

# ROMANIA

## AUTHORS

### Professor Radu ANDREI

Technical University Gheorghe Asachi,  
43 Prof. Dimitrie Mangeron Str.,  
code 700050, Iasi  
E: radu.andrei.d@gmail.com

### Professor. Gheorghe LUCACI

Polytechnic University of Timisoara,  
E: gheorghe.lucaci@ct.upt.ro

### Professor Nicolae TARANU

Technical University Gheorghe Asachi,  
E: taranu@ce.tuiasi.ro

### Associate Professor Liliana-Mihaela MOGA

Dunarea de Jos University,  
E: liliana.moga@gmail.com

### Dr. Alina- Mihaela NICUTA

Technical University Gheorghe Asachi,  
E: alinanicuta@yahoo.com

### Mihaela CONDURAT, PhD Student

Technical University Gheorghe Asachi,  
E: conduratmihaela@yahoo.com

## 1. OVERVIEW OF THE REGION

### Characteristics of the Region

With an area of 238,391 km<sup>2</sup>, Romania is the eighth largest country of the European Union and the seventh largest population of the European Union with 22,760,449 inhabitants. The North East Region is one of the eight Development Regions of Romania (Romania Central.com.a) located, as shown in *Figure 1*, in the East side of the country.



*Figure 1 – The Eight Development Regions of Romania (Romania Central.com. a)*



*Figure 2 – The North East Region of Romania (google.ro/the North East region of Romania)*

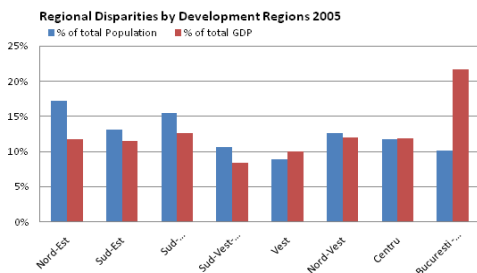
As illustrated on *Figure 2*, the North-East Region consists of the six counties: Bacau, Botosani, Iasi, Neamt, Suceava and Vaslui.

This Region hosts 17.25 % of Romania's total population on 15.5 % of its total territory. The Nord East Region, as other development regions, does not have any administrative power, its main function being to co-ordinate, through its Regional Development Board, development projects and manage funds from the European Union. The Regional Development Board is a deliberative organism that coordinates, through its Regional Development Agency (RDA), the entire regional development process.

The North East Regional Development Board (RDB) involves the presidents of County Councils in the region, representatives of County Municipalities, representatives of Towns and representatives of Communes. The main tasks of the RDB consists of coordinating and monitoring the achievements of the regional development policy and objectives, providing an equal and fair approach toward all the counties from the region. This body also analyses and approves the regional

development strategy and programs, approves criteria, priorities, distribution and destinations of Regional Development Fund, monitors the funds allocated to RDA from National Regional Development Fund, analyses and approves selection criteria and priorities for regional development projects, analyses and approves regional development projects proposed by RDA, approves documents designed to obtain “disadvantage area” status. Thus the RDA is a generator of economic and social development in the North East Region. RDA develops strategies, attracts resources, identifies and implements financing programmes and offers services for stimulating sustainable economic development, partnerships and entrepreneurial spirit.

The economy of North East Region is mainly agricultural, especially towards the North, even though there are a number of industrial cities, especially Iasi, Bacău and Suceava. Iasi, the largest city in North East is one of the wealthiest cities of the country. The region’s richest counties are, in order: Iasi, Bacău, Suceava, Neamt, Vaslui and Botosani. The disparities between the North East Region and the other regions (Romania.Central.com-a), expressed in terms of percentage of population and percentage of GDP, at the level of year 2005, is significant, as shown in *Figure 3*.



*Figure 3 – Regional Disparities by Development Regions of Romania (Romania.Central.com. a)*

This undesired situation has not improved over the years. Thus, according to statistical data (INS.a) presented in Table 1, the regional GDP per capita, at the level of 2010 year, was the lowest in Romania, at about two-thirds of the national average.

