



ROMANIAN ENERGY REGULATORY AUTHORITY
ENERGY EFFICIENCY DEPARTMENT

Energy Efficiency trends and policies in ROMANIA

Date:

September 2015

Contact person:

Name:

IULIANA LAZAR

Organization:

ROMANIAN ENERGY REGULATORY AUTHORITY - ENERGY EFFICIENCY DEPARTMENT

Country:

ROMANIA



Co-funded by the Intelligent Energy Europe
Programme of the European Union

The sole responsibility for the content of this publication lies with the authors. It does not necessarily reflect the opinion of the European Communities. The European Commission is not responsible for any use that may be made of the information contained therein.

FORMAT OF THE REPORT: PLEASE USE THE PROPOSED TEMPLATE

Type and size of characters: Calibri 11

Figure(s):

- ✓ Title with number of figure before the graph: **Ex: Figure 1: Title of figures**
- ✓ Size of picture 15*7
- ✓ Source: xx

CONTENT OF THE REPORT

The report should describe energy efficiency trends and policies in your country, focusing on energy efficiency trends based on the ODYSSEE database (since 2000) and, recent and innovative policies and measures from the MURE database. Please use when it is possible the different tools that we developed to illustrate some examples.

Table of content

FORMAT OF THE REPORT:	ERROR! BOOKMARK NOT DEFINED.
CONTENT OF THE REPORT	ERROR! BOOKMARK NOT DEFINED.
TABLE OF CONTENT	ERROR! BOOKMARK NOT DEFINED.
LISTA CU FIGURI	ERROR! BOOKMARK NOT DEFINED.
LIST OF TABLES	ERROR! BOOKMARK NOT DEFINED.
EXECUTIVE SUMMARY	10
1. ECONOMIC AND ENERGY EFFICIENCY CONTEXT	13
1.1. Economic context.....	13
1.2. Total Energy consumption and intensities	15
1.3. Energy efficiency policy background	22
1.3.1. Energy efficiency targets	28
2. ENERGY EFFICIENCY IN BUILDINGS	33
2.1. Energy efficiency trends	33
2.2. Energy efficiency policies	43
3. ENERGY EFFICIENCY IN TRANSPORT	46
3.1. Energy efficiency trends.....	46
3.2. Energy efficiency policies	56
4. ENERGY EFFICIENCY IN INDUSTRY	58
4.1. Energy efficiency trends.....	58
4.2. Energy efficiency policies	62

LIST OF FIGURES

Figura 1: Evolution of the GDP	12
Figura 2: GDP at exchange rate and 2005 purchasing power parities	13
Figura 3: Total primary energy consumption with climatic corrections	14
Figura 4: Total finally energy consumption with climatic corrections	15
Figura 5: Final energy consumption	15
Figura 6: Primary energy consumption	16
Figura 7: Final energy consumption by energy sources	16
Figura 8: Final energy consumption by sector	17
Figura 9: Share of final energy consumption by sector – 2000	17
Figura 10: Share of final energy consumption by sector – 2000	18
Figura 11: Final energy intensity at purchasing power parities and climatic corrections	19
Figura 12: Primary energy intensity at purchasing power parities and climatic corrections	19
Figura 13: Primary energy intensity adjusted to EU economic structure	20
Figura 14: Energy intensity per GDP expressed in different modes	20
Figura 15: 2020 Targets	27
Figura 16: Share of the five sectors in achieving the national target	29
Figura 17: Share of household energy consumption in total final consumption – 2008	32
Figura 18: Share of household energy consumption in total final consumption – 2013	32
Figura 19: Total energy consumption of household sector	33
Figura 20: Total energy consumption of household sector on fuel type	33
Figura 21: Number of dwellings	34
Figura 22: Energy consumption per dwelling	34

Figura 23: Living area	35
Figura 24: Share of the electricity consumption of household sector – 2013	35
Figura 25: Final electricity consumption of household sector	36
Figura 26: Electricity consumption per dwelling	36
Figura 27: Electricity prices	37
Figura 28: Share of tertiary energy consumption in total final energy consumption – 2013	37
Figura 29: Total energy consumption of tertiary sector	38
Figura 30: Share of tertiary energy consumption in total final energy consumption – 2008	38
Figura 31: Electricity consumption of tertiary sector	39
Figura 32: Share of tertiary electricity consumption of tertiary sector – 2013	39
Figura 33: Share of tertiary electricity consumption of tertiary sector– 2008	40
Figura 34: Energy intensity of service sector (to value added)	40
Figura 35: Electricity intensity of service sector (to value added)	41
Figura 36: CO ₂ intensity of service sector (to value added)	41
Figura 37: Energy efficiency measure patterns household sector	42
Figura 38: Rehabilitated blocks and apartments during 2009-2014	43
Figura 39: Energy efficiency measure patterns tertiary sector	44
Figura 40: Final energy consumption of transport sector	45
Figura 41: Share of transport energy consumption in total final energy consumption – 2013	46
Figura 42: Share of transport energy consumption in total final energy consumption – 2008	47
Figura 43: Freight traffic	47
Figura 44: Share of freight traffic by mode – 2011	47
Figura 45: Share of freight traffic by mode – 2000	48
Figura 46: Passengers traffic by cars	48

Figura 47: Passengers traffic by buses	49
Figura 48: Passengers traffic by trains	49
Figura 49: Share of energy consumption by mode – 2010	50
Figura 50: Share of energy consumption in transport – 2013	50
Figura 51: Final energy consumption of transport sector by fuel type	51
Figura 52: Share of transport electricity consumption in transport – 2013	51
Figura 53: Share of transport electricity consumption in transport – 2008	52
Figura 54: Energy and CO ₂ intensities	52
Figura 55: CO ₂ intensity of transport sector to GDP	53
Figura 56: Energy intensity of transport sector to GDP	53
Figura 57: Odex variation	54
Figura 58: Energy efficiency measure patterns transport sector	55
Figura 59: Share of industry energy consumption in total final energy consumption – 2013	57
Figura 60: Share of industry energy consumption in total final energy consumption – 2000	57
Figura 61: Final energy consumption of industry sector and total final consumption	58
Figura 62: Final energy consumption of industry sector	58
Figura 63: Energy consumption by energy sources	59
Figura 64: Share of electricity consumption of industry sector– 2013	59
Figura 65: Energy intensity of industry sector to value added	60
Figura 66: CO ₂ intensity of industry sector to value added	60
Figura 67: : Energy efficiency measure patterns industry sector	61

LIST OF TABLES

Table 1- The programs to achieve the national target and the coordinators	30
---	----

EXECUTIVE SUMMARY

The report describes energy efficiency trends and policies in Romania, on the basis of energy efficiency indicators and trends based on the ODYSSEE database (since 2000) and, recent and innovative policies and measures from the MURE database. The indicators in this report are updated from 2000 to 2013.

Over the period 2000-2013, the total final energy consumption in Romania has decreased from 22.167 Mtoe in 2000 to 21.885 Mtoe with 282 Mtoe, 0.1% year. Only the final energy consumption of agriculture and transport sectors have increased since 2000. In 2011 the energy used in industry sector declined due to the recession of 2009.

Energy consumption of industry and households sectors have also decreased.

Traditionally, the industry was the greatest energy consumer at the national level. During the period of the centralized economy, Romania's economic development was based on the development of the heavy energy intensive industrial branches. The restructuring has led to a major decrease in the share of industry within the national economy and in energy consumption. These effects have been enhanced by the economic crisis so that in the period 2009-2010 the industry did not occupy the leading position regarding final energy consumption, the role was taken over by the household consumption sector.

The share of the industrial consumption within total energy consumption, decreased from about 41% in 2000 to 29% in 2013.

In the analysed period, the consumption in the industrial sector registered an important decrease with 2710 ktoe. The transport sector registered an important increase with 1897 ktoe. In percent, the industrial consumption decreased with 2.3%/year and the consumption in transport registered an increase with 4.2%/year. The energy consumption of services and agriculture sectors have increased too.

The final energy consumption decreased in during 2000-2013 with 283 ktoe respectively by 1.3%, while GDP had been increasing with 271%.

In the context of national energy, sustainable development means ensuring energy demand, but not by increasing its use (excluding renewables), but by increasing energy efficiency, upgrade technology and restructure the economy. Final energy intensity is one of the main macroeconomic indicators for analyzing the efficiency of energy use and is included in the list of indicators of sustainable development of the international organizations.

The final energy intensity (final energy consumption per unit of GDP) (with climatic correction) has decreased with 4.8% /year since 2000.

If we calculate the energy intensity toe / thousand Euro 2005 this indicator in 2013 for Romania (0.335 toe / 1000 Euro 2005) is 2.36 times higher than the EU 28 average (0.142 toe / 1000 Euro 2005). **If the calculation is made in toe/1000Euro PPP, the energy intensity of Romania (0.112 toe /1000 Euro PPP) is lower than the EU 28 average intensity (0.123 toe /1000 Euro PPP).**

If we calculate primary energy intensity in Romania adjusted to economic structure in toe/\$05P, the value of this indicator from 2013 **is lower than the EU and international average.**

Also, in 2013, the value of the final energy intensity in toe/\$05p for Romania is lower than the EU and international average.

Over the period 2000-2013, only in households, services and agriculture sectors, the energy intensities have increased with respectively 4.3%, 2.9%, and 1.4%/year. The industry intensity has considerably decreased with -7.4% and the energy intensity of transport has remained quite the same (-0.4%).

ODEX is the index used in the ODYSSEE-MURE project to measure the energy efficiency progress by the main sector (industry, transport, households) and for the whole economy (all final consumers). The use of ODEX indicators in Romania has enabled the quantitative illustration of the energy efficiency policies.

During 2000-2011, regarding energy savings, the largest savings have been made in the household sector, which represented 32.2 % of the total savings in 2011, followed by industry 32 %. In the period 2000-2011, both sectors have contributed to this significant improvement in energy efficiency of Romania.

The households sector has registered the most favourable evolution from the point of view of energy efficiency. By choosing 2000 as the basic year (100 %) the value of the ODEX indicator for this sector was only 67.8 % in 2011. This means that energy efficiency gained 32.2%.

The manufacturing industry has also had a favourable evolution. In comparison with the year 2000 (100 %) the ODEX indicator calculated as an index on three consecutive years decreased to 68 % in 2011. This means that energy efficiency gained 32%.

The transport sector is in a less favourable situation from the point of view of energy efficiency. In comparison with the basic year 2000 (100 %), in 2011 the ODEX indicator value was 101%, after being 108% in 2005. The descending trend registered in the last years is, nevertheless, promising.

As a result of all these sectoral evolutions a global decrease in the ODEX indicator has been registered. By choosing 2000 as the basic year (100 %) the value of the Global ODEX indicator was 75.7% in 2011. A value of ODEX equal to 75.7% means that the energy efficiency gained 24.3%.

CO₂ intensity has decreased only due to industry and transport sectors: 6.8% and 0.5% /year. On the contrary, the emissions of services and agriculture sectors have increased with 2.6% and respectively 1.5%/year.

Romania should continue its efforts to reach the national and European commitments in force. A lot of efforts will be necessary to reach the target "3 X 20" and reach a decrease of 20% of the energy consumption and a decrease of 20% of CO₂ emissions.

In Romania the main energy ministries and institutions act to the improvement of energy efficiency, the reduction of greenhouse gas emissions and the promotion of the renewable energy sources.

To achieve the target adopted by Romania, the new energy efficiency action plan continue to provide for measures similar to those included in the earlier plans.

Law no 121/2014 of energy efficiency transpose the requirements of Directive 27/2012/EU/ in the Romanian legislation. The law provides the necessary conditions for the implementation of measures to increase energy efficiency in all economic and social sectors in Romania.

Transposition of EU legislation is a positive side providing a legal framework and also some specific new financing mechanisms.

Transposition of Directive 2012/27/UE

In August 2014 entered into force the **Law no. 121/2014 on energy efficiency**. The Law transposes the European Union regulations set out under Directive 2012/27/UE regarding energy efficiency, into national legislation. The main purpose of the Law is to establish a coherent legislative framework for the development and application of the national energy efficiency policy in order to achieve the national target for increasing energy efficiency.

The established measures for energy efficiency apply to: primary resources, production, distribution, supply, transmission and final consumption.

Establishment of the Energy Efficiency Department

Law no.121/2014 on energy efficiency established, within Romanian Energy Regulatory Authority, the **Energy Efficiency Department**. The Department is responsible with transposing the provisions of the law into secondary legislation and has the responsibilities to draft policy proposals and delegated legislation on energy efficiency and monitor the implementation of the National Energy Efficiency Action Plan as well as related programs for increasing energy efficiency at national level.

National Energy Efficiency Action Plan

Following the provisions of the **Law no. 121/2014 on energy efficiency** for the transposition of the Directive 2012/27/UE regarding energy efficiency, the Romanian authorities drafted the third National Energy Efficiency Action Plan (NEEAP III), government approved by Government Decision 122/2015.

The previous National Action Plan for the Energy Efficiency are published in English on <http://ec.europa.eu/energy/en/topics/energy-efficiency/energy-efficiency-directive/national-energy-efficiency-action-plans>.

The passing years showed that the support financial mechanisms of the abovementioned measures on energy efficiency are relatively limited in Romania, generating a negative impact in the promotion thereof. In order for the implementation of the abovementioned measures to be successful, the financial aid is needed in the form of commission reductions, aid from private companies involved in the implementation of these plans, as well as loans under beneficial conditions from banks. The proposed financial aid shall be granted by law, in observance of the legal conditions on state aid.

The total consumption of primary energy in 2012 will represent 81% of Romania's 2020 primary energy consumption. Furthermore, the final energy consumption in 2012 is **25% lower than the 2020** final energy consumption. It follows that the measures included in the last two energy efficiency action plans, aimed at increasing energy efficiency, have contributed to reductions in primary energy consumption and final energy consumption. These reductions were also influenced by the economic crisis that affected Romania in 2009-2010, and by the fact that the economic recovery has been accompanied by modest increases in energy consumption.

1. ECONOMIC AND ENERGY EFFICIENCY CONTEXT

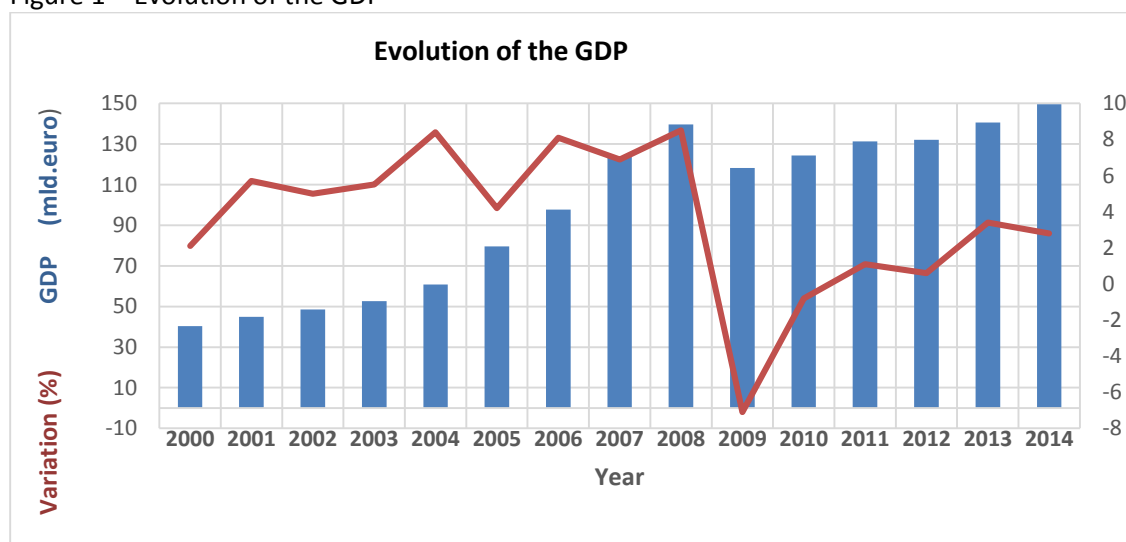
1.1. ECONOMIC CONTEXT

Romania is a country situated in South-Eastern Europe with a population of 21.4 million inhabitants and an area of 238,391 km². After the fall of the communist regime, in 1989, Romania underwent a process of transition from the former centralized economy to the market economy.

Romania's economic evolution after 2000 has been strongly influenced by the specific effect of the period of transition to the market economy. The economic reforms necessary for replacing the mechanisms of centralized economy with those characteristic of the free market, introduction of the energy efficiency principles in all activities, have resulted in a deep recession at first, nonetheless, a common effect to all the countries in this zone.

The trend of the GDP and its variation are given - Figure 1.

Figure 1 – Evolution of the GDP



Source: Romanian Statistical Yearbook

The economic growth and energy consumption in Romania has been decoupled since 1998, and the energy intensity of the economy, measured by primary energy consumption per unit of gross domestic product, has decreased substantially. After the large contractions of the economy and energy consumption in the 1990s, Romania's GDP increased with 53 % from 2000 to 2011 while energy demand remained flat. This is in large part due to the structural adjustments of the economy toward higher-value-added manufacturing and services and significant improvements of energy efficiency in industries.

It has been established that the periods of economic increase have alternated with periods of recession. The first two recessions (1990-1992 and 1997-1999) took place due to the economic reorganization specific to the transition to the market economy. The latest recession (2009-2010) has been registered in the context of the international economic crisis. Nevertheless, the period between 2000 and 2014 has been characterized by a constantly positive evolution with increase rates above the EU average. This has led to the rapid increase in the GDP per capita, a significant indicator characterizing the level of development.

GDP value in 2010 increased compared to 2009. However, the nominal growth of 4.3% is lower than the consumer prices level increased by 6%, which have intensified the economic and social environmental degradation due to the spread of the international financial and economic crisis started in 2009.

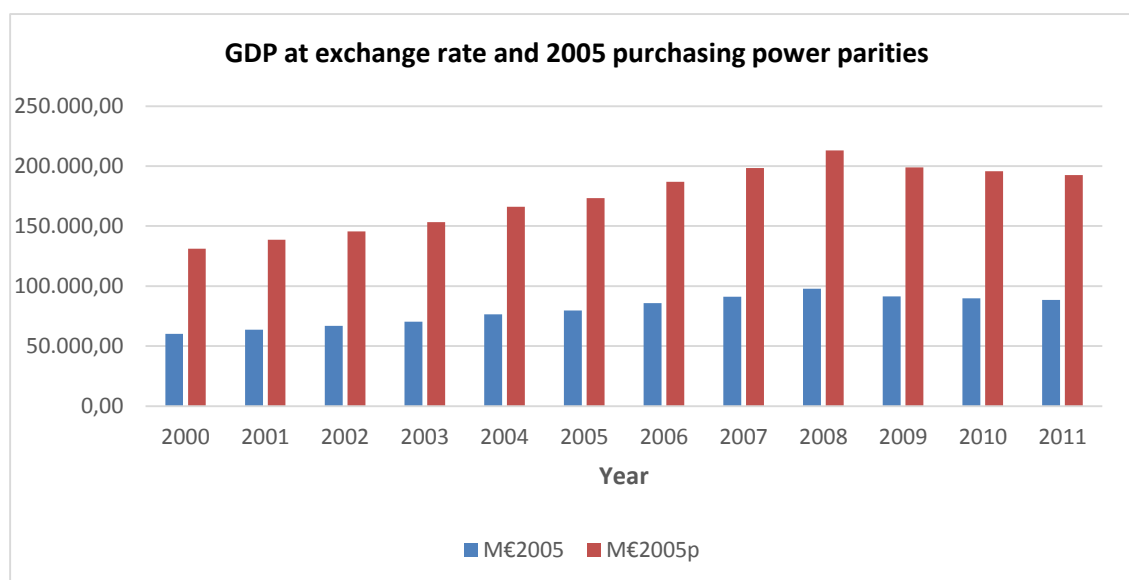
The main macroeconomic outcome indicators were GDP and labour productivity.

Romania was in technical recession (two consecutive quarters of decline in GDP compared with the previous quarter) for two and half years 2008-2011 and back in technical recession in early 2012, and managed to return to growth by the end of that year.

Analyzing Figure 2, there is a growing trend. GDP at the exchange rate in the analyzed period 2000-2011 increased by 47%.

The evolution of GDP at exchange rate and 2005 purchasing parities are presented in Figure 2.

Figure 2 — GDP at exchange rate and 2005 purchasing power parities



Source: Odyssee database

In all these instances, a trend towards the increase has been noticed.

The economic crisis registered in the period 2009-2010 has negatively influenced the evolution of this indicator. In 2011 signs that the crisis had been surpassed were registered but the effect is difficult and slow. The international evolution of economy on its whole and of the EU economy in particular has a great influence on Romania's resuming its economic growth.

Romania registered an economic growth in 2013 of 3.5%. This growth is largely due to massive government commitments regarding stability of monetary policy, export-oriented trade policies, taxes at low levels, and the use of cheap labour force.

1.2. TOTAL ENERGY CONSUMPTION AND INTENSITIES

1.2.1. Total Energy consumption

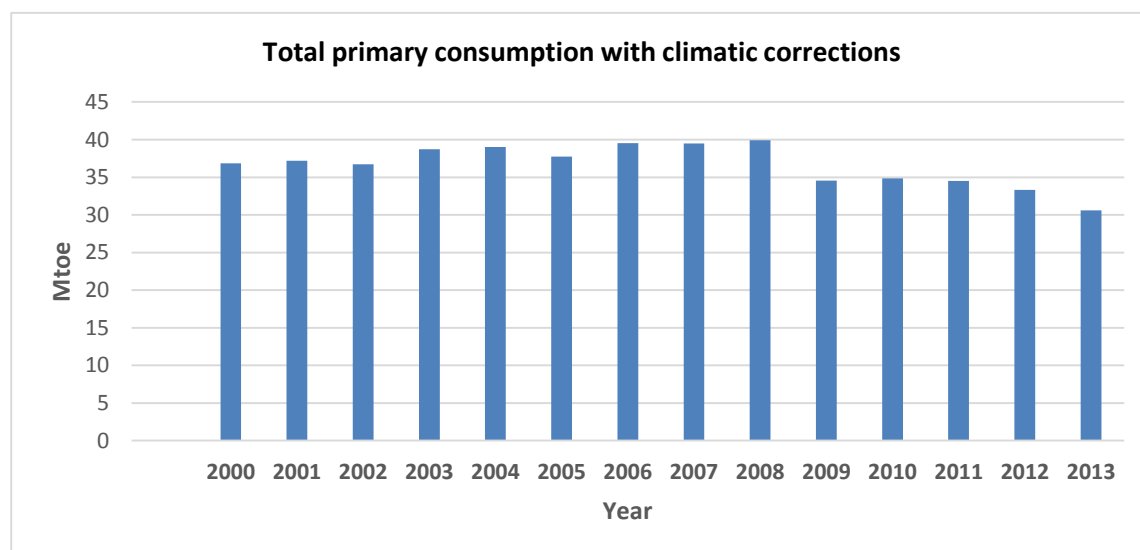
A. Primary energy consumption

The primary energy consumption is a fundamental indicator to monitor progress made by the EU as a whole and for each Member State achieving the set targets by the directive. This indicator is defined as the difference between the gross consumption of primary energy and non-energy consumption of all energy carriers (e.g. natural gas used as feedstock in the chemical industry).

Analysing of main macroeconomic indicators of energy consumption after the 2010 has established an increase in primary energy consumption with 1.46% / year (2010-2011). During 2011 – 2013 primary energy consumption has established a decrease with an average annual rate of about 5.66%/year - Figure 6.

The evolution of the total primary energy consumption is represented in Figure 3.

Figure 3 – Total primary consumption with climatic corrections



Source: Odyssee database

Primary energy consumption in Romania is characterized by a relatively high and increasing share of low-carbon energy sources, even though natural gas consumption is declining. From 2000 to 2011, sharing primary energy sourced from nuclear, hydro and wind power and biomass increased from 15% to 22 %, while that of natural gas declined from 37 % to 30 %.

