A Web Based Puzzle for Energy Sources

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ABSTRACT

At present many countries in the world consume too much fossil fuels such as petroleum, natural gas and coal to meet their energy needs. These fossil fuels are not renewable; their sources are limited and reducing gradually. More importantly they have been becoming more expensive day by day and their damage to the environment has been increasing. In spite of it, renewable energy sources are renewed and never run out. In addition there are many benefits of renewable energy. In this study a puzzle is prepared for primary-school students aiming at teaching of energy sources as a supplementary source. In the mean time, the puzzle we prepared reveals the advantages and disadvantages of renewable and fossil energy sources. Here, the student's aim is to complete the puzzle by answering the questions respectively.

Keywords: **Energy sources; renewable energy; non-renewable energy; puzzle, chemistry education, Distance education.**

INTRODUCTION

The use of energy in different forms has become the main element in the development of human being and civilization. Today one of the most important criteria of the degree that development and prosperity have reached is the amount of energy that societies produce and consume per person. Today we gain most of energy requirement from fossil fuel resources. But fossil fuel resources are limited and day by day these resources are decreased. Also as a result of fossil fuel usage, environmental pollution is increased. In spite of it, renewable energy sources are renewed and never run out. There are many benefits of renewable energy;

- **Environmental benefits: Renewable energy sources are clean energy sources. Their environmental effects are less then traditional energy technologies.**
- **Energy for the grandsons of our grandsons: Ending of renewable energy source is not a matter of remark. Other energy sources will end one day.**
- **Employment and economy: Renewable energy investments have been focused on developing materials and work power to be able to set up the structures and systems. As a result, the money spent on this issue remains in the country, so the new job opportunities and economical income have been achieved.**
- **Energy security: As a result of the decreasing of the fossil fuels, countries have had to export fossil fuel from abroad for their energy needs. However, there is no danger like the exhaustion of renewable energy, since these resources are natural resources of the countries and they are unlimited. The research carried out about the natural energy sources which are alternative for fossil and nuclear fuels has also made renewable concepts a current issue.**

It is not sufficient that the sources are sustainable enough for the ecological balance. The continuity of one thing does not imply its sustainability for the ecological balance. It is essential that the sources be renewable. Sustainability is possible only if it is renewed in all aspects. Therefore, energy systems must be sustainable and energy sources should be renewed. Renewable energy is defined as the energy source that can remain the same the next day in the rotation of the nature. Fossil fuels that are commonly used today are the ones that end and are not able to be renewed when they are burnt. However, while such natural sources as hydroelectric, sun, wind and geothermal are renewable, they are also the clean energy sources. Today, much research has been carried out both at schools and in society.

They need to be increased and made common. At schools Martin and O'Toole (2002) has been presenting the CDs they have prepared about the renewable energy. Grant and Littlejohn (2001) have prepared a book at the level of primary or secondary school and mentioned in their book such topics as the greenhouse effect, the season and the climate changes and energy.

In his study about the green chemistry Uffelman (2004) has stated that it is closely related to the energy and the environmental problems. In the study various web sites about green chemistry have been examined. In one of these sites, 12 principles of the green chemistry are listed. Heimlich (1993) has been examining the present case of the job opportunities about the environment. He has stated that the job opportunities in the environmental field of study are divided into two parts; the content and the position. He has told that the positions focused on the content include preventing the illnesses and environmental planning and added that the career focused on the position includes ecology, environmental policy, and environmental knowledge.

In his study entitled "The duty of Polish Universities on protecting environment" Mazurkiewicz (1990) has stated that Polish Universities try to decrease the pollution and protect the long term energy needs. These efforts have been combined with COPERNICUS. In the study it is stated that the topics related to ecology problems and environmental protecting have been included in the biology, geography, and chemistry curriculum, and such subjects as protecting of natural environment, soil erosion, protection and control methods have also been added to the five government programs at Polish Universities.

