

Project: Capacity building for the implementation of Long Term Agreement as specific instrument to promote energy efficiency in privatised sectors of the Romanian Industry - PPA 06/RM/8/1

Long Term Agreement – Study on Romanian Context

Activity 3.1

REPORT

Developed by:
ENERO, Romania



Report coordination:
ARCE, Romania



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Summary

The report starts with an overview of the Romanian economy evolution, macroeconomic indicators and energy supply and consumption data. The GDP increase in the last years was satisfactory, in line with the industry good evolution. Most of the industry is privatized now. The energy consumption also increased, the manufacturing industry remaining the largest national final energy consumer with some 40% of the total consumption.

At present, there is an explicit descending trend for the energy intensity at the national level, even if the actual values are relatively high compared to the EU values, mainly if the energy intensity values are calculated using the exchange rate. The final and primary energy intensity in Romania are about 3 times higher than the average ones registered in the EU25, while the electricity intensity is about 2 times higher.

The Romania EU accession brought also the adoption of the European acquis on energy. A legal framework to promote energy efficiency is in place, mainly the *National Strategy for Energy Efficiency* and the *Law 199/2000 for Energy Efficiency*. The stated target for decreasing the energy intensity at national level is 40%, during the period 2004-2015, compared to 2001. Even if the documents state the adoption of financial and fiscal tools to promote energy efficiency projects, until now no scheme was approved. The industrial policy defines the priority directions for competitiveness and environmental protection.

A detailed analysis is made on the industry evolution and on the industry energy consumption and energy intensity. The sectors with the highest contribution to the gross added value of the manufacturing industry are: food, beverages and tobacco, machinery. The final energy consumption has different trends, depending of the industrial sector. E.g. in the textile industry the economic growth was performed with no significant energy consumption increase while in the chemical industry the energy consumption increased to 1.7 times within the period 1999- 2005.

The chemical industry and metallurgy are consuming together 60% from the final energy consumed in the manufacturing industry, but their share to the gross added value in the manufacturing industry is low 9-10 %. The chemical industry has the most unfavorable final energy intensity indicator, 15 times higher than in the developed countries. The other energy intensive sectors (steel and non ferrous products) have also higher values in comparison with developed countries. The best situation shows the food industry, beverages and tobacco, where the energy intensity is quite low and close to the values registered in other countries.

The Strategy for Energy Efficiency declares a high potential for energy savings in industry (up to 1.7 Mtoe/year). Most of the savings could be reached by low cost measures.

A specific part of the report addresses the analyze of the political context for LTA promotion in Romania, today, in comparison with the results of the SAVE II project developed in 2000-2001, as summarized bellow:

LTA preconditions	Fulfillment degree	
	SAVE II project	Today
1. Social – economic stability	XX	XXX
2. Political continuity	XX	XXX
3. Interest shown for energy efficiency and environmental protection	XX	XXX
4. Confidence in economic policy	XX	XX
5. Political and organizational cooperation	X	X
6. Feasibility of energy efficiency programs	XX	XX
7. Interest to LTA participation	X	*

X – low

XX – medium

XXX – high

* this precondition will be clarified within the present project.

The results from the opinion survey on possible promotion of a Long-Term Agreement scheme in Romania are presented in chapter 5. The general approach is positive, but still several barriers are to be faced. The participants emphasized the importance of the incentives for the success of the LTA.

At the end of the report is provided a list of conclusions, while in the annex is presented the list of contacts with several LTA potential stakeholders.

LTA could be a valuable tool for energy efficiency improvement in Romania. A careful and step by step approach should be performed in order to secure the success of the LTA under the Romanian conditions.

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Acronyms

ARCE – Romanian Agency for Energy Conservation

CO₂ Carbon Dioxide

DH – District Heating

ESCO - Energy Services Companies

GDP – Gross Domestic Product

GHG – Greenhouse Gas

LTA – Long Term Agreement

MEC – Ministry of Economy and Commerce

NACE – Classification of Economic Activities in the European Community

PPP – Purchasing Power Parity

R&D – Research & Development

RTDI - Research, Technological Development and Innovation

SME – Small and Medium Enterprise

UNFCCC - the United Nations Framework Convention on Climate Change

Units

toe/Euro - tones oil equivalent energy consumption per Euro

ktoe - thousand tones of oil equivalent

Units prefixes

M - Mega (10^6)

G -Giga (10^9)

T -Tera (10^{12})

TERMINOLOGY

- 1) Purchasing Power Parity (PPP) is a currency conversion rate that converts economic indicators expressed in a national currency to an artificial common currency that equalizes the purchasing power of different national currencies. In other words, PPP is both a price deflator and a currency converter; it eliminates the differences in price levels between countries in the process of conversion to an artificial common currency, called Purchasing Power Standard (PPS). (Source: The Eurostat Concepts and Definitions Database - CODED).
- 2) In the present report the following terms for the industry are used:
 - **industry** includes the economic activities corresponding to the following NACE codes: C - Mining and quarrying, D – Manufacturing and E - Electricity, gas and water supply.
 - **manufacturing industry** includes the economic activities corresponding to the NACE code D – Manufacturing, namely:
 - DA - Manufacture of food products, beverages and tobacco
 - DB - Manufacture of textiles and textile products
 - DC - Manufacture of leather and leather products
 - DD - Manufacture of wood and wood products
 - DE - Manufacture of pulp, paper and paper products; publishing and printing
 - DF - Manufacture of coke, refined petroleum products and nuclear fuel
 - DG - Manufacture of chemicals, chemical products and man-made fibers
 - DH - Manufacture of rubber and plastic products
 - DI - Manufacture of other non-metallic mineral products
 - DJ - Manufacture of basic metals and fabricated metal products
 - DK - Manufacture of machinery and equipment n.e.c.
 - DL - Manufacture of electrical and optical equipment
 - DM - Manufacture of transport equipment
 - DN – Manufacturing n.e.c (no elsewhere classified)
 - **light industry** includes the economic activities corresponding to the NACE codes:
 - DB – Manufacture of textiles and textile products
 - DC - Manufacture of leather and leather products
 - **machinery** includes the economic activities corresponding to the NACE codes:
 - DK - Manufacture of machinery and equipment n.e.c.
 - DL - Manufacture of electrical and optical equipment
 - DM - Manufacture of transport equipment

LTA -Study on Romanian context

1. INTRODUCTION

The Romanian government has approved a long-term strategy to reduce the energy intensity of its GDP by 3% per year.

In view of achieving this target, it was noted that there is a high potential for reduction of the energy intensity within industrial sector. In a SAVE study (project XVII/4.103 I/P/99-300 "Schemes and measures to implement in România specific energy LTA in industry) finalized in 2002, the Dutch model for Long Term Agreements (LTA's) was identified as the most successful model to get industrial commitment for energy efficiency.

The Romanian Ministry of Economy and Commerce (MEC), responsible for development and enforcement of policy on energy, has requested assistance from the Netherlands to strengthen the capacity to implement the policy for business associations on public private partnerships concerning energy saving. The Dutch Ministry of Economic Affairs has asked SenterNovem, the Dutch energy agency, to provide the required assistance in collaboration with the Romanian Agency for Energy Conservation (ARCE). The Center for Promotion of Clean and Efficient Energy in Romania ENERO is the local sub-contractor of SenterNovem.

The project started on September 2006 and until April 2007 focuses on the preparatory steps for the implementation of LTA's. The major aspects to concentrate on are:

- increasing knowledge of the LTA as an instrument for energy efficiency
- dissemination of the Dutch LTA experience;
- analyzing the present Romanian context for LTA promotion;
- drafting a LTA scheme for the Romanian Industry or part of it.

The present report is presenting the results of the analyze regarding the today Romanian context for LTA promotion. The report was developed based on existing documents and materials and on information obtained during direct contacts with LTA stakeholders in Romania. General information on energy and energy efficiency in Romania are presented, but the major focus is on industry sectors, as defined in the terminology above.

2. ECONOMY GENERAL EVOLUTION

2.1. Evolution of main macroeconomic indicators

After a decade of economic decline specific for the transition period towards the market economy, in 2000 the economy started a positive evolution characterized by an important increase of Gross Domestic Product (GDP), in parallel with a decrease of inflation and unemployment rate (table 1).

Table 1. General macroeconomic data

Year	Population	GDP annual increase	Industrial production increase	Inflation rate	Unemployment rate
		%	%	%	%
1999	22,458,022	-1.2	-2.2	45.8	11.8
2000	22,435,205	+2.1	+7.1	45.7	10.5
2001	22,408,393	+5.7	+8.3	34.5	8.8
2002	21,794,793	+5.0	+4.3	22.5	8.4
2003	21,733,556	+5.2	+3.1	15.3	7.4
2004	21,673,328	+8.4	+5.3	11.9	6.3
2005	21,623,849	+4.1	+2.0	8.6	5.9
2006 (estimation)	21,550,000	+7.9	+7.4	4.87	5.4
2007 (estimation)		+6.2		4.7	5.6

Source: statistical data - National Institute of Statistics, National Commission of Statistics

The GDP/capita, in figure 1, still has low values in comparison with the average in EU. In 2004 this value was 8.1 times lower than the average in EU 25 if the comparison is made on the exchange rate RON/EUR or 3.1 times lower if we use the Purchasing Power Parity (PPP). In 2006 it was registered also a strong valuation (9 %) of the Romanian currency reported to the Euro. The annual average exchange rate for 2006 was $1 \text{ Euro} = 3.5245 \text{ RON}$.

Taking into account the Romanian accession to EU, it is expected that after 2010 the Romanian development will approach the level of the countries which accessed the EU in 2004.

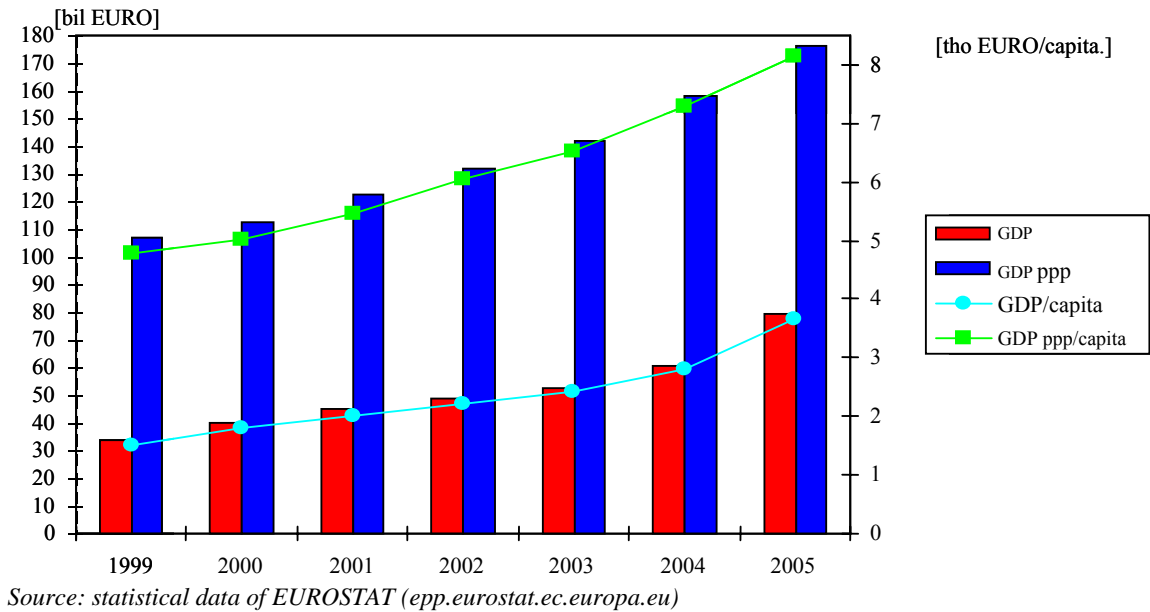


Figure 1. The evolution of GDP

The economic reform included the adoption of a coherent industrial policy, the improvement of the business environment and the privatizations of state companies, all these conducting to a re-launch of the industry. The share of the gross added value of the manufacturing industry (Classification of Economic Activities in the European Community – NACE code D) increased (fig. 2). As absolute value, the share increased from 6.1 billions Euros in 1999 to 10.4 billions Euros in 2003.

