Chapter 2

Current Romanian Context

2 Current Romanian Context

2.1 Introduction to Romania

Name	Romania
Geographic Location:	South east of Central Europe, north of the Balkan Peninsula, in the Lower Danube basin, bordering the Black Sea.
Geographic coordinates:	46 00 N, 25 00 E
Boundaries:	- In the east: Ukraine 169 km, the Republic of Moldova 450 km and the Black Sea 225 km ; - In the south: Bulgaria 608 km; - In the south and south-west: Yugoslavia 476 km; - In the west: Hungary 443 km; - In the north: Ukraine 362 km.
Area:	238,391 sq km (12th position in Europe) Land: 231,231 sq km Water: 7,160 sq km
Border Length:	3,190.3 km
Coast line:	225 km
Maritime claims:	contiguous zone: 24 NM continental shelf: 200-m depth or to the depth of exploitation exclusive economic zone: 200 NM territorial sea: 12 NM
Geological Age:	The same as the European Continent, some 550 million years.
Physical Features:	Mountains (31%), hills and plateaus (33%), plains (36%).
Hydrography:	The river Danube in the south of the country, length 1,075 km (out of a total of 2,850 km from its source to its reaching the sea).
Other Rivers:	Mures, Olt, Prut, Siret, Ialomita, Somes, Arges, Jiu, Buzau, Bistrita etc.
Lakes:	approximately 2,300 lakes and over1,150 ponds (2,650 sq.km). The best known are Razelm (415 sq.km), Sinoe (171 sq.km), Brates (21 sq.km), Tasaul (20 sq.km), Techirghiol (12 sq.km) and Snagov (5.8 sq.km).
Climate:	Temperate continental, with oceanic influences from the west, Mediterranean from the south-west, excessive continental from the north-east. Mean annual temperatures: ranging between 8 degrees in the north and 11 degrees in the south. Average annual rainfall does not exceed 700 m.
Population:	22,364,022 (July 2001 est.) inhabitants. Density: 95.7 inhabitants per sq.km Demographic structure: Romanian 89.5%, Hungarian 7.1%, Roma 1.8%, German 0.5%, Ukrainian 0.3%, other 0.8% (1992) Religions: Romanian Orthodox 70%, Roman Catholic 3%, Uniate Catholic 3%, Protestant 6%, unaffiliated 18%
Main cities:	(inhabitants as of 7 January 1992): Bucharest (2,066,723), Constanta (350,581), Iasi (344,425), Timisoara (334,115), Cluj-Napoca (328,602), Galati (326,141), Brasov (323,786), Craiova (303,959). Twenty-five cities have a population of over 100,000, while eight cities exceed 300,000.

Form of government:	Republic, according to the Constitution voted by Parliament on 21 November 1991 and validated by referendum on 8 December 1991. The two-chamber Parliament (the Chamber of Deputies and the Senate), elected for a four-year term, is the people's supreme representative body and the sole law-making authority. The president is elected by universal vote for two four-year terms at the most. The Government, validated by Parliament, provides general management of public administration.
Capital:	Bucharest ('Bucuresti') municipality (1,521 sq.km), divided into six administrative districts, lies in the south-eastern part of the country, in the Romanian Plain (altitude 85 m). It dates back to the 14th century and is recorded in writing for the first time in 1459 as residence of prince Vlad the Impaler. Capital of Wallachia in the 17th-19th centuries and then of Romania since 1862, Bucharest is the most important political, economic, cultural and scientific centre of the country
Administrative divisions:	41 counties (judete, singular - judet); Alba, Arad, Arges, Bacau, Bihor, Bistrita-Nasaud, Botosani, Braila, Brasov, Bucuresti, Buzau, Calarasi, Caras-Severin, Cluj, Constanta, Covasna, Dimbovita, Dolj, Galati, Gorj, Giurgiu, Harghita, Hunedoara, Ialomita, Iasi, Maramures, Mehedinti, Mures, Neamt, Olt, Prahova, Salaj, Satu Mare, Sibiu, Suceava, Teleorman, Timis, Tulcea, Vaslui, Vilcea, Vrancea and Bucharest municipality (municipiu, county status) , 260 towns (of which 57 are municipalities), 2,688 communes (with about 13,000 villages).
Independence:	1881 (from Turkey; republic proclaimed 30 December 1947)
Constitution:	8 December 1991
Suffrage:	18 years of age; universal
Executive branch:	Chief of state: President Ion ILIESCU (since 20 December 2000) head of government: Prime Minister Adrian NASTASE (since 29 December 2000) cabinet: Council of Ministers appointed by the prime minister elections: president elected by popular vote for a four-year term; election last held 26 November 2000, with runoff between the top two candidates held 10 December 2000 (next to be held NA November/December 2004); prime minister appointed by the president election results: percent of vote - Ion ILIESCU 66.84%, Corneliu Vadim TUDOR 33.16%
Legislative branch:	Bicameral Parliament or Parlament consists of the Senate or Senat (140 seats; members are elected by direct popular vote on a proportional representation basis to serve four-year terms) and the Chamber of Deputies or Adunarea Deputatilor (345 seats; members are elected by direct popular vote on a proportional representation basis to serve four-year terms)

2.2 General Economic Conditions

2.2.1 Economic and Social Indicators

Romania's population currently stands at about 22.5 million, just over 2 million of whom reside in the capital, Bucharest. About 55 percent of Romania's population live in urban areas. The decline in the relative size of the rural population, which was a feature of virtually all of the 20th century, and which accelerated during the heavy industrialization period from the 1960's through to the late 1980's has now ended, the relative size of urban and rural populations having been relatively stable over the last decade.

Overall however, Romania has been experiencing a slight population decline over the last decade. This is illustrated in Table 2.2.1 below.

Table 2.2.1: Population Trends 1970-1999
(Selected Years July 1st)

Year	Total	Number (million)		Percentage	
		Urban	Rural	Urban	Rural
1970	20.25	7.47	12.79	36.9	63.1
1980	22.2	10.17	12.03	45.8	54.2
1985	22.72	11.37	11.35	50	50
1990	23.21	12.61	10.6	54.3	45.7
1995	22.68	12.46	10.22	54.9	45.1
1996	22.61	12.41	10.2	54.9	45.1
1997	22.55	12.4	10.14	55	45
1998	22.5	12.35	10.15	54.9	45.1
1999	22.5	12.3	10.16	54.8	45.2

Source: National Commission for Statistics

Romania is one of the poorer developing countries, its per capita income in 1999 of $US 1,520 being approximately 70% of the average of all transition economies in Europe and Central Asia, and about 25% greater than the average for all lower middle income developing countries.

This is reflected in certain key social indicators: for example, infant mortality rates, at 21 per 1,000 live births, are significantly higher than for the lower middle income developing country group, which have 33 infant deaths per thousand live births. Similarly, only 62% of the Romanian population has access to safe water compared with 86% for all lower middle income developing countries. On the positive side however, only 2% of the Romanian population over the age or 15 is illiterate, compared with 15 % for the lower middle income group.

The key characteristic of economic development in Romania in recent years has been its struggle to adapt to the new demands of a market economy. The transition process has been particularly difficult for Romania, due in large part to its pre-transition emphasis on heavy industry, much of which has been unable to compete under increasingly free market conditions. This has resulted in major reductions in GNP, extremely high rates of inflation, high levels of unemployment, and growing social problems.

Slow progress during the 1990s in introducing economic reforms in Romania, in particular with regard to privatization of state owned enterprises and financial sector reform has prolonged the adjustment process, while impacting sharply upon the lowest income groups. The share of the population living below the national poverty line increased from 20 to 41 percent during the second half of the 1990's.

Of particular importance for the present study is the status of the industrial sector, which has shown a considerable decline over the last two decades. Thus the value added by the industry sector in Romania in 1990 was about 68% of that for the year 1980, falling to 41% in 1991, rising again slightly to 47% in 1995.1

The decline of the industrial sector and abandonment of industrial sites has also revealed the extent of environmental damage caused by these operations, and historical industrial waste being a major environmental problem for the country. On the other hand, the decline in this sector has meant a reduction in the on-going emission of industrial pollutants in Romania.

The major economic objective of Romania is to achieve accession to the European Union, and rapid reforms are required in a number of areas, including general economic policy as well as the country's environmental performance. Clearly, these two aspects are closely interrelated. Economic growth will be required to finance environmental improvements, and environmental improvements will be required to address health issues and therefore productivity and growth.

2.2.2 Recent Economic Trends

As indicated below, recent trends in macroeconomic indicators show that little progress was made during the 1990's in terms of income growth, while inflation and unemployment remained major problems.

Table 2.2.2: Macroeconomic Indicators

	1995	1996	1997	1998	1999	2000
GDP growth (%)	7.1	3.9	-6.1	-5.4	-3.2	1.6
GNP per capita ($US)	1,400	1,450	1,420	1,430	1,520	1,640
Current Account Balance($US million)	(1,732)	(2,611)	(2,360)	(3,112)	(1,302)	(1,200)
Govt. Budget Balance (% of GDP)	-3.4	-4.8	-5.2	-5.5	-3.7	-3.8
Inflation (CPI)	32.3	38.8	154.8	59.1	45.8	40.7
Unemployment Rate (%)	9.5	6.6	8.9	10.4	11.5	10.5

Source: National Commission for Statistics

Industry remains the most important sector in terms of value added, followed by agriculture. Nevertheless by 1999 both sectors were relatively less important contributors to overall Value Added than they were in 1994, during which period the service sector became increasingly important. Details are shown in the following two Tables:

[1] Source: PHARE Support for Environmental management, Ministry of Waters, Forests and Environmental protection, Group on Hazardous Waste Management, November 1996.

Table 2.2.3: Indices of GDP, by Sector (1990=100)

	1994	1995	1996	1997	1998	1999
Agriculture	89.9	94.2	90.2	89.1	79.6	82.5
Silviculture etc	64.9	66.9	66.9	63.1	63	61
Industry	78.6	83	88.7	81.6	77.3	76.2
Construction	120.8	128.9	129.9	104.9	100.2	97.9
Trade	60.9	74.2	83.4	74.4	77.5	75.5
Transport	78.1	78.7	79.3	70	60.4	57.8
Post, Telecomms	199.3	211.9	279.2	274.7	279.7	278.5
Financial, banking	142.3	144.3	123.7	95.8	97.6	88.4
Real Estate/other Services	122.4	136	156.3	145.6	145.5	144.2
General Government	113.9	119	110.5	106.9	103.3	93.7
Education	120	124.2	136.6	123.8	123.3	119.9
Health, Social	106.2	109.1	119.4	105.2	121.7	109.9
GDP	83.8	89.8	93.4	87.7	83.5	81.6
GDP per capita	85.6	91.9	95.8	90.2	86.1	84.3

Table 2.2.4: Value Added by Sector, 1999 (in billion lei/ 1999 prices)

Sector	Value Added in 1999 (bn. Lei 1999 prices)	Percent of Total Value Added in 1999	Percent of Total Value Added in 1994	Change in Relative Importance of Sector 1994-1999
Agriculture	69,832.4	14.5	19.4	-25%
Silviculture etc	2,263.6	0.5	0.5	0
Industry	146,054.2	30.4	36.2	-16%
Construction	26,260.2	5.5	6.5	-15%
Trade	70,660.4	14.7	8.2	+79%
Transport	33,844.9	7.0	7.5	-7%
Post, Telecomms	21,295.6	4.4	1.3	+238%
Financial, banking	8,494.1	1.8	4.8	-62%
Real Estate etc	66,652.9	13.9	4.3	+223%
General Government	17,800.1	3.7	3.2	+16%
Education	13,495.3	2.8	2.5	+12%
Health, Social	11,405.3	2.4	1.9	+26%
Adjustment	-7,970.8	-1.7	-4.0	
Total	480,088.2	100.0	100	

Source for Tables 2.2.3 and 2.2.4: National Commission of Statistics

Within the industrial sector, manufacturing remains dominant, with food and beverages being the largest single sector, with metallurgy, metallic construction and metal products, crude petroleum processing, coal coking and nuclear fuel treatment; and chemistry and synthetic and man made fibers also being significant. Electricity, gas, and hot wate r supply between them account for one fifth of industrial value added in 1999.

This is illustrated by production indices over the period 1996-99, as shown in the following table:

Table 2.2.5: Structure of Industry 1996-1999: Production Indices

Year	1994	1995	1996	1997	1998	1999
Total	100	100	100	100	100	100
Mining, Quarrying	7.2	6.9	6.7	7.9	6.8	5.3
Manufacturing	79.5	80.5	82	78.8	78.8	74.4
Food, beverages	15.9	16.3	17.1	16.1	18.2	13.9
Metals	9.4	10.4	10.4	11.6	9.7	9
Oil, coal, nuclear processing/ treatment	7.7	7.7	6.4	8.3	6.3	7.9
Chemicals, synthetic/ manmade fibers	7.5	8.7	7.8	7.2	5.8	5.8
Energy/Gas, Water	13.3	12.6	11.3	13.2	14.4	20.3

Source: National Commission of Statistics

The above trend is further illustrated by employment data. The magnitude of the employment problem is revealed by the rapid decline in those employed, by roughly 25% between 1994 and 1999.

Table 2.2.6: Employment Trends by Sector 1994-1999 (thousands, Annual Average)

Sector	1994	1995	1996	1997	1998	1999
Agriculture	484	420	364	283	250	187
Sylviculture, Forestry	91	83	78	69	61	53
Industry/energy/water	2,856	2,615	2,586	2,443	2,272	1,991
Construction	515	443	431	387	378	309
Trade	495	660	587	613	654	579
Hotels, Restaurants	124	115	109	118	94	91
Transport, Storage	448	420	398	365	340	279
Post and Telcomms	93	96	97	97	100	95
Finance/Banking/Insce	56	67	69	74	76	69
Real estate/other svcs	233	195	185	144	164	167
Public Administration	123	130	125	130	134	141
Education	428	427	432	423	414	415
Health, Social	329	328	335	321	311	283
Other	163	161	143	130	121	102
Total	6,438	6,160	5,939	5,597	5,369	4,761

Source: National Commission of Statistics

2.2.3 Future Prospects

Future growth prospects depend heavily upon the pace of economic policy reform. The World Bank has identified a number of constraints that must be overcome. These include the very high levels of enterprise arrears to the banking sector and utilities; frequent changes in the legislative framework; and an unattractive business environment.

Industry was almost entirely government owned in 1991, and although about 7,000 industrial enterprises were privatized over the period 1991-98, government ownership of industry remains very high. The following table shows that SOE's still account for almost 70%

of Romania's industrial GDP, and 38% of total GDP.

Table 2.2.7: Public Sector Share in GDP 1991, 1999 (Percent)

	1991	1999 (est)
Total GDP	76	38
Agriculture	21	7
Industry	99	68

Specific areas where structural reform is required, as identified by the World Bank, include the following:

- Enterprise privatization
- Banking and financial sector reforms
- Energy sector reforms, particularly pricing
- Fiscal decentralization and other reforms
- Land privatization and Agricultural sector reforms
- Education reform
- Pension reform

The World Bank has also made projections of economic growth for 2002-3 under two scenarios, namely an accelerated reform scenario and a slow reform path. Its macroeconomic prospects under the alternative scenarios, made in the year 2000, included an estimate for 2001 of a 4% growth rate. This was in fact achieved. The actual projections made by the Bank were as follows:

Table 2.2.8: Immediate Macroeconomic Prospects

	Actual	Accelerated Reform			Slow Reform		
	2000	2001	2002	2003	2001	2002	2003
GDP growth rate (%)	1.6	4.0	5.0	5.0	3.4	0.5	-2.0
Current Account Balance (% of GDP)	-3.8	-4.2	-4.8	-5.8	-4.9	-5.5	-6.1
Consolidated budget deficit (% of GDP)	-3.7	-3.7	-3.0	-2.5	-3.8	-4.3	-5.0
CPI (% change)	45.7	30.0	22.0	15.0	33.0	32.0	38.0

Source: World Bank, Country Assistance Strategy, Romania, 2001

The World Bank, in common with other external agencies, is reluctant to make longer term projections of overall economic growth. Extrapolation of past trends provides an unreliable basis in view of the recent volatility of economic performance, and much hinges upon the future pace of economic policy reform.

