



Co-funded by the
Erasmus+ Programme
of the European Union

GREEN ENERGY SAVES THE EARTH

ERASMUS+ PROJECT MAGAZINE

1st ISSUE , 2021

ISSN 2810 – 1677

The European Commission support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Authors: Chrys Vräjitoru, Candan Kafalı, Pascariu Iustin, Pascariu Iustina, Atasiei Alexandra, Serap Kahraman, Gavrilută Gabriela, Cennet Erbay, Istrate Valerica, Asiminei Cătălina Mirela, Spiridon Elena Ramona, Camelia Tașcă, Elinor Markova

Coordinator: Chrys Vräjitoru

Introduction:

GREEN ENERGY SAVES THE EARTH PROJECT

Chrys Vrajitoru, English teacher
Scoala Profesionala Holboca, Romania

We started this project because we believe that green energy can really save the planet from pollution. We, teachers from 6 countries: Romania, Turkey, Bulgaria, Croatia, Greece and Italy have this ideal that the world of the future will rely on green renewable energy. We envisioned this clean world where human beings live in harmony with nature, using the free resources without damaging the environment.

We hope to inspire new generations to create a better future, when it is time for them to decide. We can help them understand the importance of preserving our environment. They have the chance to learn more about green energy, through this project that was co-funded by the Erasmus+ programme, financed by the European Commission. It is a great opportunity for us to expand awareness and knowledge related to green energy, climate issues and sustainable renewable resources.

In a few years, the world might change and we hope we can contribute to this change, through our project and our results, including this magazine.

It is our duty to make others aware of the benefits of green energy and to do something to improve life on Earth. Each of us can contribute by reducing pollution, recycling waste or changing the mentality of others around us, by example and information.

It is our duty to try and our chance to succeed.

WHAT IS GREEN ENERGY?

Candan Kafalı, science teacher
Küçükkuyu Fernur Sözen Ortaokulu, Turkey

WHAT IS THE GREEN/RENEWABLE ENERGY?

- Renewable energy is energy that is generated from natural processes that are continuously replenished.
- Renewable energy, often refers to as clean or green energy.
- Renewable energy resources are considered as environment-friendly, having no or little emission of poisonous gases like carbon dioxide.

ENERGY SOURCES



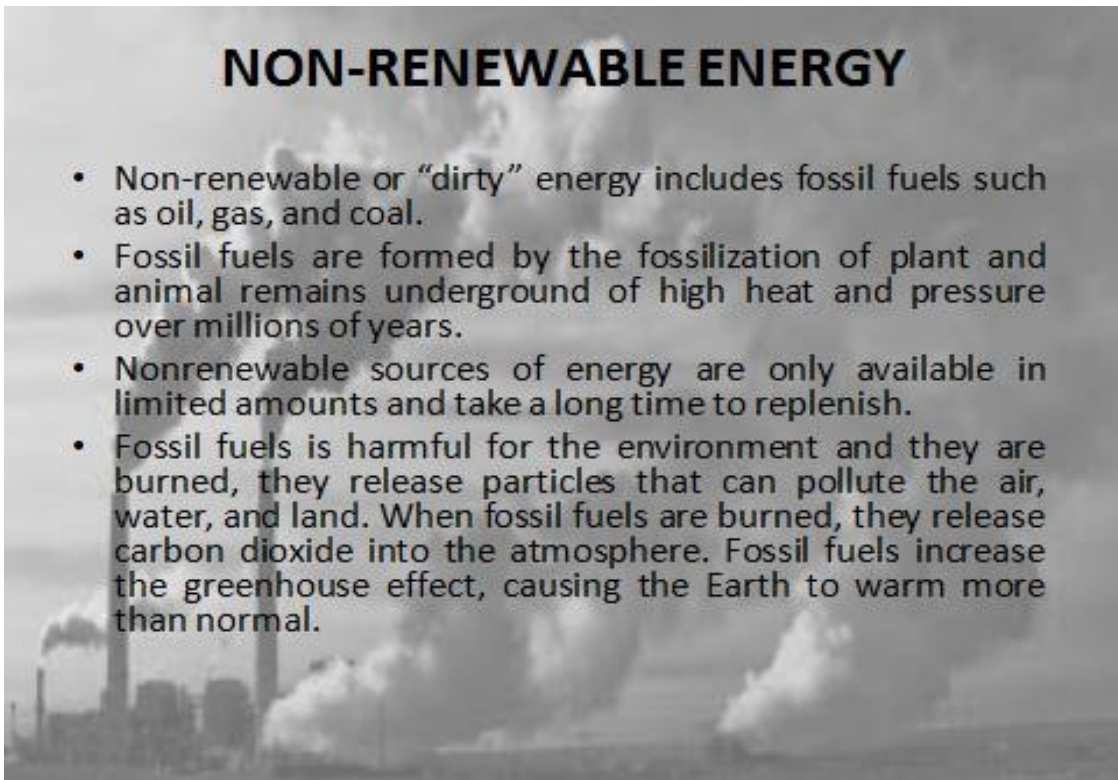
RENEWABLE ENERGY SOURCES

- Solar
- Wind
- Hydropower
- Geothermal heat
- Tidal and wave
- Biomass



NON-RENEWABLE ENERGY

- Non-renewable or “dirty” energy includes fossil fuels such as oil, gas, and coal.
- Fossil fuels are formed by the fossilization of plant and animal remains underground of high heat and pressure over millions of years.
- Nonrenewable sources of energy are only available in limited amounts and take a long time to replenish.
- Fossil fuels is harmful for the environment and they are burned, they release particles that can pollute the air, water, and land. When fossil fuels are burned, they release carbon dioxide into the atmosphere. Fossil fuels increase the greenhouse effect, causing the Earth to warm more than normal.



SOLAR ENERGY

- Energy created by the heat and light of the Sun is called solar energy.
- The sun is the source of all energies on Earth
- Solar energy is used in various fields in daily life.

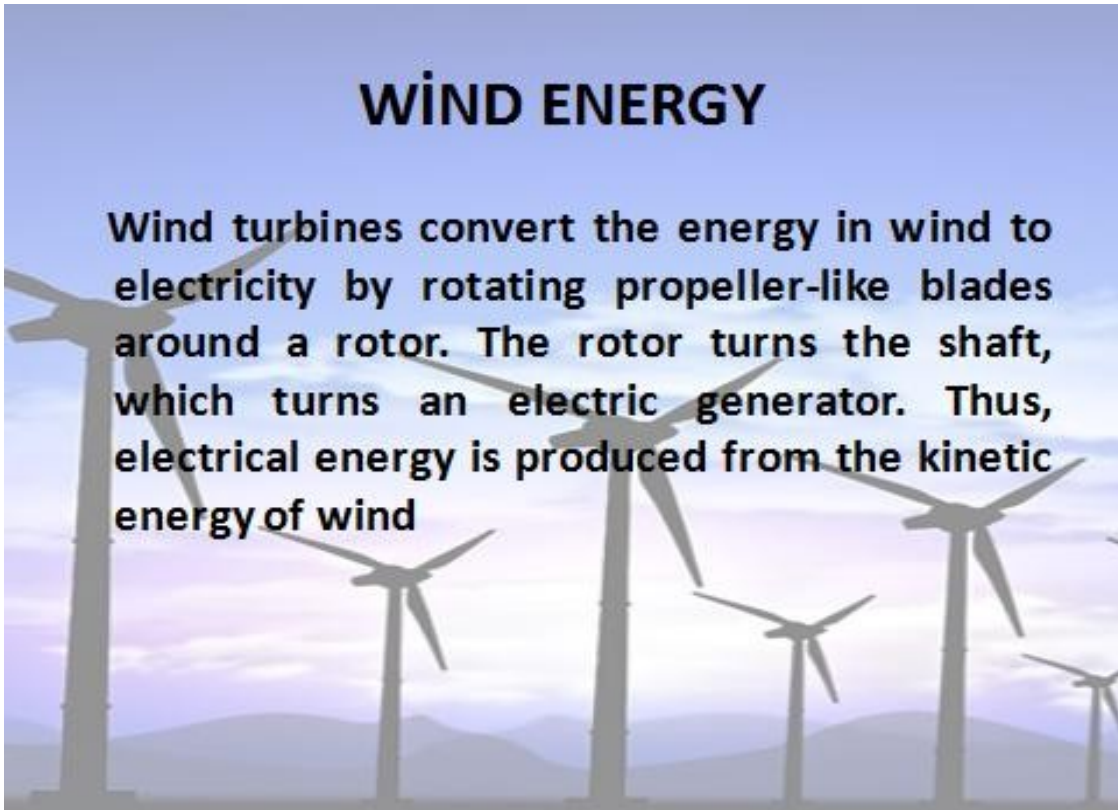


- To generate electricity in homes and in outer space.
- To generate electricity with solar cells in calculator, traffic light, street light, cell phone charge.
- To take the salt away from sea water.
- To dry agricultural products and heat greenhouses.
- To use in cooking (solar cookers).
- To provide hot water in homes and heat the pools.
- To produce cars, planes, bicycles powered by solar energy



