



# ENERGY RESOURCES

Student worksheets

ENERGY

Susana Amorós Ortega

RESOURCES

October-December 2008

## LESSON 1.- ENERGY RESOURCES AND POWER STATIONS



**What are energy resources?**


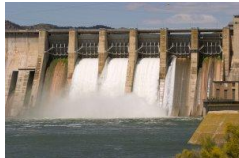






**1. Energy resources.**

**a) In pairs, think about different kinds of energy used to produce electricity. Make a list (if you don't know the word in English, you can draw a picture).**

**b) Whole group discussion. In turns, tell your classmates which are the ENERGY RESOURCES you have written.**

- We think that \_\_\_\_\_ can produce electricity.
- \_\_\_\_\_ is used to produce electricity.

**c) Complete the grid writing the name of the following energy resources.**



**d) Are these energy resources renewable or non-renewable? Read the following text and complete the table below.**

*Energy resources provide us with energy. There are different types of energy resources, including fossil fuels such as coal or oil, and stores of energy such as batteries or the wind. We can divide energy resources into two categories, non-renewable and renewable.*

- *Non-renewable energy resources cannot be replaced once they are all used up. That means they cannot be renewed or replenished. Once they are gone they cannot be used again.*
- *Renewable energy resources can be replaced, and will not run out (finish).*

<b>RENEWABLE</b>	<b>NON-RENEWABLE</b>
<p><b>Solar energy</b></p>	

**2. Complete these sentences using the most suitable word:**

- a) Coal, natural gas and oil are all \_\_\_\_\_ (renewable / non-renewable) energy resources. They release \_\_\_\_\_ (energy / electricity) when they are burned.
- b) Wind and solar energy are \_\_\_\_\_ (renewable / non-renewable) because they \_\_\_\_\_ (can / cannot) be replaced.
- c) Coal, natural gas and oil are called \_\_\_\_\_ (nuclear fuels / fossil fuels).
- d) Two more examples of renewable energies are \_\_\_\_\_ and \_\_\_\_\_.

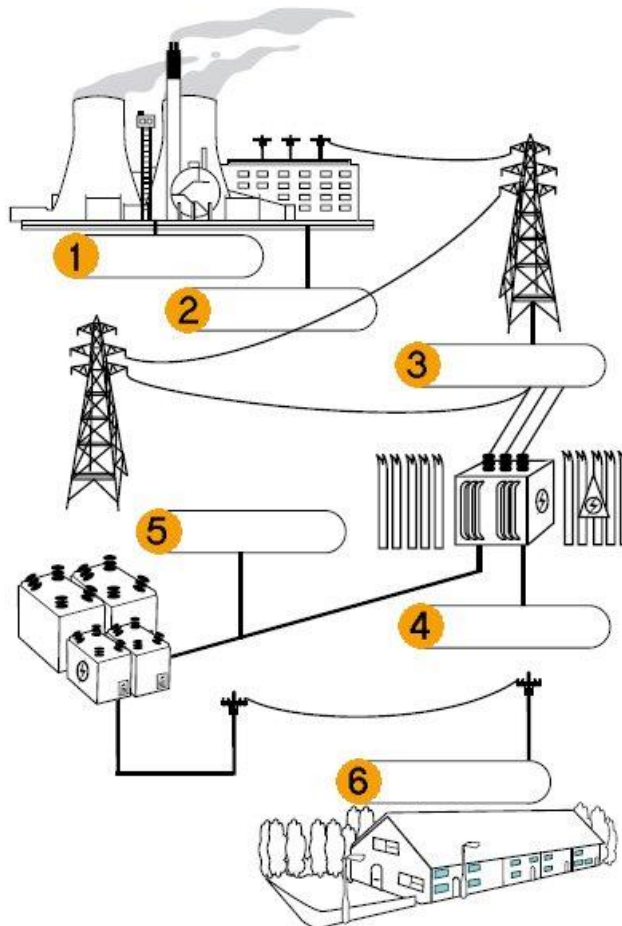
**3. Match each kind of energy with the correct sentence. Underline the key words**

Wave power	is generated from running water. Dams are built across a lake or river in a valley to trap water. The water flows through tunnels and turns the turbines which make electricity.
Geothermal power	are used to convert the Sun's energy into electricity.
Fossil fuels	comes from the movement of water in the sea by the tides. These tides happen twice a day.
Hydroelectricity	uses the energy of the waves to turn turbines that make electricity.
Nuclear energy	uses the energy from plants and waste materials to make electricity.
Wind energy	is made from radioactive uranium ore which occurs naturally in the ground.
Tidal energy	uses the heat that comes from deep rocks under the surface of the Earth.
Biomass	were formed in the Carboniferous period millions of years ago (before the dinosaurs!)
Solar panels	is used to turn wind turbines and make electricity.



