



ENERGY RESOURCES

Lesson plans

ENERGY

Susana Amorós Ortega

RESOURCES

October-December 2008

SUMMARY

<ul style="list-style-type: none"> ➤ Topic: Energy resources ➤ Subject: Technology ➤ Level: 2nd ESO ➤ Materials for students: Students' worksheets 			
LESSON	TIMING	SUPPLEMENTARY MATERIALS	ROOM
L1.- Energy resources and power stations	1 h		Classroom (whole group)
L2.- Fossil fuels: coal, oil and natural gas	1 h	fossil_fuels.pps	Classroom (whole group) with computer and projector
L3.- Nuclear power	1 h	nuclear_power.pps	Computer room (whole group)
L4.- Renewable energy resources (I): solar energy, biomass and ocean power	1 h	handout41.pdf handout42.pdf	Classroom (whole group)
L5.- Renewable energy resources (II): wind energy, hydropower and geothermal power.	1 h	handout5.pdf renewablell.pps	Classroom (whole group) with computer and projector
L6.- The future of energy	1 h	handout6.pdf	Classroom (whole group)
L7.- Saving energy in the home	1 h		Classroom (whole group)
PROJECT.- Making our school green	4 h	project.pdf	Computer room (half of the group) with internet access and projector

LESSON PLAN 1.- ENERGY RESOURCES AND POWER STATIONS

<p>KEY SKILLS: Students will be able...</p> <ul style="list-style-type: none"> To interpret and use knowledge about processes to predict consequences. 			
<p>TRANSFERABLE SKILLS</p> <ul style="list-style-type: none"> ➤ Communicative skills: Students will be able... <ul style="list-style-type: none"> To understand flow diagrams and pictures and explain a process to other students. To interact with other students by giving their opinion about energy resources. To select from their knowledge and communicate in a variety of ways: talking, writing... ➤ Methodological skills: Students will be able... <ul style="list-style-type: none"> To transform information they are given into knowledge by activating thinking skills. To process and assimilate new knowledge and skills. ➤ Personal skills: Students will be able... <ul style="list-style-type: none"> To develop individual and collective activities. 			
<p>Aim: Students will learn the difference between renewable and non-renewable energy resources and how electricity is transported from power stations to our homes.</p>			
TEACHING OBJECTIVES	LEARNING OUTCOMES	COMMUNICATION	CULTURE
CONTENT	CONTENT	<ul style="list-style-type: none"> ➤ Language of learning Key vocabulary about energy resources, types of energy and electricity. ➤ Language for learning Understanding a flow diagram. ➤ Language through learning Language that comes out when completing tasks, i.e. new vocabulary and expressions. 	<p>- Energy around us: where does electricity come from?</p>
<ul style="list-style-type: none"> - Energy resources to produce electricity. - Definition of renewable and non-renewable energy resource. - Differences among energy resources. - The electricity transmission. 	<ul style="list-style-type: none"> - Knowing all the energy resources that produce electricity. - Understanding the difference between renewable and non-renewable. - Understanding the electricity journey. 		
COGNITION	COGNITION		
<p>To offer opportunities for students to synthesize knowledge.</p>	<ul style="list-style-type: none"> - Comparing different energy resources. - Drawing a flow chart of the process of producing electricity in a power station. - Explaining a process by means of a diagram. 		
<p>ASSESSMENT CRITERIA: Students should be able to distinguish between renewable and non-renewable energy resources and explain the electricity journey from power stations to our homes.</p>			

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

<p>KEY SKILLS: Students will be able...</p> <ul style="list-style-type: none"> To argue and draw conclusions. 			
<p>TRANSFERABLE SKILLS</p> <ul style="list-style-type: none"> ➤ Communicative skills: Students will be able... <ul style="list-style-type: none"> To understand flow diagrams and pictures and explain a process to other students. To interact with other students by discussing the advantages and disadvantages of using fossil fuels. To select from their knowledge and communicate in a variety of ways: talking, writing... ➤ Methodological skills: Students will be able... <ul style="list-style-type: none"> To transform information they are given into knowledge activating thinking skills. To process and assimilate new knowledge and skills. ➤ Personal skills: Students will be able... <ul style="list-style-type: none"> To develop individual and collective activities with critical thinking. 			
<p>Aim: Students will learn how fossil fuels were formed and how a fossil fuel power station works to produce electricity.</p>			
TEACHING OBJECTIVES	LEARNING OUTCOMES	COMMUNICATION	CULTURE
CONTENT	CONTENT	<ul style="list-style-type: none"> ➤ Language of learning Key vocabulary about fossil fuels (oil, natural gas, coal), parts of power stations and environmental problems (global warming, greenhouse effect, acid rain). ➤ Language for learning Understanding power station diagrams. ➤ Language through learning Language that comes out when completing tasks, i.e. new vocabulary and expressions. 	<p>- Climate change: greenhouse effect, global warming and acid rain.</p>
<ul style="list-style-type: none"> - Formation of coal, oil and natural gas. - Electricity production in power plants. - Advantages and disadvantages of fossil fuels. 	<ul style="list-style-type: none"> - Knowing how fossil fuels were formed. - Understanding the electricity generation in a power station. - Understanding the advantages and disadvantages of fossil fuels. 		
COGNITION	COGNITION		
<p>To offer opportunities for students to synthesize knowledge and evaluate fossil fuels.</p>	<ul style="list-style-type: none"> - Distinguish between advantages and disadvantages of fossil fuels. - Drawing a flow chart of the process of producing electricity in a power station. - Explaining a process by means of a diagram. 		
<p>ASSESSMENT CRITERIA: Students should be able to explain how a fossil fuel powered power station works and draw a flow diagram of the process.</p>			

