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SOME ISSUES IN THE EUROPEAN UNION EMISSIONS TRADING SYSTEM

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Abstract

The present paper provides an introduction and updated background of the published information reported and discussed issued by EU Member States as a synthesis of the most contentious issues surrounding climate policy and/or climate mitigation. Climate policy is an important tool to combat the impacts of climate change caused by mankind in general. This study aims at analysing and describing of the emissions trading and the emissions taxation in the context of climate policy instruments. On one hand, it gives a good introduction to the main features of a tradable emissions system in general and of the EU Emissions Trading Scheme or Emissions Trading System (ETS) in particular. On the other hand, it summarises carbon taxes in general and of the carbon dioxide (CO_2) taxation in particular. It contributes to the existing literature in several ways, e.g., it focuses to the literature by both scientific and policy research. And also, it contributes to the literature by investigating the current policy tools and strategies regarding climate change in specific ways; on the reducing greenhouse gas (GHG) emissions especially in the EU Member States. In addition, it gives general background reviews on the climate change policies, and gives matter-of-facts presentation and references for who wishing to investigate further about climate change policy and its EU ETS. Finally, the EU ETS is a 'cap-and-trade' scheme for GHG emissions regarded as the cornerstone of the climate policy, it is a major tool aims to meet reduction targets of GHG emissions at least-cost (cost-effectively), since January, 2005. Nowadays, it operates in 31 countries (EU-28 plus Iceland, Liechtenstein and Norway), and covers about 45% of the EU's GHG emissions, and also, by 2020, it has aimed directly to cutting emissions in EU-28 by 21% compared to 2005 levels.

Keywords: *Taxation, Climate Change Policy, CO_2, GHG Reduction, Cost-effectively, 31 Countries*

1. INTRODUCTION

The most important market-based instrument in tradable permits and quotas is the ETS [1], in general, the EU ETS relies on the principle of 'cap-and-trade' as a role on economic and environmental performance of companies, also, the EU ETS acts as a main major driver of investment in clean technologies and low-carbon economy, particularly in developing countries [2]. The EU ETS was launched in 2005 as a cornerstone of EU climate policy and the key tool for reducing industrial GHG emissions in a cost-effective manner. It is the first and largest international scheme for trading emission allowances, and is open to non-EU countries on the condition that they meet the strict standards of the EU ETS [3]. With similar schemes under active consideration by a number of other countries, the share of total emissions from rich countries covered by 'cap-and-trade' or other tradable permit regimes could triple in a few years. Addressing the treatment of emission permits and offsets in both direct and indirect taxation is therefore vital [4]. The EU ETS is a 'cap-and-trade' system. It caps the total volume of GHG emissions from installations and aircraft operators responsible for around 50% of EU GHG emissions. The system allows trading of emission allowances so that the total emissions of the

installations and aircraft operators stays within the cap and the least-cost measures can be taken up to reduce emissions [5]. Therefore, the primary purpose of the EU ETS is to reduce carbon emissions from power producers and energy-intensive industries [6]. Generally, the objective of the EU ETS is the mitigation of a global environmental problem [7]. Moreover, the EU ETS has changed the parameters for doing business in Europe by establishing a uniform carbon price for a large set of emitters in the power sector and energy-intensive industries. A thorough understanding of how firms respond to this policy is crucial for making informed decisions about both improvements to the EU ETS and newly implemented carbon trading schemes in other parts of the world [8]. Over the last decade the emerging global trade in carbon has become increasingly central to efforts to govern climate change [6, 9].

Carbon pricing, particularly in Europe, is achieved by a combination of ETS and carbon tax. The EU ETS is said to cover about 45% of GHG emissions in Europe. The sectors or activities not covered by the ETS should be covered in principle by the carbon tax. There is a close link between energy taxes and carbon taxes, and many European countries have reformed or are reforming their energy taxes to include a specific carbon element. Most energy taxes preceded the EU ETS and there are attempts to coordinate this system with energy and carbon taxes [10]. Nevertheless, a number of factors explain changes in ETS emissions from stationary installations during the 2005 to 2014 period. The interaction between the ETS (as an economic policy instrument) and other policies makes it difficult to identify the specific role of each factor and particularly the role played by CO_2 prices on overall reductions in ETS emissions, compared with the role of other policies [11]. Finally, the EU ETS is a 'cap-and-trade' scheme for GHG emissions from the 28 EU Member States and Iceland, Liechtenstein and Norway [12].

