



Erasmus+

**EUFURES**

**Erasmus+ KA2**

**“My EUrope, my FUture, my RESponsibility –  
Energy and sustainability”**

**A Lesson Plan on Energy**



**Gymnasium of Eani – Lyceum of Velestino**

## Section 1: What is energy? What are the sources of energy?

*Aim: To get to grips with definitions and general notions of different forms of energy*

*Objectives: - to introduce students to the lessons about heating*

*- to introduce students to renewable forms*

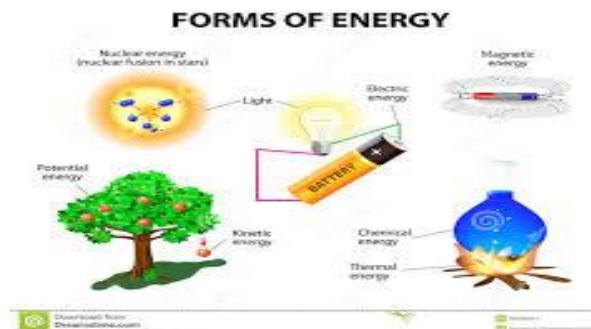
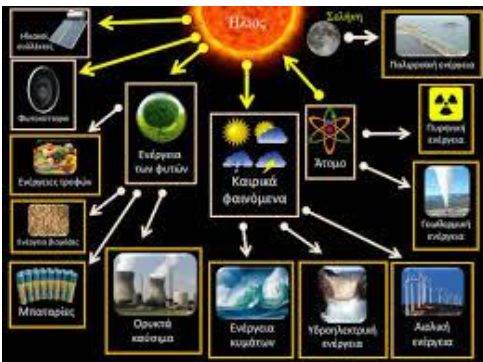
*Classroom time: 90' (two 45'lessons)*

### 1. Read the following text carefully:

#### What is energy

Energy is so intertwined with our everyday life that only its absence makes its necessity evident. All human activities bind, produce, consume, transform, store, and degrade huge amounts of energy. Every citizen of developed countries consumes as much energy as the muscles of 100 large men or 12 strong horses produce.

The action appears in many formats: motion, heat, chemical bond energy or electricity. Even mass is a form of energy. Energy can come from different sources such as wind, coal, timber or food. All energy sources have a common feature. Their use enables us to put objects in motion, change temperatures, produce sound and image. In other words, we are given the opportunity to produce work.



#### Where does the energy come from?

The cycle of energy production and consumption starts with the original forms of energy such as coal, crude oil, wind, sunlight or natural gas. These forms are characterized as primary energy and, of course, they can hardly be used by consumers. The next step is to transform primary forms into final energy such as electricity or gasoline. Finally, suitable equipment or devices such as the car or TV convert final energy into useful energy by providing energy services.

#### Energy sources

The commonly used term "Energy Sources" is not scientifically valid because, according to the Energy Conservation Act, energy is neither created nor destroyed. It simply changes styles. Generally, however, the term Energy Sources describes power generation potential. Energy sources are generally classified into two categories:

- Nonrenewable
- Renewable

**2. Answer the following questions:**

**a) In what form does the energy appear? Fill in the spaces with the words given to you.**

The action appears with many ..... Movement, ..... .., energy of chemical bonds or ..... .. Even the ..... Is a form of energy. All energy sources have one ..... .. Their use enables us to put objects in motion, to change ....., to produce sound and picture. In other words, we are given the opportunity to produce ..... .. (Wind, forms, heat, timber, food, electricity, mass, gas, common feature, power, work, sun, temperatures)



**b) Assign words from column A to words in column B**

Original forms of energy	Crude oil
	Renewable
Energy sources	Electricity
	Sun light
Final action	Nonrenewable
	Petrol

**c) Mark suggestions as True (T) or False (F)**

The action appears in specific formats	
Appropriate equipment or devices such as car or TV turn the final energy into useful energy by providing energy services	
All energy sources have different characteristics	
Energy is created and destroyed	
Energy sources are generally classified into three categories	

