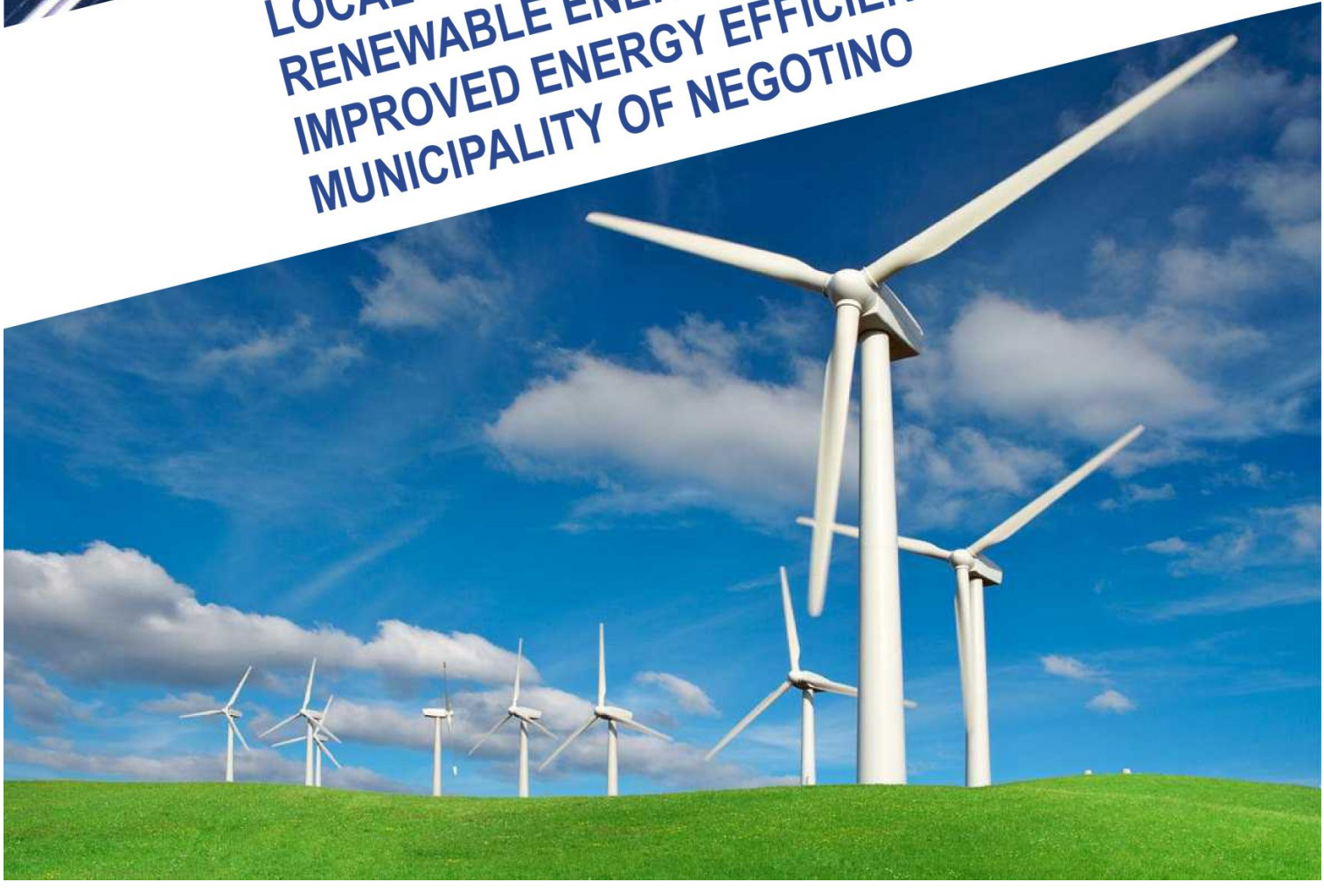
Interreg – IPA CBC

EUROPEAN UNION

CCI 2014 TC 16 I5CB 009

ENPOL-EE

LOCAL SOURCES OF RENEWABLE ENERGY AND IMPROVED ENERGY EFFICIENCY IN MUNICIPALITY OF NEGOTINO



Interreg – IPA CBC

CCI 2014 TC 16 I5CB 009

ENPOL-EE

This brochure is a deliverable of the project "*Energy Efficiency in the cross border area as an indicative factor for Environmental Policy*" with the acronym "ENPOL-EE".

