

European Emission Trading

CarbonSim - A Tool For Corporate Decision Makers

Whereas the success of global climate policy still depends on Russia's outstanding ratification of the Kyoto Protocol (KP), the European Union is making swift headway towards substantial cuts in greenhouse gas (GHG) emissions. A new directive confronts the larger part of European industry with mandatory emission caps and far reaching business implications. Three recent emissions trading simulations run by CarbonSim Pty Ltd. have provided important insights into emission trading at operational level and helped companies prepare for the carbon-constrained future. By **URS BRODMANN**.

IN JULY 2003, the European Parliament and Council of Ministers put the final touches to an emissions trading directive that introduces mandatory GHG caps for a number of industries. Starting in 2005, installations operating under the directive will be required to surrender emissions allowances, denominated in tonnes of CO₂-equivalent, for all their emissions of CO₂. Later, the scheme may be extended to include other gases, such as methane.

The Member States will be responsible for defining the yearly aggregate emissions cap for their industries, and for issuing a corresponding number of allowances to the individual installations. To this end, they will work out so-called National Allocation Plans, the first one (for the initial trading period 2005-2007) being due by end of March 2004.

Emissions allowances will be tradable, resulting in a community-wide allowance market and a uniform price for carbon. Companies wishing to emit more than their allocation will be able to purchase additional allowances from other companies. Also, companies will be able to bank any excess allowances for use in future years, subject to certain conditions. This flexibility helps to ensure that industrial GHG emissions are reduced at the lowest overall cost. At the same time, the emerging carbon market, which has been predicted to be worth several billion euros, opens new business opportunities for a number of stakeholders.

The emissions trading scheme is a cornerstone of the European Climate Change Programme, the Community's framework for meeting the KP's 8% GHG reduction target. The scheme will cover over 10,000 installations in the following sectors or 'activities': Thermal combustion installations with a rated fuel capacity exceeding 20 MW, mineral oil refineries and coke ovens, iron and steel production, mineral industry (cement, lime, glass, bricks), as well as production of pulp and paper. Together, these activities are responsible for nearly half of the CO₂ produced within the EU. The ten countries acceding in 2004 will adopt the emissions trading directive without delay.

Key Features & Open Questions

Some essential features of the emissions trading directive include the following:

- Member States may auction a maximum of 5% of the total allowances in 2005-07, and a maximum of 10% in 2008-12. The remaining allowances must be allocated free of charge.
- Installations have to surrender, by 30 April of each year at

the latest, allowances equivalent to their emissions during the preceding calendar year. The penalty for a shortfall in allowances is 40 €/t CO₂ in the period 2005-07, and 100 €/t CO₂ in 2008-12. Those paying the penalty still have to make up the shortfall by surrendering the corresponding extra allowances in the next year. Member States are responsible for enforcing the penalties.

- From 2008, Member States may unilaterally 'opt-in' additional activities and gases. In addition, the Commission may recommend the harmonised inclusion of additional activities and gases across the Community from 2008, for example for the aluminium and transport sectors. On the other hand, Member States may temporarily 'opt-out' selected installations from the scheme in 2005-07, but not whole activities.
- An amendment to the directive will regulate the linkages between the European trading scheme and the flexibility mechanisms of the KP. According to a draft published in July, project-based credits for emission reductions under the KP's *Joint Implementation* and *Clean Development Mechanism* could be used for compliance from 2008.

CarbonSim Emissions Trading Simulations

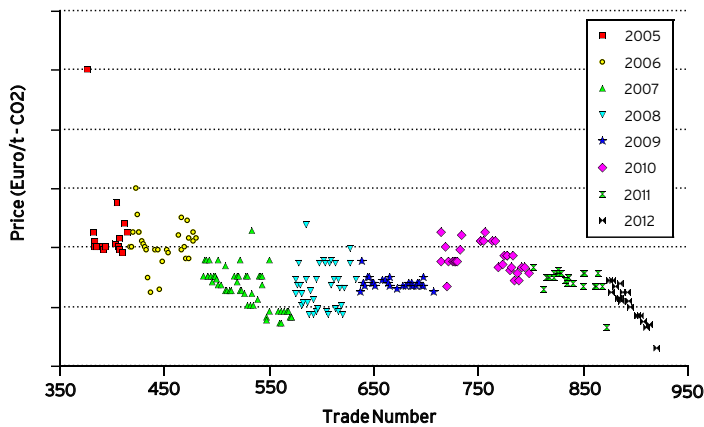
The simulations typically run over one or two days, covering the development of the European emissions trading market in the period 2005-2012. 20-30 participants (or groups of participants) log on to the trading platform remotely, via the Internet, or from individual computers at a seminar. Each participant represents a virtual company from a relevant sector such as power generation or cement production for example. Participants have the choice to use their own company's actual emissions profile and abatement strategy, or to trade as a hypothetical company. The objective is to maximise each virtual company's profit while ensuring compliance with the emissions cap.