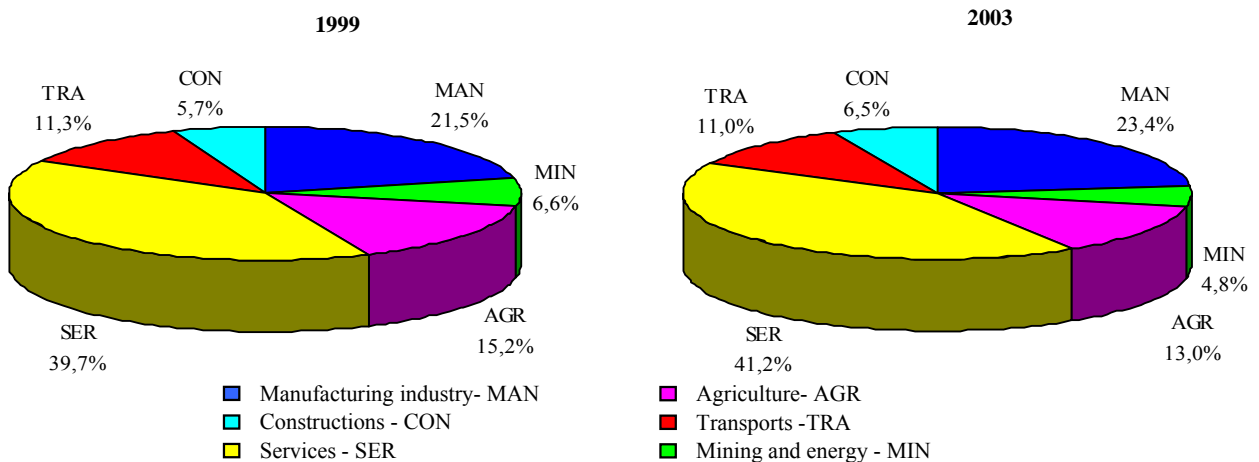


Fig. 2. National economy structure: 2003 compared to 1999

The efforts for privatization contributed to the increase of the share of the private sector (fig. 3).

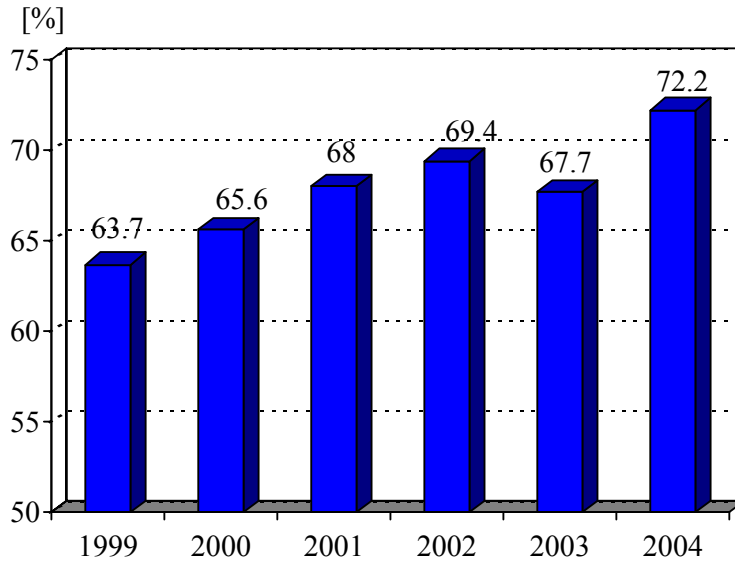


Fig.3. Share of private sector in GDP

The investments, mainly the private ones, increased in absolute value and share as well (table 2). The main share was registered for the investments in the services sector and the industry sector (fig. 4).

Table 2 – Investments evolution in national economy

		1999	2000	2001	2002	2003	2004
TOTAL Investments	bil. Euro	5.15	6.26	7.85	8.69	9.49	11.07
of which: private	bil. Euro	2.60	3.65	4.89	5.51	6.45	8.31
	%	50.5	58.3	62.4	63.4	68.0	75.1

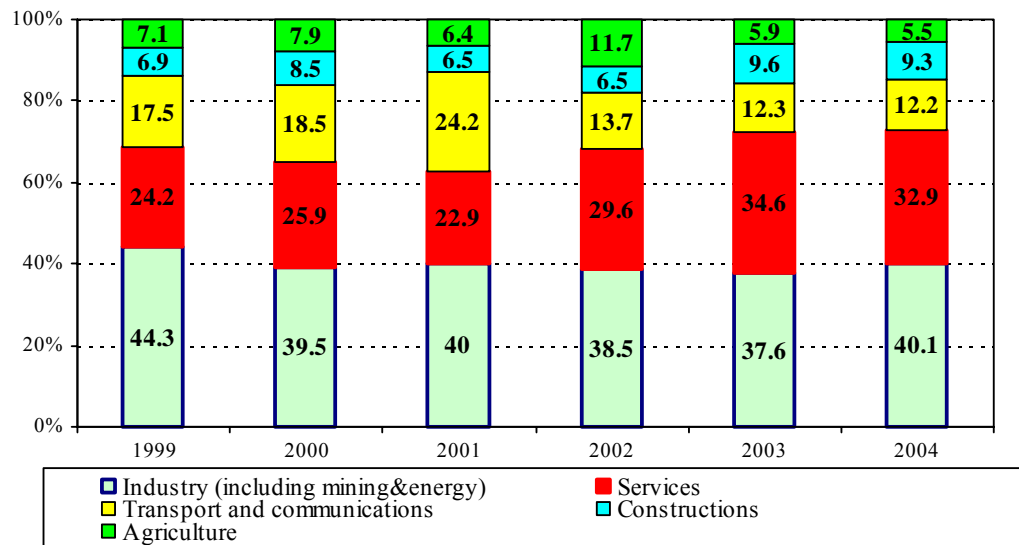
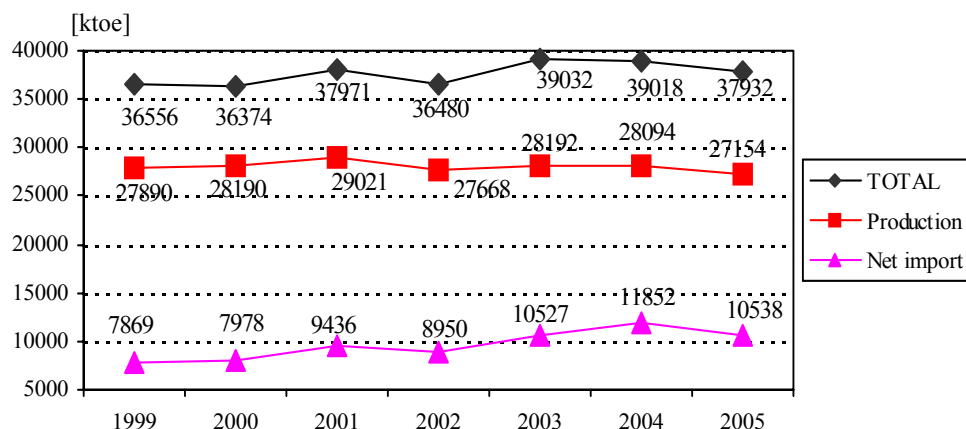


Fig. 4. Investments structure

Now it could be considered that Romania overcame the transition period and is engaged in a steady process of economic development and recovery of the gap to EU countries.

2.2. Evolution of energy consumption and energy intensity at macroeconomic level

The restart of the economic development in 2000 led to an increase of the primary energy consumption. This increase was limited which is a good signal, meaning the de-coupling between the economic growth and the energy consumption.



Note: The difference between the total primary energy supply and the primary energy production and net imports is the variation of energy stocks (\pm).

Figure 5. The evolution of the primary energy consumption

The evolution of the final energy consumption followed an increasing trend, but there have been registered important changes in its structure.

Table 3. The final energy consumption

Year	Total (ktOE)	of which: (%)					
		Manufacturing	Agriculture	Transport	Services	Households	Others*
1999	21,793	37.2	2.1	14.4	3.6	40.2	2.5
2000	22,164	38.1	1.8	15.8	3.7	38.0	2.6
2001	22,438	39.2	1.3	17.7	7.3	32.1	2.4
2002	23,370	42.5	1.2	18.4	3.8	31.2	2.9
2003	25,153	41.0	0.9	17.2	7.3	31.3	2.3
2004	27,332	39.6	0.8	21.6	7.3	28.9	1.8
2005	25,102	39.3	0.8	16.9	8.3	32.1	2.6

*Other sectors are as follows: non-energy mining, constructions, water collection, purification and distribution
Source: National Institute of Statistics-“Energy Balance” collection

Although the industrial energy consumption is reduced by 57% since 1990, the industry is still the most energy consuming sector, holding a 40% share of the final energy consumption (significantly higher than the EU-27 average of 28%). The energy consumption in this sector increased in absolute values and also as share in the total consumption.

The evolution of the final electricity and natural gas consumptions are presented in table 4 and table 5.

Table 4– Final electricity consumption

Year	Total (TWh)	of which: (%)					
		Manufacturing	Agriculture	Transport	Services	Households	Others
1999	31.853	56.3	2.5	4.7	4.2	24.7	7.6
2000	32.734	55.0	1.9	5.7	8.3	23.4	5.7
2001	36.294	52.5	1.3	4.9	15.3	21.3	4.7
2002	35.569	58.0	1.2	5.5	7.6	21.8	5.9
2003	37.500	54.5	0.9	4.9	12.7	22.0	5.0
2004	38.774	59.9	0.7	4.2	9.2	20.7	5.3
2005	38.756	56.0	0.6	4.2	10.3	23.8	5.1

Source: National Institute of Statistics-“Energy Balance” collection

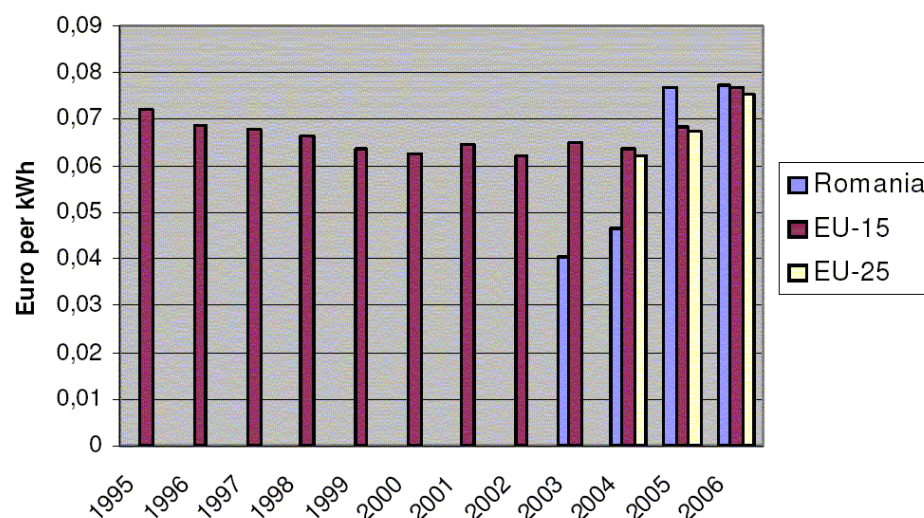
Table 5 – Final natural gas consumption

Year	Total (mil.m ³)	of which: (%)					
		Manufacturing	Agriculture	Transport	Services	Households	Others
1999	7,750	59.1	0.8	0.0	5.7	32.8	1.6
2000	7,991	59.2	0.3	1.0	3.0	34.7	1.8
2001	8,440	60.1	0.2	1.1	7.1	29.9	1.6
2002	8,685	61.6	0.5	0.4	1.5	34.2	1.8
2003	10,059	55.9	0.3	0.3	10.8	31.9	0.8
2004	9,814	57.0	0.4	0.3	8.7	32.8	0.8
2005	9,504	53.7	0.5	0.4	10.3	33.6	1.5

Source: National Institute of Statistics-“Energy Balance” collection

Industrial user electricity prices have increased by 91% over the last four years, and are now slightly above the EU-15 and EU-25 averages. Industrial user gas prices have risen by 120% in the same period, but remain about 39% lower than the averages for the EU-15 and EU-25.

