

Example 7.2

Reducing Greenhouse Gases: The EU's Emissions Trading System

As part of the Kyoto Protocol, the original 15 members of the European Union agreed to reduce their emissions of greenhouse gases by 2012 to a level 8% below their 1990 levels. Then, in 2003, the EU took a bold and unprecedented step in order to try to meet its commitment at the lowest possible cost to the member nations' economies: the European Trading Scheme (ETS) Directive of 13 October 2003 established a system of marketable allowances to reduce emissions of carbon dioxide from industrial sources. The directive applied to the five so-called 'dirty' manufacturing industries (those that emit the largest amounts of CO₂): the electric utilities, oil, building materials, metals, and paper. These five industries account for 45% of total EU emissions of CO₂. Each European Union Allowance (EUA) permits the emission of one metric ton of CO₂. The ETS was planned in two phases: Phase I from 2005 to 2007, and Phase II from 2008 to 2012. The goals of Phase I were to establish the market for allowances and point the member nations down the path towards meeting the Kyoto target by beginning to reduce CO₂ emissions. The member nations would then meet the overall 8% reduction goal in Phase II.

THE OPERATION OF THE ETS

The EU chose a decentralized approach to reducing emissions, with the member nations playing the leading role. Each member nation submits a National Allocation Plan (NAP) at the beginning of each phase that indicates how many allowances it needs each year. The totals are determined in consultation with the companies within the five ETS industries. Each NAP is subject to twelve EU Commission guidelines, the most important being that the total number of allowances requested must be consistent with the overall goal of meeting the Kyoto target. The EU Commission has to approve each member nation's NAP. Once approved, the member nations then determine the allocation of the

allowances among the industries. The allocations are made at the lowest possible level to the plant installations within each firm that are the sources of the CO₂ emissions. Allowances had to be allocated to more than 11,400 installations in 2005.

The allocations are given to the installations at the beginning of each year free of charge. At the end of the year, the firms issue an annual report that indicates the total amount of their CO₂ emissions during the year and they turn in the number of allowances to match the tons of CO₂ emitted. If firms see that an installation is likely to need more allowances than they have been allocated, then they can buy them from other firms who were allocated more allowances than they need. The firms are subject to stiff fines if they do not have the required allowances at the end of the year. Each member state maintains a national registry that records the initial allocation of the allowances to each installation and all purchases and sales of allowances during the year. The firms' annual emissions reports are verified by third parties approved by the EU Commission.

The role of the EU Commission in this decentralized system is three-fold. First, it must assure that the total number of allowances is scarce, so that a reduction of emissions within the five ETS industries is achieved. It is the scarcity of allowances that establishes a positive price for emission allowances, which in turn provides the incentive for firms to reduce their emissions in a least-cost manner (as described in Chapter 7 of the text). Second, the EU must establish rules for trading the allowances to ensure that the market for the allowances is orderly. For example, once the member nations' NAPs are approved, no nation can make ex-post adjustments in the total number of allowances granted, because this could affect the market price of the allowances. Finally, the Commission acts as a facilitator and mentor to the member nations, providing guidance on such matters as how to project emissions by installation throughout the years of each Phase, and how to set up their national registries to keep track of the allowances. It also consults with the banks and other financial brokers who operate the market for the allowances. These three roles provide the top-down oversight necessary for the smooth operation of the ETS.

PHASE I: SUCCESSES AND FAILURES

By the summer of 2007, near the end of Phase I, the results of the ETS were viewed as disappointing by many observers. Far from pointing the member nations down the path to the Kyoto targets, total EU emissions of CO₂ had *increased* since 2004. This occurred for two reasons. One is that the NAPs were only mildly constraining on the five ETS industries. The other is that the member nations made hardly any efforts to reduce CO₂ emissions in the non-ETS industries that account for 55% of the total emissions.

Regarding the ETS, it suffers from a design flaw that makes it far less effective than it could be in reducing CO₂ emissions. The surest way to meet an emission reduction

target is to set the total number of allowances equal to the desired reduction and then have the firms purchase the allowances in an auction. The initial auction immediately establishes a market price for the permits and places the tightest possible control on the CO₂ emissions. The auctions also bring in revenues, which would allow the member nations to reduce their tax rates on labor and capital. Economists refer to this as a double dividend from marketable permits or allowances: the price of the allowances simultaneously reduces the CO₂ emissions in a least-cost manner and the efficiency losses of the tax system. Despite these advantages, the EU chose instead the business-friendly approach of giving away the initial allocations. They worried that an auction, by increasing firms' costs of production, would make them less competitive in world markets, thereby reducing output and employment in the five ETS industries. These fears were such that allocating the allowances by auction was probably not politically feasible.

