Third parties participation in tradable permits market. Do we need them?

Asproudis, Elias and Weyman-Jones, Tom

Loughborough University, School of Business and Economics

11 August 2011

Third parties' participation in tradable permits market. Do we need them?

Elias Asproudis
Loughborough University[*]

Tom Weyman-Jones
Loughborough University[†]

August 11, 2011

Abstract

This paper analyses the behaviour, influence and role of third parties in tradable permits markets. Following the literature, it focuses on a framework in order to understand how society and third parties react against the firms' emissions due to their participation in the tradable permits' market. Therefore the paper reveals the tradable permits mechanism as a new way for public direct action and highlights the possible benefits for the regulator. An important part of

[*]Corresponding author: School of Business and Economics, Loughborough University, Leicestershire, Loughborough, LE11 3TU (United Kingdom). Tel: +44 (0) 1509 222701 Fax: +44 (0)1509 223910 E-mail: ecea@lboro.ac.uk

[†]School of Business and Economics, Loughborough University, Leicestershire, Loughborough, LE11 3TU (United Kingdom). Tel: +44 (0)1509 222710 Fax: +44 (0)1509 223910 E-mail: T.G.Weyman-jones@lboro.ac.uk

the third parties consists of the very active participation of the Environmental Non Governmental Organisations. Therefore, this paper argues that the third party's participation and specifically the environmental groups' participation in tradable permits' market could drive the market to the optimum equilibrium. In order to examine this 'proposition' we use some data from the first phase of the permits' market in European Union and some available data for the environmental groups' income. We conclude that the environmental groups could purchase the exceeded, overallocated permits and could drive the market in the equilibrium point. Finally, for the regulator the environmental groups' participation could be desirable given that they could improve the efficiency of the tradable permits market.

Keywords: emissions; permits; overallocation; third parties; environmental groups; equilibrium.

JEL Codes: L31 Q50 Q32 Q54,

1 Introduction

In the last few years, an increasing number of studies in economic literature report and analyse the third parties' participation in tradable permits market. The common spirit in these studies is the role that the third parties could play in the market as well as the information-signal which they may give to the regulator. The third parties could participate in the Emissions Trading Systems (ETS) like in the European permits' market and could pur-

chase or sell permits as an extra player (except the firms) in the permits' trading process. Therefore, this could be a signal for the regulator that the number of the permits in the permits' market (allocated by the regulator) is more than the optimum level. Hence, the third parties could participate and purchase the extra quantity of permits which exceed the optimum point where their participation could drive the market to the equilibrium level or at least closer to this.

The aim of our study is to confirm practically if the third parties' participation in the ETS is strong enough to drive the market to the optimum point in which the real level of emissions are equal to the number of permits excluding the permits that have been withdrawn by the third parties. For this reason we focus on a specific part of the third parties, the environmental groups because they have a strong participation in the permits' market and they focus on the retirement of the permits as a tool in order to press the firms to adopt a better less polluting technology.

The rest of the paper is divided in two parts. In the first part we analyse the function and the origins of the European ETS. Also, we present the literature with respect to the third parties' participation in the tradable permits market and specifically the environmental groups' participation and their relation with the permits. In the second part we examine if the environmental groups' participation could drive the market to an interior equilibrium given that initially the regulator allocated number of permits more than the optimum. For this reason we use some empirical evidence and specifically

we focus on the first phase of the tradable permits' application in European Union (2005-2007). Furthermore, we collected the data for the environmental groups' income for the same period and following the permits' prices of this period we examine if the ENGOs had the purchasing power to buy and withdraw part of the extra-overallocated permits.

Our results indicate that it is possible for the environmentalists, due to their participation in the ETS, to drive the market to the interior equilibrium point. Simply, the environmental groups had the aggregate sufficient budget to purchase and withdraw, out of the market, the surplus quantity of permits (the excess over the optimum quantity of permits). Finally, for the regulator the third parties' participation could be an important 'help' or a safety valve (maybe partial) which could protect the market if he will allocate a number of permits greater than the optimum.

1.1 European Union Emissions Trading System - Origins and Applications

The function and the use of European Union's Emission Trading System (EU ETS hereafter) were reinforced by the Kyoto Protocol (1998) and the efforts by many countries to stop global warming. These countries participated in the Conference of the Parties (COP) in order to decide on the strategies and tools against global warming. In 1997 the COP3 took place in Kyoto and its result was the Kyoto Protocol where the Parties decided to reduce the level

of the greenhouse gases by 5% below the level of the analogous emissions from the year 1990. The time line for this target is the period 2008 until 2012.

