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Full Length Research Paper

Implications of environment regulations on industrial development, under the conditions of adopting the EU-ETS scheme in Romania: An analysis

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The growing interest in limiting the negative effects of pollution on the European level led to the development and implementation of a European mechanism, beginning with 2003, voluntarily assumed by all the member states aiming at reducing the greenhouse gases, besides the mechanism required by the Kyoto Treaty. The effects of this mechanism on the industry development inside the community as well as on each member state's industry are a large debating subject. Romania's integration in the community economic area means not only observance of the commitments assumed by the community in all action branches, but also active appropriate measures. In this context, this work aims at analyzing the impact the environment regulations have on the Romanian industry, especially the European Union Emissions Trading Scheme (EU-ETS), while adopting those objectives meant to reduce the greenhouse gases. The first part of the article presents a panoramic analysis of the community frame for implementing the EU-ETS scheme, and the second part analyzes the effects and mutations suffered as a consequence of the fact that the local industry is in accordance with the new environment conditions, but also of the necessity to review the pollution quotas and certificates.

Key words: European Union Emissions Trading Scheme (EU-ETS), ecologic impact, durable development, industrial collapse.

INTRODUCTION

Strongly tied to the old conceptions (Schneider et al., 2002, Richard and Kathryn (2002), Michael et.al. 2003 or Christoph and Andreas 2005), the states continue to pay a great atten,tion to the industrial development, without taking into account the sustainability of those processes.

If some time ago the heavy industry represented the main key in the industrial development, the investments' re-orientations towards other industrial sectors started to show their results. Nevertheless, the re-orientation towards a durable and sustainable development of the industrial branch must go beyond declarations and regulations that should be implemented rather than been identified temporarily in accordance with solutions.

Even though in this context, as Emilic et al., 2008, William and Martina (2004), Jane and Dennis (2006) consider, the first measures mostly aim at reducing the carbon dioxide level and especially due to the emissions level, the other pollutants must also be considered in the subsequent European schemes on reducing the pollution, which is still under the substantiation stage.

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Abbreviations: JI, Joint implementation; **CDM,** clean development mechanism; **EU-ETS,** European union emissions trading scheme.

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The set on the climate changes or the so-called Plan 20-20, expresses the fact that until 2020, 20% of the energy must mostly be spent from alternative sources and the level of the greenhouse gases must be decreased by 20% as compared to the level in 2005 (Alberola et al., 2008). If we take into account the greenhouse gases emissions and their impact on the environment conditions, we can find out that despite all the efforts promoted on the European level they record major fluctuations. Thus, in the case of the developed European economies, even though the emissions are reducing, they are not significant as compared to their investment potential. On the contrary, in the Eastern European countries, the level of the emissions has significantly decreased due to the massive transformations they suffered after the centralized economy systems have collapsed.

Considerations on carbon European market

In the context of a more and more powerful globalization of the industrial relations, the identification and application of the most appropriate strategies for increasing the European industry competition degree (Faure et al., 2003; Alberola et al., 2001; Teodora et al. 2011), generally speaking, and particularly of the member states, need important financial resources, but mostly, efficient implementation economic instruments. The industry develops and orientates towards the branches with competitive productions in the broader context of the community policies. Even though the European trend in this area goes together with the rationalization of the production, the branches with a massive impact on the environment quality (Capoor and Ambrosi, 2009; Blyth and Bsoi, 2004; Reinaud and Philibert, 2007), such as the energy and the metallurgic industry, the industrial strategies and the accompanying economic policies, are re-oriented so that these industries preserve at least the production level and even register growths using specific community systems, such as the trade scheme of the carbon emissions that only represents a direct redistribution method of the European pollution.

As for the evolution of the greenhouse gas emissions as compared with 1996, considered subsequent to the reference year, it can be said that they have registered on the EU-27 level, a decrease from 95.5% to about 92%, five years later, whilst in 2006 there was a slight growth of 0.4%.

