

# The Proposed Solutions to Protect the Environment by Encouraging the Use of Renewable Energy in the Western Part of Romania

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**Abstract:** Renewables (wind, solar, hydropower, ocean energy, geothermal, biomass and biofuels) are alternatives to fossil fuels that contribute to the reduction of greenhouse gas emissions, diversify energy supply and to reducing dependence on volatile markets and the unreliability of fossil fuels, especially oil and gas. In recent decades there have a multiple causes of pollution. They have made as environmental protection to become one of the most important and most serious problems of humanity. Due to economic development, pressure on the planet's capacity to meet resource and absorbing pollution is steadily increasing. Thus, the company must make efforts to reduce the negative impact of economic growth on the environment.

Sustainable development, meeting the needs of the present without compromising those of future generations is a fundamental objective, recognized by treaties worldwide. To achieve this objective should be that economic, social and environment to be addressed in a spirit of synergy at all levels. In essence, sustainable development includes environmental protection and sustainable development environmental conditions. An essential role in the harmonious, balanced and sustainable development of the Western Region plays the protection and conservation of the environment, which is support life on Earth.

For a more efficient protection of the environment in the west of Romania, funds should be allocated for environmental protection, biodiversity conservation, climate change mitigation and prevention of natural hazards, expanding the use of alternative energy sources and improving energy efficiency in the economy and in the household.

**Keywords:** air pollution, environmental protection, protection and conservation of the environment.

## 1. INTRODUCTION

Given that non-renewable energy resources are about to exhaustion and the European Union to achieve a share of energy from renewable sources in gross final consumption of energy by 20% on 2020, were binding each Member State, including Romania, where national target is 24%. Thus, Romania should establish a legal framework and mechanisms of European funds targeting the use of renewable energy. It is important to recall that the Western Region has a

high potential regarding renewable energy sources, it has the greatest potential biomass.

According to European commitments, Romania must improve its energy efficiency by 19% and reduce emissions of greenhouse gases by 20% by 2020. This creates some so-called priorities for achieving the objectives set by the European Union. These priorities such as environmental protection and improvement, expansion or modernization of technical infrastructure, preserving biodiversity, mitigating climate change and natural risk prevention, the use of alternative energy sources, improving energy efficiency in industry and in the household[1].

## 2. ENVIRONMENTAL PROTECTION by MODERNIZATION OF TECHNICAL INFRASTRUCTURE

Given that non-renewable energy resources are about to exhaustion and the European Union to achieve a share of energy from renewable sources in gross final consumption of energy by 20% on 2020, were binding each Member State, including Romania, where national target is 24%. Thus, Romania should establish a legal framework and mechanisms of European funds targeting the use of renewable energy. It is important to recall that the Western Region has a high potential regarding renewable energy sources, it has the greatest potential biomass and geothermal energy.

A picture of the environment in the Western Region requires a brief analysis of the main natural factors, in particular aspects of the quality of air, water and soil.

### 2.1 Air quality

Air quality is one of the most important aspects of environmental factors, being affected by pollution in recent years. On the short and medium term effects of air pollution harms human health and harm ecosystems in particular. In the long term, air pollution affects the environment through: the effect of greenhouse gases, ozone layer depletion, acid rain,

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the presence of micro-pollutants and suspended particles.

The main share of CO<sub>2</sub> emissions and N<sub>2</sub>O Regional has Hunedoara county - 47.2% to 56.7% CO<sub>2</sub> and N<sub>2</sub>O from; CH<sub>4</sub>, Timis County has the biggest contribution, with 61.5%. Energy sector's contribution to emissions of greenhouse gases is significant, 43.7% of total CO<sub>2</sub> emissions being produced in this sector. CH<sub>4</sub> emissions are considerably higher than those of CO<sub>2</sub> and N<sub>2</sub>O in all counties of the region, reaching a peak in Timis county [1].

As a result of the presence of emissions of certain pollutants into the air from chemical reactions occurs pH change of air, precipitation and sometimes even soil. The main acidifying gases are sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>) and ammonia (NH<sub>3</sub>).

From the recorded data to monitor air quality in the West Region were found not exceeding the maximum allowable concentrations above mentioned compounds, the values hovering well below their level.

The indicators particulate matter and sediment frequent breaches of maximum allowable concentrations, which are not found with other pollutants.

