Les Cahiers de la Chaire Economie du Climat

*Information and debates* Series

n° 14 • March 2012

# The European $CO_2$ allowances market: issues in the transition to Phase III

Christian de Perthuis[1] and Raphaël Trotignon[2]

The European emissions trading scheme (EU ETS) is the centrepiece of Europe's climate policy to put society on a low-carbon path to better economic conditions. The system has been undermined variously by the weakness of its regulation, an undesirable overlap with other public policies and the far-reaching economic and financial crisis that caused the market price of allowances to plunge.

This Climate Economics Chair "Cahier" attempts to identify the conditions for making the transition to Phase III (2013-20) of the EU ETS a success. It draws historical lessons from the eight years the scheme has been in operation, which show the market's extraordinary sensitivity to even moderate changes in supply and demand conditions. It then analyzes, using the ZEPHYR-Flex model, the various interventions by the public authorities currently under discussion in order to lift allowance prices in the market. These simulations reveal the risk of carrying forward problems to the future, with further clouding of the visibility needed by ETS actors in the long term.

Finally, the present "Cahier" proposes to draw lessons from monetary policy by outlining what might be the mandate of an Independent Regulation Authority, with responsibility for the dynamic management of the supply of allowances and whose main mission, along the lines of a central bank, would be to ensure the optimal linkage between the different temporal horizons of the climate strategy.

*The authors would like to thank the reviewers of this paper s for their relevant comments and suggestion, in particular Alain Ayong Le Kama, Pierre-André Jouvet, Adeline Duterque, Christine Faure-Fedigan, Diane Simiu, Cécile Goubet and Emmanuel Fages. Opinions expressed here remain those of the authors.*

1. Professor at Paris-Dauphine University and President of the Climate Economics Chair's Scientific Committee
christian.deperthuis@chaireeconomieduclimat.org

2. Researcher at the Climate Economics Chair
raphael.trotignon@chaireeconomieduclimat.org

Climate Economics Chair
Paris-Dauphine University
CDC Climat

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## Introduction: three levels of regulation

The European emissions trading scheme (EU ETS) was launched in 2005, organized in such a way that considerable autonomy was given to Member States through the principle of subsidiarity. This decentralized architecture was a political condition for its launch, and the result was dramatic: the market grew rapidly, becoming a key standard in terms of global carbon price. The downside was the weakness of its regulation by the public authority, the full extent of which became apparent with the large-scale frauds and embezzlement of 2009 and 2011[1]. Today no-one disputes the need to strengthen this regulation, but many unknowns arise as soon as one attempts to put it into practice, since the term "regulation" can have three different meanings.

Regulation firstly refers to the set of rules ensuring the security of the market infrastructure. In the case of an allowances market, it mainly concerns the registries system, the registration procedures for recording transactions, and the conditions for market access. These rules have been greatly reinforced following the misappropriation of funds occurring in the market, and will be further strengthened with the transition to Phase III (2013-20), which will include setting up a single registry at a European level as from 2013.

A second aspect of regulation concerns what is traditionally called market oversight by a regulator who has to guarantee the fluidity and transparency of transactions by preventing the risk of manipulation. In the European emissions trading scheme, this oversight raises complex questions of harmonization and legal definition of the compliance instruments that were created within the framework of climate policy. In France it gave rise to an innovative sharing of responsibilities between the financial regulator and the energy regulator following the recommendations of the Prada report published in 2010. For convenience, ways of strengthening this oversight in Europe should be cast more along the lines of the regulation of financial markets, though some points would need to be adapted for industrial actors.

A third possible level of intervention by the public authority concerns actions designed to influence price formation in order to change its equilibrium level or reduce its volatility. In a system of regulation by quantities, the role of the public authority is to set the emissions cap, leaving it to the market to set the price. Other than a revision of the cap, we see no *a priori* reasons that would lead to an intervention to change the market price, if the first two levels of market regulation are implemented effectively. The principle of an intervention of this type has, however, been under discussion for several months, both in the European Parliament and in the various committees dealing with the climate issue at the European level.

The present paper focuses on this third level of regulation. It first outlines the contextual elements explaining the rationale for an intervention by European public authorities intended to raise the price

[1] On this topic, see the summary "Failings of the European CO2 emissions trading market", available on the Climate Economics Chair website. http://www.chaireeconomieduclimat.org/?page_id=1111&lang=en

of $CO_2$ allowances in the market. Using the ZEPHYR-Flex model[2], it then simulates the various options available to the public authority by showing how improbable it is that an intervention would settle once and for all a problem whose recurrence is attributable to intrinsic weakness of governance. In the third part, the paper explores the options for renewed market governance, based on the establishment of an Independent Regulation Authority (IRA), whose mandate, drawing on lessons from monetary policy, would be to proactively manage the supply of allowances by ensuring that the different time horizons of climate policy are properly articulated. In the absence of such a mandate, it is a safe bet that improvised interventions to restore the "right carbon price" would lead first to the weakening and then to the marginalization of an instrument that until now has been a key tool in the European climate strategy.

# 1. In search of the "right" carbon price signal

One of the major difficulties in implementing climate policies is the treatment of uncertainty, which concerns both the evaluation of potential damage from climate change and the cost of the actions taken to reduce emissions. This uncertainty makes it impossible to know *ex ante* the "right" price for carbon, i.e. one whose implementation would over time lead to the equalization of the marginal costs of action taken to reduce climate risk and the marginal benefits that would accrue to society. The role of the EU ETS is precisely to reveal this price *ex post* from the level of constraint imposed *ex ante* in the form of an overall cap limiting the emissions of industries subject to the scheme. The experience of the first eight years of the market leads to a result often seen in allowances markets tried out in other contexts: an *ex ante* debate dominated by fears of an overly high constraint level that makes allowance prices skyrocket at the risk of damaging the competitiveness of the economic entities subject to the system; and the *ex post* problem of managing the consequences of the tradeoffs and compromises that led to limiting the credibility of the constraint and consequently the blurring of the predictability of the price signal.

## 1.1 What eight years of market operation reveals

When Europe launched its $CO_2$ emissions trading scheme in 2005, the information available on historical emissions was of very varied quality, depending on the countries and sectors concerned. Choosing a constraint level in the form of an overall emissions cap was thus carried out through trial and error, within the framework of the three phases of the market.