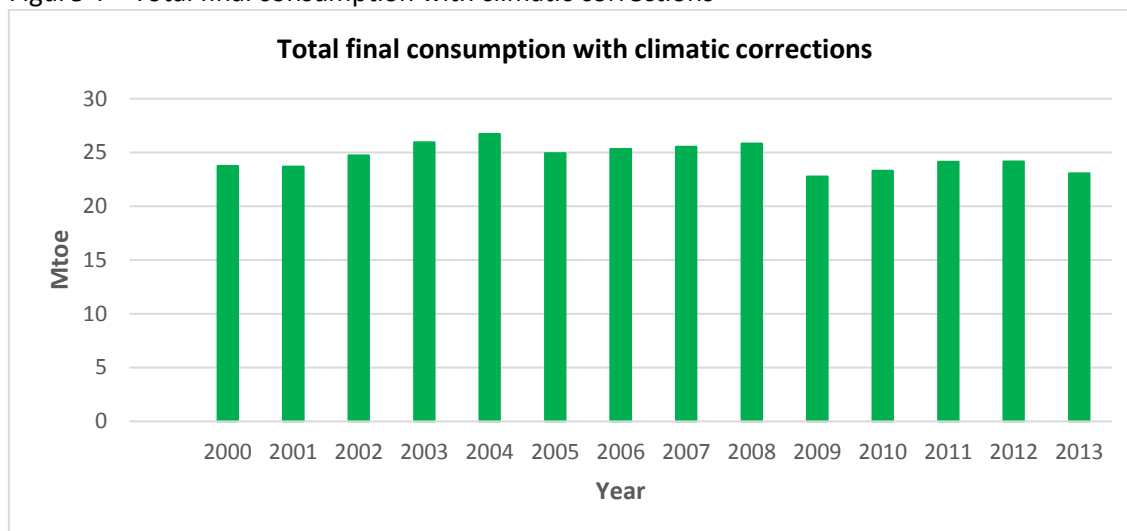
B. Final energy consumption

The evolution of final energy consumption has been qualitatively similar to the evolution of primary energy consumption and, in fact, to the evolution of the national economy on its whole.

The final energy consumption decreased in during 2000-2013 with 283 ktoe respectively by 1.3%, while GDP had been increasing with 271%.

The evolution of the trend of total **Final energy consumption** is represented in Figure 4.

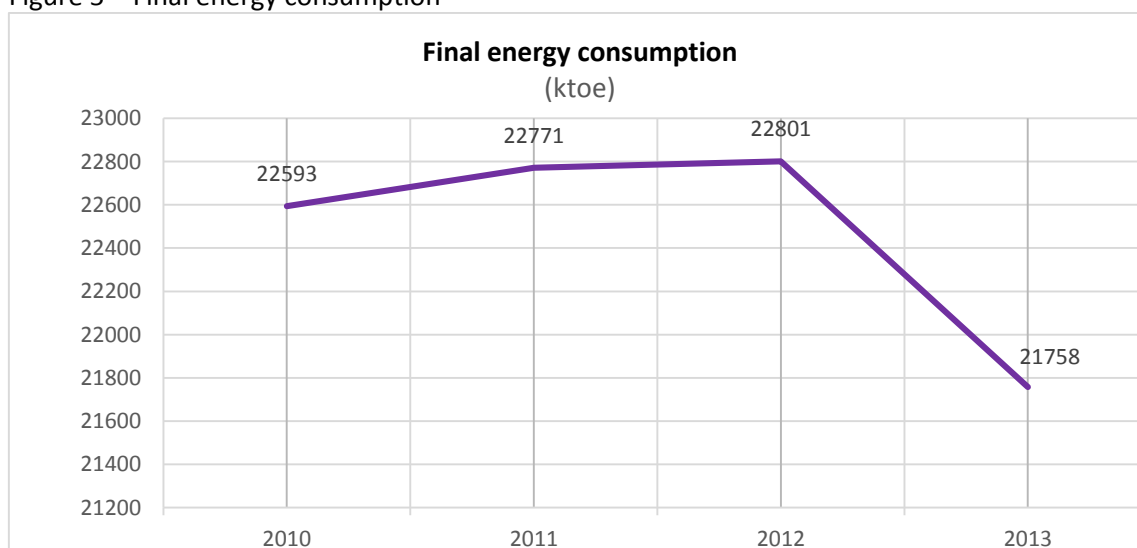
Figure 4 – Total final consumption with climatic corrections



Source: Odyssee database

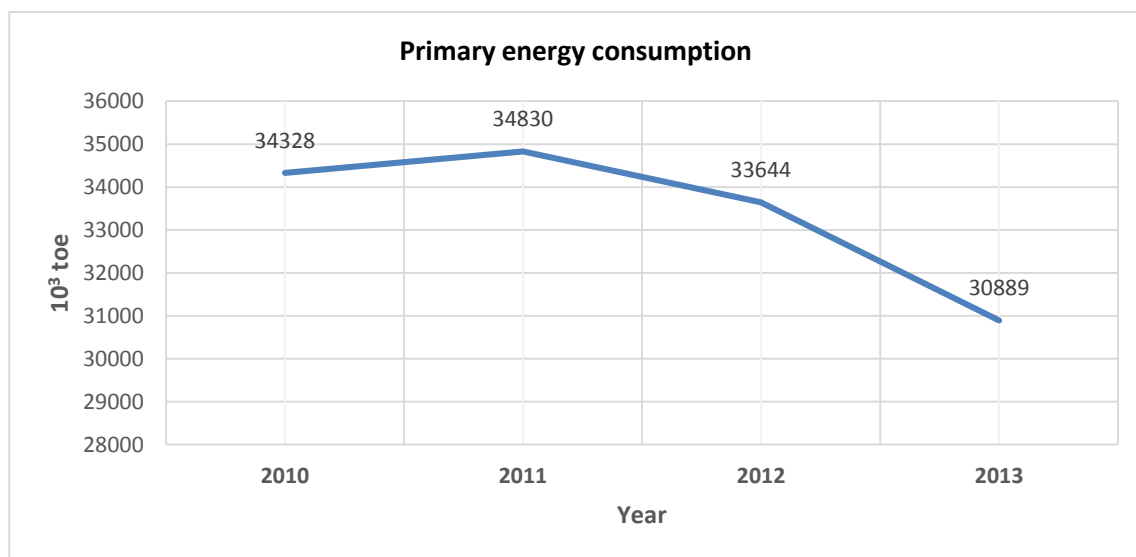
During 2012-2013, the decrease in the final energy consumption – Figure 5, caused a reduction in primary energy consumption of 2755 toe respectively by 8.2 %, - Figure 6, while the GDP increased in real terms by 3.4% - Figure 1.

Figure 5 – Final energy consumption



Source: Romanian Statistical Yearbook

Figure 6 – Primary energy consumption



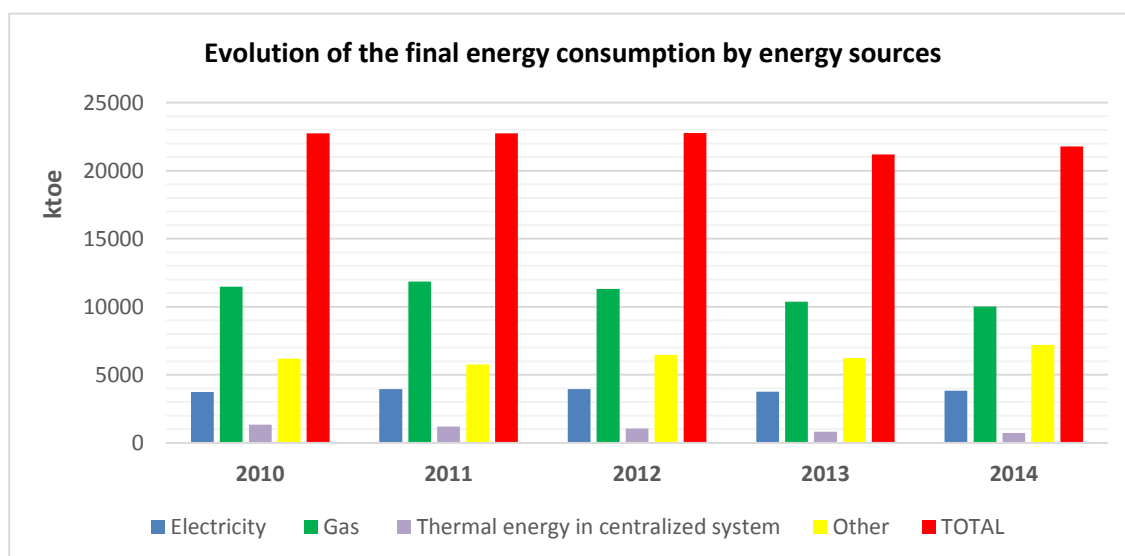
Source: Romanian Statistical Yearbook

These variations reflect an increase in the energy efficiency and in the end-use sectors restructuring measures undertaken both by the economy and by achieving energy efficiency programs.

A significant and positive another reason is to reduce the amount of primary energy to produce one unit of final energy. This indicator reflects the overall efficiency of the energy sector (extraction of the energy products, the electricity and the heat production, transmission and distribution) and it is frequently used internationally. Decreasing of this value in 2013 compared to 2012 meant an increase in the efficiency of the energy sector as a whole.

FINAL ENERGY CONSUMPTION BY ENERGY SOURCES is represented in Figure 7 for 2010-2014 period. For the last four years, it is distinguished the constant share of all energy sources and the major share of gas consumption in the final energy consumption.

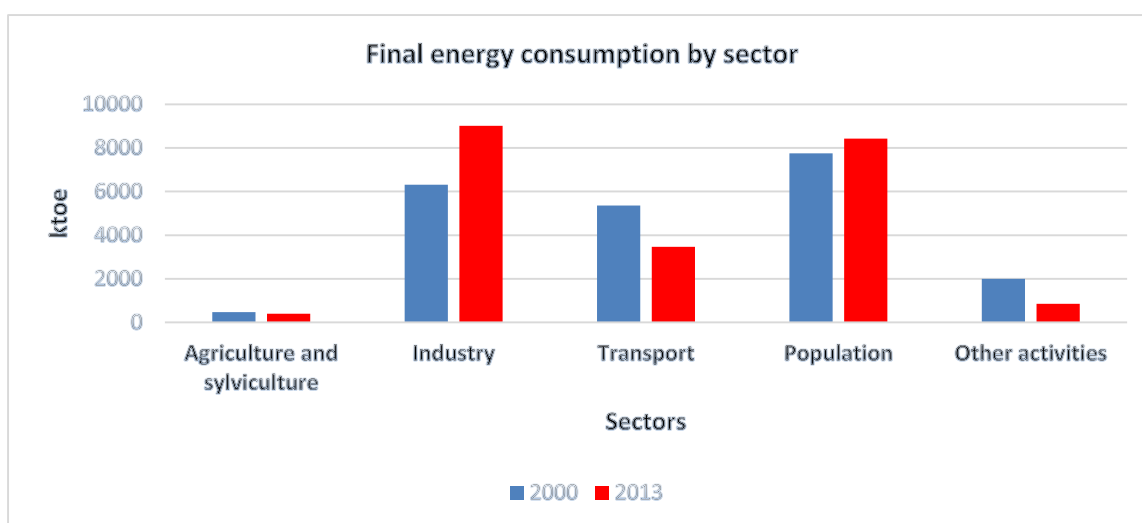
Figure 7 – Evolution of the final energy consumption by energy sources



Source: Source: Romanian Statistical Yearbook

FINAL ENERGY CONSUMPTION BY SECTOR is represented in Figure 8.

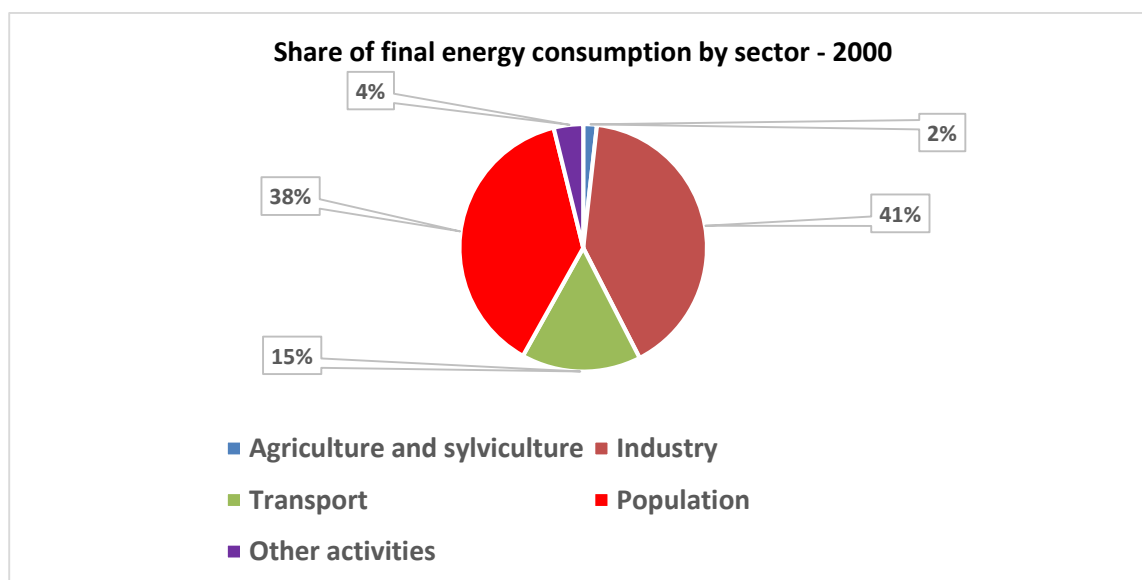
Figure 8: Final energy consumption by sector



Source: Romanian Statistical Yearbook

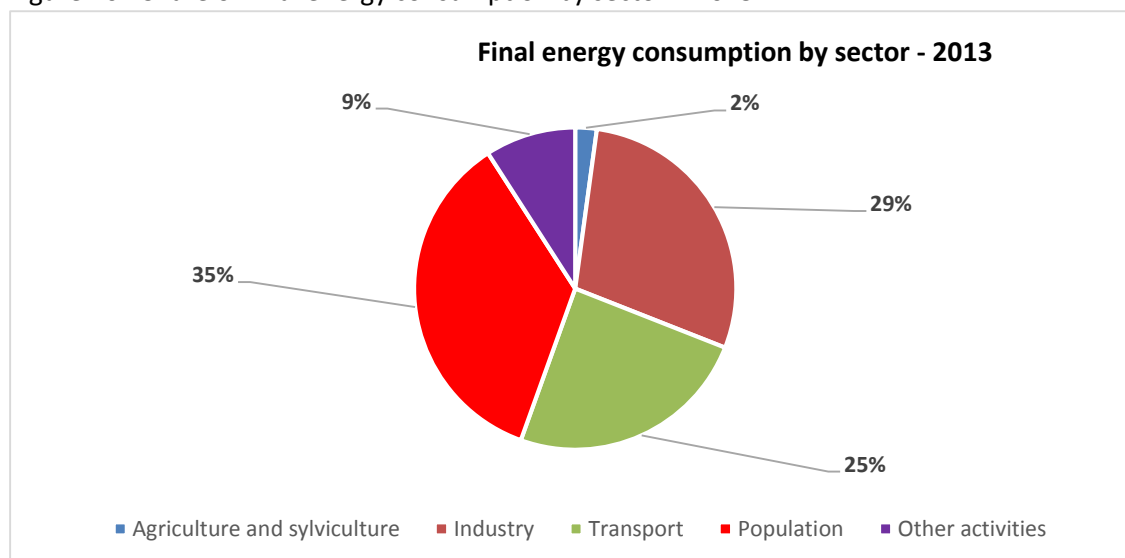
The figure 9 presents the structure of the final energy consumption in 2000 and figure 10 presents the same structure in 2013. By comparing the two figures the changes that took place concerning the consumption sectors within the final energy consumption can be pointed out.

Figure 9: Share of final energy consumption by sector – 2000



Source: Romanian Statistical Yearbook

Figure 10 - Share of final energy consumption by sector – 2013



Source: Romanian Statistical Yearbook

In the analysed period, the consumption in the industrial sector registered an important decrease with 2710 thousands toe. This means -2.3%/year. The transport sector registered an important increase with 1897 thousands toe. In 2013 the household consumption surpassed the industrial consumption with 23% and the consumption in the transport registered an increase with 4.2%/year. The energy consumption of services and agriculture sectors increased too.

1.2.2. Energy intensity

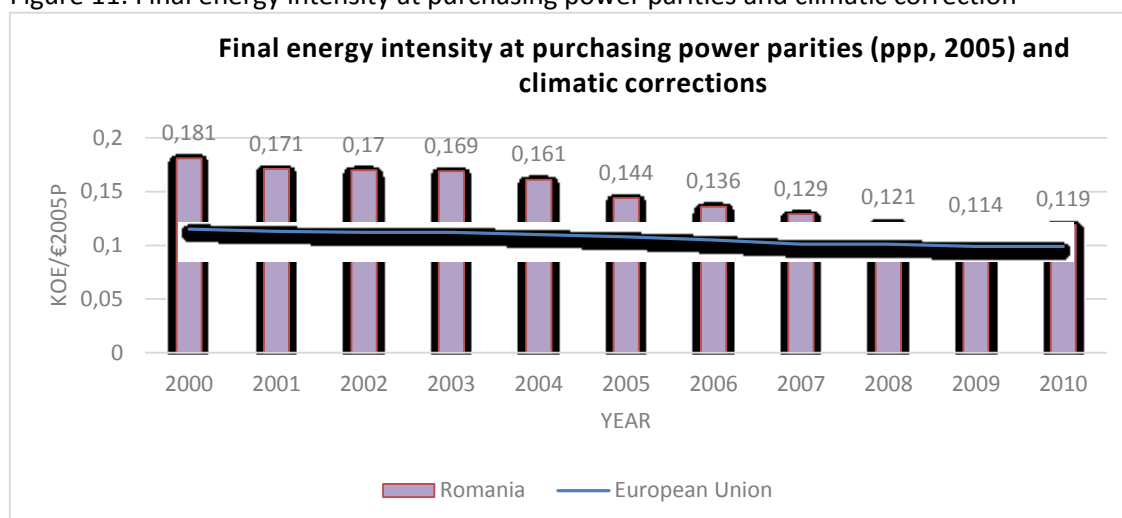
The evolution of the primary energy intensity and the final energy intensity during the crisis and economic recovery do not allow conclusions to be drawn conclusive regarding the increased energy efficiency in accordance with the National Energy Efficiency Action Plans. According to Eurostat, in 2010 the average primary energy intensity for the 27 Member States of the European Union was 0.152 toe/1000 Euro.

The energy intensity of industry in Romania has decreased between 2007 - 2012 by about 42%, both due to the increased energy efficiency measures and the restructuring that took place during the crisis.

Since the energy intensity of the Romanian economy is still slightly higher than the EU average, further policies and measures for improving the energy efficiency have to be implemented, therefore ensuring a sustainable development.

The final energy intensity is the ratio final energy consumption (climate corrected) over GDP. The GDP is converted into 2005 euro, using purchasing power parities instead of exchange rates. The purpose of these climatic corrections is to leave out the influence of the cold winter. This is particularly important when there are large climatic variations from one winter to the other. The climatic corrections are made only for the part of the consumption corresponding to the space heating. The climate corrections **are only made in the residential and service sectors**. During 2000-2010 the final energy intensity registered a continuous decline with 3.4%/year - Figure 11.

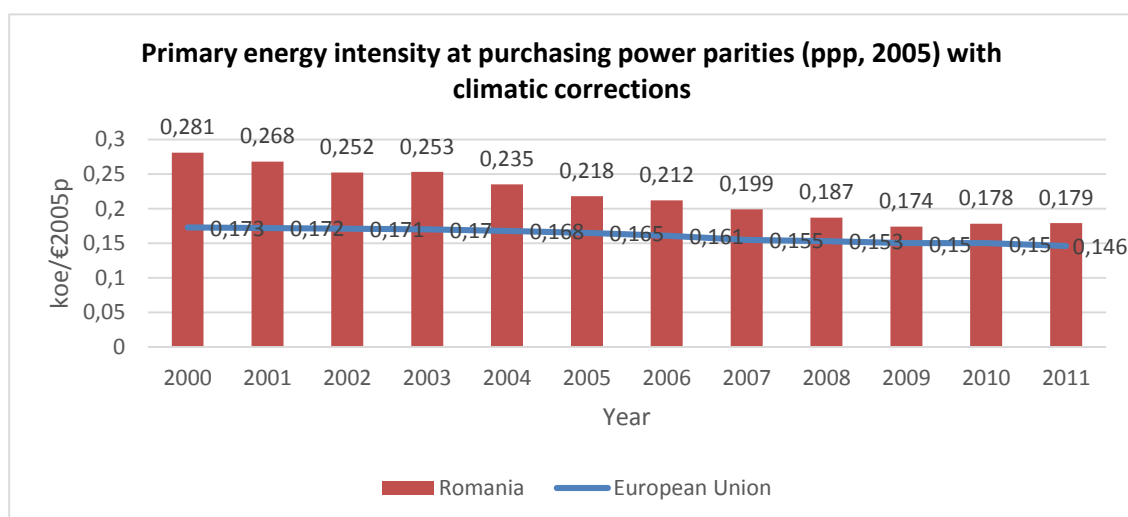
Figure 11: Final energy intensity at purchasing power parities and climatic correction



Source: Odyssee database

The primary energy intensity is the ratio between the total energy consumption (the corrected climate) and GDP. It measures the total amount of the energy necessary to generate one unit of GDP. The GDP is converted into EUR 2005, using the purchase of power parities instead of the exchange rates. The purpose of these climatic corrections is to leave out the influence of the cold winter. This is particularly important when there are large climatic variations from one winter to the other. The climatic corrections are made only for the part of the consumption corresponding to the space heating. The climate corrections are only made in the residential and service sectors.

Figure 12: Primary energy intensity at purchasing power parities with climatic corrections



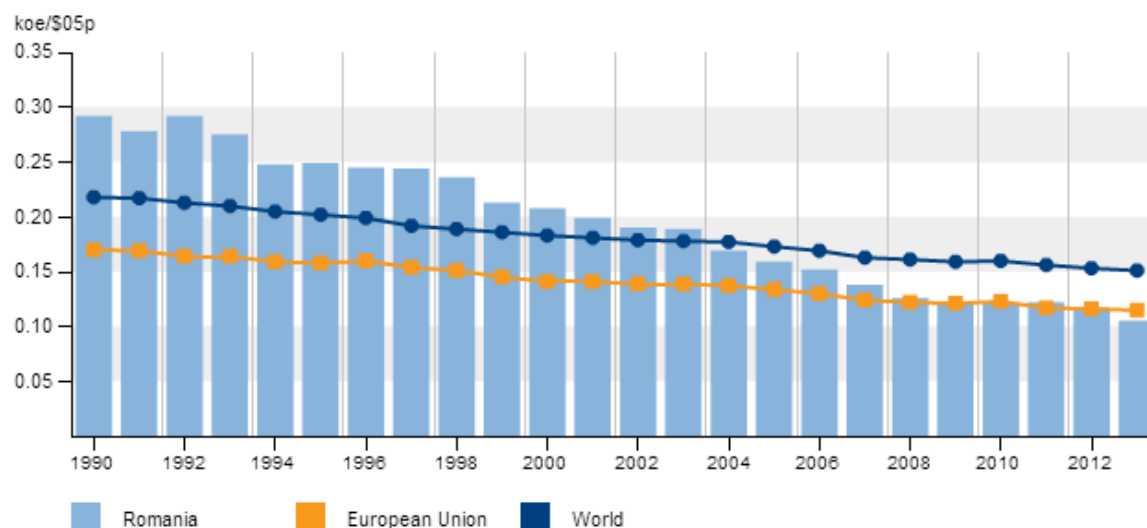
Source: Odyssee database

For many years, the primary energy intensity experienced a continuous decline. During 2000-2011 the primary energy intensity registered a continuous decline with 3.3%/year - Figure 12.

In Romania's case, the value of this indicator depends on how the GDP is expressed. This has an impact on the comparisons made with the existing international situation.

If you calculate Energy intensity in Romania adjusted to the economic structure of EU in toe/\$ 05P the value of **this indicator from 2013 is lower than the EU and the international average**. Figure 13 presents the primary energy intensity in Romania adjusted to the economic structure of EU and the international average.

