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Research Report

The impact of the implementation of the energy-climate change package on the Romanian economy

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The impact of the implementation of the Energy-Climate change package on the Romanian economy



EUROPEAN INSTITUTE OF ROMANIA
SPOS Project 2009 – Strategy and Policy Studies

Study no. 5

**THE IMPACT OF THE IMPLEMENTATION
OF THE ENERGY-CLIMATE CHANGE PACKAGE ON
THE ROMANIAN ECONOMY**

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Bucharest
December 2009

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FOREWORD

The research- development program destined for the Strategy and Policy Studies – SPOS, launched by the European Institute of Romania in 2006 in order to support Romania in exerting its attributions as EU member state, has continued in 2009 through a new series of studies.

The topics approached have answered different requirements, of great interest from the perspective of the evolution of the Romanian economy and society, representing the result of both a consultation process as well as of national and European programmatic documents, and institutional requests, as they are perceived by representatives of the central administration present at the European affairs coordination meetings.

The studies provide founding elements for the main directions of action in order to bring to fulfillment some measures adopted at the European level (*Public finances: Introduction of a medium-term budgetary framework; The Future of the European Community's Resources and the Implications for Romania's Contribution to the EU Budget and The Impact of the Implementation of the Energy-climate Change Package on the Romanian Economy*), as well as perspectives of Romanian policies aiming to promote national reform measures in a European context (*Flexicurity and social dialogue in Romania– Perspectives on the implementation of flexicurity principles in Romanian undertakings and Improving vocational competencies among graduates and youths: A chance for the future*).

The current series of studies has benefited from contributions of a research team made up of:

Aureliu Leca, Doctor of Engineering, Head of UNESCO Chair, Energy-Environment, University Politehnica of Bucharest, author and co-author of 32 books and textbooks in the field of energy. President- Director General of the Electric Utility - RENEL (1990-1998) and member of The Romanian Academy of Technical Sciences (from 1997), awarded the “Order of the Star of Romania”, in Knight rank, by the President of Romania (2000).

Virgil Muşatescu, Doctor of Engineering, UNESCO Chair, Energy-Environment, University Politehnica of Bucharest, Project Officer in several projects in the field of energy developed by EBRD. Senior Expert in the regional programme for promoting the renewable energy resources financed by USAID and Hellenic Aid and President of The Romanian Energy Policy

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Ana Maria Marinoiu, Lecturer, Ph.D. candidate in Economics, The Bucharest Academy of Economic Studies, Councillor in the Program Evaluation and Analysis Department, Government of Romania, Prime Minister's Chancellery, author of various pieces of specialised literature.

Throughout the elaboration of the mentioned study, the research team has enjoyed the active support of Mrs Iulia Serafimescu as Project coordinator on behalf of the European Institute of Romania, as well as the support of a working group, consisting in representatives of the main central administration institutions with attributions in the field.

Gabriela Drăgan,
Director General of the European Institute of Romania

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EXECUTIVE SUMMARY

This study makes a somber and honest analysis of the impact of the of EU energy-climate change legislative package on the Romanian economy and society, presenting below the findings and a number of proposals for action. In the first part of the study there are presented general considerations on the energy-climate change package and their necessity. The second part focuses on presenting the impact of the implementation of the package, focusing on the benefits and risks of such action, on a legislation, institutional and social basis. The impact on the national budget, the economic costs, the externalities generated by an action of this scale are considered in light of the three levels of the package: the emissions of greenhouse gases, the renewable energy and the energy efficiency. In the case of the first level (GHG) there is a detailed presentation of the effects in ach affected industry, whether it is incorporated or not in the European trading scheme for emission allowances. The study concludes with a synthesis of a series of proposals, detailed in the chapters designed to facilitate the implementation of the energy-climate change package, but also to reduce its negative effects. These measures are:

1. It is proposes the establishing of a “**National Institute of Strategic Planning**”.

2. It is proposes the establishing of a “**Ministry of Energy and Resources**”.

3. The Energy Strategy of Romania on a medium and long term will have to respond with practical solutions for all the pledges made in as a Member State. Furthermore, **the Government will have to join the energy strategy with the environmental one in a joint document, consistently toured on the requirements of the package.**

4. Romania is now in a position to have to take a number of major decisions and implement a series of measures that, in their absence, may lead to massive relocations of production, the transformation of the national market into a purely consumer market, with devastating social effects. To limit these potential dramatic effects, **a series of measures are recommended**, contained in a clear national strategy, supported by a regional and local cooperation, such as:

- The retechnologization of industries, with emphasis on using the best available technology and on the increase in productive efficiency, not only on methods of reducing carbon emissions.

- Creating a system of analysis, research and dissemination with the relevant expertise in the area (a national research network, connected internationally) to provide: a) analysis and studies on the current situation, the real situation of the national economy in terms of carbon emissions, b) analysis and studies to objectively identify the externalities arising from the implementation of the package, on each sector and activity in part c) the appropriate technological solutions to solve the problems of carbon emissions, d) the dissemination of information by economic agents, authorities and individuals in an appropriate time to facilitate the decision making in an uncertain environment.

Creating a system of financing for the activities necessary to implement the energy-climate change package: a) National funding lines or access to European and international funding lines for activities and equipment related to the carbon emissions b) National funding lines or access to European and international funding lines for activities and equipment related to the new technologies to increase the production efficiency, c) National funding lines or access to European and international funding lines for activities of research and innovation in the field, d) Creating an energy grant, to allow local access to risk reduction measures; e) Funding mechanisms for the support of strategic producers (such as suppliers of heat for homes), f) Protective measures designed to support on a short term basis the local producers covered by the EU ETS scheme, until the retechnologizations, against their removal from the market by international manufacturers, which are not covered by this scheme.

- Introducing measures on taxation and the financial aspects of the energy-climate change package: a) Establishing a tax system of emission allowances and related transactions; b) Determining the accounting system of costs from the implementation scheme for producers of heat and electricity through cogeneration.

5. In terms of ambitious targets and major financial restrictions there should be promoted the no cost measures, namely, an institutional framework and an adequate legislation for the passing period, a performance management and qualified personnel.

6. Establishing a neutral, non-political body, for the surveillance of the energy market with responsibilities that are being established, to replace the NAER. As an alternative to the earlier proposal, to ensure the autonomy and independence, **NAER can be placed under the jurisdiction of the Romanian Parliament**, with all that follows from this (the appointment of management, control, etc.)

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7. Promoting the use of renewable sources of energy through: Rethinking the country's entire energy strategy in the period 2010-2020; establishing an entity, desirable under the Regulatory Agency (the current NAER) that will monitor the achievement of the intermediate and final targets based on the monitoring the origin certificates conducted by clear procedures; further urgent improvement to the current law 220/2008 on supporting and promoting the use of renewable resources; rethinking the support schemes of some sections of the population, and well as the obligation to yearly allocate an appropriate budget to cover this additional necessary, the future master-plans of the development of settlements that should necessarily contain the chapters for the implementation of Directive 2009/28/EC, There are necessary measures, including investment, to strengthen the transport and distribution networks.

8. Following the analysis of the economic impact of the Directive regarding the use of renewable energy sources there have been identified the following social, institutional, legal, psychological and economic barriers in the use of RES: Legal and financial barriers, Lack of information, Difficult access to new equipment and technologies, Educational barriers, Barriers that appeared due to the environmental protection;

9. Given the public system in Romania, as well as the lack of information and decision centralization, it is proposed the creation a national body to manage the energy-climate change package.

• 10. With regard to ensuring the correct implementation of the new legislative package there can be also considered the following recommendations: To achieve the new objectives assumed by Romania for the period 2013-2020 it is necessary the elaboration of **a coherent national strategy on green energy**, that would include data on the bodies responsible for implementing these directives, the reporting of the results and their evaluation; To ensure the optimal achievement of the goals proposed through the new energy-climate change package, state institutions must be prepared to **promote, support, implement and monitor some energy programs**; It is recommended to have regular monitoring (annually) of the progress of our country in achieving the proposed goals in order to be able to intervene quickly in case of unforeseen events. The corrections may include measures of legislative nature; It is required to have **psychological preparation for the entities affected by the provisions of the new legislative package** (state institutions, public and private economic

operators, population, etc.) regarding the potential effects and ways to neutralize them through the production of campaigns with an advisory and informational role; Given that **the implementation of investment projects in the energy field is achieved in the medium and long term**, with significant mobilization of capital and that the time taken to achieve the assumed objectives at the EU level are quite close, **it is recommended the swift implementation of this package. The legal framework in Romania necessary to ensure the investment of the funds received from the valuing of the carbon dioxide allowances** on the European market in other environmental projects must be created. Ensuring at a national level of the implementation of **programs for skilled labor**, destined for the design, the implementation and operation of new technologies for environmental protection; The ensuring of the simple and effective legal framework to implement on the Romanian market the new technologies to reduce environmental pollution.

11. Increasing the energy efficiency and reducing the final energy consumption is certainly a priority objective, which fully meets all the requirements of the energy-climate change package. Therefore, we believe that special attention should be paid to **the following measures:**

- In order to achieve the foreseen savings, the most important step is **to improve the legislative and regulatory framework**
- **Strengthening the role of the Romanian Agency for Energy Conservation (RAEC)** to promote national programs and governmental projects of energy efficiency, as well as the continuing of the program of making the public buildings more efficient.
- **The recapitalization** of the Romanian Fund for Energy Efficiency (RFEE), fund established by an agreement between the World Bank and the Romanian Government and the **extending of its action field by adding projects of renewable sources.**

12. The decrease in emissions of carbon dioxide and other greenhouse gases is the main objective of the energy-climate change package. In this regard, it is considered for our country to **adopt the following measures:**

- A strategic element that could affect the security of energy supply in the country is considered to be the inevitable decline of the local share of power stations using local coal, fuel with high intensity of CO₂ emissions. When replacing a part of these with natural gas, inevitably brought from outside the country in the context of the continuous decrease of the national reserves, it is foreseen the increase of Romania's import dependence. It also

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can be seen from this the importance that the alternative routes can have, such as that of the NABUCCO project, so the proposal that we should be doing is **to focus actions both domestic and especially foreign, of the state to diversify gas supply sources**, but that should not be wasted but they should be used only in very suitable schemes in mixed cycles of steam-gas, possibly with high efficiency cogeneration. In addition, **mature thinking is required for the rehabilitation program of thermoelectric plants using lignite, in conjunction with programs to achieve the desulphurization installations**. There is danger of desulphurization in the old groups, not modernized or the ones that become unprofitable in the situation of buying emission permits (which can almost double the price of electricity from these plants).

- While the general elements and the approach principles are generally established, the situation of the two fields related to the emissions of ETS and non ETS greenhouse gases is still in the process of clarification. Moreover, our country is given the chance of a 19% increase in emissions in the non-ETS area; therefore, the way in which the two areas are defined is crucial. Therefore it is proposed that the representatives of Romania to seize any opportunity **to extend through negotiations the non-ETS area (from the 10 000 t CO₂/year proposed limit to 25 000 t CO₂/year, which would be more convenient for our country) and thus allow more plants to use this rate**. However, monitoring during the 2009-2020 period of the emissions in the two categories of sectors is essential to justify the way in which Romania is achieving the requirements of the legislative package. Moreover, until now, there are no clear rules and procedures through which the state companies can trade certificates, while private companies have them individually. It is therefore **urgently necessary to establish rules of implementing the legislative framework that describes the means of valuing the emission allowances**. This involves reducing the negotiations time between the Ministry of Economy and the Environment Ministry that still have different opinions and proposals.

- **Large investments required for the whole package cannot be covered by the state; therefore, they are likely to be covered by the private sector or through a public-private partnership**. This is required, under new conditions, a reassessment of the opportunity of **continuing the privatization in the energy system**

- **The accomplishment of an evaluation study of our country's potential regarding the capture and storage of the CO₂ and the establishment of methods of use for this potential.**

13. The thermal rehabilitation of buildings.

14. The consideration of cogeneration through the adopting of special measures on this field, among which: The main factor able to accelerate the development of this subsector is the **firm and permanent political will** that will ensure the functioning and progress in the area of influence of each factor described above; It is proposed the appointment of a member of the Government that will ensure the coordination of activities specific to this energy subsector; The precarious situation in the financial and technical terms of the operators (suppliers of heat) must be subject to a **Government analysis** as required by art. 11, par. 2, of Law 51/2006; Urgently developing a survey on the state of the centralized heating systems and **the development of a national strategy in the residential heating field**, of the energy efficiency and the use of renewable energies, with measures, deadlines and responsibilities based on local strategies; Creating a stable and predictable environment in terms of the legislative and regulatory framework; **Gas price differentiation** between the large and small consumers according to the EU models to promote central heating and eliminate cross subsidies; **Introduction the binomial tariff** for gas and heat supply, as a guarantee of recovery of the investments and the operation on the summer time of the heat operators.

15. In the skills they have, NAER must regulate the introduction of the binomial tariff for heat and gas, so as to reflect the economic reality for these two energy carriers

16. Insuring a degree of supportability of the energy bills for the consumers through:

a) **The termination of all subsidies** for the energy sector in accordance with the requirements of the European Union Treaty.

a) **The elimination of seasonal aid payments for heat** in a fixed amount and the introduction of a **permanent system for energy assistance** for low income families in order for them to fight poverty and social exclusion.

b) Diverting the saved state funds by **a system of assistance for energy fully targeted to all low-income families, regardless of the energy use.**

c) Establishing **a social fund for household consumers** faced with price increases, financed by voluntary contributions from energy suppliers, which will provide partial compensations to consumers for the impending price increases to heat and gas.

d) The Ministry of Labor and Social Protection shall establish **the annual social analysis in the energy field.**

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e) The development of a new framework law for energy with a clearly definition of **the general interest service (GIS)** for the energy sector, with particular reference to the financing of the access to energy for vulnerable groups.

17. Given Romania's obligations under the energy-climate change package, the developing of the **nuclear program** is justified by reducing the country's dependence on foreign sources of primary energy (especially natural gas imports), through the absence of carbon dioxide emissions, and by replacing old and inefficient energy capacities with fossil fuels.

18. The waiving of the new structure proposed for the energy system.

19. The increase in absorption of structural funds designed to improve environmental factors.

20. In view of the above we believe that it is imperative to achieve a uniform national strategy in our country regarding the increase of the labor employment in the energy field and in other sectors that are to be affected following the implementation of the measures on the field of climate change. The strategy must be based on policies in line with the Lisbon strategy and include actions regarding: the providing of redeployment of people made redundant within the same sector, providing guidelines for the organization and implementation of retraining courses, etc.

PART I.

GENERAL CONSIDERATIONS ON THE CURRENT SITUATION

Chapter 1. INTRODUCTION

It is already certain that the **21st century shall be influenced by the interlinked climate change and fundamental alterations in the energy area.** Although the concept of global warming was initially used to describe the increase in temperature at the surface of the Earth, it could not encompass all the consequences of this “warming”, such as storms, floods, droughts and heat waves.

Thus, the concept of **climate change** is now used to describe both heating as well as all the consequences of this warming. There is an **uneven distribution of the primary energy resources in the geographical areas of the globe** and an obvious disparity between areas with significant reserves of resources and highly industrialized areas of resource consumption. Technologies that currently use primary energy sources have a different and complex effect on the environment (production of carbon dioxide and other noxious and waste). The most frequently used fuels, by far, are now oil (on which the transport sector depends upon) and natural gas. **The known global reserves of fossil fuels and uranium are limited.** At present consumption levels, the oil reserves may run out in about 45 years, the natural gas in about 65 years, and the uranium in about 88 years, coal reserves are more significant, amounting to about 257 years, but for reasons of environmental impact coal is a marginal alternative¹. In the European Union, the energy issue is managed at a Member State level, without a common policy. Therefore, the analysis of the impact and implications of the European-wide package is made from a national point of view.

¹ IIASA/WEC, *Global energy perspectives*. WEC, London, 1998.
The National Energy Observer, *Energy Resources*, ICEMENERG, Bucharest, 2005.

In the particular case of Romania the situation of the primary energy resources is concerning. A reliable analysis of the critical infrastructures in Romania, as well as of the effects on them of the accession to the European Union and NATO, has been made by the coordinator of this research team in SPOS 2008 – Directions of the Energy Security in Romania². The known oil reserves may run out in less than 20 years, the natural gas in about 15 years, coal reserves in about 40-50 years, and the uranium reserves can ensure the operation of two groups from the nuclear power plant from Cernavodă by the year 2017. Romania has put into service about 58% of the hydraulic economic potential that can be set up, namely the most efficient projects. According to the KPMG report³, Romania currently has a high proportion of water resource usage (40% hydro, 37% solid fuel, 14% nuclear, 8% natural gas, 1% fuel oil) in the supply of electricity, dependent on the volume of water remaining in the major accumulation lakes.

Under the new RES Directive and data available at present, Romania will have to change its policy of energy mix and to increase the share of renewable sources other than water, especially wind power. According to the data supplied by the National Institute of Statistics, for Romania the main resources of primary energy in the first half of the year 2009 totaled 16.5 million toe (tons oil equivalent), down with 4.1 million toe, in the same period of the year 2008.

The decrease of the volume of resources of primary energy was due to a fall in imports, which represents almost 80% of the resource reduction. Domestic production totaled 11.5 million toe, down with 6.8% compared to the year 2008, and imports totaled 5 million toe, decreasing by 39.4%.

The latest report (the fourth) prepared by the **Intergovernmental Panel on Climate Change (IPCC)** and published on February 2, 2007, is the most relevant and recent document regarding climate change. It shows the fact that global warming is undeniable and increasingly faster. Global average temperature rose by 0.76° C in the last 100 years, in Europe the warming being larger than the average, about 1° C. The second half of the 20th century was the warmest period in the last 1300 years in the Northern hemisphere. The growth rate of sea level, due to melting glaciers, almost doubled: from 18 cm per century between 1961 and 2003, to 31 cm per century in the period 1993-2003. The IPCC report projected that

² SPOS 2008 – “Directions regarding Romania’s energy security”, Authors: Neagu S., Leca A., Papatulică M., Vlad L.B., Neacșu M. C., European Institute of Romania, 2008.

³ ***, *Climate Changes your Business. KPMG review of the business risk and economics at sector level*, KPMG International, 2008.

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temperatures and sea levels will increase further in this century. The global average temperature is presumed to grow between 1.1 and 6.4° C. The best estimates, assuming that no action will be taken to reduce emissions, indicate however, a temperature rise between 1.8 and 4.0° C and sea levels between 18 and 59 cm (it is considered, however, that forecasts regarding the rise in sea levels are underestimated, because they do not include the effects of melting glaciers from the glacial regions).

The economic costs of climate change and the economic benefits of the activities undertaken in due time to control these changes have been analyzed in **the report of the well-known English economist Lord Nicholas Stern**, published in October 2006⁴. The economic losses resulting from climate disasters have doubled in the last 20 years, accounting for around 8.5 billion Euros annually. Climate change is a reality, and the general conclusion is that global warming is caused, mainly, by **the increase in concentrations of greenhouse gases (GHG) at the Earth's surface**, gases resulting from human activity, mainly, burning fossil fuels and deforestation.

These gases remain in the atmosphere for decades, capturing the heat from the sun, in the same way as greenhouse windows. According to the EU ETS and the National Register of emissions of greenhouse gases⁵, *direct* greenhouse gas emissions are: carbon dioxide CO₂, methane CH₄, N₂O nitrous oxide, hydro fluorocarbons HFCs, per fluorocarbons PFCs and sulfur hexafluoride SF₆. It also includes *indirect* greenhouse gases, namely NO_x, NMVOC, CO and SO₂. Problems related to greenhouse gases will be discussed extensively in the context of their impact on the economic activity in the following chapters of the present study.

The Stern report estimates that **without future action to limit the GHG emissions, the damage caused by climate change could lead to a reduction in the GDP worldwide, from 5 to 20% per year**. If action is taken now in order to stabilize the GHG concentrations at a level that will not lead to dangerous consequences, the cost of these actions would reach about 1% of GDP per year.

The challenge is considerable. If current emission trends continue, the GHG emissions will double by 2050. But if we are to limit global warming to a relatively safe level of about 2° C above pre-industrial temperatures, the world must reduce to less than half the emissions of GHG

⁴ Stern, N. *The economics of climate change*. Cambridge University Press, October, 2006.

⁵ ***, *Romania's Greenhouse Gas Inventory 1989-2007*, National Inventory Report, Ministry of the Environment, National Environmental Protection Agency, March 2009.

by 2050. The conclusion is clear: the international community must act quickly. The next decade will decide whether the actions for keeping the situation under control are a success or if it will allow the climate change to reach dangerous levels that will affect the prosperity and stability of our society.

Globally, the UN has taken the first international measure relating to climate change by adopting in 1992 and enforcing in 1994 the **United Nations Framework Convention on Climate Change** (UNFCCC-United Nations Framework Convention on Climate Change), ratified by 189 governments. UNFCCC is founded on the **principle of shared, but differentiated, responsibilities and capabilities**; it is recognized that, while all countries aim at controlling climate change, developed countries are responsible for most of the GHG in the atmosphere; therefore, these countries must be first in reducing emissions. **The objective of the Convention** is to stabilize the GHG concentrations in the atmosphere at a level that would limit the dangerous human interference with the climate system. It requires that the governments establish **national programs to reduce GHG emissions**, with regular reporting. It also recommended that industrialized countries should stabilize the GHG emissions to the levels of the year 1990.

A second global measure has been to adopt, in December 1997, in the Japanese city of Kyoto, an UNFCCC Protocol, **the Kyoto Protocol**. The Protocol establishes legal limits for the GHG emissions from 38 industrialized countries and the European Community (EU-15). It also introduces innovative implementation mechanisms, market-based (so-called **Kyoto flexible mechanisms**), which aim to limit the costs of reducing emissions. The reduction required is based on the decrease of emissions by about 5% below the chosen reference year (usually 1990), this will be achieved in **the first commitment period of the Protocol**, i.e. 2008-2012. **EU-15** (which ratified the Protocol in 2002) committed to reducing the combined emissions of GHG by **8%** below base year (1990 in most cases). Romania has ratified the Protocol in 1997, being among the first countries undertaking this action.

Another measure taken by the EC in the area of climate change includes a legal framework for **Carbon Capture and Storage (CCS)**. This technology is urgently needed because coal and gas shall continue to be the main fossil fuel used in the future in energy production and carbon capitation offers a possibility to substantially reduce the emissions. The EC proposal mainly refers to maintaining the environmental safety of the technology, respectively, that the CCS brings real benefits to the

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environment. EU's top priority remains to reach a broad and ambitious international climate agreement in the period after 2012, in this respect it is hoped to achieve this at the **Conference regarding climate change in Copenhagen in December 2009**. **The coming decades shall be dominated by the challenges of developing an effective energy economy, with reduced carbon, competitive, with a secure supply**⁶.

1.1. The Kyoto Protocol

The Kyoto Protocol established three market-based mechanisms, known as **the Kyoto flexible mechanisms**: 1) trading emissions between governments, respecting the Kyoto targets, 2) Clean Development Mechanism (CDM) and 3) Joint Implementation (JI). **Emissions trading** can take place between countries with Kyoto targets, namely the industrial countries; each country has been attributed a maximum rate of emissions that can be issued during the Agreement (2008-2012). Countries that emit less can sell the unused quota to other countries emitting more than the set target.

To meet the desiderates of the Kyoto Protocol, the EU introduced the European Scheme of Emissions Trading for greenhouse gas (hereinafter "**EU ETS**"), a Community scheme defined by Directive 2003/87/EC, establishing the trading scheme of the rate of GHG emissions allocated in the Community, as amended by Directive 2004/101/EC ("Linking Directive"), that ties the previous referred scheme to other emissions trading schemes and projects to reduce CO₂ (JI and CDM). There is also in force the 2004/280/CE Decision regarding a monitoring mechanism of the GHG emissions in the Community and the application of the Kyoto Protocol as well as the **Decision of the Commission 2007/589/CE** regarding the establishment of guidelines for monitoring and reporting of GHG emissions in accordance with Directive 2003/87/EC of the European Parliament and Council. EU ETS is the EU's main instrument used to fulfill the commitment of the Kyoto Protocol, not being an indication of the Protocol, but an effect of it.

This system of **cap and trade**, launched on January 1, 2005, now covers all the 27 EU Member States and is the first and biggest international emissions trading scheme worldwide. This scheme has grown rapidly and is now the engine for **the carbon market**, expanded globally.

The scheme takes place during three implementing periods: first

⁶ International Energy Agency, *World energy outlook – 2006*. OECD/IEA, Paris, 2006.

period (*Phase I*) took place between January 1, 2005 and December 31, 2007, the second period (*Phase II*) of the scheme is from 2008 to 2012, during which the EU must reduce the GHG emissions by 8% compared to level of the year 1990. Since 2007, the commitment is to reduce with at least 20% the GHG emissions by 2020. The third period (*Phase III*) is associated with the interval 2013-2020.

ETS has as primary objective the effective, from a technical and economic point of view, reduction of the GHG emissions, operating through the allocation and trading of GHG emissions certificates in the EU. A certificate represents the right to emit one ton of CO₂ equivalent. Each Member State has allocated a total number of GHG emissions certificates, the certificates are then allocated to individual sectors and then to each installation covered by the above-mentioned Directive. The distribution by sectors is based on the weight of that sector's emissions in the total emissions generated by ETS activities. In the scheme it is taken into account the existence of a reserve for the new entrants and of a reserve for granting a bonus for early action. The total numbers of allowances that the Romanian Government allocates to the scheme, as well as the allocation methodology of them by sectors and installations are mentioned in the National Allocation Plan (NAP), which must be approved at a European level by the European Commission.

The scheme exempts, for the first implementation stages, the following areas considered for free allocation: combustion installations exceeding 20 MW, plant refineries, coke ovens as well as installations in steel and metallurgy, extraction industry, cement and concrete, glass, ceramics, pulp and paper. Synthetically, the eight areas considered to be applicable in the scheme are: 1) the energy sector, 2) oil refining, 3) the production and processing of ferrous metals, 4) the cement sector, 5) the chalk/lime sector, 6) the glass sector; 7) the ceramics sector; 8) the pulp and paper sector. **The types of activities included in the EU ETS**, according to the previous said regulations, are: • the energy sector: combustion installations exceeding 20 MW, oil refining and coke ovens. • Production and processing of ferrous metals: the sintering of metal ore and the production of iron and steel (production capacity from 2.5 tons / hour). • The mineral extraction: cement clinker (rotary ovens with producing capacity that exceeds 500 tons / day, other furnaces with production capacity exceeding 50 tons / day), lime (production capacity exceeding 50 tons / day), glass (melting capacity exceeding 20 tons / day), ceramics (oven capacity exceeding 4 m³). • Other activities: pulp and paper (production capacity exceeding 20 tons / day).

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An amendment from July 2008 to the EU ETS Directive includes in the scheme, beginning with 2012, the aviation sector. Also in Phase III there will be included other sectors and greenhouse gases: CO₂ emissions from petrochemicals, ammonia and aluminum production, N₂O emissions from nitric acid production, adipic and glycolic as well as per fluorocarbons from the production of aluminum. Capture, transport and geological storage of all GHG emissions will be covered also by the scheme, receiving free allocations.

In Europe, after 2012, there will be only one European maximal level and the allocations will be made on the basis of harmonized rules, the total annual appropriations decreasing every year, linearly by a factor of 1.74%. The starting point for the decrease is the average total quantity allocations of Phase II, adjusted to reflect the broad range of the system from the year 2013, as well as the plants under 20 MW which the Member States have decided to exclude from the scheme. So the starting point is the 20% reduction of GHG emissions compared to 1990, which is equivalent to a reduction of 14% compared to the year 2005. However, the reduction percentage for the ETS sectors is larger, while noting the fact that it is cheaper to implement a reduction in emissions in such areas.

Thus, the overall reduction is: • **21% by 2020 compared with 2005 for ETS sectors**. This reduction leads to a European level of maximum 1720 million allocation, with an average level for Phase III of approximately 1 846 million allocation, i.e. an 11% reduction from the maximum level of Phase II. The figures do not take into account sectors and GHG that will be included in the scheme in 2013, the final figures on maximum levels for Phase III being published by the European Commission until September 30, 2010. • **Approximately 10% by 2020 compared to 2005 for non-ETS sectors**. Having prices on emissions or on value on emissions saved, the EU-ETS scheme had determined that the climate change should be a main issue for the companies involved, offering them incentives for reducing the CO₂ emissions and the total costs, when taking decisions. The system ensures that the operators reduce the emissions at their cheapest, thereby ensuring that the reductions are made at the lowest possible cost to the economy. Also, it increases **innovation**, companies being given incentives to improve their energy efficiency and invest in compatible technology (“friendly”) with the environment.

The first two phases of implementation of the scheme showed different national methods of dealing with problems, which resulted in an impairment of domestic competition rules. This led to a weakening of the effectiveness of the environmental measures as well as a major credibility

problem of the scheme, given that companies in the sectors or in the Member States that properly implement the requirements could suffer loss of profitability and / or significant market share in competition with companies from areas that fail to implement environmental policies.

CDM and JI allow industrialized countries to achieve part of their commitment to reduce emissions by investing in emission-saving projects abroad and calculating the reductions achieved as part of its commitments. JI covers projects from other industrialized countries with Kyoto targets, while CDM projects are carried out in developing countries. The two mechanisms decrease the costs of the agreement, promote the transfer of advanced technologies to developing countries and transition economies and encourage the cooperation between countries with Kyoto targets. CDM credits can be generated retroactively, from the year 2000 (CDM being already operational), while JI credits must be generated in the period 2008-2012. A condition for these loans is that projects must have as result the real reductions of emissions, measurable and on a long-term basis, in addition to those that would result without these projects. Several EU countries intend to acquire CDM and JI credits to help achieve the Kyoto targets. In total, these states have allocated in the budget more than 3 billion Euros for this process. The EU ETS scheme is linked to CDM and JI. Companies in the scheme can use emission credits from most types of CDM and JI projects (from January 1, 2008) to settle emissions in the same way as emission certificates. This link leads to investment in CDM and JI projects by European companies, in addition to the amounts provided by governments. EU Member States are required to comply with Community law to achieve its objectives, which are enforceable by imposing procedures by the European Commission.

1.2. The European Strategy for Sustainable, Competitive and Safe Energy

The European Union's main instrument in fighting the climate change was the energy policy. In March 2006, the European Commission made a critical analysis of the energy situation in Europe. The result was far from reassuring. The conclusions were published in the **Green Paper** or the policy document, entitled **The European Strategy for Sustainable, Competitive and Safe Energy**. The title refers to the goals that Europe promotes regarding energy: it must be sustainable for the environment, it must help Europe become competitive and secure, in terms of energy supply, both domestic and imported. The main conclusion of the Green

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Paper was that the European Union lacks a common policy, which is the reason why the key objectives have not been met: secure food resources, the proper functioning of the internal market, sustainable economic growth and climate change objectives. **The Green Paper proposed several areas in which the EU Member States should work closely**, namely: saving energy, greater use of renewable energy, investments in energy supply and in the energy technologies of the future, as well as the adoption of a common point of view in the international negotiations on energy.

In *the Green Paper - A European Strategy for sustainable, competitive and safe energy* the European Commission proposes a series of **concrete actions**:

- a) **The development of domestic energy and natural gases markets.**
- b) **A revision of the policies regarding the mandatory reserves of oil and natural gases.**
- c) **A European Energy observer**, with the role of increasing the transparency regarding the demand and the production of energy in Member States
- d) **The improvement of network security.** This objective can be attained through a better cooperation between the operators of the national networks and, maybe, through the establishment of a new structure at a European level- a European Center for Energy Networks.
- e) **A new mechanism that would prepare and provide solidarity and assistance that will be granted to countries in distress**, due to natural disasters that affect the energy infrastructure.
- f) **A wide debate in the Union on the future of the different energy sources**, including on issues related to cost and the impact on the environment arising from the usage of these sources.
- g) **An action plan for energy efficiency**, with common agreed upon targets. In addition, it will be possible to establish an international agreement on energy efficiency.
- h) **A roadmap for renewable energy resources**, which would provide a predictable framework regarding measures to promote these resources at a Community level.
- i) **A strategic plan for technological innovation.**
- j) **A coherent foreign policy at EU level**, that would combine national and Community instruments in the dialogue with third countries on energy issues, including the supply of imported primary resources.
- k) **A revival of the European Union energy policy.**
- l) **Establishing a priority list for construction of new infrastructure elements** needed to ensure the security of energy supply:

new natural gas pipelines and liquefied natural gas terminals, new cross-border power lines.

m) A revival of the dialogue with Russia, especially on the Energy Charter and Transit Protocol of Energy products.

n) A Treaty of the European Energy Community.

o) A new mechanism at the Community level for a rapid and coordinated response in **crisis situations that affect the supply of energy resources** of the Member States

The Commission has published on January 10, 2007 a coherent package of documents that formed the proposals for **A New European Energy Policy**, proposals that were discussed and adopted by the Parliament and the European Council in March 2007, presented in a report called **The Energy Policy for Europe**. The document addresses three issues: • First, it shows how the EU had failed in the policies proposed so far, in solving the existent challenges in the energy area; • Secondly, it proposes a strategic objective or target, that would represent a guide for all future decisions related to energy policies; • Third, it establishes a plan of action on a wide range, in which it is indicated what should be done to achieve this new goal. The European Council (composed of heads of state and government from all EU Member States) has approved this document in March 2007, which became, for Europe, **an integrated strategy for energy and climate change**. The main element of this new policy relates to **the strategic objective of the European energy policy: reducing GHG emissions by 20% by 2020 as compared to 2005**. Achieving this goal may limit the effect of global warming to only 2° C in addition to the pre-industrial temperatures. The overall objective is accompanied by **three related objectives** for each one, the European Commission proposing a target:

1. Increasing the percentage of the renewable resources in the total energy mix to 20% by the year 2020;

2. The decrease of the final energy consumption through the increase in energy efficiency with 20% by the year 2020;

3. The increase of the percentage of the biofuels in transport to 10% by 2020.

By setting some limits for the emissions from energy, the EU will help to overcome the economic, social and environment challenges determined by climate change, helping, both to increase energy efficiency, the use of renewable and other forms of energy with low emissions, as well as the promotion of developing low carbon technologies to obtain a cleaner energy.

Chapter 2. THE LEGISLATIVE ENERGY-CLIMATE CHANGE PACKAGE

2.1. The objectives of the package of legislative measures

The Energy-Climate Legislative Package, adopted by the European Council on April 6, 2009, contains strong measures to fight climate change and promoting renewable energy sources (RES) in order to achieve **environmental objectives set at the European level by the year 2020**, namely: reducing emissions of greenhouse gases by 20%, ensuring energy consumption in the EU by 20% from renewable energy sources.

The European Council underlines the vital importance of achieving the strategic objective of limiting the global average temperature increase to no more than 2° C above pre-industrial levels. It stresses the necessity for a decisive and immediate action to effectively address the challenges caused by climate change. It will be essential for international collective actions to determine a real, efficient and equitable response, on the required scale to face challenges posed by climate change.

In this context, agreement regarding **energy-climate package** represents a major contribution to protecting the planet's future, building the leading role of Europeans in the fight against climate change. It will contribute to the EU efforts to ensure funding for mitigation and adaptation measures to climate change, in particular through carbon markets in the context of a wider international agreement.

The European Council stresses the fact that Member States will decide, in accordance with their own constitutional requirements and their budget, the use of the revenues generated from auctioning the allowances under the EU system of trading emissions certificates. Council notes the willingness of the Member States to use at least half of that amount for actions regarding the reduction of emissions of greenhouse gases, the mitigation and adaptation to climate change, for measures regarding the avoidance of deforestation, the development of renewable energy resources, of energy efficiency as well as other technologies that help the transition to a safe and sustainable economy, low emissions of carbon dioxide, including building the capacity through transfer of energy, research and development.

In the context of an international agreement on climate change, which is expected to be concluded at a conference in Copenhagen in December 2009, and for those who desire it, a part of that amount will be used to

facilitate and finance actions of mitigation and adaptation to climate change in the developing countries that will ratify the agreement.

The challenges that the EU package of measures regarding climate and energy must answer are: climate change could reach alarming levels in this century unless urgent and firm action is taken to reduce emissions of greenhouse gasses; • UE needs safer sources of energy supply, in other words, to be less dependent on imported oil and natural gas.

■ **The benefits of the measures envisioned** are: • a major contribution in fighting climate change; • an example for non-EU states, which might lead to sign a new global agreement on climate change • ensuring energy supply; • an annual reduction of 50 billion Euro of the value of imports of oil and natural gas by 2020 (at present, Europe imports 54% of its energy, these annual imports are estimated at 350 billion Euros, in 2009 energy prices, or about 700 Euro/year for each EU citizen⁷); • approximately 1 million additional jobs (currently, there are 300 000 jobs) in the European industry that exploits renewable energy sources by 2020, • a competitive advantage due to the high degree innovation in the European energy sector; • more jobs in environmental protection industries; • a reduction in air pollution, considerable benefits for health and the limiting of the budget for control measures.

2.2. The content of the legislative measures

Following negotiations in December 2008 between Member States and the European Parliament, the Council of Ministers has adopted the individual legislative texts at the beginning of 2009. Prior to the vote of the Parliament, its members have reached an informal agreement with the French Presidency of the Council on the six proposals following (according to the Report 2009 CERA / Cambridge Energy Research Associates).

On April 6, 2009 the Commission presented to the Council **The White Paper - Adapting to climate change: Towards a framework for action at European level**. It provides an action framework for to reduce vulnerability of the EU to the impacts of climate change and which comprises the **following actions**: • the need for all countries, in particular the most vulnerable ones, and the sectors to adapt to the inevitable climate change; • the need for initiating a preparatory phase by 2012 to build a comprehensive EU strategy to adapt that is to be implemented beginning with the year

⁷ ***, The communication of the Commission towards the Parliament and the European Council , *An action plan for the security and solidarity in the energy area*, Bruxelles, 13 November, 2008, COM(2008)781final.

