The impact of the emission trading system on companies' profitability: the case of Greece

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Abstract

The European Union is in many respects a key player in the global efforts to curb emissions of greenhouse gases (GHGs). Maintaining the role of the frontrunner, the European Parliament and the Council established on 13 October 2003 a scheme of GHG emission allowance trading within the Community, the so-called Emission Trading System (ETS).

Greece, as a Member State of the European Union, takes action in the field of the reduction of carbon dioxide (CO_2) emissions. According to the Directive 2003/87/EC, the Greek government includes in National Allocation Plans (NAPs) the biggest polluters from each one of the energy demand sectors. More specifically, the Directive covers electricity industries, other industrial combustion installations, refineries, metal ore roasting and cindering installations, pig iron and steel production installations, cement clinker production installations, lime production installations, glass manufacture installations, ceramic production installations and pulp and paper production installations.

The objective of this paper is to examine the impact of the Emission Trading System on the profitability of Greek companies included in the NAPs. On this basis, the quantities of carbon dioxide that every participant has emitted during each year of the period 2005-2008 are compared respectively to the quantity of emission allowances issued. The balance indicates whether the tradable allowances are responsible for the participants' financial results (of their balance sheets).

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Financial indicators are used to present the impact of the acquisition or sale of allowances on the total turnover and the profit before tax of the participating companies.

An additional goal of this paper is to identify the causes that resulted in a surplus or shortage of allowances, taking into consideration financial, as well as environmental, parameters. Consequently, some useful conclusions are drawn concerning the management of allowances that are granted for free to the participating companies.

Keywords: greenhouse gases, CO_2 emissions, emission trading system, allowances, companies' profitability.

1 Introduction

The United Nations Framework Convention on Climate Change (UNFCCC) and the Integrated Pollution Prevention and Control (IPPC) Directive were the predecessors of the Kyoto Protocol, which sets targets, timetables and legally binding emissions, for Annex I countries, concerning carbon dioxide (CO_2), and other greenhouse gases. The foundation stone and the legal bedrock of the flexible market mechanisms were laid by the UNFCCC, but the Kyoto Protocol established them, in order to coordinate the efforts in the field of cost-effective environmental protection. Directive 2003/87/EC of the European Parliament and the Council established a scheme of greenhouse gas emission allowance trading within the community, the so-called Emission Trading System (ETS) [1].

In Greece, the activities covered by the provisions of Directive 2003/87/EC differ significantly in terms of the share of their emissions from combustions and emissions from processes. Considering this, the allocation of emission allowances is carried out in two stages, first at activity level and then at installation level. The activities under examination are the ones referred in Annex I of the Directive, namely energy activities and other combustion installations, mineral oil refineries, production and processing of ferrous metals, production of cement and lime, manufacture of glass and ceramic products and production of paper and cardboard [2].

2 The Greek national allocation plans

The first Greek NAP, concerning the three-year period 2005-2007, included 141 installations and allocated them approximately 223,3 Mtn CO_2 [3], while the second Greek NAP, concerning the first period of commitment under the Protocol, 2008-2012, includes 140 installations and allocates them approximately 341,5 Mtn CO_2 [4]. The installations that finally submitted verified emission reports for the first period outnumbered those initially included in the NAP. On the contrary, the installations that submitted annual verified emission reports for 2008, the first year of the five-year period, were noticeably less than those which were initially included in the second NAP. This reduction depends to a great extent on the financial crisis which led to malfunction or even closure of a considerable number of other combustion installations.

3 The impact of the ETS on Greek companies' profitability

3.1 The trends of CO_2 emission allowance prices

Trading of carbon dioxide emissions takes place in marketplaces since 2005. During the first year of operation of the multi-country, multi-sector GHG Emission Trading System, EUAs (EU Allowance Unit of one tonne of CO_2) were priced on the average at 21.37 €/tn CO_2 eq. [5], after many fluctuations, by reason of immaturity of the market.

In 2006, the market was, once more, characterized by instability and EUAs were priced at 18.18 €/tn CO_2 eq. on the average. Prices decreased, due to the fact that EUAs for trading period 2008-2012 stimulated a lot of interest.

In 2007, EUA prices plummeted. The price of a tonne of carbon dioxide in Europe often fell below 1 €/tn CO_2 eq. [5]. Demand for permits to emit CO_2 dropped off, since traders had lost all interest of first trading period's EUAs and the price was 1.44 €/ton CO_2 eq. on the average.