Name of Region	2010	Regional GDP weight co-efficient
Country level :	24435.9	1.00
<b>North-East Region</b>	<b>15014.8</b>	<b>0.61</b>
South-East Region	20076.8	0.82
South Muntenia Region	20288.2	0.83
South-West Oltenia	18735.1	0.77
West Region	27640.0	1.13
North-West Region	21827.2	0.89
Central Region	23428.3	1.47
Bucharest-Ilfov Region	58137.0	2.38

*Table 1 – Country and Regional GDP per capita/ year 2010 (euro/capita) (INS.a)*

According to published economic studies (Romania Central.com. b) the Region contributed 11.81 % to the total GDP in 2005. The population is concentrated in the rural areas. In 2006, the region North East featured the lowest GDP per capita of all in Romania and even Europe, reaching with 3,051 € just 67.8 % of the Romanian average. Romania’s employment rate on the segment of working population aged between 15 and 64 years old (INS.b) at the level of year 2011 was 59.1%.

### Energy demand and supply of the Region

According to official sources (INS.b), total energy consumption, at the level of year 2011, expressed in thousands tonnes of oil equivalent for domestic, commercial, industry, and transport for the North East Region, was 22,750 tonnes (2,646 TWh) of equivalent oil, as shown in *Table 2*.

Energy consumption	2011
Industry (including construction)	7,093
Agriculture, forestry, fishery	433
Transport	5,313
Other activities	2,028
Population	7,883
Total	22,750 <sup>2)</sup> (2,646 TWh)

Table 2 – Distribution of energy consumption<sup>1)</sup>  
(INS.b)

- 1) Thousands tonnes of oil equivalent/oil equivalent
- 2) Oil equivalent (10000 kcal/kg).

According to the same source (INS.c), the total energy consumption by fuel, at the level of year 2011, expressed in thousand tonnes of oil equivalent and percentage from the total is given in Table 3.

	2011
Total <sup>2)</sup>	29,048 (3378 TWh)
Electric energy	1,242 4.28%
Coal	8,147 28.05%
Crude oil	8,472 29.17%
Natural gas <sup>3)</sup>	11,187 38.50%

Table 3 – Total energy consumption by fuel<sup>1)</sup>  
(INS.c)

- 1) Oil equivalent (10000 kcal/kg).
- 2) Including energy products obtained and consumed in households.
- 3) Excluding gasoline and ethane from extraction oil-wells which are included in crude oil.

In Table 4, the share of various energy sources for electricity production (%), (INS.d) is presented. In this table, the share of renewable energy, like wind, solar, etc is included in the figure corresponding to Crude oil 3).

	2011	%
Coal	8,298	19.80
Natural gas <sup>2)</sup>	12,676	30.23
Crude oil <sup>3), 4)</sup>	10,426	24.87
Imported petroleum products	2,319	5.53
Fuel wood (including biomass)	3,524	8.41
Other fuels	269	0.64
Hydroelectric and nuclear-electric energy	4,286	10.22
Imported electric energy	89	0.21
Energy from non-conventional sources	37	0.09
Total	41924 <sup>1)</sup> (4876 TWh)	100%

Table 4 – Share of Energy Sources for Electricity for year 2011 (INS.d)

- 1) Oil equivalent (10000 kcal/kg).
- 2) Including energy products obtained and consumed in households.
- 3) Excluding gasoline and ethane from extraction oil-wells which are included in crude oil
- 4) Including wind energy

The actual thermal energy production and distribution, based on power plants functioning with coal or other fuels, is characterised by low efficiency and losses. Alternatives have emerged during recent years, mainly in cities, replacing centralised heating systems and increasing the number of private flat heating systems installed, based on gas or electricity. Besides low efficiency and loss of energy during transport to users, an important reason for this significant shift is the fact that

the owner can arrange and control a more suitable scheme of heating their own home, in terms of temperature and duration of heating. More importantly the quantity of fuel (gas or electricity) can be controlled over a specific period of time.

