The EU's Emissions Trading System, Part II: A Political Economy Critique

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Abstract

This and a previous 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. In the previous paper, the basic design, the workings and the outcomes of the scheme were discussed with a critical perceptiveness. In particular, the paper revealed the unsatisfactory results of the scheme (even in its own proclaimed aims) which include allowances surplus, allowance trades for pure financial profit, low and volatile prices of allowances, windfall profits, extensive use of Kyoto project-based credits, and several malfunctions and frauds. These findings set the ground for this paper which offers a critical assessment of ETS as the proclaimed major vehicle for the transition to a low-carbon economy by mainstream analyses. In particular, the complications and instabilities created by the increasing financialization of the carbon market are exposed. Moreover, the ineffectiveness of the ETS as a catalyst for investments in clean energy technologies, especially in times of economic crisis, is subatantiated. Since 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.

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

Acknowledgement: This work was supported by the Research Center of the Athens University of Economics and Business (AUEB) under Grant # EP-2336-01.

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1. Introduction

The Emissions Trading System of the European Union (EU ETS), established by the Directive 2003/87/EC, is the cornerstone of the EU's strategy for fighting climate change. The proclaimed major aim of the EU ETS is to help EU member states achieve their carbon reduction commitments in a cost-effective way. The EU ETS has been also considered by many scholars as a model for other carbon markets and a global CO_2 emissions trading system.

This and a previous paper (Vlachou and Pantelias 2016) revisit the 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. In the previous paper, the basic design, the workings and the outcomes of the scheme in the first two phases and in the first two years of phase III were discussed with a critical perceptiveness. In particular, the paper revealed the disappointing results of the scheme (even in its own proclaimed aims) which include allowances surplus, allowance trades for pure financial profit, low and volatile price of allowances, windfall profits, extensive use of Kyoto project-based credits, and several malfunctions and frauds. These unsatisfying outcomes are grounded in the fundamental aspects of the scheme (such as cap-setting, initial allocation, competitiveness and investment incentives, and distributional impacts). ETS is a market for carbon emissions embedded in European capitalist economies and, for that matter, is conducive to capitalism.[1]

Free initial allocation and very limited auctioning of allowances under phase I and II of the EU ETS is a form of privatization of a global common asset, i.e. earth's capacity for carbon cycling. Grandfathering assigns *de facto* 'rights to pollute' to large capitalist emitters and to highly industrialized EU countries for the time duration of the allowances, and reveals the class bias of the scheme, while raising serious ethical issues on the new forms of private appropriation of global commons by the mediation of quasi-state institutions.

[1] See Vlachou (2014) for a discussion of the class-biased process towards establishing EU ETS and for aspects of the scheme's conduciveness to capitalism.

In this paper, employing a radical political economy informed by Marxism, we extend and enrich our previous critical assessment of ETS (Vlachou 2014) on the basis of the completion of phase II of the scheme and the new developments of phase III, as presented in our previous paper (Vlachou and Pantelias 2016), which allow us to deepen our understanding of it and to explore new contradictions. In the next section, we consider the financialization of the EU carbon markets and its implications for the environmental effectiveness of the EU ETS. The section 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. In the third section, the ineffectiveness of the ETS as a catalyst for investments in clean energy technologies, especially in times of economic crisis, is substantiated. In the final section, some concluding remarks are offered.

2. From Commodification to Financialization

CO_2 or GHG allowances and Kyoto credits are entitlements to release emissions or to use the earth's capacity for carbon cycling. They commodify the earth's capacity for carbon cycling. CO_2 or GHG allowances and Kyoto credits have no exchange value in terms of socially necessary time of production (Vlachou 2002). As a "commodity" based on *de facto* property rights (although temporary ones) over earth's capacity for carbon cycling, the price of allowance is determined by supply (established by the cap/allocation of allowances via a policy decision) and demand generated by the actors engaged in the EU carbon market primarily with a compliance motive.

Rights to emit can be obtained in the market by a party on the basis of GHG emissions reductions generated by various mitigation strategies on the part of the seller. In order to be traded, such GHG emissions reductions should be measurable, divisible and quantifiable in equivalence terms over different GHG emissions, source locations, fossil-origin, land-based uptake of CO_2 and so forth, i.e. carbon markets had to abstract from place, substance, technology and history to carry on a trade of emissions equivalents (Lohmann 2009a; Vlachou 2014). However, carbon markets ran up against difficulties of specification and quantification with respect to commensurating emissions from different sources or emissions reductions from different strategies in view of their

different implications for sustainability. The involved irreversibility and uncertainty can not easily be resolved (Lohmann 2009a; Aldred 2012).

Most EUAs and Kyoto credits are traded as futures or forward contracts and options on futures. Obviously, carbon derivatives try to commodify a range of uncertainties involved in carbon trading by treating them as calculable risks attached to the underlying (price of EUAs, CERs, and ERUs).