Having decided to give the allowances away, the best way to do this is by means of a benchmark or standard for reducing emissions. Under a benchmark system, the firms project the annual output for the year from each of their installations and then the government applies a standard amount of CO₂ emissions per unit of output to the output projections. For example, the benchmark could be the best-practice technology for each industry in place at the time, meaning the technology that generates the least amount of CO₂ per unit of output. Alternatively, the standard could be the industry-wide average amount of CO₂ per unit of output over the past few years. Whatever benchmark is chosen, the allowances for an installation are equal to the product of the projected installation output and the benchmark CO₂ emissions per unit of output. An installation receives that number of allowances whether it is emitting more or less than the benchmark tons of CO₂.

The EU did try to establish a benchmark allocation but it proved to be impossible. One problem was that the installations used such different technologies, both across the five industries and even within an industry, that there was no obvious benchmark to apply. The initial attempts often generated scores of benchmarks for a single industry. Another problem was that the development of the first NAPs occurred under a severe time constraint. The first NAPs were due in March of 2004, just five months after the passage of the ETS Directive in the previous October, and approved NAPs had to be in place by the end of the year. To make matters worse, the member nations quickly discovered that there were no data on output or emissions by installation for these industries.¹ Therefore, the member nations had no choice but to enter into separate negotiations with the individual firms and ask that they voluntarily supply data on emissions as well as output projections for each of their installations. Given the time pressure, the only feasible choice was to allocate the initial allowances across installations on the basis of their average CO₂ emissions over the past few years. This

¹ The single exception was Denmark, which had been operating an emissions trading scheme at the installation level applied to roughly the same industries.

meant, however, that the larger an installation's emissions were, the more allowances it would receive. This is clearly not the best way to induce firms to reduce their emissions.

Another immediate consequence of the lack of data was that the EU Commission could not set its emission reduction goal relative to 1990 emissions levels, as the Kyoto Protocol mandated. 1990 data on emissions at the installation level simply did not exist. The best the EU Commission could do was to define the 8% emission reduction target relative to emissions levels over the past few years.

Basing the initial allocation on past emissions can work reasonably well if the member nations choose to set a tight ceiling on the total number of allowances. But this was not done, perhaps because the governments needed the cooperation of the firms to develop a usable data base on emissions. Instead, the allocation of allowances went as follows, for the most part. All of the industries, except the electric utilities, were given a number of allowances equal to the number of emissions they would require under a so-called business-as-usual (BAU) projection, that is, their emissions if no restrictions were applied to them. In addition, a small percentage of allowances were set aside for potential new entrants. The remaining allowances were allocated to the electric utilities. Given the overall constraints on the NAP total allowances imposed by the EU Commission, the number of allowances available for the electric utilities was typically less than their BAU projections. The electric utilities were chosen to bear the brunt of the program because it was felt that they could reduce emissions at much less cost than the other four sectors. On the one hand, they were the least involved in competition in world markets of all the industries. On the other hand, they could achieve a significant reduction in emissions by changing their fuel from coal to natural gas. No such obvious factor substitutions were available to the other industries. It was felt that they could reduce their CO₂ emissions significantly only by reducing their output, clearly a costly option. In other words, the feeling was that the pollution-proportionate-to-output model described in the beginning of Chapter 7 of the text applied to them.²

The net effect of all these decisions was that too many allowances were allocated. The clearest sign of this was the price of an allowance, which fell from €34 in 2006 to €1.20 by May of 2007.³ €1.20 is too low to induce firms to reduce their CO₂ emissions and supply allowances to the market.

Regarding the non-ETS sectors, they include some important CO₂ emitters, such as Transport (21% of total emissions, the largest single emitter of CO₂ of any sector), Households and Small Businesses (17%) and Agriculture (10%). The EU is highly unlikely to reach its Kyoto target if the member nations do not generate incentives for these sectors to reduce their CO₂ emissions through taxes or marketable permits. CO₂ emissions grow directly with increases in output, so it is imperative that the non-ETS

² The CO₂ emissions can also be captured and stored, but this is a very expensive option – so expensive that none of the member nations were willing to consider it.

³ “What Price Carbon?”, *The Economist*, 15 March 2007, p. 2, available on www.economist.com.

sectors reduce their CO₂ emissions per unit of output. In fact, by 2007 the member nations had made almost no effort to reduce CO₂ emissions in the non-ETS sectors. As a consequence, by mid-2007 only about half the member nations were considered to be on track to meet their Kyoto targets.

Despite the disappointments regarding the overall level of emissions, the ETS has recorded a number of impressive accomplishments during Phase I. Keep in mind to begin with that the ETS was a hugely ambitious undertaking, by far the largest pricing approach to reducing pollution ever attempted. Compare, for example, the scale of the ETS with the marketable permit program in the United States to reduce the sulfur dioxide (and later nitrous oxide) emissions of the electric utilities. The ETS applied to 11,400 installations with pre-policy emissions of 2 billion metric tons of CO₂ versus 3,000 installations with pre-policy emissions of 16 million short tons of SO₂ under the U.S. program.⁴ In addition, the initial data problems were overcome. The EU now has a viable data base of the output and CO₂ emissions for all the targeted installations in the ETS sectors. Finally, the market for CO₂ allowances is up and running, and handling a large volume of trades. In 2006, the firms in the ETS sectors paid €2.5 billion for 1.6 billion allowances (*i.e.*, tons of CO₂ emissions).⁵ The majority of the trades were between electric utilities within member states. The EU-ETS has achieved an historic first step in the global effort to reduce greenhouse gas emissions –it has established a price for industrial emissions of CO₂.