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2013; • in the preparatory phase there should be developed an EU framework for adaptation, focused on improving the knowledge management, the sharing of data (through a mechanism for exchanging information) and integration; • in order to advance the EU framework for adaptation and the strengthening of cooperation, there should be used a combination of policy instruments. In this context, the Commission has proposed the establishment of a management group regarding the impact and the adaptation; • the reinforcement of the international cooperation in terms of adaptation.

The European Parliament and the European Council have developed the following directives:

■ **Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC**⁸.

The Directive sets legally binding targets for each Member State, in order to reach the EU target of 20% share of energy from renewable sources in 2020. It creates mechanisms for cooperation, so as to be capable of reaching targets in an efficient manner in terms of cost. It removes administrative barriers and other difficulties, confirms the target of 10% for renewable sources in transport and for the first time ever, sets sustainability criteria for biofuels to give assurances that only the biofuels that have no negative environmental impacts are supported. The agreement incorporates cooperation mechanisms to allow the Member States to meet together the targets of renewable energy sources. The new directive also provides an additional emphasis on the priority in accessing the network for renewable sources and the priority dispatching, “to the extent that the safe operation of the network allows it”. Eventually, the assessment by the Commission in 2014, of the implementation of the directive will not affect the target of 20%, but will help to improve, if necessary, the efficiency of the cooperation mechanisms. Finally, the directive sets out the sustainability criteria for bio-fuels and bio-liquids in order to ensure that they can be considered renewable energy sources for the purposes of this directive, only when it is guaranteed that they meet those criteria that are related, among others, with biodiversity, protecting the threatened species and ecosystems, to reduce emissions of greenhouse gases.

⁸ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.

■ **Directive 2009/29/EC of the European Parliament and the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community**⁹. Approved model changes will be applied in the third period, starting with January 2013. Although preparatory work will be initiated immediately, applicable rules will not change until January 2013 to ensure the stability of the framework.

The EU ETS scheme in the third period will be more effective, consistent and fair. Increased efficiency is achieved through a longer period of trading (8 years compared 5 years), a robust limit and annual reduction (a 21% reduction in 2020 compared to 2005) and a substantial increase in the volume auctioned (from less than 4% in phase 2, to more than half in phase 3). In many areas has been approved an even larger harmonization, including setting the ceiling (a ceiling on the EU, instead of national ceilings in phases 1 and 2) and rules for free transitional allocation. The equity of the scheme has been increased substantially by switching to free allocation rules for industrial installations in the EU and by introducing redistribution mechanisms, which entitle the Member States to sell more licenses.

■ **Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006**. The Directive establishes a legal framework for the safe geological storage from the point of view of the environment in terms of carbon dioxide (CO₂) to help fight climate change.

The purpose of safe storage of CO₂ is the permanent capture of it, so as to prevent and, where this is not possible, to eliminate as much as possible the negative effects and any risks to the environment and to human health. The geological storage of CO₂ is carried out on the territory of the Member States, in exclusive economic areas and their continental platforms. The directive presents the selection of the storage sites, exploitation and storage operating permits, obligations corresponding to the operation, the closure and post closure of the storage complexes, measures that need to be taken in the event of CO₂ leakage or other significant irregularities, third party access to transport network and storage sites, the competent authorities

⁹ Directive 2009/29/EC of the European Parliament and the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community.

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responsible for fulfilling tasks defined in the directive, public information and applicable penalties. The directive contains no mandatory performance standard for emissions for a new central, but stipulates an obligation that the new power plants larger than 300 MW have solved the problem of capture. In addition, review of the ETS requires that up to 300 million certificates be dedicated to support the construction and operation of up to 12 commercial demonstration projects aimed at CO₂ capture and safe geological storage in terms of environment, as well as demonstrative projects for innovative technologies in the renewable sources area within the EU territory.

■ **Decision No 406/2009/CE of the European Parliament and of the Council of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.** The decision sets a minimum contribution of Member States to respect the Community's commitment to reduce emissions of greenhouse gases in the period 2013-2020, in terms of emissions of greenhouse gases covered by the decision and the rules on the implementation of these contributions and their evaluation. The decision also establishes provisions for evaluating and implementing a stricter commitment of the Community to reduce the emissions by over 20%, which will be implemented upon approval by the Community of an international agreement on climate change that would lead to the reduction of the emissions over the levels established, as resulting from the commitments to reduce emissions by 30%, approved by the European Council in March 2007. Each Member State shall limit, by 2020, the emissions of greenhouse gases, respecting at least the percentage set for the respective Member State within the limits of -20% and +20% compared to its emissions in 2005. For Romania the specified limit for emissions for 2020 is +19%. Improving the energy efficiency is a key element for the Member States to meet the requirements of that decision. In this context, the Commission should closely monitor the progresses registered towards achieving the objective of reducing the energy consumption by 20% by 2020 and to propose further action if progress is insufficient. The decision provides that the use of credits from project activities, the reporting, the evaluating progress and changes, the corrective actions and applicable adjustments, as well as the procedures relating to exploitation and the change of land destination. The decision will enter into force on the twentieth day following its publication in the *Official Gazette of the European Union*.

There can be distinguished a series of goals of the energy-climate package:

■ **The review of the EU ETS**, which covers the third phase (2013-2020) of the scheme, with the following **lines of action**:

• **A single target covering the entire European Union.** The reduction by 21% by 2020 compared to 2005 replaces the current 27 national targets, with an annual reduction of 1.74% since 2013. The reducing of emissions by 2013 at EU level is 16% below the level from the year 2005. By comparison, the national targets of the first phase of the ETS (2005-2007) resulted in an annual limitation of the growth of emissions at EU level by 6%, higher than the level of emissions in 2005, while the second phase (2008-2012), the annual limitation of emissions is 6%, lower than emissions in 2005.

• **A broader area.** The scheme is extended to new sectors, including the petrochemical sector, ammonia and aluminum, as well as two new gases (nitrogen oxides and perfluorocarbons), so that 50% of all EU emissions will be covered. Smaller installations, emitting less than 10 000 tons CO₂ per year will be allowed to choose to exit the ETS scheme, on the condition of admitting to apply a series of alternative reducing measures. Industrial emissions of greenhouse gases prevented from entering the atmosphere by the CCS technology will be credited as not emitted under the EU ETS scheme.

• **Exclusion of small installations.** The compromise allows small plants (under 35 MW and 25 000 tons reported emissions in CO₂ equivalent, in each of the three years preceding the entry into force of the revised ETS scheme) to be excluded from the scheme, on the condition that they take equivalent action to reduce emissions.

• **Maritime transport and aviation.** The treatment of the aviation sector remains unchanged; it will receive 85% of free allowances for the entire period. The maritime transport will be included in emissions trading, if by 2011 no agreement with the International Maritime Organization is approved.

• **Auctions.** The final agreement has confirmed the principle of full auctioning of emission certificates for the electricity sector beginning with the year 2013, but introduced exceptions for companies from the Member States which are either not or are poorly interconnected to the UCTE system (maximum of 400 MW), or *obtain over 30 % of the energy from a single fossil fuel and have a GDP that does not exceed 50% of the EU average.* These countries will be allowed to enter in the auction only the remaining

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certificates in the terms of a free allocation in the proportion of 70% to zero in 2020. The other sectors of industry will be subject to auction, from 20% in 2013 to 70% in 2020 and 100% in 2027, the ones subject to risk of relocation will however enjoy a free allocation of 100%, based on a methodology for benchmarking, which will be subject to ongoing review. The Commission will determine the sectors concerned by December 31, 2009. The method of free distribution will be developed by December 31, 2010 by a team of experts from the Commission.

- **The solidarity mechanism.** The Member States whose income per capita are still significantly below the Community average and whose economies are in a process of closeness to the stronger Member States will get a greater share of allowances to be auctioned (10% of the total quantity of allowances will be redistributed to the 19 old and new Member States and 2% will be redistributed to the 9th new Member States from Eastern Europe).

- **Carbon capture and storage.** The acceptable compromise introduces the possibility of financing the construction of demonstrative plants with the CCS technology and with the “innovative technologies for supply of electricity based on renewable sources” through revenue from the sale of 300 million tons of ETS credits.

- **Flexibility and third countries.** The Member States may “relocate” the emissions, meaning that they can buy credits resulted from projects in countries outside the EU under the UN CDM system (United Nations Clean Development Mechanism) as a way to comply with their own emission limitations for greenhouse gases. The acceptable compromise consists in the fact that no more than 50% of the reductions across the whole EU from 2008 to 2020 can count on such loans. For these loans there will be introduced a series of implementation principles, that must be “real, checkable, additional and they need to generate permanent emission reductions.”

- **The use of auction revenue to adapt to climate change.** The accepted compromise determines the Member States to use at least 50% of the revenues from ETS auctions to diminish emissions and adapt in the developing countries to reduce the possible effects, such as increased electricity prices.

- **The decision to “divide the effort”** defines the national targets for Member States regarding the reduction the emissions of greenhouse gases from the sectors not covered by the ETS (non-ETS sectors), which represents about 60% of the current European emissions. Annual use of

credits for “foreign travel” (for example, through the financing of the reduction of emissions in countries outside the EU) is limited to 3% of emissions of greenhouse gases in each Member State in 2005 (in addition to these 3%, some Member States with strict targets will be able to use additional credits from projects from the least developed countries and developing states on the small islands up to 1% of their own emissions in 2005).

■ **Regulation on CO₂ emissions from passenger vehicles** sets performance standards for new cars, which represent about 12% of the CO₂ emissions from EU in 2007. The regulation sets an average target of 120 grams of CO₂ per km for new passenger vehicles by 2012 and 95 grams of CO₂ per km by 2020, compared with the current level of 160 grams of CO₂ per km. Manufacturers will be set interim targets and will pay fines (the so-called excess emissions premiums), if the average CO₂ emissions will exceed the targets.

The new regulation requires these objectives as being mandatory for an average range of any car manufacturer in several successive steps: in 2012, 65% of his range must reach the target, in 2013- 75% and in 2014, 80%. Beginning with 2015, the whole range of new cars must comply with the new regulations of CO₂ emissions. The Council has proposed this sequence of steps to respect the process of industrial planning and the production cycles of car manufacturers and to give the automotive industry the necessary time to adapt to the new requirements. Thus, from 2012 until 2018, 5 Euros shall be paid per every new car registered, for the first gram of CO₂ that exceeds the target. For the second gram in excess 15 Euros shall be paid and 25 Euros for the third gram in excess. For the CO₂ emissions with more than 3 grams over the imposed limit there will be a penalty of 95 euro per every new car registered. From 2019 the penalty will be 95 Euros per new car for each gram over the limit.

Manufacturers can improve their emissions range by including eco-innovation, new technologies that are not taken into account in the standard testing for CO₂ emissions or by producing ultra-low-emission cars that emit less than 50 grams CO₂/km. Additional to these directives, but **outside the energy-climate package**, there are found a series of directives and related regulations, namely:

■ **The revised directive regarding fuel quality** sets a target of reduction of 10% in emissions of greenhouse gases produced in a life cycle in 2020. This target is split into a compulsory reduction of 6% from 2010 levels to be achieved at the end of 2020, an indicative reduction of 2% to be obtained by using electric vehicles or technologies, such as the capture and

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storage of carbon in the production process and another indicative reduction of 2% to be achieved through the purchasing of credits in the UN CDM system.

To enable these reductions of GHG emissions, the oil may have a higher content of bio-fuel. Since 2011, oil may contain up to 10% ethanol. However, to prevent damage to older cars, fuel with 5% ethanol (E5) will still be available until 2013, with the possibility for Member States to extend this period.

The Directive also sets tough criteria of social and environmental sustainability for biofuels appropriate with the ones in the directive to promote the energy from renewable sources. It imposes limits on sulphur and metal additives quantities in motor fuel. To minimize the emission of volatile pollutants in the air, the vapor pressure of fuel is predefined.

Exceptions to full auctioning in the electric power sector. In October 2008 the eight countries in Eastern Europe have suggested that the richer Member States should bear more of the burden of the new targets and that the full auctioning of ETS allowances in the third phase will highly increase the cost of producing electricity in coal plants. In particular Poland has expressed its reservations regarding the impact of the third EU ETS phase on its production of electricity generated by burning coal.

The final compromise accepted in December 2008 has confirmed the principle of full auctioning of emission allowances for the electricity sector beginning with 2013, but has introduced exceptions for companies in the Member States which are either not or poorly interconnected to the UCTE (maximum 400MW), or they obtain over 30% of energy from a single fossil fuel and have a GDP not exceeding 50% of the EU average (the case of Poland and the Balkan countries). If these concessions were necessary to give Eastern European countries time to make the journey to the low-carbon generation technologies, for the governments such concessions reduces the number of certificates that will be bid and, accordingly, the income resulting from these auctions (income that could have been used to stimulate the investment in low carbon technologies or other purposes).

The analysis of the impact of the laws, alongside the national regulations, depending on the type of level addressed by the Energy-Climate Package, is detailed in the later parts of the present study. It is to be considered the fact that, from a legislative point of view, at a first level of understanding, the coverage of the issue through national and European laws and regulations is optimal.

2.3. The legislation adopted and the institutional framework in Romania

Through the development in 2005 of the “National Strategy to Fight Climate Change” and “The Plan of Action on Climate Change” important steps have been made in coordinating the national effort to achieve the assumed objectives by the Kyoto Protocol and by the UN Framework Convention on Climate Change (UNFCCC). In order to translate the *acquis communautaire* (directives and decisions) into the national law, Romania has introduced and implemented a series of policies and measures that have directly or indirectly reduced emissions of greenhouse gases. In Romania, as member of European Union, the directives are transposed into national law and the European Commission’s decisions are implemented through the following ministries, authorities and agencies: The Ministry of Environment, The Ministry of Economy, The Ministry of Transport and Infrastructure, The Ministry of Agriculture, Forestry and Rural Development, The Ministry of Regional Development and Housing, The Ministry of Administration and Internal Affairs, The Ministry of Public Finance, The Ministry of Health, The Ministry of Education, Research and Innovation, The Ministry for SMEs, Trade and Business Environment, The National Environmental Protection Agency, The National Agency for Mineral Resources, The National Authority for Energy Regulation, the Romanian Agency for Energy Conservation, The National Commission for Prognosis, The Department of European Affairs.

The legislative framework for the energy and environment sector has been changed and adapted to the relevant Community legislation, in view of Romania's admission to the EU and then as a Member State, but also in its transition to a functioning market economy.

- An important step in **restructuring the electricity and heat sector** has begun in 1998 (GD 364 and 365/98), when the RENEL (The National Electricity Company) was abolished, the activities separated and converted into separate companies. The restructuring process continued between the years 2000 and 2003 through the administrative and financial separation of production, transport, distribution/supply, and restricted access to the network, creating a competitive structure in production and supply, simultaneously with the establishment of an energy regulatory authority, NAER and of an independent transmission system, Transelectrica.

- **The Electricity Law (Law 318/2003)** established the legal framework of regulation for the activities of production, transport, distribution and supply of electricity, taking into account the satisfaction of

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public and private interests, according to market economy principles. In early 2007, the Law 318/2003 was replaced by **The Electricity Law 13/2007**, which transposes the provisions of Directive 2003/54/EC, and which allowed the adjustment of the regulatory framework for full opening on the electricity market (up to July 1, 2007) and ensuring the conditions necessary for the legal separation of the distribution activities from the supply ones.

“The roadmap” for Romania's energy sector, approved by **GD 890/2003**, sets out objectives in the short, medium and long term, for the development of the energy sector. The document requires the implementation of policies resulting from European directives and policies as well as measures linked to the occurrence of regional electricity market in South-Eastern Europe.

Romania's Energy Strategy for 2007-2020 (GD 1069/2007) has set as the general objective of the strategy the meeting of energy needs both for the present as well as for medium and long term, at a lowest possible price, suitable for a modern market economy and a civilized standard of life, in terms of quality, food safety, while respecting the principles of a sustainable development.

An important role in implementing the provisions of EU legislation is owned by the three regulations approved by government decision as follows: *The Regulation for licensing and permits in the electric power sector*, approved by GD 540/2004, later modified, *The regulation on the connection of users to the power networks of public interest*, approved by GD 867/2003 and *The regulation of the electricity supply to customers* approved by Government Decision 1007/2004. Electricity Law stipulates the attributions and powers of the regulating authority (NAER), which is formed as a public, autonomous institution, under the coordination of the Prime Minister.

- Transposing the provisions of Directive 2001/77/EC regarding **renewable sources** was implemented by GD **443/2003**, and the support scheme to promote the electricity production from RES has been approved by **Government Decision 1892/2004**. The promotion system involves the purchase by the suppliers of a number of green certificates in proportion to the share required that they need to carry out, the traded certificates on the specific markets. Green certificates are issued by the transport and system operator for the manufacturers who use as renewable energy the wind, solar energy, biomass as well as hydropower produced in plants with an installed capacity equal or exceeding 10 MW, new and put into service or upgraded

beginning with the year 2004. With the **GD 958/2005** there have been implemented new improvements to the regulatory framework for the promotion of electricity produced from RES.

Rules of certification of electricity produced from RES (**HG 1429/2004**) lay down the conditions in which there may be issued and withdrawn guarantees of origin (managed by NAER), documentation and information necessary to issue them, the validity and frequency of issue, as well as the provisions establishing the Unique Registration. Also, the **Law 220/2008** must be referred to in which concerns the incentives provided for producing electricity from RES, but for which there have not yet been developed the implementing rules.

- **Cogeneration** (combined production of electricity and heat for industry supply and district heating) has registered a sharp decline after 1990 for various reasons (the decline and restructuring of the industry, the price and the quality of the heat for urban consumers, competition in the gas market).

In support of cogeneration, the provisions of Directive 2004/8/EC have been transposed into the Romanian legislation by **GD 219/2007**. The document establishes the legal framework necessary for the promotion and development of highly efficient cogeneration based on the heat demand and primary energy savings in the energy market in order to increase the energy efficiency and improve the security of the energy supply. NAER is responsible for establishing the tariffs system, the support scheme bonus type for the promotion of electricity produced in high efficiency cogeneration and the costs allocation method between electricity and heat produced in cogeneration. The regulatory framework for heat supply in a centralized system has as basis the **Law 325/2006** which sets the legal framework for the establishment, organization, management, regulation, financing, monitoring and control of the operation of public services of supply for heat, produced centrally, for municipalities, cities, villages.

- Following the signing of the Energy Community Treaty in October 2005, the European Internal energy market has expanded into South-Eastern Europe. The signing of the Treaty requires that the *acquis communautaire* in the energy, environment and competition sector will be implemented in SEE countries. The process was launched by the signing of the **Memorandum of Understanding regarding the South-Eastern European regional market and integration into the EU internal market** in November 2006. The concept of regional market and the rules for congestion management, transparency and the compensation mechanism between transport and

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system operators (TSOs) have been defined. The main actions proposed for Romania refer to the introduction of the concept of supplier of last resort, the waiving of social tariffs for households, the identification of vulnerable customers and the introduction of direct subsidies for them, legal separation of the distribution and supply activities. The transport and system operator in Romania (Transelectrica) promotes explicit auctions, the linking of markets in neighboring countries in an initial sub region and the subsequent extension to a regional dimension.

- The restructuring of the National Gas Company ROMGAZ was made by **GD 334/2000** by creating five independent companies with the object of production, underground storage, transport, distribution and supply of natural gas. The regulation of the activities in the natural gas sector was made by **Law 463/2001** and through the **Law 791/2001** the National Regulatory Authority in the Natural Gas area NRANG was established. The modernizing regulations for natural gas by the provisions of EU had been done by the **Law for natural gas 351/2004**, subsequently amended by **Law 288/2005**. The legal framework relates to the natural gas policy, the organization, operation, role and powers of the regulatory authority, third party access to the transmission system, the public service obligations and consumer protection, the market, the prices and rates (NRANG is an autonomous institution of public interest, under the coordination of the Prime Minister), consumer safety and continuity in supply, economic and energy efficiency, environmental protection, promoting and ensuring competition, interconnection with the European systems, providing storage capacity, non-discriminatory third party access to transmission systems, distribution and storage facilities, etc.. Through the **Ordinance 33/2007** there has been decided abolition of NRANG and the taking over of all legal requirements by NAER.

- In the **environmental protection** area, Romania has ratified the UNFCCC by **Law 24/1994**, clearly indicating its concern over climate change at national level and the political will to meet commitments arising under this Convention. Romania had signed the Kyoto Protocol in 1999, being then the first part on Annex 1 of the UNFCCC which ratified in 2001 by **Law 3 / 2001**.

If the European Commission's decision from October 26, 2007 to reduce by over 20% the total CO₂ emissions from the NAP proposed for Romania remains final, the Romanian energy sector will face extreme difficulties after 2013.

Provisions Proposal 2008/0014 (COD) on **non-ETS sectors** (transport, buildings, agriculture, waste) to reduce GHG emissions, by 19% for Romania, have created a **state of relaxation in these sectors** relative to the real objectives. In addition, in the management of Romania's commitments to reduce GHG emissions in the 2020 perspective, it is estimated that the Environment Ministry will not have sufficient authority and jurisdiction to cover these obligations.

- In the area of energy **efficiency**, Romania has established in 1991 the Romanian Agency for Energy Conservation (ARCE), but it had visibly no autonomy and practically reduced results, being kept mostly under the subordination of the Ministry of Industry / Economy.

In 2000 the **Energy efficiency Law 199/2000** appeared, republished and supplemented by Ordinance 22/2008, which establishes the legal framework to promote measures of reduction of energy losses and reduction of the energy intensity, labeling, energy audits, etc.

The National Strategy for Energy Efficiency (**HG 1613/2004**) has set as objective the reduction by 40% of the intensity of primary energy by 2015 compared to 2001, and as well as a saving of primary energy from 2.12 million toe / year. The first National Action Plan for Energy Efficiency (2007) concluded that the targeted objectives are the reduction in energy consumption by 13.5% by 2016 (with an annual average of 1.5% for the period 2008-2016) and the reduction of 2.8 million toe, from the average consumption in 2001-2005 of 20.84 million toe.

In the area of thermal rehabilitation of buildings, **Law 325/2002** was amended concerning the thermal rehabilitation of the existing building fund and the stimulation of heat saving, **Law 211/2003**, completed by **Law 260/2006** on the establishment of special measures for the thermal rehabilitation of buildings with multi-storey housing, including how to cover the costs for performing the work, **Law 372/2005** on Energy Performance of Buildings (transposition of Directive 2002/91/EC).

The EU ETS scheme was implemented nationally by **Government Decision 780/2006** regarding the establishment of the trading scheme for the certificates of GHG emissions, supplemented by: • **Order 1008/2006** regarding the procedure for issuing and revising the authorization of GHG emissions, repealed by **Order 1897/29.11.2007**; • **Order 1175/2006** for approving the Guidelines regarding the monitoring and reporting of GHG emissions, repealed by **Order 1897/29.11.2007**; • **GD 658/2006** regarding the reorganization of the National Commission on Climate Change (NCCC) • **Order 1122 / 17.10.2006** for the approving of the Guidelines on the use of

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Joint Implementation Mechanism (JI) under Track II (Article 6 of the Kyoto Protocol) • **GD 1570 / 2007**, which establishes the national system for estimating the anthropogenic level of emissions of greenhouses gases (SNEEGES), resulting from sources or from withholding the carbon dioxide; • **Order 1897/29.11.2007** for the approval of the procedure for issuing the authorization of GHG emissions for the period 2008-2012; • **Order 1768/200** regarding the procedure for accreditation of the verification organisms; • **Order 85/2007** for approving the Methodology regarding the development of the National Allocation Plan; • **Order 1376/29.10.2008** for the creation of the inventory of GHG emissions; • **Order 1474/18.11.2008** for the procedure of archiving and data storage, the regulation for the management and operation of the National Register; • **GD 60/2008** regarding the approval of the National Allocation Plan (NAP) on GHG emissions certificates for the periods 2007, 2008-2012; • **Order 1170/29.09.2008** regarding the approval of the Guide on adaptation to climate change (GACC) • **Order 297/21.03.2008** regarding the approval of the National Procedure on the use of JI mechanism under Track I, • **Order 254/2009** for approving the Methodology for allocating GHG emission allowances from the Reserve for the new entered installations for the period 2008-2012.

Currently, there is no legislative initiative or a regulatory similar to the horizon 2013-2020, although there have been, implemented or developed and implemented, a series of European directives, regulations and laws meant to improve the GHG emissions. NAP for 2007 (the last year of Phase I and first year of Romania as an EU member, the moment of integration being considered also the moment of the beginning of the enforcement of implementation of the scheme for Romania) and 2008-2012 (phase II) was published in its first version in 30 August 2006.

The Ministry of Environment (ME) is the governmental institution invested with the role of developing and implementing the state policy in the environment protection sector. In the area of climate change the powers of this Ministry are: • The coordination, the implementation and the evaluation of the measures and the policies regarding the implementation of the Kyoto Protocol and the UNFCCC (UN Framework Convention on Climate Change) • The representation of Romania to the UNFCCC negotiations and all other meetings related to the climate change as focal center for the UNFCCC; • The development, implementation and update of the National Strategy on Climate Change (NSCC) and the National Action Plan on Climate Change (NAPCC) • The coordination of the

implementation of flexible mechanisms under the Protocol Kyoto, the Joint Implementation and the International Emissions Trade; • ME leads the National Commission on Climate Change (NCCC) • ME is responsible for transposing and implementing the EU Directive on emission exchange and subsequent amendments made.

The Ministry of Economy (ME) is organized and operates as a specialized body of the central public administration, in the area of industry, mineral resources and energy; • ME is the ministry with a focusing role, public institution with legal personality; • ME contribute to developing and implementing the strategies of the government program for the economy and energy area, ensuring the use of financial levers in accordance with the requirements of the market economy and to stimulate the economic operators' initiative; ME performs the functions of development of strategies and the programs regarding economic growth in the industry, energy, mineral resources and other economic domains, of regulation and synthesis, the material resources management, the restructuring of economic operators that function under its authority; • ME is responsible for the developing of the national policy in the domain of energy conservation, promoting renewable energy resources, the reduction of greenhouse gas emissions from power plants, etc., • ME is responsible for the implementation of the provisions of the Treaty of Accession of Romania to the European Union for the economic and energy domain.

The National Commission on Climate Change (NCCC) was created by GD 1275 / 1996, as the main inter-ministry body, coordinated by the Ministry of Environment and promotes measures and actions needed for the unitary application in Romania of the provisions of the Convention and the Kyoto Protocol. NCCC has the following duties: • periodic analysis of the state the objectives achievement, of the actions and measures set out through the National Action Plan on climate change and the information of the competent authorities and public opinion on the conclusions drawn; • identifying the activities and the objectives that can be achieved with technical and external financial assistance and the development of proposals for the requests of technical and financial assistance to improve the institutional capacity in the climate change area. The ministries are represented in the NCCC at the level of decision with attributions of elaboration and implementation of policies and specific measures in the area of climate change: MFA, MIA, The Ministry of Regional Development and Housing, The Ministry of National Defense, The Ministry of Agriculture, Forestry and Rural Development, The Ministry of Transport and Infrastructure, The Ministry of Health.

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The National Agency for Environment Protection (NAEP) is the central body that provides the technical support of the Ministry of Environment and coordinates the regional agencies of environment protection (RAEP) and the local agencies for environmental protection (LAEP).

The National Authority for Energy Regulation (NAER) is an autonomous public institution of national interest, with legal personality, under the coordination of the Government. It creates and applies the system of rules necessary for the energy sector and the electricity markets, heat and gas, the market for green certificates, in terms of efficiency, competition, and transparency and consumer protection.

A very important role in implementing the legislative energy-climate change package is played by **the local and regional authorities**. At the same time, the municipalities are the ones that have accepted responsibility for implementing joint projects. They are important decision factors in urban planning and provision of infrastructure necessary for drinking water or municipal waste management.

Research institutions. There are a number of research institutions that support the central authority in the development and implementation of the policies in the area of climate change, including: • *The National Institute for Research and Development for Environment Protection (NIRDEP), Bucharest*; • *The National Meteorological Administration (NMA)* • *The Institute for Forest Research and Management (IFRM, the Institute for Energy Research and Modernization (IERM).*

The initiative and action in this area should be taken by the EU for the following reasons: • the countries have the responsibility to limit emissions, but the joint action of the European Union is more effective; • Joint actions can: a) maximize the efficiency of the adopted measures, b) to create scale economies, so that the implementation of the measures costs less and does not affect the trade in the unique European market • the 27 Member States can have a greater positive influence if they are together rather than apart in the global fight against climate change.

PART II.

THE SYSTEMIC IMPLICATIONS OF THE IMPLEMENTATION OF THE ENERGY-CLIMATE CHANGE PACKAGE ON THE ROMANIAN ECONOMY

Chapter 3. LEGISLATIVE AND INSTITUTIONAL IMPLICATIONS

The macroeconomic impact of implementing the legislative energy-climate change package must also be quantified in terms of the capital needed to achieve the desired CO₂ threshold, thus putting the issue of determining the optimal amount of the cost-benefit proportion of this action, respectively, an estimate of the overall economic impact generated by the use of cleaner technologies and making the energy resources more efficient.

Estimating the economic impact of the implementation of measures for efficient use of energy sources and cleaner technologies, take into account the following:

- *Globally, the market growth in the environmental sector is driven primarily by the legislation, nationally and internationally. This rule applies especially among the mature markets like the EU, USA and Japan¹⁰.*
- *The non-use of efficient carbon reducing technologies will result in additional costs, and failure in applying the measures or the delay in their implementation will lead to failure in the assumed objectives¹¹.*
- *Actions in the field of climate change will have a modest aggregate economic effect on the generation of new jobs. They will rather lead to a reallocation of the degree of employment within the sector or other sectors of the economy¹².*

¹⁰ Ernst and Young, 2008, McKinsey, 2009, ETUC,2008, IEEP,2008, CERES,2008.

¹¹ Stern, N. *The economics of climate change*. Cambridge University Press, October, 2006.

¹² Ernst and Young, 2008, McKinsey, 2009, ETUC,2008, IEEP,2008, CERES,2008.

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These measures will affect differently all the other sectors of the economy which will have to face various challenges and limitations. A survey done by GHK in 2009¹³ shows that expenditure required to implement the measures proposed to reach the proposed thresholds to limit emissions of greenhouse gases reflect a shift in the economic activity and the employment policy and not necessarily a decrease in the GDP.

The implementation of this legislative package in Romania, in addition to the expected effect of reducing the emissions of greenhouse gases, wants to generate, on a medium term and long term, a number of other positive effects such as: the growth in energy efficiency and in the security of energy supply, the reduction of pollution, the increase in the number of jobs, etc.

■ **Improving the energy efficiency and changing the energy mix.** Given the fact that the legislative package will be applied on long term, it is very important to take into account the effect on output and on the energy consumption. Given the consequences of climate change and the increasing dependence on fossil fuels and the rising prices of energy, Romania will have to apply as soon as possible the EU policy in the field of renewable energy sources, which are characterized by the reduction of greenhouse gas emissions. The renewable energy sources are indigenous, not based on the future availability of conventional sources of energy and their predominantly decentralized nature, this makes the Romanian economy less vulnerable to volatile energy supply, and therefore they constitute a key element of the EU's energy future and our country.

The legislative framework for the promotion and use of renewable energy in the EU and its implementation in Romania is intended to provide the business community in our country long term security and stability to achieve investment projects in this sector. In the long term, the question of institutional stability, but also the procedures for securing funding required to implement major energy projects.

■ **Workforce.** Although the normal application of European directives should lead to the development's energy mix and the emergence of new sources of energy, this does not necessarily lead to increasing employment of labor. As mentioned previously, though in Europe have seen a substantial increase in people employed in the field, the same cannot be said in Romania. In our country there is a probability to show the phenomenon of migration of human resources within the same sector, a

¹³ ***, *The Impacts of Climate Change on European Employment and Skills in the Short to Medium-Term: A Review of the Literature*, Final Report (Volume 2), GHK, 2009.

phenomenon caused by the closure of installations currently working at full capacity.

■ **Increased competition.** Policies on climate change will have a strong impact on sectors sensitive to international competition. A very large number of industries will lose their market share due to the development of the competitive phenomenon, and the penetration of foreign investors. The liberalization of the energy market brings the increase in competition, which can be quantified only by the number of actors involved.

■ **The reduction of air pollution and health costs.** Reducing emissions of greenhouse gases will generate the reduction of air pollution, which presently causes over 370 000 premature deaths annually in the European Union. *Identifying the sectors that will be affected by the implementation of policies on climate change* can be illustrated by a recent study by KPMG¹⁴ used the existing typology^{*)} and identified three categories of risks. The three categories are: a) **The hazardous areas**, including areas where the risk is greater than can be realized; b) **Middle zones**, sectors where the risk approaches the estimations; c) **Safe areas**: sectors that seem well prepared for climate change and that seem not to face great risks. According to the same study¹⁵ there have been identified six areas in the danger zone: *transport, health, tourism, aviation, the financial sector, oil and natural gas.*

Following the facts presented above we consider that **the main effects at a macroeconomic level determined by measures on climate change will be:**

- The emergence of comparative advantages for certain types of industries due to the marginal reallocation of resources from sectors that finance (pay the costs) to the sectors who receive the intervention. The main impact of this action will only consist in shifting resources from the most polluting sectors to the cleaner ones.

- The growth of the added value determined by the transfer of the demand towards the “green” industries, which could lead to an increase in the employment in the field.

¹⁴ ***, *Climate Changes your Business. KPMG review of the business risk and economics at sector level*, KPMG International, 2008.

^{*)} The speciality literature has identified the sectors that are producing energy (the sector of public utilities and the energy one) and the sectors that intensively use the energy in the production process, or the ones that produce products that are large energy consumers (mainly the manufacturing industry and the transport industry).

¹⁵ ***, *Climate Changes your Business. KPMG review of the business risk and economics at sector level*, KPMG International, 2008.

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- The increase of investment due to funding from the state budget, the access of programs that allocate funding for these actions or attracting private sources.

- Benefits determined by the time of penetration of foreign markets - first in or road openers in competition with the "track backer". On the Romanian market, taking account of the existing barriers such as large economies of scale, bureaucracy, the antiquated and poorly developed infrastructure, etc., does not present a great attractiveness for the foreign investors, even if it is a relatively new market.

Given the public system in Romania, and the lack of centralized information, one can make the following **observations**:

- Regulations regarding the environment fall under the influence of at least three major ministries: the Ministry of Environment, the Ministry of Economy, and the Ministry of Agriculture. There are topics for discussion, as, for example, the improving of air quality, where the skills of other ministries interfere such as the Ministry of Health.

- This division of responsibilities usually leads to major delays in the decision process and there is the need for inter-ministry consultations.

- There is not a single point of information on the energy-climate change package. The information is presented by each body involved, occurring cases of informational redundancy or information vacuum in certain areas.

- The lack of centralized, national, regional and local statistics regarding the factors considered in the energy-climate change package: resource consumption, emissions, etc.

- The lack of pertinent studies and researches available to the public, regarding the impact of the package on the Romanian economy.

- The alteration of the ministerial responsibilities and the national agencies on the basis of political criteria.

- The lack of an efficient inter-ministerial communication in the field.

Therefore, it is considered necessary to create a **national structure that brings together from the point of view of the decision and information functions a number of the attributions of the public bodies** mentioned above. A model of good practice for this type of institution is given by the network created by three inter-ministerial bodies in Britain, namely¹⁶: • The Department of Energy and Climate Change (DECC),

¹⁶ <http://www.decc.gov.uk/>

created in October 2008 to bring together: national energy policies and the policy of reduction of climate change effects; • The Department for Environment, Food and Rural Affairs (DEFRA) • The Department for Innovation in Business and Skills (DBIS). The network objectives are: ensuring a secure and effective future, to facilitate the transition to a *low carbon* economy and achieve the international agreement on climate change (The Conference in Copenhagen in December 2009). The network operates under an agreement with the National Treasury (similar from an institutional point of view to the Ministry of Finance), its activity being evaluated in reference to specific measurable indicators meant to improve efficiency of the public expenditures.

The creation of the network does not imply the creation of a new institution, with negative effects on the state budget, but the implementation and effectiveness of a communication and accountability system, so as to avoid the duplication of decisions, as well as the delays due to institutional overlap.

It is referred to in the following part some **FAILURES** in the Romanian legislation in the energy sector and in the area of the environmental impact as well as in the terms of its application.

- **The electricity market**, which had a gradual opening to competition since 2000, until its full opening from July 1, 2007, had not had a fair and transparent competition. There were and still are significant contracts, on the long term, especially from Hidroelectrica (producer of “cheap energy”), obtained favorable, with political support, which led to considerable, unfair profits, in the favor of private providers. In this respect, there is a recent notification of the European Commission to the Romanian Government which requires further explanations on these transactions.

- The restructuring of RENEL was made during 1998-2000, in a certain context, in **three different manufacturers based on “fuel” type** (thermal, hydro, nuclear); so far, there had not been made any privatization of a major producer of energy. Maintaining this production structure for a very long period of time had been in the detriment both for the cheap hydroelectric producer, through the loss of a considerable exported profit as well as for the expensive thermal power producers by worsening the financial problems and the decapitalization. The recent proposal of the Ministry of Economy of restructuring the state sector of production in two national competitive companies, which either appear too late or, in the opinion of experts, is far from achieving the desired objectives

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- As a **regulator**, **NAER** was not fully independent, but subject to some political pressure, in setting the prices and the tariffs. It is given as an example, the maintenance of regulated prices for most of the non-domestic consumers, situation recently observed through a notification of the European Commission, although the market was fully liberalized from July 1, 2007. Also, usually NAER approves, lowered regulated producer prices, producers not having recognized some costs.

Regarding **cogeneration**, there are many views that NAER has brought great disservice through the use of an incorrect cost allocation in cogeneration, which has cheapened the electricity and made heat more expensive, through very large delays in the development of the regulations to promote efficient cogeneration through bonus type support schemes.

- **The Romanian Agency for Energy Conservation, RAEC**, has as main object of activity the reduction of the energy intensity and the increase of energy efficiency, a priority direction for Romania. However, the energy efficiency is disregarded; the results are insignificant in both the industrial as well as in the residential sector, and the high energy savings potential remains virtually untapped. RAEC lacks authority, independence of action, specialized personnel, coercive means and funds to promote energy efficiency.