Critical accounts of financialization and, in particular, of derivatives from the standpoint of radical political economy informed by Marxism that could be used to guide us in understanding carbon derivatives are limited. Noteworthy contributions can be found in the works of Bryan and Rafferty (2011), Bryan et al (2009), Labban (2010, 2014), LiPuma and Lee(2005), Tickell (2000), and Wigan (2009).

Overall, financial and stock markets have historically provided capitalists with the flexibility and liquidity.[2] Following Harvey (1999, 266-270), derivatives are associated with fictitious capital (Labban 2010). A broad notion of fictitious capital as claims to anticipated future revenues applies to any item (not just to produced commodities or production assets) that can be commodified and exchanged in market (such as access to natural conditions) in anticipation of revenue, i.e. a payment derived directly or indirectly from value production in capitalism, such as rent. "These revenues can be capitalized at the going rate of interest and titles to them can also be traded on the market" (Harvey 1999, 268).[3] Consequently, the price of titles is "generally fixed by the present and anticipated revenues capitalized at the going rate of interest" (Harvey 1999, 276-7).

Derivatives is a form of fictitious capital (Labban 2010). According to Bryan et al (2009), the common characteristic of securitization and derivatives is the process of commodification of risk.[4] In the course of their development, they transform capital accumulation by giving capital a concrete liquidity and fungibility that is more commonly conceived only in abstraction. "Securitization and financial derivatives mean that the

[2] According Labban (2010, 546), "financial and stock markets have historically provided capitalists with the flexibility and liquidity that enabled them to place and move their (money) capital in search for higher profits without committing to any particular productive activity, and without having to participate in that activity".

[3] "But property rights come into many forms. Titles of any sort can in principle be traded. Government can sell rights to a portion of future tax revenues. Property rights to commodities can be traded without the commodities actually changing hands or, as in commodity futures markets, prior to actual commodity production. Rights to land, buildings, natural resources (oil drilling, mineral exploration rights, etc.) can also be traded. There are, it seems, as many different markets for fictitious capital as there are forms of property ownership under capitalism" (Harvey 1999, 276).

[4] In this argument, Bryan et al (2009) do not seem to differentiate between risk and uncertainty – to be discussed later.

capital embodied in fixed or illiquid assets (like machines or mortgages) can be transformed into a fluid, competitively-driven capital" (Bryan et al 2009, 465).

Derivates as an instrument of risk management (as a financial contract) "derive their values from the difference between the spot price of the underlying asset and an agreed-upon price at the expiration date specified in the contract" (Labban 2010, 546). Importantly, in contemporary capitalism derivatives can have as their underlying asset *anything* "that can be traded in 'discriminated units', as long as the underlying asset is volatile, produces risk and can be given a price" (Labban 2010, 546; LiPuma and Lee 2004, 36). A derivative then involves an exchange of performance exposure where gains and losses are based on differences in price (Bryan et al 2009, 466). Labban observes that "because such differences are small and transient, the profitability of derivatives trading depends on the speed, flexibility and mobility of large sums of money, hence maximizing leverage, the ratio of equity to assets held by the trader"(Labban 2010, 546).

Moreover, to the extent that financial intermediaries, besides earning lucrative fees on derivatives trading, become market makers[5], trading on their own account, and to the extent that other financial institutions (such as hedge funds) enter the derivatives markets interested only in speculative trading, hedging activity tends to be surpassed by speculative trading. Since derivatives trading to be profitable depends on price volatility, speculative activity keeps expanding only on the persistence of price volatility (see Labban 2010).

Fundamental concerns raised over derivatives by critical thinkers relate first to the identification and measurement of uncertainties through existing derivatives markets, and second to market oversight exercised (see, for instance, Tickell 2000). Commensurating diverse uncertainties and theorizing them as probabilistic risks were accomplished by the skills of quantitative experts in mathematical finance (the 'quants') with the help of new computing and information technology (Lohmann 2009a, 163). Uncertainties, however, can not be often treated as calculable risks by attaching probabilities to all possible outcomes. Such probabilities may not be known.[6] Consequently, changes in prices may not be easy to predict for an efficient derivatives

[5] Market maker is "a trader who is willing to quote both bid and offer for an asset" (Hull 2012, 809).
[6]Aldred (2012, 1052-53) distinguishes risk from uncertainty in the following way: "when probabilities can be attached to all possible outcomes, the decision takes place under *risk*. Otherwise there is Keynesian/ Knightian uncertainty; in what follows, *uncertainty* refers to the absence of probabilistic information in this sense".

trading in mainstream terms.[7]

In this regard, carbon derivatives markets tend to commodify a range of uncertainties (viewing them as risks) associated with EUAs or credits (the underlying) by abstracting from their concrete aspects engendered by physical, technical, economic and social conditions and relations in which allowances and credits are embedded. In particular, "by combining different forms of risk that need not be related or commensurable", as Lohmann correctly observes, carbon derivatives inaccurately appear 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 (see also Lohmann 2009a; Daskalakis et al 2011).