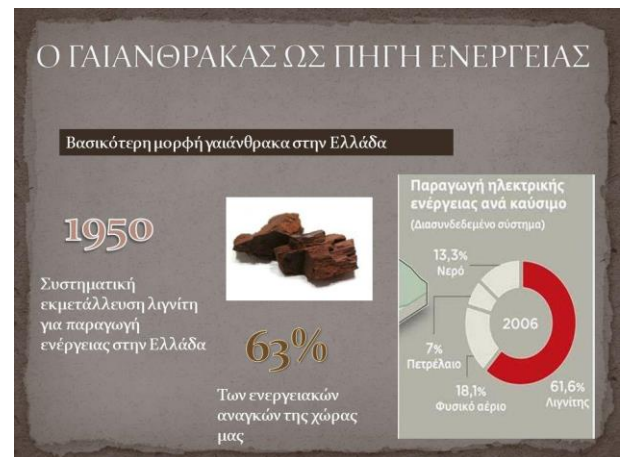
## Section 2: Renewable and Non Renewable Energy Sources

### 1. Read the following text carefully:

#### Non-renewable energy sources

Non-renewable sources of energy are the sources that are not replenished or replenished very late for human measures by natural processes. Non-renewable energy sources mainly include coal, oil and natural gas, also known as fossil fuels. Of course, nature does not stop creating either coal or oil. But if we consider that humanity consumes as much fossil fuel every day as nature can create in about a thousand years, we now perceive the concept of renewable energy.

#### Coal



#### Oil



## Natural gas



## Nuclear energy



## Renewable energy sources

Renewable Energy Sources (Renewable Energy Sources) have defined energy sources that are abundant in the natural environment. It is the first form of energy that man used before turning intensely on the use of fossil fuels. RES is practically inexhaustible, its use does not pollute the environment and its exploitation is limited only by the development of reliable and economically acceptable technologies that will aim to freeze their potential. Interest in the development of these technologies first emerged after the first oil crisis in 1974 and was consolidated after awareness of the world's major environmental problems over the last decade. For many countries, RES is a domestic source of energy with favorable prospects of contributing to their energy balance, contributing to reducing dependence on imported oil and enhancing the security of their energy supply. At the same time, they contribute to improving the quality of the environment, as it has now been established that the energy sector is the industry primarily responsible for environmental pollution. The forms of renewable energy are:

- **The sun - solar energy**, with active solar sub-systems, passive solar systems and photovoltaic conversion,



- **The wind - wind energy**,



- **Hydroelectric power**, limited to small hydroelectric power of less than 10 MW,



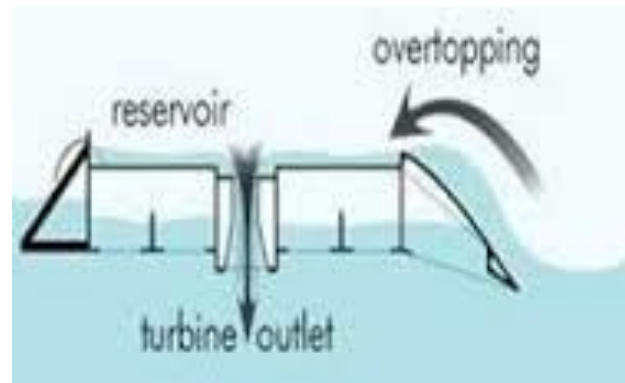
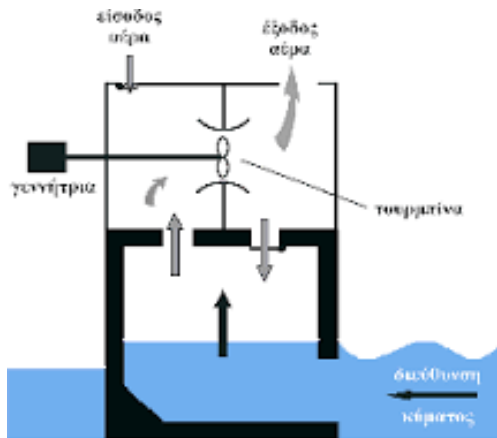
- **Geothermal - geothermal energy**: high and low enthalpy,



- **Biomass:** thermal or chemical energy with the production of biofuels, the use of forest residues and the utilization of industrial agricultural (plant and animal) and municipal waste,



- **The seas:** wave energy, tidal energy and ocean energy from the surface temperature and deep water temperature difference.



