

RENEWABLE ENERGY SOURCES IN THE SUSTAINABLE DEVELOPMENT CONTEXT

Emilian M. Dobrescu,
Diana-Mihaela Pociovălișteanu*

Abstract

Few are the studies that correlate the climatic changes with the use of the renewable energies, practical inexhaustible sources of energy, which do not pollute the environment. Planetary wise, the use of alternative types of energy was acknowledged for several centuries now. During the last century, the use through combustion of the energy from fossil fuels (oil, gas, coal) had disastrous impact on the environment, much higher than any other human activity in the History, leading to the accumulation of foul gases in the atmosphere, thing that has triggered processes (that might be irreversible).

The European Commission admits the need of promoting the Renewable Sources of Energy (RSE) as a priority measure, given the contribution of their exploitation to the protection of the environment and to the sustainable development.

Keywords: sustainable development, climatic nature, energies from fossil fuels, renewable energies, environment protection, Renewable Sources of Energy (RSE).

JEL Classification: P48, Q4

Introduction

Oceans absorb about a third of the carbon dioxide emissions (CO₂) from the atmosphere. This gas is the bas for the decrease of the pH index of the water causing a series of chemical reactions of the chemical elements dissolved in the water, reactions described as acidification. Emissions of CO₂ in the atmosphere,

* Main researcher at the Institute of National Economy and scientific secretary of the Economic, Judicial and Sociology Sciences Department within the Romanian Academy, E-mail address: dobrescu@acad.ro

Associate Professor at the “Constantin Brancusi” University of Targu-Jiu, E-mail: Diana.pociovalisteanu@gmail.com

particularly from industrial sources have led to a rapid increase of acidity in the oceans, with consequences yet unknown on the long term, on the marine ecosystem, according to a study from March 2010 of the American Academy of Science. Climate change suffered by the oceans is a problem becoming more and more serious according to U.S. researchers, who report that marine animals will not survive to a so rapid change of their environment. Without a substantial reduction in CO₂ emissions or without other control methods of CO₂ emissions with greenhouse effects for the atmosphere, oceans will become more and more acid.

Climate bill – a black hole of national budgets

In the summer of 2008, Poland tried to form a blocking minority in the European Union regarding the launch of a full auctioning system of carbon quota fixed for the Member States. Poland was unhappy with the decision of the European Commission (EC) to reduce CO₂ emission quotas sought allies in the EU to block EC decision; Warsaw action targeted the EU Member States who have entered into the same wave accession in May 2004, that the desire to witness a rapid economic development need strengthening intensive sectors, but they are both responsible for almost half of all carbon dioxide emissions in Europe. Those measures, designed to lead to reduction of CO₂ emissions in the EU by 20 percent by 2020 compared with levels in 1990, suggest that Brussels decrease the total number of credits available for CO₂ emissions by 1.74 percent in every year since 2012. Poland, that produces 96 percent of its total electricity in coal power plants, fears that the system of auctioning of quotas of CO₂ emissions will lead to the bankruptcy of its energy companies in favor of wealthier Western firms that are more efficient and investing heavily in new technologies.

EU leaders agreed at the European Council at the end of October 2009, more than a month before the historic summit on environmental issues, in December the same year in Copenhagen to support the efforts of developing countries, including the European in fighting climate change. Although they said it would take 100 billion Euros, the EU leaders have not agreed on the amounts with which to engage the EU: 22 to 50 billion per year should come from international public funding. Analysts believe that the EU decision on its

financial commitment must consider the decision of other developed and emerging countries on the planet.

European leaders have asked for any contribution to the funds of this kind to be made voluntarily. The EU supports a reduction target by 2050, of emissions of greenhouse gases in the planet's countries, 80-95 per cent lower than the 1990 levels: "I gave all world leaders a very dark vision of what science tells us and this should motivate us all, but I'm afraid I do not see evidence of that reasoning in the current stage. Science has been set aside and the remaining space was filled with political myopia, while each country is now trying to protect their own narrow short-term interests. They are afraid to go further because negotiations should compromise on these interests", said Rajendra Pachauri, the head of an international panel of the Copenhagen summit on climate change.