Pollutes the atmosphere with these pollutants are road traffic (where cleanness of the settlements and the maintenance of the roadway is inadequate) - all counties in the West Region, steel and metallurgical industries - in the counties of Caras-Severin and Hunedoara thermal power plants using solid fuels - across the region, the cement industry - in Hunedoara county, landfills of household waste - throughout the region and the tailings - the counties of Caras-Severin and Hunedoara

### Recommendations:

- Maintaining air quality within the maximum permissible concentrations laid down in legislation rivers and maintaining their ecological functions
- Reducing soil pollution
- Support for selective waste collection, increase recovery and recycling
- Improving access to water infrastructure by providing water, sewage and urban and rural areas

### 2.2 Water quality

Water quality treats important issues regarding the quality of the following components: surface water, groundwater, water resources potential, and wastewater and waste.

- In general, the headwaters rivers fall in first class quality. The middle and lower classes, courses of concern for the economy and environment and quality changes rivers passing grade III quality and even you.

In the Western Region, the largest share is held by sections of rivers falling into Class II quality, while quality grade corresponding to very degrade sections of rivers, the lowest percentage recorded.

- Lakes in the West Region were grouped into watersheds and overall employments are as

mesotrophic.

Trophic status of lakes catchment Bega-Timis and Caras-Nera-Cerna is presented in the tables below. Trophic status of the varnish refers to the nutrients contained in the water. The trophic status can be defined by the following terms: oligotrophic, mesotrophic, and eutrophic hypertrophy. A oligotrophic environment is characterized by low levels of nutrients at the levels mesotrophic environments, and the hypertrophy by excessive amounts of nutrients. Eutrophication Lakes ecosystem caused by an increase in chemical nutrients generally compounds containing nitrogen and phosphorus and is often the result of lake water pollution by wastewater discharges and waste (tab. 1)[2].

Table 1. Trophic status of lakes in the basin Bega – Timiș – Caras

Name accumulation and water course	Criteria for determining the trophic status				Global employment
	Dissolved oxygen/ oxygen saturation	Biogenic substances		Phytoplankton biomass	
		N <sub>tot</sub>	P <sub>tot</sub>		
Trei Ape r. Timis	oligotrophic	oligotrophic	hypertrophic	mesotrophic	mesotrophic
Gozna r. Barzava	oligotrophic	oligotrophic	hypertrophic	mesotrophic	mesotrophic
Poiana marului r. Bistra Marului	oligotrophic	oligotrophic	hypertrophic	mesotrophic	mesotrophic
Zervești r. Sebes	oligotrophic	mesotrophic	eutrophic	mesotrophic	mesotrophic
Secu r. Barzava	oligotrophic	oligotrophic	hypertrophic	mesotrophic	mesotrophic
Buhui r. Buhui	oligotrophic	oligotrophic	hypertrophic	mesotrophic	mesotrophic
Domcecea mică	oligotrophic	mesotrophic	hypertrophic	mesotrophic	mesotrophic

### - Groundwater quality

To monitor groundwater quality in the West Region drillings of I and II, national monitoring network components. To these surveillance drillings within range of polluting sources of environmental pollution, and some wells located around the landfill. The most serious cases of pollution - critical areas - the aquifer, the exceeding of the maximum exceptionally (according to STAS 1342-1391), and records indicators: organic matter, ammonia, phosphates, nitrates, nitrites and phenols. especially in wells located near residential interfluves or agricultural areas where intensive agriculture is practiced.

The same cannot be said of rural water wells usually located in the courtyard of households own warehouse near manure or latrine. The analyses performed by laboratories LEPA sites for water from these wells indicates often exceeding the MAC for nitrates.

On the basis of physico-chemical and bacteriological pollution of the groundwater found in some areas. Degradation of water quality in aquifers is caused by:

- Discharges of untreated or insufficiently treated wastewater and low grade network equipment with sewage;

- Dejects complexes discharged from livestock and poultry;

- Deposits of sludge and garbage in undeveloped areas;

- Chemical fertilizers and pesticides on agricultural lands administered incorrectly.

The Danube river basin, groundwater quality is affected by the mining activity in the area (flotation) and the water quality of the Danube [3].

### - Potential water resources

Water resources can be a limiting factor for economic development in a certain area especially if those resources are insufficient, the deficit to requirements. Surface water reserves in the Western Region are 8,072,704 thousand m<sup>3</sup> / year. This amount is represented in most of the river Mures (6,345,043 thousand m<sup>3</sup> / year), but the end of the basin and containing pollutants, only water is used in agriculture and industry.

The poor quality of raw water from surface sources, involves finding new sources of potable water purposes. It also requires upgrading of water distribution networks in order to ensure the quantity and quality of drinking water for the population.