According to the evolution of the data in Table 1, two types of evolutions are emerging. The developed European states show decreasing levels of the greenhouse gas emissions, because of the measures promoted by the states' authorities and of the participations in the international agreements on the climate changes. States such as Germany, France, Great Britain or Belgium record significantly reduced levels as compared to 1996. In Germany, as the country with the most powerful economy in the community area, there was a decrease of about 9% in 2008, as compared to 1996; France has also recorded a decrease of 5%, and Great Britain had a decrease of 9%. The targets of these states between the 2008 to 2012 period have recorded some reduced levels as compared to 2006, and the reductions has moved from 2 to 12%. However, in this period, developed European economies receive a significant growth of the greenhouse gas emissions. In addition, the case of France receives an increase of this level, up to the level registered in 1996.

In the same context, the balance of the greenhouse gas emissions in the national economies and on the 27 EU level is extremely important (Reinaud, 2008; Weishaar, 2007; Böhringer et al., 2006). The most developed European states have again an edge. The most powerful European economies also hold the largest part of the CO_2 emissions. Germany holds approximately 20% in the European balance, France and Italy hold 10 and 11% respectively, Great Britain holds about 13%, while the economies recently integrated in the Union, namely Bulgaria and Romania hold almost insignificant parts, due to their industrialization degree and the subsequent evolutions in the industrial branch (Ikkatai et al., 2008; Böhringer and Lange, 2005). The reduction of the industrial production directly and explicitly contributed to the decrease of the greenhouse gas emissions, not being the direct effect of the refurbishment of these branches.

The most significant balance of the greenhouse gas emissions belongs to the most developed economies worldwide, the USA and Japan, as shown by the data in Table 1. The emissions of the USA are superior to the total emissions of the EU 27, and the emissions of Japan are close to those registered in Germany, considered as the engine of the European economy. In the case of the USA, a significant increase of the greenhouse gas emissions is seen, but in the case of Japan, the emissions remain at about a constant level, even though there are slight variations all along the analyzed periods.

In this situation, the one-way reduction measures required on the European level by the European Commission through the establishment of the EU-ETS, which is the controller and transaction mechanism, have a huge impact on the community industry; the latter situation is closing production units or taking appropriate measures in view of relocating the production in areas that are not under the incidence of local or global mechanisms for reducing the emissions.

In this context, we can see a reduction of competition to the disadvantage of the European industry. Even though the trade scheme EU-ETS only refers to limiting the CO_2 emissions, there are emissions with a great influence on the environment, but does not comprised any limiting or transaction system or that make the object of a taxation.

EU-ETS aims at reducing the carbon dioxide emissions

Table 1. The evolution of the greenhouse gases in some member states of the EU, in the USA, Japan and their balance between 1996 and 2001.

	Total greenhouse gas emissions (1990 = 100)				Weighted emissions of greenhouse gases (million tons of CO_2 equivalent)			
	1996	2001	2006	Target 2008-2012	1996	2001	2006	Share in EU-27 (%)
EU-27	95.5	91.9	92.3	-	5,319.5	5,121.2	5,142.8	-
Belgium	106.0	99.6	94.0	92.5	154.5	145.2	137.0	2.7
Bulgaria	65.0	52.0	53.8	92.0	86.2	69.0	71.3	1.4
Czech Rep	82.2	76.7	76.3	92.0	159.6	149.0	148.2	2.9
Denmark	129.1	100.2	101.7	79.0	89.5	69.4	70.5	1.4
Germany	90.4	84.1	81.5	79.0	1,114.7	1,036.3	1,004.8	19.5
Estonia	50.8	42.9	44.3	92.0	21.7	18.3	18.9	0.4
Greece	106.5	121.1	124.4	125.0	113.9	129.6	133.1	2.6
Spain	107.4	133.0	149.5	115.0	311.3	385.5	433.3	8.4
France	101.3	98.9	96.0	100.0	571.3	557.6	541.3	10.5
Italy	101.3	108.0	109.9	93.5	523.4	558.0	567.9	11.0
Latvia	48.5	41.1	44.9	92.0	12.6	10.7	11.6	0.2
Lithuania	47.1	41.2	47.0	92.0	23.3	20.3	23.2	0.5
Hungary	70.6	68.8	68.1	94.0	81.5	79.4	78.6	1.5
Austria	105.9	107.9	115.2	87.0	83.7	85.3	91.1	1.8
Poland	79.6	68.4	71.1	94.0	448.4	385.5	400.5	7.8
Portugal	112.8	138.7	138.3	127.0	67.8	83.4	83.2	1.6
Romania	68.3	51.7	56.3	92.0	190.0	143.7	156.7	3.0
Slovenia	95.0	97.4	101.2	92.0	19.4	19.8	20.6	0.4
Slovakia	71.1	69.7	67.9	92.0	51.2	50.2	48.9	1.0
UK	93.7	86.7	84.0	87.5	727.2	673.3	652.3	12.7
Japan	106.8	104.0	105.3	94.0	1,358.2	1,322.7	1,340.8	-
USA	109.3	112.5	114.4	-	6,706.6	6,901.4	7,107.3	-