The European Union (15 members-countries) was a leader at the meetings of COP and ratified the Kyoto Protocol. For the EU the target for emissions reduction is equal to 8% below the 1990's level of emissions. Therefore, the EU adopted the Kyoto Protocol and the mechanisms for the control and the reduction of the total emissions.[1] One main instrument introduced in the Protocol was the tradable permits system. For the EU, the emissions trading system became the cornerstone of its environmental policy especially for the reduction of the CO_2 emissions (Convery, 2009). The first application of the EU ETS took place in 2005 where 11,500 firms (mainly heavy or energy-intensive industries) participated in the new tool, making the EU ETS the largest application of tradable permits in the world (e.g. Convery, 2009 and Newbery, 2008). According to the emissions trading system each unit of emission released to the atmosphere from a firm has to be accompanied by the analogous allowance or the emission permit from the specific firm, for example

[1] The mechanisms introduced in the Kyoto Protocol for the reduction of the greenhouse gases (GHG) are; The Joint Implementation (JI), the Clean Development Mechanism (CDM) and the Emission Trading (E.T.). The J.I. allows one industrialized country to reduce part of its' emissions by investing in the reduction of greenhouse gases (GHG) in another industrialized country. Both countries should belong to the Annex I parties according to the United Nations Framework Convention on Climate Change (UNFCCC). In the Annex I belong these industrialized countries which have quantified targets for the reduction of GHG. Furthermore CDM allows an Annex I country to reduce part of its' emissions by investing or run projects for the reduction of the GHG emissions in a non-Annex I country. Non-Annex I countries are the developing countries without any specified, quantified target for the reduction of the GHG emissions.

one tonne of CO_2 equals one permit. However the permits are allocated by the government (regulator) in each country to which the firms belong. Hence the total number of permits represents the maximum permissible levels of total emissions. Moreover, the number of the permits which corresponded to each member-state of the European Union had been decided in 1998. Simply, for each Member the target for the emissions reduction was different and all the targets together are equal to 8% less than the emissions of 1990 for the specific countries. This decision is known as the burden sharing agreement and according to this agreement specific numbers of permits belong to each Member State.[2]

Concretely, following the European environmental decisions, each member-state of the European community has a National Allocation Plan (NAP) for the allocation of the emissions permits to each industrial sector and firms in the country. Therefore, the regulator (government) will allocate the permits to the firms in accordance with each plan. Furthermore, in the context of the NAPs, the regulator will follow the grandfathered distribution system in order to share the permits to the firms. In the grandfathered system the regulator will allocate, free of charge, a specific number of permits to the firms according to the industries' historical emissions. These permits are the initial permits for each firm. Therefore the total number of the permits in the European market could not exceed the specific level of emissions.[3] Con-

[2] See http://europa.eu/rapid/pressReleasesAction.do?reference=IP/04/932

[3] According to the directive 2003/87/EC the European Union has specific target for the reduction of the emissions in the EU area. For the period 2008-2012 the target is equal to

very, (2009) briefly describes all the pieces of the puzzle (meetings, decision, legislations documents and conferences) from the beginning until the first application of the EU ETS.

According to the baseline of the tradable permits, the firms with the initial permits -allocated by the regulator- can participate in the transactions of the permits in the analogous market. If a firm has more permits than emissions for a specific period, then the firm can sell the excess permits through the permits' market to other firm(s) with more emissions than permits. A firm could purchase extra permits via the permits' market if it has more emissions than permits or could adopt a less polluting technology or/ and may reduce the level of the output. Finally, the regulator in the end of the specific period (e.g. 2008-2012) will enforce a penalty to this firm which has more emissions than permits. Hence, a market for permits could induce firms to find a socially desirable outcome and emissions with the government's intervention.

1.2 Theoretical background

The idea of the tradable permits market is familiar in economic science since it has been introduced by Coase (1960) as a possible instrument for the bilateral negotiations between the polluter and the polluting. Thus, the use of the permits bring about an equilibrium level of emissions acceptable to both sides. Later, Crocker (1966) and Dales (1968) built on the Coasian idea

8% below the amount of emissions from the year 1990. Therefore the total number of the permits that had been allocated by the regulator to the firms for the period 2008-2012 is equal to the target's emissions.

to illustrate the fixed quantity of transferable permits as a new instrument for environmental policy. The level of the fixed permits represents the total allowable pollution and the price of the permits could be a motivation for the polluters to innovate and reduce emissions. Specifically, Crocker focuses mainly on the air pollution in United States and Dales, Canada on water pollution. However, when the idea of the tradable permits became more mature, more studies focused on the design of markets for transferable permits: Montgomery, (1972); Mackintosh, (1973); Kneese and Schultze, (1975); Krupnick et al, (1983) and Baumol and Oates, (1988). In these studies the authors showed that the system of tradable permits could reach their environmental targets with minimum cost. The function and the idea of the tradable permits market was well described by Pearce (2002, pp. 74-75.) "Given the need to meet some target, say X tonnes of pollution, and the source of the pollution is Y emitters, distribute permits equal to X tonnes to the emitters, and then allow them to buy and sell the permits. Because pollution without a permit is not allowed, each emitter will reduce pollution so long as the cost of doing so is less than the price that would have to be paid for a permit. High abatement–cost polluters will therefore tend to buy permits, and low–cost polluters will sell permits. The market in permits will determine an equilibrium price for the permits."

Then, the idea passed from theory to the real market in USA for the Clean Air Act Amendments of 1970 under the authority of the Environmental Protection Agency (EPA) for air quality. In the same spirit, the tradable

permits applied for fishing quotas, airport landing slots, development rights for land use, etc. (e.g. Gorman and Solomon, 2002; Pearce, 2002 and Heyes and Liston, 2006). For a brief early application of emissions trading systems see Gorman and Solomon, (2002).