2.2.4 Economic Conditions and Hazardous Waste Management

In view of the difficulty of predicting macroeconomic or industrial sector growth rates in the aggregate, projections of hazardous waste generated by industry in Romania can only be

made on an industry by industry basis in which the efforts are concentrated on those most relevant for hazardous waste generation, and in light of the financial and economic prospects of individual major companies and plants.

The economic conditions and the importance of the rate of economic policy reform described above are nevertheless highly relevant in determining appropriate policy recommendations for hazardous waste management in Romania. Policy reform in the area of hazardous waste management areas, as in other areas, ideally requires:

- More rapid privatization of industry
- Cost-reflecting tariffs for key industrial inputs

Of particular concern is the acceleration of privatization in an economy where the large State Owned Enterprise sector continues to operate under soft budget constraints, and where the imposition of pollution taxes or fees, or cost-reflecting utility tariffs create little incentive to cut costs.

With regard to the private sector, clean production technology also requires pricing of energy, water and material inputs that provide an incentive to the industrial or other consumer to use them efficiently and avoid waste. More generally, a market situation in which prices adequately reflect real economic costs is a necessary condition for the adequate functioning of any system of environmental taxation or efficient resource use.

Other related "enabling factors", which provide the necessary framework within which an efficient hazardous waste policy may be developed include:

- an unambiguous legal framework, facilitating adherence to standards and enforcement of regulations
- an efficient capital market, in which, inter alia, companies can obtain funds to invest in pollution control at acceptable interest rates, and
- the presence of a population that is well informed about the causes and consequences of industrial pollution

However, these enabling factors lie outside the jurisdiction of hazardous waste management authorities. In practice therefore, this Study recognizes such constraints, tailoring certain policy recommendations to overall progress in market liberalization in the Romanian economy. While indicating longer term policy goals, the Study therefore proposes less satisfactory, but feasible shorter term actions. Accepting the realities of the current economic situation, these include a relatively slow adoption of market based instruments, and the expansion of an environmental fund to administer a carefully targeted subsidy program.

2.3 Environmental Conditions[2]

2.3.1 Natural Resources of Romania

Natural resources of Romania represent the natural capital, an important component of Romanian welfare. The capitalization of these resources, by exploitation of both non-regenerating raw materials and regenerating ones and their processing to necessary products, is determining the economic and social development of the country, state of

[2] Source: Ministry of Waters and Environmental Protection – State of Environment 2001

environment and living conditions of the population.

2.3.2 Natural Resources - Non-Regenerating Raw Materials

Natural resources of non-regenerating raw materials were and still are exploited using technologies which lead to a severe pollution in some areas of the country. The extraction and use of fossil fuels (coal, crude oil), mining areas, metallurgical industry, energy industry, chemical and petro-chemical industry, paper and pulp industry, construction industry, and other industries have a major role in environmental media pollution, releasing large quantities of common pollutants (sulphur dioxide, carbon dioxide, nitrogen oxides, ammonia), heavy metals, suspended and sedimentable particles, and other specific pollutants as: formaldehyde, hydrogen sulphide, carbon sulphide, chlorine, chlorides and others.

Effective conservation and capitalization of energy resources is a priority for Romania. Pollution from power production activities, up-stream and down-stream from the place of production, is responsible for over 50% for methane and carbon oxide, 97% for sulphur dioxide, 88% of nitrogen oxides, and 99% carbon dioxide emissions.

2.3.3 Natural Resources - Renewable Raw Materials

Renewable raw material resources are varied, but limited. The most important are: water resource, soil, fauna, flora and forest.

a) Water Resource

Water resources represent a hydrological potential which is formed by surface and ground water, in natural and arranged regimes. Water resources here exclude sea water and water which is used in individual regimes, outside the organized system.

In Romania, internal water resources are limited to 1,700 m3/yr.inh., and, by taking into consideration the Danube River, to 3.250 m3/yr.inh., much lower than those values for water rich countries like: Scandinavian countries, Austria, Hungary, Switzerland, Greece, France, etc.

The main water resource for Romania is internal rivers, 4,864 rivers, having a total length of 78,905 km.

Water consumption in industry and agriculture increased up to 1989. After 1989, water consumption in these two sectors has decreased while domestic water consumption increased. Average water consumption per capita, as well as specific consumption for industry and agriculture is bigger than in other countries. In some cases this is due to huge losses in distribution networks, inefficient usage, and old technologies.

b) Soil Resources

Soil resources in Romania are as important as water resources. Out of the total area of Romania, 238,391 sq.km, 62% is represented by agricultural land, 26.7% - forests, 3.7% -water and 7.3% - other land.

In the National Strategy for Sustainable Development it is estimated that, for ecological reconstruction of degraded areas and for restoration of the agricultural land quality, the amount of about 25-30 billion USD will be required, over a period of 15-20 years.

c) Flora and Fauna

Flora and fauna are well distributed in the Romanian territory and they are valuable assets. Romania has a wide range of biological diversity and a natural eco-systems.

2.3.4 State of Environmental Media

(1) Air

The Ministry of Waters and Environmental Protection has an air quality monitoring network which has been countinuously developed over time. From data colected by this network, one can say that the air quality has been improved due to the decrease in economic activities and to modernization and rehabilitation programs by some industrial units, as well as to the activities of EPI's.

Year	Number of monitoring stations	Number of pollutants/station	Number of analyses
1997	395	1-3	395-1185
1998	469	1-5	469-2345
1999	704	1-7	704-4928
2000	1150	1-7	1150-8050
2001	1160	1-7	1160-8120

a) Greenhouse Gases

Knowledge regarding the value of the greenhouse emissions at the national level represents an important element in defining the impact on the environment of socio-economic development, and it creates the ncessary basis for environmental protection policies.

From estimated data, total greenhouse gases emissions in Romania were 9,712,247 t CO2 equiv., approximately 65% lower than emissions from the reference year, 1989. Of the total emissions, the power sector contributed 64.8%. In comparison with emissions in 1989, 221,499 thou. t CO2 equiv., emissions in 2000 represented about 72%. The significant reduction in greenhouse gases emissions of the power sector was mainly due to the reduction in industrial production.

b) Acidification

SO2 emissions decreased from approx. 1,085 thou. tonnes in 1995 to approx. 950 thou. tonnes in 2000. The main source (approx. 67%) was the burning of fuels in power production and processing sectors.

NOx emissions were also decreasing in the period 1995-2000, from approx. 407 thou. tonnes in 1995 to 387 thou. tonnes in 2000. The main source (approx. 27%) was the burning of fuels in power production and processing sectors.

Ammonia emissions were decreasing in the period 1995-2000, from approx. 234 thou. tonnes to 184 thou. tonnes in 2000. The main source was livestock breeding.

c) Ambient Air Quality – Acidification

The daily average concentration of sulphur dioxide exceeded the Maximum Allowed Concentration (MAC, 0.25 mg/m3) in some cities. This situation was more frequent in Zlatna (7.59%), Baia Mare (0.09%), Copsa Mica (0.47%) and Medias (0.13%). The annual average

concentration of sulphur dioxide was, generally, below MAC (0.06 mg/m3), but in one case the concentration exceeded MAC (Zlatna, 0.108 mg/m3). The excessive concentration in Zlatna is due to emission from S.C. Ampellum Zlatna. For the other cities, it is due to burning of fuels having a high sulphur content.

For nitrogen dioxide, daily average concentrations have exceeded MAC (0.1 mg/m3) in 6 cities (Carei, Medias, Bucharest, Barlad, Satu Mare and Bustrita). For the annual average concentration of nitrogen dioxide, only in Carei did it exceed MAC (0.04mg/m3), having a value of 0.043mg/m3. In Bucharest, concentrations over MAC are a due to car traffic.

Daily average concentrations of ammonia have exceeded MAC (0.1 mg/m3) in 12 cities (Hunedoara, Giurgiu, Iaşi, Suceava, Zalău, Alba Iulia, Bistrița, Satu Mare, Slobozia, Tg. Mureş, Vaslui). The annual average concentration of ammonia has reached a maximum in Satu Mare city – 0.047mg/m3.

d) Heavy Metals, Persistent Organic Pollutants

If, for mercury emissions the trend was a slight increase in the period 1995-2000 (from 15.2 tonnes to 17.9 tonnes), for the cadmium emission the trend was a slight decrease (from 6.3 tonnes in 1995, having a maximum of 6.4 tonnes in 1996 and a decrease up to 6.0 tonnes in 2000). For lead emissions the general trend was an increase, but with some fluctuation (from 24.9 tonnes in 1995, a minimum of 24.3 tonnes in 1998 and 25.5 tonnes in 2000). One possible explanation for this increase in lead emissions can be intensification of road traffic.

The main source of persistent organic pollutants is agriculture, mainly through its existing storage areas for banned, unidentified and/or obsolete substances. At present, the use of toxic substances in agriculture is very limited; the reason is that the new land owners are very poor. Another source is the chemical industry, pesticide production, as well as the import of commercial substances.

It was noticed that POP emission (PAH – polyaromatic hydrocarbons, dioxines and PCB) had a slight decrese in the period 1995-2000, with the exception of 1996-1997 when it was noticed a pronounced increase, mainly for dioxines and PCB. The main sources for these emissions are non-industrial burning facilities and burning processes from processing industry.

e) Ambient Air Quality – Heavy Metals

In Copsa Mica, Baia Mare and Giurgiu lead and cadmium from suspended particles has been monitored, and there were recorded exceedance of MAC-24h (Pb-0,0007 mg/m3, Cd–0,00002 mg/m3). The highest values of lead concentrations were recorded in Baia Mare (0.224 mg/m3 – 320 times MAC) and Copsa Mica (0.046 mg/m3 – 66 times MAC). The highest values of cadmium concentrations were recorded in Baia Mare (0.01 mg/m3 – 500 times MAC) and Copsa Mica (0.0012 mg/m3 – 60 times MAC).

It can be noticed that the high levels of heavy metal pollution in these areas are similar to previous years. Of these, the highest values of daily average concentrations, both for lead and cadmium were recorded in the Baia Mare area, as a result of industrial activity of S.C. ROMPLUMB SA.

f) Suspended and Sedimentable Particles

Suspended and sedimentable particulates are major pollutants in Romania, for which MAC standards are significantly exceeded.

Atmospheric pollution with suspended particles has many sources. First, metallurgical and steel-making industries which release into the atmosphere large quantities of particles, then power and thermal plants which use solid fuels, cement factories, road transport and so on. The nature of these particles is very different, and may contain ferrous oxides, steel-making processes, or heavy metals (lead, cadmium, chromium, manganese), non-ferrous processes, or other noxious substances.

The daily average concentrations have exceeded MAC value (0.15 mg/m3) in 14 cities. The highest values were recorded in Copsa Mica – 0.839 mg/m3, Timisoara – 0.370 mg/m3, Resita – 0.347 mg/m3, Ramnicu Valcea – 0.340 mg/m3, Arad – 0.258 mg/m3 , Hunedoara – 0.250 mg/m3, Zalau – 0.259 mg/m3, Slobozia – 0.233 mg/m3, Medias – 0.225 mg/m3, Tg. Mures – 0.210 mg/m3, Alba Iulia – 0.174 mg/m3, Ocna Mures – 0.173 mg/m3.

The annual average concentrations have exceeded MAC (0.075mg/m3) in 8 cities (Arad, Resita, Zalau, Ocna Mures, Copsa Mica, Alba Iulia, Tg. Mures, Ramnicu Valcea). The highest values were recorded in Arad – 0.127 mg/m3 and Resita – 0.132 mg/m3.

Pollution levels with suspended or sedimentable particles are maintained at a high level, MAC being exceeded in an important number of monitored cities.

(2) Water

Water resources in Romania are limited to some 1,760 m3/yr/inh. or 2,680 m3/yr/inh. including the Danube's resources, a value relatively small when compared with other European countries (average 4,000 m3/yr/inh.). Romania has 4,864 watercourses with a total length of about 78,905 km.

Ninety-eight per cent of Romania lies within the Danube river basin. One-thousand and seventy-five km of the Danube river flow over Romanian territory, of which 242 km form the border between Romania and Yugoslavia, 458 km between Romania and Bulgaria and 131 km between Romania and Ukraine. The river is regulated over most of its course.

The Danube Delta, where the River flows into the Black Sea, is an ecological system unique in Europe. Its ecological value is inestimable. It covers an area of about 550,000 ha of Romanian territory, with a hydrological network including main branches, secondary branches, channels and lakes with a wide variety of species of plants, fish, and birds, most of them migratory. Because of this biodiversity the whole zone has been declared a protected area and a World Natural Heritage Site.

Only 12% of the potential water resources of the territory could have been used for continuous water supply if the natural flow regime had not been modified. That is why over 1,300 reservoirs with a total capacity of 14 billion m 3 have been built for storing water and redistributing it when needed (400 have a capacity of over 1 million m 3 each). Most of them are multipurpose reservoirs for flood protection, drinking and industrial water supply, irrigation and hydropower production.

There are also 2,000 km of canals and galleries for interbasin water diversions and the reallocation of water resources according to the needs of agricultural irrigation in dry periods and other demands for water. However, more than 70% of the inland watercourses are in their natural state (i.e. unregulated). Romania also has 194 natural lakes totalling an area of 132,730 ha and a water volume of 2,265 million m 3 . A number of natural lakes are used for therapeutic purposes and have an international reputation, such as Techirgohiol and Amara.

a) Quality of Rivers

Depending on their quality, watercourses are categorized as follows:

- Category I - includes waters that can become drinkable to supply the centres of population or animal breeding units, the food industry, salmon farms and bathing resorts (pools).
- Category II - includes surface waters that can be used for industry, pisciculture (for fish that all not as sensitive to pollution as trout), and for urban and recreational use.
- Category III - includes waters for irrigating agricultural land, electric power production in hydroelectric power plants, industrial cooling installations, cleaning units and other purposes.
- Category D - includes degraded waters improper for the development of aquatic fauna.

About 40 physical, chemical, biological and microbiological parameters (such as oxygen content, biological oxygen demand (BOD), chemical oxygen demand (COD), total dissolved solids (TDS), nutrients, organic pollutants, heavy metals) are used to categorize the waters. The limit values of the main pollutants depend on river categories.

In the year 2001, of the cadastered 78,905 km of rivers, 22,031 km, which are potentially affected by water users, are monitored. They are classified as follows:

- Category I – 14,979 km - 68.0%;
- Category II – 4,117 km - 18.7%;
- Category III – 1,401 km - 6.3%;
- Category D – 1,534 km - 7.0%.

The worst conditions, classified category "D", were encountered in the hydrological basins of the Ialomita (22.6%) and the Prut (about 21.9%). Nevertheless, overall surface water quality improved over the 1989-2001 period:

- Category I – increased from 35% in 1989 to 68% in 2001
- Category II – decreased from 25% in 1989 to 18.7% in 2001
- Category III – decreased from 18% in 1989 to 6.3% in 2001
- Category D – decreased from 22% in 1989 to about 7% in 2001

This improvement is due mainly to the reduction in polluting activities, the enforcement of economic instruments (water use and water pollution charges) and also because measures have been taken to improve the treatment of waste-water.

b) Quality of Lakes

Water quality in the lakes is generally adequate. In most cases, monitoring campaigns determined the trophic degree by physical, chemical and biological indicators as well as the water temperature, its transparency, the oxygen regime, the nutrition regime, and the evolution of the bioceonoses.