2. HISTORY AND THEORETICAL BACKGROUND OF THE EUROPEAN UNION ETS

The history of the EU ETS, which was originally known as the Emission Trading Scheme, is now longer than a decade (Table 1) [13]. An EU ETS was first introduced by Directive 2003/87/EC, which the EU Council and the European Parliament approved in October 2003 [14], this piece of legislation initially applied to a few sectors (i.e. energy activities), and to CO_2 only [15]. Later, its scope was extended to include the aviation sector with Directive 2008/101/EC [16] and subsequently the whole EU ETS scheme was revised and updated with the adoption of Directive 2009/29/EC [17], generally, the emission trading regimes can be considered the most relevant application of market solutions to environmental problems [15]. It aims to promote reductions of GHG emissions in a cost-effective and economically efficient manner [14, 12].

In the context of the global climate change negotiations, tradable emission permits have emerged as an essential policy tool [4]. Further, the EU has a range of policies to reduce emissions, promote clean energy and energy efficiency, and stimulate Europe's transition to a low-carbon economy [18]. Furthermore, carbon pricing can persuade the most virtuous firms to invest in new technologies, with a twofold goal: firstly, to avoid purchasing costly tradable permits; secondly, to sell, and thus monetise, the available permits in excess [15]. Moreover, the EU ETS demonstrated the ability to design and launch a large-scale trading system in a short period of time. The path from initial reticence about emissions trading to implementation of the world's largest program is an important history [19]. So, the EU ETS, as the world's largest carbon market and as the major source of demand for international credits under the Clean Development Mechanism (CDM) and Joint Implementation (JI), is an important driver of international carbon markets and the international carbon price [5].

The EU ETS is the world's first international company-level 'cap-and-trade' system of allowances for emitting CO_2 and other GHGs. Building on the innovative mechanisms (e.g., flexible mechanisms) set up under the Kyoto Protocol - international emissions trading, the CDM and JI - the mandatory system has rapidly become the dynamo behind the expansion of the international carbon market.

Table 1: Important Events in EU ETS History

Years	Important Events
2003	- EU ETS Directive adopted
2004	- EU linking Directive with Kyoto Protocol adopted
2005	- ETS Phase I (2005-2007) launched on 1 January
2007	- National Allocation Plans (NAPs) for Phase II assessed by the European Commission - Bulgaria and Romania join the EU ETS
2008	- ETS Phase II (2008-2012) begins - Norway, Iceland and Liechtenstein join the EU ETS - EU ETS aviation directive adopted
2009	- Adoption of the 2020 EU energy and climate package (Effort-Sharing Directives) with a revised ETS Directive for Phase III (2013-2020)
2011	- EC releases "Towards a 2050 Low-carbon Economy Roadmap"
2012	- Aviation included in the ETS
2013	- Beginning of ETS Phase III (2013-2020) - Croatia joins the EU ETS
2014	- Back-loading measures for auctioning EU emission allowances (EUAs) implemented - Adoption of new targets for ETS Phase IV (2021-2030)
2015	- Market Stability Reserve (MSR) approved

Source: De Paoli L. (2016): The EU Emission Trading System: For an effective and viable reform. Economics and Policy of Energy and the Environment, 1: 5-40 [13]. DOI: 10.3280/EFE2016-001001 Retrieved from: https://www.researchgate.net/publication/315969718; [Accessed at: October 2018].

Therefore, by putting a price on each tonne of carbon emitted, the EU ETS is driving investment in low-carbon technologies. It has forced the cost of emissions onto the agenda of company boards, thus marshalling the ingenuity and creativity of the business community in finding innovative and least-cost ways to fight climate change. In general, the system or the scheme is one of the EU's most important means of achieving emission reduction goals, and is based on four fundamental principles, which are as the followings [2]:

1. It is a 'cap-and-trade' system;
2. Participation is mandatory for businesses in the sectors covered;
3. It contains a strong compliance framework; and,
4. The market is EU-wide but taps into emission reduction opportunities in the rest of the world by accepting credits from emission-saving projects carried out under the Kyoto protocol's CDM and JI instrument.

