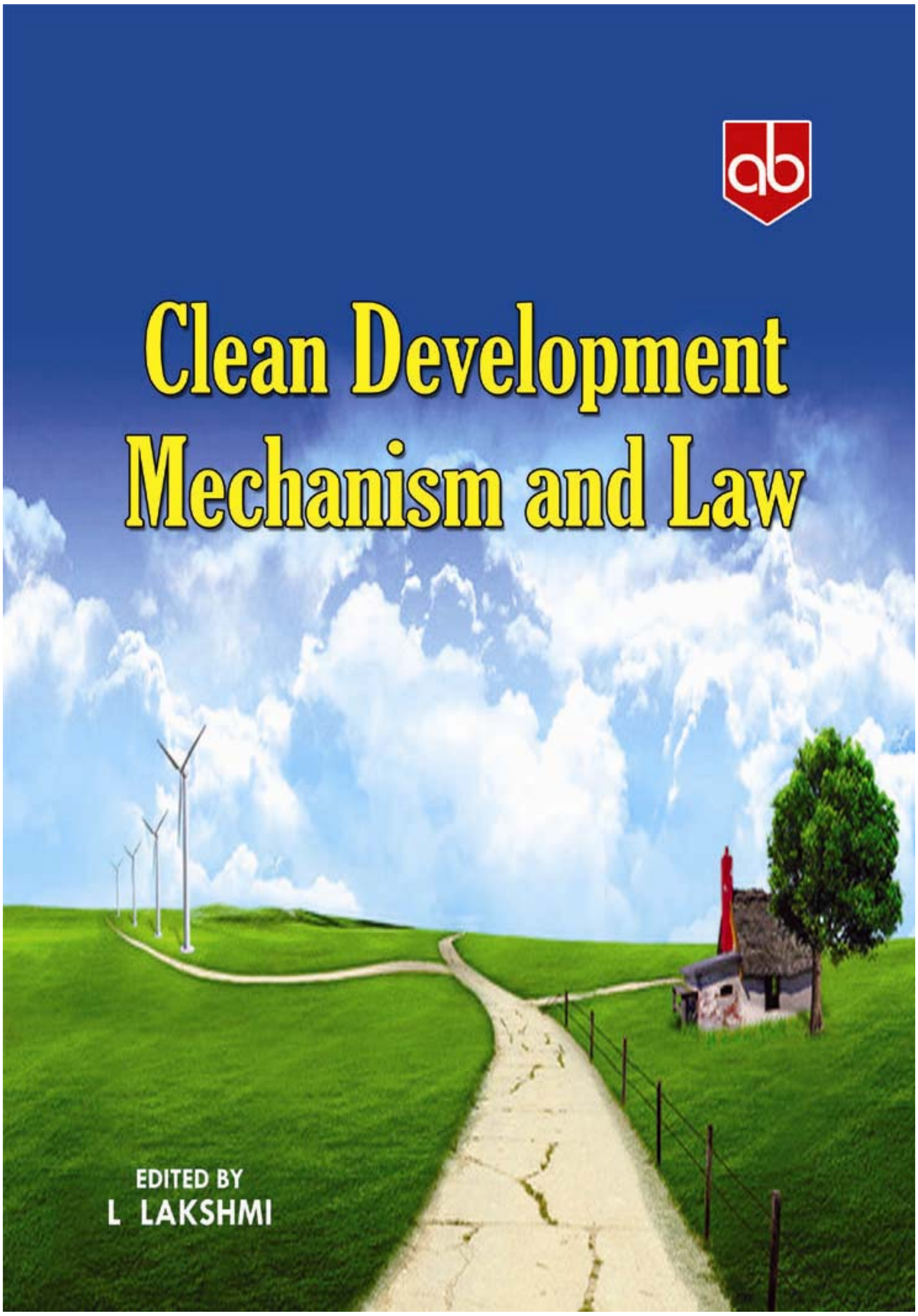

Clean Development
Mechanism and Law
EDITED BY
L LAKSHMI

L Lakshmi holds an LL.M and M.A (Pub. Admn.,) from Osmania University and a Postgraduate Diploma in Business Administration from AP Productivity Council. She is currently working as Consulting Editor at Amicus Books, an imprint of Icfai University Press. She is also the Consulting Editor, Icfai Journal of Environmental Law, a quarterly journal published by Icfai University Press. Prior to joining Amicus Books she was a practicing lawyer for five years. Her areas of interest are environmental law, labour laws, and administrative law.

Amicus Books

An Introduction

Amicus Books is the initiative of the Icfai University Press to publish a series of books in various segments of law with a special focus on emerging issues. These books seek to provide, at one place, a retrospective as well as prospective view of the contemporary developments in the legal environment, with emphasis on general and specialized branches of knowledge and applications.

The books in this series are based on relevant, authoritative and thought-provoking articles written by experts and published in leading professional magazines and research journals. The articles are organized in a sequential and logical way that makes reading continuous and helps the reader acquire a holistic view of the subject. This helps in strengthening the understanding of the subject better and also enables the readers stretch their thoughts beyond the content of the book. The series is designed to meet the requirements of executives, research scholars, academicians and students of professional programs. The Icfai University Press has published over 900 books in this series. For full details, readers are invited to visit our website: *www.amicus.iupindia.org*

Clean Development Mechanism and Law

Edited by
L Lakshmi

Amicus™ **Books**
The Icfai University Press

Clean Development Mechanism and Law

Editor: L Lakshmi

First Edition: 2008

Printed in India

Published by

The Icfai University Press
52, Nagarjuna Hills, Punjagutta,
Hyderabad, India–500 082.
Phone: (+91) (040) 23430 – 368, 369, 370
Fax: (+91) (040) 23435386
E-mail: info.amicus@iupindia.org, ssd@icfai.org
Website: www.amicus.iupindia.org

ISBN: 978-93-80120-02-7

Editorial Team : G Yellam Goud, C Sri Devi and R Suneetha

Layout Designer: VVSS Sai Babu, MSM Lakshmi, VRSC Prasad, N Jaya Bharathi, PSRASV Prasad and RV Srinivas.

Cover Design : N Shashidhar Rao

Contents

Overview

Due to massive industrialization the planet Earth had been witnessing a tremendous development in all spheres of human activities. In consequence, there is increase in huge quantities of atmospheric concentrations of carbon dioxide, methane, and nitrous oxide in the atmosphere. This in turn has been found to be escalating the temperature of Earth resulting in global warming and climate change. The concern for the health of the individuals made the States realize the likely adverse effects of global climate change on human health that led them to propose for mitigating the GHG's by entering the United Nations Framework Convention on Climate Change (UNFCCC). The efforts further led to Kyoto Protocol in 1997, which advocated for framing and implementation of flexible mechanisms enabling the industrialized countries to pursue their goals of GHG reduction by purchasing GHG emissions.

The Kyoto Protocol provided for three mechanisms that enabled developed countries to acquire greenhouse gas reduction credits. These mechanisms include- Joint Implementation (JI) wherein a developed country with relatively high costs of domestic greenhouse reduction could set up a project in another developed country. Whereas, under the Clean Development Mechanism (CDM) a developed country could sponsor a greenhouse gas reduction project in a developing country where the cost of greenhouse gas reduction project activities is usually much lower, but the atmospheric effect is globally equivalent. The developed country would be given credits for meeting its emission reduction targets, while the developing country would receive the capital investment and clean technology or beneficial change in land use. Finally under International Emission Trading (IET) the countries can trade in the international carbon credit market to cover their shortfall in allowances. Countries with surplus credits can sell them to countries with capped emission commitments under the Kyoto Protocol. These carbon projects can be created by a national government or by an operator within the country.

The Clean Development Mechanism (CDM) a market based concept developed under Article 12 of the Kyoto Protocol was intended to allow industrialized countries -Annex B countries with a greenhouse gas reduction commitment to invest in projects that would reduce emissions in developing countries as an alternative to more expensive emission reductions in their respective countries. The members further intended to assist developing countries in achieving sustainable development, while contributing to stabilization of greenhouse gas concentrations in the atmosphere. It is supervised by the CDM Executive Board (CDM EB) under the guidance of the Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC).

An industrialized country that wishes to get credits from a CDM project must obtain the consent of the developing country hosting the project that the project will contribute to sustainable development. Then, using methodologies approved by the CDM Executive Board (EB), the applicant - the industrialised country must establish a baseline estimating the future emissions. Then it is validated by a third party agency, called a Designated Operational Entity (DOE), to ensure the project results in real, measurable, and long-term emission reductions. The EB then decides whether or not to register the project. If a project is registered and implemented, the EB issues credits, called Certified Emission Reductions (CERs), known as carbon credits, where each unit is equivalent to the reduction of one metric tonne of carbon dioxide. Any proposed CDM project has to use an approved baseline and monitoring methodology to be validated, approved and registered. Baseline Methodology will set steps to determine the baseline within certain applicability conditions whilst monitoring methodology will set specific steps to determine monitoring parameters, quality assurance, and equipment to be used, in order to obtain datas to calculate the emission reductions. With costs of emission reduction typically much lower in developing countries than in industrialised countries, industrialised countries can comply with their emission reduction targets at much lower cost by receiving credits for emissions reduced in developing countries as long as administration costs are low.

However, the concern is with regards to inclusion of forests in CDM schemes as they have been excluded from CDM. There is so far no international agreement about whether projects avoiding deforestation or conserving forests should be initiated through separate policies and measures or stimulated through the carbon market. One major concern is the enormous monitoring effort needed in order to make sure projects are indeed leading to increased carbon storage. In response to concerns of unsustainable projects or spurious credits, the World Wide Fund for Nature and other NGOs devised a 'Gold Standard' methodology to certify projects that use much stricter criteria than required, such as allowing only renewable energy projects.

India being a party to the United Nations Framework Convention on Climate Change (UNFCCC) is one of the forerunners of CDM projects. India's CDM potential represents a significant component of the global CDM market. Presently The National CDM Authority (NCDMA) in India has accorded Host Country Approval to projects in various sectors covering energy efficiency, fuel switching, industrial process, municipal solid waste and renewable energy.

This book would cover the various issues related to framing, functioning of CDM schemes and machinery for effective reduction of carbon dioxide emissions post Kyoto. It would enumerate the regulatory schemes and machinery constituted by the developed countries like in mitigating emissions. The comparative analysis of various successfully implemented schemes across the globe especially in US, UK, EU, and Australia would serve as an exemplary model to the developing countries.

In **"Enlisting Carbondioxide Capture and Storage as a Clean Development Mechanism Project: Legal and Regulatory Issues Considered"** the author *Olawuyi Damilola Sunday* identifies that the global concern for the adverse effects of climate change on human health have culminated in United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol. Kyoto Protocol recognized the Clean Development Mechanism (CDM) Project as an incentive for governments and companies in industrialized countries to invest in Green House Gases, and an aid in promoting sustainable development in the countries hosting the projects. The only drawback with these projects is that they do not have an answer for the operational and application issues related to Carbon dioxide Capture and Storage (CCS) technology involved in a CDM project. The author identifies inadequate regulatory mechanisms that require to be filled at various stages of CCS and therefore advocates for development of a comprehensive global legal framework that would address the Carbon dioxide Capture and Storage (CCS) technology issues concerning project operation, remediation, assessment of project boundaries, fixing liability or accounting for leakage and permanence, monitoring, validation and verification.

In **"Flexible Mechanisms for Climate Change Compliance: Emission Offset Purchases under the Clean Development Mechanism"** the authors *Christopher Carr and Flavia Rosembuj* states that carbon credits have witnessed tremendous growth in international market since 2005 due to their flexible approach. The international carbon markets are especially flourishing with two market-based tools one cap and trade, second emission offsets or project based program. In cap and trade program the emissions are capped at a certain level by the regulatory authorities. The regulated entities in turn are allocated allowances to emit a certain amount of Greenhouse Gases (GHGs). The entities subsequently are allowed to trade in with their allowances to meet their compliance obligations. In emission offset, or project based programs like CDM, the credits are generated from projects that reduce GHG emissions below a certain baseline that is beyond the regulated cap. Subsequently these credits are sold to entities that can use them to meet regulatory compliance obligations within the scope of a cap. The regulatory costs of getting a project and its methodology approved by the CDM Executive Board, and the cost of implementing the project are perfectly drafted and executed. The authors finally suggest that regulatory infrastructure constituted for CDM projects can be considered as a model for other national and international programs related to climate change.

Prof. *J. de Sépibus* in his article **"Linking the EU Emissions Trading Scheme to JI, CDM and Post-2012 International Offsets"** comments on the Linking-Directive by European Union Emissions Trading Scheme (EU ETS). He finds that the Linking directive though did not impose any limit on the import of JI/CDM credits yet it required the Member States to set maximum quantity of Kyoto 'units'. The directive was found to be one of the causes for collapse of prices in the Emission markets in EU. Realizing this EU ETS decided to impose strict limits on the use of JI/CDM credits during the second trading period beginning from 2006. The author intends to examine the International and European legal framework to find a better utilization of JI/CDM credits in post-2012 international offsets. Based on his examination of commissions proposal on the third trading period of the EU ETS and the related reports the author suggests for introduction of quantitative and qualitative restrictions for the use of international offsets within the EU ETS. The author finds that the European view on the appropriateness of linking the EU ETS with the international project mechanisms has changed over the years. The efforts of EU ETS were timely supported by the proposals made by the Environmental Committee of the European Parliament on the ETS in the Council.

In **"Links between European Emissions Trading and CDM Credits for Renewable Energy and Energy Efficiency Projects"** the author *David M. Driesen* critically examines the relationship between the Kyoto mechanisms and sustainable development. He finds that the short term cost effectiveness that emission trading fosters does not correspond with the long-term goals set by the climate change treaty and the principles of sustainable development. He suggests that European Union can increase demand for CDM credits by adopting stringent regulations in the trading sector. However such approach may create pressure to expand the use of cheap CDM credits. In order to achieve sustainable development the author suggests the European Union and other nations currently in compliance with Kyoto targets must take meaningful steps toward sustainable development, to acquire increased credibility. The developing countries in turn would recognize the stand of the developed nations and come forward and express their willingness to make commitments.

"Linking Community Forestry Projects in India with International Carbon Markets: *Opportunities and Constraints"* – the authors *Rohit Jindal and Shailesh Nagar* identify that prior to Kyoto; community forestry projects in India were implemented to strengthen rural livelihoods. In Post Kyoto however there has been tremendous rise in expectations for selling carbon sequestered from various Indian projects in international markets. The authors study the forest projects taken up at Seva Mandir and Foundation for Ecological Security (FES) and their tie up with Chicago Climate Exchange (CCX), the single largest market that receives sequestration credits from forest projects. They find that the Seva Mandir and FES have the potential to sell carbon sequestration credits on the CCX and generate incomes for their local communities. The authors suggest other NGO's planning to take up such projects to establish relationship with CCX by making simple payment arrangements on small contiguous sites that are easy to monitor and administer. They hint that these small performance-based payments will ensure the local communities with long-term stake in conserving the plantations, and provide economic incentives for conserving forests and other valuable natural resources.