Prices were kept stable during 2008. In grace of traders' raised interest, EUAs were priced at 22.66 €/tn CO_2 eq. [5] on the average.

3.2 The impact of the ETS through diagrams and financial indicators

Undoubtedly, the ETS has influenced Greek companies' profitability. The average emission allowance price per year, as well as data concerning the companies' CO_2 emissions [6] were required in order to examine thoroughly its impact.

The following diagrams present the income from the surplus CO_2 emission allowances and the expenses on the acquisition of extra ones, of representative companies from each sector.

Moreover, two financial indicators were used so as to examine the financial situation of the above companies after the installation of the ETS. The impact of the acquisition or sale of CO_2 emission allowances on the total turnover and the profit before tax of the participating companies was calculated, using financial results from the companies' balance sheets.

3.2.1 The impact of the ETS on the total turnover of the participating sectors' companies

The first diagram depicts the comparison between the average of indicators presenting the impact of the acquisition or sale of emission allowances on the total turnover of the companies during 2005-2007 and 2008. More specifically, the first bar concerns 2008, while the second one concerns the three-year period 2005-2007.

By studying the diagram, it is obvious that the ETS doesn't exert much influence on the paper and cement clinker production sectors.

Nonetheless, the lime and ceramic production installations had either shortage or small surplus of allowances during the first tradable period, whereas big part of their income proceeds from the sale of the surplus CO_2 emission allowances in 2008.

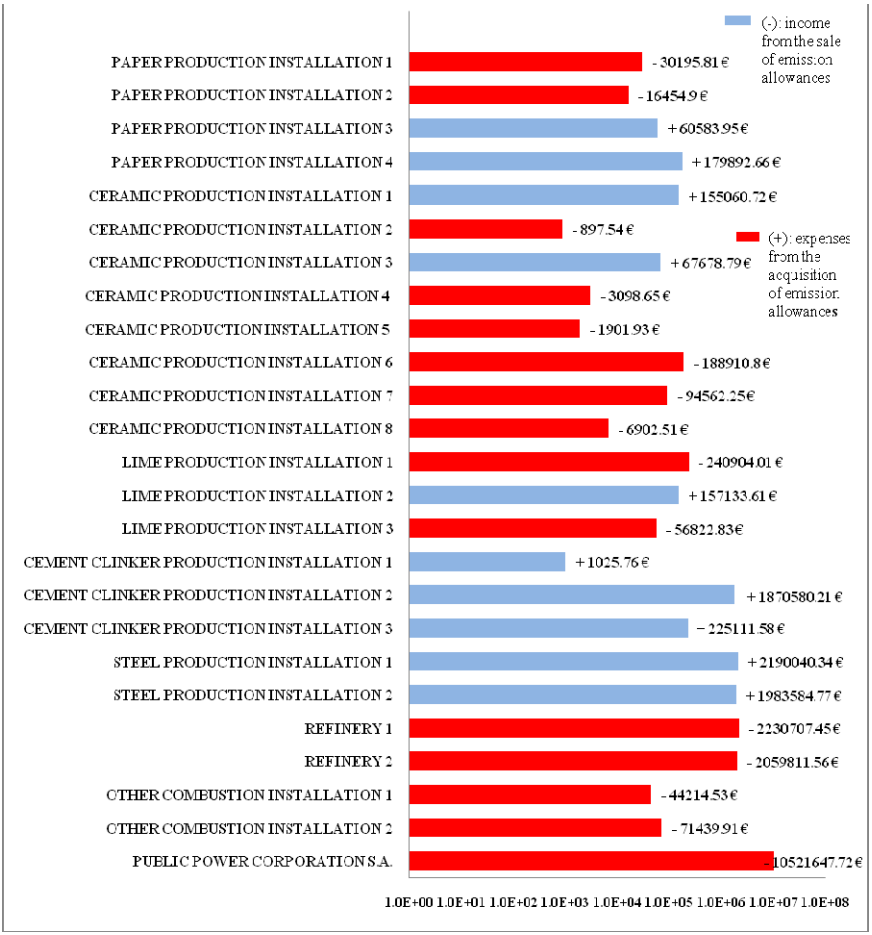

Figure 1: Income from the sale of CO_2 emission allowances and expenses on their acquisition during 2005.