Allen and Fielding (1981), in their project entitled "The Adaptation of Renewable Energy Sources to the Science Curriculum" stated that they are preparing a project by State Fair Community College which is about the adaptation of renewable energy sources to agriculture curriculum. In that study, 138 practices were made about alcohol production, 7 lessons were added to agriculture curriculum and job opportunities at final stage of the projects, suggested curriculum and a final report which contains necessary tools take place. Materials related to the low cost energy have a place in the study conducted by DOE (Energy Information Administration) (2001) in Washington. 163 organizations are listed about energy and saving energy.

In another study conducted by Pezzoli and Ainsworth (2001), a career program which is related to the long-lasting technology in Hawaii is explained. In another study by Mumma and at al. (1996), a curriculum which involves the relation between natural resources and buildings is prepared. The names of 15 units are given in the study. In a study conducted by Shanebrook (1997), a lesson design, in which technological and social problems which arise from students needs for energy in USA will be studied, is explained. In a study conducted by Weiskopf (1997) CD, in which the use of renewable energy recourses and its effects on society are focused, is emphasized. Several examples from this study are: what is

renewable energy?, what is the cost of it to the environment? etc. In the study conducted by Nicholson (1996) discussion of internet use in classes takes place. In this study students, who use the web resources, present their projects about "renewable energy". Kroll (1992) suggested a curriculum for children involving seven parts. Each part contains games scientific experiments, ecosystem, habitat, sun energy, renewable energy topics. New Mexico Solar Energy Institute's education program aims at improving teacher's abilities to teach renewable energy sources. Renewable Energy Crossword Puzzle prepared by California Energy Commission, which is on the Internet in 2004, contains 19 elements which explain the features of renewable energy types. Renewable Energy Crossword Puzzle is given in Figure 1 below. (http://www.energyquest.ca.gov/games/crossword_puzzles, 08. 06. 2006)

