1 *Introduction*

This book focuses on the first period (2005–7) of the European Union Emissions Trading Scheme (EU ETS), known also as the 'pilot' or 'trial' period. The EU ETS is one of the most exciting and important initiatives ever taken to limit the greenhouse gas emissions that cause climate change. It will be an important influence on the development and implementation of trading schemes in the United States, Japan and elsewhere. As such, it can provide the cornerstone for an eventual global trading regime, which will be an important component of the set of policies that will be needed to address climate change.

The audience for this book are those in all walks of life who want to understand how the EU ETS came about, and (especially) how it functioned in its early life. It is written by economists, but for a general audience, defined as those who take more than a passing interest in how to address our planet's climate change challenge and who are neither technically nor temperamentally attuned to the economics literature. It will also be of value to those with an interest in understanding how the European Union can function effectively in developing and executing a climate policy that has global implications.

Ever since the profession of environmental economics came into being, the integration of the environment and the economy via markets has been a core objective, and the reason why many entered the field in the first place. Carbon emissions trading in Europe has finally lifted the environment from the boiler room to the boardroom, from ministries of environment to ministries of finance, from local councils to Cabinet tables. For chief executives of many major corporations, the environment and the carbon market has become an omnipresent, if not always welcome, guest at their strategic tables. Carbon now has a price in Europe, and the impact of the EU ETS on policy and business continues to progress and intensify. The EU ETS is orders of magnitude more significant in terms of its scope, ambition and

likely impact than any other application of environmental economics. Several billion euros cross frontiers on a monthly basis, and abatement – the technical term for emission reduction – happens in all kinds of interesting and surprising ways. Its effects spill over to influence other markets, notably the volume and value of projects undertaken in developing countries under the aegis of the Clean Development Mechanism (CDM). There are thousands of people involved, including prime ministers and bureaucrats, entrepreneurs and inventors seeking to create lower-cost ways of reducing carbon; carbon market analysts, brokers and bankers mediating and funding markets; CEOs (chief executive officers) developing their carbon strategies; engineers in the control room changing the order in which electricity generation plants come on-stream; and academics analysing and discussing evidence so as to give some intellectual shape to what is happening. For all of these, it should be of interest to know how the scheme came about, and how it performed it its first trading period.

The EU ETS draws its inspiration from Dales' (1968) observation that '[i]f it is feasible to establish a market to implement a policy, no policy maker can afford to do without one'. A key underlying reason for the problem of climate change is the failure of the market to recognize the scarcity value of the atmosphere as a sink for anthropogenic greenhouse gas (GHG) emissions. There is no price that signals this increasing scarcity, and therefore no incentive to reduce emissions. Economists recognize two broad policy instruments to repair this failure, aimed at introducing price incentives that will encourage the parsimonious use of diminishing environmental endowments and stimulate innovation to find new and better ways of reducing such pressure. The first is to introduce environmental taxes, whereby a tax is levied on every unit of emissions produced. This was the instrument first proposed by the European Commission, in the form of a carbon energy tax. The story of its introduction and failure to be accepted is told in chapter 2, but in essence it failed because of the human reluctance noted by Edmund Burke over two centuries ago: 'To tax and to please, no more than to love and be wise, is not given to men.'[1]

The second market-based policy instrument is emissions trading, which draws on humanity's singular impulse to trade. In its simplest

[1] Edmund Burke, 'On American taxation', British House of Commons, 1774.

expression, this involves setting an overall cap per unit of time on the emissions to be permitted and allocating allowances or permits to emitters such that the sum of the allocations does not exceed the cap. These emitters can then pollute as much as they wish, but only on the condition that they hold sufficient allowances at the end of the period to 'cover' their emissions. If they wish to emit more than the allowances they have received, they must buy allowances from those who emissions are lower than the quantity of allowances they hold. These transactions produce a price per unit of pollution that provides the incentive to polluters to reduce emissions and sell the surplus to those who need to buy to cover their emissions. Emissions trading also provides a signal to innovators to come up with new and better ways to reduce emissions. Because those who can do so at least cost will reduce most, the overall burden on the economy of meeting the cap is likely to be achieved at close to minimum cost. The European Union Emissions Trading Scheme is the creation of a Europe-wide market for carbon dioxide (CO_2). The inspiration for, and some of the design of, the European scheme came from the United States, where, for over a decade, trading has evolved on a 'learning by doing' basis, culminating in a trading scheme for sulphur dioxide (SO_2) in the power sector.