WIND ENERGY

Wind turbines convert the energy in wind to electricity by rotating propeller-like blades around a rotor. The rotor turns the shaft, which turns an electric generator. Thus, electrical energy is produced from the kinetic energy of wind

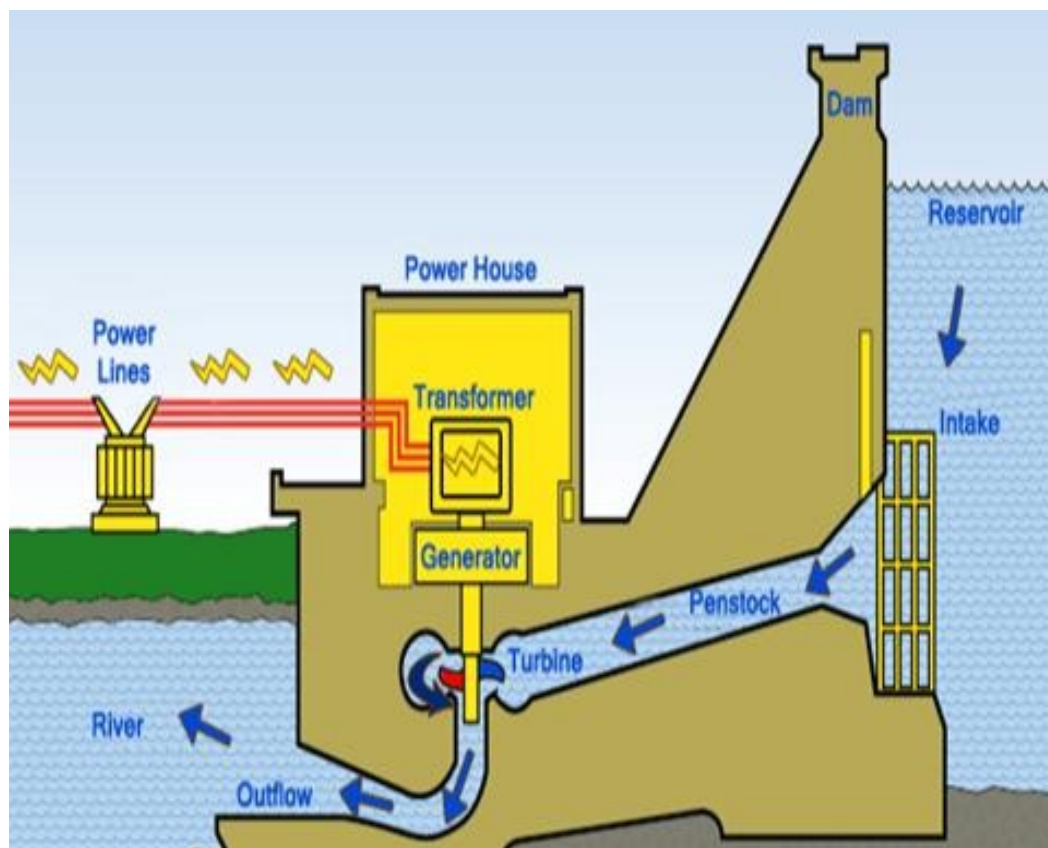


GEOHERMAL ENERGY

- Geothermal energy is the heat that comes from the sub-surface of the earth.
- The steam of hot water coming from the depths of the ground rotates the turbine and generator generates electricity.
- Geothermal energy can be used to supply homes with hot water, cook food, heat homes, and generate electricity.

HYDROPOWER ENERGY

- Hydropower energy is derived from the energy of fast-running water. The basic principle of hydropower is using water to drive turbines. A barrier is set up in front of the river. Thanks to the drawn set, water accumulates, rises and gains potential energy. When the water channels are opened, the turbine starts to rotate with the effect of the water flowing downward. The kinetic energy of the turbine is transformed into electrical energy with the generator.



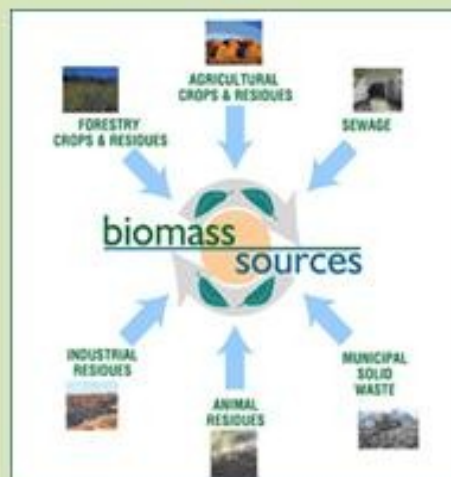
WAVE AND TIDAL ENERGY

- Water in the oceans is constantly in motion due to waves and tides.
- Tides, related to the gravitational pull of the Moon and Sun on the oceans, are like very big waves that can produce very strong currents in some coastal areas.
- With these waves in the oceans, electricity is produced by rotating the turbine.



BIOENERGY

- Biomass energy can be briefly defined as energy obtained from organic materials in various ways. Plants such as corn, sugar cane, sugar beet, herbs specially grown for biomass energy production algae, animal feces, fertilizer and industrial wastes, all organic wastes collected in homes, especially fruit and vegetable wastes, are used in biomass energy production. The processing of these organic wastes produces fuel or the materials are used for industrial purposes.



S.O.S NATURE

Student Pascariu Iustin
6th grade A
Teacher Valerica Istrate
Școala Profesională Holboca, Romania

Happy Flopi flies away. „If I hurry, I'll be home before it gets dark.” He breathes deeply and smiles.

”How beautiful!”, he said: „Clean air... here, high up, I can breathe easier than in dirty water. My friend will be surprised when I tell him about the humans I met and the adventure of my life.”

This is the beginning of Flopi's story - a strange animal that flies like a bird and swims like a fish. Lost in thoughts, he's dreaming and doesn't realize he's flying above a factory. Suddenly, he wakes up in a cloud of dust, starts coughing, his eyes fill with tears, he can't see anything and hits one of the towers of the factory. He hurts one of his wings and remains hanging on the huge tower, yelling: „Help, I'm falling!”

This cry for help is not only his, but it belongs to our entire planet. The Earth coughs often, surrounded by clouds of dust. From green, it turned grey and the ice caps are melting.

We all realize that our planet is ill, it's suffering because of human negligence that pollutes the environment. People are not very aware of the damage they're causing, therefore we need to make them think about the effects of their activities on the life of our planet and of course, the lives of everybody.

Human beings must understand they live on a planet they must take care of constantly! What nature created in millions of years could be destroyed in a few years, months or days.

A recent study regarding the climate change proves the way in which natural resources were exploited until now, endangering the future generations, modifying dramatically most ecosystems. The way in which society ensured its supplies of food, water, wood and oil in the last 50 years caused real damage to the environment. There were, of course, some advantages: economy increased and agricultural products were abundant.

But here are the costs: since 1945 the land that was cultivated got bigger and bigger; more than half of fertilizers were chemicals, after 1985; the diversity of animal species was considerably reduced - between 10% and 30% of mammals, birds and amphibians are endangered to become extinct; the level of drinkable water is a lot under the limit that can cover present needs.

A big number of books and magazines alert the public every day about the dangers that burden our life conditions, the future, as a result of increased human population and deep degradation of the environment. The destruction of forests from temperate climate and tropical zones, the erosion of the land, the sterility of mineral ground, the energy crisis, the pollution of waters are enough elements that prove that human civilization has an intense negative impact on the biosphere.

Man has always searched for the shade under the tree, the cool of the forest or the clear waters, the warmth of the sunny beaches, the beauty, serenity and balance around him. All these are generously given to us by NATURE, that must be respected, loved and protected like a living soul. If it's a more difficult and longer process for older generations to change their mentality, it is a matter of first priority for the education of children, raising their awareness on the importance of preserving and protecting the environment. Children are the future agents of social action in 21st century. The society and natural environment where they will live depends directly on the minds and behaviors they are developing now in school.

Specialists have found the solution to release the burden that humanity placed on nature: the Education for sustainable development – that has a purpose to answer the needs of the present without compromising the needs of the future, of new generations.

Do you remember Flopi, the little animal from the story mentioned earlier? He is the one who swam in a dirty river and, to save himself, flew through the atmosphere, where he entered a cloud of dust from a factory, hurting his wing on one of the towers. Fortunately, Friends of the Environment cared for him until he healed and returned home again, in the clear lake from the wide forest. He was looking forward to seeing his friend the snail, that he had left behind.

A Clean World

Student: Pascariu Iustina

6th grade A

Teacher: Valerica Istrate

Școala Profesională Holboca, Romania

Although human beings left their mark on many aspects of planet Earth and pollution killed so much of beautiful plants and animals, the Earth continues to amaze us every second.

A great truth is that people caused the pollution of the planet and this damages our health and the health of other living beings.