On the contrary, the steel production installations have surplus of allowances during both of the periods examined. More precisely, the biggest share of income due to the sale of CO_2 emission allowances arises during 2005-2007.

Finally, the Greek Public Power Corporation (PPC) seems to have faced an extended shortage of allowances in 2008.

3.2.2 The impact of the ETS on the profit before tax of the participating sectors' companies

The second diagram pictures the comparison between the average of indicators presenting the impact of the acquisition or sale of emission allowances on the profit before tax of the companies during 2005-2007 and 2008. Likewise, the

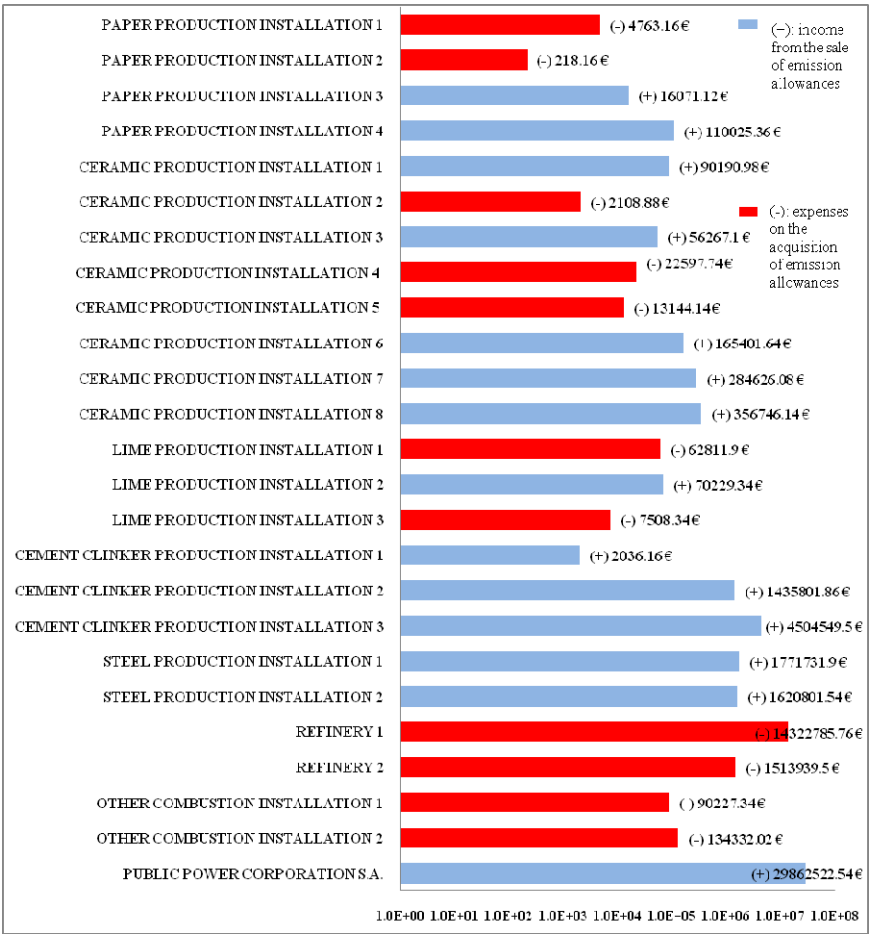

Figure 2: Income from the sale of CO_2 emission allowances and expenses on their acquisition during 2006.

first bar concerns 2008, while the second one concerns the three-year period 2005-2007.

Undoubtedly, the ETS has aided numerous companies from the lime and ceramic production sector to improve their economic situation, especially since the beginning of the financial crisis.

Regarding the steel production installations, the diagram gives the impression that the ETS has helped them raise their profits.

Oppositely to the above, the ETS unquestionably presides over 45% of the heavy loss the PPC announced in 2008.