In addition, a key aspect of the EU ETS is that it allows companies to use credits from the Kyoto Protocol's project-based mechanisms - the CDM and JI - to support them comply with their obligations under the system. This means the EU ETS not only provides a cost-effective means for EU-based industries to reduce their emissions but is also channelling considerable business investment into emission-reduction projects in developing countries and economies in transition. This stimulates the transfer of environmentally sound advanced technologies to these countries, giving a support to their efforts to achieve sustainable development [20].

There has been a gradual extension over time of EU policy objectives and targets relating to the reduction of GHG emissions and the transition to a low‑carbon economy. For 2020, there is a 20% reduction target for EU GHG emissions from 1990 levels, while for 2030 and 2040, 40% and 60% reductions are foreseen compared to 1990. The ultimate overall ambition is to cut the EU's emissions by 80% below 1990 levels by 2050 through domestic reductions alone [1]. Nevertheless, ETS emissions decreased by 24% compared to 2005. Emissions levels observed in 2014 were the lowest since the scheme was launched in 2005. Consequently, the 2020 target level set for stationary installations (represented by the cap in 2020) was already reached in 2014 [11]. General, the 20-20-20 targets were established using economic modelling to imply least-costs for the EU economy as a whole in moving towards a low-carbon economy [5]. Additionally, climate change and energy sustainability - reduce GHG emissions by at least 20% compared with 1990 levels, increase the share of renewable energy (e.g., wind and solar) in final

energy consumption to 20%, and encourage a 20% increase in energy efficiency as strategy targets to be achieved by 2020 in Europe [21].

3. SOME ISSUES IN THE EUROPEAN UNION ETS

The EU ETS sets a cap on the total amount of CO_2 and other GHGs [Nitrous oxide (N_2O) and Perfluorocarbons (PFCs)] that can be emitted by power plants, manufacturing installations and aircraft operators in the system. In general, the cap is reduced over time so that total annual GHG emissions covered by the system decrease. Further, within the cap, companies receive or buy emission allowances that they can trade. They can also buy limited amounts of international credits from GHG emission-saving projects. Each allowance gives the holder the right to emit one tonne of CO_2 or the equivalent amount of N_2O or PFCs. In addition, after each year, a company must surrender enough allowances to cover all its verified emissions subject to the EU ETS, otherwise fines are imposed. If a company reduces its emissions, it can keep the spare allowances to cover its future needs for surrendering allowances or else sell these allowances to another company that is short of allowances [22].

During the second trading period (2008-2012), the accelerated use of offset credits and the effects of the economic crisis (which resulted in lower emissions than initially anticipated) resulted in the accumulation of a large surplus of around 1.8 billion allowances [23]. In 2014, ETS emissions exceeded the quantity of ETS emission credits (allowances) which had been auctioned or freely allocated to operators. It was the first time since 2008 that the demand for EUAs was greater than the existing supply. This was a direct consequence of the decision to postpone the auctioning of 400 million EUAs for the year 2014 (back-loading). Taking into account the additional supply of allowances resulting from the use of international emission credits generated under the Kyoto Protocol, overall supply and demand of allowances were balanced in 2014. The overall surplus of allowances (accumulated over recent years) therefore remained at a level of about 2.1 billion EUAs [11]. In addition, operators of stationary installations newly included in the scope of the EU ETS in the third trading period, which did not receive free allocations or entitlements for international credit use during the second trading period are able to use international credits up to a maximum of 4.5% of their verified emissions during the third trading period, adding another estimated 40 million units. The same holds for operators of installations that are new entrants to the EU ETS, the total effect of which will be known only once the total emissions of these installations are confirmed at the end of the third trading period [24].

Generally, in October 2014, the European Council concluded that "a well-functioning, reformed [25] ETS" will be the primary instrument with which to achieve the EU target of at least a 40 % reduction, compared with 1990, in GHG emissions by 2030 [12]. Further, in July 2015, the European Commission presented a legislative proposal for the revision [26] of the EU ETS for the period 2021-2030 (phase 4). The proposed changes include an increase in the pace of emissions cuts (the overall number of allowances will decline at an annual rate of 2.2 % from 2021 onwards, compared with 1.74 % currently) as outlined in Table (2), the better targeted and more dynamic allocation of free allowances, and several support mechanisms to help the industry and power sectors meet the innovation and investment challenges of the transition to a low-carbon economy [12].