LESSON PLAN 3.- NUCLEAR POWER

<p>KEY SKILLS: Students will be able...</p> <ul style="list-style-type: none"> To use their knowledge about facts to predict consequences. 			
<p>TRANSFERABLE SKILLS</p> <ul style="list-style-type: none"> ➤ Communicative skills: Students will be able... <ul style="list-style-type: none"> To acquire specific vocabulary. To interact with other students by describing processes from diagrams. To select from their knowledge and communicate in a variety of ways: talking, writing... ➤ Methodological skills: Students will be able... <ul style="list-style-type: none"> To look for information on the internet and select key words. To process and assimilate new knowledge and skills. ➤ Personal skills: Students will be able... <ul style="list-style-type: none"> To use their initiative and previous knowledge. 			
<p>Aim: Students will learn how nuclear power stations work and the consequences of using nuclear energy.</p>			
TEACHING OBJECTIVES	LEARNING OUTCOMES	COMMUNICATION	CULTURE
CONTENT	CONTENT	<ul style="list-style-type: none"> ➤ Language of learning Key vocabulary about nuclear energy (uranium, fission, chain reaction), parts of nuclear power stations and environmental problems (radioactive waste). ➤ Language for learning Understanding nuclear power station diagrams. ➤ Language through learning Language that comes out when completing tasks, i.e. new vocabulary and expressions. 	<p>- Clichés about nuclear energy.</p>
<ul style="list-style-type: none"> - Uranium and nuclear fission. - Electricity production in nuclear power stations. - Radioactive waste and environment. 	<ul style="list-style-type: none"> - Knowing what a chain reaction is. - Understanding the electricity generation in nuclear power stations. - Understanding the environmental effects of nuclear energy. 		
COGNITION	COGNITION		
<p>To offer opportunities for students to synthesize knowledge and evaluate nuclear energy.</p>	<ul style="list-style-type: none"> - Distinguishing between advantages and disadvantages of fossil fuels. - Drawing a flow chart of the process of producing electricity in a power station. - Explaining a process by means of a diagram. 		
<p>ASSESSMENT CRITERIA: Students should be able to explain electricity production from a diagram of a nuclear power station and know the safety measures which are necessary.</p>			

LESSON PLAN 4.- RENEWABLE ENERGY RESOURCES (I)

KEY SKILLS: Students will be able... <ul style="list-style-type: none"> • To work in group and share knowledge. 			
TRANSFERABLE SKILLS <ul style="list-style-type: none"> ➤ Communicative skills: Students will be able... <ul style="list-style-type: none"> • To understand a written document and extract the most important information. • To interact with other students by asking and answering questions to find out some information. • To select from their knowledge and communicate in a variety of ways: talking, writing... ➤ Methodological skills: Students will be able... <ul style="list-style-type: none"> • To transform information they are given into knowledge activating thinking skills. • To memorize, process and assimilate new knowledge and skills. ➤ Personal skills: Students will be able... <ul style="list-style-type: none"> • To solve problems in a reflective way by using their previous knowledge. 			
Aim: Students will learn about solar energy, biomass and ocean energy (tidal and wave energies) and they will study how electricity is produced in power stations and what the advantages and disadvantages of those energies are.			
TEACHING OBJECTIVES	LEARNING OUTCOMES	COMMUNICATION	CULTURE
CONTENT	CONTENT	<ul style="list-style-type: none"> ➤ Language of learning Key vocabulary about renewable energy resources (solar panel, photovoltaic cells, types of biomass, biodiesel, tidal energy, parts of a power plant). ➤ Language for learning Asking and answering questions, explaining a process step by step. ➤ Language through learning Language that comes out when completing tasks, i.e. new vocabulary and expressions 	<ul style="list-style-type: none"> - Current use of renewable energy resources in our country: location, pros and cons.
- Basis of solar energy, biomass and ocean energy. - Examples of use. - Electricity production in power stations.	- Knowing all the uses of solar energy, biomass and ocean energy. - Understanding documents with specific vocabulary. - Remembering how power stations work.		
COGNITION	COGNITION		
To offer opportunities for students to understand the process of electricity production.	- Deducing how a power station works from previous knowledge. - Summarizing some information for a partner. - Drawing a diagram of a process from a written explanation.		
ASSESSMENT CRITERIA: Students should be able to explain the main aspects of each renewable energy resource and understand how different power stations work.			