At the end of November 2009, before the Copenhagen summit, the U.S. announced to the general surprise, 17 percent reduction of emissions of greenhouse gas from now until 2020 compared to 2005 levels. This announcement has already been deemed insufficient by the environmental movement, which called for the U.S. to do more. In response, Washington appeared ready to commit to a reduction of 30 percent by 2025 and 42 percent by 2030. Nearly simultaneously, the Pekin presented its own figures: a reduction of 40-45 percent to "its carbon intensity" (pollutant emission per unit of GDP) from 2020, compared to 2005. We would like to remind you that the European Union has committed to a 20 percent reduction in greenhouse gas emissions and is prepared to increase this reduction to 30 percent.

As we will explain in detail in the second chapter of our work, the EU has committed 20 percent decrease emissions of greenhouse gases, use a rate of 20 percent renewable energy and achieve energy savings of 20 percent by 2020. EU has already reduced greenhouse gas emissions by about 16 percent by 2010 and increase the share of renewable energy to 10 percent of the total of energy consumed, according to data released by the European Commission. EU countries have registered delays in energy saving, which was only 3 percent, while the Member States are not subject to any constraint.

A checklist with new stages and targets was discussed on June 21, 2011 in Luxembourg, in order to provide consistency to the EU action to limit global

warming to 2 degrees Celsius by 2050. There were proposed three stages: a reduction of 40 percent compared to 1990 levels by 2030, 60 percent by 2040 and 80 percent by 2050. In the day of the release of the checklist to limit global warming, Poland again opposed any additional commitment to reduce greenhouse gas emissions, thus blocking the EU's position in international negotiations on climate, a few days before taking over the EU presidency. that Poland refused any commitment beyond the 20 percent reduction approved in 2008 under the EU Action Plan. "It's disappointing," said the EU Commissioner for Climate Connie Hedegaard. She pointed out and isolated the position of Poland, noting that "the vast majority of EU states have agreed with the checklist of the Commission on further reducing the emissions of greenhouse gases. Producing coal and dependent on this highly polluting fossil used to produce electricity, Poland agreed with many hesitations, as noted above, only to the action plan adopted in 2008.

Importance of renewable energy sources

In the last century, the use of energy from fossil fuels (oil, gas, coal - through burning) has had disastrous effects on the environment, greater than any human activity in history: the accumulation of greenhouse gases in the atmosphere, which triggered processes (perhaps irreversible), such as depletion of ozone layer, global warming, etc. Therefore, the use of alternative energy sources becomes increasingly important for today's world. These sources, like the sun and the wind, are practically never consumed and they are called renewable energies. The electricity produced using the sun or the wind produces far fewer emissions, reduces chemical, thermal, radioactive pollution and is available virtually anywhere in the world. Renewable energies are also known as alternative or unconventional. The main types of alternative energy, which the author analyzes in this paper, are: solar energy, wind energy, hydro energy, wave energy, geothermal energy, renewable resources of forests and biomass.

Global emissions of carbon dioxide are increasing three times faster than the experts estimated and have a negative effect on the climate. The United Nations has warned since 2006 that following the acceleration of the global warming, the water supplies will decline, the glaciers will melt, and many

species will disappear. The increase of the greenhouse effect raises the overall temperature of the planet. Due to human activity, the concentration of greenhouse gas has increased since pre-industrial period (1750-1800). The concentration of carbon dioxide (CO₂) gas emissions with the highest share has increased in the last 50 years by 30 percent compared to the pre-industrial era. The combined consequences of the growth of all greenhouse gases (CO₂, methane, ozone) are equivalent to a growth of 50 percent over that period.