Source: author own processing, EUROSTAT, European Environment Agency, European Topic Center on Air and Climate Change.

and regulating the trading frame of these quotas, without taking into account the rest of the pollutants that have implications that are more complex on the environment than the CO2 emissions as Stephen et al. (2002), Dallas et al. (2006) or, Emilic et al. (2008) noticed in their work. Table 2 presents the values of the main categories of polluting gases in several member states of the EU, for a 10 years period, namely 1995-2005 and 1996-2006, as compared to the CO_2 emissions.

As can be seen, the highest quantities of polluting gases are represented by carbon dioxide emissions that remain relatively constant all along the interval; this cannot be said about the other categories of polluting agents. In the case of carbon monoxide emissions, there is a decrease to approximately half of the value registered in 1995, namely 19.91 million tons; for methane emissions, the decrease is approximately 5.53 million tons; for sulfur oxides emissions, the decrease is approximately 1.34 million tons; and for nitrogen oxides emissions, the decrease is approximately 3.31 million tons.

Thus, it becomes necessary to identify specific methods for introducing these categories in the extended scheme of the EU-ETS or in a similar one. The one-way orientation of this system causes a decrease of the impact that the measures taken on the community level have on the environment.

A series of market instruments are already used on the community level (Michaelet al., 2003, Jane and Dennis (2006), Julia (2008), Seiji et al.,2008) in the view of consolidating the measures on the environment protection, such as the charges and taxes, for certain categories of pollutants, but due to their level, these measures do not represent determining factors for limiting the emissions. This fact could lead to the orientation towards those industries categories whose main emissions are represented by these categories. In this context, according to The European Commission, COM (2007) 140 final, several member states use market instruments in order to fight against the air pollution, especially taxes and charges for NO and SO_2. National trade systems for the emissions certificates have been

Table 2. Evolution of the main polluting gases in several European states between 1996 and 2006.

	Emissions of carbon dioxide (million tons)		Emissions of carbon monoxide (million tons)		Emissions of sulphur oxides (million tons of SO_2 equivalent)		Emissions of nitrogen oxides (million tons of NO_2 equivalent)	
	1996	**2006**	**1995**	**2005**	**1995**	**2005**	**1995**	**2005**
EU-27	4,241.7	4,257.6	51.08	31.89	17.16	15.82	14.60	11.29
Belgium	128.0	119.1	1.11	0.88	0.26	0.24	0.37	0.29
Bulgaria	65.0	55.1	0.85	0.74	1.48	1.42	0.27	0.23
Czech Rep.	138.4	127.9	1.00	0.51	1.09	0.94	0.37	0.28
Denmark	74.0	57.6	0.71	0.61	0.14	0.17	0.26	0.19
Germany	943.3	880.3	6.53	4.03	1.73	1.45	2.17	1.44
Estonia	18.7	16.0	0.21	0.16	0.12	0.12	0.04	0.03
Spain	243.0	359.6	3.22	*2.38*	1.81	*1.58*	1.33	*1.53*
France	402.4	404.3	9.57	5.68	0.97	0.94	1.65	1.21
Italy	439.3	488.0	7.17	*4.21*	1.32	*1.21*	1.81	*1.17*
Latvia	9.2	8.3	0.32	0.34	0.05	0.05	0.04	0.04
Lithuania	15.9	14.5	0.29	0.19	0.09	0.09	0.07	0.06
Hungary	63.4	60.4	0.76	0.59	0.70	0.67	0.19	0.20
Austria	67.4	77.3	1.01	0.72	0.05	0.04	0.19	0.23
Poland	374.9	330.5	4.55	3.33	2.38	2.37	1.12	0.81
Portugal	50.3	64.5	0.85	0.65	0.33	0.27	0.27	0.28
Romania	135.4	111.0	2.09	1.41	*0.89*	0.86	*0.32*	0.31
Slovenia	15.7	16.9	0.09	0.08	0.13	0.11	0.07	0.06
Slovakia	42.4	40.0	0.42	0.30	0.25	0.23	0.18	0.10
U.K	568.0	554.8	6.30	2.42	2.32	1.97	2.38	1.63