Electricity and gas prices for industrial users are lower in absolute terms than for households. The evolution of the electricity and natural gas industrial prices are presented in figure 6a, b.

**Figure 6a. Average electricity prices for one kWh**

Source: EUROSTAT (epp.eurostat.ec.europa.eu)

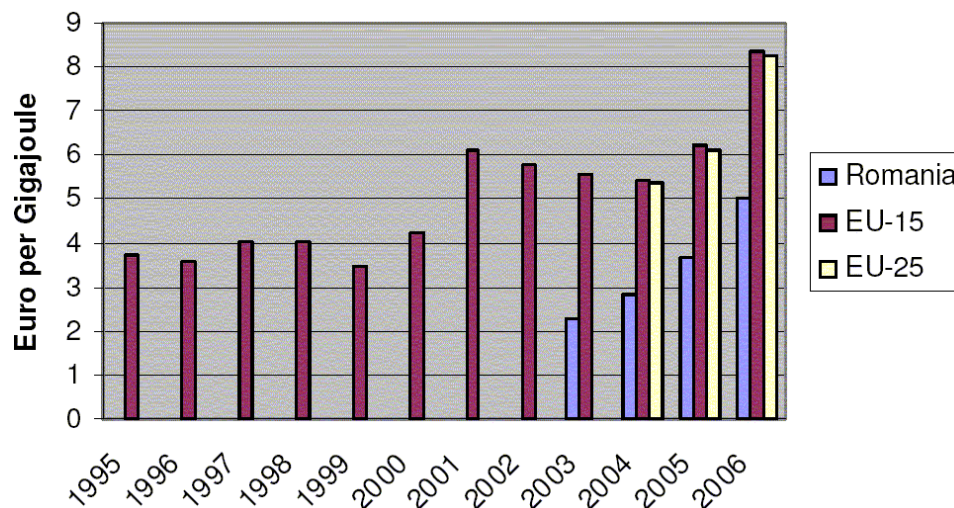
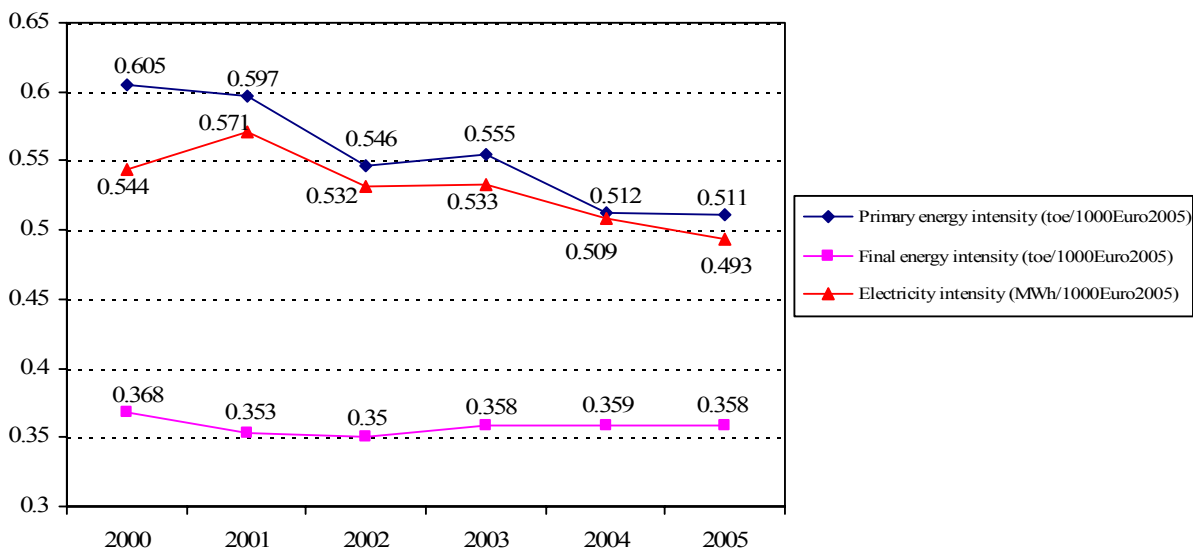


Figure 6b. Average natural gas prices for one Gigajoule

Source: EUROSTAT (epp.eurostat.ec.europa.eu)

The evolutions of the primary energy intensity, the final energy intensity and the electricity intensity are presented in fig 7. The values of these indicators are calculated in constant prices using Euro2005 as the exchange rate.



Source: Ministry of Economy and Trade- "Energy Policy of Romania 2006-2009" (project)

Figure 7. Energy intensity evolution

Due both to the structural changes of the economy and to the increase of energy efficiency, in the last 5 years a clear trend towards energy intensity reduction was registered, even if the absolute values are still high. In the analyzed period, the primary energy intensity decreased

by 15.5%, the final energy intensity decreased by 2.7% and electricity intensity decreased by 9.4%.

Table 6 shows the values of the same indicators with the European countries.

Table 6 – Energy intensity, Romania vs. EU

	Romania	EU 25	EU 15	NM10
Primary energy intensity (toe/tho Euro2005)	0.546	0.166	0.153	0.419
Final energy intensity (toe/tho Euro2005)	0.350	0.109	0.101	0.256
Electricity intensity (MWh/tho Euro2005)	0.532	0.251	0.239	0.487

Source: Ministry of Economy and Trade-”Energy Policy of Romania 2006-2009” (project)

There are important differences with respect to the EU countries for the energy intensity values calculated using the exchange rate. The final and primary energy intensity in Romania are about 3 times higher than the average ones registered in the EU25 while the electricity intensity is about 2 times higher. The comparisons are more favorable if the purchasing power parity is used to calculate the energy intensity values. In this case, for example the primary energy intensity (0.243 toe/1000Euro2005 PPP) is 1.6 times higher than the average value registered in EU25.

CONCLUSIONS chapter 2.

1. Romania concluded the transition period and is engaged in a significant economic development and gap recovery towards EU countries.
2. Since 2000, the positive economic development, determined a primary energy consumption increase. This increase has a limited trend, which represents a good sign about breaking the direct dependence between economic development and energy consumption.
3. The manufacturing industry was, and still remains, the largest national final energy consumer. The re-launch of the industry after 2000 resulted also in an increase of energy consumption in industry, in absolute values and as share in total final energy consumption too. In this context, a reduction of energy consumption in industry will lead to a substantial decrease of final energy consumption.
4. At present, there is an explicit descending trend for the energy intensity at the national level, even if the actual values are relatively high compared to the EU values. Given the expected further economic growth in Romania, further attention to energy conservation is needed in order to decrease the energy intensity in the future.

3. ENERGY POLICY

3.1. Legal framework

The policies and energy strategies elaborated after 1990 focused mainly on sustainable development objectives and on components to increase the energy efficiency, in line with the environmental protection. The implementation of this policy was strongly affected by the transition period towards a market economy. It was possible to adopt concrete measures because the economic development was re-launched. The European integration procedures played a major role. During 2000-2004, the strategies and the regulatory framework on energy were developed according to the trend towards a market economy and to the necessity to be aligned to the community acquis. The energy and industrial policies, strategies and legislation framework are developed by the Ministry of Economy and Commerce that also monitors the implementation according to the Government Decision no.738/2003 regarding the organization and functioning of the Ministry of Economy and Commerce. The main legislative documents in the energy efficiency domain are presented shortly below.

1. The Law 199/2000 for energy efficiency (amended by Law 56/2006)

The main objective of this law is to establish a legal framework for development and implementation of a national energy efficiency policy in agreement with the provisions of the Energy Charter Treaty, the Energy Charter Protocol and sustainable development concept. The law establishes obligations and incentives for energy producers and consumers in order to implement measures for efficient energy use.

According to the provisions of this law, the Romanian Agency for Energy Conservation - ARCE is the competent authority at national level for energy efficiency issues. ARCE reports to the Ministry of Economy and Trade. The main responsibilities of ARCE are:

- proposes the national policy on energy efficiency and forwards it to the Government to be approved;
- implements and monitors the national policy and the national programs on energy efficiency;
- coordinates the energy efficiency programs financed by international institutions (as PHARE, SAVE etc);
- authorizes legal and physical persons to develop energy audits;
- acts as consultant to local authorities, economic bodies and others;
- elaborates and coordinates training programs for personnel with responsibilities within the energy management.

The Ministry of Economy and Trade issues the technical regulations for energy efficient equipment, while the Ministry of Public Works, Transport and Buildings issues technical regulations for energy efficiency in buildings. An inter-ministerial committee is supposed to harmonize the activities on energy efficiency.

The commercial companies with an energy consumption over 1000 toe/yr should develop their own energy efficiency programs, containing short term measures at low cost and long term measures (3-6 years) for investments projects. ARCE is gathering and synthesizing these programs.

Energy consumers should implement their own system to manage and monitor the energy consumption and should make available the information on energy consumption and energy efficiency indicators to appropriate institutions. In the initial variant, the law contained also financial and fiscal incentives like:

- financial support from the *Special Fund for the development of the energy system*, up to 50% of the investment;
- exemption of the profit tax for the share regarding investments on energy efficiency projects;
- credits for energy efficiency projects with interest rates up to max 75% of banks rates
- exemption of custom taxes regarding imports for energy efficient equipment and technologies;
- reduction to 50% of the energy services companies (ESCOs) profit tax for a 5 year period.

The *Special Fund for the development of the energy system* was operational between 1994 and 2004.

The Law 199/2000 was modified several times during the approval process, and the financial and fiscal incentives were excluded at the end. The last amendments to the Law 199/2000 were made by the Law 56/2006 adopted by the Government in March 2006. According to this last form, within a 6 month period from the publication of the law a *National Program for Energy Efficiency Improvement for the period 2006-2010* should be elaborated, in connection with a financial support mechanism from the state and local authorities budget, managed by the Ministry of Economy and Trade. The program should address the specific priority energy efficiency projects to be developed in the main economic sectors, including industry, and should be approved by a Governmental Decision. The consumers may receive up to 50% of investment values in energy efficiency projects. Until now, the Government didn't adopted such a *National Program*.

2. *The National Strategy for Energy Efficiency*, approved by GD 163/2004, has as main objective to identify the possibilities and means to improve energy efficiency in the whole energy chain. The targets for energy efficiency policy were established under the premises of a GDP annual increase rate of 5.4% and a reduction of primary energy intensity by 40% in 2004-2015 in comparison with 2001 year level. The target for the industry sector is to reduce the annual primary energy consumption with 336 Mtoe from the present 2,122 Mtoe/year, with a capital effort of 110 millions Euros. The targets should focus on the main energy consuming branches, like chemical and oil industry, metallurgy, machinery, construction, pulp and paper industry.

The actions to achieve the targets are:

- improvement of the energy consumption management in the companies;
- stimulation of the private industry to develop energy efficiency projects by tools like:
 - the Long Term Agreement- LTA mechanism;
 - the partnership between central/local administration and the private sector, in order to implement the European Union experience regarding reduction of energy consumption and pollutant emissions.

The financial measures mentioned to promote energy efficiency are as follows:

- the *Romanian Fund for Energy Efficiency* (RFEE) created by GD 124/2001 and approved by the Law 287/2002. RFEE is a body of public interest, with legal

personality, independent and autonomous. RFEE offers services for energy efficiency projects, as credits up to 80% of the capital costs;

- Financing of Research & Development (R&D) projects on energy efficiency within national R&D programs;
- Technical assistance and financing using European or international programs;
- Grants from ministries state budget (only for residential sector, the district heating system -DH);
- Grants from local budgets (only for DH);
- Credits from state budget (for the residential sector, the thermal rehabilitation of multi-storey buildings);
- Financing through public-private partnerships.