In **"The Commerce Clause Meets Environmental Protection: The Compensatory Tax Doctrine as a Defense of Potential Regional Carbon Dioxide Regulation"** the author *Heddy Bolster* discusses the issues raised during implementation of the Regional Greenhouse Gas Initiative (RGGI) to reduce greenhouse gas pollution from power plants, and the report submitted by the California's Environmental Protection Agency on the emissions trading program in the state. Both the RGGI agreement and the California report, identify leakage of emissions as a major hurdle in implementation process. The author identifies that leakage of emissions from regulated to unregulated regions is usually taken up by the regulated entities in order to avoid caps on emissions. The same strategy is being applied by the Electricity suppliers when they import power from outside the regulated region. In consequence there is no or minimal decrease in emissions from power plants. The author finds that the States covered under RGGI, and California are successful in controlling emissions associated with energy imported into their regions. Yet such limitations are found to be effecting the interstate imports under the Interstate Commerce Clause of the US Constitution. The author therefore intends to explore the possibility of applying the principles of compensatory tax doctrine to prevent leakage. The doctrine states that even if a state regulation imposes a burden on interstate commerce, it may survive constitutional scrutiny if it is designed to make interstate commerce bear the burden.

In **"Balancing Cost and Emissions Certainty: An Allowance Reserve for Cap-and-Trade"** the authors *Brian C. Murray, Richard G. Newell and William A. Pizer* present the scope, advantages, limitations and the legal regimes for using carbon tax, cap-and-trade systems to control emissions. They find cap-and-trade system as a system that fixes the quantity of emissions allowed, but its market price remains uncertain. Whereas, in a carbon tax the price of emissions is fixed and the quantity of emissions remains uncertain. Therefore, an alternative system is suggested by the authors that is fixing a safety valve. The new system would take up a cap-and-trade system along with a price ceiling at which additional allowances can be purchased. Till the allowance price remains below the safety-valve price, this system acts like cap-and-trade. Whereas, once the safety-valve price is reached, this system behaves like a tax. Thus the safety valve represents a mechanism that falls between price or quantity of instrument. The authors therefore advocate for allowance reserve which stipulates both a ceiling price at which cost relief is provided and a maximum number of allowances to be issued in exercising that relief. They finally suggest that an allowance reserve and suggest for tightening the future cap, by placing an upper limit on the available number of extra allowances.

Joanna Hendy, Suzi Kerr and *Troy Baisden* in their article **"Greenhouse Gas Emissions Charges and Credits on Agricultural Land: What can a Model Tell Us?"** examine the impact of emissions from agriculture sector.

In this regard the authors make a study of the land use and emissions implications of climate policies that provide landowners credits for regenerating indigenous forest and scrub. The authors, team of economists from Motu Economic and Public Policy Research, and scientists from Landcare Research, Agresearch, Scion/Ensis, and NIWA develop LURNZ-climate. LURNZ-climate is a computer model that simulates the effect of climate change policies on rural land use in New Zealand. The study intended to predict the land-use change across the whole country and thereby calculate the greenhouse gas implications of land-use change. Subsequent to this simulation study, New Zealand has been recognized to have developed the capacity to empirically investigate the potential impacts of policies designed to charge farmers in proportion to the amount of methane and nitrous oxide that which is emitted by their livestock and reward them for regenerating indigenous forest. The first simulation study finds that agricultural emissions charge based on land use are not so effective in reducing emissions. The second simulation showed that the inclusion of a reward for regenerating forest and scrub without a similar reward for plantation forestry had a negative impact and increased emissions growth. The authors conclude by stating that a further careful empirical analysis of potential policies has to be made by devising more tools in second phase of LURNZ study.

1

Enlisting Carbondioxide Capture and Storage as a Clean Development Mechanism Project: Legal and Regulatory Issues Considered

*Olawuyi Damilola Sunday**

The Clean Development Mechanism of the Kyoto Protocol provides an incentive for governments and companies in industrialized countries to invest in Green House Gases (GHG) reductions projects in developing countries and be credited for GHG reduction achieved through these projects, through the issuance of Certified Emission Reductions (CERs). Carbon dioxide Capture and Storage technology has been identified as one of such viable projects that can be carried out by industrialized nations for CERs as it offers high GHG mitigation potential. Of concern, however, is the lack of a clear, defined legal and regulatory framework which addresses some of the technical concerns associated with the CCS technology like leakage, permanence, boundary issues, and allocation of

* Faculty of Law, Murray Faser Hall University of Calgary, Alberta, Canada. E-mail: dsolawuy@ucalgary.ca

liabilities among others. This article shows that there is an urgent need for a legal framework which addresses these technical concerns, if CCS is to be enlisted as a CDM compatible project.

Introduction

Realizing the likely adverse effects global climate change may impose on human health, the world community came together under the United Nations Framework Convention on Climate Change (UNFCCC) to jumpstart efforts, aimed at addressing these concerns. These efforts led to the Kyoto Protocol of 1997 which advocates taking concrete steps and binding commitments to reduce greenhouse gasses that contribute to global warming. At the heart of The Kyoto Protocol lie its flexible Mechanisms which allow industrialized countries to pursue their goals of GHG reduction by purchasing GHG emission reductions from elsewhere, mostly from non annex I and II countries.[1] One of such mechanisms is the Clean Development Mechanism (CDM).[2] The CDM provides an incentive for government and companies in industrialized countries to invest in GHG reduction projects in developing countries. The CDM also aims to promote sustainable development in the countries hosting the projects.[3]

However, the CDM rules as elaborated by The Marrakech Accords[4] do not define in clear terms, whether the Carbon dioxide Capture and Storage (CCS) technology will qualify as a CDM project. Though CCS is not one of the project types originally included when the CDM was first established, previous studies show that CCS is a promising emission reduction option with potentially important environmental, economic and energy supply security benefit.[5] CCS is a process consisting of the separation of carbon dioxide (CO_2) from industrial and energy related sources, transportation to a storage location and long term isolation from the atmosphere through storage in geological formations. This technology has the potential of reducing overall mitigation costs and increasing flexibility in achieving greenhouse gas emission reductions worldwide.[6] CCS could in fact yield 15% to 55% of the cumulative mitigation efforts required worldwide up to the year 2100 (roughly 220 to 2200 $GtCO_2$).[7] It will also be an important element in furthering the transfer of CCS technology and expertise to developing countries.[8]

The CCS idea has however attracted a degree of concern from scholars,[9] these concerns bother on the absence of a clearly defined legal and regulatory framework in which CCS is to operate, the absence of global mandatory standards or guiding principles for CO_2 capture; transport; storage site selection; injection; project operation; decommissioning; stewardship; or remediation, assessment of project boundaries; accounting for leakage and permanence; monitoring, validation and verification. This article is an attempt to address these concerns and to answer the question -How could CCS projects contribute to the general objectives of the CDM?. Similarly, most of the existing works on CCS focus only on the technical aspects,[10] this article in contrast concentrates on legal issues surrounding CO_2 storage, with emphasis on the key legal and regulatory issues to be addressed before CCS activities can be included in the portfolio of climate change mitigation activities under the CDM.

This article sets out in part 1 by giving an analysis of CDM, part 2 analyses the CCS technology, its prospects and challenges. Part 3 discusses the eligibility of CCS projects as CDM projects under the UNFCCC and the Kyoto Protocol. Part 4 offers recommendations on the development of a framework to address technical concerns associated with CCS technology. This article shall argue that there are significant benefits waiting to be exploited for mitigating global GHG emissions through deploying CCS technology, but these may remain in the realm of imaginations if adequate legal and regulatory frameworks are not put in place to close all existing regulatory gaps.

1. The Clean Development Mechanism: An Overview

1.1 What is CDM?

The Kyoto Protocol, known for its efforts at tackling global climate change by fixing emission limits to be achieved by industrialized nations by 2012, is even more famous for providing three flexible mechanisms through which industrialized countries can achieve their commitments. These mechanisms enable countries to pay for emission reductions anywhere on the planet, based on the idea that since climate change is a global problem,[11] reductions are equally good for the climate no matter where they occur.[12] One of such flexible mechanisms is the Clean Development Mechanism (CDM).[13]

The CDM evolved from the Brazilian proposal for a Clean Development Fund (CDF) in a meeting of the ad hoc group on the Berlin mandate in 1997 just prior to COP-3.[14] The CDF idea was to finance adaptation measures through penalties levied on industrialized countries not reaching their targets; to ensure much more flexibility in achieving emission reductions and for the possibility of international emissions trading to achieve the emission reductions where it could be done at the least cost. At the COP-3 in Kyoto, the idea became a subject of so much disagreements and skepticism. An apparent contradiction emerged between the goals of emission reduction in the North and sustainable development in the South due to the differing priorities of different countries and regions of the world. The differing sets of priorities between developed countries and the developing countries as they arose at Kyoto, has been roughly tabulated as follows:[15]

Industrialized Countries	Developing Countries
Emissions reduction	Sustainable development
Emissions trading and credits	Equity
DC participation	Common but differentiated responsibilities
Joint Implementation	Technology Transfer
Sinks	Financial Assistance
Compliance and Verification	Special Circumstances
Clean Environment	Poverty Reduction

After so much opposition most especially from developing countries, CDM was eventually accepted as part of the Kyoto Protocol to serve as a balance point to meet the yearnings of both the developed world and the developing nations.[16]

The purposes of the CDM as defined under Article 12 of The Kyoto Protocol include:

- To assist non-Annex I countries in achieving sustainable development,
- To assist non-Annex I countries in contributing to the ultimate objectives of the FCCC as described in Article 2 (to stabilize GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic

interference with the climate system within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner.

- to assist Annex I countries in achieving compliance with their quantified emissions limitation and reduction commitments under Article 3 of the Protocol.[17]

The core of the CDM is to transfer and acquire emission reductions between developing countries and developed countries on a project basis. Developed countries can get Certified Emission Reductions (CERs) through CDM projects during this period. Typically, a project proponent will identify an investment that would lead to reduced greenhouse gases in a developing country and approach the government of the country where the investment is located in for approval.[18] The government will then decide whether the project meets its sustainable development needs and approve it as a CDM project.

The Fourth Conference of the Parties (COP-4) to the UNFCCC held in November 1998 passed the Buenos Aires Plan of Action (BAPA). This plan requests the COP to set up detailed structures, rules, guidelines, operation procedure and methodology for CDM, so that CDM can be fully applicable by 2000. After a few years of tough negotiation,. Bonn Agreement. was adopted by the COP-6 in July 2001, which set a political basis for the future implementation of CDM. In November 2001, the COP-7 was held in Marrakech where the negotiation for CDM had a new improvement. Several agreements were made to specify some important CDM issues, such as its operation pattern, rules, and procedures.[19] An Executive Board (EB) of CDM was also formed to take responsibility for making series of decisions on many detailed technical issues for the implementation of CDM.

It is however surprising to note that the CDM rules do not define what a CDM project is, it only states the eligibility requirements and the project requirements. This has created uncertainties as to whether CCS projects qualify as CDM projects. The only explicit reference made to CCS in the Kyoto Protocol is that Annex-I countries need to research, promote, develop and increasingly use CO_2 sequestration technologies.[20] The Marrakech Accords also was only able to further clarify the Protocol regarding technology cooperation stating that Annex I countries should indicate how they give priority to cooperation in the development and transfer of technologies relating to fossil fuel that capture and store greenhouse gases.[21] But in all, there is no text referring explicitly to CCS project-based activities in The Kyoto Protocol. Thus, we are left to ponder on what qualifies as CDM projects and whether CCS activities can qualify as CDM projects. We may perhaps move closer to answering this if we analyze the eligibility requirements of every CDM project.

1.2 Eligibility Requirements of CDM

1.2.1 Participant Eligibility

The participant eligibility requirement for CDM project implementation stipulates that both countries (developed countries and developing countries) should have ratified the Kyoto protocol, that participation in CDM project should be voluntary, and that the government should designate a national authority for the CDM.[22] Developed countries are also required to transfer and acquire CERs generated by CDM project.[23]

1.2.2 Project Eligibility

The question here is what project qualifies as a CDM project?. The CDM rules do not define what a CDM project is; instead the rules only require that:[24]

- CDM projects must promote *sustainable development* in the countries in which they are located;
- The emissions reductions from CDM projects must be *real, measurable*, long-term, and *additional* to reductions that would have occurred without the project.
- Funding for CDM projects must not divert funding from existing *official development assistance.*[25]

The requirements also include that the project has to generate CERs compared to the baseline emission, the methodology applied by the project has to be approved and if the project has a great environmental impact, a solution has to be made to minimize that impact. The project baseline should also be established on a project-specific basis; in a transparent and conservative way; taking into account the relevant national or sectoral policies; and a reasonable system boundary has to be set and the leakage issue needs to be fully considered.[26]

An eligible CDM project needs to be verified by the Operational Entity (OE) and certified by the Executive Board (EB). Project Operational Entity is responsible for validating proposed CDM project, submitting the project proposal to the EB for registration, verifying emission reductions generated by EB and sending the application to EB for issuing CERs. The Executive Board on the other hand is responsible for supervising the CDM project. The main tasks of the EB include making detailed rules for modalities and procedures for the CDM according to the decision and recommendation of COP, suggesting simplified rules for small-scale CDM project, developing and approving new methodologies for CDM, and making recommendations to the COP for the designation of operational entities.

Having gotten a fair idea of the eligibility rules of the CDM, I shall later in this work use these criteria to assess CCS to see whether it can satisfy the sustainability, additionality and other requirements of the CDM rules, but that will be after we have a fair understanding of the CCS technology.

2. Carbon Dioxide Capture and Storage Technology: An Overview

CO_2 is one of those gases identified as responsible for global climate change.[27] CO_2 is emitted principally from the burning of fossil fuels, both in large combustion units such as those used for electric power generation and in smaller distributed sources such as automobile engines and furnaces used in residential and commercial buildings.[28] Flue gases emitted from medium to large point sources typically contain 3.15% (by volume) of carbon dioxide.[29] It is thus generally agreed that limits will have to be placed on the atmospheric concentration of CO_2 and other greenhouse gases in the atmosphere and that emissions of CO_2 will need to be reduced significantly below their current levels in order to stabilize its atmospheric concentration at a reasonable level.[30]

Carbon dioxide Capture and Storage (CCS) is an option in the portfolio of mitigation actions for stabilization of atmospheric greenhouse gas concentrations which could allow fossil fuels to be used with low emissions of greenhouse gases.[31] CCS involves the use of technology, first to collect and concentrate the CO_2 produced in industrial and energy related sources, transporting it to a suitable storage location, and then storing it away from the atmosphere for a long period of time.[32] Application of CCS to biomass energy sources could result in the net removal of CO_2 from the atmosphere by capturing and storing the atmospheric CO_2 taken up by the biomass.[33] CCS also has the potential to reduce overall mitigation costs and increase flexibility in achieving greenhouse gas emission reductions.