Source: author own processing, EUROSTAT, Europe in figures, Eurostat yearbook (2009).

recently adopted in order to reduce the problems caused by the traditional atmospheric pollutants. The environment's sensitivity to these pollutants varies in Europe while the trade shall certainly be more efficient at a larger scale; there has to be a guarantee that, by trading the certificates of emissions, no serious local pollution is generated (hot zones) and that the natural environment is not harmed through acidification, eutrophication or ozone.

If we take into account the CO_2 level per capita registered on the community level, we can also easily see the development levels of each country's industry, but mostly of the production intensity, considering that in these situations, the greenhouse gas emissions, especially the CO_2 emissions, are specific for the industrial production and less for the activities of branches such as agriculture, transportation or aviation.

The evolution of the CO_2 emissions per capita by country are represented in Figure 1 for 2005, considered as a reference year for the implementation of the EU-ETS European scheme, and it can be seen that the highest level is in Luxembourg, followed by Estonia and the Czech Republic. The level of this indicator places Romania within the limits reached by Lithuania, Latvia or Sweden, with levels under the average of the EU-27, EU-15 or EU-12.

The use of market specific instruments (Burtraw et al., 2006; Ellis and Tirpak, 2006; Reinaud, 2008) in the complex frame of the environment policy is justified not only by their extended capacity to correct the market imbalances and failures, and to offer the competition by reducing the costs, but also by their high effectiveness in enforcing the self-regulation of a system that has to face the effects of market exogenous phenomena, such as limiting and re-allotment measures for the greenhouse gas emissions quotas.

The signals of the market, and in our case, the carbon market represent input signals for the specific instruments used within this market.(De Eileen et al.,2001, Stephen 2002, Jane and Dennis 2006, Nicholas 2007 or Emilic et al., 2008). Even though the most known market instruments are the taxes and charges, the quotas trade system – the EU-ETS system imposed on the community area ensuring the accordance and limitation of the greenhouse gas emissions and the observance of the limit values established in the European plan on reducing the pollution and on promoting the energy production from alternative sources.

Table 3 presents the main data on the EU-ETS scheme on European level without including the new installations commissioned in branches affected by this scheme (The