- **Residential and public buildings** are, at the same time, the biggest consumer of energy, comparable to the industry, but also having the greatest losses of the order of 40-50%. In this way, the public buildings, especially residential buildings represent very difficult problems from the economic, social and environmental impact point of view. The lack of concern from the responsible authorities has caused the fact that from over 80 000 existing buildings that were programmed to be thermally rehabilitated only about 100 were done so, not existing a clear prospect of the development of this program meant for energy modernization for the next 15-20 years.

Besides the long term electricity contracts granted preferential to private suppliers, the worst distortion existing in the electricity market in Romania is **the imposition by NAER, at political pressure, of some low regulated prices to energy producers** (especially, thermal), in order not to increase the electricity prices for final customers. Through this practice, the NAER gives a false signal to the market, the latter being led by producers of state and, not as naturally meant, by the consumers. Not admitting the real costs of producers regarding the technological upgrading, the reducing of the environmental impact and the proper maintenance have as effect on the medium term the decapitalization of these producers, and ultimately, their

inability to function technically and economically. In terms of the National Power System (NPS) this leads to a shortage of generating capacity and an increase of the dependence on imported electricity.

The following considerations are based on the opinions of the authors of this study as well as on a series of assessments of specialists from the private companies in the sector. The division by technologies of the power system was originally designed under the single buyer model: each manufacturer is competing with other producers to participate in covering the load curve, each receiving marginal closing market price. Later, **it had been chosen the hybrid model of regulated bilateral contracts, plus the bilateral negotiated contracts.**

When translating this model into rules by the NAER it was omitted the fact that not privatizing the energy producers, **there may appear serious functional deficiencies** such as:

- **Preferential sales on the wholesale market at prices below the one set by the market**, giving significant competitive advantages to the preferred companies. Thus, **money that would have been entitled to producers were outsourced to third parties hand were not invested in the sector.** At any time, this type of supplier that owns cheap energy can mix this energy with one purchased at market price, obtaining a resulting lower price and being able to extend without problems to its market share in the disadvantage of other suppliers.

- **The separating of producers by technologies** and the freezing of this situation until the full opening of the market **has led to the impossibility of competition.** In the case of privatization, through new investments, it would have led to a more balanced structure in terms of prices of energy production.

- Other countries have solved the existence of such contracts that distorted competition by canceling them and socializing to all participants of the penalty costs, thus establishing the foundation for a balanced competition.

In the case of restructuring the sector according to the model announced by the Ministry of Economy there is the danger that, by incorporating the three existing non-privatized providers (Electrica Transilvania Sud, Electrica Transilvania Nord and Electrica Muntenia Nord), **the two major new companies can seize over 90% of the total retail market because they can build an energy mix with a price below market price, using hydro and nuclear energy.** In the countries with similar situations (see the case of CEZ in the Czech Republic), the dominant

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producers are forced to sell the energy on the wholesale market by the transparent market mechanisms. Preferential contracts with suppliers in the group are strictly prohibited. **Since the beginning of reform (1998-2000) and until the present Hidroelectrica has been used, improperly, as a source of cheap energy, the money being outsourced from the sector, instead of being invested in it. The thermoelectric plants Turceni and Rovinari closely follow the same pattern.**

In the current form of organization of the sector, the companies are not strong enough to attract financing on advantageous terms and in some cases not at all. For the reasons above, it should be taken into account the fact that any aggregation scheme should not include the distribution branches of SC Electrica SA that are not privatized.

There is the known myth that *a growth of the efficiency of the producers will automatically lead to a fall in the production price.* However, to increase the efficiency of the production groups investment is needed, which firstly, will lead to a price increase followed by a decline. The phenomenon is similar to the evolution of distribution tariffs in the privatized distribution companies.

There is also the myth that, *through the assembly of the NO_x and SO_x installations the greenhouse gas emissions will be reduced.* It also should be noted that, *only the reduction of CO₂ falls in this area and this can be achieved primarily through the increase in efficiency (the emissions are directly proportional to the fuel consumed).* This raises the question: what is better to do: to retechnologize the existing groups or to build new, suitable ones. The answer is simple and starts from the fact that, under current conditions, the emissions resulted would increase the production price by about 20-25 Euros/MWh, if no exemptions or subsidies are allocated for emissions. The increase of efficiency, in the case of retechnologizing the existing groups, is of several percentages and, however, insufficient to reach the yields of new technologies. Moreover, if one considers the cost of the investment, both for efficiency gains and that of environmental conditions, it results that a *greenfield* project is successful.

In the current crisis, the sector is characterized by low investment capacity: • The energy consumption has decreased dramatically and so did the income of producers (**the volume effect**); • The low power consumption has resulted in a decrease in prices on the free market, and, thus the incomes of the producers are again reduced (**the price effect**) • Cost of funding is much greater and more projects become non-bankable.

Romania has lost at least 5 years of reform in the production by not doing anything. If the production units had been privatized from the beginning, at this time there would have been another technology in the system and another structure of the actors resulting from economic principles. In this, the implementation of a series of public-private partnership-generated projects is to be desired, in order to allow the use of economic criteria, while maintain the characteristics of strategic industry, in the context of the improvement of the national energy security. PPPs are a major challenge for the strategic industries, being on the one hand extremely important for achieving structural changes meant to improve an 20-year old status quo, and on the other hand, difficult to implement due to the specific organization and implication of critical infrastructures.

Unfortunately, the new structure proposed for the electricity subsector cannot be consistent with the principles of the legislative package. The oligopolistic position of the two companies will shortly lead to removing some of the other players on the market. This might be accepted if the two companies could generate important financial resources for future investments in the sector, thereby improving the technology and the efficiency. However, the two companies have as a functional basis the energy complexes that use the local lignite. **The next auctions in 2012, for allocation of emission allowances, as well as the significant reduction of the final consumption and the support of the area of renewable energy resources through the support schemes of state aid will diminish the importance of coal plants and it will increase their costs, and the two companies will become weaker, unable to fulfill the role for which their creation had been justified, that of powerful actors on the European internal market.**

Therefore, after a series of competitors of these two companies will be removed from the market, the new structure will not be able to cover the gap formed, because the two companies will have big financial problems themselves. The shift towards other fuels will not be possible to achieve by these companies, because they will not have enough financial resources, leaving the private sector to solve this problem. So, the probable solution will probably be another round of privatization, which would be done much easier this time and even harder in the future if the new structure, is implemented. **Many experts feel that on the short, possibly medium term, these newly-established companies shall be important as national players, moderately important as regional market players and will have no importance as players in the European market.**

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3.1. Conclusions and recommendations regarding the insurance of the correct implementation of the new legislative package

1. In order to achieve the new objectives assumed by Romania for the period 2013-2020 the elaboration of **a coherent national strategy regarding the green energy**, which would include data regarding the responsible authorities for implementing these directives, reporting the results and their evaluation. Also, this strategy should identify and classify the entities affected by the provisions of the legislative package and to quantify their effects on their activity. Actions must be undertaken on how to secure the financing of the activities necessary to achieve these objectives.

The implementation of the legislative energy-climate change package will have major impacts on the Romanian energy sector, starting from the very new structure imposed in particular, related to the important share of renewable sources, but also probably from the need to rethink the fuel mix, whereas the reduction of emissions from the sector will be an additional pressure on the electricity producers that use local lignite.

In addition, we must be aware that **the entire economy will be affected, mostly in the negative form, mainly, by increasing the energy prices, being able to reduce the very competitiveness of the national economy, both in the European internal market as well as, especially on the market world.** At least for these reasons, it seems appropriate to reassess the country's entire energy strategy in the period 2010-2020. The current strategy only refers to the sectors of production, transmission, distribution and supply of energy, without adequately integrating the other sectors that now became very important, especially **agriculture, essential for the biomass** that it can generate and that can be the support to some projects for producing electricity, heat, cold and biofuels.

In addition, due to increased decentralized initiatives, especially in the villages, it is necessary to **integrate all projects of local authorities** that can make an important contribution to the self-imposed burdens regarding the achievement of the target of renewable sources from the net consumption of the country, both at the end of the range as well as in the biennial targets. The problem is particularly worse if linked to the Government's intention to restructure the whole electricity production sector. The current proposal, based on **the creation of two companies with state ownership, to capture over 90% of the production market**, builds the two pillars on energy complexes that use lignite of low calorific value and with important CO₂ emissions. The increase of the share of renewable

energy, obviously through private initiative, takes over part from the market of the two companies and makes them vulnerable (added to this the challenge connected to the event of an auction for the allocation of emissions).

The emergence of large wind farms will have an impact on the transmission and distribution networks and will require additional solutions to maintain the system's stability. At the same time, due to the likely penalties on lignite and the auctions of emission permissions, a shift to other fuels could be interesting, especially in the case of the appearance of new opportunities such as the **Nabucco project**. Interesting **new nuclear projects** may arise that are not taken now into account.

Therefore, a modeling of the new situation and a reconsideration of the methods of restructuring of the electricity generation sector is absolutely necessary. With the changing of the target and in final in the area of the energy consumption, **the application itself would be different than the one expected in the current strategy**, which would alter the country's energy balance for the period 2010 to 2020. Special attention should be given to the industrial energy sector, the rural (now non-existent) and the urban to the rehabilitation of the heating in buildings, central heating and cogeneration.

Finally, the large investment required to achieve the targets imposed by the legislative package in question could not be done by the state, which will require that the new strategy should propose **measures to attract private investment** in those areas that need development for the implementation of the package.

2. To ensure optimal achievement of the proposed goals through the new legislative energy-climate change package, state institutions must be prepared to **promote, support, implement and follow some energy programs**. The energy programs will be elaborated on a long term basis in line with the EU policies, taking into account the actual state of the Romanian energy sector and the energy requirements for the future. The energy strategy of Romania for a medium and long term will have to respond with practical solutions for all the objectives assumed as a Member State.

Furthermore, **the Government must join the energy strategy with the environment one in a joint document, consistently focused on the requirements of the legislative package**. We believe that this complex strategy must be accompanied by a clear plan of action, with public sector projects and ways to support private sector projects, with deadlines and responsibilities. To this purpose, the responsible ministries (the Ministry of

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Environment, the Ministry of Economy, the Ministry of Administration and Internal Affairs, the Ministry of Agriculture and Rural Development, the Ministry of Transport and Infrastructure, the Ministry of Finance and the European Affairs Department) will have to identify and monitor the part of the national program that corresponds to them in the accomplishment of the objectives of the new package.

Appointment of a **single national coordinator**, with the role of reporter, with the direct support of all stakeholders involved in the implementing of the investment projects will be the key to Romania's response to the requirements of the new legislative energy-climate change package.

3. The area of research and design will have additional tasks, because it is clear that it is required to proceed to the amendment / updating of the rules of design / implementation for adaptation to climate change, to avoid over evaluated projects, but also to increase the degree of efficiency and safety in the operation of future plants that will use the new technologies. This should be done as quickly, knowing the large periods to achieve the objectives of the sector and the major implications due to high levels of investments.

4. Periodic monitoring is recommended (annually) for the progress of our country in achieving its set goals in order to be able to intervene quickly in the case of unforeseen events. Corrections may include legislative measures.

5. **Psychological preparation of the entities affected by the provisions of the new legislative package** is necessary (state institutions, public and private economic operators, the population, etc.) regarding the potential effects and ways to neutralize through the production of campaigns with an advisory and informational role.

6. Given the fact that **the implementation of investment projects in the energy department is achieved in the medium and long term**, with significant mobilization of capital and that the deadlines assumed to achieve the proposed objectives at EU level are quite close, it is recommended the **swift implementation of this legislative package**.

7. It is necessary to **create the legal framework in Romania necessary to ensure the investment of the funds generated from the valuation of the carbon dioxide allowances** on the European market in other environmental projects.

8. Ensuring at a national level that the performance of some **qualification programs for labor force** destined for the design, the

implementation and the operation of the new technologies for environmental protection.

9. Providing the simple and effective legal framework to implement on the Romanian market of new technologies to reduce the environmental pollution. This national support will enable both to maintain the climate of social stability as well as to development of new capabilities that can be exported, in the context where the whole Europe is faced with shortages of qualified personnel suitable to comply with the requirements of the new legislative package.

Key elements of this package should be expanded and included in future international actions such as:

- **Trading emissions certificates**, considering the expansion and connection to the growing number of emissions. The trading of the schemes from around the world is a powerful way to promote cost-effective reductions regarding the emissions as well as to encourage action in developing countries: key targets in rich countries could move the financial flows of tens of billions of dollars each year to support transition to development of solution for the low carbon emissions.
- **Cooperation in technology** requires an informal coordination as well as formal agreements that can boost the effectiveness of investments in innovation around the world. Globally, the support for research / development in the energy department should be at least in a two-way manner and the support for the dissemination of new low carbon technologies should increase up to five times. International cooperation for product standards is a powerful way to boost the energy efficiency.
- **Adaptation**, considering that the poorest countries are the most vulnerable to climate change. It is essential that climate change is fully integrated in the development policy of each country and the rich countries honor their commitments to increase support through development assistance programs abroad. International funding should also provide support for regional information on the impact of climate change and support regarding the research on new varieties of crops that will be more resistant to drought and floods.

Chapter 4. THE BENEFITS AND THE RISKS OF THE IMPLEMENTATION OF THE LEGISLATIVE ENERGY-CLIMATE CHANGE PACKAGE

When analyzing the potential benefits and risks for Romania one should consider the average time horizon for which the consumption and investment in the sector projections are made. For an accurate extrapolation of assumptions made at the time in 2009 and to reduce the uncertainty related to a projection for an average time, we will address **the method of scenarios**, taking into account a number of **variables**, namely:

1. Variables that depend on government policy. One can identify the following directions: the exclusive implementation of EU policies and strategies in the time allocated, the implementation of European policies and strategies, to which it is added a series of other complementary legislative elements in the time allocated, the delayed implementation of the European policies either exclusively or together with a number of other complementary measures; the implementation of measures meant to support the European directives, such as a grant system or an organizational management information system and implementing the local and central government policies.

2. Variables that depend on the national economy. One can identify three possible directions: sustained economic growth, economic stagnation, recession. Contrary to expectations, for the reducing of the environmental impact, a recession is preferred because growth is generally energy-intensive, and so it is preferred to have production methods with low-cost, that allow to recycle the profits. What is desirable in these circumstances is to create some conditions in which the energy-intensive economic growth to be done with low costs and with the latest technology with high economic efficiency. This requires a large investment in new technologies, designed to increase the economic efficiency and not only to reduce GHG emissions.

This large investment cannot be currently supported by the Romanian economy without external support, given the conditions in which the rate of profitability for private companies decreases on the background of the world economic crisis, not facilitating for the re-investment of profits in large initial size investments and a large recovery period. Furthermore, in the case of companies funded by the state or the in the case of implementation of a support financial system for investments, they will need to be supported also through external support, the available funds for the state budget being

reduced by the effects of the crisis. It is to be considered the fact that a series of industries directly affected by the Energy-Climate Package may be ranked as losers of the current crisis, with low chances of recovery in the following years. An example in this respect is the construction industry, though not singular, especially considering the domino effect of several industries, such as the energy sector. In the same range of variables that depend on the national economy the possibility of relocating production in other areas of the country is discussed. This can only be done with high social costs, given that the staff in inefficient companies that will have to be closed (or will become bankrupt) will not be offered viable alternative employment in their area of origin. It should be noted, in that case, the situation of the cities built around large energy and mono-industrial platforms.

Given this, we consider that for the national economy one may mention the following **benefits of implementing the energy-climate change package:**

- The opportunity to implement retechnologizing measures directing towards the growth of economic efficiency, not only to reduce environmental impacts.

- The opportunity of purifying the economy of inefficient energy-intensive companies, with plants with expired life expectancy.

- The opportunity to create a research system based on environmental innovation.

- The opportunity of creating an effective organizational system at central and local levels to facilitate the communication between public administrations, companies and the nongovernmental environment.

- The opportunity of application of measures of good practice in the area of environmental protection.

- The opportunity for sustainable economic growth and reducing the dependence on some foreign markets so as to reduce the vulnerability to global economic changes.

- The positive effects on the environment and the population: the high health level, the amount of waste reduced the increased air quality.

- The positive effects on the energy efficiency of homes and the lowering of their costs.

- On the long term, the decrease in energy costs while maintaining an efficient market to an European and regional level.

- The opportunity of transferring a large number of activities in the virtual environment.

- The opportunity to improve the infrastructure of all kinds.

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- The opportunity of a viable system for financing investments available for large companies, as well as for SMEs.
- The opportunity of introducing quality management systems that would include environmental quality.

Assessing the costs of implementation are based on a series of tests already carried out on the European Commission¹⁷, the Ministry of Economy (ME) and the National Agency for Energy Regulation (NAER), the Institute for Energy Research and Modernization (IERM), on the papers presented by specialists in the field¹⁸ and on the basis of assessments and calculations of the team of authors of this study. With the launch of the package, the European Commission made **a simulation of the impact at the EU level** in a working document of the Commission staff accompanying the legislative package¹⁹.

The Commission has based the respective impact analysis on a number of key principles:

- **Cost effectiveness.** Achieving the proposed goals can have significant economic effects and, therefore, the implementation of effective policy instruments in terms of costs is essential.

- **Flexibility.** The impact assessment takes into account the different national *ex-ante* circumstances, such as expected GDP growth, changes in the industrial and energy sectors. These projections are, however, uncertain. Therefore, the policy instruments must allow a large enough flexibility regarding how the objectives are achieved. Without the appropriate policy instruments that allow flexibility, any change in *ex-ante* forecasts could lead to costs that could be avoided using a less rigid option.

- **The internal market and loyal competition.** The proposed policy instruments must be consistent and create conditions of equality in the EU, to ensure fair competition between EU industries in the context of the

¹⁷ Assessing the impact – Complementary document of the package of measures of implementation of the objectives set by the EU for the year 2020 regarding the climate changes and the renewable energy, Bruxelles, 23.01.2008 SEC(2008) 85.

¹⁸ Leca, A. and Muşatescu, V., *Priorities of the energy sector in Romania*, UNDP Seminar, June 2009.

Muşatescu, V., *The Directive 2009/28 and Romania*, Conference CNR-CME, 25 May 2009.

Barbu, S., *The new European legislative package and its effects on Romania*, Conference: We answer the challenges: climate change, 25 June 2009.

¹⁹ Assessing the impact – Complementary document of the package of measures of implementation of the objectives set by the EU for the year 2020 regarding climate change and renewable energy, Bruxelles, 23.01.2008 SEC(2008) 85.

internal market. This can be achieved through using market-based instruments such as EU ETS and other policies and measures at the Community level, such as product standards.

- **Subsidiary.** It is important to ensure that action is taken in the most appropriate manner. In some sectors such as transport, the Member States have key competences to define key policies and measures, for example, ambitious tax schemes, traffic management, modal shift, public transport, urban transport planning. In these sectors the EU must establish a reference framework, focusing, for example, on the setting of minimum targets, of standards of products and other supportive policies. In other areas, in which fair competition operates on a single market, the existence of 27 rules, standards and national regulations would result in the unnecessary increase in costs and distortions in the economic decisions. For these areas it is necessary to create a detailed regulatory framework at European level.

- **Equity.** In March 2007 the European Council recognized the need to take into account the different situations of the Member States as well as the fact that the different levels of wealth affect the ability of Member States to invest.

- **Competitiveness and Innovation.** Until one does not reach a comprehensive international agreement relocations of the carbon dioxide emissions may occur, undermining the overall environmental objective of the EU climate and energy policies. In such situations, some large energy consuming industries that are especially exposed to international competition may be affected. In preparing the proposal it was taken into account the need to protect the competitive position of the EU industry, but at the same time, the established objectives reflect a strong commitment to take the lead in fighting climate change, in improving the energy security, in accelerating the innovation and create a competitive advantage in the area of energy technologies and clean industrial.

In what concerns the methodology that can be used, everyone acknowledges the difficulty of correctly assessing both at a Member State level as well as at the whole of the EU-27. For example, in the document accompanying the package it is estimated that the impact analysis must be performed using a set of modeling tools. There is no single model that can assess the full range of parameters and effects at different levels (EU, Member States, and sectors) of the three different proposals; the complexity of the package would require, in any case, the examination of the options to explore in different ways, using various models used to test their strength. It

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is not for this study to assess the quality and accuracy of these different models, but only to assess the likely area of the effects.

On the other hand, the objectives regarding the climate and renewable energy are ambitious and, obviously, will require a significant initial economic investment, even if the overall long-term benefits are positive and important for the sustainable development of the EU economy. Therefore, the European Commission considers that any analysis should highlight the importance of applying the policies that should minimize the economic costs in each Member State, in the context of sharing in an equitable manner of the efforts, together with other Member States and between different economic sectors.

The paper on evaluating the impact²⁰ shows that fact that in the assessment will have to be applied a wide range of options for policy design. To assess the global effects of the various options there were put forward several options for modeling using the series of models and reflecting the combinations of options regarding political conception. These options of political conception are related to the targets set for the GHG reductions in the sectors not covered by EU ETS (non-ETS sectors), by the targets regarding renewable energy and the amount on which Member States are entitled to bid in the EU ETS. The central point of impact assessment was a reference option based on *cost efficiency* at the EU level. This option is a minimum cost approach, with which the main objectives demanding of cost (20% RES and 20% emissions) can be achieved simultaneously, at a minimum cost to the EU as a whole, in certain framework conditions, such as lack of exogenous consolidation of the improvements in energy efficiency or credit imports JI / CDM (Joint Implementation / Clean Development Mechanism). As shown in the accompanying document, this implies the equalizing of marginal costs in the Member States and in all the sectors, both to reduce the emissions of greenhouse gases within and outside the EU ETS system as well as for the widespread use of renewable energies. But this assessment shows that a distribution of efforts between the Member States based solely on cost effectiveness would lead to important differences in the level of economic cost between Member States. Because the Commission considers that this option would represent a disproportionate requirement for the Member States with the lowest GDPs per capita, the work also examined other options: disjunction of the dynamic of ETS and

²⁰ Assessing the impact – Complementary document of the package of measures of implementation of the objectives set by the EU for the year 2020 regarding the climate change and the renewable energy, Bruxelles, 23.01.2008 SEC(2008) 85.

non-ETS by redistributing the objectives outside the ETYSD, without taking into account the CDM projects, another option with the CDM consideration and, finally, option 2 with the redistribution of the targets on renewable energy without RES trading.

The impact analysis of the target for renewable energies meant that the policies regarding energy efficiency, such as the ones stipulated in the Energy Efficiency Action Plan are implemented. They were not included specifically in the reference option based on cost effectiveness, based solely on the price of carbon and the policies to encourage renewable energy use. The reference option based on cost effectiveness simultaneously achieves the two goals at a direct economic cost of 0.58% of the EU's GDP or 91 billion Euros in 2020. It also provides a carbon price of 39 Euro / tone CO₂ and measures to encourage the use of renewable energy use by 45 Euros / MWh. It is expected that the imports of oil and natural gas would decline by about 50 billion in 2020, the costs of controlling air pollution are expected to decrease to around 10 billion Euros in 2020, while it is probable that the electricity prices should increase by 10-15% compared to the level reached today. Overall, this will lead to an improvement of the energy intensity by about 32% between 2005 and 2020. The reference option reference based on cost-effectiveness assumes that oil prices increased from USD 55 per barrel in 2005 to \$ 61 per barrel in 2020.

The paper also analyzed a basic scenario with a high oil price, this scenario providing an increase in oil prices to \$ 100 per barrel in 2020, with related increases in the price of natural gas and coal. The total costs of the energy system increase substantially in the scenario based on a high oil price, with 275 billion. The results of the scenarios can be seen in Appendix 1. On the other hand, the additional effort necessary to achieve the GHG targets and the renewable energy sources is reduced by approximately 32 billion to 59 billion Euros, or just under 0.4% of GDP, showing that, in terms of implementing the objectives of GHG and the renewable energy sources, the costs are much lower than the economic effects of the current oil price increases. The modeling results for the 27 Member States for the case of the five options (the four already explained, plus the unrestricted trading of RES) are given in Appendix number 2. Romania is noted for the cost of the baseline scenario, respectively an important cost of 0.95% of the GDP in the year 2020, as the maximum value, while the fifth option decreases this cost to 0.04% of GDP. It remains at the discretion of the Romanian government on how to use the flexible mechanisms developed by Directive 2009/28/EC.

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As it also results from their name, these benefits are now in the form of opportunities that can be recovered or not. Moreover, one can distinguish the following **risks when implementing**:

- Failing the moment of implementing the actions, which can lead to a worsening of cost curves.
- The inability of Romanian companies to respond to the requests, for several reasons: a) the lack of financial capacity to invest; this risk is worsened by the current financial situation of the global economic crisis, b) investments only in measures of decreasing the carbon emissions, not in the refurbishment measures that would increase the economic efficiency and thus reduce the costs, c) the organizational disability: problems of management and human resources, d) the lack of information regarding the European and national requirements as well as to the alternatives of the field, e) the lack of access to the innovations in the field.
- The inability of the central and local government to formulate strategies and policies viable on the medium and long term, for several reasons: lack of specialists, political appointments in key positions, lack of organizational capacity, inefficiencies in communication.
- The lack of a system of financial grants and other support measures to facilitate capital investment at the expense of portfolio investments.
- The lack of measures to increase public awareness and involvement in the protection of the environment.
- The possibility of relocating the production to other countries, in the condition that costs are becoming prohibitive in Romania.
- The possibility of invasion of the market by products and services offered in countries that are not covered by the EU ETS scheme, for example, China.
- The massive transfer of cost increases on the population or customers, in a *domino* effect that could damage their purchasing power and therefore, lower the economic growth capacity.

In these circumstances, a correct implementation is desirable, that will enhance the positive effects specified in the goals of energy-climate change package, as long as it allows the reduction of their negative effects.

4.1. Other aspects

■ **Reference year.** The new legislative package has as objective the reduction of the emissions by 20% of greenhouse gases in 2020, compared to emissions in 1990. As this time has mostly elapsed, the Commission considers as reference a year currently close to the present, i.e. 2005. The reference year is the year to which the country in referring regarding the reduction of emissions. In the translation of the base year, the Commission considered that the EU-27 has reduced its emissions of greenhouse gases in

the period 1990-2005 by 6% and, thus, the EU target of reducing the emissions of greenhouse gases (GHG) by 20%, presented in the conclusions of the spring European Council from 2007, actually represents a reduction of only 14% from its 2005 level. Such approach disadvantage Romania with regard to the following aspects:

- Emissions of greenhouse gases had decreased in Romania with approximately 46.5% during 1989-2005, from 280 million tons in 1989 to 250 million tons in 1990 and 150 million tons in 2005; during the same period, the emissions in Germany decreased by 200 million tones, 100 million tons in Poland and in Bulgaria with 50 million tones and so the 6% reduction in EU-27 has occurred only in those Member States, while a number of old Member States had the possibility to increase the GHG emissions, sometimes over the commitment's limit to reduce referred to by the Kyoto Protocol (Spain, Portugal and Italy).

- Thus, by considering the year 2005, the Member States are not starting from the same level as occurred for the first commitment period of the Kyoto Protocol, given that a number of Member States like Spain and Portugal had the possibility to increase their GHG emissions in the first commitment period by 25% and 27%, exceeding even that goal, and by selecting the reference year as 2005, these Member States have an advantage because they start from a high level of emissions generated by an excessive development in recent years compared with Romania, which registered a reduction of GHG emissions and will have to cut down more in the post-2012 period.

- 2005 is the year in which a number of Member States that had not yet begun to implement the additional policies and measures to reduce the GHG emissions to meet the targets under the Kyoto Protocol for the first commitment period (2008-2012) and thus they will have to reduce emissions anyway until December 31, 2008 and, further in time, until 2012 to meet the objectives undertaken by the Protocol.

At the same time, given that, at EU level, it is considered that the total GHG emissions (recorded at the United Nations Framework Convention on Climate Change, UNFCCC and calculated based on the methodology of the Intergovernmental Panel on Climate Change, IPCC) of a Member State are shared between the sectors included in the EU ETS (emissions effectively monitored and independently verified) and non-ETS sectors, one should take into consideration the fact that in the year 2005, Romania did not participate in the EU ETS and therefore, there were no verified emissions for these sectors. The emissions of the Member States for the EU ETS

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installations are checked (therefore reported from down up in the National Allocation Plan, while the emissions for Romania are calculated from top to bottom, based on the statistical reporting).

- To argue the need for flexibility of the less developed Member States of the EU and, in particular, Romania, one must take into account a number of indicators regarding the existing and projected economic growth (e.g. according to Eurostat, Romania had in 2005 the fastest growth rate of constructions in the EU (30.9%) compared to the EU average, which had registered an annual decline of 4%). There are various indicators in Romania, including the GDP growth, which can argue the economic growth in the recent years, and, especially, the forecasted growth and that need to be presented to demonstrate the impossibility of accepting the reference year 2005 for its post-2012 arrangements. Romania does not receive any compensation for the reduction of the GHG emissions that were achieved during 1989-2005 (they will be considered as made by the EU), the consequences being reflected in the economic development of the post-2012 economic development. If the base year is 1990, Romania would be recognized as having reduced the emissions of greenhouse gases in the '90s period, reducing the negative impact on the national economy of the reduction of emissions that are to be made in the next period. Therefore, the Conference of Parties that will be held in Copenhagen in December 2009 could set a new target for emission reductions (i.e. 30%) as compared to 1990.

- **The emission structure.** Due to the economic structure, in Romania the emission structure designed by the EC does not apply, namely 40% of emissions from installations covered by the ETS Directive and 60% non-ETS. In Romania, in the year 2007 were covered by the ETS Directive about 48% of the emissions and, through the introduction of other sectors, will reach about 60% in 2013. Also, from the emissions covered by the ETS Directive, about 60% are coming from energy sector. Therefore, the acceptance of the new ETS structure versus the non-ETS disadvantages the Romanian energy sector.

4.2. The social impact of the implementation of the Energy-Climate Package - the supportability of the bills

Romania inherited from the socialist regime, especially in the large and medium cities, a centralized heat supply system; obsolete both technologically as well as regarding the distribution infrastructure. In parallel with this heating system the tile stoves with gas, firewood and

charcoal continued to subsist in the urban areas, prior to the period of urban reconstruction. They represented the main solution for heating the homes in the neighborhoods or in areas too remote from the cities, in which the heating systems did not yet reach.

The rural areas, almost in 100% percentage, heated themselves with wood, coal and agricultural waste, with more or less improvised stoves, but primitive and inefficient in terms of fuel consumption. According to data from the **2002 population and housing census**, 23% of the homes using centralized heating (thermofication), 24% use their own power plants or gas stoves 50% wood or coal stoves, and 3% did not have a heating system or were cut off from the heating due to inability to pay. The wood stoves were more frequent in rural areas (in proportion of 92%), while centralized heating covered about 60% of the urban households. **The average structure of energy consumption of a household by destination of use** is 57% - heating, 25% - hot water, 11% - electricity, 7% - preparing food. These figures suffer some variation for the urban environment (where about 52% of the population of the countries live and, respectively, for the rural areas (48% of the population).

The importance of **the energy consumption in the residential sector** also results from its size. Therefore, according to the "First National Action Plan on energy efficiency (2007-2010)", the structure of the average consumption of final energy for the period 2001-2005 was: **population 37%**, industry 32%, transport 22%, services 8%, agriculture 1%, from an annual average consumption of 24.68 million toe (1 tone oil equivalent = 10.5 Gcal).

The size of a family's income determines **the capacity to bear the energy bills**, respectively, for the families with low income their classification into a social assistance system. In 2007, in Romania the net minimum wage was 116 euro / month (in December 2007, 149 euro / month). In 2008, these values have been slightly increasing, while in 2009, due to the economic crisis, the values either have significantly decreased or they have stagnated, accompanied by a considerable increase in unemployment. In this context, considering the higher values in the previous years, in 2007 **the poverty** affected 18.6% of the population, "fuel poverty" having higher levels. Thus, a family is considered to suffer from "fuel poverty" if more than 10% of its annual net income is spent on energy (heat, electricity, natural gas), not including the fuel used for transport. According to a recent report of the World Bank, **poverty remains concentrated in vulnerable groups**; especially in the villages, where three quarters of the poor Romanians live. In 2008, about 1.2 million of Romanian was living in

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absolute poverty, when in 2007 their number was 2.1 million people. The World Bank experts estimated that, due to the economic crisis, the share of Romanians living in absolute poverty will increase from 5.7% in 2008 to 7.4% in 2009, and the number of children in this situation will move to 7, 8% last year to 10.7% this year. Considering an average apartment in Romania, with an annual consumption of heat of 12 Gcal / year, electricity by 2000 kWh / year and gas (for preparing food) of 550 m³/an, with prices in 2009, a family will pay for the annual energy consumption about 800 per year, respectively 24% of the annual net income, being framed (by the criteria from the United Kingdom) in the category of “fuel poverty”.

The table below shows the evolution of average gross monthly and annual salary in Romania, for the period 2007-2020.

Table 1. The evolution of the average wage in Romania (2007-2020)

Wage	2007	2008	2009	2010	2011	2012	2013	2014	2015	2020
Monthly Net, euro/month	279	306	278	292	307	328	350	376	405	567
Annual Net, euro/month	3352	3671	3343	3503	3688	3931	4200	4511	4864	6804

Source: The National Commission for Forecasting “The projection of the main macroeconomic indicators by the year 2020”, June 2009.

According to a statistical situation in 2005, out of the total households in Romania, 55.5% failed to meet the current expenses for heating out of the monthly net income and 19.5% failed to pay heat invoices on time due to insufficient financial resources. For the winter of the same year 2005 for the poorest decile of the households, the expenses with the heating for households with central heating accounted for 64.3% of total net revenue, 69% of the users of natural gas and 25.2% for users of wood and coal.²¹

After 1990, all governments have expressed a **growing concern over the improvement of the capacity to pay the energy costs for low-income households**, the responsibility of those steps being attributed to the Labor and Welfare Ministry. By 1997, the subsidizing of the costs of production

²¹ Pop, L., „The social policy of Romania regarding the increase of population access to the consumption of heat energy and the capability to pay the bills”. EMERG II, p.137-160, AGIR Publishing House, 2006, Bucharest.

and supply of heat and power have been the only protection policy for the population from these increased prices (including the industry-population cross subsidies), costs that reflect both the inefficiency of production as well as the inefficiency of the energy supply. From 1997 it is established for the first time systematic aids for the winter for the population, for the users of systems of central heating.

In 2001 the Emergency Ordinance 115/2001 is adopted, which provides protection measures to increase the accessibility to heating for the population that uses natural gas. Direct aids for the people that use the centralized heating system are supplemented by grants, meant to cover the difference between the price for heat production and the price of reference (established by Ordinance 162/1999). One of the important contributions of this ordinance was meant to specify the funding sources of the subsidy for heat: 45% of the total grants from the state budget and the difference of 55% completed from the own funds of the local budgets (in this way, the local authorities had the possibility to increase the prices locally, therefore subtracting the grant level, but growing, in proportion, the direct aids to the population). In reality, the local budgets have not been capable to allocate grants at a rate of 55% and due to the low local administrative capacity, they also have not been able to increase the reference price in the favor of the social protection of those in need. The result of this behavior was that the heat suppliers have accumulated considerable debt due to the unpaid bills.

As regarding the heating aids, they are offered in a fixed amount, depending on the category of income in which the family is categorized (income per capita) and the heating time used (a centralized or natural gas system).

The degree of coverage of the population with low incomes, but also the focus of the benefits for them are different, depending on the legislation that provides different thresholds for eligibility and the different eligibility testing methodologies, especially for consumers of wood and coal, on the one hand and consumers of natural gas / heat, on the other.

A detailed analysis of the social protection system and the capacity to pay energy bills in Romania was made in the Energy Program for Romania - Phase 3 (Romanian Energy Program Phase 3, REP3), coordinated by the American consultancy company IRG and sponsored by IRG USAID, in the period 2005-2007, for the Romanian Government.

The general findings of the REP3 Programme were: the cost of heating is too high compared with the quality of service provided, there is a high rate of interruption of the service, consumers can bear more than 40% increase in the current heating bills, the heating and gas costs during the

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winter exceed 50% of the revenues of many families (situations assessed as “fuel poverty”), only 1.66 million apartments, i.e. 57% of the total are still connected to the national heating system.

One must mention the following **shortcomings of the existing system of social protection for energy**:

a) There is no government strategy for improving the access to energy and supportability; so, the system is fragmented, the authority is dispersed, and the multiple grants: there are four types of price subsidies, three forms of direct aid and three types of support for energy efficiency.

b) The system is expensive and distorts the markets: in 2006 there have been spent over 600 million Euros on energy subsidies and aids for energy, but only 140 million Euros (nearly one quarter of expenses) were allocated for direct aids. The current system produces significant distortions on the energy markets and affects the impartiality of the social assistance system.

c) The system does not encourage the energy efficiency, because the energy assistance finances the consumer part and that affects the price signals for the efficient use of energy.

d) The targets for assistance are not well established, on the whole, the system does not manage to address the poor.

e) The scheme does not provide good coverage for the poor families, thereby increasing social exclusion.

f) The system reduces social cohesion through unequal treatment of the energy consumers.

Both the income support for heat type **local reference price**, as well as the subsidization of a part of the amount of fuel for central heating systems, are variable, unpredictable and do not lead to competition of the heating technologies. The grants through conventional prices for heat and gas suppliers have no motivated the interest of the suppliers for efficiency. The public funds for energy aids do not maintain a sufficient interest for the efficient use of energy by the consumers, because the service only covers the variable costs and does not cover the fixed costs. With the exception of the components managed by the Ministry of Labor and Social Protection, the system’s overall resources are not allocated with priority to the poor. The system still has a low coverage. The most important of the fund grants finances the customers connected to networks (electricity, natural gas and heating), while for over 50% of the population there still are not fulfilled the obligations that Romania has towards the EU cohesion policy (Article 158 of the EC Treaty, former art. 130 a).