**2) Match the following words:**

Renewable energy sources	Biomass
	Natural gas
	Wave energy
	Nuclear energy
Non-renewable energy sources	Sun
	Coal
	Water
	Wind

**3) Choose the right answers from each question:**



a) Sources that are not replenished or replenished very slowly for human measures by natural processes are called:

- Renewable       Non-Renewable       Insufficient       Pollutants

b) Non-renewable energy sources include:

- Sun       Carbon       Natural Gas       Wind

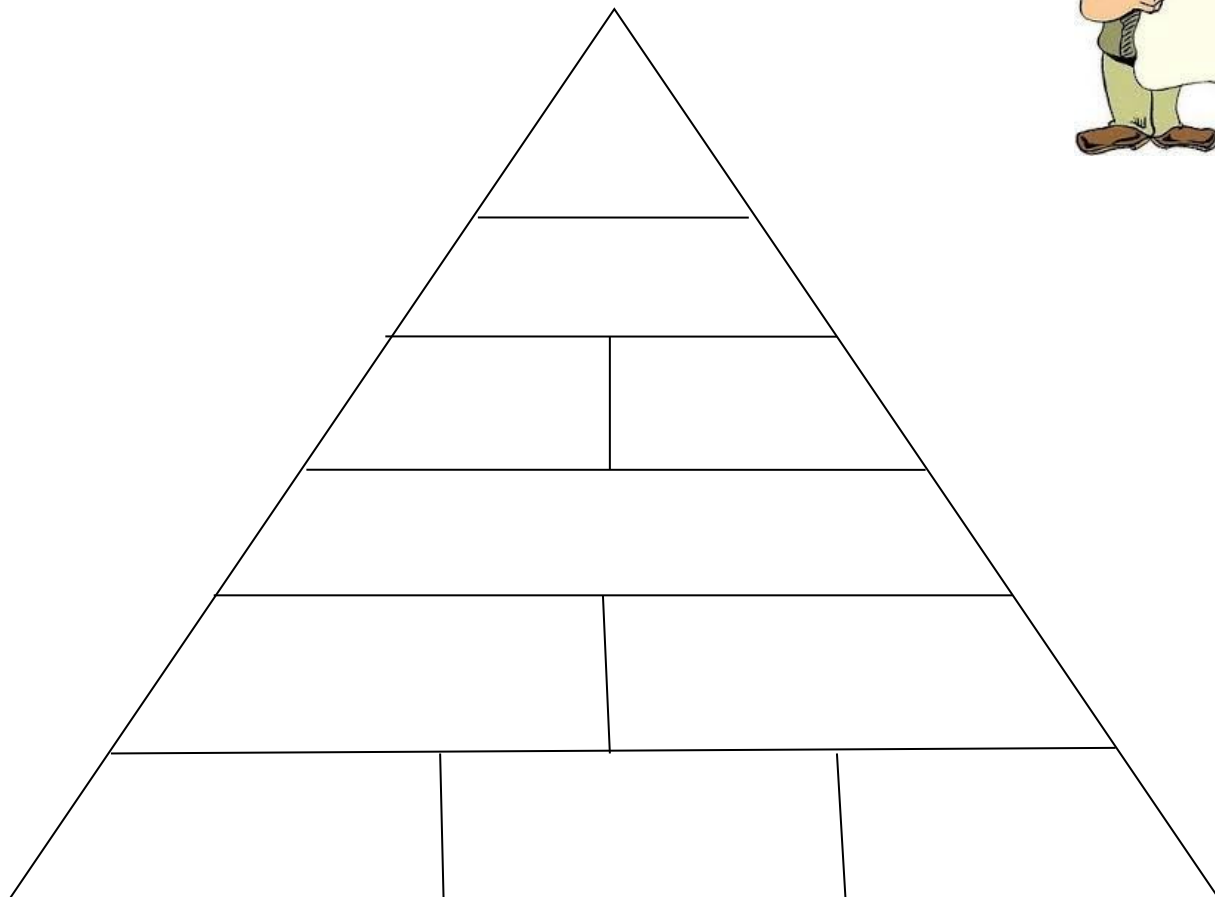
c) Renewable energy sources include mainly:

