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The allocation of carbon emission permits: theoretical aspects and practical problems in the EU ETS

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Abstract

The paper investigates the effectiveness of the progressive shift towards the auctioning system within the EU ETS and the practical difficulties that such a shift is encountering on its way. For this purpose, it first examines the theoretical debate on the optimal allocation method underlying the ETS and describes the current allocation regime of the European Union Allowances, presenting the general rules as well as the special provisions to address specific sectors (e.g. aviation and electricity generation). Then it discusses the main problems that have been emerging so far in terms of: (i) possible carbon leakage arising in some of the ETS sectors, (ii) unsatisfactory results of the NER (New Entrant Reserve) program, (iii) intertemporal evolution of the auction price and corresponding revenues, and (iv) the much debated backloading proposal, that is the idea of temporarily halting and postponing further auctions due to the lack of permits' demand. The comparison of the theoretical debate with the practical difficulties arising in real world applications, highlights that a long way is still to go to achieve an optimal allocation method.

Key words: Emission Trading Scheme, Grandfathering, Auctioning, Backloading, New Entrants Reserve.

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1. Introduction

The allocation of carbon permits is the object of one of the most lively debate among scholars, practicioners and environmental organizations. In general, economists are in favour of auctioning carbon permits, while firms tend to support grandfathering, namely, the allocation of initial permits for free based on historical emission trends (Hepburn, 2006). Environmental organizations, though often skeptical towards a mainstream economic instrument such as carbon permits, want polluters to pay to receive them; therefore they are generally in favour of auctioning carbon permits and have harshly criticized grandfathering as a source of windfall profits for incumbent firms.

The contrast between supporters and opponents of auctioning carbon permits has clearly emerged in the EU ETS. When the EU Commission proposed to progressively shift the allocation method from grandfathering to auctioning it encountered the strong opposition of the business groups, some of which adopted a sort of retaliation strategy, foreshadowing the risk that the new costly allocation method could force them to close or relocate their production elsewhere.

In an ideally competitive world this debate should not take place. Economic theory, in fact, shows that under perfect competition and full information the final allocation of permits is independent of the allocation method (Tietenberg, 2006). However, this is no longer true if there exists market power. Following the pionnering contribution by Hahn (1984) on cap-and-trade under mkt power, previous studies have compared auctions vs grandfathering in terms of cost-effectiveness. In particular, Antelo and Bru (2009) as well as Montero (2009) compare the two alternative allocation methods assuming a permit market with one dominant firm and complete information. They both conclude that in such a setting the optimal strategy for the dominant firm is not to take part in the auction and buy all permits acting as a monopsonits in the secondary market. Alvarez and Andrè (2013) extend their analysis to the case of incomplete information and determine the conditions under which auctioning is more/less cost-effective than grandfathering.

This work does not intend to provide a new theoretical model to discuss the pros and cons of the auction vs grandfathering allocation system, but rather build upon the ongoing theoretical debate to assess the efficiency and effectiveness of the progressive shift towards the auctioning system within the EU ETS and the practical difficulties that such a shift is encountering on its way.

In our view, the revision proposals of the EU ETS that have been set forth to address the rapidly changing economic and environmental conditions of these last few years make the European emission scheme a particularly interesting case of analysis that allows to draw important lessons on the allocation of carbon permits, comparing theoretical optimal with practically feasible solutions.

To examine this issue, the paper will be structured as follows. Section 2 examines the theoretical debate in the literature on the most appropriate criterion for the initial allocation of the permits, discussing the pros and cons of permits auctioning as compared to the grandfathering allocation system. Section 3 describes the current allocation regime of the European Union Allowances (EUAs), presenting the general rules as well as the special provisions to address specific sectors (e.g. aviation and electricity generation) and possible problems (carbon leakage). Section 4 illustrates the rationale underlying the NER (New Entrant Reserve) programme and the main results emerged so far. Section 5 and 6 describe the evolution over time of the auction price and corresponding revenues, respectively. Section 7 discusses the much debated backloading proposal, that is the idea of temporarily halting and postponing further auctions due to the lack of permits' demand, that has been adopted by the EU to counterbalance the price collapse observed in the last few years. Section 8 concludes.

2. Grandfathering vs auctioning: the theoretical debate

One of the most widely debated issues in the literature on carbon markets concerns the most suitable allocation criterion to be adopted. As a matter of fact, in the EU ETS emission permits have been given mainly for free on the basis of the firms' historical emission levels using a grandfathering allocation system. This criterion, however, disregards the past abatement efforts that agents may have done before the EU ETS was implemented. Moreover, it tends to preserve the *status quo*, reducing the firms' incentive to adopt more environmental friendly technologies. Finally, it may create potential disparities in the permits market between large firms (that receive many initial permits to maintain their activity level) and small-medium enterprises. For these reasons, many scholars (e.g. Parry et al., 1998; Grubb and Neuhoff, 2006; Mandell, 2005) have argued that it would be preferable to adopt an auction system as initial allocation criterion. Whether carbon permits are given away for free or sold by the government through an auction system, this will not affect the market-clearing price that emerges in a competitive market.[1] The two allocation methods, however, can have very different distributional effects according to how the auction revenues are used and whom the permits are grandfathered. In a grandfathering system scarcity rents go to the recipient of permits, while in an auction system the government collects these rents as revenues that can be used to reduce the deficit and/or cut distortionary taxes. Therefore, while the allocation method of carbon permits does not affect their price (since it influences neither their demand nor their supply), it will determine who is going to pocket the extra revenues, whether potential emitters or taxpayers.[2] Moreover, the government entries generated by the auction system could be used to promote R&D in environmental innovation and the diffusion of better technologies, with a potential double-dividend effect in terms of higher economic growth and lower environmental damages.[3] Finally, as some authors have argued (cf. Cramton and Kerr, 2002), another attractive feature of an auction system is that it may entail lower administrative costs and lower delays in the implementation with respect to grandfathering. The latter system, in fact, often implies long negotiations between the

[1] As a matter of fact, for the potential emitter what matters is the opportunity cost of using the permit, whether received for free or through an auction, that is given by the loss of the opportunity to sell that allowance in the future.
[2] See Ellerman and Joskov (2008) for a further discussion of the controversial issue of "windfall profits" for incumbents, namely, additional profits earned by potential emitters to which allowances were allocated for free. See also Pearson (2010) for a detailed analysis of the profits that the main companies may have derived from the free allocation of the allowances in the EU-ETS.
[3] See Bovenberg and Goulder (2002) for an analysis of the literature on the "double dividend" hypothesis, the possible uses of auction revenues and the relative performance of various policy instruments in a second best context.

government and the interest groups that invest much time and resources in lobbying activities in order to obtain the highest possible number of initial permits.

These considerations, together with the heated debate on the possible windfall profits effect of the grandfathering system adopted in the early phases, have led to a profound revision proposal of the initial allocation mechanism. In particular, the European Directive 2009/29 established that a higher share of emissions should be progressively allocated through auctions rather than grandfathering, along with the harmonization of the allocation rules when permits are instead given for free.

In particular, the European Commission had originally proposed a huge increase in auctioning as early as 2013, with full auctioning becoming the rule from 2013 onwards for the power sector and between 2013 and 2020 for the other sectors. But the fierce opposition of the dominant interest groups of the regulated sectors (see Cramton and Kerr, 2002, and Markussen and Svendson, 2005) has induced the Commission to postpone the deadline for the complete phase out of the free allocation system in the final text of the Directive, that requires the level of auctioning to achieve 70% of all allocations in 2020 and 100% in 2027.[4]

The proposed (but not yet fully implemented) adoption of auctions rather than grandfathering as allocation criterion may improve the functioning of the ETS. In this case, however, particular attention should be devoted to the design of the auction as this may play a crucial role for the success of the system (Cramton and Kerr, 2002). As Alvarez and André (2013) have shown, auctioning can outperform grandfathering only if it manages to dilute the market power that may occur in the secondary market, namely, if the leader's ability to set the price in the secondary market is weaker/absent in the auction. However, if market power spills over the auction (i.e. if the auction inherits the leader and follower roles from the secondary market) then the opposite holds and the grandfathering allocation turns out to be preferable.

[4] Some energy-intensive sectors, however, could continue to receive their emission permits for free if they are considered to be at risk of "carbon leakage", namely, if there is a concrete risk that firms belonging to those sectors are at risk of relocation of their activities in countries with less restrictive environmental policies (see paragraph 3.4 below).

It follows that if the auction is not properly designed it may favour a few large firms that initially buy most of the permits for strategic reasons. At first sight one could argue that this problem is unlikely to occur in the EU ETS for carbon emissions that covers thousands of firms across different sectors. However, even in the EU ETS one cannot exclude the existence of asymmetric information and collusive behavior. As Karl Martin et al (2006) have pointed out, for instance, permits in the EU ETS could be used as a tool for tacit collusion in oligopolistic product markets. Moreover, Hinterman (2011) emphasises the possible existence of permit price manipulation by the largest electricity producers in Germany, UK and the Nordpool market during the first phase of the EU ETS. Finally, market concentration and the potential abuse of market power have arisen in the past even in similar contexts with many firms, as suggested by the experience of the UK ETS, the world's first large-scale GHG trading scheme that was launched in April 2002. In the UK ETS, although the number of participants was very high (approximately 1400 firms in over 40 industrial sectors the first 3 years), sales were very concentrated, with the four largest sellers accounting for 65.7 per cent of total sales (Smith and Swierzbinski, 2007). Interestingly enough, all four largest sellers entered the UK ETS as a result of an auction in 2002 which allocated a budget for abatement subsidies. According to Smith and Swierzbinski (2007), the observed concentration on the permits supply side is likely to reflect the concentration in the auction outcome where some firms might have coordinated their behaviour to manipulate the auction price. The UK experience, therefore, may provide important insights for the EU-wide carbon trading scheme, suggesting that the issue of market concentration should not be neglected in the auction design even in the EU-ETS despite the large number of potential participants. In fact, some of the sectors involved in the EU-ETS have a rather oligopolistic nature, which might determine a similar oligopolistic concentration of carbon permits in a few dominant firms that could exert their market power by influencing the transaction price of the traded permits. If this is the case, achieving the required GHG emission reductions level would imply higher economic costs than under the competitive market.

