The EU's Emissions Trading System, Part I: Taking Stock

by
Andriana Vlachou, Professor
Department of Economics
Athens University of Economics and Business (AUEB)
76 Patission Street, Athens 104 34, Greece
E-mail: Vlachou@aueb.gr

and Georgios Pantelias, Adjunct Researcher
The AUEB Research Center
Athens University of Economics and Business

Abstract

This and a companion paper revisit the European Union's Emissions Trading System (EU ETS) in an attempt to take stock of how the system has worked and evaluate it from the standpoint of a radical political economy. This paper discusses briefly the basics of the scheme, including its design as a financial instrument, and its performance during the first trading period (2005-2007). It then moves to elaborating on the workings of the scheme during Phase II (2008-2012) and on the initiation of Phase III (2013-2014). This analysis discusses the adjustments and the extensions of the scheme, compliance results, and allowance trades and prices with a critical eye. The paper reveals the unsatisfactory results of the scheme (even in its own proclaimed aims) which include allowances surplus, allowance trades for pure financial purposes, low and volatile price of allowances, windfall profits, extensive use of Kyoto project-based credits, and several malfunctions and frauds. These findings set the ground for the companion paper which offers a critical assessment of ETS from the standpoint of a radical political economy, putting emphasis on the needs and interests of the unprivileged working people.

Keywords: political economy, climate change policy, EU Emissions Trading System, low-carbon economy.

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1. Introduction

The carbon market operating today at the level of the European Union (EU) has been established under the provisions of the Kyoto Protocol (KP). The KP established legally binding emissions reduction commitments of 5.2%, on the average, from their 1990 level for the period 2008 to 2012 and for 38 developed countries (Annex I Parties). Under the Kyoto Protocol, reduction targets could be achieved by various domestic efforts at the national level and by the use of international flexible mechanisms: international emissions trading (IET), clean development mechanism (CDM), and joint implementation (JI). IET was designed as a cap-and-trade system which involves trading of emissions allowances among Annex I countries. CDM and JI create project-based credits, i.e. certified emissions reductions (CERs) and emissions reduction units (ERUs), respectively, which can be used for KP targets.[1]

To meet its commitments under the KP (an emissions reduction by 8% on average from 1990 level), the EU came to favor an emissions permits system over other measures such as carbon taxes or direct emissions limits. The EU Emissions Trading System (EU ETS) was proposed in 2001 and took its final compromised form (Directive 2003/87/EC) after a biennial consultation with the concerned parties. The ETS was designed to run for two phases: Phase I (2005-2007) and Phase II (2008-2012) which coincided with the first commitment period of the KP.

After a reviewing process of the first phase, the European Commission (EC) presented an ETS amendment proposal on 23 January 2008. An agreement was reached in December 2008 and the revised ETS was to enter into force in 2013 and run until 2020 (phase III).

The carbon market, which developed to a huge new derivatives market, was unsurprisingly affected in the second phase by the developments in the financial markets. The EU ETS has been also influenced by the failed efforts in the negotiations to reach a new, legally-binding international climate agreement after the end of the first KP commitment period. At the Durban conference in December 2011, an agreement was

[1] In particular, CDM generates CERs from projects funded by KP liable investors in developing countries without national KP commitments. JI generates ERUs from projects funded by KP liable investors in another country with national KP commitments (Vlachou and Konstantinidis 2010).

reached to initiate UN negotiations on a new global climate agreement to be adopted by 2015 and to enter into force in 2020. To fill the gap between 2012-2020, 38 developed countries, including the EU, agreed to participate in a second Kyoto period running from 2013 to 2020. The necessary amendments to the KP were adopted at the Doha conference in December 2012. The Doha Amendment, however, needs ratification. The target set was a reduction of at least 18% from 1990 levels by 2020. However, the second KP currently applies to only around 14% of the world's emissions. The EU set a target of a 20% reduction from 1990 level; this was part of the "climate and energy package" (20-20-20) adopted in 2009.[2]

In this and a companion paper, we investigate the workings of the EU ETS from the standpoint of a critical political economy of the environment (Vlachou 2000, 2002, 2005a, 2005b; Vlachou and Konstantinidis 2010), inspired by Marx (1991). The analysis extends our previous critical study of the EU ETS (Vlachou 2014) and focuses predominantly on its second phase. In the next section, we discuss briefly the basics of the EU ETS scheme, including its design as a financial instrument, and its performance during the first trading period. In the third section, the workings of the EU ETS in phase II are explored. This section discusses, in particular, the adjustments and the extensions of the scheme, compliance results, and allowance trades and prices with a critical eye. In the next section, a brief discussion is provided of the initiation of the third phase and its first results. In the last section, some concluding remarks are offered along with an introduction to the issues covered in the companion paper.