The project is implemented in the framework of the Interreg IPA CBC Programme "Greece- Republic of North Macedonia 2014-2020", co-funded by the European Union and national funds of the participating countries.

More information about the project can be found in the project's website www.enpolee.eu

ОПШТИНА НЕГОТИНО

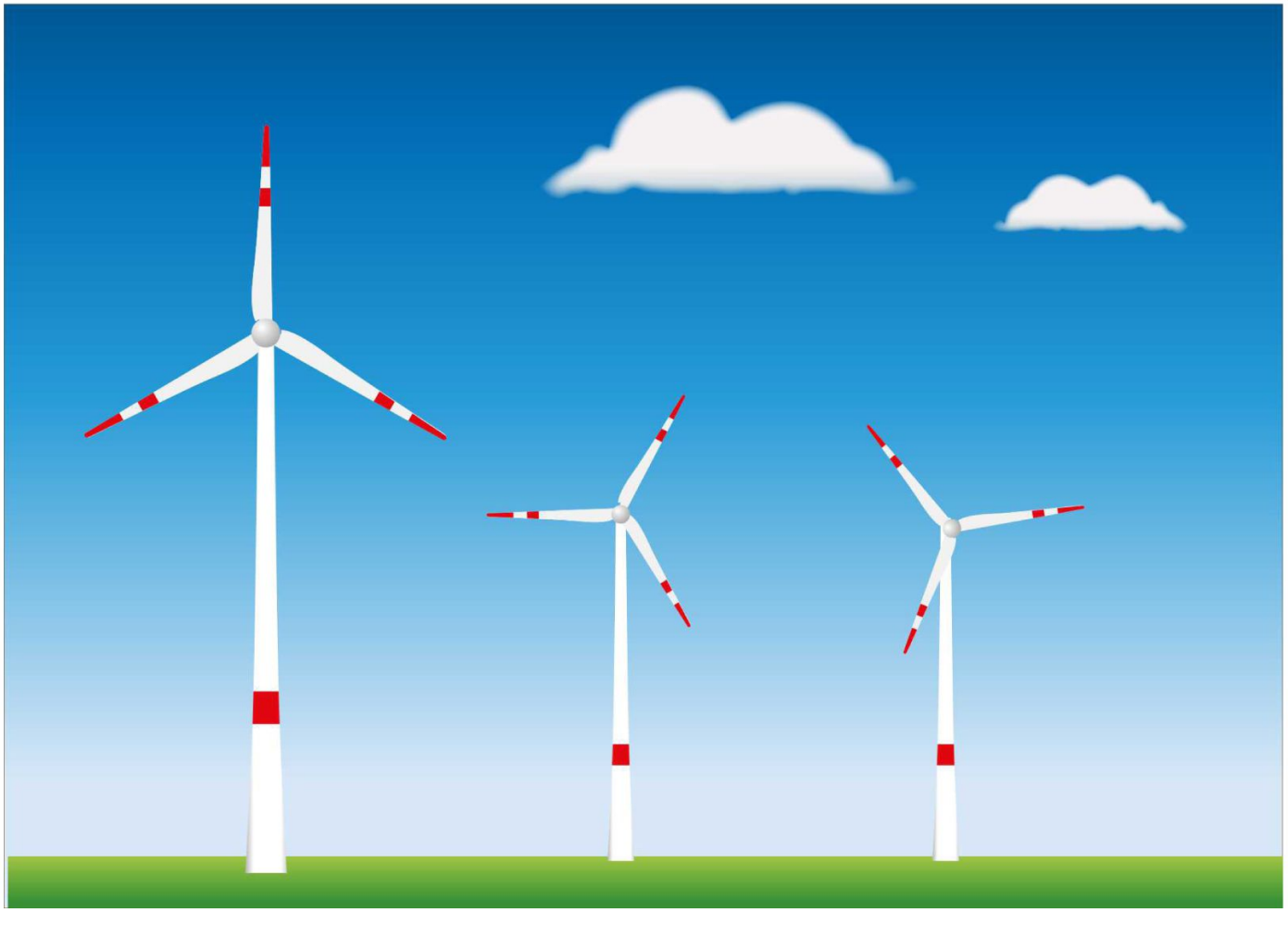
The Programme is co-funded by the European Union and by National Funds of the Participating Countries