In cities with lower economic strength, the existing thermal power distribution system is under continuous modernisation. In areas with developed primary wood processing, uncontrolled sawdust deposits have a negative impact on land surfaces. Fuel made of waste wood (e.g. sawdust briquettes) can be used as an alternative for primary wood fuel

## 2. CURRENT SITUATION: TARGETS RELATED TO ENERGY POLICY

Romania has established threshold values nationwide relating to energy demand and supply objectives. Thus, by year 2020, Romania should reach the following indicators for Energy and Climate change:

- decrease of greenhouse gas emissions by at least 20% compared to 1990;
- increase by 24% the percentage of renewable energy sources in total energy consumption;
- increase of energy efficiency by 19%.

The status of Green House Gas (GHG), expressed in thousand tonnes of emissions (INS.e), at the national level is shown in Table 5, and the targets of its reduction in the next years are given in Table 6 from opposite:

	2005	2010
Total GHG emissions (CO <sup>2</sup> eq.)	148,889.37	121,354.55

Table 5 – Total GHG Emissions at national level (thousand tone, kt) (INS.e)

According to the latest available data (for 2010) from the National Inventory of Greenhouse Gas Emissions (INEGES) (Romania's National Reform Programme 2011 – 2013: Implementation Report - March 2012), greenhouse gas total GHG emissions (excluding Land-use, land-use change and forestry) decreased by 51.48% during 1990-

2010 (from 255,350.08 Gg CO<sub>2</sub> equivalent to 123,904.19 Gg CO<sub>2</sub> equivalent), and total GHG emissions (including LULUCF) decreased by 56.55% during 1990-2010 (from 227,947.70 Gg CO<sub>2</sub> equivalent to 99,041.50 Gg CO<sub>2</sub> equivalent), both values well below the Romanian maximum GHG emissions for 2020.

The strategy objectives for 2020/ achieved 2014	European Union	Romania
Decrease of greenhouse gas emissions (GHG) (compared to those from 1990)	20%	20%
Share of renewable energy sources in final gross consumption	20%	24%
Increase of energy efficiency	20%	19%

Table 6 – GHG Reduction Targets (Romania's National Reform Programme 2011 – 2013: Implementation Report – March 2012)

Also, the overall objective of the North-East Region for the period 2007 – 2013 was to reduce the existing gap compared with other more developed regions of Romania (see Table 1) by increasing the regional competitiveness and attractiveness.

Thus, the EFFECT project (EFFECT Project), in which Romania is a partner through North-East Regional Development Agency (ADR - North-East) was designed to contribute to achieving the EU energy strategy and meet the need for innovation and alignment of public procurement procedures in the countries EEA area community requirements. The EFFECT project established from the need to innovate SEE countries public procurement procedures and stimulate their integration with energy efficiency criteria in order to meet EU Public Procurement requirements and to contribute to achieve EU energy strategy objectives. EU public procurement impacts more than 16% on EU GDP and it is an important for public authorities to effectively address energy efficiency policies fostering the production and consumption of

energy efficient products and services and adoption of energy technologies.

Established in 1999 through the association of the 6 counties in North-East Romania and by the enforcement of the Law no 151/1998, North-East Regional Development Agency is a reference organisation for regional development system in Romania. As a public utility NGO, the agency's mission is to generate economic and social development in the North-East Region of Romania by developing strategies, attracting resources, identifying and implementing financing programs and offering services for encouraging sustainable economic development, partnerships and entrepreneurial spirit. By participating in the EFFECT project, North-East RDA makes important steps towards achieving its objectives of:

- stimulating intra – and interregional partnerships as well as the international ones through promoting projects of common interest;
- promoting innovation, know-how and technology transfer by consolidating the link between the business, research, technological and scientific environments;
- promoting regional opportunities in order to attract Romanian and foreign investors.

The achievements of more than 12 years of activity includes: an absorption rate of 85% allocated pre-accession PHARE ESC funds within more than six hundred implemented projects, and over 5,000 new jobs created. The North-East Regional Development Plan 2007-2013 will be mainly implemented through the Regional Operational Program that allocated to our region €654 million Euros.