3. The regime for the allocation of EUAs and the general regime and validity of allowances

3.1. General rules for allocation of EUAs

The EU ETS was firstly established by EC Directive 2003/87, which initially foresaw a free allocation of the EUAs, based on a *grandfathering* method. The EUAs were distributed to the incumbent operators according to specific National Allocation Plans (NAPs) developed by the EU Member States. The EU ETS format described above covered two periods, 2005-2007 and 2008-2012, and was mainly intended as a learning by doing experience.

EC Directive 2003/87 was substantially amended by EC Directive 2009/29, which strengthened and improved the EU ETS, while foreseeing a third committment period covering the period 2013-2020 and a fourth one running from 2021 to 2028.

One of the main novelties brought by EC Directive 2009/29 covers the EU allowance allocation method which, starting from 2013, are normally no longer issued for free and under a *grandfathering* criteria, but rather via auctioning. Indeed, the previous allocation regime adopted in the first trading periods foresaw by EC Directive 2003/87 proved to be not suitable to reach the ETS objective of halting GHG emissions in a cost-efficient manner, mainly due to overallocation to incumbent operators and surplus of EUAs in the related market.

The new allocation regime established by EC Directive 2009/29 seeks to overcome these shortcomings and create a more dynamic and efficient market, at the same time effectively promoting mitigation of GHG emissions and eco-innovation in the sectors under the EU ETS coverage. The detailed rules on allocation are analysed hereinafter.

3.2. The EU-wide Cap for stationary installations and for the aircraft operators

First of all, the total quantity of EUAs to be allocated every year in the period 2013-2020 and 2021-2028, are set at EU level by a Decision adopted by the European Commission: therefore, an EU-wide Cap is set at central level.[5] The available allowances within this Cap

[5] The 2013 Cap is set by EU Decision 2010/634 (*Commission Decision of 22 October 2010 adjusting the Union-wide quantity of allowances to be issued under the Union Scheme for 2013 and repealing Decision 2010/384/EU*).

are allocated to Member States according to detailed rules set by EC Directive 2009/29 and then allocated to operators subject to the EU ETS by means of auctioning (although some exceptions apply, as it will be described below in greater detail).

As far as stationary installations are concerned, article 9 of the revised EU ETS Directive, states that for each year after 2013, the EU-wide Cap will decrease by a linear factor of 1,74% of the average quantity of EUAs issued annualy in 2008-2012. This annual linear reduction will lead in 2020 to a number of GHG emissions from stationary installations 21% lower than 2005. The linear factor shall be reviewed if appropriate by the Commission as from 2020 with the aim to adopt an "adjustment" decision by 2025. By 28th February of each year, each Member State shall issue the allowances to be allocated to its stationary installations.

As already explained above, the operators are subject to the GHG permit application and conditions (artt. 3-6 EU ETS Directive) and to the so called *EU ETS compliance cycle* whereby their GHG annual emissions shall be monitored, reported and verified and, finally, they shall surrender a number of EUAs equal to their verified GHG emissions of the preceding year by 30th April.

As far as aircraft operators are concerned, article 3(c)(2) provides that the aviation total quantity of allowances for 2013-2020 shall be 95% of the historical aviation emissions (i.e. average of the aviation annual emissions for years 2004, 2005 and 2006) multiplied by the number of the years in the period. According to article 3(d), 15% out of these total aviation emissions will be allocated to aircraft operators through the auctioning system, under the auctioning rules that will be analysed later in this chapter. The 85% of aviation allowances will be distributed for free according to the rules spelled out in article 3(e) and already analysed in the paragraphs above, i.e.: the aircraft operator shall submit the national competent authority an application including the monitoring plan and the verified tonne/km data for the monitoring year. On the basis of article 3(f), 3% out of the total aviation emissions not to be auctioned (i.e. the 85% of aviation allowances) shall be set aside for later distribution as a s*pecial reserve* for fast growing airlines (whose tonne/km increases by an average of more than 18% annualy) and new entrants into the market (starting performing the aviation activity after 2012).

The competent national authority will submit the applications received to the Commission, that will decide on the EU wide total quantity of aviation allowances to be issued and, among this Cap, the amount of allowances to be auctioned (15%) and to be allocated for free (85%). Within the ones to be allocated for free, a 3% will be set aside as special reserve. The total amount of aviation allowances to be allocated for free in the period 2013-2020 will be determined by the Commmission on the basis of a benchmark calculated by dividing the total amount of free allowances by the sum of tonne/km data included in the applications submitted by the aircraft operators.

After the Commission decision, each administering Member States[6] shall calculate and publish the total aviation allowances to be allocated for free to the aircraft operators, by multiplying the benchmark by the 2010 tonne-km data of each aircraft operator. By 28th February of each year, the competent administering Member State shall issue to the aircraft operators the aviation allowances.

3.3. The allocation rules for EUAs to stationary installations

As mentioned above, as a general rule, from 2013 onwards, the default method of allocation of EUAs to stationary installation is auctioning (article 10 EU ETS Directive). In fact, auctioning is deemed the most transparent, non discriminatory allocation method as well as the most suitable implementation of the *"polluter-pays"* principle.

Article 10 of the EU ETS Directive as amended, identifies the Member States' shares of allowances in the auctioning volume. More in detail, it determines that the total quantity of EUAs to be auctioned by Member States shall be composed as follows:

a) 88% of the total quantity of allowances to be auctioned shall be distributed amongst Member States in shares that are identical to the share of verified emissions under

[6] For a definition of *"administering Member State"* see article 2q of EU ETS Directive: *"Member State responsible for administering the ETS Community scheme in respect of aircraft operators in accordance to article 18a"*.

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the Community scheme for 2005 or the average of the period from 2005 to 2007, whichever one is the highest, of the Member State concerned;

b) 10% of the total quantity of allowances to be auctioned shall be distributed amongst certain Member States for the purpose of solidarity and growth within the Community, thereby increasing the amount of allowances that those Member States auction under point (a) by the percentages specified in Annex IIa of the EU ETS Directive (these are 19 Member States that benefit from an additional revenue to invest in low carbon technologies and adaptation to climate change);[7] and

c) 2% of the total quantity of allowances to be auctioned shall be distributed amongst Member States the GHGs emissions of which were, in 2005, at least 20% below their emissions in the base year applicable to them under the KP. The distribution of this percentage amongst the Member States concerned is set out in Annex IIb to the EU ETS Directive (this is the so called *Kyoto bonus*).[8]

According to article 13 of the EU ETS Directive as amended, the allowances issued from 2013 onwards shall be valid for the entire 2013-2020 period (3rd committment period). To this end, four months after the beginning of each period referred to above, allowances which are no longer valid and have not been surrendered and cancelled in accordance with Article 12 of the EU ETS Directive, shall be cancelled by the competent authority. Then, Member States shall issue allowances to persons for the current period to replace any allowances held by them which have been cancelled.

According to article 11 of the EU ETS, each Member State shall develop the so called *National Implementation Measures*, i.e. the list of installations covered by the EU ETS Directive in its territory and any free allocation to each installation in its territory calculated in accordance with the rules referred to in Article 10a(1) and Article 10c of the Directive. These measures shall be published and submitted to the EU Commission for approval.

[7] These States are: Belgium, Bulgaria, Czech Republic, Estonia, Greece, Spain, Italy, Cyprus, Latvia, Lithuania, Luxembourg, Hungary, Malta, Poland, Portugal, Romania, Slovenia, Slovakia, Sweden.

[8] These States are: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia.

3.4. The benchmarks and the special regime for manufacturing and risk of carbon leakage

The general regime of default auctioning allocation described so far, is subject to some exceptions foreseen in articles 10(a)-(b) and (c) of the EU ETS Directive as amended, providing for free allocation of EUAs to certain sectors and under certain conditions.

Before going through these exceptions, it is important to underpin that no derogation from the monitoring, reporting and verification (*EU ETS compliance cycle*) is foreseen for the installations benefitting from free allocation, since all the operators subject to the EU ETS face the same monitoring, reporting and verification duties. On the contrary, the exceptions only cover the allocation method of the EUAs.

The article 10a provisions have been implemented by EU Commission Decision 2001/278 determining transitional Union-wide rules for harmonised free allocation of emission allowances pursuant to Article 10a of EC Directive 2003/87 and EU Commission Decision 2010/2 determining a list of sectors and sub sectors exposed to a significant risk of carbon leakage.

Firstly, as a rule, no free allocation is foreseen for the electricity production and free allocation will progressively decrease up to 30% in 2020, with the view to be totally phased out by 2027 (article 10(a).11).