1.3 Who can participate in the EU ETS?

The European tradable permits market is open to all the possible players or agents in the market. According to the European legislation documents and official statutory documents, everyone can participate in the European ETS. Therefore, the European Commission's law decisions allowed the participation in the ETS not only to those who create the pollution but also to the victims who suffer from this. That is, the third parties like, the victims from the firms' emissions, Non Governmental Organisations (e.g. environmental groups), legal persons, citizens, consumers, individuals, schools, unions, associations, etc. can participate in the permits market in order to: a) purchase permits from the market; b) to sell permits to the market or; c) to purchase and withdraw permits from the market.

A number of important documents confirm the third parties' free entrance and participation in the emissions trading system. For example; the instruction COM (2001) 581 Final proposal, allows ecological groups (Non Government Organizations) to buy and withdraw permits from the market. (Page 12; Paragraph 13, 'Distribution and Publication of Permits.').[4] Also,

[4]E.C. COM (2001) 581 final "Proposal for a directive of the European Parliament and

another report about the participation by legal persons in permits' market originates from the UNFCCC Guideline (FCCC/CP/2001/2/Add.4.).[5] Moreover, in the Directive 2003/87/E.C. it is clear that any legal or natural person can participate in emission trading market.[6]

2 Third parties' participation in the ETS

Theoretical papers have focused on the third parties' participation in relation to the regulator's decisions problem (the endowment of permits) and the system's efficiency. The economic approach is based on a common political-economic-social platform which links the economists' opinion. Specifically, the economic consensus that an optimal pollution control is possible if the pollution's damage and the abatement cost of pollution are known to everybody. Because in the real world it is not possible for the government or the regulator to know these two parameters several different theoretical approaches have been designed, by the researchers, in order to test the tradable permits' efficiency under the third parties' participation. In this case if the

of the Council establishing a scheme for greenhouse gas emission allowance trading within the community and amending council directive 96/61/EC."

[5]FCCC/CP/2001/2/Addition 4. Page 27, paragraph 21 (b)). "Review of the implementation of commitments and of other provisions of the convention. Preparations for the first session of the conference of the parties serving as the meeting of the parties to the Kyoto protocol (decision 8/cp.4). Decisions concerning guidelines under articles 5, 7 and 8 of the Kyoto protocol."

[6]Directive 2003/87/E.C. article 3, paragraph (g) "Directive 2003/87/E.C. of the European parliament and of the council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the community and amending council directive 96/61/E.C."

third parties are dissatisfied with the quantity of emissions then in order to react against pollution will participate in the permits' system. Hence, they could purchase and retire permits. These theoretical papers are analyzed below.

In Smith and Yates (2003a) firms and citizens purchase permits. The authors analyzed the case in which the regulator faces uncertainty about environmental damages and about the citizens' participation and their collective action problem. They examine this case in a static and a dynamic model and they present the optimal permits endowments for both cases. Also, Smith and Yates (2003b) show that consumers' participation in the permits market may create a signal for the regulator. If consumers purchase permits then, the initial number of permits (allocated by the regulator) is too high and the market equilibrium is inefficient. The regulator can read this signal and can improve the social welfare in the future.

In an analogous spirit, Shrestha (1998) argues that in the case where the regulator has uncertainty about the benefits or the damage; the environmental groups' and/or the citizens' (victims) participation in ETS can drive the market into the interior equilibrium point. However, there are two conditions: First ecologists or citizens are allowed to participate in ETS. Second the marginal benefits of ecologists/citizen exceed the price of permits which is equal to the marginal cost of pollution control.

Malueg and Yates (2006) present two different scenarios. In the first scenario, the citizens lobby the government to reduce the pollution permit

endowment (in opposition to the firms' lobby). In the second scenario, the citizens participate directly in the ETS with the aim of purchasing and retiring permits. In their basic scenario permits are auctioned rather than grandfathered. They conclude that firms and citizens prefer permits.

Boyd and Conley (1997) and Conley and Smith (2005) consider a market in which the citizens participate in the permits market. However the retired permits are not sold at the same prices as in the common market but at personalized price.

Ahlheim and Schneider (2002) propose a system where the households' can distribute the permits. They support a new sharing system for the permits allocation. According to this, the permits are distributed firstly to households free of charge by the regulator and then the households sell as many permits as they wish, to firms. Then, this new system includes households' preferences. Hence, this kind of participation is not parallel with the firms' action in the permit market and the permits are not shared by grandfathered system.

Recently, English and Yates (2007) designed an expansion on the Kwerel (1977) mechanism adding the citizens' demand for permits. In their conclusions, the Kwerel mechanism is effective when the citizens are participating only if, there is absence of elements of stature environmental damage (the level of the damage is unknown).[7]

[7] The pollution's damage is common knowledge but the firm's abatement cost is private. The regulator asks the firms about their abatement cost. By Kwerel's assumptions the firms have higher benefit telling the truth. The government (regulator) does not grandfa-

Furthermore, a recent paper in a similar spirit emanates from Rousse (2008). This paper diffuses the idea of the citizens' participation in the ETS in order to purchase and withdraw permits which induces emissions' reduction and distinguishes the advantages of the direct participation in the ETS in relation to the carbon-offsets. A public institution or a non-governmental organization could be the broker which can perform the citizens' purchase but then the possible high increase in the permit's price -which emanates from the citizens' participation- could stimulate innovation.