In practice, since carbon derivatives derive their value from price differences, it is necessary to predict movements in prices for the specification of the carbon contract. Looking at financial models applied to the EU carbon market, such as those developed and/or discussed by Daskalakis et al. (2009, 2011), Paolella and Tachini (2008), Chevalier (2014) and others, we realize that they discuss "the most suitable stochastic behaviours to forecast patterns of futures prices" (Creti et al. 2012) and "use spot EUA price as the underlying for pricing futures and options on futures" (Daskalakis et al. 2009), without offering an explanation of carbon prices based on the economic fundamentals of carbon market. Albeit mathematically sophisticated, most financial carbon models depict the trajectory of carbon futures price as sequences of a repetitive and calculable occurrences of risk (approximated via a probability distribution) based on the historical movement patterns of the underlying. This way, however, the trajectory of the underlying and the associated calculable risks have been disembedded from the economy and society, which (in interaction with natural conditions and processes) shape underlying uncertainties, by abstracting from them. Consequently, uncertainties (as calculable risks) have been reified into a financial commodity (see also Lohmann 2009a).

Both commodification and financialization of carbon reductions fail to take into account the variety of physical, economic, political and social relations that give rise to specific uncertainties. More specifically, sources of uncertainties of particular importance to the EU carbon markets (esp. to compliance actors) include: epistemic aspects (i.e. incomplete knowledge and lack of research with respect to physical and social phenomena); unpredictable patterns of climate change; the non-binding emissions

[7] Tickell (2000, 89) observes that "despite the increasing sophistication of risk management, there continue to be inaccuracies in the measurement of risks inherent in specific instruments …and changes in value that may not be easy to predict."

constraint (cap); the lack of an international agreement on climate change; the impacts of economic crisis (triggering, for instance, the pull-out from risky carbon-reducing projects); the changes in the prices of coal and natural gas giving rise to fuel switching in power generation as an important abatement strategy under EU ETS; physical and economic constraints for renewable power technologies used to reduce carbon emissions. In addition, the use of KP offsets for compliance under ETS give rise to further risks related to the *additionality* requirement, and to monitoring, verification and approval procedures and mechanisms. Importantly, these uncertainties can not easily be resolved by assigning probabilities to different states of the world (i.e. creating a security for every condition in the world) since probabilities may not be known due to the many nonlinearities, indeterminacies and unknowables of the climate system (Vlachou 2000). As was the case with other financial models, carbon models are susceptible to failure in such circumstances, especially in view of radical change (see also Lohmann 2009a, Aldred 2012).

Carbon derivatives, as part of the financialization of capitalism since the 1980s, carry with them the general benefits for capitalist development briefly introduced above. In practice, a number of incentives and opportunities expanded, indeed hurriedly, the development of financial derivatives in the carbon market, giving also rise to various innovations such as securitized carbon products. In the name of enhancing liquidity, both governments and the financial sector became eager to establish and promote global carbon markets, with the World Bank playing a pivotal role in this process. Financial institutions (particularly large banks) became involved in the carbon trading (especially in OTC) in order to collect fees from the expanding transactions and later to trade for profit.

Countries with established international finance and banking sectors (like the UK, USA and Australia) seek to establish superiority in these new financial markets as they view carbon markets as a source of economic growth. For instance, most financial players in the ETS operate in the United Kingdom (ECX, the major platform for futures transactions, is based in London); this makes the country to be the largest buyer of CDM and JI projects and trader of EUAs (World Bank 2010). Commission and brokerage fees are sources of economic growth for UK. In other words, high transaction costs such as commission and brokerage fees are not seen as obstacles to attaining *efficient* carbon markets, instead they are viewed as sources of growth.

The limited financial regulation and the abolition of capital controls led to vastly increased trading volumes for earning speculative profits by hedge funds and large banks. Moreover, big players like ETS utilities engaged in transactions not only for compliance but also for short-term high yield investment opportunities as well as for market consolidation (World Bank 2010; Lohmann 2009a; Reyes 2011).

The large sell-off of allowances that started the September 2008 signalled the extent to which carbon allowances were viewed as financial assets. Over 70% of the spot transactions occurred during the first half of 2009 to raise funds (World bank 2010). Financial speculators such as hedge funds were reported as taking part in this sell-off. The wide sell-off helped in triggering a collapse in the price of carbon, as mentioned above.

The secondary markets tend to be dominated by speculators and to displace the primary markets (see also Friends of the Earth 2009). Not surprisingly, secondary markets for CERs have been characterized by destabilizing price volatility. Moreover, as the financial crisis prompted financial institutions not only to raise capital by shedding assets (including selling CERs to buyers in need) but also to redirect their position from risky to safer assets (thus avoiding new risky CER origination), the offset market was dampened down (World Bank 2010).