Out of 94 monitored lakes, 63 lakes (67.02%) were included in category I; 16 (17.02%) in category II; 6 (3.39%) in category III and 9 (9.57%) in category D. The state of the lakes and reservoirs was good in the hydrological basins of the Tisa, Somes , Mures , Bega-Timis, Nera-Cerna and Jiu (category I – 100%); it was inadequate in the basins of the Prut (category

D: 11.11%), the Somes (category D: 11.76%) and in the littoral area (83.57%.

As regards the trophic degree of lakes and reservoirs, the following general aspects should be mentioned: 27 (28.72%) are oligotrophic; 7 (7.46%) are oligo-mesotrophic; 30 (31.91%) are mesotrophic; 11 (11.70%) are meso-eutrophic and 19 (20.20%) are eutrophic.

c) Quality of Danube River

In 2001, physio-chemical and sapro-biological monitoring was carried out for 1,073 km. of the Danube River. The water quality was: 646 km (60.2%) – category I; 427 (approx. 39.8%) – category II.

d) Ground Water Quality

The following main pollution types were recorded according to the groundwater pollution factors and taking into consideration the data available for each hydrological basin:

- pollution by oil and petroleum products due to accidental or deliberate oil pipe breakages;
- pollution by various noxious compounds resulting from industrial activities;
- pollution by fertilizers and pesticides either during production or in fields through inappropriate use;
- pollution due to unsuitable application of manure on the land;
- chemical and bacteriological pollution underneath big cities and animal breeding complexes;
- pollution generated by industrial and urban waste dumps because of a lack of environmental protection measures.

(3) Soil

Chemical pollution of the soil affected about 0.9 million ha, out of which 0.2million ha was severely polluted; mainly pollution with heavy metals and sulphur dioxide in the Baia Mare, Zlatna, Copsa Mica areas. Oil and salty water pollution, from oil extraction and transport activities, is present in 50 thou. ha.

(4) Waste

During the year 2000, over 55 million tonnes of waste were generated, out of which 15% represented municipal waste, and 85% the waste from industry, agriculture, construction etc.

Industrial, agriculture and construction waste was 47 million tonnes, 23 mill. tonnes lower than the 1999 amount. These types of waste were generated mainly in the following counties: Hunedoara (5.75 mill. tonnes), Covasna (4.66 mill. tonnes), Mamramures (4.47 mill.tonnes), Caras Severin (2.83 mill.tonnes), Gorj (2.75 mill.tonnes), Prahova (2.52 mill.tonnes), Valcea (2.29 mill.tonnes) and Salaj (2.25 mill.tonnes). Out of this amount, 10 mill.tonnes (22%) were re-used, and 37 mill.tonnes (78%) were disposed of (landfilling, incineration).

The amount of hazardous waste generated in 2000 was 900,000 tonnes, representing 2% of the total amount of industrial waste. Most hazardous waste (76%) was eliminated through landfilling, co-incineration or incineration. The main types of hazardous waste generated in 2000 were: phosphogypsum-186,000 tonnes, calcinated soda-170,000 tonnes and

casting sand-131,000 tonnes.

2.4 Industrial Conditions

2.4.1 General Indicators of the Romanian Economy

Since 1989, the Romanian economy experienced significant changes due to the transition process to a functional market economy. The most important challenges the Romanian economy encountered have been:

- the changes of property structure in the privatization process
- loss of the external markets (especially the East European common market CAER) and the continuous diminishing internal market
- legislative changes supporting the transition to the market economy
- important inflation associated with the transition period

Some general economic indicators listed below are reflecting this reality:

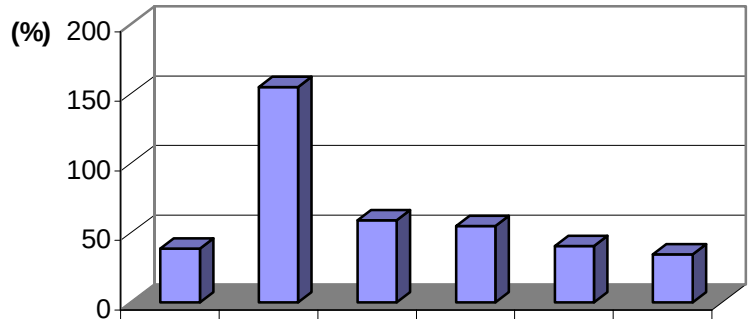
Table 2.4.1: GDP and Industry Contribution to GDP

Year	GDP Billion lei Current prices	**GDP Index** 1990=100 (%)	**Industry contribution to GDP** billion lei current prices	**Industry Index** 1990=100 (%)	Percentage of industry in GDP (%)	Percentage of private sector to GDP (%)
1989	*798.0*	*134.41*	*421.9*	*119.9*	*52.9*	*0.0*
1990	857.9	100.0	347.6	100.0	40.5	16.4
1991	2,203.9	87.1	834.6	87.2	37.9	23.6
1992	6,029.2	79.4	2,311.0	75.2	38.3	26.4
1993	20,035.7	80.6	6,781.4	76.0	33.8	34.8
1994	49,773.2	83.6	18,018.3	78.6	36.2	38.9
1995	72,135.5	89.8	23,711.3	83.0	32.9	45.3
1996	108,919.6	93.4	36,181.5	88.7	33.2	54.9
1997	252,925.7	87.7	78,093.8	81.6	30.9	60.6
1998	371,193.8	83.5	103,053.7	77.3	27.8	62.0
1999	545,730.2	82.5	135,343.8	76.1	24.8	63.7
2000	800,308.1	84.0	201,953.0	80.9	25.2	65.5
2001	-	88.5			25.8	

Remark. 1)Growth indexes are evaluated by using comparable prices
2)Percentage are evaluated in current prices
3)Even if in the table there are shown some estimates for 1989 the accounting system was different, there are no comparable prices (due to the centralized economy) and we cannot consider these figures as an evaluation basis.

In interpreting the above data it should be considered the fact that current prices are significantly affected by the inflation trend of the national currency, which can be observed below:

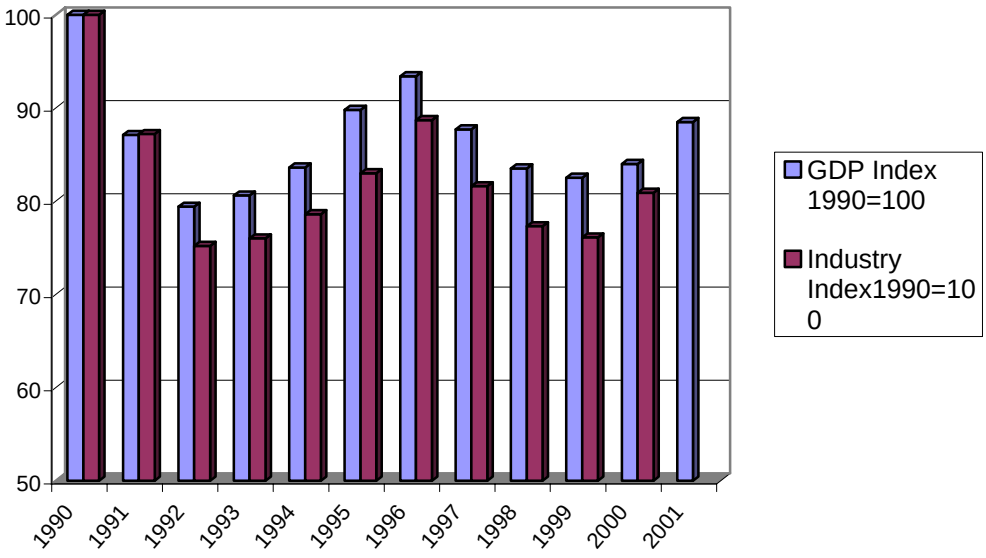
Figure 2.4.1 Annual Inflation Rate



	1996	1997	1998	1999	2000	2001
Annual inflation rate (%)	38.8	154.8	59.1	54.8	40.7	34.5

The industrial product had a similar evolution with the evolution of the economy reflected by the GDP. Most of the economical sectors have been affected by the transition period in a similar way.

Figure 2.4.2 GDP and Industry Index



The evolution of the percentage of the industrial GDP in the total GDP was a decreasing one. The industrial GDP represented 40.5% of GDP in 1990 and in 2001 it dropped down to 25.8% of GDP

Figure 2.4.3 Percentage of Industry in GDP

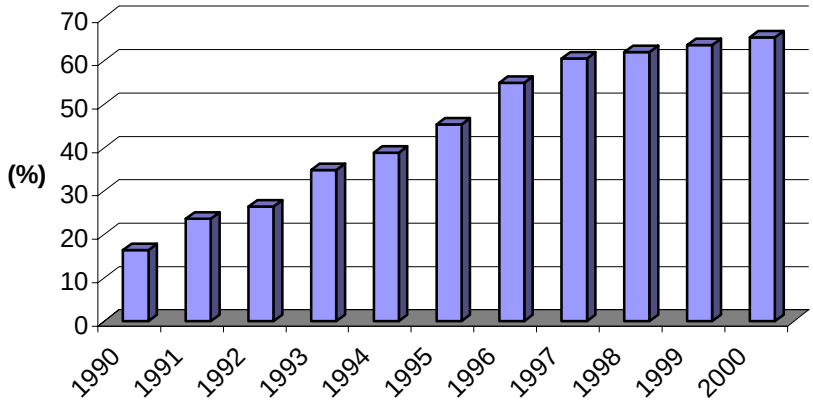
The development of the private-owned sector following the privatization by foreign or internal investments made the economy more dynamic. Some figures connected to the foreign investments are listed below:

Table 2.4.2: Equity Capital in Hard Currency

Year	Equity capital in hard currency	
	USD million	%
1991-2001 of which:	7,841.964	100.00
1991-1995	3,007.064	38.34
1996	529.086	6.75
1997	364.842	4.65
1998	703.877	8.98
1999	926.018	11.81
2000	828.636	10.57
2001	1,371.195	17.49

Over the years the privatization method that has reached greatest success has been the sale of enterprises to managers and employees (MEBO). Initially devised as a standard procedure applicable only to small companies MEBO has become the dominant method of privatization when a special law (77/1994) has granted substantial facilities to the employees who have expressed interest in buying shares. A proof of the efficiency of the private sector is that in 2000 over 60% of the Romanian GDP has been produced by this sector.

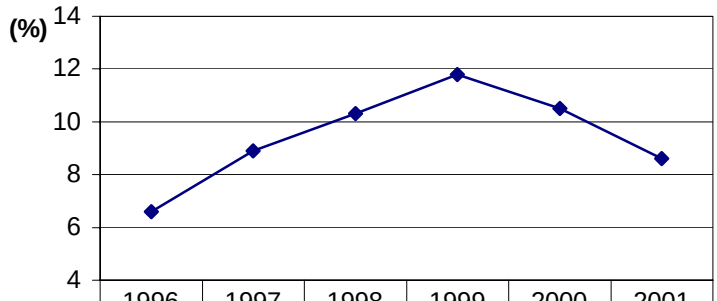
Figure 2.4.4 Percentage of Private Sector in GDP



In the last years the privatization process has been substantially enlarged with the reorganization of the non-privatizable "regies autonomes" into "national companies". The corporation of the large companies has opened new opportunities for privatization, in sectors as banking and public utilities. Many of these large sales have involved foreign investments.

The not too high unemployment may be explained by the fact that the privatization of the public sector and strategic sectors (as energetic) has only just begun.

Figure 2.4.5 Annual Unemployment Rate



	1996	1997	1998	1999	2000	2001
Annual unemployment rate (%)	6.6	8.9	10.3	11.8	10.5	8.6

Although before 1989 it was aimed an approximately equal development of industry in all counties, in the last 10 years this equilibrium has disappeared being reflected also by the inequalities in unemployment between different counties.

The situation is more difficult in some mono-industrial counties where the communist regime developed some unsustainable investments in some sectors as energetic, machine building industry and chemistry and petro-chemistry. The development of these economic sectors before 1989 far surpassed the internal necessities.

Although a future forecast on which industrial sub-sectors are going to grow is difficult to be accomplished, considering that Romanian economy has reached a quasi-equilibrium, an evaluation based on internal resources (raw materials, human resources, capital, internal market) could suggest that the most dynamic sectors are: IT, food industry, energetic, chemistry, agricultural machine building industry. The role of the SME should be emphasized also in

industry as in services.

2.4.2 Electronic Industry

Since 1994, the Romanian IT industry has been defined by a rapid development as a major supplier for all the other economic sectors and as a basis for the construction of the informational society. The IT industry refers to computation and office equipment, informatics and other connected activities.

Most of the companies have a large range of activities of production, integration and commercializing of systems, equipments and components. The last seven years meant a development of the activities from commercializing to assembling and integrating, and important progress in insuring the required quality.

In the software and services industry the activities are targeted thru solution development and implementing for the internal as well as for the external market, based on the newest technologies. It can be mentioned that more software-based companies (mainly exporting companies) have met the criteria for ISO9001 and 9002 being certified.

1997-2001 represented a fast ascending period for the whole IT sector, with an important increase of total revenues by 45%, the increase of production by 47% and of added value by 107%. The strengths of the sector are its role of major supplier for all the other industries and basis for the construction of the informational society. The added value of the sector is superior to other economic sectors, reaching a value of 27.6% of total revenues. The IT industry has also an important export potential; in 2000 the percentage of exports in total revenues was of 18%. Another advantage would be the reduced necessary amount of investments compared to other sectors, and composed mainly of human resources. The Romanian market has a highly qualified offer in this field, frequently solicited on the international market.

The weaknesses of the sector are the reduced self-financing capacity, the dependence on an internal market not sufficiently developed and the insufficient examination for product exports

The development of the sector is the result of the private initiative, 95% of the total revenues being obtained by private companies.

Romanian government's goal of meeting e-Europe criteria will determine in the medium term an accelerated development pace of the internal market with estimates of 20-30% growth annually.

Many projects for the informational society have been started at the government initiative, partially financed from budgetary sources. The administrative sector plays an important role in the evolution of the informational society, being a large consumer of equipment, software, and services. In 2005 the estimates show a growth of the internal market from USD 340 mill. to USD 1000 mill., implying a sharp competition between brand names as IBM, HEWLETT-PACKARD, COMPAQ and local-names as BEST or FLAMINGO computers.

The main goal of the industrial policy in this field is to insure the conditions for optimal integration in the EU industrial structures by creating and consolidating the production

facilities, increasing their efficiency and competitiveness of their products.

- ***Waste Management***

The manufacture of the mentioned products requires in some cases the use of the following technological processes:

- technological processes for cold mechanical processing;
- technological processes for heat mechanical processing;
- technological processes for metallic coatings (galvanization);
- technological processes for plastic waste chopping;
- technological processes for washing and neutralizing of the electronic component structures

The most part of these technological processes are industrial waste generators.

The analysis of generated wastes establishes two types of wastes depending of their components and characteristics: hazardous wastes (trichloroethylene, waste cyanide solutions from galvanic baths, heavy metal sludge, sludge from the neutralization of the waste waters, sludge containing metallic hydroxides, hydraulic oils) and non-hazardous wastes (ferrous and non-ferrous metallic wastes, plastic processing wastes, etc.).

The quantities of waste is not so significant as for the electrotechnic industry, due to the fact that the IT industry is generally assembling imported computer parts, but the waste materials are more or less the same.

2.4.3 Machine Building Industry

The machine-building sector represents the major support of the Romanian economy, contributing to the development, modernization and maintaining of other industrial sectors.