Finally, Eshel and Sexton (2009), argue that the direct participation of the community in the permits' market may contribute to the environmental quality and reveal the community's preferences for the level of pollution. In their model, the community participates in an imperfectly competitive permits' market under the presence of one dominant firm which can affect the price of the permits (market power) but it is a price taker in the output market. Also they assume that the rest of the firms are price takers to both markets, permits and output, where the community is a price taker in the permits' market. Furthermore, they analyse two cases; In the first case the community can purchase permits only through the permits' market. In the second case, the regulator will allocate initial permits (free of charge - grandfathered system) to the firms as well as to the community. Thus, the community can purchase and /or can sell permits to the firms through to the permits' market. The authors conclude that the participation of the commu-

ther the permits.

nity in the permits' market could have an ambiguous influence (increasing or decreasing) on the efficiency of the tradable permits' system and it depends on the position of the dominant firm in the permits' market. Simply, it depends if the dominant firm is a net seller or a net buyer of permits.

3 Environmental groups' strategy and tradable permits

As we know from the legal documents, everyone can participate in the ETS, even the victims. The victims could be some interests groups or individual persons who are affected by the firms' emissions and are trying to react against the pollution. We will focus on a specific interest group with high sensitivity to environmental protection; the environmental groups. Characteristic of the environmental groups are, the methods which they use in their strategy: activism and lobbying.[8] From the late 80's decade, environmental groups had participated in the USA's permits market in order to withdraw a number of allowances from the market as a way to reduce pollution. Then the environmental groups' acquired another new method for environmental protection. This new strategy is clear from the homepage of Acid Rain Retirement Fund (ARRF, 1997) :[9]

[8]For an idea on the transnational environmental activist groups in the international politic arena, with examples on activism, see Wapner (1995).

[9]The ARRF is one of the leading environmental groups in USA. The source of this information emanates from Carman (2002).

«As we retire more allowances, the price will go up. Polluting companies will need to bid larger amounts of money to continue polluting. As the price of polluting goes up, companies will be more inclined to invest money in technologies that remove pollution before it reaches the smokestack»

Permits in the environmentalists' hands confer the right not to accept more pollution emissions from firms and a democratic reaction like this is possible only by the victims' free participation in the permits' market without restrictions. This opinion is confirmed by Kruger and Dean (1997) who argue that the environmentalists' participation in the ETS by an ethics' viewpoint lends a democratic character to the permits' system. Hence the environmental groups independent of the type of distribution system (auctioned or grandfathered) selected by the government, could purchase and withdraw permits (McKibbin and Wilcoxen, 2002). Gorman and Solomon (2002) and Hahn and Stavins (1991) describe the environmentalists' reaction to the emissions tradable permits' application in USA. They argue that the ecologists had been opposed to the early applications of EPA emissions trading program (in 70's and 80's) but later become major proponents of tradable permits since the control of acid rain (later 80's).[10] In addition, Tietenberg (1990) points out that some environmental groups (organizations) have economic incentive approaches in their strategy for environmental protection.

Initially, the environmentalists' participation in the ETS took place in USA almost from the first applications of the tradable permits. Currently

[10]EPA: Environmental Protection Agency, U.S.A.

the British Non Governmental Organisation, Sandbag, collects charitable donations in order to purchase and withdrawn permits from the European Emission Trading System. From the historic applications of the tradable permits in USA we have some elements which could explain; the environmentalists' targets or the reasons for this participation as well as their effects in the permits' system and market. These elements are presented later in the paper but firstly we explain why the environmentalists prefer the tradable permits as a better way (than other choices) in order to achieve their aims.

3.1 Why the environmentalists prefer the tradable permits?

The environmentalists prefer the permits market to the taxes because the level of desirable emissions reduction is explicit (Stavins 1998) and the level of the environmental protection that will be achieved is specified (Hahn and Stavins, 1991). Moreover, according to Carman (2002), the free participation in the tradable permits markets could directly affect the policy outcomes and create a new way of public activism and reaction for groups which care for the environmental quality. Furthermore, the success of the interest groups' lobbying is more uncertain in relation to the tradable permits. In a further analysis on the interest groups preferences on tradable permits, Svendsen (1999) ascertains that, from the environmentalists' viewpoint, the free permits' sharing based on the historical emissions (grandfathered), makes the de-

crease of high level emissions from the industry more possible. Moreover, the environmentalists trust the grandfathered system because it provides higher degrees of insurance against the cases of firms cheating. The grandfather system is an automatic monitoring system. The regulator or an authority is monitoring the firm's emissions and enforces a penalty if in the end of a specific period the firm has more emissions than permits.

3.2 Environmentalists' participation in tradable permits' market

From the earlier applications on tradable permits in USA, we have some reports about the environmentalists' participation in the ETS. The ecological groups' participation started in the US almost two decades before. Some examples are: Clean Air Conservancy Trust, Acid Rain Retirement Fund, Adirondack Council and Environmental Resources Trust.[11] These groups use donated funds to purchase and withdraw emissions permits in order to reduce the level of the maximum emissions in the atmosphere. In the literature, some empirical papers confirm and analyze the third parties' participation in the US's tradable permits markets.