The Carbon dioxide Capture and Storage process can be split into four separate stages:

i. **The Capture process:** This involves the actual separation of the carbon dioxide (or carbon) from fuel or fuel gases. Because of scale considerations, capture from processes that generate large amounts of carbon dioxide is most cost-effective.[34] Such large sources are, for instance, power plants and heavy industry. Some of these sources could supply decarbonized fuel such as hydrogen to the transportation, industrial and building sectors, and thus reduce emissions from those distributed sources. Capture processes can be carried out through the *Post combustion/Gas scrubbing routes,*[35] *Pre-combustion/Syngas approach,*[36] and *"Oxy fuel" routes*.[37]

ii. **Compression**: After capture, CO_2 is usually compressed to form a supercritical or dense fluid and is generally transported by high pressure pipeline to the storage site. Compression is a major consideration in several sequestration schemes, e.g., ocean or geologic sequestration.

iii. **Transportation**: The transportation step is required to carry captured CO_2 to a suitable storage site located at a distance from the CO_2 source. Because of the large quantities involved, captured carbon dioxide can be transported most economically in liquid form through pipelines.[38] For transport over sea, it might be attractive to use tankers in some cases. [39]

iv. **Storage**: Potential storage methods include injection into deep saline aquifers (onand offshore), in depleted oil or gas fields (on- and offshore), in active oil or gas fields for enhanced oil or gas production (on- and offshore), in coal seams (onshore), or by direct injection into the water (offshore). Some industrial processes also might utilize and store small amounts of captured CO_2 in manufactured products. CO_2 may also be disposed after its removal as a natural constituent of gas from certain fields.[40]

As of mid-2005, there have been three commercial projects linking CO_2 capture and geological storage: the offshore Sleipner natural gas processing project in Norway, the Weyburn Enhanced Oil Recovery project in Canada[41] and the In Salah natural gas project in Algeria. Each captures and stores 1.2 Mt CO_2 per year.[42]

The process described above offers the potential to meaningfully reduce worldwide CO_2 emissions in a practical manner and to become an important climate change mitigation option. Indeed, estimates for CO_2 global geological storage potential range from 1,000 to over 10,000 Gt CO_2 in depleted oil and gas reservoirs, saline aquifers and unminable coal seams.[43] This represents more than 26 to over 260 times the amount of projected energyrelated CO_2 emissions in 2030.[44] This will undoubtedly be a major step in meeting the challenge of limiting GHG emissions and meeting the ultimate objective of the UNFCCC.

Placing the CCS idea near the CDM objective, it becomes obvious that CCS will in no small way assist in meeting the over all objectives of FCCC. The apposite questions and litmus tests here are:

i. Will CCS assist non-Annex I countries in contributing to the ultimate objectives of the FCCC to stabilize GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system?. This will obviously be answered affirmatively as CCS has the tendency to remove from the atmosphere about 1,000 to over 10,000 Gt – CO_2, the gas which accounts for over eighty-two percent of all greenhouse gas emissions.[45] Since CCS projects are large in nature and offer the potential to mitigate millions of tonnes of

CO_2 emissions, this will ultimately help to stabilize GHG concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.

ii. Will CCS assist Annex I countries in achieving compliance with their quantified emissions limitation and reduction commitments under Article 3 of the Protocol? The answer to this is yes. Even though no single technology option will provide all of the emission reductions needed to achieve stabilization,[46] CCS as an option in the portfolio of options could facilitate achieving stabilization goals because CCS projects are large in nature and offer the potential to mitigate millions of tonnes of CO_2 emissions thus assisting industrialized countries to reduce from the atmosphere a great deal of CO_2 which alone accounts for about 82 per cent of total green house emissions.[47] This means that if industrialized nations can effectively achieve CO_2 reduction from the atmosphere, they would have gone a long way in ensuring a drastic reduction in their green house gas emission thereby achieving significant reductions in global GHG emissions.

iii. Will CCS assist non-Annex I countries in achieving sustainable development?. Ordinarily, CCS will offer an important opportunity to help developing countries move from the unsustainable fossil fuel economy and attract technological advancements to themselves. But the degree of sustainability that can be achieved through CCS will be dependent on how far we are able to respond to the technical concerns associated with the CCS idea. These concerns range from permanence, leakage, project boundary issues to monitoring, validation, and verification and additionality issues. Since sustainability looks at how we can meet our needs without compromising the needs of future generations,[48] we cannot say we have achieved much GHG reductions if the CO_2 we capture now later leaks or escapes back to the atmosphere. For CCS to be described as meeting sustainable development needs of non annex 1 countries, it must thus be shown to remain perpetually safe and environmentally sound.

In September 2005, the Intergovernmental Panel on Climate Change (IPCC) produced a Special Report on Carbon Dioxide Capture and Storage, which summarizes the current status of research, technology development, and deployment of CCS.[49] The special report was presented at a side event at the meetings of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) (COP 11) and the Parties to the Kyoto Protocol (COP/MOP 1) in Montreal in December 2005. At the side event, the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) decided that CCS project methodologies could be eligible for submission under the Clean Development Mechanism and as of June 23, 2006, three methodologies have been submitted to the CDM Executive Board.[50] Because CCS is not one of the project types originally included when the CDM was first established, the CDM Executive Board now has the task of reviewing these methodologies and then submit recommendations to the COP/MOP regarding whether CCS should be included on the list of eligible project types under the CDM. SBSTA also requested that the Secretariat organize a working group at the 24th session of SBSTA (SB 24)[51] to study CCS and present a report for consideration at its 25th session (November 2006).[52] At SB 24, two in-session workshops and six side events related to CCS were organized.[53] Both workshops focused on information sharing and no decisions were taken related to CCS. While there was general support for using CCS as an emissions-reduction mechanism, environmental non-governmental organizations and some developing countries were concerned about these technical concerns which have been left unaddressed.

I believe that if CCS must be considered as an option in the portfolio of CDM mitigation activities, there is an urgent need for legal and regulatory framework which will address these concerns, establish procedures and modalities for accounting of CO_2-storages reflecting issues related to project boundaries, leakage and permanence and conform with appropriate site selection criteria, to minimize risk of leakage from storage sites. This is my next concern in this work.

3. Legal and Regulatory Issues in Carbon Capture and Storage

Despite the potential benefits of using CCS technology to address climate change and enhance energy security, several unresolved legal and regulatory issues have been identified as being critical to the future success of CCS technology development and its deployment as a CDM project. Most of these relate to the injection and storage of CO_2 and the long-term stewardship of the storage site. These concerns will now be discussed under three heads:

a. *Injection and Storage stage:* This include concerns on storage, site selection criteria, leakage and permanence, assessment of project boundaries;

b. *Crediting period:* This include issues of monitoring, validation and verification; additionality issues, and

c. *Post crediting period*: This include issues of monitoring long term leakage, need for supervision unit, post injection liabilities amongst others.

3.1 Injection and Storage Stage

3.1.1 Storage

Four main legal and regulatory issues relating to the storage of CO_2 call for answers if CCS is to be considered as a mitigation option under the CDM and under other existing international treaties: which methods of storage should be allowed under the CDM?, what might be addressed in guidelines on site selection?, what should be taken into account in the development of guidelines?, Who might prepare these guidelines?.

Consistent standards are needed in carbon storage to ensure the highest level of prevention of leakage into the ground, water, and air systems over the long term. This highlights the importance of a well defined regulatory standard and legislative action which will ensure that a CCS project under the CDM would demonstrate careful site selection which would include assessing whether abandoned or active gas wells will compromise the integrity of the sea, conducting detailed site characterization that encompasses an assessment of the geological characteristics of the storage reservoir and cap rock; understanding the hydrogeology, geochemistry and geomechanics at the site; assessing the volume and permeability of the storage formation; and understanding the site's geological trapping mechanisms.[54]

This shows the need for the CDM Executive Board to establish operational rules and to establish uniform standards for the salient features of operation in accordance with the reservoir characteristics. A standard regulation of well design should include operational practices, materials used, number and age of wells, potential geophysical changes, pathways in the event of leakage, and duration of storage.

Similarly, the greatest technical risk to long term storage integrity is considered by many to be the potential failure of a well due to the corrosive effects of CO_2. Thus some CCSCDM specific standards are required for confirming the potential leakage through site characterization and realistic models that predict movements of CO_2 over time and locations where emissions might occur need to be done.

3.1.2 Project Boundary

The modalities and procedures for CDM state that the project boundary encompasses all anthropogenic greenhouse gas emissions under the control of the project participants that are significant and reasonably attributable to the CDM project activity.[55] Emissions from a project that go beyond the project.s boundary are called. leakage.[56] From this provision, there are certain legal and regulatory questions that need clarification and appropriate legislative action. For example, what should be included in the project boundary?, what factors need to be taken into account in addressing project boundary issue? How should the energy penalty from Carbon Capture and Storage be factored in?.[57]

I believe that a minimum Project Boundary definition needs to be formulated which should be derived from a complete project structure description (the physical delineation).The project boundary of the CDM project activity need to accommodate full life cycle analysis of the CCS project i.e., The Project boundary should be broad enough to encompass GHG emissions during CO_2 capture, transport and injection phases in order to measure the degree of emissions that are been reduced due to the CDM activity. The analysis of the project boundary will also need to consider the long-term CO2 storage aspect of CCS and should be flexible to accommodate disparate storage types (e.g., Enhanced Oil Recovery, Enhanced Coal bed Methane, Enhanced Gas Recovery), each of which has specific characteristics.

In terms of leakage, it is equally important that CCS project methodologies under the CDM adequately account for potential significant, attributable sources of emissions outside the project boundary. For example, the loss in efficiency of a power facility, which results from CO_2 capture, will likely require additional makeup power from another source. The emissions from the make-up power source, if beyond the project boundary, should be factored in when calculating net emission reductions from the project activity. A methodology that incorporates a full-life cycle analysis of the CDM project within the project boundary will serve to minimize potential leakage.

So much legislative action is indeed required to address these project boundary concerns if CCS is to stand firmly as a GHG mitigation option under the CDM.

3.1.3 Leakage and Permanence

Project leakage is the total change in emissions by human sources which occur outside the CDM project activity boundary, which is measurable and attributable to the CDM project activity.[58] The risks due to leakage from storage of CO_2 in geological reservoirs cannot be underestimated. This includes global risks[59] and local risks.[60] Injection well failures or leakage of abandoned wells could create a sudden and rapid release of CO_2 back to the atmosphere. Hazards associated with this type of release primarily affect workers in the vicinity of the release at the time it occurs, or those called in to control the blow-out. A concentration of CO_2 greater than 7.10% in air would equally cause immediate dangers to human life and health.[61]

So much therefore needs to be done to prevent the menace of CO_2 leakage. The selection of storage sites for CCS projects together with methods for early detection of leakage (preferably long before CO_2 reaches the land surface), are effective ways of reducing hazards associated with diffuse leakage. Adequate legal and regulatory frameworks are required to ensure that storage sites proposed for CCS CDM projects have been thoroughly characterized and analyzed, and that the documentation is a part of the Project Design Document (PDD).This framework is also needed to provide for appropriate monitoring technologies, such as 3D seismic surveys, to grasp the storage situation, to verify the amount of injected CO_2 being stored, to detect leakage as soon as it happens; and to lay down a measure to prevent and address future leakage after injections of CCS in the long term.

3.2 Crediting Period

A key issue in balancing environmental additionality and cost-effectiveness is establishing how many emission credits are generated by a particular CDM activity, and over what time frame the credits are being created. Establishing these characteristics of the flow of CERs requires a counterfactual baseline, as well as an estimate of the emissions change relative to that baseline. The legal and regulatory actions needed under this phase are highlighted seriatim.

3.2.1 Monitoring

The modalities and procedures for the CDM requires that the monitoring plan for a CDM project activity provides for the collection and archiving of all relevant data necessary for estimating greenhouse gas emissions and determination of baselines.[62] Monitoring is a basic requirement for CCS project and as an important part of the whole risk management strategy. A framework to ensure appropriate monitoring is thus necessary, this framework should include monitoring of the amount of CO_2 injected to the reservoir and the relevant data from the injection project, and identification of all potential sources of increased emissions outside the project boundary that are significant and attributable to the project activity during the crediting period.

In my view, proper and long-term monitoring of the reservoir is required, so that leakage from the site will be detected and appropriately accounted for. It is important that the monitoring program covers the CO_2 storage and addresses possible leakage pathways in an appropriate way. These leakage pathways would have been identified during the analysis of the storage site. It should be decided who is responsible for the monitoring after the crediting period, the project participants or the host country, and the length of this period. The monitoring system must be technically feasible, able to detect physical leakage (during project operation & long-term leakage) including fugitive emissions above a certain level (i.e. above the threshold, assuming that a threshold is introduced and accepted), and should not be prohibitively costly.

A legal framework is necessary to provide for and enforce standard procedures / best practice, and monitoring guidelines for various types of formations, including operational rules such as: well injection pressure, injection rate, temperature, etc.

3.2.2 Additionality Assessment

The Kyoto Protocol specifies that a CDM project must provide additional reductions in emissions than would not have occurred without the project.[63] In practice, this means that a baseline of. what would have occurred without the project. must be defined, and any emission reductions additional to this baseline level of emissions can yield. Proving additionality for the majority of CCS projects will likely be relatively straight forward, as CCS is only implemented for emission reduction purposes. However, it may be more difficult to prove additionality for Enhanced Hydrocarbon Recovery (EHR) projects where CCS projects gain financial benefits from additional hydrocarbon production through injecting CO2. There is thus a need for legislative action in this area to create a standard methodology to establish the emissions baseline from which the performance of a CCS project can be assessed (and potentially rewarded with credits).It is clear that this question needs to be carefully addressed, because if the baseline against which CERs are allocated is miscalculated, there is a significant risk of creating. certified hot air. which could undermine real abatement opportunities in other sectors and undermine the environmental integrity of the CDM.[64] The development of rigorous baselines is the only way to guarantee the integrity of a reduced tonne of CO_2.

Similarly, current accounting methods used by the Parties to the UNFCCC are based on the assumption that fuel combustion automatically leads to CO_2 emissions. This assumption clearly does not take cognizance of the CCS technology. Thus, there is also the need for legislative action in this regard to ensure the modification of existing methodologies, or definition of additional methodologies which will take into account the impact of CCS technologies on CO_2.

On the whole, there is a need for a standard legal framework stating clearly the methodologies for estimating BAU emissions baselines. Ideal baselines should be: (i) credible from an environment perspective; (ii) transparent; (iii) simple and practical leading to low transaction costs; as well as (iv) limit the crediting uncertainty for project developers and investors. Accounting rules should build on the principles of financial accounting, i.e., relevance, completeness, consistency, transparency and accuracy while not being too cumbersome.