According to the Strategy, the fiscal incentives that may be granted are:

- supporting a part of the interest rates to commercial credits and
- reduction of the income tax, as stated in Law 500/2002 on public finances and in the annual state budget.

Also the use of flexible mechanism within the Kyoto Protocol (Joint Implementation type) should be used for energy efficiency projects financing.

In the context of the Romanian integration in the EU, the new **Directive 2006/32/EC** dated 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EC will play an important role in promoting cost-effective improvement of energy end-use efficiency in Romania. The Directive stipulates that the Member States will provide the necessary indicative targets as well as mechanisms, incentives and institutional, financial and legal frameworks to remove existing market barriers and imperfections that impede the efficient end use of energy. In order to promote energy end-use efficiency and energy services the Member States shall ensure that voluntary agreements and/or other market -oriented schemes, such as white certificates exist or are set up. The voluntary agreements shall have clear and unambiguous objectives and monitoring and reporting requirements linked to procedures that can lead to revised and/or additional measures when the objectives are not achieved or are not likely to be achieved.

The Directive states that Member States shall repeal or amend national legislation and regulation, other than those of a clearly fiscal nature that unnecessarily or disproportionately impede or restrict the use of financial instruments for energy savings in the market for energy services or other energy efficiency improvement measures.

3. *The Sectoral operational program to increase the economy competitiveness* was elaborated in respect to the National Development Plan 2007 – 2013, in order to access the structural funds. The program contains 6 priority axes. We mention:

Priority axe 1: An innovative system of production which contains an objective related to efficient production equipment. Here, energy efficiency projects may be included as part of technological modernization of industrial companies.

Priority axe 2: Research, Technological Development and Innovation (RTDI) for competitiveness. The objective is to increase the research capacity and stimulate the cooperation between the research and industry.

Priority axe 4: Energy efficiency improvement and sustainable development of the energy system. The key points are to contribute to reducing the energy intensity through the implementation of new technologies in order to increase productivity; to improve energy

efficiency within the whole cycle; to increase the use of renewable energy. In view of increasing energy efficiency, the technological modernization of installations and equipment for the industry (other than the energy sector) in order to improve the energy management of economic operators and reduce their specific consumption of energy is envisaged.

In order to prepare the projects for the structural funds and to increase the capacity absorption of these funds a program, called IMPACT, was approved to stimulate the research & innovation. The program is developed for the period 2006 and 2010. IMPACT is covering, following a competition and selection of the forwarded projects proposals, the costs for services to build the documents needed for the structural funds request:

- feasibility studies or parts of the feasibility studies needed to apply for projects co-financed by the structural funds. The maximal value is 100.000 RON (about 28.500 Euro).
- consultancy to develop other documents (business plans, market and impact studies, economic analysis) also needed to prepare projects related to research, development and innovation of enterprises. The maximal value here is 40.000 RON (about 11.500 Euro).

3.2. Specific industry policy

The industry policy of Romania is related to the position document on the chapter 15 within the EU accession negotiation process. The document mentioned the directions to increase the industrial competitiveness, taking into account the conditions for a sustainable development. With the GD 1172/2005 there were approved, a **Document for industrial policy of Romania** for the period 2005-2008 and an **Action Plan** for the implementation of the industrial policy of Romania for the period 2005-2006. The main targets of the industrial policy are to:

- increase the competitiveness;
- increase the role of the research, development and innovation;
- promote the sustainable management of resources and environment;
- improve the professional training;
- develop the industrial cooperation and the public private partnership.

The factors by which the targets will be reached are:

- consolidation of a stable and predictive business environment;
- support of the research, development and innovation, and of the infrastructures to evaluate the products conformity and industrial services;
- development of an open and competitive market;
- sectorial assistance for every sector;
- encouragement of direct investments, by building a transparent, stimulative and predictable environment;
- support of the SMEs development by facilitating their access to financing sources and by assistance, consultancy and info dissemination;
- assistance for export;
- support of privatization, restructuring of commercial companies, finalization of the state companies privatization process;
- promoting the compatibility with environmental restrictions;
- development of the human resources policy and promotion of the social cohesion.

In connection with the industrial policy comes the concurrence policy. The document considers that a competitive market is an essential condition to secure the operation of the market economy. It is necessary to apply the rules on state aid procedures. It should be mentioned that starting with the 1st of January 2007 the Government Emergency Ordinance no.117/2006 regarding the national procedures in the field of **State aid** came into force thereby repealing Law no.143/199 on the state aid, and transferring the state aid procedures to the level of the European Commission.

One of the tools of the sectorial assistance policy is the **Program for the increase of the industrial products competitiveness**, approved by the GD 357/2004, which financially supports the manufacturing industry producers for activities like:

- implementing of quality and environmental management systems;
- endowment of testing laboratories and their licensing;
- products licensing and ecological labeling;
- building demonstrative and pilot models following the results of the Romanian research activities;
- analyses and evaluations of the manufacturing industry, in view of the development of restructuring plans.

The main objectives for environmental protection on medium term 2010 and long term 2013, are:

- integration of environmental protection restrictions in all developed policies and strategies;
- implementing of best available technologies and of clean technologies in the industrial sectors and therefore the reduction of wastes;
- development of a free market for technologies and services for the waste management and the energy efficiency use.

Related to the Kyoto protocol, an important financial opportunity is offered by the Joint Implementation mechanism to the industrial companies developing investments leading to greenhouse gas emissions reduction.

At sectorial level, there were adopted some development strategies, like:

- Strategy for restructuring of steel industry 2004-2010 (GD 655/2004);
- Strategy for development of domestic machinery and devices industry, on medium and long term 2001 – 2010 (GD 1297/2001);
- Strategy for the development of medical instruments and devices industry on 2001 – 2010 period.

3.3. Other issues: environment

The **National Strategy for the climate change 2005-2007** (GD 645/2005) has as main objectives:

- the fulfillment of the tasks assumed by Romania within the Kyoto protocol and UNFCCC, and the obligations derived from EU integration;
- elaboration and implementation of voluntary objectives and actions regarding climate change impact;
- decreasing the carbon intensity and

- use of flexible mechanisms in Kyoto protocol.

The document specifies the importance of energy efficiency measures, in order to reduce the carbon intensity, and the high potential of Joint Implementation energy projects.

The **National Action Plan for climate change** (GD 1877/2005) presents the policies and individual measures that will be implemented, as well as the reporting methods of monitoring process. The action plan specifies the competent authorities for each action, implementing deadlines and possible financing sources. The measures include:

- inter-sectorial issues;
- obligations regarding the reporting of Greenhouse Gases (GHG) level at international level;
- flexible mechanisms specified in Kyoto Protocol;
- EU scheme for trade of emissions certificates;
- policies and measures to reduce GHG emissions.

One mentioned measure to reduce GHG emissions is to promote energy efficiency to final energy consumers. It stated the importance of adoption of a multi-annual National Program regarding energy efficiency with objectives:

- introducing of financial incentives for energy investments;
- create audit programs to permit the identification of investments opportunities.

The actions foreseen to be implemented by 2007 include:

- increased participation to Intelligent Energy for Europe Program, in order to sustain the elaboration of energy efficiency policies;
- introducing of new financial mechanisms for energy efficiency projects by modification or revoking previous documents, limiting the use of financial tools and energy performance contracts on energy services market.

The **Trade scheme for GHG certificates** was introduced by GD 780/2006, which transfers the Directive 2003/87/CE, modified by Directive 0204/101/CE, in Romanian legislation,. According to this document, starting 1st January 2007, the GHG emitting installations must have a GHG emissions permit. Those installations are presented in the annex of the document, for different sectors, including:

- Steel production and manufacture;
- Mineral and non ferrous metals production;
- Pulp and paper production;

Recently the **National Allocation Plan** was developed for the years 2007 and for the period 2008-2012. This plan will become operational after the approval of the Government and EU Commission. The plan stipulates that in 2007 the limit of GHG certificates will be 84.2 millions certificates which mean 84.2 t CO₂. For 2008-2012 the limit will be 487.77 millions certificates (97.554 millions certificates annually). The total number of certificates is further allocated on two levels:

- allocation on each sector;
- allocation on installation level.

Sectors taken into consideration:

- energy (153 installations);
- oil products refining (9 installations);
- steel production installations (19 installations);

- pulp and paper (11 installations).

Romania does not intend to auction allowances other than excess allowances from the new entrants reserve and allowances from JI reserve left unused at the end of the period.

CONCLUSIONS chapter 3.

1. A legal framework to promote energy efficiency is in place.
2. The National Strategy for Energy Efficiency mentioned the target for decreasing the energy intensity at national level with 40% during the period 2004-2015, compared to 2001. This means a yearly decrease of about 3.5%. The strategy promotes LTA as a tool for energy conservation policy.
3. Even if the strategic documents state the adoption of financial and fiscal tools to promote energy efficiency projects, until now no scheme was approved. It is expected, that once a National Plan for energy efficiency will be adopted, the financial and fiscal incentives will be introduced. The implementation of the Directive 2006/32/EC on energy end-use efficiency and energy services will create the right environment for LTA promotion and adoption of financing schemes.
4. The Sectoral operational program to increase the economy competitiveness will permit the access to the structural funds.
5. The industrial policy defines the priority directions for competitiveness and environmental protection.
6. The environment protection policy integrates energy efficiency aspects and sustainable development. Joint Implementation projects addressing energy efficiency have a high potential.
7. The necessary general legal framework to promote energy efficiency and in particularly LTA has been adopted. Still to be established are the necessary incentives for LTA as well as specific regulations in order to eliminate some restrictions or impediments in using financial instruments for energy efficiency improvement measures.

4. INDUSTRY SITUATION

4.1. Industry evolution

During the centralized economy, one of the national priorities was the development of the heavy industry characterized by high energy intensity. The political decision prevailed before the technical and economical criteria. After 1990, this industry was severely transformed and restructured in order to fit the new economic environment during the transition towards the market economy. In the last decade, the industrial policy was focused mainly to the privatization and to the performance increase of the companies. Consequently the share of the private sector increased constantly as showed in table 7.

Table 7 – Private sector share in the main economic indicators for industrial companies [%]

Year	Turnover	Investments	Direct exports
1999	52.5	24.2	63.9
2000	58.3	31.0	73.7
2001	62.8	33.2	83.5
2002	67.4	42.5	86.8
2003	70.0	62.8	89.8
2004	77.5	63.4	96.8

The number of private companies with foreign capital share increased (table 8).

Table 8. Evolution of private owned companies in the manufacturing industry

Year	Total (number)	State as main shareholder	Private main shareholder	With foreign capital (of total)
1999	40966	909	40057	920
2000	41547	554	40993	1553
2001	42787	492	42295	1635
2002	46517	294	46223	1703
2003	50863	301	50562	2106
2004	55305	253	55052	2459

The average number of employees in the manufacturing industry decreased continuously within the period 1999 – 2004, from 1628 thousands to 1491 thousands. Significant reduction of the number of employees was registered in the metallurgical, chemical, transport and machinery sectors (table 9), due to the restructuring of the companies, externalization of some services, modernization of technologies and a more performing management imposed by multinational companies.

Table 9 – Industrial sectors with significant reduction of employees, in thousands

year	Metallurgy	Chemical industry	Transport	Machinery
1999	194	142	146	182
2000	163	128	132	150
2001	168	122	126	144
2002	146	108	121	149
2003	144	108	110	135
2004	138	106	102	133

Source: Ministry of Economy and Trade – “Program for the increase of the industrial products competitiveness”

The strong points which led to the strengthening of the industry were:

- the intensification of the privatization process,
- the achievement of a more stable and predictable business environment,
- the overcome of some bureaucratic and administrative barriers,
- the restructuring of the institutional regulatory framework, in view for a fair competition

In 2000 – 2004 the industrial production registered a continuous growth. The manufacturing industry pioneered the growth of the industrial production (figure 8a).