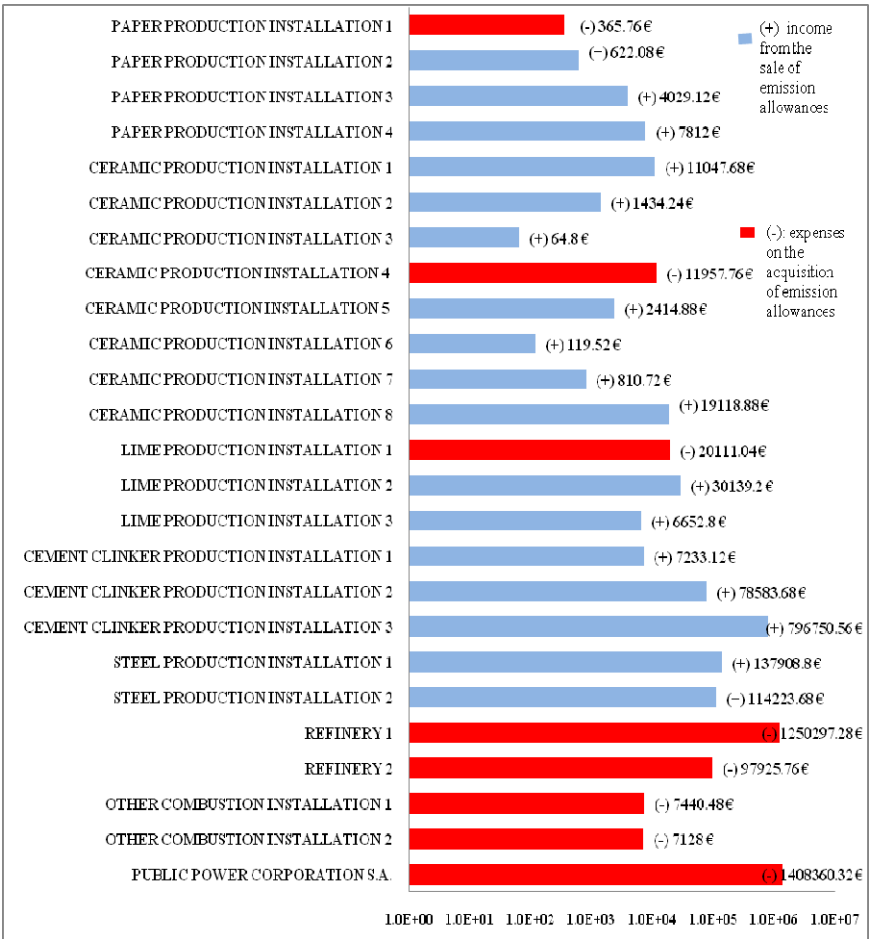

Figure 3: Income from the sale of CO_2 emission allowances and expenses on their acquisition during 2007.

4 Analysis of the impact of the ETS on Greek companies

4.1 Power generation sector

As far as the Greek Public Power Corporation (PPC) is concerned, the ETS seems to incur much of the damage in the company's profitability. Not only has the PPC shouldered the responsibility to cover the energy demands of the majority of Greek capitals, but also operates technologically old electricity generation units, using lignite [7]. The above factors explain the company's shortage of emission allowances, which is growing in 2008, since it's the first year of a period that demands reduction of CO_2 emissions.