- Waters       Biomass       Petroleum       Geothermy

d) Renewable energy sources are practically:

- Exhausted       Clean       Polluted       Exact

**4) Put in the pyramid underneath the sources of energy starting from the bottom with the ones that are inexhaustible(=non ending) and going upwards with the ones that are exhausted (ending):**





## Section 3: Tele-Heating – Definition - General information

*Aim: To acquaint students with a special form of heating in a country*

*Objectives: - to introduce specific vocabulary and terminology on heating*

*- to assist students enhance their vocabulary comprehension and writing production*

*Classroom time: 90' (two 45'lessons = Section 3 & 4 can be done in one lesson, Section 5 can be used also as time for recapitulation, feedback and further reading as introduction into a new chapter of Energy Geography).*

### 1. Read the following text carefully:

#### Definition - General information

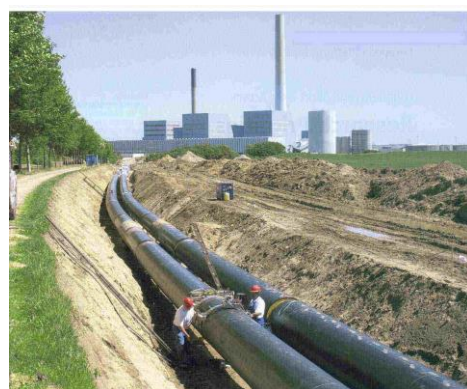
Tele-heating is defined as the provision of heating with a special network of insulated pipes carrying hot water, which is heated in boilers, usually in thermoelectric plants, far enough away from the consumption area. It is the heating of the buildings of a city or part of the city from a central burner rather than individual ones.

The heating of water is by burning gas, oil or coal (lignite) in a plant mainly producing electricity and thermally or vice versa.

The heat required to heat district heating water comes from the steam used in the plant and in particular from the end of the process. Steam has a temperature of 120 ° C-140 ° C. This hot steam heats the water used in the district heating, passing the pipes it is transported with, next to the steam - that is to say a heat exchanger. At the beginning of the flow, the water has a temperature of 100 ° C and the return of 20o - 40oC.

The first small-sized T / C installation in Greece started in Ptolemaida in 1960, heating the PPC settlement in the suburb of Eordea by Ptolemaida.

Today, the T / C facilities have the cities of Kozani, Ptolemaida, Amynteou, Filotas, Megalopolis and Serres, which use the thermal load of neighboring thermal power plants.



#### Tele-heating in Kozani

More than 75 million euros (currently approximately 110 million euros) have been invested since 1992 in the district heating of Kozani, which has been successfully operating since 1993,

heating approximately 25,000 apartments, to a total of 4,900 , About, buildings. This money came from European programs, And own resources of DEYAK and resulted in:

- The steam installations from the III / V and V units III of the SA / Dimitriou
- High-end boiler room
- Transport and distribution pumping stations
- Supply and distribution network, with a total length of more than 450 pipes kilometers.



### **Tele-heating: Economy and protection of the environment**

The operation of T / C benefits both Kozani and its inhabitants as well as our national economy, because The quality of life of residents, which enjoy a cleaner environment, free from the chimneys of oil and oil-fired central heating, have burdened the already impoverished atmosphere of our PPC activities.