Concerns had been expressed that carbon market might turn into a *sub-prime* market as carbon trading was developing to a huge new derivative market. In particular, sell-offs for financial profit, in which hedge funds were engaged, triggered fears for a sub-prime carbon.[8] Moreover, the speculative nature of the secondary CERs markets had the potential to create a carbon bubble, as the Friends of the Earth (2009), a grassroots environmental network, correctly pointed out. Sub-prime carbon would involve futures contracts to deliver carbon offsets that carry a high risk of not being fulfilled,

In addition, carbon derivatives have started to give rise to various financial innovations (e.g. complex securitized products). For instance, offset aggregators already bundle small offset projects for buyers. According to Friends of the Earth (2009, 6),

> "in November 2008, Credit Suisse announced a securitized carbon deal in which they bundled together carbon credits from 25 offset projects at

[8]Vincent de Rivaz, the chief executive of the EDF Energy in UK, alerted, for instance, that selling operations of the ETS observed in 2008-2009 needed to be reviewed by the EC before carbon was turned into a 'sub-prime tool' by unscrupulous companies, instead of doing the task was set up for: "to encourage real investment in real low-carbon technology." See T. Macalister "Britain's big polluters accused of abusing EU's carbon trading scheme", in *Guardian*, Tuesday 27 January 2009.

various stages of UN approval, sourced from three countries, and five project developers."

Future carbon securities could become bigger and more complex than the Credit Suisse deal. Bundling numerous carbon assets of mixed types and origins could result in carbon securities whose value would be very difficult to assess (see also Lohmann 2009a).

In short, risks and uncertainties relate both to price and volumes of EUAs and KP credits and stem from factors influencing both the supply and demand side. As such, they cannot be disembedded from the economic, social and natural conditions.

Let us turn now to the oversight of EU carbon market. As financial instruments, EUAs derivatives ('the lion's share' of transactions in emissions allowances) is subject to the rules of EU financial markets, including the Market Abuse Directive (MAD) and the Markets in Financial Instruments Directive (MiFID) (European Commission 2011b). The implementation of MiFID is devolved to member state level and it is carried out by national financial regulators which have some degree of discretion.

A great portion of carbon trading, however, is taking place through the ECX platform[9], as mentioned above, which is located in London, U.K. Consequently, the UK's Financial Services Authority (FSA) serves as the financial regulator with the greatest oversight of the carbon markets, as Daskalakis (2011) has correctly pointed. Driven by a risk-based regulatory approach, the FSA regulatory capacity covers the emission derivatives but *not their underlying*. The FSA has identified a range of risks related to commodity markets in general and to carbon markets in particular. These include: i) market foundation risk, ii) market abuse risk, iii) market infancy risk, iv) information risk, and v) liquidity risk (Hill et al. 2008; Daskalakis 2011). Importantly, since most of these risks relate to the underlying markets that fall outside the FSA regulatory boundaries, they have the potential to spread out into the emission derivatives markets (Hill et al 2008, 5). For instance, the generous caps which resulted in a surplus of allowance and in the collapse of EUA price in April 2006 can be accounted as "a market foundation risk" and "a market confidence risk" (due to misleading information from the engaged parties in the design and application of the ETS), which are both beyond the regulatory boundaries of FSA (Daskalakis 2011, 10-12).

These arguments from the side of a financial regulator assert that the robust workings of the of EU carbon markets is, to a significant extent, grounded in the

[9]In July 2010 the International Exchange (ICE) bought the ECX. ICE operates an electronic platform which trades commodities and commodity derivatives, including electricity and emissions allowances, on a global scale (Kachi and Freck 2013, 6).

environmental design and management of the carbon emissions market by the EU – "a politically generated and managed market" (Hill et al. 2008, 5).[10] Environmental regulation (the compliance aspect) importantly conditions the financial aspect of carbon markets.

The financial crisis has painfully demonstrated that significant segments of the financial markets (especially derivatives) are under- or un-regulated. This was true for carbon markets, as well.[11] As a result, increasing transparency, imposing position limits and increasing margins have been proposed as a way to prevent market irregularities and failures.

As part of the initiative to reform MiFID, the EC published a communication on the oversight of EU carbon markets (European Commission 2010b) and a related discussion paper for the European Climate Change Programme (ECCP) shareholders meeting (European Commission 2011b). Proposals for regulatory change that were put into consultation included the following: the extension of financial regulation to the spot market; the application of increased regulation to all market participants; the enlargement of transparency and information disclosure in the OTC derivatives markets; the redefinition of exemptions from authorisation and compliance duties under the new MiFID; the extension of positions limits regime provided under MiFID for commodities derivatives to emission allowances, and so forth. The rationale of each of these proposals and an account of the consultation can not be elaborated here due to space limits (see Vlachou 2016).

The proposed regulatory changes for carbon markets were met by opposition by financial firms and associations, such as the International Swaps and Derivatives Association (ISDA) and the International Emissions Trading Association (IETA) and by energy firms and associations, such as EURELECTRIC, for diminishing liquidity, flexibility and cost efficiency. The responses of the broader business, including industrial

[10]Several critics have pointed that this political determination opens the door for "regulatory capture" as it makes "the EU carbon market particularly prone to *lobbying influence*." Lobbying influence can be exerted "through direct lobbying by Brussels-based associations, or by lobbying national governments to act on behalf of certain industries in EU processes. Such lobbying effects not simply the rules governing how the market operates, but the supply of permits and credits" (Reyes 2011, 5). Such arguments capture the shaping of public policies via complex class and social struggles the outcomes of which depend on the balance of forces in opposition (Vlachou 2005a).

