and choose your favorite. You can win receive £150 worth of gift vouchers for Nigel's Eco Store. Go for it!

TOP TEN UK ECO HOMES



<http://www.theguardian.com/lifeandstyle/2014/apr/08/top-10-eco-homes-marsh-house-nottingham>

GREEN ENERGY!

SESSION 1

ENERGY AND POWER STATIONS ACTIVITIES:

ACTIVITY 1

Presentation about energy and then exercises:

- 1) Investigate the energy that these foods have per 100 gr:

Yogurt		Big Mac	
Bread		Apple	
Biscuits		Orange Fanta	
Cereals		Oil	
Chips		Butter	

- 2) Calculate the energy of a Coke in joules.
- 3) If we use a 100W lamp, and we use Cokes to provide energy, how many Cokes do we need per second?
- 4) Explain the difference between the concepts of source and form of energy.
- 5) Define the six groups of energy sources, and give four examples of each.
- 6) Make a list of 20 objects indicating the form of energy used and the energy obtained .

Object	Energy Form	Energy obtained
TV	Electricity	Light
.	.	.

SESSION 2

HYDROELECTRIC ENERGY

ACTIVITY 1: WORKSHEET "HYDROELECTRIC POWER"

READING AND QUIZ ABOUT.

ACTIVITY 2: VIDEO

LISTENING

<http://www.youtube.com/watch?v=Km1M4Hbt-io>

ACTIVITY 3: QUESTIONNAIRE ABOUT THERMAL ELECTRICAL POWER

READING AND QUIZ ABOUT.

Questions for "Thermal Electricity - How it Works"

1. What are the three fossil fuels used by generating stations to make electricity?
Coal, natural gas, and oil
2. What is the purpose of the pulverizer?
To grind up the coal into a fine powder before it is burned
3. How is steam produced in the boiler tubes?
Heat from the burning coal boils the water and creates steam
4. What causes the generator rotor to spin?
The pressure and flow of the steam
5. What happens when it spins?
The electromagnets create a flow of electrons in the stator
6. What happens to the steam afterwards?
It is condensed back to water using cooling water from the lake, and later reused.

SESSION 3

NUCLEAR ENERGY

ACTIVITY 1

LISTENING AND WRITING

- Video about nuclear energy
<http://www.youtube.com/watch?v=N1o3P8mLVRc>
- Writing about video how work nuclear energy.

WINDY ENERGY

ACTIVITY 2

LISTENING AND WRITING

- Video about windy energy.
- Writing about video how work wind energy.

SESSION 4

RENEWABLE ENERGIES

ACTIVITY 1

SPEAKING

Explanation about tidal energy, solar energy, biomass energy and geothermal energy and book activities.

CLIMATE CHANGE

ACTIVITY 2

READING

Hand out between students different readings about climate change, ozone layer depletion, greenhouse effect, acid rain, global warming and saving energy.

I'm going to make groups in class. Each group will do a different task, depending on reading I give them.

There are a reading about climate change. With this reading, they have to describe what they can see in the pictures and they will have to give their opinion about that.

There are a text about ozone layer. They have to do a summary about this and answer the question about ozone depletion effect.

The reading about global warming I'm going to divide it in two parts. A group of students will have to do the summary and they will explain to classmates of the first three pages and other group will do the same with the rest of pages.

Other group will do the summary and explanation about acid rain.

And finally one group will read the reading about saving energy and they have to find solution to save energy. When they explain to classmates, they will have to ask, that they also give solutions.

GREEN ENERGY!

SESSION 1

We are working contents related to units 11 "Statistics" and 13 "Functions".

The activities are designed in accordance with these objectives:

- To read and interpret graphics.
- To use different ways of representing data.
- To study the convenience of a type of representation as against others.

The attitudes own of our subject dealt here are:

- taste of analysis of data.
- autonomy for understanding statistics.
- value of the importance of mathematical methods to make predictions from data.

PRIMARY ENERGY USE

ACTIVITY 1 "making predictions"