In telling the story of this market in its early stages, the concern has been to be as factual as the available evidence allowed, sharing the view of Pablo Neruda that 'the reality of the world should not be under-prized'. Accordingly, the emphasis is on the positive – what has happened – rather than the normative – what should have happened.

In proposing the three-year pilot period that is the focus of this book, the European Commission was anxious to have a window of experience from which to learn and which would inform later stages of the trading scheme. What is described and analysed here is 'out of date', therefore, in the sense that lessons have been learnt, and the second and subsequent stages differ from what comprised the first period. All the same, this volume will contribute to a sound understanding of this evolution and inform the development of other trading systems that are evolving around the world.

One of the most interesting aspects of the EU ETS is its multinational character. The twenty-seven member states of the European Union are engaged in achieving greater economic and political

integration, but they are still sovereign nations, with a wide range of political structures and traditions, and sometimes widely differing commitments in the framework of multilateral policies (e.g. under the United Nations Framework Convention on Climate Change or the Kyoto Protocol). The coordination that has been required, as well as the implications for national policy-making, is an important and often underestimated aspect of the EU ETS.

Outline of the book

The EU ETS had its origins in the necessity for the European Union to convert the commitments, targets and visions expressed via the Kyoto Protocol and elsewhere into action, in the knowledge, as expressed in the Japanese proverb, that 'vision without action is a dream; action without vision is a nightmare'. Creating a carbon market at the heart of Europe was a means of providing not only a price signal, but also a practical fulcrum that could enhance the effectiveness and coherence of other, parallel EU policies, demonstrate global leadership by the European Union and provide encouragement to, and a framework for, the rest of the world to join in the effort. This vision took the practical form of the Emissions Trading Directive. The development of this centre for European climate policy is described in chapter 2, and the key features of the EU ETS are summarised in box 1.1.

A key step in the creation of a trading scheme is deciding on the scope of coverage – the gases and sectors to be included – and the level – upstream or downstream – to which coverage applies. These decisions were made in the enabling legislation, the ETS Directive, and the choices were to go downstream to the level of installations and to limit the coverage in the pilot period to carbon dioxide and to the power sector and heavy industry (the latter including oil-refining, cement and lime, steel, ceramics and glass, pulp and paper). The next step – deciding the cap and allocating allowances to affected installations – was left to the member states and the European Commission. How they dealt with the problem and the outcomes decided upon are the subject of chapter 3.

The free allocation of allowances triggered some controversy about consequences. Chapter 4 addresses these issues, with particular attention to the effects of the extent of trading and the effects of free

Box 1.1 Key features of the EU ETS in the pilot period

A cap-and-trade scheme with a pilot, or 'learning', period

A cap on emissions from the covered sectors is fixed (see coverage and allocation below). The scheme operates over discrete periods, with the first or pilot period (2005–7) being the subject of this book, with a review and appropriate amendment to follow for subsequent periods, of which two have been specifically defined. The second period, corresponding to the first commitment period of the Kyoto Protocol, will extend from 2008 to 2012, and it will be followed by a third period, from 2013 to 2020.

Relationship to the Kyoto Protocol

Those countries that ratified the Kyoto Protocol agreed to meet emission targets in the 2008–12 period. The European Union target for the then fifteen member states was a reduction of 8 per cent below 1990 emissions levels. This overall objective was subsequently redistributed in the form of fifteen separate national targets to the member states under the European burden-sharing agreement (BSA). The twelve new member states are also signatories of the Kyoto Protocol, and ten accepted individual country targets. There is no direct link between Kyoto and the EU ETS, in that the latter was agreed before Kyoto entered into force, and will continue post-Kyoto. Nevertheless, the EU ETS is the anchor around which EU-level climate change policy is structured, and it contributes towards meeting the Kyoto targets.

Coverage was partial

The pilot period was confined to carbon dioxide emissions from combustion installations (electric power and other) with a rated thermal input in excess of 20 MW (megawatts) (except municipal or hazardous waste incinerators), oil refineries, the production and processing of ferrous metals, the manufacture of cement (capacity > 500 tonnes per day), the manufacture of lime (capacity > 50 tonnes/day), ceramics including bricks, glass, and pulp, paper and board (> 20 tonnes/day). This coverage accounted for about a half of CO_2 emissions and 40 per cent of total greenhouse gas emissions. About 11,500 installations in all twenty-seven member states were covered, embracing emissions of about 2 billion tonnes of CO_2 annually. Reductions achieved by the use of sinks – e.g. planting trees – were not allowed.