3.3 Post Crediting Period

Due to the long life span of CCS projects, there is a need for the establishment of long term CCS enabling infrastructures (such as monitoring and verification regimes and accounting protocols for very long term emission storage performance criteria by storage site).Legal issues related to this will be considered here.

3.3.1 Monitoring Long Term Leakage

Standards for the measurement, monitoring, and verification (MMV) of injected CO2 are crucial to any regulatory or legal framework for CCS because they provide for the collection of vital data on containment, reactivity of CO_2 with surrounding well materials, seismic activity, leakage, and long-term storage, which are necessary for establishing who is liable in the event of leakage or disruption. For MMV in particular, existing and future CCS projects will provide the most concrete basis for a regulatory framework, especially when coupled with modeling in the research and development phases of a project. Because MMV is site-specific, it would be inappropriate to develop a single MMV framework with a uniform set of requirements. However, it is imperative that guidelines are established to try to create consistency and uniformity where possible. One way to set up flexible but meaningful monitoring guidelines would be to rely on objectives and performance standards instead of specific measurement techniques.[65]

CCS-CDM specific issues will ultimately need to be addressed in a more comprehensive CCS regulatory framework. In general, monitoring of stored CO_2 should focus on two dimensions: lateral migration of CO_2 and vertical leakage of CO_2 outside the storage area. A variety of MMV techniques are currently being applied and reviewed in active projects such as Weyburn and Sleipner to review lateral and vertical migration of the injected CO_2.[66]

Another area that could be included in a framework is the use of monitoring data to provide feedback into reservoir management practices during the injection phase of the project. Such a step could potentially be far more important than monitoring later in the project.

There are few established guidelines for the specific kinds of monitoring that should be done for CCS in the short- and long-term, including who should be doing the monitoring, for how long a site should be monitored, and how to determine long-term MMV responsibilities in case of existing CO_2 compliance systems, such as the EU Emissions Trading Scheme (EU ETS),[67] trans-border projects, or projects in international waters. The Australian government recently developed principles for regulating CCS projects that also include general guidelines for when in the CCS process the MMV step should take place, and how it should be done.[68] There is however a need for a standard regulatory framework which will regulate MMV in all jurisdictions covered by the Kyoto Protocol.

3.3.2 Allocation of Risks and Treatment of Liabilities

Liability is one of the most essential regulatory issues facing CCS projects. It is very important to address it because it will impact the costs of CCS projects and will be crucial in advancing public acceptance of the technologies and processes. Liability issues can be divided into short[69] – and long-term,[70] with the preponderance of unresolved liability issues relating to long-term storage.[71]

i. **Short-term Liability:** A common liability issue raised in connection with the shortterm aspects of CCS projects is operational liability, which refers to the environmental, health, and safety risks associated with capture, transport, and injection of CO_2. Most short-term liability issues will probably be taken care of by the CER contract, but certain issues should be considered in a regulatory framework, including exemptions under special circumstances. Short-term liabilities will likely have a set timeframe, they are therefore easier to manage and plan for, and could be addressed in a regulatory framework relatively quickly. The more urgently needed regulations are for long-term liability.

ii. **Long-term Liability:** There are three types of liability issues that are relevant for longterm CCS projects: environmental, *in situ*, and trans-national liability.[72] Environmental liability is associated with any CO_2 leakage from the storage sites that may affect the global climate by contributing to CO_2 concentrations in the atmosphere. In the event of any CO_2 leakage or migration to the atmosphere, responsibility must be assigned to address any harm caused to the global climate. *In situ* liability is associated with leakage or migration that could result in public health, environmental, or ecosystem damage. Failure to properly address these issues could lead to negative public perceptions and an inability to procure appropriate sites for injection and storage. *Trans-border liability* on the other hand refers to liability issues that may affect more than one country. This is important in instances of migration of CO_2 across national borders and/or damage to the global climate caused by CO_2 leakage in one individual country. These issues will have to be addressed by the Kyoto Protocol and other relevant treaties.[73]

The first area that should be addressed is how to determine where local/national liability and international liability differentiates. It is possible that CO_2 could leak far from its injection point and storage area, and if that leakage point is in another country or in international waters, a framework for determination of which party is liable for clean up, remediation, or loss of resources should be established.[74] These issues could be set up in an international framework, but specifics would probably be worked out on a case-by case basis. In the case of CO_2 leaking into the atmosphere and causing. environmental liability,. this is probably best addressed as part of a broad climate policy designed to control greenhouse gases like the Kyoto Protocol.[75]

Since CCS projects are designed to last for centuries, there should be parameters and guidelines laid down, and some sort of limitation or reference should be included to determine how long certain parties are liable and at what point the stored CO_2 becomes a public liability. Also, a basic compliance system should be established to assure accountability and proper enforcement in the event of leakage or other damage. Similarly, due to the longevity of CCS projects, determining responsibility for cost coverage is crucial, and one option could be the establishment of special funds or insurance schemes to cover compensation or remediation in the case of any leakage or damage resulting from the process in the long term.

4. Recommended Framework for Addressing these Concerns

It is pertinent to note from the onset that several efforts have been undertaken or are currently in process for addressing the regulatory gaps discussed above. For instance, the Conference of the Parties serving as the meeting of the parties to the Kyoto Protocol (COP/MOP), in response to these concerns invited parties to provide to the secretariat, by 13 February 2006, submissions on the consideration of CCS as Clean Development Mechanism project activities, taking into account issues relating to project boundary, leakage and permanence. Eleven submissions containing different recommendations were received.[76] Most of these submissions however focused mainly on the technical concerns with little or nothing said on the legal and regulatory gaps[77] which has been the main focus of this article.

The issue of CCS as a CDM project also came up for discussion at the second meeting of the Parties to Kyoto Protocol (COP/MOP 2) and twelfth session of the Conference of the Parties (COP 12) concluded on Friday, 17 November 2006 in Nairobi, Kenya.[78] The COP/MOP recognized the rapidly expanding portfolio of CDM project activities and that CCS in geological formations could lead to the transfer of environmentally safe and sound technology and know-how, and the attainment of GHG reductions.[79] The COP however identified the legal and regulatory gaps still existing and thereby requested the Executive Board to continue to consider proposals for new methodologies, including the project design documents for CCS in geological formations as CDM project activities. The COP in its decisions also encouraged parties to organize global and regional workshops to enhance capacity-building on CCS technologies and their applications and to share information on these workshops broadly. The COP also sent invitations to intergovernmental organizations and non-governmental organizations to provide to the secretariat, by *31st May 2007*, information addressing these concerns discussed in this work.[80]

With the COP still inviting parties to make submissions to the secretariat, by 31st September 2007 on gaps to be filled if CCS is to be enlisted as CDM project activities, it is clear that these regulatory concerns are yet to be resolved and still call for solutions.

I am of the view that the time to act is now. The COP can no longer afford to delay action on laying down a detailed legal and regulatory framework which will address all these concerns raised in this work. I believe that these salient issues ought to be addressed as soon as possible to resolve all these technical concerns hindering the deployment of CCS as a GHG mitigation option under the CDM. CCS will no doubt assist in the GHG mitigation efforts of most countries while delivering sustainable development to the doorsteps of developing countries if these issues are laid to rest.

I consequently wish to recommend the following as immediate actions which ought to be taken and finalized *with utmost priority* by the Executive Board of CDM:

i. The EB should intensify its call for immediate proposals, organize workshop and/or conferences as soon as possible to deliberate extensively on these issues and finalize *with utmost priority* on a legal framework to address these concerns based o the out comes of these deliberations,

ii. A legal framework should be laid down by The Executive Board and then submitted as recommendations to the COP/MOP for prompt adoption and incorporation into the CDM Modalities and Rules. The legal and regulatory framework which I envisage should:

   a. Describe clearly the criteria for the demonstration and assessment of additionality most especially for Enhanced Oil Recovery and Enhanced Coal Bed Methane Recovery project activities;

   b. Lay down an international best practice and environmental criteria for site characterization including assessment of the risk of emission releases from the project and of impacts on the surrounding environment;

   c. Establish operational rules, and determine whether there will be uniform standards for the salient features of operation. If uniform standards are preferred then their appropriate level needs to be determined;

   d. Formulate and define the idea of minimum Project Boundary. This should be derived from complete project structure description (the physical delineation) which also accommodates full life cycle analysis;

e. Define potential leakages as emissions due to the project which occurs outside the project boundary (CO_2 sources can be in or out of boundary depending on the nature of the project),

f. Lay down a common and consistent methodology for different CCS projects based on a standard principle,

g. Lay down standard procedures / best practice monitoring guidelines or protocols for various types of formations, including operational rules such as: well injection pressure, injection rate, temperature, etc. This methodology should highlight applicable techniques and must be flexible to allow for new techniques, must be technically feasible, able to detect physical leakage (during project operation & long-term leakage) including fugitive emissions above a certain level (i.e. above the threshold, assuming that a threshold is introduced and accepted), and should not be prohibitively costly;

h. Lay down standard methodologies for emission inventories and develop accounting rules which will be used in accounting for long-term leakage;

i. Address specifically issues, such as permanence and responsibility for remediation in the event of emission releases, both during the crediting period and subsequently;

j. Address health, safety and environment risks in further detail and develop common cost-effective remediation techniques;

k. Lay down a mechanism to allocate liability for any seepage among parties;

l. Ensure the standardization of methodology for monitoring. This is necessary to determine who will conduct the monitoring, and who will bear the cost, and

m. Make appropriate provisions for cases where geological formations used for storage cross national boundaries.

I recommend that this framework does not need to be in form of a new stand alone regulatory framework or treaty rather it should be incorporated into the current CDM Modalities and rules by the COP/MOP of The Kyoto Protocol as an improvement on the Marrakesh Accords. I believe this will be faster and less stressful than having to create a fresh treaty on CCS as a CDM activity.

Conclusion

CCS technology has the potential of reducing overall mitigation costs, increasing flexibility in achieving greenhouse gas emission reductions and in contributing positively to the attainment of the overall CDM objectives. Its viability and global acceptability as a CDM Project will however depend on how soon the COP/MOP to the Kyoto Protocol can provide a legal/ regulatory framework which will address the concerns of permanence, leakage, project boundary, liability amongst others which have consistently been identified as the ills of his viable technology. This is a task which must be accomplished without further delay. This work will be a useful guide to the COP/MOP in achieving this necessary task.

Endnotes

1 Non Annex I and II countries under UNFCCC include developing countries like China, India and Nigeria amongst others.

2 The other flexible mechanisms are emissions trading and Joint Implementation (JI).see online: See Online: United Nations Framework Convention on Climate Change, http://unfccc.int/resource/docs/convkp/kpeng.html

3 See online, Foundation for International Environmental Law and Development, <www.field.org.uk/climate_2.php>

4 Decision 17/CP.7 of the Seventh session of The Conference of Parties to the UNFCC (COP-7) in Marrakech.

5 Organization for Economic Co-operation and Development,. Prospects for CO_2 Capture and Storage. Online: Organization for Economic Co-operation and Development, www.oecd.org/publications see also Intergovernmental Panel on Climate Change Report,. Workshop on Carbon Dioxide Capture and Storage., (2002) Regina, Canada at 15-18.

6 McKee, B, "Solutions for the 21st Century, Zero Emissions Technologies for Fossil Fuel" (2002) OECD/IEA, at 2-4.

7 IPCC Report, see note 5 above.

8 *Ibid.*

9 See for e.g., International Energy Agency,. Legal Aspect of Storing CO2. (2005) International Energy Agency at 3.

10 See for e.g., Anderson, S & R, "Prospects for Carbon Capture and Storage Technologies" (2003)2 ENDA, see also Bachu, S. and Celia, M., *Geological Sequestration of* CO2*: Is Leakage unavoidable and acceptable?*, (2002,Sixth International Conference on Greenhouse Gas Control Technologies, Kyoto, Japan, October).

11 Jonathan Wiener,. Global Environmental Regulation: Instrument Choice in Legal Context.(1999) 108 Yale L.J. 677 at 691-692.

12 *Ibid at* 689-690.

13 For the other flexible mechanisms see note 2 above.

14 Karen Holm Olsen,. Clean Development Mechanism.s contribution to Sustainable Development, A review of the literature, online: United Nations Environmental Programme, www.uneprisoe.org/karen at 2.

15 Youba Sokona, "The Clean Development Mechanism: What Prospects for Africa?" (2005) ENDA at 1.

16 It has thus been variously described as the 'Kyoto surprise', 'The Kyoto baby', 'the win-win mechanism' and as having the handwriting of both the South and the North. see Aslam, M.A.,. "The Clean Development Mechanism: unraveling the. 'Mystery'", (1998)Islamabad 2 at 21, see also Karen Holm Olsen, *Supra* note 14 at 2.

17 See also Unep Risø Centre, Clean Development Mechanism Legal Issues Guidebook to the Clean Development Mechanism, online: Unep Risø Centre www.uneptie.org/energy/publications/files/cdm_LEGAL_issues.htm - 10k -

18 See Foundation for International Environmental Law and Development, note 2 above.

19 The basic rules for CDM can be found in Decision 15, Decision 17 and the attachments of COP-7. *Supra* note 2.

20 Art. 2, Para. iv, Kyoto Protocol. *Supra* note 2.

21 Paragraph 26, Decision 5/CP.7. *Supra* note 2.

22 See paragraphs 28 -30 of the annex of Decision of the COP-7 (Clean Development Mechanism Modalities and Procedures). Supra note 2.

23 *Ibid.* see Paragraph 31 and 32.

24 Decision 17 of the COP-7.

25 See *supra* note 3.

26 *Ibid.*

27 Others include Methane (CH_4), Chlorofluorocarbons (CFCs), Nitrous oxide (NO_x) and Ozone (O_3). See Nigel Bankes,. Course Material for LAW 649.32, University of Calgary. at 69-70. Online: University of Calgary,www.ucalgary.ca/it/computersupport/blackboard.html

28 CO2 emissions also result from some industrial and resource extraction processes, as well as from the burning of forests during land clearance.

29 For example, flue gas from a coal-fired power plant typically contains about 14% CO2, 5% O_2, and 81% N_2. online: IPCC, http://www.ipcc.ch

30 Under IPCC scenario B1 in its Climate Change 2001 report, emissions of CO2 will have to be reduced by approximately 40% by 2100 in order to stabilize the atmospheric concentration of CO2 at no more than 50% above its current level online: IPCC, http://www.ipcc.ch.

31 Other mitigation options include energy efficiency improvements, the switch to less carbon-intensive fuels, nuclear power, renewable energy sources, enhancement of biological sinks, and reduction of non- CO2 greenhouse gas emissions. See generally Susanne Haefeli,. CCS issues. Accounting and Baselines under the UNFCC. (2004) OECD/IEA at 8.

32 IPCC,. Special Report on Carbon Dioxide Capture and Storage,. September 2005, Chapter 5, online: IPCC, http://www.ipcc.ch/activity/srccs/index.htm

33 See note 22 above, at 17.

34 See note 32 above.

35 In which the CO2 is scrubbed from the gas exiting the combustion or production process. These are the most commonly used technologies today and, for example, they can capture up to 99 per cent of the processed/flue gas exiting a boiler or a gas sweetening unit.