More than 1,100 projects applied for funding under this program to date which indicates the amount of work to be covered, but above all, the trust in the professional capacity of RDA North-East to deliver efficient implementation. Together with their collaborators, project beneficiaries, members of North-East Regional Development Board, colleagues from various ministries or international partners, are making efforts in mobilising regional resources to reach a major goal – to upgrade the development level of our region.

All countries involved in the project have structural weaknesses due to difficulties in producing energy from renewable sources and spread the concept of rational use of energy. These are highlighted by unfavourable legislative conditions, institutional hurdles and low skills, lack of available information and poor awareness, which causes a lack of perception, demand and acceptance.

### **Other Regional targets, barriers and drivers**

One of the important drivers to achieve the targets related to the energy policy is the strategy for North-East region 2007-2013 which is financed from Regional Operative Program and structural instruments, and includes the Action 1.5 “Energy Infrastructure Development”. The existence of the research, development and innovation infrastructure at the regional level, which involves 73 research and development units representing 12% of the total nationwide, also constitutes an important driver.

Another important target in the Region is the rehabilitation and modernisation of county roads and streets including the construction and rehabilitation of ring roads. The objectives for this are the rehabilitation of county roads connecting the national road network and the -Trans European Network (TEN), the upgrading of urban streets in order to improve urban traffic flow, to reduce journey time and to eliminate bottlenecks in the access points to the city.

Expertise in renewable energy is located in Universities and Research Centres. Three University Centres having undertake research on science and technological development, promoting an informative society, sustaining actions for energy efficiency, management of local plans in energetic fields. Various methods of evaluation and reduction of the actual negative impact (noise, CO<sub>2</sub>e emissions, fuel consumption, etc) have been investigated in the Region of Iasi. An analysis of the rolling stock and the fixed plant involved in transportation and the evaluation of traffic emissions on various roads and streets has been recently undertaken by the Technical University Gheorghe Asachi of Iasi (Horobet, 2013). Romania's national policy on renewable



energy has been developed and implemented in the difficult context of specific economic phenomena of transition from a centralised economy to a market economy and lately to post-transition policy. The main objective for the energy infrastructure development at a national level, is to improve the living standard of its residents and increase the attractiveness of investments in urban environment by creating, expanding and upgrading energy infrastructure. The measure undertaken in order to achieve these objectives, consists of the following:

- construction, rehabilitation and modernisation of energetic heating distribution and thermal plants;
- construction and/or expansion, upgrading, rehabilitation and modernisation of natural gas networks;
- construction, modernisation and development of renewable energy sources (biomass, solar, wind).

In the context of EU membership negotiations, the Romanian Government has developed the National Development Plan (NDP) 2007-2013. In this document the issue of Renewable Energy Sources (RES) valorisation is approached in the chapters “Analyze on the current situation” and “Development Strategy”. NDP highlights the potential RES according to previous strategies. The main goals established in Romania regarding the promotion of bio-fuels are as follow:

- by the end of 2010, the percentage of bio-fuel in total energy usage for transportation sectors should reach at least 5.75% (target set by Directive 2003/30/EC.);
- by 2020, the percentage of bio-fuel should be at least 10%, based on the development of new bio-fuels generations;
- the measures undertaken by the Romanian Government in cooperation with Environmental Ministry, in order to support the strategic objectives for promoting the usage of renewable energy sources implied a pilot program named “Green House”;
- in 2008 has been approved the Order of the Ministry for Environment and Sustainable Development for the program of replacement and development of classical heating systems using solar, geothermal and wind energy;
- the program objectives consisted of collecting

finances from the Environmental Fund Projects.

The potential key beneficiaries of investment programs might be economic operators, forest districts, Administrative Territorial Units and Educational Institutions, Individuals, Housing Associations and non-government organisations. At country level there is a National Regional Development Council, with a decisive role on the development and policy implementation. Promoting the use of bio-fuels and other renewable fuels for transport has been the subject for the Government Decision HG 1844/2005 completed with HG456/2007. At July 1st, 2007 – gasoline fuel has reached the level of 4% bio-fuel by volume.