### - Wastewater and Domestic

The West Region is discharged wastewater as follows:

Table 2. Distribution of wastewater in the West Region in 2014

County	Wastewater Volume (mil m <sup>3</sup> )	Share (%)
Arad	16.1	2.6
Caras Severin	40.1	6.5
Hunedoara	496.8	81.1
Timis	59.3	9.7
West Region	616.2	100

Volumes of wastewater generated in the region in 2014 reveals that the largest volume resulting from Hunedoara County - 496.8 mil. m<sup>3</sup> (81.1%), where is a particular situation due to the large wastewater resulting from the energy sector. The assessment of the regional situation wastewater sources has the following features: sewage yield amounts and toxicity of pollutants discharged pollutants. From this point of view highlights:

- inefficient municipal wastewater treatment plants that require modernization and refurbishment;
- Lack of treatment plants for some urban and rural areas;
- pre-treatment stations inefficient industrial activities;
- Major sources of pollution are identified in the regional area: RAAC Arad, SC Prodcom Andante, Prescom Resita, Resita Steel Plant, GOSCOM Caransebeș, Mine Moldova Noua Moldova Noua IGOSER

### 2.3 Soil quality

Soil quality is strongly influenced by anthropogenic factors and especially the way agriculture is practiced and forests are exploited. Soil condition is closely linked to how land use or otherwise of the land structure. In the Western Region, the main factors of soil degradation are: shallow and deep erosion, acidification, salinization, landslides, destruction of soil structure by compaction, chemical pollution (pesticides, oil, heavy metals). To ameliorate the quality of the soil, it can intervene through various

measures pedohydroameliorative or agrophyto-technical such as: fertilization, irrigation, drainage, terracing, damming, unblocking, etc. Soil reaction is corrected by amendments or by amending soils with calcium to acid and alkaline soils by gipsare. Of the range of erosion control measures to be applied to soils undergo this process, remember that an important link, territorial organization, regularization of rivers, land slope, cropping patterns, crop rotation, maturing, soil tillage, crop systems erosion (grassing, culture system in strips), afforestation. Improving soil moisture excess hydro comprises a set of methods (drainage, drainage and embankment) and agro improvement (deep loosening, leveling, modeling, drainage)

### The impact of farming on soil

Agricultural activities through applied technologies, effects on soil quality, especially when unilateral fertilization (creating nutrient deficiencies in the soil) and through various mechanical works in areas with potential for soil erodability (slopes) . Using the crops, primarily chemical methods agro pyrotechnical detrimental methods, biological, physical to reduce losses caused by diseases, pests and weeds can have negative effects on soil and other environmental factors.

Irrational use of mineral fertilizers, especially nitrogen and phosphorus, nitrate pollution caused groundwater and surface water. There is a passive pressure exerted by stocks of expired phyto sanitary accumulated while units with agricultural, former IAS.

Because of age these products are increasingly damaged packaging, defending risk of uncontrolled discharge into the environment when handling them. These waste pesticides are regularly checked. The concentration of animals in large livestock also causes large damage to the environment, and agriculture by dumping soil in rivers and lakes resulting slurry, leading to their pollution, and groundwater. A major impact on soil landfills are the animal (pools, ponds) that belong particularly Comtim and Avicola farms that are not properly preserved [4].

### 2.3 Conclusions and Recommendations

As regards the technical infrastructure of the Western Region is insufficient or need rehabilitation or modernization. After assessing the situation in the Central Region to sewage pollution of natural receptors found by the following objectives: urban wastewater treatment plants discharging insufficiently treated wastewater into the natural, lack of treatment plants for some urban and rural areas, lack of connection to the system network centralized sewage and industrial activities after water treatment ineffective.

#### Recommendations:

- Maintaining air quality within the maximum permissible concentrations laid down in legislation
- Reducing soil pollution
- Support for selective waste collection, increase recovery and recycling

- Improving access to water infrastructure by providing water, sewage and urban and rural areas

### 3. BIODIVERSITY CONSERVATION

Biodiversity, the variety of life on Earth, has seen a steady decline over the past year, sounding the alarm on quality of life and ecosystems. Following the negative effects of loss of biodiversity, the European Union is committed as 2020 to protect and halt the loss of biodiversity. In the past 25 years the European Union has built an extensive network of 26,000 protected areas in all member countries holding 18% of the land area of the European Union. Implementation of the European ecological network Natura 2000 in the West Region started with the identification of species of flora and fauna and natural habitats of European interest, a process that used for drawing up the list of potential sites NATURA 2000. This list consists of proposals for Special Areas Protected Areas (SPA) and Sites of Community Importance (SCI) which since enlargement have become or will become Special Areas of Conservation (SAC)[2].