In addition to the proposals of a certain generality regarding the **ensuring of a degree of supportability for the energy prices for consumers** made by "the Romanian Energy Strategy for 2007-2020", one has to mention **the propositions of the REP3 Programme regarding the social welfare in the energy department**, including:

- The use of the **binomial tariff** for the supply of heat and gas, therefore reflecting an economic reality. The protection of the vulnerable consumers can be realized through social assistance that could partly or fully cover the component / fixed costs.

- **An unitary system of social assistance for energy** is needed, that would include the **two basic components**:

- a) Direct social aids for energy for the consumers with low incomes that are connected to the networks, established according to the size of the fixed costs of the service (the fixed tariff of the binomial component) for the entire period of the year;

- b) The integration of the low-income households in the national programmes of increase of the energy efficiency: the thermal rehabilitation of the residential areas, other measures to increase the efficiency of the energy and the use of alternative energy sources.

For **the implementation of an uniform system of public assistance** for the population's access to **services of general interest, GIS** (the supply of electricity, natural gas and heat) the following measures are required:

- The establishment of effective mechanisms in order to monitor the energy markets to increase their efficiency and encourage the investments in modernization of the sector due to an increase in the consumers' confidence in the markets. It is necessary to continue monitoring the operation of the electricity markets, natural gas and heat, possibly by a competent, independent and specialized institution;

- The clear separation of powers and responsibilities of the regulators for the energy domain of the ministry responsible for social assistance;

- All the public assistance necessary for accessing the energy will be budgeted in a transparent manner and will focus on the low-income social groups;

- The development of a special component of public support for access to energy, focused on the increase in energy efficiency for the consumers with low incomes, both in the urban and in the rural environment, with emphasis on the thermal rehabilitation of buildings and facilities for heating in households.

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In addition, it is recommended the implementation of a series of **measures in the energy department for strengthening the social policy**, for example:

a) **The cease of all subsidies** towards the energy sector in accordance with the requirements of the European Union Treaty. Removing these subsidies will lead to significant price increases, which, in the thermic energy, is estimated at about one third of the actual subsidized price.

b) **Eliminating the seasonal aid payments for heat** in a fixed amount and the introduction of a **permanent system of assistance for energy** to families with low incomes to fight poverty and social exclusion. The assistance for energy reduces the social exclusion and the poverty caused by the market cost of energy services by financing a part of the fixed component of the energy costs (and, possibly, a part of the variable cost) based on the level of poverty (or vulnerability) of the family. The assistance for energy requires that all poor consumers must pay, at their turn, a part of their energy bill.

The diverting of the funds saved by the state towards **an integral assistance system for the energy targeted towards all the families with low incomes, regardless of the energy use**. The energy service should be priced so that it would promote the employment and prosperity in the energy sector. However, such measures need to promote also the social solidarity and not to exclude the vulnerable categories.

Setting up **a social fund for the domestic consumers** faced with price increases, financed by voluntary contributions from energy suppliers, which will provide partial compensation to consumers for the impending price increases in heat and natural gas. The establishment of this social fund will complete:

■ the liberalization of energy markets by eliminating the remaining subsidies; ■ the reform of the energy prices system, particularly the introduction binomial tariffs; ■ the reconfiguration of the system for energy assistance, respectively the moving of public support from the universal indirect support (through price subsidies) towards tested direct benefits (through social assistance for energy).

It is recommended that the voluntary contribution model should be similar to an insurance or a scheme of private benefits. The Government, through the special tax benefits granted to the supply firms for their contributions, must be form the social fund, so as to encourage the voluntary contributions.

f) The Ministry of Labor and Social Security must establish **the**

annual social analysis in the energy department. The interaction between independent energy regulations and the social policies produces social effects difficult to predict for the decision factors. The factors responsible from the Ministry of Economy and from the regulatory authority, together with the poverty experts and the social services must develop surveys to better inform the policy makers about **the interaction between prices, poverty and energy use.**

g) Develop a new framework law for energy with the clear definition of the general interest service (GIS) for the energy sector, with particular reference to the financing of the access to energy for the vulnerable groups. The regulatory framework should be strengthened to include the specific requirements of GIS for energy companies, especially in terms of the contract provisions and the performance requirements.

The energy-climate change package of the EU approved in April 2009, through the stringent provisions that it contains, will produce an appreciable increase in the energy prices and, hence, reduce their supportability for all the consumers. The most affected will be the vulnerable consumers, which, in the case of Romania, is an important segment of the population. Without a clear and strong government strategy to protect them, developed and urgently implemented, the social effects will be disastrous. In this context, the responsibility and the determination of the policy decision factors in managing this social programme is essential.

PART III.

THE ECONOMIC IMPACT OF THE IMPLEMENTATION OF THE ENERGY-CLIMATE CHANGE PACKAGE

Chapter 5. THE EMISSIONS OF GREENHOUSE GASES (THE FIRST TARGET OF 20%)

5.1. General considerations regarding the greenhouse gases emissions (GG) in Romania

Annually there are released into the atmosphere about 26 billion tones of CO₂, equivalent to about 7 billion tons of carbon (the conversion factor is 1 tone carbon = 3.7 tons CO₂). The concentration of CO₂ in the atmosphere is about 0.04%. In terms of global GHG emissions, **the greatest contribution is the energy's sectors** (for the production of electricity and heat, as well as for the energy activities in the industry), **followed by transport**, through CO₂ emissions from burning fossil fuels (with carbon content, the combustion of them producing CO₂). In this way, the energy sector plays a central role in climate change, while technological changes of this being the main solution for improvement. **The concentration of CO₂ in the atmosphere has increased continuously** since the beginning of the industrial revolution. Thus, in ppmv (parts per million by volume) the evolution was as follows: 279 in the year 1765, 296 in 1900, 337 in 1980, 355 in 1992, and 383 in 2006²².

The general action directory of Romania on the field is given, on the one hand, by *the Strategy and Action Plan for Atmosphere Protection*, focused on improving the air quality. Among the **provisions**, one may mention: the more active involvement of Romania in the “*Intelligent Energy Europe*” programme, the support of the renewable energies, promoting the energy efficiency for the final user and regarding the heat supply systems (with the cogeneration), the control of emissions from transport, the recovery of the energy from waste, the introduction of

²² Buchdahl, J., *A review of contemporary and prehistoric global climate change*. Aric, Manchester Metropolitan University, 1999.

integrated systems for land use, the elaboration of a plan of action in the matter of climate change, increasing the public's education degree on climate change as well as its access to information. These latter measures are particularly necessary, given that a 2008 study by Eurobarometer²³ for the European Commission, referring to **the attitudes of Europeans on climate change**, reveals the following facts: • only 85% of Romanians consider climate change as a serious problem, compared with 90% of the Europeans; • 23% of people who answered believe that the issue of climate change has been exaggerated (26% in at a European level), and 27% responded that they do not know (9% in Europe) • 38% admit that they have not done anything personally to fight climate change, 50% of them say that they would take the necessary measures, if they know what they were; • 66% believe that the industries are not doing enough to reduce the impacts of climate change; 69% make the same claim on regarding the citizens, 66% regarding the national authorities and 51% regarding the EU.

The most recent centralized information regarding the statistic of the GHG emissions come from the National Register of GHG (March 2009)²⁴ and covers the period up to the year 2007. Thus, *the average proportion* between the greenhouse gases in the Romanian economy for the period 1989-2007 is as follows: **CO₂ - 71.39%**, **CH₄ - 17.33%**, **N₂O - 10.70%**, **HFCs - 0.0028%**, **PFCs - 0.58%** **SF₆ - 0.00013%**. As it can be seen, a significant proportion of the GHG emissions come from the CO₂ emissions, the evolution during the period of emissions following the development of the national economy, at that moment in time, having an intensive growth period in terms of energy. It was also noted the decrease in absolute figures for the CO₂ emissions as a result of lowering the quantities of fossil fuels used in the energy sector, resulting from the decline in the activity level of the sector concerned. In 2007, the level of CO₂ emissions (excluding LULUCF - Land Use, Land Use Change, Forestry, as well as agriculture and forestry) was 110, 8 million tons compared to 193.3 million tons in 1989, dropping by 42, 64%. The second contributor to the GHG emissions is the methane, decreasing by 44.59% compared to 1989. This mainly comes from fossil fuel extraction and distribution and from animals. The third important GHG in the Romanian economy is N₂O, dropping by 54.38% compared to 1989, the emissions being originated mainly from agriculture and the chemical industry. The other GHG have a negligible

²³ http://ec.europa.eu/public_opinion/archives/ebs/ebs_300_full_en.pdf.

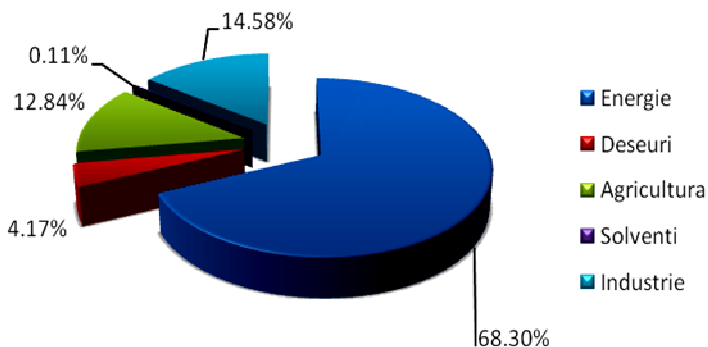
²⁴ *Romania's Greenhouse Gas Inventory 1989-2007*, National Inventory Report, Ministry of Environment, National Environmental Protection Agency, March 2009.

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impact and relevant decreases in the period considered, such as emissions of PFC, coming from the aluminum production, which dropped by over 80%.

Regarding the sectoral distribution, the National Register of GHG emissions states that the energy sector has a share of 68.3% of the total national emissions, followed by the industry with 14.58% and the agriculture with 12.84% as can be seen from the following figure²⁵.

Figure 1. The sectoral allocation of the GHG emissions in the Romanian economy in the period 1989-2007.



Although the percentages reflect a major importance of the CO₂ emissions from the energy sector, the policies and the measures to decrease the emissions at the national level do not make the difference between the types of sectors or the requested effort to realize the decreases asked by the EU. In the following subchapters, there will be presented the ETS and non-ETS sectors according to their specifications.

For a pertinent analysis of the implications of implementing the energy-climate change package it is required **a short presentation of the economic situation of Romania today**. Considering the evidence published by the National Commission of Prognosis regarding the long-term evolution of the main macroeconomic indicators²⁶, provides an economic revival after the year 2009, supported by the exit from the recession of some major world

²⁵ *Romania's Greenhouse Gas Inventory 1989-2007*, National Inventory Report, Ministry of Environment, National Environmental Protection Agency, March 2009.

²⁶ *The projection of the main macroeconomic indicators by the year 2020*. The National Commission of Prognosis, June 2009.

economies. Thus, the real GDP growth for the period 2007-2020 is presented in the following table.

Table 2. The forecast regarding the GDP real growth for the period 2007-2020

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GDP, the real growth %	6,2	7,1	-4,0	0,1	2,4	3,7	4,4	5,2	6,0	5,7	5,3	4,9	4,8	5,0

From the same source²⁷, one can notice the decrease in the share of the industry in the added gross value for the benefit of the service sector, which positively affects the situation of implementing the energy-climate change package. If one considers the energy consumption structure for the activities of the third branches, compared with the industry sectors, the benefit to the implementation of the legislative package is evident. The structure of the GDP for different sectors, compared to the years 2007 and 2020, is shown in the table below²⁸.

Table 3. The structure of the GDP for different structures in 2007 and 2020, %

Sector	2007	2020
Industry	24	20
Agriculture, forestry, fishery, forest exploitation	6	4
Constructions	9	13
Services	50	55
The net taxes on the products	11	8

²⁷ *The projection of the main macroeconomic indicators by the year 2020*. The National Commission of Prognosis, June 2009.

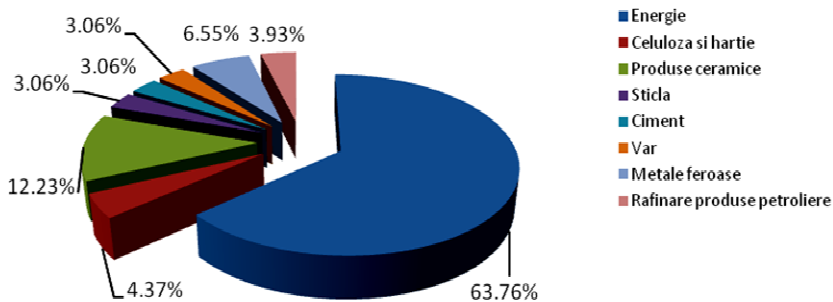
²⁸ *The projection of the main macroeconomic indicators by the year 2020*. The National Commission of Prognosis, June 2009.

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5.2. Emissions of greenhouse gases from the ETS sectors

The sectors included in the ETS have, in the case of Romania, the distribution from the Figure 8.2. The analysis of the implications that the implementing of the energy-climate change package could have on each sector will be done, hereinafter, with reference to the specific of the sector, as well as to referring to the risks that come from the decrease in profit, the increase in the selling price to the consumers, the relocation of the CO₂ emissions (GHG with the largest share).

Figure 2. The distribution of the ETS sectors at Romania's economic level in 2007



Source: ISPE, 2008

The allocations of allowances for the period up to 2012 have the distribution shown in the table below, which does not fully complies with the percentage distribution of the ETS sectors. Therefore, most of the certificates are allocated (respecting the position of main ETS sector) for the energy sector, followed by the production of ferrous metals and not the sector of pottery. The explanation comes from the amount of emissions from the production and processing of ferrous metals, compared to the ceramics industry.

Table 4. The distribution of the allocation of the allowances on the ETS sectors in the period 2008-2012

Sector	The allocation of certificates 2008-2012	The percentage of the allocation
Energy	208 674 068	59,43%
The refining of oil products	28 818 122	8,21%
The production and the processing of the ferrous metals	61 654 319	17,56%
Chalk	4 908 313	1,40%
Cement	41 251 885	11,75%
Glass	1 618 308	0,46%
Ceramics	1 753 842	0,50%
Paper and pulp	2 449 411	0,70%

Source: ISPE, 2008

In the methodology of allocation by sectors, it was started from the historical and projected productions as well as the growth rate of the emissions generated by the activity covered by the scheme. At the moment of allocation from the sector level to the plant level, it is considered the share of the emissions of the referred plant from the total of the emissions generated by the sector of reference, while mentioning the fact that in the energy sector there are also included the installations that belong to other sectors of activity and covered by the scheme, because they own burning installations with a nominal thermic power larger than 20 MW.

For a more accurate estimate of the ETS impact on the sectors of the economy, certain information should be considered, such as, for example: the energy intensity of the production and the carbon intensity (emissions reported to the income from exploitations or production). Regarding a pertinent analysis of the impact of implementing the energy-climate change package on the ETS sectors, we will hereinafter refer to every type of activity, taking into account the following: • The development of the domestic production and by sector. • The evolution of demand and consumption at national level and by sector. • The requirements of the policies of reducing the impact of the GHG emissions on the sector concerned. • The level of real competition on the relevant market of the

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- The ability to transfer the cost increase on the final price.
- The effective opportunities to reduce the GHG emissions.

The size of the costs for implementing the energy-climate change package must take into account the actual costs that a company may have, namely: cost of acquisition of the GHG emission allowances, the cost of the measures to reduce the GHG emissions as well as the increase of the cost of the energy necessary for the production process, mainly, for the situation in which it is acquired from the national energy system.

The General Directorate for Energy Policy (GDEP) of the Ministry of Economy has made its own assessment of the impact of the legislative package in question. According to the results of the meetings with representatives of the GDEP, the main challenges linked to the two targets, in particular, imposed by the requirement to reduce the GHG emissions by 20%, are the following:

■ **Safety in the power supply.** Through the transition from the acquisition in 2012 of about 20% of the necessary emission permits by the electricity producers that use fossil fuels to the acquisition of 100% of this necessary in 2013 it is created a sudden financial pressure on those producers. As a result, it is possible to substantially reduce the capacity reserves at the EU level, while endangering the safety of food. One must mention that the gradual introduction of competitive mechanisms in the late '90s resulted in reducing the capacity reserve; in addition, few rehabilitation projects and new groups have been realized in the last 20 years. Reducing the electricity production based on indigenous coal is another element that endangers the safety of the power supply in Romania.

■ **The relocation of producers.** The European Commission has maintained the graduality of the increase in pressure on other industries that produce CO₂ emissions to avoid their migration outside the Union (“*carbon leakage*”), while for the energy; the Commission considered that this phenomenon is not possible. Unfortunately for Romania, being a country located at the edge of the EU, it is possible to relocate the producers of electricity on fossil fuels in countries like Moldova or Ukraine, countries that are not affected by the ETS scheme and hence, the imports of energy in Romania. The migration will be facilitated by joining the UCTE of the two countries. Both the trade deficit and the food safety will be affected and the effect on emissions will be negligible, the emissions that will not be produced in Romania will be transferred in these countries from the borders of our country.

Considering the fact that short-term changes are not possible in the structure of production or in the structure of technologies, these challenges must be taken into account right now and act upon them immediately. In this regard, the GDEP from the Ministry of Economy has made a series of proposals to be considered in the draft laws under discussion:

a) The application to gradually increase the auctioning of the licenses for the energy producing industry by 2020, like the other industrial sectors.

b) Including in the non-ETS sectors all the plants that have an emission threshold up to 25 000 tones of CO₂ each year and not exceeding 10 000 tones of CO₂, as in the draft directive. These things would allow a proper absorption of the additional costs in the account of the possible increase of 19% of the non-ETS emissions.

c) Extending the support possibilities for all cogeneration systems, and not only for the highly efficient cogeneration systems. Romania is, unfortunately, the beneficiary of a large portfolio of old heating systems, with poor performances, that did not benefit from the necessary investments for rehabilitation and / or modernization. Accepting the possibility of implementing the support mechanisms also for these systems would allow their survival. On the other hand, such a measure should be well designed because it entails the transfer of additional costs on the consumers, a fact that is not sustainable at any time and everywhere. Another solution would be, but only on a short term basis, to increase the subsidized part of the cost, so that local reference price would be bearable. This second solution is unlikely to be applied at this time of crisis.

According to the Ministry of Economy, the impact of the National Emission Allocation Programme in the period 2008-2012 on the economy, analysis conducted at a minimum price of the certificate of emission of 17.5 Euros / tone CO₂ (marked amounts*) and at a maximum price of the certificate of 35 Euro / tone CO₂ (marked values**) can be seen in the following:

- Costs for the development and the operation of investments (new technological phases) made in the refineries to ensure the technical specifications of the fuel, according to Directive 98/70/EC, shall be increased by the additional costs generated by the acquisition of certified **130.8 million Euros* - 261,6 million Euros****.

- Endangering the achievement of the objective of viability of the steel companies, respectively the achieving of a steel production of 9 million tons per year in 2010 (in terms of competitiveness). The additional expenses arising from the acquisition of certificates are **280 million Euros*-560 million Euros****.

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- For the cement and lime sectors the decrease of the allocated emission allowances will lead to specific emissions of CO₂ / t produced under specific emissions, recommended by the BREF BAT reference documents, and prices on t / product will increase by 30-40%. The additional costs of buying the licenses, for the cement sector are **186.7 million Euros*** - **373.4 million Euros **** and for the lime sector are **24.5 million Euros *** - **49 million ****.

- For the ceramics, glass, pulp and paper sectors any additional cost generated by the purchase of certificates could result in non-competitive products and non-economic operation of installations. For the ceramics sector the additional cost of purchasing certificates is 8.3 million Euros * - 16.6 million Euros**, for glass are 8 million Euros*- 16 million Euros **, and for pulp and paper are about 11.25 million Euros *- 22.5 million **. The additional costs of acquisition of certificates for the manufacturing industry are 649.5 million Euros * - 1.299 billion Euros **.

5.2.1. The energy sector: the energy industry, oil refining and coke ovens

The sector with the largest number of installations covered by the ETS, the energy sector, is one of the most important strategic sectors for a national economy. From the point of view of the National Registry, this sector includes the following activities: fuel (from the energy industry, manufacturing and construction industries, transportation and others, according to the IPCC classification) and fugitive emissions from fuels (solid, oil and natural gas).

5.2.1.1. The energy industry

Currently, in Romania, the distribution of the energy production for the first part of 2009 is²⁹: 40 % hydro, 37% energy from solid fuels, nuclear energy 14%, 8% of energy from gaseous fossil and 1 % energy from liquid fuels. From the data provided by the National Commission for Prognosis regarding the balance of the primary energy for Romania shows the following projections: • The decrease in production in 2013, on the basis of a downward trend begun in 2009. The sharp fall in imports compared to 2005, with a slight increase in 2013, after the decreases from 2009. The large share of natural gas resources, coal and oil. • The reducing of the consumption from the industry area and the increase in consumption in the

²⁹ *The raport regarding the results of the monitoring, the electricity market in May 2009**, NAER, 2009

construction department (on the background of the support for this sector, considered in the last years as a driver of the economic growth). • Maintaining a relatively constant increase in the final consumption. • The reduction of the industry and construction in the consumption: from 61% in 2005 to 54% projected for 2013. • The significant reduction of the total energy intensity from 0.611 tep/1000euro2005 to 0.252 tep/1000euro2005 in 2013. One can notice an important difference from the present energy intensity compared to the average of the European Union.

Regarding **the specific features of the energy sector** it is mentioned, in particular, three of them: first, it is characterized by **high inertia**, with a time constant between the decision and the practical accomplishment of the order of 4-15 years, second, with the transport sector, are **the main contributors to environmental pollution and climate change**, thirdly, require **considerable investments**, often very difficult to obtain.

■ **The energy needs of the end users** can be divided into three categories³⁰:

- a) needs of energy in the form of liquid fuels (fuels) for the transport sector, very rarely gas and recently solar energy;
- b) energy needs that can be met only by electricity (lighting, stationary engines, electrolysis, electronic equipment, electric trains and trams, etc.)
- c) Energy needs as heat, are the most numerous and can be divided into three temperature ranges: • low temperature (below 100°C), mainly heating buildings and the production of hot water; • average temperatures (from 100°C to 300°C): heat treatment in the chemical industries, the sugar industry, food, textile, paper, etc. in general in the form of steam; food preparation also fall in this category; • high temperatures (over 300°C): a wide range of industrial uses, some processes (for example in the steel or cement industry) sometimes require temperatures above 1000°C.

It should be noted that more than 60% of the enormous amount of energy consumed in the countries of the region of the Economic Commission for Europe (ECE) of the UN (about 60% of the global demand) is used to produce heat, the difference being divided between the transport sector (about 25%) and electricity sector (about 15%). According to the Worldwatch Institute, globally, the electricity is only 13% of the final energy use (17% in the industrialized

³⁰ Leca, A. and Muşatescu, V. (coordinators). *Energy management. Principle, concepts, policies, instruments*, AGIR Publishing House, Bucharest, 2008.

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countries)³¹. According to sources ECE - UN, half of that percentage of 60% is used to produce a heat below 100°C, meaning a low quality energy, which can be obtained from many primary resources.

For Romania, according to calculations made by the author, it is estimated that the share of the final heat demand in the final energy consumption is of 75-80%, electricity and fuels with almost equal weights of 10-15%. From the final heat demand it is estimated that approximately 60% is below 100°C, 10-15% is in the range of 100-300°C and 25-30% is applied to over 300°C.

Given the importance of energy for the society, as well as for all the other economic sectors, the development of this sector is carried out under the supervision of the state, on the long term through the development and the implementation of a sector strategy, and on the short term, by implementing a policy related to the strategic document. This last document is “The energy strategy of Romania for the period 2007-2020” approved by the Romanian Government by GD 1069/2007 and published in the OG no. 781 of November 19, 2007³². In an economy increasingly globalized, Romania’s energy policy is realized in the context of the developments and changes that take place nationally. **Given the dynamics of this international context, the Romanian Energy Strategy must register significant and urgent changes.**

In this context, Romania's energy policy must be linked with similar existing documents at an European level, given the need for the convergence of our country’s policy with the European policy in this area. The current trends will be analyzed in the present strategy, in the process of defining the objectives of the Romanian energy policy and the measures for their implementation.

The evolution of the energy demand and the primary energy resources on an international level imposes the disposal of the scenarios that have as basis a low energy price on the long-term. The improving of the energy efficiency, the increase in the share of renewable resources and the diversifying of the supply of sources and supply routes of primary energy are the priorities for the energy importing countries. Through the including of the environmental costs associated with the production of electricity from conventional sources. The European Commission estimates on the long-term the doubling of the cost of production of electricity from coal or oil and an increase of 30% in the case of using natural gas as fuel.

³¹ Flavin, Ch., Lenssen, N., *Powering the Future*. Worldwatch Institute, S.U.A., 1994.

³² *The energy strategy of Romania for the period 2007-2020*. HG 1069/2007, published in the Official Gazette no. 781 from 19 November 2007.

Table 5. The situation of the national primary energy resources

The resources bearing primary energy	Reserves						The estimated annual production Mil. tones ¹⁾	The estimated insurance period		
	Reserves		Concesioned exploitables		In new perimeters			Geological Reserves	Concesioned exploitable reserves ²⁾	In new perimeters
	Mil. tones ¹⁾	Mil. tep	Mil. tones ¹⁾	Mil. tep		Mil. tep		Years	Years	Years
1	2	3	4	5	6	7	8	9=2/8	10=4/8	11=6/8
Coal										
-pit coal	755	422	105	38,8			3,3	229	32	
-brown	1490	276	445	82,4	1045	133	32	47	14	33
Oil	74	72					5,2	14		
Gas	185	159					12,5	15		

¹⁾ exclusively natural gas, expressed in billion m³;

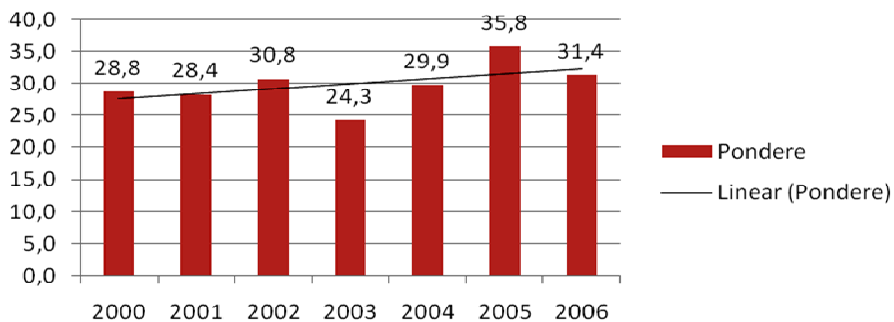
²⁾ the time to grant a concession is less than 2 years, and the opening of a perimeter at the projected capacity can exceed 5 years
5 years

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■ **Exhaustible energy resources.** Romania has a wide but with a low quantity or expensive variety of primary energy resources: oil, natural gas, coal, uranium ore as well as a significant potential for RES, particularly in the hydro energy and wind field. In the table below it is showed the situation of Romania's primary energy resources³³.

Romania has a specific potential important for five renewable energy sources: *wind, solar, hydropower, biomass and geothermal energy*, and their share in energy total is shown in the following figure. Its oscillating trend shows that the implementation of this directive can generate long-term positive effects on the Romanian economy, only if it provides viable funding sources. Romania was the first country in Eastern Europe which joined the Partnership for Renewable Energy and Energy Efficiency.

Figure 3. The percentage of the energy from renewable sources in Romania, in the period 2000-2006



The harnessed technical wind potential is estimated at 8 TWh / year, and its utilization degree is very low. According to EWEA data in 2006, Romania was on the last place, with an installed capacity of 3 MW (currently 6 MW), the wind sources of energy for the EU-27 at that time amounting to 48 062 MW.

Biomass is the main source of RES for heat (heating) in Romania. In 2004, for this purpose over 3 million toe of biomass have been used, with little annual variation. **Biomass** is the biodegradable fraction of products, waste and residues from agriculture, including vegetal and animal substances, from forestry and related industries, as well as the biodegradable

³³ *The energy strategy of Romania for the period 2007-2020*. HG 1069/2007, published in The Official Gazette no. 781 from 19 November 2007.

fraction of industrial and municipal waste³⁴, which is the basis of the production of biofuel. Using biodiesel in Romania may replace normal diesel (gas oil), without having to be made changes to engines, maintaining the payload capacity. It is a 100% natural diesel fuel that can be produced, in general, out of rape, palm, soy, sunflower, olive oil, etc. Being a fuel superior in quality to the diesel fuel, made from the oil of technical plants, biodiesel is biodegradable, non-toxic and does not contain sulphur.

Romania has a potential of about 167 thousand toe/ year of low temperature **geothermal resources** (between 60 and 120° C), which currently are valued at about 30 thousand toe / year (18%).

■ **Production and consumption of energy.** Romania's current energy situation is determined by developments in the transition period as well as the overall economic and social situation of the country in the recent decades, characterized by poor management, excessive centralized, which determined the orientation of the resources primarily for forced and overdeveloped industrialization, with high costs, in total lack of correlation with their own availability of resources and the neglect of the other sectors, particularly agriculture, transport, tourism and services, leading to an inefficient economic activity and a reduced quality of life.

The structure of the annual consumption of primary energy resources in 2007, totaling 47.9 million toe³⁵, broken down as follows: 59% oil and natural gas, coal 27%, 7% RES, 4% nuclear, 3% water. Due to the lower economic development level, the gross energy consumption per capita (2.3 toe / inhabitant.) in Romania is about two times lower than the average value of the EU-25 countries. The internal production of primary energy remained constant (about 28-29 million toe), the increase of the coal production offsetting the decrease of the production of oil and natural gas. Based on the increase in primary energy consumption, the import dependency has risen from 27% in 2000, to about 40% in 2008.

It should be noted that the contribution of hydrocarbons (oil and natural gas) in the annual balance of primary resources was 60-63% and that, in the light of the wearing out of domestic reserves, relatively little action has been undertaken to replace them. It also should be noted that, in time, the share of industrial consumption declined, increasing the

³⁴ According to the definition of the Government Decision 1844/2005 regarding the promotion of the use of biofuels and other regenerables fuels for transport.

³⁵ *The projections of the energy balance for the period 2008-2013.* The National Commission for Prognosis of Romania, 15 June 2008, based on the data published by the National Institute of Statistics.

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consumption for the residential sector and the services department. The electricity production, in the first half of 2009 was 29.4 billion kWh, down by 3.86 billion kWh (-11.6%) over the corresponding period of the year 2008. The decrease in electricity production was due, mainly, to the decrease in consumption, with 3.88 billion kWh (-11.8%). The production from thermal power plants fell by 3.143 billion kWh (-17.6%), the production of hydropower plants was down by 1.28 billion kWh (-12.9%), while the nuclear-electric power energy increased by 0.53 billion kWh (10.3%).

The final consumption of electricity in the first half of 2009 was 24.2 billion kWh, with 9.1% lower than the first semester of 2008; street lighting registered an increase of 9.8% and the consumption of the population increased by 8%. The export of electricity has decreased from first semester, 2008 with 0.84 billion kWh, 29.9% respectively.

The heat supply was done in centralized systems of distribution from thermal plants (CTP) and electric thermal/cogeneration plants (CHP), which provide heat for a city, an area of the city or a district. In recent years, the total heat consumption decreased slowly, mainly, due to the decrease in industrial consumption, total consumption in the year 2006 amounting to 9 million toe, out of which the consumption provided through centralized distribution systems representing 2.6 million toe, respectively about 30%.

Urban centralized supply systems with centralized heat and power cogeneration represent in Romania the most defective energy sub-sector, because of the physical and moral wear and tear of the plants and equipments, the larger total energy losses between the source and the buildings (by 35-77%), the insufficient financial resources for the operation, maintenance, rehabilitation and modernization and not least because of complex social problems related to the supportability of the energy bills. As regarding the urban housing fund supplied with heat, it is represented by more than 83,800 housing units, with about 3 million apartments and 7 million dwellers, many of them having modest incomes. The high energy losses, of 40-50%, require an emergency heat rehabilitation of these buildings. In percentages, the number of homes connected to urban centralized heating systems is 57.9% of all housing in the urban area and 30.7% out of all the housing.

According to estimates of the National Institute of Statistics (NIS), approximately 45% of the population of Romania (10.13 million people) lives in rural areas and they have as a basic occupation agriculture or other rural activities. Although 98% of the households have electricity, only 7%

of them (0.27 from 3.81 million) are connected to gas distribution networks. The main fuel for heating and food preparation is biomass (wood, wood or agricultural waste) and 98% of households use stoves for heating. Only 2% of households are equipped with centralized heating systems. Even the latter use for cooking mostly, stoves with solid fuel (biomass).

■ **The technical condition of the installations.** The entire energy chain of resource-production-transportation-distribution-consumption is characterized in Romania by a low efficiency, respectively, a high energy loss for the following reasons:

Technologies and equipment throughout the chain are from the years 1960 and 1970, being obsolete and physically outworn. About 80% out of the thermal power groups were installed before 1980, out passing their normal life (30 years). Most of the thermal power capacities lack suitable installations for the reduction of toxins, thereby the emissions of NO_x and SO₂ are topping over the maximum allowed in the EU. In recent years the thermoelectric capacities were upgraded/retechnologised by approximately 10% of the installed capacity. The total efficiency of the Romanian power stations is by 15-20% lower compared to the power stations in the EU countries. With regard to the hydro-power plants, 37% of them have over passed their normal life expectancy. In recent years there have been rehabilitated capacities amounting to approximately 25% of the total installed hydro power, representing about 900 MW.

The electric distribution networks are characterized by a high degree of physical wear as well as moral wear of the power lines for low, medium and high voltage, of the stations and the transformer posts. The individual technology consumption in the distribution networks (including the commercial losses / energy unpaid or avoided) had a slight decrease, reaching in 2004 the average annual value of 12.6% compared with the average of the EU countries of 7.3%.

• **The centralized district heating systems** are faced with physical and moral wear of the installations and equipments, the insufficient financial resources for maintenance, rehabilitation and modernization, the large losses in transmission and distribution, the inaccurate thermal insulation of the existing housing fund (85 000 multi-storey residential blocks with about 3 million apartments, where about 7 million people live). The best centralized heating systems (heat source-transport-distribution-block houses) have about 35% heat losses and the inefficient ones about 77% losses, paid by the final consumer and welfare system.

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These factors have led to high production and distribution costs, reduced service quality and in the increase in the value of the energy bill. If in 1989 251 operators of centralized heating were operating, in early 2008 there were only 104 operators, the difference being represented by the operators that have disappeared due to financial difficulties. Although the thermal rehabilitation of the buildings can reduce the heat consumption by 40-50%, the lack of an effective system of financing has made the thermal rehabilitation to be achieved only for 20 blocks, a totally insignificant figure. For comparison, after the first oil crisis in 1973, the Western European countries have developed national programmes for energy rehabilitation of the buildings with a duration of 15-25 years, managing to reduce heat consumption by 60-65%.

It should be noted that the EU demanded an additional decrease of 22% of the heat consumption of buildings by 2012. Compared with sub-sectors of electricity and gas, the central heating subsector in Romania is in the most difficult situation, with a very high social impact. The disappearance of operators and the disconnection of the occupants from the central heating have made that today only 1.6 million apartments, i.e. 57% of the total, are still connected to these systems.

- Nearly 69% of the total length of the **National Transmission System of natural gas** has exceeded the standard operational life. Out of the total of regulatory and measurement stations, approximately 27% have been operating for over 25 years. In recent years there have been upgraded/replaced the pipes of a length of 1 964 km, representing about 24% of the total length. The natural gas distribution networks are characterized by a high degree of wear of the valves and lines, about 40% having exceeded their normal life. The underground storage capacity for natural gas has known a continuous development. Compared to 2000, when it was stored 1 340 million m³, in 2005, in the eight existing stores was stored the quantity of 3 084 million m³.

- **The National System of Transmission of the Oil through Pipelines** has a transmission capacity of about 24 million tones / year. In 2005, the transmission capacity had been used at a rate of 54%. Since 1996, the system entered into a comprehensive programme of rehabilitation / modernization, completed at the end of the year 2006.

- **Environmental protection.** The energy sector is a major source of pollution due to mining, processing and combustion of fossil fuels. In 2005, from the combustion of fuel for the production of energy resulted about 88% of the total national emissions of NO_x, 90% of SO₂ and 72% of

the particulate matter discharged into the atmosphere. The management of the radioactive waste produced by Unit 1 at Cernavoda, in its lifetime, is realized in accordance with the requirements of the standards of the International Atomic Energy Agency and the advanced international practices. Spent nuclear fuel is stored safely, for a period of 50 years, in a dry storage (DICA), developed on phases on the Cernavoda site. The deposit is made to respect international standards. For the final disposal of spent nuclear fuel a suitable geological deposit will be built in the period from 2040 to 2055. Low and medium radioactive wastes are stored into an intermediate storage (DIDR) for the final disposal there will be achieved a final repository in 2014. The Average Annual Unit 1 Power Plant environment reports show no impact on the environment, population and operating personnel. Regarding the preparation of the ore and the refining of the uranium concentrate, there will be made a classification of the quality indicators of the industrial wastewater in NTPA 001/2002 by the end of the year 2010, by making wastewater treatment plants and by storing the contaminated radioactive waste salts in dry storages.

■ **Energy markets – the public service.** A basic principle of the free market economy is the consumer's right to choose the provider of a product and/or service. In energy, this represents the shift from provider-consumer relationship specific to the energy monopolies or oligopolies to the competitive market relationships. An important note is linked to the fact that **the energy market is seen as a powerful tool for enhancing of EU energy security**, as a whole and the security of each Member State, in part.

The European Commission progress report on the stages of implementation of the internal market, addressed to the Council and the European Parliament at the end of the year 2005 showed the need to further separate the vertical integrated activities, strengthen the regulatory capacity and the independence of the regulating authority, to build additional interconnection capacities as well as the promotion of measure for a better functioning of the competitive markets for electricity and natural gas. The fact that for the industrial consumers the electricity prices vary between the different EU countries, from simple to double, and that the exchanges of electricity between the countries only reached 10.7% of the consumption, clearly reflects that the process of creating the single market is far from being over. At the Member State level, this is reflected by the degree of concentration of production, manifested by the existence of less than three operators. If in the electricity department, three producers own on average half of the market, on the gas market the concentration degree is over 70%. This concentration trend seems to continue, which is why the European

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Commission triggered in 2005 an investigation regarding the compliance with competition rules, investigation whose results were expected by the end of 2006.