**The electricity journey: from power stations to our homes**

4. **Look at the picture.** Electricity is produced in **power stations** and it travels a long way before arriving at our homes. This power station is used to produce electricity from coal, natural gas, oil or nuclear energy.



*Electric journey: from power station to home (Source: [E.ON UK](#))*

a) **Write the names of the different steps (1-6) in the chart above using the words in the box.**

power lines / grid	wooden pole	power station
substation	transformers	underground cable

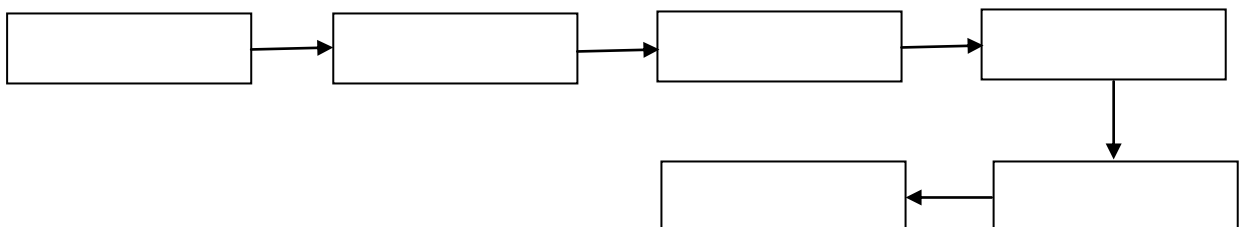
**b) Match each number with the step of the process:**

<b>1</b>	In some areas, cables are carried to buildings on wooden poles.
<b>2</b>	Small local substations reduce the voltage to 230 Volts for houses, schools and businesses. In towns, most cables are underground.
<b>3</b>	Power stations make electricity. They usually burn coal or oil to work the generating machinery
<b>4</b>	In towns and cities there are more transformers in substations. These change the electricity down to 11,000 Volts.
<b>5</b>	The electricity is carried along thick metal cables called power lines. Some of them are carried overhead on pylons.
<b>6</b>	Transformers change the voltage of the electricity up to 400,000 Volts so it can travel long distances.

**c) Write the process in the correct order:**

First \_\_\_\_\_  
 \_\_\_\_\_ . After that \_\_\_\_\_  
 \_\_\_\_\_ . Then \_\_\_\_\_  
 \_\_\_\_\_ .  
 Finally \_\_\_\_\_ .

**d) Draw the flow diagram of the process:**



- e) *Work in pairs. One student (S1) asks 5 questions and the other student (S2) answers looking at the picture of the electric journey. Then, change the roles.*

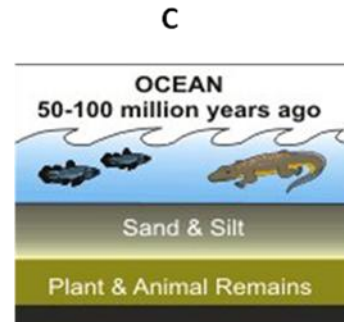
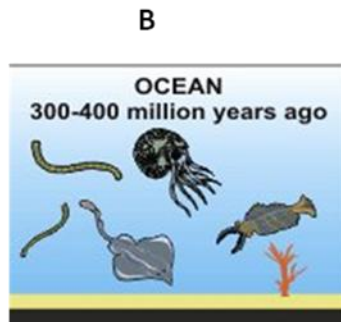
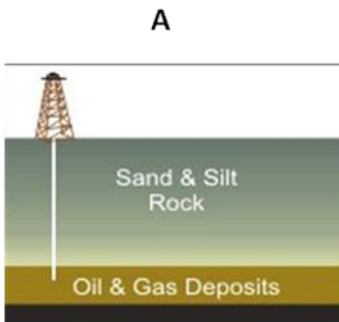
Example:

<b>S1.</b> Where is electricity produced?	<b>S2.</b> In...
<b>S1.</b> How is electricity transported?	<b>S2.</b> By...
<b>S1.</b> Why...?	<b>S2.</b> Because...
<b>S1.</b> What is ..... for?	<b>S2.</b> For .....
<b>S1.</b> Which is the first / next / last step?	<b>S2.</b>

Each student writes his/her questions and the answers:


## LESSON 2.- FOSSIL FUELS: COAL, OIL AND NATURAL GAS

1. Put the pictures in the correct order.



2. Match each picture with the suitable text.

Over millions of years, the remains were buried deeper and deeper. The enormous heat and pressure turned them into oil and gas.

Today, we drill down through layers of sand, silt, and rock to reach the rock formations that contain oil and gas deposits.

Tiny sea plants and animals died and were buried on the ocean floor. Over time, they were covered by layers of silt and sand.