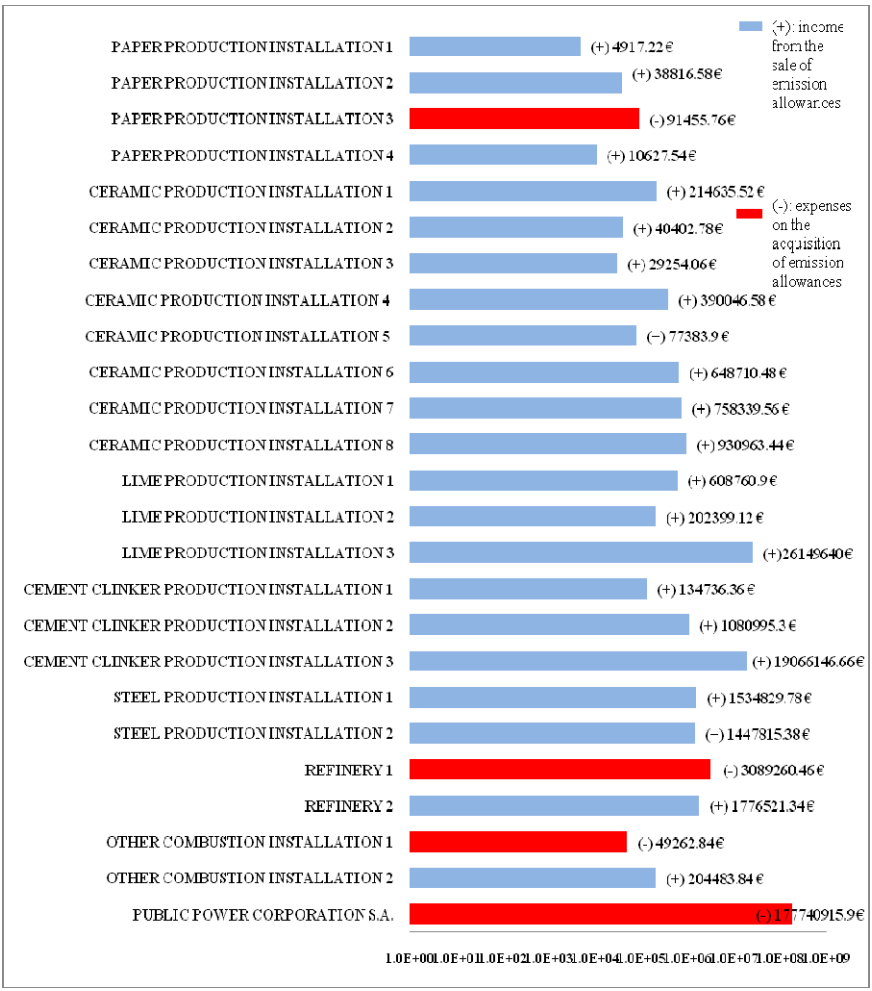

Figure 4: Income from the sale of CO_2 emission allowances and expenses on their acquisition during 2008.

Electricity market liberalization led to the entrance of three new units. Their parent companies were aware of the establishment of the ETS in advance, therefore, they had provided their subsidiary companies with combined cycle natural-gas units [8]. Hence, carbon dioxide emitted by them didn't outnumber the quantity of emission allowances issued.

4.2 Other combustion installations sector

The sector of other combustion installations, generally, presents limited CO_2 emissions during 2008, compared respectively to those of the three-year period 2005-2007 [6].