Figure 13: Primary energy intensity adjusted to EU economic structure

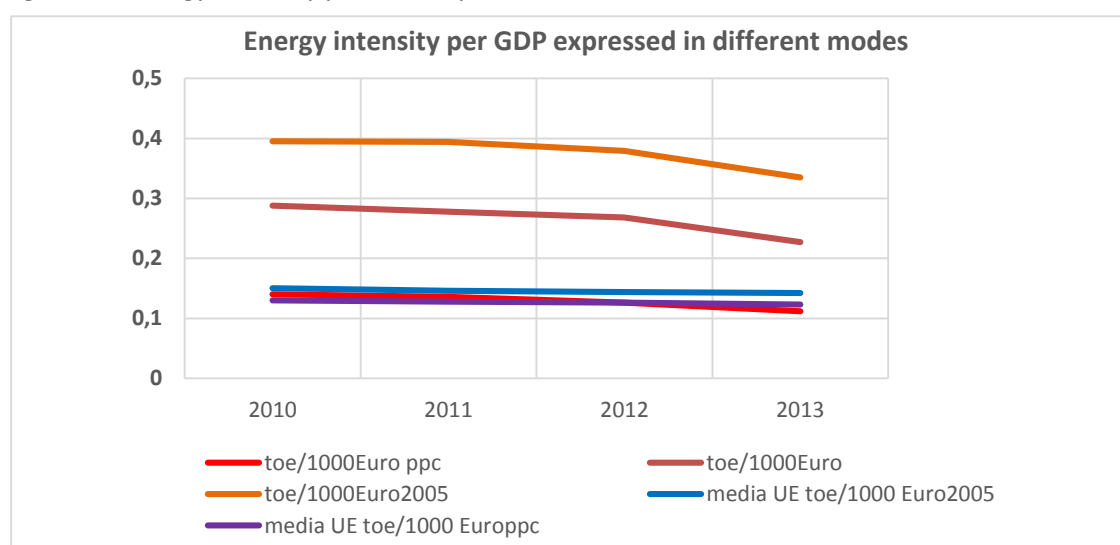


Source - World Energy Council data base

If you calculate the energy intensity toe/thousand Euro 2005 this indicator in 2013 for Romania (0.335 toe/1000 Euro 2005) is 2.36 times higher than the EU calculation 28(0.142 toe/1000 Euro 2005).

If the calculation is made in toe/1000Euro PPC, the energy intensity of Romania (0.112 toe/1000 Euro PPC) is lower than the EU 28 average intensity (0.123 toe/1000 Euro PPC) - Figure 14.

Figure 14: Energy intensity per GDP expressed in different modes



Source - World Energy Council database

1.3. ENERGY EFFICIENCY POLICY BACKGROUND

LEGISLATIVE AND INSTITUTIONAL FRAMEWORK IN ROMANIA

A. Primary legislation on energy efficiency

The transposition of Directive 2012/27/UE on energy efficiency

In August 2014 the **Law no. 121/2014 on energy efficiency** entered into force. The Law transposes the European Union regulations into national legislation set out under Directive 2012/27/UE regarding the energy efficiency, amending the Directives 2009/125/EC and the 2010/30/EU ones and repealing the Directives 2004/8/EC and the 2006/32/EC ones. The main purpose of the Law is to establish a coherent legislative framework for the development and the application of the national energy efficiency policy in order to achieve the national target for increasing the energy efficiency.

The main provisions of the law:

- The criteria used to define companies that are in scope of the energy audit obligation is the total annual energy consumption. The threshold is 1000 toe/year:
 - the enterprise with energy consumption higher than 1000 toe is obligated to carry out, every 4 years, energy audits for 100% of energy consumption;
 - the enterprise with energy consumption less than 1000 toe/year is obligated to carry out, every 4 years, energy audits for a selected percentage of the energy consumption (the energy audit beneficiary choose the percentage of the energy consumption);
 - each site that has an energy consumption above 1000 toe is considered an independent unit and has to carry out an energy audit on 100% of the energy consumption of the unit;
 - the enterprises that are consuming annually less than 1000 toe have to carry out energy audits on a percentage of energy consumptions chosen by the beneficiary.
- The exempt from the obligation: SMEs and enterprises that implement a system of energy or environmental management, certified by an independent body in accordance with European or international relevant standards.

Establishment of the Energy Efficiency Department

In accordance with the provisions of the **Law no. 121/2014** on energy efficiency, within the Romanian Energy Regulatory Authority was established the **Energy Efficiency Department- EED**, by Order of ANRE's President no. 95/2014, published in the Official Journal no. 737/2014.

Romanian Energy Regulatory Authority is responsible with transposing the provisions of the law into secondary legislation.

National Energy Efficiency Action Plan

The National Energy Efficiency Action Plan (2014-2020) - **NEEAP III** was approved by Governmental Decision no. 122/2015.

<http://www.anre.ro/ro/eficienta-energetica/legislatie/legislatie-primara1387180368>

The established measures for energy efficiency apply to: primary resources, production, distribution, supply, transmission and final consumption. The measures provided by the NEEAP represented the basis for establishing 12 national EE Programs, grouped into 5 sectors.

B. Secondary legislation on energy efficiency issued by Energy Efficiency Department of the Romanian Energy Regulatory Authority

ANRE Decision no.2794/2014 - Regulation for certification of energy managers and energy service provider companies and Regulation for authorising industrial energy auditors

Accordingly to the ANRE's Decision no.2794/2014, energy auditors authorized in another Member State of the European Union or European Economic Area are equivalent to the energy auditor authorized in Romania, if they prove knowledge of Romanian legislation after sustaining an interview.

The applicants must submit the following documents to Regulatory Authority for Energy:

- a) a certified copy of the authorization issued in a Member State of the European Union or the European Economic Area translated and legally certified;
- b) the references to the work carried out in the past 3 years as energy auditor;
- c) the list of equipment owned by the applicant specific to the work required for the energy audits.

Energy auditors from countries outside the European Union must attach to the documentation, besides the documents mentioned above, a certificate of equivalence / recognition of the university degrees related, issued by the National Council for Recognition and Equivalence of Diplomas from Romania.

Decision ANRE no.2123/2014 - Guide for energy audit

- a) it includes minimum criteria for energy audits according to the Energy Efficiency Directive 27/2012/CE;
- b) the transport companies or those who have a fleet have also the obligation to carry out energy audits on fleet regarding the fleet composition, the technical characteristics of vehicles, the number of hours of operation of a vehicle for a reference period, the specific indicators- such as tonnes/km or persons/km, energy consumption and its reduction possibilities, the maintenance programs, the programs route optimization and the training of drivers.

Model for developing the *Program for increasing the energy efficiency for industrial units* ANRE Decision no. 8/DEE/12.02.2015

Model for developing the *Program for increasing energy efficiency of establishments with a population exceeding 5000 inhabitants* - ANRE Decision no. 7/DEE/12.02.2015

Accordingly to the provisions of the Energy Efficiency Law no. 121/2014:

- a) Art. 9(12) For municipalities more than 5000 inhabitants it is obligatory to have:
 - Energy efficiency programs
- b) Art. 9(13) For municipalities more than 20000 inhabitants it is obligatory to have:
 - Energy efficiency programs
 - Energy manager

Decision no. 13/DEE/2015 regarding the approval of the syllabus of specialized courses in the field of energy management and energy audits development.

Decision no 1765/2013 regarding the approval of the layouts for the total energy consumption per year statement and the analysis questionnaire of the energy consumer.

Additional information

In the ANRE headquarter situated in Bucharest, no. 4, Sos. Cotroceni, was established the Energy Efficiency **Information Point**. The initiative aims to help all energy consumers to achieve a better understanding of the energy efficiency matters, from legislation to the measures that help increase the energy efficiency.

C. Strategies

There are several **strategies** approved by the government that explicitly approach the energy efficiency.

❖ National Energy Efficiency Strategy approved by GD 163/2004.

The objective of the strategy by 2015 is to reduce primary energy intensity by 40% compared to 2003.

❖ National Strategy on the heat supply of localities by means of district heating systems approved by GD 882/2004

Based on the analysis of the existing situation the document establishes the main domains of intervention namely: the thermal insulation of the blocks of flats and rehabilitation of the heat transport and distribution networks.

❖ The Energy Strategy of Romania in the period 2007- 2020 approved by GD 1069/2007

The general objective of the Strategy is to “cover the present and future energy demand at the least price, in the conditions of a modern market economy and civilized life standing, ensuring quality and security of supply and observing the principles of the sustainable development”.

In order to reduce energy intensity in the great energy consuming sectors and attain the targets proposed both by the National Energy Efficiency Strategy and the National Energy Efficiency Action Plan corresponding to the Directive 2006/32/EC, the measures will be taken in the following directions:

- **Industry**
 - ✓ Information campaigns;
 - ✓ Energy audits and efficient energy management;
 - ✓ Energy efficiency improvement by supporting financing from the Community funds.
- **Transport**
 - ✓ Energy consumption reduction by people and merchandise railway transport modernization;
 - ✓ Increase the public transport quality so that people will preponderantly use instead of their own cars;
 - ✓ Expansion of the public transport with new routes;
 - ✓ Increase the traffic and the parking efficiency;
 - ✓ Provision of the public means of transport for the employees by the beneficiary companies;
 - ✓ Increase the development of the rail transport within urban transport (trams, trolleybuses);
 - ✓ Increase the energy efficiency of the vehicles by establishing minimum efficiency criteria;
 - ✓ Introduction of standards to support the most efficient and least polluting vehicles;
 - ✓ Usage of the gaseous and the bio-fuels in the transport sector.

An essential component in the implementation of the above-mentioned measures is the education for making the population accept and apply them on a large scale.

- **Residential** (the final energy consumption in buildings: heating, hot water and lighting):
 - ✓ Rehabilitation of the building envelope through thermal rehabilitation measures and financial support for the low-income owners for carrying out the rehabilitation works;
 - ✓ Increasing the efficiency of the existing thermal installations;
 - ✓ Increasing the efficiency of lighting, utilization of the low consumption lamps;
 - ✓ Obligation to apply the provisions of the Directive and the European standards on the new buildings;
 - ✓ Increasing the energy efficiency by supporting financing from the Community funds;
 - ✓ Continuing the final consumer thermal energy metering;
 - ✓ Development of the national energy saving education programme for population, in schools and through mass-media, aiming at saving energy, protecting the environment and locally using the renewable energy sources;
 - ✓ Stimulation of energy service company (ESCO) functioning.
- **Public sector**
 - ✓ Increased efficiency and reduction in the public lighting consumption;
 - ✓ Increased efficiency and reduction in the water supply installation consumption;
 - ✓ Public building efficiency increase.
- **Agriculture**
 - ✓ Increase the efficiency and the use of bio-fuels;
 - ✓ Development of energy crops, both for producing bio-fuels, and electricity and heat through cogeneration;
 - ✓ Increase the energy efficiency of irrigations.
- **Cogeneration**
 - ✓ Promotion of the highly efficient cogeneration;
 - ✓ Identification and turning to good account of the national cogeneration potential;
 - ✓ Energy auditing of the cogeneration units;
 - ✓ Rehabilitations and modernizations of the existing installations for increasing efficiency and reducing the environmental impact;
- **Renewable energy sources**
 - ✓ Increase in the degree of RES utilization under high economic efficiency conditions for producing electricity and heat, by means of facilities, including facilitation of the access to the electrical network, in the investment phase;
 - ✓ Green certificate improvement with a view to attract the private capital in the RES field investment;
 - ✓ Promotion of mechanisms for supporting utilization of RES for producing heat and hot water for domestic use;
 - ✓ Utilization of structural funds.
- **Bio-fuel utilization**

By 2020, the percentage of bio-fuel utilization will amount to at least 10%, in the conditions of the new generations of bio-fuels.

❖ **National Strategy for Romania's Sustainable Development 2013-2020-2030** approved by GD 1460/2008

The strategy establishes that the efficient utilization of energy and promotion of RES are essential for ensuring the sustainable development on the long term.

D. As a Member State of the European Union, Romania has to translate the EU directives into its internal legislation and observe the energy policy measures established by the European Commission.

❖ **GD 1043/2007 on the eco-design requirements for the energy- using products**

The decision translates the Directive 2005/32/EC that sets a framework establishing the eco-design requirements that apply to the energy-using products.

❖ **Law 220/2008 on the establishment of the system for the promotion of energy production from RES** with its subsequent modifications and completions

In its present form the law translates the provisions of the Directive 2009/28/EC into internal legislation.

❖ **EGO 152/2005 on the prevention and integrated control of pollution** with its subsequent modifications and completions

In its present form the Ordinance translates the Directive 2008/1/EC into the internal legislation.

❖ **EGO 40/2011 on the promotion of the non-polluting and energy efficient road transport**

The Ordinance translates the Directive 2009/33/EC.

❖ **Several Government decisions on the establishment of the requirements relating to the labelling, the energy efficiency and the introduction of receivers on the market** (refrigerating equipment, air conditioners for household utilization, electric ovens, dryers, washing machines, dish washers, electric lamps, ballast for fluorescent lighting devices, etc.)

In order to implement the strategies and the adopted legislation several national energy efficiency, there are programmes that have been initiated and financed from the European funds, state budget or other centralized funds, especially established.

E. Programmes

The main programmes that have been implemented in the last years are the following:

❖ **The Sectoral Operational Programmes financed by the European Union that Romania benefits from**

All these programmes enable actions aiming at increasing the energy efficiency, but from the impact point of view, it is worth to mention:

- The Sectoral Operational Programme Increase in Energy Competitiveness Priority Axis 4: Improvement in Energy Efficiency and Security of Supply in the context of climate changes;
- Regional Sectoral Operational Programme Priority Axis 1: Support for the sustainable development of towns and Priority Axis 3: Social infrastructure improvement.

❖ **The Program for the increasing of energy efficiency of the blocks of flats** approved by the Emergency Government Decision 1661/2008

The Ordinance establishes the work necessary for the thermal insulation of the blocks of flats designed and built between 1950 and 1990, the way of financing, as well as the obligations and the responsibilities of the public administration authorities and of the owners' associations.

The execution of the works will be financed as the following:

- a) 50% from the state budget allocations, within the funds annually approved to this goal from the budget of the Ministry of Regional Development and Dwellings;
- b) 30% from the funds annually approved to this goal from the local and/or other sources legally established;
- c) 20% from the repair funds of the owners' associations and/or other sources legally established.

The Ordinance stipulates the obligations and responsibilities of all the factors involved in applying this ordinance, as well as the monitoring and the control actions.

❖ **Programme for the renewal of the national auto fleet**

Through this programme the physical persons receive a scrapping premium of 3,800 RON/vehicle (about 900 euro) for the vehicles more than 8 years old that are brought to the centers especially established for his purpose. The scrapping premium is given in the form of vouchers that can be used only for acquiring new cars. The programme is financed from the Environmental Fund.

❖ **National Energy Efficiency Action Plans**

According to the provisions of the Directive 2006/32/EC in 2007 Romania drew up the First National Energy Efficiency Action Plan. Through this document Romania pledged to reduce the final energy consumption in the period 2008-2016 to an average annual rate of 1.5% compared to the average in the period 2001-2005 (compared to the average annual rate of 1% set by the Directive). The pledged quantitative targets represent 2,800 ktep for the year 2016 and 940 ktep for the year 2010.

In 2011 the Second National Energy Efficiency Action Plan was developed. The calculations made by means of the top-down indicators recommended by the European Commission have led to the conclusion that in 2010 Romania's final energy consumption savings amounted to 2.223 ktep of which care 1.060 ktep in industry, 782 ktep in the services sector and 281 ktep in the household sector. The total value of these savings is by far greater than the intermediate target set for 2010 and is relatively close to the final target set for 2016. The evaluation of these values should take into account the fact that they have been registered on the background of the period of recession of these years. The highest values have been registered in industry and services, representing the sectors most seriously affected by the crisis, and the important transformations /restructurings have taken place.

❖ **Financing mechanism for energy efficiency - Energy efficiency financing facility (EEFF)**

EEFF is structured as credit line based on grants established from the EC and EBRD funds that is carried out through six Romanian banks and is designed for the private companies. These companies have the following facilities:

- Low-interest loan of up to 2,5 million Euro from one of the participant banks;
- Free of charge technical consultancy from a specialized firm;
- Grant amounting to 15% at the investment completion.

1.3.1. ENERGY EFFICIENCY TARGETS

2020 TARGETS

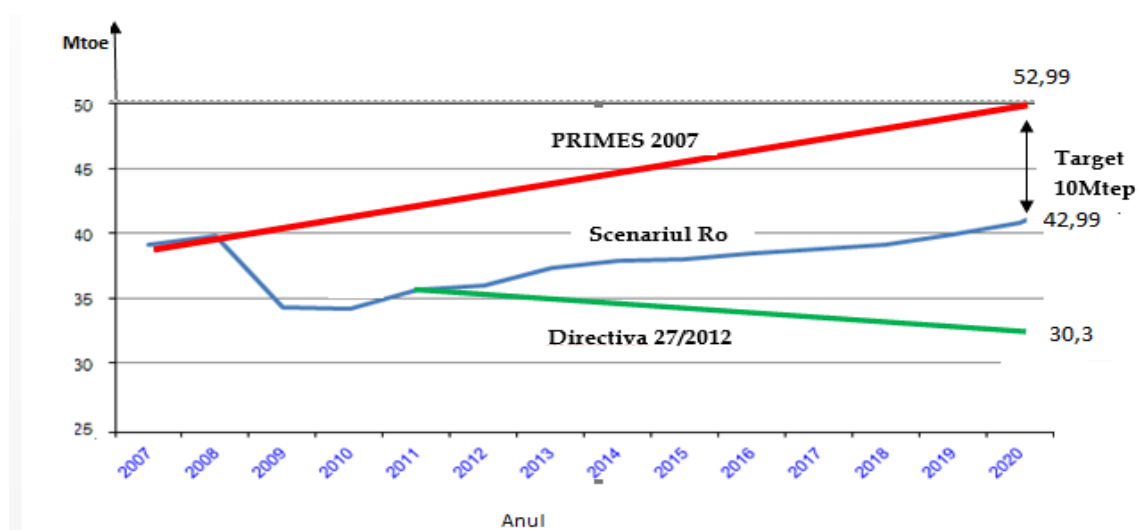
According to Romania's National Reform Programme corresponding to the Europe 2020 Strategy, the national climate change and energy sustainability targets are:

- **Green house gas emissions** 20% lower than 1990;
- 24% increase sharing the **energy from renewable sources** in gross final energy consumption;
- **Energy efficiency** growth (expressed as a reduction of 10 Mtoe (19%) in the primary energy consumption).

Romania's national indicative energy efficiency target for 2020 is to save **10 Mtoe** of primary energy, which represents a reduction of **19%** in the volume of primary energy consumption (52.99 Mtoe) forecasted in the Primes 2007 model for the realistic scenario.

Achieving this target implies that in 2020 primary energy consumption will be 42.99 Mtoe, while total energy consumption will be 30.32 Mtoe – Figure 15.

Figure 15 - 2020 Targets



Source: Romanian Energy Regulatory Authority

The measures provided by the NEEAP III represented the basis for establishing 12 National Energy Efficiency Programs, grouped into **5 sectors**.

Table 1- The programs to achieve the national target and the coordinators

1. Energy efficiency in energy supply system - transformation, transmission and distribution

Programs to achieve the national target	Coordinator
P1 - National Investment Plan	Ministry of Energy, Small and Medium Enterprises and Business
P2 - Energy efficiency in electricity transmission and distribution networks	Romanian Regulatory Authority for Energy
P3 - Promoting of high-efficiency cogeneration	Romanian Regulatory Authority for Energy
P4 - Program “Heating 2006-2016 – Warmth and Comfort”	Ministry of Regional Development and Public Administration

2. Energy efficiency in industry

Programs to achieve the national target	Coordinator
P5 – Energy efficiency in industry classified in ETS	Ministry of Environment, Water and Forests
P6 – Energy audit and energy management	Romanian Regulatory Authority for Energy

3. Energy efficiency in the residential sector

Programs to achieve the national target	Coordinator
P7 – Energy efficiency in the residential sector	Ministry of Regional Development and Public Administration

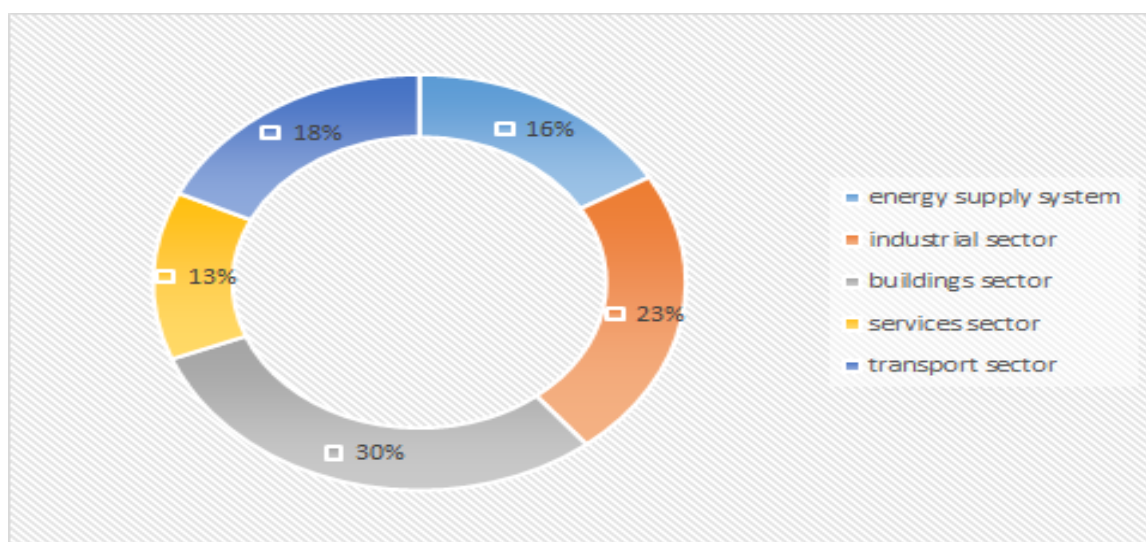
4. Energy efficiency in the services sector

Programs to achieve the national target	Coordinator
P8 – Energy efficiency in governmental buildings	Ministry of Regional Development and Public Administration
P9 – Energy Efficiency in the service sector	National Authority for Consumer Protection
P10 – Developing the energy services	Ministry of Regional Development and Public Administration & Romanian Regulatory Authority for Energy

5. Energy efficiency in the transport sector

Programs to achieve the national target	Coordinator
P11 – Energy efficiency in the transport sector	Ministry of transport
P12 – Car fleet renewal	Ministry of Environment, Water and Forests

Figure 16: The share of the five sectors in achieving the national target



Source – Romanian NEEAP III

Targets by sector are detailed in part 2.

Cross sector horizontal measures - Energy Efficiency Department in ANRE

In addition to the sector specific packages, a number of cross sector horizontal measures will be implemented.

Based on the specifics of each measure or package of sector specific measures the responsibility of the stakeholders are clearly defined.

Involving the stakeholders is the key to plan and implement the measures. This means a generation of commitment and an ownership by developing an understanding of the long term benefits of EE in a functional, realistic and sustainable way.

The implementation of actions will be the task of the various governmental bodies, the private sector entities, as well as the individual users of energy. In parallel with definition of the responsibilities, the required institutional and organizational capacities and resources will be provided, including enough expertise and financing. If such capacities are not yet available, the first step in the list of measures shall include respective activities and instruments to establish these capacities.

A monitoring and advisory scheme of implementation will be established to enable early recognition of the risks and the problems and interact with mitigation or emergency support. A coordinated measuring of the results is vital to comply with reporting requirements, evaluate the degree of achievements, learn lessons and demand for the future action plans.

The establishment of the Energy Efficiency Department plays a key role in the implementation of NEEAP III.

The Energy Efficiency Department is an effective division with the key role of executing government policies and strategies through the coordination of energy efficiency policies and programmes, including programmes design, administration, management, monitoring, evaluation, etc. The EED has the capacity to coordinate within and across levels of government, and engage the key stakeholders in consultative processes to help building consensus. The EED has administrative and management authority and adequate human and financial resources.