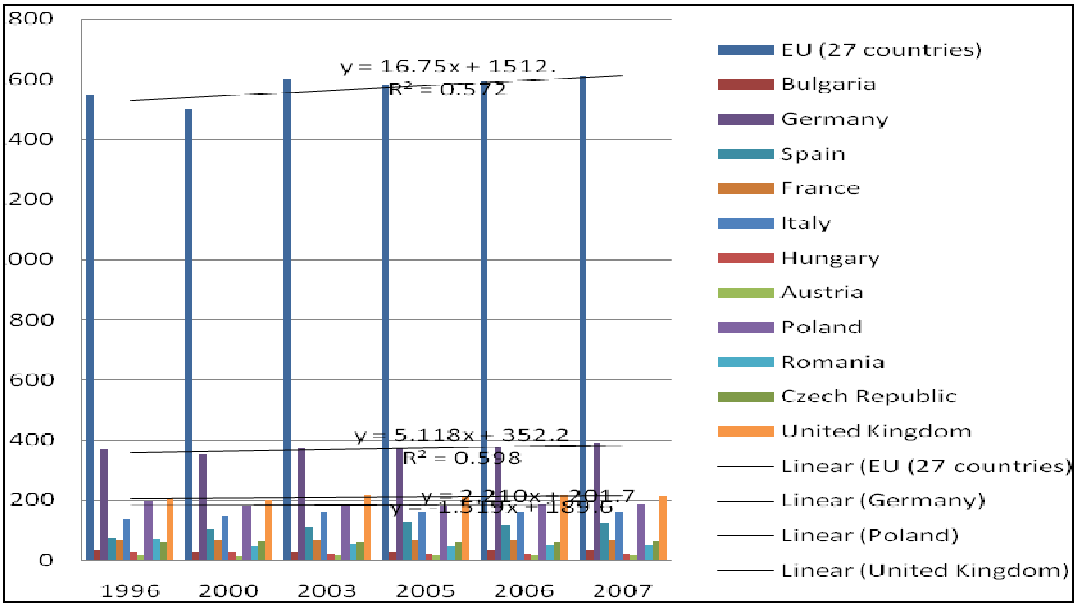

Figure 1. CO_2 emissions per capita by country (split by energy and non-energy related emissions) in 2005. Source: author own calculation based on Eurostat database, environment statistics datasets.

European Commission, 2009). Although the data on Romania and Bulgaria are not checked and certified by independent bodies, their level is certainly inferior to that recorded by states that have joint community areas and industrial structures as compared to those in our country. It is interesting that in 2005, the UK chose to be temporarily excluded from the ETS scheme, the emissions coming from certain sectors, but were subsequently included in the re-allotment period. However, these emissions were estimated to be 30 Mt., and in the case of Italy, neither the installations were affected by the implementation of this scheme nor were the additional quantity of greenhouse gas effects included.

The joint implementation (JI)/clean development mechanism (CDM) limits express the maximum percentage that the companies and member states can choose in favor of the JI quotas within the clean development mechanism (CDM) promoted during the Kyoto Treaty (Stern, 2007; Polimeni and Polimeni, 2007; Claussen, 2001; Clarkson and Deyes, 2002), as compared to those allotted by the EU-ETS European mechanism for covering the greenhouse gas emissions. The JI credits are the result of the measures for promoting the reduction of CO_2 emissions in third states, in several clean development projects based on flexible mechanisms. As such, 22% of the data included in the national allotment plan of Germany, related to the additional emissions quotas, are not meant for transaction and acquisition through the scheme.

The use of a quantitative system may efficiently contribute in the accomplishment of the objective 20-20, even though the use of such a system is not a solution for all the environment problems with an economic impact that emerge inside a market, with a high globalization degree, for example, the Common Market. One of the European documents (The European Commission, COM (2008) 16 final) shows that the risk of some developed states' non-participation in the international schemes meant to reduce the greenhouse gas emissions will severely affect the measures adopted on the community level. Thus, certain industrial branches and sub-branches that are great energy consumers, and which are subject to international competition, could be subject to the risk of relocating carbon dioxide emissions. This would underestimate the ecologic integrity and the benefits of the actions undertaken by the Community.

The impact of implementing the EU-ETS scheme within the Romanian industry

The approaches on limiting the greenhouse gas emissions on the community level have materialized in 2003 by the creation of the European system for trading the greenhouse gas emissions quotas (EU-ETS), comprising the entire emissions generated by the installations and capacities that can be verified, reported and monitored. 100,000 installations whose emissions exceed 10,000 tons of CO_2 per year have been included in this system. Romania has become the subject of this trading scheme implementation, since they have joined the economic community area.

Analysis of the impact of implementing the EU-ETS

Table 3. Main characteristics of the EU-ETS Scheme in several European states (million tons of CO_2).