The inhabitants of Kozani spent 65 million euros less heating, increasing their disposable income accordingly. In the future and every year this amount will be about 10 million euros.

Foreign currency was saved due to non-consumption of 380,000 tons of heating oil. Every year 32,000 tons of heating oil will be saved.

New jobs were created, directly and indirectly, and new impetus was given to the commercial and craft activity of the city.

Since 1994 there have been 40 employees working on the system, and it is estimated that more than 100 people per year have been employed in the construction of the project since 1993.

There is the possibility of further development of the area with multiple activities in the primary and secondary sectors, such as greenhouses, dryers etc.



**1. Answer the following questions**



**a) How is district heating specified? Fill in the spaces with the words given to you.**

District heating (T / C) is the supply ..... With a special network ..... pipes carrying hot water, which is heated to ..... , Usually in thermoelectric ....., far enough from the consumption area. It is the heating of the buildings of a city or a part of the city by ..... .. burner rather than .....

(Heat, boilers, heating, oil, factories, temperature, atomic, energy, insulated, central, thermal)

**b) Assign words from column A to words in column B**

Heat	Provision of heating
Return temperature	100 ° C
District heating	> 450 km
First installation of T / C in Greece	20 ° C - 40 ° C
Total pipe length	Ptolemaida
Initial Temperature	Steam

**c) Describe in your own words how the district heating works**

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## Section 4: Tele-Heating – How it Works

1. Watch the following video carefully:



2. Mark suggestions as True (T) or False (L)

The district heating system is powered and operated at a thermal power that receives constantly from two (2) units of the CHP. Ag. Dimitriou	
The T / C Enterprise has its own boiler room, which is used every time there is a need to cover a heat load deficit	
All over the years, T / C has been abolished over 35,000 chimneys	
The price of district heating is 25% less than the price of heating oil	
The water returns hot again to the factories	

3) Choose the right answers from each question:



a) The water transferred from the factory of Ag. Dimitriou is:

- Bright
  Cold
  Warm
  Pure

b) The water that returns from the city to the factory of Ag. Dimitriou is:

- Cold
  Hot
  Dirty
  Hot

c) Before the water reaches the city, you may need to:

- Refresh
  Clean Up
  Freeze
  Enrich

d) In the city the water is transported to

- Schools
  Public Services
  Apartment Buildings
  All above



## Section 5: Energy saving

1. Read the following text carefully:

2.

### Definition - Ways of saving

Energy saving is called any effort that reduces the waste of energy reserves.

This can be done by selecting cheaper engines for fuel, more efficient home installations (insulations, etc.) and more economical (less) energy consumption. Undoubtedly such measures are the fact that regardless of economic profits, they produce much less air pollution.

### Ways to save energy are:

- We change the incandescent lamps in our room with saving lamps.
- Turn off the TV, stereo, and generally all electrical devices from the main switch (do not leave them in standby mode).
- Proper insulation of the house ensures coolness in the summer and warmth in winter.
- Avoid using an electric heater or stove.
- In summer we put a fan to cool down and avoid using an air conditioner



- We do not "forget" the chargers when plugged in.
- Lower washing temperature in the washing machine and wash only when the bucket is full.
- We prefer laptop and flat screen, turn off the screen and turn off peripheral systems when not in use.
- We cook smart, in dishes that fit into the hobs with the lid closed. Ten minutes before preparing the meal we close the eye.
- When buying new electrical appliances, we select a high energy class (A ++, A +, A).
- Install a solar water heater.
- We install on our roof a photovoltaic system of electricity generation (1kW, ie about 10-15 square meters).



- We lower washing temperature in the washing machine and wash only when the bucket is full

YES

NO

- We prefer laptop and flat screen, turn off the screen and turn off peripheral systems when not in use

YES

NO

- We cook smartly in dishes that fit into the hobs with the lid closed. Ten minutes before preparing the meal we close the eye

YES

NO

- We avoid the use of an electric heater or stove

YES

NO

- In the summer we put a fan to cool down and avoid using an air conditioner

YES

NO

