

OSTC (SSTC/DWTC)
Belgian Federal Office for Scientific, Technical and Cultural Affairs

**"Climate change and instruments for emissions abatement
in Belgium: an interdisciplinary analysis "
(CLIMBEL project)**

Final Report 2001
Executive Summary

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**"Climate change and instruments for emissions abatement in Belgium:
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1. Objectives and research strategy

Launched in 1999 for two years, and designed to accompany the CLIMNEG project (on which it is reported separately), the research network CLIMBEL bears upon the evaluation of the instruments and measures allowing to reduce the emissions of greenhouse gases in Belgium. Also conceived of as an interdisciplinary scientific endeavour, it contained three projects.

(i) Project CLIMBEL I, devoted to analysing the *macroeconomic framework* within which the envisaged instruments will be adopted. This study was to put the reduction obligations of Belgium in perspective *vis-à-vis* those of the other European countries; to examine the potential of the "joint implementation" instrument and to assess the sectoral impacts of the Belgian policies.

(ii) Project CLIMBEL II, focusing on one particularly important instrument: tradable permits. It included two approaches.

Firstly, a *microeconomic* study of permits, bearing upon the concerned actors, the forms and characteristics of the instrument, the procedures of initial allocation and of functioning of the market after permits have been emitted, and finally the "domestic burden sharing" implied by the various initial distributions.

Secondly, a *juridical* study following a *de lege ferenda* reflection, directly inspired by the foregoing microeconomic study. It was to cover private and economic law aspects, public law, administrative law as well as aspects of private and penal responsibility.

(iii) Project CLIMBEL III consisted in a reflection conducted within the Administration of the Belgian State, bearing upon the *implementation of permits and of other instruments* by the competent authorities.

2. Results

Results are presented below under headings that approximately correspond to the projects outlined above. However, interactions among the CLIMBEL researchers, as well as between them and those of the companion project CLIMNEG have been strong enough for it being difficult to allocate papers to projects in an exclusive way. All results are therefore better considered as common to the entire research group, and those of both CLIMNEG and CLIMBEL are collected together in the series *CLIMNEG-CLIMBEL Working Papers* whose titles are listed at the end of this report. It is referred to them by the acronym **CWP** followed by the number in the series. We also provide the complete list of the persons associated with the CLIMNEG and/or CLIMBEL projects over the years.

Space constraints for this executive summary compels one to make a selection among the many contributions made, a selection guided more by the necessity of homogeneity than by the intrinsic importance of some of the papers. The summary is therefore quite incomplete. A fuller appreciation of the contributions can be obtained by reading the final report or, better, the papers themselves.

I. Emission reduction constraints for Belgium after Kyoto, macroeconomic and sectoral dimensions

- ***International burden sharing and the efforts of Belgium(CWP n°33)***

The European GHG emission reduction target of minus 8% has been reallocated among the EU member states taking into account considerations of both efficiency and equity. **CWP n°33** investigates this European burden sharing agreement using an inverse welfare optimum approach. Implicit welfare weights are computed that were used by the EU negotiators to fix the Burden Sharing Agreement in order to visualize the efficiency-equity trade off.

The following conclusions can be drawn:

(i) the EU renegotiation of the abatement burden does indeed much better in terms of cost efficiency than a uniform allocation of 8% for every EU member.

- (ii) Portugal and Greece should have been allowed a higher increase on the basis of cost efficiency considerations
- (iii) Germany and the UK should have been assigned an higher reduction on the basis of cost efficiency considerations
- (iv) introducing inequality aversion (income distribution concern) reinforces the last two conclusions
- (v) the Netherlands and Belgium have assumed relatively ambitious emission abatement targets compared to the other EU member states

Recently, this analysis has been extended to account for market power and to evaluate emission trading ceilings within a EU permit market. The general conclusion is that also in the EU permit market, the discussion on permit import/export ceilings is probably motivated by market power arguments. Similarly as in a paper by Ellerman and Wing (2000) for the world carbon market, strong monopoly effects are found in the European carbon market if market supply of permits is restricted by means of an export trading cap.

- ***Potential of Joint Implementation***

From a survey of the literature, it is concluded that

- By its nature, ET (Emissions Trading) would be environmentally more efficient than JI (Joint Implementation) and CDM (Clean Development Mechanism). Regarded in general as a step *before* ET, JI and CDM substitute for ET when the emission trading mechanism is not yet available and they will become unnecessary as soon as ET can be implemented. ET covers all sectors, can execute whatever measures to curb domestic emissions, and therefore is able to reduce economy-wide emissions, whereas JI/CDM are project-linked and therefore less flexible.
- Most researches consider that ET will be economically more efficient than JI/CDM.
- CDM in general has greater potential for cost efficiency than JI. Many researches have reported that non-Annex I countries have very low abatement costs compared with Annex I region. However, CDM may not easily achieve cost efficiency. There are a number of adverse factors likely to erode the potential for cost efficiency.