The free allocation is performed on the basis of *ex ante* benchmarks established by the Commission. Benchmarks are established per product and not per sector or output, and are values used to calculate free allocation per installation. They reflect the average of GHG emission performance of the 10% best performing installations (for a given product) in 2007-2008 in the EU. Moreover, the benchmarks do not differ according to the technology or fuel used or the size or location of the installation. Such an approach shall ensure no distorsion of competion and transparency, at the same time providing incentives to GHG emission reductions and efficiency in the production activity.

The installations that reach performances closer to the benchmark will receive more EUAs, while the ones far from meeting the benchmark will receive a lower amunt of EUAs for free, thus being forced to improve their performance or buy the extra EUAs in the market, or a combination of the two options (flexibile approach).

More in detail, manufacturing industry shall receive 80% of EUAs for free, distributed on the basis of the ex-ante benchmarks, but this percentage shall annualy decrease to 30% in 2020 and 0% in 2027. Therefore, a maximum amount of EUAs that can be distributed free of charge is determined.

Sectors and subsectors exposed to a significant risk of carbon leakage will receive 100% of EUAs free of charge. The term *"carbon leakage"* is used to refer to the practice of operators who transfer their production in countries with laxer GHG constraints. In this respect, article 10 (a).12-18 defines the detailed norms related to carbon leakage.

First of all, a sector or subsector is deemed to be exposed to a significant risk of carbon leakage if both of the two following requirements are fulfilled (article 10 a.15):

a) the sum of direct and indirect additional costs induced by the implementation of the EU ETS Directive would lead to a substantial increase of production costs, calculated as a proportion of the gross value added, of at least 5%; and
b) the intensity of trade with third countries, defined as the ratio between the total value of exports to third countries plus the value of imports from third countries and the total market size for the Community/Union (annual turnover plus total imports from third countries), is above 10%.

Besides these two circumstances, a sector or subsector is also deemed to be exposed to a significant risk of carbon leakage if one of the two following conditions applies (article 10 a.16):

a) the sum of direct and indirect additional costs induced by the implementation of the EU ETS Directive would lead to a particularly high increase of production costs, calculated as a proportion of the gross value added, of at least 30%; or
b) the intensity of trade with third countries, defined as the ratio between the total value of exports to third countries plus the value of imports from third countries and the total market size for the Community/Union (annual turnover plus total imports from third countries), is above 30%.

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Similarly to the manufacturing industry, and despite the softer regime applicable to the carbon leakage sectors and subsectors, the ex-ante benchmarks approach applies here alike.

Thus, sectors and subsectors under carbon leakage risk which reach the benchmark level will receive a higher share of free EUAs while the other ones falling short on the benchmark level will receive a proportional lower amount of free EUAs.

As a result, only the most efficient and best performing sectors and subsectors under carbon leakage will receive an amount of EUAs enough to cover their GHG emissions needs, as monitored, reported and verified.

The list of sectors and subsectors facing the risk of carbon leakage is adopted by a Commission decision for 5 years, but may be amended meanwhile. In 2009, the EU Commission adopted Decision 2010/2, containing the first list of sectors and subsectors under risk of carbon leakage, to be applied for the period 2010 to 2014.[9] Recently, in October 2014, the EU Commssion, following consultations with all the relevant stakeholders, adopted Decision 2014/746, which contains the second revised list of sectors and subsectors under risk of carbon leakage. The new Decision will enter into force on 1 January 2015 and will cover the period 2015 to 2019.

3.5. The special regime for modernization of electricity generation

In principle, no free allocation is foreseen for the electricity production.

However, article 10c of the EU ETS Directive, provides for an option for a transitional free allocation to installations for electricity production in operation by 31 December 2008 or to installations for electricity production for which the investment process was physically initiated by the same date, provided that one of the following conditions is met:

a) In 2007, the national electricity network was not directly or indirectly connected to

[9] The original list adopted in 2009 with EU Decision 2010/2 was amended by two subsequent Commission Decisions. These are, namely: EU Commission Decision 2011/745 of 11 November 2011 amending EU Decisions 2010/2 and 2011/278 as regards the sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage (document C(2011) 8017) and EU Commission Decision amending EU Decisions 2010/2 and 2011/278 as regards the sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage (document C (2012) 5715).

the network interconnected system operated by the Union for the Coordination of Transmission of Electricity (UCTE); or

b) In 2007, the national electricity network was only directly or indirectly connected to the network operated by UCTE through a single line with a capacity of less than 400 MW; or

c) In 2006, more than 30% of electricity was produced from a single fossil fuel, and the GDP per capita at market price did not exceed 50% of the average GDP per capita at market price of the Community.

Furthermore, only 10 Member States are eligible to grant their power plants this more favourable allocation of EUAs, namely Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland and Romania.

Additional to this limitation in the scope of application of the exception, other two limitations apply to this case, one related to the time and the other one to the quantity of EUAs to be freely allocated. As to the former, the time limit for the free allocation is set at 31 December 2019, since no free allocation is allowed as from 2020. As to the latter, the maximum amount of EUAs to be freely allocated in 2013 shall not exceed 70% of the annual average verified emissions in 2005-2007 from such electricity generators for the amount corresponding to the gross final national consumption of the Member State concerned and shall gradually decrease, resulting in no free allocation in 2020.

Moreover, the free allocation to the electricity sector is subject to the condition that modernization of the electricity generation will take place.

In fact, the Member State concerned shall submit to the Commission a national plan that provides for investments in retrofitting and upgrading the infrastructure and in clean technologies. The national plan shall also provide for the diversification of their energy mix and sources of supply for an amount equivalent, to the extent possible, to the market value of the free allocation with respect to the intended investments, while taking into account the need to limit, as far as possible, directly linked price increases.

The Member State concerned shall submit to the Commission, every year, a report on investments made in upgrading its infrastructures and introducing clean technologies.

The Commission is competent for assessing the national plans and consequently deciding on the eligibility of the power plant for the free EUAs allocation, also taking into account the general requirements set by article 10c.

As already anticipated, the *ratio* behind this rule exempting the 10 above mentioned Member States from full auctioning of the EUAs for their electricity sector is to provide some extra time and incentive for the modernization of their electricty sector. This also explains the conditional requirement to provide a national plan of retrofitting and upgrading the related infrastructures and technologies in order to benefit from the exemption.

The shares of EUAs allocated for free under the regime described above are deducted from the amount of EUAs that the Member State concerned would have auctioned pursuant to article 10 of the EU ETS Directive.

4. The new entrants reserve (NER) and the NER 300 programme

Article 10 a.7 states that 5% of the EU-wide allowances for the period 2013-2020 shall be set aside for the so called *new entrants*, namely:

- any installation carrying out one or more of the activities indicated in Annex I, which has obtained a GHG emissions permit for the first time after 30 June 2011;
- any installation carrying out an activity which is included in the Community scheme pursuant to Article 24(1) or (2) for the first time, or
- any installation carrying out one or more of the activities indicated in Annex I or an activity which is included in the Community scheme pursuant to Article 24(1) or (2) (i.e. activities or GHG not listed in Annex I but included in the EU ETS by decision of the Member States under certain conditions and Commission approval), which has had a significant extension after 30 June 2011, only in so far as this extension is concerned.

Moreover, article 10a.8 establishes the so called *"NER 300"*, one of the world's largest funding programmes for innovative low-carbon energy demonstration projects. The programme aims at becoming a catalyst for the demonstration of environmentally safe carbon capture and storage (CCS) and innovative renewable energy (RES) technologies on a commercial scale within the European Union.

As the name NER300 suggests, the programme is funded from the sale of 300 million emission allowances from the new entrants' reserve (NER) set up for the third phase of the EU-ETS. In particular, article 10a.8 provides that up to 300 million allowances within the new entrants' reserve shall be available until 31 December 2015 to help stimulate the construction and operation of up to 12 commercial demonstration projects that aim at the environmentally safe capture and geological storage (CCS) of CO2 as well as demonstration projects of innovative renewable energy technologies, in the territory of the Union.

Such allowances shall be made available for support for demonstration projects that provide for the development, in geographically balanced locations, of a wide range of CCS and innovative renewable energy technologies that are not yet commercially viable.

Their award shall be dependent upon the verified avoidance of CO_2 emissions and the related projects shall be selected on the basis of objective and transparent criteria that include requirements for knowledge-sharing.

The total supply of EUAs NER300 has been divided in two tranches:

1 200 millions allowances were allocated between December 5, 2011 and September 28, 2012;

2 100 millions allowances will be auctioned in 5 months, starting from November 14, 2013

The first Call for proposals launched by the EU Commission was closed in December 2012. Therefore, the first projects awarded funding are now moving towards implementation. They must reach their final investment decisions by December 2014, and enter into operation by December 2016.[10] Currently, the second Call for project proposals, launched on 3rd April 2013, is running.

Unfortunately, the total amount of revenues coming from tranche I of NER 300 has been significantly lower than expected due to a depressed carbon price. Table 1 reports the

[10] The EU Commission took the first award decision in December 2012, see C (2012) 9432 final Commission implementing Decision of 18.12.2012 *Award Decision under the first call for proposals of the NER300 funding programme*.

monthly sales of EUAs NER300 and the corresponding revenues for the first tranche of 200 millions EUAs NER300, while figure 1 shows the average unit price observed monthly during the first phase of implementation.