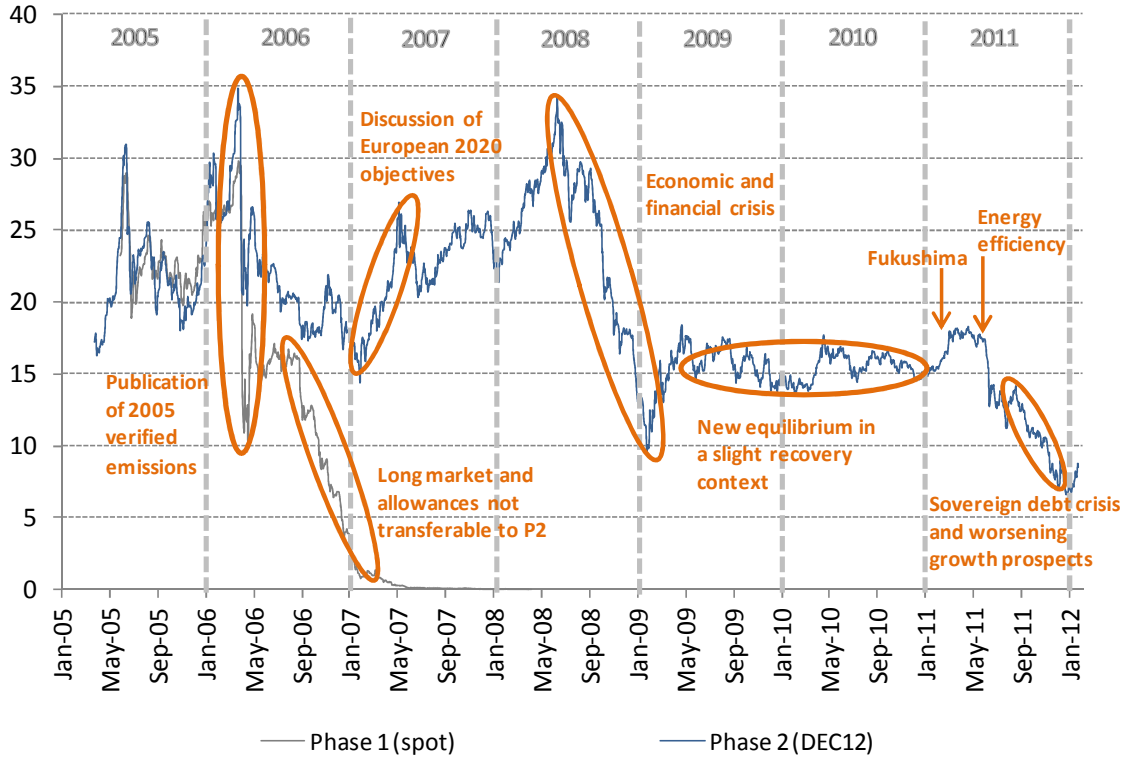
The constraint during the first phase (2005-07) was defined as part of a highly decentralized process, leading to rather similar trade-offs from one country to another: a more restrictive cap for installations in the electricity sector than for industries open to competition from outside Europe, which were generally well provided with allowances distributed free of charge; and a higher constraint level in countries such as Germany and the UK which were subject to more ambitious Kyoto commitments than France or the countries of eastern Europe. This second group therefore generated large surpluses of allowances, the price of which tended toward to zero because it was impossible to transfer them from the first to the second phase (Figure 1).

[2] An economic model developed by the Climate Economics Chair that simulates the price formation and trading of $CO_2$ allowances in the European cap-and-trade system up until 2020. It is described in more detail in Box 1 below.

The allocation process for the second phase (2008-12), characterized by the use of rules that were much more harmonized at the European level, led to a tightening of the cap by about 10%. Simultaneously, industries subject to the cap were allowed to ensure their compliance through credits from the Kyoto projects within the framework of an average limit of 13.5% at EU level. When that decision was taken, no-one knew very clearly how many credits were likely to be placed on the market up to 2012: the pace of development of projects around the world and the level of demand for these credits outside the European system were both very uncertain. As in the first period, the start of this phase was marked by expectations of high allowance prices, driven up by the climate and energy package negotiations in Europe and the revival of federal carbon market projects in the U.S. Congress. These expectations did survive the deterioration of economic conditions, which led to a sharp market correction in the second half of 2008, at the same time as discussions on the rules of the third phase of the market were getting under way.

In the initial project, the third phase (2013-20) should see a tightening of the cap and a change in the allocation method, whereby the auctioning of allowances is likely to become the rule and free allocation the exception. Strengthening the constraint will involve applying a 1.74% annual cap decrease factor from 2013, leading to a 21% reduction in emissions by 2020 compared to 2005. In addition, the Commission is aiming to reduce the amount of Kyoto credits used by industry by imposing qualitative restrictions on certain industrial projects as from 2013. The measure will tend to speed up their entry in 2011 and 2012. This tightening of the constraint was in line with the Commission's intention to "shore up" $CO_2$ allowance prices in the second phase (2008-12) by encouraging industry to make precautionary savings of allowances for the third phase (2013-20), as quotas are transferable from one phase to the next. But the market reacted to fundamentals and did not conform to the wishes of the people running the scheme: the sovereign debt crisis and the prospect of strengthening policy instruments for energy efficiency again caused allowance prices to fall to "crisis" levels in the second half of 2011 (Figure 1).

**Figure 1 – $CO_2$ emissions prices since the launch of the ETS in 2005 (€/t$CO_2$)**

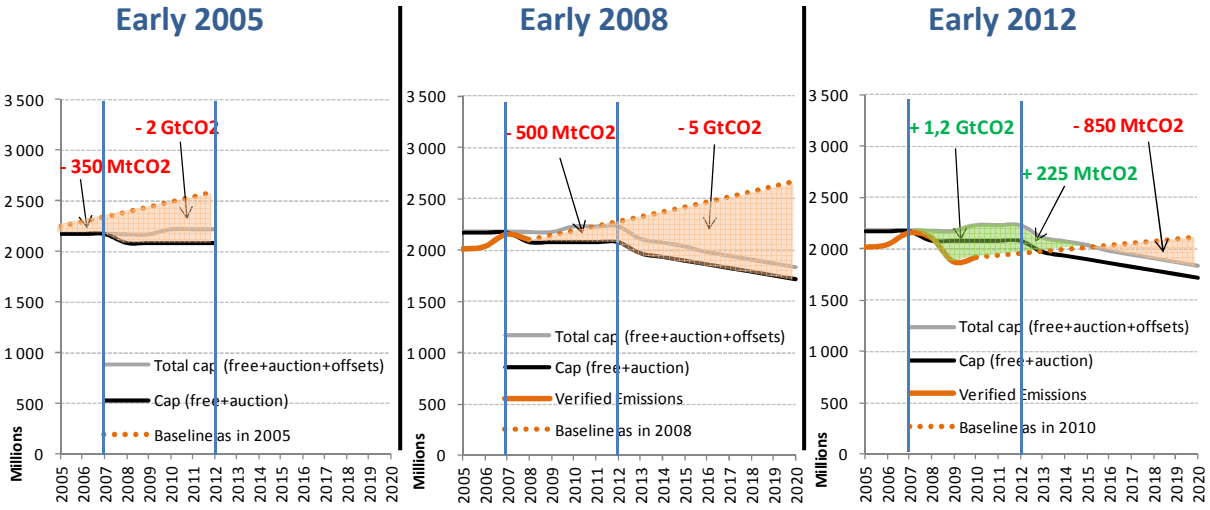



*Source: Climate Economics Chair, based on BlueNext and ICE ECX Futures data*

Two fairly basic lessons emerge from this brief retrospective. The first is that the market reacts very quickly to any changes, even minor ones, in the balance between supply and demand for allowances: changing short-term meteorological conditions affecting heating and/or air-conditioning needs; changes in relative energy prices making primary sources with varying carbon content less or more attractive; changes in the pace of economic activity that can drastically change the workload of large high-emitting, intermediary industries; and regulatory decisions that tend to become more complex and overlap at the expense of efficiency and clarity. This responsiveness is all the stronger because in a compliance market the supply and demand for allowances, in the absence of so-called banking or borrowing regulatory mechanisms (to be discussed later), may become very inelastic.

The second lesson draws on a number of observations of other emissions allowances cap-and-trade systems. As shown in the first two stylized images of Figure 2, actors and governments at the beginning of the first (2005) and second periods (2008) anticipated a market starting from an initial position close to instantaneous equilibrium between the supply of and demand for allowances, and in which the hypothetical growth of future emissions, by increasing the allowances deficit and the need for action to reduce emissions, would pull the price up. In both cases, the correction of these expectations during the period concerned caused a major downward revision of the market equilibrium price.