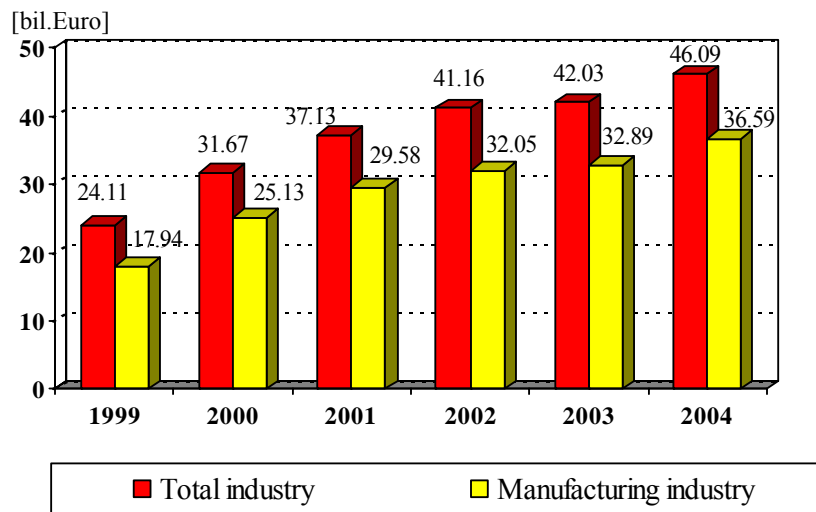


Fig. 8a. Production value in industry and manufacturing industry

Similarly, the contribution of the industry increased, the manufacturing industry share increased from 78.1% in 1999 to 83.9% in 2003 (figure 8b).

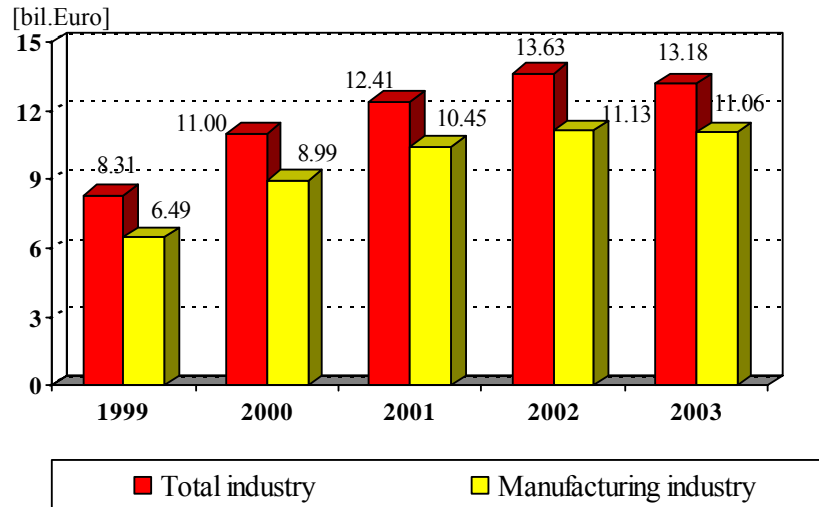


Fig. 8b Gross added value evolution in industry and manufacturing industry

Table 10. Share of the private sector, %

	1999	2000	2001	2002	2003	2004
Gross added value	53.7	68.4	76.0	80.6	84.2	80.6
Production	50.2	55.7	59.7	66.6	68.5	79.2

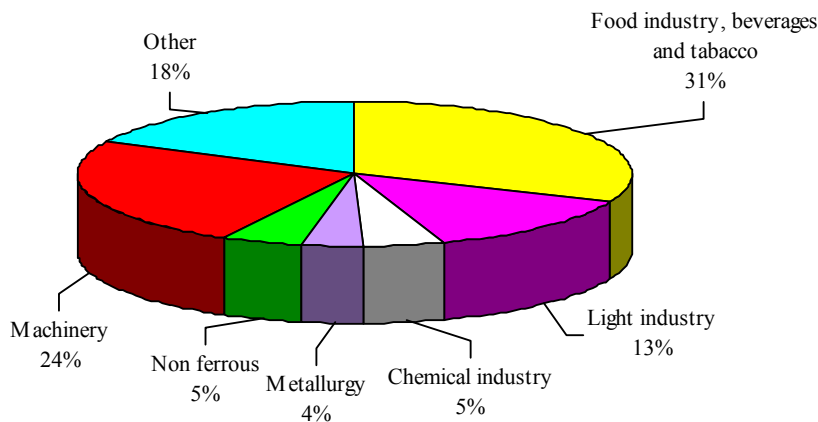


Figure 9. Structure of the manufacturing industry in 2003

The sectors with the highest contribution to the gross added value of the manufacturing industry are: food, beverages and tobacco, machinery.

The energy intensive sectors, metallurgical, chemical, and construction materials, are in a different position. These sectors were strongly affected by the transition period. Nevertheless the privatization led finally to a positive evolution in the last years. This trend will be further

maintained due to the strong infusion of foreign capital and to the technological modernization.

The investments in the industry slightly decreased from 44.3% in 1999 to 40.1% in 2004. The manufacturing industry attracted the main share, 65% from the total industry investments.

The value of the direct foreign investments in the industry increased significantly. The manufacturing industry was the beneficiary of 34% of the total direct foreign investments, mainly in the steel sector (8.1%), machinery (7%), wood industry (5.7%), chemical industry (5.4%) and light industry (3.3%). The investments in the industry were focused both to the modernization of the companies with a tradition in the Romanian industry and to *green-field* projects. The sectors with more visible green-field foreign investments were the tires, cars components, telecommunication, wood processing and construction materials industries. The multinationals active in Romania usually do not subcontract supplies from Romanian companies with unsatisfactory technologies, management and production quality. The multinationals import in general the majority of the components, this way limiting the national income.

4.2. Evolution of energy consumption and energy intensity in industry

The manufacturing industry is the industry with the highest final energy consumption. The economic development led to an increasing trend of energy consumption in this sector as absolute value and also a share in the total final energy consumption.

Table 11 – Final energy consumption in manufacturing industry

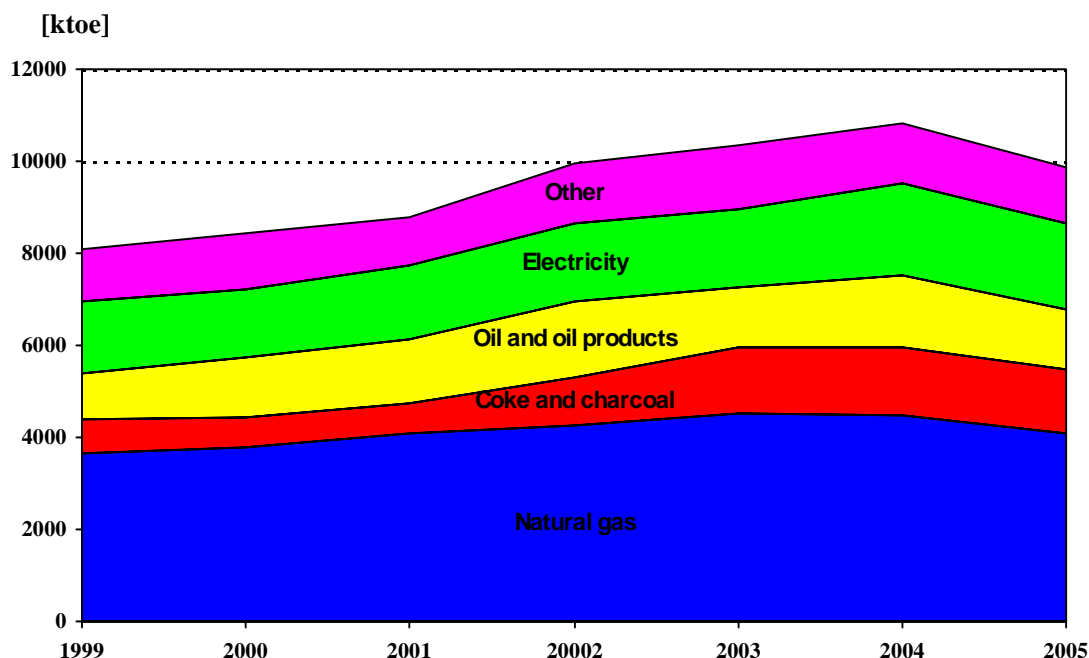
Year	Total (ktoe)	Out of which (%)				
		Chemical industry	Metallurgy	Non-metallic mineral products	Food, beverages and tobacco	Light industry
1999	8,105	18.6	33.6	13.8	7.6	3.7
2000	8,436	24.9	29.4	15.3	7.6	3.4
2001	8,802	24.9	28.2	15.1	8.9	3.6
2002	9,942	28.3	27.9	14.1	7.5	4.1
2003	10,334	32.1	31.3	9.3	6.8	3.4
2004	10,821	30.8	32.6	11.4	8.2	3.1
2005	9,868	25.5	35.2	13.5	10.0	2.1

Source: National Institute of Statistics-“Energy balance” collection

The final energy consumption has different trends, depending of the industrial sector. E.g. in the textile industry the economic growth was performed with no significant energy consumption increase while in the chemical industry the energy consumption increased to 1.7 times within the period 1999- 2005.

The chemical industry and metallurgy are consuming together 60% from the final energy consumed in the manufacturing industry but their share to the gross added value in the manufacturing industry is low 9-10 %. The most important share of the final energy consumption in the manufacturing industry is represented by the natural gas consumption 41.3% in 2005 in comparison to 41.8% in 1999, followed by the electricity consumption 18.9% in 2005 in comparison to 19% in 1999, the oil consumption 13.3% in 2005 in

comparison to 12.7% in 1999, the coal and coke consumption 14.1% in 2005 in comparison to 8.8% in 1999.



Source: National Institute of Statistics- "Energy balance" collection

Figure 10. The final energy consumption in the manufacturing industry

The industry remains by far the main electricity and natural gas consumer. In 1999 – 2005 the electricity consumption in industry increased by 21.1% (table 12). The structure of the electricity consumption is similar to the total final energy consumption.

Table 12. Electricity consumption in the manufacturing industry

Year	Total (TWh)	Of which: (%)				
		Chemical industry	Metallurgy	Other mineral and non ferrous	Food, beverages and tobacco	Light industry
1999	17.931	16.1	41.0	10.1	6.6	2.7
2000	17.386	18.2	33.9	10.2	7.5	4.3
2001	18.411	16.7	39.5	8.7	7.4	4.4
2002	20.096	16.8	34.7	8.5	7.6	5.3
2003	19.856	17.0	36.4	5.2	12.9	5.0
2004	23.235	15.2	36.8	8.8	14.4	4.3
2005	21.712	15.7	39.0	9.6	13.4	2.8

Source: National Institute of Statistics- "Energy balance" collection

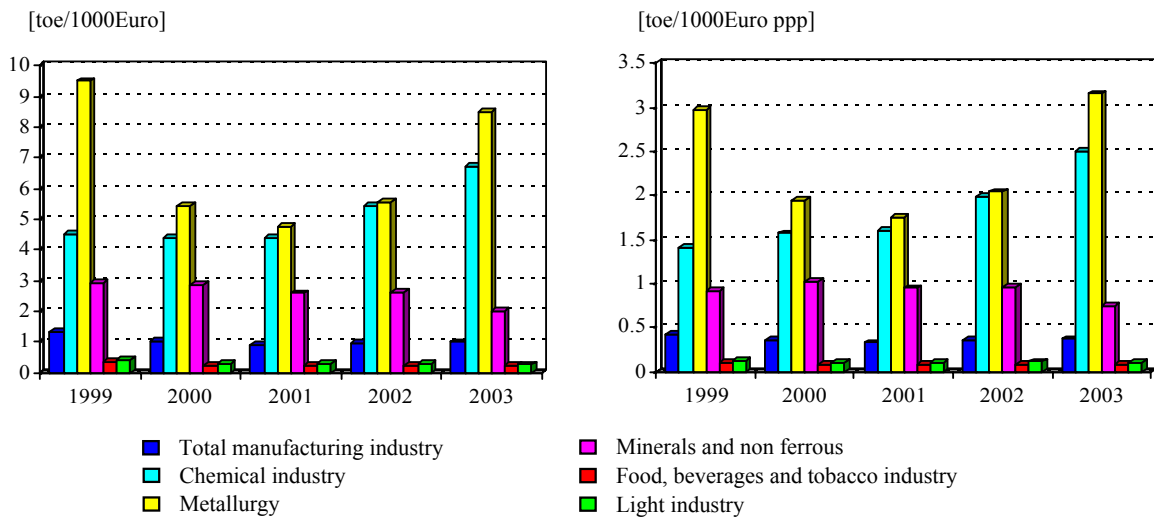
The natural gas consumption of the industry increased by 11.4% (table 13). The largest industrial sector with regard to the gas consumption is the chemical industry.

