NEW INSTITUTIONAL TASKS TO EFFICIENT RESPONSE AGAINST THE ECOLOGICAL IMPACT OF CLIMATE CHANGE EFFECTS IN ROMANIA

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Climate change is a priority for the European Union. The strategies and plans developed into European Union aims to reduce the emissions of greenhouse gases, while encouraging other nations and regions to do the same. Meanwhile, the European Union develops strategies for adapting to climate changes, which can't be prevented. These strategies are certainly a significant cost but doing nothing will be more expensive on the long term.

Keywords: climate change, Kyoto Protocol, Cancun Agreement, innovative solutions.

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1. Introduction

Motto: „*Policymakers look to climate change science to answer two big questions: what could we do to prepare for the impacts of climate change and which steps might be taken to slow it?"*
Richard Alley, Ph. D. Pennsylvania State University
„Understanding and responding to climate change", 2008 edition

According to the Fourth Assessment Report of the Global Intergovernmental Panel on Climate Change (IPCC), established in 2007, the human activities (e.g. burning fossil fuels, changing land use, etc..) contribute significantly to increased emissions of greenhouse gases atmosphere (carbon dioxide, methane, nitrous oxide, hydro fluorocarbons, per fluorocarbons, sulfur hexafluoride), causing warming and climate change in its composition. In addition, investments in green technologies to help reduce emissions will also create jobs and stimulate, over time, the world economy.
Our understanding of climate and how it has varied over time is advancing rapidly as new data are acquired and new investigative instruments and methods are employed.

2. Background

The main conclusions of IPCC Report are as follows:

- 5 years warmest globally have been registered in the last two decades, the years 1998 and 2005 being the warmest;
- temperatures across Europe rose by almost 1° C more warming than the global rate of 0.74° C;
- concentration of greenhouse gases in the atmosphere now exceeds the values recorded in the last 650,000 years, and forecasts indicate an unprecedented growth;
- in 2100, global temperatures will rise by 1°C to 6.3 °C and ocean levels will rise by 19 to 58 cm;
- to increased frequency and intensity of extreme weather events (e.g. storms, tornadoes, hurricanes) changed rainfall patterns and regional climate (heat waves, droughts, floods), and trends indicate a gradual increase in the coming years;
- thickness loss of glaciers and the expansion of the Arctic (40% during the last 30 years) and possibility to their complete disappearance by 2100;
- withdrawal of glaciers in mountain areas (Alps, Himalayas, Andes) and the possibility of disappearance of over 70% of continental glaciers;
- mutations' development in biosystems: Early flowering plant species, extinction of some species of amphibians, etc.

The implemented strategies and plans by the European Union to prevent the worst effects of climate change and scientific evidence shows that have taken steps to limit global warming to no more than 2° C above pre-industrial temperature.

This is only 1.2 ° C above current levels. To stay within this ceiling, it stopped growing trend of global emissions of greenhouse gases before 2020, by at least halving emissions by the middle of this century and continuing with their subsequent suppression. European Union has followed the path through its strategy to fight climate change and the policies they implement or has already proposed the Member States and the European Parliament and the explores of the European Commission are also preparing options for future proposals.

Climate emission reduction initiatives include:

- continuous improvement of energy efficiency for a wide range of equipment and appliances;
- mandatory increasing use of renewable energy sources such as wind, hydro, solar, and biomass, and renewable transport fuels such as biofuels;
- supporting the development of carbon capture and storage (CCS) to store CO2 emitted by power plants and other large installations;
- launch of the European Climate Change Programme (ECCP) in 2000, which led to a wide range of new policies and measures, including emissions trading, the EU's key instrument for reducing greenhouse gas emissions efficiency costs in the industry;
- a developing a comprehensive EU adaptation strategy that strengthens Europe's resistance to climate change.

After some lengthy negotiations, European Union (EU) and the United Nations (UN) have signed an agreement on two major climate treaties: the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and the Kyoto Protocol in 1997.