**Figure 2 – Perception of the market in 2005, 2008 and 2012**



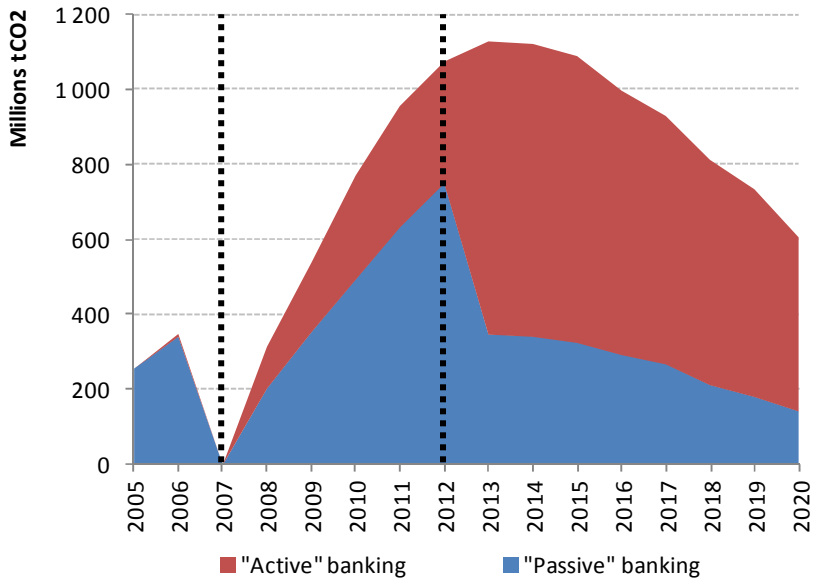

*Source : Climate Economics Chair*

The graph's third stylized image shows the different expectations on the part of market actors and public authorities in the third phase. Due to the accumulation of past surpluses and a strongly revised downward projection of anticipated emissions in the scenario resulting from the worsening economic climate, there is a general expectation of a surplus of allowances on the market until 2020. Hence current plans for an exceptional intervention by public authority in the third period with the intention, one way or another, of raising the equilibrium price. We will now look more in detail at the conditions for the transition to the third phase.

## 1.2 The transition to Phase III: acrobatic conditions

The preceding analysis of the history of the EU ETS, though brief, revealed the many factors influencing the supply/demand equilibrium of allowances. These factors make it very difficult to anticipate the future trajectory of allowance prices. As a result we need to approach interpretations of prospective assessments of the development of the third phase with a degree of caution. Three key parameters should in our view be taken into account: the management of surplus allowances inherited from the past, in a context where prior banking and borrowing behaviour will be altered by the transition to auctions in the electricity sector; uncertainties as to economic growth; and possible overlapping with other European policy instruments that are themselves impacted by the macroeconomic and budgetary context.

**Figure 3 – Estimation of the amount of allowances and credits carried over from one year to another**




*Source: Climate Economics Chair, ZEPHYR-Flex model*

Note: Within the stock of allowances carried over from one year to the next, the ZEPHYR-Flex model makes a distinction between, on the one hand, allowances allocated free of charge to installations and retained (so-called passive banking) and, on the other, allowances or credits bought by an installation as a precautionary measure (so-called active banking).

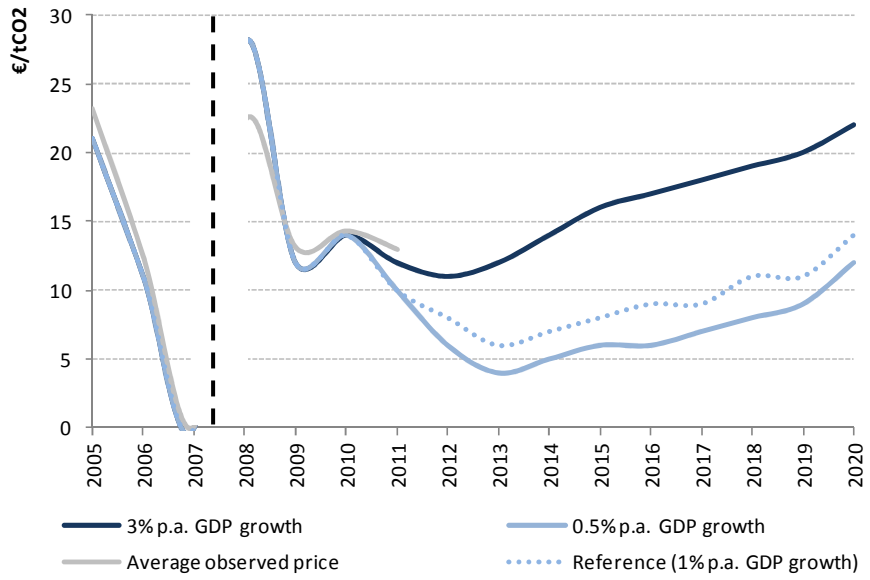
One of the few points that is no longer in dispute concerns the assessment of surplus allowances or credits not used in the second phase that installations will transfer to the third phase. The estimates obtained from the ZEPHYR-Flex model result in a magnitude of about 1.2 Gt of $CO_2$, slightly more than half the 2012 emissions cap. This amount can be viewed as a safety margin that companies want to keep unchanged from one period to the next. In this case, it might be argued that the amount of surpluses would not alter the market equilibrium conditions in the third period. This view, which is difficult to maintain even in a situation where the allocation rules are not modified in the third phase, becomes particularly unrealistic with the extension of the allowances auction system, which is likely to significantly change the banking and borrowing behaviour of installations subject to the constraint.

As Figure 3 shows, the great majority of allowances until now have been retained from one year to the next in a passive way: if an installation receives free of charge more allowances than it needs for compliance and does nothing, it will bank them without any active decision on its part. In an auction system where companies must buy all their allowances, this routine banking system disappears, thereby, one, reducing the surplus of allowances that until now have been almost automatically transferred from one year to another and, two, weakening one of the traditional levers for supporting prices in a market with a surplus of allowances. In the basic ZEPHYR-Flex scenario for the third phase, it was assumed that most of this passive banking would be replaced by actors' active decisions to buy allowances in excess of their compliance needs (Figure 3). If such a process were not to occur, we could see a more rapid reduction in surpluses accompanied by a new period of

allowance price weakness. At the same time, the application of payment by auction should limit the previously existing possibility of borrowing quotas free of charge for up to a year, by superimposing the period for that year's allocation of allowances with the period for the surrender of allowances from the previous year. By restricting the previous possibilities of freely carrying out banking and borrowing operations, the transition to auction, unless it is accompanied by new flexibility vectors[3], may therefore increase the instability of allowance prices. While economic reasoning allows the direction of expected changes to be detected, our tools may have difficulty predicting their magnitude and timing.

The second element to include concerns hypotheses about economic growth. As the simulations carried out with the ZEPHYR-Flex model reveal, the demand for allowances by the industrial and energy production sectors is very sensitive to changes in the growth rate of GDP, with an elasticity greater than one reflecting the pro-cyclical nature of the major intermediate industries. In the third phase, an increase of two points in the growth assumption leads, *ceteris paribus*, to a rise of nearly ten euros in the equilibrium price of allowances over the whole period (Figure 4). This positive relationship between economic growth and allowance prices is also highly desirable if it does not interfere with the long-term expectations of the actors: it reduces compliance costs for businesses in lean times and asks them to increase their tribute when business is good. All the same, uncertainty about economic growth up to 2020 and the probably bearish bias of forecasts made by actors in a negative economic climate may result in a number of surprises during the third phase, especially if the economic and budgetary context disrupts the implementation of public policy instruments outside the cap-and-trade system.