Imagine a world without pollution, meaning: no toxic waste anywhere, no cigarettes (most people smoke and even children start to practice this unhealthy way of life, including the use of drugs), no artificial food, filled with chemicals that infiltrate our bodies and the environment (nowadays modern industry and agriculture pour poison and smoke in the environment, contaminating air, water and soil, while the fuel from vehicles adds to pollution) and many other factors that damage the Earth.

We all declare that we want a green society. Easier said than done. In Romania people accept pollution, they don't protest. We the children learn about ecology in school, while our parents make factories that pollute the air. We don't have an ecological education, we behave with total lack of awareness.

The Romanians that are poor have other problems to deal with, they are not afraid of water containing nitrates, or breathing the poison from the plastic they burn in their gardens in the weekend. And they prefer chemicals instead of natural fertilizers.

We accept and we practice pollution, such is human nature, leaving behind piles of garbage. But everything could be different.

On earth we have everything
bad and good, good and bad
freedom, prisons and steel bars,
it could be better but it's sad
we have mud and we have stars

Our planet is a huge rainbow of complementary colors and geometrical shapes that blend and interlace one another, offering a live show that elevates our senses and wraps us in mystery, and if we want it to remain like this, WE MUST CHERISH AND PROTECT IT because Earth was, is and always will be OUR HOME !

A Green Future

Student: Atasiei Alexandra
6th grade A
Teacher Valerica Istrate
Scoala Profesionala Holboca, Romania

One of the major challenges of our days is protecting the environment to our advantage and for younger generations' gain.

The land, the water, the air, the vegetation and the ground are the main elements of the environment on which human beings can intervene through their activities, out of a wish to live better.

All these elements are closely related, so when you intervene on one of them it affects all the others.

One of the biggest human aggressions on the environment is pollution.

Due to pollution the number of endangered plants and animal species is increasing, industrial emissions are affecting the air that we breathe, also the growing amount of plastic waste is destroying the lives of seas and oceans.

As an answer from nature to humanity, one of the most important damage is health.

One important role in ensuring the quality of the environment and the survival of future generations is human awareness.

Nature is the place where every human takes the energy he needs, if it doesn't exist, the human will wither, but also everything that is around him.

This is why we, the children must be actively involved in the fight against the clock on environmental protection.

WHY? BECAUSE UNDERSTANDING NATURE MEANS UNDERSTANDING THE FUTURE!

And the future could be GREEN if we manage to save it!!!

ENVIRONMENTAL POLLUTION

Serap Kahraman, 7th grade student

Küçükkuyu Fernur Sözen Ortaokulu, Turkey

Environment is the area that people and other living things maintain their relationships with throughout their lives. Environmental pollution is the pollution of this environment due to human factors.

According to the research of the United Nations Environment Program, Earth hosts 8 million 700 thousand living species. Many living species such as humans, animals and plants try to survive in nature. Among so many living species, it is only humans who pollute nature. Although this situation is very painful, it is unfortunately true.

People pollute the nature and complain about this at the same time. We visibly lose the water we drink and the air we breathe. And we forget that there are millions of different species in this world other than us and that they also need these resources.

A person who grows up in a clean environment is more eager to protect his environment and alert the polluters, but the person who grows up in a polluted environment may be the other way around. Therefore, if we raise our children in a clean environment, they will keep the future clean.

Let's raise generations who are environmentally conscious.

Let's not forget, we can live if we keep the environment alive!

Why green energy ?

Gavriluță Gabriela, Science teacher
Școala Profesională Holboca, Romania

On a global level, the energetic sector has a massive effect on the environment, determining the competent authorities to take measures to ensure a stable level of gaseous emissions with a greenhouse effect, that are released into the atmosphere, but also it is necessary to start actions to diminish them because 85,77% of total energy consumption in the world is represented by gasses that have a greenhouse effect. A radical change is not only welcome, but also compulsory for a greener future, the sooner the better.

Taking into account the present situation, that is far from being ideal in most parts of the world, renewable energy represents the number 1 substitute for this problem, being a viable solution for the reduction of the carbon imprint left in the atmosphere.

In theory, the potential resources for renewable energy surpass the other types of energies, because they are unlimited and don't have negative effects.

The current situation

At present, in Romania the renewable energy is 30% of the total percentage of energy that is used, even though we have a high potential of renewable energy resources such as biomass, hydro energy or wind energy. From a statistic viewpoint, we are doing well, reaching the target of 25% renewable energy until 2020, most of it being hydro energy.

Wind energy

Because of Romania's favorable geographical position, there is great potential for wind energy, one of the biggest in Eastern Europe, especially in regions like Dobrogea, where the wind turbines reach the speed of 7m/s at 100m altitude. One of the biggest functional Eolian parks is in Constanta county, in the zone Cogealac-Fantanele, with 240 turbines and a total capacity of 600 MW, whereas a nuclear reactor from Cernavoda nuclear power plant has the electric power of 700 MW. Right now, in Romania there are 25 big Eolian parks, where 3 billion euros have already been invested.



"Romania is, at the moment, the country that afforded the luxury of granting the highest number of green certificates, compared to other countries, that leads to an unpleasant aspect for all of us, as consumers. All these green certificates that are paid are on our bills of consumers of electric energy" said Dănuț Jugănar, AGERPRES

The previously mentioned potential can bring benefits for the future of wind energy in the country, estimating additional 23.000 GWh per year, due to it. Romania has a temperate continental climate with increased energetic potential (~23 TWh), especially on the sea shore and high mountain zones.

In 2014, Dobrogea generated the biggest quantity of wind energy in Central and Eastern Europe, and in 2016, 23% of the total energy generated in Romania came from it. At the end of 2018, 16 more power plants with a total capacity of 9.5 MW were made functional, producing around 11.02 GWh per year.

Hydro-energy

Romania has an installed capacity of 6.71 GW and an yearly production of 1.25 Mtoe. Hydro-energy remains one of the most important sources of renewable energy, generating around 36 Twh per year and contributing with 30% of the total energy. Raising from year to year, there was an expansion of 10% between 2000 and 2016, and at the moment, Romania has a capacity of 6,71 GW and an yearly production of 1.25 Mtoe.



Solar energy

Romania has a substantial advantage from this point of view because of its favorable geographical position and the number of sunny days per year, recording a significant progress in previous years.



Dobrogea, especially, is a zone where solar energy developed a lot. Of course, there are many other zones in the country where the number of solar panels continue to rise.

What's next ?

According to the president of Photovoltaic Industrial Association in Romania, our country already has a huge potential in the green energy sector, which is mostly unused. In the recent years, 6 billion euros were invested to develop the green energy sector in Romania and more than e 45.000 MW were built.

Considering that the European Parliament approved projects that require at least 35% from Europe's energy consumption to come from renewable energy until 2030, Restart Energy wants to help as many consumers as possible to realize the importance of choosing a green energy provider.

SAVE WATER

Cennet Erbay - English teacher

Küçükkuyu Fernur Sözen Ortaokulu, Turkey

Web 2.0 tools are defined as the second generation web platform where users can develop content, collaborate with each other, and support the exchange of information and ideas among users.

Web 2.0 technologies encourage teachers and students to share ideas and work collaboratively to develop those ideas. Using Web 2.0 tools enables students to be technology literate, active and participatory individuals in their learning and future lives.

With the increase in internet access and the importance given to social skills and creativity, the prevalence of web 2.0 tools is increasing. Especially with the outbreak of the Covid-19 pandemic and the start of distance education, the importance of web 2.0 tools in education has increased and its use has become significantly widespread.

The message to be given to the students can be more effective with these tools. Our students created their own puzzles about water saving using the "Jigsawplanet" web 2.0 tool. Thus, they tried to raise awareness on a fun platform by sharing their slogans with their friends.



EOLIAN ENERGY

Valerica Istrate, Technology teacher
Școala Profesională Holboca, Romania



Wind energy is a renewable energy generated by the transfer of wind energy to an eolian turbine.

Winds form because of uneven heating of the surface of Earth, from sunlight. The variable heating of layers of air produces different densities in many zones, which creates air movement. The air generator uses the kinetic energy of wind to move the turbine, which generates electricity (stored in accumulators or distributed through wires. The eolian systems or

conversion may also experience loss, resulting in 59% efficiency for the eolian turbine and 96% for the multiplier.

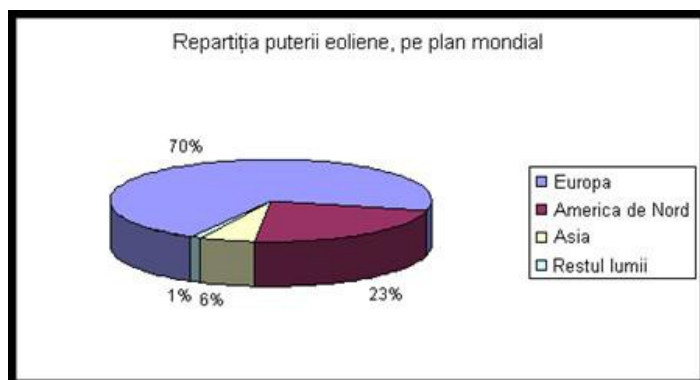
The kinetic energy of the wind can be used for the propellers of the turbines, that are capable of generating electricity. Some turbines can produce up to 5 MW electric energy, though they require a constant wind speed of 5,5 m/s or 20km/h. There are very few regions of the Earth where there are winds having constant speed of that value. Stronger winds blow at high altitude and in oceanic areas. The only advantage of the eolian energy is that it needs maintenance because of wear out.