The Kyoto Protocol requires that the EU countries which were at that time (called EU-15) to reduce their collective emissions in 2008-2012 to 8% below 1990 levels. Emissions Monitoring and projections show that EU-15 is on track to meet that goal. The Kyoto Protocol also provides for the use of three flexible mechanisms voluntary international cooperation: Joint Implementation (JI), Clean Development Mechanism (CDM) and International Emissions Trading (IET).

In 2007, EU leaders endorsed an integrated approach to climate policy and energy and have pledged to turn Europe into a highly energy efficient economy, reduced carbon emissions. They made a unilateral commitment that Europe could reduce emissions by at least 20% of 1990 levels by 2020. This commitment is implemented through a package of legislation binding on all States acceding. EU has offered also to increase the percentage of 30% reduction by 2020, provided that other big emitting countries in the developed world and developing nations to jointly engage with others in a future global climate agreement. This agreement should come into force in early 2013 when the Kyoto Protocol during the first commitment will be expired.

The Cancun Agreement - a substantive and balanced package of decisions - adopted at the end of the UN Climate Conference of Mexico (December 2010) represents an another important step towards building a comprehensive and legally binding to climate change for the next period after 2012.

Climate change in Romania, Global warming affects both physical systems and biological ones. Among the direct effects can be mentioned:

- global average temperature rise significant regional variations;
- ice caps and thus reducing the volume of ocean level rise;
- changing hydrological cycle;
- increasing arid areas;
- seasonal changes to the economic development;
- increased frequency and intensity of extreme weather events;
- biodiversity reduction, etc.

The climate change has affect all sectors of the Romanian economy, will lead to periods of vegetation change and move the dividing line between forests and grasslands. Extreme weather events (e.g. storms, floods, droughts) will occur more frequently, and the related risks and damages may become more significant. In Romania, the drought affected areas have already expanded in recent decades, the most exposed being in the south-east region of our country, almost the entire country being affected by prolonged drought.

Along with floods prolonged periods of drought leading to significant economic losses in agriculture transport, energy, water management, health and household activity.

In statistical term the indicators of compliance obligations assumed by Romania to the European bodies to which they belong or who entered.

The agriculture is the most vulnerable sector studies highlighting the following issues:

- if the wheat crop, an increased production of approximately 0.4 to 0.7 t / ha and increased vegetation season with 16 - 27 days;
- if irrigated maize crop, an increase of grain production between 1.4 to 5.6 t / ha, a decrease in vegetation season between 2-32 days, a decrease in vegetation period between 2 - 19%, values are estimated based on the model used;
- if irrigated maize crop, the results depend on models used and the sites chosen for sampling data conditions.

The studies show that about one third part of Romania (about 7 million hectares) and approximately 40% of the agricultural land are located into the areas under desertification risk and the 3 million ha of agricultural land was directly affected by desertification.

Only the famous area called "*Oltenia Sahara"* (a strip of 30 km wide of Danube-Craiova-Caracal area) is composed of about 100,000 ha.

A study elaborated by the Romanian National Institute of Meteorogy and Hydrology it was noted that during the two future decades following ten departments of Romania, the cereal production given that the effect of desertification will expand with 40% compared to the present on the regions of Banat, Oltenia, Muntenia, Dobrogea and southern Moldova as a result of warming of the planet.

Experts warn that the climate is not only the cause of this phenomenon. The destruction of forests, the curtains have a protective role in the phenomenon of desertification and Romania needs to invest heavily in preventive measures.