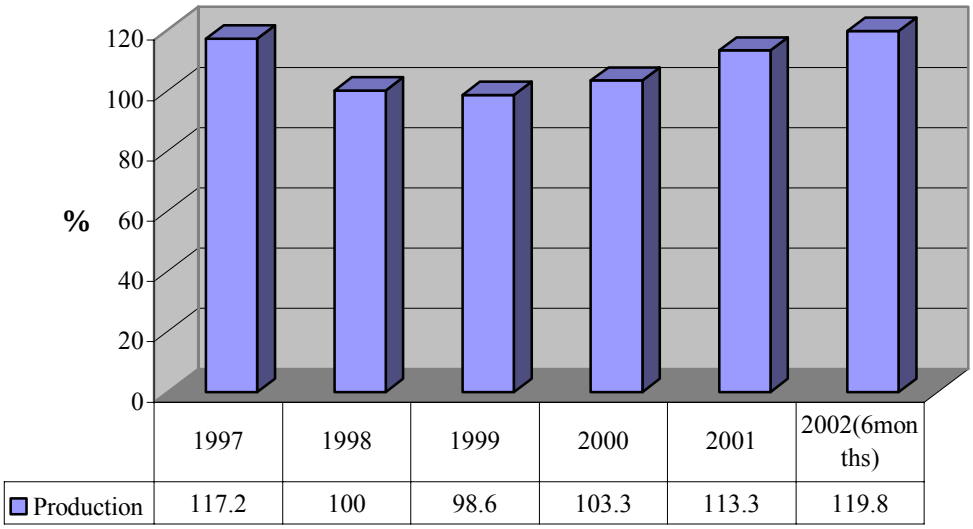
In 1989, over 40% of the domestic production (similar to the GDP) was intended for development purposes. Nowadays, a wide range of equipment is produced with the help of up to date facilities.

Presently, machine-building sector includes many companies with 365,000 employees. The subsections with the greatest number of employees are the following: metal constructions and metal products industry, machines and equipment industry, automotive industry and transport vehicles industry.

The research-development activities are carried out within 38 companies (2 of them National Institutes) with about 6,000 employees. Most of these companies allow making prototypes and short series. Most of the products currently manufactured are based on Romanian designs, but there are also license-based products, the licenses being bought from well-known international companies.

After 1993, the production and exports experienced a growth with two peak levels in 1996 and 1997, when it slowed again till 1999 taking 1998 as base (100%), the machining industry evolution was the following:

Figure 2.4.6 Machine Buildind Industry Evolution



Comparing to 1996, for 2002 is forecasted a 25% decrease of production in machine building, a sector of great impact for the Romanian economy, while the productivity rate grows with 10% .

- ***Tractors and farming machines***

In 1989, the entire production of 70,000 units was developed in three plants in Brasov, Craiova and Miercurea Ciuc. Between 1989 - 1992, production decreased to 25,000 units/year out of which 50% was exported. Nowadays, the tractors continue to be produced in the three big companies.

- ***Bearings***

There are six bearings producers with about 18,000 employees, able to produce a wide range of about 9,640 sort-typo-dimensions (STD) in hundreds of constructive alternatives with dimensions from very small sizes (min. 18 mm) to the heavy ones, up to 2500 mm diameter suitable both for general and specific use (manufacturing of cars, machine-tools, excavators. a.s.o).

In 1989, the plants produced 149 mill. pcs. bearings, out of which about 70% were exported. The most diversified manufacturing offer is presented by S.C. Rulmentul Brasov S.A., followed by Barlad and Ploiesti factories, that cover together 81% of the produced STD. All bearings factories are certified ISO 9001.

The privatization situation of this sector is:

- S.C. Rulmentul G S.A. Ploiesti has been privatized in 1997 with Timken USA
- S.C. Rulmentul S.A. Alexandria has been privatized in 1998 with Koyo Japan
- S.C. Rulmenti S.A. Barlad is under negotiation with other foreign company for a joint-venture
- S.C. Rulmenti S.A. Slatina has received the offer of Daphinia Trading Cyprus
- S.C. Rulmentul S.A. Suceava is under a special program of restructuring and

upgrading in order to be privatized too.

- ***Power equipment***

Power equipment is produced mainly by 7 industrial companies, the manufacturing range being very diversified. The manufacturing process meets the quality requirements according to I/N standards ISO 9001, 9002. The power units are equipped with boilers having a nominal flow up to 1035 steam To./h, produced under Babcock license, the manufacturing quality being confirmed by ASME and TUV certifications. Under CANDU license could be offered the main equipment for the nuclear plants with powers up to 700 MW.

In the hydro-energetically field, the Romanian industry can produce electrical generators and turbines of PELTON, KAPLAN and FRANCIS type with a power range of 4 up to 178 MW. The special quality of equipment permitted their exports to countries as China, Turkey, Philippines, Syria, Egypt and others.

- ***Food industry***

The food industry subsection produces mills, sun flower and maize oil plants, sugar plants, paste lines, bottling lines, refrigerating units, cooling windows, bread, milk and diary products plants, meat processing lines. These plants are interested in modernization and development of their range of products, in order to achieve the UE regulations.

- ***Railroad cars***

The railroad industry has a tradition of over 100 years, the first railroad cars being produced in 1891 in Arad plant.

Nowadays there are four major industrial companies with 7700 employees producing freight cars, passengers coaches and metro carriages, featuring various gauges for local needs and for export. In 1989, the production consisted of 11.6 thou. freight cars, 257 thou. passengers coaches and subway carriages, out of which 2/3 of the first two categories were exported.

The freight cars are produced in four companies S.C. Astra Vagoane S.A. Arad, S.C. Astra Vagoane Calatori S.A. Arad, S.C. Meva S.A. Drobeta Turnu-Severin and S.C. Romvag S.A. Caracal.

Recently, S.C. Astra Vagoane S.A. Arad has been privatized with an American top company in the area, which intends to extend the profile and to pursue a special modernization program.

Romania has an old tradition in manufacture of locomotives. The main profile manufacturer is S.C. Faur S.A. Bucuresti. Owing to its wide range of products featuring technical characteristics comparable to those of well known foreign companies, as well as to its production capacity of 15800 locomotives and over 200 motor-railers (out of which 2100 were exported), S.C. Faur S.A. Bucuresti is one of the major rolling stock producers.

- ***Aircraft sector***

The aircraft manufacturing started in 1924 in Brasov and has been re-launched in 1968 in Bucharest, Craiova, Bacau, and Brasov through new investments. Between 1968-1991, a

number of 3200 aircrafts were produced among which:

- ROMBAC 1 - 11 medium carrier (BAC GB license)
- BN2B Islander light plane (in cooperation with Pilatus Britten Norman - GB)
- Fight aircrafts IAR 93 and 99 (Romanian design)
- Helicopters IAR 330 (Aerospatiale France license)

The aircraft-building sector includes 12 industrial commercial companies current predicting 5 types of aircrafts, 2 types of helicopters, 4 types of gliders and motor-gliders, 7 types of engines. Exports represent 20% of the production. Nowadays, the 12000 employees working in this area are facing considerable difficulties and uncertainties due to the reduced number of contracts for the future production.

- ***Mining equipment***

All types of underground and surface mining equipment are produced to cover a wide range of operation such as: devices, heading combines, loading machines, mining locomotives, trolley, extraction machines, bucket rotor excavators, belt conveyors and mineral matters, mills, screens, flotation equipment, a.s.o.

Main industrial companies that produce equipment for the mining industry are S.C. Unio S.A. Satu Mare, S.C. Muntenia S.A. Filipestii de Padure, S.C. UMT S.A. Timisoara, S.C. Umeg S.A. Baia Mare and S.C. Umirom S.A. Petrosani.

- ***Shipbuilding***

The long tradition of shipbuilding of over 160 years, led to the development of a higher education system in order to ensure highly skilled specialists, a strong research and design data bank. Both the "Lower Danube" University and the ICEPRONAV Institute are located in Galati.

Romania shipyards are generally specialized in building merchant ships used for freight transport. The main types of ships build so far are:

- bulk carries between 25,000 and 170,000 tdw
- tankers between 5,000 and 150,000 tdw
- cargo ships (port container ship Ro-Ro and general commodities cargo ships) between 2,000 and 18,000 tdw
- fishing vessels
- tow boats/pushers between 300 and 60,000 HP
- barges up to 4,500 to.

It is worth to mention the repair and conversion activities carried out mainly at the shipyards of Mangalia, Midia and Tulcea. The other shipyards on the Danube also have repair (workshops) possibilities.

The development of shipyards in the past 5 years has been marked by fundamental changes according to the terms of the outlet market. If in 1989, over 80% of the output was designed to the domestic market, while export activities were oriented in a proportion of 85% towards the CMEA countries, currently 70-80% of the output is exported to the EU, China, South Africa and Norway. The privatization process is under way, two of the main shipyards (Mangalia&Galati) being already bought by foreign investors (Daewoo&Darumen).

- ***Metallurgical equipment***

The metallurgical subsection produces for the ferrous metallurgy: foundry devices, special carriages, continuous casting lines, recovery boilers, coke plant equipment, converter palletizing equipment, ball mills, rollers, electric filters, exhausters, a.s.o. For the metallurgical shears, iron wastes presses, forge furnaces, heat treatment furnaces, roll mill cylinders, handling equipment and self-propelled cranes.

The main plants of metallurgical equipment are: S.C. Rotec S.A. Buzau, S.C. Fortus S.A. Iasi, S.C. Independenta S.A. Sibiu and S.C. Unimet S.A. Cluj.

- ***Chemical equipment***

Romania is a producer of a wide range of chemical, petrochemical and refining equipment designed to realize reforming and catalytic cracking, as well as to produce: smoke black, polyethylene, polypropylene, synthetic rubber and synthetic fibers, detergents, fertilizers, sulfuric acid, pip and paper plants.

The main producers are: S.C. Griro S.A. Bucuresti, S.C. Uzuc S.A. Ploiesti and S.C. Umuc S.A. Bucuresti.

- ***Domestic electrical and non-electrical machine and apparatus***

Romania is a producer of a wide range of domestic electrical machine and apparatus and domestic non-electrical apparatus.

The main producers are: . SC ELECTROARGES SA Curtea de Arges, SC METALICA SA Oradea, SC ELECTROLUX SA Satu Mare, SC ARCTIC SA Gaesti

- ***Waste Management***

The manufacturing of the mentioned products requires technological processes such as:

- technologies for mechanical processing;
- technologies for thermal plastic deformation processing;
- technologies for thermal treatment;
- technologies for metallic coating;
- casting technologies ;
- enameling
- technologies for plastic material injection and extrusion.

The analysis of generated wastes establishes two types of wastes according to their components and characteristics: hazardous wastes (electrolytic sludges, treatment sludges, enameling sludges, waste oils, waste car accumulators) and non-hazardous wastes (ferrous and non-ferrous metallic wastes, enamel and ground wastes, plastic wastes).

The total and specific quantities of the main generated wastes, consumed and removed during 1995-2000 for the manufacturing of domestic electrical machine and apparatus and of non-electrical apparatus are presented below.

Table 2.4.3: Main Generated Waste Amounts

Unit= tones

No	*Waste type*	1995	1996	1997	1998	1999	2000
0	1	3	4	5	6	7	8
	Generated wastes – total, Out of which:	6731.7	7446	7111.6	7105	6532.3	7083
1	Hazardous wastes, – total, out of which:	408.7	300	305.6	319.5	298.,6	396.8
	1.1. Electrolytic treatment, hydro-cyclone, enamel, ground, polishing, sludge	377.2	267.5	275.2	284.4	276.7	381.4
	1.2. Spent oils (motor, transmission, hydraulic)	25.6	24.2	22.1	26.8	15.95	17.45
	1.3. Used up care accumulators	6.1	8.3	8.3	8.3	5.95	2
2	Non- Hazardous wastes – total, Out of which:	6322.8	7146	6806	6785.5	6233.7	6686.2
	2.1. Enamel wastes for re- grinding	337	280	290	302	302	337
	2.2. Ferrous metallic wastes	3917	4560	4341	4314	3790	4329
	2.3. Non-ferrous metallic wastes	289.7	298.2	293.4	279.8	264.1	170.4
	2.4. Paper-cardboard wastes	120	112.5	107.,2	108.,5	93.,9	142
	2.5. Wood wastes	92.,2	84.3	82.,7	81.5	68.6	70.2
	Plastics wastes	27.6	26.4	27.5	27.3	25.75	28.3
	2.7. Glass wastes	17.6	17.3	17	6.3	35.2	26.6
	2.8. Foundry wastes	64.2	63	63	64.2	65.6	85
	2.9. Used tires	5.3	4.2	3.7	3.5	6.9	4.1
	2.10. Municipal wastes	1452	1701	1580	1599	1582	1494

2.4.4 Energetic

- ***Sector Structure and privatization situation***

In 1990 the Romanian Electricity Authority (RENEL) was set up following the reorganization of the former Ministry of Electric Energy. RENEL was a vertically integrated state owned company, whose main activities were:

- Electricity generation, transmission, distribution and supply in conventional and nuclear based power plants
- Heat generation and transmission

Starting with 1992, RENEL's reorganization process began and some of ancillary activities were separated from RENEL

The first restructuring stage started in July 1998 by Government Decisions, further to which RENEL the National Electricity Company-CONEL was setup. The Company was state-owned and operated under the authority of the Ministry of Industry and Trade. CONEL performed the tasks of transmission, system and market operator and had 100% shares in three affiliates:

- SC TERMOELECTRICA SA for electricity and heat generation
- SC HIDROELECTRICA SA for electricity generation

- SC ELECTRICA SA for electricity distribution and supply

Nuclear power - related activities separated from RENEL and were organized as two entities: the National Company "NUCLEARELECTRICA SA" and the National Regie for Nuclear Activities. The Romanian Electricity and Heat Regulatory Authority (ANRE) was setup by Emergency Ordinance in October 1998.

By the Romanian Government Ordinance No. 627/2000, the former vertically integrated National Electricity Company split into separate legal entities:

- SC TERMOELECTRICA SA for electricity and heat generation
- SC HIDROELECTRICA SA for electricity generation
- SC ELECTRICA SA for electricity distribution and supply
- SC TRANSELECTRICA SA for electricity transmission, power system operation and dispatching (The National Power Grid Company - Transelectrica (joint stock state-owned company))

- ***Hidroelectrica***

HIDROELECTRICA S.A. is a trade state-owned company whose main activity is to generate electrical energy by using hydropower resources from ROMANIA.

HIDROELECTRICA S.A. has in administration 120 hydropower plants, 4 power pumping stations summing up an installed power of 6,249.5 MW (from which 71 MW in power pumping station) with a power generation in an average hydrological year of 17,261.9 GWh. S.C. Hidroelectrica S.A. accomplished in 2001 the quantity of 14,478.219 GWh - head energy .

In 2002, 21 hydropower objectives have been proposed to be privatized .

- ***Electrica***

S.C. ELECTRICA S.A. has as main activity object electricity distribution and supply, as well as development of distribution, telecommunications and IT systems in connection with the transport and production systems.

S.C. ELECTRICA S.A. is a state-owned company, under the patronage of the Ministry of industry and Resources.

A very important issue for S.C. ELECTRICA S.A. is preparing for an important stage – the privatization of the distribution and supply of electric energy sector. In 2000, a collaboration with the French consultant BNP Paribas started with the PHARE project RO9805-01-03 " Privatization in the electric energy distribution sector".

- ***Transelectrica***

Transelectrica is a legal entity under Romanian Law, that is situated in Bucharest. In December 2000, a power transport license (link) and a power dispatch license (link) were issued to Transelectrica by ANRE, the National Electricity Regulatory Authority.

The functions that Transelectrica, either directly or through subsidiaries, has to fulfill are as follows:

- transmission operator of the National Electricity System;
- system operator of the National Electricity System;
- metering operator of the Romanian Wholesale Electricity Market; and
- commercial operator of the Romanian Wholesale Electricity Market.

The latter function is executed by Opcom S.A., a subsidiary of Transelectrica.

Restructuring process

Since July 1998 remarkable progress has been achieved by the Government of Romania in connection with the establishment of a legal and regulatory environment for the electricity sector.

An ambitious program to create a market-driven electricity sector was established which, over the course of five to six years, will be in conformity with EU Directive 96/92/EC. Two fundamental tasks were set:

- clear separation of generation, transmission/dispatch, distribution and supply activities - with a view to possible privatization of certain assets in the generation, distribution and supply sector; and
- market liberalization with open access to the transmission and distribution networks and the creation of a power pool.