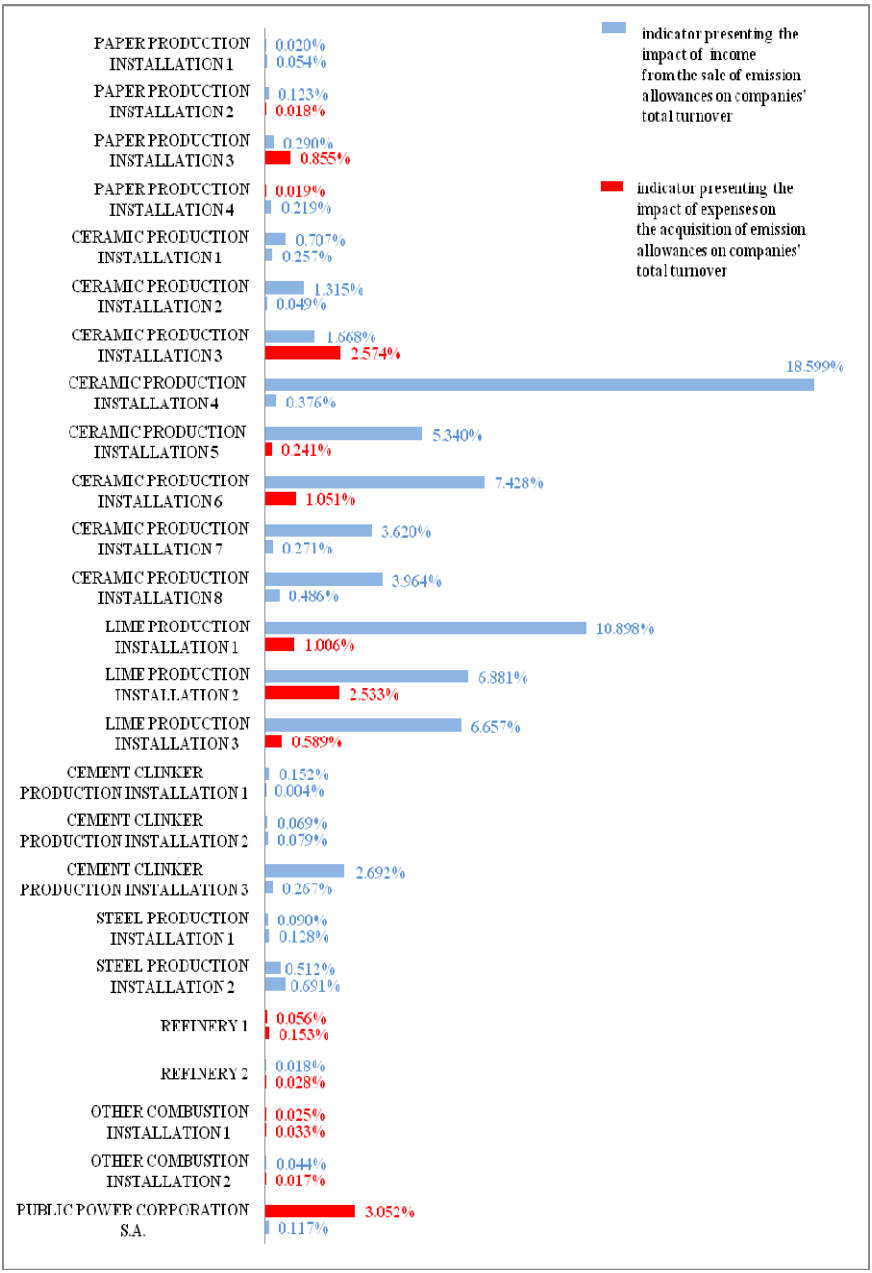

Figure 5: Comparison between the average of indicators presenting the impact of the acquisition or sale of emission allowances on companies' total turnover during 2005-2007 and 2008.