In Romania, the creation of a functioning energy markets was based on: • restructuring the power sector by separating the production, transport, distribution and supply activities; • the market liberalization through free access to the transmission and distribution networks, linked with the eligibility of the consumers, thereby encouraging the competition in the production and supply sectors; • The implementation of a legislative and a trading energy framework, that is both consistent and transparent; • the transposition of the provisions of Directive 2003/54/EC concerning the common rules for the internal market of electricity and the Directive 2003 / 55/CE regarding the common rules for the internal gas market.

The electricity market. Romania has opted for the decentralized market model of electricity, in which the producers and suppliers are free to enter into transactions of sale of electricity. The market model chosen is based mainly on the development of bilateral contractual relationships between manufacturers and suppliers, with the gradual reduction of the regulator's intervention in the competitive segment.

The relations between market participants are based on contracts that can be negotiated or regulated bilaterally. The regulation of activities that are of natural monopoly nature (transmission and distribution) was conducted on principles of transparency, non-discriminatory network access and cost justified recognition. Beginning with the year 2005, the regulated tariffs for network use is calculated based on the ceiling type methodologies. The level reached at this time is appropriate to the global requirements in the field, making possible the integration of the national electricity market integration at a regional and European level.

Until the total opening of the electricity market, it was composed from the regulated market and the competitive market. On the competitive market prices are formed freely on the basis of supply and demand. On the regulated market, the prices and tariffs are set by NAER based on their own methodologies. Since 2005, all consumers except households have become eligible, which corresponds to a degree of opening of the electricity market by 83.5%. The full liberalization of the electricity market, including for the households, took place in 2007. Until the full opening of the retail electricity market the distributors were required to also carry out the delivery service for the captive customers of the license areas, at regulated tariffs.

The electricity market has expanded and improved by the introduction in 2005 of four new trading platforms: • *The Day Ahead Market*; • *The Balancing Market* • *The Centralized Market of Bilateral Contracts*; • *The Green Certificates Centralized Market*. This model was adopted by most of the European countries. Romania is the only country in the region that organizes a market for the following day and a functional balancing market. Thus, in addition to trading through contracts, the participants in the wholesale electricity market have the possibility of voluntary participation to a physical energy market held on a short-term basis, with one day before the day of dispatch (The Day Ahead Market), operated by the Commercial Operator of the Electricity market (COEM). The balancing market has as its main purpose the compensation of the deviation from the planned values of production and the consumption of electricity, as is mandatory for all available production capacities.

The support of the electricity production from renewable sources is achieved by the Green Certificates traded on the Competitive Market for Green Certificates, and the mandatory quotas for the suppliers. Each supplier is required to annually purchase a quantity of Green Certificates, in proportion with the amount of energy sold to the consumers by the respective supplier.

In terms of market competition, although a number of legislative and regulatory measures have been taken to liberalize the market and for the liberalization of captive consumers, at a calculation of a Herfindahl-Hirschman Index (HHI, market concentration index equal to the sum of squares of shares market of traders acting on the analyzed market) it is shown that the analysis should be done at the manufacturing and supply level. One also should distinguish between the retail and wholesale level. For 2008, for example, at the level of the competitive retail market, the calculated HHI index is 743, with a concentration of 38% of the market in the first three competitors, indicating the degree of increased competition. At the same retail level, on the regulated market, HHI has a value of 1315, with a concentration of 51% of the market in the first three competitors, indicating a moderate level of competition. The ratio of the two national markets is 49% - 51% in favor of the regulated market, so it can be concluded that the HHI index for the energy market is 1034.72, revealing the optimum competition, the degree of market concentration in the first three competitors being 44.63%. However, while noting that, on the regulated market, the suppliers have regional monopoly, which alters the distribution of market shares, the new calculated level of the HHI is

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5464.07, indicating a high level of concentration, which allows a reduced number of captive customers.

The natural gas market consists of: *the competitive segment* that comprises the natural gas trade between suppliers and between suppliers and eligible consumers; in the competitive segment the prices are formed freely based on the offer and demand; *the regulated segment*, which includes activities with character of natural monopoly and activities that provide at the regulated price and based on the frame contracts; in the regulated segment of the market, the price systems and the tariffs are established by the ANRGN based on their own methodologies.

The activities corresponding to the regulated segment include: natural gas supply at a regulated price and based on frame contracts to customers, the management of the commercial contracts and the contractual balance of the internal market, the natural gas transportation, the underground storage of natural gas, the natural gas distribution, the natural gas transit – with the exception of the transit that takes place through the dedicated pipelines (this transit is subject to the regime established by international agreements under which they were made).

In order to ensure an organized framework regarding the equitable and non-discriminatory allocation of the natural gas from domestic production and imports there has been established and functions The Market Operator, organized under the National Gas Dispatch of Bucharest, from the structure of Transgaz SA Medias. The gas market in Romania has been gradually opened starting with the year 2001; for the year 2005, the degree of opening of the gas market was set at 50% of the total consumption. Starting with the date 01/01/2006, the openness of the domestic gas market was 65% of the total domestic consumption, from 01.07.2006 the degree of market opening was 75% and the degree of openness in 2007 was a full 100%.

In order to ensure the consumption necessary to all categories of consumers and eliminating the failures occurred in the domestic natural gas market in the winter of 2005-2006 (as a result of low temperatures and the reducing of the imported natural gas quantities in January and February 2006), The Romanian Government approved the promotion of the concept of interruptible consumer, in order to achieve the security of gas supply in accordance with European Council Directive 2004/67/EC and the allocation under an indiscriminative regime of the quantities of new gas to all industrial consumers that accept the status of interruptible consumer. The interruptible consumer is the consumer who contributes decisively to maintaining the safe operation of the National Transmission System of

natural gas and the distribution systems, by accepting the reductions in consumption, up to the finish, in accordance with European Council's Directive 2004/67/EC, in order to insure the protection of the supply of domestic consumers.

■ **The efficient use of energy.** The technological leap for the use of effective methods offers considerable potential for improving the energy efficiency. Presently, **the overall conversion of energy efficiency in the usable energy is 1/3 (2/3 of the primary energy is lost in the conversion).** There are many economic opportunities to develop the energy efficiency, mainly, for the final step of conversion of the energy necessary for energy services. In the next 20 years, the primary energy required for a given level of energy services in the industrialized countries can be reduced by 25-30%. This opportunity exists in all the stages of the energy chain. In most of the industrialized countries, this potential increase from 30% to more than 45%, relative to the improvements reached with the main source. This idea will be discussed in detail in the chapter dedicated to energy efficiency.

With regard to the GHG emissions, they are in a direct link proportional with the increase in production in the sector, to the extent that there are no investments in retechnologising, to increase plant efficiency. Compared to the GHG emissions from other sectors (industry, agriculture or waste), the energy sector is the largest source of anthropogenic GHG emissions, according to the National Register of GHG emissions by **69% of the total emissions, of which 88.36 % CO₂.** The contributions of each sector for 2007 are: **energy 41.5%**, manufacturing and construction 17.95%, residential 15.81%, 10.95% transport, fugitive emissions from oil and natural gas 6.94%, 4.04% commercial sector, fugitive emissions from solid fuels 2.28%, agriculture, forestry and fishing 0.52%.

The largest percentage of emissions, however, reduced compared to 1989, is given by the emissions **from the energy sector with solid fuel** respectively the power plant with coal. This comes to support the idea that energy is the ETS with the greatest impact and a high emission rate, from the power stations. Note that the thermal power stations have outdated equipment, with a expired life expectancy, in which the investments made to that moment have been for rehabilitation / repair and not for upgrading.

The cost structure for the energy-producing plants in Europe, is presented in the table below³⁶, assuming the price of fuels: coal, 56 Euros / tone, lignite coal equivalent, 31 Euros / tone, gas, 12.6 Euros / MWh. Basically, there are three main types of costs in a power plant: fuel,

³⁶ *EU ETS Review*, McKinsey European Power Model, 2006.

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maintenance and operational expenditures and the capital expenditures (depreciation). In the case of old plants with the expired life expectancy, as most of the installations in Romania are, the main advantage is the fact that the depreciation is zero.

Table 6. The indicative structure of the expenses for the power plants, in euro/MWh

Type of installation	Fuel	Operational expenses	Capital	Total
CCGT – new	22,1	4,7	8,3	35,1
Coal – new	15,2	6,3	17,4	38,9
Brown coal – new	8,9	6,5	15,3	30,7
Nuclear – new	14,1	7,1	19,5	40,7
Nat. gases – old	39,4	12,9	0	52,3
Turbines with gases	40,6	42,0	0	82,6
Coal– old	18,3	21,0	0	39,3
Brown coal – old	10,8	13,1	0	23,9
Nuclear – old	14,5	8,3	0	22,8

In addition to these costs, in the context of implementation of the EU ETS scheme, there are also (as ISPE, 2008) the following types of costs: • costs of purchasing allowances, to respect the annual return requirement of a number of allowances equal to the generated emissions; costs of monitoring, reporting and verification of CO₂ emissions related to the installations, imposed by the need to comply with the present legislation; • costs for the management and trading of the emission allowances, assessing the costs that an operator has to bear in the case of an efficient management of the certificates portfolio and in the event that there is trading with them; • costs regarding the increase in the electricity prices.

However, there should also be considered the following **considerations at an European level**, considerations to be taken into account also for the case of Romania:

b) Compared with a situation where they are no CO₂ constraints, the EU ETS must ensure a 50% decrease in emissions from solid fuels by 2020 to meet the established target

c) At the EU level, it is expected an increase in the electricity prices by 10 Euros / MWh, at a CO₂ price of 20 Euros per ton, assuming a full transfer of the costs of the CO₂ into the price.

d) According to empirical studies cited in the report³⁷ on international competitiveness of the EU ETS, the level of competition in energy markets is lower, the lower the transfer costs of CO₂ is in the electricity prices. The explanation for this comes from the price establishment method, which is not completely based on the market in the case of a oligopolistic competition.

e) The price for natural gas, publicly traded worldwide, is directly linked to the oil prices, which experienced high volatility in recent years, with the probability of maintaining this volatility in the future, against a background of political and geostrategic factors determinants of the price.

f) In the conditions of a high world price of oil and thus a high gas price, coal price becomes competitive for production. This will determine a main use of this type of fuel and, therefore, there will be a pressure to increase emissions.

g) In the case of a low global price of oil and hence a reduced price of natural gas, according to historical observations, this will determine the facilitating of economic growth, which will bring with it an increased quantity of GHG emissions, which outperforms the corresponding reductions of the transfer from the use of coal to natural gas. The competitive position of coal will be a relatively weak one in Europe³⁸, however, it should be noted that the lignite power plants have variable costs in the short term, of only 10% of the fuel costs, due to the creation of energy complexes, and the fact that lignite does not have a sufficiently large energy potential to justify the transport in other exploitation locations.

So, in the context of using the energy sources (input in production on the time table) according to the marginal cost on the short-term, the lignite power plants will be used even at a cost increase in CO₂ emissions.

Therefore, **for the thermal subsector** from the energy sector, in the case of the lack of investment in retechnologising in which the production yields and / or the production technology will change, aligning them to the BAT (*Best Available Technologies*), as well as BP (*Best Performance*) and in conditions of a free competition where the cost of certificates must be included in the final price, not being free any longer than in a small

³⁷ *EU ETS Review – Report on International Competitiveness*, European Commission, Directorate General for Environment, McKinsey, Ecofys, 2006.

³⁸ *UK Energy and CO₂ Emissions Projections, Updated Projections to 2020*, DTI, 2006.

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proportion after 2013 and not at all after 2020, **one can make the following considerations:**

- The decrease of the competitiveness of the coal compared to other sources of energy production, with reduced CO₂ emissions: nuclear, hydro, even natural gas.
- The reducing of the investment capacity in order to limit the gap to other energy sources.
- The marginal central will be, in the case of the merit curve, centered on coal or natural gases, what will lead to an increase in the final price to the consumer.
- The increase in electricity prices produced by including in the price the costs of emission allowances, which is likely to exceed the price of fuel and, therefore, make inefficient the production activity.
- The decrease of the profitability until the threshold of loss, in the conditions of a fully liberalized market will lead to the exit from the market of some solid fuel energy producers. This may have a series of negative effects, propagated at the national level: the high unemployment rate and disadvantaged areas affected (there are pointed out, mainly, the energy complexes Turceni, Rovinari, Craiova or Deva).

On the other hand, a drain in the market for inefficient producers can have, at least apparently, positive effects. In theory, this will lead to an optimal setting for the final consumer price, which will provide the most efficient price, according to the merit curve. In practice, however, the social costs, in terms of a lack of alternative for the available work force, may surpass the benefits for the implementation of the scheme.

5.2.1.2. Oil refining

Romania currently has 10 refineries, 5 of them of large dimensions, bringing together approximately 85% of the refining capacity. Petrom SA has two refineries: Petrobrazi Ploiești and Arpechim Pitești, with a combined refining capacity of 13.5 million tons / year and the opportunity to work at half capacity due to the two separate modules. The two refineries of the Rompetrol group, Rompetrol Refining (Petromidia, at the Black Sea, Năvodari) and Vega (Ploiești) together cover 32% of the refining capacity of Romania. With an installed capacity of processing of 4.8 million tons of raw material per year, Rompetrol Refining is the most modern refinery in the country, with the latest technology installed. Vega, with an installed capacity of processing of 0.5 million tons per year, has specialized in the processing of alternative raw materials and the production of organic solvents, bitumen with special purpose, organic fuels for heating and other specialized products. Petrotel was privatized by acquiring a majority stake by the company Lukoil, which has upgraded the refinery, building installations for hidrofining of gasoline, isomerization and hydrogen

production. The total volume of processing of the refinery is 2.5 million tons per year. RAFO Onești has a capacity of 3.5 million tons per year. Astra Ploiești was closed in June 2005. The Romanian Star Cămpina has a capacity 0.4 million tons annually. Petrolsub Surplacu Barcău has a capacity of 0.46 million tons annually and produces bitumen for roads and insulations, oil and fuel. It is in bankruptcy since 2007, being purchased in 2008 by EcoDiesel.

CO₂ **emissions** are closely related to the refinery capacity, the usual quantity of emissions being of 15 tons per 1 000 barrels in direct emissions and 1.4 tons to 1 000 barrels in indirect emissions. The sources of CO₂ emissions are: *Fuels*: natural gas, refinery gas (technological process), oil, *Raw materials*: natural gas (raw material for the hydrogen Factory), oil. The cost of refining a barrel represents between 1 and 2.5 Euros / tone depending on the complexity of the refinery, the oil from Romania being placed around the average of the spectrum of refining. Considering the CO₂ price of 20 Euros per ton, according to the forecast³⁹, the cost of refining will increase by about 32 cents, which equals with a percentage of 20.5%, which is very likely to be mostly transferred (approximately 75%) towards the final consumer, considering the margin for a tone of refined oil. In the conditions of a sharp rise in the oil prices on the international exchanges, as was the case in 2008, correlated with an average elasticity of demand for petroleum products, one can conclude that, as long as oil companies accept a slight reduction in the profit margin the final consumer is not affected. Considering the means of transfer in a higher percentage than 50% of the cost increases towards the final consumer, it can be presumed that this will happen in this case as well.

Therefore, with a rise of about 20% of the final price of the product of refining towards the final consumer, **the economic impacts** may be the following: a) The decrease of fuel consumption of the economic agents may lead to restricting the transports or the shift towards cheaper alternatives. Considering Romania's relief, as well as the existing infrastructure, choosing an alternative can prove to be more expensive than supporting the price increase. b) The transfer of fuel price increases in the prices of consumer goods: affecting the daily basket can lead to inflationary effects. c) Limiting the economic growth, the cheap fuel being a way to support it. d) The decrease of the ability of oil companies to invest in retechnologizing e) The reorientation of the oil companies towards the refining capacity

³⁹ *EU ETS Review – Report on International Competitiveness*, European Commission, Directorate General for Environment, McKinsey, Ecofys, 2006.

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relocating in areas that are not covered by the EU ETS (e.g., the former Soviet states). f) The social effects regarding the functioning at a low capacity of the refineries, for example, technical layoffs. g) Other effects caused by the increase in prices for fuel.

5.2.1.3. The production and the processing of ferrous metals

The steel industry in 2007-2008 was considered one of the most stable sectors of investment, on the background of a rising world price on products, it being deeply affected by the global crisis, Figure 8.3⁴⁰. Prior to the crisis, Romania's situation was considered to be favorable, especially for the market of finished steel products (where, in 2007, the target of 4.6 million tons for consumption for 2010 had already been exceeded, established by the Restructuring Program, GD 655/2004). In the case of semi fabricated products, the trade balance is obviously to the detriment of Romania, which imports nearly 2,500 times more than it exports, although the export trend is an easy upward one⁴¹. In terms of technology, the steel industry from Romania practices the same technological flows as the countries with developed steel industry, namely oxygen converters and electric arc furnaces, with a high proportion of continuous casting.

The eventual differences in the efficiency of use of the metal load may be a result of a different quality of raw materials, respectively iron ore and / or the insufficient preparation of the scrap; of an insufficiently technology for higher returns based on the main production fluxes regarding the processing of liquid iron or liquid steel, of some technological deviations from the current practices from the steel industry of advanced countries, highlighted by BATs (*Best Available Technologies*) and BP (*Best Performance*). From the point of view of the European Commission, the entire steel industry of Romania will have to be aligned with the BATs by the end of 2013.

In this way, it will become possible to reveal the criteria for relocation and respectively, will provide the opportunity for the units from the steel industry to participate in the compensation of additional prices by the use of an electricity at a increased price, following the acquisition of emission allowances for payment. The optimization of material, energy and fuel consumption through the proper and immediate implementation of the BAT could therefore contribute to the improvement of the "stability" in the

⁴⁰ IISI – WorldSteel Association - <http://www.worldsteel.org/>

⁴¹ Sorin Dimitriu, *Communications in the Steel Producers Unit from Romania*. (UNIROMSIDER) 2008, 2009.

domestic market, of the manufactured products, the conditions for a sustainability of the natural environment by reducing the GHG emissions. Considering these facts, it naturally results that one of the concerns must be based on the optimization of material and energy consumption per unit sold, making it possible to reduce the technological and energy consumption. The metal production contributes with 42.80% of the total GHG emissions at a national level in 2007, according to the National Register of GHG emissions, the production of ferrous metal and steel holding 5.09% of the total CO₂ emissions, excluding LULUCF. The sources of emissions are: *fuel*: natural gas, *raw materials*: limestone, ferro-alloys, petroleum coke, graphite electrodes, scrap, scraps metal, iron ore, *production*: steel.

In order to determine the effects of implementing the energy-climate change package there should be distinguished between the production processes, respectively oxygen converters and electric arc furnaces (BOF, EAF respectively). BOF is used, in general, for flat products, while the EAF for long products. BOF has an average of about two tones of CO₂ per ton of product resulted, out of which only 10% indirect, therefore it is the main sector to apply measures to reduce emissions. In the case of EAF, the emissions are about 0.4 tones of CO₂ per ton of steel, almost all of them being indirect emissions in the form of electricity. Assuming the forecast⁴², at a price of 20 Euros per ton of CO₂, the total increase in costs on the short and medium term is about 17.3% for BOF and 2.9% for EAF, out of which about 2% indirect increase. Given the mix of products offered, as well as the specific of the markets, the transfer rate of costs in the final price is expected to be from 6% for BOF to 66% for EAF, under normal conditions. The explanation for the large gap between the two types of methods of production comes from the specific of the market, respectively the flat products tend to be sold on global markets, highly competitive, where the determining factor for maintaining the market share is the low price, while long products, from the EAF, are generally sold on local or regional markets, with a higher bid concentration. Moreover, the flat products are generally intended for specialized markets, by a group of relatively small suppliers at the EU27 level, while the long products are offered by a large number of companies, for a generic market; the domestic demand for products is generally stable, although the market is highly volatile and cyclical.

⁴² *EU ETS Review – Report on International Competitiveness*, European Commission, Directorate General for Environment, McKinsey, Ecofys, 2006.

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In the case of BOF, one can notice an alteration of the incomes by about 4% in the conditions of a reduction of 80% for the free allocations, which may lead to the relocation of production in countries that are not covered by the scheme. EAF is the least affected, as shown, however, has changed the production structure towards the production of EAF, to the expense of the BOF, this is a utopian alternative for several reasons: a) the specific of the products from each technology separately, b) the lack of current bid for raw materials, used mainly by the demand from China, in a sustained growth, c) the specific of the companies that have the technology; in general, EAF is owned by smaller companies..

Thus, although the industry is, on the one hand, severely affected by the global crisis and, on the other hand, will be affected in the BOF production area when there will be an elimination of the free allocations, the implementation of the latest technologies enables a better management of the emissions, without a significant transfer towards the final customer and with relatively low long-term effects.

5.2.2. The mineral industry

5.2.2.1. Cement and lime

Cement can be produced by three types of processes: dry, semi-dry and wet, out of which the most commonly used is the dry process, which holds about 95% of the European market. This production technology is also used in Romania, whose market is dominated by three multinational companies: Lafarge, Holcim and Carpatcement Holding (from the Heidelberg group). The lime market is more fragmented, considering the fact that there are no entry barriers as high as that of cement, which requires a large initial investment (about 120 million Euros for a production unit of 1 million tons) and that it does not require access to privileged assets such as ports. The great players on the cement market integrate elements of downstream industries in their business processes, and producing capacities of concrete and / or aggregates. The demand for cement and lime products is closely related to the construction industry, which has developed in Romania in a spectacular way in the previous period, but also being one of the most affected industries by the current economic crisis. The construction industry is among the top 10 sectors of activity in number of bankruptcies due to the economic crisis, according to CCIR, 2009. The construction sector has brought 10.5% of the GDP in 2008, and 5.7% in 2007. At its peak activity, 45 867 houses were built, most of them in the development region in the north-east and in the metropolitan area of Bucharest, followed closely

by the south-east region. Approximately 65% of the construction projects for residential areas and office buildings are for the Bucharest area.

The sub-sector of the minerals industry represented in 2007 approximately 35.32% of the emissions of the industrial sector. Regarding the emissions level, it oscillates for cement, in the case of the dry process production from 0.4 to 1 tone of CO₂ per ton of cement, placing it at an average level of 0.7 tones of CO₂. The emission sources for cement are: *fuels*: coal, petroleum coke, natural gas, fuel oil; *alternative fuels*: waste tires, waste oils, plastics, mixed solid waste, other waste fossils, biomass; *raw materials*: gypsum, limestone crushing, granulated slag, ash, cement additives. Regarding the CO₂ emissions from lime production, the emission sources are: *fuel*: natural gas, *raw materials*: limestone. Since 2007, the information on the production of lime is confidential, and therefore, the analysis will be based on general implications, the applications of lime and the existing data until 2007. There is a *warning* for this approach, namely, the year 2007 was a year of growth for the construction industry, located in a pronounced decline presently, which can damage an accurate forecast. The applications of lime are in the construction industry, roads and civil construction, the steel industry, nonferrous materials handling, waste management, treatment of burned gases, the chemical industry, the agro-food industry, paper and glass fabrication. The emission factors used in the National Register of GHG emissions are 477 kg CO / tone of dolomite and 440 kg CO₂ / tone of lime.

Operating margins for the cement industry are relatively small in Europe (between 11 and 15%); in Romania placing them close to 20%. Compared with other regions, Europe has low prices, in a market with high production costs, of around 50 to 70 Euros per ton, while the U.S., for example, quoted at 100 Euros / tone. The energy intensity of the cement production is 15.8 MW/1000 Euros and the lime production of 12.6 MW/1000 Euros with a carbon intensity of 0.9 tones CO₂ per ton of product for both types. The estimate⁴³ is that the level of costs for a typical production unit will increase by 36.5% due to the trading of CO₂ certificates. Most of the increase (over 93% of it) is caused by direct emissions; the indirect effect, given the rising price of electricity, has only a small part of it.

The probability of a price increase for the final consumer, caused only by the elimination of free allocations is relatively high for the industry,

⁴³ *EU ETS Review – Report on International Competitiveness*, European Commission, Directorate General for Environment, McKinsey, Ecofys, 2006.

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especially in the case of the countries from the border of the European Union, thus, implicitly Romania as well, where the possibility of import substitution of products is higher. The impact on the marginal unit production cost, of around 36%, equivalent to 12 Euros / tone of cement is, at the prices of 2005, equivalent to the transport costs per ton of cement imported from the countries outside the EU ETS incidence: former Soviet countries or Africa. Therefore, the probability of relocation of production, in the case of a transfer of the costs to the final consumer, in conjunction with the medium term effects of economic crisis, is relatively high. In the case of lime, the cost growth figures go up to 16% in the case of a 40% reduction of the free allocations, as estimated by ISPE.

5.2.2.2. Glass and Ceramics

Beginning with the year 2007, the information on the production of glass and ceramics are confidential, therefore, the analysis is affected. The emission sources are: *fuel*: natural gas, *raw materials*: limestone, soda ash, dolomite, dolomitic limestone, graphite, charcoal, chalk, marble. ISPE estimated that the growth percentage in the production costs for glass reaches up to 9.6% in the case of a 40% reductions of allocations, and for ceramics, up to 1.65%. The energy intensity for glass production is 26.3 MW/1000 Euros and for ceramics only 5.6 MW/1000 Euros, while the carbon intensity is 0.7 tones CO₂ per ton of product for glass, compared with ceramics, which are only 0.4 tones of CO₂. The degree of transfer of cost increases due to the elimination of free allocation is relatively small, as it refers to a market with a high elasticity of demand to price.

Therefore, the glass producers are more vulnerable to the introduction of energy-climate change package than producers of ceramics. Therefore, without the introduction of measures to upgrade, that would allow the reducing the energy intensity, on the one hand, decreasing the vulnerability to the changes in electricity prices and, on the other hand, the reduction of the carbon intensity, especially in the glassware sector, the probability of relocation of production in other areas, possibly outside the scheme is very high.

5.2.3. Other sectors: Pulp and paper

About half of the European paper production comes from recovered fiber, while the other half comes from wood, the percentage being much higher to the benefit of wood for the Romanian industry. The emission sources, regardless of the type of production process (chemical, mechanical

or thermo-mechanical) are: *Fuel*: oil, diesel, biomass (wood, sawdust); *raw materials*: soda. Therefore, most of the price growth factors, in the case of the reduction of the free allocations, are indirect. The Romanian structure of the market of pulp and paper is interesting from several points of view: on the pulp market there is the monopoly of the Somes Dej company, while on the paper market, although, when analyzing the number of companies, there is a fragmentation; in fact, in the division based on the type of product, one can observe a specialization of these companies, so that each is the market leader in its sector.

Some of the representative companies include: Letea Bacau, Rondocarton, Ambro Suceava, Ecopaper Zărnești, Vrancart Focsani or Celhart Domaris. From 2007 pulp and paper industry is under a confidentiality agreement, and therefore, the latest figures that we can report to are the market level of 186 million Euros in 2007, out of which 60% is covered by domestic production. The problems facing the industry are multiple: on the one hand, overcoming the expiration of the life cycle of technological plants, which can be replaced only with a very large investment and, on the other hand, the costs of raw materials and utilities, which are taken in a percentage of over 75% from the domestic market and are found at a rate of 75% in the final price. The operating margins are constant, but reduced in level, therefore, the investments in new technologies become effective only for a very large following production. To the extent that this production of break-even point cannot be taken over entirely by the domestic market, the outlet of the exports is reduced due to the high costs of international transport as well as the large volume to transport, with a low density.

Therefore, on the background of a lack of forested areas, that would enable the reduction in the price of the raw material-wood, the companies in the pulp and paper sector are particularly vulnerable to any other item that could cause a price increase for the final consumer. The energy intensity for pulp and paper is 7.1 MW/1000 Euros, while the carbon intensity is about 0.6 tones CO₂/tone of product. In the case of using the thermo-mechanical technology, the emission rate drops to 0.14 tones CO₂/tone of product. According to the report on international competitiveness⁴⁴, even today, the free allocations only cover a small percentage of the costs of carbon emissions, however the chemical production process will bring (through the mix of cost elements) an increase of cost of only 1%, out of which about

⁴⁴ *EU ETS Review – Report on International Competitiveness*, European Commission, Directorate General for Environment, McKinsey, Ecofys, 2006.

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half can be transferred to consumers, while the other production processes will bring increases between 2 and 8%, with a maximum of 1% that can be transmitted to the final consumer.

So, as far as possible, given the high entry costs as well as the competition of products from other parts of the world (for example Brazil), one can observe a trend towards adopting the chemical production. For Romania, this is even less possible because the direction of retechnologizing in order to reduce carbon emissions and the energy intensity is required in this case as well. The need for retechnologizing also appears due to the fact that the market requires top quality products, which cannot be offered with the existing installations, which will lead to companies leaving the market.

5.3. The implications on the non-ETS sectors

With regard to non-ETS sectors, there are covered those areas except the ETS, previously listed and analyzed, subject to environmental policies, by virtue of a lack of discrimination for the ETS sectors. From these, the most important sectors, with effect on the GHG emissions are: **services**, **construction** (directly related to the ETS sector of cement, lime, glass and ceramics), **transport**, **residential sector**, **agriculture** (for the CH₄ emissions from fermentation of the effluents and N₂O emissions due to the use of chemical fertilizers), the **forestry** (the latter for the potential to absorb carbon from the atmosphere) and **waste**. In 2003, the percentage of the non-ETS sectors in the total emissions was about 53%, rising to 55% in 2006 and falling back to 53% in the period 2007-2012.

5.3.1. Transports

Beginning with 2013, **the aviation** will be included under the ETS sectors, but the percentage of the emissions made by it in the Romanian economy is relatively small. Extremely important for the transport sector was the fleet renewal program, begun in 2005 and which continues to the present that allowed the withdrawal from circulation of a large number of polluting vehicles. This came partly to reduce the effects of the increasing number of vehicles, as well as the emissions brought in the daily traffic by the lack of adequate road infrastructure. Since the program will continue beyond 2013, it will preserve a high percentage of suitable vehicles in terms of the environmental impact.

Moreover, Romania can make efforts to support the production of motor vehicles, with emphasis on the efficient cars in terms of emissions.

Thus, on the one hand, an industry with growth potential, especially in the automotive products market in Romania is supported (low initial price, lower maintenance costs), with positive financial and social effects and, on the other hand, it reduces emissions by offering efficient cars. Also, another way to reduce emissions in the transport sector is the use of biofuels, currently being implemented a legislation that forces the manufacturers of diesel, beginning with 2007, to include a 2% biodiesel percentage and from July 2009 with a percentage of 4%, in the conditions that Romania must produce at least 100 000 tones of biodiesel annually.

In the medium and long term, the transport efficiency in terms of carbon emissions can only be achieved through the implementation of regulatory standards, related to fines and bonuses at a national level. Also, switching to hybrid cars, in order to achieve an even greater emission reductions, can be made with the fulfillment of at least two conditions: the existence of a supply infrastructure and the implementing of a financial subsidies system similar to the one regarding the renewal of the fleet, which would cause an increase in the demand for such cars. One of the main reasons why this type of financial subsidy is preferred, at the expense of other measures, derived from the success of the fleet renewal program, which emphasized the increased elasticity of the demand compared to the price. Furthermore, when implementing a supply infrastructure, one should consider a series of international standards that allow the inter-regional interoperability. All this, combined with a national policy for road traffic management allow an optimization of GHG emissions in the transport sector.

5.3.2. The constructions and the residential sector

The construction industry is firstly affected, by the price of construction materials and the economic climate, as we have seen over the period 2008-2009. Therefore, the increased degree of dependence on the industry of cement, lime, the transport price, as well as indirectly, by the electricity prices, are the elements that make this industry vulnerable to the effects of implementing the energy-climate change package. Given the fact that the effects on the cement industry were previously analyzed, in this section there are references to the direct effects of the package, namely the need to introduce building standards, which limit the environmental impact in terms of several dimensions:

- Design and construction of energy efficient buildings, for the future construction; the introduction of standards that will ensure that the

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percentage of defective buildings to be constructed in the future will decline drastically. In this regard, it is desired to use innovative methods and materials with low environmental impact

- The need to improve the energy and environmental performance of the existing buildings, starting from the premises that most constructions from 2005 are already built.

- The mandatory character of the certificates that attest the energy efficiency of a building, being similar to the certificates used for electrical and electronic products, which would allow information to reach the investors and buyers.

- The need to inform people about the methods to reduce the GHG emissions and the energy consumption, in the conditions that in 2008 there was a study realized by Eurobarometer⁴⁵ for the European Commission on the attitudes of Europeans on climate change and mentioned earlier, reveals the following: only 85% of Romanian considers climate change a serious problem, compared with 90% of Europeans, 23% of the respondents believe that the issue of climate change has been exaggerated (26% at an European level), and 27% responded that they do not know (9% in Europe), 38% admit that they did not do anything personally to fight climate change; 50% of them say that they would take the necessary measures if they knew what they were.

- Developing a financial system, that would provide access to the new methods and innovative materials with a low environmental impact for people with low incomes; the financial system would have to include a system of “green” mortgages, which would support the acquisition of residential buildings and offices with high energy efficiency at the expense of the inefficient ones.

- The implementation of such measures, which cumulatively have a positive impact on the GHG emissions and the energy consumption and on the industry, creating the employment opportunity (by the request for repairs and improvements to existing buildings, rather than construction of new buildings) is beneficial at a national level. Also, the cooperation between authorities, employers and organizations, as well as *The Romanian Green Building Council* is desirable to create a level of information and cooperation.

⁴⁵ http://ec.europa.eu/public_opinion/archives/ebs/ebs_300_full_en.pdf.

5.3.3. The services

Although the services sector (excluding the transport) is one of the least polluting, it allows the reduction of other sectors' carbon footprint, in particular, by using information technology and the computers. The smart use of the new technologies of information and computer facilitate the replacement of goods and / or services with their electronic equivalent, Global Initiative sustainability⁴⁶ estimating a 15% reduction of emissions by 2020.

The SMART 2020⁴⁷ report noted that the energy used by the approximately 4 billion subscriptions to mobile services (worldwide) and by the 1.5 billion internauts, will generate 3% of the global GHG emissions. The integration of information and computer technology in everyday life of individuals and companies will result in lower transport costs (communication could be done virtual), lower cost of materials (paper, by virtual communication and transforming a large number of information materials: books, publications into electronic paper), the reduction being much greater than the proportion of GHG emissions coming from this industry. In this regard, it is desirable the involvement of government to support the information and computer industries and, in this regard, increasing the proportion of their national use. Moreover, government involvement must be based on the example of good practice, wishing, in this respect, more efficient central and local government services, through the implementation of information and computer technologies.

Another sector of services that is affected by the implementation of the energy-climate change package is the financial sector, on the one hand, through the indirect costs of energy and transport, and, on the other hand, through the need to use the sector to support a set of measures meant to reduce the negative effects of the implementation of the package. In this regard, the first step that should be applied is the local creation of a carbon market that addresses the emissions certificates as marketable commodities. This type of markets exists internationally supporting the trading with emission certificates. Such locally available market allows access to all potential polluters by 2013, especially those who do not have the necessary knowledge and skills to trade on international profile markets. Moreover, given the positive effects on the degree of information transparency brought to the capital markets, a similar market for carbon will impose on the

⁴⁶ Global eSustainability Initiative, www.gesi.org.

⁴⁷ <http://www.gesi.org/Media/GeSINewsFullStory/tabid/85/smId/503/>.

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polluting companies a transparent, on time, reporting of the GHG emissions. Another direction of the financial sector is that of an element of support for the measures of reducing the risk of implementation of the energy-climate change package, namely: a) Offering "green" mortgages to support the construction industry. b) Offering funding and advice lines for the purpose of access to financing for companies that apply the retechnologizing measures. c) Working together with the tax authorities to establish the tax and the accounting system of the tradable emission allowances.

5.3.4. Agriculture

In the case of agriculture there are identified the following sources of GHG emissions, according to the National Register: CH₄ from the fermentation of the droppings and the rice cultivation, N₂O from the use of chemical fertilizers, CH₄, N₂O, NO_x, CO from the burning of the land (a prohibited activity in Romania from 2007). The agriculture was in 2007, according to the National Register of GHG emissions, 12.84% of the total GHG emissions, the largest share being the one corresponding to the N₂O emissions by 59.17%, the rest being CH₄ emissions.

One should note regarding this matter, that emissions decreased by 51.13% compared to 1989, basically due to the lack of investment in agriculture, the application of old methods of mining, with low economic efficiency, but also with low GHG emissions. On the basis of a decrease in the importance of agriculture in the economy, the positive effect of the reducing of GHG can disappear in the context of investments due to the Common Agricultural Policy that would boost the agricultural activity to an increased level. Also that fact that it starts from an obsolete technology and equipment can be a positive factor, because it offers the possibility of investment in equipments that would be at the European environmental standards. With regard to LULUCF, it may be decided that the reduction of the CO₂ emissions at the national level, through the absorption by the forest potential of Romania, will remain constant over the medium term, given especially the lack of coherent policies for afforestation at a national level, the implementation of unmanaged deforestations, the time until the forest becomes effective in attracting and storing CO₂.

5.3.5. Waste

Based on information obtained from the National Institute of Statistics, there has been conducted a sectoral analysis of the evolution of

the quantities of waste recorded in Romania in the period 2003-2005⁴⁸. As regards the geographical distribution of the municipal collected waste, it is noted that the largest amount in 2003 was collected from the North-West region, the following place being held at an approximate equality by the north-eastern region, Bucharest-Ilfov and the South-East region. The lowest amounts were collected from the South-West region Oltenia. Therefore, the increase of the share of the Bucharest-Ilfov region is accompanied by an increase in the total amount of municipal waste, which shows an increasing trend for this region. Due to the reduction that occurred in 2005 compared to the other years of analysis one must observe the fact that the Bucharest-Ilfov region has a positive but relatively small slope (by comparison with other regions).