▪ ***Production Trends***

Figure 2.4.7 Primary Energy Resources

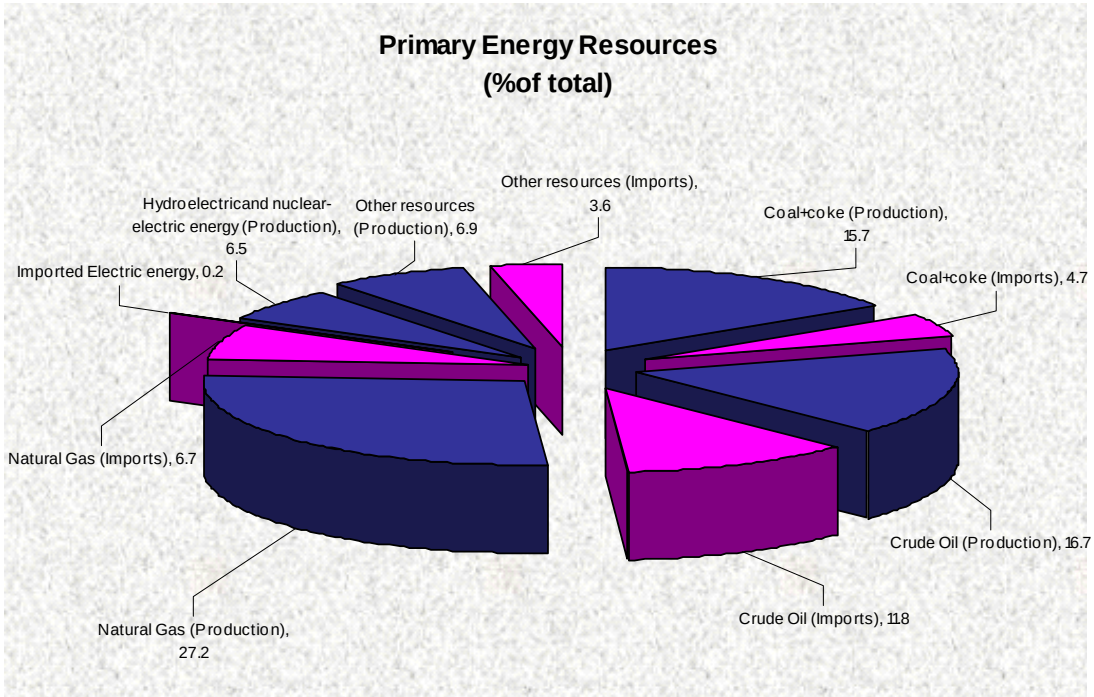


Table 2.4.4: Installed Capacity and Production of Electric Energy

	1992	1993	1994	1995	1996	1997	1998	1999	2000
	Puterea instalată a grupurilor electrogene (la sfârşitul anului) *Installed capacity of electric generating sets (end of year)*								
Total (mii kW) / *(thou kW)*	22177	22262	22060	22276	22856	22843	22557	22236	21905
din care: / *of which:*									
Termoelectrică *Thermoelectric*	16442	16390	16122	16265	16818	16769	16476	16154	15785
Hidroelectrică *Hydroelectric*	5735	5872	5938	6011	6038	6074	6081	6082	6120
Pe locuitor (W) *Per inhabitant (W)*	973	978	970	982	1011	1013	1002	990	976
	Producţia de energie electrică / *Electric energy production*								
Total (milioane kWh) / *(million kWh)*	54195	55476	55136	59267	61350	57148	53406	50713	51935
din care: / *of which:*									
Termoelectrică *Thermoelectric*	42495	42708	42090	42573	45595	39639	34617	32423	37157
Hidroelectrică *Hydroelectric*	11700	12768	13046	16694	15755	17509	18879	18290	14778
Pe locuitor (kWh) *Per inhabitant (kWh)*	2378	2438	2426	2613	2714	2535	2377	2258	2315

- ***Waste Management***

Out of the electric power producing processes based on coal as raw material it results slag and ash – as waste of the burning process in boilers firebox.

The hydraulic discharge of slag and ash resulted from the boilers to the disposal site represents a common solution for electric power plants operating upon coal.

The quantity of slag and ash resulted from burning process is directly proportional to the quantity of burned coal.

The specific wastes generated further to the electric and thermal power producing based on coal are listed into the following table:

Table 2.4.5: Generated Waste Amounts

Waste	Unit	1995	1996	1997	1998	1999	2000
Slag, fly ash and sludge (Termoelectrica, Govora,ROMAG TERMO) Total, out of which:	t	8,383,885	9,185,225	7,345,263	6,295,040	6,500,018	6,838,314
Slag and fly ash (Termoelectrica), out of which:	t	6,890,170	7,456,060	5,871,073	5,041,600	5,056,476	5,906,594
Slag and fly ash delivered to third parties (domestic ones)	t	19,000	18,900	18,660	16,554	1,762	730
Sludge	t	9,765	10,148	9,682	9,580	5,651	11,682

2.4.5 Mining and Smelting Industry

The mining sector, with a 2% share of Romania's GDP (1998), has recorded large losses and receive huge subsidies from the state budget during the transition period. The restructuring process that took place with the support of the international organizations (World bank) has led to the closing of a number of mines (171 were planned to be shut down in 2000 according to the World bank) and to an important reduction of the labor force. Under Government Decisions 816/1998, 17/1999, 720/1999, 493/2000, and 602/2001, 279 mines and quarries were going to be closed, but until he end of 2001, only 66 had been closed. According to the following table, 171 mines closed (or were going to close) in 2000 (only 32 mines were closed until the end of 2000).

Table 2.4.6: Number of Mines in Romania in 2000

Product	Total number (Underground/ Quarries)	Active	In Conservation U./Q.	Closed	
		U./Q.		Total U./Q.	Remediated U./Q.
Lignite and Brown Coal	150 (109/41)	60 (30/30)	45 (34/11)	45 (45/0)	6 (6/0)
Hard Coal	32(32/0)	10 (10/0)	19 (19/0)	3 (3/0)	1 (1/0)
Non ferrous Metals	121 (116/5)	26 (23/3)	26 (26/0)	69 (67/2)	5 (5/0)
Precious Metals	21 (21/0)	8 (8/0)	12 (12/0)	1 (1/0)	0
Ferrous Metals	34 (30/4)	10 (7/3)	9 (8/1)	15 (15/0)	1 (1/0)
Salt	15 (9/6)	10 (6/4)	1 (1/0)	4 (2/2)	0
Uranium	23 (23/0)	3 (3/0)	8 (8/0)	12 (12/0)	0
Non-Metal Minerals	49 (28/21)	22 (6/16)	5 (3/2)	22 (19/3)	4 (2/2)
TOTAL	**445 (368/77)**	**149 (93/56)**	**125 (111/14)**	**171 (164/7)**	**17 (15/2)**

Source: Ministry of Industry and Resources, 2001

Mining production has considerably decreased since 1991 (next table). Mining will continue on a smaller scale, based on important existing reserves: 3 billion tons of lignite and brown coal; 1 billion tons of hard coal; 40 million tons of gold and silver ores; 90 million tons of non-ferrous ores; 900 million tons of copper; and 4 billion tons of salt.

Table 2.4.7: Mining Production in the 90s (1,000 tones)

Output/Year	1991	1995	1996	1997	1998	1999
Hard Coal	5,411	6,356	6,965	5,642	4,331	3,741
Brown coal	645	570	605	511	369	328
Lignite	29,149	37,062	37,204	30,093	23,405	20,645
Ferrous min.	1,461	865	860	756	459	131
Non-ferrous	68.9	84.6	77.9	73.8	59.8	60.5
Bauxite	200	175	175	127	162	
Salt	3,255	2,489	2,689	2,612	2,220	2,197

Very few mines have been concessioned in the second part of the last decade; most mines remain under state administration. State mines have been included in autonomous regies (state monopolies), which were recently transformed into national companies or societies, like CN Lignite Oltenia, CN Huila Petrosani, and SN Coal Ploiesti in the coal sector. The two national coal companies have recorded huge losses and debts. At the end of 2001, the fiscal arrears o CN Huila amounted to 11,500 billion lei, including 4,300 billion lei of budget taxes and 5,600 billion lei of social insurance.

During the 1997-2000 period, the labor force was drastically reduced from 170,000 to 73,400 miners, which increased unemployment in underdeveloped and mono-industrial areas.

Under the new government's strategy, $120 million will be spent in 2001-2003 for closing mines and creating new jobs for former miners. The focus is on productivity increase, selling some inefficient mines to private owners, cutting subsidies, and redistributing non-productive employees.

- ***Waste Management***

The mining disposal sites and lagoons represent, from quantitative point of view, an important source of environmental pollution, having an insignificant content of reusable useful substances.

The waste quantities resulted from excavation and processing (sterile) are eliminated by disposal, so that the land surfaces as resulted from disposal to be restore in order to be reused as agricultural land.

The lagoons are installations used as landfill sites for sterile storage generated by ore processing removed from underground or surface extraction.

Part of the sterile resulted from processing (lagoons) are reused in the same time with the improvement of the related putting into value technology. (ex: about 6 mil tones of sterile from REMIN Baia Mare have been turned into useful matter through a cyanide technology, by gold extraction).

Regarding the surfaces covered by ores and coal, the IPROMIN Bucharest study is mentioning about 3,600 ha, respectively 5,500 ha.

The economic agents in the sector which are coordinated by the Ministry of Industries and Resources have organized the activity of wastes management resulted from dismantling and decommissioning (scrap iron) and are reusing them by trading with the specialized units.

Storage areas are organized for the technologic sterile some specific norms being in force for their design and execution.

The quantities and types of technological wastes generated within the production processes, during 1995 – 2000, the ferrous wastes resulted from decommissioning and dismantling as well as the disposed of wastes are listed in the following table.

Table 2.4.8: Quantities and Types of Waste

	U	1995	1996	1997	1998	1999	2000
Technological wastes Total, out of which:	t	306,564,932	333,498,713	308,762,834	245,262,523	204,785,701	252,831,095
- excavation wastes	t	293,542,000	320,194,000	295,870,000	236,366,000	198,290,000	238,219,099
- processing wastes	t	13,022,932	13,304,713	12,892,834	8,896,523	6,495,701	14,611,996
Ferrous wastes resulted from decommissioning and dismantling	t	25,032	18,180	25,862	17,845	20,008	33,173
Disposed of wastes	t	306,564,932	333,498,713	308,762,834	245,262,523	204,785,701	252,831,095

2.4.6 Other Extraction Industry

- ***Sector Structure***

PETROM S.A. Oil National Society Bucuresti has been established under government order nr. 49/15.09.1997, approved by Law nr. 70/1998, as a vertical integrated society in the oil industry , starting the commercial activities on 01.11.1997.

S.N.P. PETROM S.A. Bucuresti is organized as follows:

- 10 on shore branches for the exploration of the hydrocarbon deposits and extraction of these products (crude oil, natural gas, ethane, CO2, gasoline, propane), with 24 oil fields.
- 1 off shore branch (in the continental platform of the Black Sea) exploring and extracting hydrocarbons: PETROMAR Constanta;
- 3 oil and gas processing branches: ARPECHIM Pitesti, PETROBRAZI Ploiesti, DOLJCHIM Craiova;
- 41 branches for the commercialization of the oil products with 630 subordinated gas stations and 155 oil product warehouses: 40 PECO and COMPETROL Bucuresti.
- 3 research branches: Institutul de Cercetari si Proiectari Tehnologice Campina, Centrul de Cercetari si Proiectari in domeniul Explorarii Petroliere Bucuresti, INCERP Ploiesti;
- 1 IT&C branch: PETROSOFT Bucuresti;
- 1 supply branch: Baza de Aprovizionare Floresti;
- 1 branch for oil-wells special activities : Baza de Operatiuni Speciale la Sonde Campina;
- 1 branch providing mechano-energetics services and transport activities: PETROREP Moinesti;
- 1 oil product transport branch: TRANSPECO Bucuresti;

Petrom has subsidiaries in Hungary, Republic of Moldavia, Yugoslavia, Kazakhstan, India, Ecuador, Turkey, Iran, Nigeria, Sudan, etc.

The company has as activity object:

- exploring and exploiting oil and natural gas deposits on-shore and on the continental platform of the Black Sea;
- oil and oil products transport;
- crude oil refining;
- product commercialization through its own distribution networks;
- crude oil, oil products, equipment and technologies imports and exports;
- scientific cooperation;

PETROM extracts approx. 6 million tones crude oil annually, approx. 6.1 billion m3 natural gas ,and produces about 96,000 tones of gasoline and 47,000 tone of ethane. Petrom also has a processing capacity of 14 million tones annually, but only 5.5 million tones crude oil are processed, and 700 million m3 natural gas, resulting about 70-80 different refined and petrochemical products. Petrom commercializes 1,680,000 tones of fuels and approx. 2,000 types of complementary products through its gas stations network, and 800, 000 tones of fuel directly from its refineries and warehouses. Among the large range of products commercialized by Petrom, the most important are: fuel oil –900, 000 tones, CLU 220 000 tones, GPL 130, 000 tones, ethylene – 170,000 tones, polyethylene 90, 000 tones, ammonia 62,000 tones, urea 50,000 tones, methanol 72,000 tones, etc.

- ***Privatization***

SNP Petrom privatization is one of the main objectives of the Oil industry development strategy.

In 2000 it was intended the social capital increase by issuing of shares and selling them by direct negotiation with one or more private investors. More than 90% of the Petrom total shares are not transacted on the market, being state-owned.

Due to the international situation in the oil industry and to the economic environment in Romania, capturing the interest of important oil companies hasn't been succeeded.

OPSPI, institution subordinated to the Ministry of Industry and Resources, has began the privatization discussion with the appointed consultants, "Credit Suisse First Boston" and "ING Bearings" Ltd. From United Kingdom, in order to establish the first steps of the privatization strategy.

- ***Future Outlook and Governmental Strategy***

The Romanian government has developed a strategy for the oil industry based on the principles and objectives expressed in the Romanian political industry and the National Romanian strategy for the energetic sector on the medium term (2001-2004).

The premises of the oil industry development strategy are:

- the oil industry represents a strategic sector of the national economy and a support for the development of the other industrial sectors;

- the development of the oil sector has a great influence over the economic growth, namely the GDP growth and improvement of the quality of life
- modernization and restructuring of the oil industry supports the sustained economic development of the country

The following estimates present the production of crude oil, gasoline and ethane of SNP Petrom:

Table 2.4.9: Estimates of Crude Oil Production

– thou tones –

Year	*Crude oil*			*Gasoline*	*Ethane*
	Domestic	*Foreign*	*Total*		
2002	6029	200	6229	171	73
2003	6150	300	6450	170	60
2004	6000	400	6400	167	58
2005	6008	500	6508	163	56
2010	5571	2000	7571	129	49

- ***Waste Management***

Technological wastes (types and quantities) generated between 1995 -2000, within extractive industry of methane gases, inclusively transport and distribution, as well their way of management (turning into value or removal) are shown below.