ABOUT THE PROJECT

The project “ENPOL-EE” is implemented in the framework of the Interreg IPA CBC Programme “Greece- Republic of North Macedonia 2014-2020”, co-funded by the European Union and national funds of the participating countries.
Its main purpose is to emphasize the importance of energy efficiency in both public and private sectors as an indicative factor of environmental policy for local authorities in the cross-border area.

Thus, the aim of this project is to promote local activities for environmental protection and contribution to local / national / European policies for energy efficiency and use of renewable energy sources. The implementation of activities for energy efficiency and the use of renewable energy sources at the local level will affect the energy problem on a regional to global scale.

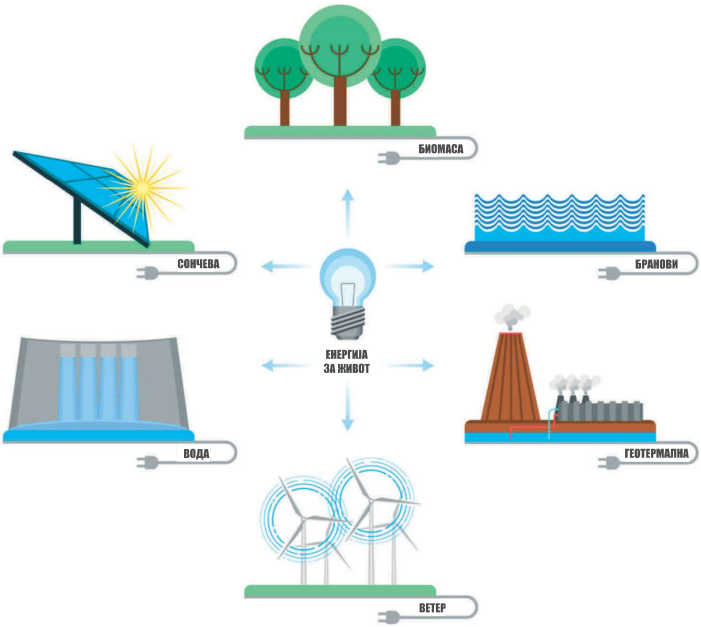
The duration of the project is 32 months and its total budget is € 849,900.15.
The Municipality of Pella is the Lead Partner with a budget of € 404,152.65.
The other partners are the municipality of Negotino (€ 315,979.00), the Association for Culture and Public Development of the municipality of Pella (€ 43,028.00) and the municipal high school “St. Cyril and Methodius ”- Negotino (86,740, 50 €).



RENEWABLE ENERGY SOURCES

Renewable energy is a term used to describe a group of energy technologies that come from sources that are not depleted or can be replenished during a human life. The most common sources of renewable energy are:

- Sun, where solar energy is used,
- Wind, where the movement of wind is used to produce energy,
- Hydropower, where water is used to generate electricity,
- Biomass, which refers to a large group of technologies that use living or until recently living organisms, as well as waste for energy production
- Tides for electricity production
- Geothermal energy, when using the earth's internal heat for energy production.



Renewable energies are just small share of the world's total energy supply, yet it is the fastest growing energy in the world.

Renewable energy is important because it is a clean source of energy, which means that it does not produce direct emissions of greenhouse gases and other air pollutants.

Although renewable energy is better for the environment, it still faces several challenges such as low efficiency, high cost and inconsistency.