Current situation

At the moment, the global distribution of renewable energy for generating electricity is very low. The potential resources for renewable energy are under-exploited. However, a progress in technology facilitated the use of eolian generators, in a constantly increasing rhythm in the recent years, growing by 25% in 2003.

Eolian energy is widely developed in Europe, the territory with the most use of renewable energy. This type of renewable energy ensures the necessary electricity for 10 million people. Besides, 90% of producers of medium and high power are in Europe.

Europe owns only 9% of the potential eolian resources in the world, yet it owns 72% of the eolian power functioning in 2002. It produced 50 TWh from eolian energy in 2002, the global production being 70 TWh / year.



The distribution of electricity of eolian origin in Europe shows differences between countries: Germany is the leader, Spain is second (expanding their eolian parks constantly), Denmark is third, with offshore eolian parks and improved 10 year old equipment.

An eolian generator takes up little space on the ground, and that is a great advantage, because it doesn't disturb the agricultural or industrial activities in the area nearby. There can be individual eolian generators in isolated locations, or groups of eolian generators, that are formed by many eolian turbines connected with one another.

When installing eolian generators, it's necessary to consider the speed of the wind in that region, the price of land, the visual impact and the impact on nearby buildings, also the distance to the electrical network. The costs of such equipment can be expensive, including maintenance and price of energy. Economic progress is needed to ensure the resources for developing eolian parks. Installing an eolian KW costs around 1000 euro. Price keeps lowering with technological progress and the quantity of energy produced every year.

In Germany and Denmark, investors are either big industrial groups, individual households, or farms. The population tends to get involved in the use of eolians. Eolian energy is perceived as a way to diversify agricultural production. In Denmark, 100000 families own stocks in eolian energy. There are 15000 employees in Denmark and 30000 in Germany directly or indirectly involved in eolian business.



a.

b.

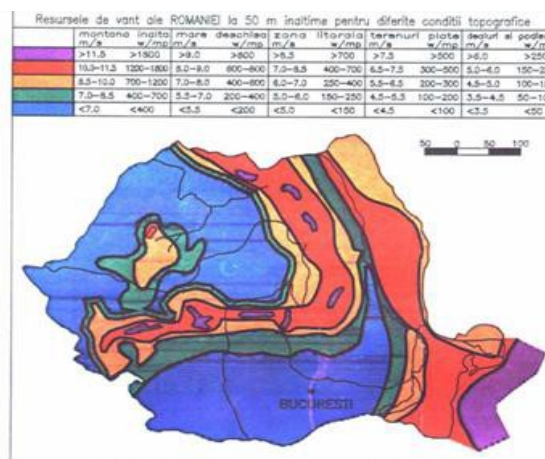
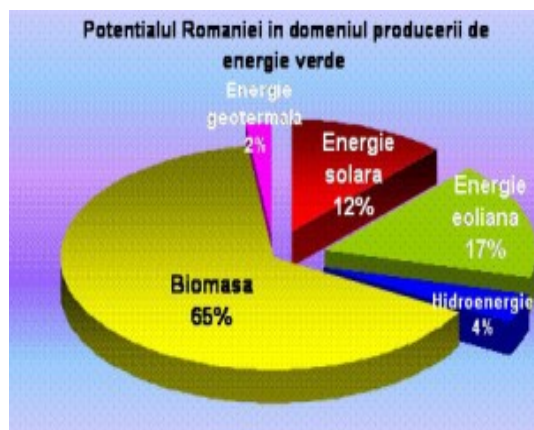
c.

a. eolian with three propellers 750 kW (Sursa: Departament Génie Electrique, HEI)

b., c. – eolian group (Sursa: <http://valromeysolidaire.free.fr/index/main.php3>)

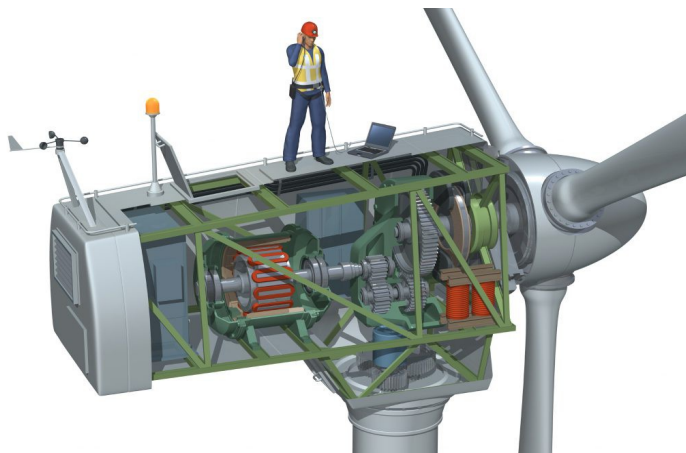
Eolian energy in Romania: The first eolian in Romania started 8 km from Ploiesti town.

Eolian energy is unlimited. It doesn't pollute the environment and the costs are comparable with traditional fuel energy.



Component parts of eolian turbines

A simple eolian turbine has three important parts: the propellers (they capture the wind energy and transmit it to the rotating part), the axis of rotor (connecting the rotor and generator) and the generator (a simple device that uses the properties of electromagnetic induction to produce electricity). However, most eolian turbines are more complex than that.



Components of eolian turbine

Small eolian turbines for homes

Small eolian turbines can be installed anywhere: at home, in the garden, in the field, near a cabin, on the mountain or on the sea shore. According to the wind speed, they can generate enough electricity to ensure independence from conventional suppliers.



For a green house, that completely respects the environment, people can use the eolian system combined with photovoltaic panels, to create independent electricity. Small eolian turbines are strong enough to charge accumulators and provide energy for several days.

Eolian turbines of small or medium power up to 10 KW are excellent solutions for houses, cabins, motels or hostels of 100 guests, companies, schools or hospitals.

Their height must be at least 10 m and around them on 100m area the ground must not contain obstacles that can diminish or change the speed of the wind.

Recent research shows an alarming increase in recent years of levels of pollution, from burning fuel. It is clear that we must make a priority reducing our dependence on these fuels.

Eolian energy represents a sustainable solution to the global energy issue.



A eolian system requires a thorough technical design. It is important to choose a location where we have constant wind the whole year, strong enough to ensure the necessary energy. We will decide the size of the turbine according to wind strength, then the foundation for the pillars. It is important to have an area of 100m around the turbine without any obstacle higher than 6m. Every turbine type is designed for different values of the wind power and may cease to function the wind is too weak or too strong.

Geothermal energy

Asiminei Cătălina-Mirela, Geography teacher

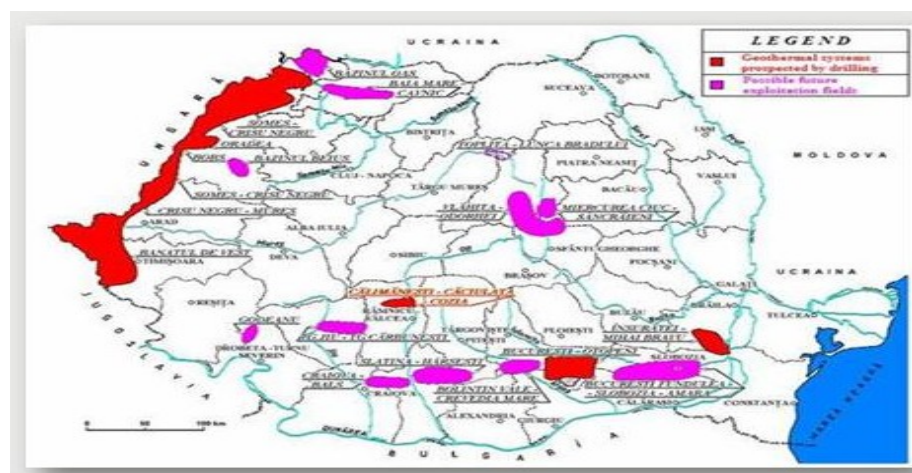
Scoala Profesionala Holboca, Romania

Geothermal energy is one of the renewable energies represented by the thermal energy stored in the geological structure of Earth.

The directive RES 2009/28/CE defines geothermal energy as stored warmth under the solid surface of the Earth.



In Romania we have a region in the West part of the country where we can find this potential energy of the earth, in Western Plain and also in Călimănești-Căciulata. There are possibilities of exploitation in the South of the country, in Romanian Plain and Ciuc region. Romania has 95 towns connected to the centralized systems of mass production of thermal energy.