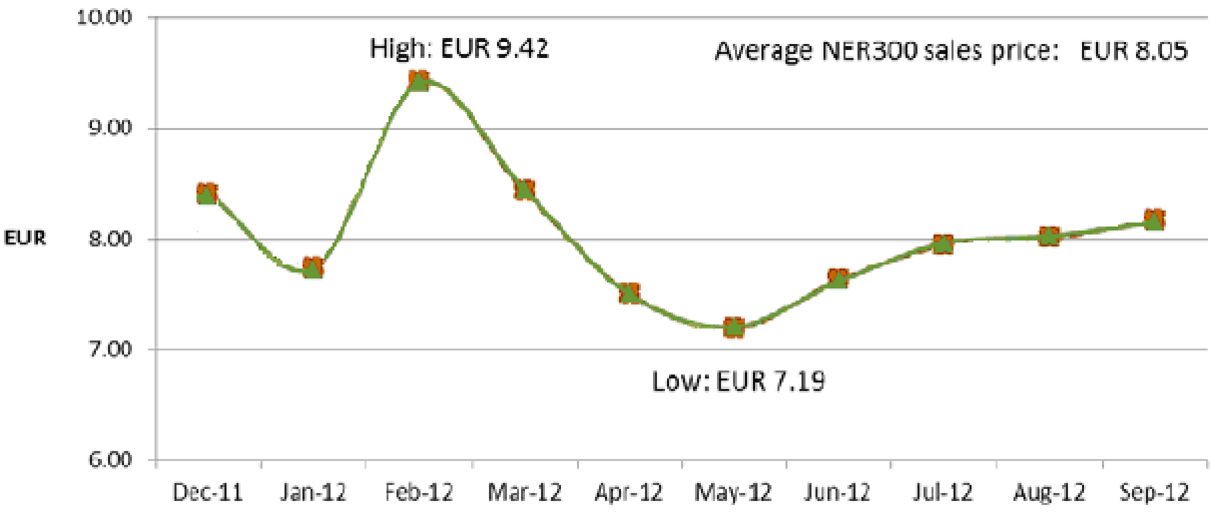
Tab. 1 – Detailed breakdown of monthly sales of EUAs NER300 during first phase of plan implementation (Dec 2011 – Sep 2012)

Month	Sales channels	Volume sold (EUA)	Executed average price *** (EUR)	Deviation from Emissions Index (excluding auctions)	Value of sold allowances (EUR)
December 2011	OTC	12,000,000	8.15	0.000%	97,849,000
January 2012	OTC	21,500,000	7.87	+ 0.051%	169,201,000
February 2012	OTC	23,500,000	9.42	+ 0.003%	221,476,500
March 2012	OTC OTC exchange-cleared Direct screen trades	21,400,000 25,000 175,000	8.43	+ 0.001%	182,114,710
April 2012	OTC OTC exchange-cleared Direct screen trades	10,950,000 1,750,000 7,800,000	7.51	+ 0.002%	153,869,020
May 2012	OTC OTC exchange-cleared Direct screen trades	3,200,000 8,200,000 9,600,000	7.19	0.000%	151,028,600
June 2012	OTC OTC exchange-cleared Direct screen trades Auctions	800,000 6,854,000 5,096,000 8,750,000	7.54 * 7.76**	+ 0.003%	164,079,320
July 2012	OTC exchange-cleared Direct screen trades Auctions	5,125,000 4.125,000 11,250,000	7.99 * 7.90**	+ 0.003%	162,829,760
August 2012	OTC exchange-cleared Direct screen trades Auctions	4,300,000 3,250,000 11,500,000	8.06 * 7.97**	+ 0.004%	152,545,510
September 2012	OTC exchange-cleared Direct screen trades Auctions	2,550,000 6.300,000 10,000,000	8.25 * 8.12**	+ 0.007%	154,132,040
Total		**200,000,000**	**8.05**		**1,609,125,460**

* Average price executed via OTC, OTC exchange-cleared and direct screen transactions
** Average price executed via auctions
*** The executed average price is calculated before deduction of expenses and market and EIB fees. Market fees and expenses include margins on volume weighted average price transactions, trading fees, exchange and clearinghouse fees and collateral funding costs.

Source: EIB (2013).

Fig. 1 – Average NER300 sales EUA price and the average ICE Emissions Index trend during Dec 2011-Sep2012 period.



Source: EIB (2013).

In the second phase of implementation the price was even lower so that the revenues arising from tranche II of NER 300 are likely to be unable to trigger CCS and RES technologies in the near future. Table 2 below provides the monthly and total volume of EUAs NER300 sold between November and December 2013.

Table 2 – Breakdown of monthly sales of EUAs NER300 November-December 2013 period

Month	Sales channel	EU Allowances sold (#)	EU Allowance contract	Executed average price (EUR)	Deviation from Index	Value of EU Allowances sold (EUR)
Nov-13	Screen trades OTC cleared	10,250,000 300,000	Dec-13	4.45	0.03%	46,947,320
Dec-13	Screen trades OTC cleared	16,300,000 500,000	Dec-14	4.86	0.01%	81,695,800
Total		**27,350,000**		**4.70**	**0.02%**	**128,643,120**

Source: EIB (2014).

5. The revenues of the auctions

The EU ETS is designed as a cost effective, market based tool to achieve GHG mitigation by supporting and integrating the other necessary direct mitigation actions and measures taken at EU level and furthered at national level by EU Member States.

The rules on the use of revenues generated from the auctioning, which might be somehow defined as a sort of *"tied use"*, is a good example of the effects of the EU ETS on other aspects and measures conceived for halting climate change.

In fact, according to article 10.3 of EC Directive 2003/87 Member States shall determine the use of revenues generated from the auctioning of allowances, but the following regime applyies:

- at least 50% of the revenues generated from the auctioning of allowances or the equivalent in financial value of these revenues, should be used for one or more of the following:

a) to reduce GHGs emissions, including by contributing to the Global Energy Efficiency and Renewable Energy Fund and to the Adaptation Fund as made operational by the Poznan Conference on Climate Change (COP 14 and COP/MOP 4), to adapt to the impacts of climate change and to fund research and development as well as demonstration projects for reducing emissions and for adaptation to climate change, including participation in initiatives within the framework of the European Strategic Energy Technology Plan and the European Technology Platforms;

b) to develop renewable energies to meet the commitment of the Community to using 20% renewable energies by 2020, as well as to develop other technologies contributing to the transition to a safe and sustainable low-carbon economy and to help meet the commitment of the Community to increase energy efficiency by 20% by 2020;

c) to promote forestry sequestration in the Community;

d) to develop the environmentally safe capture and geological storage of CO_2, in particular from solid fossil fuel power stations and a range of industrial sectors and subsectors, including in third countries;

e) to encourage a shift to low-emission and public forms of transport;

f) to finance research and development in energy efficiency and clean technologies in the sectors covered by the EU ETS Directive;
g) to promote measures intended to increase energy efficiency and insulation or to provide financial support in order to address social aspects in lower and middle income households;
h) to cover administrative expenses of the management of the Community scheme.

Member States shall be deemed to have fulfilled the conditions set above if they have in place and implement fiscal or financial support policies, including in particular in developing countries, or domestic regulatory policies which have a value equivalent to at least 50% of the revenues generated from the auctioning of allowances. Finally, they shall inform the EU Commission on the use made of the revenues of the auctions. Germany, for instance, is currently spending most of its auction revenues to finance climate change projects in developing countries and emerging economies.

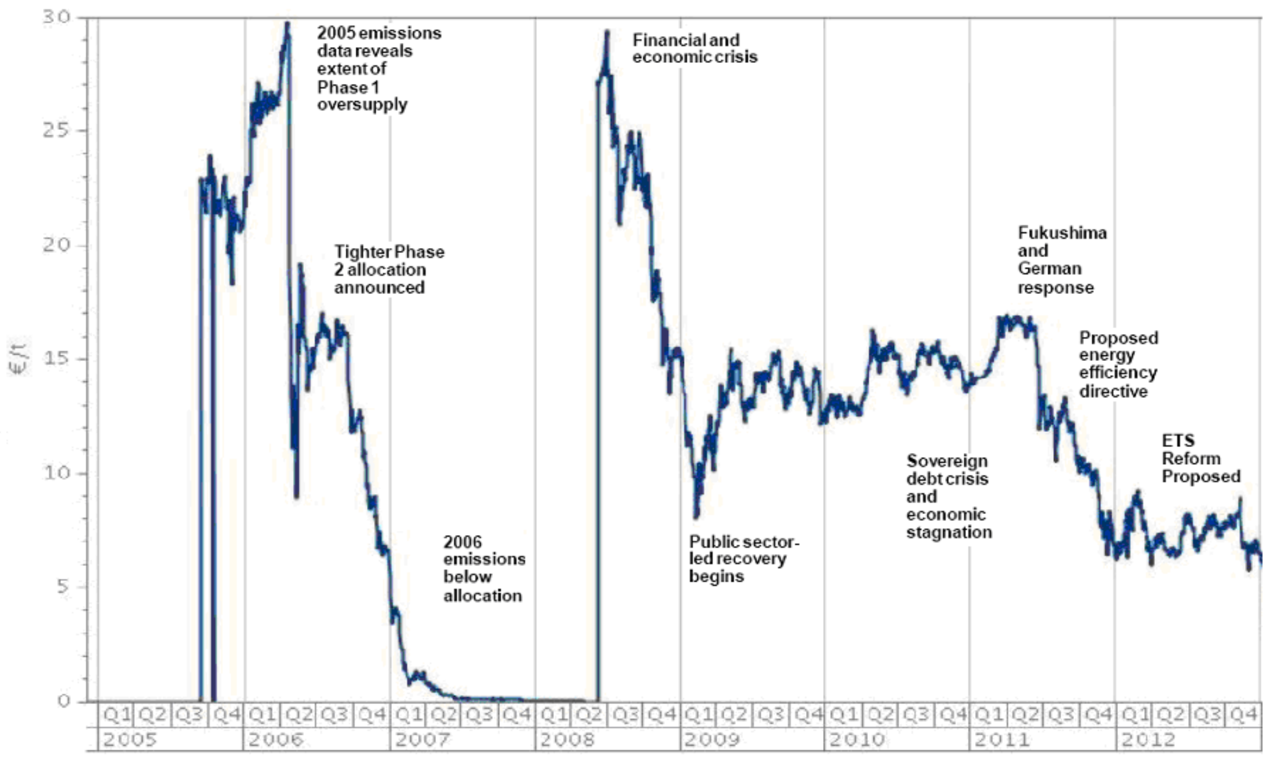
The increasing role of auctioning as the initial allocation method of the allowances in the years to come can be used to raise money that governments may use to finance environment-related projects and support environmentally friendly technologies, as well as to help mitigating the sovereign debt crisis that is adversely affecting their economies. As a consequence, a proper use of the auction revenues could potentially generate a double dividend (improved environmental quality and lower budget deficits). This possibility, however, obviously depends on the actual capacity to raise enough revenues through auctioning, a possibility that should not be given for granted, as the recent trend seems to show.