At a Regional level, the process of development planning provides a strategic base essential for the inclusion of measures and implementing projects. Thus, as part of a Joint Implementation (JI) project for Kyoto Protocol (Wikipedia.b), the North-East Region in partnership with Denmark has developed a biomass heating unit in the city of Vatra Dornei, the largest of its kind in Romania. This unit provides heat for about one third of the city of Vatra Dornei and leads to a significant reduction of GHG as compared to fossil fuels.

Investments in the energy sector can also drive long and medium term competitiveness of other economic sectors, becoming an income source. Economic competitiveness and sustainable development are based on efficient energy use in the whole chain including natural resources, production, transport, distribution and final use and technological innovation that will reduce the energy consumption. Potential alternative energy sources and their distribution on the Romanian territory are illustrated in *Figure 4*.

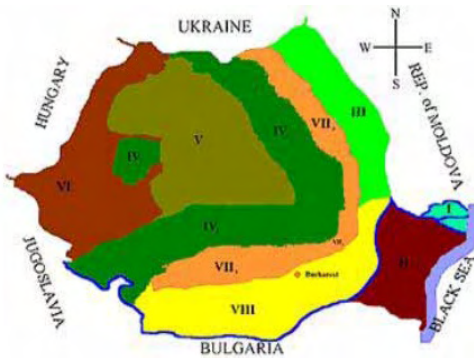


Figure 4 – Distribution of Potential Alternative Energy Sources in Romania (Romanian Renewable Energy Association)

- I Danube delta (solar energy);
- II Dobrogea (solar and wind energy);
- III Moldavia (biomass, small hydro and wind power);
- IV Carpathian Mountains (biomass and small hydropower);
- V Transylvanian Plateau (small hydropower);
- VI Western Plain (geothermal energy);
- VII Subcarpathians (biomass & small hydropower);
- VIII South Plain (biomass, geothermal and solar energy).

In 2007 there were about 20 companies with green certificates producing renewable energy, with installed power plants of 47 MW in Romania. In recent years, the number of alternative energy sources (solar, wind, biomass) has largely increased and previously constructed systems have been upgraded. Of special interest to individual consumers was the “Green House Program” ([afm.ro/casa\\_verde](http://afm.ro/casa_verde)), a Government program intended to finance the implementation of alternative sources production systems. Rehabilitation and extension of the national electricity distribution and gas networks must also be achieved along with interconnection to national and European grids, which will ensure a higher degree of security of supply.

Taking into consideration that Romania technically has potential significant availability of renewable energy, at this point only a very small proportion is used, with the exception

of hydroelectric. To ensure a sustainable future energy production must always take into consideration the carrying capacity of the environment for the quantity and quality of energy and pollution problems generated. In order to minimise the environmental impact of energy production, it is necessary to reduce the emissions from Large Combustion Plants whose running is essential for the National Power Grid, as these are the main polluters in the energy sector.

Significant research in Universities of the North East Region is being carried out on the assimilation and implementation of new sources of energy in different fields, on the efficient use of various “cold” technologies in housing construction and also in the transport vehicles and infrastructure. New modes of transportation including cycling routes and hybrid vehicles are encouraged to be used and implemented as a result of existing EU projects like CIVITAS, EFFECT, etc. At the same time, green construction technologies for housing and for transport infrastructure are being researched and implemented. Thus, in the field of road and street construction, new concepts and construction technologies, developed recently, in the frame of Technical University Gheorghe Asachi of Iasi, such as Long Lasting Flexible Pavements (LLFP) (Tanasele, 2013) involving new concepts of pavement structures, will extend the life of asphalt roads from 25 to 50 years, thus contributing to significantly reduced costs and emissions, during the construction and maintenance processes. In similar way, the implementation of the new developments in the field of concrete pavements (Puslau, 2012) such as Long Lasting Rigid Pavement (LLRP), Steel Fibre Reinforced Concrete, Rolling Compacting Concrete (RCC), will have similar impact on reduced costs and emissions.

### 3. CASE STUDY: COUNTY OF IASI

The overall aim of this case study is to evaluate the existing needs for energy and the status of the actual energy consumption in order to improve and develop better strategies for:

- production of non-renewable energies;
- limitation of the actual use of the existing power plants, by decentralising power

plant supply and extending the network of individual/private gas heating installations;

- Undertaking appropriate traffic management policies, such as implementing alternative daily permits of the user of vehicles, in order to drastically reduce the actual GHG emissions and traffic impacts expressed in terms of barrier effects.