Table 13. Natural gas consumption in the manufacturing industry

Year	Total (mil.m ³)	Of which: (%)				
		Chemical industry	Metallurgy	Other mineral and non ferrous	Food, beverages and tobacco	Light industry
1999	4,577	22.7	24.2	14.7	8.1	5.2
2000	4,727	34.3	22.1	13.8	7.6	3.7
2001	5,075	33.9	18.8	12.9	11.2	3.9
2002	5,348	38.1	16.1	16.5	6.6	5.2
2003	5,621	48.0	14.9	10.9	7.1	4.6
2004	5,599	46.6	16.5	12.0	7.8	3.8
2005	5,100	38.1	16.0	7.7	14.6	2.4

Source: National Institute of Statistics-“Energy balance” collection

The final energy intensity in the manufacturing industry and in the main industrial sectors is presented in fig 11. The values are presented both on exchange rate and PPP.



Source: National Energy Data Center OEN – “Evolution and prospects on energy intensity of the Romanian economy”, Energy Efficiency International Symposium EEIS 2006

Fig. 11 Final energy intensity in manufacturing industry

The growth of the energy intensive sectors after 1999 is a positive process, but this process led also to an increase of the final energy intensity. These sectors were characterized also initially by a traditional high energy intensity. The food industry and the light industry show a positive evolution regarding the final energy intensity: for e.g. in the analyzed period the energy intensity decreased by 20% in the food industry, beverages and tobacco, and by 24.8% in the light industry. As a cumulative effect of the reforms on each sector level, the final energy intensity of the manufacturing industry decreased by 12%, even as non favorable trends were manifested in the energy intensive sectors.

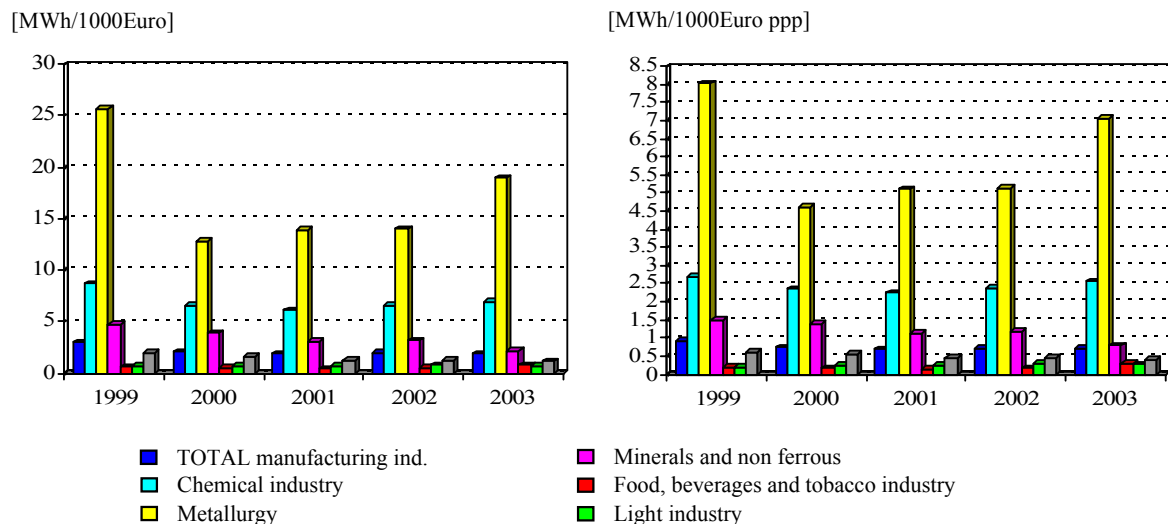
Table 14– Comparisons on final energy intensity, year 2003

[toe/1000Euro]

Country	TOTAL Manufacturing industry	Chemical industry	Metallurgy	Food, beverages and tobacco	Mineral and non ferrous	Light industry
Belgium	0.291	0.342	1.549	0.177	0.556	0.155
Germany	0.142	0.256	1.002	0.131	0.520	0.111
Spain	0.269	0.407	1.366	0.184	0.762	0.150
France	0.183	0.281	1.212	0.165	0.517	0.082
Italy	0.201	0.348	1.093	0.193	0.682	0.121
Hungary	0.253	0.406	3.611	0.260	1.000	0.099
Portugal	0.323	0.606	0.513	0.205	1.069	0.164
Bulgaria	1.694	4.807	10.653	0.680	3.926	0.334
ROMANIA	0.990	6.727	8.495	0.214	1.984	0.252

Source: National Energy Data Center OEN – “Evolution and prospects on energy intensity of the Romanian economy”, Energy Efficiency International Symposium EEIS 2006

The industrial sector which from the point of view of intensity has the most unfavorable evolution is the chemical industry. The final energy intensity of the chemical industry is 15 times higher than in the developed countries. Also, the final energy intensity in this sector is 6.8 times higher than the average of the total manufacturing industry in Romania. The other energy intensive sectors (steel and non ferrous products) have also higher values in comparison with developed countries. The best situation shows the food industry, beverages and tobacco. The energy intensity is quite low and close to the values registered in other countries. Also the light industrial has a similar situation. Concerning the electricity intensity, the analysis shows a different trend (fig 12).



Source: National Energy Data Center OEN – “Evolution and prospects on energy intensity of the Romanian economy”, Energy Efficiency International Symposium EEIS 2006

Figure 12. Electricity intensity in manufacturing industry

After a period of decrease of the electricity intensity after 1999, now there is a continuous increasing trend. The increasing trend of the electricity intensity in the chemical sector and in the metallurgy is not necessarily a bad signal, because, in our case, it means an improvement of the technical level and a “shift” from the consumption of primary energy to electricity consumption.

In Table 15 are presented some comparisons regarding the electricity intensity.

Table 15. Comparisons on electricity intensity, 2003

Country	[MWh/1000Euro]					
	TOTAL Manufacturing industry	Chemical industry	Steel	Food beverages and tobacco	Mineral and non ferrous	Light industry
Belgium	0.914	1.412	3.266	0.680	1.127	0.885
Germany	0.565	1.190	2.560	0.420	1.162	0.548
Spain	0.893	1.285	6.310	0.595	1.255	0.676
France	0.652	0.929	4.109	0.665	1.086	0.357
Italy	0.718	1.286	3.448	0.646	1.160	0.469
Hungary	0.710	1.503	7.008	0.725	1.621	0.375
Portugal	0.918	2.389	3.448	0.634	1.311	0.632
Bulgaria	3.849	7.789	22.258	2.196	4.522	1.291
ROMANIA	1.902	6.881	18.983	0.781	2.137	0.713

The electricity intensity in the manufacturing industry in Romania is higher than in the developed countries. Nevertheless, these differences are not so high as for the final energy intensity.

The sectors with very high electricity intensity were, and still remains, the steel and the chemical industry. Also the non ferrous and mineral industry has a high value for electricity intensity, 2 times higher than in developed countries.

4.3. Potential of energy efficiency improvement

The analyses made by Romanian experts and foreign consultants showed a high energy saving potential, both in sectors of producing, transport and distribution and in the final consumption sectors. These analyses underline that the progress in implementing energy saving measures is developing at a low pace.

The country reports elaborated by EU mentioned that in Romania, the central authorities are more concerned to develop sophisticated models for the energy market, but neglect the problem of energy efficiency. An important step was the adoption in 2004 of the National Strategy for Energy Efficiency. This document was synthesized in chapter 2. In the followings, some provisions of the document will be detailed.

On national level, the average value of the energy saving potential (calculated as the weighted average of the saving potential of different economic sectors) is estimated to 30-40% during the period 2004-2015 (in comparison with 2001 level). Based on this are obtained the savings presented in table 16.

Table 16. – Optimistic estimation of annual energy savings

Sector	Final energy consumption 2001* (ktoe/year)	Estimated economic potential (%)	Maximal final energy saving (ktoe/ year)	Maximal primary energy saving (ktoe/ year)
Total in final consumption sectors	21,803	-	6,823	7,852
Of which: Industry	9,351	10-17	1,590	1,752

Source: National Strategy for Energy Efficiency

Note: * the National Strategy for Energy Efficiency was developed in 2003 and the data on final energy consumption for 2001 were at that time preliminary data, so that there is a certain difference between these values and the definitive ones presented in table 3.

In order to save one toe final energy per year, the average needed specific investment is estimated at about 170 Euro. With these premises, the value of needed investments to exploit the total energy saving potential in the final energy consumption sectors and in the industry is presented in table 17.

Table 17. Investments needed to use all energy saving potential in energy end-use sectors

Sector	Maximal primary energy saving (ktoe/year)	'No cost' savings (ktoe/year)	Saving obtained by investments (ktoe/year)	Specific investments (Euro/toe)	Total investment (mil. Euro)
Total in final consumption sectors	7,852	4,137	3,715	-	7,907
of which: Industry	1,752	1,514	238	200	571

Source: National Strategy for Energy Efficiency

The strategy established as target the reduction of the energy intensity by 40%, compared to the 2001 value, in the period 2004-2015. According to this target, table 18 presents the targets established by the strategy for the industry sector and for all energy end-use sectors and the corresponding investments as well.

Table 18. Investments related to energy end-use sectors, in order to reduce the energy intensity by 40% in 2004-2015

Sector	Total primary energy saving 2004-2015 (Mtoe)	Primary energy saving by sector (ktoe/year)	Saving obtained by investments (%)	Specific investment (Euro/toe)	Total investment (mil. Euro)
Total in energy end-use sectors	18.1	1,510	47.3	-	1,522
Of which: Industry	4.0	337	13.6	200	110

Source: National Strategy for Energy Efficiency

It is important to note that the “no cost” savings potential is 1,514 ktoe/year, corresponding to 18.1Mtoe for the entire period 2004-2015. For the same period, the strategy targets no cost savings of 3.494 Mtoe, respectively 291.17 ktoe/year. It is surprising that only a part of the “no cost” saving is considered in establishing the energy efficiency target for the industry sector (as presented in the table 18). In other terms, a higher reduction of energy intensity within the analyzed period will be possible.

4.4. Measures to improve energy efficiency in industry

For the main energy end-use industrial sectors, there were developed several studies and investments projects coordinated by ARCE, as presented in table 19.