2. The Design of the EU ETS and its Workings in Phase I

2.1 The Basics of the EU ETS[3]

The EU ETS establishes an internal EU market for greenhouse gas (GHG) emissions permits. It is a 'cap and trade system'. The cap on the total number of allowances is what creates scarcity in the market. Member states issue emissions allowances, which amount in total to the approved cap, and allocate them to participating plants, setting this way an emission cap at the level of the individual plant. The

[2] See EC "UN negotiations and other international fora" available at http://ec.europa.eu/clima/policies/international/negotiations/index_en.htm, accessed 14 September 2014.

[3] This section draws in part for the basic description of EU ETS from an earlier paper (Vlachou 2014).

participants can then engage in emissions allowances trading to fulfill their commitments in a cost-effective way. They can also obtain and use, albeit to a limited extent, CERs and ERUs from CDM and JI projects, respectively, for compliance.

From another angle, in a cap and trade system established by state or quasi-state apparatuses, an allowance to emit CO_2 or GHG emissions is a "commodity" based on *de facto* property rights (although temporary ones) over earth's capacity for carbon cycling. This holds true for European Union allowances (EUAs) as well as for CERs and ERUs (Lohmann 2009a, Vlachou 2014).

For the first two trading periods, the scheme covered only CO_2 emissions. One allowance (EUA) gives the holder the right to emit one ton of CO_2 (tCO_2). Moreover, for the first two trading periods, the ETS covered the emissions of large emitters from the power and heat industry and certain sectors of energy intensive industries. As of May 2008, the participating installations amounted to 11,186 plants. Important sectors such as transport and aviation (until 2012) were left out from the first two phases of the scheme.

For the first two trading periods, allowances were given free of charge (*grandfathering*) by the governments of the member states to the companies involved. In particular, Directive 2003/87/EC required that at least 95% of allowances for the period 2005-7 and at least 90% of the allowances for the period 2008-12 should be allocated for free. The remaining percentage of allowances could be auctioned (European Commission 2003).

Member states were given discretion over the allowances allocation process. For each trading period, member states designed *National Allocation Plans* (NAPs) which were submitted to the Commission for approval. NAPs determined the total level of ETS emissions and the allocation of emission allowances at the level of each installation in the country. In addition, the plans had to specify the maximum amount of JI and CDM credits to be used for compliance. The use of JI/CDM credits was limited by the *supplementarity criterion* of the KP which was widely interpreted as requiring that at least half of the reduction implied by the county's assigned limit should be fulfilled by domestic action.

Banking and borrowing of allowances were permitted only within the first three-year phase (and within the second five-year phase) but not between the first and the second trading periods. For the second and subsequent phases banking is allowed between periods but not borrowing.

With respect to monitoring mechanisms, the ETS established a system of uniform national registries which connected with the Community Independent Transaction Log (CITL). Member states reported allocations and verified emissions at the installation level to the CITL. Following the EU monitoring and reporting guidelines, member states also developed their own monitoring, reporting and verification procedures. Facilities self-reported their emissions following the guidelines. The reports were verified by an independent verifier who was certified by the member state. Member states ensured compliance by deducting allowances from firm's account at the national registry which were equal to the verified emissions of the firm.

ETS has strict compliance provisions. A fine of 100 euros per excess ton of CO_2 equivalent (CO_2e) is set for a company not in compliance. For the first trading period, the fine was lowered to 40 euros per ton of CO_2 equivalent to give time to the installations to adapt. To the extent that fines are much higher than the allowance prices, the ETS scheme can stimulate emissions mitigation.

By design, EU ETS allowances were intended to become a *financial instrument* in order to increase liquidity of the market. Market participants in the EU ETS can trade in emissions in the form of spot[4], futures or forwards, swaps, and options on futures.[5] The carbon futures and forward contracts hold promises to deliver carbon allowances or credits in a certain quantity, at a certain price, by a specified date (European Commission 2016).[6] As is the case with other derivatives, carbon derivatives derive their value from an underlying commodity/asset. In particular, carbon futures or forward contracts have as underlying either EUAs, CERs or ERUs, i.e. their value is linked to the expected future spot price of EUAs, CERs or ERUs.

In the mainstream analysis, derivatives provide a fundamental mechanism for risk management. Carbon derivatives are used by *hedgers* and *speculators*.[7] In the carbon markets, hedgers use carbon futures, for instance, as a form of insurance against the risk involved in EUAs and credits trade for compliance with his/her EU ETS obligations.

