



**Subject: Alternative energy sources.**

**General objective:** get acquainted with non-emitting CO<sub>2</sub> energy sources.

**Specific objectives:**

- student is able to give examples of renewable energy sources (wind, solar, geothermal, biomass, fusion power plants)
- knows the principle of solar panels

**Methods of work:**

- seeking: talk (questions and answers), discussion
- practical - group work, students' exercises

**Forms of work:**

- collective (with the whole class)
- group work.

**Teaching aids:**

- ppt presentation „ Alternative energies”, computer, projector,
- toys with solar panels.

**Lesson's scenario:**

TEACHER'S ACTIVITIES	STUDENT'S ACTIVITIES
<i>Introduction</i>	
- Presentation of the topic of the lesson and its purpose.	
- Homework check: Divides students into groups for global warming and against it and begins a discussion: <ul style="list-style-type: none"> <li>• Is there global warming?</li> <li>• What factors testify to yes (which to no)?</li> </ul> - discussion is an introduction to the topic: <ul style="list-style-type: none"> <li>• What can we do to reduce CO<sub>2</sub> emissions?</li> <li>• How to produce electricity?</li> </ul>	- ongoing discussion: students present theses for and against global warming  - possible answers: - Sort waste, use cars less often - choose a bike, walk, reduce coal burning.  - Use renewable energy sources that do not produce CO <sub>2</sub> .
<i>Lesson development</i>	
- Presentation (fragments) "Alternative energies", with information concerning: <ul style="list-style-type: none"> <li>• Geothermal energy</li> <li>• Wind energy</li> <li>• Solar energy</li> <li>• Photovoltaic panels principle</li> <li>• Biomass burning</li> </ul>	- Taking notes while watching the presentation
- students' experiment: He distributes various toys with photovoltaic panels to students	Divided into groups of 3-4, they perform the experiment according to the instructions, take notes, write down the applications.
- Asks for a summary of the work result.	- discussion on the efficiency of various types of solar panels.
<i>Summary</i>	
- asks the questions: <ul style="list-style-type: none"> <li>• What have you learned during today's lesson?</li> <li>• What are renewable energy sources?</li> <li>• Can one completely replace conventional power plants with alternative energies?</li> </ul>	- answering the questions
- Assesses students' work during the lesson. - Homework assignment	

Course of experiment (group work):

- Each group receives different photovoltaic toys (having a photovoltaic panel).
- The teacher prepares various light sources: LED bulbs, energy-saving, classic. It is worth preparing several, even of the same type. Students write down the nominal power consumed by each of them.
- Students are divided into groups of 3-4 people and move with their "toys" from one light source to another: they check the maximum distance from the light source at which the toys are still working. They take notes.
- Discussion of the results: each photovoltaic cell can have different performance and spectral sensitivity, reacting differently to different light sources.

#### Homework

*- The teacher divides the class into groups, each of them for the next lesson will prepare arguments for the selected "source" of energy: photovoltaics, wind, water, nuclear (?), thermonuclear, biomass.*

- *Each group prepares a benefit-cost analysis (investments, day-to-day running, dismantling, social costs, health risks).*
- *Please defend your energy source as much as possible: do not present disadvantages to other groups until they ask: this is a political debate.*