6. Carbon Pricing and price ceiling

During the EU-ETS Phase I (2005-2007), the average annual price of EUA followed a trend characterized by a strong volatility on spot market, ranging between €7 and €31/ton, until 2007, when it basically collapsed to zero. This situation can be ascribed to the confluence of several factors. First, the goals for emission reduction in the pilot program were constructed under time pressure with a shortage of reliable data and turned out to be relatively modest and not stringent enough.[11] Second, aggregate emission data were unavailable until almost halfway through the pilot program, and when the first tranche of actual emissions data was released in 2006 by the EU Commission, market participants realized aggregate emission levels were low vis-à-vis allowance supply. Third, emissions allowances in this pilot first phase of the program could only be used between 2005 and 2007 and could not be further banked. Fourth, the increase in energy efficiency and renewable energy sources promoted by the 20-20-20 Climate Energy package significantly contributed in further lowering the demand for permits, thus exacerbating market unbalance.[12] The too-late realization of an existing oversupply coupled with an inability to use excess allowances sparked a dramatic fall in prices. The rationale for not allowing banking was the desire to separate Phase II (which coincided with the first Kyoto compliance period starting in 2008) from the pilot program period, but the consequences of this decision were self-evident: by the final quarter of 2007, spot prices were essentially equal to zero, at €0.06/ton, even while contract futures prices for Phase II allowances hovered above €20/ton.[13] Figure 2 below summarizes the EUAs price trend during the 2005-2012 period.

[11] See Ellerman D., Convery, De Perthius, 2010.
[12] On the optimal policy mix between carbon pricing and energy policies (such as energy efficiency and support to renewables) see the interesting contributions recently published by Lecuyer and Quirion (2013) and Hood (2013) who provide further theoretical insights and guidance for policymakers on this issue.
[13] Point Carbon, 2012.

Fig. 2 – EUA's price trend considering the influence of several political and economic events occurred in the 2005-2012 period.



Source: authors' own elaboration based on Point Carbon (2013) data.

Contrary to what happened in 2005-2007, during Phase II the average annual EUA price trend has been relatively more stable. As shown in Figure 3, annual prices have been oscillating between €8,12 and €22,48/ton CO2,[14] depending on the levels of allowances demand.

In EU-ETS implementation Phase II the supply and demand of allowances on spot market are "[…] *being adjusted through exchanges and over-the counter transactions based on price levels, institutional characteristics of the market (compliance requirements, banking provisions, etc.), fundamentals identified during Phase I (linked to other energy markets*

[14] *ICE Global Markets in Clear View, 2013.*

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prices, weather events, economic growth, etc.), and anticipations of the reduced allocation which will be linearly enforced through time [...]". [15]

Between 2008 and 2012, the intertemporal evolution of the EUA spot market was affected by several factors, which contributed to determine an overall downward trend, such as the on-going financial crisis and the delays in post-Kyoto negotiations after the unsatisfactory outcome of the Copenhagen Summit. These different and contextual events can explain the descending trend of the EUA unit market spot price, which decreased the value of a CO_2 equivalent ton by about 63,88% from 2008 to 2012 (see Table 3).

As Table 3 shows, the observed reduction in the average annual price in Phase II has been accompanied by an increase in the overall EUAs auctioned or sold in the secondary market.[16] While in Phase I (2005-2007) the market volume did not exceed 6,800,000 ton CO_2 equivalent, in Phase II the EUAs sold on the spot market have increased annually – both in absolute terms and as a percentage of the permits given for free - until reaching in 2012 the peak of 125,034,099 ton CO_2 equivalent of permits. This increasing trend continued in 2013, when the EU ETS third phase started. In fact, in the first nine months of 2013 the market volume actually experienced a boom, since the EAU auctioned or sold on the spot market exceeded 588 billion of tons CO_2 equivalent permits.[17]

It should be noted that the drastic reduction of the average annual price in 2012 (column 3) has more than compensated the progressive increase in the number of transactions (column 2), so that the estimated value of the ETS market (column 4) has decreased in 2012 with respect to the previous year. On the contrary, the market volume has been so high in the period January-September 2013 that the estimated value of the ETS market has

[15] Chevallier J., 2010.

[16] Notice that we are not claiming here the existence of a direction of causality between the two phenomena. Their correlation, however, is relevant to assess the evolution of the overall market volume, as described below.

[17] The updated values reported in the last row of Table1.3 have been computed by the authors based on the periodic reports of the EUAs auctioned on the primary market in the three EU validated markets: the *Transitional Common Auction Platform*; *Auction Platform Germany*; *Auction Platform UK* (see http://ec.europa.eu/clima/policies/ets/cap/auctioning/documentation_en.htm). These data are consistent with the estimations reported in the document recently published by the Italian Manager of Energy Services (GSE, see http://www.gse.it/it/Gas%20e%20servizi%20energetici/GSE_Doc_AsteCO2/Archivio%20Storico/130906_RAPPORTO%20ASTE%20CO2_Trimestri_1-2_2013_.pdf).

increased dramatically with respect to the past and reached a peak despite the extremely low average price observed over that period. The increase of the auction volume observed in Phase II and in this first tranche of Phase III is likely to suggest a higher maturity of the carbon market, with professional traders having a better knowledge of its functioning and several big operators beginning to participate to the market.

Table 3 – EU-ETS market volume and average annual price during the period 2005-Sept. 2013

	Freely allocated EUAs	Auctioned or sold EUAs (total amount)	Auctioned or sold EUAs (as percentage of freely allocated)	EUA average clearing price	Estimated revenues
2005	2096237465	0	0	0	0
2006	2071557066	6781750	0,33%	14,32	97114660
2007	2152943931	1729500	0,08%	10,83	18730485
2008	1958526978	53130000	2,71%	22,48	1194362400
2009	1974536150	79315050	4,02%	14,18	1124687409
2010	1998167092	91861500	4,60%	15,25	1400887875
2011	2016870610	92942565	4,61%	14,09	1309560741
2012	2049960954	125034099	6,10%	8,12	1015276884
2013	**886540000** [a]	588723000 (jan-sep)	66,41%	4,29 (jan-sep)	2528259590 (jan-sep)

[a] See the *Status table on free allocation to industry and heat production for 2013* (updated on 3 Febrary 2014) http://ec.europa.eu/clima/policies/ets/cap/allocation/docs/process_overview_nat_en.pdf

Source: authors' own elaboration on the basis of European Environment Agency (2013), ICE Global Markets in Clear View (2013), European Commission (2013) and European Energy Exchange (2013) databases.