#### Recommendations

- Conservation of natural habitats and of wild flora and fauna
- Preserving and increasing biological diversity by reducing negative impacts and ecological reconstruction of damaged ecosystems and habitats
- Protection, conservation and restoration of biological diversity by applying specific agro conducive to sustainable agriculture
- Preservation and protection of biodiversity through forest regeneration and developments
- Tourist capitalization of protected areas and Nature 2000 sites

### 4. USE OF ALTERNATIVE RESOURCES ENERGY

In the European Union the current energy system is heavily dependent on fossil fuels, more than half of primary energy consumption is imported. While exhausting nature of fossil fuels, the pollution produced by burning them and increased greenhouse effect leading to global warming and other resources required to identify energy, renewable and inexhaustible. In the European Union are formulated a series of policies and measures for use of renewable energy resources. Geothermal resources are used and Oradea, Bihor county capital, but also in Timis County; location of these resources in the western region of Romania (Banat, Apuseni Mountains, Bihor) green could mean a chance for the area, but investments in this area are needed. Pre-drilling and drilling studies themselves are extremely expensive, and this hampers environmental intentions. Individual households may operate on the basis of geothermal energy, independent of centralized systems: a heating mechanism in this way, for

example, is formed of a heat pump and a system of underground pipes, through which flows a fluid (usually a mixture of water and antifreeze). In winter, the fluid absorbs the energy from the earth and goes home; the heat is concentrated inside the pump and distributed at a higher temperature (Figure 1). In summer the process is reversed - excess heat is extracted with the pump housing and dispersed into the soil (or, this excess can heat domestic water). The procedure relieves residents of unwanted effects house air conditioning, indoor climate control that achieved by extracting heat from the housing, not by introducing cold air. One advantage of geothermal heating systems is the lack of danger - no risk of fire, no toxic gas, no chemical combustion; facility is silent, maintenance is costly [2].

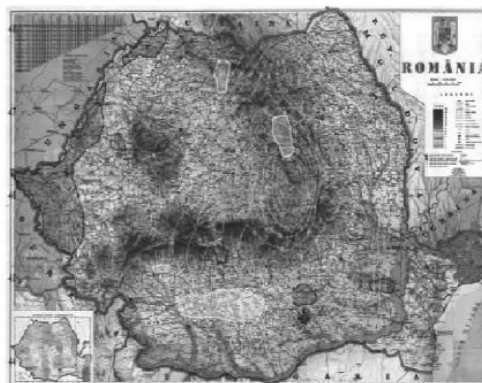


Figure 1 Geothermal map of Romania

Beius is the only city in Romania currently operates using geothermal resources for heating homes Fig. 2



Figure 2. Beius city view

Every year in Beius consumed over 200,000 Gcal produced only from geothermal sources. Under the name "Beius, geothermal city", local authorities have launched a 4.3 million euro project which aims to best use the resources that benefit the town. The project involves increasing the capacity of thermal comfort and thermal energy production, create new

jobs, involving local and regional business environment in the process of using geothermal resource. Also Beius aims to achieve a spa fed by geothermal water park. The park will offer spa cures and mountain tourism, but will provide visitors and different ways of leisure. We have four thermal pools (Olympic standard, for children, for polo, recreational), hotels and restaurants, in a word; it will be a small oasis of relaxation and health. Beius dream of being a truly green city of Romania

With regard to electricity supply in the North-West region, in urban areas, 72% in towns and municipalities were powered by natural gas, a rate below the national average of 75%. In rural areas, the percentage of 26% is higher than the national (22%). Compared with 2000, the number of localities connected to the natural gas in 2010 rose by over 75%, a percentage above the national average of 60%.

The total length of gas distribution pipelines in the region expanded by 70%. A characteristic is the natural gas consumption decrease of 66% during the analysis. The same trend is recorded in terms of domestic consumption of natural gas, which accounted for only 58% of that recorded in 2000. Another feature of the region is related to the number of localities in which thermal energy which has dropped compared to the reference year 2000.

A feature related to energy efficiency aims thermal rehabilitation of buildings. From this perspective, a small percentage (0.76%) of all conventional dwellings was rehabilitated in the North-West region.