During the simulation, participants have to decide what strategies to take, and when and how they should be implemented. To achieve compliance, companies can invest in internal emissions abatement, reduce their production, or trade allowances on the floor. In addition to carbon, the trading platform includes floors for electricity, renewable energy, coal, gas and oil. The trading floors allow for spot as well as forward trades, and can be tailored to include other derivatives. A CDM/JI floor is also integrated as a project-based over-the-counter market. The platform is accessible via standard Intranet and Internet systems and is fully compatible with the most commonly used corporate operating systems and networks.

CarbonSim's simulations are based upon different - but politically realistic - emissions trading rules. In Europe, CarbonSim recently completed the third in a series of simulations, all of them tailored according to the emerging rules of the EU directive. These simulations addressed many of the most pressing design issues facing corporations and policy makers, such as the method of allocation, the extent of auctioning, the role of banking, allowances for new entrants etc. Participants included companies from the electricity, mining, chemicals, oil and gas, manufacturing, cement, aluminium and forestry sectors, among others.

Figure 1. Time Series Price of CO₂

(By contract settlement), as observed in CarbonSim's second European simulation, November 2002

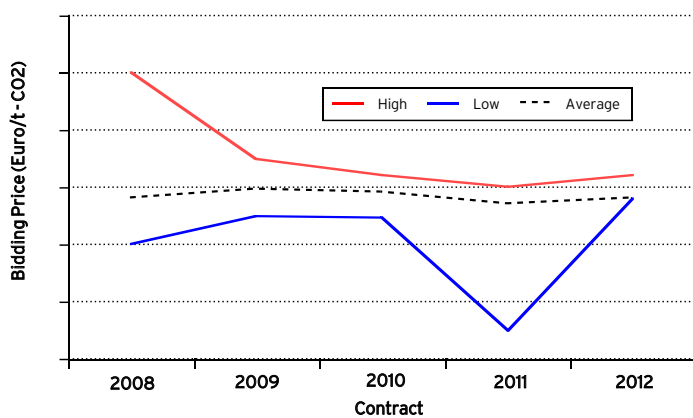


Source: CarbonSim

Considerable uncertainty remains, however, with regard to how Member States will implement the directive, and particularly how they will design the national allocation plans. For example, Member States have considerable flexibility in choosing methods of allocation and base years, and in dealing with early emission reductions, new entrants and plant closures. Furthermore, the interaction of the emissions trading scheme with other policy instruments needs to be resolved, such as voluntary agreements, ecological taxes and incentive mechanisms for example.

Figure 2. CO₂ Bidding Prices

As observed in CarbonSim's second European simulation, November 2002



Source: CarbonSim

Exploring the Business Impacts with CarbonSim

By attaching a price to carbon emissions, the trading scheme will profoundly impact the balance sheets of European industry. Liable companies need to develop and implement a careful strategy to ensure compliance with their emissions caps at least cost. Such a strategy will usually integrate investment planning, operation and maintenance, trading activities, as well as risk management. However, beyond mere compliance, the trading scheme is bound to influence prices of electricity, fuels, and other GHG-intensive commodities, and will therefore also affect companies that are not directly covered by the directive.

With this background, and with a view to the start of the

scheme in little more than a year, there is an urgent need for industry to prepare for the new regime.

Results & Outlook

The European simulations were perceived as useful in helping participants understand the requirements and pitfalls of a successful carbon strategy. Participants gained a practical insight into the operation of the trading scheme, experienced the dynamics of a European GHG market, and developed and tested their trading strategies. The simulations also highlighted the interactions of the carbon market with markets for electricity, renewable energy and fossil fuels, as well as the impact of the scheme on different industries.

As an illustration, Figure 1 shows the price of emission allowances as observed in the second European simulation. Prices were quite volatile, with pronounced downward trends at the ends of both the pre-commitment period 2005-07 and the first commitment period 2008-12. This decline was probably due to several factors:

- Participants ensured their compliance in time.
- Some participants were able to cut their emissions beyond the expected level during the simulation.
- A discount of 2/3 was applied to allowances banked from 2007 into 2008, in order to reflect the restrictions for Member States imposed by the KP.
- Unchanged reduction targets for the time after 2012 reduced the incentive for banking at the end of the first commitment period.

Please note that the observed price curve is the result of a simulation with a limited number of participants acting under a specific set of assumptions. Therefore, it should not be interpreted as a *projection of future carbon prices*. Still, these results highlight the importance of banking rules as well as long-term emission reduction targets for the carbon price development in 2005-12.

Another key feature of the European simulations was the annual auctioning of 10% of the allowances from 2008. Figure 2 shows a typical pattern of bidding prices in these auctions. The large spread reveals how challenging such single round or sealed bid auctions are, especially in the beginning of the trading scheme when price signals are scarce. The message for policy makers here is that auctioning of substantial amounts of allowances may not only mean a financial burden but also increased risks for the industries concerned ■

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CarbonSim's next European simulation will be held on 10th November 2003, based on the rules of the finalised trading directive.

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