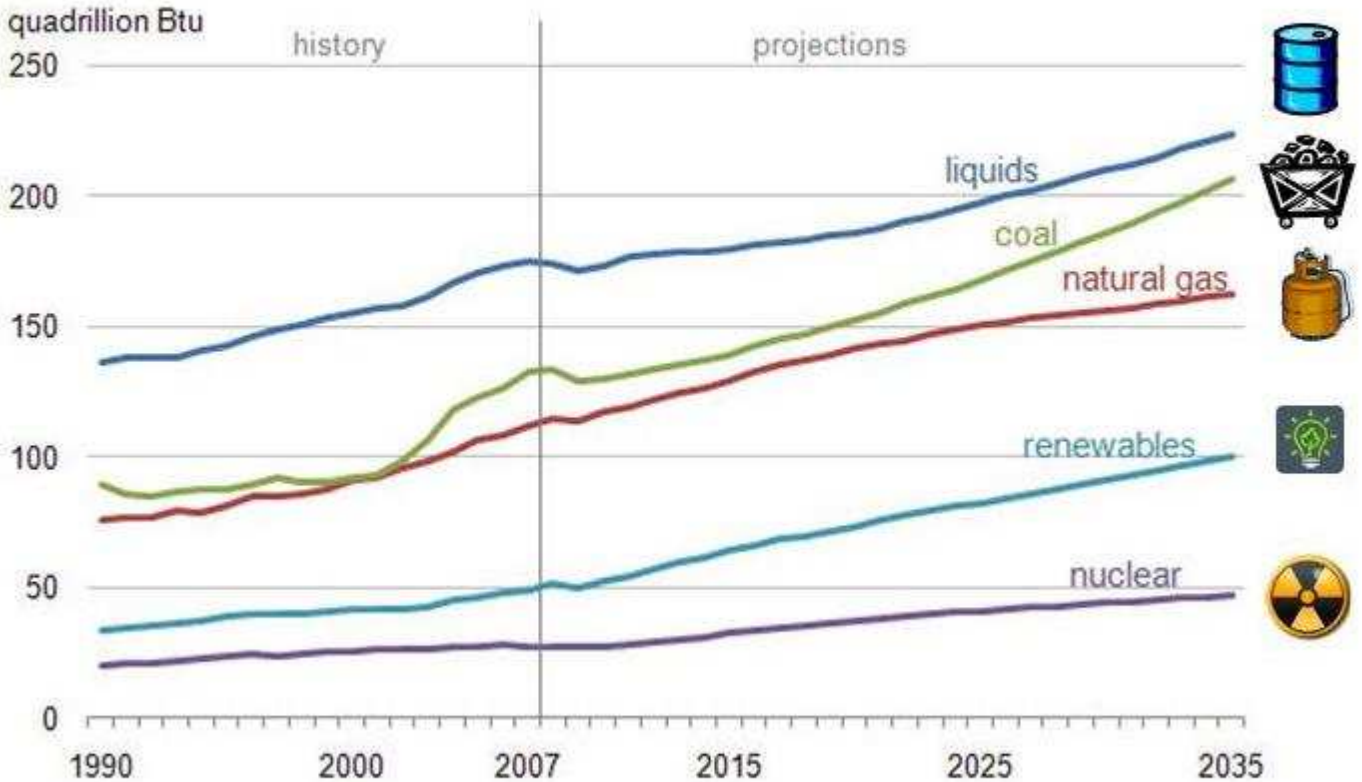
SPEAKING

Study this graph and answer these questions:

- 1) What is the study about?
- 2) What years are considered in this study?
- 3) What does BTU mean?
- 4) Why has the graphic two parts separated by a vertical line?
- 5) What conclusions do you come to?

Primary Energy Use

Figure 2. World marketed energy use by fuel type



Source: U.S. Energy Information Administration
(Report #DOE/EIA-0484(2010))

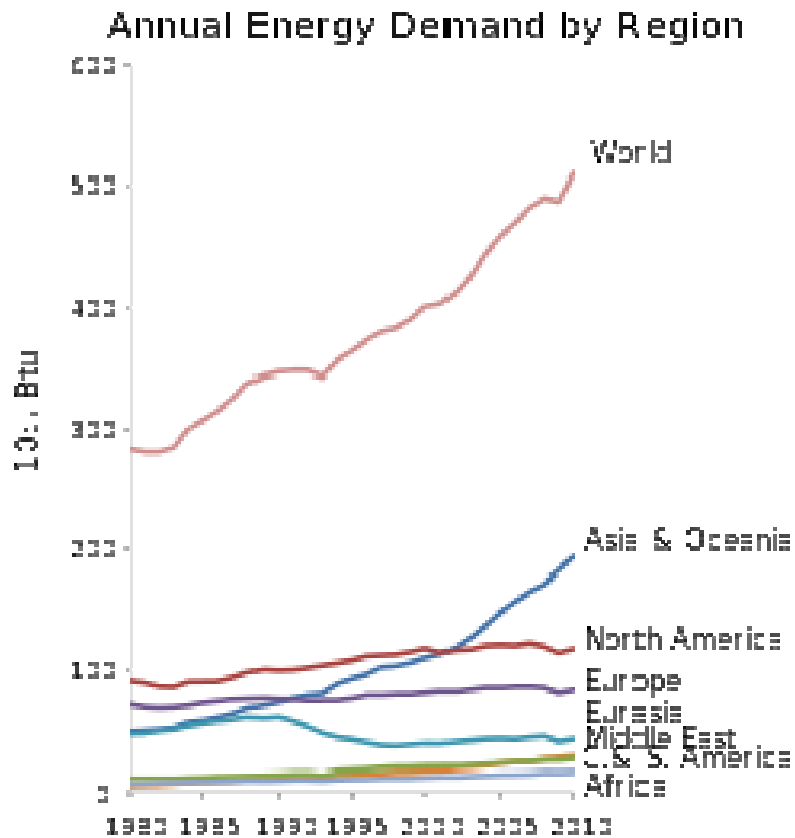
ANNUAL ENERGY DEMAND BY REGION

ACTIVITY 2 "reading graphs"

WRITING AND SPEAKING

Study this graph and answer these questions. Afterwards, we'll read out.

- 1) What are the continents with a least energy demand? What's the reason?
- 2) How do you explain the trend of demand in Asia & Oceania ?
- 3) Do you think that we urgently need to exploit other sources of energy? Which ones?



GREEN ENERGY!

SESSION 2

REGIONAL ENERGY USE (KWh/cap.)

ACTIVITY 3 "working with percentages"

SPEAKING

Study this graph and answer these questions:

YEAR	kWh/capita		Population (mil.)	
	1990	2008	1990	2008
EE.UU.	89021	87216	250	305
UE-27	40240	40821	473	499
MIDDLE EAST	19422	34774	132	199
CHINA	8839	18608	1141	1333
LATIN AMERICA	11281	14421	355	462
AFRICA	7094	7792	634	984
INDIA	4419	6280	850	1140
THE WORLD	19421	21283	5265	6688

- 1) In what regions has the population increased most? Justify using percentages.
- 2) In what regions has the energy demand grown more? Explain with percentages.
- 3) How would you represent graphically the regional energy use related to 1990 and 2008?