Furthermore, the European Commission is responsible for producing a carbon leakage list of exposed sectors or subsectors, which is primarily based on both carbon cost (i.e. direct and indirect carbon costs/gross value added (GVA)) and trade intensity (i.e. imports and exports/production and imports). These indicators are updated every 5 years. The second carbon leakage list (the first carbon leakage list applied from 2013 to 2014), which applies for the years 2015-2019, was adopted by the European Commission in October 2014. Since a carbon price of EUR 30 per tonne CO_2-equivalent (CO_2-eq) was assumed for the assessment of the risk of carbon leakage, more sectors and subsectors were included in this second carbon leakage list than would have been had current carbon prices considered. The European Commission justifies

the choice of a higher carbon price by the expectation that introducing an MSR will increase carbon prices in the medium and long term by managing the supply of allowances in circulation [28, 24].

Table 2: Development in phases or 'trading periods' of the EU ETS

Trading Period (Phases)	Development in phases (phase 3 and phase 4)
Trading period 2013-2020	This phase (3), running from 1 January 2013 to 31 December 2020 it's the third phase and it is now running. This longer trading period for 8 years contribute to the greater predictability necessary for encouraging long-term investment in emission reductions as well as in achievement of the EU's climate and energy targets for 2020 [2]. Therefore, major reform took effect (1.1.2013). The biggest changes have been the introduction of an EU-wide cap on emissions (reduced by 1.74% each year) and a progressive shift towards auctioning of allowances in place of cost-free allocation. Croatia joined the ETS in the first of January 2013 [27]. Here we can concluded that a major reform of the system is occurring and there is an EU-wide cap on emissions (which is reduced by 1.74% each year). Auctioning is the default mode of allocation [12].
Trading period 2021-2030	In this phase (4), just a legislative proposal [26] for the revision of the EU ETS was presented by the European Commission in July 2015 [27]. Finally, it is proposed that the cap will be reduced by 2.2% each year in this phase [12].

Source: [2, 27, 12].

Moreover, the Commission presented a legislative proposal [26] to revise the EU ETS for the next decade. Reforming and revising the EU ETS constitutes an integral part of the work on achieving a resilient Energy Union which is a key policy area in the current Commission. So, the key aspects of this proposal on the revision of the EU ETS for trading period 2021-2030 (phase 4) are: the overall number of allowances is to decline at an annual rate of 2.2% from 2021 onwards, compared to 1.74% currently; better targeted allocation of free allowances, such as update of benchmark values and more targeted carbon leakage groups; and, several support mechanisms help the industry and the power sector meet the innovation and investment challenges of the transition to a low-carbon economy. These support mechanisms including two new funds; innovation fund - extending existing support for the demonstration of innovative technologies to breakthrough innovation in industry. And, modernisation fund - facilitating investments in modernising the power sector and wider energy systems and boosting energy efficiency in 10 lower-income Member States [29].

The free allowances under Article 10c are deducted from the quantity that the respective Member State would otherwise auction. Depending on the national rules for the implementation of the derogation, electricity generators can receive free allowances of an equivalent value to the investments they carry out or have carried out from investments listed on the National Investment Plan, or to payments made into a national fund through which such investments are financed [29, 30].

In general, since 2013 (phase 3), auctioning is the default method of allocating emission allowances. This means that businesses have to buy an increasing proportion of their allowances at auction. Auctioning is the most transparent method of allocating allowances and puts into practice the principle that the polluter should pay [27]. So, for allowances allocated for free, harmonised allocation rules, which are based on EU-wide benchmarks of emissions performance, apply [12]. As well as electricity production no longer receives any free allowances. And also, an EU-wide New Entrants' Reserve (NER) is foreseen equivalent to 5% of the total amount of allowances for phase 3 (monetisation of 300 million allowances from this reserve funded NER300 programme) [29].