Geothermal resources with a low temperature (below 100 C) are extracted with thermal pumps, in order to release a quantity of heat for different necessities. The natural geothermal potential continues to be considered limited because there are many locations with very high temperature (over 200 C) but without water. This thermal resource can be exploited with the “cold and hot rocks” technology, that keeps developing. The principle is to pump water through the first well towards the deep areas (deeper than 3000 m) corresponding to the cracks in the rocks. This re-heated water climbs through the second well and generates electricity, just as in the case of classic thermal central heating devices. However, the potential of this type of energy is not mentioned. There are two sources of energy called geothermal:

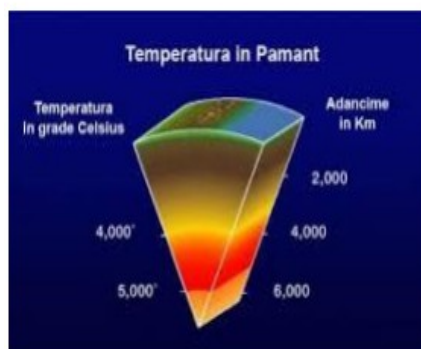
1. the energy of the hot core of the Earth that seeps into higher layers;
2. the solar energy transmitted through radiation to the Earth and stored in the surface layers.

Geothermal energy is obtained by capturing the hot water from the areas with volcanic and thermal activity. It comes from deep within the Earth and it produces minimal emissions. We can reduce pollution by using this energy and the effects are sustainable, creating a healthier environment for us and for future generations.

Geothermal energy has been used since 1904 when the heat of geothermal waters from geysers was used for home heating. Nowadays it has many uses: heating plants in greenhouses, drying the crops, warm water for fish farms, warm water for swimming pools and therapeutic resorts.

The geothermal heating system is made of a thermal pump and a circuit of pipes that capture the energy, installed under the earth (in horizontal or vertical direction) or at the bottom of water reservoirs.

The first three meters of the terrestrial surface have a constant temperature of 10-16 degrees Celsius. Just like in a cave, its temperature is slightly higher than the air during winter and lower than the air in summer. Geothermal pumps use this property to heat or cool the buildings.



Geothermal pumps are composed of three parts: the unity of heat exchange with the ground, the thermal pump and the system of air supply. The exchange unity is a group of pipes arranged in a spiral, buried in the superior part of the terrestrial surface around buildings. A fluid – usually water or antifreeze solution – circulates through the pipes and absorbs or releases heat into the ground.

In winter, the pump transmits the heat accumulated in the fluid in the air supply system. /in summer, the process is reversed, and the heat eliminated from the inside of the building can be used for heating water, becoming a free source of warm water.

Considering the thermal potential, geothermal energy can be classified in two categories:

Geothermal energy of high thermal potential – in this case the water temperature is high, the energy transforming directly in electricity or thermal energy. This type of energy is used only in the zones with active volcanoes, for example in the Fire Circle of the Pacific, and in countries with geysers such as Island and Norway.

Geothermal energy with low thermal potential- in this case, the water temperature has a lower level, the energy being used only for houses and it can't be used to generate electricity. The advantage of this type of energy is that it is available in shallow layers, which also implies lower costs of exploitation.

Ways to use geothermal energy: for heating (the home or water); warm water for cooking, for electricity; to produce energy; for industrial processes (for example the pasteurization of milk); warming the roads to melt the snow; for bathrooms; for plants in greenhouses; drying crops; warming water in fish farms; in health resorts; swimming pools, spa centers, saunas.

Geothermal energy is ecological and environment friendly. Besides, it doesn't represent a danger to people: there is no risk of fires in the absence of burning fuel, there are no toxic substances or unpleasant smells. The pumps work without making much noise and they don't need special maintenance.

This type of energy doesn't cost anything. Investment is only in equipment, money that is retrieved in five years by not having to pay bills for traditional thermal energy. However, the maintenance costs can make people hesitate and this is the main disadvantage for this form of energy.

Disadvantages: geothermal activity doesn't represent an inexhaustible source. The active zones cool down after a few decades of use. The drilling costs are very high and the analyses before drilling can be even more expensive. Installing the equipment leads to instability of the soil in that area, sometimes causing small earthquakes of reduced intensity.

Example of geothermal energy consumption: let's start from an ideal situation when the loss of heat is minimal. In order to heat a room of 10 square meters surface, we need 1 KW power. Therefore, we need 10 KW for 100 square meters. From 1 KW of electric energy used by the electric pump, we get 4 KW of heat. So to produce 10 KW of heat we need 2.5 KW

of electricity per hour. For one day we need 48 KW and for one month 1140 KW.
Considering 1 KW of electric energy costs 2,16 lei, geothermal energy will cost 2460 lei per month.. To conclude, geothermal energy is not cheaper than other forms of traditional energy.

Conclusions : geothermal energy can be used in any home from the zones with geothermal potential, which reduced significantly the expenses. It can also be used combined with other types of renewable energy, such as: solar energy or eolian energy.

Because of high costs, over 40.000 € for a house – depending on the surface that needs heating, this type of energy can cause problems if it's installed for only one house. The costs of installation may be recovered in 5-7 years, which is beneficial in the context of sustainable development.

Green energy and carbon fiber, solutions to reduce toxic emissions

Istrate Valerica, Technology teacher

Școala Profesională Holboca, Romania

Nowadays the only constant truth is change, that transform the world very fast. According to participants to the conference in Davos in 2016, we're witnessing the dawn of the Fourth Industrial Revolution. The First Industrial Revolution introduced the use of water and steam for mechanical production, starting with XVIIIth century. The Second Revolution in XIXth century used electricity and the Third Revolution introduced electronics and technology of information for automatic production, since 1969 until now. At the moment, the Fourth Industrial Revolution, blending with the previous one from the last 20 years, uses a mixture of technologies: physical, digital and biological. We are already surrounded by artificial intelligence, from autonomous vehicles and drones to virtual assistants and software that translate instantly, make investments in stocks and contribute to finding new medicine or algorithms capable of predicting our interests and social behavior. Over 30% of global population uses social media platforms to learn, to connect and transfer information. This interaction should create the opportunity of a multi-cultural cohesion and understanding that would transform the world in a more tolerant place, more interconnected and with less problems.

In the Fourth Revolution, energy is everything. And green energy started to surpass fossile fuels. Now, humanity invests yearly in new technologies for renewable energy, more than in coal, natural gases or oil altogether.



It may seem surprising, ut nowadays clean enenergy represents more than half of the total added energy – new re-created energy sources, aside from the old fuel infrastructure. And the surprise is that most of this type of renewable equipment – over two thirds – come from the countries in the process of developing.

Morocco becomes a „solar superpower”. Here, they are building one of the biggest photovoltaic power plant that will produce enough energy for more than a million people, reducing the need for fossil fuels by 2,5 million tons of oil. In Bangladesh, around 3,5 million houses – or 18 million people – have electricity coming from solar panels.

China is transforming 800 schools from Beijing in „solar schools”, whose roof tops will be covered by 100 MW solar panels to supply classrooms, cleaning the atmosphere at the same time. Mexico distributed for free 23 million economic light bulbs to its citizens, so more than 5,5 million Mexican families reduced their electricity bills with 18%. Even in Romania, in Dobrogea region there is the biggest eolian park in Central and Eastern Europe (Cogealac-Fântânele), where there are hundreds of eolian turbines, with a power of 2,5 MW each.

According to the Convention in Paris, at least 40% of global energy production must come from technologies with zero emissions. In this perspective, China will play a key role, in the sense of transformation towards green, renewable energy. The ambitious target of this country is that, until 2030, 25% of its total energy production will come from renewable sources. This is the goal, while right now the percentage is only 1,5% – 2%. Meanwhile, China is already a leader of export in technology for clean energy – over 60% of photovoltaic panels from the whole world are produced there.



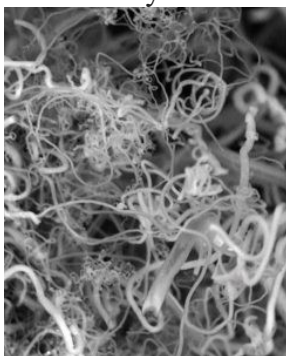
There is a prediction that, until 2030, electric systems will be more connected and combined from many resources and networks. In the future, by a smart energy network, buildings will generate their own electricity from renewable sources, using the space within walls, on rooftops and windows to capture solar or wind energy.

Almost everyone agrees that gases that cause a greenhouse effect, from which carbon dioxide is the most important, influence directly the raise of global temperature and climate change. On a global scale, around 60% of electric energy is obtained by burning coal in thermal central heating plants. Then 50% of oil is used as fuel. And most of natural gases are burned in houses, or for producing energy. We reach again a strong confrontation between the people who sustain the idea of „business-as-usual” (which are the conventional companies) and those who militate for „divest fossil fuels” (those who want to give up completely the exploitation of fossil fuels and replacing them with renewable energy sources). Reducing the pollution resulted from burning fossil fuels is possible by technologies such as CCS (Carbon Capture and Storage).