D

E

F

3. Explain the process of how coal was formed.

4. Make sentences with the information in the table.

COAL	was formed	from sea plants and animals
		from plants
		in swamps
OIL		in oceans
		100 million years ago
		50-100 million years ago



**5. Look at the diagram in the PowerPoint presentation. Put the steps of the process in the correct order.**

The turbines turn the generators, which create electricity	The electricity flows into the grid	The steam pushes the turbines, forcing them to spin very fast	The oil is burned to heat water, producing steam	Crude oil is delivered to the power station
□	□	□	□	□

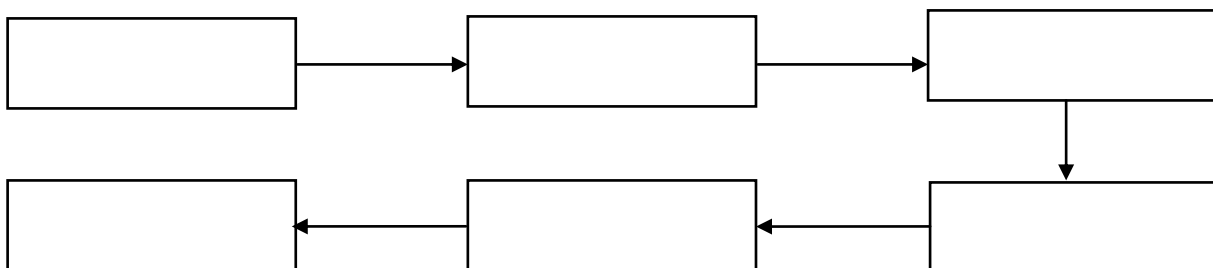
**Write the process of electricity production looking at the diagram in the power point presentation.**

First, \_\_\_\_\_  
 \_\_\_\_\_  
 After that, \_\_\_\_\_  
 \_\_\_\_\_  
 Then, \_\_\_\_\_  
 \_\_\_\_\_  
 Eventually \_\_\_\_\_  
 \_\_\_\_\_

**6. Look at the diagram of a coal-fired power station and watch the video. Describe the process:**

First, \_\_\_\_\_  
 \_\_\_\_\_  
 After that, \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 Finally \_\_\_\_\_  
 \_\_\_\_\_

**7. Draw the flow chart of the process of electricity production.**



**8. Write the advantages and disadvantages of using fossil fuels.**

ADVANTAGES	DISADVANTAGES

**9. Answer the questions:**

- What's the *greenhouse effect*?
- Why do power stations powered by fossil fuels increase *global warming*?
- How is the *acid rain* produced?