Member State	1st period cap (2005-2007)	2005 verified emissions	Proposed cap 2008-2012	Cap allowed 2008-2012 (in relation to proposed)	Emissions from additional installations in 2008-2012	JI/CDM limit 2008-2012 in %
Austria	33.0	33.4	32.8	30.7 (93.6%)	0.35	10
Bulgaria	42.3	40.6	67.6	42.3 (62.6%)	-	12.55
Czech Rep.	97.6	82.5	101.9	86.8 (85.2%)	-	10
Denmark	33.5	26.5	24.5	24.5 (100%)	0	17.01
Estonia	19	12.62	24.38	12.72 (52.2%)	0.31	0
Finland	45.5	33.1	39.6	37.6 (94.8%)	0.4	10
France	156.5	131.3	132.8	132.8 (100%)	5.1	13.5
Germany	499	474	482	453.1 (94%)	11.0	20
Hungary	31.3	26.0	30.7	26.9 (87.6%)	1.43	10
Ireland	22.3	22.4	22.6	22.3 (98.6%)	-	10
Italy	223.1	225.5	209	195.8 (93.7%)	-	14.99
Latvia	4.6	2.9	7.7	3.43 (44.5%)	-	10
Lithuania	12.3	6.6	16.6	8.8 (53%)	0.05	20
Poland	239.1	203.1	284.6	208.5 (73.3%)	6.3	10
Portugal	38.9	36.4	35.9	34.8 (96.9%)	0.77	10
Romania	74.8	70.8	95.7	75.9 (79.3%)	-	10
Slovakia	30.5	25.2	41.3	32.6 (78.9%)	1.78	7
Slovenia	8.8	8.7	8.3	8.3 (100%)	-	15.76
Sweden	22.9	19.3	25.2	22.8 (90.5%)	2.0	10
UK	245.3	242.4	246.2	246.2 (100%)	9.5	8
Total	2298.5	2122.16	2325.34	2082.68 (89.56%)	54.69	-

Source: author own processing using European Commission data 2009.

scheme in the Romanian industry must represent a priority for the decision making factors in the general context of accomplishing a sustainable economic growth, especially as the high industry's contribution in the GIP and the employed labor force in the industrial branch (even if it is lower than the level in 1989) are determining factors for the reorientation of the economic growth.

From the industrial production perspective, the CO_2 certificates allotment system may represent the determining factor for the sustainment and re-launching of the Romanian industrial production or, as the case may be, the comprehension and the mechanistic application of this system may contribute to the more severe reduction of this production. The production capacities already closed in the previous period have contributed to the reduction of the CO_2 emissions level, as they were not the result of having taken active measures for fighting against the complex phenomena of the greenhouse effect, but rather the result of a natural removal process of the existing non-performing branches in the national economy.

The unsustainable development of the Romanian industry, the creation of the over-dimensioned production centers without foreseeing the raw materials sources, the use of old and polluting technologies turned the reorientation of the production structure into a phenomenon belonging to the economic efficiency requirements.

The major impact that this scheme has on the

Table 4. Production of the industrial branches according to the EU-ETS scheme.

Sector	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Ferrous metals										
coke	1550	1573	1777	1900	2100	2250	2320	2360	2360	2360
cast iron	4101	4244	4098	4500	5800	6230	6400	6510	6510	6510
steel, out of which:	5578	5920	6175	6300	7960	8600	8800	9000	9000	9000
Converter steel	4543	4676	4509	4600	5350	5745	5900	6000	6000	6000
Electric	1035	1244	1666	1700	2610	2885	2900	3000	3000	3000
Cement	5002	5624	6021	7280	8600	10000	11400	12900	14400	16000
Lime	1936	1978	1978	2000	2100	2250	2400	2560	2730	2900
Glass	314	315	320	350	480	500	520	540	570	600
Ceramics	1503	1787	2112	2300	2400	2600	2750	2900	3000	3100
Cellulose and paper	444	454	371	435	552	640	670	680	795	800

Source: author own processing using the national allotment plan for Romania between 2008 and 2012.

Table 5. The current and foreseen emissions of the ETS branches in Romania (Million tons CO_2).

Branch	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Combustion installations	47.26	43.04	44.15	47.09	52.69	54.37	55.94	56.96	57.99	59.47
Refineries	4.92	5.67	6.09	6.53	7.29	7.18	7.62	7.66	8.72	8.66
Ferrous metals	11.84	12.37	12.33	12.85	13.10	15.05	15.51	15.98	15.99	15.98
Cement production	5.15	5.90	6.15	7.30	8.06	9.58	10.71	11.88	13.00	14.16
Lime production	0.65	0.75	0.88	1.00	1.29	1.38	1.50	1.52	1.54	1.57
Glass production	0.38	0.33	0.36	0.39	0.46	0.47	0.49	0.50	0.50	0.51
Ceramics production	0.30	0.35	0.42	0.49	0.51	0.55	0.55	0.55	0.56	0.57
Paper and cellulose production	0.47	0.39	0.43	0.45	0.51	0.59	0.66	0.68	0.69	0.70
Overall industrial processes	18.79	20.09	20.57	22.48	23.93	27.62	29.42	31.12	32.28	33.49
Overall CO_2	70.97	68.80	70.81	76.10	83.91	89.17	92.97	95.74	99.0	101.6

Source: The national allotment plan for Romania between 2008 and 2012.