Next we have used the analysis of the quantities of waste collected by type, during the period 2003-2005. Depending on this distribution of waste and the quantity of GHG emissions generated from this activity, a series of measures must be taken to allow a proper reduction of the effects, namely: • public the awareness of the population regarding the waste management; • the correct implementation of the industrial waste management measures; • maintaining some measures to collect and store waste, allowing the reduction of the GHG emissions.

5.4. The impact of the carbon dioxide capture and storage technology

The reduction of the GHG emissions should be supported by a policy of storing the existent emissions, through a series of technological processes involving the capture of the carbon dioxide (CO₂) from the gases emitted by industry, the transporting and injecting of it into geological formations, the storage in water towers or mineral storage. Although technologically feasible, storage in the water column is forbidden in the European Union, having an extremely high environmental risk. Currently, there are a series of European projects, including: Sleipner⁴⁹, from the North Sea; Vattenfall, from Schwartze Pumpe⁵⁰, Germany; CSC of Total, from the Lacq tank,

⁴⁸ Lupu, R., Marinoiu, A.M., Voicu-Dorobanțu, R., Project: *Waste management. A diagnostical analysis of the evolution of waste from constructions and demolitions in the urban environment in the context of Romania's post-accession*; Research raport, project PNII - 31082/2007, 2008.

⁴⁹ <http://www.statoil.com/statoil.com/technology/SVG03268.nsf?OpenDatabase>.

⁵⁰ http://www.vattenfall.com/www/vf_com/vf_com/365787ourxc/366203opera/.

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France and In Salah⁵¹, from Algeria, involving the separation of the CO₂ from natural gas and the underground storage. For now these projects work at the demonstrative level of pilot project, implementing a comprehensive system of carbon capture and storage has yet to be implemented, including at the European level.

The processes of capture and storage of carbon emissions are presumed to have a reduction yield of 90%⁵² for fossil fuel power plants as well as for the industrial processes. The Directive requires that, for the new power plants with installed capacity exceeding 300 MW, it should be provided a location for the capture plant as well as for the establishment of the appropriate geological storage site. This implementation requires, on the one hand, the need for investments in equipments and installations for capture, transport and storage, and, on the other hand, after the initial investment to create the facility, the operating costs for its use in principle and the electricity costs. Given the status of pilot technology, in the demonstration phase, with no market outlet, the costs are currently prohibitive, even compared to the functioning of a standard plant at a BAT level. So, for a power plant, with an expired life expectancy and with obsolete technology, it is preferred to make a *greenfield* investment in a new plant, with the best technology available, than the investment in one plant for carbon capture and storage. Like any new implemented technology, its widespread use will depend on several factors, among which the most important is the cost of development and operation, and another element to consider is the cost of carbon and its impact on the national economies, such as to determine the justification for the use of an expensive technology.

To support the widespread use of this process and, inherently, to determine the decrease of its initial and use costs, an initial support from the central or the regional level is necessary. Thus, the introduction of European or national funding lines for this type of projects, as well as special lines to support the research activities in the field, it is one of the viable solutions. Also, another way of financing the projects oriented carbon capture and storage is appealing to the free allocations for new entrants from the EU ETS.

This goal is to be applied in Romania also, where it is necessary to identify those projects for carbon capture and storage that are adequate and

⁵¹ http://www.colloqu coast2.com/IFP/fr/minisiteCO2/presentations2007/ColloqueCO2-2007_Session2_3-Wright.pdf.

⁵² IPCC (2005) Carbon Dioxide Capture and Storage: a summary for policymakers, www.ipcc.ch/pdf/special-reports/srccs_summaryforpolicymakers.pdf.

have an increased efficiency, the determination of the geological areas where storage is favorable, with low costs, determining the optimum methods of transportation regarding the security of the transport but also the reduction of costs. Selecting the optimum locations for placement of the storage installations is one of the steps necessary for the proper implementation of projects. Therefore, it may also be useful to have a map of the suitable sites for the geological storage of carbon, following that, based on this map, but also based on the risk of leakage and the transport cost calculations from the polluting plant to the storage location and the putting into operation a storage facility in the chosen location, to be able to decide regarding the optimal site.

The map will be designed by starting from a list of requirements that the geological site must fulfill, which will be made available by the competent authorities, taking into account the fact that carbon storage period needs to be indefinite. This map can be designed as early as the present, so that, when the technology becomes available in financial terms and, after 2013, the costs of the GHG emission allowances are prohibitive for a series of plants, CCS being the alternative, the time to implement such a capture and storage project is considerably reduced. This measure can also be constituted into a contingency measure, when the technology is late in becoming available at the commercial level.

In order to best use the before-mentioned map as well as the national potential of the carbon storage, it is necessary to create an authority that would bring together the competences on this field, providing financing in the first phase for the research and innovation elements, being the interface between the energy companies that have indication to implement, the regulatory authorities, the research institutes with relevant expertise in the field as well as informational contact point with the similar European authorities, in their attempt to create an European network for the capture and storage of the carbon.

5.5. Conclusions and general recommendations

Romania is now in a position to have to take a number of major decisions and implement a series of measures that, in their absence, might lead to massive relocations of production, the transformation of the national market into a purely consumer market, with devastating social effects. To limit these potential dramatic effects, **it is recommended a series of measures**, contained in a clear national strategy, supported by a regional and local cooperation, such as:

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- The retechnologizing of industries, with emphasis on using the best available technologies and on increasing the productive efficiency, not only on methods of reducing carbon emissions.

- Creating a system of analysis, research and dissemination with relevant expertise in the field (a national research network, connected internationally) to provide: a) analysis and studies on the current situation, the real situation of the national economy in terms of carbon emissions, b) analysis and studies that would identify objectively the externalities arising from implementing the package, on each sector and activity in part c) appropriate technological solutions to solve the problems of carbon emissions, d) the dissemination of information by economic agents, authorities and individuals, in an appropriate time to facilitate the decision making in an uncertain environment.

- Creating a system of financing of the activities necessary to implement the energy-climate change package: a) National funding lines or access to European and international activities and equipments related to carbon emissions b) National funding lines or access to European and international funding for activities and equipments related to new technologies to increase the production efficiency, c) National funding lines or access to European and international funding for activities of research and innovation in the field, d) Creating an energy grant, to allow local access to risk reduction measures; e) Funding mechanisms in order to support strategic producers (such as suppliers of heat for homes), f) Protective measures designed to support on a short term basis the local producers covered by the EU ETS scheme, until the upgrading, against their removal from the market by international manufacturers, which are not covered by this scheme.

- Introducing measures on taxation and the financial aspects of the energy-climate change package: a) Establishing the taxing system of the emission allowances and related transactions; b) The determination of the accounting system of the costs from the implementation of scheme for producers of heat and electricity cogeneration.

In the conditions of a positive implementation of the scheme, correlated to coherent policies of sustainable economic growth, there is the real possibility of adequate benefits for the Romanian economy.

Chapter 6. USING THE RENEWABLE RESOURCES (THE SECOND TARGET OF 20%)

6.1. General elements

The target of at least 20% share of renewable energy sources (RES), as average for the EU in 2020, is a very ambitious goal. The European Commission has made some projections of the manner in which it is considered most likely that there will be developed the renewable resources at the level of the Member States and the EU as a whole. In the forecast regarding the coverage with energy from RES of the gross energy consumption of the European Union, it is observed that the water sources will participate virtually with the same production, however the growth will be, especially, based on the use of wind and biomass in various use (electricity and heat). Biofuels, both produced in the Union as well as imported have their own importance. For Romania, it is seen that the forecast focuses on the use of wind, biomass, large and small hydro power and biofuels. It is also noted, the particular participation of the "champions" such as: Germany, France, Spain, Italy and Britain.

The technical and harnessed potential of the SRE has been studied closely lately and presented in various works. From these, the most recent were performed by a consortium of Romanian research institutes coordinated by ICEMENERG, respectively, a study funded by European funds, conducted in 2008. Unfortunately, the conclusions of this second study are not yet public, but from the discussions that the authors have had with various seminars of profile, their figures are more conservative. Instead, The Romanian Energy Strategy for the period 2007-2020⁵³ uses the ICEMENERG data, which considers the potential of the main renewable sources in the table below.

However, a recent paper of the same institute (ICEMENERG) presents more optimistic numbers: 9 million toe heat energy and around 65 TWh of electricity⁵⁴. The positioning of the areas with significant SRE is the

⁵³ *The energy strategy of Romania for the period 2007-2020*. HG 1069/2007, published in the Official Gazette no. 781 from 19 November 2007.

⁵⁴ *Solutions for the energy security and the industrialisation of Romania, The development of the renewable energies*, ICEMENERG, Aspen Institute România Round Table, 7 July 2009.

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following⁵⁵: The Danube Delta (solar), Dobrogea (solar and wind), Moldova (plains and plateaus - microhidro, wind and biomass), the Carpathians: biomass and microhidro, V. the Plateau of Transylvania (microhidro), the Western Plain (geothermal energy); The Subcarpathians: biomass, microhidro, The South Plain (biomass, geothermal and solar). In the last years, mainly driven by the opening of the business environment and the appearance of specific legislation documents, including the law 220/2008, a number of investors have promoted RES projects. No doubt, the sources which are regarded by investors as being the most promising are the wind sources, projects with capacities of 2 000 MW being already in the approval process.

Table 7. The harnessed annual potential of the RES from Romania, according to the Energy Strategy for the period 2007-2020

Source	Annual potential	Application
Solar energy	60 PJ 1,2 TWh	Thermal energy Electric energy
Wind energy (theoretical potential)	23 TWh	Electric energy
Hydro energy of wich under 10 MW	36 TWh 3,6 TWh	Electric energy
Biomass and biogas	318 PJ	Thermal energy Electric energy
Geothermal energy	7 PJ	Thermal energy

A source considered traditional in Romania is **the biomass** (forestry waste from wood, from the wood work, sawdust, plant stems, etc..), which is a relatively abundant resource estimated at over 15 million equivalent toe⁵⁶, while for the heating of all areas of Romania, including in rural areas, were consumed about 7 million toe / year in the year 2006. The same quoted paper appreciates that the EU experts have estimated Romania as being in the first 3 places, as biomass resources, it results that **there are enough resources of biomass alone** to heat about 2.5 million households.

Biomass offers however in Romania a number of problems: threat of a massive deforestation, usually mostly less for energy purposes, as for the

⁵⁵ *The energy strategy of Romania for the period 2007-2020*. HG 1069/2007, published in the Official Gazette no. 781 from 19 November 2007.

⁵⁶ *Solutions for the energy security and the industrialisation of Romania, The development of the renewable energies*, ICEMENERG, Aspen Institute România Round Table, 7 July 2009.

marketing of timber; the access is often "free" for the biomass, which determines that there is no concern for its effective use; the low concern for the sustainability (as defined in the Directive 2009/28) of its use, etc. On the other hand, in some cities, there are made efforts to introduce natural gas as a heating source. Such a tendency, with clear implications on the fuel mix in the country and on the security of the energy supply will quickly become uneconomic for consumers, with the rising price of natural gases.

Therefore, it would be a great error that the households that are now using biomass (wood and plant), for heating in stoves with low productivity, not to continue to use biomass, but using better technology and the solution offered by the existing stoves and the suitable installations should lead to the desired results. For this, the state, forced to manifest its role of promoter for the unconventional energies, respectively insuring the energy security, should give clear signals of support for the biomass. Programs like the one entitled "Sawdust 2000", undertaken in five localities in Romania (Vatra Dornei, Gheorghieni, Vlăhița, Huedin and Întorsătura Buzăului) and dedicated to the use of biomass for thermal plants have demonstrated the viability and the economical character of using this resource.

For the case of rural areas that cannot benefit from a heating system, there can be implemented separate heating systems, plants with power between 8 and 150 kW, operating on biomass (wood or plant). However, in these areas there are about 2.5 million traditional stoves with low yield, fewer than 20%. They can be replaced by modern units, which have a much higher yield of about 80%.

With regard to the **solar energy**, according to studies made in the last 25 years, reconfirmed by measures over the past three years and enhanced with estimates of established European firms, Romania receives from the Sun, in an annual average, from 1300 to 1400 kWh/m². The most economical way of using still remains the producing of both heat and domestic hot water both in individual households, installations 2-4 standard panels (the panel surface of about 2 m²), the tourist attractions (hostels, hotels), on farms with installations with 4-8 standard panels, but also in the public sector (kindergartens, schools, administrative offices, etc.), as well as in centralized systems for the thermal points of heating and pre-heating the water. In the area of solar-thermal systems, it is estimated a market potential totaling 1.5 million of m² of solar collectors, with a total value of the investment needs of about 500 million Euros. Regarding the use of solar energy for electricity production through photovoltaic cells, the potential appreciated by ICEMENERG is considered of about 100 MW, with an investment effort that can reach 700 million Euros.

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Although there are a limited number of locations that can benefit from the existence of thermal anomalies, the potential of the **geothermal energy** is estimated at a level of about 7 PJ. This includes however a share regarding the use of geological heat used by the application of heat pumps. In the field of heat pumps, it is estimated a market **potential** totaling 100 MW with a total value of about 350 million Euros.

The hydro energy remain to participate with an important share in the energy mix of renewable sources by its two components: the hydro power (> 10 MW) and the microhidro (<10 MW). There are several recent studies on the harnessed economic hydroelectric potential, but in this paper there will be use the official figures of the Romanian Energy Strategy for 2007-2020: 36TWh/year respectively 3.6 TWh / year in a year with an average hidraulicity. For the hydro power stations, the simulation realized by the European Commission for Romania in the year 2020 shows a quasiconstant participation with the present one, because practically the increase the installed capacity, less the withdrawals of service, will be about the same level with the new investment. Similarly, the microhydro units will have a certain development, but that is due to their low power, their share will not increase significantly.

6.2. The legislative and institutional impact of the Directive 2009/28

From the start it must said that the failure to meet the conditions imposed by the Directive will result in **the infringement procedure from 2010** for: • Failure to produce a credible national plan of action, • Failure to implement all the aspects of the Directive; • A significant deviation from the plan or path; • Valid complaints from every EU citizen regarding the incorrect implementation by the Member State. It is specified that **the infringement procedure** is a common tool for the implementation of the EU laws. It is effective, and usually, most cases are resolved through corrective action by the Member State, well before coming before the Court.

The Directive requires a number of conditions, the execution of specific documents, the strengthening of the legal and regulatory framework and, above all, a close monitoring. As part of the *acquis*, it should be integrated in the national law and, as such, a number of provisions of law 220/2008, in a sense, the Romanian equivalent of the Directive, especially the aspects regarding the reporting and monitoring should be reviewed. Also, the implementing regulations need to be adapted. In connection with the intermediary national targets, Romania should adopt a convenient

"route" as well as possible, that would entail minimal cost and competitive prices. According to Article 22 of the Directive, each Member State, Romania included, must send the Commission a report on *"the progress and the use of renewable energy until December 31, 2011 and every 2 years thereafter"*. The sixth report is the final report required.

The minimum content of the reports shall show:

- The shares of energy from renewable sector sources (electricity, heat and cold, plus transport) and global in the last two years before the time of the report as well as the actions taken or planned at national level to promote the renewable sources.
- The introduction and functioning manner of the support schemes and of the other measures to promote the renewable sources within the National Action Plan.
- How the support schemes work in order to take into account the renewable energy applications, which provide additional benefits to other comparable applications, but also can have higher costs, such as biofuels from wastes, residues, non-food cellulosic materials and ligno-cellulosic materials.
- The operation of the system of guarantees of origin and the measures taken to prevent any fraud.
- Progress made in evaluating and improving the administrative procedures to remove administrative and regulatory barriers.
- Measures taken to ensure the transport and distribution of the electricity produced from renewable sources.
- Developments regarding the improving of the availability and usage of the biomass resources for energy purposes.
- Changes in the prices of goods and the land usage from the Member State associated to the increase in the use of biomass and other forms of energy coming from renewable sources.
- The development and the level of the share of biofuels from wastes, residues, non-food cellulose materials and ligno-cellulose materials.
- The estimated impact of the production of biocombustibles and biofuels on biodiversity, water resources, water quality and soil.
- The reduction of the emissions of greenhouse gases due to the use of renewable energy.
- The estimated excess energy production from renewable sources compared with the indicative trajectory and that can be transferred to another Member State, as well as the estimated potential for joint projects by 2020.
- The estimated demand for renewable energy expected to be satisfied by means other than domestic production by 2020.
- Information on how the share of biodegradable waste from all the waste used for energy production has been assessed and the measures taken to improve and verify these estimates.

One of the important problems that the Member State, Romania included, must answer even from the first report is the intent to establish *"a single administrative body"*, which will be responsible for processing the

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authorizations, certifications and licenses, to also secure assistance for the applicants. Currently, Romania has divided the various activities to promote the renewable sources namely: the strategy and policies at the Resort Ministry, the regulatory activity at the Regulatory Agency, promotion and demonstrative projects at the Romanian Agency for Energy Conservation, the certificates of origin at the System Operator and the green certificate market at the Market Operator. If we consider the implications of lack of sustainability connected to the biofuel production, we need to introduce into the equation also the Ministry of Environment. Someone must coordinate all this, however, especially in the conditions of the emergences of new flexible mechanisms that involve coordination at the state level anyway and negotiations between Member States or with third countries. One of the major implications of implementing this Directive is therefore represented by the institutional changes that Romania must make to meet the requirements of this Directive.

6.3. The economic impact of the Directive 2009/28

The effects of the implementation of the Directive are complex and can affect the very foundations of the future development strategy of Romania. Obviously that they cannot be accurately quantified at this time, that is why the present paper aims to carry out only a qualitative analysis of them limiting itself at the possible main influences. We believe that from them, the following are the most important: a) On the national energy system. b) On other economic sectors. c) For consumers.

a) **The impact on national energy system** is complex involving: • The need for financial resources that will cover the investment needed to implement the Directive. In this respect, the difference between the two reference values (17.8% in 2005 and 24% in 2020) needs to be covered by the new investments. By a rough calculation (taking into account the probable structure of the renewable sources in the year 2020 (see Figure 8.6) and taking into account the specific investments of the new objectives, with figures based on the indicators proposed by the International Energy Agency) one gets values of 1.3 billion Euros for a market potential of about 8 000 MW only for the wind power. • The measures, including the investment ones, for the strengthening of the transport and distribution network to meet the challenges related to the conditions imposed by the Directive. This impact is particularly related to wind power plants, which introduce additional vulnerabilities in the national electricity system in order to pass the difficult moments of the fall in electricity production by the

sudden drop in wind speed. • On the electricity market through the appearance of a larger "green" power that has priority access to the network.

This translates into three types of effects: i) the decrease of the share of electricity that can be traded (it enters into competition) on the open market) the increase of the marginal cost of the system by increasing the rate of injection of electricity with costs higher than the average; iii) the increase the number of green certificates that accompany the increased amount of electricity produced from renewable sources

b) **The impact on other sectors of the economy:** • In particular, the **construction** industry will be affected by the setting of special conditions by 2015 on new buildings or upgraded beginning from the architecture up to the ensuring with heating, respectively, conditioning using renewable sources; • The horizontal branches of the industries that participate in the achieving of the equipment that use renewable sources. This effect appears to be favorable as it is generating new employment places (figures at the European Union level reached values of about 900 000 jobs). According to the ICEMENERG⁵⁷ assessments in the case of the **biomass** in Romania there can be built biomass components or plants based on biomass, boilers, heat circuits and systems design and biomass processing, suitable biomass stoves. These products can be made in their own design or with technological transfer. However, it is estimated that it will provide about 10 000 new jobs. • In **the solar energy** field, the Romanian industry can produce panels, fasteners and seals, heat circuits, boilers, various sensors, electronic subassemblies. As with biomass, they can be made both in their own conception as well as by assimilation of products or by technological transfer, with imports of parts (e.g. vacuum tubes). It is estimated a required 1 000 new jobs for the applications of the photovoltaic sources, plus another 2 000 jobs for the solar-thermal installations both for the design, manufacture, assembly, testing, and for operation and maintenance. • It is estimated a production level of about 20 000 **wind installations/** year insuring about 5 000 jobs, both for design, manufacture, assembly, testing, and for operation and maintenance. There are industrial capacities that can be converted to produce components and assemble equipment, mount them, operate and maintain them. The components can be produced easily are: the pillars of support, the anchoring systems, generators, the rotor blades, the electrical circuits, different transducers (vanes, anemometers, etc.), electronic subassemblies (inverters, regulators, pictures of connections). •

⁵⁷ *Solutions for the energy security and the industrialization of Romania, The development of renewable energies, ICEMENERG, Aspen Institute Romania Round Table, 7 July 2009.*

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Regarding the **geothermal energy**, it is estimated a production level of about 5000 installations with heat pumps/year and it can provide 5 000 jobs, both for design, manufacture, assembly, testing and operational and maintenance. • Regarding **the agriculture and the land use for biomass production**, one of very sensitive issues imposed by the Directive is the sustainability of the biofuel production, imposing a careful selection of the lands used for the production of biomass. • On **research and development** of new technologies, and **advice** in this area it is assessed the development of new jobs. • On the **service branch** for operation and maintenance, design, assembly, testing equipment. • Finally, on the **transport** sector, where the fuel prices will increase at least for two reasons: i) the natural tendency in the long run, to increase the price of fossil fuels and ii) the mandatory share of minimum 10% of the biofuels required by the Directive.

c) **The impact on the consumers** through the mandatory quotas of renewable sources from the electricity consumption and the new prices that contain internalizations specific to renewable sources as adopted support mechanisms. An adjacent element of this impact would also be the unavoidable increase of grants (regardless of the "*social safety net*" used) for the vulnerable social categories, especially in view of acceptance of the energy service as a public interest service. According to the data from the National Agency for Energy Regulation (NAER), reiterated by the General Directive for Energy Policy of the Ministry of Economy⁵⁸, only the mere impact on the price of green certificates corresponding to the quotas required by renewable sources in the period 2008-2012, a rise is expected in the energy prices for final consumers between 2.59 and 5.78 Euros / MWh, respectively in the year 2016 an increase in the marginal price of the electricity produced at the level of the national energy system by around 27 Euros / MWh

d) There will be **an impact on urban areas** as well. In this respect, the provisions of the Directive 2009/28/EC will have significant influence on the architecture and the manner of construction of the buildings by 2020 and over that time. The Directive specifies that "*to facilitate and accelerate the establishment of the minimum levels of renewable energy use in buildings*" and suggests the incorporation of a "*factor for renewable energy in meeting the minimum energy performance requirements under the*

⁵⁸ Săndulescu, A. , *The consequences and challenges of the EU 20-20-20 targets for România*. The seminar „Nuclear energy and the environment. Energy resources for the future, The Belgian and Romanian perspectives”, 8 July 2009.

Directive 2002/91/EC, relative to an optimal reduction of the carbon emissions for each building” (Article 13.3, Directive 2009/28/EC).

A greater degree of usage of the wind, sun and biomass energy as sources for heating, cooling and electricity production will change the concept of designing buildings and new standards will have to be developed. The architecture of the upgraded or new buildings will take into account the new elements of construction (solar panels, walls and roofs with photovoltaic elements, wind generators etc.), integrated into the buildings’ tires and in the resistance structure. To this purpose, *“the Member States will recommend to all the players, as local and national government bodies to ensure that the installations and systems for use of electricity, heat and cooling from renewable sources and cogeneration, are used when planning, designing, constructing and renovating industrial and residential areas. Member States shall encourage, in particular, the local or regional government bodies to include heating and cooling from renewable sources in the planning of the urban infrastructure, where possible.”*

At the level of the regulatory framework, according to art. 13.4 of the same Directive, the Member States will introduce into the regulations and building codes, the appropriate measures to increase the share of renewable sources. Regarding the other two objectives (the reduction of GHG emissions and energy efficiency), *“in establishing the regional measures or the support schemes, the Member States can consider the national measures for substantial increases in the energy efficiency and relatively cogeneration and in the new passive buildings or with a low or zero consumption”*

Special attention is given to the public buildings that need to be an example of a correct implementation of the Directive. Therefore, *“the Member States will ensure that the new and existing public buildings, which are subject to major renovation, can play at a national, local and regional level the role of an example in the context of the Directive, after January 1, 2012”*. Among others, the Member States can allow *“... roofs of public buildings or with mixed public-private property to be used by third parties for installations that produce energy from renewable sources” (art.13.5).*

Chapter 7. ENERGY EFFICIENCY (THE THIRD TARGET OF 20%)

7.1. General elements

In addition to replacing the fossil fuels with renewable energy sources, the capture and sequestration of the CO₂ emissions, the efficient use of energy is a powerful tool in the fight against climate change. But energy efficiency also meets the other goals set by the EU Green Paper on Energy: food safety and competitiveness, building the basis for achieving these objectives. The three types of policies (technological, energy and the one related to climate change) are interrelated and include a series of legislative initiatives that are the main pillars of support and must work together to achieve the goals proposed by the energy package - namely: • the Directive on energy performance of buildings (EPB-D) • the Directive on promotion of cogeneration (CHP-D) • the Directive on the eco-design requirements for energy using products (EuP-D) • the Directive on the efficiency of the final consumption of energy and the energy services (ESD) • the Directive on taxation of energy products and electricity; • the Directive on the energy efficiency requirements for boilers, refrigerators and fluorescent lamp ballast; • the Directive on labeling the electric stoves, air conditioners and other appliances; • The regulation regarding the labeling with the Energy Star for office equipments.

The important position to improve energy efficiency can be seen from the IPCC study that has split the influence of the various indicators (population, GDP / capita, the energy intensity in relation to the purchasing power parity) on the intensity of carbon emission. In absolutely all the scenarios (IMAGE, MESSAGE, AIM and IPAC) considered by IPCC, the energy efficiency appears as being the one saving solutions. The energy efficiency and the conservation of energy play the second most important role in meeting the targets of climate stabilization in the proposed models for the period until 2030. However, as the time interval increases (even up to a century), the impact of energy efficiency becomes lower compared o the provision of “decarbonated” energy, yet still remaining important. The great advantage of this solution is the decrease in funding requirements, these measures representing virtually the cheapest way to reducing the CO₂ emissions. For example, if it were to be made only the efficient investments in terms of investment in buildings, they can provide about 40% of the

necessary emission reductions by 2030 for a scenario that involves the limiting of warming to 3 ° C.

This is especially important for the economies considered still in transition, including Romania, which are unable to implement the measures that require large investments, which essentially influences the cost of carbon on a broad market. The study⁵⁹ presents a probable situation regarding the seven fundamental sectors of these economies. It is noticed the enormous potential of the building sector in the reduction of the energy consumption and in the CO₂ emissions, much higher than for the other sectors (virtually equal to the potential of the industry, the agriculture and the transport taken together). Also impressive is the share of low cost and environmental measures with very favorable effects.

In these economies, investments in energy efficiency, particularly in the housing stock, reduce pressure of increasing the prices and the pressure of the result of eliminating subsidies in the energy supply over the past decade. If the buildings would end up using 15-25 kWh / (m²*year) to ensure the thermic comfort (like the study⁶⁰ proposes for the temperate climate countries), through rehabilitation and new buildings, instead of 180-250 kWh/(m² * year), this economy could substantially contribute to increasing the social welfare.

Beyond the social co-benefits, there is a wide range of other benefits associated with the energy efficiency. For example, the improvement of the industrial energy waste helps increase productivity and thus competitiveness. Providing energy through superior performances at a consumer level is often a cheaper way to achieve increased capacity and has a positive effect on the number of jobs, even if a reduction of them might be felt in the manufacturing industries. The employment-related benefits arise from the creation of new activities and, indirectly, through the multiplying effects, by spending the money saved through reducing the energy costs. The European Commission considered in 2005 in its Green Paper on Energy Efficiency⁶¹ that a 20% reduction of the EU energy consumption by 2020 could create (directly and indirectly) a total of one million new jobs.

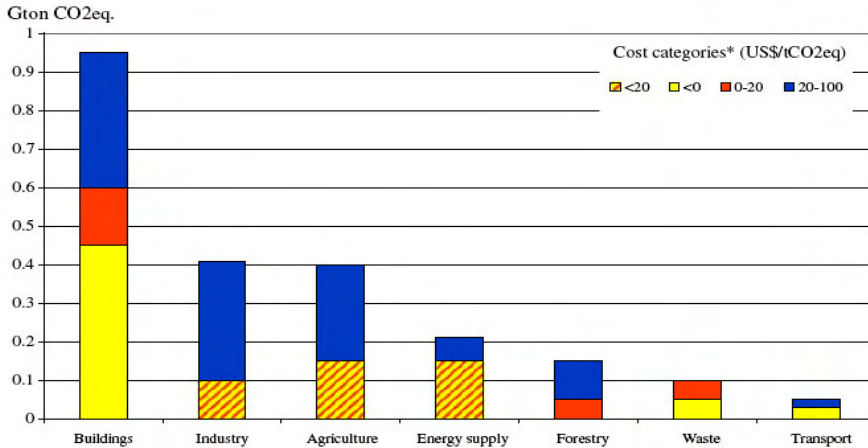
⁵⁹ Ürge-Vorsatz, Diana & Metz. B., *Energy efficiency: how far does it get us in controlling climate change?* Springer Science + Business Media B.V., 2009.

⁶⁰ Ürge-Vorsatz, Diana & Metz. B., *Energy efficiency: how far does it get us in controlling climate change?* Springer Science + Business Media B.V., 2009.

⁶¹ European Commission (2005), *Green paper on energy efficiency: Doing more with less*, Luxembourg: Office for Official Publications of the European Communities.

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Figure 4. The reducing potential of the CO₂ emissions for the economic sectors according to the carbon costs in the transition economies, in the year 2030.



*For the buildings, forestry, waste and transport sectors, the potential is split into three cost categories: at net negative costs, at 0-20 US\$/tCO₂, and 20-100 US\$/tCO₂. For the industrial, forestry, and energy supply sectors, the potential is split into two categories: at costs below 20 US\$/tCO₂ and at 20-100 US\$/tCO₂.

Improving energy efficiency by 9% in 9 years can be achieved through structural changes in the transition and industrialized countries, through services and industrial power generation and through saturation effects in the transport field. The structural changes can occur from constant recycling or the establishment of the energy intensive materials, the improvement of the efficiency of materials and the durable intensification of the use of investments. The combined results of the structural changes and energy efficiency can accelerate the annual decline in energy intensity by about 2.5%.

The synthetic indicator representative for the efficiency of the energy use at a national level is the energy **intensity**, respectively, the energy consumption for producing one unit of Gross Domestic Product. The structural adjustment of the economy, but also the increase in the efficiency of utilization of the resources, led to a reduction in the primary energy intensity from 0.605 tep/1000 euro2005 in 2000 to 0.511 tep/1000 euro2005 in 2005, the calculation being made on the parity of the exchange rate. The value of this indicator is still close to almost 3 times higher than the EU average. The energy intensity also had a favorable evolution, falling by 6.4% during the period 2000-2004. The value recorded in 2004 (0.658

MWh/1000 euro2004) is about 2.5 times higher than the EU average. The comparison with the developed countries (mainly European Union countries) is more favorable, if the energy intensity is calculated using the purchasing power parity (PPP). In this case, the primary energy intensity of Romania in 2005 was 0.243 tep/1000 PPP euro2005, respectively 1.6 times higher than EU-25.

Table 8. The economic potential of saving energy (efficient from the point of view of the costs)

Sector	The medium potential of saving energy, estimated as a percentage of the consumption, %	Maximal values for the potential of saving energy, ktep/year
Industry	13,0 (10 – 17)	1590
Residential	41,5 (35 – 50)	3600
Transport and communications	31,5 (30 – 35)	1390
Third sector	14,0 (13 – 19)	243
Total	100 %	6823 ktep/year

In this respect, it is forecasted the adoption of a range of energy efficient measures, including: a) the use of financial instruments for energy savings, including energy performance contracts, which require the provision of measurable energy savings, b) purchase of equipment and technologies, taking into account the priority of the energy efficiency specifications, c) the acceleration of the implementation of rigorous energy audits to industrial customers, the public and residential buildings, certified audits organized by authorized agencies, followed by measures to reduce the energy consumption. Due to numerous reasons, the technological and economic potential of the energy efficiency, as well as the positive impact on mining have been, traditionally, undervalued. The achieving of a greater efficiency involves a variety of technological and marketing options. Since the energy efficiency is a decentralized and dispersed activity, it represents a difficult subject, with a low visibility. According to an assessment made by the Energy Charter Secretariat (Brussels) in 2002, of the situation of the energy efficiency in Romania, the result was a potential of energy savings

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(table above) of 30-35%⁶³, a value recognized by the Romanian Agency for Energy Conservation (RAEC).

There is a number of **adverse factors that negatively affect the energy efficiency** including: the practical disregard of the energy efficiency; the responsible institutions are less active; the declarative energy efficiency programs, without significant results; superficial energy audits; non-stimulative penalties; a bad management; very difficult financing; only demonstrative projects.

Overall, one can state that there is a low level of energy efficiency (“business as usual”) and that **in what regards the bearing of energy bills, there are great disagreements about the price of energy, but lacks the concerns for reducing the energy consumption by reducing the losses.**

Table 9. The energy savings potential in different consumption sectors

The energy savings potential	Value
Industry	20-25 %
• The cast iron production	20 %
• Steel production in electric ovens	20 %
• The ammonia production	10-30 %
• The production of natrium hydroxide	15-30 %
• The oil chemical industry	12-50 %
• The pulp and paper industry	25-45 %
• The food industry	25-30 %
• The mining industry	30-40 %
Buildings	40-50 %
Transport	35-40 %
National potential	30-35 %

For comparison, for the buildings in Romania, the specific average annual energy consumption is around 390 kWh / (m² *year). this indicator for EU countries is 220 kWh / (m² *year) After the oil crisis of 1973, all countries from Western Europe turned to the development of **national programs for thermal upgrading**, conducted in successive stages over a

⁶³ *In-depth review off energy efficiency policies and programs of Romania*, Energy Charter Secretariat, Brussels, 2002.

15 to 20 years. As a result, the specific energy consumption for heating buildings has continuously decreased, overall by up to 60-65%⁶⁴.

For Romania, the national potential for saving energy and reducing the CO₂ emissions through the thermal rehabilitation of the buildings is estimated at 19.7 billion kWh / year (or 1.7 million toe / year) and 4.1 million tones CO₂ / year. The harnessing of that potential can be done through realizing “the National Program of heat rehabilitation of buildings”. The cost of rehabilitation will be recovered in 8-12 years from the reducing of the energy consumption.

The measures from the buildings sector, especially the residential ones, have built the concentration area of most of the national plans, including: the thermal rehabilitation, the strengthening of the codes for construction and support measures for passive building or building with a low energy consumption. Some Member States have proposed measures for the tertiary sectors, transport and industry; however, very few of them have included agriculture (Livonia, Netherlands, Spain and Sweden)⁶⁵. Some of the new plans for action regarding energy efficiency included measures that are outside the scope of the Directive 2006/32/EC. Most of them were related to changing the fuel, power generation, including cogeneration, centralized heating with biomass, the reducing of losses in networks, biofuels, measures in international transport and measures affecting the ETS. Unfortunately, Romania has a higher energy intensity than the other EU countries, especially calculated at the exchange rate.

Table 10. The effects of the energy efficiency improvements at the final consumer

	2016	2020
Reduction:		
The demand for final energy, million tep	86	124
The CO ₂ emission, million tones CO ₂	275	393
The CO ₂ reduction compared to the emissions in 1990*	6,8%	9,7%
The reduction of CO ₂ emissions under the value of 1990	3,6%	4,6%

⁶⁴ Leca, A. and Cremenescu, C. *The public service of centralised heating. Propositions of efficiency*, AGIR Publishing House, Bucharest, 2008.

⁶⁵ Communication from the Commission, *Energy efficiency: delivering the 20% target*, COM(2008) 772 final, Brussels, 13.11.2008.

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* The value represents, also, the avoided CO2 emissions, inherent to reference until the year 2020.

Obviously the reduction of this indicator has only one solution: the reduction of the final consumption or a higher gross domestic product value. According to the National Action Plan of the country⁶⁶, the intermediate target for saving the consumed energy at the level of the final consumer, set for Romania for 2010 is 940 thousand toe, which corresponds to 4.5% of the average of the years 2001-2005. In setting the target there were taken into account the potential energy savings in Romania, on the economic sectors of the scope of the Directive 2006/32/EC respectively the industry, other sectors than the ones included in the National Action Plan, the residential, tertiary and transport. At that stage, reference was the year 2001 and the values of the economic potential are given in the following table⁶⁷.

Table 11. The economic potential (efficient from the point of view of costs) of saving energy in the year 2001

Sector	The average potential of saving energy, estimated as a percentage of the consumption %	The maximal values for the potential of saving energy, thousands tep/year
Industry	13,0	1590
Residential	41,5	3600
Transport and communications	31,5	1390
Third	14,0	243
Total	100,0	6823

Measures to improve the energy efficiency included in the first National Action Plan for Energy Efficiency (NAPEE) fall into the following categories: • **Regulatory**. • **Information and legislative measures** (information campaigns, energy audits). • **Voluntary agreements and instruments of cooperation** (industrial companies, long-term agreements). • **Energy services for energy savings** (third party financing, energy performance contracts). • **Financial instruments** (subsidies, tax exemptions

⁶⁶ The Ministry of Economy, *The first National Action Plan in the area of Energy Efficiency (2007-2010)*.

⁶⁷ The Ministry of Economy, *The first National Action Plan in the area of Energy Efficiency (2007-2010)*.

on construction permits for making the heat rehabilitation work, the co-financing of the works). • **Mechanisms for energy efficiency and other combinations of other sub-categories** (energy efficiency funds). Also NAPEE includes horizontal and cross-sectorial measures, namely regulations (the transposition into national law of the provisions of the Directive 2006/32/EC and Directive 2005/32/EC), information campaigns, funding schemes proposed to be undertaken in partnership with the international financial institutions, especially with the European Bank for Reconstruction and Development (EBRD).