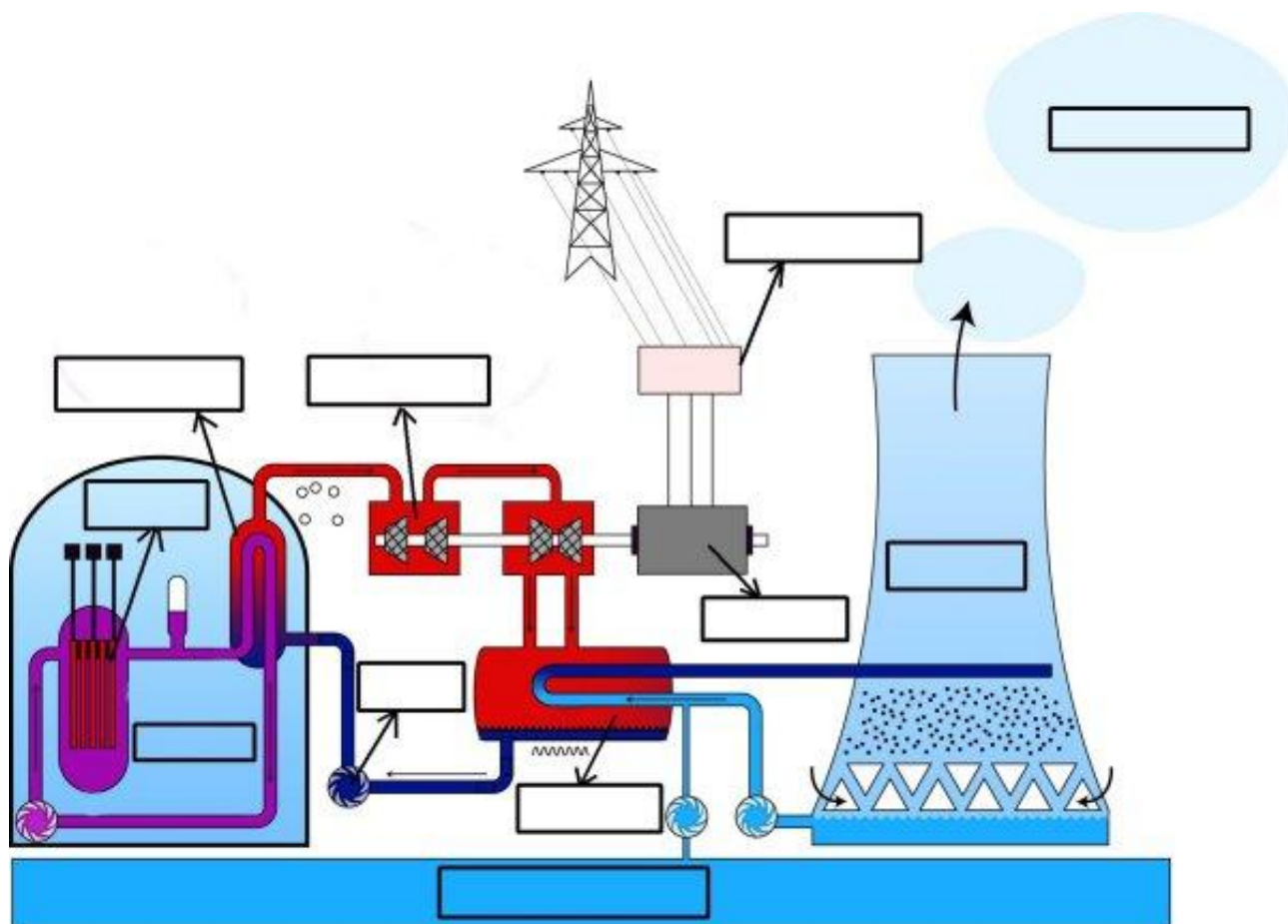
### LESSON 3.- NUCLEAR POWER

1. Go to the website about nuclear energy: <http://www.darvill.clara.net/altenerg/nuclear.htm>  
**Fill in the gaps with the words in the box below.**

- a) Is nuclear power renewable? \_\_\_\_\_.
- b) Nuclear power stations use \_\_\_\_\_ as fuel. They need very little, compared to a "fossil" power station because there is much more \_\_\_\_\_ in nuclear fuel.
- c) The \_\_\_\_\_ reaction inside the \_\_\_\_\_ creates heat, which turns \_\_\_\_\_ into steam to drive \_\_\_\_\_, which drive generators to make electricity.
- d) \_\_\_\_\_ power stations do not create atmospheric pollution, because they do not \_\_\_\_\_ anything. However, the small amount of \_\_\_\_\_ that they do produce is very \_\_\_\_\_.

*Nuclear - burn - chain - dangerous - energy - reactor - turbines - uranium - waste - water*

2. **Label the picture of the nuclear power station with the words in the box.**



Source: Wikimedia commons

cooling tower	reactor	river	control rod
steam generator	transformer	condenser	turbine
water vapour	pump	generator	

**3. Explain the process by using all the words you have in the box above:**

**4. Activity in pairs. Here you have some words related to nuclear energy. You have to discuss with your partner about them and write one sentence for every word.**

a) pollution

b) radioactivity













c) Chernobyl

d) Greenhouse effect and global warming

## LESSON 4.- RENEWABLE ENERGY RESOURCES (I)

### 1. SOLAR ENERGY.- Activity in pairs (*handout 4.1*)

- a) Read your handout, underline the keywords and try to remember the information.
- b) In pairs, complete the table by labelling the pictures.

				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;"></td> <td rowspan="2" style="width: 50%; text-align: center;"></td> </tr> <tr> <td style="width: 50%; text-align: center;"></td> </tr> </table>			
				
				

**c) In pairs, answer the following questions without looking at your handouts:**

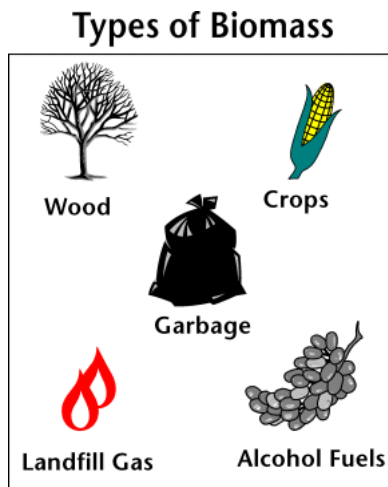
1. Where does solar energy come from? \_\_\_\_\_.
2. Solar energy can be converted into \_\_\_\_\_ and \_\_\_\_\_.
3. What is thermal energy used for?: \_\_\_\_\_.
4. Photovoltaic cells (PV) convert \_\_\_\_\_ energy into \_\_\_\_\_.
5. Write 5 devices that work with solar energy: \_\_\_\_\_.