Compared to 1860, the average temperature of the earth's crust rose with nearly 1 degree Celsius. According to several sources and statistics, in recent years the average temperature of Earth has been recording increases between 2 and 3 degrees Celsius, despite the measures taken to reduce the amount of CO₂ released into the atmosphere due to highly polluting human activities. Reducing this development, however, is only possible through the significant reduction of emissions of greenhouse gases. CO₂ natural absorbents such as soil, the leaves of trees and oceans are not only able to retain slightly more than half of the amount of CO₂ produced by present human activity. To stabilize the concentration of CO₂ in the next few years, the CO₂ emissions must therefore be urgently reduced by 50 to 70 percent. It is impossible, however, to achieve this reduction quickly but the action must be done urgently because we are presented with a cumulative problem. Since the lifetime of carbon dioxide in the atmosphere is of the order of centuries, several generations are required to achieve stabilization of CO₂ concentrations to acceptable levels.

CO₂ is produced by burning all the fossil fuels: oil, gas and coal. The residues of CO₂ from the coal combustion are approximately two times higher than those caused by natural gas, and that correspondent to oil is somewhere between the two.

In the early 2000s, the distribution sector CO₂ emissions in the world were: electricity production - 39 percent; transportation - 23 percent; industry - 22 percent; housing - 10 percent; other fields - 4 percent and agriculture - 2 percent. This distribution is both very different from one country to another. For example, in France, where only a tenth of the electricity is produced from fossil fuels, the transport sector has the share of 40 percent of the CO₂ emitted into the atmosphere.

In 2000, the world energy consumption was of the order of 10 Gtep (1 tep corresponds to energy produced by burning one tone of oil). Fossil fuels are

around 8 Gtep. Many energy scenarios are developed each year by energy specialized bodies. These scenarios indicate a need for 15 to 25 Gtep for the year 2050. Such future scenarios are based on different parameters such as economic growth, population growth, and progressive access to electricity of 1.6 million people that still lack electricity, the growing needs of developing countries and the development of policies to protect the environment. Uncertainties about the evolution of these different parameters explain the important differences between existing scenarios. At the same time, it is reasonable to predict that by the middle of the century, the energy demand will double.

This creates an urgency of developing new technologies inevitably more expensive in the beginning. At the same consumption, it is estimated that current reserves and shale oil will be exhausted in the next 40 years; other expert opinions estimate the exhaustion of the reserves in a period between 20 and 80 years, depending on the consumption growth and the discovery of new reserves. At the same level of consumption, current reserves of natural gas are expected to be exhausted in the next 60 years, while the natural gas consumption increases every year. But if you replace oil and coal to natural gas to reduce greenhouse emissions, gas reserves will be consumed in about 17 years. Replacing nuclear energy with the one produced through natural gas by some countries can accelerate the consumption of resources. Coal is the fossil fuel with the most important reserves. It is estimated that this would be sufficient at the current rate of consumption for another 200 years.

The energy demand by 2050 is expected to be between 15 and 25 Gtep and will be achieved by the countries of the planet, for the most part. The residues of energy from fossil fuels will greatly increase, which will have dramatic consequences on the environment, ignoring the needs of future generations. For the average temperature not rise more than 1-3 degrees Celsius the total greenhouse gas emissions in the coming decades must represent more than one third of emissions caused today by burning natural gas resources, oil and coal. This would mean to prohibit the burning of two thirds of conventional and relatively inexpensive energy. It is no reasonable hope that, the fast draining of natural resources will reduce emissions of greenhouse gases. On the other hand, the relatively low price of conventional resources slows the development of new technologies inevitably more expensive, as long as these technologies do not reach mass production. Starting with 2020-2030, the

economic and political tensions could lead to diminishing exploitable fossil resources and concentration in politically unstable areas, which will harm the security of supplying the EU countries if they remain dependent on fossil fuels.

Conclusion

Through natural resources, according to Government Emergency Ordinance no. 195/2005, approved and amended by Law no. 265/2006, we understand all the natural elements of the environment that can be used in human activity, and those are: a) non-renewable resources (minerals and fossil fuels); b) renewable resources (water, air, soil, flora, fauna); c) inexhaustible resources (solar, wind, geothermal and wave energy). After the Environmental Protection Act in Romania, the last two categories of resources can be classified as renewable resources. Although the last category of resources is considered inexhaustible, we express the opinion that this approach was determined by the level of knowledge on which this classification was performed.