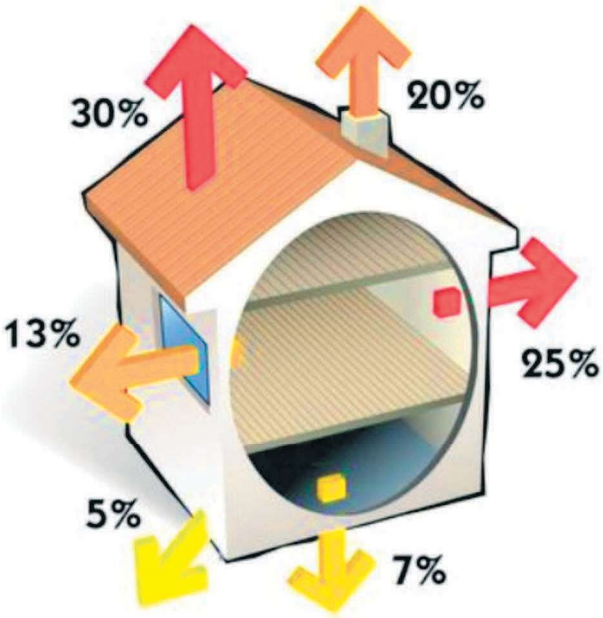
Although we develop alternative energy technologies and always talk about cost and savings, very little is said about energy efficiency, the cost of which is lower than all other fuels.

ENERGY EFFICIENCY

The very notion of energy efficiency has no special definition. As the word itself tells us, it is about efficient use of energy. This means that energy efficiency means a set of measures taken in order to reduce energy consumption, which do not disrupt the existing working or living conditions.

Energy efficiency is achieved by:

- Using lower power appliances
- Replacing old machines with new more efficient ones
- Reduce lighting where it is not needed
- Turn off lights that are not needed
- Replacing lighting with light sources with greater efficiency
- Make thermal insulation in order to reduce heat loss, etc.



Energy efficiency is in fact a competitor to all other types of fuels in electricity generation. Investing in energy efficiency can significantly reduce fuel needs.

The higher the energy efficiency, the less fosil fuel we need. Without emissions and power plants, energy efficiency costs only 1.5 denars for 1 kilowatt hour of energy saved, compared to 7 denars if that energy is used.

SOLAR ENERGY

Solar photovoltaic cells are a technology that converts solar energy into direct electricity using semiconductors. When the sun rays reach the semiconductor in the cell, electrons are released and electricity is generated.

Every hour, the Sun provides energy that can meet global energy needs for an entire year. Slightly less than 0.1% of this solar energy is used in the world today.

Unlike solar, thermal technology solar panels use only direct sunlight, which means that when there is no sun, no electricity is generated.

One of the biggest advantages of solar panels is that it transfers electricity generation from large centralized plants to smaller, production sites, such as the roof of your house.

This way, electricity consumers are turned into producers, i.e. people who produce and consume electricity.

Estimates show that 10,000 times more solar energy comes to the earth's surface than the global annual demand for fossil fuels.

Traditionally, concerns about solar panels relate to cost, inconsistency and efficiency as well as problems such as network compatibility, lack of expertise in the solar industry, and the use of rare and precious metals in cell fabrication.

WIND ENERGY

The wind represents the air movement, caused by differences in atmospheric pressure. Wind speed varies depending on geography, topography and time of year.

As with other renewable energy sources, some places are more suitable for producing wind energy than others. There are optimal locations both on land and at sea.

Wind energy is obtained by converting wind motion into mechanical energy. Traditionally, this energy has been used to grind grain and pump water, but today it is most commonly used to generate electricity.

The mechanism used to convert wind movement into energy is called a turbine. The turbine is a large device with several rotating blades, and these blades are connected to an electromagnetic generator that produces electricity when the wind causes the blades to rotate.

Wind is becoming an increasingly important part of the global power supply mix. The advantage of wind is that the production of electricity does not cause direct emissions of carbon dioxide (CO_2). B

But wind power generation is not without challenges. As we know, the wind does not blow all the time, which causes problems with consistency.