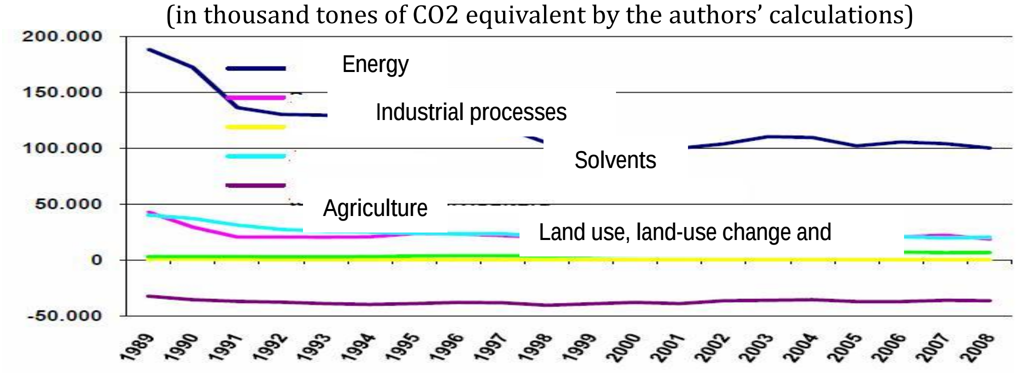
In Romania, 26.7% of the country area is covered with forests, which are distributed unevenly across the country (58.5% in the mountains, 27.3% and 6.7% in the hilly area in the plains). Forest area is 6,366,888 ha, of which 6,249,236 ha is occupied by forests and 117,652 ha is for forest culture, production and management. In areas of low forest and hilly forest productivity decreased considerably after 2040 due to rising temperatures and rainfall.

3. Problem Solution

Climate change effects on water management and human settlements provide hydrological consequences of increased atmospheric concentration of CO_2 significant. To modeling of the effects of this phenomenon was made with a special emphasis on the main river basins. The results show the probable effects of changes in precipitation and evapotranspiration. Maximum monthly flows move during spring - summer to late winter. It also found that in September the lowest leakage occurs at the situation so far, when, very often, minimum flow is recorded in the winter season.

Industrial, commercial, residential and infrastructure (including energy and water supply chain, transport and waste disposal) are vulnerable to climate change by different ways (graph. 1).

Graphic 1.Emission trends of greenhouse gases by activity branch of Romania
(in thousand tones of CO_2 equivalent by the authors' calculations)



These sectors are directly affected by the changes in temperature and rainfall regime or indirectly through the general impact on the environment, natural resources and agricultural production.

The sectors most vulnerable to climate change effects as construction, transport, oil and gas exploitation, tourism and industries are located on the coastal areas. Other potentially affected sectors are food industry, wood processing, textile industry, biomass production and renewable energy branch.

3.1. Innovative solutions proposed by Romania against climate change effects

By ratifying the United Nations Framework Convention on Climate Change (UNFCCC), Romania has committed to achieving its objective: "stabilization of greenhouse gases in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system, level to be achieved in a timeframe sufficient to allow ecosystems to adapt naturally to climate change, so that food production is not threatened, and economic development to take place in a sustainable manner. Since 2002, Romania sent annually to UNFCCC Secretariat, the national inventory of emissions of greenhouse gases.

According to the assumed international obligations, the Romanian latest national inventory was made in 2010 year and it includes the estimates of emissions of greenhouse gases between 1989-2008 years. Total emissions of greenhouse gases (excluding the contribution of land use sector, land use change and forestry) decreased by 46.89% in 2008 compared to 1989 emission levels. By the National Allocation Plan (NAP), the Romanian Government established the number of allowances allocated in 2007 and also 2008 up to 2012 year for the installations of the follows sectors: energy, petroleum refining, production and processing of ferrous metals, cement, lime, glass, ceramics, pulp and paper.

Kyoto Protocol was ratified by Romania by the Law no. 3/2001, assuming the commitments our country stronger than stabilize emissions of greenhouse gases, namely the establishment of measures, targets and clear periods to reduce the greenhouse gases emissions.

Thus:

- the commitment to reduce emissions of greenhouse gases for the period 2008 - 2012 is 8% from the year 1989, to harmonize with EU measures, reducing emissions of greenhouse gases with the same percentage;
- the decisions have been made in implementing the European Commission of 26 October 2007 by which it decided to lower the ceiling of allowances by 10.8% in 2007 and 20.7% for the period 2008-2012.

Since 2007 year when Romania joint to EU, our country implemented some specific actions aimed to:

- improve the national system for estimating emissions of greenhouse gas inventory and national;
- implementation scheme of emissions trading of greenhouse gas emissions and to develop the National Allocation Plan;
- functioning national registry;
- development of a Guidelines on adaptation to climate change;
- continue participation in flexible mechanisms under the Kyoto Protocol;
- provide a public awareness/adaptation to climate change effects.