First, it is clear that humanity sends CO_2 in the atmosphere faster than it can be absorbed by forests. Mainly, a ton of wood can absorb 1,8 tons of CO_2 (a quantity that is sent in the air by an automobile in a year, while a tree needs 10-20 years to grow). Only in USA, for example, they should reforest every 10 years an area equal to a medium size state, to counteract the pollution effects. It becomes obvious that we don't have enough space to plant so many trees.

In lab tests, scientists obtained nanofibres of carbon from carbon dioxide captured from the air. Americans from George Washington University come with a SF solution: to decarbonize the atmosphere through the process of electrolytic conversion, obtaining something that can become the basis of a new industrial era of humanity. Americans promise us that, in 10 years, if the lab system could be projected to 10% of the Sahara desert surface, it is possible to erase the pollution produced in the last 200 years!

Carbon fibre is superior to metals: it is easier, more resistant, it doesn't get rusty. So, it could be used for vehicles, buildings, replacing concrete. Carbon fibre could successfully replace any petrol product in the plastic industry.



It is necessary that all these become more than an experiment, because we need a long term solution for the future! Este imperios ca toate acestea să nu rămână la stadiul de încercare, pentru că avem nevoie de un viitor pe termen lung! XXIst century will probably remain in history, for future generations, as „the eco century”.

Bibliography:

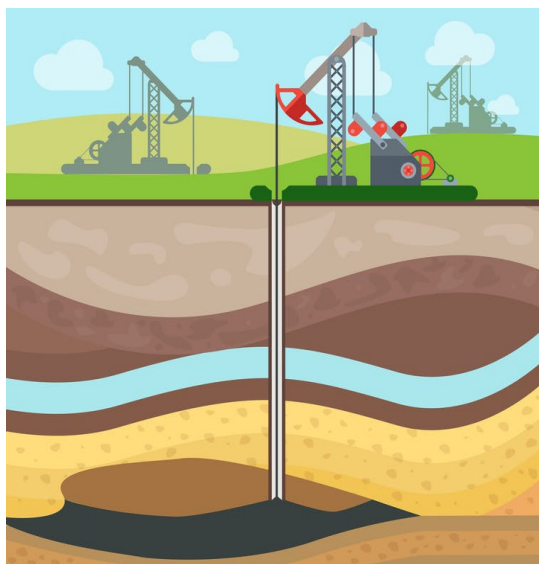
- A Patra Revoluție Industrială/Alexandru Safta și Claudiu Andone/Știința și Tehnica/Martie 2017
- Decarbonizarea atmosferei: noua provocare tehnologică a secolului/Oraan Mărculescu/Știința și Tehnica/Decembrie 2016

Fossil fuel extraction changes the climate

Spiridon Elena Ramona, English teacher

Scoala Profesionala Holboca, Romania

Most of the researchers in the scientific domain agree that burning fossil fuels have a great impact on the changing of the climate. The temperature in the world increased with 1 Celsius degree since the pre-industrial times. Meteorologists say that CO₂ levels alone cannot account for all of the global warming that has been observed. They also take into consideration the role of thermal emissions. Burning fossil fuels do not produce only greenhouse gases, but also generate a lot of heat, which spreads out in the atmosphere. Fossil fuels such as coal, oil and gas that are to be found in layers beneath the Earth's surface act as an insulating blanket, keeping the heat in the planet's interior. When these deposits are being emptied, greater heat levels reach the surface.



When underground reservoirs of fossil fuels are drained, their role as an insulating blanket between the heat of the Earth's core and the surface is lost. [Sentavio/Shutterstock](#)

Fossil fuel companies represent a great source of pollution, either by producing or by selling their products. This is the reason why scientists plead for a mass switch to renewable energy sources and efficiency. Wind and solar

When oil and gas are extracted, the voids fill with water. This way, more heat from the interior of the Earth is conducted to the surface, causing the oceans and the land to warm up more. One of the fastest rates of warming has been observed in the Arctic, where temperatures have risen by 0.6°C every decade since 1978.

Fossil fuel extractions are a real menace even to wildlife. The drilling operations and the loud noises affect the natural course of the animals' existence: the way in which they communicate, their breeding and nesting. The animal habitats are limited by powerlines, fences and roads that humans need for the extraction process.

power have fewer negative impacts. Thus, the electricity and transportation sectors should be committed to policies and practices that encourage the use of "clean" energy.



source:

<https://www.forbes.com>

Activity

Complete the table with the missing information:

<u>What is it made of?</u>
<u>Where does the matter and energy in this type of fossil fuel come from?</u>
<u>How is it formed?</u>
<u>How is it extracted?</u>
<u>What are the environmental impacts of the main extraction method?</u>
<u>How do human use this type of fossil fuel?</u>
<u>What are the benefits of these uses?</u>
<u>What are the environmental impacts of these uses?</u>
<u>Where does the matter and energy in this type of fossil fuel end up after being used in this way?</u>

Water Mills – source of energy, past and present

Camelia Tașcă, Romanian language teacher

Scoala Profesionala Holboca, Romania

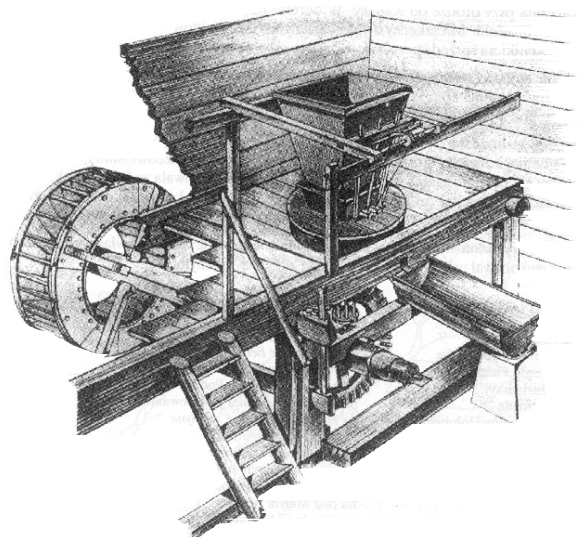
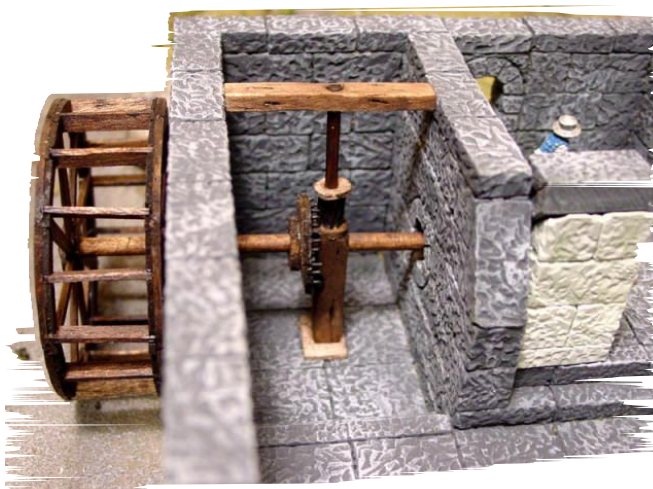
Energetic independence and using renewable resources is a universal purpose nowadays, hard to reach because of various reasons. The modern man, preoccupied to ensure technological progress and comfort, used resources such as coal, oil, natural gases, causing damage to the environment. It is high time humanity developed green methods that do not harm nature, using renewable, clean energy: the wind, the sun and the water.

People have been using water in many ways across centuries, improving their life conditions, by mechanical devices or transport, so this clean source can be found in the history of many countries. Water mills, proof of intelligence and engineer talent of the simple man, were used for cutting wood, grinding cereals, oil press or cranes. We must admit that in Medieval Ages, „everything that water set in motion was called a mill” (Dr. Márton László).

How does a water mill work?

There is a flow of water, deviated into a channel towards a dam, from where it is directed to the mill blades. The mill wheel is made of wood and can have many types of blades, according to the situation. The mill wheel rotates inside the building where it sets in motion other wheels that have various purposes. Initially, wheels were made of wood, just like the entire mechanism. Leather belts were also used to transmit motion. For resistance reasons, in time elements that come in contact with water were strengthened or replaced with iron.

Water mills in Romania



In Romania there are many such folk constructions that use the water force for various chores, preceeding the engineering genius that later built hydro-electric powerplants at Bicaz and Porțile de Fier. In Maramureș region such mills are still functional for washing clothes in houses. There are many types of water mills: made of stone, wood, bricks, with horizontal or vertical wheels, folk mills or semi-industrial mills. Some of them are still functioning, others are just preserved and others are already ruins. Most were lost between 1960 and 1980, the main causes being the works to redirect water flows, the industrial modernization of the country, abandoning collective mills and keeping only individual ones, on electricity. In the last decades many mills were destroyed by floods.