Israel D. (2007) examines the thirds parties' participation (but mainly the environmental groups) in the sulfur emissions trading program between the years 1993 and 2006. She concludes that the number of the withdrawn

[11] For more information: http://www.epa.gov/airmarkt/traiding/buying.html (access date 27 Nov. 2007).

permits is not too high relatively to the total number of available permits in the market. This fact indicates that, on the one hand the regulator had uncertainty about the social optimal level of emissions but, on the other hand, the regulator had targets near to the social optimal. Joskow et al. (1998), through an empirical analysis on the auction of tradable emissions (SO_2) in 90's, had focused on the buyers' behaviours and they argued that; the third parties (ecological groups, law schools, etc) used to offer very high prices for the permits acquisition. The possible explanations for this behavior, according to the authors are: a) the non awareness about the market's function; b) the certainty of the permits property or; c) the buyers appreciated that it was plausible for some reason to offer high prices. Schwarze and Zapfel (2000) compared the design of two different anti-pollution programs (SAT and RECLAIM) in which the third parties' participation in permits market confirmed the political acceptability and the public correspondence for environmental improvement.[12] Frank (2001) presents the difficulties of the tradable permits' application but also comments on the system's benefits where he includes the permits' ownership by the environmental organizations. Tietenberg (2003) in the experience of the tradable permits' application in air, water and fisheries, concludes that the environmental groups had purchased and withdrawn allowances in acid rain permits market.

The environmentalists have one main aim: They want to minimize the

[12] Sulfur Allowance Trading Program (SAT) for the decreasing of SO_2 and South Californian Regional Clean Air Incentives Market (RECLAIM) for the decreasing of SO_X and NO_X.

firms' externalities. So the environmentalists participate in the ETS in order to purchase and withdraw permits from the market. Retiring permits decreases the available supply of permits and by the economic principles (of supply and demand) this action drives prices of permits up.[13] Then, the rational firms' strategy is to use a tool which can provide higher independency from the permits. Therefore, the strategy of the withdrawn permits, could induce firms to select a greener-technology which reduces the productivity's negative externalities (by-product result). However, a necessary condition for the environmentalists' participation (as well as for the third parties' participation) is the existence of available permits in the market or quantity of permits more than the optimum. Hence, this participation could be a signal for the regulator that he/she allocated a number of permits greater than the optimum but the third parties' participation could drive the market to the optimum point or closer to this.

4 Environmental groups and overallocated permits

As discussed in the previous section, the environmental groups purchase and withdrawn permits in order to reduce the quantity of the market's available permits. Therefore, due to the law of demand and supply the price of the

[13] For a diagrammatic approach see Israel (2007) and Smith and Yates (2003b).

permits is increasing.[14] Besides, the environmentalists will purchase permits if the market is over the equilibrium point where someone is willing to sell permits (the seller) and someone else is willing to purchase permits (buyer).[15] Therefore, the question is; if they could purchase the extra quantity of permits. Thus, in order to explore this issue it is important to know the number of the overallocated permits as well as the price of the permits. For these reasons we use the available information from the application of the tradable permits' market from 2005 until 2007 (pilot phase).

During the first period of the emission permits system in the European Union (pilot phase 2005-2007) a number of permits allocated to the firms by the regulator. However, the allocated permits exceeded the real level of the emission, or simply the level of the verified emissions was less than the quantity of the allocated permits for all the years of the pilot phase. We adopted the data from Anderson and Di Maria (2011) and it is obvious the overallocation of permits during the phase 1. The data are presented in the next table

Table 1: Tonnes of overallocated permits/emissions in the EU 25.

[14] For a diagrammatic analysis see Israel (2007) and Smith and Yates (2003b).

[15] We focus on a short term (e.g. one year) where the seller or the buyer will not adopt a different technology and will not change the level of their production.

Year	allocated permits/ CO_2 emissions	verified emissions	overallocated permits/ CO_2 emissions
2005	2,096,444,000	2,014,017,000	82,427,000
2006	2,071,740,000	2,035,612,000	36,126,000
2007	2,078,703,000	2,051,545,000	27,158,000
Total	6,246,887,000	6,101,174,000	145,713,000

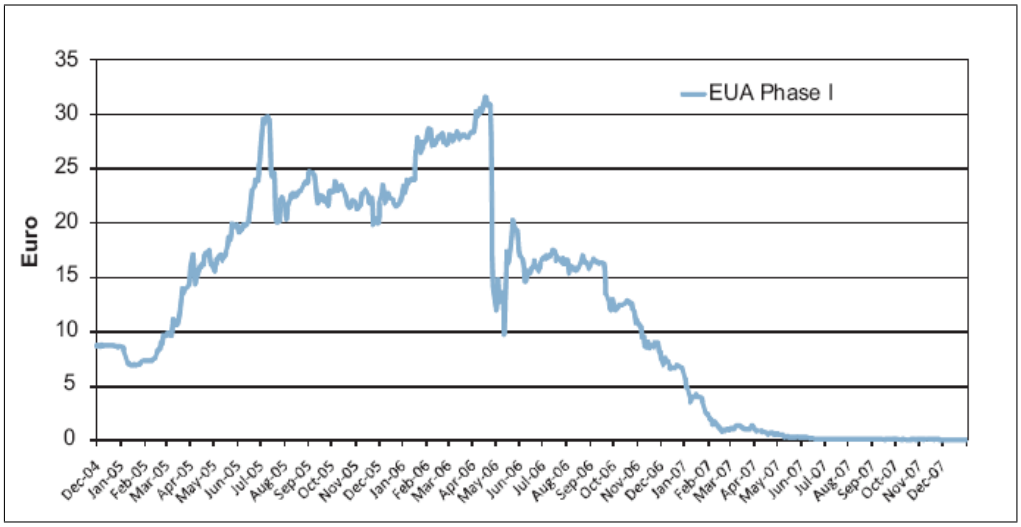
Source: Anderson and Di Maria (2011).