[11] See "Ensuring the integrity of the European carbon market". Available at http://ec.europa.eu/clima/policies/ets/oversight/index_en.htm, (accessed March 21, 2016).

sectors like chemicals and cement, were mixed (IETA 2011; Reyes 2011; Vlachou 2016).[12]

The revised MiFID (or MiFID II) was published as Directive 2014/65/EU and was followed by the Regulation (EU) 600/2014; it was scheduled to be applicable as of January 2017 (European Commission 2014d, 2014e). On February 2016, the EC extended by one year its application date (European Commission IP/16/265).

Spot trading was defined as financial instrument and is regulated as such by the revised MiFID II. In addition, four articles (article 2,58,79 and 88) in MiFID II explicitly address emissions allowances (European Commission 2014d, 376, 444, 465, 468). With respect to exceptions, the MiFID II Directive largely exempts carbon traders dealing on own account and operators dealing as a result of compliance obligations (as is the case of intermediaries). It does not establish positions limits on carbon traders. It only establishes position reporting by categories of position holders to be done on a daily basis. MiFID II establishes the obligation for competent authorities managing carbon trading to cooperate with competent authorities dealing with compliance under Directive 2003/87/EC in order to ensure proper monitoring and increase transparency.

As with other state policies, environmental and financial regulation, so important for climate sustainability, is shaped by capitalist competition and by environmental, class and social struggles[13]; their outcome depends on the relative power of the opposing forces. Although debated and highly contested, current amendments in financial regulations as applied to EU carbon market bear the influence of the engaged energy and financial firms, mentioned above.

Concluding, the financialization of carbon market has destabilizing impacts on the EU ETS as a vehicle to achieve long-lasting carbon reductions. It has contributed to price volatility, increased pro-cyclical transactions, canceling of carbon-reducing projects, and to the acceleration of the melting-down of the CDM credit market. These problems,

[12] For instance, IETA expressed its opposition to the classification of EUAs as financial instruments and to the inclusion of spot trades under MiFID in terms of the negative cost implications for compliance buyers: "eliminating the option for trading on own account in the secondary [spot] market, would raise compliance costs, especially for larger emitters. This is not reasonable, unless specific exemptions are provided." Moreover, with respect to the holding of large positions by larger emitters, IETA argues that "the reasons for holding large positions in the carbon market are mainly to hedging needs rather than for speculative purposes. They mitigate and do not leverage the risk profile of the company" (IETA 2011, 4). Apparently, these arguments run against setting position limits; however, the fact that increased transactions were observed for speculative reasons rather than for compliance purposes was noticed even by the World Bank, as mentioned above.

[13] For the side of environmental and social movements, see, for instance, the interventions of Oscar Reyes associated with the Carbon Trade Watch organization and that of Lohmann associated with the Corner House Organization. See also Bond and Dorsey (2010).

however, are deeply rooted in the design of the "politically generated and managed" carbon market under the influence of dominant rooted-in-carbon capitalist interests in contemporary EU economies (see also Vlachou 2014), and they have been exacerbated by financialization and the loopholes in market oversight under the reign of neoliberalism.

3. The EU ETS's Effectiveness for the Transition to a Low-Carbon Economy

Overall, the first two trading periods evidenced an overallocation of allowances, indicating a limited environmental effectiveness. Although a stricter cap than the proposed one was set for the second phase, a continued slackness in carbon constraint was evidenced. Mainstream research, including qualitative studies based on surveys of market participants, suggests that the contribution of ETS to the emissions reductions during Phase I and II was quite small compared to other factors such as the economic crisis, the deployment of renewable energy and the new energy efficiency directive (EDF et al 2015; Ellerman et al 2016; IEA 2014a; Martin et al 2016).[14]

Not binding national emissions constraints resulted overall in low EUAs prices. Price volatility was also evidenced as high prices levels were followed by declines or even a collapse. It is widely acknowledged that low and volatile prices undermine investments in low carbon projects by capitalist firms.

In contrast to the overall surplus, the electricity sector faced allowances shortages, making necessary the purchase of EU allowances and credits. At the same time, the electricity sector received 'windfall' profits in phase I and II as it was able to pass through the price of allowance. Indeed, a number of mainstream empirical studies conclude that the full cost of carbon was passed through to electricity prices in many European countries (Hintermann 2016, 119). Large electricity generators are also implicated for exercising market power (ibid.; see also Martin et al 2016). Consequently, the argument that ETS provides incentives to the power companies to efficiently shift to low-carbon generation technologies is severely undermined. Furthermore, increased prices of

[14] "According to CDC Climat Research (2013), compared to a "*business-as-usual*" scenario, around 1.2 billion tCO_2 of emissions were avoided between 2005 and 2011: around 30% of the reduction was the result of a fall in manufacturing output, while approximately 60% of the reduction was caused by the development of renewable energy and the improvement in energy intensity. Research suggests that the carbon price (also weakened by the economic crisis, the deployment of renewable energy and the new Energy Efficiency Directive) does not seem to have been the main driver for domestic CO_2 emission reductions." (EDF et al. 2015, 15).

electricity have negative income distributional effects on buyers, especially low wage earners. Partially established for phase III, auctioning would tend to avoid 'windfall' profits but not the negative distributional effects due to electricity price increases (see also Vlachou 2014).