36 In which a synthetic hydrogen and CO2 rich gas is produced from the fuel. This approach is used in Integrated Gasification Combined Cycle plants (IGCC). It is a clean coal technology under development with few already existing plants in Europe and the US, but with promising prospects as a large-scale technology.

37 In which the combustion process is fired with oxygen rather than air to create a flue gas primarily comprising CO2. This approach is still in a R&D phase. All three processes consume a significant amount of energy, and thus entail costs. This is referred to as the. energy penalty. of the capture process. The energy penalty typically ranges between 15 to 40 per cent of the energy output in the case of CO2 capture at a coal-fired power plant. *See generally* Thambimuthu, K.,. Zeroing emissions with CO2 Capture and Storage, Presentation at COP8, online: IEA, http://www.iea.org/envissu/cop8/ieaside/kelly.pdf.

38 CO_2 transmission pipelines already exist in countries like the USA. see online: US Department of Energy, Capture Sequestration R&D Projects Database, http://www.fossil.energy.gov/fred/feprograms.jsp?prog=Carbon+Sequestration

39 The transportation chosen will very much depend on the storage site, because the farther this is from land the more expensive it will be to carry the CO_2.

40 The Norwegian State oil company has been injecting around a million tones of CO_2 a year since 1996. a by-product of the gas they produce from the North Sea Sleipner west gas field, directly into sub-seabed formations.

41 This stores CO_2 captured in the United States. see note 38 above.

42 See note 33 above.

43 International Energy Agency, "Carbon dioxide Capture and Storage Issues – Accounting and Baselines under the United Nations Framework Convention on Climate Change (UNFCCC)" (2004) OECD/IEA at 5.

44 *Ibid* at 8-10.

45 *Ibid*.

46 IPCCC, "Third Assessment Report", online: IPCC, http://www.ipcc.ch/activity/srccs/index.htm.

47 *supra* note 43.

48 See Bruntland, G, The World Commission on Environment and Development,. *Our Common Future.*, (Oxford University Press, Oxford) at 38.

49 IPCC Special Report, see on line: IPCC, http://www.ipcc.ch/activity/srccs/index.htm.

50 NM_0167 White Tiger Oil Field CCS project in Vietnam; NM_0168 capture of CO_2 from LNG complex and its storage in an aquifer in Malaysia; and SSC_038 Anthropogenic Ocean Sequestration by Changing the Alkalinity of Ocean Surface Water, Online: UNFCC, http://cdm.unfccc.int/methodologies

51 This was held from May 17-26, 2006. *Ibid*

52 UNFCCC SBSTA. FCCC/SBSTA/2005/L.26, December 5, 2005, online: UNFCC, http://unfccc.int/resource/docs/2005/sbsta/eng/l26.pdf

53 IISD, Earth Negotiations Bulletin,. Twenty-fourth Sessions of the Subsidiary Bodies of the UNFCCC and First Session of the Ad Hoc Working Group Under the Kyoto Protocol: 17-26 May 2006,. online: IISD, http://www.iisd.ca/download/pdf/enb12306e.pdf

54 See Canada's submissions to the COP/MOP, FCCC/KP/CMP/2006/MISC.2, at 15-18. *supra* note 2.

55 Decision 17/CP.7 (FCCC/CP/2001/13/Add.2).

56 See note 3 above.

57 Submission by Austria on behalf of European Community. See *supra* note 55 at 10-11.

58 See note 43 above.

59 Global risks involve the release of CO_2 that may contribute significantly to climate change if some fraction leaks from the storage formation to the atmosphere.

60 Local risks refer to local hazards that may exist for humans, ecosystems and groundwater if CO_2 leaks out of a storage formation.

61 See IPCC Report, note 32 above.

62 S*upra* note 43.

63 See Article 12 paragraph 5(c) of Kyoto Protocol. *Supra* note 2.

64 *Supra* note 32.

65 See Kate Robertson, "International Carbon Capture and Storage Projects Overcoming Legal Barriers" (2006) NETL-2006/1236 at 3-8.

66 The most often used techniques are time-lapse 3D seismic imaging (also called 4D seismic) and vertical seismic profiling (VSP) in wells, along with injection well pressure and rate monitoring, but a consensus of the most appropriate techniques to use has not been reached. *Ibid at 8-10.*

67 *Ibid.*

68 Ministerial Council on Mineral and Petroleum Resources,. Carbon Dioxide Capture and Geological Storage: Australian Regulatory Guiding Principles,. November 23, 2005,http://www.industry.gov.au/assets/documents/itrinternet/Regulatory_Guiding_Principles_for_CCS20 051124145652.pdf

69 Generally considered to cover the timeframe of the project and any contractual time period covering post-injection.

70 Long-term timeframes are generally defined as 50-100 to thousands of years.

71 See note 57 above.

72 TNO, "Environmental Challenges of the E&P Industry: Dealing with CO_2" online: TNO, http://gcceuconference. epu.ntua.gr/Portals/1/documents/02.Elewaut.pdf

73 So much work is currently been done in this regard to effect changes into International treaties like the London Convention /London Protocol, Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR), to address these Trans boundary liability issues. See International Energy Agency,. Legal Aspects of Storing CO_2, (2005) OECD/IEA, at 12-18.

74 CSLF, "Considerations on Legal Issues for Carbon Dioxide Capture and Storage Projects", Report from the Legal, Regulatory and Financial Issues Task Force, 13 August 2004. http://www.cslforum.org/documents/Legal_Issues_Report_P14C.pdf

75 M.A. de Figueiredo, D.M. Reiner, and H.J. Herzog, "Framing the Long-Term In Situ Liability Issues for Geologic Carbon Storage in the United States", *Mitigation and Adaptation Strategies for Global Change*, 10: 647-657, October 2005, http://sequestration.mit.edu/pdf/Framing_the_Long-Term_Liability_Issue.pdf

76 These submissions were submitted by Australia, Austria on behalf of the European community and its member states, Bangladesh, Brazil, Canada, Japan, New Zealand, Norway, Qatar, Saudi Arabia, and Switzerland. See FCCC/KP/CMP/2006/MISC.2. *Supra* note 2.

77 An exception is the submissions by Canada which touched on certain regulatory issues. *Supra* at 11-12.

78 The Conference was attended by six thousand participants from one hundred eighty countries. online: UNFCCC, http://unfccc.int/2860.php

79 See UNFCCC, "Nairobi Conference". online: UNFCCC, http://unfccc.int/meetings/cop_12/items/3754.php

80 *Ibid.*

2

Flexible Mechanisms for Climate Change Compliance: Emission Offset Purchases under the Clean Development Mechanism

Christopher Carr and Flavia Rosembuj***

The authors provide an overview of recent developments on clean development mechanism – a specific type of offset program for climate change compliance. Their article gives a background on how CDM of the Kyoto Protocol works and investigates aspects of CDM purchase agreements from a legal perspective. They found out that "the international carbon market has shown how market-based mechanisms can muster capital to address global climate change and transfer climate-friendly technology to the developing world.

* Counsel Vinson & Elking LLP, 1455, Pennsylvania Avenue, NW, Washington, D. C., 2004. E-mail: Ccarr@velaw.com

** Senior Legal Counsel, Co-financing and project finance, legal department, World Bank. 1818 H street NW, MC 6-401 Washington D.C. 20433. E-mail: frosembuj@worldbank.org

Source: wbcarbanfinance.org

Introduction

From 2005 through 2006, the international market for carbon credits experienced tremendous growth and reached an annual market value of over US $30 billion.[1] As part of this growth, new tools, skills, and capital have been introduced into the international carbon market to address the global problem of climate change.

Broadly speaking, the international carbon market has involved two types of market-based tools to reduce greenhouse gas emissions. The first tool is a cap and trade program. Under such a program, emissions are capped at a certain level by regulatory fiat, regulated entities are allocated allowances to emit a certain amount of Greenhouse Gases (GHGs), and these entities can then trade allowances to meet their compliance obligations. An entity whose emissions fall below its allocated amount can sell unneeded allowances for compliance purposes. An entity whose emissions are higher than its allocated amount can purchase allowances from others who are willing to sell them.

The second type of program is an emission offset, or "project based" program. As opposed to a cap and trade regime, offsets involve a "baseline and trade" regime. These offset credits are generated from projects that reduce GHG emissions below a certain baseline *outside* of a regulated cap. These credits can then be sold to entities that can use them to meet regulatory compliance obligations *inside* a cap.

This article focuses on a specific type of offset program – the Clean Development Mechanism of the Kyoto Protocol (CDM).[2] This article (i) begins with an overview of the Kyoto "flexible mechanisms" (including the CDM), (ii) explains how CDM offset credits are generated, (iii) examines the growth of the international carbon market, (iv) explores aspects of CDM offset purchase agreements, and (v) summarizes several lessons learned. In sum, the international carbon market has shown how market-based mechanisms can muster capital to address global climate change and transfer climate-friendly technology to the developing world. This article provides an overview of recent developments in the CDM and an understanding of how market based mechanisms may address global climate change. This is, however, only an overview, and other sources delve into these topics in greater detail.

I. Overview of the Flexible Mechanisms

The United Nations Framework Convention on Climate Change (UNFCCC) established an international system for addressing the issue of climate change.[3] In doing so, it set a broad objective of stabilizing GHG emissions "at a level that would prevent dangerous anthropogenic interference with the climate system."[4] The UNFCCC sought to achieve such a goal "within a time frame sufficient to allow ecosystems to adapt naturally" while still allowing economic development to proceed in a sustainable manner.[5]

Furthermore, the UNFCCC established an "aim" of reducing GHG emissions to 1990 levels.[6] In doing so, the UNFCCC acknowledged that there could be some degree of co-operation between the parties to the UNFCCC, when it stated that these GHG emissions could be attained individually or "jointly."[7] However, the UNFCCC did not itself set binding emission reduction commitments.[8]

Unlike the UNFCCC, the Kyoto Protocol, negotiated in December 1997, sets out firm GHG emission reduction targets for developed countries (listed in Annex I to the UNFCCC) to be met within an agreed commitment period (2008—12).[9] The Protocol requires the Annex I parties to reduce their emissions by an average of 5.2% from 1990 levels.[10] The specific targets (or assigned amounts) were set out in Annex B of the Protocol.[11] The Annex I Parties were then given the opportunity to reach their targets by the adoption of command-and-control regulations or by using the "flexibility mechanisms" in order to comply with their assigned emission levels.[12]

During the negotiation of the Kyoto Protocol, the United States was the main driving force for the inclusion of the so-called "flexibility mechanisms." The Kyoto Protocol includes three flexibility mechanisms: (i) the Joint Implementation provisions, set out under Article 6; (ii) the Clean Development Mechanism, in Article 12; and (iii) International Emissions Trading under Article 17.

The Joint Implementation provisions allow Annex I parties to transfer to, or acquire from, *another Annex I country*, Emission Reduction Units (ERUs) generated by projects that reduce manmade GHGs or enhance the anthropogenic removal of such gases by sinks.[13]

The Clean Development Mechanism allows Annex I countries to finance projects that reduce emissions in developing countries that are Kyoto parties but have not made commitments to reduce their GHG emissions. In return, Annex I countries receive Certified Emission Reductions (CERs) from those projects.[14] These CERs then can be used for compliance in Annex I countries.[15] Thus, under the CDM emission credits generated from climate-friendly projects in the developing world can be used for compliance purposes in the developed world.

Finally, under the International Emissions Trading provisions, Annex I countries can trade Assigned Amount Units (AAUs) among themselves.[16] AAUs are allocated to Annex I parties at the beginning of each commitment period based on each party's targets set out in Annex B of the Protocol.

By the end of the first commitment period, in 2012, an Annex I country must be in compliance with its obligations under the Kyoto Protocol such that its emissions of GHGs are either less than or equal to its AAUs, which can be duly adjusted with any of the following assets:

i. ERUs transferred through Joint Implementation (JI) projects,

ii. CERs resulting from the Clean Development Mechanism, and

iii. AAUs themselves that may be traded by means of International Emissions Trading.[17]

Each one of the above mentioned assets (ERUs, CERs and AAUs) represents one metric ton of CO_2 equivalent.[18] One ton of a GHG reduction from a CDM or JI project anywhere in the world can be converted into a ton of carbon dioxide equivalent by multiplying it by a pre-determined global warming potential.[19] This conversion allows for a common "currency" whereby ERUs, CERs, and AAUs can be freely exchanged for compliance purposes, as each represents a ton of carbon dioxide equivalent. A party to the Kyoto Protocol can also authorize a private entity to participate in these flexible mechanisms.[20] In this way, companies and other non-sovereigns can undertake climatefriendly projects and generate emission reduction credits. These credits can then be used for compliance purposes, or sold or traded in emissions markets to others who may need the emission credits for compliance purposes.

The CDM, on which this article focuses, began operation shortly after the adoption of the Marrakech Accords. The Marrakech Accords resulted from the 2001 meeting of all of the parties that are signatories to the UNFCCC (Conference of the Parties or COP). The Marrakech Accords supplemented the Kyoto Protocol by identifying in detail the modalities and procedures by which the flexible mechanisms would operate.[21]

The CDM directs the design and development of emission reduction offset projects located in the developing world under the Kyoto Protocol. For instance, the CDM provides the framework for the development of baselines and monitoring methodologies for measuring emission reductions from projects. It also develops procedures by which emission reductions could be verified by independent third parties.[22]

Although the Kyoto Protocol was negotiated in 1997, it did not enter into force until February 16, 2005, when the required number of countries finally ratified it.[23] When Kyoto became effective, the CDM was ready for a period of significant growth in the volume of GHG emission reductions that could be generated by environmentally-friendly projects.

II. The Creation of Certified Emission Reductions

The main institutions involved in overseeing the CDM are the "Conference of the Parties serving as the Meeting of the Parties" (referred to as the "COP/MOP")[24] and the Executive Board (EB). The COP/MOP provides overall authority and guidance to the CDM.[25] The EB is composed of ten members (two from Annex I and eight from non Annex I countries).[26] The EB manages the day-to-day supervision of the CDM.[27] The EB is assisted in its activities by panels of experts, working groups, and the CDM registration and issuance team.[28]

Every CDM project has a defined project cycle that derives from the Marrakech Accords and guidance provided by the COP/MOP and EB. The formal project cycle starts with the Project Design Document (PDD). The PDD contains details about the proposed CDM project, including of a description of the project activity that will reduce GHG.[29]

The PDD substantiates each project's "additionality" by demonstrating that the project creates emission reductions that are "additional" to those that would have occurred under a "business as usual" scenario. In order for a CDM project to generate CERs, the project proponents must present a "counterfactual," that is, a description of the reductions that would have occurred in the absence of the investment.[30] Each PDD must describe the "baseline" scenario[31] from which this additionality is measured and must include a detailed monitoring plan.[32]

A written "Letter of Approval" (LOA) from the host developing country must also be obtained for the project.[33] The Kyoto Protocol is an international agreement between sovereign parties, but through this letter of approval a sovereign can devolve rights and obligations to private entities, allowing them to take advantage of the flexible mechanisms.