In table 1 we present the allocation of the permits for the pilot phase (or phase 1) in E.U where one permit represents "the right to pollute" one tonne of CO_2. In the first year of the phase1 (2005) the quantity of the overallocated permits was equal to 82,427,000 tonnes of CO_2 but the last year (2007) the quantity of the exceeded permits was 27,158,000 tonnes of CO_2. Then, as expected the overallocation of the permits with respect to the real emissions had an influence for the determination of the permits' price. Particularly, the excess supply of the permits had a negative effect on the permits' price given that the supply was higher than the demand in the European market.

So, the next step is to focus on the price of the permit during the phase 1. The permit's price behavior during the period 2005-2007 is presented diagrammatically in figure 1 below. As we can observe in figure 1, during the year 2007 the price of the permits reduced and it was much lower than the previous two years, 2005 and 2006. Specifically, in the beginning of 2007, January, the price of the permit was equal to 4 € but during all this year the price was reducing and in the end of the year the price was approaching

zero (€0.03 in December, 2007)[16][17]

Figure 1: Prices of CO_2 European permits.



Source: Hintermann, B. (2010)

Therefore, we know that the regulator allocated a quantity of permits much higher than the optimum or that the regulator had a lack of knowledge for the optimum number of permits/emissions. Also we know that in the European emissions permits' market the third parties are allowed to participate and the environmental groups are participating (see for example the ENGO Sandbag). Hence we return back to the question; whether the environmental

[16] See also the report 2008 from the pointcarbon under the title: Carbon 2008: Post-2012 is now. (Source: http://www.pointcarbon.com/research/resources/analysis/1.912721)

[17] It is interesting to note that from the year 2013 and after some countries (like UK) will adopt or thinking to adopt a regulation for the minimum price of the permits, a carbon price floor. See for example http://www.hm-treasury.gov.uk/consult_carbon_price_support.htm

Also, for the price floor see Wood and Jotzo (2011).

groups have the budget to purchase and withdraw permits in order to drive the market to the optimum point. In other words, can they purchase the excess quantity of permits? If yes then, can it be a protection valve for the function of the system? Also, could they offer more safety to the regulator if he overallocated permits?

In order to explore the previous issues we collected information from different ENGOs with respect to their annual income. Particularly, in the next table (table 2) are presented some environmental groups which were active in the countries of the European Union and their available income for the year 2007 is published and is available to the public. In order to decide which environmental groups are appropriate for our research we followed some criteria. Specifically, we choose the ENGOs according to the following criteria:

a) They have available data for the level of their income at least for one year of the period 2005-2007

b) They are funded by the European Commission[18]

c) They are relatively known or famous European ENGOs

However, it is important to note that the presented incomes are not available for all the European environmental groups and therefore we collected some data directly from the environmental groups' websites and some other data indirectly through the guidestar.uk website which provides information

[18] Under the European project LIFE the European Commission provides operating funds to ENGOs (http://ec.europa.eu/environment/ngos/list_ngos97_07.htm).

for the non-governmental organisations. Unfortunately, there are not enough available data before the year 2007 and in some cases the incomes that we include in the table are only for the British part of some environmental groups such as for example WWF-UK.[19] Also, is essential to note for the reader that there are more ENGOs which could participate in the EU permits' market and here we present only some of these ENGOs.

Table 2: ENGOs' income for the year 2007

Environmental Groups	Income in National Currency 2007	Income in Euros 2007
Birdlife International[1]	9,562,392 £	11,952,990 €[3]
Friends of the Earth [1]	6,521,039 £	8,151,298 €[3]
Greenpeace (environmental trust-UK)[1]	2,942,826 £	3,678,532 €[3]
WWF-UK[1]	45,404,000 £	56,755,000 €[3]
CEE Bankwatch Network[2]	1,393,093 €	1,393,093 €
European Environmental Bureau[2]	2,229,222 €	2,229,222 €
Women in Europe for a Common Future[2]	2,394,688 €	2,394,688 €
Environmental Partnership for Sustainable Development[2]	5,256,037 €	5,256,037 €
Total		91,810,860 €

[19]It is essential to note that we focus on the European or British parts of the ENGOs and not on the global level. For example the year 2007 Greenpeace International had 212,316,000 € and WWF International had 133,601,000 $ and WWF Network had 633,193,000 $. So, at global level the ENGOs have larger available income.

Source: [1]guidestar uk, [2]available from the site of the analogous ENGOs, [3]according to ameco for the year 2007, 1 € = 0.8 £

In the first column of the table there are the environmental groups where their available income in national currency (pounds or euros) is presented in column two. In order to use the same currency with the permits' price we calculated the incomes according to the average exchange rate of the year 2007 following the information from European union ameco.[20] The results are included in the last column.

As we can observe, the higher income for the year 2007 had the WWF-UK with 56,755,000 € and the Birdlife International with 11,952,990 €. In addition, the lower income for the same year had the CEE Bankwatch Network with 1,393,093 €. However, the total annual income only from these 8 ENGOs is equal to 91,810,860 €.