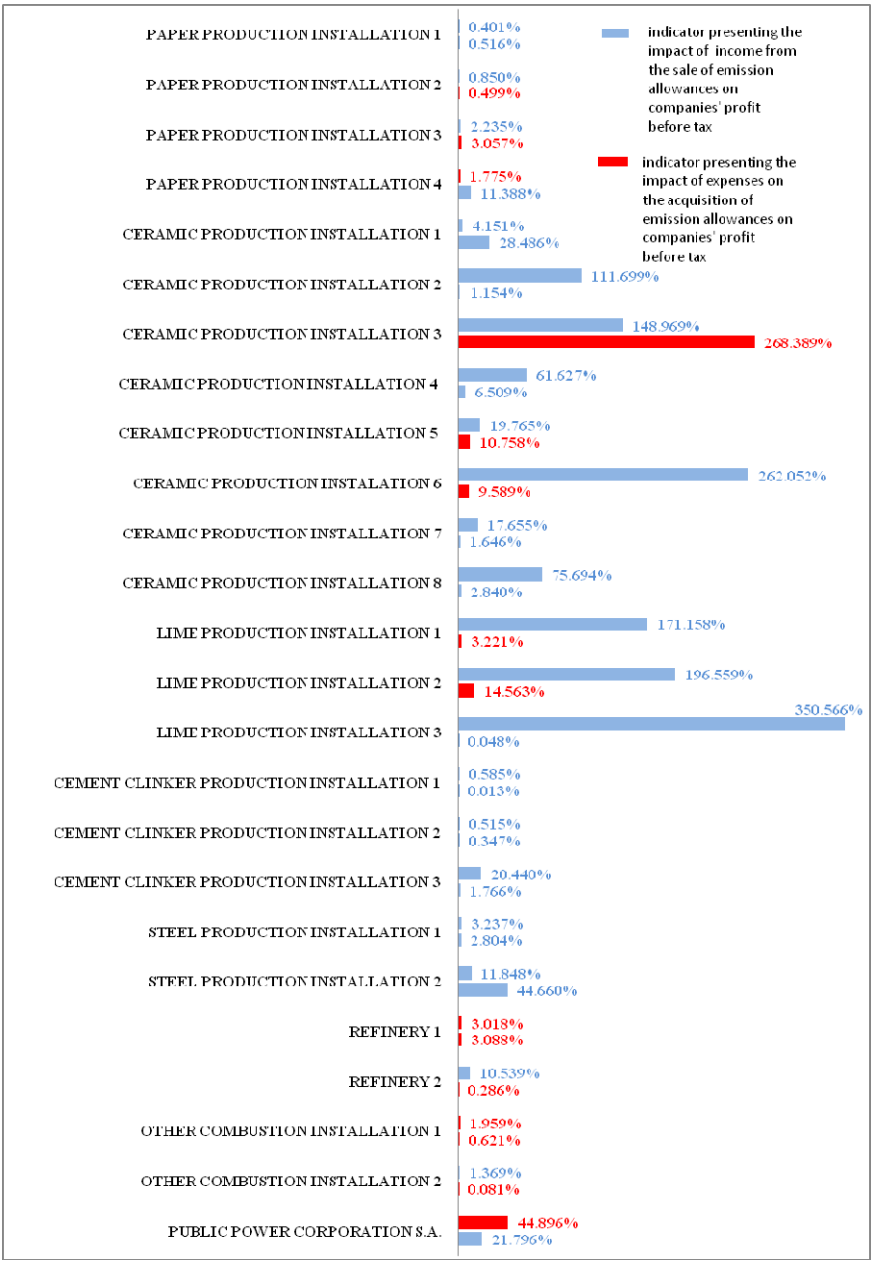

Figure 6: Comparison between the average of indicators presenting the impact of the acquisition or sale of emission allowances on companies' profit before tax during 2005-2007 and 2008.

The fact that the installations included in the second NAP are less than those included in the first one, brought about considerable emission reductions. Moreover, three installations malfunction and two others have already closed. Therefore, their quantity of emission allowances issued is not used. Furthermore, the biggest installation of this sector has stopped electricity generation activities that demanded non environmental friendly fuels. Instead, combined heat and power, using natural gas, was integrated in the company's activities [9].

4.3 Refineries

The first refinery has progressively reduced its shortage of emission allowances during 2005-2007, as a result of implementation of Best Available Techniques (BAT) [10]. These actions contributed directly in surplus of CO_2 emission allowances in 2008.

Notwithstanding the above, the total allowances of the sector were increased comparatively to the quantity of emission allowances issued for the three-year period, due to an expansion of the installations of the sector's second refinery.

The expansion took place in 2006, but no additional allowances were allocated to the company. Thus, the quantity of CO_2 emitted exceeded the quantity of emission allowances issued, which led to a big shortage of allowances. Therefore, a respectable amount of money was spent by the company, in order to cover its shortage.

The assigned amount of emission allowances for the second refinery during the first period of commitment under the Protocol (2008-2012), was calculated on the basis of its historical emissions. Thereupon, it was increased in comparison to the amount of emission allowances of the previous period. Even though the shortage was diminished, the company still spent much money to tide over the shortage of CO_2 emission allowances, as a consequence of high EUA prices during 2008 [5].

4.4 Steel production sector

The steel production installations have surplus of emission allowances throughout the period examined. The participating companies of this sector were aware of the establishment of the ETS. Taking into consideration the above, the companies had enough time to substitute HFO with natural gas and therefore reduce their carbon dioxide emissions [11].

Besides, the historical emissions, on which the assigned amount of emission allowances is based, were calculated while the installations were using HFO, a fuel that causes extremely high emissions of CO_2. Wherefore, the fact that allocated emission allowances were far more than the allowances the companies really necessitated, had an enormously positive impact on their profitability.

As far as the second NAP is concerned, substitution of HFO with natural gas was taken under consideration and as a result, allocated emission allowances were significantly less than the ones of the previous period.

4.5 Construction sector

The construction sector, on the whole, presents reduced CO_2 emissions compared to those of the three-year period 2005-2007. The financial crisis led the sector to a slowdown, and as a result the demand diminished [12]. In consequence of the limited demand, there was a proportionally limited production which restrained CO_2 emissions in low levels.

Additionally, the staple of the installations included in the construction sector (cement clinker production installations, lime production installations, ceramic production installations) is limestone. Thereupon, all the relative installations have the ability to use limestone of low percentage of CO_2 content and consequently reduce their emissions.

4.5.1 Cement clinker production sector

Regarding the cement clinker production sector, especially during the three-year period 2005-2007, there is no remarkable variance between the quantity of emission allowances issued and the quantity of CO_2 emitted. More specifically, the quantities of carbon dioxide emitted that are presented in the submitted verified emission reports, are slightly less than the allocated emission allowances, due to the following factors.