The EED is mandated to coordinate the EE process, and to monitor its progress. The mandate includes steering and advice on the EE improvement process, information and promotion, legal advice and support to the implementation of the measures packages. The key tasks and activities of the EED include policy support, advisory services and technical assistance, information and dissemination services, education and training, management support to measures and programmes, and facilitation of the access to finance for the energy efficiency projects. In the short term (2014-2020) the operating costs of the EED are estimated to 0.9 MEUR per year.

The Energy Efficiency Department has the following main attributions and responsibilities:

-  to draft policy proposals and delegated legislation on energy efficiency;
-  to monitor the implementation of the National Energy Efficiency Action Plan as well as related programs for increasing energy efficiency at national level;
-  to cooperate with national and international bodies to promote energy efficient usage and reduce the negative impact on the environment;

- ✚ to elaborate technical regulations in order to increase the energy efficiency in all the sectors of activity;
- ✚ to authorize the energy auditors and certificate the energy managers;
- ✚ to regularly update the list of energy services suppliers that are qualified and certified, as well as their qualifications/certifications;
- ✚ to develop synthesis of implementation stage by operators of the energy efficiency programs
- ✚ to promote to consumers the usage of renewable resources, through additional actions to regulatory activity;
- ✚ to participate to substantiating the indicative targets for energy saving and the necessary measures;
- ✚ to monitor voluntary agreements initiated by competent authorities;
- ✚ to collaborate with the National Authority for Regulating and Monitoring Public Procurement in order to support central public administration authorities to meet the obligation of purchasing only high efficiency performance products, services and buildings, as far as the requirements for cost effectiveness, economic feasibility, high viability, technical compliance and a sufficient level of competition are blending.

2. ENERGY EFFICIENCY IN HOUSEHOLD, TERTIARY AND BUILDINGS

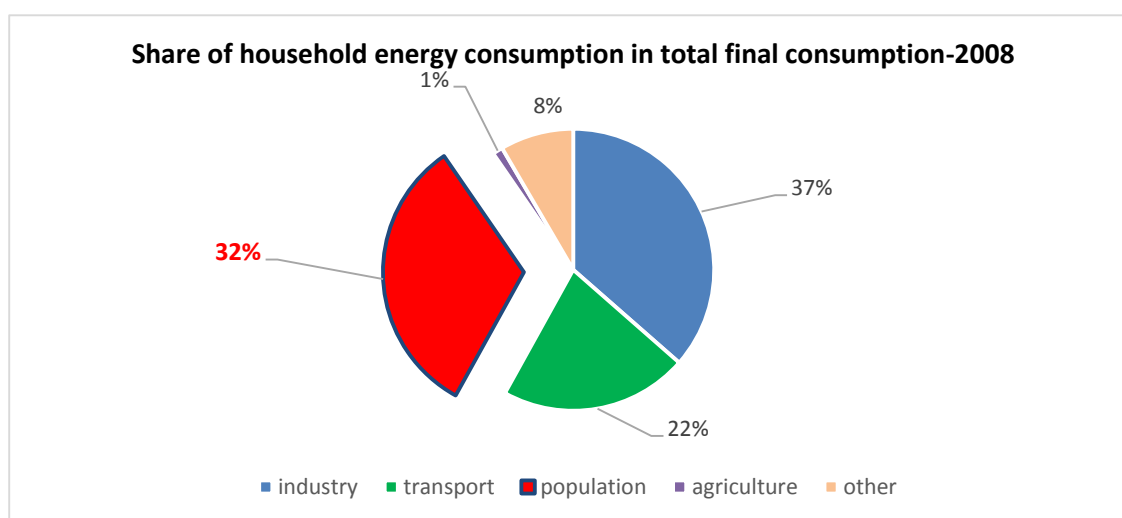
2.1. ENERGY EFFICIENCY TRENDS

A. Household sector

After 2000, the economy has had a positive evolution and this has led to an increase in the population income. Energy consumption increased only between 2000 and 2003; afterwards, the descending trend was resumed between 2004 and 2006.

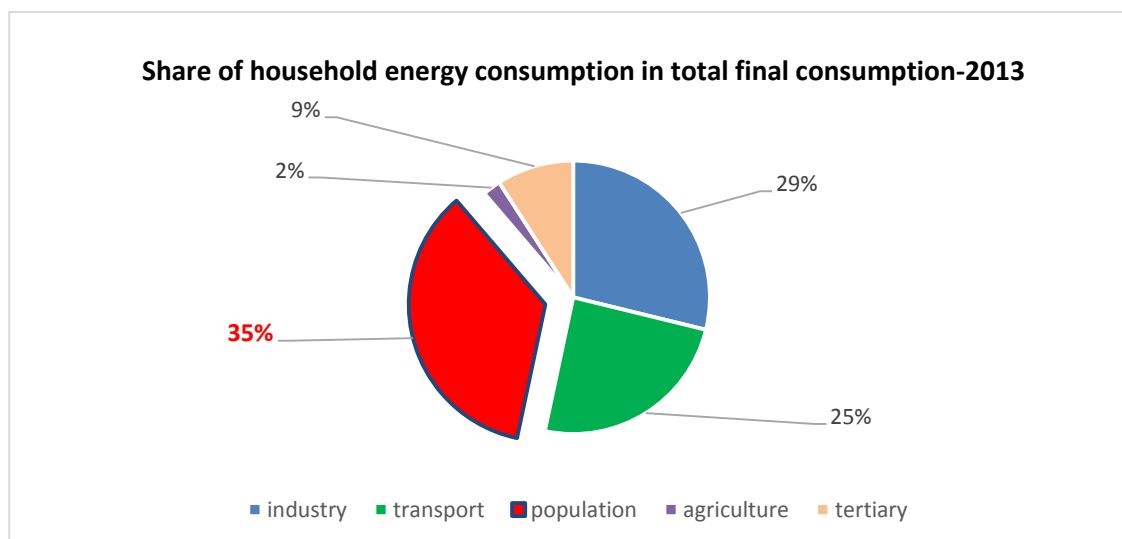
In the context of EU accession negotiations, in the period 2004-2006 an alignment of energy prices for the population was registered which led to a decrease in consumption; in 2008 the share of households energy consumption in total final consumption was 32 % - Figure 17 and the industry share was 37%; after 2009 the population became the main energy consumer at the national level reaching at 35% in the household sector compared to 29% in industry in 2013 – Figure 18.

Figure 17: Share of household energy consumption -2008



Source: Romanian Statistical Yearbook

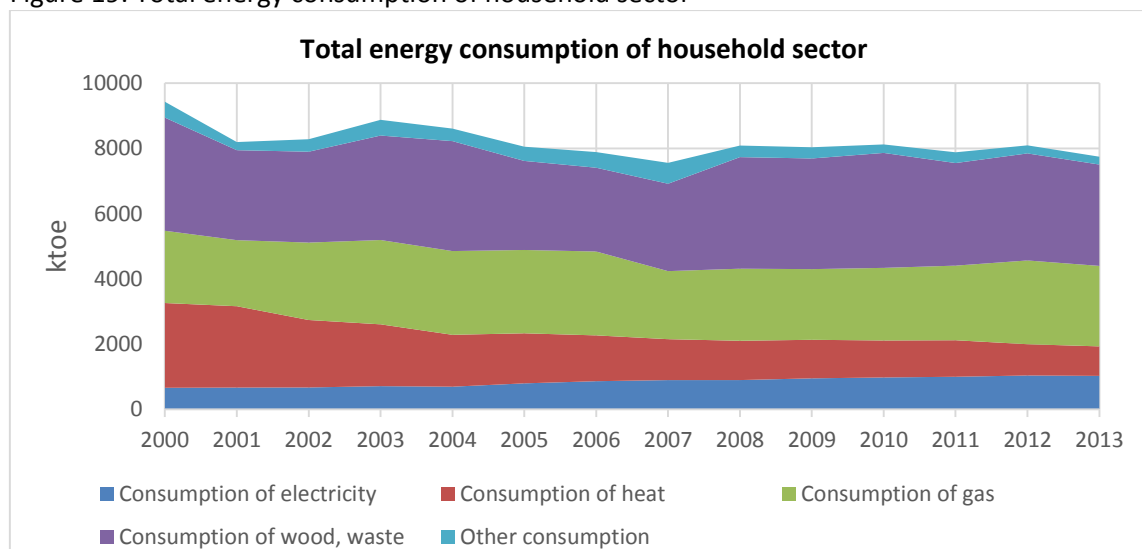
Figure 18: Share of household energy consumption -2013



Source: Romanian Statistical Yearbook

The household energy consumption has been decreasing constantly since 2000, at an average rate of 1.4%/year. This trend is explained by the energy efficiency improvements driven by the various types of policy measures and higher energy prices since 2005 (+70%) – Figure 19.

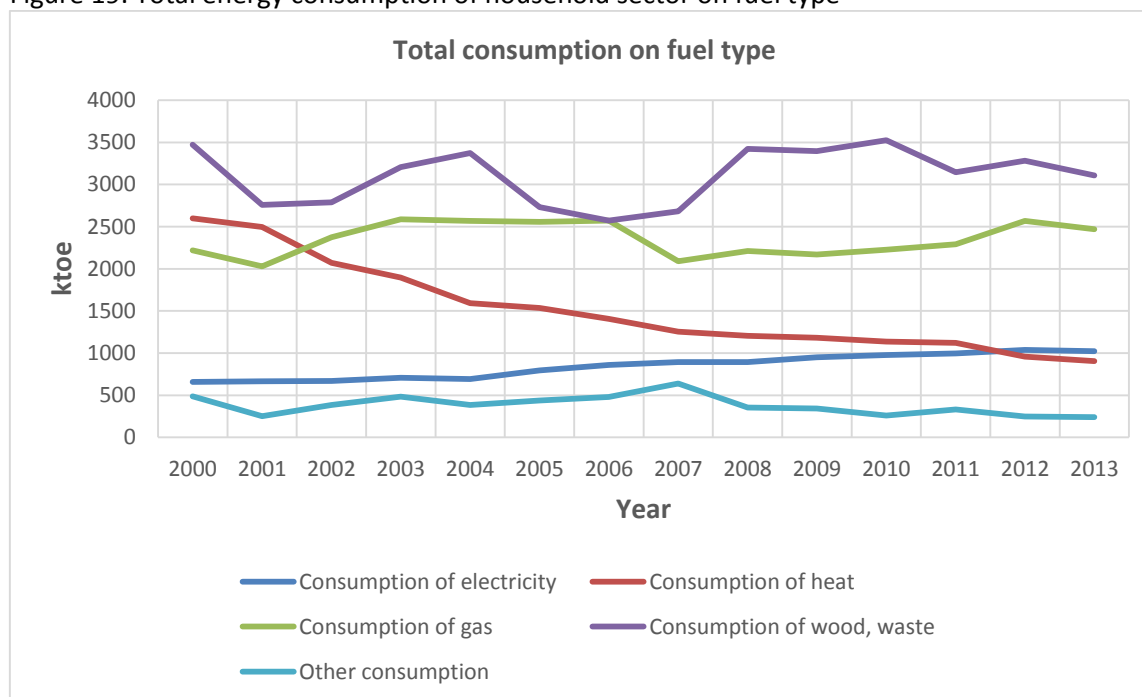
Figure 19: Total energy consumption of household sector



Source: Romanian Statistical Yearbook

Both figures 19, 20 show a drop in the gas consumption over other fuels. This is partially due to the replacement of the centralized heating systems in blocks of flats with individual boilers and not using their nominal capacity.

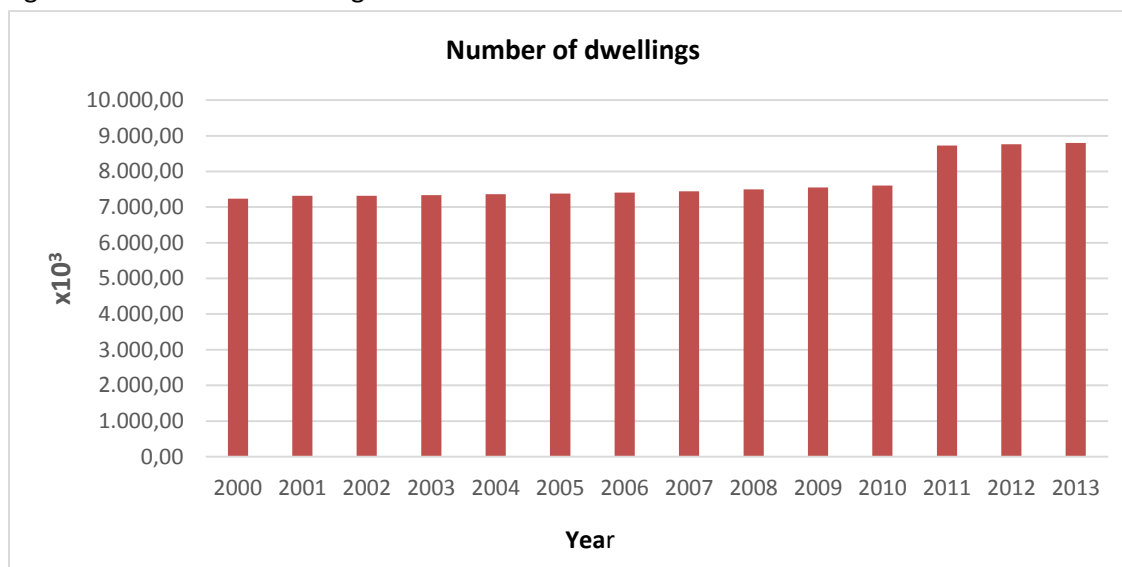
Figure 19: Total energy consumption of household sector on fuel type



Source: Romanian Statistical Yearbook

Considering the increase of the number of dwellings at the national level (Figure 21), the decrease in the end-use energy consumption per dwelling has been even greater, from 0.41 toe/dwelling in 2003 to 0.35 toe/dwelling in 2007. After 2007 the value of this indicator has been increasing to 0.4 toe/dwelling in 2012- Figure 22.

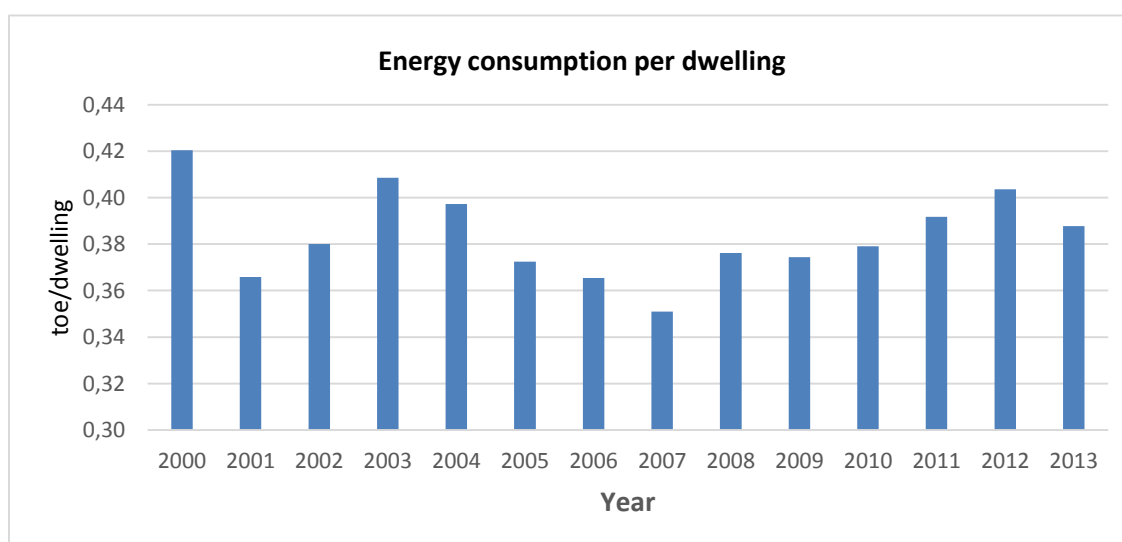
Figure 21: Number of dwellings



Source: Romanian Statistical Yearbook

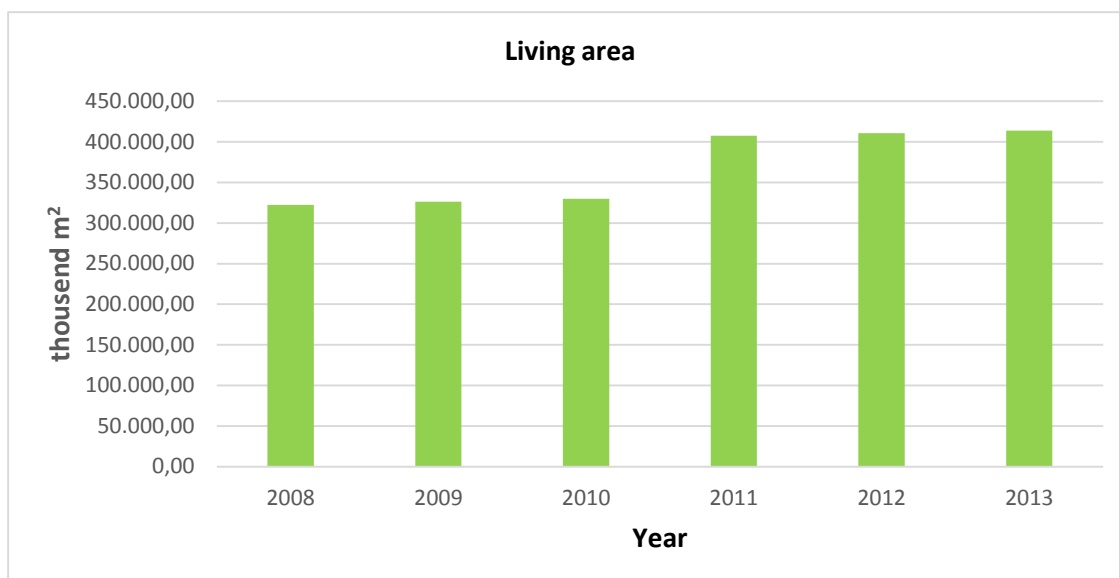
A more in-depth analysis should consider not only the evolution of the number of dwellings, but the evolution of their average area, as well. The areas of the new- built dwellings are more likely to determine an increase in the corresponding average area of a dwelling at the national level. At the same time, the new buildings are built according to the new, the improved standards, by means of the new materials and technologies. Their energy efficiency is much more improved. Figure 21 presents the increasing evolution of the number of dwellings and in Figure 23 this indicated the evolution of the living area during 2008-2013 at the national level. This value has increased with 5.68 %/year.

Figure 22: Energy consumption per dwelling



Source: Romanian Statistical Yearbook

Figure 23: Living area

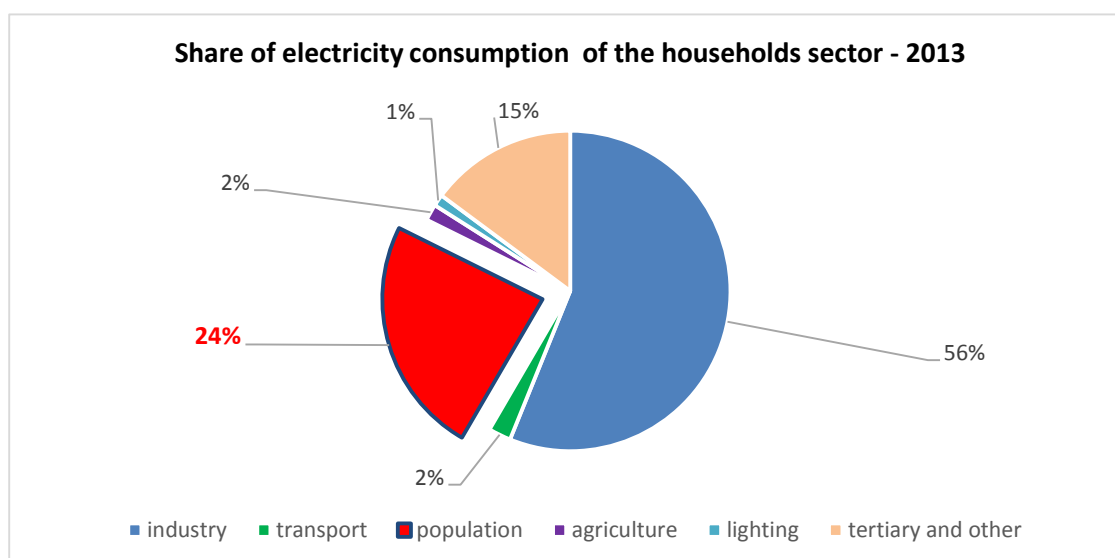


Source: Romanian Statistical Yearbook

Electricity consumption trends in the household sector

The final electricity consumption for households-figure 24 accounted for 24 % of total final electricity consumption in the year 2013. It was therefore the second most consuming sector after the industry sector with 56%. Final electricity consumption in the households sector in Romania is still on the rise and efforts to promote the energy efficiency in electricity, using household appliances and equipment that are hence especially important.

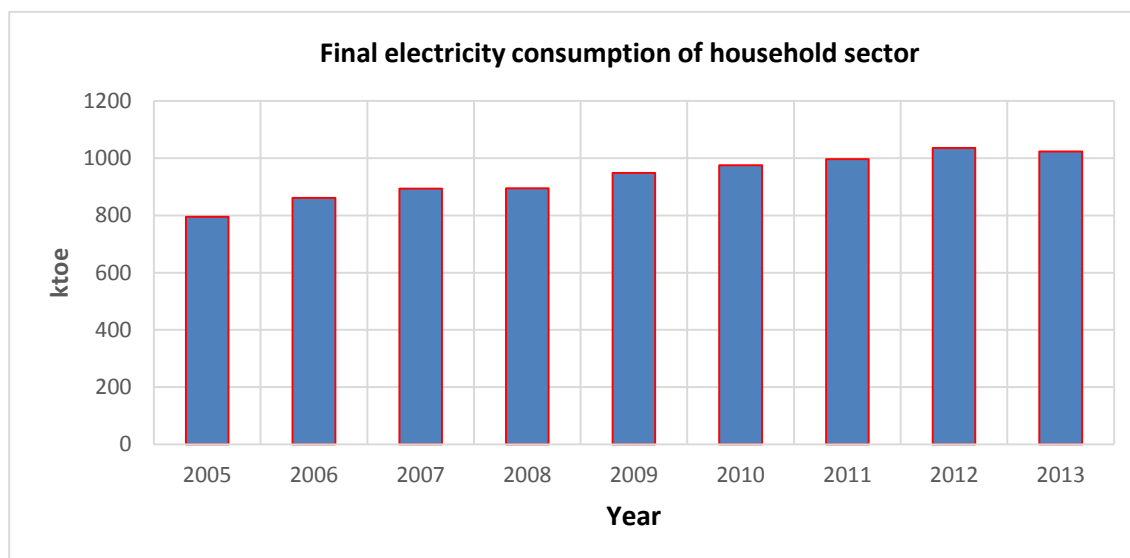
Figure 24: Share of electricity consumption of the household sector- 2013



Source: Romanian Statistical Yearbook

Electricity consumption registered an increasing trend (from 0.659 Mtoe in 2000 to 1.024 Mtoe in 2013) and its share within total consumption was 24% in 2013 – Figures 24 and 25.

Figure 25: Final electricity consumption of household sector

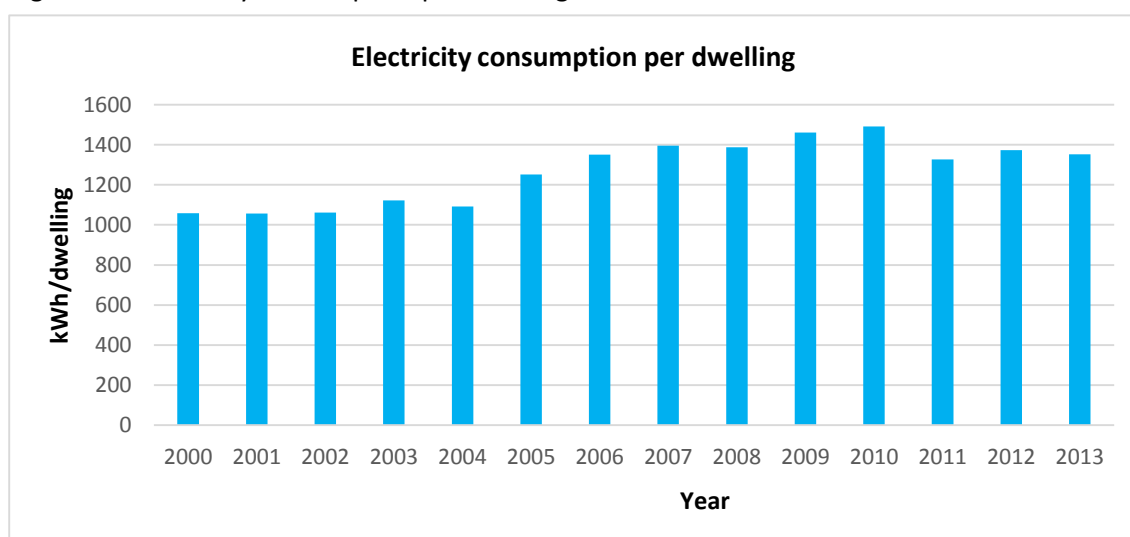


Source: Romanian Statistical Yearbook

The values of electricity consumption (kWh/dwelling – Figure 26) are low compared with the values from other EU countries, meaning that the endowment of the population with the household appliances is modest.