Allocation was free and decentralized

Member states had the option to auction up to 5 per cent of their allowances, but most chose not to do so. Allocations – called European Union

Box 1.1 *(cont.)*

allowances (EUAs) – were denominated as tonnes of CO_2. The allocation process was decentralized to the member states, each of which prepared a national allocation plan (NAP), but had to follow the procedures and criteria specified in the directive; each NAP had to be approved by the Commission. Most used emissions in a past period as a basis for allocation.

Full banking and borrowing within the period

This was allowed within the pilot period, but not between the first and second periods. Allowances were issued by the end of February, two months before allowances had to be surrendered for the previous year. This overlap provided installations with the ability to meet last year's emissions targets using allowances from next year's allocation.

Monitoring, reporting and verification (MRV) and enforcement

Once the allocations had been approved by the Commission, each member state had to establish a registry to record the creation, transfer and surrender of allowances. There is also a central registry in Brussels – the Community Independent Transaction Log (CITL) – which records all transactions, including among installations located in different member states; this requirement allowed the Commission to block any transfers that were out of compliance. Annual emissions for each installation had to be verified, typically by a certified independent verifier. Emitters whose emissions exceed their allowances are liable both to make up the deficit and to pay an automatic penalty, of €40 per EUA in the first period and €100 in the second period. This is the only EU law that prescribes financial penalties that must be applied automatically for non-compliance. A degree of uniformity was maintained by the issuance of regulations and guidelines concerning monitoring, reporting and verification and enforcement.

There was a provision to include project-based emissions reductions

The amendment to the directive to provide for linkage allowed qualifying project-based reductions in the pilot period to be used to comply with obligations under the EU ETS, up to certain ceilings specified by member states with the approval of the Commission. These are known as certified emission reductions (CERs), achieved via the Clean Development Mechanism in developing countries and certified by the United Nations Framework Convention on Climate Change (UNFCCC) Clean Development Mechanism Executive Board.

Box 1.1 *(cont.)*

There were provisions for a new entrant's reserve and for the closure of installations

Most member states exercised the option of setting aside a quota of emissions to give free to new entrants, including in some cases for expansions of existing facilities. Most member states exercised the option to require installations that closed to surrender post-closure allowances – i.e. such allowances could not be sold.

allocation on profitability and operations, in both the short run and the long run.

Once the framework had been established and allocations had been made, trading commenced. Trading strategies were conditioned by the extent to which firms were left short or long, the extent to which they understood trading, including the provisions relating to banking and borrowing, and perceptions with regard to overall supply and demand. The market developed in three stages, related to the evolution of allowance prices over the pilot period. The volume of trades likewise evolved over time, and a variety of intermediaries and products entered to facilitate the working of the market. These issues of conditioning factors, pricing and institutional development are the subject of chapter 5.

The extent to which abatement occurred is a key consideration. Although the pilot period was established primarily to get the system up and running, as opposed to achieving substantial progress as regards abatement, whether such occurred remains nevertheless of great interest and is the topic of chapter 6.

Competitiveness can be described variously (OECD [Organisation for Economic Co-operation and Development] 1996a), but it is a dominant consideration for the industrial sectors involved and policy-makers alike. In chapter 7, this issue is addressed with regard both to industries inside the EU ETS – cement, steel and refineries – and to those outside the scheme (notably aluminium) that could be affected by the need to incorporate carbon prices into inputs, such as electricity.

An important consideration in designing and implementing any trading scheme is the extent to which costs are incurred to set up and

operate the scheme, including the buying and selling of allowances. These transaction costs can affect the efficiency or even the feasibility of trading. It is interesting to compare what the analytical community expected to happen *ex ante* as regards overall costs – impacts on gross domestic product (GDP), marginal costs of abatement, etc. – and the *ex post* reality. Chapter 8 addresses the issues of transactions costs and *ex ante* and *ex post* comparisons.

