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More specifically for Belgium, this volume includes contributions on the role of Clean Development Mechanisms (CDM), the impact of climate change policy on industrial activity as well as on the transport sector, the electricity production and the role of biomass production.

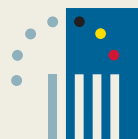
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All three editors work at the Center for Economic Studies of K.U.Leuven.



BELGIAN SCIENCE POLICY



B. WILLEMS, J. EYCKMANS AND S. PROOST (Eds.)

Economic Aspects of Climate Change Policy

acco

BERT WILLEMS, JOHAN EYCKMANS AND STEF PROOST (Eds.)

Economic Aspects of Climate Change Policy

A European and Belgian Perspective

A joint product of CES-K.U.Leuven and CORE-UCL

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Acco Leuven / Voorburg

First edition: 2005

Published by

Uitgeverij Acco, Brusselsestraat 153, 3000 Leuven (België)
E-mail: uitgeverij@acco.be – Website: www.uitgeverij.acco.be

For the Netherlands: Kemper Conseil, De Star 17, 2266 NA Leidschendam

Cover design: Danny Juchtmans

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D/2005/0543/203

NUR 780

ISBN 90-334-5971-X

Table of Contents

I	Introduction	1
II	Climate Change: Challenges for the World <i>J. Eyckmans, B. Willems, J-P. van Ypersele</i>	5
III	Optimal and Stable International Climate Agreements <i>J. Eyckmans, H Tulkens</i>	21
IV	Emission Allocation and Welfare in Post-Kyoto Scenarios: An Analysis with Gem-E3 World model <i>D. Van Regemorter</i>	35
V	Kyoto-Permit Prices and Compliance Costs: An Analysis with MacGEM <i>J. Eyckmans, D. Van Regemorter, V. van Steenberghe</i>	45
VI	The Impact of Banking on Permits Prices and Compliance Costs <i>V. van Steenberghe</i>	57
VII	The Clean Development Mechanism in Belgian Climate Policy <i>T. Bréchet, B. Lussis</i>	68
VIII	Industrial Activity Effects of Climate Change Policy Instruments <i>S. Proost, D. Van Regemorter</i>	77
IX	The Belgian Burden Sharing <i>M. Germain, S. Proost, B. Saveyn</i>	89
X	Transport Sector <i>J. Knockaert, S. Proost</i>	99
XI	Carbon Sinks and the Use of Biomass for Bioenergy <i>E. Moons, S. Proost, J. F. Garcia-Quijano, G. Deckmyn, R. Ceulemans, B. Muys</i>	111

XII	Electricity Generation, Nuclear Energy and Renewables	
	<i>G. Pepermans, S. Proost, D. Van Regemorter</i>	121
Appendix		
	Economic Models Used to Study Climate Change Issues in the Climneg Consortium	133

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Acknowledgements

This book on the economics of climate change is the result of more than ten years of research in the Energy, Transport and Environment division of the Center for Economic Studies of K.U.Leuven and of the Center for Operations Research and Econometrics (CORE) of UCL. It is also the product of fruitful collaboration with many other researchers in Belgium, in particular with the Université Catholique de Louvain, and abroad.

During these ten years, financial support was provided by many public research institutions at the regional, federal and European level. We would like to express our special gratitude to the Belgian Federal Science Policy Office for their substantial and continuous support in the framework of the CLIMNEG (1997-2001), the CLIMBEL (1999-2001) and CLIMNEG 2 contracts (2001-2005), which were funded under the Support Program for Sustainable Development. The CLIMNEG contracts initiated stimulating and enduring collaboration between economists and climatologists in both Leuven and Louvain-la-Neuve. The Science Policy Office also made the editing and the publishing of this volume possible.

