

Emission rights allocation criteria

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Abstract— Contrary to what a naïve application of standard economic theory could suggest, correct emission right allocation can be critical in order to assure the economic efficiency of an emission trade system. In this paper, the main criteria that should be fulfilled are reviewed, with a special focus in the current European emission trading system.

Index Terms— Emission trading, CO₂, emission allowances

I. INTRODUCTION

The allowance allocation the European emission trading system is the biggest one to have been implemented by an order of magnitude. Yearly economic value ranges between €22 to €66 billion, to be compared with the figures for the USA East Coast NO_x trading programmes (€1.1 billion) or SO₂ trading schemes (€2.2-8.7 billion) [5,6]. Therefore, its implications on the economic performance of the affected sectors, as well as that of the economy as a whole, are of paramount importance.

Most of the required burden for carbon emission cutbacks falls over the electricity generation sector, mainly for two reasons. Firstly, a significant fraction of the total amount of carbon emission is due to electricity generation by thermal plants. Secondly, European companies in electricity markets are subject to a much less degree than other ones, like those in the aluminum or refining markets, to overseas competition [6]. Therefore, concerns about loss of competitiveness of European industry are not so marked for the electricity supply industry.

European Directive on Emissions Trading requires Member States to specify the fraction of their national emission budget that are to be dedicated to the sectors covered by emission trading, as well as the specifics on how are to be distributed among existing facilities, new facilities and auctions [2]. In this paper, it is argued that the chosen method has influence on operation and investment decisions.

Electricity industry representatives usually argue that the additional cost of the emission rights should be somehow compensated by granting to generators with an adequate amount of allowances. On the other hand, as carbon cost is, in a competitive market, passed through the consumers via a higher electricity price, it is not obvious how many

allowances, if any, are to be granted; and how that amount depends of the different generation technologies. This paper intends to shed light on this issue.

Moreover, allocation mechanism is a dynamic one, as allocation plans are to be done for 2008-2012 (Phase I) and after 2012 (phase II). Even if the European Commission and some Member States initially announced that current behavior is not to be the basis for future allocation, is difficult to envisage a situation where no element of "updating" is present. We also consider how updating is likely to affect operation and investment activities, to suggest ways to avoid detrimental effects.

II. THE EUROPEAN EMISSION TRADING SYSTEM

The European Emission Trading System (EU-ETS) Directive was adopted by the Council and the European Parliament on 13 October 2003 [4], and Member States implemented its provisions in the following months. The EU-ETS is a central piece of the European environmental policy, and one of the main instruments developed in order to fulfill with the provisions of the Kyoto treaty. However, it is not legally subordinated to the treaty itself. Actually, it is a binding agreement for the Member States irrespective of the treaty vicissitudes.

The Directive establishes that each Member State must submit a National Allocation Plan to the Council stating the way in which intends to fulfill its commitment regarding greenhouse gases emissions. Overall, the EU has agreed to reduce aggregated emissions of greenhouse gases by 8%, from the 1991 emissions baseline to the 2008-2012 average emissions. The Burden-Sharing Agreement redistributes the reduction target among the Member States. The national commitments range from a decrease of 21% for Germany and Denmark, to an increase of 25% for Greece.

Although the Council must approve each National Allocation Plan, the general principle is that each Member State should be free to comply with its commitments as considers more adequate. National Allocation Plans include a number of measures related to almost any sector in the economy. However, a cornerstone of every National Allocation Plan is the allocation of the emission allowances granted to each Member State, in the EU-ETS framework.

The EU-ETS is a cap and trade scheme that affects to large combustion plants, accounting for about 46% of EU emissions. The EU-ETS present coverage includes: energy

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activities (power generators; combustion installations with a rated thermal input exceeding 20MW, mineral oil refineries, coke ovens): production and processing of ferrous metals: mineral industries (cement clinker, glass and ceramic bricks); and pulp, paper and board activities.

Generally speaking, each European government has grandfathered to its industry (including its power industry) allowances related to its historical emissions. A very small share of allowances (0% in most Member States) has also been auctioned. Allowances can be traded in a market, as any other commodity, providing a publicly quoted carbon price. Allowances can be used in any moment of the first and, presumably, second EU-ETS phases. No banking between phases is allowed.