By setting up a national system for estimating anthropogenic emissions of greenhouse gases from sources and removals by sequestration of carbon dioxide (SNEEGHG) were set tasks and ways of cooperation between institutions involved in this process, the necessary data to build reports, the procedural steps for the estimation of anthropogenic emissions of greenhouse gases, reporting, processing, archiving and storage of data contained in the National Inventory of Greenhouse Gas Emissions Greenhouse (INEGES).

The SNEEGHG purpose administered by the National Agency for Environmental Protection is to ensure transparency, consistency, comparability, completeness and accuracy and compliance of INEGES and to compliance the obligations assumed by Romania undertaken by Kyoto Protocol ratifying or required by the Community legislation in force on estimation of anthropogenic emissions of greenhouse gases from sources and removals by carbon dioxide sequestration.

Romania has been involved into investment projects called "Joint Implementation", collaborating with various states in order to achieve technology transfer, increase energy efficiency targets and where investments are made to improve environmental quality, they also having important social impact. In Romania, Directive 2003/87/EC on establishing a scheme for trading emissions of greenhouse gases has been implemented since 2007 (the EU accession date). This is a tool designed to assist Member States to promote the reduction of emissions of greenhouse gases in an economically efficient for the fulfillment of commitments under the Kyoto Protocol. The operation scheme is based on limiting - trading emission allowances in greenhouse gas emissions allocated to operators who have facilities in which the activities covered by the Directive, to the extent that they comply with the limits on CO2 established by the National Allocation Plan (NAP).

4. Conclusions

Kyoto Protocol regarding the total emissions of greenhouse gases (without absorbing forests) provides to decrease by 44.42% in 2008 compared with 1989. Based on these observations, there is such a good chance for Romania to compliance its obligations to reduce emissions of greenhouse gases in the first commitment period (2008 – 2012) without additional measures to reduce emissions.

Because, some energy of intensive industrial branch reduced their activities and has resulted a greenhouse gases reducing emissions. The emissions began to grow until 1996 by the revitalization of the Romanian economy. After commissioning of the first reactor of Cernavoda Nuclear Power (1996) and after the necessary structural reforms at the national level, the emissions began to drop again until 1999 and, after 1999 the economic development reflects the increasing trend during 1999-2008 years (see graph.1).

The sectors for which we estimated levels of emissions / removals by sequestration of greenhouse gases are: *energy, industrial processes, solvents and other products use, agriculture, land use, land-use change and forestry (LULUCF abbreviated by) sector waste*. The energy sector is the most important sector in terms of emissions of greenhouse gases and it is responsible for 68% of total greenhouse gases emissions of nationwide during the 2008. Emissions from this sector decreased by 44% over the level recorded in 1989 (base year).

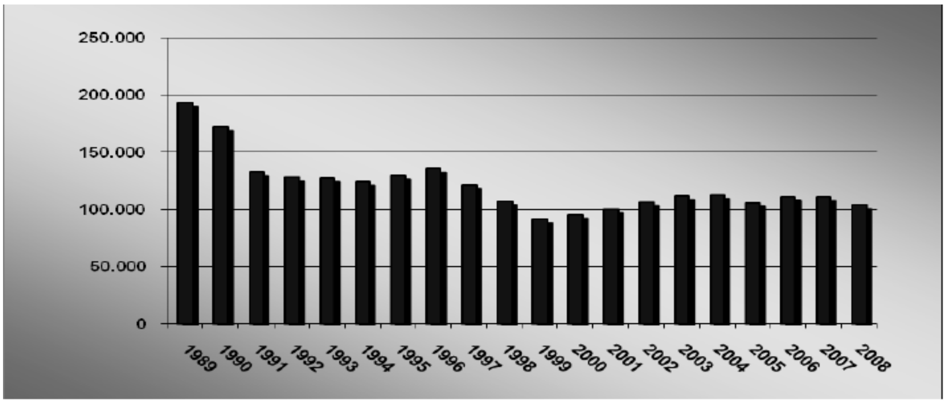
Industrial Processes sector contributes by 13% of total emissions of greenhouse gases. In this sector registered a significant decrease in the amount of emissions of greenhouse gases in 2008, compared with the year (down by 53% compared to 1989) by the reason of the decline or cessation of certain industrial branch activities.