The PDD, together with the LOA, is submitted by the project sponsor to an independent entity for "validation."[34] This entity is known as the Designated Operation Entity (DOE).[35] The DOE reviews the PDD and submits it together with the LOA to the EB. The formal acceptance by the EB of the validated project as a CDM project activity is known as "registration." A request for registration is considered granted and the registration final within eight weeks of the EB's receipt of the request, unless prior to the expiry of that period three or more members of the EB (or a party involved in the CDM project itself) request review of the proposed CDM activity.[36]

In the implementation phase, the project is carried out and the monitoring plan submitted in the PDD takes effect. Based on the monitoring plan in the PDD, GHG reductions are calculated and submitted for verification as CERs.[37] A different DOE needs to be hired by the project sponsors (unless the project is small scale) to verify the GHG reductions and to generate a verification report that certifies in writing the amount of additional emission reductions attributable to the project.[38]

If everything goes as planned, the EB ultimately issues the CERs in the amount of one CER for each ton of carbon dioxide equivalent of emissions reduced.[39] A percentage of the CERs issued is transferred to a special account used to finance projects that help developing countries adapt to the adverse impacts of climate change. The remaining CERs are forwarded to the accounts of the participants in the CDM project.

III. Growth of the International Carbon Market

The international carbon market has grown tremendously over the past several years. Prior to February 2005, when Kyoto Protocol came into effect, the market was relatively inactive, particularly within the private sector. Early market activity was largely prototype buying by sovereigns and international financial institutions like the World Bank. Prototype buying showed, through "learning by doing," how CDM and JI transactions could be undertaken.

With the entry into force of the Kyoto Protocol, the international carbon market grew to US$30 billion in two years.[40] The volume of credits generated by projects that reduce greenhouse gases more than quadrupled from 2004 to 2006.[41]

The potential for market growth is much larger. For instance, the UNFCCC Executive Secretary, Yvo de Boer, has said that carbon finance could generate up to $100 billion annually in financial flows to developing countries.[42]

As mentioned in the introduction, the international carbon market has so far been dominated by two types of market-based mechanisms. The first is the trading of allowances that have been allocated to regulated entities under a "cap and trade" program.

Indeed, based on the monetary value of trades, the dominant force in international trading has been the European Union Emission Trading System (EU ETS). The EU countries entered into a "burden sharing agreement" whereby they collectively agreed to reduce their emissions by 8% from 1990 levels in accordance with the Kyoto Protocol. Each individual EU country then agreed to cap its emissions at certain levels.[43] EU countries devolved compliance obligations down to individual regulated entities, allocating each a certain number of allowances.[44] The EU market topped US$20 billion in 2006.[45]

The other dominant type of transaction in the international carbon market has been emission offset projects, in particular those under the CDM.[46] The principal buyers of such credits have been EU countries and Japan.[47] The main reason for this is that, depending on the rules of various regulatory programs, entities regulated by the EU ETS can use CDM credits for compliance purposes.[48] Japanese private entities have also purchased CDM credits as part of voluntary targets set to help their country meet its Kyoto commitments.

Other regulatory regimes, including those in the United States, could also "link" to either the CDM, the EU ETS, or other regulatory regimes, depending on the specific provisions in each system and applicable law.[49] Through this linking, it could be possible for credits to be traded between the regulatory regimes of different countries.

A wide variety of projects have been launched under the CDM, including renewable energy projects such as wind and hydroelectric; energy efficiency projects; fuel switching; capping landfill gases; better management of methane from animal waste; the control of coal mine methane; and controlling emissions of certain industrial gases including HFCs and N_2O.[50] CDM projects have taken place throughout the developing world, including in Asia, Africa, and Central and South America.[51]

However, certain countries have dominated the market. The World Bank estimates that from 2002 through 2006, China represented 60% of the cumulative CDM market in terms of credit volume.[52] Based on the number of projects (as opposed to credit volume), China still represents 50% of the market.[53] Other dominant sellers include India and Brazil.[54] These concentrations aside, CDM projects have been registered in over 45 countries.[55] In total, as of October 2007, over 80 million CERs have been issued from over 20 countries.[56]

Early purchases of carbon credits received a significant boost with the commencement of the Prototype Carbon Fund (PCF) of the World Bank, which began carbon purchases in the year 2000. The basic concept of the PCF is quite simple: the fund collects contributions from participating entities and uses those funds to facilitate projects that reduce GHG emissions. The emission reductions so generated are then distributed to the entities that contributed to the fund *pro rata* based on the amount of their respective contributions. The Prototype Carbon Fund helped to pioneer the development of the carbon market and demonstrate how CDM and JI transactions could work.[57] Notably, since the development of the PCF there has been a proliferation of carbon funds both in the World Bank and the private sector. The World Bank currently manages ten carbon funds with approximately US$2 billion in capital commitments.[58]

At the time of this writing, over 700 projects have made it through the rigorous CDM process and been both validated by a Designated Operational Entity and registered by the CDM Executive Board.[59] This has also led to the approval of over sixtyfive methodologies for measuring emission reductions from different types of projects.[60] The projects in the current CDM pipeline are expected to generate approximately two billion CERs through 2012 (the end of the first Kyoto commitment period).[61]

IV. Purchasing Carbon Credits through Erpas[62]

An Emission Reduction Purchase Agreement (ERPA) is a specialized form of a purchase and sale agreement, involving what can be considered a relatively new type of commodity an emission reduction.[63]

CDM transactions can take many different forms. In simplest terms, there is a seller and buyer of emission reductions. The seller typically has some ownership or control of the project which is generating the emission reductions. At a minimum, the seller needs to have legal rights to the emission reductions being sold. However, in some transactions the buyer may take other roles as well, including providing funding to the project activity, preparing the relevant Kyoto documentation, contributing technology or expertise, taking an equity position in the project, or any other number of approaches.

Given the wide variety of possible approaches to carbon finance transactions, ERPAs can also take widely varying forms. Several different template ERPA contracts are publicly available. For instance, the International Emissions Trading Association (IETA) has developed a model form of ERPA.[64]

In its pioneering role in the carbon finance market, the World Bank developed a form of ERPA that became a prototype for many transactions. In line with the World Bank's approach, most ERPAs principally make payment on the future delivery of emission reductions.[65] Contracts may involve varying degrees of up-front financing.[66] However, most ERPAs – both those of the World Bank and others – remain forward contracts, in that the contracts are typically entered into well before the delivery of the CERs.

A. Contracting for a Regulatory Asset Amidst Regulatory Uncertainty

Two broad categories of risk exist in ERPAs. Project risk arises out of the physical activity occurring that reduces or sequesters emissions. "Kyoto risk" arises out of uncertainty surrounding the regulatory status of emissions reductions generated by the project.[67]

The value in a CDM transaction derives from a regulatory regime – the Kyoto Protocol. Accordingly, CDM transactions involve a variety of regulatory risk. For example, the project may not be approved by the CDM executive board; the CDM may be discontinued post-2012; or CDM standards may change, reducing or eliminating the value of the carbon finance revenue stream.

Understanding the allocation of regulatory risk in ERPAs is important. Two approaches to this regulatory risk can be seen in VER (Verified Emission Reduction) and CER contracts.

For example, the World Bank's Prototype Carbon Fund (PCF) began purchasing emission reductions roughly five years before the entry into force of the Kyoto Protocol in 2005. These initial PCF ERPAs were designed to stimulate the generation of emission reductions that would eventually be convertible into CERs under Kyoto.[68]

Because the Kyoto system was still in flux, the PCF structured its purchases around VERs. An emission reduction in these early PCF contracts was defined as all existing and future legal and beneficial rights arising from one GHG reduction. This included the right to any CERs arising from that GHG reduction.[69]

Under a VER contract, the buyer and seller agree to a monitoring protocol, which was used to verify the emissions reductions generated. If a VER project is subsequently registered by the CDM Executive Board this monitoring protocol is adjusted to maximize the delivery of CERs from the project.[70]

Currently, the Kyoto Protocol is the primary driver of value in carbon transactions. However, VER-type contracts allow the parties to create, transfer, and pay for emission reductions despite regulatory uncertainty.[71]

When Kyoto entered into force, many market players focused on CER contracts, under which the buyer would only pay for a "compliance grade" asset – CERs issued by the CDM Executive Board.[72] Under these contracts, the seller bears the risk of a project's failure to generate CERs. This includes the risk that the project will not receive the approval of the CDM Executive Board.[73]

The World Bank has continued to use VER contracts after the entry into force of the Kyoto Protocol in order to allow maximum flexibility to sellers interested in contracting with the Bank. The VER mechanism also helps sellers develop difficult projects and innovative methodologies.[74]

VER contracts also provide a bridge to the post-2012 carbon market. Because the first Kyoto commitment period ends in 2012, projects that plan to generate emission reductions post-2012 involved the risk that no Kyoto compliance exists, or that the current regime will be replaced by a different one. Either outcome could reduce the value of credits.

However, the World Bank has realized that post-2012 purchases can contribute to market stability, during the transition from the first commitment period to the regime that follows.[75] This can be particularly true where projects need revenue for more than the approximately five years remaining in the first commitment period. The approach the World Bank has usually followed is entering into hybrid contracts that include the purchase of CERs for emission reductions delivered up to 2012 and purchase of VERs thereafter.[76] To accomplish the goal of post- 2012 purchases, the approach the Bank has usually followed is hybrid purchases, including the purchase of CERs for emission reductions delivered until 2012, and purchases of VERs thereafter.[77] Thus, as VER contracts facilitated the development of the carbon markets before the Kyoto rules were fully developed, they also provide a mechanism for contracting forward into the post-2012 world.[78]

Experiences in the VER market also have ramifications for the so-called "voluntary" market for GHG emission reductions. In the voluntary market, parties can buy and sell emission reductions based on contractually agreed-upon verification protocols, outside of a regulatory regime such as the Kyoto Protocol.[79]

B. Standardization, Risk and Price

Standardized conditions for ERPAs have been developed by the World Bank and other third-party buyers in an effort to build market capacity through increased uniformity in terms. However, wide variation in contract terms exists due to variation in project risk and buyer and seller preferences.

In 2005, the World Bank developed standardized sets of "General Conditions" that apply to its agreements. These General Conditions are incorporated by reference into World Bank ERPAs. The use of General Conditions increases the transparency of transactions, increases fairness by offering comparable terms to all sellers, and reduces transaction costs and negotiation time.[80] The ERPA contains negotiated terms covering price, volume, and other project-specific conditions.[81]

One constant in both World Bank CER and VER contracts is that the seller bears the risk that the agreed upon project activity, such as capping a landfill or improving energy efficiency, will not take place.[82] The assumption underlying this allocation is that the seller is best-positioned to assess and bear project risk.

However, significant differences in "Kyoto risk" allocation can be seen between the World Bank VER and CER contracts. Under the VER General Conditions, the buyer (the World Bank acting as trustee of a carbon fund) bears the risk that the project may not be registered and commits to make a payment based on the agreed-upon monitoring protocol if that registration does not occur within a specific time period. Furthermore, under the VER General Conditions, the Bank bears the risk that the agreed-upon methodology will not be not approved by the CDM Executive Board, and a less favorable methodology will be applied to the project.[83] By comparison, in a CER contract, the seller bears these risks.[84]

Another crucial issue in ERPA contracting regards the remedies that are available if a seller breaches its obligations under an ERPA. Both the World Bank VER and CER General Conditions provide for three remedies in the event of a seller's unintentional failure to deliver the contracted-for emission reductions: (i) allow delivery in subsequent years, (ii) convert the amount of emission reductions subject to a delivery failure to a call option, or (iii) if, and only, if, the delivery failure persists for three consecutive years or in any of the last three years of the contract, terminate the ERPA and recover the World Bank's costs.[85] Notably, the World Bank forgoes the right to terminate for just one or two years' delivery failure, as long as the breach is not an intentional breach. Rather, there must be a continuing delivery failure in order for the World Bank to have the right to terminate. The intent behind this approach is to enhance the income flow stability to the seller, to allow it to obtain financing for the project. Both the CER and VER General Conditions provide for more stringent remedies in the event of an intentional breach.[86]

By comparison, some CER contracts by other buyers require the seller to guarantee delivery. Under such contracts, if the seller fails to deliver emission reductions from a project, it must deliver CERs from a different source to the buyer. Guarantee provisions have the potential of converting an ERPA from an asset to a liability for the seller. This occurs if a project fails to deliver emission reductions and the seller incurs higher costs for obtaining those emission reductions from a different source. However, sellers that offer guaranteed delivery can obtain higher prices.[87]

Other provisions unique to ERPAs as compared with other purchase and sale agreements can be seen in the World Bank General Conditions. For instance, ERPAs allocate the responsibility between buyer and seller for paying for the share of proceeds required to fund certain CDM administrative expenses and adaptation measures.[88] Under the VER General Conditions the buyer pays the share of proceeds, while under the CER General Conditions the seller pays the share of proceeds.[89] This allocation mirrors the allocation of risk in Kyoto-compliant projects.

In 2006, CER prices averaged above US$10.00. One study has shown a significant range in CER prices from around US$6.00 to over US$24.00.[90] Thus, CER prices exist along a wide band, indicative of the significant variety in risk between projects, be it project risk, the choice of remedies, the existence of a delivery guarantee, or some other allocation of risk. This price variation is indicative of significant differences in risk between projects, and demonstrates the impact of the allocation of risk and responsibilities in ERPAs on carbon prices. Average CER prices in 2006 were demonstrably higher than VER prices, further reflecting the importance of risk in emission reductions pricing.[91]

The future is likely to continue to see some convergence in contracting terms, although varying project activities and approaches to risk make cookie-cutter contracts unlikely to emerge soon in the wider market.

V. Lessons Learned

Several lessons can be learned from the growth of the carbon market. First, both the EU ETS and CDM were successful in bringing substantial amounts of capital into the carbon market in a short amount of time. In the two years following the entry into force of the Kyoto Protocol in 2005, the carbon market experienced tremendous growth from a prototype market to one measured in the tens of billions of dollars. The market expanded to include a wide variety of project types and market participants.

Second, the CDM was instrumental in developing a regulatory infrastructure capable of generating significant amounts of offset credits. This regulatory infrastructure includes a process for validating projects, creating and revising emission reduction methodologies, and issuing credits subject to third-party verification.

This CDM regulatory infrastructure can serve as a model for other national and international programs. Few regulatory programs satisfy every goal of every stakeholder, and the CDM is no exception. One significant challenge for the CDM will be to evolve to scale. Increased scale, if properly implemented, can allow more capital, development and technology benefits to flow to the developing world, while also scaling up increased greenhouse gas emission reductions in a cost-effective manner.