**d) Correct the answers with your handouts.**

**e) Think about the advantages and disadvantages of solar energy and write them down.**

**2. BIOMASS.- Activity in pairs (handout 4.2)**

a) *Read your handout and try to understand as much as possible. Look at these pictures for some help.*



**Manure**

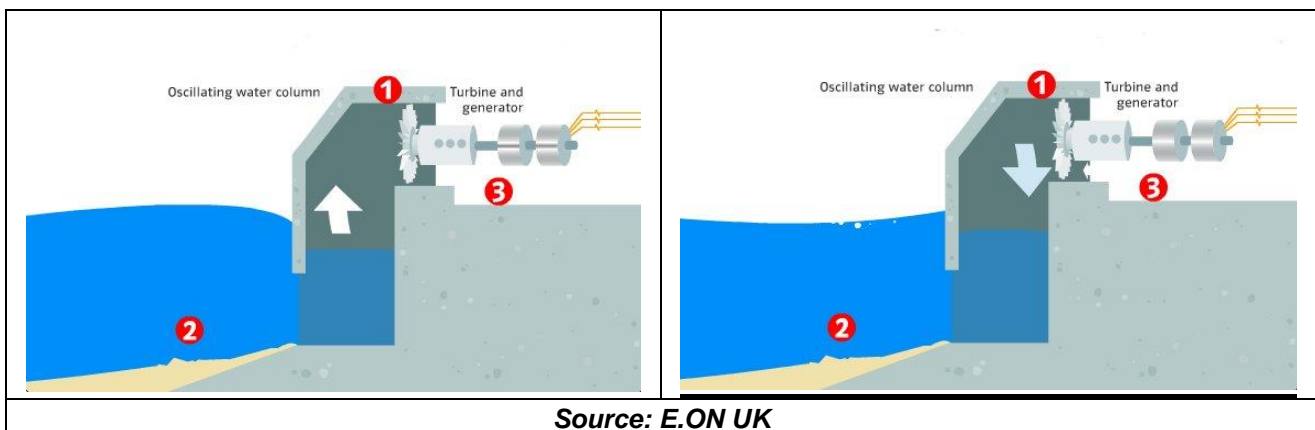


**Biodiesel bus**

b) *Fill in the gaps by asking questions to your partner. Answer the questions your partner asks you.*

- ✓ What is biomass made from?
- ✓ What's the name of the process...?
- ✓ Can you tell me examples of...?
- ✓ Where...?
- ✓ What kind of...?

**3. OCEAN POWER: WAVE AND TIDAL ENERGY**



**a) Label the first picture with the following words:**

wave	electricity	turbine	air	generator
------	-------------	---------	-----	-----------

**b) Look at the pictures of the wave energy power station. Explain how electricity is produced.**

First the waves \_\_\_\_\_.

Then \_\_\_\_\_.




Finally \_\_\_\_\_.

**c) Read this information about TIDAL ENERGY:**

*“Tides are caused by the gravitational effects of the Sun and the Moon on our oceans. This creates a rise and fall in sea height, twice a day. Tidal streams are fast-moving currents that are caused by the movement of water between high and low tide. The amount of energy you can get depends of the size and speeds of the streams.”*

- ✓ **What is the meaning of “tide”?**
  
- ✓ **How do you think electricity will be generated? Draw a picture if it helps you.**
  
  
- ✓ **In which part of Spain can we use this energy?**
  
  
- ✓ **Why is it renewable?**

## LESSON 5.- RENEWABLE ENERGY RESOURCES (II)

			<p><b>WIND ENERGY, HYDROPOWER AND GEOTHERMAL ENERGY</b></p>
---	---	---	---

**Activity 1.-** Work in groups of 3 students with the same handout (A, B or C). Each group of 3 students has handouts with information about **one** of the above energy resources.

- a) *Read the information about the energy resource. Ask your partners if you don't understand something.*
- b) *Write 3 new words you have learnt, and explain their meaning.*

c) *Complete the following table:*

Energy resource		
1	Primary energy	
2	Final energy/energies	
3	Name of the device	
4	How electricity is generated	
5	Some years ago this energy was used for...	
6	Examples of today's use	
7	Location	



**d) Write the 7 questions you can answer with the information you have in the table above.** Here you have some help:

1. What does a \_\_\_\_\_ use to make electricity?
2. Which is the final energy?
3. How is \_\_\_\_\_ transformed into \_\_\_\_\_? By means of \_\_\_\_\_.
4. How ...?
5. Write examples ...
6. Write ...
7. Where .....?