[4] In the *spot* market financial instruments are traded and delivered immediately.

[5] For the different types of derivatives, see Hull (2012).

[6] The futures contract is a standardized agreement between two parties written by a clearing house that operates an exchange where the contract can be traded. As the two parties do not necessarily know each other, the exchange provides a mechanism that guarantee that the contract will be honoured. In contrast, a forward contract is a non-standardized agreement to buy or sell an asset, written by the parties themselves. A forward contract is traded between two financial institutions or between a financial institution and one of its clients, that is it takes place 'Over-The Counter' (OTC), rather than via an exchange (Hull 2012, 5-7).

[7] Hedgers use derivatives to hedge risk in the underlying, while speculators use them to bet on the future direction of the underlying, i.e. they acquire risk in order to speculate, to make profit in the underlying in the case that its value moves the way he/she anticipates (see also Hull 2012, 12-15).

On the other hand, speculators appear to the other carbon market participants as providers of liquidity by buying and selling futures contracts in search for a profit. In this way, hedgers find counterparts (in speculators) for their trading needs (see also Hull 2012). Financial intermediaries also engage in the carbon market to offer brokerage and consultancy services to compliance traders but also to take advantage of an investment opportunity on their own account. However, conflicts of interest may arise for intermediaries between consulting and trading on their own account (Kachi and Freck 2013).

As financial instruments, carbon derivatives appear in the mainstream eyes as a singular, homogeneous instrument, engendering an abstract form of risk linked to the spot price of the underlying (EUAs, CERs and ERUs), which can be traded. Carbon derivatives markets then commodify a range of uncertainties (viewing them as risks) associated with emissions allowances or KP credits by abstracting from concrete uncertainties engendered by various specific conditions and relations (see also Lohmann 2009a; Daskalakis et al 2011).

Carbon derivatives are distinguished by the way they are traded in the market. The type of trading has implications for the performance of the carbon market. *Over-the-counter (OTC) derivatives* are contracts that are traded directly between two parties, without going through an exchange or other intermediary. The key advantage of the OTC derivatives is that they are privately negotiated and the terms of the contract do not have to be those specified by an exchange platform.[8] However, since OTC derivatives are not traded on an exchange, there is no central counter-party. As a result, they are subject to counter-party risk since each counter-party relies on the other to honour the contract. The OTC derivative market is made up of banks, financial institution and other highly sophisticated parties, and it is largely unregulated with respect to disclosure of information between the parties (Hull 2012, 3-4).

Exchange-traded derivatives (ETD) are derivatives that are exchanged via specialized derivatives market where individuals trade standardized contracts that have been defined by the exchange. A derivatives exchange acts as an intermediary to all related transactions. The major advantage of carbon exchanges is the use of the central counterparty which reduces the risks of default through the *margins* system (initial margin,

[8] The OTC markets tailor instruments to fit certain requirements of their clients, i.e. they trade customised products as is the case of individualized carbon contracts with electric utilities (Kachi and Freck 2013).

maintenance margin and margin call) (Hull 2012, 809). Organized exchanges take initial margin from both trading sides to act as a guarantee (Hull 2012; World Bank 2012).

The trading in physically delivered EUA futures was initiated in April 2005; the underlying is EUA. In October 2006, the European Climate Exchange (ECX) platform initiated the trading of European-style options written of EUA futures with December maturities (Daskalakis et al 2011). As it will be evident later, spot trading represents a relatively small volume of transactions while derivatives trading represents the lion's share of transactions. The trading of EUA derivatives is already subject to the rules of EU financial markets, including the current Markets in Financial Instruments Directive (MiFID). However, "spot transactions are not currently subject to equivalent rules at the EU level and are not supervised" (European Commission 2016, 69).

EU ETS allowances have been hurriedly developed to a major financial instrument by banks, professional financial intermediaries and investment advisors, turning over billions of dollars a year (Lohmann 2009a; Friends of the Earth 2009). Moreover, following financial practices, carbon derivatives have started to give rise to various financial innovations (e.g. complex securitized carbon products)[9].

Secondary markets were also developed in credits.[10] The secondary CERs market transactions, for instance, provided insurance to final buyers (mainly EU ETS installations with annual compliance obligations) by transferring under-delivery risk to intermediaries which take on this risk in exchange for a premium over primary market prices (World Bank 2010).