The agriculture sector also recorded a decrease in emissions of greenhouse gases. In 2008 this level shows a decrease by 50% compared to year basis. In 2008, 14% of emissions of greenhouse gases come from this sector. Emissions of the waste sector have increased in the period 1989 - 2008 by 20%, and the contribution of this sector to total emissions of greenhouse gases at the national level is by 5% for 2008 (see graph.1).

Energy sector is the most important sector in which emissions of greenhouse gases, responsible for 68.63% of total emissions of greenhouse gases generated nationally in 2008. Emissions from this sector decreased by 46, 85% from the level recorded in the year 1989 (graph. 1)

The nitrous oxide (NO) emissions resulted mainly from the agriculture sector - agricultural soils and industrial processes sector- the chemical industry branch. The decline of these activities is reflected by the NO emission levels evolution as see in graph. 2.

Graphic 2.The nitrous oxide emissions level (kt CO2 equivalent without LULUCFC)



Trading Scheme emissions of greenhouse gases (EUETS), regulated by Directive 2003/87/EC was implemented in Romania, starting 01.01.2007 when it maded the accession to the EU regulatory framework (GD. 780/2006, MO. 1897/2007, MO. 1474/2007, MO. 85/2007, MO. 296/2008, GD no. 60/2008) being completed and improved with a series of normative acts developed during 2008.

The scheme is a tool designed to assist EU Member States to promote reducing emissions of greenhouse gases in an economically efficient. Its operation is based on emission allowance trading greenhouse gas allocated to operators who have facilities in which the activities covered by the decision of the Romanian Government no. 780/2006, to the extent that they respect the limits for emissions of CO2 allocated by the National Allocation Plan.

A emissions of greenhouse gases Certificate is the title of an installation that gives the right to emit one tone CO2 equivalent in a defined period, valid for the purpose of fulfilling by Romanian Government Decision no. 780/2006 and transferable as provided by legislative act.

By this decision has been approved the National Allocation Plan and the Romanian Government established the number of allowances in greenhouse gas emissions, allocated during the period 2008-2012 years, for the installations where activities in the sectors: energy, petroleum refining, production and ferrous metals processing, cement, lime, glass, ceramics, pulp and paper.

To support new installations - between "green field" commissioned in 2008, to achieve compliance under the scheme, the legislative framework for implementing the EU ETS was filled with methodology for allocating emission allowances of greenhouse gas reserve facilities - new entrants in the period 2008 - 2012 (NER). According H.G. no. 60/2008, the number of allowances available in reserve for plants - new entrants, is 21,731,869 (accounting for 6% of the national ceiling), with the additional possibility only if the final closing of the facilities included in the NAP allocations their being transferred later in the NER. The number of allowances allocated to the reserve for new installations - have entered (approved by the European Commission) and the allocation methodology are shown website of the National Environmental Protection Agency.

Also, after connecting with international transactions Registry administered by the UNFCCC Secretariat (ITL) respectively of the Community of Independent Transactions Registry (CITL), administered by the European Commission and after going through tests with these organisms, the Romanian National Register became operational on October 16, 2008 .

For 2009 year the operators have shown that environmental authorities have complied with the obligations they have returned as a result of participation in the EUETS by monitoring, reporting and verifying emissions from facilities and enrollment in the National Register of emissions greenhouse gas emissions. In 2009, the total emissions of greenhouse gas emissions from EUETS installations 48,993,089 t CO2 is compared to the amount originally allocated 73,704,133.

As an obligation arising from Directive 2003/87/EC (Article 21), Romania has sent the European Commission Report on the implementation of the trading scheme in 2007, which contains information about: the procedures for allocating allowances in greenhouse gas emissions greenhouse, application monitoring and reporting guidelines for emissions, that permitting the installation, operation of the National Register, operators compliance issues, business verification, use within the scheme of emission reduction units (ERU) and certifie the emission reductions (CER) from project activities stipulated by the Kyoto Protocol.

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