**Figure 4 – Sensitivity of allowance prices to assumptions of economic growth**




*Source: Climate Economics Chair, ZEPHYR-Flex model*

[3] Note that in a generalized auction system, an alternative (or a complement) to banking carried out at installation level arises if the authority retains a proportion of the allowances that it could put up for sale in the market.

The third challenge faced by market participants in anticipating the balance between the supply of and demand for allowances arises from the risk of superimposing public policy instruments. This issue was latent from the formulation of the energy-climate package with two binding targets – the first regarding the reduction of greenhouse gas emissions, the second in terms of market penetration by renewables – without there being a clear specification as to the type of instrument applied to each of them. The orientations consistent with making the objectives of the Directive on energy efficiency binding may make the overlapping of instruments acting on the real level of emissions more likely. In this context, any progress in terms of energy efficiency or renewable energy obtained by measures outside the allowances system may result in decreased demand for allowances and lower prices. If we want to avoid the cap-and-trade system becoming a residual tool, allowance caps need to be adjusted according to the observed or expected effects of other instruments[4]. But we must be extremely careful regarding the forecasts, because it is not the intentions announced by the legislator that count, but the ability of governments to make use of the instruments available given the economic and budgetary context.

Implemented in a particularly uncertain economic and financial context, with the rules regarding policies for energy efficiency and renewables still to be settled and with the modified basic allocation rules liable to increase market instability, the transition to the third phase is in fact taking place under acrobatic conditions. How consequently do we calibrate the public authority's intervention to spontaneously alter the expected market equilibrium? With the help of the ZEPHYR-Flex model, the second part of this study examines the various options that have been put on the table for such an intervention.

## 2. The different proposals for market intervention

Three types of intervention proposal have been advanced to change the equilibrium price of allowances during the third phase. The first would take advantage of the transition to auction in the electricity sector to establish a reserve price that would *de facto* play the role of a price floor. The second would be to operate a set-aside, that is to say, to distribute differently over time the amount of allowances available, without explicitly changing the reduction target associated with the system. The third would lengthen the market's time horizon, quickly setting a binding cap for 2030 in order to change the long-term expectations of industry. To our knowledge these three options have not yet been subject to quantified evaluations. We propose here to use the ZEPHYR-Flex model (Box 1) to link each option with figures as to their main impacts on the functioning of the market up to 2020. To do this, we start from the representation of market equilibrium simulated in the central scenario of our forecasting exercise[5]. Each proposal is then treated as a variant on this central scenario.

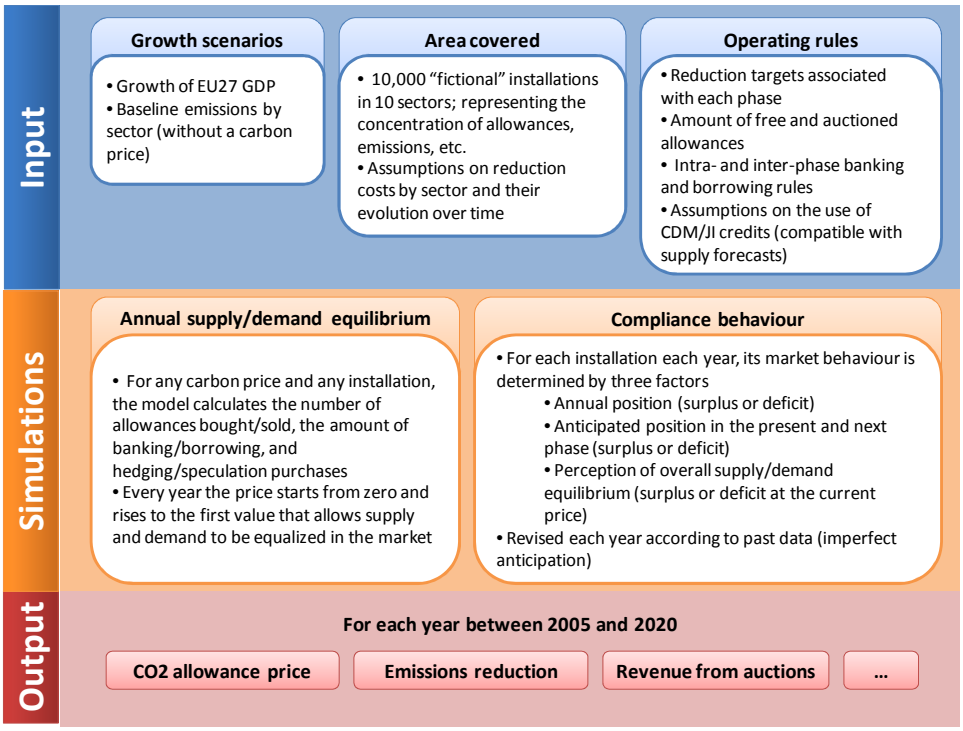
[4] On this point, see Richard Baron's contribution of February 2012 cited in the bibliography.

[5] See *EUA price forecast*, January 2012, downloadable from the Climate Economics Chair website: http://www.chaireeconomieduclimat.org/?page_id=2259&lang=en

**Box 1 – Description of the ZEPHYR-Flex model**

The ZEPHYR-Flex model developed by the Climate Economics Chair is a tool that simulates the price formation mechanism and allowances trading on the European carbon market. Its specificity is to operate within an economic framework that takes into account the particularities of the European cap-and-trade system (operating rules and characteristics of the area covered), as well as the expectations and attitudes to compliance of the entities covered (Figure 5). It allows us to test different configurations, for example by varying the growth scenario or the dividing up of emissions reduction targets over time.

**Figure 5 – The ZEPHYR-Flex model**




*Source: Climate Economics Chair, ZEPHYR-Flex model*

Each proposal for intervention by the public authorities in the allowances market can be simulated in ZEPHYR-Flex and compared to a reference scenario, corresponding to the situation that can currently be represented in the absence of intervention in the market.

- The objective of reducing emissions by 21% in 2020 compared to 2005, and the implicit continuation of the cap-and-trade system after 2020 (continuity of the linear reduction factor of the cap and transferable allowances into the next phase).
- Auctioning of all allowances in the electricity sector from 2013 and a decreasing share of free allowances in other sectors, except those identified as being at risk from carbon leakage.
- Nearly total use of the amount of carbon credits authorized during the 2008-20 period, or 1.5 billion credits, such use being compatible over time with the qualitative restrictions agreed in 2011 and the likely supply of credit over the period.
- A baseline emissions growth scenario for each sector (i.e. as they would have been without a carbon price) on the basis of a low-growth scenario of European GDP from 2012 (+1% per year until 2020).

## 2.1 Setting a reserve auction price

The transition to the third phase will be accompanied by a sharp increase in the amount of allowances auctioned. The way auctions are organized was designed by a regulation whose main objective is to ensure that the auction system, which will introduce a genuine primary market into the scheme, does not disturb the equilibrium of the secondary market. In other words, auctions must be "neutral" in relation to market prices, as economic theory also makes clear. The proposal to establish a reserve price at a level well above the current price has been advanced by some economists[6] and endorsed by CDC Climat. In this alternative approach, the aim would be to use the auction system in order to act directly on the equilibrium price. The ZEPHYR-Flex model allows us to analyze its possible implications.