2.2 The Working of the ETS in the First Trading Period

The working of the ETS in the first phase gave rise to unsatisfactory outcomes which are often explained in the mainstream literature by the experimental nature of the

[9] As a financial practice that distributes the risk of default, securitization aggregates assets in a pool and then structures and issues new securities backed by the pooled assets, which are divided into "tranches" of different levels of risk and associated reward. These new securitized financial products are sold to investors who have the right to receive cash flows in accordance to the "tranches" of the structured product. These newly securitized uncertainties could be moved off balance sheet and also expand credit in supposedly efficient ways. However, the quality of these new securitized products depends on their structure and on the expected performance of the pool of assets and thus transparency and quality rating are crucial for the investors (see also Hull 2012, 180-192).

[10] Secondary markets involve transactions where the seller is not the original owner or issuer of the carbon asset while primary markets involve transactions where the seller is the original owner or issuer.

first trading period (i.e. as a 'learning by doing' phase). Let us discuss briefly the major results of the first trading period.[11]

With respect to *cap-setting*, no specific reduction target for CO_2 emissions was set. Member states had to enhance their efforts in order to meet their Kyoto targets in the second trading period (2008-2012), according to the Burden Sharing Agreement.

Regarding *the allocation of allowances*, member states could allocate allowances to participating companies using a method of their choice (such as historical emissions or benchmarking), following consultations with the stakeholders. The Commission reviewed and approved the proposed limits at the installation level. The EU ETS scheme mainly implemented a free initial allocation of allowances based on recent historical emissions, raising issues of negative distributional impacts.

Leaving caps and allocations at the discretion of member states, in combination with the self-reporting of emissions data, resulted in inflated projections and modest actual emissions reductions. The yearly overall cap for the first trading period was set at 2,298.5 million tCO_2. Based on the official data provided by the CITL, the allocated emissions overall exceeded the verified emissions by 360 million tons of CO_2 in the EU-27. The allowances 'surplus' amounted to 5.6% of the total allocation (6,455.8 million tCO_2) in the EU-27. The only countries which experienced a shortage of allowances were the United Kingdom, Spain, and Italy. Thus the environmental effectiveness of the first phase was quite limited.

With respect to sectors, the sector that was actually confronted with an allowances shortage was the electricity sector. This was planned because the power sector was assessed to have a relatively low-cost abatement potential and was not exposed to non-EU competition (European Commission 2006).

EUA trading was originally driven by the expected compliance needs. The average price of EUA was €19 per tCO_2e in 2005 and €17 in 2006. In April 2006, the price reached its peak (over €30). Following the release of verified 2005 emissions data at that time, which revealed the over-allocation of allowances while banking for phase II was not allowed, the price of EUA dropped significantly and by the end of 2006 and during the first months of 2007 the price reached a level under €1 (see also World Bank 2007, 2008). Concerns were raised that the low level and volatility in the price of allowances did

[11] A more extensive analysis of the implementation of the ETS in the first phase can be found, among others, in Vlachou (2014) from which this section draws.

not encourage investments in free- or low-carbon technologies and energy efficiency (European Commission 2006).

Regarding the types of EUA trading, according to the World Bank (2010), on average, approximately 70% of the carbon transactions during phase I were performed over-the-counter (OTC). According to Daskalakis et al (2011), the remaining were realized through six trading platforms.

Power companies were engaged in carbon trading, given that the electricity sector faced an allowance shortage. However, since initial allocation was free of charge, power companies were after all able to appropriate 'windfall' profits (rents). In the liberalized internal EU wholesale power market, the power sector was able to pass on the market carbon price, applying it not only on bought allowances but also on freely allocated ones through marginal-cost pricing (see also Ellerman and Joskow 2008; Egenhofer 2007; Sijm 2006; and Vlachou 2014).

Important issues of *competitiveness* were raised through the experience of the first trading period. Given that major internationally trading partners had not ratified the Kyoto Protocol, fears were expressed that the EU ETS would lead to carbon leakage. Several energy-intensive industries (like steel, paper and pulp, cement, etc.) claimed to have encountered competitiveness problems due to price increases as a result of EU ETS. The EU firms also complained for lack of predictability. These complains were grounded in the fact that there was no effective long-lasting international agreement that binds together major GHGs emitters (European Commission 2006). Competitiveness concerns affect adversely the incentives for investment in low- or free-carbon projects.

Discretion for member states over cap-setting and allocation also increased complexity and, subsequently, *administrative and transactions costs***.** These problems gave rise to demands for harmonization at the EU level (EC, Memo/08/35, 23 January 2008). In addition, the inclusion of small installations in the ETS created disproportionately high administrative costs to them when compared to their contribution to overall emissions; it also caused administrative costs for the governments and delays (European Commission 2006; see also Egenhofer 2007; and Vlachou 2014).