III. HOW MANY ALLOWANCES SHOULD BE ALLOCATED TO THE POWER SECTOR?

The power sector is one of the main players in the EU-ETS. Allocation has allegedly more stringent than in other economy sectors, as it is not subject to direct non-EU competition. The existence of a carbon price implies the existence of a cost for every fossil generator that, in a competitive market, should be pass through the consumers by way of the electricity price. However, both windfall profits and losses can impact to the different electricity companies. The impact depends of the generation mix of each particular company.

Firstly, let us consider the bid of a fossil (i.e. coal or natural gas) generator. The generator must take into account not just the fuel cost, but also the price of the allowance that it is required in order to emit the CO₂ coming from the fuel combustion. It is important to emphasize that allowance grandfathering do not change the economic reasoning, because it is a sunken income: the generator can decide not to generate, sell the allowance and cash the proceedings. Therefore, it incurs an opportunity cost by generating. Actually, empirical research of European electricity prices strongly suggest that 60% to 100% of carbon price is pass through to the consumers [1].

Now, let us consider a competitive power generation market in which the order of merit is, from cheaper to more expensive, nuclear, coal and natural gas. Furthermore, the order of merit is the same one either if allowance price is consider or not (that is the likely case with the rather low present allowance price). Then, after introducing the trading system, the electricity price increases by the same amount than the variable cost of the marginal unit (a natural gas fired plant), that it is the allowance cost for this technology. This amount is insufficient to compensate the coal plant for the greater allowance cost it faces per generated MW-h (windfall loss), but it is an additional revenue for the non-fossil nuclear plant (windfall profit).

In a real system, these effects are certainly more complex than in the above idealized situation, but again there are losers and winners. A policy designed to fully compensate these effects is unlikely to be very simple. Moreover, uncertainty of the future allowance price can complicate considerably the picture, specially if it involves changes in the merit order in some, but not all, the possible scenarios.

Therefore, it is advocated in this paper that allocation should be done after careful studies of the impacts in the system operation and electricity prices, taking into account the existing uncertainties, are done by the regulatory authorities. These studies should include standard ones in the power industry, as production cost models simulations.

IV. UPDATING ISSUES

Economic theory advises that, in order to maximize the efficiency of the system, the amount of allowances granted should be independent of the plants actual operation after the allocation. Moreover, no allowances should be allocated for free to new facilities. Allowances already allocated for free to existing facilities are a lump transfer that do not affect the economic effectiveness of the scheme.

Allowances allocation criteria for post-2012 EU-ETS has not been already decided. However, there is a widespread opinion that today's emissions could influence future allocations. Therefore, there is an incentive to value more dearly present allowances than just the amount that the today's circumstances would justify, because of the implicit promise of more future allowances. On the other hand, there is an additional incentive for the generation companies to keep in operation fossil generation plants if future allowances are granted on the basis of historical emissions, partially undermining the final objective of the EU-ETS (greenhouse gases emission reduction) [3].

The problem is compounded if the different Member States follow different policies regarding allowance allocation, as in EU-wide carbon and electricity markets distortions can arise because of the different national regulations. For instance, if country A decides not to modify the initial allowances allocation, while country B decides to continuously update them based on historical emissions, *ceteris paribus* country A is going to suffer higher allowances prices than those in case country B should follow the same policy than A. Overall, consumers in country A are going to receive a smaller surplus, and electricity industry in country A is going to have greater or lesser profits according its technological mix.

The incentives for investments in new capacity are going also to be affected. Firstly, allowances present an expected future prices are possibly going to bias the investment decision in favor of one or another technology. Moreover, in many National Allocation Plants new entrants are awarded additional allowances, that are function of the technology of

the new plant. Although this measure reduces the cost of new entry, it also bias the investment process towards fossil plants.

V. CONCLUSION

Careful consideration of allowances allocation is required in order to attain both fairness and effectiveness of the trading scheme. Ideally, effectiveness requires allocation not to be contingent on generators subsequent behavior, while fairness require careful consideration of both actual and counterfactual regulatory scenarios (with and without emission trading). Although these are new problems, they are not completely unknown for the industry, as in some aspects resembles previous discussions on the payment of costs of transition to competition.

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