First and foremost, the cement clinker production sector is characterized by stability. It is consisted of a small number of companies and as a result, demanded quantities of cement, which indicate the produced quantities of cement and consequently the quantity of CO_2 emitted, are approximately stable from year to year. On account of that, historical emissions, on which calculations of the allocated emission allowances were based, suggest accurately the sector's demand for emission allowances.

On the other hand, participating companies of this sector, were beforehand aware of the establishment of the ETS and substituted fossil fuels with natural gas, which releases much less quantities of CO_2 [11].

Particularly in 2008, Greek cement clinker production companies confirmed reduction of carbon dioxide emissions up to 5%. This reduction emanated from the slowdown of the construction sector, due to the recent financial crisis. In 2008, the three biggest cement associations acted according to their estimation that downturn would continue, and sold big amounts of allowances through international marketplaces, in order to support their economic situation [6].

4.5.2 Lime and ceramic production sectors

Remarkable similarities can be identified between the lime and ceramic production sectors.

To begin with, none of the relative installations has renewed its equipment, or substituted fossil fuels with natural gas, since the establishment of the ETS.

What is more, during the period 2005-2007, allocated emission allowances proved to be insufficient to cover the needs of the installations included in the NAP. Thus, the quantity of CO_2 emitted exceeded the quantity of emission allowances issued, which led to a big shortage. As a consequence, the companies spent considerable amounts of money so as to tide over the shortage [12].

Under these circumstances, the second NAP allocated more emission allowances to the above companies for the period 2008-2012. However, the extra allowances that were at the companies' disposal turned out to be needless, since their verified emission reports of 2008 present significantly reduced emissions of carbon dioxide, owing to two main factors.

First of all, the financial crisis impacted on the construction sector, and by extension on the lime and cement clinker sectors, leading to their slowdown. As a result, the emerging CO_2 emissions dropped [6].

Additionally, several companies adopted the policy of further reduction of their production, aiming at the creation of a surplus of allowances. The sale of the surplus of allowances enabled them to support their economic situation.

4.6 Paper production sector

The paper production installations present slight differences between the quantity of emission allowances issued and the quantity of CO_2 emitted. With regard to this sector, paper production is based exclusively on recycled paper, and not on wood pulp (wood pulp is usually bleached using calcium carbonate, in order to produce white paper product). Hence, CO_2 emissions result only from combustion.

During 2008, the decision several paper production installations made to replace outdated technology, led to reduction of carbon dioxide emissions [13]. Some of them, having access to natural gas pipelines, have substituted fossil fuels with natural gas. Others use LPG either exclusively or in the mix of fuels [11].

5 Conclusions

This paper reported the impact of the Emission Trading System on Greek companies' profitability and its influence on their environmental policy.

The ETS, being responsible for the emergence of a big shortage of allowances and by extension of money, has worsened the economic situation of the Greek Public Power Corporation. More accurately, it unquestionably presides over the 45% of the heavy loss the PPC announced in 2008. Yet, the company hasn't taken sufficient measures to reduce CO_2 emissions, and instead operates mainly lignite stations.

Nevertheless, the other combustion installations and the paper production installations have remained almost unaffected. The first ones don't exceed the quantity of emission allowances due to their malfunction or even closure. The majority of the second ones have substituted fossil fuels with environmental friendly fuels and replaced outdated technology.

The sector of refineries was affected by the ETS, due to an expansion of one of the installations, during the first period examined, without being allocated additional emission allowances. Even when the second NAP took the expansion under consideration, CO_2 emission allowance prices were so high that loss was unavoidable.

The fact that the companies from cement clinker and steel production sectors were beforehand aware of the establishment of the ETS, in combination with the

financial crisis, led to limited CO_2 emissions. As a result, they took advantage of the current situation, sold big amounts of allowances and increased their income.

The lime and ceramic production sectors were, indubitably, most aided by the ETS. CO_2 emission allowances became the needed source of income which helped them improve their economic situation, or even avoid their closure.

Beyond shadow of doubt, the Emission Trading System has underlined the importance of using Best Available Techniques and substituting fossil fuels with environmental friendly ones, like natural gas.

To sum up, the Kyoto Protocol, despite its apparent flaws in its current form, is the first international environmental agreement that sets legally binding GHG emissions targets and timetables for Annex I countries. If properly designed, emission trading scheme can effectively reduce their abatement costs while assisting Annex I countries in achieving their Kyoto obligations and assuring their economic viability.

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