The price of wind energy is higher than traditional energy sources, but the price is significantly reduced with long-term production of wind energy.

HYDRO ENERGY

Hydropower or hydroelectric energy is the conversion of water flow into electricity. It is considered a renewable energy source because the water cycle is constantly renewed by the sun.

The mechanical energy generated by the movement of water spins the turbine rotor. This turbine is connected to an electromagnetic generator that produces electricity when the turbine is running.

Of all renewable energy sources, hydropower has the largest share in the world production of electricity from renewable energy sources.

Hydropower is sustainable compared to other renewable sources and can be used as basic energy. In some cases, reservoirs help control floods and can be a reliable source of water for communities.

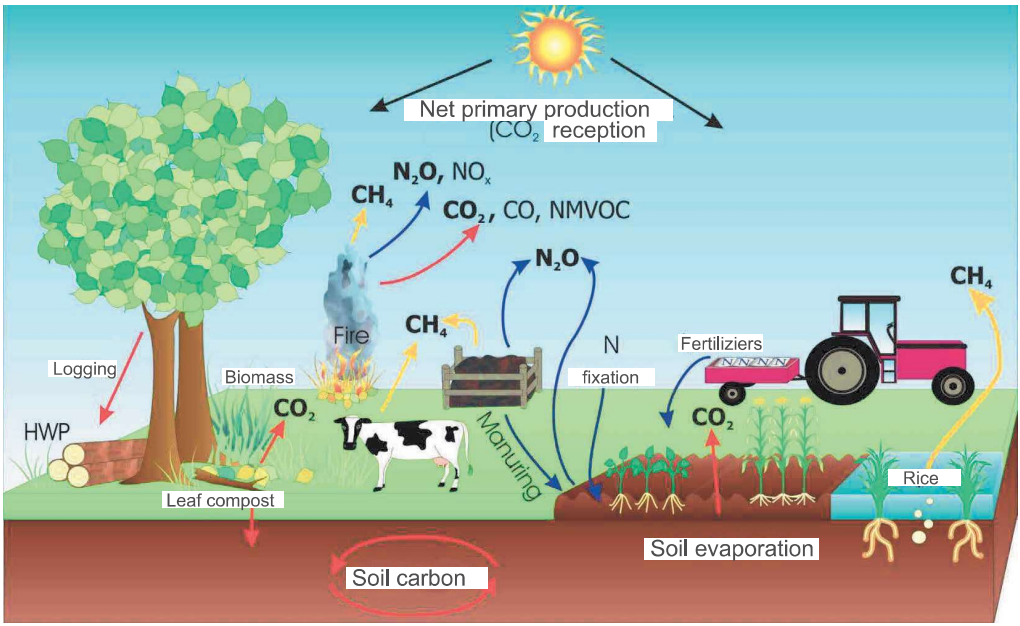
ENERGY FROM BIOMASS

Biomass energy or bioenergy refers to energy produced from organic matter. Biomass is primarily found in the form of live or until recently living plants as well as in the form of waste. The term biomass fuel refers to any type of organic material that will be used to produce energy. Different fuels have different chemical compositions, and generally all fuels contain carbon, water and organic matter.

Biomass is a carbon neutral fuel, it removes carbon from the atmosphere as it grows and returns the same amount when it burns. If managed sustainably, biomass is offset by new growth. This maintains a closed carbon cycle without a net increase in the level of carbon dioxide in the atmosphere which contributes to global warming and climate change.

Biomass is also obtained through cultivated energy crops (eg Miscanthus, grass), wood or forest residues, food waste (wheat straw, bagasse), horticulture (yard waste), food processing (corn husks), cultivation of animals (fertilizer) rich in nitrogen and phosphorus), or human waste from sewage plants. Wood is the most common type of biomass fuel and biomass boilers use three main forms: logs, wood pellets and wood shavings. Biomass is a clean and sustainable source of fuel. It can meet 100% of the citizens' needs for heating and hot water, which makes it a justified and preferred alternative to fossil fuels.