Several of the above-mentioned problems were addressed first by the adjustments of the ETS scheme for phase II implementation and second by the 2008 revision of the scheme to be applied for the 2013-2020 period.

3. The Second Trading Period

3.1 Adjustments and Extensions of the ETS Scheme

Given the overallocation of allowances in the first trading period, the EC made efforts to create allowances scarcity in the process of reviewing and approving NAPs for phase II. Overall, the proposed caps by the member states amounted to 2,325.3 $MtCO_2$ per year while the allocated cap by the EC was set at 2,083 $MtCO_2$ per year, i.e. there was a cut of 10.4% compared to the proposed cap (EC, IP/07/1869, dated 7 December 2007).

With respect to CDM/JI credits, ETS participants were allowed to buy up to 1.4 billion CDM/JI credits during the 2008-12 trading period, or 280 $MtCO_2$ per year, i.e. 13.4% of the overall allowed cap (see also World Bank 2008, 10). Concerns were expressed that the credits allowed from CDM/JI projects might be quite close to the reduction target, limiting domestic action (see also Egenhofer 2007).

In the second period, the EU ETS continued to freely allocate most of the allowances and to place most of the responsibility for CO_2 reductions on the electricity sector. Extensions to new sectors and to other GHGs beyond CO_2 were initiated in phase II. France and Netherlands unilaterally included installations emitting nitrous oxide (N_2O) as it was expected that these reductions could be achieved at a low cost. The proposed inclusion of air transport in phase II was for long under discussion because of the unresolved issues involved (World Bank 2008). The inclusion of aviation in the EU ETS requires the issuing of approximately 200 million of additional allowances annually; 82% of the allowances will be freely allocated to aircraft operators, 15% will be auctioned and the remaining 3% will be allocated to a special new entrant's reserve (World Bank 2012, 26). Aviation was actually included in the EU ETS since 2012 but this move was met with opposition, especially from Chinese and US airlines. As a result, aircraft operators had limited responsibility for 2012 to flights within EU only (European Commission 2014a).[12] It should be noted that only unidirectional trading is possible between the aviation sector and the other sectors; the aviation sector can purchase non-aviation EUAs but not the reverse (World Bank 2013).

[12] Following the 'stop the clock' Decision in April 2013, the inclusion of flights into and out of Europe was deferred until after the International Civil Aviation Organization (ICAO) General Assembly in autumn 2013. On 4 October 2013, the Assembly of ICAO agreed on a roadmap for developing a global market-based mechanism (MBM) to tackle aviation emissions. The global MBM is to be finalised at the next ICAO Assembly in 2016 and implemented in 2020. Until then flights into and out of Europe were excluded from ETS. Only emissions from flights within the European Economic Area (the 28 EU member states plus Iceland, Liechtenstein and Norway) fall under the EU ETS for 2013-2016 (European Commission 2014a).

Finally, it should be mentioned that differences across member states were still observed in the rules concerning the allowances allocation to new entrants as well as in the limits on the use of CDM/JI credits, raising concerns with respect to competition distortions in the internal market.

The cap adjustments in the second trading period did not make a real difference in creating a scarcity in the EU carbon market. Environmental effectiveness was not improved as the compliance results indicate.

3.2 Compliance Results

Figure 1 presents the allocated and verified emissions for the 2008-2012 period by member state based on the official data provided by EC. Overall allocated emissions in EU-27 amounted to 10,125.0 million tCO_2 while verified emissions were 9,688.2 million tCO_2. A high concentration of allowances is observed in the countries that are large emitters: Germany, UK, Poland, Italy and France. Together these six countries accounted for 66.3% of total allocation. Interestingly, emissions (and allocations) were highly concentrated in a few companies.[13]

The observed allowances surplus amounted to 4.3% of total allocation in EU-27 and to 1.74% of total allocation in EU-15. As feared, many former socialist countries (economies in transition) exhibited over-allocations. The only countries which experienced a shortage of allowances were Germany, the United Kingdom, and (marginally) Estonia.

[Figure 1 near here]

The economic crisis was in part implicated for allowances surplus. Industrial EU ETS companies were harder hit by the economic crisis than electricity utilities. For instance, in 2009, verified emissions of EU industrial installations declined 18.3% vis-à - vis their 2008 levels. The 10 installations with the biggest allowance surpluses were all steel plants. Electricity utilities experienced relatively modest declines in demand and they had to buy allowances (World Bank 2010, 12). On the supply side, activity to reduce emissions slowed down. According to the World Bank,

[13] For instance, the 25 largest participating companies accounted for more than 50% of 2008 EU-25 emissions under the ETS while the smallest 80% of installations accounted for about 10% (World Bank 2010, 12).