Table 2.4.10: Waste Amounts Generated Between 1995-2000

Waste	UM	1995	1996	1997	1998	1999	2000
A. Waste waters, total, of which:	t	19,253	16,415	18,027	22,717	34,434	9,500
-used within their own production process	t	101	98	117	123	157	180
-removed (landfilled)*	t	19,152	16,317	17,910	22,594	34,277	9,.319
B. Spent oil, total, of which:	t	292	295	272	228	193	165
-turned into value at third parties	t	284	286	264	218	184	156
-removed (landfilled /incinerated)	t	8	9	8	10	9	9
C. Scrap iron** -turned into value at third parties	t	1,639	2,400	2,700	3,400	1,380	1,360
D. Non-ferrous wastes** - turned into value at third parties	t	14	43	33	21	36	10

* The wastewater is re-injected in the working-out wells
** Of replacement of pipes

The amount of technological wastes generated during 1995 – 2000, in extraction industry, crude oil refining, oil and petroleum products transport and in the petrochemical industry are listed in the following table:

Table 2.4.11: Waste Amounts Generated Between 1995-2000

Waste	UM	1995	1996	1997	1998	1999	2000
Technological wastes, total, out of which	t	106,162	352,650	347,149	129,846	630,409	311,919
A.Used in their own production processes	t	6,300	105,939	240,248	79,021	51,554	40,535
B.Reused by third parties	t	50,036	61,986	51,967	13,248	30,497	29,701
C.Disposed of (landfilled/incinerated)	t	49,826	184,725	54,934	37,577	549,339	241,683

Analyzing the data it results that out of the total amount of technological wastes as resulted from the crude oil extraction industry and the petrochemical industry, on an average, during 1995 – 2000, over half of the quantity : 51% have been disposed of by landfilling or incineration and 49% have been reused (31% have been used within the own production processes of the generators, the rest of 18% being reused by third parties.

2.4.7 Food Processing Industry

The important changes taking place in the agricultural sector after 1990 have influenced other sectors especially the food processing industry, the main consumer of agricultural products

Due to the agriculture recession an important part of the food processing facilities remained unused. The balance between the food industry and agriculture between 1998-2000 is presented below:

Table 2.4.12: The Balance Between the Food Industry and Agriculture Between 1998-2000

– % –

Specifications	1989	1992	1996	2000
A. Agriculture				
I_n/I_{n-1}	100	86.72	101.22	85.90
1989=100	100	84.9	99.08	85.64
B.Food production				
I_n/I_{n-1}	100	82	101.8	109.4
1989=100	100	53.6	54.3	57.5
B/A	76.6	48.36	41.98	51.45

The agricultural production in 2000 decreased at 85.64% of the 1989 value, even if in 1996 the value of the production was significant (99% of the 1989 value).

Food production has rapidly decreased to 57.5% in 2000. The ratio between food and agricultural production decreased from 76.6% in 1989 at 51.45% of 1989 value in 2000, implying negative aspects for the economy.

The reduced degree of utilization of he food processing facilities determined high unitary fixed costs and, combined with the diminishing of the purchasing power of the population led to the decrease of the internal demand for food, and consequently decelerated the development of the sector. The presence of an insufficiently developed supply and distribution network was also a factor of the drastically cut off of the production experienced in the food sector.

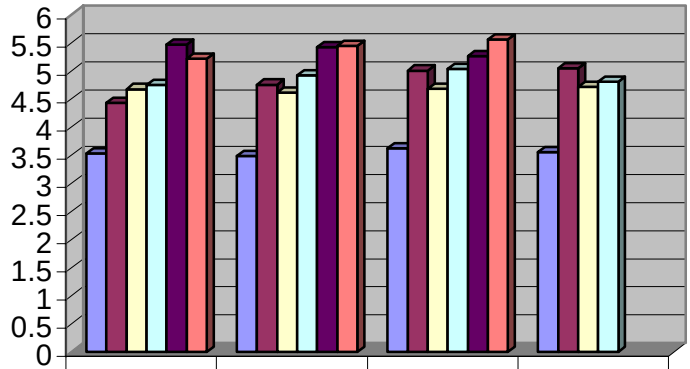
However, in the last years there has been a light increase of the production (+17% in 1999 , +9.4% in 2000,and 22.1% in 2001)

- ***The Meat Industry***

The production facilities of great capacities, although performant in 1980-1985 when they were built, have reduced their production to less than half of their capacity.

One of the causes has been the diminishing of the number of heads of all species as well as the decrease of the purchasing power.

Figure 2.4.8 Medium Monthly Meat Consumption per Person (kg)



	1997	1998	1999	2000
Romania	3.54	3.49	3.63	3.56
Hungary	4.44	4.76	5.01	5.05
Slovak Rep.	4.68	4.62	4.69	4.72
Czech Rep.	4.75	4.93	5.04	4.81
Slovenia	5.47	5.43	5.27	
Poland	5.22	5.45	5.56	

The meat production in slaughterhouses was in 2001 lower than in the previous year for most of the products, except for poultry which increased by 7.3%.

- ***Milk and Milk Based Products Industry***

The milk industry experiences in 2001 an increase for all the products (+16.5% for powder milk, +14.7% fresh milk products, 5.7% milk, 1% for cheese). Taking into consideration that only 20% of the production is being processed, it is expected an important

increase (mainly cheese for exports), in the next years.

- ***Bread and Wheat Flour***

Wheat flour production increased by 9.9% in the first semester of 2001 compared to the same period of the previous year, and bread production increased by 4.6 % . Another important development presented the biscuits industry (57.2%), and oil industry has maintained the positive production trend (+10.3%).

- ***Sugar Industry***

The year 2000 value was the worst figure in the last 10 years, with 55% lower than in 1989, and with 84% lower than in 1990. It continues to be confronted with a major lack of domestic raw materials. 2/3 of the factories have been closed due to financial difficulties. The remaining facilities were functioning in 2000 at 30% of their capacity, the domestic demand of sugar being covered from imports and refining of the imported raw sugar.

- ***Privatization***

At present the food processing industry is 95% privatized, with the highest percentage of privatization in the following sub sectors in decreasing order: milling and bread industry, meat industry, alcoholic beverages industry, milk and milk based products industry, mineral waters and other beverages, fruit and vegetables cans, non-alcoholic beverages, oil and vegetal fats industry, sugar industry, fish industry.

287 of the 440 societies state-owned in 1993 have been privatized by the end of 2000, and for 48 societies has started the reorganization procedure.

- ***Estimates***

Table 2.4.13: Milling and Bread Industry

Specification	2000	Estimates			
		2001	2004	2006	2010
Wheat processing – thou tones					
- industrial production	3140	4350	4152	4100	3800
-consumption needs	3600	3750	3432	3340	2850
-%of cons. from domestic prod.	87	116	121	123	133
- deficit/exc.	-13	+16	+21	+23	+33
Bread –thou tones					
- industrial production	2534	2690	2475	2425	2100
-consumption needs	2500	2500	2475	2425	2100
-%of cons. from domestic prod.	101.4	107.6	100	100	100
- deficit/exc.	+1.4	+7.6	-	-	-

Table 2.4.14: Meat Industry

Specification	2000	Estimates			
		2001	2004	2005	2010
Domestic production -total	253	240	550	580	960
-pork	166	170	280	300	575
Consumption needs	565	590	710	780	1150
- for pork	280	295	355	390	575
% of cons. from domestic prod.	45	41	77	74	83
-for pork	60	58	79	77	100
Deficit/exc.	-55	-59	-23	-26	-17

Table 2.4.15: Milk Industry

Specification	2000	Estimates			
		2001	2004	2005	2010
Consumption Milk -thou hl					
- internal production	1900	2600	8000	8160	8800
-consumption needs	8000	8000	8000	8080	8160
-%of cons. from domestic prod.	23.75	32.5	100	101	108
- deficit/exc.	-76.25	-67.5	-	+1	+8

Table 2.4.16: Edible Oil Industry

Specification	2000	Estimates			
		2001	2004	2005	2010
- internal production	309	328	480	600	700
-consumption needs	250	250	280	300	350
-%of cons. from domestic prod.	124	131	171	200	200
- deficit/exc.	+24	+31	+71	+100	+100

Table 2.4.17: Sugar Industry

Specification	2000	Estimates			
		2001	2004	2005	2010
- internal production	362	392	435	435	560
-consumption needs	450	450	475	475	500
-%of cons. from domestic prod.	80.4	87.1	91.6	91.6	112
- deficit/exc.	-19.6	-12.9	-8.4	-8.4	+12

2.4.8 Wood, Cellulose and Paper Industry

The cellulose and paper industry with a tradition of over 125 years and represented by 18 companies in 1989 includes now 30 major companies all over Romania and about 100small and very small private-owned enterprises.

In 1989, at the beginning of the transition period to a market economy, the Romanian sector of fibrous materials was defined by a very unfavorable state, production being oriented towards energy-intensive pollutant and non-competitive products, encountering also a dramatic demand cut off , as per chemical celluloses.

While worldwide, in 1989, the production was oriented mainly to whitened sulfate cellulose (38.8% of total), non-whitened sulfate cellulose (21.6%) and mechanical paste (21.8%), the Romanian sector was producing chemical cellulose (23.1% tones), whitened sulfite cellulose (only 24.6%) and only 10.3% mechanical paste.

Another disadvantage of the Romanian cellulose and paper industry is he prevalence of low-capacity facilities; out of 25 fibrous pastes fabrication lines, about 17 of them have capacities smaller than 50,000 tones/year, and out of 67 paper and cardboard production lines, about 50 have capacities under 40, 000 tones/year; the standard capacities considered of good performance exceed 200, 000 tones/year.

- ***Restructuring and Privatization***

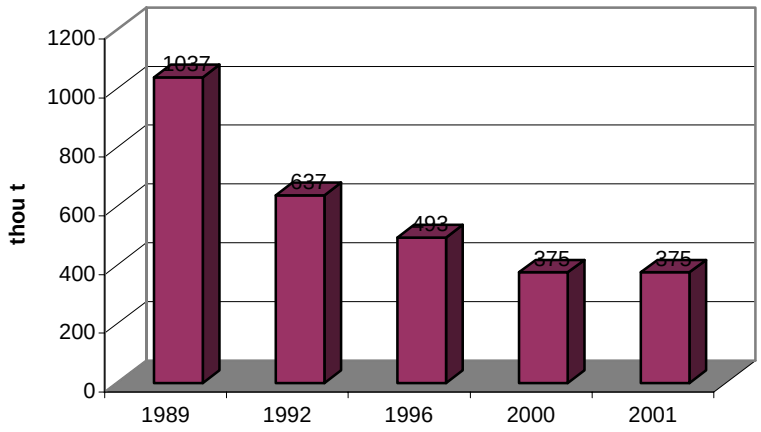
The transition to a market economic has been reflected in the changes in the products' structure, ownership and human resources. These are some of the adopted measures:

- shutting down the installations and machines with low capacities, low technological endowment and heavily polluting;
- conservation of those lines suitable for reprofiling and modernization;
- getting out of fabrication inefficient assortments ;
- significant restructuring of the human resources;
- privatization over the last period of some important enterprises producing cellulose and paper as: Ambro Suceava, Somes dej, Hartia Busteni, Comceh Calarasi, Celohart zarnesti;
- launching of modernization projects, especially at the big commercial societies; Letea Bacau, Celromturnu Severin, Ambro Suceava, Celhart Dinaris Braila, Vrancart Adjud.

- ***Production Trends***

a) Trend of the production facilities of fibrous cellulose materials

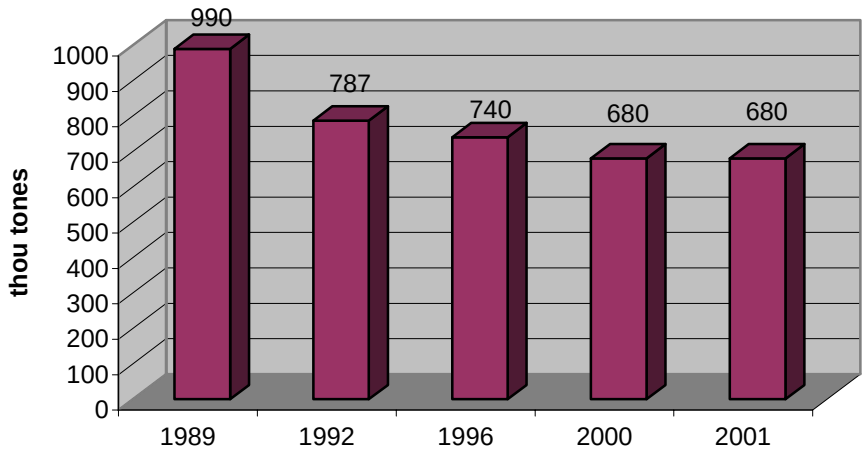
Figure 2.4.9 Trends of the Production Facilities of Fibrous Cellulose Materials



The abandoned installation and machines of low capacities and pollutant sum up a capacity of 602 000t/year and the preserved line represented a decrease of 60 000 t/year.

The evolution of the production facilities for paper and cardboard:

Figure 2.4.10 The Evolution of the Production Facilities for Paper and Cardboard



- ***Estimates***

According to the estimates of the Romanian economy in 2001-2005, for the cellulose and paper industry the estimates show an average medium growth rate of the production of 5.3%.

As a result of the proposed development program in connection with the market evolution estimates, a minimum rate of 5.3% is forecasted, as follows:

Table 2.4.18: Estimate for Cellulose and Paper Industry

Products	Unit	2001	2004	2005	2010
1. Industrial production	***Mil. $***	***271***	***445***	***610***	***765***
	$/t	410	500	570	600
2. Physical Production Trend, Total	***Thou t***	***662.6***	***890***	***1080***	***1265***
- fibrous materials	Thou t	267.6	380	480	545
- paper and cardboard	Thou t	395	510	600	720
3. Exports, out of which	***Mil $***	***105.0***	***145.0***	***190.0***	***190.0***
– Fibrous materials	Thou t	25	60	110	120
	$/t	358	380	400	450
- paper and cardboards	Thou t	165	240	270	235
	$/t	477	490	520	580
4. Imports, out of which	***mil. $***	***300***	***330***	***320***	***255***
– Fibrous materials	Thou t	6	10	5	-
	$/t	563	563	563	563
- Paper and cardboards	Thou t	239	280	280	230
	$/t	1150	1150	1150	1150

- ***Waste Management***

The basic raw material used for fibrous pulp production (cellulose, semi-cellulose and mechanical pulp) is the wood (evergreen and deciduous trees). The wood is processed by debarking and cutting for fibrous pulp production. The following wastes result: the bark and the sawdust. The debarking is performed in dry atmosphere- the general procedure- excepting the mechanical pulp production at LETEA - Bacau, where the debarking is performed in wet atmosphere.

Table 2.4.19: Generated Waste Amounts

Generated waste	Unit	1995	1996	1997	1998	1999	2000
Bark	Thou. t.	70,4	57,0	48,9	42,7	47,4	61,6
Sawdust	Thou. t.	27,5	22,2	19,6	17,2	18,5	24,3
Calcium carbonate sludge	Thou.t.	70,3	67,3	53,6	44,9	50,7	65,2
Alkalizing sterile	Thou. t.	5,6	5,4	4,3	3,6	4,1	5,2
Technological brack	Thou. t.	27,5	25,4	25,2	23,0	21,9	26,8
Wastes form waste sheet pulp production	Thou. t.	17,8	20,5	17,0	16,3	18,0	21,6

2.4.9 Oil Refinery and Petrochemistry

- ***The Oil Sector***

Oil refinery and petrochemistry sector include the following activities:

- Crude oil processing
- Petrochemistry
  - Production of organic basic chemical products
  - Production of synthetic rubber

The percentage of participation of the mentioned sector in whole industry, considering year 2000, appears as follows:

- 10.6% of the industrial production;
- 7.6% of export;
- 6.7% of crude oil import;
- 2.7% of oil based products import for the economy

Romanian oil processing sector has the following structure:

- ***10 refineries***: installed capacity 34 million to/ year, from which 11.7 million to/ year under conservation, as shown in the following table:

Table 2.4.20: Main Refineries

Unit – million to/year

No.	Refinery name	Installed capacity	Operational capacity	Nelson index
	Big refineries			
1.	SNP PETROM SA – PETROBRAZI branch	7.50	4.50	11.70
2.	SNP PETROM SA – ARPECHIM branch	7.00	3.50	9.40
3.	SC PETROTEL LUKOIL SA Ploiesti	5.00	3.50	10.73
4.	SC ROMPETROL SA – Petromidia	5.30	4.80	8.69
5.	SC RAFO SA ONESTI	5.20	3.50	9.54
	Small refineries			
6.	SC ASTRA SA Ploiesti	1.00	0.70	4.52
7.	SC ROMPETROL SA-VEGA Ploiesti	0.80	0.45	1.90
8.	SC STEAUA ROMANA SA	0.60	0.36	3.52
9.	SC Rafinaria DARMANESTI SA	1.15	0.60	5.49
10.	SC PETROLSUB SA Suplacu de Barcau	0.45	0.40	2.50
	TOTAL	**34.00**	**22.31**	

Excepting SNP PETROM SA with the state as major shareholder, all other refineries are private owned.