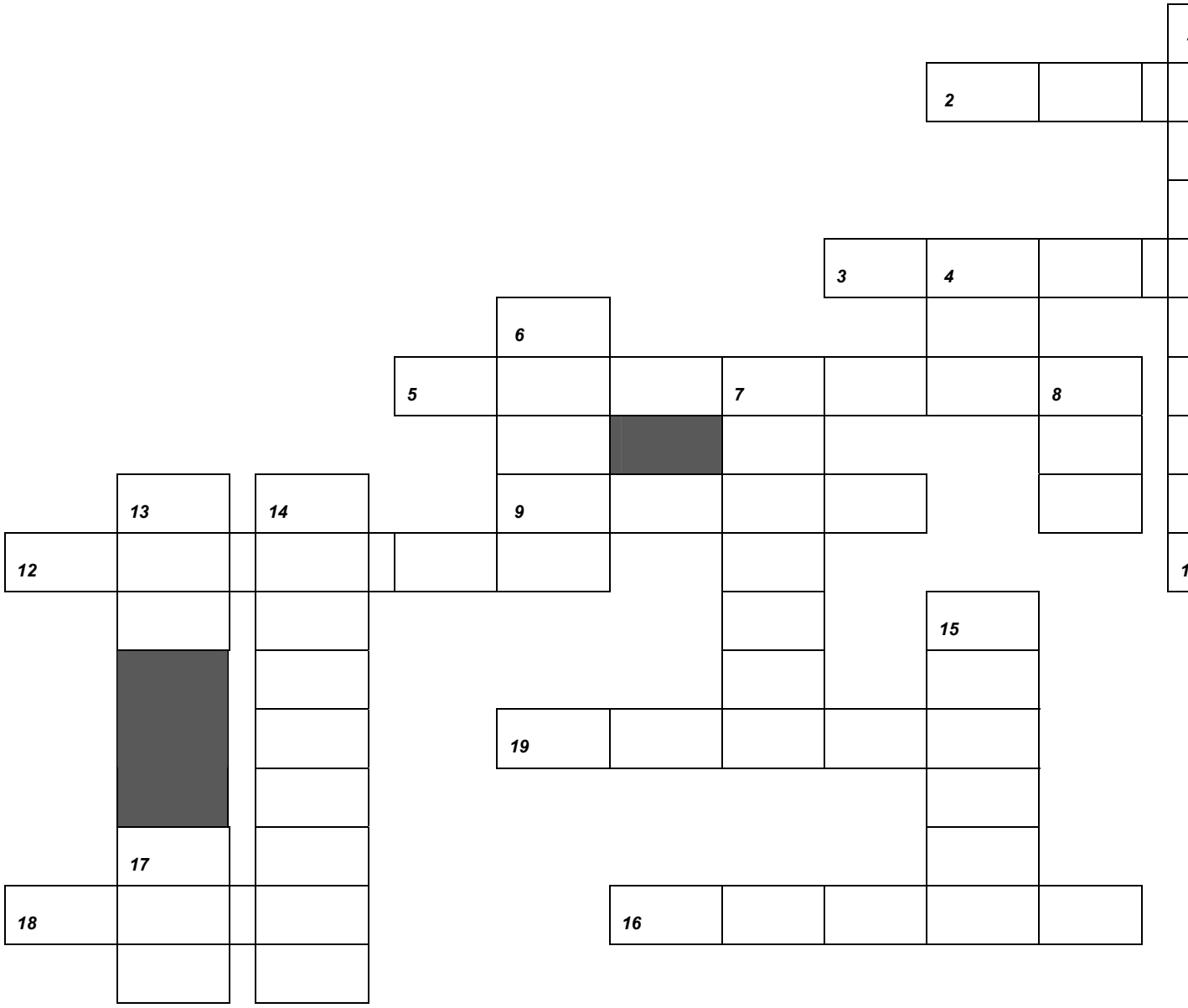


Figure: 1 Renewable Energy Crossword Puzzle

The questions of the puzzle in Figure: 1 is as the following:
(http://www.energyquest.ca.gov/games/crossword_puzzles, 08. 06. 2006)