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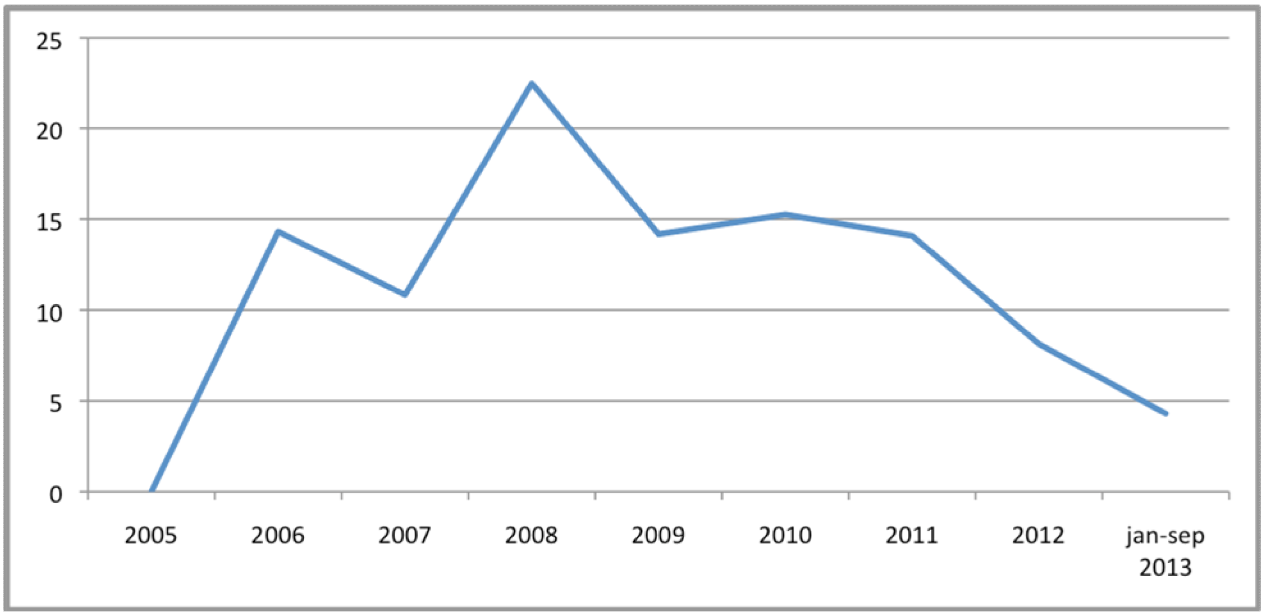
Fig. 3 – Average EUA price trend during the period 2008 - 2013 (jan-sep).



Source: authors' own elaboration on the basis of European Environment Agency (2013) and ICE Global Markets in Clear View (2013).

The EUA price kept on decreasing at the end of 2012 and in the first few months of 2013. In fact, as Figure 4 shows, during November 2012 and February 2013 the auction clearing price for the EUAs ranged between €3.43 and €8.49 per allowance.[18]

Afterwards, between March 2013 and April 2013 the auction clearing price for the EUAs moved further down to a range between € 2.65 and € 4.98 per allowance (Figure 5).[19]

As Figure 6 shows, if we consider the overall period between November 2012 and September 2013, the EUA average spot market price was equal to 4.56 in the primary market and 4.63 in the secondary market. As emerges from the figure, the spot price has shown again an ample variance around these averages even in Phase III, but such variations have been less pronounced than in Phase II (the price range being 5.84 in Phase III versus 14.36 in Phase II). However, in Phase III the price has been stabilizing around a much lower average than in the previous phase. From the comparison of the last two

[18] European Commission, 2013

[19] The auction on 12 March had to be cancelled because it would have otherwise cleared below the reserve price.

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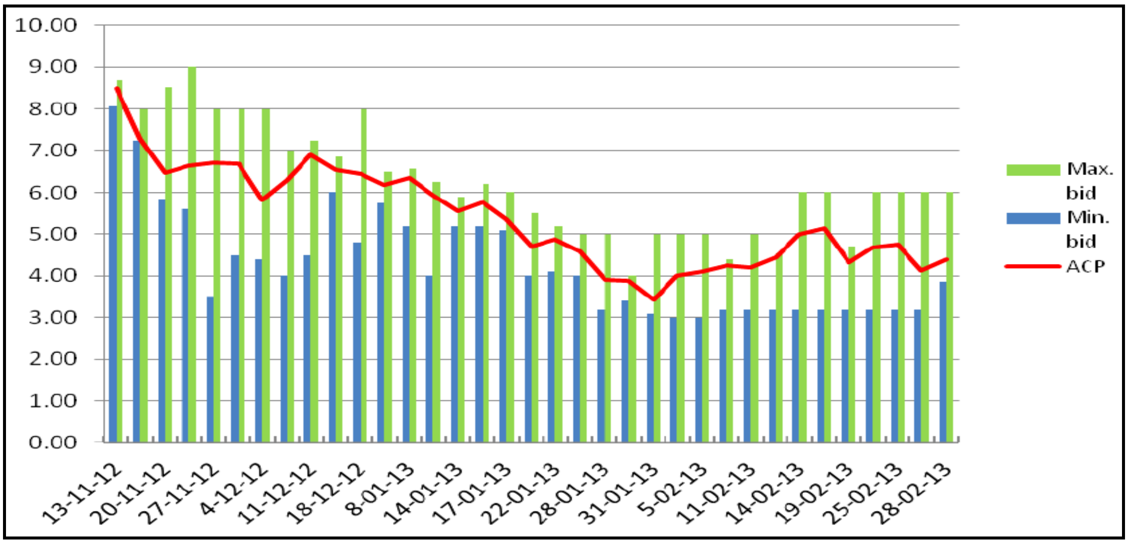
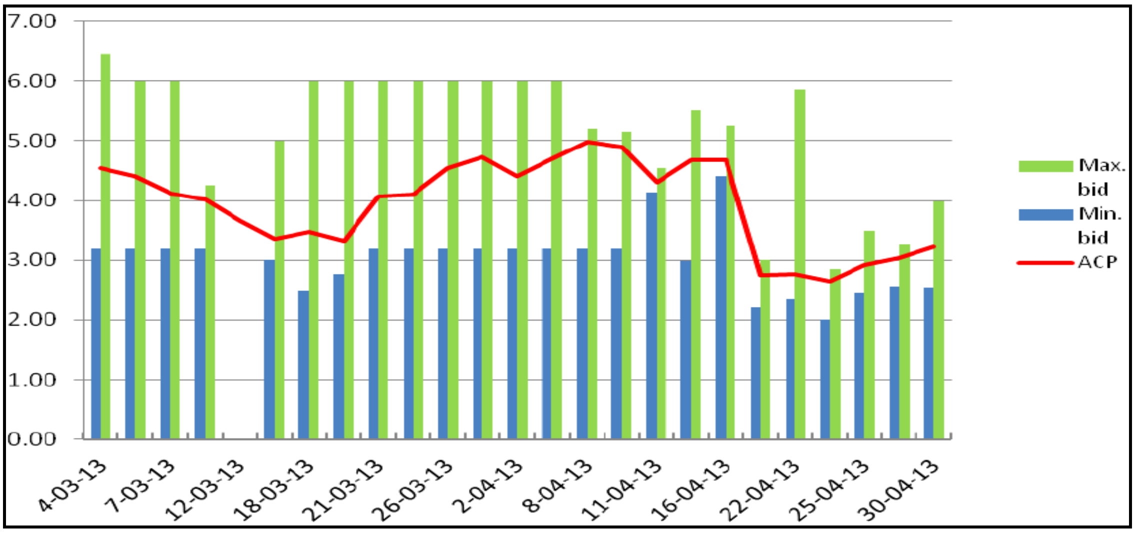
phases, in fact, it emerges that in Phase III the average annual price in the primary market (4.56) has been about half the lowest average annual price in Phase II (8.12).

Fig. 4 – Auction clearing price, maximum bid and minimum prices bid (euro/ton CO2-e) during November 2012 – February 2013 period.



Source: European Commission (2013),. Auctions by the transitional common auction platform 1st Report.

Fig. 5 – Auction clearing price, maximum bid and minimum prices bid (euro/ton CO2-e) during March 2013 – April 2013 period.



Source: European Commission (2013), Auctions by the transitional common auction platform 2nd Report.

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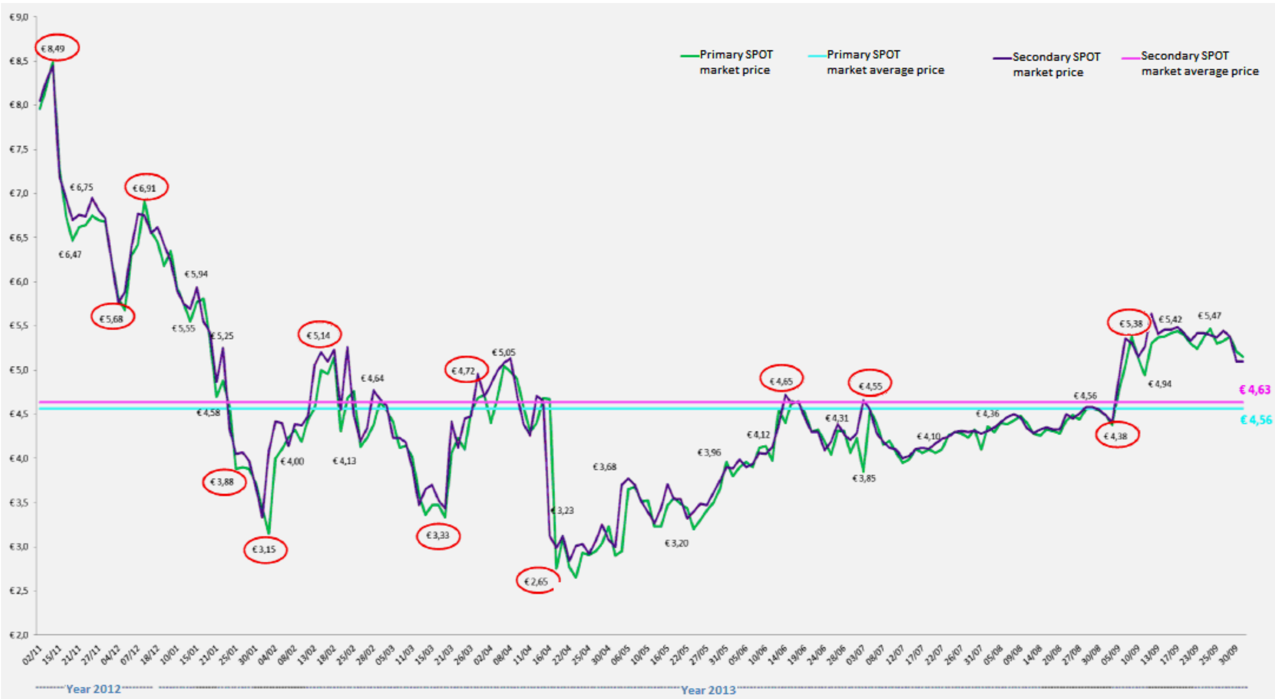
Fig. 6 – EUA average spot market price (November 2012-September 2013)



Source: authors' own elaboration on base of European Energy Exchange (EEX) data.