> "the financial crisis spurred financial institutions and private investors to deleverage and redirect their positions away from risky investments and toward safer assets and markets. Capital inflow to developing countries fell dramatically, while already internalized resources flowed out. As a result, many project developers found it impossible to lock in finance and project origination effectively ground to a halt" (World Bank 2010, 1).

In short, economic crisis affecting both the demand and supply of allowances and credits created a slackness in the emissions constraint.

Overall, the CERs and ERUs used for compliance in EU-27 amounted to 1,049.3 million tCO_2 which accounted for 10.4% of the total amount of allocated allowances. Interestingly, the majority of offsets were used for compliance in the last two years of the second period.[14] Since CERs and ERUs were cheaper than EUAs, ETS installations obviously used the offsets and retained and banked EUAs for future use.

The origin of KP credits is revealing. With respect to CERs, 63% of them originated from projects in China, 16% in India, and 12% in South Korea. With respect to ERUs, 56% of them originated from projects in Ukraine and 34% in Russia. Importantly, the majority of the CDM projects were undertaken in countries which also attract high levels of Foreign Direct Investment (FDI). As multinational companies move globally by shifting their productive operations from core countries to large developing ones such as China, taking benefit of lower costs (especially wages) and of limited environmental regulation (see also Labban 2014), they also relocate the origination of GHG emissions from advanced countries to developing ones. In such countries which are eager to attract FDI by lax environmental protection, it might be tempted to stage-manage the additionality requirement for a CDM project authorization, as additionality is difficult to be verified (Vlachou and Konstantinidis 2010). EU transnational firms then might not only export GHG emissions by relocating emitting activities abroad, but also compromise domestic reduction obligations by using credits from dubious carbon-reducing CDM projects. These observations apply to JI projects in economically vulnerable countries such as Ukraine.

When the amounts of CERs and ERUs are added to the EUAs surplus (the difference between verified and EU allocated allowances), the actual total surplus of

[14] In particular, 48.4% of the total period's offsets were surrendered for compliance in 2012 while another 23.9% were surrender in 2011.

allowances is estimated. The actual total surplus of the 2008-2012 period, according to our calculations, accounted for 14.7% of the allocated emissions in EU-27.[15]

With respect to aviation, total surrenders for the year 2012 of the second phase for aircraft operators were 83 million tCO_2 in EU-27 (of which EUAs account for 86.9%, CERs and ERUs for 13.1%)(EC, IP/13/437, 16 May 2013).

During phase II, several malfunctions and frauds occurred in the EU ETS but limits of space do not permit a detailed discussion here (see World Bank 2010, 2011, 2012). They revealed that enhanced registry infrastructure, regulation and surveillance were necessary for the mere functioning of the ETS scheme; such requirements could only be met, however, by increasing administrative costs. As a result, following initiatives taken by the EC and the revision of the ETS Directive, a single EU registry, the Union Registry, replaced member states' national registries since 2012. The Union Registry holds accounts for ETS installation and keeps record of transactions; it is operated by the Commission and thus surveillance is centralized.

In short, based on the evidence on compliance, we conclude that the environmental effectiveness of the second phase was quite limited.

3.3 EUA Trades and Prices

The amount of EUAs transactions steadily increased both in physical and monetary terms over phase II (World Bank 2009, 2010, 2012). Figure 2 provided by the EC shows the increase in the trading volumes of EUAs in 2008-2012. As mentioned above, in both phases of the scheme, the bulk of the transactions was in the form of futures (World Bank 2012; Daskalakis et al 2011). For instance, according to data provided by the World Bank, in 2011 spot EUAs trades totalled 2% of the EUAs annual traded value (compared to 7% in 2008). On the other hand, futures and options on EUAs continued to increase: EUAs futures volumes represented over 88% of all EUAs transactions in 2011 (compared to 92% in 2008) while options on EUAs accounted for 10% of EUA transaction value (compared to 1% in 2008) (World Bank 2012).

Figure 2 also shows that the share of exchange transactions in total trades of EUAs increased during phase II. The economic crisis raised concerns for counterparty default when engaging in OTC transactions, resulting in an increase in exchange transactions.[16]

[15] In *The state of the European carbon market in 2012,* the EC estimated the surplus at the start of Phase III to be around 1.5 to 2 billion allowances (EC 2012a; see also World Bank 2013, 42).