Before the Industrial Revolution, biomass was the main source of energy. Biomass now accounts for only a small percentage of the world's total energy. However, for about 2.5 billion people, it remains the main source of energy for cooking and heating.



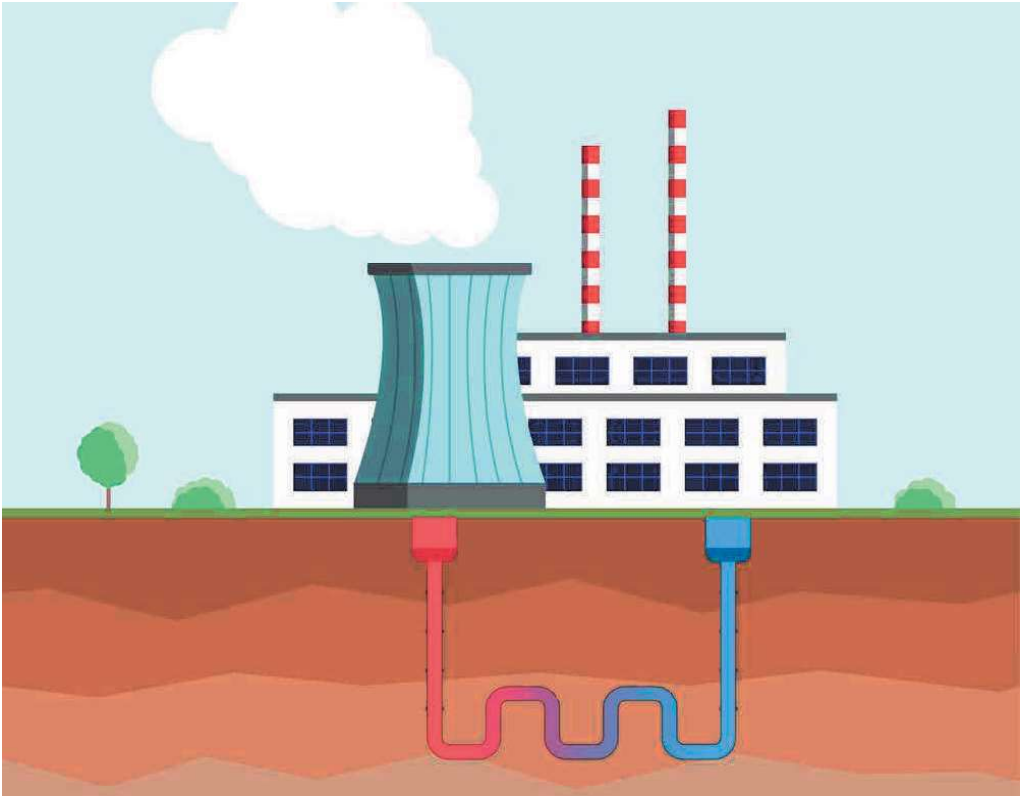
GEOTHERMAL ENERGY

Geothermal energy is the production of energy from the internal heat of the earth. The earth's internal heat is generated by the radioactive decay of minerals and the constant heat loss from the earth's original formation.

Geothermal wells are drilled in the earth's crust at a depth of about 3 to 10 km. Heat is extracted by several methods, but in most cases it is extracted by water or steam. Hot water from the ground can be extracted directly for heating homes and buildings. This is done either by directly circulating water through the buildings or by pumping it into a heat exchanger that transfers heat to the buildings.

Geothermal heat can also be used to generate electricity in a geothermal power plant. Electricity is produced by the fact that geothermal heat is generated by steam that spins the generator turbines.