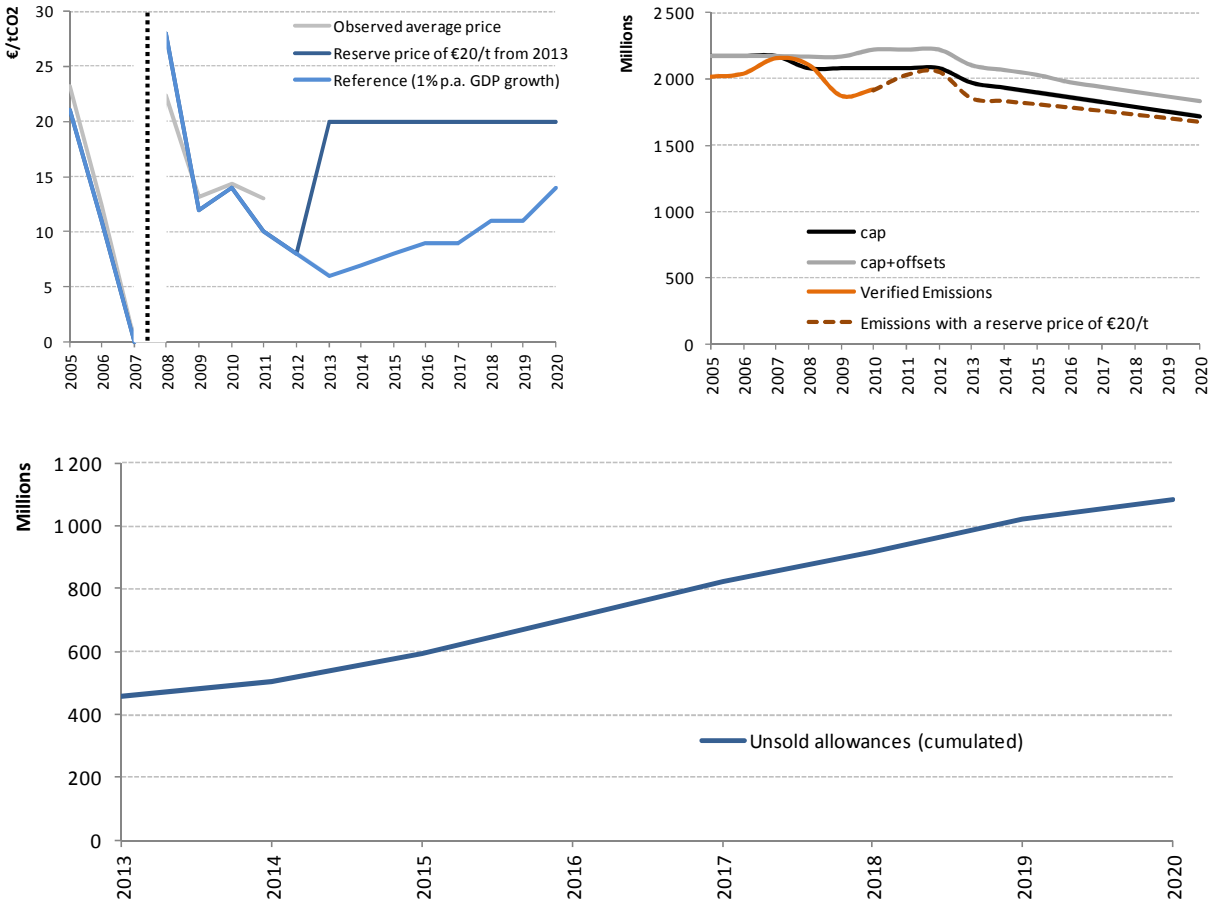
Establishing a reserve price at an auction means that a sale is not concluded unless the price reaches a value determined *ex ante* by the public authority. In our simulation, the reserve price is set at €20/t$CO_2$. If this option is implemented from 2013, the first consequence is that half the allowances do not enter the market in 2013, which raises the allowance price to €20/t. For this price to become a market price responsive to changes in supply and demand would require that emissions be immediately reduced by 50%, which is not possible at less than €20/t given the marginal abatement cost curves used in the model. A gap is thus created – which cannot be absorbed over the period as a whole – between the reserve price that will prevail due to the removal of allowances by the allocating authority and the price that theoretically would appear on the market in the absence of this intervention (Figure 6, top left).

The difference between the new price and the theoretical market price spontaneously tends to grow: the floor price of €20/t$CO_2$ "forces" emissions reductions that were not necessary to attain the environmental objective, which remains unchanged because the cap has not been altered. This pseudo-tax lowers $CO_2$ emissions below the limit represented by the total number of allowances and credits available (Figure 6, top right).

The decrease in emissions resulting from a price that is twice the level dictated by supply/demand equilibrium automatically leads to additional emissions reductions and hence a reduced demand for allowances. But as the auctioning authority cannot sell allowances at a price below the reserve price, the allowance price remains tied to the reserve price throughout Phase III. The authority auctioning allowances is thus forced to accumulate an ever-increasing amount of allowances that it is unable to sell without lowering the price below €20. Our simulation puts this quantity at about 500Mt in 2013, increasing to a total of 1.1 Gt unsold over Phase III (Figure 6, bottom).

[6] See, for example, Michael Grubb and Tim Laing "Price Floors – Getting Some Perspective", 2009, in the bibliography.

**Figure 6 – The implications of a reserve auction price**




*Source: Climate Economics Chair, ZEPHYR-Flex model*

The direct intervention in the price of allowances by establishing a reserve price at auctions thus leads to the "freezing" of 1.1 Gt, or the equivalent to more than a year's auctions. The great unknown in so acting is obviously the future of those allowances that have not been put onto the market. Here the ZEPHYR-Flex model recalls a key mechanism: as soon as the auctioning authority places these quantities on the market without reserve clause, the price immediately tends to zero. A radical option would then be to simply cancel these allowances – in other words, to modify the cap. But in that case why not directly adopt this option, thereby sending a clear signal to industry?

In short, setting a reserve price of €20/t means removing allowances from the market, but without deciding in advance the quantity withdrawn. If maintained throughout the period, this reserve price gives actors a temporary visibility on the price thus "forced", but totally clouds their medium-term perspective in that it has not been clearly decided what would happen to these allowances in the succeeding period. If the fixed reserve price is abandoned during the period, it causes a collapse of market prices because the imbalance between supply and demand for allowances has been widened by the price floor that generated additional reductions. Many such lessons may be found in the following analysis of different variants of set-aside.

## 2.2 Did you say set-aside?

For institutional reasons, if an intervention by the public authorities is agreed, it will probably involve a set-aside decision. Specifically, the draft Directive strengthening energy efficiency objectives in the EU envisages going ahead with such a withdrawal[7], made all the more necessary in the European legislator's thinking in that the implementation of said Directive could have a further depressive effect on the carbon market.

Such a measure is actually not as distant as it first seems from the introduction of a reserve price. It consists simply in setting *ex ante* the quantity of allowances that will be withdrawn from the market and then observing the resulting price. The simulations carried out using ZEPHYR-Flex lead to the same kind of conclusion: in both cases, the impact of intervention by the public authorities in the medium term depends primarily on what happens to the allowances that were set aside. To clarify this point, we simulated three possible options for a withdrawal of 1.1 Gt over the whole period: in variant 1, the allowances are removed from the market at the start of Phase III and then re-introduced before 2020; in variant 2, they are removed between 2013 and 2020 and reintroduced in the next phase; and in variant 3, they are removed permanently from the market[8].