Additionally, for the third trading period (2013-2020), free allocation is implemented by applying new EU-wide, fully harmonised, allocation rules. Member States are still required to prepare an "allocation plan", known as the National Implementation Measures (NIMs) document

which contains all of the detailed information about the allocations planned for each installation in the country. Member States remain responsible for data collection and final allocation. The Commission is responsible for approving or rejecting the NIMs or parts thereof, requiring amendments where necessary. While the NIMs determine the amount of allowances to be allocated to individual installation, the method of allocation is determined by the EU ETS Directive and implementing Commission Decision (Commission Decision 2011/278/EU [31]) "on determining transitional Union-wide rules for harmonised free allocation of emission allowances" [5]. So, on the basis of these harmonised allocation rules, governments submitted to the European Commission preliminary calculations (NIMs) of the number of free allowances to be allocated to each installation in their jurisdiction. As the preliminary allocation through the NIMs exceeded the maximum number of allowances laid down in Article 10a (5) of the ETS Directive [32, 24], a cross-sectoral correction factor - equal to 5.73% in 2013 and rising to 17.56% in 2020 - is applied to non-electricity generators, in order to comply with these rules. Allocations for heat production by electricity generators, in accordance with Article 10a (4) of the ETS Directive, are not subject to the above-mentioned maximum amount, and are instead reduced by the linear reduction factor of 1.74%. After applying those factors, the final allocations to installations in each country were calculated, inscribed in the national allocation tables and published on the EU Transaction Log [24, 33, 34].

Generally, GHG emissions from industry are dominated by two main sources: the first of these is GHG emissions from the direct use of fossil fuels (e.g., energy intensive industry such as cement, iron and steel); the second is the indirect use of fossil fuels via electricity consumption (e.g., air-handling, space conditioning and lighting). Smaller sources of GHG emissions in industry include 'non-energy' uses of fossil fuels, such as the use of fossil fuels as feedstocks in chemicals processing; as well as emissions from industrial processes [35]. However, since 2005, the EU ETS has been the cornerstone of EU strategy for reducing GHG emissions from industry and the power sector cost-effectively [29]. On one hand, GHGs and sectors covered by the EU ETS, which including, firstly, CO_2 from: power and heat generation; energy-intensive industry sectors (e.g., oil refineries, iron and steel, aluminium, metals, cement, lime, glass, ceramics, pulp, paper, cardboard, acids and bulk organic chemicals); and, from civil aviation. Secondly, N_2O from: production of nitric acid; adipic acid; and, from glyoxal and glyoxylic acid production. And thirdly, PFCs from: aluminium production [27]. On the other hand, the EU ETS is one of the key climate policy instruments implemented in the EU to reduce GHG emissions [22]. Additionally, The EU ETS is based on a recognition that creating a price for carbon through the establishment of a market for emission allowances offers the most cost-effective way for countries to move towards the low-carbon economy and achieve the deep reductions in global GHG emissions that are needed to prevent climate change from reaching dangerous levels [20].

As mentioned above, the EU ETS covers approximately 45% of the EU's total GHG emissions. In 2014, emissions covered under the EU ETS amounted to 1 868 Mt CO_2-eq, with stationary installations representing the largest share (97%, 1 813 Mt CO_2-eq) and the remainder being attributed to aviation activities (3%, 55 Mt CO_2-eq). Further, the EU ETS covered approximately 514 aircraft operators in 2014. The total emissions of aviation covered by the EU ETS in 2014 were equal to 55 Mt CO_2-eq. Furthermore, stationary ETS emissions decreased from 2 375 Mt CO_2-eq to 1 813 Mt CO_2-eq between 2005 and 2014. This is equivalent to a 24% decrease [11].

Since the cap for stationary installations amounts to 1 816 Mt CO_2-eq in 2020, this target level was already reached in 2014 [11]. So, in terms of the total reduction in GHG emissions, European countries are leading the global climate change mitigation effort by a wide margin [3]. Moreover, ETS emissions from stationary installations declined by 5% in 2014, compared to 2013. This decline was caused mostly by the reduced combustion of fossil fuels, where power plants play a predominant role. It was driven by a relatively mild winter in 2013 and 2014, leading to a weak demand for heating, combined with an increased use of renewables [11]. In 2016, the GHG emissions covered by the EU ETS declined by 2.9% compared with 2015. The majority of this reduction was delivered by emission cuts in large power plants, which reflects factors including the phasing out of coal use in several Member States. In the other industrial

sectors, a large drop in emissions occurred in the iron and steel sector, primarily reflecting changes in output levels. In addition, the total emissions of aviation activities covered by the EU ETS in 2016, increased compared with the previous year, as the number of passengers continues to grow [36].