The high volatility in the EUAs price characterizing the implementation of the EU-ETS so far, as well as the recent declining trend described above, raise the question on the opportunity to set upper and/or lower bounds to limit the price variations within a given range of values. In this regard, it should be emphasized that the EU-ETS penalty system described above implicitly sets an upper bound to the EUA carbon price (i.e. the price of the allowance to produce 1 ton/y of CO_2). As a matter of fact, if the current carbon price gets particularly high (well above the penalty), firms may prefer not to cover their excess emissions and run the risk of having to pay the penalty as long as the expected cost of being non-compliant is below the current cost of purchasing the allowances. This point has been illustrated in heuristic terms by Borghesi (2011) using a simple analytical framework.

More precisely, as pointed out above, art. 16 of the Emission Trading Directive establishes that if an operator emits more than allowed by the permits at disposal, it will be liable not only to pay the penalty, but also to purchase the excess emissions *"when surrendering* *allowances in relation to the following calendar year"*. This suggests that the price that the non-compliant firm has to pay for its excess emissions is given by the market price when the purchase is made. Therefore, if firms expect that the future carbon price will be much lower than the present one, they may have an incentive to cheat (i.e. not cover all their emissions). It follows that the large fluctuations of the market price, together with possible limitations in the monitoring system observed so far, might possibly generate moral hazard behaviors among the operators. However, given the extremely low value of the carbon price at present and the high value of the penalty (€100/ton), this theoretical problem is currently far from occurring in practice.

A price ceiling might provide a useful "safety net" against possible mistakes by policy-makers. The latter, in fact, often lack sufficient information on the firms' abatement costs when establishing the emission cap. A price ceiling, therefore, may prevent abatement costs from rising above what is socially optimal and in this sense a penalty system might be a useful instrument against upward price fluctuations. If so, however, it would be reasonable to introduce in the market also a lower bound for the carbon price to prevent that possible flaws in the policy design (such as a too high emissions cap) may reduce the carbon price below what is socially optimal. In this regard, it is worth mentioning that Moreno-Bromberg and Taschini (2011) have proposed a new policy instrument (named *European-Cash-4-Permits*). Using a non-cooperative game theoretical model, the authors show that such instrument could generate a floating price floor. At the moment, however, the EU-ETS neither has, nor envisages a price floor for the unit value of the EUA.

7. Back-loading and proposals for other structural reforms of the EU ETS

The EU ETS represents a milestone of the EU climate change policy and largely inspires other several ETSs worldwide. Moreover, the amendments brought into force by the EC Directive 2009/29 were aimed at strengthening its application and effectiveness, in particular with regard to the problem of overallocation and surplus of EUAs in the market. However, the state of the EU ETS carbon market reveals that the problem cited above, namely the surplus of EUAs, still affects the system and undermines its effectiveness.

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According to article 29 of the EU ETS Directive, if the Commission has an evidence that the carbon market is not working properly, it shall submit a Report to the EU Parliament and Council with the view to propose the measures to increase the transparency of the market and to improve its functioning.

To this effect, the EU Commission released the *Report on the European carbon market 2012,*[20] showing that despite the regulatory changes introduced by the EC Directive 2009/29, there is a persistent problem of surplus of allowances available in the market with consequent low price of EUAs and scarce incentive to participation to the auctions. This determines high price fluctuations and undermines the reliability and predictability of the market. In other words, the EU Commission observed that a weakened demand of EUAs has not been accompanied by a decreasing supply of EUAs.

It is true that such an extra offer of EUAs, not matching the real demand of the incumbent operators, is partly due to the economic crisis that lowered the GHG emissions in the recent years. However, it is also evident that it is worsened to the forward supply and selling of phase three allowances for NER 300 and to the selling of the left-over allowances in national phase two new entrant reserve. Anyway, as the Commission noted in its Report, the result is that in the third commitment period of the EU ETS (2013-2020) a surplus of almost 2 billion EUAs is foreseen, seriously endangering the entire purpose and functioning of the EU ETS and risking to totally frustrate the EC Directive 2009/29 goals.

The Commission therefore deemed appropriate to propose some precise measures to overcome this exceptional and risky situation of continued increase of supply of EUAs. More in detail, in its Report it calls for a review of the timetable which determines the supply within the 3rd phase of the EU ETS and postpone auctions of a certain amount of allowances (more in detail, almost 900 million) planned for 2013, 2014 and 2015 (*back-loading*).

The Report was therefore complemented by a draft amendment of the Auctioning Regulation, accompanied by an impact assessment, showing that such "back-loading", if well designed, can rebalance supply and demand in the EU ETS market for the transition into phase three and reduce volatility caused by the rapid build-up of surplus allowances.

[20] Report from the Commission to the European Parliament and the Council, *The state of the European carbon market 2012*, COM (2012) 652 final.

Moreover, the Commission affirmed in the Report that the proposed back-loading was not meant to cause any significant negative impacts on competitiveness and would strengthen government revenues, in the early phase three.

The amendment of the Auctioning Regulation could be adopted by the Commission only following the approval by the EU Climate Change Committee and by scrutiny by the European Parliament and Council, under the so called "Regulatory procedure with scrutiny" spelled out in Regulation 219/2009/EC amending the old "Comitology" procedure.[21] However, such Auctioning Regulation amendment had firstly to be preceded by an amendment of article 10.4 of the ETS Directive (back-loading amendment), to be adopted under the ordinary legislative procedure envisaged by articles 289 and 294 of the Treaty on the Functioning of the European Union (TFEU). In fact, this ETS Directive modification was necessary in order to clarify that the timing of auctions may be changed to ensure the orderly functioning of the carbon market.

Threrefore, the Commission submitted a draft amendment of article 10.4 that was approved by the EU Parliament at first reading on December 10th 2013. As a result, on December 16th 2013, the EU Council and Parliament adopted Decision 1359/2013/EU on back-loading, which provides that:

"In the first subparagraph of Article 10(4) of Directive 2003/87/EC the following sentences are added: 'Where an assessment shows for the individual industrial sectors that no significant impact on sectors or subsectors exposed to a significant risk of carbon leakage is to be expected, the Commission may, in exceptional circumstances, adapt the timetable for the period referred to in Article 13(1) beginning on 1 January 2013 so as to ensure the orderly functioning of the market. The Commission shall make no more than one such adaptation for a maximum number of 900 million allowances".[22]

In any case, the "backloading" resulting from the amendments of both article 10.4 EU ETS Directive and the Auctioning Regulation, should be considered as an *interim relief* measure, acting only as a sort of temporary *buffer* solution. Indeed, the postponement of

[21] See Council Decision 999/468/EC as amended by Council Decision 2006/512/EC and Regulation 219/2009/EU.

[22] See OJ L 343 19.12.2013, p. 0001.

the auctioning of 900 million EUAs would not affect the structural surplus of around 2 billion allowances over the 2013-2020 period. In fact, such allowances, mainly allocated during the economic crisis, could be used long after the crisis is (hopefully) over, with the result that the effects of the surplus will be in place up to 2020 and beyond, and so the imbalance between supply and demand.

Therefore, additionally to the back-loading initiative, a structural measure is needed to correct this over supply and to limit its long term negative impacts on the EU carbon market.

In such a context, the Commission Report proposing the back-loading also launched a debate on 6 alternative options for structural reform measures to be possibly adopted in the future.