Figure 5 – General Map of the County of Iasi (google.ro/Iasi County)

Figure 5 represents the general map of the County of Iasi which has an area of 5,476m<sup>2</sup>.

Figure 5 illustrates the County of Iasi which has an area of 5,476 km<sup>2</sup>. According to the 2012 data provided by the County Population Register Service, the total registered population of the county is 873,662 people. The Institutions involved in decision process for Iasi County are the City hall, Prefecture, and City Council. The Administrative Divisions of Iasi County has 2 municipalities, 3 towns and 93 communes. Iasi County is predominantly agricultural due to its topography. Industry is concentrated in the cities Iasi, Pâncani, Hârlău, Târgu Frumos and Podu Iloaiei. The main industries are software, pharmaceuticals, automotive, metallurgy and heavy equipment manufacturing, electronics and electrotechnics, textiles and food production. The city of Iasi is the most important city in the North East Region, and one of the most important cultural centres in Romania. It has the oldest University in the country, and, until the formation of the United Principalities, it was the capital of Moldavia.

**Objectives and methods**

In the field of production of renewable energy, international companies together with other stakeholders are involved in the design and construction of wind farms located in the county of Iasi due to the wind speed being favourable, as shown in Table 7.

Scobinti Iasi	ACK srl Romania	40 MW	Scobinti-Iasi
Ruginoasa Iasi	Moldova-Eolian srl Romania	100 MW	Ruginoasa-Iasi

Table 7 – List of wind farms developed during 2012 in the county of Iasi

In the field of waste management, Iasi County Council has developed a partnership with districts from Republic of Moldova, under the bilateral treaties signed with the district of Ungheni. As a result of this the IASI Intercommunity Development Association was formed, which manages the waste problem for the whole county, its purpose being to attract funding from EU using the Sectoral Operational Programme. The operation of waste management is not well developed, with over 51% from the total number of Iasi localities not having a management service for waste. The situation is better regarding water supplies which has 59% coverage. Regarding the water network, some public authorities have prepared development projects under the SAPARD project, while some of them are being prepared under the National Rural Development Program.

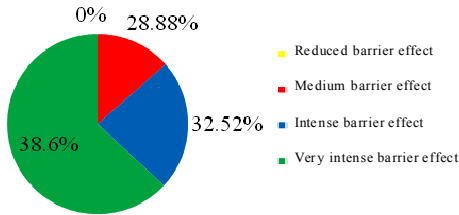
**Long term focus**

The financial resources of the local authorities from county of Iasi are dependent on the degree of access to public or private transport. Some localities isolated from eastern Iasi County have difficult accessing urban services due to distance and poor quality road infrastructure. Poor technical condition of roads and streets, provides a barrier effect to development expressed in terms of increased pollution such as noise, vibration, emissions (NC, CO<sub>2</sub>e, NO<sub>x</sub>, etc) and habitat mortality. Recent research (Horobet, 2013) undertaken in the frame of Tehnical University Gheorghe Asachi.

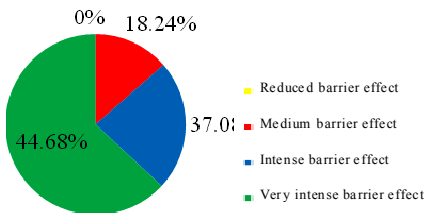


of Iasi, demonstrated that the barrier effect will double in the period 2010-2035, thus justifying the urgent need for specific action in this field. These results are presented in *Figure 6*, *Figure 7* and *Figure 8*.