Third, the international carbon market is just that – a market. Markets respond to incentives. Early CDM projects involved credits that could be generated both quickly and relatively inexpensively. This is not surprising since markets seek the most efficient mechanism for creating economic value. The question of what incentives are provided by the international carbon market is driven in significant part by political decisions that shape the regulatory structure.

Risk in the carbon market has had a significant impact on the pace of projects and the price of carbon credits. Even though the framework of the Kyoto Protocol was agreed to in 1997, the volume of projects did not increase significantly until the entry into force of the Kyoto Protocol nearly seven years later. In the interim period, a number of buyers took innovative approaches to assessing risks, including the purchase of carbon credits under VER structures before the entry into force of the Kyoto Protocol. The World Bank played a significant role in spearheading the "learning by doing" of how transactions could take place in the international carbon market. However, the allocation of "Kyoto risk" continues to have an impact on projects and carbon pricing. Various approaches to allocating rights and responsibilities have allowed parties to tailor risks and benefits to their particular needs. Market continuity is also a significant issue. CDM projects involve upfront costs, including the regulatory costs of getting a project and its methodology approved by the CDM Executive Board, as well as capital costs in implementing the project itself. These upfront costs can be a particularly significant issue for renewable energy projects, which require a certain length of time to recover costs through carbon payments. If these projects cannot recover payments for carbon credits beyond 2012, the end of the first Kyoto commitment period, many worthwhile projects may not be feasible. At the time of this writing, much remains to be done to ensure a viable and vibrant post-2012 international carbon market.

In sum, carbon finance has shown that a market-based mechanism can draw significant amounts of capital, both public and private, to the problem of climate change, as well as spur economic activity in, and transfer climate-friendly technology to, developing countries. The international carbon market has learned significant lessons, and has developed a regulatory infrastructure for offset credits through the CDM. These lessons learned can provide a roadmap not only for improving the CDM, but also for expanding the carbon market to include new market participants and regulatory regimes.

About the Author

Christopher Carr is co-head of the climate change practice group at the law firm of Vinson & Elkins and a former Senior Counsel at the World Bank. Flavia Rosembuj is a Senior Counsel at the World Bank. The views expressed in the article are the views of the authors and do not necessarily represent the views of the World Bank or Vinson & Elkins.

Endnotes

1 KARAN CAPOOR & PHILIPPE AMBROSI, STATE AND TRENDS OF THE CARBON MARKET 2007 3 (World Bank 2007), *available at* http://carbonfinance.org/ docs/Carbon_Trends_ 2007-_FINAL_-_May_2.pdf.

2 *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change Art. 12, Dec. 10 1997, UN Doc FCCC/CP1997/L.7/Add.1, *available at* http://unfccc.int/resource/docs/convkp/kpeng.pdf, 37 I.L.M. 22 [hereinafter Kyoto Protocol].

3 *See* United Nations Framework Convention on Climate Change, May 9, 1982, S. Treaty Doc. No. 102-38 (1992), 1771 U.N.T.S. 107, 165, UN Doc. A/AC/237/18,

available at http://unfccc.int/resource/docs/convkp/conveng.pdf. UNFCCC is used hereinafter to refer both to the treaty document and to secretariat charged with overseeing its execution.

4 *Id.* at Art. 2.

5 *Id*.

6 *Id.* at Art. 4.2(b).

7 *Id*.

8 *Id.* at Art. 1-26.

9 Kyoto Protocol, *supra* note 2, at Annex B. For background on the negotiation of the Kyoto Protocol and the design of the CDM, *see* RAUL ESTRADA-OYUELA, A *Commentary on the Kyoto Protocol*, *in* ENVIRONMENTAL MARKETS: EQUITY AND EFFICIENCY (Graciela Chichilnisky & Geoffrey Heal eds., Columbia University Press 2000); FARHANA YAMIN (ED.), CLIMATE CHANGE AND CARBON MARKETS: A HANDBOOK OF EMISSION REDUCTION MECHANISMS (Earthscan 2005); MICHAEL GRUBB, THE GREENHOUSE EFFECT: NEGOTIATING TARGETS (Royal Inst. of Int'l Affairs 1989); MICHAEL GRUBB ET. AL., THE KYOTO PROTOCOL: A GUIDE AND ASSESSMENT (Royal Inst. of Int'l Affairs 1999).

10 *See* UNFCCC, Kyoto Protocol http://unfccc.int/kyoto_protocol/items/ 2830.php (last visited Nov. 12, 2007); see also ENERGY INFORMATION ADMINISTRATION [EIA], ANNUAL ENERGY OUTLOOK 2002: WITH PROJECTIONS THROUGH 2020 23 (2001), *available at* http://www.gcrio.org/ OnLnDoc/pdf/aeo2002.pdf.

11 Kyoto Protocol, *supra* note 2, at Annex B.

12 *See generally* GRUBB, *supra* note 9.

13 Kyoto Protocol, *supra* note 2, at Art. 6, ¶ 1.

14 *Id.* at Art. 12, ¶ 3.

15 *Id.*

16 *Id.* at Art. 17.

17 *See id*. at Art. 3, ¶¶ 10—14; *see also id.* at Art. 4.

18 UNFCCC, Emissions Trading, http://unfccc.int/kyoto_protocol/mechanisms/emissions_ trading/items/2731.php (last visited Nov. 12, 2007).

19 The Kyoto Protocol regulates six greenhouse gases, each of which is indexed, on a per-ton basis, based on global warming potential relative to carbon. Thus, one ton of carbon equals one tCO2e. Methane is 23 times more potent than carbon as a GHG, and thus reducing one ton of methane is equivalent to reducing 23 tons of carbon. The industrial gas HFC-23 is 12,000 times more potent than carbon as a GHG. Energy Information Administration [EIA], Comparison of Global Warming

Potentials from the Second and Third Assessment Reports of the Intergovernmental Panel on Climate Change (IPCC), http://www.eia.doe.gov/oiaf/1605/gwp.html (last visited Nov. 12, 2007); *see also* Kyoto Protocol, *supra* note 2, at Art. 5, ¶ 3.

20 *See, e.g.*, Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Nov. 28, 2005—Dec. 10, 2005, *Modalities and procedures for a clean development mechanism*, ¶ 7, UN Doc. FCCC/KP/CMP/2005/8/Add.1 (Mar. 30, 2006), *available at* http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf [hereinafter *Modalities and Procedures*].

21 *See* UNFCCC, Kyoto Protocol, http://unfccc.int/kyoto_protocol/ items/2830.php (last visited Nov. 12, 2007) (describing the effect of the Marrakech Accords on the Kyoto Protocol).

22 *See* UNFCCC, Verify and Certify ERs of a CDM project activity, http://cdm.unfccc.int/ Projects/pac/howto/CDMProjectActivity/VerifyCertify/ index.html (last visited Nov. 20, 2007).

23 UNFCCC, Status of Ratification, http://unfccc.int/Kyoto_protocol/ background/ status_of_ratification/items/2613.php (last visited Nov. 12, 2007); *see also* Kyoto Protocol, *supra* note 2, at Art. 25, ¶ 1.

24 The COP/MOP, a subset of parties to the UNFCCC, consists of those parties that have also ratified the Kyoto Protocol. Thus, the United States and Australia are not members of the COP/MOP. *See* Kyoto Protocol, *supra* note 2, at Art. 13, ¶¶ 1—2.

25 For a detailed review of law-making by COPs, *see* Jutta Brunnée, *COPing with Consent: Law-Making Under Multilateral Environmental Agreements*, 15 LEIDEN J. INT'L L. 1 (2002).

26 *Modalities and Procedures*, *supra* note 20.

27 *Id.* at ¶ 5.

28 *Id.* at Decision 7/CMP.1, ¶ 12.

29 *Id.* at ¶¶ 35—38.

30 *Id.* at ¶ 43.

31 *Id.* at ¶¶ 44—48.

32 *Id.* at ¶ 53.

33 *Id.* at ¶ 40(a).

34 *Id.* at ¶ 35.

35 *Id.* at ¶¶ 26—27.

36 *Id.* at ¶ 41.

37 UNFCCC, CDM Project Activity Cycle, http://cdm.unfccc.int/Projects/ pac/index.html (last visited Nov. 20, 2007).

38 The CDM allows for expedited procedures for small scale projects. *See* United Nations Framework Convention on Climate Change, Small scale CDM project activities, http://cdm.unfccc.int/Projects/pac/pac_ssc.html (last visited Nov. 20, 2007).

39 UNFCCC, Verify and Certify ERs of a CDM project activity, *supra* note 22.

40 CAPOOR & AMBROSI, *supra* note 1, at 3.

41 *See id*. at 21.

42 Interview by unknown with Yvo De Boer, Executive Secretary, UNFCCC, in Bonn, Fr. (October 30, 2006), *available at* http://www.ecologie.gouv.fr/ IMG/pdf/interview_ yvo_de_boer.pdf.

43 Council Decision 2002/358, 2002 O.J. (L 130) 1, 1–3 (EC); *see also* Council Directive 2003/87, 2003 O.J. (L 275) 32, 32–35 (EC).

44 Council Directive 2003/87, Art. 11, 2003 O.J. (L 275) 32, 36 (EC).

45 CAPOOR & AMBROSI, *supra* note 1, at 3.

46 *See id*. at Table 1.

47 *Id.* at 22 (Fig. 3).

48 The use of credits from forestry projects and large hydroelectric projects is restricted. *See* Council Directive 2004/101, arts. 11(a)–(b), 2004 O.J. (L 338) 18, 20–21 (EC).

49 *See e.g*., Climate Stewardship and Innovation Act, S. 280, 110th Cong. §§ 144–145 (2007).

50 CAPOOR & AMBROSI, *supra* note 1, at 27–29.

51 *Id.* at 24.

52 *Id.*

53 *Id., citing to* Jorgen Fenhann, UNEP Risoe Centre, CDM projects by host region, http://cdmpipeline.org/cdm-projects-region.htm (last visited Nov. 20, 2007).

54 CAPOOR & AMBROSI, *supra* note 1, at 24 (Fig. 4).

55 UNFCCC, Registration, http://cdm.unfccc.int/Statistics/Registration/NumOfRegisteredProj ByHostPartiesPieChart.html (last visited Nov. 20, 2007).

56 UNFCCC, CERs issued by host party, http://cdm.unfccc.int/Statistics/Issuance/ CERsIssuedByHostPartyPieChart.html (last visited Nov. 20, 2007).

57 *See* DAVID FREESTONE, *The World Bank's Prototype Carbon Fund: Mobilizing New Resources for Sustainable Development*, *in* LIBER AMICORUM IBRAHIM F.I. SHIHATA 265, 280 (Sabine Schlemmer-Schulte & Ko-Yung Tung eds., 2001).

58 *See* WORLD BANK, CARBON FINANCE FOR SUSTAINABLE DEVELOPMENT 19 (2006), *available at* http://carbonfinance.org/docs/CFU_AR_2006.pdf.

59 UNFCCC, CDM Statistics, http://cdm.unfccc.int/Statistics/index.html (last visited Nov. 20, 2007).

60 UNFCCC, Methodologies for CDM Project Activities, http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html (last visited Nov. 20, 2007).

61 UNFCCC, CDM Statistics, *supra* note 59.

62 This section draws heavily on the Authors' prior work, available at Christopher Carr & Flavia Rosembuj, *World Bank Experiences in Contracting for Emission Reductions*, 15 ENVTL. LIAB. 114, 116 (Mar.—Apr. 2007).

63 *See id*.

64 Int'l Emissions Trading Ass'n [IETA], *Buyer Limited and Seller Co., Ltd.: Emissions Reduction Purchase Agreement* (Dec. 3, 2005) (draft for discussion purposes), *available at* http://www.ieta.org/ieta/www/pages/download.php?docID=1318; *see also* Certified Emission Reductions Sale and Purchase Agreement [CERSPA], http://www.cerspa.com/downloads/CERSPA_Template_Eng_v1_4-2007.doc (last visited Nov. 7, 2007) (an open source contract template for buying and selling CERs).

65 *See* CAPOOR & AMBROSI, *supra* note 1, at 34.

66 *Id.*

67 Carr & Rosembuj, *supra* note 62, at 118. While transactions may involve a variety of other risks, focusing on these two types of risks helps to understand the fundamentals of CDM transactions.

68 *Id.* at 116—17.

69 *Id.* at 117. *See* Int'l Bank for Reconstruction and Dev. [IBRD], *General Conditions Applicable to Verified Emission Reductions Purchase Agreement: Clean Development Mechanism Projects*, at 3, (Feb. 1, 2006), *available at* http://carbonfinance.org/docs/VERGeneralConditions.pdf [hereinafter *VER General Conditions*] (providing a definition of Emission Reductions).

70 Carr & Rosembuj, *supra* note 62, at 118; Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Nov. 28, 2005—Dec. 10, 2005, *Report of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol on its first session*, ¶ 8, UN Doc. FCCC/KP/CMP/20005/ 8/Add.1 (Mar. 30, 2006), *available at* http://cdm.unfccc.int/Reference/COPMOP/08a01.pdf#page=31. The CDM Executive Board supervises the CDM, under the authority and guidance of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol.

71 Carr & Rosembuj, *supra* note 62, at 117.

72 *Id.* at 117; *see, e.g.*, Int'l Emissions Trading Ass'n [IETA], *Code of CDM Terms: Version 1.0*, *available at* http://www.ieta.org/ieta/www/pages/getfile.php?docID=1794 (Sept. 11, 2006).

73 *Id.* at 117.

74 *Id.* at 117.

75 WORLD BANK CARBON FINANCE UNIT, THE ROLE OF THE WORLD BANK IN CARBON FINANCE: AN APPROACH FOR FURTHER ENGAGEMENT 13 (2006), *available at* http://carbonfinance.org/docs/Role_of_the_WorkBank.pdf.

76 Carr and Rosembuj, *supra* note 62, at 117.

77 *Id.*

78 *Id.* at 117.

79 For instance, in the United States, companies have voluntarily bought and sold emission reductions in the absence of a federal greenhouse gas regulatory program.

80 Carr and Rosembuj, *supra* note 62, at 117.

81 *See*, *e.g.*, PROJECT ENTITY & INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT (AS TRUSTEE OF FUND), CLEAN DEVELOPMENT MECHANISM CERTIFIED EMISSION REDUCTIONS PURCHASE AGREEMENT (2006), http://carbonfinance.org/docs/CER_ERPA_07_07_06_model.doc.

82 *Id*. at 118. *See, e.g.*, *VER General Conditions*, *supra* note 69; *see also* IBRD, *General Conditions Applicable to Certified Emission Reductions Purchase Agreement* (2006), http://carbonfinance.org/docs/CERGeneralConditions.pdf [hereinafter *CER General Conditions*].

83 *See, e.g.*, *VER General Conditions*, *supra* note 69.

84 *See, e.g.*, *CER General Conditions*, *supra* note 82; Carr & Rosembuj, *supra* note 62, at 118.