Table 19. Studies and investments projects on energy efficiency in industry

No.	Name	Program	Value	Results
1.	Equipment catalogue for energy measurement, control and management (APAVE)	PHARE	30,000 ECU	Info dissemination regarding equipment available in energy efficiency field.
2.	Energy audit to paper factory AMBRO Suceava	PHARE	50,000 ECU	Know-how transfer for energy audits performance and recommendations for rational use of energy and improvement of energy efficiency in the paper and pulp sector
3.	Energy conservation and switch of fuels in the cement industry – MOLDOCIM	PHARE	150,000 ECU	Implementing measures to reduce energy consumption in cement industry and switch liquid fossil fuel and gas to coal
4.	Training and management techniques for energy management and energy saving technologies	PHARE	22,000 ECU	Training course for energy management and energy conservation technologies
5.	Integrated energy services for industry	PHARE	600,000 ECU	Identification of medium and high cost investments and preparing the needed documentation for large investments projects
6.	Schemes and measures to implement in Romania the specific energy saving LTA in industry	SAVE II	133,000 EURO	Building of a framework document for LTA to reduce energy intensity in main industrial sectors (chemical industry and steel)
7.	Monitoring and management of energy consumption in industry	PHARE	300,000 ECU	Scheme for monitoring and management of demonstrative projects implemented in companies from 3 industrial sectors

No.	Name	Program	Value	Results
8.	Increasing the capability for energy management – financing of energy efficiency projects for large industrial consumers	PHARE	200,000 ECU	Short term investment plan with financing from own resources and contribution from PHARE program
9.	Energy Conservation Financing Scheme	PHARE	330,000 EURO	Assistance to train the personnel from different economic sectors on financial schemes for energy efficiency projects

Source: National Strategy for Energy Efficiency

The studies and the projects performed in the industrial sectors identified an investments portfolio totaling 25 mil USD of which 15 mil USD with 100% bankability from a credit line offered by the European Bank for Reconstruction and Development (Romania – Energy Conservation Financing Scheme). The attitude of industrial consumers was very positive, especially towards the projects with demonstration components and projects which were further developed with own financial contributions. The analyzed investments demonstrated the existence of a savings economic potential between 15% to 60% and the possibility to pay back the credits. In this context there were created specialized institutions to finance and facilitate investments (e.g. the Romanian Fund for Energy Efficiency).

An important impact, obtained with low cost, may create energy management activities together with minor investments, in measurements, control equipment and software for data processing and analyze. The activities of ARCE territorial branches were very useful to build the interface between the consultants and the assisted industrial consumers in order to motivate and activate those consumers and also to monitor the effects of the demonstration projects.

In addition to the projects and actions coordinated by ARCE, other technology modernization measures has been performed or planned in the industrial sectors. Details on the obtained or estimated costs and energy savings of these measures are presented in table 20.

Table 20. Investments for energy savings

Nr. crt.	Industrial sector	Performed investments or ongoing (2001-2004)		Investments planned for 2004-2010	
		Investment value (mil. USD)	Energy saving (ktoe/year)	Investment value (mil. USD)	Energy saving (ktoe/year)
1.	Chemical fertilizers industry	135.3	276.0	15.0	338.0
2.	Chemical industry	165.0	17.8	87.0	19.3
3.	Oil processing industry	118.3	43.7	n.a.	n.a.
4.	Construction materials industry	650.0	132.0	1500.0	300.0
5.	Paper and pulp industry	195.0	15.0	n.a.	n.a.

6.	Wood industry	150.0	25.0	n.a.	n.a.
7.	Machinery industry	39.4	15.7	23.0	0.9
8.	Steel industry	161.2	124.4	102.7	58.0
9.	Non ferrous metallurgy	30.7	6.8	73.5	13.7

Source: National Strategy for Energy Efficiency

The investments efficiency is demonstrated by the decreasing trend of the specific energy consumption. Table 21 and 22 present the specific energy consumption evolution to manufacture some industrial products in the industry of consumption goods, respectively in steel or non ferrous industry.

Table 21. Evolution of specific energy consumption for the main industrial products

Industry	Energy	U.M.	1989	1992	1996	2000	2002
Cement	Fuel	toe/ton clinker	87.130	95.870	90.200	90.070	80.400
	Electricity	toe/ton cement	12.420	11.800	11.220	10.540	10.060
Fine ceramics for constructions	Heat	ktoe/kg	0.384	0.415	0.235	0.134	0.107
	Electricity	ktoe /kg	0.027	0.027	0.023	0.020	0.021
Glass	Heat	ktoe /kg	0.396	0.498	0.371	0.324	0.296
	Electricity	ktoe /kg	10.920	12.300	9.980	8.340	8.000
Fine ceramics for domestic use, decorative	Heat	ktoe /kg	0.572	0.647	0.364	0.304	0.266
	Electricity	ktoe /kg	18.100	25.990	17.760	15.500	12.900
Pulp	Heat	toe/kg	0.160	0.220	0.152	0.130	0.128
	Electricity	toe/ton	0.129	0.146	0.122	0.116	0.108
Paper	Heat	toe/ton	0.260	0.290	0.220	0.215	0.208
	Electricity	toe/ton	0.112	0.146	0.110	0.100	0.094
Stratified wood	Fuel	toe/1000m ³	176.67	180.000	178.670	173.330	166.670
	Electricity	toe/1000m ³	12.900	16.360	15.530	14.660	14.620

Source: National Strategy for Energy Efficiency

Table 22. Evolution of specific energy consumption in the steel and non ferrous metallurgy

Type		1990	1992	1996	2000	2002	2005	2010
Steel metallurgy								
Integrated specific consumption	toe/ton steel	0.745	0.668	0.598	0.561	0.537	0.513	0.466
Non ferrous metallurgy								
Electricity specific consumption	toe/ton	1.582	1.600	1.686	1.505	1.488	1.462	1.376

Source: National Strategy for Energy Efficiency

CONCLUSIONS chapter 4.

1. A continuous increase of the industrial production was manifested between 2000 and 2004. The manufacturing industry determined the overall industrial production increase.
2. Industry privatization acceleration led to an increase of the contribution of the private sector up to 30% in gross added value and in industrial production.
3. The most energy intensive branches are metallurgy, chemistry and construction materials that have a low added value contribution within the manufacturing industry, whereas the branches with the highest added value and low energy intensity are food, beverages and tobacco industry, light industry and machines constructions industry.
4. Final energy intensity for the manufacturing industry as a whole decreased in the last years due to the structural reforms. Still there is a trend of increasing energy intensity in energy intensive branches.
5. An important overall energy saving potential is estimated: 30-40%. In the industry, the energy saving potential is estimated to about 1514 ktoe/year by no cost or low cost measures and to about 238 ktoe/year by new investments.

5. POLITICAL CONTEXT

5.1. LTA preconditions

Usually, the following 7 preconditions are analyzed as criteria which should be fulfilled in order to have a LTA minimum failure risk:

1. *Social –economic stability* – evaluates the social economic conditions needed in order that the Government and the industry may focus their attention on actions and measures specific to promote energy efficiency. It includes aspects like economic growth, industrial production, the financial situation, the policy on energy efficiency promotion;
2. *Political continuity* – regards the political conditions under which the Government and the Industry could fulfill the technical and financial commitments within a future LTA: the policy situation trends, existence of industry homogenous and credible structures, at the branch and sector level;
3. *Interest shown for energy efficiency and environmental protection* – identifies the trend of actions to improve energy efficiency and environmental protection promoted by the Government and the Industry;
4. *Confidence in economic policy* – evaluates the economical principles guiding the economy, as sustainable development and planning. It reviews that the Government agreed to contribute to the industrial sector development, that there is interest for energy efficiency in the industry and that there is the availability to develop investments for a longer term than 1 year ;
5. *Political and organizational cooperation* – regards the cooperation between the Government and the industry to develop some decisions and the existing opportunities to assume responsibilities within the potential LTA negotiations;
6. *Feasibility of energy efficiency programs* – the technical and economical possibilities to develop energy efficiency programs, the energy efficiency know-how, the financial capability of the industry to implement efficient technologies, the Government financial possibilities to sustain the program;
7. *Interest to participation*: regards the evaluation of incentives and availability shown by the Government and the industry motivation for negotiations.

5.2. Review of the SAVE 2000 preconditions

The project SAVE II “Schemes and measures to implement in Romania the specific energy saving long term agreements in industry”, developed in 2000-2001, analyzed the opportunity to implement LTA in Romania..

The conclusions of this study on fulfillment of preconditions are:

1. Social – economic stability

- the macroeconomic situation in 1999 was: GDP in decrease in comparison to the precedent year, but a general positive trend, the unemployment rate was high, low privatization penetration, financial losses in state enterprises, low financial discipline and developed underground economy;
- the legal framework for market economy was built, but the administrative capacity of the responsible bodies to operate the framework was low;
- the industry was confronted with social protests linked to the reforms and the increased unemployment and high inflation as well;
- the Government was able to control the political stability only for short term programs.

This precondition was partial fulfilled, the social – political situation being confronted with adverse reactions.

2. Political continuity

- the continuation of the macro-economic reform was a strategic direction for the Government, but regarding the structure of the industry sector no real decisions were taken;
- the accession of Romania to the EU was a priority objective for the national policy;
- the relation between the Government and the industry was still under the influence of the subordination mentality, residual from the former centralized economy;
- lack of industry confidence in Government policy continuity.

The precondition was only partial fulfilled.

3. Interest shown for energy efficiency and environmental protection

- positive activities of the Government, within the alignment of indigenous legislation to the European acquis;
- the industry sector reform led partially to the awareness of managers regarding the role of energy efficiency and environmental protection.

The precondition was appreciated to be fulfilled in a quite high level.

4. Confidence in economic policy

- the economic development and the policy in energy sector was in line with the first stage of the reform process;
- the Law 199/2000 created the institutional framework to develop programs and activities on energy efficiency;
- lack of industrial policy at national level;
- the industry had a manifest interest for investments to rise the production quality, but lower interest for investments that are oriented to energy efficiency for longer term;
- postponement of energy efficiency investments after privatization and reforms, due to the incertitude about the viability of some industrial companies.

The precondition was satisfactory fulfilled.

5. Political and organizational cooperation

- lack of collaboration experience between the Government and the industry;
- energy efficiency was considered as a minor factor for the modernization of the industry, in comparison with other factors (quality, new technologies);
- the needed cooperation between the Government and the industry was appreciated as difficult to be achieved: the Government looked not so interested to negotiate the problems with the industry, and the industry was oriented to other priorities.

The precondition was fulfilled in a low degree.

6. *Feasibility of energy efficiency programs*

- a significant potential for energy efficiency was identified, but also barriers to overcome: Governmental subsidies imposed by the social conflicts, the low income level etc;
- the institutional framework (ARCE) was in place to identify the energy efficiency problems, offer consultancy and accelerate the process of programs and projects building;
- the industry was interested for investments in new technologies in order to reduce the product costs (high quality) and maintain their position on the market;
- existence of the Special Fund for the development of the energy system according to the Law 199/2000, able to provide some funds for energy efficiency investments

This precondition was almost fulfilled.

7. *Interest to participation*

- no clear signals from the Government and the industry to participate into negotiations on LTA;
- Governmental priorities were focused to elaborate a coherent national energy efficiency program, with clear objectives.

This precondition was almost not at all fulfilled.

5.3. Present Preconditions

1. *Social – economic stability*

- the macro-economic situation after 2000 was marked by a positive evolution, characterized by an important GDP increase (estimated 8% increase in 2006), in parallel with decrease of inflation and unemployment rate. The private sector share in GDP increased. Romania was engaged in a stable process of economical development and recovering the gap to the EU countries. The 2007 Romanian integration in the EU will accelerate this process;
- the industry is in the last phase of the reform process, the manufacturing industry being almost totally privatized;
- the Government is able to assure the political stability for medium term programs.

The precondition is fulfilled in a high degree.

2. *Political continuity*

- the Government strategies and policies are focusing mainly to improve the economic competitiveness and the development of market mechanism in view of sustainable development and environmental protection
- the relation between Government and Industry is still static
- there is clear continuity of the Governmental policy regarding the economy as a whole and the industry.

The precondition is fulfilled in a high degree.

3. *Interest shown for energy efficiency and environmental protection*

- the majority of policies and strategies adopted in the last years includes messages on improving energy efficiency and environmental protection. The whole needed regulatory framework to align the Romanian laws to the Community acquis were adopted. Also the most recent Directives are to be soon transposed. It is necessary to

- update the strategy for energy efficiency and energy efficiency law, and also details how to integrate the energy efficiency issues in the environmental policy;
- from the point of view of the industry, the privatization led to the growth of investments addressing energy efficiency, in view of competitiveness increase on the market.