First, **the industrial sector**, which is considered an area with considerable potential for savings. The main instrument identified by a SAVE study (“Schemes and measures for implementation in Romania of long-term agreements for industry”), conducted in 2000-2001, was identified as being **voluntary agreements**, as one of the most effective tools to obtain employment of the industry in the increase of the energy efficiency. According to NAPEE, an important impact can be achieved also by activities of energy management, accompanied by investments in measuring equipments and control regarding energy consumption⁶⁸.

In **the transport sector** the energy saving measures relate to the promotion of using biofuels and the modernization of passenger and freight trains and the subway. On the one hand, biofuels are not in themselves a measure of energy efficiency, but one of direct reduction of the CO₂ emissions and the targets related to biofuels consist in the object of the Directive 2009/28/CE, being treated in the chapter about renewable sources. However, the modernization of the land transport fleet, as well as a rethinking of traffic management can represent effective measures.

In **the residential sector**, the thermal rehabilitation program of the multi-storey buildings will continue and will save energy and reduce cost for the public. As noted above, throughout the EU the residential sector has the greatest potential to reduce emissions of greenhouse gases, and in Romania, the solution for the problems related to old apartment buildings has strong social connotations. Also, the introduction of the energy **efficiency certificate**, since 2007, for public buildings and for the newly built ones and beginning with 2010, also for single-family residences and apartments in existing buildings which are sold or leased is a powerful tool for improving the energy performances of the residential park.

⁶⁸ The Ministry of Economy, *The First National Action Plan in the field of Energy Efficiency (2007-2010)*.

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Romania has a financial scheme suitable for apartment owners that are willing to thermally rehabilitate them and has launched a national program since 2007. Unfortunately, for various reasons, including organizational, until the completion of this study there have not been rehabilitated only just over 100 blocks in a total of 80 000 existing across the country.

The legislative package will contain the following normative acts directly related to making the energy consumption more effective: • The Directive on the efficiency of final energy consumption and energy services (ESD) • The Directive on the requirements of energy efficiency for boilers, refrigerators and ballast fluorescent lamps; • The Directive on labeling electric stoves, air conditioners and other appliances; • The regulation of labeling with the Energy Star (Energy Star) for office equipment. They show, in fact, the main directions considered as priority by the European Commission. The Directive 2006/32/EC on the effectiveness of the final energy consumption and energy services was translated into Romanian legislation by Ordinance 22/2008, but the other normative acts, which are under preparation, will have to be adapted. The expected effects for the period until 2010 and thereafter in 2016 are presented in the table below⁶⁹.

Given a reported consumption for the whole economy in the reference year 2005 of 25.1 million toe⁷⁰, the proposed value of 20% savings leads to a figure of 5.02 million toe of energy savings, which can be translated into likely savings of around 17-20 billion / year (obviously depending on the price of the fuel mix of country). In this calculation it was not taken into account the measures for year 2009 held uncharacteristic due to the economic crisis. On the other hand, achieving these savings involves corresponding costs in various sectors where such efforts are made. The great advantage of the energy efficiency measures is the existence of certain categories of measures of "no cost" and "low cost". For the other measures, the ones that are considered effective are only the projects with an internal rate of returns of the investment of at least 15%. Therefore, it is very risky to advance a number of investments necessary to achieve the economies considered above, however the values of 4-5 billion for the whole period until 2020 is plausible. Comparing the figures of the savings with the investments, it results the clear advantage of such measures.

⁶⁹The energy strategy of Romania for the period 2007-2020. HG 1069/2007, published in the Official Gazette no. 781 from 19 November 2007.

⁷⁰ The Ministry of Economy, *The First National Action Plan in the field of Energy Efficiency (2007-2010)*.

Table 12. Energy savings- a comparative analysis 2010-2016

Sectors	Savings in 2010 million tep	Savings in 2016 million tep
<i>TOTAL FINAL CONSUMPTION (minus the firms included in the NAP), of which:</i>	0,664	1,992
- by investment in installations, buildings ... existent	0,349	1,047
- by new installations, buildings	0,315	0,945
<i>INDUSTRY</i> Total, of which:	0,060	0,180
- by investments in existing installations	0,009	0,027
- by green filed installations	0,051	0,153
<i>RESIDENTIAL</i> Total, of which:	0,416	1,247
- by investment in existing buildings	0,300	0,899
- by new buildings	0,116	0,348
<i>TRANSPORTS</i> Total, of which:	0,160	0,480
- by investments in existing transport means	0,038	0,114
- by investments in new transport means	0,122	0,366
<i>TERTIARY</i> Total, of which:	0,028	0,085
- by investments in existing buildings	0,002	0,007
- by new buildings	0,026	0,078

There is a significant difference between the targets of the Directive ESD and the ones of the energy-climate change package. While the ESD requires at least a 9% reduction from the average of the period 2001-2005 by 2016 (Romania even imposing for herself 13.5%) the 20/20/20 package requires a reduction of the energy consumption in 2005 by 20% by the year 2020. It practically results in a reduction in consumption by about 6.5% for the last 4 years (2017-2020), meaning with an average rate of 1.625% per year, which represents a special effort to leave for the last years of the interval. It is clear that in this context, the second NAPEE and the following should reconsider the average rate of energy saving. It should be noted however that the years 2009 and 2010 will be the only uncharacteristic years, the reducing of consumption being caused, mainly, by the economic crisis and much less by energy-saving measures.

To achieve the forecasted savings, the most important step is **to improve the legislative and regulatory framework** to allow:

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a) Accelerate the knowledge process of the actual situation by **facilitating the conditions of implementation of the rigorous energy audits** for industrial customers, the public and residential buildings, certified audits done by authorized agencies, followed by measures to reduce the energy consumptions;

b) Removing a very important remaining barrier, **the funding**, thus **improving the use of the specific financial instruments** for energy savings projects, including the energy performance contracts, which require the provision of measurable energy savings;

c) **Changing the consumer's mentality** through awareness, that would allow the purchase of equipments and technologies mostly taking into account the energy efficiency specifications, considering the effect of lowering the GHG emissions;

d) Addressing the fundamental problem of **warming the urban conglomerates by reconsidering the benefits of cogeneration, trigeneration** respectively, and of **centralized supply** with heat / cold combined with decentralized cogeneration, through the implementation of the regulatory framework to support this technology. Regarding **the buildings**, Romania should review the regulations and the building codes, particularly for the use of the heating and cooling systems using renewable sources and equipments that achieve a significant reduction in energy. Moreover, our country as a member will need to expand the use of energy performance labels or the eco-labels to encourage efficient use of the equipment and suitable systems. Also, the continuing and the expanding of some programs, such as the thermal rehabilitation of multi-storey housing blocks project, can form solutions with long-term effects.

PART IV.

CONCLUSIONS AND PROPOSALS REGARDING THE ADAPTATION OF THE ROMANIAN ECONOMY TO THE REQUIREMENTS OF THE LEGISLATIVE ENERGY-CLIMATE CHANGE PACKAGE

This study attempted to make a sober and honest analysis of the impact of the legislative energy-climate change package of the EU on the Romanian economy and society, presenting below the conclusions and a number of proposals for action:

1. It proposes the establishing of a **“National Strategic Planning Institute”**, under the subordination of the Government, whose main role will be to develop proposals and pursuing economic and social development strategies for Romania, in conjunction with the supporting capacity of the natural capital in the medium and long term, the coordination of the interdependent sectoral programs and insuring the consistency of the government programs and of those with Community funding. In 1990, the former State Planning Board was abolished, believed to be a specific structure of the centralized economy, a control structure, however, without being replaced with anything until now. **An important cause of the disordered development of the Romanian economy and society, a process that has deepened beginning with 2009 with an alarming economic and social decline, is the absence of such an institution, with an ongoing activity.** It was replaced, often through measures and ad-hoc proposals, through the political programs of government, with an electoral character, which, because of the alternation in power, have had no continuity or significant practical relevance. In this context, the development and approval of the various sectoral strategies, including the “Energy Strategy of Romania for the period 2007-2020”, are official documents that lack consistency, as long as they do not have a common national support. In this period of 19 years there can be mentioned two exceptions. The first is the development in March 2000 of the “National Strategy for Romania's Economic Development over the medium term (2000-2004)”, by the Isărescu Government, at the express request of the European Union Commission. The statement of this document was: to

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create a functioning market economy, consistent with the principles, rules, mechanisms, institutions and EU policies. Regarding the modernization of the energy sector as an objective, the only acceptable formulation was extremely vague, because of the unions' opposition to restructure this sector namely: the modernization and development of public services so that they best suited the needs of the citizens and the national economy, progressively ensuring that the closeness to the standards of the EU countries. The second exception is the "National Development Plan 2007-2013", in which energy is neglected, respectively appears as a subpriority meaning only to promote energy efficiency.

The complexity and difficulties of the current period and, especially, the future one, the crucial period for Romania's sustainable localization among the EU Member States, definitely calls for creating a specialized institution of the national strategic planning, specific to the free economy, able to strike a balance between the national interest, the high standards required by the EU and the obstacles of the economic and financial crisis that we are crossing. It is mentioned again that the usefulness of this institution depends directly on the quality and professionalism of the staff, the people being the main chance for Romania.

2. It proposes the urgent establishment of "**the Ministry of Energy and Resources**", as the government institutional structure, responsible for developing the national energy policy, the politics, the instruments and mechanisms from the area of primary energy resources, including renewable resources, import of resources, the production and the efficient use of energy, the energy impact on the environment, to ensure the national energy security, the sustainable energy development and the bearing of energy costs. In 1990 they abolished the former "Ministry of Electricity" and all the activities in the energy sector were introduced as departments or general directions of the Ministry of Economy and Resources (Industry, etc.). Next, as a method of representation in government, the energy has not been a priority and was treated with a low attention, with important economic and social consequences. Unlike the energy sector, the "Transport" and "Communications" sectors were recognized as institutions representing infrastructures throughout the whole period after 1990. Today, energy is by far the main concern of the Ministry of Economy, where many opinions, this being about 80% of the activities of the Ministry of Economy. Late restructuring and privatization or the problem of the energy, as many as there have been made, took place mainly at the insistence of the

international institutions (EU, World Bank, IMF, USAID), with modest results and many of them unfavorable for Romania.

A special mention must be made in connection with providing the ability to implement the extremely stringent requirements of the energy-climate change package, approved in April 2009 by the European Council and Parliament, given that Romania is facing major difficulties in this area. Of particular importance in the functioning of the new Ministry of Energy and Resources is the quality of staff, respectively the proven professionalism of it, including the management staff and senior advisers. Any concession made in this regard can only have serious consequences. In addition to the above, one can make the following arguments:

- In most EU Member States there is a Ministry of Energy of its own or at least made explicit, together with other fields of activity.
- Energy is becoming increasingly important during the coming years, as an area which will lead directly the economic and social activity of the country.
- In no EU country (maybe except Bulgaria, which however has a Ministry of Energy) the situation of the energy sector is not as poor as in Romania. The key difference is that these countries have institutional structures adequate to economic and social systems that are more developed and stable, significantly more efficient than the Romanian system.
- As a result, a Ministry of Energy and Resources can no doubt be justified for at least two to three election mandates, during which such a government institution would be dedicated solely to improving the energy sector in Romania, after which, if the case be, it can be converted or put into a different structure.

3. The Energy Strategy of Romania on a medium and long term will have to respond with practical solutions for all the pledges made as a Member State. Furthermore, **the Government will have to merge the energy strategy with the environmental one in a joint document, consistently focused on the requirements of the legislative package.** We believe that this comprehensive strategy must be accompanied by a clear plan of action, with public sector projects and ways to support the private sector projects, with deadlines and responsibilities. To this end, the responsible ministries (the Ministry of Environment, the Ministry of Economy, the Ministry of Administration and Internal Affairs, the Ministry of Agriculture and Rural Development, the Ministry of Transport and Infrastructure, the Ministry of Public Finance and the Department of European Affairs) will have to identify and monitor the part of the national

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program that belongs to them in achieving the objectives of the new package. Focusing on a national level of regulation may be altered during the following years, due to the increasing importance of the European Parliament, thus having to take into consideration the possible sharing of responsibility after 2013. The appointment of **a single national coordinator**, with the role of reporter, directly supported by all the stakeholders in implementing the investment projects will be the key to the success in Romania's response to the requirements of the new Energy-Climate package. This is supported by the case studies of like institutions at a European level, in a similarly regulated environment; such is the administrative structure in the field in the United Kingdom.

The authors consider that **it is necessary to start some educational programs at a national level of qualification of the labor force devoted to research, design, construction, installation and operation of new technologies**. This national support will enable both to maintain the climate of social stability and to development of new capabilities that can be exported, in a context where, in all Europe, there are shortages of suitably qualified personnel to comply with the requirements of the new legislative package.

For the area of research and design there will be additional tasks, because it is clear that it is imperative to proceed with the alteration/ updating of the rules of design / implementation to adapt to the climate change, in order to avoid over-drafted projects, but also to increase the degree of efficiency and safety in the exploitation of the future plants that will use the new technologies. This should be done as quickly as possible, knowing the great periods necessary to achieve the objectives of the sector and the major implications due to the high levels of investments.

4. Romania is now in a position to have to take a number of major decisions and implement a series of measures that, in the case of their absence, might lead to massive relocations of production, the transformation of the national market into a purely consumer market, with devastating social effects. To limit these potential dramatic effects, **it is recommended a series of measures**, contained in a clear national strategy, supported by regional and local cooperation such as:

- The retechnologization of the industries, with emphasis on using the best available technologies and on increasing the productive efficiency, not only on methods of reducing the carbon emissions.
- Creating a system of analysis, research and dissemination with relevant expertise in the field (a national research network, connected

internationally) to provide: a) analysis and studies on the current situation, the real situation of the national economy in terms of carbon emissions, b) analysis and studies to objectively identify the externalities determined by the implementation of the package, on each sector and activity in part c) the appropriate technological solutions to solve the problems of carbon emissions, d) the dissemination of the information by economic agents, authorities and individuals, in an appropriate period of time to facilitate the decision making process in an uncertain environment.

- Creating a system of financing of the activities necessary to implement the energy-climate change package: a) National funding lines or access to the European and international financing lines, for the activities and equipments related to carbon emissions b) National funding lines or access to the European and international financing lines for activities and equipments that are related to the retechnologization in order to increase the productive efficiency, c) National funding lines or access to the European and international financing lines for research activities and for the innovation in the field, d) Creating an energy grant to allow local access to risk reduction measures; e) Funding mechanisms for the support of strategic producers (such as the heat suppliers for homes), f) Protective measures designed to support on a short term basis the local producers covered by the EU ETS scheme, until the retechnologization, against their removal from the market by international manufacturers, which are not covered by this scheme.

- Introducing measures on taxation and the financial aspects of the energy-climate change package: a) Establish the tax system of emission allowances and related transactions; b) Determination of the accounting system of costs from the implementation of the scheme for the producers of thermic energy and electricity through cogeneration.

5. In recent years, there has been a great expansion of the **appointment to senior positions** in agencies, authorities and national committees, as well as in the companies that are owned by the state from the energy sector, **in the algorithm after the general election, of persons, representatives of political parties without expertise in that certain field and, most often, without proven managerial qualities.** This practice, in a crucial sector for the economy and the Romanian society, faced with intensive processes of modernization under the pressure of European directives, can only have serious consequences, amplifying the existent challenges through the lack of experience and professionalism of the responsible factors. It should be noted, with regret, that Romania has

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neglected a basic principle of modern management, namely **in the conditions of ambitious targets and major financial restrictions, one should promote no cost measures, namely, an appropriate institutional framework and a legislation that is adequate for the period that is crossing, suitable management and qualified personnel.**

6. The National Authority for Energy Regulation (NAER) with the mission to create and apply the system of rules necessary for the functioning of the sector and the electricity and heat market in terms of efficiency, competition, transparency and consumer protection. The law specified from the beginning the **main powers and duties of the NAER** namely: issues, grants, suspends or revokes permits and licenses, regulates access to transmission and distribution networks, establishes methodologies for calculating and prices / fees for the activities with a natural monopoly character, states technical and commercial regulations, oversees the functioning of market mechanisms and commercial operator (COMOP), protects the legitimate interests of investors and consumers against the abuses of the government and of the large companies with market power.

In the understanding of the international institutions that Romania has to collaborate with (World Bank, USAID) **the NAER autonomy** requires **distancing** from the regulated companies, from the customers, from the government and other political authorities, and **the protection of the autonomy** must be ensured through: special legal mandates, the independence from the ministerial control, professional criteria for appointments, appointments on fixed terms and the protection from arbitrary dismissal; there are exceptions to the governmental waging rules and public service wages; a personal budget and secure funding through fees collected from regulated companies. Although there has been a proposal for a joint authority for the electricity and natural gas, MIR has decided to create a separate National Regulatory Authority in the Natural Gas field (NRANG), by Ordinance 41/2000, approved by Law 79/2001. Subsequently, with the Ordinance 33/2007 NRANG is abolished and its functions are taken over by NAER. Romania has chosen ever since 1998 (with the occasion of restructuring RENEL and then ROMGAZ) for a competitive market. The current market model has been implemented since 2005 and is compatible with the EU requirements regarding the single energy market. Significant progress has been made towards competition and the energy legislation is fully harmonized with the European law. Unfortunately, the energy sector by size, implications and temptations allowed **the occurrence of failures**

and deviations from the legal framework, involving NAER as for example:

- The Resort Ministry was very present in guiding important decisions of the NAER, as, for instance, **the populist prices before general elections**. Later, at the request of the EU and the World Bank the NAER has passed in the coordination of the Prime Minister, who named the president of the NAER at the suggestion of the resort minister. There were also some **abusive replacements**.

- NAER was constantly under a certain **pressure and political interference**, which increased with the opening of the energy market. There have been, with the tacit acceptance of NAER, **attributions of direct preferential contracts of cheap energy** (especially from Hidroelectrica), on a long term basis, to certain companies with political support. These contracts have allowed the obtaining of considerable, unfair and harmful for the national interest profits.

- In a note from May 15, 2009, **The General Directorate for Energy and Transport of the European Commission asked for clarification from the Romanian party regarding the awarding of long-term contracts at a very low price** (15-20 Euros / MWh), signed in a non-transparent and non-competitive manner by Hidroelectrica SA with a number of customers or suppliers selectively chosen. It is estimated that such practices, that involve the electricity producers that are under the state's property, lead to **the distortion of the market** and can be interpreted as violations of the Articles 87 and 88 of the Establishment Treaty of the European Community, regarding state aids.

- The same note mentioned above requires clarification regarding **the definition of vulnerable consumers and measures to protect them**, as there are information that a very large number of consumers are unable to pay their electricity bills and it is questioned the inadequate character of the Romanian system of protection of the vulnerable consumers.

- The European Commission opened on June 26, 2009, **an infringement procedure against Romania**, requiring more rigor in application of the Directive 2003/54/EC. Two criticisms were made: a) the breach of Regulation 1228/2003 regarding the network access conditions for cross-border electricity exchanges and the Commission Decision of 9 November 2006 of amending the Annex of the Regulation 1228/2003, b) maintaining regulated prices for most of the non-domestic consumers. These criticisms are based on the assumption that our country still maintains barriers against the manifestation of an efficient and transparent competition on the electricity market (criticism is similar also in natural gas sector).

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▪ Although the tasks also included the electricity and heat, **NAER remained oriented towards the electricity market, neglecting and treating superficially the heat sector, respectively the supply of heat through cogeneration.** Although the EU has promoted the efficient cogeneration more and more strongly, for reasons of reducing the CO₂ emissions and the use of renewable energy sources, with its position, the **NAER has brought large damages to the development of cogeneration in Romania.** Therefore it is mentioned a system of allocation the costs from cogeneration between the two products, electricity and heat, which had cheapened the electricity, making heat more expensive by 25-35% expensive than the price of heat obtained from separate production; after not as much as two years from the conversion of the EU Directive 2004/8/EC into the Romanian legislation through GD 219/2007 regarding the promotion of high efficient cogeneration, NAER has not developed the support scheme and the methodology for determining the bonus for these technologies; also it excluded, in a discriminatory manner, the efficient industrial cogeneration from these provisions, introducing the condition (unspecified in the European directives) that the industrial cogeneration units should supply electricity to the national system; finally, in setting the energy prices in some urban cogeneration plants, the NAER did not recognize the costs of development, which contributed to the bankruptcy of some new units.

▪ In order to protect (inappropriately) the final consumers of energy, **NAER, under a certain pressure, adopted the policy of regulating the prices for energy producers** by considering only the costs of operating and not comprising the development costs, the proper maintenance and the environmental costs. The effect of this position is that the energy producers (in particular, the thermal sector producers) do not obtain the necessary revenues to support the environmental investment programs or the retechnologizing, in time reaching decapitalization.

▪ In recent years, NAER came increasingly under the political algorithm by **appointing in some important management functions of individuals without specific expertise and professionalism** needed in a highly sensitive area and with great economic and social consequences.

As noted, **failing to respect the mission, the status, the independence and the autonomy of the NAER can have serious and major consequences. The correct function of the NAER determines the correct operation of the electricity market,** the latter being one of the

main EU direction for action. It is estimated that one could consider the following **proposals for action**:

- **Establishing a neutral, non-political body for the surveillance of the energy market**, with responsibilities that are to be determined. The proposal was made under the REP3 program sponsored by the USAID in 2005-2007, for the Romanian Government, after a careful research of the energy market in Romania.

- As an alternative to the earlier proposal, for the purpose of ensuring the autonomy and independence, **NAER can be placed under the jurisdiction of the Romanian Parliament**, with all that follows from this (the appointment of management, control, etc.)

- **Procedures for selecting and appointing the NAER staff** that will ensure its professional and ethical skills.

- **The energy prices established on economic criteria, separated by the social welfare criteria.**

7. The whole energy-climate change package will produce profound changes throughout the whole European Union. The political objectives of the three targets of 20% , the shares of renewable energy resources, the reduction of the emissions of greenhouse gases and the efficiency of the energy consumption are difficult challenges for the rich states as well, but especially for countries like Romania. The first of legislative acts related to this package, the Directive 2009/28/CE for promoting the use of **renewable energy sources** will come into force on July 1, 2010. At a first qualitative analysis of the effects of the implementation of this Directive it is clear that the impact will be very important, and the decision factors will have to use this period until the implementation for a thorough preparation in terms of administrative, institutional and legislative points. At the same time, we must be aware that the entire economy will be affected, in most of the cases, in the negative, mainly by increasing the energy price, it can be influenced even the competitiveness of the national economy, both in the European internal market, as well as, especially on the world market. Therefore, **we propose the following measures**

- **Rethinking the country's entire energy strategy in the period 2010-2020.** The current strategy only refers to the energy production, transmission, distribution and supply sector, without accurately integrating the other important sectors, especially agriculture, essential for the biomass basis that it can generate and that can be the support for projects that can generate electricity, heat, cold and biofuels. In addition, due to the increase in decentralized initiatives, it is necessary to integrate all the projects of the

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local authorities, which can make an important contribution to the self-imposed tasks, regarding the achievement of the target of renewable sources of the net consumption of the country, both at the end of the range and in the biennial targets. The problem is particularly acute, if it correlates with the government's intention to restructure the whole electricity production sector. The current proposal, based on the creation of two companies with state ownership, which would capture almost over 90% of the energy production market, builds the two pillars on energy complexes that use lignite of low calorific value and with significant CO₂ emissions. The increase in the share of renewable energy sources, obviously by private initiative, takes from the market of the two companies and will make them more vulnerable (plus the challenge regarding the event of an auction of the allocation of emissions). A modeling of the new situation and a reconsideration of the methods of restructuring the sector of electricity generation is absolutely necessary.

- Failure to realize the national action plan in the field of the renewable resources, the inadequate monitoring and the failure of the intermediate and final targets may be subjects of the infringement procedure for any EU Member State. Under the current circumstances, where the entire central authority, including the government agencies, is being reorganized, **it is imperative to establish an entity, desirable under the Regulatory Agency (the current NAER) that will monitor the achievement of the intermediate and final targets** based on the monitoring the origin certificates conducted by clear procedures. The national action plans, being a useful tool for policy implementation in the field, would remain in the care of the resort ministry (Ministry of Economy).

- **Further urgent improvement to the current law 220/2008 on supporting and promoting the use of renewable resources** is necessary, taking into account the many proposals coming particularly from potential developers of projects in the field, but particularly by integrating the provisions of the Directive 2009/28/CE and the fastest approval of its implementing rules. The current law could not be applied *de facto* because of lateness in occurrence of the Government Decision, which should have clarified a series of practical aspects of its implementation method.

- The implementation of the energy-climate change package is bound to lead to **the increase in the electricity price for all types of consumers**. According to the data of the National Agency for Energy Regulation (NAER), reiterated by the General Directorate for Energy Policy of the Ministry of Economy (see subchapter 8.2), by the mere impact of the

price of green certificates corresponding to the imposed shares required by the renewable sources in the period 2008-2012 it is expected an increase in the electricity price for the final customers between **2.59 and 5.78 Euros / MWh**, respectively at the level of the year 2016 an increase in the marginal price of electricity produced at level of the national energy system by around **27 Euros / MWh**. An adjacent element of this impact would be the unavoidable increase of the grants (regardless of “social safety net” used) destined for the socially vulnerable categories, especially in view of accepting the energy service as a public interest service. Hence the need for rethinking the support schemes of certain sections of the population to meet these challenges and to avoid the increase in the so-called “energy poverty” as well as the obligation to allocate year after year of an appropriate budget that would cover this additional requirement

- I was shown that the provisions of the Directive 2009/28/EC have implications in virtually all the branches of the national economy, in particular, **in the construction / urban planning and transport sectors**. Therefore, the national strategies of these areas must also be adapted and adjusted as required by the Directive. If the absorption of biofuels, which should last until 2020 at a minimum rate of 10% of the total fuels used in road transport, it remains on the shoulders of some large companies, all major private, then the integration of renewable sources from construction and the development of settlements, inevitably, will fall in the duties of local authorities. They can prevent **the difficulty of the lack of qualified personnel** to determine if the new developments are in accordance with the said law. Therefore, it is proposed that the future development master-plans of the settlements could contain, the necessarily chapters for the implementation of Directive 2009/28/CE. On the other hand, through the care of the Ministry of Environment it should be developed the national training programs for officials of the local town halls and authorities.

- Measures are needed, including investment measures, for **strengthening the transport and distribution networks** to meet the challenges of the requirements of the Directive 2009/28/EU. This impact is particularly related to the wind power plants, which introduce additional vulnerabilities in the national electricity system to pass the difficult moments of the fall in electricity production through the sudden drop in wind speed.

8. The binding national targets of Romania on the use of RES are consistent with the established objective of the European Community regarding the weight of at least 20% in 2020 of renewable energy sources in

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the final raw consumption of energy of the Community. In order to achieve the defined national objectives, it is important to continuously ensure state aids in favor of the environmental protection and the operation of national support mechanisms for the promotion of energy from RES. Three major sectors are referred to by the RES field: electricity, heating / cooling and transport. The aim being applied globally, it gives Member States, including Romania, the freedom of decision regarding the contribution of these sectors to achieve the national objective.

Following the analysis of the economic impact of the Directive regarding the use of renewable energy sources there have been identified the following **social, institutional, legal, psychological and economic barriers** in the use of RES:

a. Legal and financial barriers • In Romania there are no institutional rules that would define programs and policies on the use of RES or, in case they exist, they are not known to the target audiences. • The lack of an economic mechanism of the state budget, including the tax mechanism that would facilitate the large capital investments in order to create plants and factories that produce renewable energy. The state's position on how to support the investors has not constant, it has changed from one government to another because of the important role the lobby played and still plays for the relevant bodies in Romania. • The high costs involved in the implementation and use of RES. It must be underlined that these costs are high on the short term, but on the medium and long term they are redeemable.

b. Lack of information. Economic agents do not have available information sources about the potential of renewable energy in Romania and guides on how to exploit them. There are clear statistical data and indicators in the area of recent date. In our country, the number of associations, NGO's and other bodies that can provide information on funding opportunities in order to invest are very small.

c. Difficult access to new equipment and technologies. In Romania, the renewable energy industry is very poorly developed, and the number of operators that produce parts for it is insignificant in comparison with the other EU Member States. The outdated technologies used in Romania lead to a reduction in the yield and the damage of the cost / benefit report.

d. Educational barriers. There are no compulsory school programs that would recognize the role of renewable energy. There were no sufficient regional or national awareness campaigns on the role of renewable energy in reducing the negative impact of the GHG on the population. Both the urban

population and the rural are not familiar with the procedures and mechanisms necessary to implement these measures.

e. Barriers that appeared due to the environmental protection. The companies, through their growth policies, can contribute to create a new strategy regarding the use of RES. The biofuel production should be ecologically sustainable and therefore, the biofuels that meet the targets in this Directive and those that benefit from the national support systems should meet the environmental sustainability criteria. Now the question arises of the lands that have high stocks of carbon in the soil or vegetation and are transformed in order to cultivate raw materials for biofuels and other bioliquids, action that will lead to his release into the atmosphere. Scientists argue that the conversion of forests, grasslands and wetlands into agricultural land for biofuel plants will produce a serious imbalance. Thus, the carbon emissions "won" through the use of biofuels will be lost through the destruction of the ecosystems. It raises question marks regarding the total replacement of fossil fuels with biofuels.

9. Given the public system in Romania, as well as the lack of information and decision centralization, it is proposed the **creation a national body to manage the energy-climate change package**, on which one can make the following **observations**:

- The regulations on the environment fall under the incidence of at least three major ministries: The Ministry of Environment, the Ministry of Economy, and the Ministry of Agriculture. There are topics for discussion, as, for example, the improving of air quality, in which intervene the skills of other ministries such as the Ministry of Health. This sharing of responsibilities leads to major delays in decision making, inter-ministerial consultations being required.

- There is not a single point of information on the energy-climate change package. The information is presented for each body involved, occurring cases of informational redundancy or information vacuum in certain areas.

- The lack of centralized, national, regional and local statistics, regarding the factors considered in the energy-climate change package: resource consumption, emissions, etc.

- The lack of publicly available studies and research, relevant, on the impact of the package on the Romanian economy.

- The change in the ministerial and national agencies' responsibilities on the basis of political criteria.

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- The lack of an effective inter-ministerial communication in the field.

An important note related to the national body refers to **the unitary management to reduce the GHG emissions through the ETS and non ETS schemes**, the objectives that have been drawn for Romania for The 2020 Horizon being 21% (for ETS sectors) and +19% (for the non-ETS sectors). **For a unitary treatment within the same body**, of the National Program to reduce GHG the following arguments are brought: • The current lack of a responsible and authoritative coordination at a national level • the allocation of responsibilities, currently, between the various ministries and bodies, with little coordination between them; • the +19% target for the GHG emissions from non-ETS sectors, it seems, has brought *a relaxation state* in these sectors, compared to the strict promotion of the new clean technologies.

Therefore, it is considered necessary the creation of **this national structures that would bring together from a decision and information point a number of the attributions of the public bodies** mentioned above. A model of good practice for this type of institution is given by the network created by three inter-ministerial bodies from Great Britain, namely: • The Department of Energy and Climate Change (DECC), created in October 2008 to bring together: the national energy policies and the politics of climate change mitigation; • The Department for Environment, Food and Rural Affairs (DEFRA) • The Department for Innovation in Business and Skills (DIBS). The network objectives are: ensuring a secure and efficient future, facilitating the transition to *a low carbon* economy and achieving the international agreement on climate change (Conference in Copenhagen in December 2009). The network operates under an agreement with the National Treasury, its activity being evaluated on the basis of specific measurable indicators meant to improve the efficiency of public expenses.

10. With regard to ensuring the correct implementation of the new legislative package there can be also considered the following recommendations:

- To achieve the new objectives assumed by Romania for the period 2013-2020 it is necessary the elaboration of **a coherent national strategy on green energy** that would include data on the bodies responsible for implementing these directives, the reporting of the results and their evaluation. Also, this strategy should identify and classify the entities affected by the provisions of the legislative package and to quantify their

effects on their activity. There should be undertaken actions on how to secure the financing of the necessary activities to achieve these objectives.

- To ensure the optimal achievement of the goals proposed through the new energy-climate change package, state institutions must be prepared to **promote, support, implement and monitor some energy programs**. The energy programs will be elaborated on a long term basis in line with the EU policies, taking into account the actual state of the Romanian energy sector and the energy requirements in the future.

- It is recommended to have regular monitoring (annually) of the progress of our country in achieving the proposed goals in order to be able to intervene quickly in case of unforeseen events. The corrections may include measures of legislative nature.

- It is required to have **psychological preparation for the entities affected by the provisions of the new legislative package** (state institutions, public and private economic operators, population, etc.) regarding the potential effects and ways to neutralize them through the production of campaigns with an advisory and informational role.

- Given that **the implementation of investment projects in the energy field is achieved in the medium and long term**, with significant mobilization of capital and that the time taken to achieve the assumed objectives at the EU level are quite close, **it is recommended the swift implementation of this package**.

- **The legal framework in Romania necessary to ensure the investment of the funds received from the valuing of the carbon dioxide allowances** on the European market in other environmental projects must be created.

- Ensuring at a national level of the implementation of **programs for skilled labor**, destined for the design, the implementation and operation of new technologies for environmental protection.

- The ensuring of the simple and effective legal framework to implement on the Romanian market the new technologies to reduce environmental pollution.

11. Increasing the energy efficiency and reducing the final energy consumption is certainly a priority objective, which fully meets all the requirements of the energy-climate change package. Therefore, we believe that special attention should be paid to **the following steps**:

- In order to achieve the foreseen savings, the most important step is **to improve the legislative and regulatory framework** that will allow to: a) accelerate the process of understanding the real situation by facilitating the

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conditions of implementation of **rigorous energy audits** to industrial customers, the public and residential buildings, audits certified by authorized agencies, followed by measures to reduce energy consumption, b) the removal of important, still existing barriers, **the funding barrier**, thus improving the use of specific financial instruments for energy savings projects, including the energy performance contracts which require the provision of measurable energy savings, c) **changing the consumer mentality** through awareness, that will allow the purchase of equipments and technologies, taking into account the priority of the requirements on energy efficiency in order to reduce the GHG emissions, d) the solution of the fundamental problem of **warming of urban conglomerates by reconsidering the benefits of cogeneration**, trigeneration respectively, and the **centralized supply** with heat / cold, combined with decentralized cogeneration, through the implementation of the regulatory framework to support this technology.

- **Strengthening the role of the Romanian Agency for Energy Conservation (RAEC)** to promote national programs and governmental projects of energy efficiency, as well as the continuing of the program of making the public buildings more efficient. However, the finalizing of the implementation of the only tool of support considered to be applicable in Romania for increasing efficiency of the energy consumption in the industrial sector, **the long term agreements**, must be made as soon as possible, being a useful tool also for the industries concerned, for the passing through the current economic crisis.

- Given that fact that in the first quarter **the consumption in Romania has decreased due to the crisis by about 10%**, this will make the assessment of the first National Action Plan for energy efficiency of the country, to show at the end of 2009 that the objective of 1 % reduction in the energy consumption per year during 2007-2009, was accomplished. This should not reassure the Ministry of Economy and RAEC as the new targets imposed by the legislative package are much more severe, especially during 2016-2020, which should be considered by the new National Action Plan.

- The authors of this study considers that **there are still major difficulties in financing the energy efficiency projects**, the Romanian banks being involved, in particular, only when they are accessing specific tools opened by the multilateral development banks such as the European Bank for Reconstruction and Development (EBRD). One of the actors who really have worked on this market is the Romanian Fund for Energy Efficiency (RFEE), a fund established by an agreement between the World

Bank and the Romanian Government. At this point, the initial funds were borrowed and the entity became a revolving fund. **We propose the recapitalization of the fund and the expansion of its area of action by adding projects of renewable sources.**

- On the basis of the current methodology for calculating the rates for the network activities, a reduction in the electricity consumption automatically leads to an increase in the rates of transport and distribution. As a result, **the current trend of decreasing of the consumption will lead to major increases in the network tariffs. By default, these increases will be automatically reflected in the prices to final consumers**, whether they are from the open market or in the captive market. Adding on top of them of an increase of the producers, due to necessary investments, as well as the payment for CO₂ emissions will create an unbearable situation for the population and for the vulnerable consumers, but also for the Romanian economy.

12. The decrease in emissions of carbon dioxide and other greenhouse gases is the main objective of the energy-climate change package. In this regard, it is considered for our country to **adopt the following measures:**

- A strategic element that could affect the security of energy supply in the country is considered to be the inevitable decline of the local share of power stations using local coal, fuel with high intensity of CO₂ emissions. When replacing a part of these with natural gas, inevitably brought from outside the country in the context of the continuous decrease of the national reserves, it is foreseen the increase of Romania's import dependence. It also can be seen from this the importance that the alternative routes can have, such as that of the NABUCCO project, so the proposal that we should be doing is **to focus actions both domestic and especially foreign, of the state to diversify gas supply sources**, but that should not be wasted but they should be used only in very suitable schemes in mixed cycles of steam-gas, possibly with high efficiency cogeneration. In addition, **mature thinking is required for the rehabilitation program of thermoelectric plants using lignite, in conjunction with programs to achieve the desulphurization installations.** There is danger of desulphurization in the old groups, not modernized or the ones that become unprofitable in the situation of buying emission permits (which can almost double the price of electricity from these plants).

- While the general elements and the approach principles are generally established, the situation of the two fields related to the emissions

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of ETS and non ETS greenhouse gases is still in the process of clarification. Moreover, our country is given the chance of a 19% increase in emissions in the non-ETS area; therefore, the way in which the two areas are defined is crucial. Therefore it is proposed that the representatives of Romania to seize any opportunity **to extend through negotiations the non-ETS area (from the 10 000 t CO₂/year proposed limit to 25 000 t CO₂/year, which would be more convenient for our country) and thus allow more plants to use this rate.** However, monitoring during the 2009-2020 period of the emissions in the two categories of sectors is essential to justify the way in which Romania is achieving the requirements of the legislative package. Moreover, until now, there are no clear rules and procedures through which the state companies can trade certificates, while private companies have them individually. It is therefore **urgently necessary to establish rules of implementing the legislative framework that describes the means of valuing the emission allowances.** This involves reducing the negotiations time between the Ministry of Economy and the Environment Ministry that still have different opinions and proposals.