The generous caps on CDM/JI credits to be used for compliance resulted in a considerable use of CERs/ERUs, enlarging the actual surplus of EU allowances. The use of Kyoto credits has thus endangered long-term domestic efforts to reduce CO_2 emissions in the EU. On the other hand, the reduced verified ETS emissions which led to a reduced demand for EUA allowances and Kyoto credits, causing sharp declines in prices, undermined investments in CDM and JI projects. However, in mainstream evaluations, "lower credit prices have enabled installations to reduce their cost of compliance"; and in this regard, "the EU carbon price has been useful in promoting cost-effective emissions reductions" (EDF et al 2015, 15).

Hintermann et al (2016) point that the strong presence of intermediaries in the EU carbon market implies that transaction costs may be important, especially for small firms, and this may result in low-level ('thin') trading on the part of compliance installations.[15] When a considerable amounts of allowances are not exchanged due to high transactions costs, the mainstream arguments for cost-efficient emissions reductions and for information efficient carbon risk-management through carbon markets are seriously doubted in their own terms.

By design, climate policy, and for that matter ETS, cannot jeopardize competitiveness of capitalist firms operating in European and global markets. The high priority of international competitiveness is evidenced in the carbon leakage debate. The European Commission has recognized the problem of carbon leakage raised by ETS-regulated firms exposed to international competition. While taking part in the negotiations for an international agreement on climate change in December 2007, the European Commission admits that

> "In the event that other developed countries and major emitters of greenhouse gases do not participate in this international agreement, this could lead to an increase in greenhouse gas emissions in third countries where industry would not be subject to comparable carbon constraints

[15] In their literature review, Hintermann et al. (2016, 118) draw from P. Heindl's work on Germany that impressively "only about 51 percent and 54 percent of German firms covered by the EU ETS were involved in trading in 2009 and 2010, respectively, and almost two-thirds of those that did trade did so only once a year." When this information is combined with the high traded volumes of allowances, it might shed more light on the real prospect of speculative trade by major traders, with electricity firms being the most likely candidates.

(carbon leakage), and at the same time could put certain energy-intensive sectors and sub-sectors in the Community which are subject to international competition at an economic disadvantage. This could undermine the environmental integrity and benefit of actions by the Community" (European Commission 2009, 66).

When moving forward to phase III, grandfathering was decided to continue under certain qualifications in order to protect industrial ETS firms from a competitive disadvantage.[16]

Without any countervailing measures, low and volatile carbon prices do not encourage new investments in low-carbon projects. Furthermore, as mentioned above, the global economic crisis impacted on clean energy projects quite negatively in the first years of phase II; this development was the result of economic rationalization by capitalist firms after the decrease in GDP and under fierce competition.[17] The EU intervened with a recovery support program in order to contain the impact of crisis on clean energy and climate. In the framework of the European Economic Recovery Plan (amounting to €200 billion), the EU launched in May 2008 a European Energy Program for Recovery (EEPR), endowed with €3980 million in support of energy projects for 2009 and 2010 with the objective to stimulate recovery and to meet energy and climate policy objectives. The EC was concerned that, as a result of the recession, planned projects would be in danger of being delayed or withdrawn. The funding of 59 projects was allocated as follows: (i) gas infrastructure €1363 (35.6% of the total); (ii) electricity infrastructure projects €904 million (23.6%); (iii) offshore wind energy (OWE) projects €565 million (14.7%); and (iv) carbon capture and storage (CCS) projects €1000 million (26.1%). This contribution of the Union was in the form of grants. The grants were intended to cover up to 50% of eligible investment costs in the case of gas and electricity infrastructure and OWE projects, and up to 80% in the case of CCS. An amount of €146 million (3.7%) could not be committed to projects by the deadline of 31 December 2010 and was reallocated to the European Energy Facility, a new financial facility for

[16] It should be mentioned that labor unions had proposed trade restrictions on carbon-intensive imports to answer carbon leakage and job losses concerns. The business side, however, expressed fears with respect to the trade-restrictive action. According to Folker Franz (senior advisor for the European employers' organization BusinessEurope), such measures could provoke retaliatory measures on the part of competitors. Interestingly, Franz suggested as an alternative that the EU should continue to promote the use of CDM. EurActiv, "EU Emissions trading Scheme" dated February 1, 2008. At http://www.euractiv.com/en/climate-change/, accessed on April 4, 2008 .