In Romania electricity is less used for space heating/cooling or for cooking and preparation of hot water. An increase in the level of population endowment with household appliances (refrigerator, washing machines, etc.) has been registered and this is registered only in the conditions of efficiency increase. Labelling of appliances has been very favourable from this point of view.

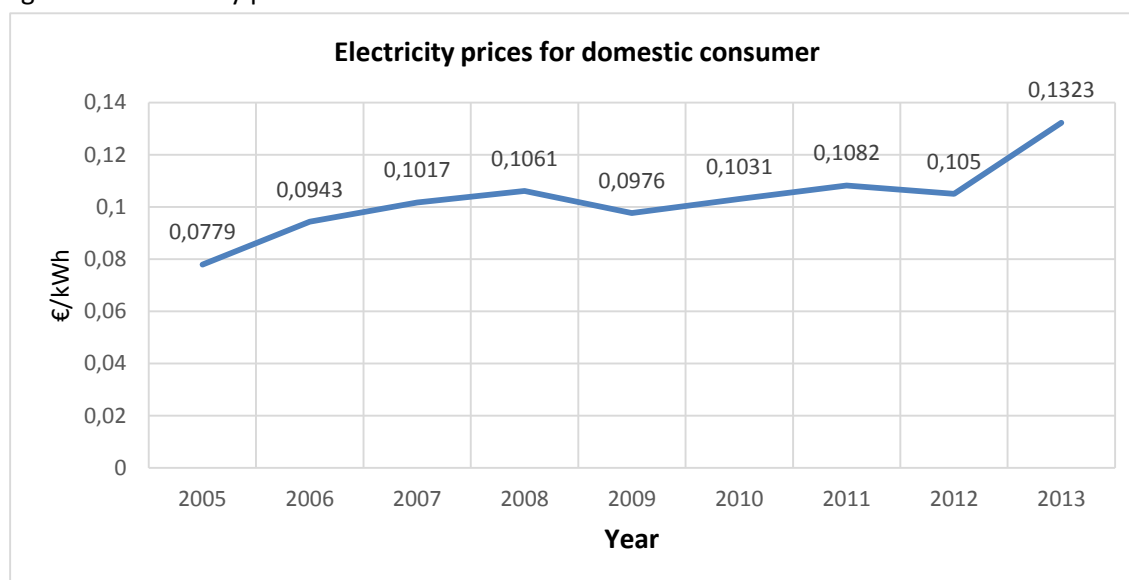
Figure 26: Electricity consumption per dwelling



Source: Odyssee database

Romania has comparatively low electricity prices (without PPP correction) with 0.1323 € / kWh electricity used in 2013 illustrated in figure 27.

Figure 27: Electricity prices



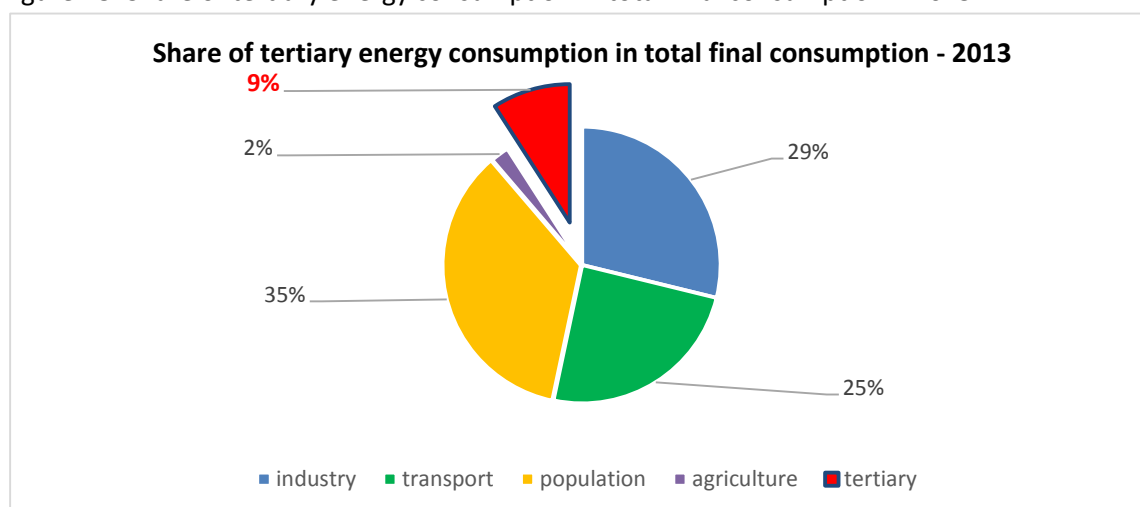
Source: EuroSTAT database

During the last years, electricity prices have increased in Romania from an average price of 0.1050 €/kWh electricity used in 2012 the price increased to 0.1323 €/kWh electricity used in 2013. This means an increase of 26% during one year. In the same period the household final electricity consumption remained approximately constant. The influence of the price of the electricity consumption is, however, not that large since the electricity demand is generally quite inelastic.

B. Tertiary sector

In 2013 the energy consumption in the tertiary sector accounted for 9% in final energy consumption of Romania – Figure 28 with an increase of 1% compared to 2008 – Figure 30.

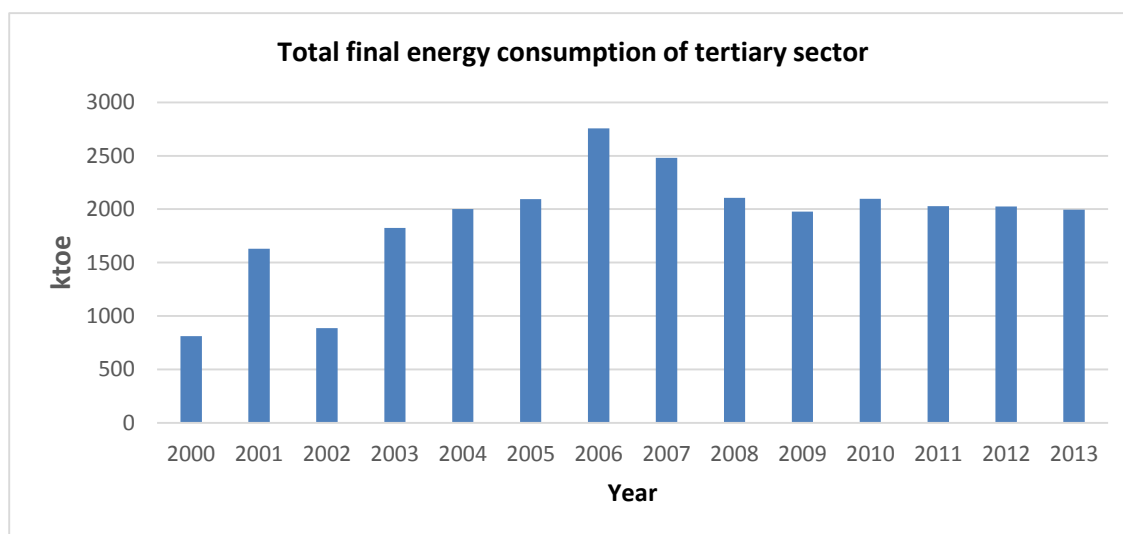
Figure 28: Share of tertiary energy consumption in total final consumption – 2013



Source: Romanian Statistical Yearbook

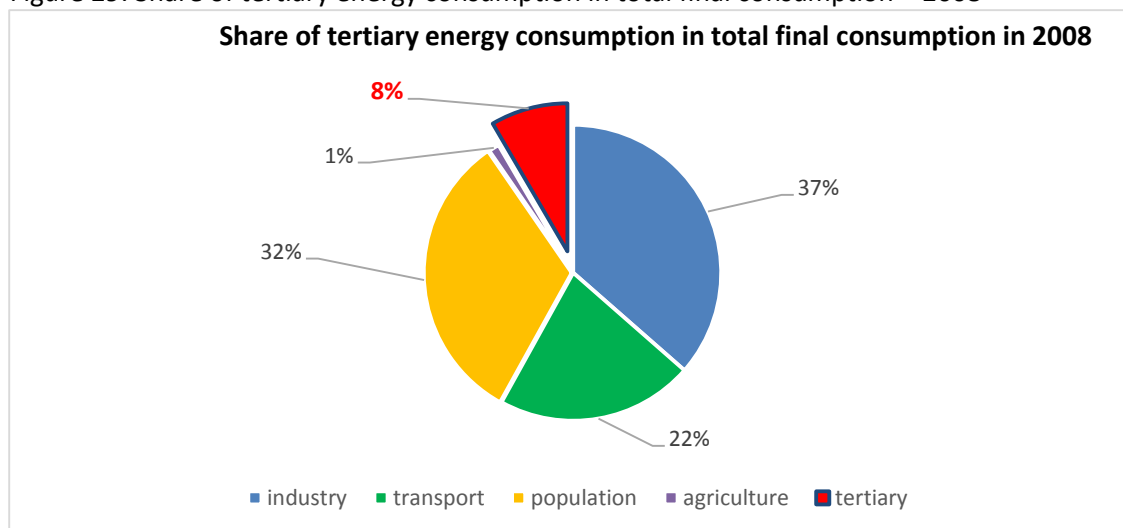
During 2000-2013, the final energy consumption of this sector has increased with 11.2%/year, recording a maximum value 2757 ktoe in 2006 - Figure 29.

Figure 29: Total final energy consumption of tertiary sector



Source: Romanian Statistical Yearbook

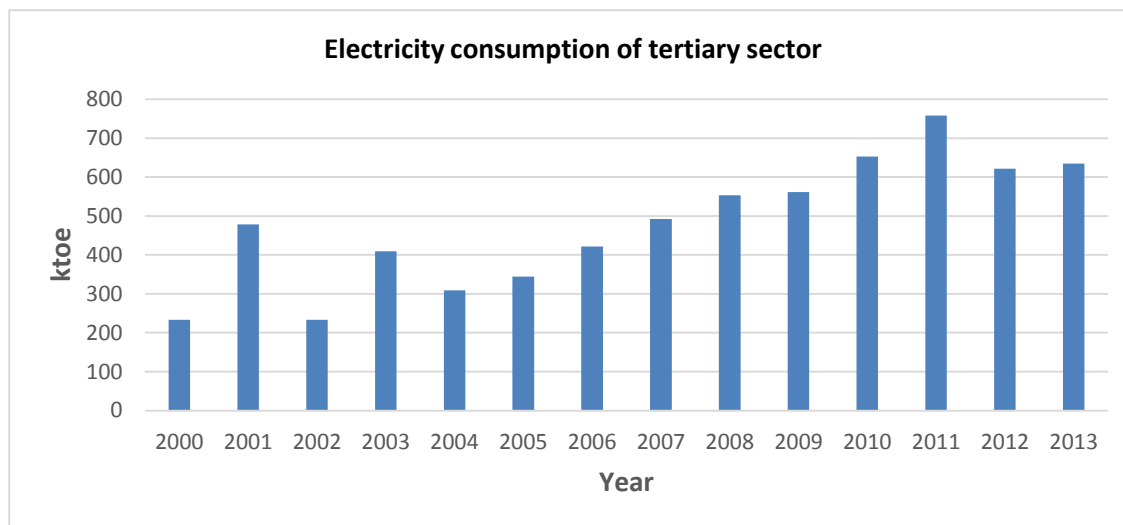
Figure 29: Share of tertiary energy consumption in total final consumption – 2008



Source: Romanian Statistical Yearbook

During 2000-2013, due to the development of this sectors at the national level electricity consumption of the sector, it was registered an increasing trend with 13.25%/year (from 233 ktoe in 2000 to 634.3 ktoe in 2013) – Figure 31.

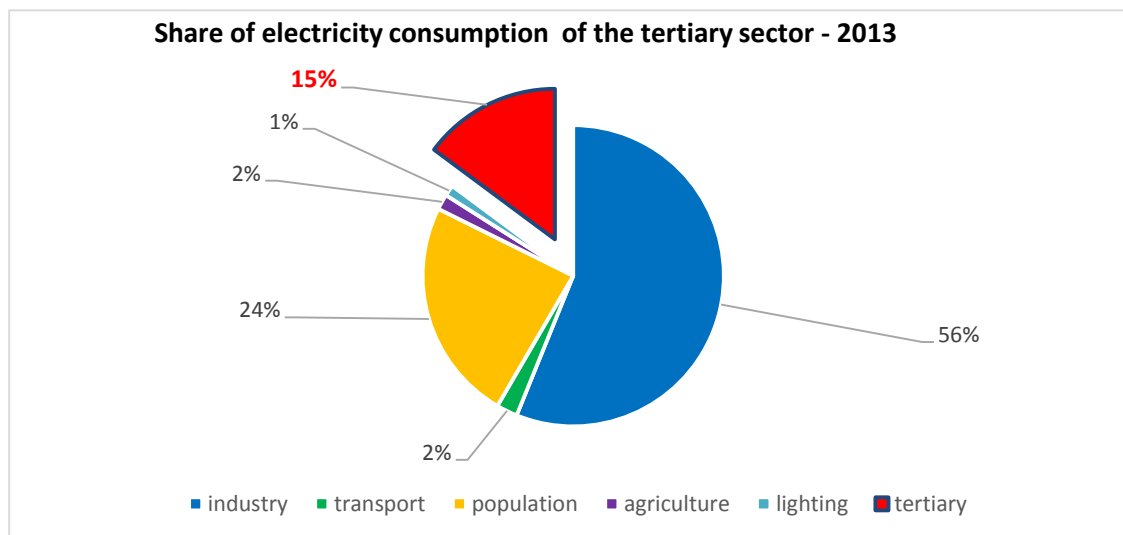
Figure 31: Electricity consumption of tertiary sector



Source: Odyssee database

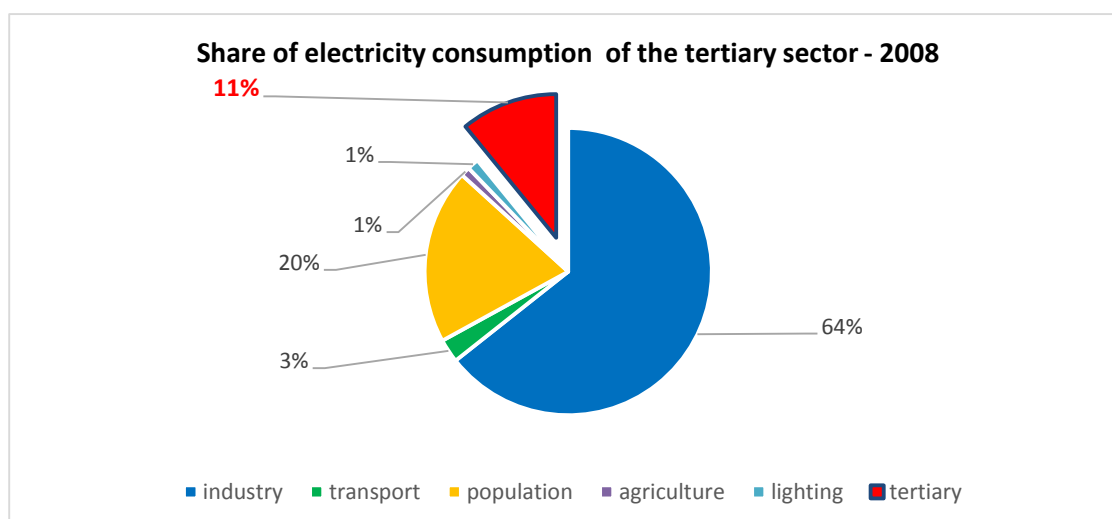
Following the industry and the household sectors the tertiary sector is the third largest consumer of electricity in Romania. The share of its consumption within total energy consumption of Romania accounted for 15% in 2013 and an increase with 7.3 %/year since 2008 (from 11%) – Figure 32 and Figure 33.

Figure 32: Share of electricity consumption of tertiary sector - 2013



Source: Romanian Statistical Yearbook

Figure 33: Share of electricity consumption of tertiary sector - 2008



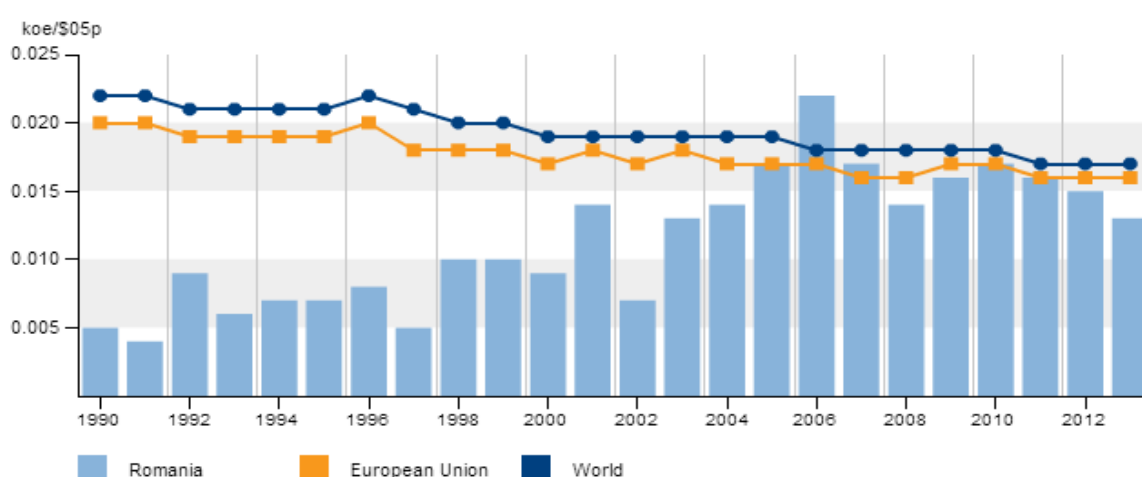
Source: Romanian Statistical Yearbook

In the public sector, there are limited financial resources for investing in the energy efficiency and measures foreseen by the legislation. The action plans cannot be implemented due to the lack of budgets. In this sector, some financial programmes are available which include tax reductions as well as financial support for the renovation of multi-family buildings.

Evolution of energy intensity of service sector during the crisis and economic recovery do not allow conclusions to be firmly drawn regarding increasing energy efficiency in accordance with the third National Action Plan for Energy Efficiency.

According to WEC database, after 2008 the average energy intensity of the service sector for the 27 Member States of the European Union (EU) is higher than the values for the service sector in Romania if the energy intensity (added to value) is calculated adjusted to economic structure of the EU in toe/\$05P value of this indicator - Figure 33.

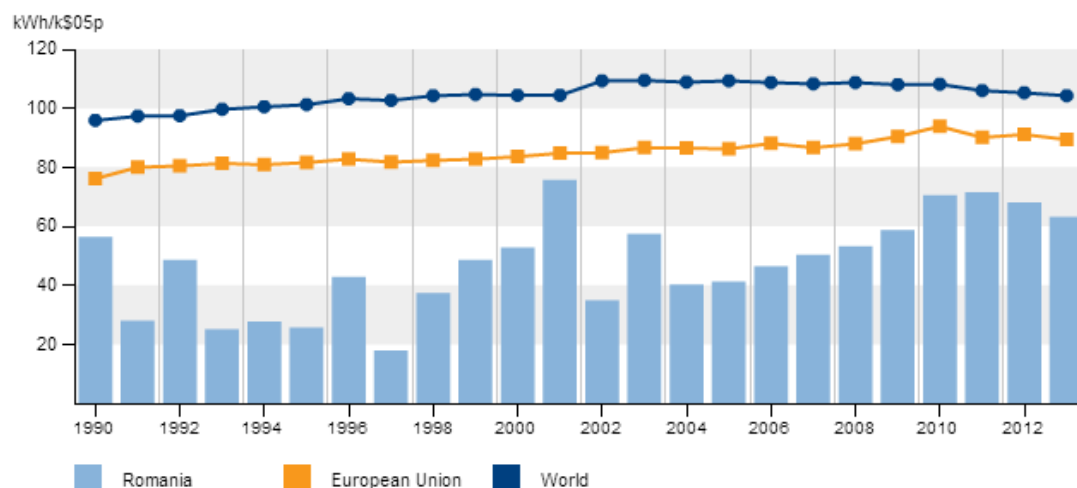
Figure 34: Energy intensity of service sector (to value added)



Source: WEC database

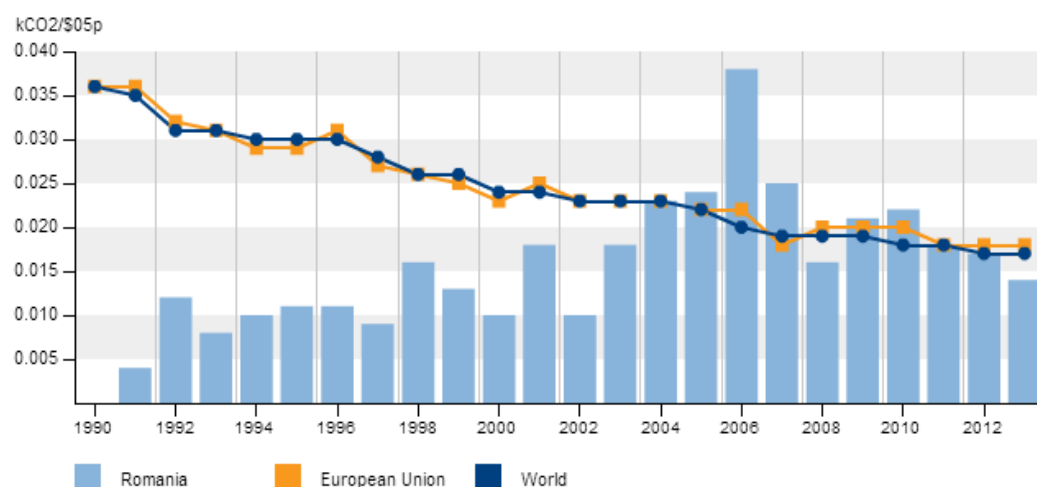
More, after 1990 the average electricity intensity of the service sector for the 27 Member States of the European Union is higher than the values for the service sector in Romania if the electricity intensity (added to value) is calculated adjusted to economic structure of the EU in toe/\$05P value of this indicator - Figure 35.

Figure 35: Electricity intensity of service sector (to value added)



Source: WEC database

Figure 36: CO₂ intensity of service sector (to value added)



Source: WEC database

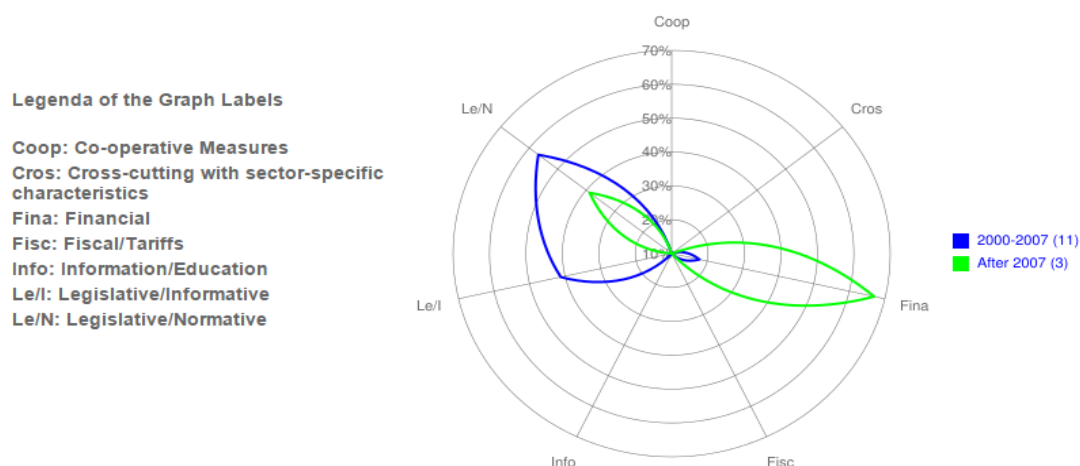
Both energy and CO₂ intensity of service sector has decreased during 2000-2013. These are the results of the environment requirements and energy efficiency measures implementation since 2000 - Figure 36.