**e) Look at the diagram in your handout and draw the flow diagram of the process.**

**f) Write three advantages and three disadvantages of this energy.**

**Activity 2.-** Make new groups of three students with different handouts (one student A, one student B and one student C)

**a) You have to complete the following table asking your partners for the information you need (remember you already have the questions).**

	Energy resource		
1	Primary energy		
2	Final energy/energies		
3	Name of the device		
4	How electricity is generated		
5	Some years ago this energy was used for...		
6	Examples of today's use		
7	Location		

**b) Explain the process to your partners using your flow diagram.**

First \_\_\_\_\_  
 \_\_\_\_\_ . After that \_\_\_\_\_  
 \_\_\_\_\_ . Then \_\_\_\_\_  
 Finally \_\_\_\_\_ .

**Activity 3.-** General revision.

**LESSON 6.- THE FUTURE OF ENERGY****Activity 1.- Let's review...**

*Work in pairs and complete the following table using handout 6.*

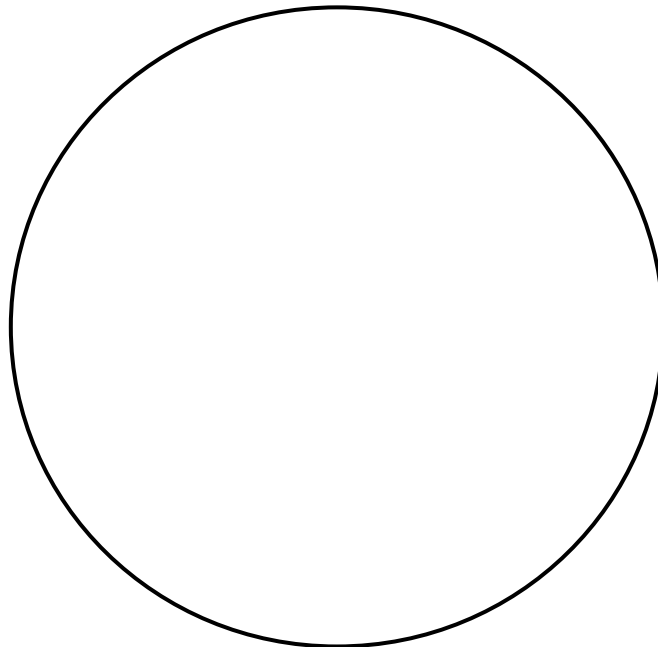
<b>Energy source</b>	<b>Advantages</b>	<b>Disadvantages</b>
<b>Coal</b>		
<b>Oil-natural gas</b>		
<b>Nuclear</b>		
<b>Wind</b>		
<b>Hydropower</b>		
<b>Solar</b>		

**Activity 2.- Drawing a pie chart.**

Look at the table below. It shows the percentages of energy resources used to produce electricity in Spain during 2007. Using these percentages, draw the pie chart.

Fossil fuels: coal, oil and natural gas	Wind	Hydropower	Nuclear	Other Non- renewable	Other Renewable
44	16	19	9	8	4

Source: REE (Red Eléctrica de España)



**Activity 3.- ROLE PLAY: Debating renewable and non-renewable energy resources**

***This is a speaking activity which consists of making a radio programme to debate renewable energy resources and nuclear energy. You will work in groups following your teacher's instructions.***

Here you have some useful vocabulary to help you with this activity:

✓ **Key words:**

HELPFUL VOCABULARY		
Global warming	Risk of acid rain	Renewable/ non renewable
CO <sub>2</sub> emission (greenhouse effect)	Noisy	Cheap / expensive to build
Remote locations	Floods a large area	Reliable /unreliable
Depends on the weather	Waste	High / low cost per unit of electricity
Risk of big accident	Unightly	Free energy resource
Small amount of fuel produces a lot of electricity	Popular / unpopular	Safe /unsafe

✓ **To ask questions and moderate the debate:**

Good morning /evening  
 What do you think about...?  
 Which are the advantages / disadvantages of...?  
 Do you think that... ?  
 I have one more question: ...  
 It's time. We have to finish.  
 Thank you very much...  
 Good luck with...

✓ **To express opinions:**

From my point of view...  
 I think that... / I believe...  
 I agree /don't agree with that / you.  
 Yes, you are right.  
 Are you sure about this?  
 I'd like to add something.

## LESSON 7.- SAVING ENERGY IN THE HOME

### Activity 1.- Calculating the energy consumption in our homes

1.- Complete the grid with all the electrical appliances you have at home and calculate the total energy consumption in kW·h per DAY (Daily kW·h consumption)

Room	Electrical appliances	kW	x	number	x	Hours per day	=	kW·h/day
Kitchen	Oven	4,5		1		1		4,5
	Light bulbs 100 W	0,1		4		7		2,8
Dining room								
Bathroom(s)								
Bedrooms								
Corridor								
Daily kW·h consumption								

To calculate the energy consumption you can use this formula:

$$\text{kW} \times \text{Hours per Day} = \text{Daily Kilowatt-hour (kW-h) consumption}$$