Current scientific knowledge allows us to consider solar, wind, geothermal and wave energy as renewable resources. The regeneration mechanism is quite complicated. Solar energy is produced by the most important star in our galaxy; the Sun. The thermal reaction produced in the Sun generates heat even now, the only energy that can be considered and inexhaustible.

At a global level, the use of alternative forms of energy has been acknowledged for centuries. In the last century, the use of energy by burning fossil fuels (oil, gas, coal) has had disastrous effects on the environment, much higher than any human activity in history, leading to the accumulation of greenhouse gases in the atmosphere, which triggered processes (may irreversible), such as depletion of ozone layer, global warming, etc.

Therefore, the use of alternative resources of energy becomes more and more important for today's world. These sources, such as the Sun or the wind, practically cannot be consumed, they renew and this is the reason why they are called renewable energies. The use of the renewable energies, according to the stage reached by current human civilization on Terra, produces less toxic emissions, reduces chemical, thermic, radioactive pollution, and those resources are available, theoretically, anywhere on the globe. The renewable energies are also known as alternative unconventional sources of energy. According to a different classification, the types of

alternative energy are: a) solar energy; b) wind energy; c) water energy, also known as hydro energy, that occurs when the water – in fall – produces mechanical work or wave energy, when the oceans' and seas' water moves under the influence of some forces; d) geo-thermal energy; e) bioenergy (that results from the use of biofuels or of animal waste).

The programme of using the renewable resources of energy meets the environment requirements undertaken through the Kyoto Protocol at the Frame Convention of the United Nations on climatic changes, adopted on December 11th, 1997 and approved by Romania through Law no. 3/2001, respectively by the European Union under the Document 2002/358/CE. At the beginning of the third millennium after Christ, a new era foreshadows in the energetic usage – mankind's passing to the use of renewable (regenerative) energies: solar energy, wind energy, tide energy, water's hydraulic energy, thermal waters energy, biomass.

The European Commission admits the need of promoting the Renewable Sources of Energy (RSE) as a priority measure, given the contribution of their exploitation to the protection of the environment and to the sustainable development. Promoting the electric energy from SREs is a priority, due to energetic security measures, to vary the sources, protect the environment and maintain the economic – social cohesion. The elevated use of SRE represents an important part of the Kyoto Protocol on climatic changes that was effective up until December 2012. In order to capitalize the energetic potential of the renewable resources it is mandatory to fulfill some specific objectives – analyzed in the hereby work – activities that should be performed throughout average and long duration, in accordance with the undertaken regulatory stipulations.

References

Bumbac, Cristina. 2004. *Energetic efficiency – main component of the actual energy policies in the context of limitations of the available primary resources*, research of the „Costin Murgescu” World Economy Institute.

Ciupagea, Constantin and Câmpeanu, Virginia (coord.). 2007. *Energy in the race competitiveness – global warming*, Bucharest, Expert Publishing House.

Dobrescu, Emilian M., Pociovălișteanu Diana Mihaela. 2012. *CERTIFICATES FOR THE EMISSION OF GREENHOUSE GASES*,

<http://www.caleaeuropeana.ro/certificatele-pentru-emisia-de-gaze-cu-efect-de-sera/>.

Dobrescu, Emilian M; Dobre, Edith Mihaela and Dumitru, Raluca Maria (coord.). 2013. *Renewable energies. Economic, social, ecologic efficiency*, 2nd edition – revised, Bucharest, Biltong Publishing House.

Papatulică, Mariana and collab. 2012. *Current situation and perspectives on the global market of energy*, „Costin Murgescu” World Economy Institute.

Lucian, Victor, E.. 2011. *Renewable energies and their conversion*, Matrixrom Publishing House, Bucharest.

* * *, *Logbook for the renewable energy: creating the background for a weight of 20% of the renewable energy within the energetic sector of the EU in 2020*, MEMO/07/13, Bruxelles, January 10th, 2007.