2.2. ENERGY EFFICIENCY POLICIES

A. Households

Since 2000, in the household sector in Romania, legislative/normative measures are by far dominant 57%. After 2007 there are three new ongoing measures: one measure is classified as Legislative - Informative measures, one as Legislative-Normative measures and another one is financial measure. – Figure 37

Figure 37: Energy efficiency measure patterns household sector: development of measure by type over time



Source: MURE database

Based on NEEAP III the Programs and the political measures to achieve the national target are:

P7 – Energy Efficiency in the residential sector

Coordinator: Ministry of Regional Development and Public Administration

Political Measures:

- **Procurement of high performance electrical equipment**
Total energy savings during 2014-2020: 0.462 Mtoe
- **Energy audit and energy management**
Total energy savings during 2014-2020: 0.07 Mtoe

B. Buildings

Based on NEEAP III the Programs and political measures to achieve the national target are:

P4 - Program “Heating 2006-2016 – Warmth and Comfort”

Coordinator: Ministry of Regional Development and Public Administration

Political Measure:

- **Follow-up the Heating 2000-2016 - Warmth and Comfort” Program**
Total Savings: 0.202 Mtoe

P7 - Program Energy Efficiency in the residential sector

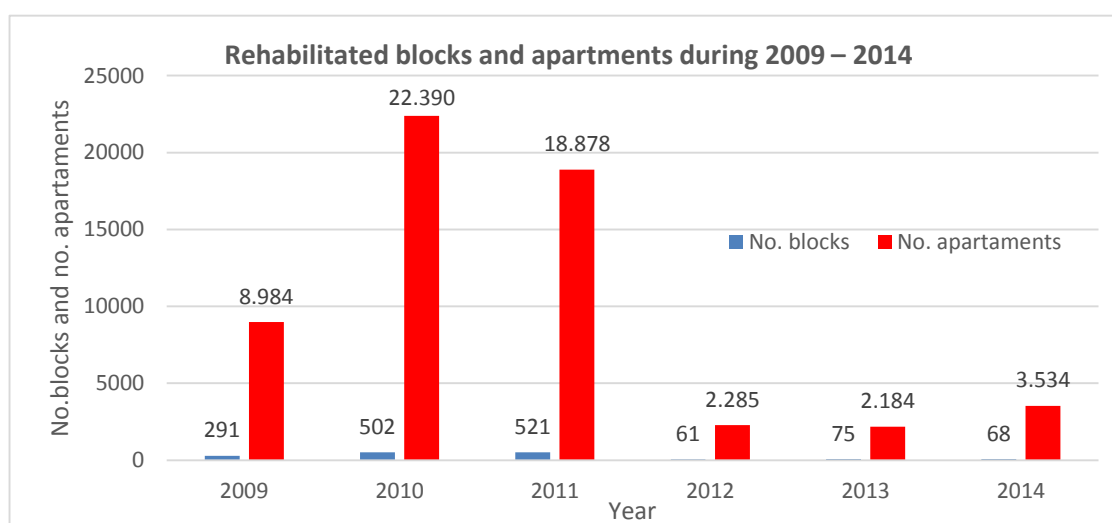
Coordinator: Ministry of Regional Development and Public Administration

Political Measures:

- **Thermal rehabilitation of blocks of flats**
Total Savings: 0.544 Mtoe
- **Thermal rehabilitation of single-family houses**
Total Savings: 0.356 Mtoe

Through the Romanian National Program for increasing the energy efficiency for the blocks of apartments were rehabilitated 1518 blocks of flats during 2009 – 2014 (from a total of around 85.000 blocks) representing 55.293 apartments, in order to obtain the heating annual specific consumption less than 100 kWh/m² - Figure 38.

Figure 38: Rehabilitated blocks and apartments during 2009-2014



Source: The Ministry of Regional Development and Public Administration database

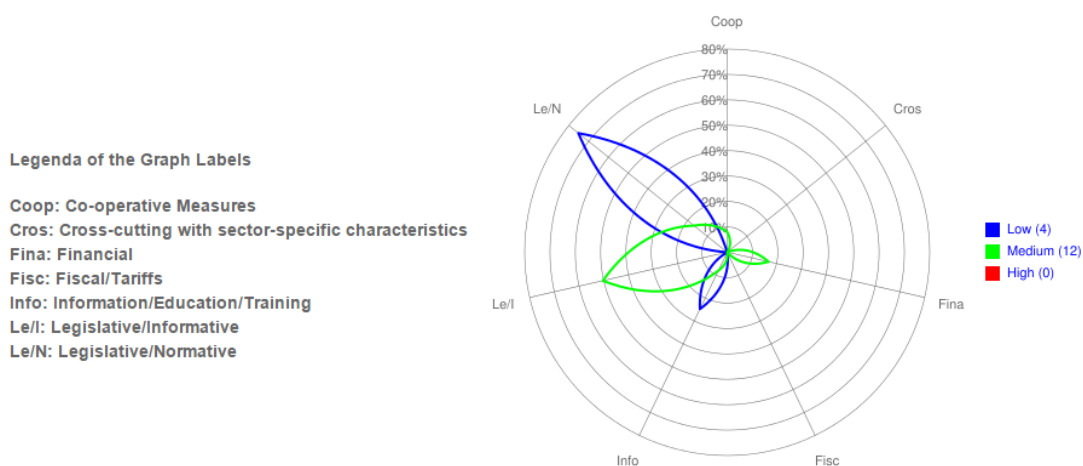
Tertiary sector

After 2000, in the tertiary sector the set of policies and measures is divided in three measure types.

- 33.3% Legislative-Normative,
- 41% Legislative-Informative,
- 1% Financial.

Since 2014, legislative measures with medium impact are dominant-Figure 39

Figure 39: Energy efficiency measure patterns tertiary sector: development of measure by type



Source: MURE database

P8 – Energy efficiency in governmental buildings and public services

Coordinator: Ministry of Regional Development and Public Administration

Political Measures:

- **Thermal rehabilitation of governmental buildings**
Total Savings: 0.023 Mtoe

P9 – Energy efficiency in the services sector

Coordinator: Ministry of Regional Development and Public Administration

- **Thermal rehabilitation of buildings (offices, commercial buildings)**
Total Savings: 0.209 Mtoe

In the public sector, there are limited financial resources for investing in energy efficiency and measures foreseen the legislation and action plans can not be implemented due to lack of budgets. In the residential sector, some financial programmes are available which include tax reductions as well as financial support for the renovation of multi-family buildings.

3. ENERGY EFFICIENCY IN TRANSPORT

3.1. ENERGY EFFICIENCY TRENDS

The transport sector is considered to have the most important policy shortcomings throughout the European Union.

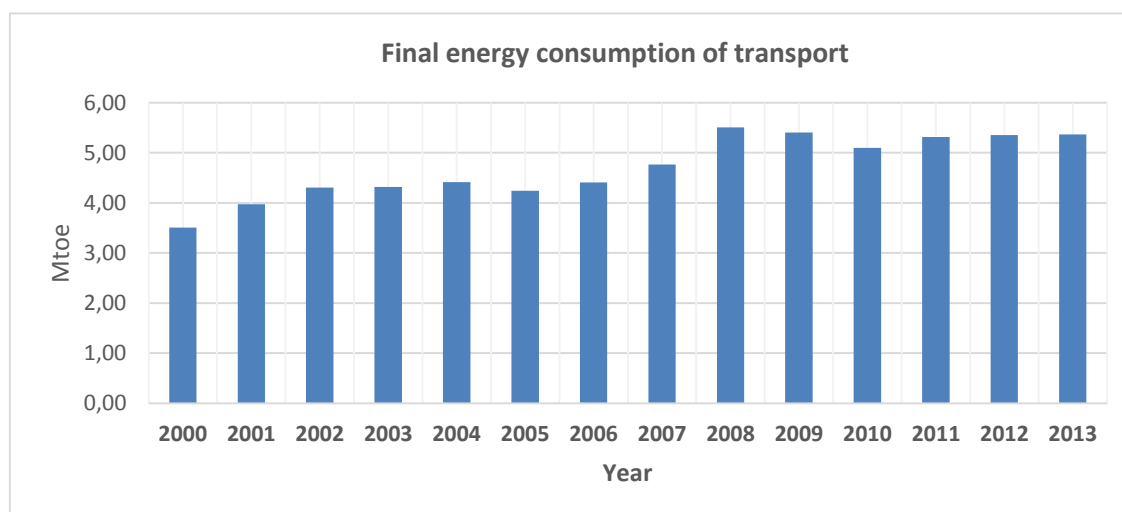
The evolutions in the transport sector in Romania after 2000 have been influenced by two factors:

- elimination of administrative restrictions against fuel procurement (acquisition) and acquisition of means of transport;
- aligning of fuel prices with the prices on the international market.

In 2013, final energy consumption in transport was 5.36 Mtoe means 25% of the final energy consumption of Romania.

During 2000-2013 the energy consumption has been increasing with 52.7% means 4.1%/ year.

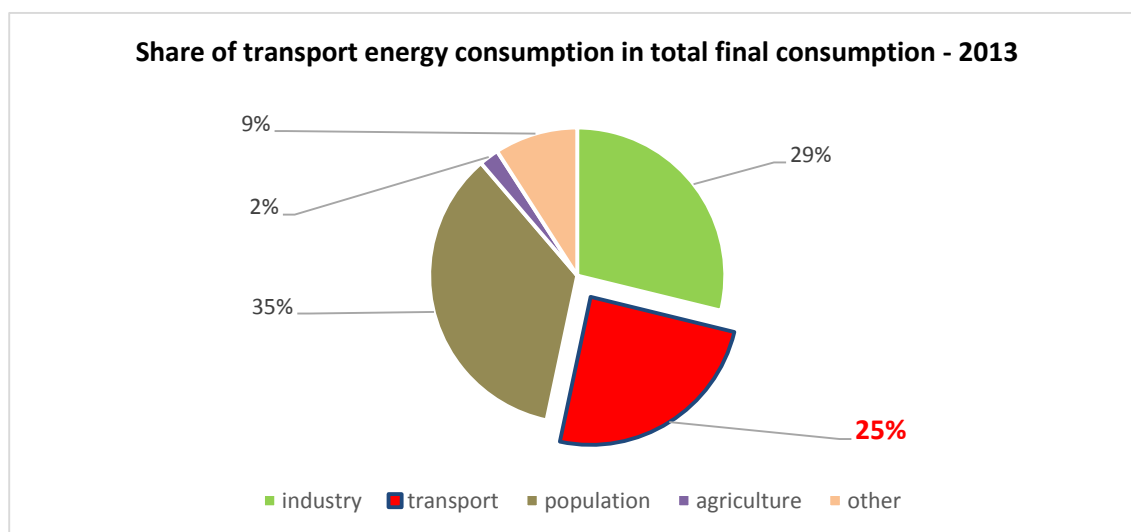
Figure 40: Final energy consumption of transport sector



Source: Romanian Statistical Yearbook

The Figure 41 illustrates the share of the transport energy consumption in the total final consumption of Romania in 2013 which is 25%. The final consumption of the transport sectors has decreased during 2008-2010 with 7.6% because of the economic crisis in 2009 and the increase in the fuel price dramatically reduced the freight transport and especially, the road transport.

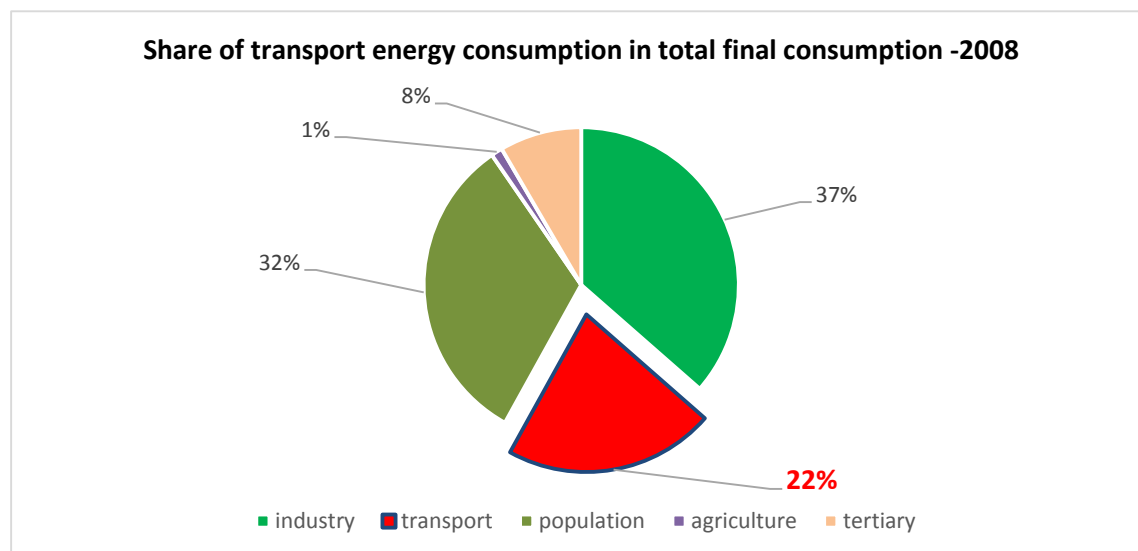
Figure 41: Share of transport energy consumption in total energy consumption - 2013



Source: Odyssee database

During the 2008-2013 final energy consumption has decreasing slowly with -0.54%/year - Figure 40. Compared to 2008 the share in total final consumption increased with 3% - Figures 41 and 42.

Figure 41: Share of transport energy consumption in total final consumption -2008



Source: Odyssee database

The modifications that have occurred in the structure of freight and passenger traffic have brought about changes in the structure of energy consumption by types of transport. The evolution of freight traffic is given in Figure 43.

Figure 43: Freight traffic

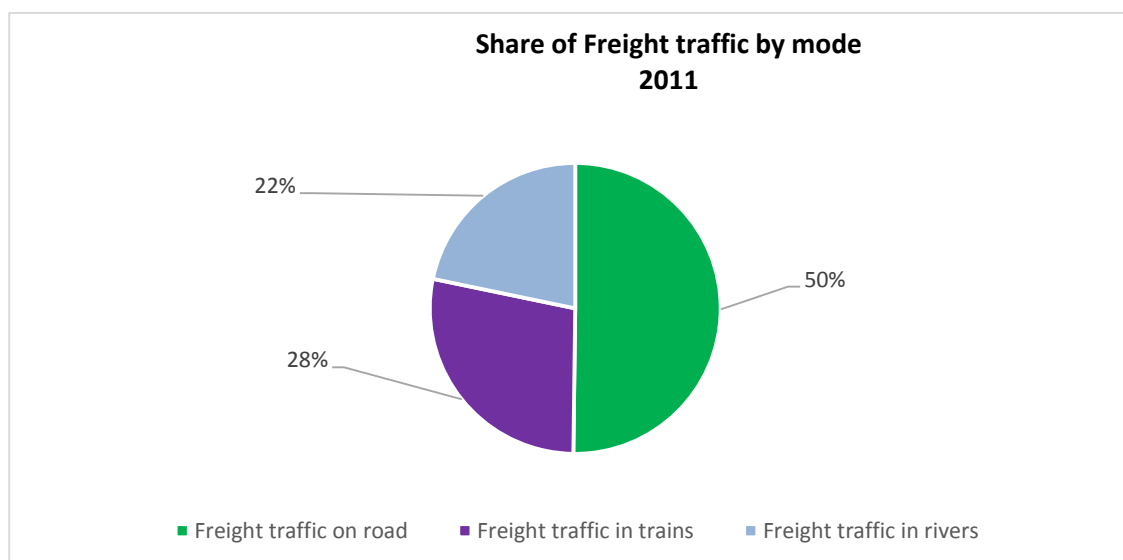


Source: Odyssee database

Romania's connection to the international markets and economic development after 2000 has determined an important increase in the freight transport. The value of this indicator was 1.98 times greater in 2007 than in 1992. The structure has also greatly changed and, unfortunately, this modification did not help for the benefit of the energy efficiency and the sustainable development.

The economic crisis of 2009-2010 and the increase in the fuel price dramatically reduced the freight transport, and especially, the road transport. The road freight traffic has increased with 84.4% during 2000-2011.

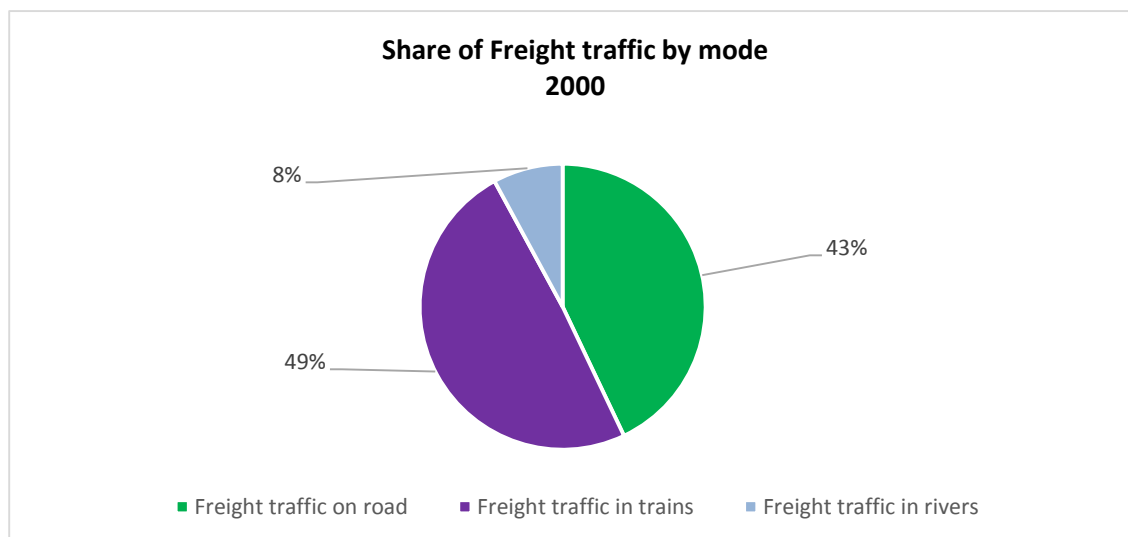
Figure 44: Share of Freight traffic by mode 2011



Source: Odyssee database

During 2000-2011 the share of freight traffic on road has increased with 7%, from 43 % to 50%. The share of the freight traffic in trains in total traffic has decreased with 21% and for traffic on rivers the share has increased with 14%, from 8% to 22%. – Figures 44 and 45

Figure 45: Share of Freight traffic by mode 2000

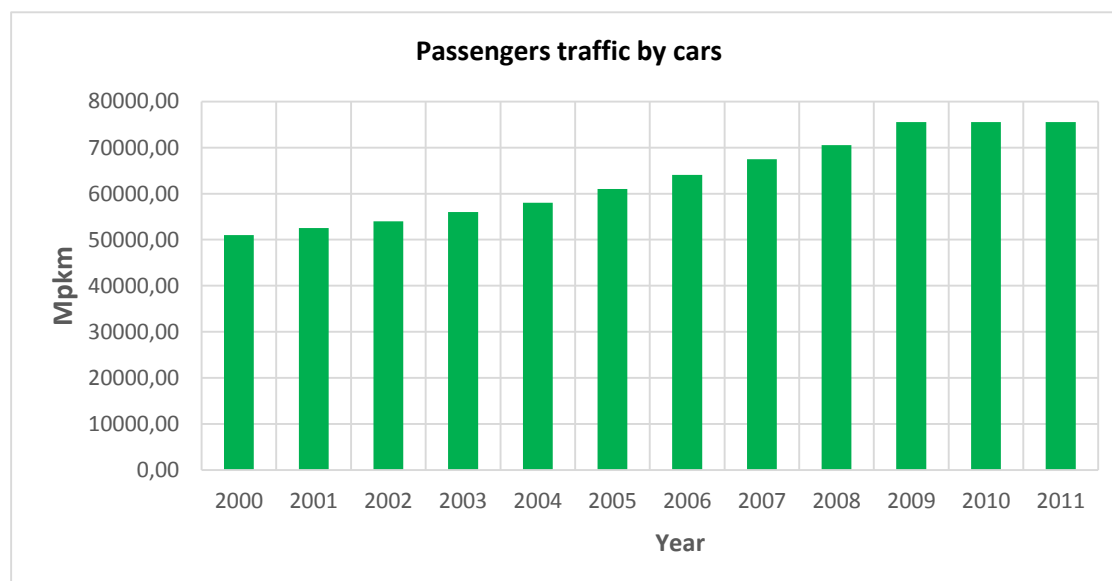


Source: Odyssee database

The evolution of passenger transport by means of the main transport means (cars, train and buses) is presented in Figures 46, 47 and 48, respectively.

On the background of a general increase in the citizen mobility, passenger transport by cars has increased with 4.37%/year in 2011 compared to 2000.

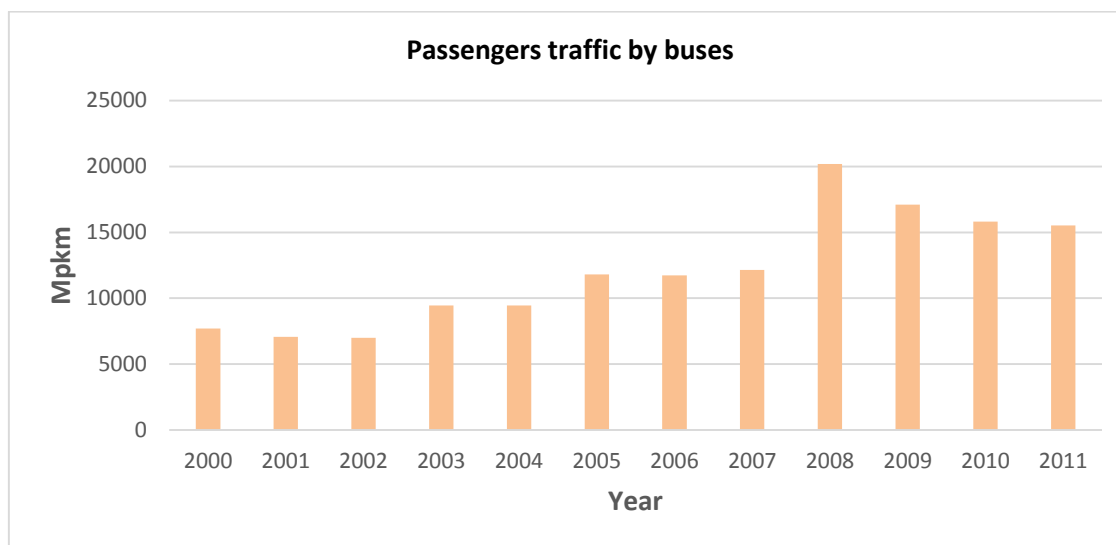
Figure 46: Passengers traffic by cars



Source: Odyssee database

The number of cars acquired by the population increased, the road condition improved. The traffic in buses registered recorded an increasing trend after 2000 with 9.2%/year as a result of the private sector development and permanent improvement in the quality /price ratio. The maximum value has been recorded in 2008 and had a value of 20184 Mpkm- Figure 47.