- Variant 1 involves withdrawing 275 Mt of allowances a year from 2013 to 2016 and then putting them back on the market between 2017 and 2020. The intervention causes a fairly rapid rise in the allowance price, which reaches 20 euros in 2016, as shown in Figure 7 below. The rise generates additional emissions reductions from companies, which proportionally reduce their demand for allowances, thereby accelerating the fall in the price of allowances following their return to the market from 2017. The effect is quite similar to what would occur in the case in which the auction authority introduces a reserve price of 20 euros at the start of the early period and then drops it in 2017. In both cases, the removal of allowances at the start of the period drives the price up, which leads to more emissions reduction. The price then falls dramatically when price when the allowances are put back on the market.

- In variant 2, 138 Mt of allowances are withdrawn each year and banked in the following period. In its current state of development the ZEPHYR-Flex model does not describe market equilibrium after 2020 and therefore cannot simulate the detailed impacts of different choices adopted for the return of allowances to the market after 2020. But it is evident that the problematic is the same as in the previous case. However, we have incorporated this uncertainty into agents' expectations regarding the market in the second phase. The result is an increase in the equilibrium price of $CO_2$ allowances of around €5/t over the entire third period compared to our baseline scenario (Figure 7). Note that the baseline scenario already includes an implicit assumption that the scheme is extended after 2020

[7] The text voted through by European Parliament ENVI Committee in late 2011 explicitly refers to set-aside; and the MEPs of the ITRE Committee proposed in early 2012 that the Commission present a report on the impact of energy efficiency measures. The MEPs are also asking the Commission to consider whether or not to take measures that "may include withholding of the necessary amount of allowances" before the beginning of Phase III.

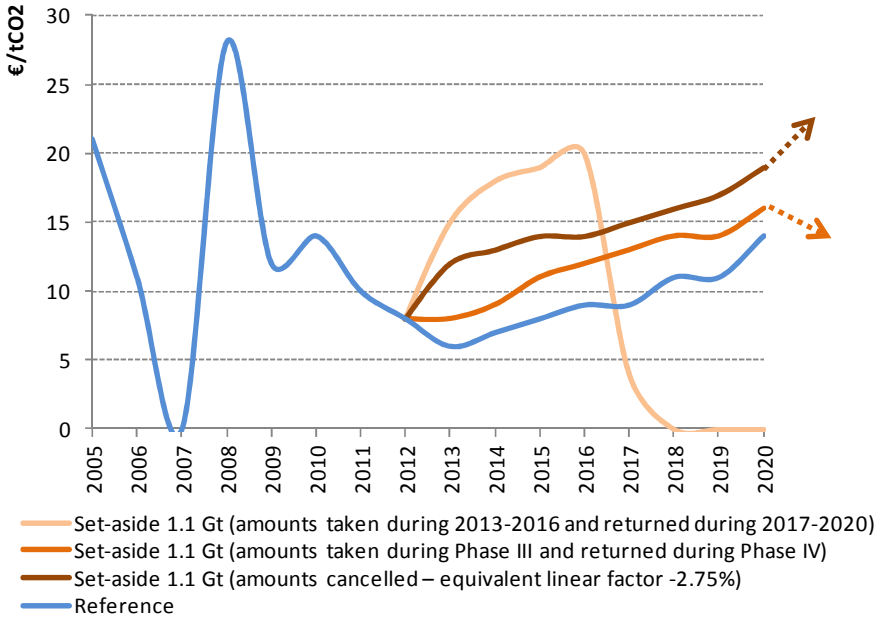
[8] In variant 2, in the absence of the possibility of taking allowances from Phase IV into Phase III, the reduction target associated with Phase III is increased, while this is compensated by easing the Phase IV target. This is not set-aside in the strictest sense of the term. In variant 3, the quantity of allowances available is explicitly altered since the allowances withdrawn will never be re-introduced, leading *de facto* to a change in the cap.

with continuity of the linear allocations reduction factor, as well as the possibility of retaining Phase III allowances for use after 2020.

- In variant 3, it is assumed that the allowances removed will not be returned to the market. This corresponds to a scenario in which the linear annual reduction factor of the emissions cap increases from 1.74% to about 2.75%. In this variant (Figure 7), the quantity of allowances supplied is the same as in the previous case, but companies are no longer uncertain as to the possible return of allowances to the market from 2021. This reduction in uncertainty leads them to increase their demand for allowances in order to build up precautionary savings (banking) in view of the expected tightening of the constraint in Phase IV.

The main lesson from these simulations is that any set-aside action, if it is to avoid blurring the signals given to industry, must be very explicit on the future allowances withdrawn from the market. Rules that are unclear or inappropriate in this area would be likely to disrupt industry's medium-term outlook and trigger undesirable shocks in the market.

**Figure 7 – The implications of different types of set-aside**




*Source: Climate Economics Chair, ZEPHYR-Flex model*

## 2.3 Setting a 2030 target compatible with Roadmap 2050

The third possible type of intervention would be to lengthen the time horizon of the market, and quickly decide on the amount of allowances available until 2030 so as to change the long-term expectations of industry. For now, the total allowance cap is determined only up until 2020. The planned reduction of the cap is set by the Directive and represents an annual decrease of 1.74% compared to the average cap for the period 2008-12. According to the text of the Directive, if the

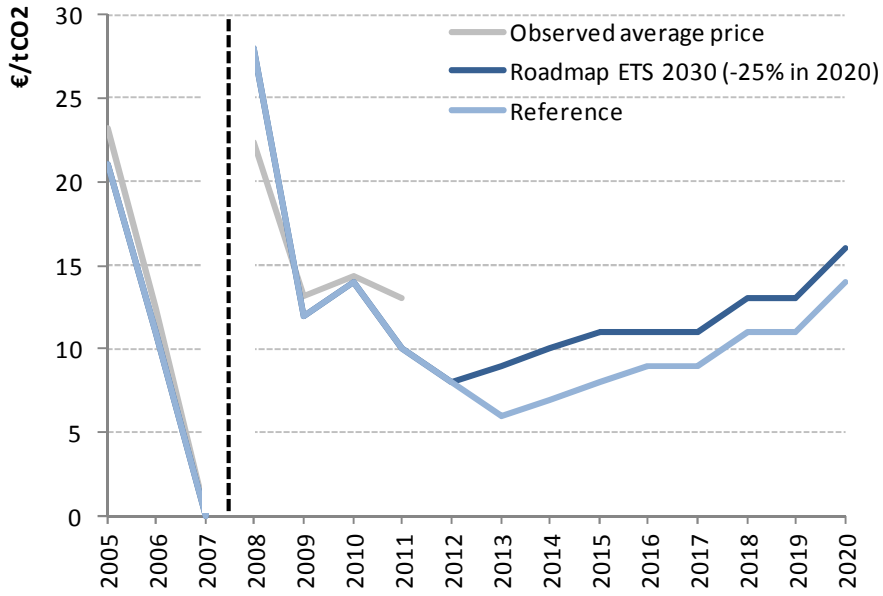
cap's linear reduction factor is not changed in Phase III, it automatically continues to apply after 2020, and constitutes an implicit reduction target of 38% in 2030 compared to 2005.