The European legislators recently approved the use of a MSR from 2019 onwards. The supply of allowances in circulation will be regulated by transferring surplus allowances into and out of the MSR, based upon a set of predefined rules. By adjusting the supply of allowances to be auctioned, the MSR is expected to reduce the surplus of allowances available for trading, in order to support carbon prices. Taking into account the proposed change in the linear reduction factor of the ETS cap after 2020 (in order to achieve a 43% reduction of emissions by 2030 compared to 2005), the surplus could be completely absorbed by the MSR by 2030 [11]. In general, allowances vary depending on specific industry, the relative share of free and purchased allowances, and the relative costs entailed in additional purchase [37]. The emission target of the EU ETS - the cap - is determined by the total amount of EUAs which are available to the regulated entities either through free allocation or purchases or auctions [23]. Moreover, EU allowances, necessary for compliance under the EU ETS, can be allocated to operators in several ways. The proportion of allowances to be auctioned is expected to increase every year over the period 2013-2020, which means that firms have to purchase an increasing number of allowances (via auctions/primary market sales or in the secondary market). As a consequence of the back-loading decision, the volumes of allowances auctioned in 2014 and 2015 were significantly lower than in 2013 [24]. Overall, to contribute cost-effectively to the adopted 40% reduction target by 2030, compared to 1990, EU ETS emissions will have to be reduced by 43% compared to 2005, and the annual factor to reduce the cap on the maximum permitted emissions will be changed from 1.74% to 2.2% from 2021 onwards. Applying a linear reduction factor of 2.2% from 2021 until 2050 would lead to emission reductions in the EU ETS sectors of 84% below 2005 levels in 2050 (for all countries participating in the EU ETS) [33].

Finally, the objective of the EU ETS is to help EU Member States achieve their commitments to limit or reduce GHG emissions in a cost-effective way. Allowing participating companies to buy or sell emission allowances means that emission cuts can be achieved at least cost [38]. The basic idea is that one emission allowance is needed for every tonne of GHG emissions produced [37]. In addition, since 2005 the system provides a price signal for power plants and other installations, to promote research, development and investment in clean, low-carbon technologies. So, under the revised rules which are proposed to apply as of phase 4 according to the Table 2 (2021-2030), the EU ETS will continue to be a cost-effective driver for low-carbon investments for the years to come. A stronger, better functioning European carbon market has the potential to make a major contribution to the transition to a low-carbon and more energy-secure economy in Europe. It will also contribute to the global low-carbon transition which is already underway and gaining momentum, following the adoption of the first universal climate change agreement at the Paris Conference in the end of 2015. Hence, the Paris Agreement is a legally binding international treaty. It entered into force on the 4th of November 2016, following its ratification by the EU [29, 39]. Generally, this agreement provides the basis for emissions mitigation and adaptation from 2020 onwards [40]. Ultimately, in order to achieve the goal of the Paris Agreement, parties will prepare, communicate and maintain successive nationally determined contributions [41].

Conclusion

The EU ETS is the cornerstone of the EU's climate policy strategy to reduce GHG emissions as well as its one of the key climate policy instruments in the EU to combat climate change and also, its key tool for reducing industrial GHG emissions in a cost-effective way, it was established by the Emissions Trading System or Emissions Trading Scheme Directive, launched at the start of 2005, is now in its third phase, which runs from 2013 to 2020. In addition, between 2005 and 2014 GHG emissions from stationary installations covered by the system or the scheme have

shown significant decreases by 24 %. This reduction was caused mostly by the reduced combustion of fossil fuels as well as increased use of renewables. Additionally, the system covers around 45% of total GHG emissions from the EU-28 and is aimed directly at cutting emissions by 21% below 2005 levels by 2020. And also, by 2030, the EU has committed to cut emissions in EU territory by at least 40% below 1990 levels. Finally, the world's first and biggest international emissions trading system, the EU ETS has made climate change a boardroom issue for firms by putting a price on their carbon emissions [42].

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