These are reported below, together with their *ratio* and main effects as identified by the EU Commission:

1) increasing the EU reduction target to 30% in 2020: such an increase in the EU GHG reduction target to 30% in 2020 would need a consequential amendment to the quantity of allowances in the EU ETS either via a permanent retirement of allowances or a revision of the annual linear reduction factor currently equal to 1.74%. According to the Commission analysis, a volume of a retirement of allowances that would align the EU ETS cap up to 2020 with an overall target of -30% as compared to 1990 and the EU's agreed long-term objective of 80-95% by 2050 as compared to 1990, would be equal to a reduction of around 1.4 billion allowances. This option would not only require changes to the quantity of allowances in the EU ETS but also affect the targets adopted under the EC Effort Sharing Decision 406/2009, applying to GHG emissions reductions in sectors currently not covered by the EU ETS scope;
2) retiring a number of allowances in phase three: the surplus can be reduced by retiring some phase three allowances from the amount to be auctioned on a permanent basis. This measure requires primary legislation and could be implemented by a separate decision, to be taken by the European Parliament and

Council, rather than a fully-fledged revision of the EU ETS Directive;

3) early revision of the annual linear reduction factor: according to article 9 of the EU ETS Directive the total amount of allowances decreases by the linear factor of 1.74% annually, compared to the average annual total quantity for the period 2008-2012. Such a linear factor applies also after 2020, pending any change to the EU ETS Directive. In fact, article 9 of the EU ETS Directive foresees a review of the linear factor as from 2020, with a view to the adoption of the decision to modify it by 2025. This review could be advanced, as such potentially lowering the total amount of allowances already available in phase three depending on how soon it would take effect. This structural measure could not only address the imbalance and (partially) restore the ambition level up to 2020, but would also impact the ambition level after 2020. As such the linear factor could be set at levels in line with an overall EU target of -30% GHG reductions as compared to 1990. The current linear factor leads to a just over 70% reduction in the ETS cap by 2050, which is not consistent with the EU's agreed long term objective of -80-95% reduction by 2050 as compared to 1990, endorsed in the 2050 Low-Carbon Roadmap. An early revision of the linear factor also affects the period beyond phase 3 and implies addressing some fundamental related issues such as, for instance: how to promote the increase of the EU's competitiveness on key low carbon technologies, the link with the EU's post-2020 policy framework, the link with the development of an international carbon market and the risk of carbon leakage;
4) extension of the scope of the EU ETS to other sectors: this reform would determine the inclusion of sectors less strongly influenced by economic cycles. In fact, while the emissions in the EU ETS sectors decreased in 2009 by more than 11%, in the sectors outside the EU ETS scope this reduction was only around 4%. This difference may be partially explained by the differing impacts of the economic crisis on individual sectors. The coverage of the EU ETS could therefore be expanded to other energy related CO_2 emissions in sectors currently outside the scope of the EU ETS, for instance, by including fuel consumption in other sectors, at the same time

increasing the emissions coverage. Such a choice would have an impact on the overall ambition level, depending on the level of the cap foreseen for the sectors included. Several policy questions would need to be addressed to this respect, such as, for instance who would carry the obligation to report emissions and surrender allowances, which are the fuel producers or users, or should some kind of a hybrid system be introduced. Therefore, this measure requires more analytical work, including on how it would relate to existing policies in these sectors;

5) limit access to international credits: the quantity limit of international credits in the period 2008 to 2020 has turned out to be rather generous and is one of the most relevant factors causing the build-up of the surplus. Without international credits, the surplus in the EU ETS by 2020 would potentially be only around a quarter (25%) of the presently expected surplus. To this effect, in phase 4 the regulatory framework could be conceived in a manner that initially allows for no or much more limited access to international credits. This would create more certainty about the effort to be undertaken in Europe and thus could encourage more domestic investments in Europe in low carbon technologies;

6) discretionary price management mechanisms: since from the third trading period a large amount of allowances will be auctioned, a carbon price floor has been discussed as a feature to be applied primarily in the primary market, i.e. for auctions. A carbon price floor would create more certainty about the minimum price, giving a better signal to investors. Alternatively, a mechanism could be envisaged in order to adjust the supply of allowances, when the carbon price is affected by a large temporary supply and demand imbalance, by means of a price management reserve. If decreases in the demand were to generate an excessive price decrease below a certain level deemed to affect the orderly functioning of the market, an amount of allowances to be auctioned could be deposited in such a reserve. In the opposite case, allowances could be gradually released from the reserve. The reserve could initially be funded by reducing phase 3 auction volume by an amount corresponding to a substantial share of the accumulated surplus. The rulebook could foresee the

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permanent retirement of some allowances, in case the size of the reserve would exceed a certain magnitude. Discretionary price-based mechanisms, such as a carbon price floor and a reserve, with an explicit carbon price objective, would alter the very nature of the current EU ETS being a quantity-based market instrument. They require governance arrangements, including a process to decide on the level of the price floor or the levels that would activate the reserve. This solution carries a downside, insofar the carbon price may become primarily a product of administrative and political decisions (or expectations about them), rather than a result of the interplay of market supply and demand. Moreover, such discretionary price management would also raise a number of design issues, mainly related to the determination of the appropriate price levels, which are crucial for the effectiveness of the instrument.

The Commission conceived and proposed to the stakeholders and working groups the 6 options reported above, with the view to act on two parallel fronts and couple the immediate relief and short term solution of back-loading of allowances with some more structural and long term reforms, capable of adjusting the EUAs supply and demand imbalance beyond the 3rd trading period and stretching to the 4th one.

The EU ETS reform envisaged by the Commission would deeply affect and modify, even though to different extents respectively, the current EU ETS structure. Therefore, after the consultation phase with the relevant actors and stakeholders addresses of the EU ETS policy, including representatives of the EU Climate Change Committee, the EU ETS reform will need the approval of the European Parliament and the EU Council, according to the ordinary legislative procedure envisaged by articles 289 and 294 TFEU.

To this effect, the European Commission, building on the results of the debate on the reform of the EU ETS,[23] and partially departing from the previous 6 options, presented in January 2014 a *Proposal for the establishment and operation of a market stability reserve*

[23] See COM(2013) 169 *Green Paper on a 2030 Framework for climate and energy policies*; COM(2011) 885 *Energy Roadmap 2050*; and COM(2011) 112 *A Roadmap for moving to a competitive, low-carbon economy in 2050.*

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for the EU ETS,[24] arguing that in order to restore the ETS as a more robust instrument a market stability reserve should be established for the 4th phase (starting in 2021). The Proposal on the ETS reform was presented alongside the *Communication on a policy framework for climate and energy in the period from 2020 to 2030*,[25] which describes the EU 2030 scenario and the proposed main objectives.

Pursuant to the Proposal, the market stability reserve would have a twofold aim. On the one side, it will try to address the surplus of emission allowances and, on the other side, it will aim at improving the system's resilience to major shocks by adjusting the supply of allowances to be auctioned. The mechanism envisaged would operate according to pre-defined rules, which would leave no discretion to the Commission or Member States in its implementation, thus ensuring transparency and effectiveness to the system.

8. Conclusions

The present paper has provided a case-study on the allocation of carbon emission permits, by looking at the evolution of the EU ETS. It has firstly analyzed the theoretical aspects on the allocation of carbon emission permits, by comparing the grandfathering and auctioning methods. Then, it has focused on the current system for the allocation of permits in the EU ETS, presenting the process of gradual shifting from grandfathering to auctioning. While such a process is still on-going, the European Commission is facing very hard times in the management of the EU ETS, due in particular to the fall of the average price which has occurred in recent years in the EU ETS.

In order to try to address the shortcomings of the EU ETS, due to the very low average price, the Commission has promoted the adoption of a "back-loading" initiative, which essentially consists in limiting the supply of EU ETS units within the 3th phase of the EU ETS

[24] See COM (2014) 20, *Proposal for the establishment and operation of a market stability reserve for the EU ETS.*

[25] See COM (2014) 15, *A policy framework for climate and energy in the period from 2020 to 2030.*

and to this effect aims at postponing auctions of a certain amount of allowances (more in detail, almost 900 million) planned for 2013, 2014 and 2015.

However, the backloading initiative, in the Commission's own view, should be considered as an interim relief measure, that may act only as a sort of temporary buffer solution and will not be able to resolve the imbalance between supply and demand observed so far.

Therefore, in addition to the back-loading initiative, a structural measure is needed to correct the existing oversupply and to limit its long term negative impacts on the EU carbon market. To this effect, the Commission has put forward a Proposal for the establishment of a market stability reserve, which should be operational starting from beginning of the 4th phase of EU ETS (from 2021 onwards). In the Commissions's view, the market stability reserve has a twofold aim. On the one side, it will try to address the surplus of emission allowances and, on the other side, it will aim at improving the system's resilience to major shocks by adjusting the supply of allowances to be auctioned.

It is still too early to assess whether the approved backloading initiative (in the EU ETS 3th phase) or the proposed market stability reserve (in the EU ETS 4th phase) will prove suitable tools to solve the shortcomings experienced so far by the European carbon market. It should be noted, however, that the market stability reserve may prove a controversial solution, in particular, if compared with another option which might have been chosen instead, to reach more or less the same goals, that is, the introduction of a price floor. This solution, in fact, is presently a common feature of some of the most relevant ETSs currently existing around the world, such as for instance the US-based California and RGGI ones, and may have proven in the long term a more effective solution also for the EU ETS.

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Decision 2014/746/EU determining a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage, for the period 2015 to 2019;

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THE ABSTRACT OF THE PROJECT IS:

The research programme will integrate diverse levels, methods and disciplinary traditions with the aim of developing a comprehensive policy agenda for changing the role of the financial system to help achieve a future which is sustainable in environmental, social and economic terms. The programme involves an integrated and balanced consortium involving partners from 14 countries that has unsurpassed experience of deploying diverse perspectives both within economics and across disciplines inclusive of economics. The programme is distinctively pluralistic, and aims to forge alliances across the social sciences, so as to understand how finance can better serve economic, social and environmental needs. The central issues addressed are the ways in which the growth and performance of economies in the last 30 years have been dependent on the characteristics of the processes of financialisation; how has financialisation impacted on the achievement of specific economic, social, and environmental objectives?; the nature of the relationship between financialisation and the sustainability of the financial system, economic development and the environment?; the lessons to be drawn from the crisis about the nature and impacts of financialisation? ; what are the requisites of a financial system able to support a process of sustainable development, broadly conceived?'

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6	Poznan University of Economics	Poland
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