WHAT NEXT?

Can the ETS build on these initial accomplishments? The answer is unclear, but there are a number of reasons to be optimistic. In 2006, the EU announced its intention to reduce ETS-sector emissions by 7% in Phase II relative to the Phase I emissions in order to meet the Kyoto Protocol and it appears to be credible on this score. The NAPs for 2008–12, which were due by June, 2006, came in well above the 7% overall allowance reduction target. The EU reacted by rejecting all but three of them (Great Britain, France, and Slovenia) and insisted that they be revised in line with the overall 7% reduction target. Following this reaction, the futures price of an allowance to be supplied in 2010 rose to €16.⁶ Then in March 2007, the member nations committed to a goal of reducing CO₂ emissions by 20% by 2020, implying that there will be a third phase to the ETS beginning in 2013. This commitment is important, because it means that as firms make their investment plans for the next decade or so they can expect to pay a price for CO₂

⁴ A.D. Ellerman, B. Buchner, “The European Union Emissions Trading Scheme: Origins, Allocation, and Early Results,” *Review of Environmental Economics and Policy*, Winter 2007, p.68.

⁵ “Trading Thin Air,” *The Economist*, 31 May 2007

⁶ “What Price Carbon?,” *The Economist*, 15 March 2007, p. 2, available on www.economist.com.

emissions. The ETS could hardly be successful if firms believed that the price of emitting CO₂ would return to zero in 2013. Finally, the planned reduction of CO₂ emissions to meet the Kyoto target for 2012 is relatively modest. Compare, for example, the 8% reduction target of the ETS with the 50% reduction target of the U.S. SO₂ program. The costs of such a modest reduction are easily manageable; one estimate places them at only 0.1% of the combined EU GDP. Even if this estimate is overly optimistic, it suggests that achieving the Kyoto Protocol will not be a great burden.

Still, there are concerns. As of the summer of 2007, six nations⁷ were strenuously resisting the EU Commission's call for sharp reductions in their NAP allowances. They have refused to submit revised plans and it is not clear how this impasse will resolve itself. The overall commitment to an 8% reduction in CO₂ emissions by 2012 to meet the Kyoto Protocol does not apply evenly to all the member nations. Some have emission levels well below their Kyoto targets and others are well above their Kyoto targets. The range runs from 28% above the target (Luxembourg) to 27% below the target (Poland). Two members, Cyprus and Malta, are considered developing countries and thus have no Kyoto targets at all. Some countries from both sets – those well above and well below the targets – may view the requested reductions by the EU Commission to be overly burdensome. Another concern is the design flaw of the ETS in giving away the allowances and basing the allocations on past emissions. The EU Commission gave the member nations some leeway to institute auctions, but for only 5% of the overall allowances in Phase I. Only four nations used auctions at all, with the result that the amount of allowances auctioned off was just 0.13% of the total allowances.⁸ The Commission has permitted up to 10% of the allowances to be auctioned during Phase II, but the Phase I experience suggests that even that modest percentage will not be met. Yet another large concern is that member nations have made no plans to reduce emissions in the non-ETS sectors. Finally, a number of the member nations who are above their Kyoto targets have indicated that they plan to meet their targets by purchasing their allowances from installations that their firms operate in developing countries or in other developed countries outside the EU. This is allowed under the Kyoto Accord, but these purchases will not reduce CO₂ emissions within the EU.⁹

These reservations notwithstanding, the EU-ETS is an impressive first step in the fight against global warming. At the very least, it has demonstrated the feasibility of a decentralized approach to establishing a price for emitting greenhouse gases through

⁷ Austria, Czech Republic, Denmark, Hungary, Italy, and Spain.

⁸ Denmark, Ireland, Hungary, and Lithuania. B. Buchner, C. Carraro, A.D. Ellerman, "The Allocation of European Union allowances: Lessons, Unifying Themes and General Principles," *Fondazione Eni Enrico Mattei*, September 2006, p. 21.

⁹ The ability to purchase credits from installations abroad was made possible by the EU's Linking Directive of 2004. The purchase of allowances from installations in developing countries is referred to by the Kyoto Protocol as the Clean Development Mechanism (CDM), and the purchase of allowances from installations in developed countries as the Joint Implementation (JI).

marketable permits, one in which sovereign governments retain their authority to allocate the permits. And people elsewhere are paying attention. To end with just one example, seven northeastern states in the U.S. are establishing a marketable permit system among themselves to reduce CO₂ emissions. One suspects that there will be many such examples of governments following the EU's lead in establishing a pricing approach to reducing greenhouse gases and other pollutants.

Sources

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¹⁰ "Questions and Answers on Emissions Trading and National Allocation Plans," Press Release Memo/05/84, 8/03/2005, European Union, p. 5.