- Finally, considering transaction costs as an additional cost to emission trading, simulations show that transaction costs will cause cost inefficiency unevenly to all parties of emission trading, depending on their marginal abatement cost and being seller or buyer of permits. Based on the idea that pre-action could contribute to reduce transaction costs, we analyse the costs and benefits of pre-action, using hypothetical values on the efficiency of the “learning by doing” process. We find that the pre-action could effectively offset transaction costs. The extent of net gain from pre-action however depends crucially on the speed of the “learning by doing” process, which is represented in the model by the elasticity of the reduction in transaction costs in response to pre-action effort

- ***Macroeconomic and sectoral effects of Belgian policy initiatives to implement the Kyoto agreement (CWP n°41)***

The GEM-E3 European model was used to evaluate the macroeconomic and sectoral impact of policies in Belgium allowing to reach the Kyoto target in 2010.

- The first policy measure evaluated was the impact of the implementation of a GHG emission tax in Belgium. The revenue of the GHG tax is assumed to be recycled through a reduction of the employers’ social security contributions, while maintaining the public budget constant in terms of GDP. It is also assumed that the other EU countries are following the same type of policy to reach their own Kyoto target.

The macroeconomic impact of this scenario in 2010 is very small: the private consumption is increased by 0.5% compared to the reference scenario, while employment is increasing with 1.2%. Regarding the sectoral evolution, the impact is the highest for the energy sector and for the energy intensive sectors, especially the exporting ones.

- Imposing an energy tax instead of a GHG tax will increase the cost of reaching the Kyoto target.

- Tradable permits, in as far as they are auctioned, will in first approximation, produce the same results as a GHG emission tax. In closed economies, grandfathered tradable permits increases the cost compared to an emission tax as there are no carbon tax revenues to reduce other distortion in the economy. However in an open economy such as Belgium, grandfathered tradable permits may have the same macroeconomic effect.

II. Design and organisation of a tradable permits market in Belgium: Microeconomic and juridical analyses

II. A. Economic aspects of the design of the permits market

- ***Alternative ways of designing a domestic market of CO₂ emission permits. (CWP n°20)***

- The research began with an extended and careful perusal of the literature on emission permits in general and on the US experience with SO₂ in particular. The paper reports lengthily on this inquiry, including private initiatives in the field.

- On the basic issue of the choice between auctioning vs grandfathering initial permits, the paper makes the point that auctioning yields revenues to the public authorities, revenues that can be used for other purposes in the economy (*double dividend* argument); grandfathering does not provide this double advantage. The respective effects of the two methods are essentially distributional.

- Once initial permits have been issued (irrespective of whether this occurs by auction or by grandfathering), the *competitiveness* of the secondary market is the key factor as far as the allocative efficiency of the system (in terms of cost minimisation) is concerned.

- ***Modeling the microstructure of an emission permits market and analysis of its impact on environmental policy (CWP n°24)***

With the collaboration of a financial market specialist, the role of intermediaries (brokers) is analysed in permits markets treated as "quote driven markets". Monopolistic and oligopolistic structures are considered as well as the influence of uncertainty, and compared with walrasian perfectly competitive structures.

- ***Should banking of permits be allowed ? (CWP n°43)***

The research concludes that in the presence of uncertainty, allowing for banking of permits increases welfare in the economy and should therefore be recommended.

- ***"Burden sharing": An analysis of rules for allocating emission quotas between countries (CWP n°39)***

Equity considerations are combined here with acceptability conditions for the initial allocations of permits to countries, in the framework of the CWS model developed in the CLIMNEG project. Purely equitable allocations (*e.g.* per capita) appear to be unacceptable for most countries, *i.e.* the outcome would be less beneficial to them than if they declined to cooperate in a worldwide agreement. Acceptability constraints are therefore introduced and their effect on the final allocation is determined, benefiting some countries and being less favourable to other ones.

II.B Juridical aspects of the organisation of the market for tradable permits

- ***Functions and limits of contractual relations involved in transactions on permits (CWP n°23)***

While the Kyoto Protocol provisions on permits trading only deals with States, firms are bound to be involved in the actual operations of the markets. Private law issues arise such as the types of contracts that will be used as well as the nature of the prerogatives that holders of permits can claim.

The paper makes the point that not only contractual but also statutory and institutional apparatuses will be needed. Prerogatives of permit holders are essentially of personal nature (as opposed to "real"). As far as property rights are concerned, their rights bear on the permits, not on the environment.

- ***Emerging permits markets and competition policy problems (CWP n°34)***

International trade liberalisation, as organised by the WTO and the EU treaties, should also apply to emission permits, to their derivatives, as well as to energy markets whose products require permits. Such liberalisation might be jeopardized by lack of coordination in the legislations adopted by countries. Harmonisation will be necessary, many aspects of which can already be borrowed from harmonisations taking place within the WTO and the EU.