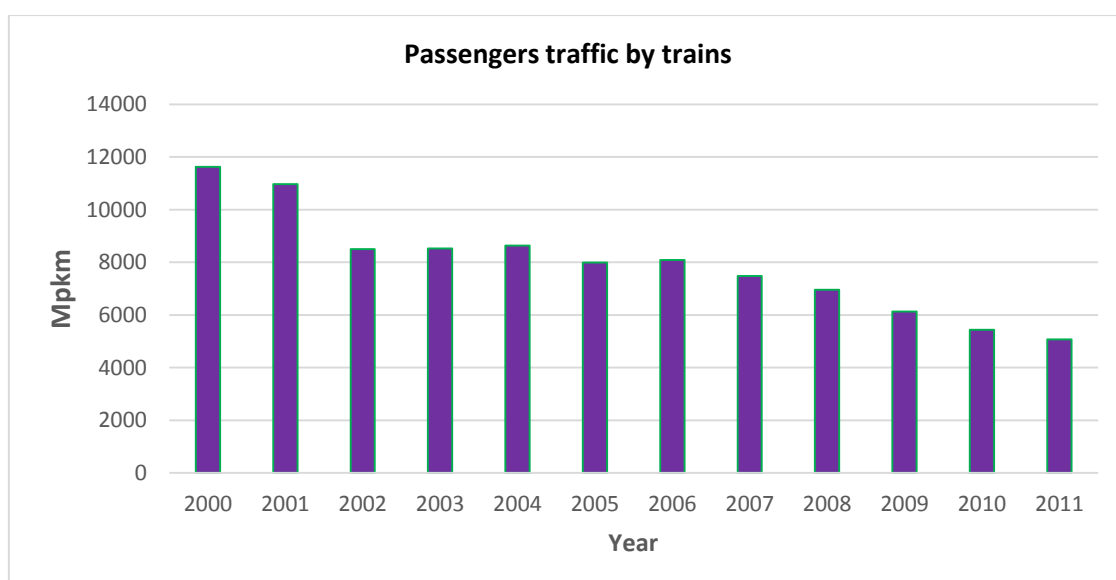
Figure 47: Passengers traffic by buses



Source: Odyssee database

The great loser in this competition is the railway transport which has considerably diminished its activity, both in absolute value with 5.13%/year and as a share in the total activity- Figure 48.

Figure 48: Passengers traffic by trains



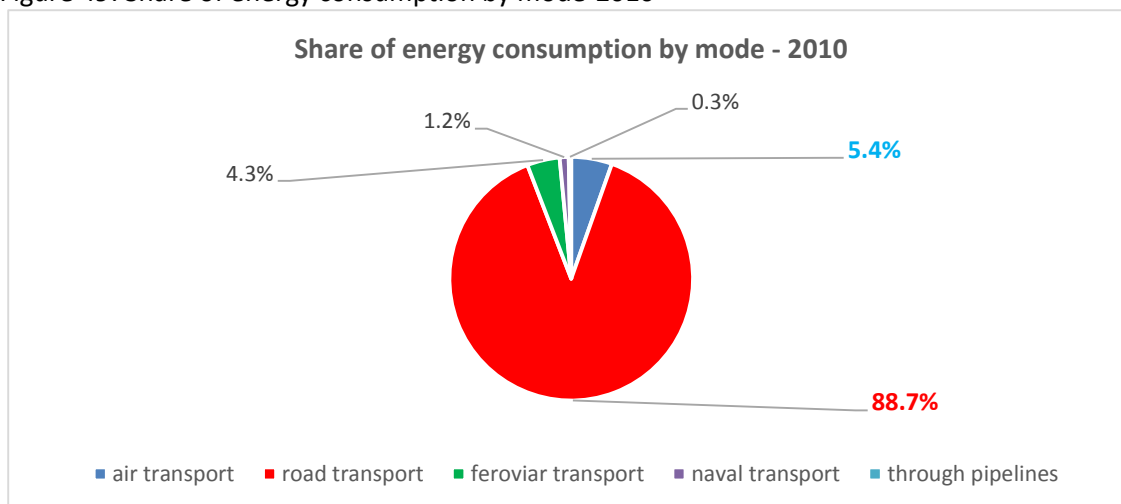
Source: Odyssee database

In 2013 energy consumption in the road transport accounts for 90.2% of total consumption and the related railway, about 4.8% in 2013- Figure 50.

Compared with 2000 the share of the energy consumption in the road transport has increased with 1.5% because number of vehicles per capita has increased – Figures 49 and 50.

However compared with the other Member States of the European Union, as the number of vehicles per capita is lower energy consumption in road transport it is less intense because it uses public transport. The downward trend recorded over the last few years has been followed by an increase in the energy consumption, mainly due to the recovery of the economic activity and the growth in freight volume.

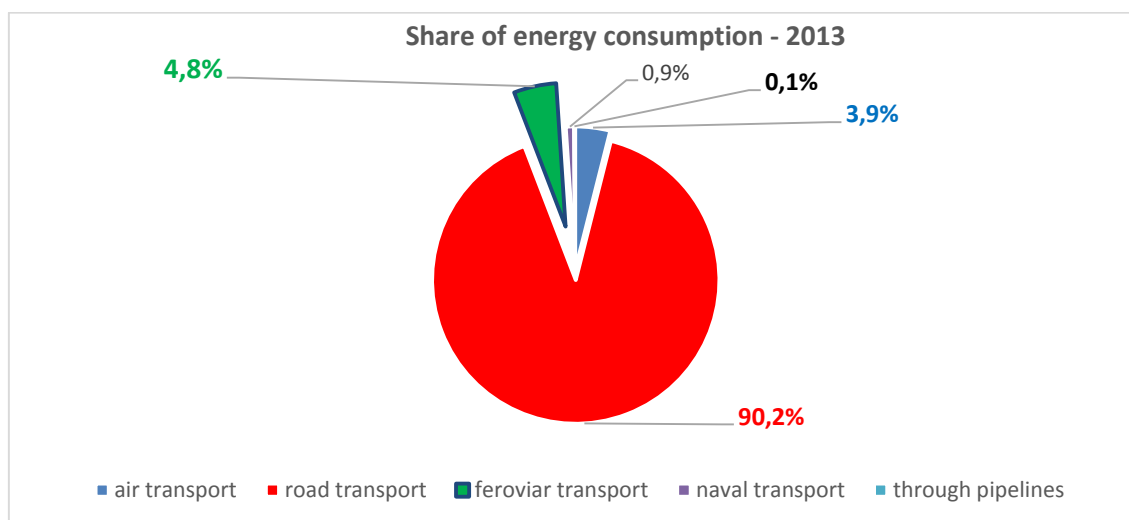
Figure 49: Share of energy consumption by mode-2010



Source: Romanian Statistical Yearbook

During 2010-2013 the share of the road transport energy consumption has increased with 0.56%/year and the share of the air transport energy consumption has decreased with 9.1%/year.

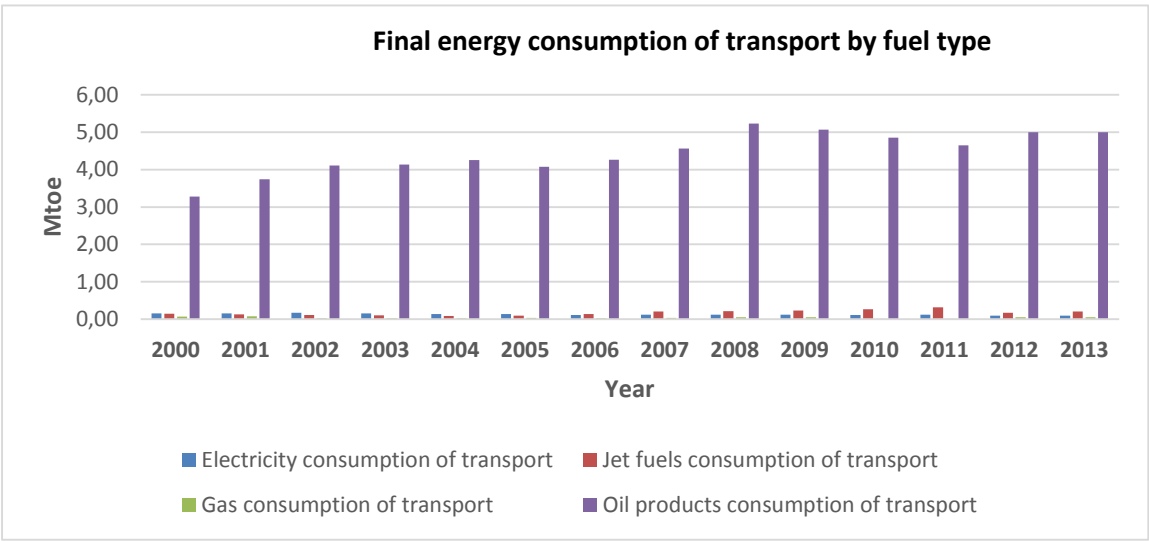
Figure 50: Share of energy consumption in transport - 2013



Source: Romanian Statistical Yearbook

The evolution of the final energy consumption by energy forms in the transport sector is given in Figure 51. The oil products are the major fuel type for this sector.

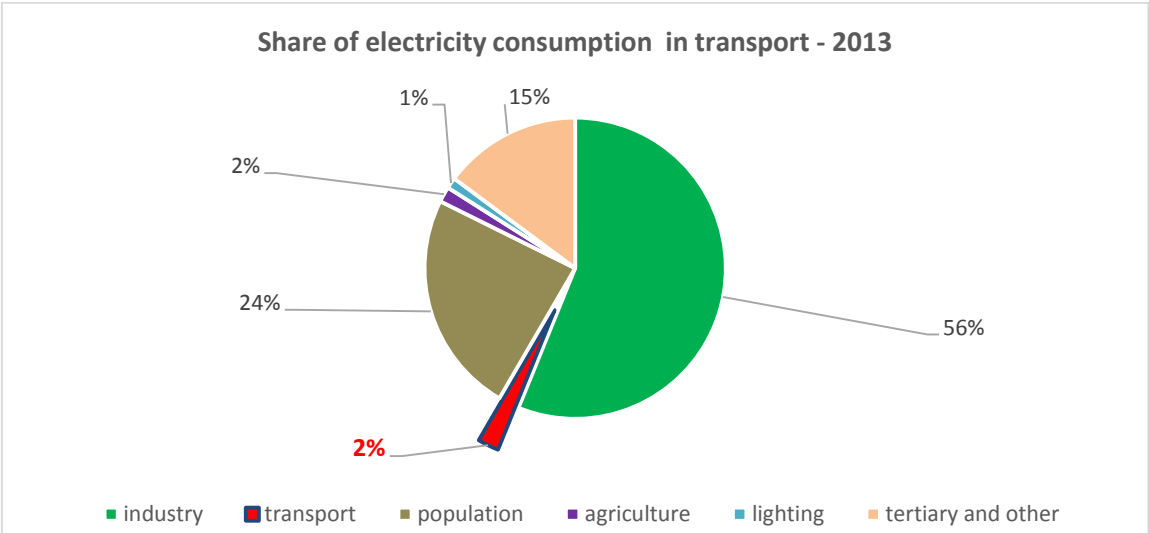
Figure 51: Final energy consumption of transport by fuel type



Source: Odyssee database

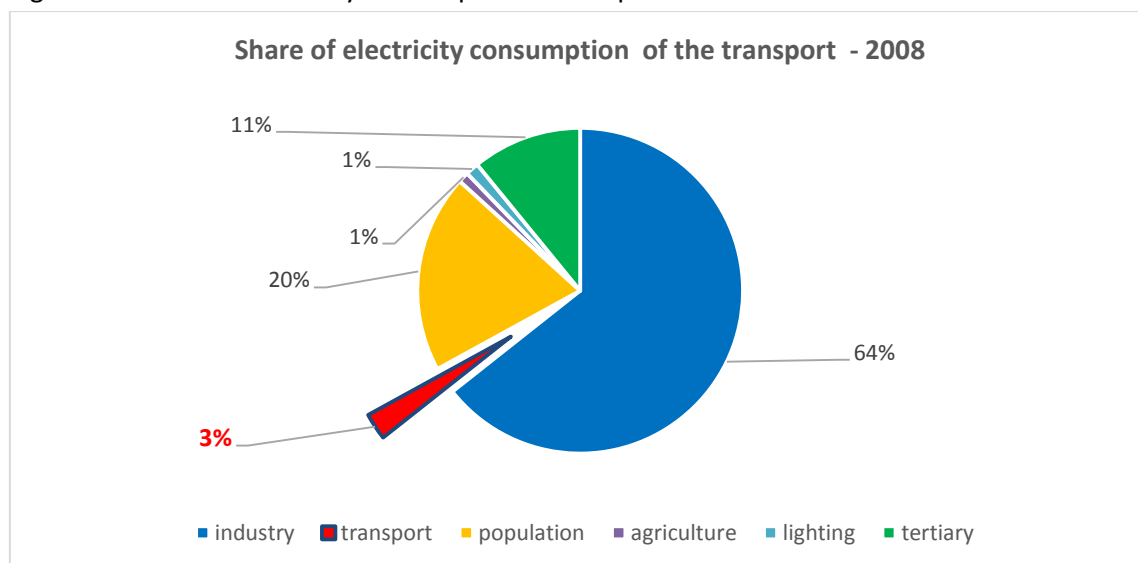
During 2008-2013 the great loser is the railway transport which has considerably diminished its activity, both in the absolute value and the share in the total activity. This is the cause of energy consumption diminish with 19.6% and the share of electricity consumption with 1%. Figures 52 and 53.

Figure 52: Share of electricity consumption in transport-2013



Source: Romanian Statistical Yearbook

Figure 53: Share of electricity consumption in transport-2008

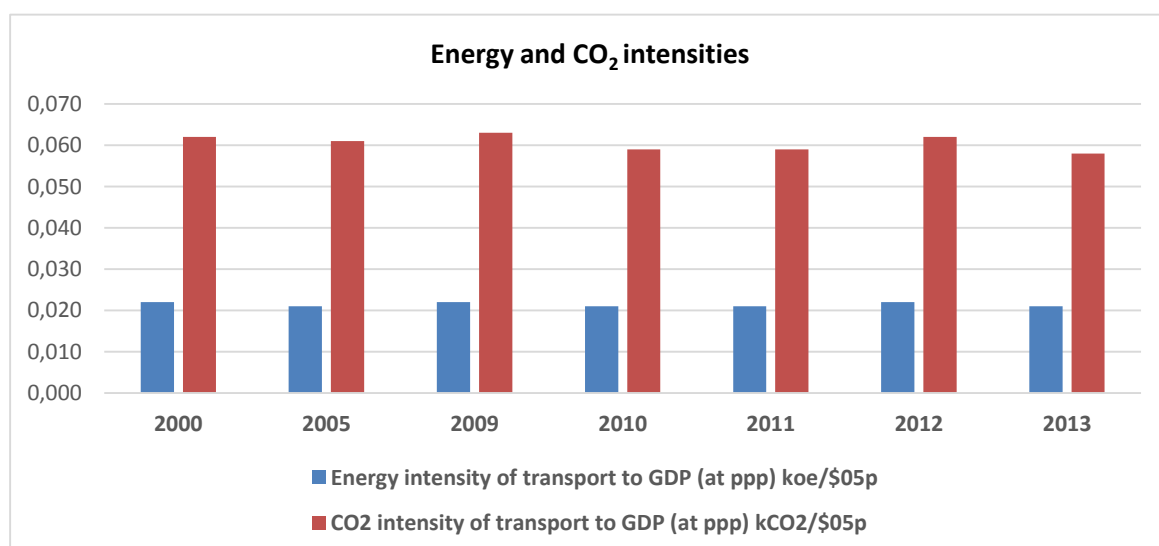


Source: Romanian Statistical Yearbook

The uptrend during 2012-2013 of electricity and renewable consumption and downtrend of gas consumption are due decreasing of freight and passenger traffic by train on the one hand and on the other hand replacing the Diesel locomotives with Diesel electric or Diesel locomotives motorcar. Taking into account the fact that electric motors are easier to maintain and operate, we understand why Diesel traction increasingly losing ground more, leaving free field of action of electric traction.

Compared with the European and the world average levels, the energy intensity to GDP and CO₂ emission per capita of transport sector in Romania is lower, during 2000-2013 - Figures 54- 56.

Figure 54: Energy and CO₂ intensities

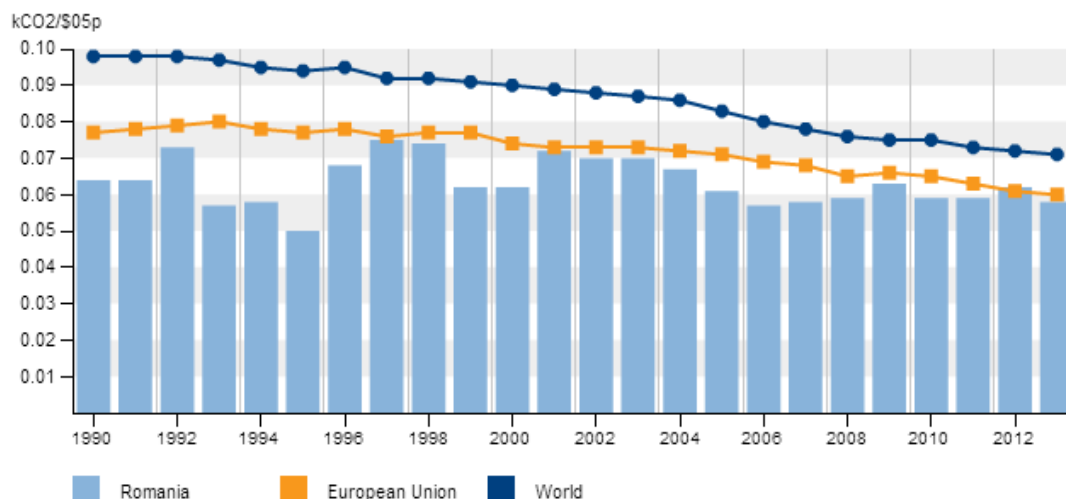


Source: Odyssee database

Energy and CO₂ intensities had a smooth and steady downtrend during 2000-2013 Figure 54.

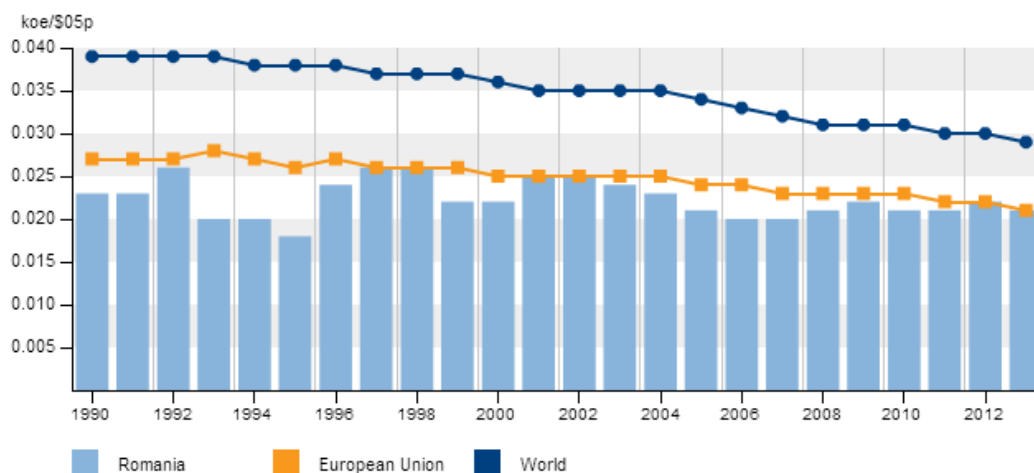
Both the energy and CO₂ intensities of transport to GDP has decreased with 0.35%/year and 0.49%/year. These values are lower than the European average. These are the results of the environment requirements and the energy efficiency measures implementation- Figures 54 and 55.

Figure 55: CO₂ intensity of transport to GDP



Source: WEC database

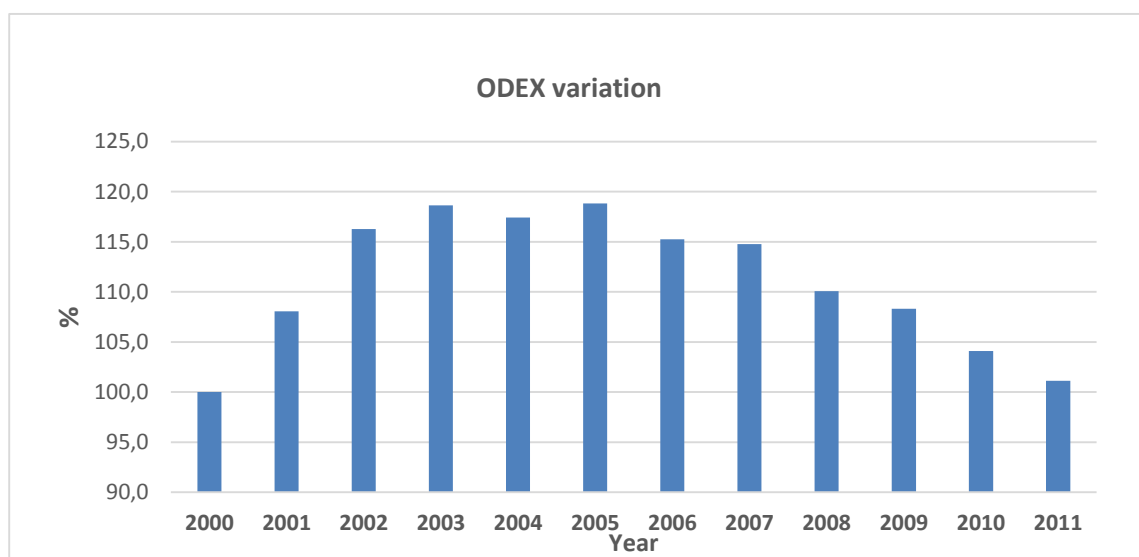
Figure 56: Energy intensity of transport to GDP



Source: WEC database

The transport sector is in a less favourable situation regarding the energy efficiency. In comparison with the basic year 2000 (100 %), in 2011 the ODEX indicator value was 101 %, after being 108% in 2005. The descending trend registered in the last years is, nevertheless, promising- Figure 57.

Figure 57: ODEX variation



Source: Odyssee database

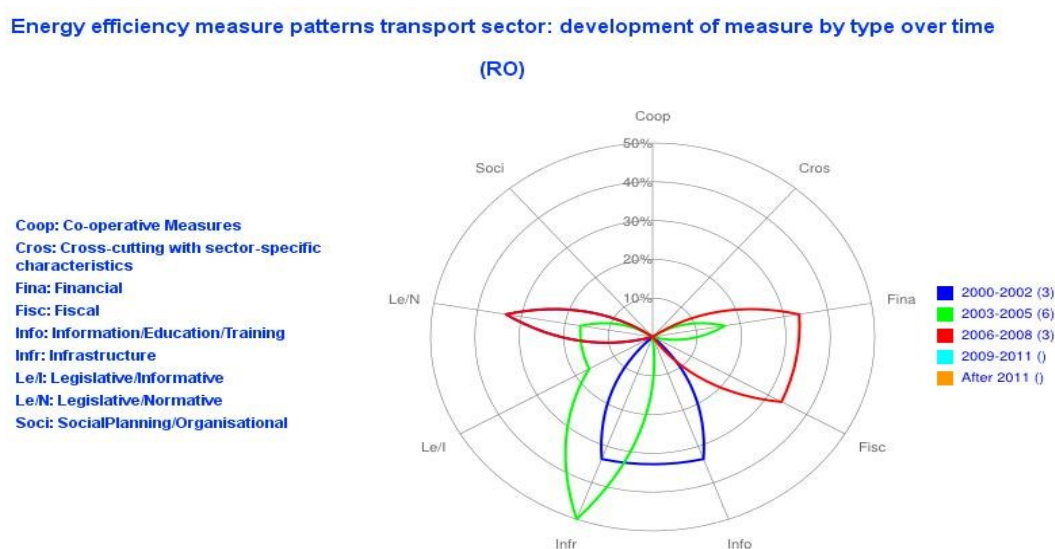
In the road transport, the continued modernization of the fleet of vehicles using vehicles with engines performance and lower emissions of CO₂ and CO, expanding the use of alternative fuels, especially for local transport (buses, taxis), increasing the quality of the road transport infrastructure by European and national road rehabilitation and expansion of the use of tachographs and speed limiters to vehicles will lead to an increased consumption of energy carriers in road and rail transport.

3.2. ENERGY EFFICIENCY POLICIES

After 2000, in the transport sector we can see that the emphasis in MURE database is on the distribution of information; 33% of measures are classified as Information-Education measures and another 8% are Legislative-Informative measures- Figure 58.