- **Large investments required for the whole package cannot be covered by the state; therefore, they are likely to be covered by the private sector or through a public-private partnership.** This is required, under new conditions, a reassessment of the opportunity of **continuing the privatization in the energy system.**

- **The solution to capture and store CO₂ is still very little studied in Romania.** From the investigations of the authors of the study, so far at least, although one wishes, our country does not participate in the EU-funded pilot projects, although we have a lot of areas likely to be used for this purpose. Therefore, **we consider necessary to conduct a study of evaluating the potential of our country in this area** and to establish methods for the use of this potential. However, the regulatory framework should be extended to provisions regarding procedures for concession of future CO₂ storage houses.

13. Considerable loss of heat, the order of 40-50%, are registered by buildings, in particular, blocks of homes, administrative buildings and the ones with budgetary activities (schools, hospitals, etc.), most of them being built after 1960, from cheap materials, with a low thermal insulation in a time when energy prices were low, subsidized. After 1990, the situation has changed fundamentally, the energy prices raised continuously, so that the energy cost of construction began to become prohibitive, requiring the **thermal rehabilitation of buildings.**

According to data from the population and housing census of March 2002, 39% of the total homes (2 984 577 suites) are in 80 632 blocks, which are virtually all connected to the central heating systems. Although these housing units are under 1.8% of the total number of existing residential buildings, the number of tenants in these blocks is 6.91 million people.

Most of the buildings have a high energy consumption, an advanced wear and the age of 90% of the buildings is between 20 and 60 years. Following the sale of houses from the state locative fund after 1990, the return of the properties and the construction of new houses, 97% of the apartments are privately owned.

The buildings are the biggest consuming sector (41% in EU) and a potential source of considerable energy saving. After the oil crisis of 1973, all countries in Western Europe and, in particular the Nordic countries, have passed to realizing **national programs to achieve thermal protection of buildings**, carried out in stages of 15-20 years. As a result, the specific energy consumption for heating buildings has continuously decreased overall by up to **60-65%**. For comparison, while for the buildings in Romania today, the specific average annual energy consumption is around 390 kWh / (m² *year), this indicator for EU countries is 220 kWh / (m² *year). **The Green Paper (2007) of the EU states the need to reduce by 22% the residential consumption by the year 2012.**

Thermal rehabilitation of buildings in Romania has been the subject of several laws (325/2002, 211/2003, 372/2005, 260/2006). However, **from the total over 80 000 units of housing there have been thermally rehabilitated so far only about 100 buildings.** The funding for the rehabilitation work was divided between the central budget, the local budgets and the local associations, the last two participants, but especially the one that was attributed to the owners associations could not be obtained practically. **Lack of funding secured through an appropriate political and legal framework is the main cause of failure in the energy modernization of buildings**

Thermal rehabilitation is preceded by a thermal energy audit of the buildings, as the legal obligation for public buildings since 2007 and for private residential buildings since 2010. Public buildings (administrative, with budgetary activities, etc.) are far from respecting this legal provision.

The national potential of energy savings and CO₂ emissions reduction by thermal rehabilitation of buildings is estimated at 19.7 billion kWh / year (or 1.7 million toe / year) and 4.1 million tones CO₂/an. Harnessing that potential can be done by realizing **“The National thermal rehabilitation of**

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buildings". The cost of rehabilitation will be recovered in 8-12 years from the reducing of energy consumption.

For the thermal rehabilitation of approximately 2 million apartments (in about 60 000 multi-storey residential buildings, representing a building fund that is justified to be upgraded), with a specific cost of 3000 Euros / apartment, it is needed about 6 billion Euros. With a duration of a rehabilitation program of 20 years, to modernize 3000 units / year funding should be provided of about 300 million Euros / year (for a period of 25 years, to 2500 units / year, it is needed 250 million Euros per year) . It appears increasingly obvious that **full funding should be provided from the central budget and local budgets**, with the subsequent recovery through the energy bill of the share of financing part of the residents (owners).

14. The centralized supply systems with thermal energy (CSSTE) are in our country in the greatest difficulty in terms of technical, economic, social and environmental impact compared with the other two main subsectors, electricity and gas. CSSTE means the total facilities of production, transport, distribution and consumption of heat; it is specific to urban areas (municipalities, cities) and, to a much lesser extent, rural (villages). In countries with free consolidated economies, central heating proved to be the only sustainable method of heat supply in densely populated areas. In transition countries, centralized heating is relatively widespread, particularly in Romania, but requires substantial modernization to become competitive in the market for performance and price.

The heat sources in the CSSTE are usually **cogeneration plants (district heating)**, (in which there are produced simultaneously and combined electricity and heat) and **heating plants** (which produce only heat). As a technical alternative, there is **separate production** of electricity (in thermal power stations) and heat (in the thermal plants).

The benefits of cogeneration (combined production) compared with separate production are represented by the fuel savings of up to 32-34%, the reduction of emissions of greenhouse gases (especially CO₂), corresponding to unused fuel, the use of biomass and waste fuel for residential heating. In this context, **cogeneration is an efficient method to reduce global warming and is promoted particularly by the European Union in its climate-energy policy.**

The situation of the cogeneration and central heating in Romania is very serious and very close to an economical collapse mainly due o the following causes: • in the majority, the equipments of the plants that provide

heating are from the 60' – 70', being technically and morally outdated, with an expired life expectancy; • on the entire energy chain the transmission - distribution - consumption heat source the energy losses are very high, respectively, reported to the consumed fuel, by 35% in the most effective systems and up to 77% in the most inefficient ones; • losses are offset partly by the final consumers and because of their small incomes, through subsidies and social assistance; • the social impact of CSSTE is particularly significant: more than 80 000 multi-storey residential blocks, with about 3 million apartments, where 7 million people live, to this built fund it is added the administrative buildings and budgetary activities (schools, hospitals, etc.); • although the energy losses of the buildings are very high, of about 40-50%, their reduction through heat rehabilitation was not only made for about 100 buildings; • the regulating of the activities of this subsector was made by three authorities: NAER, NARNG, (abolished from 2007 and its powers taken by the NAER) and the NARCC, these authorities have frequently had their executives belonging to different political parties and a weak cooperation; in particular, through the regulations it has issued or not issued, the NAER has significantly negatively influenced the situation of cogeneration in Romania; • it also can be considered that, in terms of centralized heat supply NARCC has very reduced experience; • It lacks a national policy in the cogeneration and the central heating field, the responsibilities are divided between various ministries and local authorities, with no consistent coordination between them; • the transfer, after 2001, of the 18 cogeneration plants from the Termoelectrica to the local authorities was a transfer of the problem and a solution, and the district government programs regarding thermofication in the years 2006 and 2008 had no significant results; • As other causes of decline in this subsector there are mentioned errors on fuel prices and heat, not paying the bills, grants and financial blockage, the severe shortage of funding sources, the unattractive legislation and too many interferences, a welfare system with many flaws, the dissatisfaction of the residents due to the lack of comfort and the reduced supportability of paying the bills; • if in 1990 there operated 251 operators (suppliers of heat) for about 3 million households today are, for the reasons indicated above and the phenomenon of disconnection, only 1.6 million customers and 104 operators, out of these operators, 4-5 are financially sustainable, the rest are in a bankrupt situation, the closure of activities.

The EU policy in the cogeneration field states that there is the need to promote and support the cogeneration technologies with high total returns, which allow greater fuel savings, with at least 10% compared to the

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situation of separate production of electricity and heat. The transposition of directives into the Romanian legislation was made by GD 219/2007, according to which the NAER was required to provide within 90 days of the entry into force of the Government decision the elaboration of the support scheme for efficient cogeneration development and the methodology for determining the bonus and contribution for high efficiency cogeneration. In almost two years, NAER not only did not fulfill these obligations, but excluded in a discriminatory manner the effective industrial cogeneration from these provisions, introducing the condition (unspecified in the European Directives) that these industrial cogeneration units should supply energy in the national electric system.

Given the importance of the residential sector (in size and social impact) and the beneficial advantages of high efficiency cogeneration, **Romania should urgently move to adopt specific measures in this area**, including:

- The main factor able to accelerate the development of this subsector is the **firm and permanent political will** that will ensure the functioning and progress in the area of influence of each factor described above. Given the large inertia character of the energy activities, with long durations of time between the decision and the implementation practice, it is necessary that the political decision to go beyond the electoral mandate of four years.

- It proposes the appointment of a member of the Government that will ensure the coordination of activities specific to this energy subsector. For the coordination of priorities, it must be designed a new way of **making the local heating and heat rehabilitation of buildings**, that will eliminate the dysfunctions present between **the national policy** (where the government is responsible and the sole interlocutor with the EU) **and the local policy** (where the local authorities, due to administrative autonomy may have other priorities and approaches). There must be **a better coordination between national priorities and local priorities**, economically, socially and environmentally speaking, respectively between the responsible ministries and the local authorities.

- The precarious situation in the financial and technical terms of the operators (suppliers of heat) must be subject to **a Government analysis** as required by art. 11, par. 2, of Law 51/2006.

- Urgently developing a survey on the state of the centralized heating systems and **the development of a national strategy in the residential heating field**, of the energy efficiency and the use of renewable energies, with measures, deadlines and responsibilities based on local strategies. For

the preparation of local strategies it is necessary to develop a guide for municipalities, so that a uniform system of analysis and proposed solutions exists, consistent with the national policy in this area.

- Creating a stable and predictable environment in terms of the legislative and regulatory framework. **The new regulations should be issued only after a long enough process of consultation so that the entities concerned should be able to express their views. The regulations must be non-discriminatory and ensure the attracting of investments in the sector.** It is necessary to eliminate **inconsistencies between various laws** that apply to the central heating and cogeneration in order to increase transparency and simplify the legislative provisions. It is considered that the **regulatory activity** in the cogeneration and central heating field must be found **within a single authority, and that should be the NAER** to avoid mismatches in the secondary legislation existent today. **In this respect, the regulatory activities of NARCC regarding the central heating plants and the centralized supply with heat must be transferred to the NAER.** Along with providing legislative and regulatory stability, these measures are likely to attract private investments in this sector. It is estimated that the upgrading of the sources of heat production (cogeneration plants and heat plants) would require about 6 billion euro, the funds resulting mainly from the private sector.

- **Gas price differentiation** between the large and small consumers according to the EU models to promote central heating and eliminate cross subsidies.

- **Introduction the binomial tariff** for gas and heat supply, as a guarantee of recovery of the investments and the operation on the summer time of the heat operators.

It should be clearly understood and accepted that, the promotion of effective cogeneration and the thermal rehabilitation of buildings are two main lines of action to sensibly reduce the energy losses through which Romania can meet its obligations to reduce energy consumption by 20%, respectively 20% increase in energy efficiency by 2020, of the EU energy-climate change package.

15. In the skills they have, **NAER must regulate the introduction of the binomial tariff for heat and gas**, so as to reflect the economic reality for these two energy carriers.

The energy bill in the **monomial tariff** is:

Bill [lei] = $a \cdot$ (Consumed energy),

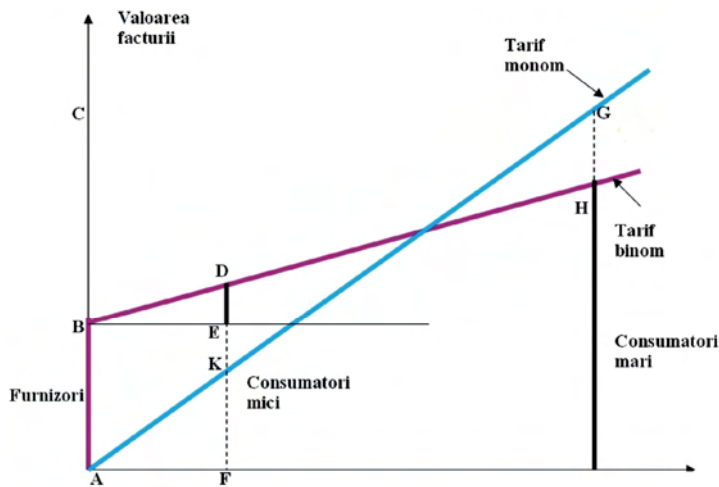
And in the case of the **binomial tariff**:

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$$\text{Bill[lei]} = b + c \cdot (\text{Consumed energy}),$$

In which a , b , and c are constant measures resulted from economic calculation. The comparison between the two tariffs is shown in the following figure.

Figure 5. The comparison between the binomial and the monomial tariff in establishing the energy



AB – costuri fixe ale furnizorilor; BC – costuri variabile cu energia ale furnizorilor;
 DF – factura consumatorilor mici în tariful binom; EF – asistență socială pentru consumatorii
 mici defavorizați; DE – plata efectivă pentru consumatorii mici defavorizați; HI – factura
 efectivă pentru consumatorii mari; GH – costuri neplătite pentru consumatorii mari.

The monomial tariff, designed with a single component, in which the charge is proportional to the energy consumed, includes in the constant amount a , all the energy suppliers' costs. This rate is likely to produce financial instability for the supplier, when consumers take used energy saving measures or stop their consumption. **The binomial tariff**, for the purpose of working and developing the system on a long term basis is composed of two components, that reflect the actual cost structure of the supplier: the fixed part b , needs to cover capital costs, maintenance costs, the staff costs and a fair profit, and the variable part $c \cdot (\text{energy consumed})$, must cover the variable costs (with fuel, electricity, water and other variable costs). Special mention must be made concerning the binomial tariff is that its application gives the energy supplier the guarantee that he can recover the investment made.

However, the binomial tariff eliminates the cross-subsidies between large and small consumers, the bill for the large consumers is reduced, and the bill for the smaller ones, naturally, increases. For the small vulnerable consumers there can be ensured a certain social assistance to cover (partly or fully) the fixed costs.

Using the binomial tariff was strongly recommended by the program REP3 (Phase3 Romanian Energy Program), funded by USAID for the Romanian Government, in 2005-2007. At present, it seems that Romania is the only EU Member which does not use this type of tariff.

16. It is estimated that the provisions of the new legislative energy-climate change package will have also in the case of Romania **an important impact on the suportability of the energy bills by increasing the prices of all forms of energy (fuel, electricity, heat), causing a reconsideration of the social protection.** The fossil fuel prices will increase, the renewable energy will be, for a relatively long period of time, more expensive than the energy from conventional technologies, and the latter will generate a more and more expensive energy because of the need to reduce emissions of greenhouse gases from fossil fuels. In this context, the increase in energy prices can be lowered by applying energy efficiency measures.

The size of a family's income determines **the supportability of the energy bills**, respectively, for the families with a low income, their localization in system of social assistance. In 2007, the net minimum wage in Romania was 116 euro / month (in December 2007, 149 Euros / month). In 2008, these values have been slight increasing, while in 2009, due to the economic crisis, the values either have significantly decreased or they have stagnated, accompanied by a considerable increase in unemployment.

In this context, following the values from previous years, in 2007 **poverty** affected 18.6% of the population, "fuel poverty" having higher levels. According to a recent report by the World Bank, **poverty remains concentrated in the vulnerable groups** especially in villages, where three quarters of the poor Romanians live. In 2008, about 1.2 million of Romanian was living in absolute poverty, when in 2007 their number was 2.1 million people. The World Bank experts estimated that, due to the economic crisis, the share of Romanians living in absolute poverty will increase from 5.7% in 2008 to 7.4% in 2009, and the share of children in this situation will move from 7, 8% last year to 10.7% this year. The social categories that are mostly exposed to the risk of poverty are, according to World Bank, in addition to rural areas, the children, especially those from large families, the youth, the Roma, the unemployed, the pensioners with

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low incomes and those who are their own employees, particularly in agriculture .

According to the National Commission for Prognosis, in June 2009, the average gross monthly salary in Romania has the following values: 399 Euros in 2007, 437 Euros in 2008, 398 Euros in 2009, 500 Euros in 2013, and 810 Euros in 2020. With such an income, an average family pays for the energy consumption 24% of the income, being able to be classified according to certain criteria in the category of “fuel poverty”.

After 1990, all governments have expressed a growing concern over **the improvement of the supportability of energy bills of the low-income households**, the responsibility of those steps being given to the Labor and Social Protection Ministry. As an example, it is mentioned that the total value of the energy subsidies and aids since 2006, of 8.509 billion lei (2.43 billion Euros). Although the total size of the contribution was significant, the system is unfair because it does not address only the poor and the most disadvantaged consumers (consumers not connected to energy networks) remain the least assisted.

The main **shortcomings of the existing system of social protection for energy** were analyzed for the Romania Energy Program-Phase 3 (Phase3 Romanian Energy Program, REP3), funded by USAID in 2005-2007, for the Romanian Government, including: the) The lack of a government strategy to improve access to energy and supportability; so the system is fragmented, authority is dispersed, and the grants multiple: there are four types of price subsidies, three forms of direct aid and three types of support for energy efficiency. b) The system is expensive and distorts the markets: in 2006 there have been spent over 600 million Euros on energy subsidies and aids, but only 140 million Euros (nearly one quarter of expenses) were allocated for direct aids. The current system produces significant distortions on the energy markets and affects the impartiality of the social assistance system. c) The system does not encourage energy efficiency because the energy assistance finances the consumption part and thereby affects the price signals for the efficient use of energy .d) The assistance targets are not well established; on the whole, the system does not manage to address in particular the poor. e) The scheme does not provide a good coverage for the poor families, thereby increasing social exclusion. f) The system reduces social cohesion by an unequal treatment of consumers of energy.

In addition to the proposals with a certain degree of generality on **ensuring a supportability degree of energy prices for consumers** made

in "The Romanian Energy Strategy for 2007-2020", one has to refer to the **REP3 Social Welfare Program proposals on the social protection in the energy field**, including:

- The use of **the binomial tariff** to provide heat and gas, reflecting an economic reality. The protection of the vulnerable consumers can be achieved through social aids that would partly or fully cover of the component of fixed costs.

- It is needed **an uniform system of social assistance for energy**, that would include **the two basic components**:

- c) Direct social aid for energy for the consumers with low incomes fed from the networks, established according to the size of the fixed costs of the service (the fixed component of the binomial tariff) for the entire period of the year;

- d) Integration of the low-income households in the national programs to increase energy efficiency: the thermal rehabilitation of residential areas, other measures to increase energy efficiency and the use of alternative energy sources.

To implement **a uniform system of public assistance** for the population's access to services of general interest (supply of electricity, gas and heat) it is required the following measures:

- The establishment of effective mechanisms to monitor the energy markets to increase their efficiency and to encourage the investments in modernization of the sector because of the increase in the confidence in the markets. It is necessary to continuously monitor the operation of the electricity, gas and heat markets, possibly by a competent, independent and specialized institution;

- The clear separation of powers and responsibilities of the regulating authorities in the energy field from the ones of the ministry responsible for social assistance;

- All public assistance for access to energy will be budgeted transparently and will focus on low-income social groups;

- The development of a special component of public support for access to energy, focusing on the increase in energy efficiency for low-income consumers, both in the urban and in the rural environment, with emphasis on the thermal rehabilitation of buildings and facilities for heating in households.

In addition, it is recommended the implementation of a series of **measures in the energy field for strengthening the social policy** that being:

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h) **The termination of all subsidies** for the energy sector in accordance with the requirements of the European Union Treaty. The removing of these subsidies will lead to significant price increases, which for the heat, is estimated at about one third of the actual subsidized price.

i) **The elimination of seasonal aid payments for heat** in a fixed amount and the introduction of a **permanent system for energy assistance** for low income families in order for them to fight poverty and social exclusion. Energy assistance reduces the social exclusion and poverty caused by the market cost of the energy services by financing a part of the fixed component of the energy costs (and possibly part of a variable cost) based on the level of poverty (or vulnerability) of the family. Energy assistance requires that all the poor consumers must pay, in turn, part of their energy bill.

j) Diverting the saved state funds by a **system of assistance for energy fully targeted to all low-income families, regardless of the energy use**. The energy service should be priced in order to promote employment and prosperity in the energy sector. However, such measures should also promote social solidarity and not exclude the vulnerable categories.

k) Establishing a **social fund for household consumers** faced with price increases, financed by voluntary contributions from energy suppliers, which will provide partial compensations to consumers for the impending price increases to heat and gas. The establishment of this social fund will complete: • the liberalization of the energy markets by eliminating outstanding subsidies; • the reform of the tariff system for energy especially by introduction the binomial tariffs; • the reconfiguration of the system for energy assistance, respectively the shift of the public support from the universal indirect support (price subsidies) towards the tested direct benefits (in social assistance for energy). It is recommended that the voluntary contribution model be similar to an insurance scheme or a private benefits scheme. The Government, through special tax benefits for supplying businesses for their contributions, must form the social fund, in order to encourage the voluntary contributions.

l) The Ministry of Labor and Social Protection shall establish **the annual social analysis in the energy field**. The interaction between the independent energy regulations and the social policies produces social effects difficult to predict for the decision makers. The factors responsible from the Ministry of Economy and from the regulating authority, together with poverty and social services experts need to develop surveys to better inform the policy makers about **the interaction between prices, poverty**

and energy use.

m) The development of a new framework law for energy with a clearly definition of **the general interest service (GIS)** for the energy sector, with particular reference to the financing of the access to energy for vulnerable groups. The regulatory framework should be strengthened to include the specific requirements of GIS for energy companies, especially in terms of the contract provisions and performance requirements.

The EU energy-climate change package approved in April 2009, through the stringent provisions it contain, will produce an appreciable increase in the energy prices and hence reduce their supportability for all consumers. The most affected will be the vulnerable consumers, which, in the case of Romania, is an important segment of the population. Without a clear and firmer strategy of the government to protect them, developed and implemented urgently, the social effects will be disastrous. In this context, the responsibility and determination of the policy makers in managing this social program is essential.

17. Given Romania's obligations under the energy-climate change package, the developing of the **nuclear program** is justified by reducing the country's dependence on foreign sources of primary energy (especially natural gas imports), through the absence of carbon dioxide emissions, and by replacing old and inefficient energy capacities with fossil fuels.

A competent assessment of the nuclear power development in the world, for the period 2006-2030, is made by the Office of Integrated Analysis and Forecasting (Energy Information Administration) of the U.S. Department of Energy⁷¹. It is anticipated that the generation of electricity from nuclear power plants worldwide would increase from 2700 TWh (billion kWh) in 2006 to 3400 TWh in 2020, respectively 3800 TWh in 2030 due to the rising in fossil fuel prices, the energy security and the emissions of greenhouse gases. Increasing prices of fossil fuels allow the nuclear energy to become economically competitive with the one produced from coal, natural gas and oil, despite the high cost of capital and maintenance of the nuclear power plants. In addition, for the existing nuclear capacities there were reported high usage indices and it is anticipated that most of the old nuclear units will be qualified to extend the normal period of operation (which is about 30 years).

On the one hand, worldwide, the nuclear power is attractive and represents a solution for countries that pursue the diversification of the energy mix, the improvement of the energy security and the development of

⁷¹ "International Energy Outlook 2009" (IEO-2009), Washington, May 2009.

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low carbon technologies as an alternative to fossil fuels. On the other hand, there is still considerable uncertainty regarding the safety of nuclear power plants, the storage of radioactive waste and the danger, in some countries, to produce nuclear weapons with the uranium extracted from the civilian program. The preliminary results of the analysis highlight a few items that deserve attention, as they demonstrate the competitiveness of nuclear energy:

- In all scenarios considered, the nuclear energy is recognized as the cheapest option for the production of electricity based on the load profile, even for a low price of CO₂, the cost of decommissioning and waste management are internalized into the electricity prices, The higher the carbon price is, the competitiveness of the nuclear energy increases; The impact of fuel price in the cost of producing of the electricity is clearly in favor of nuclear power, whereas the weights of fuel in the cost structure of the electricity production is only 15% for nuclear production, compared with 41% for coal and 76% for natural gas; The security in the supply of uranium must be ensured through diversification in the sources in politically stable countries; Europe is the world leader in nuclear technology and has on its territory the entire cycle of nuclear fuel; Very good capacity factors for European nuclear reactors encourage operators to invest in the extending of the operation of nuclear units, over the life span of the project, which is a way to add the production capacities with the lowest costs ; Replacement of the nuclear capacities with renewable energy sources (RES), dependent on weather conditions, leads to increased emissions of CO₂ by the need to include in the national energy system of flexible energy capacities based on natural gas or coal; The radioactive waste are in small quantities, they can be put in containers (compared to the dispersion of emissions into the atmosphere) and, currently, are controlled from a technical standpoint; From a social point of view, nuclear plants provide direct employment and a stable and predictable electricity price, beneficial to the whole economy; The factors facilitating in the development of nuclear capacities are: the long-term carbon price, the homogeneous regulatory framework in the EU and the electricity supply contracts in the long term; Given the substantial share of capital expenditure in the production cost structure of the nuclear energy, its competitiveness is conditioned by the financing cost that can be reduced by a proper risk analysis and a risk-sharing model. The current financial crisis requires this point more and more; In order to increase the competitiveness of nuclear power, it is considered four risk factors: the

specific of the project, the market risk, the regulatory framework and the political risk.

Possible implications for Romania. • The recent developments in the UK, France, and Finland show that European states already react to the concerns of ensuring the country's electricity requirements and the consequences in the energy mix that the environmental restrictions will cause.

- An analysis of the implications that the new energy-environment package has in Romania's national power system is required. The nuclear power is a necessity in the country's energy mix, as it increases the security of the energy supply and reduces Romania's dependence on external energy resources.

- Romania is among the EU Member States that have decided to continue the nuclear program by completing Units 3 and 4 from The Nuclear-Electric Plant (NEP) Cernavodă.

- A revival of the nuclear power is beneficial for Romania, a country possessing nuclear technology, with all the nuclear fuel cycle, from extracting the uranium ore to the storage of the spent fuel being also the country that produces heavy water.

- The infrastructure for the development and management of the nuclear facilities is there, having to be maintained and adapted to the new nuclear safety and technical requirements to meet the European requirements. Romania's experience in processing the uranium ore, in the processing and conversion of UO_2 is worth to be explored under the conditions of the positive trend towards nuclear energy, Europe knowing an increase in the demand for processed uranium and brought to the form required by enrichment facilities (UF_6) as is known that all nuclear units in Europe except Romania, use enriched uranium as nuclear fuel.

- The completion model of the Units 3 and 4 of Cernavoda Nuclear Power Plant, with private capital, without state guarantee, is a viable model; the finance project of the unit 3 at Olkiluoto, in Finland shows this. In addition, the preliminary results of the work subgroup the “*Financing of nuclear plants*” within ENEF shows that the nuclear power plants can be financed without state guarantee. However, it is necessary to examine the state's role in promoting and financing the nuclear projects, given the risks involved by large investments, such as nuclear, under the liberalized electricity market.

- It is important to consider the following elements: a) The licensing and the permits are the main risks to the cancellation or delay of the

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investment, as any delay reduces the investor's profit. b) The new concept of *standardization of nuclear projects* is in the disadvantage of continuing investment in Units 3 and 4 of Cernavoda Nuclear Power Plant, equipped with nuclear reactors of Generation II. The States that possess the nuclear technology generation III will impose their standardization, making it impossible to construct new units with technical and safety performance below the level of nuclear generation III. c) It is important to obtain favorable opinion of the European Commission for this investment before the adoption of this concept, the European Investment Bank (EIB), working in the aid of the European Community, and, as decided by the Bank's Council, economically arguing, for nuclear, only the projects promoted by EURATOM.

In the context of Romania's obligations under the energy-climate change package, the development of its nuclear program is justified by reducing the country's dependence on foreign sources of primary energy, with the absence of carbon dioxide emissions, and by the replacement of old energy capacities with fossil fuel energy.

We believe that the following have to be reported: in the art. 41 of the Euratom Treaty, **the EU began examining Units 3 and 4 of Cernavoda Nuclear Power Plant**, as a result of a newsletter from June 29, 2009 from the Romanian side. In a letter of response from August 5, 2009, the Nuclear Energy Directorate of the General Directorate for Energy and Transport of the European Commission it is send to the General Manager of SC Energo-nuclear, a list of 40 questions requesting additional information. A special mention is about the fact that, the general manager of SC Energo-nuclear, which must personally provide answers to these strictly specialty questions of nuclear energy, is an aviation engineer with no training in nuclear field

18. The new structure proposed for the electricity subsector, **structure based on the existence of two strong companies that are draining about 90% of the market**, in any case, it cannot be consistent with the principles of the legislative package. The oligopolistic position of the two companies, **state property**, will soon lead to the removal of some of the other market players. This might be accepted, if the two companies could generate substantial financial resources for future investments in the sector. **Unfortunately, the two companies have as functional basis the energy complexes that use local lignite. The next auctions for allocation of emission allowances in 2012, as well as the significant reduction of the final consumption and support for the area of renewable energy sources by state aid, will diminish the importance of coal plants, increasing**

their costs, and the two companies will go weak, unable to fulfill the role which justified their creation, that of powerful actors on the European internal market. So, after a number of competitors of these two companies will be removed from the market, the new structure will not be able to cover the gap formed, because the two companies themselves will have big problems. The reorientation towards other fuels is not feasible by these companies, because they do not have enough financial resources, leaving the private sector to solve this. So, the probable solution will probably be another round of privatization, which can be much easier this time and even harder in the future if the new structure is implemented. **Many experts feel that on the short term, medium possibly, the establishment of these companies will be important as national players, a moderate importance as a regional market players and will have no importance as players in the European market.**

19. In connection with the use of the **EU Structural Funds** to finance projects in the energy field one can make the following statements: on July 12, 2007, the European Commission approved the **Sectorial Operational Program “Increase of Economic Competitiveness (SOP IEC)”**, whose overall objective is to increase the productivity of the Romanian companies in line with the principles of the sustainable development and the reducing disparities from the productivity in the EU, so that Romania may achieve by the year 2015, a level of approximately 55% of the average EU productivity. SOP IEC program will be financed in the period 2007-2013 from the European Regional Development Fund (ERDF), one of the EU Structural Funds, to which it will be added funds from the state budget and local budgets.

From the five Priority Axes (PA) identified, the energy is contained in the AP 4 - **“Increasing energy efficiency and the supply security in the context of climate change”**, having three Major Lines of Intervention (MLI), namely: 1) Efficient and sustainable energy (**improving energy efficiency** and the sustainable development of the energy system in terms of environment), 2) **Harnessing the renewable sources of energy** for green energy production, 3) **The diversification of the interconnection networks** to enhance the security of energy supply.

The SOP IEC Program serves directly through funding (730 million Euros) and thematic in attaining the objectives of Romania in the new energy-climate change package, responsible for running the program being the Intermediate Body for Energy (IBE).

From the steps already taken **are found the following:** • *The degree of absorption of the funds is very low, about 10%, no project being accepted*

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for the increase in energy efficiency and only 14 projects being accepted, out of the 50 proposed, for the use of RES; • *The Guidelines for participants, drawn up by the IBE, are heavy* (over 250 pages), contain irrelevant details, a lot of them being impossible to put into practice, *being rather an obstacle for participants and no real support*; • The developers of the projects with which the authors of the study have discussed consider that *the IBE staff lacks experience and professionalism*, and it is called into doubt the quality of the selection process for such personnel; • Being aware that the rigors of the European Commission in using Structural Funds are very high, among the participants in the submission of projects *there is the opinion of the same developers that the IBE is raising artificial barriers through its activity*.

20. The job related policy resulting from the application of the new legislative package will have to take into account that will not necessarily be an increase in the number of jobs, as possibly, a reallocation of them in the economy. The implementation of some advanced technologies in order to reduce the emissions of greenhouse gases will generate new jobs, which will compensate with the staff redundancies resulting from the closure of underperforming production capacities. These measures will affect differently all the sectors of the economy which will have to face various challenges and limitations. The studies suggest that the level of expenditure required to implement the measures to achieve the proposed thresholds to limit the GHG emissions reflect a shift in the economic activities and the employment policy for the work force and not necessarily a decrease in the GDP. The extent to which employment policy will be affected depends on the unemployment rate and the percentage of the population unoccupied in the economy.

In view of the above we believe that it is imperative to achieve a **uniform national strategy in our country regarding the increase of the labor employment in the energy field and in other sectors that are to be affected following the implementation of the measures on the field of climate change**. The strategy must be based on policies in line with the Lisbon strategy and include actions regarding: the providing of redeployment of people made redundant within the same sector, providing guidelines for the organization and implementation of retraining courses, etc.

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ANNEXES

ANNEX 1 – The results of the impact modeling for 4 basic scenarios at EU level

Scenariu	1	2	3	4
	Scenariul de referință bazat pe eficiența costurilor	Redistribuirea obiectivelor din afara ETS, fără CDM	Redistribuirea obiectivelor din afara ETS, cu CDM	Redistribuirea obiectivelor din afara ETS, fără CDM + redistribuirea obiectivelor privind energia regenerabilă fără comercializarea surselor regenerabile de energie.
Prețul carbonului în cadrul ETS (EUR.tCO2)	39	43	30	47
Prețul carbonului în afara ETS (EUR.tCO2)	39	37	Max. 30	37
Valoarea energiei regenerabile (EUR.MW)	45	44	49	51
CLIMA & ENERGIA¹⁴				
Reducerea GES raportat la 1990 (%)	-20	-20	-14	-20
Reducerea GES în sectoarele actuale ale ETS incluzând aviația (% raportat la 2005)	-18	-20	-13	-20
Reducerea GES în sectoarele din afara ETS (% raportat la 2005)	-12	-10	-7	-10
Cota energiei regenerabile în consumul final de energie (%)	20	20	20	20
Consumul brut de energie (schimbări raportat la situația de referință în %)	-10	-10	-5	-10
Costuri directe (% din PIB)	0,58	0,61	0,45	0,66
Evoluția costurilor energiei + evoluția costurilor reducerii de emisii altele decât CO2 + evoluția achiziționării de credite CDM (miliarde EUR)	91	95	70	103
Impacturi reduse de petrol și gaz (miliarde EUR)	49	47	41	46
Creșterea costurilor de generare a electricității comparativ cu situația în care costurile de oportunitate nu au repercutat în %	28%	30%	23%	33%
Creșterea prețului mediu al electricității comparativ cu situația în care costurile de oportunitate nu au repercutat în %	23%	24%	19%	26%
Creșterea prețului mediu al electricității ținând cont de includerea actuală a costurilor de oportunitate în energie (%)	10 la 15%			
EFACTE MACROECONOMICE¹⁵				
Evoluția PIB (%)	-0,35	-0,34	-0,21	
Evoluția consumului privat	-0,19	0,21	0,21	
Ocuparea forței de muncă (evoluția raportat la statu quo %)	-0,04	-0,09	+0,05	
CALITATEA AERULUI¹⁶				
Costul controlului poluării atmosferice (miliarde EUR)	-10	-11	-8	-11
Poluarea atmosferică: SO2, NOX și PM2.5 (% reducere până în 2020)	-14	-13	-10	-13
EFACTE SECTORIALE¹⁷	(% raportat la statu quo)			
Costul energiei	6,4	6,3	4,4	6,8
Costul energiei pe unitate de valoare adăugată (industrie)	12,6	13,5	9,6	14,3
Costul energiei pe unitate de valoare adăugată (sector terțiar)	1,7	2,2	0,7	3,0
Evoluția producției în primele 3 sectoare mari consumatoare de energie	- 2	- 2	= 1,5	= - 1,5

ANNEX 2 – The economic impact in connection to the increase in direct costs of the constitutive elements of the proposals (the case of the 5 options)

Costul exprimat ca procent din PIB 2020	Opțiunea de referință bazată pe eficiența costurilor	Redistribuirea obiectivelor din afara ETS, fără CDM	Redistribuirea obiectivelor din afara ETS, fără CDM + redistribuirea parțială a drepturilor de vânzare prin licitație în cadrul EU ETS	Redistribuirea obiectivelor din afara EU ETS + redistribuirea parțială a drepturilor de vânzare prin licitație în cadrul EU ETS + cu CDM	Redistribuirea obiectivelor din afara EU ETS + redistribuirea parțială a drepturilor de vânzare prin licitație în cadrul EU ETS + cu CDM + redistribuirea obiectivelor privind sursele regenerabile de energie și comercializarea fără restricții a surselor regenerabile de energie
	Opțiunea 1	Opțiunea 2	Opțiunea 3	Opțiunea 4	Opțiunea 5
UE27	0,58	0,61	0,61	0,45	0,45
AT	0,66	0,86	0,82	0,58	0,34
BE	0,76	0,83	0,93	0,69	0,70
BG	2,16	1,09	-0,35	0,14	-1,25
CY	0,09	0,08	-0,04	-0,03	0,07
CZ	1,12	0,49	0,03	0,20	-0,51
DK	0,29	0,57	0,50	0,22	0,11
EE	1,59	1,09	0,41	0,58	-0,53
FI	0,47	0,53	0,56	0,52	0,22
FR	0,39	0,39	0,37	0,32	0,47
DE	0,57	0,47	0,60	0,49	0,57
EL	0,97	0,74	0,53	0,60	0,59
HU	1,22	0,46	0,29	0,36	-0,40
IE	0,47	0,61	0,63	0,47	0,45
IT	0,49	0,99	1,05	0,51	0,66
LV	1,10	1,60	1,50	0,88	-0,18
LT	1,02	0,52	0,36	0,43	-0,72
LU	0,54	0,89	0,91	0,59	0,70
MT	0,31	0,17	-0,36	-0,21	0,00
NL	0,28	0,34	0,43	0,28	0,32
PL	1,24	0,48	0,32	0,38	0,02
PT	0,87	0,48	0,54	0,57	0,51
RO	0,95	0,37	0,29	0,29	0,04
SE	1,17	0,79	0,74	0,60	0,26
SI	0,86	1,11	0,86	0,47	0,53
ES	0,70	1,20	1,08	0,62	0,42
SE	0,66	0,69	0,70	0,74	0,78
UK	0,49	0,36	0,36	0,34	0,41