- ***Banking and financial law developments (CWP n°35)***

Markets for emission permits will have much in common with existing financial stock markets. The paper explores the potential for centralised permits exchange and the financial law implications of such a setting. The US experience with SO₂ is referred to.

III. Institutional aspects of the use of flexible mechanisms in Belgium and of the complementarity between instruments (CWP n°45 & 46)

- Information exchanges between the administration and the scientific community on emissions trading.

These have been exceptionally numerous, from participation and work done for COP6 and other international meetings to taking an active part in the preparation of domestic policy.

- Writing of reports for the general public
 - on climate change problems and their solutions in general (**CWP n°45**), and
 - on emissions trading in Belgium in particular (**CWP n°46**). This last document also discusses the Belgian "National Climate Plan" and provides a list of main fixed emission sources in the country.
- Periodic information and briefing of CLIMNEG-CLIMBEL team members on the major developments in the international negotiation process.

3. Assessment

CLIMBEL has usefully supplemented CLIMNEG essentially in three ways:

- (i) in widening the interdisciplinary character of the combined projects by adding the legal dimension, which neither climate scientists nor economists should ignore or neglect. Admittedly only a limited step has been taken in that direction, but it is

substantial; it is also comforting to note that it has already been relayed in other instances.

- (ii) in concentrating attention on Belgian aspects of the problem and coming up with numerical estimates of the issues.
- (iii) in allowing to pursue the continuous contacts and exchanges between academic climate scientists, economists and lawyers on the one hand and the government's administration involved in the negotiations on the other hand. In spite of the risk of being repetitive, the coordinator wishes to express his very strong conviction that a research team having such a structure is a major advantage for all, yielding motivation and widening of perspectives.

Other assessment statements, presented in the CLIMNEG report, apply equally to CLIMBEL.

CLIMNEG & CLIMNEG-CLIMBEL WORKING PAPERS

List of Titles - Liste des Titres - Titellijst

Paper copies of CLIMNEG/CLIMBEL Working Papers can be obtained free of charge by ordering them at the CLIMNEG Secretariat, c/o CORE-UCL, Voie du Roman Pays 34, 1348 Louvain-la-Neuve, Belgium. - Phone +32 10 47 43 44 - Fax +32 10 47 43 01
E-mail: climneg@core.ucl.ac.be

Please also visit our website at <http://www.core.ucl.ac.be/climneg>

CLIMNEG WORKING PAPERS

- N°1: GERMAIN M., TOINT Ph. and TULKENS H., 1997, "Financial Transfers to Ensure Cooperative International Optimality in Stock Pollutant Abatement", published as chapter 11 in Faucheux S., Gowdy J. and Nicolai I. (eds), *Sustainability and Firms: Technological Change and the Changing Regulatory Environment*, Edward Elgar, Cheltenham, 205-219, 1998.
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- N°3: CURRARINI S. and TULKENS H., 1998, "Core-Theoretic and Political Stability of International Agreements on Transfrontier Pollution". (Also available as *CORE Discussion Paper* n° 9793)
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- N°12: CHANDER, P., TULKENS, H., VAN YPERSELE, J.-P. and WILLEMS, S., 1998, "The Kyoto Protocol: An Economic and Game Theoretic Interpretation", to be published in Dasgupta P., Kriström, B. and Löfgren K.-G. (eds), *Environmental Economics – Theoretical and Empirical Inquiries: Festschrift in Honor of Karl-Göran Mäler*, forthcoming Edward Elgar. (Also available as *CORE Discussion Paper* n° 9925)
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- N°14: EYCKMANS, J. en PROOST, St., 1998, "Klimaatonderhandelingen in Rio en Kyoto: een Successverhaal of een Maat voor Niets?" (Also available as *Leuvens Economisch Standpunt* n° 1998/91, Centrum voor Economische Studiën, Katholieke Universiteit Leuven, 1998)
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Overleaf: CLIMNEG-CLIMBEL Working Papers

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- N°20: VAN STEENBERGHE, V., 1999, "La Conception d'un Marché Domestique de Droits d'Emission de Gaz à Effet de Serre : Aspects Economiques", miméo.
- N°21: BERTRAND, C. and VAN YPERSELE, J.-P., 1999, "Development of a New Climate Module for the RICE/DICE Model".
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- N°33: EYCKMANS, J. and CORNILLIE, J., 2000, "Efficiency and Equity in the EU Burden Sharing Agreement." (Also available as *ETE Working Paper* n° 2000-02, Centrum voor Economische Studiën, Katholieke Universiteit Leuven, 2000)
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- N°39: GERMAIN, M. and VAN STEENBERGHE, V., 2001, "Constraining Equitable Allocations of Tradable Greenhouse Gases Emission Quotas by Acceptability."
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