Look at this table if you don't know the consumption of any electrical appliance:

Electrical appliance	Consumption (kW)	Electrical appliance	Consumption (kW)
Air conditioning	3.5	Refrigerator	0.6
Bulb (60W/100W/150W)	0.06/0.1/0.15	Television	0.15
Water heater	2.2	Oven	4.5
Coffee maker	1	Hair dryer	1.6
Computer	0.8	Microwave oven	0.9
Laptop	0.05	Iron	1.4
Vacuum cleaner	1.2	Toaster	1.1
Dishwasher	2	Washing machine	0.4
Clothes dryer	3.5	Portable heater	1.2

2.- Ask your parents for an electricity bill:

- ✓ **Which is the price of 1 kW·h?** \_\_\_\_\_ €.
- ✓ **Calculate the € you consume per day.** You have to multiply the daily kW·h consumption by the price of each kW·h: **daily kW·h consumption x price of 1 kW·h**

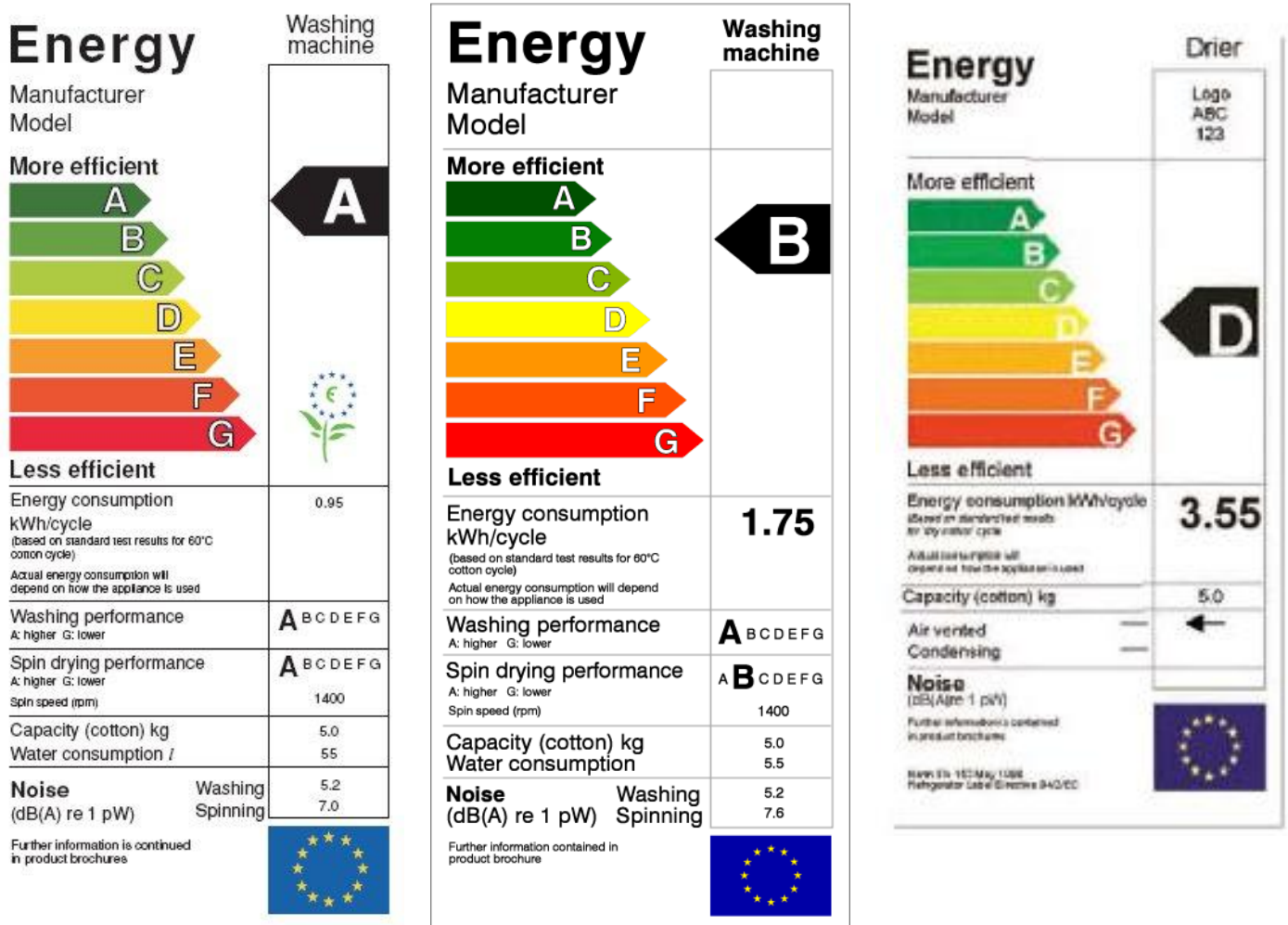
---

- ✓ **Calculate the € you consume per year.** Clue: **daily kW·h consumption x 365 x price of 1 kW·h**

---

3.- Look at the pictures of these three labels.

a) What does it mean that a washing machine has an “A energy efficiency”? And a B?



b) Imagine you have the D washing machine at home and you decide to buy the A one. How much money would you save in one year? Suppose you use it four times a week.