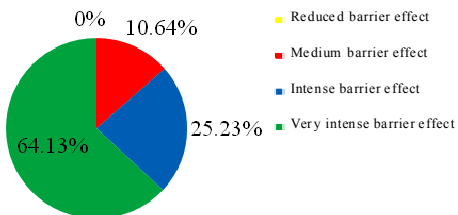
These figures illustrate that a reduced barrier effect does not exist at the level of 2010 year and that the barrier effect almost doubles between 2010 to 2035, reaching to 64.13%;



*Figure 6 – Barrier effect on national roads for 2010*



*Figure 7 – Barrier effect produced on national roads for 2025*



*Figure 8 – Barrier effect produced on national roads for 2035*

In the long term it is envisaged that the projects and research trends should be further developed based on the existing experience and expertise, and should be improved and completed with the existing knowledge and know-how, acquired by active participation of specialists, in international research programs that focus on these issues. This will involve developing technical training programs for persons involved in accessing funds, dissemination of the positive results and sharing experiences.

The development strategy of the County is heading primarily towards ensuring and improving where the situation requires providing a healthy living environment for future generations.

### Outcomes and barriers

The main drivers for a Smart Energy Region include 'green projects' involving wind, solar, hydro and biomass energy sources as described above. In this context, the following outcomes and achievements are highlighted:

- refurbishment of over 67% of the total old building infrastructure of the main towns in the County;
- construction of wind farms located in Scobinti and Ruginoasa as mentioned in Table 7;
- achievement of the ongoing SAPARD projects on waste management at the level of Iasi County;
- experimenting and promoting green technologies for the construction and rehabilitation of County roads;
- evaluation and implementation of specific risk and pollution assessment using GIS methods for existing damaged infrastructure of the Iasi City (Atanasiu, Bratianu, Leon, 2008), particularly in urban areas with a high potential of seismic hazard. The extension of the evaluation methodology and the use of GIS technology for developing digital maps of seismic vulnerability and of negative effects of lack of rehabilitation existing built infrastructure.

The most important barrier in preventing the implementation and extension of such 'green projects' is a lack of finance and funds at regional and national level. A second most important barrier is technical in that the assimilation and implementation of 'green technologies' requires a high level of expertise, new research and 'know how' and appropriate transfer of this knowledge.

A third barrier is psychological, with the resistance of the people to implement the new technologies.

The main drivers to the energy shift include political, technical and economic which will depend significantly on energy policies adopted by local and national government.

#### 4. CONCLUSIONS

1. In accordance with sustainable development objectives set at a European level, Iasi county strategy follows horizontal sustainable development principles through attention to environment protection with direct impact on the quality of inhabitants life.
2. Harnessing energy resources represents a challenge and also an important opportunity for Iasi County, both from the point of view of environmental protection and quality of life of the inhabitants, as well as from the perspective of economic development.
3. A clear assessment of the efficiency and effectiveness of interventions on the rehabilitation of existing buildings, roads and streets, whilst taking into consideration future economic functionalities, will provide certainty of the rehabilitation of infrastructure components in the county of Iasi
4. For the successful achievement of a 'North-East Smart Energy Region' there is a great need to assure a systematic interaction between the all stakeholders involved including central and local government, the North-East Regional Development Agency (ADR), Universities and regional environment agencies. Also, it is very important to identify the financial, technical and psychological

barriers, as mentioned above, in order to undertake the appropriate measure to overcome them.

5. The case study, involving the county of Iasi, is representative for the North-East Region with regard to all the aspects describing a 'Smart Energy Region' including significant achievement and future driver in the field of reduction of energy consumption in both housing and transportation fields.
6. The main initiatives in the 'green projects' described above could be applied to the whole Region, thus contributing to the diversification of various sources of energy, and at the same time by adopting 'green construction of housing and transport technologies' to reduce the high demand for energy in the Region.
7. The initial results of North-East Region and particularly of the county Iasi study could be transferred to the other low developed regions of Romania, such as South West Oltenia and the South East.