The privatization of SNP PETROM SA represents one of the important objectives of Romanian oil industry development strategy.

- ***The Petrochemical Sector***

The petrochemical sector has been developed as a complex sector in which advanced processing of oil derivates is achieved, following successive steps.

Within the sector act four complex systems, integrated with oil processing refineries: Arpechim, Petrobrazi, Petromidia, Petrotel Lukoil.

Other two companies have been developed in order to cooperate with raw materials producers: SC CAROM SA with RAFO SA and SC Solventul SA with Pancevo Combine in Serbia.

Arpechim is also functionally connected with SC Oltchim SA, delivering to Oltchim several raw materials: ethylene and propylene.

The main petrochemical products that can be obtained, grouped on usage domains, are:

- Plastics: polyethylene of high and low density, polypropylene, polystyrene and krylene, polyvinyl chloride, softening agents;
- Rubbers: SBR rubber, bi-vinyl rubber, thermo-plastics, synthetic latex;

- Raw materials for synthetic fibers: acrylonytril, glycols, phenol, para-xylene, dimethylterephtalate.
- Raw materials for manufacture of varnish, paints, cosmetics and drugs: phenol, acetone, carbon black, phtalic anhydride, and maleic anhydride.

▪ ***Oil Production***

The following companies have equipment for production of oils included in the flow sheet:

- SNP PETROM – ARPECHIM subsidiary;
- SC PETROTEL LUKOIL SA – Ploiesti;
- SC ASTRA ROMANA SA – Ploiesti;
- SC LUBRIFIN SA – Brasov;
- SC VEGA SA – Ploiesti.

Within this sector, highly influenced by oils import, middle range increases and brands diversifications are estimated.

▪ ***Production Trends***

Crude oil processing evolution for the period 1989-2000 is presented below:

Table 2.4.21: Crude Oil Processing Evolution for the Period 1989-2000

Unit – thou. tones

	1989	**1990**	**1992**	**1994**	**1996**	**1998**	**1999**	**2000**
Internal crude oil	9,179	7,774	6,672	6,593	6,324	6,106	5,800	5,950
Imported crude oil	21,819	15,890	6,756	7,925	6,904	6,403	4,300	4,750
TOTAL	**30,988**	**23,664**	**13,428**	**14,518**	**13,228**	**12,509**	**10,100**	**10,700**

It can be observed that in 1989 a maximum processing level of 30.9 million crude oil tones have been attended. From 1989, the crude-oil quantities that have been processed decreased, coming in 2000 at about 10.7 million tones.

The virgin stocks, oil and petrochemical products quantities resulted from crude oil processing in the period 1995-2000 are presented in the following tables.

Table 2.4.22: Evolution of the Production of Oil Products for the Period 1995-2000

Unit- thou. tones

No	**Product**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
1.	Crude oil	14,973	13,428	12,364	12,509	10,100	10.,700
2.	Gasoline	4,015	3,760	3,612	3,613	2,046	3,030
3.	Gas oil	4,695	4,197	3,878	4,005	3,014	3,280
4.	Naphtha	2,983	2,462	1,955	1,926	1,818	1,416
5.	Light Liquid Fuel	569	656	651	580	420	467
6.	Mineral oils	205	217	171	138	101	96
7.	GPL	285	269	242	310	256	321
8.	Bitumen	347	350	305	241	206	252

Table 2.4.23: Evolution of the Production of Petrochemical Products for the Period 1995-2000

Unit-thou. tones

No	Product	1995	1996	1997	1998	1999	2000
1.	Ethylene	161	159	147	153	167	174
2.	Propylene	137	139	157	140	124	139
3.	Polyethylene	76	81	70	81	91	91
4.	Polypropylene	26	31	31	25	11	16
5.	Polystyrene	5	4	3	1	1	-
6.	Phenol	23	13	31	23	7	-
7.	Acetones	14	8	18	14	4	-
8.	Aromatics	113	52	38	30	28	31
9.	Dimethylterephtalate	39	11	-	-	-	-
10.	NBR rubber	74	67	79	71	81	82
11.	PVC	130	123	132	123	131	128
12.	SBR rubber	38	21	27	21	15	15

- ***The Internal Market***

The demand of oil and petrochemical products on home market was of about 8-10 million to/year. From the whole gasoline production, internal consumption represented 60% and from the whole cracked gas oil production, internal consumption represented 70%. Regarding naphtha, only 45% of the internal consumption has been assured from internal sources, the rest coming from import.

- ***Medium and Long Term Sector's Strategy***

The development strategy for oil industry (2001-2010) considers the processing of 14 million crude oil tones/ year, activity that can be considered as optimal because of the following reasons:

- It covers home market demand for fuel, carburant and petrochemical products and assures efficiency regarding internal crude oil use.
- Assures raw materials for the revival of petrochemistry and industrial sectors using petrochemical products, such as: plastics, textiles, varnishes and paints, chemistry.
- Reduces imports of plastics (of about 320 million USD in 2000), fibers (of about 20 million USD in 2000), varnishes and paints (of about 54 million USD).
- Creates an export exceeding for products with high added value, under minimum market risk conditions;
- Assures favorable conditions for reopening of several production units, unused at present and the development of small and medium size companies.

Within this sector the specialization of small refineries will be increased and also the cooperation between refineries will be developed. Small refineries will no longer produce carburant because they cannot respect EU quality regulations; these products are going to be delivered as prefabs to the large refineries for a higher efficiency.

The processing level of 14-million to/ year can be overrun depending on home market absorption capacity, international market position and increase of competition within the sector. Estimation indicates a possible processing level of 18-million to/ year.

- ***Waste Management***

Implementation of EU regulations will bring important changes in this sector. Big companies will have to organize departments for assuring the implementation of regulations in the field of environmental protection and to create own groups of experts specialized in European integration. Middle and small companies will also have to train personnel for this field of activity.

Environmental management as a component of industrial management has to assure the compatibility between technologies, products and environment, as a part of competition. For these reasons, managers and specialists have to be trained in this field.

Medium and long-term objectives for waste management in refinery and petrochemistry activities:

- Modernizing of installations and implementation of new technologies in order to reduce environmental polluted emissions and reduction of ejected waste;
- Modernization of waste water treatment plants;
- Training for managers;
- Presentation and implementation of environmental management strategies of high performance;
- Implementation of information technologies in technical and economical processes management;
- Initiation and development of an efficient way of cooperation between companies acting in the field of refinery and petrochemistry.

2.4.10 Rubber Processing Industry

Rubber processing industry represents 1.1% of the national industry and about 6% of chemical and petrochemical industry. It includes companies producing tires and technical rubber items.

- ***The Tires Sector***

The tires sector comprises six companies:

1. SC DANUBIANA SA Popesti Leordeni, Ilfov region
2. SC VICTORIA SA Ploiesti, Prahova region
3. SC SILVANIA SA Zalau, Salaj region
4. SC ROTRAS SA Turnu Severin, Mehedinti region
5. SC OLTTIRE SA Caracal, Olt region
6. S ROMVELO SA Ludus, Mures region

The biggest tires production has been registered in 1986, respectively 7,487 million pieces, with a yearly output of about 10 million pieces/ year.

Table 2.4.24: Evolution of Tire Production

1980	1985	1986	1989	1990	1995	2000
5,003	5,642	5,789	4,804	3,702	3,018	3,011

The brands of tires produced in the five mentioned factories are:

- Tires for cars, inclusively jeeps;
- Tires for trucks and pick-ups;
- Tires for buses;
- Tires for agricultural vehicles;
- Tires for tractors with diagonally and radial-ply construction;
- Tires for heavy transportation vehicles, diagonally construction

Apart of the tires sector a complementary sector producing basic raw materials – synthetic rubber, vulcacites, different chemical products (CAROM SA Onesti – synthetic rubber, VERACHIM SA Giurgiu – vulcacites, PROGRESUL Ploiesti – zinc oxide) is still significant.

The present production capacities (about 7.5 million pieces/ year) and the brands that are normally manufactured can assure, excepting some special dimensions, the home market demand of tires both for new cars and as spare parts for the whole internal fleet, existing conditions even for export.

- ***Privatization***

All companies working in tires sector are privatized. Michelin owns SC VICTORIA Floresti and SILVANIA Zalau. The other companies have Romanian stock.

The Continental Company opened a tire factory in Timisoara, the future production being estimated to about 4-million tires/year, most of it for export.

- ***Technical Rubber Items***

Main products in technical rubber items industry are:

- Apron conveyors:
  - With textile and metallic insertion;
  - Resistant at high temperatures; oil products;
  - Antistatic and ignifugal;

- Flexible pipes:
  - Lower pressure;
  - Medium pressure;
  - High and very high pressure;
  - Rotary for oil industry;
  - For brake;

- Trapezoidal belts;
  - For cars;
  - Short, medium, long for industrial use;
  - For agricultural and industrial speed variator

- India-rubber packing
  - Without insertion;
  - With metallic reinforcement;
  - With textile insertion;
  - For general use;

- Resistant at oil products and high temperatures;
- Oil sealing rings;
- Flexible blocks

- Profiled seals:
  - With metallic reinforcement;
  - Without reinforcement;
  - Flanged;
  - Spongy or compact;

- Ebonite items:
  - Mono-blocks for storage batteries;
  - Boxes for storage batteries

- Other products with special destination:
  - Spare parts for cars;
  - Items for protection equipment;
  - Rubber-covered rolls

In 1989 the productive capacity of the technical rubber items sector (307 working days) was bigger than 100,000 to/ year. At present, the production is of about 75,000 to/ year.

The decline of technical rubber items sector is due to:

- Restraint of both home market and international one;
- Difficulties in assuring working load;
- Disfunctioning in assuring raw materials;

The present productive capacities assure the home market demand of technical rubber items and an export activity that represents 20% of the physical production.

The last years productions had a similar trend as the one registered in the tire industry, showing the existence of markets with relatively high absorption capacity for these products.

- ***Waste Management-Recaping,Recycling***

The tires sector includes also plants for recap activities (settled before 1990, the only exception being RECAP):

- RECAP Bucharest;
- VICTORIA Bucharest;
- RESAPARE SA Craiova;
- PNEU SERVICE Galati;
- RESAPARE REPARARE tires Arad;

The production of the mentioned companies decreased because of the lack of demand of reconditioned tires on home market.

In 1989 more than one million tires could have been recapped, most of them being tires for large sized vehicles (tractor and huge vehicles). At present only RECAP SA , belonging to

MICHELIN Romania and VICTORIA SA Bucharest are still active.

Recycling of used tires and technical rubber items is done through a grinding process.

There are two plants for reclaimed rubber (powder): SC Arteca SA Jilava and SC Artego SA Tg. Jiu.

SC Arteca SA has a reclaimed capacity (grinding) of about 150 tones used tires/ month. Only textile insertion tires are processed, obtaining more than 1200 tones of reclaimed rubber.

Reclaimed rubber is used totally in chemical mixtures in a percentage of 10% of the new product.

Artego SA Tg. Jiu has a capacity for reclaiming rubber of about 500 tones/ month; they process both textile and metallic insertion tires, having availability for selling reclaimed rubber to other users (Rolast Pitesti).

The utilization of worn tires within the cement industry represents an advantageous alternative meaning to partly substitute the classic fuels (oil, coal), considering the fact that the cement industry is a great power consumer and the tires average calorific value is about 6000 kcal/ kg. The releases of carbon dioxide, nitrogen dioxide and sulphur dioxide are lower. Solid residues do not result, the whole tire being consumed and becoming part of the end-product.

2.4.11 Drugs Industry

- ***Background***

Drugs industry is one of the most important components of the chemical industry. Medicines industry has suffered important changes on the way to market economy.

At present, in Romania, in medicine industry sector acts 89 companies that are registered and authorized by Health and Family Minister. Employees' number divides these companies divided into 9 big plants, 14 medium plants and 66 small ones.

These plants have a total stock of 806 billion lei, a turnover of 3,455 billion lei, and a number of 11,484 employees in 2000.

The Romanian drug industry has been created as an independent domain from the beginning 1940-1950. Until 1970 the production activity has been unfold in 6 big factories: SICOMED, TERAPIA, ANTIBIOTICE, SINTOFARM, BIOFARM, ARMEDICA and MEDUMAN. With the implementation of market economy, new companies with private stock were founded: EUROFARM, SINDAN, LABORMED, ARENA GRUP etc.

There is only one company, SC ANTIBIOTICE SA Iaşi, in which the Romanian state owns 53% of the shares.

Regarding the productive activities, 9 companies produce human and veterinary drugs, 80 companies produce only human drugs and 17 companies produce only veterinary drugs. The main brands of products, according to statistical records, are: antibiotics, vitamins, antiseptics, anti-pyretic, anti-diabetes, etc.

In the period 1995-2000 drugs and pharmaceutical products production (244 CAEN index) represented 0,3-0,6% of total Romanian industrial production, about 0.3% of export. At the same time, drugs and pharmaceutical products inputs increased at

2.1-2,6% by total drugs input.

- ***Main Index Evolution***

Human use drugs index /2001, authorized in Romania, comprises 6,054 products, 26.4% of it, respectively 1,601 produced in Romania. From the total number of 931 products that can be sold without medical prescription (OTC), 35% are of Romanian origin.

Human use drugs index/2001 also comprises 466 human biological products and biological reactive for diagnostic.

Human use drugs production represents 95-98% of total drugs industry, the rest being represented by veterinary use production drugs.

First ten manufacturing companies, by turnover level, are the most representative producing 80% of the total production value.

Considering statistical evaluation, the human use and veterinary use drugs production on Romanian market between 1989-2000, registered a decrease from 330 million USD to 125 million USD.

The same decrease occurred in physical structure production considering all six therapeutic class products. The decrease of drugs production is due mainly to the reduction of synthetic items production determined by:

- Non performing technologies;
- Closed-up delivery of raw material and precursors by Romanian production;
- Increasing active substances input.

Therefore, production based on conditioning drugs activity with active substances from import, appeared to be more profitable, in major cases, than production of active substances using existing equipment.

The degree of usage of productive capacity in 2000 varies between 18-80%, with an average of 45%, creating by this problems regarding profitability.

A common problem for manufactures of human use drugs is the conformation to Good Manufacturing Practice Regulation (BPF) harmonized with European directives that have to be applied until 31.12.2003 according to Law 336 / 2002. This action needs major investment efforts.

In the last three years, investment efforts of manufacturers have been oriented through the modernization of conditioning equipment, as result from flows state for which there have been obtained certificate of Good Manufacturing Practice. The investment effort for the certification of Good Manufacturing Practice Regulation application, have been done by 5 of the major national manufactures, in the period 1990-2000, summarizing about 35 million USD.

The two major manufactures present in drugs' export activities in 2000 have been: SC ANTIBIOTICE SA (50%) and SC TERAPIA SA (30%).

Referring to drugs import, as final products, an increase was registered due to:

- Home market can not be satisfied by Romanian production due to the large range of products required and also to a great specialization in their production and also due

to great costs in research and in innovative activity;
- Internal production does not totally satisfy the needed quantities of drugs for the treatment of some severe diseases such as: HIV-SIDA, diabetes;
- Innovative products that appeared on the international market have been already been patented and protected by law, so that they can not be used without author's acceptance;

Ratio between drugs' import (273 mil. $) and export (14.3 mil. $) was in 2000 19:1.