**Activity 2.- How to save energy in our homes and reduce the electricity bill.**

***In pairs, look at the grid you have completed in activity 1 and write 6-8 ways to save energy in your home and therefore reduce your electricity bill.***

Example: **We can save energy by** turning off the computer when we don't use it.  
We can reduce the electricity bill by ...

- ✓
- ✓
- ✓
- ✓
- ✓
- ✓
- ✓
- ✓
- ✓

**Activity 3.- Sharing ideas**

***Listen carefully to your classmates and write 3 new ideas to save energy.***

- ✓
- ✓
- ✓

## **PROJECT.- Making our school green**

Working in groups of 4 students, you will plan and design how to save energy in our school and how to use renewable energy resources.

- **Task 1: Listen to your teacher's explanation.**
- **Task 2: Share the roles in your group and fill in the table.** Each member of the group will have a specific task:
  - **Coordinator.** He/she will be in charge of ensuring *that the different tasks are achieved on time*. He/she has to check that everybody does his/her job. He *will help the investigator with the survey*.
  - **ICT expert.** He/she will be in charge of preparing the final presentation of the project with the results and materials the group will prepare. The two first sessions he/she will work with the designer
  - **Investigator.** He/she will be in charge of the survey. When he/she finishes, she/he will help the ICT expert to prepare the presentation.
  - **Designer.** He/she will be in charge of drawing plans, pictures and all kind of visuals needed. The two first sessions he/she will work with the ICT expert to complete the tasks.
- **Task 3: Do the activities you have in your handout.**
- **Task 4: Prepare a PowerPoint presentation to summarize all the work you have done:** calculations, conclusions, poster, your solution.
- **Task 5: Present your work to the rest of the class using the PowerPoint presentation (10 min).**
- **Task 6: Fill in the assessment and the self-assessment tables.**

## Assessment sheet 1: ASSESSING AN ORAL PRESENTATION

Your name: \_\_\_\_\_

Date: \_\_\_\_\_

MARKS	1	2	3	4	Group ____				Group ____				Group ____			
<b>General aspect</b>	Few slides and very simple	Enough slides but very simple	Nice presentation	Very nice presentation												
<b>Pictures and graphics</b>	Few pictures and with low quality	Small pictures but good quality	Too many pictures but easy to understand	Good balance between pictures and text												
<b>Organisation</b>	Disorganized and difficult to understand	Organized but difficult to understand	Disorganized but easy to understand	Organized and easy to understand												
<b>Content</b>	Little information	Important information missing	Explains key points but some information missing	Information about all the points												
<b>Timing</b>	Only one member speaks	Only two members speak	Some members speak longer than others	All the members speak for the same length of time												
					Student				Student				Student			
					A	B	C	D	A	B	C	D	A	B	C	D
<b>Vocabulary</b>	Many mistakes	Basic vocabulary	Good vocabulary, many mistakes	Very good vocabulary, few mistakes												
<b>Speed</b>	Too slow and difficult to understand	Slow and needs help all the time	Slow but easy to understand	Normal speed and easy to follow												
<b>Communication</b>	He / she reads all the time	He / she reads most of the time	He / she reads sometimes	He / she explains without reading												
<b>TOTAL SCORE</b>																

### Assessment sheet 2: SELF-ASSESSMENT

Your name: \_\_\_\_\_

Date: \_\_\_\_\_

MARKS	1	2	3	4	My marks
<b>My tasks</b>	I didn't do my tasks	I did some of my tasks but I needed help	I did all my tasks	I did all my tasks and I also helped the others	
<b>Organisation</b>	I didn't organise anything	I helped the others to organise the work	I organised all the work without asking the others	I organised the work with the rest of the group	
<b>Solving problems</b>	I didn't solve any problem. The others solved them	I helped to solve problems but I didn't take the initiative	I solved some problems helped by the others	I solved the problems and I looked for solutions	
<b>Helping the others</b>	I didn't help my workmates	I only helped my workmates when they asked me for help	I helped my workmates	I helped my workmates and they also helped me	
<b>Cooperative work</b>	I didn't know what I had to do	I only did my part of the project	I did my part of the project and I knew what the other members were doing	I did my part of the project and I also worked with my workmates	
<b>TOTAL SCORE</b>					