In Romania there is the biggest mill reservation in Europe in the village Eftimie Murgu (formerly known as Rudăria) in Caraș-Severin county, where 22 mills (of 51 existent in 1910) are still currently functioning.

Map of the mill reservation



The mill reservation from Rudăria, at present known as Eftimie Murgu, is unique in Eastern Europe, being visited yearly by thousands of Romanian and foreign tourists. One of the reasons is that it is very close to Bigăr waterfall, considered the most spectacular in the world, a few years ago. In 2004, the water mills from Rudăria were included in UNESCO heritage. „In the world wars period there were 48 water mills, but after WWII, more than half of them were destroyed, so now we only have 22 left, all functional. Water mills belong to the people in Rudăria, nobody comes from outside to grind flour. I am very glad that the mills are visited by people from other countries now. They learn about us from the internet and we have tourists from the entire Europe, from Germany, Austria, Italy, Spain, Hungary or Serbia. ", said the mayor of Eftimie Murgu community.

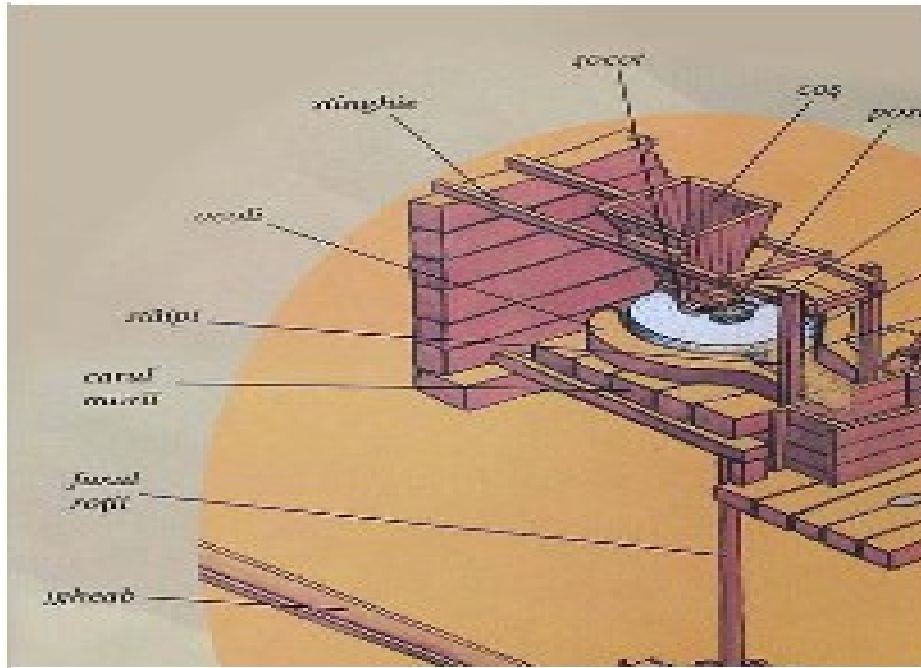
The association „Home in Banat”, a non-governmental organization that initiated the project „We're Saving Water Mills” with the objective of rehabilitating 10 water mills, started not only repairing works on the mills, but also a promotion campaign for the region. In this way, water mills will recover their charm, attracting tourists, and will help the economic development of local communities of over 1500 people and 100 years old.

The tradition of using mills in the region started in 1772, until 1980 when they were replaced with metal mills, while the wheels were entirely made of wood. Although the community had been certified since 1241 and the first 8 mills were used in 1772, these hydraulic systems were first introduced in the region beginning with the centuries II-III. The names of the mills come from the villagers' ancestors, but also the local people's imagination: The Stubborn Mill between Rivers, Trăiloanea Mill, Firiz, Roşoanea, Prundulea, Popeasca, The Mill from the Tunnel, Maxinoanea Mill etc. The mills are situated like a necklace along the water flow, on 3 km in the village and outside of it. The most distant mill and probably the most spectacular is The Mill from the Tunnel, because water comes from under the rocks.

The mills are built with a similar architecture to Kaplan system, with horizontal



wheel and vertical axis. The construction is simple: under the mill, a long gutter captures the river water and directs it to a horizontal metallic wheel with small blades. The wheel sits on a long horizontal pole, sustained by a handle to the floor. Turning, it raises or lowers the exterior hydraulic system. The blades gain rotation from the water flow, moving a vertical axis that climbs inside the building, moving the big stones that grind grain into a basket that separates the flour from the bran. The local people directed the river water through a tunnel under the rock, so that the mill can function.



This type of mill, that grinds 130-140 kg grains in 24 hours, is taken care of by 15-25 families from the village. They take turns to use the mill during the 12-24 hours of work. Local people are proud of the flour resulted from their mills: it seems it has a specific taste, because the wheels moved by water turn very slowly, while electric ones have high speed. „It is spectacular how wheat and corn flour are produced here. It is unique because we use the power of water. We are 17 families and each of us has 2 days a month to come and make flour. We can stay all night. We use the flour for ourselves and for the animals. We also sell it, if tourists come. We are glad to see many tourists here, every day, from all over the country. They like it, they are drawn to this region” said Nicolae Cureau, the owner of a mill in Rudăria. Even though many people expect these treasures to be preserved by the local authorities, only their owners can keep this tradition alive. The village halls have no right to use them and during our times, this tradition can be sustained only from the perspective of being a tourist attraction.



From the 243 water mills identified in Caraș-Severin county, only 82 are functioning, 47 are functional but turned off for various reasons: absence of water or lack of interest. Although Eftimie Murgu is the most popular village, it hosts only 22 mills, while in Cornereva community there are 32 identified mills. Also in Banat region, near Danube river, there are 10 mills that are representative monuments for folk architecture, but also very important for tourism. In Transilvania there are water mills in many villages. In Gheorghieni there is a museum of water mechanic devices on Békény river, „Tarisznyás Márton”.



Human beings have probably combined the best of creativity with nature forces in the case of water mills. Water mills are the places where human work and wood and water resources blend generously. Water mills are not only useful machineries or important places in village life, but also testimonies of human ingenuity, showing the respect our ancestors had for nature, which invites us to think about it. The modern man should learn again to use wisely the resources offered by nature and to live in harmony with those around him, for the benefit of future generations.

Webography:

[Moara de apă este o moștenire a patrimoniului național \(stejarmasiv.ro\)](http://stejarmasiv.ro)

[Morile de apă de la Rudăria - locul unde se macină timpul \(descopera.ro\)](http://descopera.ro)

<http://drumliber.ro/cel-mai-mare-parc-cu-mori-de-apa-din-se-europei-rudaria-eftimie-murgu/>

[Turism la morile de apă de la Rudăria. Oameni din toate colțurile țării și de peste hotare vin să le vadă FOTO | adevarul.ro](#)

[Morile de apă de la Rudăria, unice în Europa de Est \(vitalmm.ro\)](#)

[Descoperă România. Morile de apă de la Sichevita și Rudăria - Editia de Dimineata](#)

[Obiectiv îndeplinit – 10 mori de apă reabilitate în 2020 – Radio România Cultural \(radioromaniacultural.ro\)](#)

["Tara morilor de apă" - inițiativa care salvează morile de apă din Banat - Cultura la dubă \(culturaladuba.ro\)](#)

[Avem 243 de mori de apă, ce facem cu ele? - Caon.ro](#)

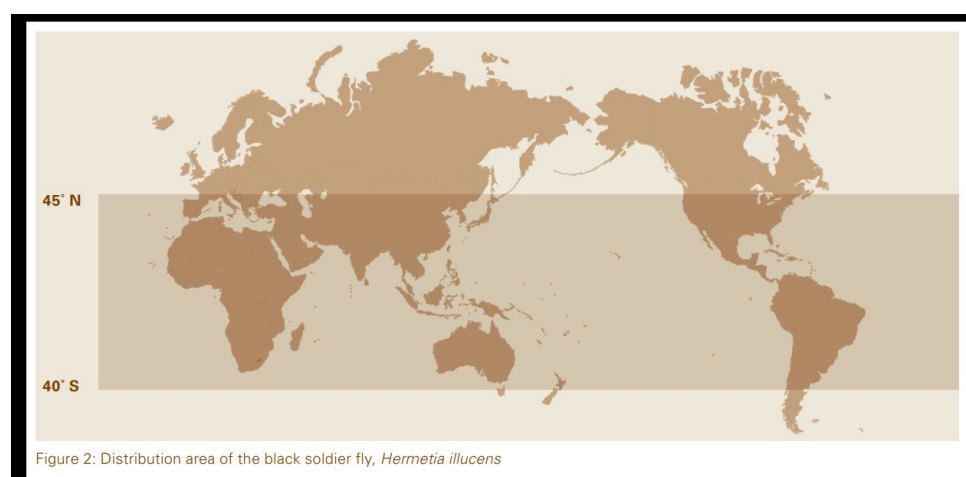
[Morile din Ținutul Secuiesc - Cele 7 minuni ale Transilvaniei \(7minuni-transilvania.ro\)](#)