4.1 Sensitivity analysis

In this subsection a sensitivity analysis is used in order to check if the environmental groups have the level of the necessary budget (annual income) in order to purchase the exceeded permits of the year 2007. In other words, we examine this hypothesis which supports that the third parties -and specifically the environmental groups- could drive the permits' market to the optimum

[20]AMECO is the annual macro-economic database of the European Commission's Directorate General for Economic and Financial Affairs (DG ECFIN).

equilibrium if the regulator allocated permits more than the optimum. The results are included in the table 3 where we present the annual spectrum of the permit's price for the year 2007, starting from the minimum price of the 0,03 €/permit until the maximum price for the same year equal to 4 €/permit.

Table 3: Sensitivity analysis

€/permit CO_2	overallocated permits	Total cost for Overallocated permits	ENGOs Total Income 2007
0,03	27158000	814,740 €	91,810,860 €
0,5	27158000	13,579,000 €	91,810,860 €
1	27158000	27,158,000 €	91,810,860 €
1,5	27158000	40,737,000 €	91,810,860 €
2	27158000	54,316,000 €	91,810,860 €
2,5	27158000	67,895,000 €	91,810,860 €
3	27158000	81,474,000 €	91,810,860 €
3,38	27158000	91,794,040 €	91,810,860 €
3,5	27158000	95,053,000 €	91,810,860 €
4	27158000	108,632,000 €	91,810,860 €

As we observe the aggregate income from the 8 ENGOs, is enough in order to purchase the excess quantity of permits (over the optimum) if the price of the permits will not exceed the 3,38 €. Of course we assume that the ENGOs will use all their income in order to purchase the extra permits. Therefore, they will not have expenditures for other ecological economics.

However, we include only some of the environmental groups which are activated in the European Area but not all of them because the available data are restricted. Furthermore, it is essential for the regulator that the ENGOs have the purchasing power to drive the market to an interior equilibrium and this could be an additional support for the policy-maker and the environmental policy generally given that the regulator could be more 'safe' under the possibility of asymmetric information and the threat of a possible overallocation of permits' quantity in the future.

Unfortunately, the available information are not enough in order to focus on the previous years (2005 and 2006) of phase 1 although there are more environmental groups which may participate (or they have the dynamic to participate) In addition, the two large environmental groups Greenpeace and WWF at global level they have a big amount of available income (see footnote 19) which could be enough in order to purchase and withdraw a large quantity of European permits given of course that they will use all their available budget for the specific reason.

Besides, we tried to present some results form the first period -first phase- which was a pilot period for the European ETS. We believe that the second period- phase (2008-2012)- could give more interesting elements and data with respect to the environmental groups' participation in the EU ETS.

5 Conclusions

In this paper we have explored the third parties' participation in the Emission Trading System and specifically the potential role of the environmental groups for the determination of the equilibrium in the permits' market. Following the literature and the experience from the first phase of tradable permits' application in the EU ETS we examine if and how the environmental groups or Environmental Non Governmental Organisations (ENGO) could purchase and withdraw permits for the European market. Specifically, the motivation for this paper emanates from the problem of the overallocation permits during the phase 1 (2005-2007) were the regulator allocated a number of permits to the firms more than the optimum quantity. Obviously, this was an essential reason why the price of the permits was very low especially during the year 2007. Hence, the environmentalists' participation in order to purchase the extra permits may be a way for the market and for the regulator to achieve an efficient outcome.

We use the available data from the first phase of the European permits system and the analogous income for some of the European environmental groups. The available data restricted the analysis to the year 2007 and although we focused on a small number of ENGOs, we show that they have the purchasing power in order to withdrawn the quantity of the overallocated permits. For the ENGOs their participation in the ETS could be a new tool in order to press the firms to adopt a better and less polluting technology which

could drive to a lower level of emissions. For the regulator, their participation could be a signal that he had allocated more permits than the optimum but also the ENGOs could help the market to reach the optimum equilibrium, so, their participation may be a helpful instrument for the efficiency of the ETS and the environmental policy.

References

1. Ahlheim, M., Schneider, F., 2002. Allowing for household preferences in emission trading. Environmental and Resource Economics 21, 317–342.

2. Anderson, B., Di Maria, C., 2011. Abatement and allocation in the pilot phase of the EU ETS. Environmental and Resource Economics 48, 83–103.

3. Baumol, W.J., Oates, W.E., 1988. The theory of environmental policy, second ed. Cambridge University Press, Cambridge.

4. Boyd, J., Conley, J., 1997. Fundamental nonconvexities in Arrovian markets and a Coasian solution to the problem of externalities. Journal of Economic Theory 72, 388–407.

5. Carman, C.J., 2002. Brokering interests: the use of market-based policies by interest groups. Social Science Quarterly 83, 137–155.

6. Coase, R., 1960. The Problem of social cost. Journal of Law and Economics 3, 1–44.

7. Conley, J., Smith, S., 2005. Coasian equilibrium. Journal of Mathematical Economics 41, 687–704.

8. Convery, F.J., 2009. Origins and development of the EU ETS. Environmental and Resource Economics 43, 391–412.

9. Crocker, T.D., 1966. The Structuring of Atmospheric Pollution Control Systems, in: Wolozin, H., (Eds.), The Economics of Air Pollution. W.W. Norton and Co, New York, pp. 61-86.

10. Dales, J.H., 1968. Pollution, property and prices, University of Toronto Press, Toronto.

11. English, D., Yates, A., 2007. Citizens' demand for permits and Kwerel's incentive compatible mechanism for pollution control. Economics Bulletin 17, 1–9.