The Science Policy Office has also supported the work on the MARKAL model that is at the basis of Chapter 12. Besides the Science Policy Office, several of the individual contributors to this volume have been supported by other sources of funds. The Fund for Scientific Research, Flanders (FWO-Vlaanderen) and the National Fund for Scientific Research (FNRS) have been providing post-doctoral support for J. Eyckmans and V. van Steenberghe, respectively. The Flemish regional administration, via the PBO contract (PBO98/12-17/23), has supported the basic material for Chapters 8, 9 and 10, while the PBO contract (PBP98/41/16) has funded the research underlying Chapter 11. Finally, the European Commission has given continuous support for the development of the GEM-E3 model.

Over the past decade, many new economic insights have been acquired in the field of environmental economics and climate change. Several of these insights have been translated into practical policies by policy-makers at the European and

Belgian level. Nevertheless, this field of research has by no means been exhausted. The ongoing international developments regarding new climate policy initiatives, as well as the unabating—and increasing—stream of scientific articles in specialized economics journals, demonstrate that the economics of climate change is alive and will probably remain with us for the many decades to come. As researchers, we hope to continue to contribute to the economics of climate change—both in its theoretical frontiers, and in the translation of theory into practical policies.

This book would not have been possible without the effort and help of many people. We would like to thank Isabelle Benoit and William Desmond for their administrative support and for proof reading the text.

I. Introduction

This edited volume contains eleven contributions to the economics of climate change with special emphasis on the European and Belgian perspective. In Part One, the book starts off at the global level looking for answers to questions such as the following. What emission pathway would be optimal from a global perspective? How should efforts be divided over generations and countries? How can international agreements be made more acceptable and sustainable to their signatories?

We then turn in Part Two to the so-called flexible mechanisms available under the Kyoto Protocol. Emissions Trading (ET) and the Clean Development Mechanism (CDM) are analyzed in detail. Some of the questions that we will address in this section are: What is the impact of carbon sinks on expected equilibrium permit prices? Will the banking of permits give incentives to undertake emission reduction projects earlier? What can the clean development mechanism contribute to Belgian climate policy?

Part Three starts with a general appraisal of the impact of the Kyoto Protocol on industrial activity in Europe in general and in Belgium in particular. What is the expected impact on industrial activity in Europe if other regions in the World do not limit their emissions? Is it a good idea to exempt carbon-intensive industries from, say, a tradable permit scheme? Part Three also reviews the internal burden sharing question within the federal state of Belgium; in doing so, it compares and evaluates the major existing studies of this question. The last chapters focus on transport, land use and energy policies, and assess the potential contribution of each of these sectors to an efficient Belgian climate policy.

The different chapters deal more particularly with the following topics:

Part One

Chapter 2 looks at the climate change problem from a long-term and global perspective. The aim is to demonstrate how integrated assessment models, which combine stylized representations of the physics and economics of the problem, can be used to design long-term climate policy. The main questions addressed in this chapter are: (i) What is the optimal, global emission ceiling? (ii) What is the

optimal timing of emission abatement efforts in order to achieve this global ceiling? And (iii) how does uncertainty affect the answers to these questions?

In Chapter 3, the focus is on the cooperation problem within the current generation. The two main questions are: (i) What is the optimal effort level and burden sharing for an international climate agreement? And (ii) What incentives do countries have to ratify and obey such an optimal agreement? Two extreme forms of international climate policy coordination are contrasted: on the one hand, the so-called national optimum, which is characterized by the complete absence of cooperation; and on the other hand, a World optimal global climate treaty. It is argued that countries will only be willing to sign an international climate agreement if it is in their best interest to do so. Some simulation results will be used to illustrate the fact that a grand agreement comprising all countries of the world will probably not be stable, because some countries would individually lose from it compared to their national optimum. Appropriately chosen monetary transfers are shown to counter these deviation threats.

Chapter 4 goes into more detail on the equity versus efficiency trade-off in international climate negotiations. It compares the impact of three alternative burden-sharing schemes for the post-Kyoto period which are in line with the European maximum warming target of 2°C. A numerical general equilibrium model for the world is used to analyse the economic effects in 2030. Detailed distributional effects are analysed by subdividing the world into 18 regions.