[FIGURE 2 near here]

Although there was a significant increase in traded volumes during the 2008-2012 period, overall the amount of verified emissions was smaller than the allocated emissions, as mentioned above. The combined demand of EUAs and offsets for compliance does not seem to drive the increases in traded volume. This leads the World Bank to assert that

> "these are strong indications that the collective demand for carbon permits and offsets has a limited impact in market players' trading. A considerable portion of the trades is primarily motivated by hedging, portfolio adjustments, profit taking, and arbitrage" (World Bank 2012, 18).

As profit opportunities from carbon trading become more relevant than compliance, some large non-ETS, even non-EU, players are involved in the market. In 2010 and during the first half of 2011, about 10% of volumes traded in the EU ETS were reportedly originated from outside the EU block (ibid., 34). Consequently, the EUA market could be easily swirled in the turmoil of financial markets.[17] Moreover,

> "large players continued to acquire under-valued portfolios from smaller (including cash-strapped) players and rapidly expanded their market positions and influence" (World Bank 2012, 34).

Large players such as utilities can thus accelerate the process of concentration in carbon markets and exercise market power.

Figure 3 shows the evolution of EUAs prices, as reported by the World Bank. Prices of EUAs show an overall declining trend but they oscillate a lot. For Kyoto credits, similar price patterns were observed. The CERs prices, however, collapsed during 2012 due to limited demand compared to ample supply (World Bank 2013).

[FIGURE 3 near here]

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[16] With respect to the exchange platforms, their market shares in phase II indicate that "ECX not only remains the leader in the European carbon market, but also has increased its market share to more than 90%. ECX is followed by BlueNext, which accounts for approximately 6% of the carbon trades, with the remaining platforms having market shares of less than 1% each" (Daskalakis et al 2011, 8).

[17] "Engagement by non EU players in the market, however, shrunk alongside the first signs of the pricing crunch in the mid-2011. Their exit has also contributed to the accentuation of the decline in prices" (World Bank 2012, 34).

These price trends reflect the influences of several factors weakening the demand of EUA and KP credits compared to their supply: the effects of the 2008-2009 economic downturn followed by a weak industrial recovery; the fears sparked by the Greek crisis of systemic contagion and of a subsequent recession in EU; excessive speculative carbon trading; the increasing domestic renewable energy capacity in recent years; the ample supply of international (Kyoto) offsets; the EU proposal of a new Energy Directive in June 2011; and the uncertainty regarding a post-2012 international climate agreement (World Bank 2012; IEA 2014a; Ellerman et al 2016).

Concluding, it should be emphasized that, given the bulk of carbon transactions was in the form of futures and options, carbon markets have become susceptible to risky practices, turbulences and crises in the financial markets (along with instabilities in commodity markets such as energy).

4. The Initiation of the Third Trading Period (2013-2014)

The EC made an effort to correct several pitfalls of the EU ETS for phase III in a proposal to amend it made in January 2008, as part of an integrated package of three proposals for implementing measures for the EU's objectives on climate change and energy. The overall target set for the EU was a reduction in GHG emissions of at least 20% from 1990 levels by 2020. At the same time, the EU committed to increase the share of renewable energy in overall EU energy consumption to 20% by 2020 and to increase energy efficiency by 20% (European Commission 2009, 63).

After consultation and debate, the amendment of the EU ETS, published as Directive 2009/29/EC, applies to the third phase (2013-2020) of the scheme (European Commission, 2009; Ellerman et al. 2016). The amended directive sets for the EU ETS an EU-wide target of 21% reduction in 2020 compared to 2005. The most important changes in the scheme were the following: (1) the adoption of a single EU-wide cap declining at 1.74 percent per year; (2) the enlargement of scope: a number of new industries (e.g. aluminium and ammonia producers, bulk organic chemicals, carbon capture and storage)[18] and two further gases (nitrous oxide and perfluorocarbons) are included; (3) the adoption of auctioning as the basic principle for allocation, to be mainly applied as rule to the electric utility sector in 2013, with limited exceptions, and to be gradually introduced for the remaining industrial sectors by 2027, at a rate depending on

[18] The inclusion of aviation emissions starting in 2012 was implemented through a separate directive.

the degree to which the sector is exposed to risk of carbon leakage; (4) free allocation for industrial sectors, based on centrally determined benchmarks and risk-exposure lists of sectors; (5) limitations on the use of offsets combined, nevertheless, with enabling provisions for linking the scheme with other GHG cap-and-trade systems, not included in the preceding KP framework; and (6) the distribution of the revenues from auctioning to member states to be largely based on the allocation of 'auction rights' determined by the country's share in the total (2005) verified emissions or the average of the 2005-2007 period, whichever is the highest.