LESSON PLAN 5.- RENEWABLE ENERGY RESOURCES (II)

KEY SKILLS: Students will be able... <ul style="list-style-type: none"> • To work in group and share knowledge. 			
TRANSFERABLE SKILLS <ul style="list-style-type: none"> ➤ Communicative skills: Students will be able... <ul style="list-style-type: none"> • To understand a written document and extract the most important information. • To interact with other students by asking and answering questions to find out some information. • To select from their knowledge and communicate in a variety of ways: talking, writing... ➤ Methodological skills: Students will be able... <ul style="list-style-type: none"> • To transform information they are given into knowledge activating thinking skills. • To memorize, process and assimilate new knowledge and skills. ➤ Personal skills: Students will be able... <ul style="list-style-type: none"> • To solve problems in a reflective way by using their previous knowledge. 			
Aim: Students will learn about wind energy, hydropower and geothermal energy and they will study how electricity is produced in power stations and what the advantages and disadvantages of those energies are.			
TEACHING OBJECTIVES	LEARNING OUTCOMES	COMMUNICATION	CULTURE
CONTENT	CONTENT	<ul style="list-style-type: none"> ➤ Language of learning Specific vocabulary about renewable energy resources (wind farm, wind turbine, dam, heat, hot spring, parts of a power plant). ➤ Language for learning Asking and answering questions, explaining a process step by step. ➤ Language through learning Language that comes out when completing tasks, i.e. new vocabulary and expressions 	<p style="text-align: center;">- Advantages and disadvantages of renewable energy resources.</p>
- Basis of wind energy, hydropower and geothermal energy. - History. - Examples of use. - Electricity production in power stations.	- Knowing all the uses of wind energy, hydropower and geothermal energy. - Understanding the advantages and disadvantages of renewable energy resources. - Remembering how power stations work.		
COGNITION	COGNITION		
To offer opportunities for students to work in expert groups and make the effort to understand information and explain it with their own words.	- Deducing how a power station works from an explanation. - Summarizing some information for a partner. - Drawing a flow diagram of a process from a written explanation.		
ASSESSMENT CRITERIA: Students should be able to remember key words related to different renewable energy resources and explain electricity production by means of flow diagrams.			

LESSON PLAN 6.- THE FUTURE OF ENERGY

<p>KEY SKILLS: Students will be able...</p> <ul style="list-style-type: none"> • To use the knowledge about facts and processes to predict consequences and take reflective action in order to preserve and improve living conditions. 			
<p>TRANSFERABLE SKILLS</p> <ul style="list-style-type: none"> ➤ Communicative skills: Students will be able... <ul style="list-style-type: none"> • To make use of graphical resources to show data. • To give accounts of experiences, opinions and develop argument. • To select from their knowledge and communicate in a variety of ways: talking, writing... • To argue and draw conclusions. ➤ Methodological skills: Students will be able... <ul style="list-style-type: none"> • To use and relate the tools of expression of mathematical thought in order to interpret different types of information. • To apply strategic thinking and cooperation skills. ➤ Personal skills: Students will be able... <ul style="list-style-type: none"> • To use their initiative and previous knowledge. 			
<p>Aim: Students will use what they have learnt in previous lessons to analyse and compare all the energy resources and to predict the future of electricity production in our country.</p>			
TEACHING OBJECTIVES	LEARNING OUTCOMES	COMMUNICATION	CULTURE
CONTENT	CONTENT	<ul style="list-style-type: none"> ➤ Language of learning Key vocabulary about different aspects of energy: safety, reliability, risk of accident, waste, CO₂, location. ➤ Language for learning Expressing opinions, asking and answering questions, discussing. ➤ Language through learning Language that comes out when completing tasks, i.e. new vocabulary and expressions 	<p style="text-align: center;">- Energy impact on our lives.</p>
<ul style="list-style-type: none"> - Advantages and disadvantages of different energy resources. - Current electricity production in our country. - Debating the future of energy. 	<ul style="list-style-type: none"> - Knowing positive and negative aspects of energy resources. - Knowing the current percentages of each energy resource used to produce electricity in our country. 		
COGNITION	COGNITION		
<p>To offer opportunities for students to talk and express opinions by means of a role play.</p>	<ul style="list-style-type: none"> - Expressing opinion taking into account all their previous knowledge. - Drawing a pie chart from figures of a table. - Comparing different energy resources. 		
<p>ASSESSMENT CRITERIA: Students should be able to summarize what they have learnt and express opinions using previous knowledge and working in group.</p>			