[17] See New Energy Finance, "44% plunge in investment as crisis catches up with clean energy", Press Release 2 April 2009, available at http://www.energy2025.com/Energy_Investment_Figures-2009.pdf, accessed July 5, 2009.

investments in energy efficiency and renewables (European Commission 2010a, 2012b). No matter its role as stimulus to recovery, the EEPR inscribes a bias in favor of fossil energy projects and infrastructures that cannot be missed. Such a bias should be evaluated as matching to the enduring dominance of fossil fuels in EU. According to our calculations, fossil fuels accounted for 78.0% of gross inland consumption in EU-27 in 2008 – down only five percentage points from their share of 83% in 1990 (Vlachou and Pantelias 2014).[18]

Although a number of concerns have been expressed over the promotion of CCS such as permanent safe storage of CO_2, interference with biodiversity, independent verification and monitoring of storage, the EC insists on promoting carbon capture and storage while recognizing at the same time that it is not yet commercially viable. By its insistence on the significant potential of CCS to mitigate climate change, the EC itself seems to recognize the fossil fuels lock-in, albeit in its own terms(European Commission 2010a).[19]

The CCS projects will be also supported by the NER 300 (New Entrants' Reserve 300) program under the EU ETS which provides funding for innovative low-carbon energy demonstration projects to help them become commercial. However, due to the high risks involved in demonstration projects, it has been a limited business interest in them. Only one CCS was awarded funding while a number of renewable projects were cancelled (IEA 2014a).

It is also interesting to check on proposals for a 'Green New Deal' that have been put forward by various sides worldwide, including N. Stern (2009), and aim at dealing both with global warming and economic recession (Lohmann 2009b). In such proposals, emissions trading systems are considered essential in providing incentives to a low-carbon economy and to economic recovery and growth. However, the effectiveness of ETS in bringing forth long term green investments has seriously been doubted, as we have seen. Even the business side asked, along with the green stimulus packages, for a

[18] Malm (2016) provides a fresh insight into the roots of the predominantly fossil-fuelled EU capitalist economies and into the difficulty to change it.

[19] The following quote from a report on EEPR's implementation resonates clearly the EC's anticipations and policy priorities with respect to energy and climate: "fossil fuels will continue to be used in electricity production and even if renewable sources do gain a greater share of the market, the use of coal is not expected to drop in the decades to come. Thanks to its ability to decarbonise power generation, the CCS can make a major contribution…however, this technology is not yet commercially viable and needs to be tested. The EEPR addresses this problem by supporting six large scale CCS demonstration projects that are expected to develop the CCS concept, reduce its investment and operating costs and build a public awareness of this technology. The EEPR represents the first step towards the objective of making CCS-based power generation commercially viable by 2020" (European Commission 2010a, 5-6).

number of measures which go far beyond ETS, many of which include extensive state intervention. For instance, Michael Liebreich, chairman and CEO of New Energy Finance, commented:

> Green stimulus plans may represent the light at the end of the tunnel for clean energy companies, but meanwhile the sector has been hit by an oncoming train. These figures [reduced investments in clean energy] highlight the need for policy makers and administrators in the US and elsewhere to insure that stimulus funds start flowing immediately, not in a year or so. There is also a strong case for further measures, such as requiring state-supported banks to raise lending to the sector, providing capital gains tax exemptions on investments in clean technology, creating a framework for Green Bonds and so on, all targeted at getting investment flowing. Many of the policies to achieve growth over the medium term are already in place, including feed-in tariff regimes, mandatory renewable energy targets and tax incentives. There is far too much emphasis among policy-makers on support mechanisms, and not enough on the urgent needs of investors right now.[20]

IEA (2014b) provided evidence on EU average annual investments in energy supply for the 2000-2013 period, which incorporates the two trading periods of EU ETS. They amounted to $152 billion and constituted 12.4% of the global average energy investments. These investments indeed manifest the enduring dominant role of fossil fuels in the EU energy structure. Their overall composition is as follows: oil 13.2%, gas 19.7%, coal 2%, power 63.2%, and biofuels 1.3%. If we exclude investments in transmission and distribution of electricity since we do not have adequate information to allocate them between fossil fuels and RES, we estimate that fossil fuel represented 42.8% and RES 36.2% of the total EU average annual amount of investments in energy supply. By comparison, fossil fuel represented 67.6% in the USA and 60.2% in OECD while RES amounted to 11.2% and 18.8% of the total average annual amount of investments in the US and OECD, respectively. In this regard, EU tends to outdo other developed countries along the transition to a low-carbon economy. However, this is a slow-moving process and the relatively higher use of RES in Europe has been challenged in terms of energy cost-efficiency and competitiveness, especially in comparison with the USA, by mainstream experts (IEA 2014a).

Importantly, it is widely admitted that the incentives for investments in RES come, to a significant extent, from energy policies, and not from the EU ETS:

> "the EU carbon market did not stimulate investment in the decarbonisation of the power generation or other sectors and only contributed to a small extent to meeting GHG targets. […] Instead,

[20] New Energy Finance "44% plunge in investment as crisis catches up with clean energy", Press Release, 2 April 2009.