Romanian industry involves the adoption of measures, firstly, aiming at promoting massive investments in the refurbishment in order to contribute to the gas emissions reduction, but also to the productivity increase. Even though the trend lately described by the Romanian industry branches is ascending and one estimates future production increases, the implications of the greenhouse gas emissions reduction measures may reduce these productions because of the technologies used; in the case of our country, these technologies mostly do not observe the promoted ecologic parameters.

Table 4 shows the evolution of production expressed in thousands of tons according to the branches comprised in the EU-ETS European scheme on limiting the pollution and the greenhouse gas emissions.

The analysis of the industrial production accruing to the sectors affected by the European scheme, shows great interest in the impact that it has on the Romanian economy development. Even though between 2003 and 2012, an increase of the produced quantities was expected for all the sectors, this increase is situated under the available national production capacity; consequently, the estimated productions do not reflect the potential. If we only take into account the production of ferrous metals, in our country, we have seen the closing of several production capacities of this industry and we have not developed new ones. This is the case for other branches, too.

The only industry with a significant increase is the cement industry, which from the very beginning of the analysis period has been foreseen to register a triplication of the production, which is not the case for the cellulose and paper industry or the ceramics industry. The industrial production must be correlated with the parameters of the CO_2 emissions accruing to these sectors. The current and foreseen emissions in Romania are presented in Table 5.

The CO_2 emissions accruing to the metallurgical industry in Romania increased by approximately 1.3% between 2003 and 2012. The estimations for 2009 to

Table 6. Main parameters for calculating the indicative limit value of allotment between 2008 and 2012.

Medium growth rate of the GIP		Average reduction of the carbon intensity		GES emissions (million of tons)	
2003-2007	2003-2010	2003-2007	2003-2010	2003	2012
6.1%	6%	1.48%	1.25%	70.97	101.61

Source: Author own processing using the national allotment plan.

2012 showed that the slight increment observed do not reflect the metallurgical industry potential valorization. In addition, the closure of several greenhouse gas emissions capacities, as a consequence of both implementing the environment protection measures and the investments, do not reflect an increase of the resources valorization degree. The maintenance of these emissions around 15 million tons is unsustainable if the demand and the relocation of these industries in the developed states increase. However, according to the data comprised in Table 5, the evolution of the CO_2 emissions in the sectors included in the EU-ETS describes the structure of the estimated industrial production. The overall CO_2 emissions of the eight industrial sectors comprised in the scheme represent 101.61 million of tons, growing by 143.17% as compared to 2003.

Calculation methodology used for establishing the indicative limits and for allotting the pollution certificates

The EU-ETS certificates are allotted according to a methodology established in European level that stipulates the fact that the allotment is made from top to bottom within the limit of the national maximum limit established. The certificates are distributed for each separate installation, according to the technical and technological parameters. The establishment of the indicative limit values (Stefan, 2009; Bygrave and Bosi, 2004; Böhringer and Lange, 2006) represents an important step in the pollution certificates allotment mechanism, in the context of the subsequent evolution of the industrial production. This limit value represents the maximum limit of the CO_2 emissions. The installations have to observe on a national level, and for each installation, the following parameters are used for the calculation of this limit value: the GIP growth rate during the allotment period, the carbon intensity rate, as well as the carbon emissions of the eight sectors in the EU-ETS scheme. The evolution of these indicators between 2003 and 2010 is presented in Table 6.

The calculation formulas for establishing the allotment indicative limit value for the two allotment periods have the following structure:

For the period of 2003-2007,

$$P.I.2007 = EET\ 2003\ (1+rPIB)^4\ (1+rIC)^4 \quad (1)$$

For the period of 2008-2012,

$$P.I.2008\text{-}2012 = EET\ 2003\ (1+rPIB)^7\ (1+rIC)^7 \quad (2)$$

Where:
P.I. = means “the limit value”;
EET = means “the carbon dioxide emissions” generated by the sectors mentioned in the scheme;
rPIB = the gross internal product growth rate during the mentioned period;
rIC = means “the carbon intensity rate” during the mentioned period.