The precondition is evaluated to be satisfactory fulfilled.

4. *Confidence in economic policy*

- economic and policy development in the energy field is satisfactory to the level to permit the integration in the EU;
- the legislative institutional framework is stated by the Law 199/2000. There has been a certain limited capacity of the administration to apply the legislation in force. E.g. the Law 199/2000 was modified frequently and its application norms too;
- the main strategic lines for the official industrial policy were defined at national level;
- the industry is still more interested in investments to enhance product quality then to investment in energy efficiency measures for the medium and long term.

The precondition is fulfilled on medium degree.

5. *Political and organizational cooperation*

- lack of collaboration experience on energy efficiency aspects between the industry and the Government;
- the cooperation between them, asked for the LTA negotiations, is still difficult to achieve. The industry is interested to obtain direct financial resources for direct investments in energy efficiency while the Government has not yet managed to identify these incentives.

The precondition looks to be fulfilled in a low degree.

6. *Feasibility of energy efficiency programs*

- there is a high potential for energy efficiency projects, including no cost measures;
- the financing sources for energy efficiency projects are not clearly developed in strategies and energy policies; it is considered that the costs will be covered by the private sector or, in the best case, within a public-private partnership;
- after the EU integration, there are good opportunities to attract funds for energy efficiency from the structural funds. Also credits from FREE are still available.
- the institutional framework (ARCE) is in place to identify the energy efficiency problems, offer consultancy and accelerate the process of programs and projects building;

This precondition is satisfactory fulfilled.

7. *Interest to participation*

- the views of the Government and the industry to participate in LTA negotiations are not clearly defined. By the end of the project, the positions of both parties will be more explicit.

In table 23 is presented a conclusion of the preconditions and their degree of fulfillment.

Table 23. The fulfillment of the preconditions

Preconditions	Fulfillment degree	
	SAVE II project	Today
6. Social – economic stability	XX	XXX
7. Political continuity	XX	XXX
8. Interest shown for energy efficiency and environmental protection	XX	XXX
9. Confidence in economic policy	XX	XX
10. Political and organizational cooperation	X	X
6. Feasibility of energy efficiency programs	XX	XX
7. Interest to LTA participation	X	*

X – low

XX – medium

XXX – high

* this precondition will be clarified within the present project.

6. LTA CONCEPT APPROACH

The comments on the actual perception of both parts, the government and the industry, regarding their involvement in LTA procedures, were developed mostly during direct contacts with government and industry representatives. The contacts were performed in the period November 2006 to January 2007, as communications, interviews, discussions within presentation meetings (see annex)

6.1. Government side

- During the transition period, the government priorities and resources were directed to the most urgent subjects as privatization, unemployment control etc. The privatization has also lead to an exaggerate dissolution of the relations with the industry. Thus leading to scarce information and data on energy efficiency. No financial means were made available to promote the implementation of the government policy on energy efficiency. Activities were limited, and focused mainly on the restrictive aspects (taxes, penalties) and not on incentives.
- In the last years government efforts and the regulatory framework in all domains, including the industry, were focused on the accession of the country into the EU. Legislative activities which were not a “must” for the EU accession became a lower priority.
- There is no governmental experience with a voluntary agreement procedure with the industry. Today the conditions for energy efficiency tools implementation, including LTA, are much better: the EU accession was performed, the economic development increased the financial resources and the security of the energy supply is very topical due to recent problems linked to the natural gas and oil supply. The government will define a

new strategy for the energy supply security (to be issued in June 2007), reconfirming energy efficiency as a priority.

- Nevertheless, once some resources were available to be allocated to energy efficiency programme, the priority was given to the residential sector, because the potential for energy savings in industry is ranked on the second place, after the energy savings potential in the residential sector.
- A large energy saving potential is reported in the power industry, to electricity and thermal energy producers as well. A overall and comprehensive approach on energy efficiency increase should include all energy chain, from production to consumption. Otherwise, the losses on energy producers are included in energy tariffs paid by the users (manufacturing industry). An increasing energy tariff may jeopardize and discourage the industry efforts to decrease the energy bill by improving their energy efficiency.
- For the moment, the promoter of LTAs on the governmental side is the Industrial Policy Department within the Ministry of Economy and Commerce. As energy efficiency schemes as LTA, require a collaborative work on several ministers (Economy and Commerce, Finance, Environment a.o.), the commitment of the Government should be enlarged to other ministers as well. Even if the Ministry of Economy and Commerce is promoting some initiatives on energy efficiency, the Ministry of Finance has a typical reluctance to accept financial incentives and generally deters these initiatives. A relevant precedent was the promotion of incentives within the Energy Efficiency Law. This is why a collaborative inter-ministerial work to promote LTA is necessary. Also it should be decided the entity to represent and sign the LTA Letters of Intent on behalf the Government.
- The LTA concept is already formally introduced in the legislative framework by the Energy Efficiency Law 56/2006. One of the Government concern on LTA is to identify resources for financial incentives. It should be investigated the possible use for LTA purposes of structural funds, which are directed for energy efficiency to consumers as well.
- Recommended industrial branches for LTA are: cement, chemical, glass. According the EU accession commitments, the Romanian metallurgy should not receive any kind of state aide.

6.2 Industry side

- The related costs to energy consumption are one of the main industry concerns. Other concerns are the access to qualified labor force and the stability of the market environment. Nevertheless, the energy issue is perceived mainly by the energy bill, thus way the main efforts are directed to reduce the bill by commercial arrangements (e.g., by acquiring the electricity on high voltage instead of medium voltage, or by optimizing the energy supply contracts). Even if investments in energy efficiency projects may be more lucrative, large energy consuming companies look more attracted to become energy self producers, using renewables energy sources or/and cogeneration units (e.g. the cogeneration units on gas installed recently by several industrial companies),

- The weak focus of some industrial company on energy efficiency, may be explained by:
 - insufficient stability of the energy market and energy tariffs.
 - energy efficiency investments are expected to have a long payback period;
 - lack of information and culture on energy efficiency;
 - lack of confidence in new procedure, as energy performance contracts;
 - companies energy managers have usually a weak position within the company top management. This explains also the low response to comply with the Energy Efficiency Law provision to report an energy efficiency action plan;
 - lack of information on energy efficiency status in the company. Many companies did not perform audits to verify and monitor the energy efficiency by specific indicators;
 - invalid perception from the management that energy consumption reduction means limiting the company's development;
 - national banks are not enthusiastic towards energy efficiency investments.

- The attitude towards energy efficiency is positively changing. Important investments were developed in the last years, some of them taking advantage of incentives offered by specific programmes (e.g. UNDP-GEF programme, the Romanian Environment Fund or the Romanian Fund for Energy Efficiency).

- The private industry has already 5-6 years of competition experience on an open market. Energy consuming sectors (metallurgy, chemical, cement) are in full process of technological modernization. The most advanced and positive towards an LTA are the large companies owned by Western capital. A good example can be found in the cement industry where energy procedures and energy policy are aligned to Western standards and benchmarking with other companies all over the world is used.

- A review of existing industry associations showed a large development and an elaborated structure, covering all important industrial companies. There is a clear willingness of these associations to improve their activities, gain relevance and improve their positions towards the government and towards the other associations. At the same time some weaknesses are identified, as:
 - In some cases the association activities are formal and superficial;
 - in case of a LTA, many associations has low capacity to represent, monitor and penalize the component companies, during the LTA negotiation and enforcing the LTA obligations;
 - Some associations are based, controlled and at the end identified with the most important company (companies) in the sector;
 - The (too) many associations and unions of associations are some time overlapping, in competition and divide the companies working in the same industrial branch.

- The main and relevant industry associations are the following:
 - UGIR – General Union of Romanian Industrialists
 - UGIR-1903 General Confederation of Romanian Industrialists
 - CONPIROM – Employers Confederation of the Romanian Industry
 - FEPACHIM – The Romanian Employer's Federation of Chemistry and Petrochemistry
 - UNIROMSIDER - Romanian Steel Producers' Union

- NITROFOSFOR - Employers' Organization of Fertilizers
 - CIROM - Employers' Organisation in Cement Industry and other Mineral Products for Construction in Romania
 - STICEF- Employers' Organisation of Glass and Fine Ceramics Industry
 - FEPA-CM – Employers' Association of the Machinery Construction Industry
 - FEPAIUS – Employers' Association of the Light Industry
- From the beginning of the present project, the attitude of the industry associations towards the LTA concept was positive, as several association issued letters of interest on the project (ROMPAP-Employers' organisation for Pulp and Paper Industry, FEPACHIM, ASPAPLAST- Employers' Association of Plastics Materials Manufacturers).
 - There is still a psychological barrier for the industry, to admit the government as a partner for a common interest. A clear and sustained positive attitude of the government will change this mentality.
 - Most industry companies focus too much on financial incentives as the major item within LTA. This way, many other elements able to enter into the negotiation process are neglected, and on the other side the government is discouraged and stressed to identify quick financial resources which are not obvious for the moment. A more in depth and careful LTA approach of the industries will lead to identify other facilities (e.g. a cement industry company is interested in an arrangement to collect old tires to be used as fuel in their heat producing processes). Large and profitable companies are much more prepared to value other facilities to be offered by the government than direct financial incentives.

7. CONCLUSIONS AND RECOMMENDATIONS

- The manufacturing industry is the largest national final energy consumer. Although there is a descending trend for energy intensity, the actual values are still high compared to the EU values. The average final energy intensity in the manufacturing industry is 3 to 4 times higher than in the developed EU countries. The most unfavorable figures are reported in the chemical industry: the intensity is 15 times higher than in the developed countries.
- A legal framework to promote energy efficiency is in place. The National Strategy for Energy Efficiency states the target to decrease the energy intensity at national level with 40% during the period 2004-2015, compared to 2001. This means a yearly decrease of about 3.5%. The strategy mentions LTA as a tool for the energy conservation policy. Despite this framework, no promotion scheme for energy efficiency is operational.
- An important overall energy saving potential is estimated: 30-40%. In industry, the energy saving potential is estimated to about 1514 ktoe/yr by no cost or low cost measures, and to about 238 ktoe/yr by new investments.
- The present conditions are favorable for LTA promotion in general, and specifically for the first phase of the LTA procedure, the political commitment. The most important factors which improved recently the LTA environment are: the EU

accession of the country, the satisfactory economy evolution and the strategic task to secure the energy supply.

- Both parts of the LTA procedure, the government and the industry, manifested a positive preliminary approach on the LTA implementation.
- If both the industry and the Government intend to continue with the LTA concept, a Letter of Intent (LOI) could be established indicating further steps. Who to sign this LOI on behalf of Government still needs to be settled.
- The LTA process may be disconcerted if the parts focus too early on the concrete objectives, targets and facilities agreed in a LTA, as these elements are to be identified and negotiated within the further steps of the LTA procedure. The industry should not see direct financial incentives as the only LTA facility to be asked to the Government. In each negotiation process, various and specific facilities may be identified.
- The first pilot LTA/LTAs are to be negotiated with important, relevant company/companies, which already started the technological modernization. The industrial branches to be approached for first LTAs are high consuming energy sectors like: cement, chemical, glass & ceramics etc.
- The possibility to use the EU structural funds as financial incentives within LTA should be investigated and the eligibility of these funds for such purposes to be confirmed.
- The continuation of the Dutch assistance during the LTA pilot phase for energy audit and LTA negotiation is welcomed.

REFERENCES

- Statistical documents issued by the National Institute of Statistics, 2000-2006
- Legal documents issued by the Parliament, Government, Ministry of Economy and Commerce, 2000-2006.
- National Energy Data Center OEN -ICEMENERG, “Evolution and prospects on energy intensity of the Romanian economy”, Energy Efficiency International Symposium EEIS 2006
- SAVE II Project Report: “Schemes and measures to implement in Romania the specific energy saving long term agreements in industry” 2000-2001
- Ministry of Economy and Commerce -”Energy Policy of Romania 2006-2009” (project)
- Information obtained during contacts with LTA stakeholders (see annex)