LESSON PLAN 7.- SAVING ENERGY IN THE HOME

<p>KEY SKILLS: Students will be able...</p> <ul style="list-style-type: none"> • To use the knowledge about facts to take reflective action in order to preserve and improve living conditions for oneself, for others and for other living things. 			
<p>TRANSFERABLE SKILLS</p> <ul style="list-style-type: none"> ➤ Communicative skills: Students will be able... <ul style="list-style-type: none"> • To interpret and understand the situations she/he will encounter in everyday contexts. • To relate observations and give accounts of experiences. • To argue and draw conclusions. ➤ Methodological skills: Students will be able... <ul style="list-style-type: none"> • To put into practise processes of mathematical reasoning leading to solving problems in everyday situations. • To assimilate new knowledge and skills. ➤ Personal skills: Students will be able... <ul style="list-style-type: none"> • To develop individual and collective activities with critical thinking. 			
<p>Aim: Students will learn how to save energy in the home in a practical way and they will learn about energy efficiency.</p>			
TEACHING OBJECTIVES	LEARNING OUTCOMES	COMMUNICATION	CULTURE
CONTENT	CONTENT	<ul style="list-style-type: none"> ➤ Language of learning Key vocabulary about electrical appliances, power units (kW, W), energy units (kW·h). ➤ Language for learning Mathematical language for calculation, expressing ideas, discussing. ➤ Language through learning Language that comes out when completing tasks, i.e. new vocabulary and expressions. 	<p>- Energy impact in our lives.</p>
<ul style="list-style-type: none"> - How to calculate the energy consumption in the home. - Energy efficiency. - Saving energy in our homes and reducing the electricity bill. 	<ul style="list-style-type: none"> - Knowing the energy consumption of different electrical appliances. - Calculating the electricity bill. - Learning practical ways to save energy in the home. 		
COGNITION	COGNITION		
<p>To offer opportunities for students to make a survey in their houses and draw conclusions in order to save energy in a practical way.</p>	<ul style="list-style-type: none"> - Drawing conclusions after a survey. - Comparing energy consumptions of different electrical appliances with different efficiency. 		
<p>ASSESSMENT CRITERIA: Students should be able to calculate the energy consumption in their homes and distinguish between electrical appliances with different energy efficiency.</p>			

PROJECT PLAN.- MAKING OUR SCHOOL GREEN

<p>KEY SKILLS: Students will be able...</p> <ul style="list-style-type: none"> • To make a responsible use of resources, to preserve and improve living conditions for oneself, for the others and for other living things. • To access and communicate information by means of ICT tools. 			
<p>TRANSFERABLE SKILLS</p> <ul style="list-style-type: none"> ➤ Communicative skills: Students will be able... <ul style="list-style-type: none"> • To interpret and understand the situations she/he will encounter in everyday contexts. • To argue and draw conclusions. ➤ Methodological skills: Students will be able... <ul style="list-style-type: none"> • To put into practise processes of mathematical reasoning leading to solving problems in everyday situations. • To apply study skills that include strategic thinking, cooperation and self-evaluation skills. ➤ Personal skills: Students will be able... <ul style="list-style-type: none"> • To develop collective projects with creativity, confidence, responsibility and critical thinking. 			
<p>Aim: Students will work in a cooperative way by means of a practical project and will be able to carry out a survey in the school and show their results to the rest of the class.</p>			
TEACHING OBJECTIVES	LEARNING OUTCOMES	COMMUNICATION	CULTURE
CONTENT	CONTENT	<ul style="list-style-type: none"> ➤ Language of learning Review key vocabulary already studied. ➤ Language for learning Mathematical language for calculation, expressing ideas, discussing, summarizing. ➤ Language through learning Language that comes out when completing tasks, i.e. new vocabulary and expressions 	<p style="text-align: center;">- Planning a project using renewable energies in our school.</p>
- Summary of key words about energy.	- Revising topics already studied and connecting ideas.		
- Ways to save energy in our school.	- Learning from the work of other students.		
COGNITION	COGNITION		
To offer opportunities for students to do cooperative work and to have a global and practical vision about energy.	- Drawing conclusions after a survey. - Applying their knowledge to solve a real problem.		
<p>ASSESSMENT CRITERIA: Students should be able to complete a project and they will give an oral presentation which will be assessed by the rest of the class.</p>			