Part Two

Chapter 5 focuses on Emissions Trading in the First Commitment period of the U.N.F.C.C.C., the so-called Kyoto Protocol phase. It presents numerical simulations to assess the consequences for the Kyoto Protocol of three major issues. First, the non-ratification by the USA causes the equilibrium carbon price in Annex B countries to fall by approximately 50%. Second, carbon sinks enhancement activities enable Parties to fulfil their reduction commitment at lower compliance costs and cause the equilibrium permit price to decrease by 40%. Third, it is shown that countries like Russia and Ukraine would gain substantially by strategically restraining their supply of hot air in order to drive up the equilibrium permits price, which would increase the compliance costs of all other Annex B countries.

The Kyoto Protocol allows for the banking of unused emission permits. Chapter 6 complements the static analysis of Chapter 5 by adding dynamic incentives. The purpose of this chapter is to analyse the potential impacts of the banking provision, namely the change in the permits prices and the total compliance costs. The first half is devoted to a theoretical presentation of these impacts. In the second half, the impacts are quantitatively assessed by means of the MacBank model. The results show that, at the world level, significant gains can be obtained from the use of the banking mechanism. However, the compliance costs of some countries may increase. This is the case for the European Union countries.

The purpose of Chapter 7 is to evaluate the potential contribution of the Clean Development Mechanism (CDM) to the Belgian climate policy. For the purposes of such an evaluation, a partial equilibrium model of the carbon market is

developed in which the key features of the CDM inherent in its project-based nature are explicitly considered—features such as its transaction costs and accessibility rate. The conditions under which the CDM could significantly contribute to the Belgian climate strategy are discussed and it is shown that this contribution should remain rather limited due to low expected carbon prices under the first commitment period.

Part Three

Chapter 8 discusses the effects of different climate change policies on industrial activity and on welfare. It compares the effects of two tradable permit systems and the effects of exemptions for energy-intensive industries. First, a survey of the insights from economic theory is provided. Next, a numerical general equilibrium model is used to assess the effect of different climate change policies on industrial activity per sector in the EU. The main findings are that, in the EU, the effects on industrial activity and the welfare costs of tradable permits are small when no industrial sectors are exempted. When one member country exempts its energy intensive sector, this will reduce somewhat the impact on its activity level but will generate an extra welfare cost.

Chapter 9 addresses the internal burden sharing question within the federal country of Belgium. The European burden sharing agreement specifies that Belgium should reduce its greenhouse gas emissions by 7.5% compared to 1990-levels. As environmental policy is a regional competence in Belgium, the EU agreement was quickly followed by a debate about the Kyoto burden sharing which opposed the Flemish and Walloon regions. This chapter gives the main insights and conclusions of three studies which contributed to this Belgian debate.

Chapter 10 analyses the net cost of reducing greenhouse gas emissions via a fuel efficiency standard for cars and via a subsidy for more fuel efficient cars. It shows that these instruments reduce GHG emissions at a very high cost compared to other abatement possibilities in the economy. New engines and fuel technologies can reduce further the environmental damage of cars but, again, only at a very high cost.

Land use, land use change and forestry also offer opportunities to accomplish the targets of the Kyoto Protocol. Chapter 11 presents and tests a decision support framework to evaluate forestry scenarios for the reduction of greenhouse gas emissions. Results show that the only economically attractive domestic option is the establishment of new multifunctional forests. The establishment of bio-energy plantations is an efficient way of reducing CO₂ emissions as far as land occupation and environmental impacts are concerned. However, it also happens to be the most expensive option. Plantation forestry in the tropics is advantageous when evaluated over longer periods of time. Conservation of tropical forest is economically attractive but not eligible as a CDM project at the moment.

Finally, Chapter 12 analyzes the role of climate change policy in the Belgian electricity sector. It analyses more particularly how the nuclear phase-out decision and the renewable energy target influence the cost of meeting climate change targets for Belgium.

An appendix presents five models that have been used for the economic analysis of Climate Change in the CLIMNEG Network.