#### 5. REFERENCES

- Atanasiu, G, Bratianu, C, Leon, F, (2008), *Decision based risk assessment model for existing damaged infrastructure application for Iasi*, COST C19 Proactive Crisis Management of Urban Infrastructure, pp 211– 218
- Google.ro *The North-East Region of Romania* Available at: [https://www.google.ro/search?q=north+east+region+of+Romania&source=Inms&tbm=isch&sa=X&ei=uXvjUr6oH9HjsgaRwIHIBg&ved=0CAkQ\\_AUoAQ&biw=1024&bih=472](https://www.google.ro/search?q=north+east+region+of+Romania&source=Inms&tbm=isch&sa=X&ei=uXvjUr6oH9HjsgaRwIHIBg&ved=0CAkQ_AUoAQ&biw=1024&bih=472)
- Accessed 19.03.2014
- Google.ro Iasi County Available at <http://pe-harta.ro/iasi/> Accessed 19.03.2014
- Green House Program, Available at [http://www.afm.ro/casa\\_verde\\_pj.php](http://www.afm.ro/casa_verde_pj.php), lang=ro Accessed 19.03.2014
- Horobet I. (2013), *Evaluation of traffic and transport infrastructure impact on environment*, PhD Thesis, Technical University Gh. Asachi of Iasi, Faculty of Civil Engineering and Building Services, 2013, lang=ro
- National Statistics Institute Romania-INS.a

*Statistical Yearbook (2011), Anuarul Statistic lang= ro*

Available at <http://www.insse.ro/cms/ro/content/anuarul-statistic-2011>  
Accessed 19.0.2014

National Statistics Institute INS.b *Romania Statistical Yearbook (2012). Romania's employment rate down during third quarter for working age segment, lang=en*

Available at <http://www.romania-insider.com/romanias-employment-rate-down-during-third-quarter-for-working-age-segment/44274/>  
Accessed 19.03.2014

National Statistics Institute-INS.c *Romania Statistical Yearbook (2011)*

Available at <http://www.insse.ro/cms/ro/content/anuarul-statistic-2011>  
Accessed 19.03.2014

National Statistics Institute-INS.d *Romania Statistical Yearbook (2011)*

Available at <http://www.insse.ro/cms/ro/content/anuarul-statistic-2011>  
Accessed 19.03.2014

National Statistic Institute INS.e, Total GHG Emissions at National Level

Puslau, E, (2012), *The Design of Long Lasting Rigid Pavements –LLRP, by Using Accelerating Load Testing*, PhD Thesis, Technical University Gh. Asachi of Iasi, Faculty of Civil Engineering and Building Services, 2013,lang=ro

Romania Central.com-a. *Development Regions of Romania*

Available at <http://www.romania-central.com/economy-of-romania/the-economy-of-romania/33-development-regions-of-romania/331-nord-east-region-regiunea-nord-est/>  
Accessed 19.03.2014

Romania.Central.com-b. *The Development Regions of Romania – NUTS-II*

Available at <http://www.romania-central.com/economy-of-romania/the-economy-of-romania/33-development-regions-of-romania/lang=en> Accessed 13.01.2014

Romania's National Reform Programme 2011 – 2013: Implementation Report – March 2012  
Available at

[http://ec.europa.eu/europe2020/pdf/nd/nrp2012\\_romania\\_en.pdf](http://ec.europa.eu/europe2020/pdf/nd/nrp2012_romania_en.pdf)  
Accessed 19.03.2014

Romanian Renewable Energy Association  
Available at <http://www.rorea.ro/?lang=en>  
Accessed 19.03.2014

Tanasele I, (2013) *Conception and Design of Long Lasting Flexible Road Pavements*, PhD Thesis, Technical University Gh. Asachi of Iasi, Faculty of Civil Engineering and Building Services, 2013,lang=ro

The EFFECT Project

Available at <http://www.effectproject.eu/> and [http://www.adrnordest.ro/index.php?page=DISCOVER\\_REGIONAL](http://www.adrnordest.ro/index.php?page=DISCOVER_REGIONAL)  
Accessed 19.03.2014

Wikipedia.a, *Development regions of Romania*

Available at [http://en.wikipedia.org/wiki/Development\\_regions\\_of\\_Romania](http://en.wikipedia.org/wiki/Development_regions_of_Romania) \o "Development regions of Romania"  
Accessed 19.03.2014

Wikipedia.b, Kyoto Protocol

Available at [http://en.wikipedia.org/wiki/Kyoto\\_Protocol](http://en.wikipedia.org/wiki/Kyoto_Protocol)