12. Eshel, D.M.D., Sexton, J.R., 2009. Allowing communities to trade in imperfectly competitive pollution-permit markets. Journal of Regulatory Economics 36, 60–82.

13. European Commission., 2001. Proposal for a directive of the european parliament and of the council establishing a scheme for greenhouse gas emission allowance trading within the community and amending council directive 96/61/E.C. COM (2001) 581 Final.

14. European Commission., 2003. Directive 2003/87/E.C. of the european parliament and of the council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the community and amending council directive 96/61/E.C.

15. Frank, R.H., 2001. The economist as public intellectual: a case for selling Pareto improvements. Eastern Economic Journal 27, 221–225.

16. Gorman, H.S., Solomon, B.D., 2002. The origins and practice of emissions trading. Journal of Policy History 14, 293–320.

17. Hahn, R.W., Stavins, R.N., 1991. Incentive-based environmental regulation: a new era from an old idea? Ecology Law Quarterly 18, 23–25.

18. Heyes, A., Liston C., 2006. Economics of environmental regulation: instruments and cases, in: Crew, M. A., Parker, D., (Eds.), International Handbook on Economic Regulation. Edward Elgar, Cheltenham, pp. 255–277.

19. Hintermann, B., 2010. Allowance price drivers in the first phase of the EU ETS. Journal of Environmental Economics and Management 59, 43–56.

20. Israel, D., 2007. Environmental participation in the U.S. sulphur allowance auctions. Environmental and Resource Economics 38, 373–390.

21. Joskow, P.L., Schmalensee, R., Bailey, E.M., 1998. The market for sulfur dioxide emissions. American Economic Review 88, 669–685.

22. Kneese, A.V., Schultze, C.L., 1975. Pollution, prices and public policy, Brookings Institution, Washington, D.C.

23. Kruger, J., Dean, M., 1997. Looking back on SO_2 trading: what's good for the environment is good for the market. Public Utilities Fortnightly 135, 30–37.

24. Krupnick, A.J., Oates, W.E., Van de Verg, E., 1983. On marketable air-pollution permits: the case for a system of pollution offsets. Journal of Environmental Economics and Management 10, 233–247.

25. Kwerel, E., 1977. To Tell the truth: imperfect information and optimal pollution control. Review of Economic Studies 44, 595–601.

26. Malueg, D.A., Yates, A.J., 2006. Citizen participation in pollution permit markets. Journal of Environmental Economics and Management 51, 205–217.

27. McKibbin, W.J., Wilcoxen, P.J., 2002. The role of economics in climate change policy. Journal of Economic Perspectives 16, 107–129.

28. Mackintosh, D.R., 1973. The economics of airborne emissions: the case for an air rights market, Praeger Publishers, New York.

29. Montgomery, W.D., 1972. Markets in licenses and efficient pollution control program. Journal of Economic Theory 5, 395–418.

30. Newbery, D.M., 2008. Climate change policy and its effect on market power in the gas market. Journal of the European Economic Association 6, 727–751.

31. Pearce, D.W., 2002. An intellectual history of environmental economics. Annual Review of Energy and the Environment 27, 57–81.

32. Rousse, O., 2008. Environmental and economic benefits resulting from citizens' participation in CO_2 emissions trading: an efficient alternative solution to the voluntary compensation of CO_2 emissions. Energy Policy 36, 388–397.

33. Schwarze, R., Zapfel, P., 2000. Sulfur allowance trading and the regional clean air incentives market: a comparative design analysis of two major cap-and-trade permit programs? Environmental and Resource Economics 17, 279–298.

34. Shrestha, R., 1998. Uncertainty and the choice of policy instruments: a note on Baumol and Oates propositions. Environmental and Resource Economics 12, 497–505.

35. Smith, C.S., Yates, J.A., 2003a. Optimal pollution permit endowments in markets with endogenous emissions. Journal of Environmental Economics and Management 46, 425–445.

36. Smith, C.S., Yates, J.A., 2003b. Should consumers be priced out of pollution-permit markets? Journal of Economic Education 34, 181–189.

37. Stavins, R.N., 1998. What can we learn from the grand policy experiment? Lessons from SO_2 allowance trading. Journal of Economic Perspectives 12, 69–88.

38. Svendsen, G.T., 1999. U.S. interest groups prefer emission trading: a new perspective. Public Choice 101, 109–128.

39. Tietenberg, T.H., 1990. Economic instruments for environmental regulation. Oxford Review of Economic Policy 9, 17–33.

40. Tietenberg, T.H., 2003. The tradable-permits approach to protecting the commons: lessons for climate change. Oxford Review of Economic Policy 19, 400–419.

41. UNFCCC., 2001. Review of the implementation of commitments and of other provisions of the convention. Preparations for the first session of the conference of the parties serving as the meeting of the parties to the Kyoto protocol (decision 8/cp.4). Decisions concerning guidelines under articles 5, 7 and 8 of the Kyoto protocol. FCCC/CP/2001/2/Add.4.

42. Wapner, P., 1995. Politics beyond the state: environmental activism and world civic politics. World Politics 47, 311–340.

43. Wood, P.J., Jotzo, F., 2011. Price floors for emissions trading. Energy Policy, 39, 1746–1753.