It is estimated by the EC that during phase III around at least 48% of allowances will be auctioned; the rest 42% will be handed out for free.[19] The first results from phase III continue to be disturbing. In 2013 there was a surplus amounting to 10 percent of total allowances issued. Monthly average spot price of EUA was quite low ranging between a low of €3.44 (May 2013) and a high level of €5.21 (January 2013), according to the European Energy Exchange (EEX). As a result, the EC moved into implementing *back-loading* of auctions in the first quarter of 2014, following the EC regulation (EU) No 176/2014, in an effort to rebalance the supply and demand. Back-loading was designed to postpone the auctioning of 900 million allowance to reduce the surplus in the short run. The volume of allowances to be auctioned will be reduced by 400 million in 2014, 300 million in 2015, and by 200 million in 2016; the auction volume will be increased by 300 million in 2019 and by 600 million in 2020 (European Commission 2014c).

The European Commission had also taken action to set up a more permanent mechanism to correct market imbalances. It proposed the *market stability reserve* (MSR) to inaugurate at the beginning of the next trading period in 2021. According to the design, allowances are deducted from the amount to be auctioned on the basis of certain rules and are placed in the market stability reserve. Alternatively, allowances may be released from the reserve and auctioned. Therefore, the creation of the MRS does not change the number of free allowances. Likewise, it does not affect the total quantity (the cap) of allowances across the EU. A decision was reached by the European Parliament and the Council on October 6, 2015 which stipulates that the MRS will start operating from January 1, 2019, that is moving its start forward by two years compared to the originally proposed schedule (European Parliament and the Council 2015; EC IP/14/54 dated 22 January 2014). Moreover, as part of a proposal to revise the ETS for phase IV (2021-

[19] European Commission, *Allowances and caps*, http://ec.europa.eu/clima/policies/ets/cap/index_en.htm, accessed April 6, 2014.

2030), in July 2015, the EC proposed to reduce the cap by 2.2% per year, instead of 1.74% currently.[20]

As for the compliance results in 2014, a shortage of EUAs allowances appeared which amounted to 15.4% of total allowances issued. In the absence of back-loading, by which the volume of EUAs to be auctioned was reduced by 400 million of allowances, there would have been a surplus amounting to 3.4% of total allowances. As a result, monthly average spot price of EUAs ranged between a low of €4.97 (January 2014) and a high level of €6.88 (December 2014), according to the EEX online.

These developments show that the serious problems of the EU ETS continue in phase III. The market stability reserve, as a more permanent mechanism to tackle the market imbalances, has to go through difficult consultations in order for its design to be concretized with a probable watering down at the end of the day.

5. Concluding remarks

In this paper, we have extended our previous critical study of the EU ETS (Vlachou 2014) by predominantly taking stock of the second phase and the first two years of the third phase. The analysis first discussed the adjustments and the extensions of the scheme made with the hope to correct some of its pitfalls that were recognized from the workings of the scheme in the first phase. The compliance results that were next presented revealed the allowance surpluses which occurred in the second phase and the extensive use of cheaper Kyoto project-based credits for compliance. Several malfunctions and frauds which occurred during phase II led to changes in registry infrastructure and the creation of a single EU registry. In short, the environmental effectiveness of the second phase was quite limited. The discussion of allowance trades and prices has shown that considerable volumes of allowances were traded for financial profit and not for compliance purposes, contributing to the low and volatile prices of allowances. Low and unstable allowances prices question the capacity of EU ETS to give incentives for long-lasting carbon reductions. By examining the workings of the phase III for the years 2013 and 2014, one comes to realizing that the serious problems of EU ETS continue to exist, leading to a new round of short-term and more permanent measures to tackle the carbon market imbalances.

[20] See EC "Revision for phase 4" at http://ec.europa.eu/clima/policies/ets/revision/index_en.htm, accessed 10 April 2016.

These findings set the ground for the companion paper which offers a critical assessment of ETS from the standpoint of a radical political economy, putting emphasis on the needs and interests of the unprivileged working people. In the next paper, we consider the financialization of the EU carbon markets and its implications for the environmental effectiveness of the EU ETS. The paper also discusses in brief the regulatory change to strengthen the oversight of the EU carbon markets that took place as part of the initiative to reform financial markets regulation. Moreover, the ineffectiveness of the ETS as a catalyst for investments in clean energy technologies, especially in times of economic crisis, is explored. Since both papers substantiate that the deep embeddedness of the scheme in capitalism risks climate sustainability, the analysis concludes that a more radical transformation of society with an eco-socialist orientation is needed.

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