Despite the fact that the region has a significant potential for geothermal energy, wind potential, especially in mountainous areas, potentially satisfactory solar and wood biomass, hydropower potential, the absence of further research to estimate this difficult harnessing renewable energy potential and establish courses of action in this regard [4].

### Solar energy

In current conditions, the energy issue is gaining momentum, and environmental protection has become a requirement of society, and intensified efforts developing technologies to exploit non-conventional energies (solar, wind, geothermal, etc.). Developing and improving technologies for capturing and capitalizing on radiation. Solar remains a topical issue because of the advantages that solar energy too it provides:

- The sun is a source of clean energy and virtually inexhaustible energy potential huge, so if they cover a thousandth part of the Earth's surface sensors having a yield of 5%, would give annually nearly 60 billion MWh;
- It is a dispersed power source, allowing its use by Conversion to other forms of energy directly to the place of consumption, eliminating such distance transport;
- Solar energy can be converted into other forms of energy - heat, electrical, mechanical or chemical,

using collectors. The shape, type, and the size of such installations / solar energy conversion devices depend - The newly created energy can be executed in single or variants complex, to obtain the corresponding performance technologies used.

Solar map in Romania is shown in Figure 3.

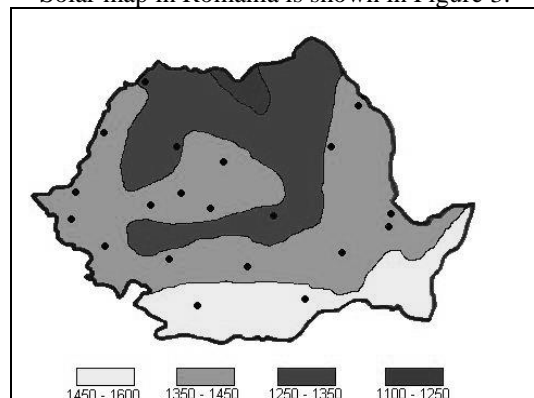


Figure 3 Solar map in Romania

### 5. IMPROVE ENERGY EFFICIENCY IN THE ECONOMIC AND IN THE HOUSEHOLD

Reducing energy consumption and energy efficiency is one of the main objectives of the European Union. EU support for improving energy efficiency will prove decisive for competitiveness, security of supply and compliance with commitments under the Kyoto Protocol on climate change.

There is significant potential for reducing consumption, especially in energy-intensive sectors such as buildings, manufacturing and transport. Energy plays an essential role in the economy both in the demand and supply. Seen through the prism of demand, energy is one of the products that the consumer decides to buy to maximize utility. Seen through the prism of supply, energy production is a key factor along with capital, labor and raw materials, playing a vital role in economic and social development of countries and regions are a key factor in ensuring economic growth and living standards [3].

The energy sector must face major challenges manifested internally and global energy supply security, economic competitiveness and reduced environmental impact.

According to national data published by the National Statistics Institute economic activities have a share of 70% of final energy consumption and 30% of the population. Industry and construction account for roughly 40% of national energy consumption

#### Recommendations

- Improving energy efficiency in industrial and economic operators through the purchase of equipment with low power consumption
- Improving energy efficiency in heating / cooling individual homes
- Improving public lighting

- Improved and more efficient urban transport by promoting the use of biofuels

## 6. CONCLUSIONS

As regards air quality, Romanian development between regions, North West has the least productive economic units emitting carbon dioxide, ie the smallest amount of emissions, so that the region's share of emissions is only returns 4%, the lowest at national level in this respect being the region with the best air quality. In terms of the amount of gas emissions, the region ranks first nationally, and most polluting activities are: waste disposal, water purification units, poultry and pigs.

The water quality is threatened by contamination with wastewater, municipal and industrial, discharged directly into the environment. This is due to the inefficiency of water treatment systems that are not designed according to the development of settlements. Another specific region and affecting water quality concerns accidental pollution as a result of errors, omissions; In 2011, the Region held seven such accidental pollution.

The land intended for agriculture are increasingly affected by degradation processes, and the main problems facing the region are: acidification of soils, surface or deep erosion, waterlogging etc. Another specific region is the expansion of built-up urban areas to the detriment of the surrounding rural areas that have land for economic circuit (all categories of land risk losing their original functions, ecological restoration is not possible).

Waste management is an issue that must be managed both nationally and in the North-West region, requiring action and investment in the future. From the perspective of contaminated sites, Northwest region ranks second nationally after South Muntenia.

The total surface of protected areas in the region is 22.04% higher compared to 2007 and for each of them were established management structures.

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