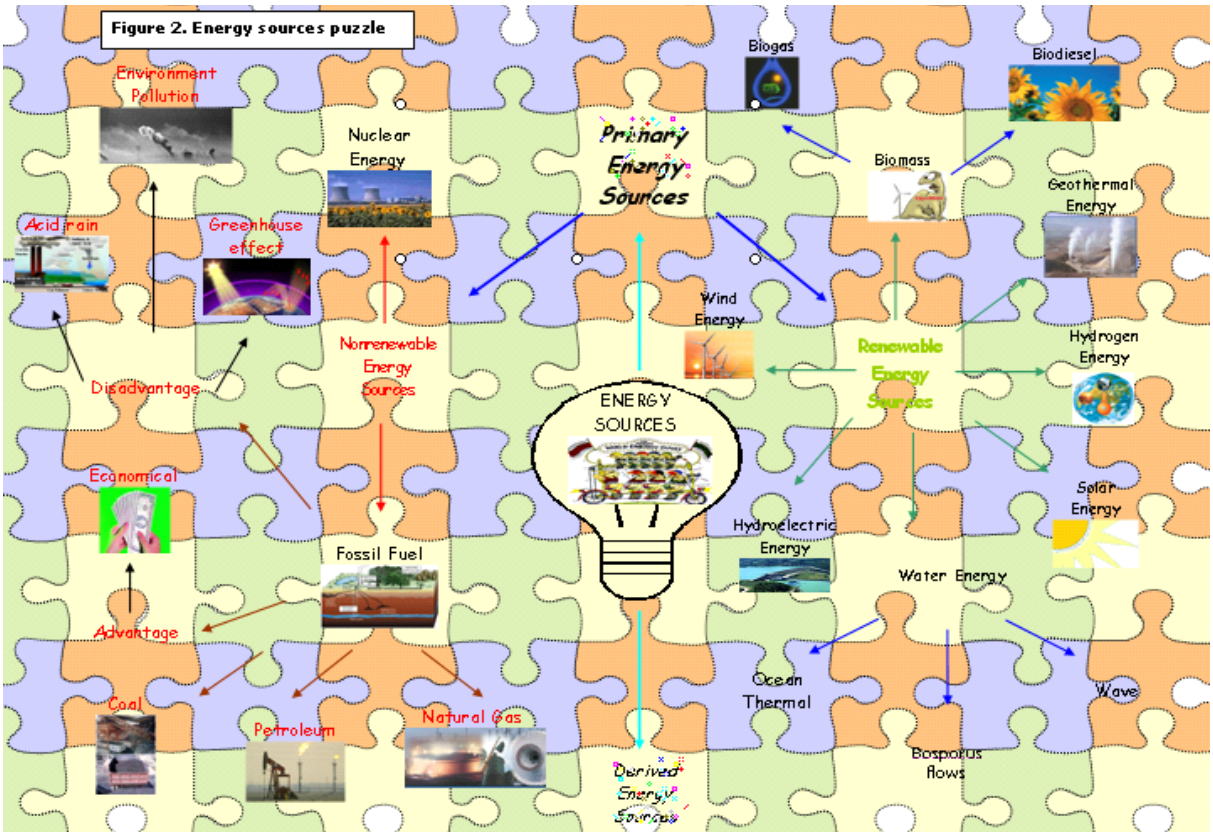
1. **Energy from heat deep in the earth is called <u>geothermal</u>**
2. **A geyser is hot water rushing out of a <u>hole</u> in the ground**
3. **Geothermal energy relies on molten rock in the <u>earth</u>**
4. **Renewable energy does not pollute the <u>air</u> that we breath**
5. **Electrical energy can be stored in a <u>battery</u>**
6. **Hydroelectric power comes from the energy of falling <u>water</u>**
7. **Spinning windmill blazed turn a <u>turbine</u> to create electricity**
8. **What to say if some one ask if wind energy is renewable. <u>Yes</u>**
9. **We use these to hear the sound of falling water <u>ears</u>**
10. **Most household appliances are powered by <u>electricity</u>**
11. **If some one says it is okay to waste energy. It's a <u>lie</u>**
12. **Tiny atomic particles fuel this type of power. <u>Nuclear</u>**
13. **The source of solar power. <u>Sun</u>**
14. **Electricity is described as a flow of <u>electrons</u>**
15. **If someone leaves the refrigerator door open, we should <u>remind</u> them to close it.**
16. **Windmills turn faster on <u>windy</u> days**
17. **A big structure that holds back water. <u>Dum</u>**
18. **This fills lakes and streams with water. <u>Rain</u>**
19. **Boiling water turns in to <u>steam</u>**

In this study a puzzle is prepared for primary-school students aiming at teaching of energy sources as a supplementary source. In the mean time, the puzzle we prepared reveals the advantages and disadvantages of renewable and fossil energy sources. Here, the student's aim is to complete the puzzle by answering the questions below respectively. At the bottom carton of the puzzle, the following questions are given. As the students answer the questions, they can place the pieces of the puzzle according to the related question on the carton.

1. **What are the primary energy sources?**
   (Renewable and nonrenewable energy)
2. **What are the main renewable sources?**
   (Wind energy, biomass, geothermal energy, hydrogen energy, solar energy, water energy, hydroelectric energy)
3. **What kind of energy does biomass include?**
   (Biogas, biodiesel)
4. **From which sources is the water energy obtained?**
   (Ocean thermal, the Bosporus flows, wave)
5. **What are the primary nonrenewable energies?**
   (Nuclear energy and fossil fuel)
6. **What are the primary fossil fuel species?**
   (Natural gas, oil, petroleum, coal)
7. **Does the usage of fossil fuel have an advantage?**
   (Just economical)
8. **What are the disadvantages of using fossil fuel?**
   (Acid rain, pollution of environment, greenhouse effect)

At the outset, the students are given puzzle pieces, and they are required to answer the questions. As the students give the correct answers, the pieces of the puzzle are combined.

After all the correct answers are given and puzzle pieces are completed correctly, a logic map will appear about energy sources. In Figure: 2 a puzzle prepared for energy sources are given.



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