Since the adoption by the European Council of a long-term objective for the European Union leading to a reduction in emissions of at least 80% in 2050 compared to 1990, the public authorities have been discussing the inclusion of this new target in official documentation. The trajectory aimed for is detailed in the European Commission's Roadmap 2050 published in March 2011. On the basis of impact studies carried out for the Commission, the implementation of the roadmap would require emissions reductions of 43-48% in 2030 compared to 2005 in the sectors covered by $CO_2$ allowances.

One of the solutions proposed to raise the allowance price in Phase II is to immediately ensure that the cap's linear reduction factor is consistent with the long-term European objective by establishing the amounts of allowances that will be available until at least 2030. This intervention would entail revising the cap's linear reduction factor from 2013 by raising it from 1.74% to about 2.15%. This change would have an impact on the 2020 reduction target, increasing it to 25% below the 2005 figure as against 21% currently.

The ZEPHYR-Flex simulation (Figure 8) shows that this reassessment of reduction targets would in fact raise the allowance price from 2013 and throughout Phase III by about €3-4/t$CO_2$. Taking into account the expectations of market participants ensures that the price increase is smoothed out over time, leading to a price increase compared to the baseline scenario that is higher at the beginning of period than at the end. Nevertheless, everything depends on the nature of the actors' expectations, particularly the element of surprise that this measure may have in a context of imperfect forecasts.

**Figure 8 – The implications of an EU ETS 2030 target compatible with Roadmap 2050**




*Source: Climate Economics Chair, ZEPHYR-Flex model*

Table 1 summarizes the main results obtained from the ZEPHYR-Flex model for each type of intervention envisaged. It is apparent that all the measures cause the price to rise within the 2020 time horizon if maintained throughout the period. But they significantly alter the quantities by increasing the amount of allowances carried over to the future, which potentially can generate market disruption. Although market actors acquire a better perception of prices in the short term, their long-term outlook becomes considerably less clear. Moreover, past experience suggests that forecasts made at the beginning of the period may be disappointed later, thus casting doubt on the idea that a single intervention by the public authorities can permanently put allowance prices on the "right" path. For this reason it seems to us that such an intervention could be wisely carried out only through establishing the dynamic management of the supply of allowances conducted within a new market governance framework.

**Table 1 – Summary of the implications for Phase III of a public intervention**

| Scenario | Allowance price in €/t$CO_2$ | | Banking in Mt$CO_2$ | | Verified emissions in Mt$CO_2$ | |
|---|---|---|---|---|---|---|
| | **2013** | **2020** | **2013** | **2020** | **2013** | **2020** |
| **Reference** | 6 | 14 | 1,075 | 610 | 2,080 | 1,900 |
| **Reserve price of €20/t** | 20 | 20 | 900 | 1,550 | 1,860 | 1,680 |
| **Set-aside – version 1** | 15 | 0 | 990 | 945 | 1,950 | 2,130 |
| **Set-aside – version 2** | 8 | 16 | 1,200 | 305 | 2,040 | 1,825 |
| **Set-aside – version 3** | 13 | 19 | 1,365 | 880 | 1,980 | 1,740 |
| **2030 target compatible with Roadmap** | 9 | 16 | 1,210 | 700 | 2,030 | 1,835 |

*Source: Climate Economics Chair, ZEPHYR-Flex model*

# 3. The need for renewed governance

After eight years of operation, the EU emissions trading scheme has not yet fully established its credibility. Interventions by the public authority carried out in a hurry to raise allowance prices risk further weakening the scheme unless they are accompanied by changes in its governance. This section explores ways of enhancing its credibility by establishing an Independent Regulatory Authority (IRA), whose mandate would draw on various lessons from monetary policy.

## 3.1 A parallel with monetary policies

In some ways, a $CO_2$ allowance amounts to a new currency, characterized by the curious feature that it can be used to purchase only one good: the right to emit one tonne of $CO_2$ into the atmosphere. The result is a certain similarity between the operation of the carbon market and that of the money market.

Every year, the issuing of carbon currency (the primary money supply) is implemented through the process of allocating $CO_2$ allowances to industry. It can be done on a free-of-charge basis or by

auction. The total amount of the currency created is determined by the emissions cap, which must not be exceeded. Once issued, this currency can circulate freely. It is withdrawn from circulation at the time of compliance, when installations must surrender to the public authority as many allowances as the number of tonnes of $CO_2$ they have emitted. In the case of "over-allocation", the value of the carbon currency is eroded – a kind of "carbon inflation". And just as inflation weakens the economy, so over-allocation impairs the capacity of the carbon price to trigger the specified emissions reductions. In a symmetrical way, if there is a liquidity crisis, the drying up of the money in circulation may cause a systemic crisis: in such a situation, the central bank typically acts as lender of last resort to prevent the collapse of the financial system and of economic activity. Similarly, in the absence of flexibility mechanisms, a shortage of carbon currency could generate a surge in the price of carbon, leading to economic breakdown.

Since 2008, industries subject to allowances quotas can use Kyoto credits, which they import from outside the system for part of their compliance. These credits are equivalent to a currency, the use of which may affect the value or stability of the domestic currency. This raises the traditional question of the degree of convertibility of the domestic currency and exchange rate management. Again, the parallel between the carbon market and money market still holds.

Given these similarities, we can draw a parallel between the functioning of a central bank in the money market and the role that an IRA could have in the emissions trading system. For decades, the main central banks have relied on quantitative management to achieve their targets for interest rates, mainly through the supply of base money and open market operations in the money market. The instruments available to an IRA would be fairly similar, as shown in Table 2, especially in the case where the majority of allowances are auctioned. Dynamic management of the supply of allowances by auction should prevent the risk of "carbon inflation" in the short term, probably limiting the need to intervene in the secondary market. In the event of a "liquidity crisis", the IRA could play a similar role to that of lender of last resort, by a farsighted use of borrowing[9]. Of course, strict requirements for public information and reporting would be imposed on the IRA, as on any central bank (Table 2).

[9] For example by anticipatory auctioning of allowances initially planned for subsequent years, without changing the total quantity of allowances allocated over the period. Care needs to be taken however, as this increases the short-term supply at the cost of increasing demand in the longer term. One might also imagine a "buffer" reserve system, of a size determined in advance or which is fueled by the market, where allowances would be released in the event of price hikes. For example, the cost control reserve due to be introduced in the California market is one such mechanism, as was the projected reserve in the Waxman-Markey bill in Congress.

**Table 2 – Comparison of the money market and the carbon market**

| | Money market | Carbon market |
|---|---|---|
| **Final objective** | Monetary stability in the long term | Emissions reduction at the lowest costs in the short and long term |
| **Market oversight** | Integrity and liquidity of transactions | Integrity and liquidity of transactions |
| **Price instrument** | Interest rate | Carbon price |
| **Quantitative regulation** | | |
| **Primary market** | Central money supply | Auction of allowances |
| **Secondary market** | - "Open market" (Sale and purchase of monetary assets)<br>- Exchange rate | - Sale and purchase of carbon assets<br>- Links with other markets (international credits) |
| **Role in a liquidity crisis** | Lender of last resort | Additional supply borrowed on the future (borrowing) |
| **Periodic communications to the public authorities (European Council, European Parliament, European Commission)** | - Annual and quarterly reports on the financial and economic situation<br>- Public hearings in the European Parliament + Council | - Reports on the carbon price and the long-term trajectory<br>- Public hearings |

*Source: Authors*

As Whitesell (2011) has shown with great acumen[10], there are not only technical similarities between currency and climate, but also a shared problematic of articulating very different time horizons. The implementation of monetary policy and climate policy involves trade-offs in relation to the long-term view which fall outside the usual concerns of government: non-inflationary growth for the first, and transition to a low-carbon economy for the second. Experience shows that governments' time horizons are too short to effectively combat the risk of inflation. This short horizon can create an instability in political decision-making that runs counter to the confidence needed for the proper functioning of markets. This is the reason for the creation of "independent" central banks to which the political authority mandates the task of making painful decisions in the short term to protect society against inflation in the long run. Similarly, the customary political horizons are too short to effectively act against the risks of climate change. The implementation of climate policies therefore requires innovative forms of governance in order to take account of the long view in decision-making. The EU ETS is no exception to this rule: its credibility would be greatly enhanced by setting up an IRA, the mandate of which we attempt to outline below.