- ***Medium and Long-Term Drugs Policy***

Considering the importance of drugs domain, the market demand, manufacturing companies profile, internal and external decisive factors and also all the premises previously shown, the governmental policy of drugs domain has the following goals:

- To assure the necessary quantity of drugs for sustaining health and social security policy, with drugs from internal production;
- To increase efficiency and competition of manufacturers, simultaneous with preparing the integration into the European Union;
- To revival and develop drugs industry leading by this to decrease of drugs import, as final products;
- To decrease environmental impact for the technologies used in synthetic industry and bio synthesis;
- To align to quality standards imposed by European Pharmacopoeia, to which Romania joined by law no. 148 / 2001;
- To align to the Good Manufacturing Practice Regulations.

The directions for approaching the proposed politics are:

- To assure, in big percentage, the internal production of drugs;
- To increase the participation of Romanian products on internal market;
- To develop the sub-domain of medicinal plants based products, in order to support at national industry level, those sectors that assure advanced processing of internal raw materials.
- To improve the manufacturing structure and to adapt the brands of products to the needs according the Ministry of Health and Family estimation.
- To enhance collaboration with private companies in order to fundament and harmonize these strategies with governmental policy in drugs sector.

Forecast of basic indexes

- Reaching an annual increase rate of 8-10% until 2010, for drug industry;
- Increasing annual consumption from 383.7 million USD in 2000 to 880 million USD in 2010;
- Increasing drugs consumption/ inhabitant to 40 USD in 2010;
- Increasing export with 200% until 2010;
- Maintaining imports below 400 million USD on medium and long term estimate.

2.4.12 Fertilizer Industry

- ***Main Companies***

Because of its relief forms, geographical position and climatic conditions Romania is one of the countries with adequate potential for developing an intensive agriculture. For this reasons between 1960 and 1980 within the chemical industry a very powerful sector for chemical fertilizers production have been developed.

At the end of this period, 10 companies manufacturing fertilizers were acting (the list billow comprise their actual names).

1. S.N.P. PETROM S.A. Bucharest – branch of DOLJCHIM CRAIOVA
2. S.C. AZOMURES S.A. Targu Mures
3. S.C. TURNU S.A. Turnu Magurele
4. S.C. AZOCHIM S.A. Piatra Neamt
5. S.C. AMONIL S.A. Slobozia
6. S.C. NITRAMONIA S.A. Fagaras
7. S.C. SOFERT S.A. Bacau
8. S.C. MARWAY FERTILCHIM Navodari
9. S.C. ARCHIM S.A. Arad
10. S.C. ROMFOSFOCHIM S.A. Valea Calugareasca

These companies are manufacturing various brands of fertilizers, simple and complex, having productive and spedition units. Within these companies there are also produced intermediate products needed in this sector, and other products used in different sectors of the national economy, integrated in the structure of the producers of fertilizers.

1989 was registered as the year of reorganizing this sector, ended with the stop of activity for the last three companies on the list above.

- ***Fertilizers Brands***

The main fertilizer brands produced in Romania are:

- *Plain fertilizers with nitrogen*
  - Granulated ammonium nitrate with about 33.5% nitrogen and with a druse seized between 1 – 2.5 mm.
  - Granulated nitro-limestone that contains 26 - 28% of nitrogen with a druse seized between 1 - 4 mm
  - Granulated urea with an content of nitrogen of 46.3% and a druse of 1 – 2.5 mm
  - Fluid fertilizers containing 28 – 32% nitrogen manufactured from urea and ammonium nitrate

- *Plain fertilizers with phosphorus*
  - Plain super phosphate, powder or granulated, with 18% P2O5 and a druse seized between 1 – 4 mm
  - Triple super phosphate, powder or granulated, that contains 46% P2O5 and a druse seized between 1 – 4 mm

- *Complex fertilizers based on acid phosphate*
  - Granulated acid phosphate with an content of nitrogen and phosphorus in diverse percents, based on beneficiary's requirements and that can alternate very much N = 32 – 20%, P2O5 = 13 – 26%, druse = 1 – 4 mm
  - Granulated di-ammonium phosphate with an content of useful substances, depending on demand, of N = 13.5 – 18.0% and P2O5 = 46.0 – 48.0%, druse = 1 – 4mm
  - Granulated N.P.K. that contains nitrogen, phosphorus and potassium in a diversity of percents: nitrogen 10 – 13%, P2O5 = 26 – 27% and K2O = 12 –13% with a druse of 1 – 4mm
  - Complex fertilizers based on ammonium phosphates and urea, granulated with nitrogen and phosphorus based on beneficiary's requirements: nitrogen = 20 – 35% and phosphorus = 18 – 30%
  - Complex fertilizers based on potassium salts, urea and granulated ammonium nitrate, that contains nitrogen = 14 – 17%, P2O5 = 10 – 20% and K2O = 10 –20%, this based on beneficiary's requirements, with a druse of 1 – 4mm

- *Complex fertilizers obtained by nitric attack on phosphor rocks.*
  - Granulated N.P. with an content of nitrogen = 20 – 27% and P2O5 = 12 – 13% having a druse of 1 – 4mm
  - Granulated N.P.K. that is containing nitrogen = 15 – 22%, P2O5 = 10 – 16% and K2O = 10 – 16%, based on beneficiary's requirements and has a druse of 1 – 4mm
  - Foliar fertilizers.

Besides these main brands, the units can produce, fertilizers with microelements or secondary nutritive elements.

The companies producing chemical fertilizers are manufacturing also a large scale of intermediate products as: ammoniac, sulphonic acid, acid phosphoric, acid nitric, carbon dioxide, nitrogen, argon, porous ammonium nitrate, phosphate dicalcic, methanol and others.

These companies are also producing thermal energy and industrial water delivered to the local communities.

- ***Technologies***

The plants that produce chemical fertilizers including plants for intermediate products or facilities, depending on the period in which they were built, use different technologies.

A delimitation of those can be done as follows:

- First generation plants – producing ammoniac, acid nitric, acid phosphoric, acid sulphonic, ammonium nitrate, simple superphosphate, and urea - were built up between 1960 – 1965.
- Second generation plants – producing urea, complex fertilizers with nitrogen – phosphorus – potassium (NP, DAP, NPK, based on phosphoric acid), ammonium nitrate, nitro-limestone, ammonia, acid nitric, acid sulphonic, acid phosphoric – were built up implementing Western technologies.
- Third generation plants - producing ammoniac, acid nitric, acid phosphoric, urea, ammonium nitrate, nitro-limestone, complex fertilizers with nitrogen/ phosphorous/ potassium (NP, NPK based on the attack of nitric acid on phosphatic rocks), fertilizers with nitrogen and phosphorus of type DAP, liquid fertilizers with

nitrogen, etc. – were built up between 1971 – 1989, with flow sheets comprising Western or home technologies.

- All these plants stepped during their functioning different stages of modernization and different works that have increased the security during functioning, have reduced the consumption of raw materials and power resources, have decreased environmental pollution and have increased the quality of the products.

- ***Privatization***

At the moment the plants belonging to the ten mentioned fertilizer companies began their activity, they were 100% state owned.

After 1989, the ownership structure of these companies was changed. Companies like: SC AZOMURES, SC AZOCHIM, SC AMONIL, SC SOFERT, SC MARWAY FERTILCHIM, SC ROMFOSFOCHIM, SC ARCHIM are at present private owned, some of them 100% and some of them for the majority of shares. SC DOLJCHIM from Craiova, became a branch of S.N.P. Romania (with the state main shareholder). SC TURNU, SC FAGARAS have the state as major shareholder, being on the way to privatization.

- ***Production Trends***

The production of chemical fertilizers has registered a big decrease after 1989, ending in the year 2000 to be of only 37%. The reasons were: SC ARCHIM ARAD, SC ROMFOSFOCHIM VALEA CALUGAREASCA and SC MARWAY FERTILCHIM NAVODARI companies stopped their activities and in other companies the production levels were reduced. This major reduction of the production was in direct connection with the decline of the whole industrial activities. As main problems that appeared after 1989 and that contributed at the decline of the production of chemical fertilizers, there can be specified:

- The alignment of the price of electrical energy and natural gas at world's standard, leaded to the decrease of export under the conditions that other countries (from the ex-soviet space) included lower prices for these basic elements in the total cost of chemical fertilizers. Because of these reasons the competition between import products increased (in connection with fertilizers consumption – agricultural products – food, and also fertilizers).
- The lost of some of the traditional markets for export.
- Severe decrease of internal consumption of fertilizers went down in 2000 at 25% of 1989' consumption, because of the lower purchasing power of internal agricultural producers and because of dividing the agricultural property as a result of Territorial Fund Law application.
- New conceptions appeared, regarding economical priorities, new directions of economical development. The criteria regarding the evaluation of the importance and the necessity of maintaining some of the industrial activities, have been re-evaluated; the results were the limitation or the cease of producing some products or some groups of products, and even closing some industrial platforms..
- The impossibility in assuring natural gas quantities (one of the basic raw materials) for the entire year, especially during the cold period.
- Financial politics had discouraged investments in the chemical fertilizers sector.

Because of this evolution, the chemical fertilizers sector represented 14-18% in the last years within the framework of chemical industry, and approximately 0.85–1.2% within the framework of the national industry and approximately 0.3% of the National Gross Income.

- ***Future Evolution of Internal Fertilizers Consumption***

According to the information received from the Ministry of Agriculture, Food and Forests , in the next period approximately 14,500,000 hectares of land should be fertilized, out of which 10,000,000 hectares are arable land. Considering these areas and the purchasing power of agricultural producers, the evolution of internal consumption of chemical fertilizers can be estimated as follows (thousands tones):

Table 2.4.25: Evolution of Internal Consumption of Chemical Fertilizers - Estimate

Year	Total Quantity	Nitrogen	Phosphorus	Potassium
2000	282.0	308.0	56.0	18.0
2001	500.0	351.0	129.0	19.0
2002	650.0	480.0	140.0	30.0
2003	850.0	550.0	250.0	50.0
2004	1,000.0	600.0	330.0	70.0
2010	2,200.0	1,100.0	800.0	300.0

- ***Waste Management***

The plants producing chemical fertilizers obtain during the flow sheets residuals that can be grouped as follows:

- Solid residuals: phosphogypsum deposited in ponds – catch pit (big vats impermeable that do not admit that the soil, the water and the air to be polluted); calcium carbonate that is used as an agricultural fertilizer; pyrites ash (there exists an installation under Japanese license that processes pyrites ash, transforming it in copper/ gold/ silver concentrate); used catalysts; metallic dump goods; paper dump goods; dump goods that are a result from the preparation of the sulfur for making acid sulphonic; fertilizer dust from the granulation towers; calcium carbide dump goods; sterile from lime and others.
- Liquid residuals: waste waters that contain different components (ammoniac, ammonium, urea, chlorine, sulfates, phosphates, carbonates, nitrates, calcium, fluorine and others); used oils.
- Gaseous residuals: nitrogen oxide, sulfur oxide and carbon monoxide.
- During the functioning of the plants different problems regarding environmental protection appeared . A part of these problems were solved. At present all of the functional plants have an environmental authorization according to the new regulations.

Of course there still exist problems that need to be solved, concerning the alignment of environmental politics of these companies to the European legislation, under the perspective that our country will become a EU member. For these reasons the plants will be modernized in order to make their activities environmental friendly, the modernization programs being established in cooperation with the environmental authorities.

2.4.13 Inorganic Chemistry

Short Presentation

As part of the chemical industry, inorganic producers (other than the producers of fertilizer) represent an important sector being the manufacturer of the following items:

- Calcinate soda;
- Caustic soda;
- Sodium bicarbonate;
- Silicate sodium;
- Chlorine;
- Hydrochloric acid;
- Chromium salts(sodium bichromate,etc)
- Barium salts (barium carbonate);
- Zinc oxide:
- Aluminium sulphate;
- Pesticides(based on sulphur);
- Fluorine compounds(fluorhydric acid);
- Calcium carbide.

The manufacture of inorganic products started in Romania at the end of the 19th century, based on the existence of some raw materials and power sources, such as: salt, limestone, sulphurous gas, methane gas.

The production of the previous basic inorganic products is realized by the following companies:

1 S.C. UPSOM S.A.- OCNA MURES
2 S.C.U.S. GOVORA S.A.
3 S.C.OLTCHIM S.A.- RAMNICU-VALCEA
4 S.C.CHIMCOMPLEX S.A.- BORZESTI
5 S.C.BICAPA S.A. -TARNAVENI
6 S.C.CARBID-FOX S.A.- TARMAVENI

UPSOM and CARBID- FOX are companies with a majority private stock, and the others are in the process of privatization. There have to be mentioned also that most of the companies and especially OLTCHIM AND CHIMCOMPLEX S.A. are representing also some other sectors of the chemical industry .

Table 2.4. 26: Main Groups of Products and Main Producers

PRODUCTS		UPSOM	US GOVORA	OLTCHIM	CHIM COMPLEX	BICAPA	CARBID-FOX
I. CALCINATE SODA AND SECONDARY PRODUCTS							
1.	Calcinate soda-light	X	X				
	Heavy	X	X				
2.	Caustic soda -lye(100%)	X	X				
	-solid		X				
	-flakes		X				
3.	Calcium carbonate(sec)	X					
4.	Sodium bicarbonate	X					
5.	Sodium-silicate	X	X				
	solution	X	X				
6.	silica gel	X					
7.	Calcium chloride(sol 34%)	X					
8.	Sodium sulphide(sol 20%Na_2S)		X				
9.	Detergent	X	X				
II.CHLORINE-SODA RPODUCTS							
10.	Caustic soda washed(100%)			X	X		
	Solid and flakes			X	X		
11.	Liquefied chlorine			X	X		
12.	Hydrochloric acid technical(32%)			X	X		
13.	Hypochloride sodium(100%)			X	X		
14.	Lime chloride,32%Cl2				X		
15.	Calcium chloride sol,34%(synthesis)				X		
	Anhydrite				X		
16.	Ammonium chloride				X		
17.	Ferric chloride sol 40%				X		
	III.CHROMIUM SALTS					X	
	IV.BARIUM SALTS					X	
	V.DIFFERENT INORGANIC SALTS					X	
	VI.PESTICIDES(based on sulphur)					X	
	VII. FLUORINE COMPOUNDS					X	
	VIII.CERAMICS					X	
	IX.CARBID and SECONDARY PRODUCTS						X
1.	Carbide						X
2.	Sodium formiate						X
3.	Formic acid						X
4.	Sodium sulphate(sec)						X

PRODUCTS		UPSOM	US GOVORA	OLTCHIM	CHIM COMPLEX	BICAPA	CARBID-FOX
DIFFERENT PRODUCTS							
1.	Magnesium salts	X					
2.	Florex(for the fire extinction)	X					
3.	Molecular sieves -for n-paraffins		X				
4.	-for p- xylene		X				

A big part of the production is designated to the export. The companies with an important contribution in the export are OLTCHIM (the whole activity), US GOVORA and CHIMCOMPLEX (the whole activity). Together they cover almost 83% from the export of inorganic products.

The demand of products on international market was especially for caustic soda , calcinate soda, chlorine, sodium dichromate and carbide.

- ***Waste Management***

The manufacture of the inorganic products is done using well-known technologies.

The quantities of pollutants agents that result from the manufacture of most important products for the inorganic industry are known for most of the technologies .As an example for calcinate soda production the following types of pollutants agents are the most significant:

- Residual gases, emitted in atmosphere:
  - Controlled emissions(point sources):
  - Gases with CO2 from the lime furnace (35-40% CO2)
  - Uncontrolled emissions (diffused sources: manipulations, untightness losses, etc)
  - Ammonia emitted to the liquid surface from the tub of the rotative filter: 0.50Kg/t.

- Residual suspensions:
  - Water for the washing of the CO2 gases in scrubber, from the lime furnace FCH: 8 m3/t;
  - Residual precipitates from the purification of the pickle: 0.2 t/t-15% NaCl;

- Waste material:
  - limestone 0.1-0.15 t/t;
  - powder coke: 6Kg/t;.