> national support policies and subsidies for energy efficiency and renewable energies have been driving decarbonisation"(IEA 2014a, 5).[21]

The increasing use of supported renewable technologies tended, however, to push up electricity prices, "as support is charged to end users through green surcharges or taxes" (ibid.), with negative income implications, as already mentioned. Moreover, poorly designed, these incentives resulted, for instance, in "the growth of solar PV much quicker than expected"(ibid.); the subsequent partial dismantling of these incentives in several EU countries will tend to undermine the future prospect of solar energy. The International Energy Agency, along with other established carbon experts (see, for instance, Ellerman et al 2016), critically call attention to "a lack of integration of climate and energy policies at EU level and between EU and national energy policy decisions" thats need to be rectified (IEA 2014a, 5).

However, the recognized lack of EU ETS effectiveness in bringing forth investments in low-carbon technologies and the emergence of various contradictions in the ten years and counting of EU ETS, have not created a momentum for academics and practitioners to look deep in the causes of current economic crisis and climate change policy impasse. It is my understanding, however, that the latter are grounded in the fundamental patterns of capitalist development, albeit under the influence of current financialization (see also Vlachou 2014; Labban 2014). Such development, driven by the profit motive and grounded in surplus value extraction, is connected to and spurred by long-standing centralized fossil energy systems that emit all kinds of pollution; given the vested interests of giant fossil energy and automobile corporations in them, it is difficult to change them. In particular, proposed piecemeal measures can be only marginal to the needed extensive restructuring of the energy systems.

4. Concluding Remarks

Climate change is deeply grounded in the patterns of capitalist development. As it has been argued in this and the previous paper (Vlachou and Pantelias 2016), as well as elsewhere (see also Vlachou 2014), the many problems of ETS are grounded in the nature of the scheme: it is a market for emissions embedded in capitalist economies. ETS

[21] "The IEA *World Energy Outlook 2014* estimated the total value of subsidies to renewable energy in the European Union of around USD 70 billion or EUR 52 billion in 2013, which equals to 57% of the global subsidies to renewable energy, with solar PV accounting for over USD 30 billion or EUR 22 billion, followed by wind with over USD 15 or EUR 11 billion" (IEA 2014a, 5).

was chosen over other instruments, designed and put into force through the influences of intra-capitalist competition and struggles waged by labor, environmental and other social movements. The kind of policy that comes out of these confrontations depends on the balance of forces in opposition.

As the evidence from ten years and counting shows, EU ETS does not really challenge the processes of contemporary capitalism which give rise to global warming. It has been environmentally ineffective and distribution-wise unfair. From its start, it has been a climate policy compromise reached under the great influence of dominant EU industrial capitals as environmental and labor movements have been able to exert limited influence over the EU climate policy (see also Vlachou 2014). On the other hand, the disturbing financialization of EU carbon market reflects its embeddednes in the still-unsettling financialization of contemporary capitalist economies. Moreover, the enduring economic recession gave rise to old and new risks for ETS as climate policy: allowances surpluses due to recession, price volatility, sub-prime carbon risks and market instability triggered by enhanced financialization, all undermining long term investments for a low-carbon society. Our investigation into the reforms of EU ETS for the third trading period (2013-2020) and of market oversight has revealed that these reforms do not seem to solve the fundamental problems of the scheme.

More generally, Keynesianism, understood as state regulated capitalism, has to some extent re-emerged in recent years as a way to contain economic crisis, pave an exit from it and trigger sustainable development, including transition to a low-carbon economy. Outspoken supporters of such a perspective include the well-known economists Joseph Stiglitz and Paul Krugman. The influence of Keynesianism nowadays reaches many environmentalists and radical thinkers who resist the perils of Neoliberalism.[22] However, Keynesian type policies (such as stimulus packages, state bailouts, etc.) along with amended environmental/climate and financial regulation of capitalism are being proved quite inadequate to trigger green investments for climate sustainability. They also create new problems and contradictions (financing problems, rising government budget deficits and debts, disincentives for capital investments when profit taxes increase to enhance state revenues, conflicts over auctioning versus free allocation of carbon allowances, etc). All things considered, Keynesianism has already been tried and proved ineffective. In the 1970s, it resulted in staginflation and made easier the advent of Neoliberalism and the subsequent deregulations and privatizations.

[22] For a discussion of New-Keynesianism and Neoliberalism, see Vlachou and Christou (1999).

An extensive restructuring of the existing capitalist societies (their energy system, production, transport, social processes and personal ways of life) is needed for climate sustainability and can take the form of an eco-socialist transformation. Eco-socialists work out a vision of future society in which a collective non-exploitative organization of production will be combined with climate sustainability: use of renewable energy, energy efficiency and conservation, afforestation, emissions abatement, mass transportation, along with democratic decision making and environmental ethics. Towards this transformation, a variety of climate policies (such as emissions limits, taxes, subsidies, technology standards, public investments, public support for developing green technologies) need to be investigated in order to achieve climate sustainability in combination with other communal objectives related to income, education, health, etc. (Vlachou 2005b). Such a far-reaching transformation needs to be initiated and implemented by a large and sustained association of worker-citizens acting as a radical collective subjectivity towards elaborate short- and long-term social and ecological targets.

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