The reach of the EU ETS has been global. Emission reductions outside the European Union, made through the project-based mechanisms of the Clean Development Mechanism and Joint Implementation (JI), have been given status and reality in the marketplace by the fact that they can be used, up to a point, to meet EU ETS obligations. The EU ETS has also stimulated the development of pilot projects at the member state level, and created a template that may be linked to trading schemes elsewhere. These themes are addressed in chapter 9. The final chapter, 10, provides our conclusions and the lessons that we draw from the pioneering experience of the EU ETS.

The electricity sector is the most important of those included in EU ETS, whether judged in terms of emissions, share of allowances or its role in the carbon market. This important issue is addressed in a separate annex authored by Professor Jan Keppler of the University Paris-Dauphine. The treatment includes addressing the link between CO_2 prices and electricity prices, the effects on electricity demand, the interface with international competitiveness and security of supply, and the windfall profits issue.

The book also contains some textual and data appendices. Appendix A is a timeline describing the sequence of events in the development of the EU ETS and the Linking Directive. Appendix B provides data tables concerning allowance allocation and emissions, carbon and energy prices, and allowance trading volumes.

The authors have tried to be faithful to their objective of being as true as possible to the evidence before us, but we are always conscious of Einstein's admonition 'Whoever undertakes to set himself up as judge of Truth and Knowledge is shipwrecked by the laughter of the gods'. We hope our readers will find that our best has been good enough to make the reading worthwhile.

2 *Origins and development of the EU ETS*

Introduction

In a context of which Nietzsche would have approved, the European Union Emissions Trading Scheme grew out of failure. He admonishes us:

> Examine the lives of the best and most fruitful people and peoples and ask yourselves whether a tree that is supposed to grow to a proud height can dispense with bad weather and storms; whether misfortune and external resistance, some kinds of hatred, jealousy, stubbornness, mistrust, hardness, avarice, and violence do not belong among the favourable conditions without which any great growth even of virtue is scarcely possible. (Nietzsche, *Beyond Good and Evil*, 1886)

The sapling that became EU ETS was a product of two failures. First, the European Commission failed in its initiative to introduce an effective EU-wide carbon energy tax in the 1990s. Second, the Commission fought unsuccessfully against the inclusion of trading as a flexible instrument in the Kyoto Protocol in 1997. This chapter explores how these apparent setbacks were followed by the successful creation of an EU-wide market in carbon dioxide.

Before delving into the political foundations of the EU ETS, some background knowledge will be useful. The first section of this chapter describes the political decision-making process within the European Union, in which power is shared between the Commission, the European Parliament and the Council of Ministers. The second section explores the academic and experiential platform that made the EU ETS possible, from the work of economists Coase, Dales, Crocker and Montgomery, to the American SO_2 trading programme to intellectual development within Europe.

The material in this chapter draws heavily from Convery (2009).

With this background in hand, sections three and four explore the political foundations that supported the creation of the EU ETS: the carbon tax failure, the Kyoto Protocol, the EU burden-sharing agreement, the Commission's Green Paper on climate policy, and the EU ETS and Linking Directives. Section five of the chapter focuses on some of the people who played key roles in moving market-based environmental policy forward in Europe. Section six concludes.

The European Union and the environment: legislative and institutional context

The Single European Act of 1986 is a fundamental building block of the European Union and its environmental policy efforts. It made the idea of a single European market – which hitherto had been largely theoretical – a reality by guaranteeing the free movement of goods, people and capital and by providing the legislative and institutional support to ensure that these provisions were implemented. The act also added a separate section on the environment to the treaty establishing the European Community, which created the legal foundation for Community action in this area based on qualified majority voting.

The Treaty on European Union, signed in Maastricht in 1993, created new forms of co-operation between the member state governments, including the introduction of the euro. It and the Treaty of Amsterdam (1997) substantially enhanced the role of the European Parliament in the legislative process.

Three institutions are key to policy formulation, development and implementation within the European Union. The first is the European Commission, which is organised into a number of Directorates General, of which one is Environment. It is often, incompletely, described as the bureaucracy of the European Union. It is that – but much more as well. It has the singular right to initiate legislation, it is the fulcrum that levers the various other actors towards decision, it provides the evidence and analytical ballast to drive an agenda forward, and it has the responsibility of ensuring implementation, including, when necessary, taking delinquent member states to court.

The second key actor is the Council of Ministers, consisting of representatives of the member states, who, in the case of emissions trading, are typically ministers for the environment. They are a key decision-making hub; nothing can be enacted without their approval.