[Expoziții permanente - Muzeul Tarisznyás Márton \(tmmuzeum.ro\)](#)

The Black Soldier Fly (*Hermetia illucens*) - source of bio-energy

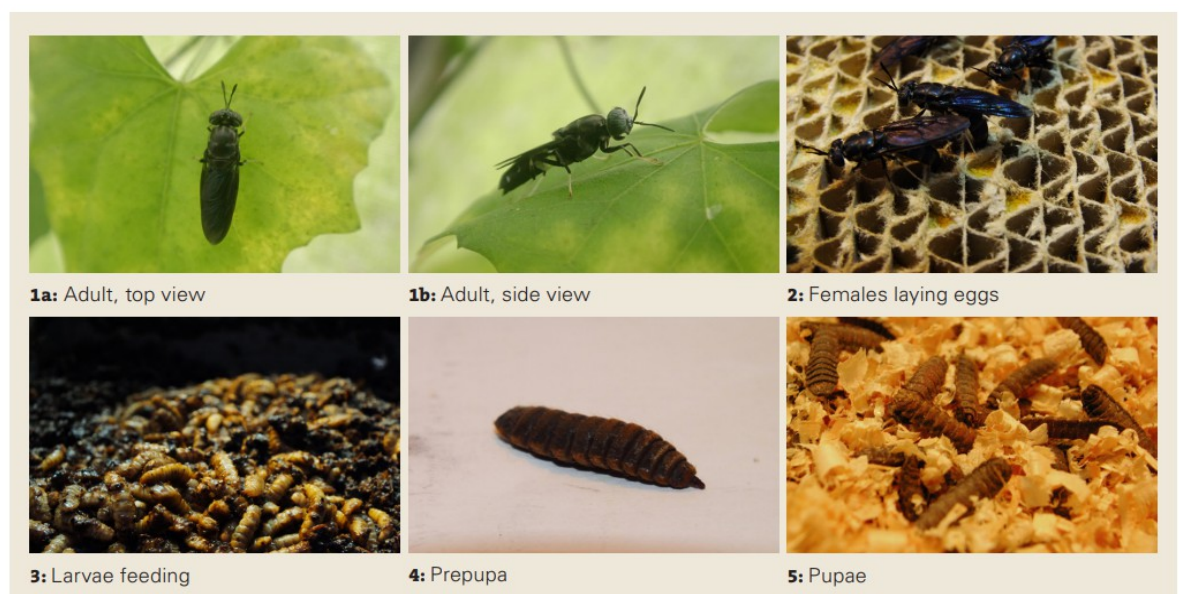
Camelia Tașcă, Romanian language teacher
Professional School Holboca, Romania

Black Soldier flies (BSF) , *Hermetia illucens*, is of the dipteran family Stratiomyidae and are small, harmless and clean insects. Because of its non-eating nature, BSF does not become a vector of disease like house flies, commonly called trash flies. They are found on every continent except Antarctica. It can be encountered in nature worldwide in the tropical and sub-tropical areas between the latitudes of 40°S and 45°N.

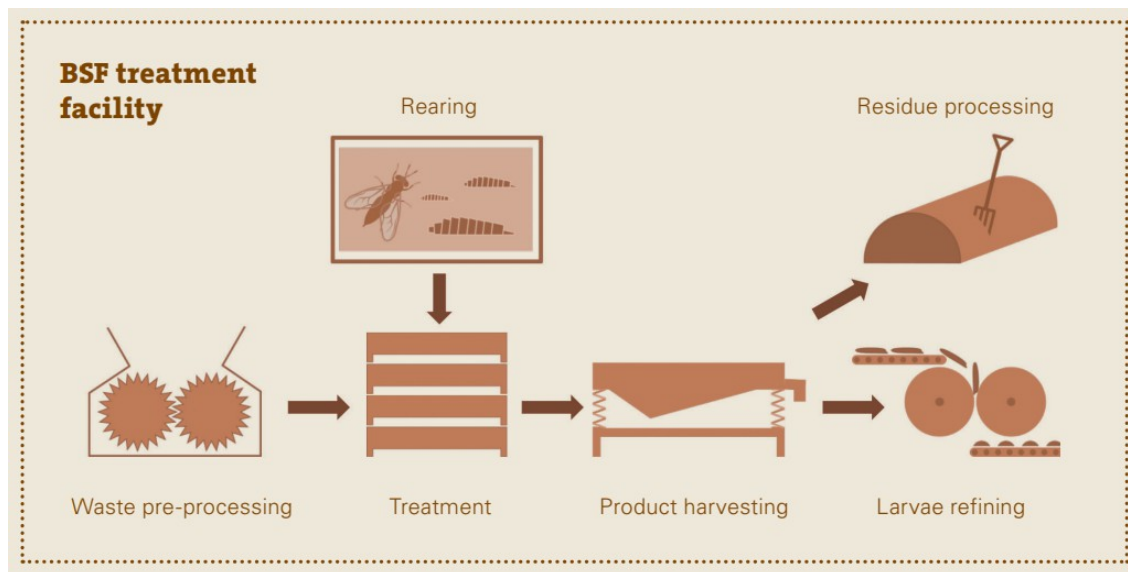


Black soldier fly larvae (BSFL) are used to compost waste or convert the waste into animal feed.

The egg starts a BSF life cycle and at the same time marks the end of the previous life stage: a fly laying a cluster of eggs (also called ovipositing). The female fly lays a package of 400 to 800 eggs close to decomposing organic matter, into small, dry, sheltered cavities. Shortly after having laid the eggs, the female dies. The closeness of the eggs to the decomposing organic matter ensures that the larvae have their first food source nearby after hatching. The sheltered cavities protect the eggs from predators and prevent dehydration of the egg packages by direct sunlight. On average, the eggs hatch after four days and the emerged larvae, which are barely a few millimetres in size, will search for food and start feeding on the organic waste nearby. The larvae feed voraciously on the decomposing organic matter and grow from a few millimetres size to around 2.5 cm length and 0.5 cm width, and are of cream-like colour. The different life stages are shown in below Figure :



The special thing is that the larvae of Black Soldier fly (BSF) have enormous potentials for converting organic waste into compost. Market waste, food waste, cow dung, manure are some common organic materials that can be used for maggot food. Applications can be either fresh maggot or, in processed form such as dried larvae, flour or pellets. This is an inexpensive, alternative protein intake, the produced BSF larvae can be used as animal feed. Applied in an engineered way, BSF is a promising biowaste treatment option.



This fly is already used in South Africa to treat waste, but also in other parts of the world, being considered „living gold”. The BSF is a path to improving household incomes with a readily available resource, and that is really exciting,” says Mwangi, a mother of three who lives in Muranga County, a farming community in Kenya’s Central Highlands.

The economic viability of a BSF processing facility will depend on a range of local conditions:

- Scale and respective capital and operating costs of the facility
- Climate (temperature, humidity)
- Potential revenue from waste processing (tipping fees)
- Sales revenue from larvae derived products (e.g. whole larvae, protein meal, larval oil, etc.)
- Sales of the waste residue as soil amendment or its use in a biogas plant.

The Black Soldier fly is a source of bio energy, a solution to turn vegetable waste into compost.

WEBOGRAPHY

https://www.eawag.ch/fileadmin/Domain1/Abteilungen/sandec/publikationen/SWM/BSF/BSF_Biowaste_Processing_HR.pdf

<https://www.eawag.ch/en/departement/sandec/projects/mswm/practical-knowhow-on-black-soldier-fly-bsf-biowaste-processing/>

<https://ro.ergonengineering.com/insect-larvae-turn-pan-ready-with-home-appliance-farm-432-786137+&cd=12&hl=ro&ct=clnk&gl=ro>

[Brown live Gold - The Black Soldier Fly agripneur - YouTube](#)

GREEN ENERGY , A BETTER OPTION

Student: Elinor Markova
7th grade, Yordan Yovkov School
Varna, Bulgaria



In the past three decades, research and development in green energy has exploded, yielding hundreds of promising new technologies that can reduce our dependence on coal, oil, and natural gas. But what is green energy, and what makes it a better option than fossil fuels?



Green energy defined



Green energy comes from natural sources such as sunlight, wind, rain, tides, plants, algae and geothermal heat. These energy resources are renewable, meaning they're naturally replenished. In contrast, fossil fuels are a finite resource that take millions of years to develop and will continue to diminish with use.



Renewable energy sources also have a much smaller impact on the environment than fossil fuels, which produce pollutants such as greenhouse gases as a by-product, contributing to climate change. Gaining access to fossil fuels typically requires either mining or drilling deep into the earth, often in ecologically sensitive locations.



Green energy, however, utilizes energy sources that are readily available all over the world, including in rural and remote areas that don't otherwise have access to electricity. Advances in renewable energy technologies have lowered the cost of solar panels, wind turbines and other sources of green energy, placing the ability to produce electricity in the hands of the people rather than those of oil, gas, coal and utility companies.

Green energy can replace fossil fuels in all major areas of use including electricity, water and space heating and fuel for motor vehicles.