[10] See the references to his work in the bibliography.

## 3.2 Outline of the mandate of an Independent Regulatory Authority (IRA)

As with the definition of a central bank's mandate, it is first necessary to separate the ultimate objective, which must remain the prerogative of the political authority, from the intermediate objectives that are better delegated to the independent authority.

The ultimate objective of monetary policy – achieving the best non-inflationary growth path – is not the responsibility of the central bank. Its role is to decide how much money to put into circulation, ensuring that the amount is large enough to stimulate growth, but not so large that it leads to traditional inflationary processes or speculative bubbles.

Similarly, the ultimate goal of climate policy – bringing emissions levels onto a path that can mitigate climate change – is not the responsibility of the IRA. That is a sovereign prerogative falling within the remit of the political authority. Concretely, this target was set in Europe in the form of caps defined with great precision through to the 2020 horizon and of a decarbonisation trajectory by 2050, whose interim targets (2030 and 2040) are in the preparatory stage. The role of the IRA is not to intervene in defining these objectives, but to ensure that the carbon market puts the economy on the right track to reduce emissions: one in which industries subject to the ETS achieve the required reductions in each period and make the necessary investments to prepare for the reductions of subsequent periods.

The IRA's mandate is therefore to reconcile the different time horizons, ensuring that the market generates a carbon price that reflects changing short-term market conditions and simultaneously sends a signal triggering long-term investments. In case of an unanticipated shock, such as the 2009 recession, its role would not be to prevent a decline in allowance prices – altogether desirable in regard to short-term conditions –, but to ensure that the change does not alter industrialists' expectations and their low-carbon investment programmes. Where there are threats of soaring prices due to insufficient carbon currency, the IRA could smooth out the bumps by anticipatory releasing onto the market allowances earmarked for a future period (borrowing).

One of the key conditions for the success of this mandate is that the IRA assembles the necessary expertise to understand and anticipate both the dynamics of the functioning of the carbon market and the dynamics of emission reduction trajectories. The independence of its mandate is in fact conditional upon this technical competence, which alone should guide its choices and allow it to build up its credibility vis-à-vis market actors. Of course, this technical credibility and the discretionary powers resulting from it must be balanced by strict obligations in regard to reporting, both to the public and the political authorities.

One of the IRA's priority mandates will be to increase the temporal depth of the European carbon market. In the industrial and energy sectors concerned, there is an enormous stock of fixed capital. Investment decisions determine the volume of future emissions for several decades. We cannot therefore be satisfied with a goal for the allowances market on a 2020 time horizon, as is the case now. Following the European Council's commitment to an emissions reduction target of at least 80% in 2050 (compared to 1990), the Commission has thought long and hard as to the best way to achieve this target. It comes within the mandate of the IRA to convert this long-term goal and its intermediate targets for 2030 and 2040 into credible changes in the emissions cap in the market. To be credible with industrialists and energy producers, who would then be cognizant of the emissions

cap for 40 years, a number of possible clause revisions must be foreseen, depending on the highly unpredictable future evolution of technologies, energy prices, the international trading environment and economic conditions.

An important component of the IRA mandate should be to incorporate developments outside the system into its dynamic management of the supply of allowances. Progress in international climate negotiations is likely to expand the range of market tools encouraging emissions reduction. Connecting the EU ETS to these international instruments is highly desirable, but doing so calls for specific rules to be established under the responsibility of the IRA, if we are to avoid a repetition of the unfortunate experience of the introduction of Kyoto credits, followed by their restriction. The same applies to coordination between the operating rules of the allowances market and the introduction of other climate policy instruments. The dynamic adaptation of the ETS to the effects of these various instruments is a priority mission for the IRA, which must avoid the inefficiencies resulting from the unwanted overlapping of public policy instruments.

The final aspect of the division of roles between the public authority and the IRA concerns the allocation of the proceeds from auctions. It goes without saying that the entire amount must be returned to the public authority, whose prerogative is to set the climate policy goal and to collect taxes or quasi-taxes. Any allocation of a portion of auction proceeds to the IRA would generate conflicts of interest and be totally unjustified. Without the emergence of an IRA, it is moreover likely that the transition to auction will considerably complicate decision-making by the 27 governments of the EU, which are increasingly experiencing a conflict of interest in dividing up the financial windfall of the tens of billions of euros expected to be generated annually from the auction of $CO_2$ allowances as of 2013.

# Conclusion

If we are to maintain and strengthen the role of the carbon market in the European policy for combating climate change, three conditions appear to be necessary: (1) ensuring that climate policy instruments are complementary, (2) taking a long-term view of the market, and (3) making transactions and compliance procedures secure in the short term.

All three of these conditions need to be fulfilled if confidence in the market is to be restored. To achieve this, the lessons of monetary policy teach us that it is risky to rely on current interventions by the public authorities, whose limited time horizon leads to decisions favouring the short term. It is for this reason that in this paper we attempt to outline the mandate of a prospective Independent Regulatory Authority (IRA) responsible for the dynamic management of the supply of allowances in the market.

In the absence of progress in market governance, although the courses of action currently under discussion to boost carbon prices may be able temporarily to increase price visibility, they risk further clouding the medium and long-term visibility required by market actors. As the simulations using the model ZEPHYR-Flex show, establishing a reserve price in allowances auctions or creating a set-aside system simply defers the problem to the future. On the other hand, setting an ambitious goal now for 2030 would not suffer from this disadvantage – though its impact on the market would depend on participants' expectations and on the credibility of the public authority, which in the current market governance context has been weakened.

Although institutional constraints make setting up an IRA difficult for the next few years, would it not make sense to undertake action, however imperfect, in the form of an exceptional withdrawal of allowances within the framework of the adoption of the Directive on energy efficiency? We know that in the flawed world in which we live, the best can be the enemy of the good. Completely excluding an intervention until such time as the IRA is operational would no doubt be somewhat dogmatic. On the other hand, it would advisable to insist that such a measure be accompanied by an impact study clearly analyzing the various long-term effects of the different options, including those resulting from the introduction of the dynamic management of the supply of allowances under the mandate of the IRA.

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# *Information and Debates* Series

n° 14 • March 2012




**Contact us :**
Chaire Economie du Climat - Palais Brongniart (4e étage)
28 Place de la Bourse, 75 002 Paris, France
Tel : +33 (0)1 73 01 93 42
Fax : +33 (0)1 73 01 93 28
Email : contact@chaireeconomieduclimat.org


Directeur de la publication : Christian de Perthuis


*La Chaire Economie du Climat est une initiative de CDC Climat et de l'Université Paris-Dauphine*

Climate Economics Chair
Paris-Dauphine University
CDC Climat