Investment costs for geothermal energy production are relatively high. It is expensive to carry out seismic measurements, test drilling, confirmation tests and other necessary preliminary research to ensure that our new geothermal plant can meet the desired production

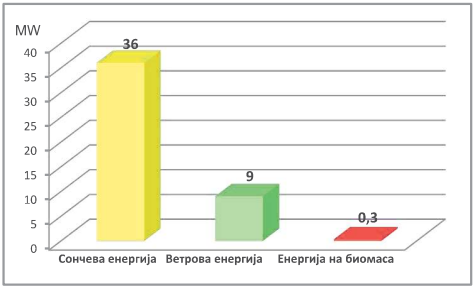


POTENTIALS OF THE MUNICIPALITY OF NEGOTINO FOR USING RENEWABLE ENERGY SOURCES

The global trends to protect the environment, reduce greenhouse gas emissions, Macedonia's dependence on energy import, as well as the need to ensure greater diversity and thus security of energy supply inevitably impose an increased share of renewable sources in the final energy consumption.

However, in parallel with the activities and measures for increasing the share of renewable sources, measures should be adopted and activities should be implemented to increase the energy efficiency in the final consumption. In that way, the target percentage for the share of renewable sources in the final consumption will be fulfilled much easier and faster, but also the competitiveness of the economy will be improved due to the reduced energy costs.

According to the Feasibility Study for determining the potentials of the Vardar region for utilization of renewable energy sources, for the Municipality of Negotino as primary potentials are defined: solar energy, wind energy and biomass energy.



The potential for use of renewable energy sources depends on the natural characteristics of the Municipality.

Potential of the Municipality of Negotino for the use of Renewable Energy Sources					
Type of RES	Hydro energy	Biomass	Geothermal energy	Solar energy	Wind energy
Potential	Small	Small	Insignificant	Very big	Big

An additional factor that affects the potentials for use of renewable energy sources is the environment for investment as well as the support by the local and national government for subsidies and feed-in tariffs for kW / h produced from renewable energy sources.

The Municipality of Negotino through direct investments in energy efficiency directly affects the reduction of electricity needs from fossil fuels, but also the reduction of CO2 emissions into the air and pollution in the Municipality. An additional challenge for the Municipality of Negotino is the production of energy from Renewable Sources, which depends on local resources as well as the potential and interest for investment.

According to local resources, potential, opportunities and interest for investment, three types of renewable energy sources have been identified as real and feasible.

SOLAR ENERGY

With more than 260 sunny days, Municipality of Negotino has large potential for investing in solar panels for the production of electricity or heat. Investing in solar power plants depending on their size (kW) is related to the need of individual households and companies that have the opportunity to sell electricity on the open market or use it for their own needs. Additionally, investing in solar thermal power plants is a great opportunity for households and farmers to meet their own needs and reduce their electricity bills from fossil fuels.

Investment prices range from 1,500-2,500 Euros per household for solar termal unit and 15,000-40,000 Euros per household or company for electricity generation through photovoltaics with a capacity of 20-50 kW.

HYDRO ENERGY

The potential for hydropower in the Municipality of Negotino is very small, due to the hydrology characteristics in the Municipality. But Municipality of Negotino through its own investment or public private partnership has the opportunity to install turbines to generate electricity on its own water supply network as an example from several municipalities in the country. This will be able to directly affect the reduction of municipal costs for electricity used in public buildings but also to make a profit, which can be used for future investments of the Municipality.

The investment prices are determined according to the water flow, but for a capacity of 200kW it is necessary to invest approximately 500,000 Euros.

BIOMASS ENERGY

The potential for obtaining energy from biomass is small and is based on the wood waste from orchards and vineyards. The calculations are showing that from 1 hectare of waste from pruning a vineyard, biomass is obtained which replaces approximately 5 m^3 of firewood. The orchards in the Municipality of Negotino are spread over 185ha, which can provide approximately 22,500 m3 of biomass that can meet the need of the Municipality of Negotino of 20,000 m3 of heating wood (mostly oak, beech, hornbeam, etc.). In order to obtain energy from biomass, the Municipality of Negotino should establish joint cooperation with farmers to provide the required amount of biomass from the agricultural land that would be further processed and biomass energy would be obtained.

Investment prices range depending on the technology from 3,000 - 4,000 $ per kW, and the price of energy ranges from 0.3-0.12 $ per kWh.