In the 2000-2008 periods, the predominant measures were Legislative-Normative and Infrastructure, with medium impact and Infrastructure measures with high impact. After 2009 there are four new measures.

Figure 58: Energy efficiency measure patterns transport sector



Source: MURE database

RO3 Pollution tax for motor vehicles

According to the Romanian legislation entered into force in February 2009, cars pertaining to the EURO 4 category and with a cylinder capacity of less or equal to 2.000 cmc are exempt from pollution tax in Romania if registered for the first time anywhere within the EU during the period from December 15, 2008 to December 31, 2009.

RO6 Promotion of Biofuels or other Renewable Fuels for Transport

According to Government Decision No 1844/2005 (which fully transposes the provisions of Directive 2003/30/EC) regarding the promotion of biofuels and other renewable fuels for use in transport, a minimum of 5.75% of biofuels or other renewable fuels should be in use by 2010. This will be calculated on the basis of the energy content of all types of petrol and diesel used in transport.

According to Ordinance no. 44/2006 regarding the modification of Emergency Government Ordinance No 25/2006, agricultural producers have been accorded 1.00 RON for every litre of diesel acquired / biodiesel produced.

RO7 Program to stimulate the national car park renewal with funding from the National Environment Fund budget

Romanian “Old Cars” Program Allows Loans, Leasing On For Purchases Romanian people who replace their cars through the car park renewal program “Old Cars” will be able to use leasing and lending to finance the purchase, according to an order by the environment minister, which also states that an owner can receive the bonus from the state for each vehicle scrapped.

According to the most recent statistics from the Ministry of Environment in 2008-2010, 251,793 cars were annulled by the "Rabla" and the new cars were bought using vouchers.

In 2011 Romania's government granted 456 million RON through the “Old Cars”; 120,000 cars were discarded and 39,216 new cars were bought using vouchers

For 2012 the program has 15,000 vouchers.

Based on NEEAP III the Programs to achieve the national target and total savings **2014-2020** are:

P10 – Scrapping Schemes

Coordinator: Ministry of Environment, Water and Forests

Political Measure: Car fleet renewal

Total Savings: 0.294 Mtoe

P11 –Energy efficiency in the transport sector

Coordinator: Ministry of transport

Political Measures:

- Extending the subway network in Bucharest
Total Savings: 0.053 Mtoe
- Modernization of the railway transport
Total Savings: 0.114 Mtoe
- Modernization of naval transport
Total Savings: 0.004 Mtoe
- Modernization of air transport
Total Savings: 0.005 Mtoe
- Alternative mobility
Total Savings: 0.445 Mtoe

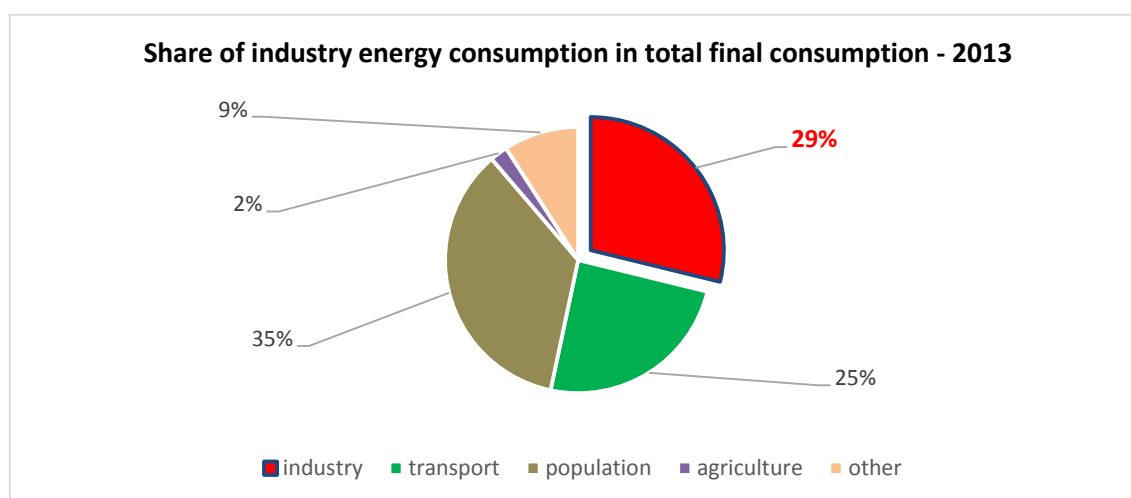
4. ENERGY EFFICIENCY IN INDUSTRY

4.1. ENERGY EFFICIENCY TRENDS

The evolution of the industry after 2000 can be divided into two distinct periods:

- The period 2000-2009 (post transition period) when the state intervention diminished and the evolutions were mainly dictated by the specific market,
- The period 2009-2013 (the after crisis period) when the restructuring and privatization actions prevailed.

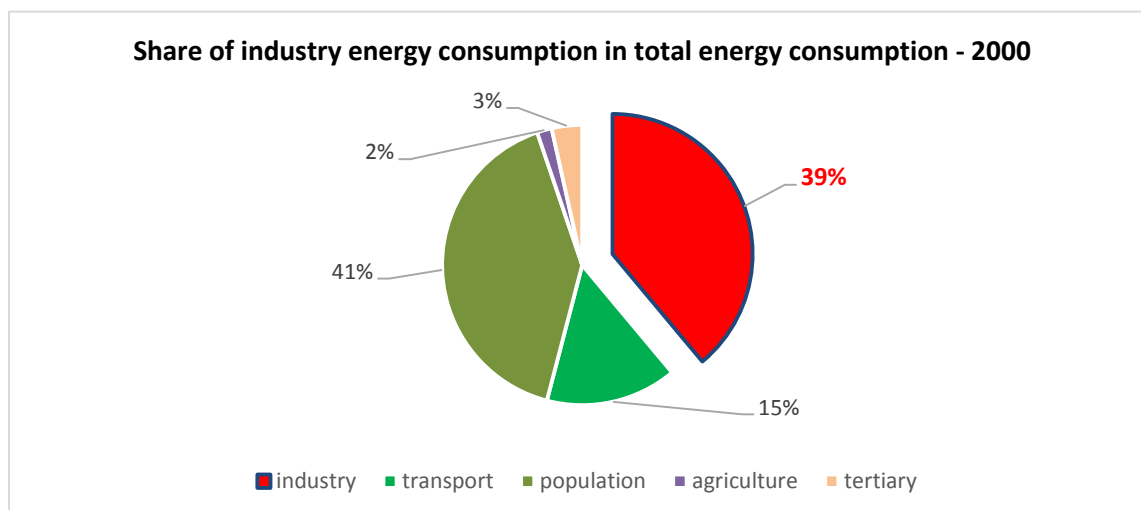
Figure 59: Share of industry energy consumption in total energy consumption - 2013



Source: Romanian Statistical Yearbook

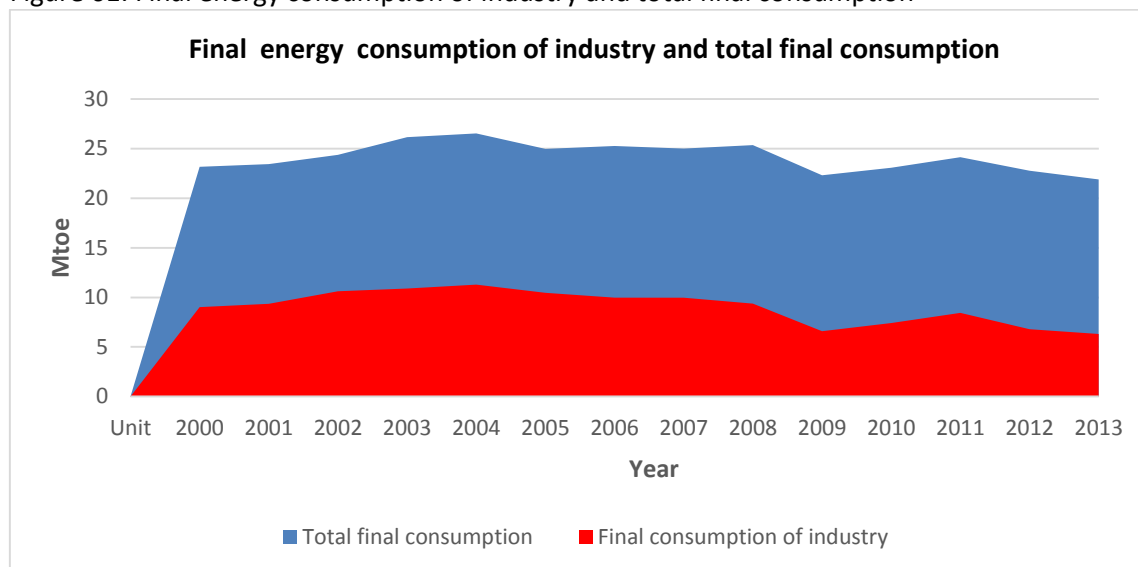
The share of the industry within the national economy has decreased after 2000 with 0.84%/year (from 39.4% in 2000 to 28.8% in 2013)- Figures 59 and 60.

Figure 60: Share of industry energy consumption in total energy consumption – 2000



Source: Odyssee database

Figure 61: Final energy consumption of industry and total final consumption

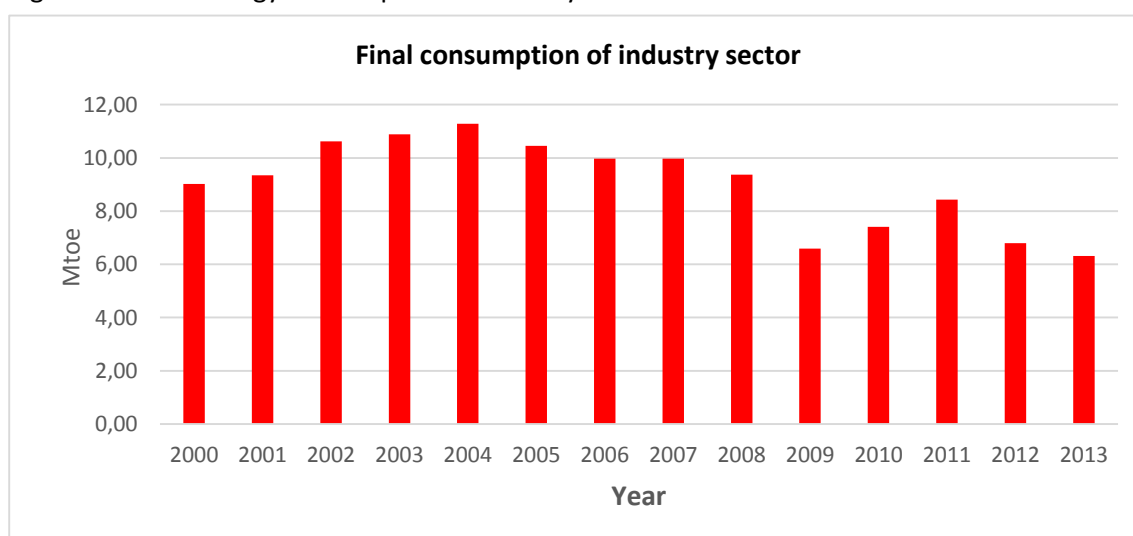


Source: Odyssee database

The structure of the industry underwent modification. The companies from the great energy consumer branches had to overcome great difficulties and many interrupted their activity. The share of the chemical and primary metals industries within the total manufacturing industry decreased from 14.6% in 1992 to 10.6% in 2000 and 6.5% in 2010. The share of the food industry within the total manufacturing industry increased from 22 % in 1992 to 31.5 % in 2000 and decreased to 24.6% in 2010 (nevertheless, it should be mentioned that VAB, the gross added value, in EURO 2000 registered a slow increase). The share of the Metal products, the machinery and the transport equipment decreased from 26% in 1992 to 20.75 in 2000 and increased 36.1% in 2010.

In the period 2000-2013 the energy consumption trend of the industrial sector was a descending one. Its value has declined at a rate of 2.31% /year. The economic crisis of 2009 brought to a sharp decline in the energy consumption by 29.7% - Figure 62.

Figure 62: Final energy consumption of industry sector

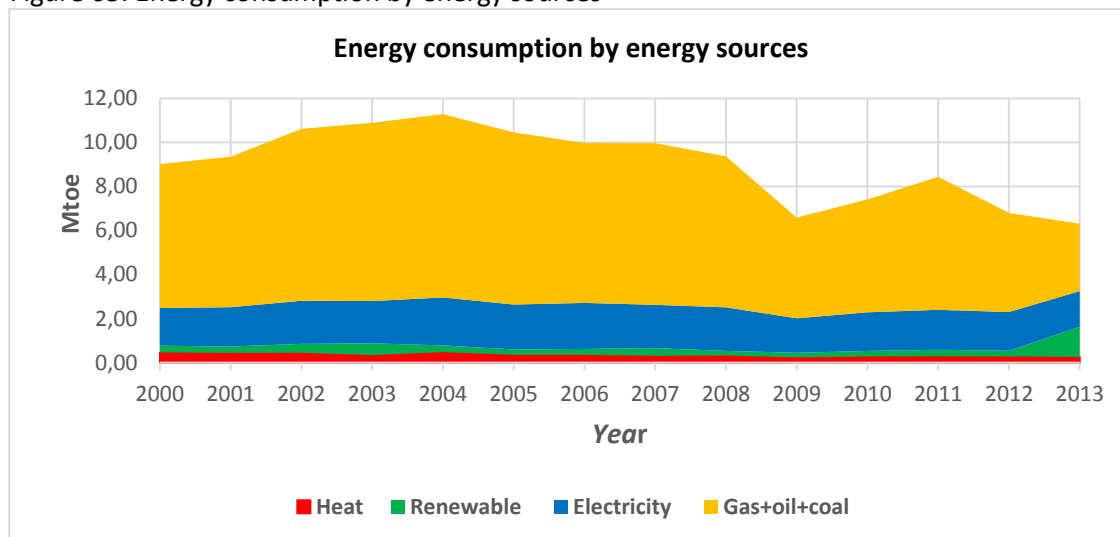


Source: Romanian Statistical Yearbook

The gas consumption has the main weight in the final electricity consumption and it has followed electricity consumption.

During 2000-2012 it is distinguished the constant share of all energy sources and the major share and falling of gas consumption in the final energy consumption. This is due to reduced activity of large consumers of gas in the period of crisis 2008-2009- Figure 63.

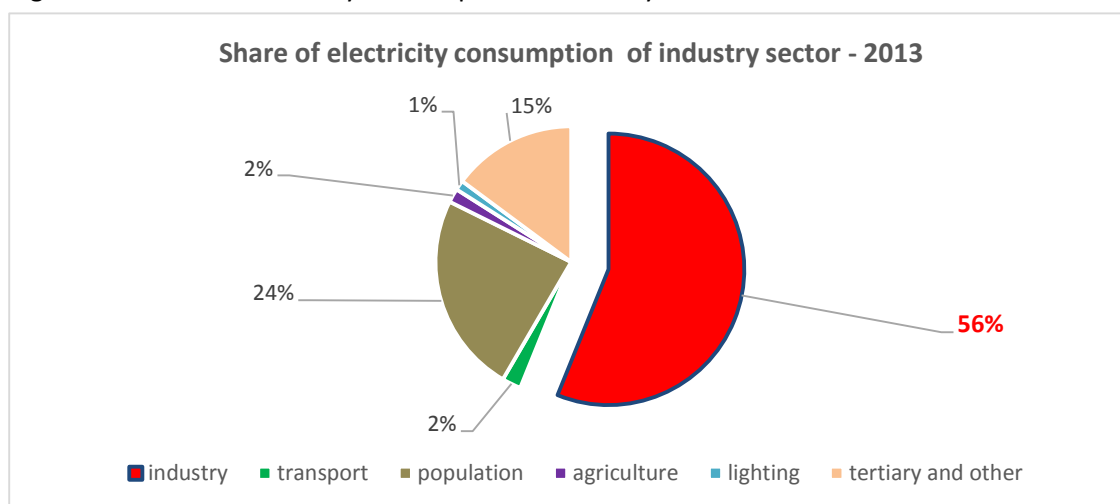
Figure 63: Energy consumption by energy sources



Source: Romanian Statistical Yearbook

At the national level the industry sector is the main consumer of electricity in Romania with a share of 56 % in 2013 - Figure 64.

Figure 64: Share of electricity consumption of industry sector-2013



Source: Romanian Statistical Yearbook

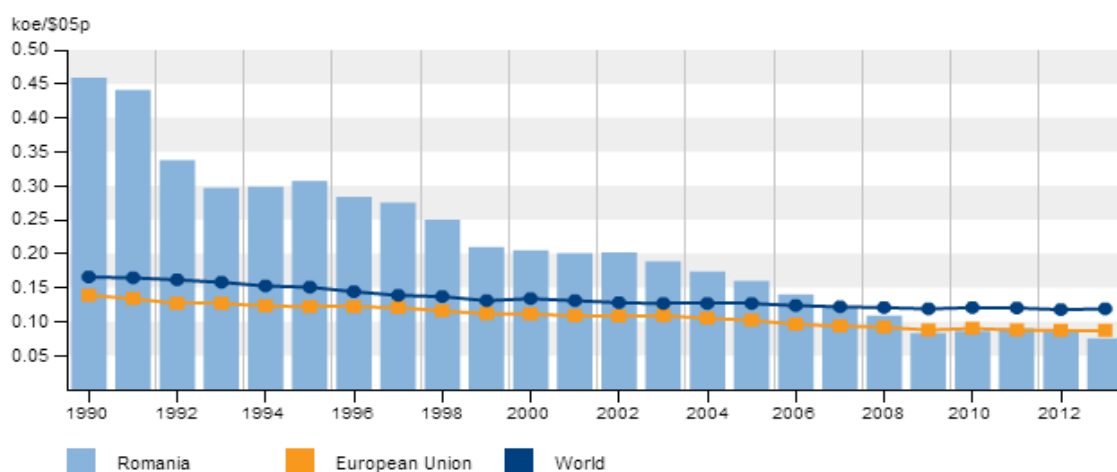
The energy intensity of industry in Romania has decreased during 2000 - 2012 by about 4.8%/year, both due to increased energy efficiency measures and the restructuring that took place during the crisis - Figure 65.

Given that the energy intensity of the Romanian economy is still slightly higher than the EU average, to be further policies and measures for improving energy efficiency, ensuring sustainable development.

Evolution of energy intensity of industry sector during the crisis and economic recovery do not allow conclusions to be firmly drawn regarding increasing energy efficiency in accordance with the third National Action Plan for Energy Efficiency.

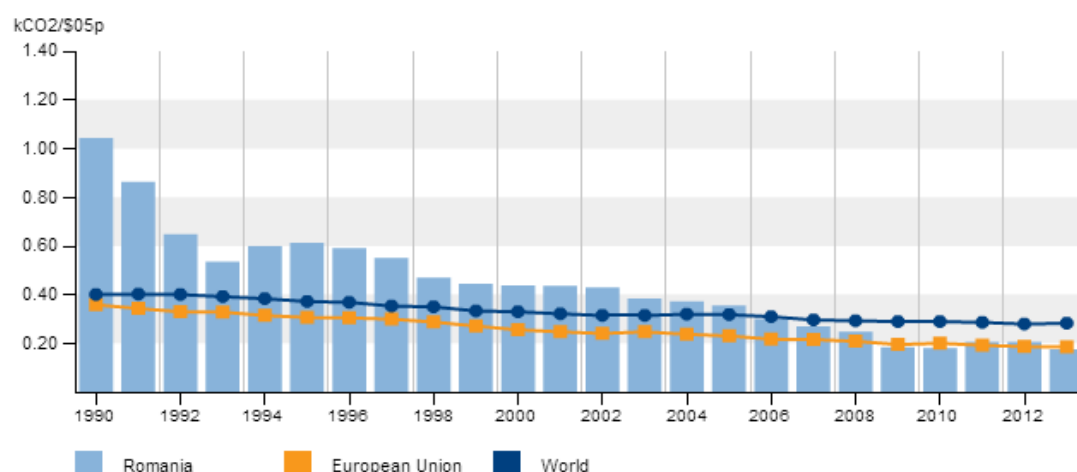
According to WEC data, after 2007 the average energy intensity of the industry for the 27 Member States of the European Union (EU) is higher than the values for the industry sector in Romania if the energy intensity (added to value) is calculated adjusted to economic structure of the EU in toe/\$ 05P value of this indicator - Figure 65.

Figure 65: Energy intensity of industry sector to value added



Source: WEC database

Figure 66: CO₂ intensity of industry sector to value added



Source: WEC database

Both energy and CO₂ intensity of industry has decreased with 4.8%/year and 4.5%/year during 2000-2013. These are the results of the environment requirements and energy efficiency measures implementation - Figure 65 and 66.

4.2. ENERGY EFFICIENCY POLICIES

After 2000 there are 10 ongoing measures. Of these, four are classified as financial measure, two measure are classified as New Market – based instruments, one is classified as Legislative-Informative measure, one as informative measures and another one is financial measure- Figure 67.

These measures are with:

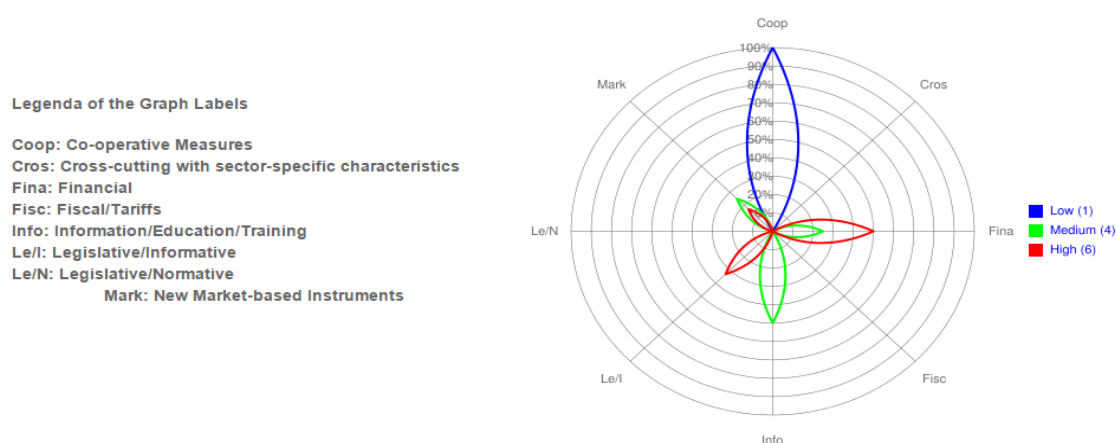
- high impact - 55%
- medium impact- 35%
- low impact- 10%

In the industrial sector financial measures however, become more important in recent years; after 2007 two main financial measure: „The promotion of CHP’s“and EU Emission Trading Scheme (2003/87/EC) - Energy Efficiency in Industry framed in EU-ETS.

During 2000-2007, the set of policies and measures is divided in two measure types:

- Financial measure – 36,4%
- New market – based instruments – 18,2%

Figure 67: Energy efficiency measure patterns industry sector: development of measure by type



Source: MURE database

Based on NEEAP III the Programs to achieve the national target are:

P5 – Energy efficiency in industry classified in ETS

Coordinator Ministry of Environment, Water and Forests

Total energy savings 2014-2020: 0.98 Mtoe

P6 – Energy audit and energy management

Coordinator Romanian Regulatory Authority for Energy

Total energy savings 2014-2020: 0.35 Mtoe

❑ **2014 main results:**

- energy audits carried out at 349 companies,
- 432 identified measures to improve the energy efficiency,
- estimated energy savings: 26795 toe/year,
- annual investment of approx. 26 M€.

Energy efficiency improvement Program must be filed annually, until 30 September.

❑ **Preliminary steps:**

- the energy audit elaborated by energy auditors authorized by ANRE;
- selecting measures to improve the energy efficiency, based on the results and recommendations of experts, taking into account the existence of reliable funding sources;
- preparation of feasibility studies, spread as far as the economic unit's business plan allows the financial effort.

❑ **Content :**

- short-term measures , lasting up to 1 year ;
- medium-term measures with duration between 1 and 3 years;
- longterm measures , the implementation of the investment works for a period exceeding three years.

END