As can be seen, the emissions of the year 2003 is used as the basis for calculating the national limit value, which does not offer a representative image of the industrial production structure and evolution in Romania. This is why we propose to introduce a correction factor Ke, in order to balance the CO_2 emissions losses and to consolidate the Romanian industry competition through the efficient allotment of the free pollution certificates. Thus, Formula 2 becomes:

$$P.I.\ 2008\text{-}2012 = EET2003 \times Ke[(1+rPIB)^7\ (1+rIC)^7] \quad (3)$$

where:

$$Ke = \frac{PIB\ 2005}{\Delta PIB\ 2005-2003} * \frac{EET\ 2005}{\Delta EET2005-2003} \quad (4)$$

The data on the pollution certificates allotment for the year 2007 and for the period between 2008 and 2012 is presented in Table 7, which is obtained using Formulas 1 and 2.

As can be seen, according to The Romanian National Allocation Plan (2009), Romania receives a yearly limit value of 75.944.352 pollution certificates for the period 2008-2012, with 1108117 certificates more as compared to 2007, namely; as compared to 74.836.235 certificates. Thus, in the case of the metallurgical industry we see an increase by 5,2 times of the number of certificates, for the energetic industry an increase by 4,4 times, and for the cement industry, an increase by 5,8 times. Even if there is a slight increase of the annual allotment average, it cannot cover the necessary for the local industry. Consequently, the Romanian industrial companies must acquire additional certificates on the free market, thus significantly contributing to the reduction of this sector’s

Table 7. EU-ETS certificates allotment for each sector in Romania.

Allotment period/sector	Allotment (No. of certificates)	
	2007	2008-2012
Energy	47.046.971	208.674.068
Petroleum products refining	6.286.751	28.818.122
Ferrous metals production and processing	11.835.763	61.654.319
Lime	1.102.910	4.908.313
Cement	7.015.003	41.251.885
Glass	392.974	1.618.308
Ceramics	403.194	1.753.842
Paper and cellulose	462.766	2.449.411
National limit value	74.836.235.	75.944.352 annual average

Source: The national allotment plan for Romania between 2008 and 2012.

competition.

The free allotment of certificates positively influences the industry development as well as the acquisition of less polluting technique and technology that observes the environment criteria. In this sense, the allotment of certificates for non-valuable consideration for certain activities grants some operators selective economic advantages with a potential to determine a damage of the competition and to affect the intra-community trade. The allotment of certificates without consideration seems to be chargeable to the member state, which involves the use of the State's resources, 90% being offered without consideration [1]. At least for Romania, the industrial development can be sustained, and less harming environmental technologies can be promoted by the valorization of pollution certificates on the international carbon market. As such, a national fund is created for a co-guarantee of the investments in the technique and technology for the Romanian and foreign agents that develop industrial activities in Romania, which give up their right to pollute by the reduction of the greenhouse gas emissions, as a result of their investments.

Consequently, the national allotment limit value has to be reviewed to stimulate the investments in less polluting technology, and the economic agents that make investments must be rewarded with free certificates, accruing to modern capacities that they can valorize on the specific market through a stimulating reallocation.

CONCLUSIONS

The policies promoted in order to reduce and financially sustain the greenhouse gas emissions represent the valuable factors of the economies searching for solutions that are so necessary in the view of reducing the negative effects of the global phenomena. In this context, promoting a sustainable development with a reduced impact on the environment besides its ecological side is the efficient solution for any economy that respects human nature and durable production. The approaches are multiple, but they need considerable financial resources. The major implications of reconsidering the environment policy and legislation determine a re-consideration of Romania's industrial strategy, in the context of accomplishing the European objectives. Even if the community environment policy severely affects the industrial development, it has to be implemented.

The EU-ETS scheme must be a stimulant for investments in the sectors affected by its implementation, so that the industry becomes competitive in observing the environment protection criteria.

[1]The European Commission, the Decision of October 26, 2007 on the National Plan for Allotting greenhouse gas emissions certificates for the 2008-2012 period, notified by Romania based on the Directive 2003/87/CE of the European Parliament and of the Council.

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