85 *VER General Conditions*, *supra* note 69, at § 13.03(a)(i); *CER General* Conditions, *supra* note 82, at § 13.03(a)(i); Carr & Rosembuj, *supra* note 62, at 118.

86 Carr & Rosembuj, *supra* note 62, at 118.

87 *Id.*; CAPOOR & AMBROSI, *supra* note 1, at 32.

88 Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol, Montreal, Can., Nov. 28-Dec. 10, 2005, Annex ¶ 66, UN Doc. FCCC/KP/CMP/2005/8/Add.1 (March 30, 2006). The adaptation fee includes a two per cent deduction from CERs issued for projects (except those located in Least Developed Countries). The administrative fee US$0.10 per CER issued for the first 15,000 CERs for which issuance is requested in a given calendar year and US$0.20

per CER issued for any amount in excess of 15,000 CERs for which issuance is requested in that calendar year. *Id.* at Decision 7/CMP.1, ¶ 37.

89 *VER General Conditions*, *supra* note 69, at § 5.05; *CER General Conditions*, *supra* note 82, at § 5.05.

90 Carr & Rosembuj, *supra* note 62, at 119.

91 *Id.*; *see* CAPOOR & AMBROSI, *supra* note 1, at 31.

3

Linking the EU Emissions Trading Scheme to JI, CDM and Post-2012 International Offsets

*J. de Sépibus**

The author evaluates the Linking-Directive approved by European Union Emissions Trading Scheme (EU ETS). The author finds that though the Linking directive did not impose any limit on the import of JI/CDM credits yet it required the Member States to set maximum quantity of Kyoto units. The directive lead to collapse of prices in the EU's emission markets, in consequence the EU ETS decided to impose strict limits on the use of JI/CDM credits during its second trading period. The author intends to examine the International and European legal framework to find a better utilization of JI/CDM credits in post-2012 international offsets. The author finds that the European view on the appropriateness of linking the EU ETS with the international project mechanisms has changed over the years. Therefore, the author suggests for introducing quantitative and qualitative restrictions for the use of international offsets within the EU ETS.

* Former professor of International and European ILaw (university of fribaurg); consultant, NCCR trade regulation. World Trade Institute, Haller Strasse 6, Berne, Switzerland. E-mail: joelle.desepibus.@unifr.ch

Source: www.nccr.trade.org.

Introduction

The so-called 'Linking'-Directive adopted in 2004 doesn't impose any limit on the import of JI/CDM credits under the European Union Emissions Trading Scheme (EU ETS), but requires from the Member States to set, in accordance with their 'supplementarity' obligations under the Marrakesh Accords, the maximal amount of Kyoto 'units' each covered installation is entitled to use for compliance under the scheme. Fearing a second price collapse of the European Union Allowance, the Commission decided, however, in 2006 to impose strict limits on the use of JI/CDM credits during the second trading period. This paper examines the legal basis of the Commission's decision and explores further the international and European legal framework within which the current debate on the use of JI/CDM credits and post-2012 international offsets takes place. It analyses in particular the recent proposal of the Commission on the third trading period of the EU ETS and the related report of rapporteur Doyle of the European Parliament and discusses the necessity to introduce quantitative and qualitative restrictions for the use of international offsets within the EU ETS against the backdrop of the international negotiations on a new global deal on climate change.

While the international discussions about a global and comprehensive post-2012 agreement to fight climate change started in Bali in December 2007, the first trading period of the European Union Emissions Trading Scheme (EU ETS) has come to an end. Its environmental effectiveness is highly contested, as Member States, facing a type of 'Prisoner's Dilemma',[1] were unable to resist the temptation to hand out generous emissions allowances, causing the collapse of the price of the European Union Allowance (EUA)[2] at the end of 2006 and reducing to zero the incentives to abate emissions and to develop alternative fuels and more energy-efficient technologies. The question naturally arises as to whether the second (2008–2012) and third trading periods (2013–2020) of the EU ETS will witness a more positive environmental outcome.

Although the European Commission[3] has cut the proposed amount of allowances (the 'cap') for the second trading period by about 10%, many analysts[4] expect the shortage of allowances to be covered entirely by the import of cheap credits of often dubious environmental effectiveness from the Kyoto Protocol's project mechanisms.[5] There is indeed growing concern that a significant part of the credits generated by the JI[6] and CDM[7] do no reflect real, verifiable emission reductions and that the CDM in particular is inadequate to assist developing countries in bringing about structural changes to reduce their dependence on fossil fuels.[8]

This would mean that the principal legal instrument adopted by the EU to fight climate change neither encourages investments leading to a progressive decarbonisation of the industries covered in the EU nor significantly helps developing countries in their transition towards a low-carbon economy as required by the Bali Action Plan.[9]

While the critique regarding the inability of the Kyoto Protocol's project mechanisms to contribute effectively to long-lasting reductions of greenhouse gas emissions will not be discussed at length, this study sheds some light on the rules which govern the use of CDM and JI credits and post-2012 international offsets[10] within the current EU ETS and in the proposals for its third trading period.[11]

After a brief account of the debate preceding the adoption of the 'Linking' Directive,[12] which amended the ETS-Directive in respect of the Kyoto Protocol's project mechanisms, we examine its content and analyse the criteria established by the Commission in its guidance on the ETS[13] at the end of 2006 to limit their use in the second trading period. We then present the international and European legal framework within which the current debate on the use of JI/CDM credits and post-2012 international offsets, which are also referred to as 'external' credits, takes place. We discuss in particular the recent proposal of the Commission on the ETS[14] and the related report of rapporteur Doyle[15] of the European Parliament and evaluate their proposals in the light of the scientific findings presented by the 2007 IPCC[16] and the international commitments made by the EU at the UNFCC Conference in Bali.[17] Finally, we conclude with an outlook on the debate regarding the use of offsets by emission trading schemes in the United States.

I. The Use of CDM and JI Credits within the EU ETS

The EU ETS, launched in January 2005, is an EU-wide 'cap-and-trade' scheme for CO_2 emissions from energy-intensive industry, covering about 45% of greenhouse gas emissions in the EU. Its legal framework is set out by the Directive, which established a scheme for trading in greenhouse gas emission allowances within the Community ('ETS-Directive').[18] The scheme distinguishes between two distinct trading periods: phase I, a three-year period from 1 January 2005 until 31 December 2007, and phase II, a five-year period, coinciding with the Kyoto Protocol commitment period, starting 1 January 2008 and ending in 2012.[19] Its aim is to help Member States reduce their greenhouse gas emissions to meet their targets under the Kyoto Protocol at minimum costs. The scheme itself does not set an upper limit (the 'cap') to the number of allowances, but leaves that decision to the Member States, which have to fix the maximal amount of allowances allocated to their industry in their National Allocation Plans (NAPs). The NAPs are submitted to the European Commission (the Commission), which has to assess them and decide whether to grant approval.[20] It may reject a plan, or any aspect thereof, if it finds it to be incompatible with the criteria set out in Annex III of the ETS-Directive.[21]

A. The 'Linking' Directive

1. The Commission's Proposal

In its original version, the ETS-Directive did not include the possibility for operators to use Kyoto 'units' for compliance under the scheme. The importance of the project-based mechanisms in increasing the cost-effectiveness of the EU ETS was, however, already stressed in its preamble.[22] On 23 July 2003, the Commission presented a proposal aiming at linking the CDM and JI mechanisms with the ETS,[23] which took the form of an amendment to the ETS-Directive.[24] The proposal allowed for the 'conversion' of JI and CDM credits into allowances for use in the EU ETS from 1 January 2008 onwards.[25] No limit on the amount of credits to be converted was foreseen, but the Commission was required to undertake an immediate review by the 'comitology procedure'[26] in the case that the amount of credits reached 6% of the total quantity of allowances and to consider whether a maximum percentage, 'for example' 8%, should be introduced.

The most frequently invoked reason for the inclusion of the project-based mechanisms was that they reduce the compliance costs for the sectors covered under the EU ETS by broadening the range of opportunities to reduce emissions in another Member State or outside the EU at lower costs.[27] Another advantage is that they allow sources not covered by the ETS-Directive to engage in implementing cost-effective reduction options. Finally, the combination of emission caps and the possibility to use CDM and JI was meant to help kick-start the international carbon market. Many environmental Non-Governmental Organisations (NGOs) were, however, opposed to the use of JI and CDM credits within the EU ETS, because they feared that a massive import of Kyoto units into the system would significantly lower the market price of the EUA and lead to little or no domestic abatement.[28] They also expressed doubts about the environmental quality of the credits generated by the Kyoto Protocol's project-based mechanisms.[29]

2. The Legal Framework

The final Directive, the so-called 'Linking-Directive', was adopted on 27 October 2004 after intensive debates.[30] It differed significantly from the Commission's proposal. Contrary to this proposal, which imposed a conversion of CDM and JI credits, operators are allowed to use CDM and JI credits directly to offset their reduction obligations under the ETS-Directive.[31] Whereas CDM credits may be taken into account in both trading periods, JI credits can enter the scheme from 1 January 2008 onwards.[32] The clause triggering a review in the case that Kyoto 'units' reach a certain percentage of overall allowances, was dropped. Member States are, instead, required to define an installation-specific limit in their national allocation plans (NAPS) in accordance with criterion 12 of Annex III of the ETS-Directive. The use of credits resulting from land use, land-use change and forestry (LULUCF or 'sinks') projects, as well as from nuclear facilities is excluded.[33] Special provisions concern the use of JI and CDM credits from projects that affect emissions from installations under the EU ETS and domestic projects, so-called 'unilateral JI'.[34]

According to criterion 12 of Annex III of the ETS-Directive, Member States have to mention the maximum amount of Kyoto units, which may be used by operators covered by the scheme as a percentage of the allocation of the allowances to each installation. The percentage must be consistent with the Member States' 'supplementarity' obligations, which were laid down in the Marrakesh Accords.[35] These provisions require Annex 1 Parties to ensure that the use of the flexible mechanisms of the Kyoto Protocol is supplemental to domestic action and that domestic action constitutes a significant effort made by each of them to meet their targets under the Kyoto Protocol.[36] No precise information is, however, provided with respect to the 'supplemental' character of the flexible mechanisms, either by the ETS-Directive or in the Marrakesh Accords.

B. The Commission's Decision to Restrict the Use of JI and CDM Credits in the Second Trading Period of The EU ETS

With respect to the second trading period, the Commission indicated at the end of 2005[37] that Member States had to take into account the aggregate reductions in greenhouse gas emissions when evaluating the fulfilment of criterion 12 of Annex III. This meant that Member States had to consider the overall recourse to the flexible mechanisms when fixing the percentage of CDM and JI credits to be used within the EU ETS. The Commission did not however provide any information on how the 'supplementarity' principle should be interpreted.

It was only in its third guidance on the criteria of Annex III from November 2006 that the Commission became more assertive.[38] It departed from its formerly cautious attitude and announced that it would assess the NAPs in a manner which would allow the ETS '*to unfold its full environmental and economic potential in terms of environmental and economic benefits*'. It not only significantly reduced the caps proposed by the first batch of NAPs submitted, but provided guidance regarding the interpretation of criterion 12 of Annex III in a three-step process. It first developed a formula allowing the calculation of the overall amount of JI/CDM credits to which a Member State can have recourse between 2008 and 2012. Second, it indicated which rules Member States have to observe when fixing the limit for the use of Kyoto 'units' for the covered sectors. Third, it set a minimal percentage of Kyoto units any installation subject to the EU ETS is entitled to use. The criteria set out by the Commission are briefly discussed below.

1. The Maximal Overall Use of JI and CDM Credits by Member States

The Commission stated that the maximum amount of JI/CDM credits Member States were allowed to have recourse to between 2008 and 2012 would have to be calculated in relation to the 'reduction effort' they had to make to meet their targets under the Kyoto Protocol[39] and the so-called 'Burden-Sharing Agreement'.[40] This 'reduction effort' would have to be calculated with respect to the three different baselines, the base year of the Kyoto Protocol (in general 1990), 2004 and 2010.[41] Half of the highest difference between the level of greenhouse gas emissions in one of these years and the reduction target laid down in the Burden-Sharing Agreement and the Kyoto Protocol represents the maximal amount of JI/CDM credits a Member States is allowed to import. This formula fixed an effective ceiling of 50% on the number of JI/CDM credits to be used by a Member State with respect to their 'reduction effort'.[42]

The recourse to three different baselines to calculate the national 'reduction effort' seems at first sight somewhat confusing, but was probably chosen for political reasons. By allowing Member States to rely on the highest figure resulting from these calculations, the Commission was able to take into account the large diversity of Member States' emission paths since 1990 without penalising one over the other. It thereby arguably reduced the important potential for conflict arising from its interpretation of the 'supplementarity' principle. Caution was indeed required, as the Commission's interpretation is based on rather weak legal foundations. Indeed, neither the Kyoto Protocol[43] nor the Marrakesh Accords nor any Community instrument contains a numerical definition of the 'supplementarity' requirement. If it is true that the European Union during the negotiations of the Marrakesh Accords had insisted that at least half of the emission reductions to achieve compliance with the Kyoto Protocol should be realised domestically, this limit remained controversial and did not become legally binding.[44] Moreover, it concerned the overall recourse to 'external' credits and thus also included credits Member States intended to acquire through emission trading according to the rules laid down in Article 17 of the Kyoto Protocol.[45] Accordingly, by interpreting the requirements of Article 12 of Annex III of the ETS-Directive as a compulsory ceiling of 50% with regard to the aggregate use of JI/CDM credits by Member States the Commission could rely neither on Community law nor on international public law.

2. The Repartition of JI and CDM Credits between the Sectors Covered by the EU ETS and the Non-covered Sectors

With respect to the repartition of JI and CDM credits between the covered and non-covered sectors of the EU ETS, the Commission clarified that Member States were free to choose which sectors should bear the burden of the domestic 'reduction effort'.[46] Member States which had not purchased any Kyoto 'units' with government funds, and did not intend to do so, were allowed to distribute the full amount of CDM/JI credits among the installations of the covered sectors.[47] If, on the contrary, the government had purchased or intended to purchase Kyoto units, Member States were required to deduct the amount of JI/CDM credits from the overall ceiling when fixing their use within the EU ETS.[48] Regarding 'intended' purchases of Kyoto units, the Commission further specified that Member States had to substantiate sufficiently their intention, which meant that they had to demonstrate that an operational programme was in place and that it had taken concrete steps and committed budgetary resources for the purchase of carbon credits.[49]

Finally, the Commission stated that notwithstanding the result of the criteria set out above, the limit imposed on the use of JI/CDM credits by installations under the EU ETS might not be lower than 10% of the allowances allocated to each installation. It justified this decision by arguing that it reflected 'a reasonable balance' between domestic reductions and incentives for operators to invest in projects in developing countries. The Commission did not substantiate this statement. In the light of the overall cap imposed on covered sectors in the second trading period this assertion is, however, problematic. Indeed, the aggregate limit to the use of JI/CDM within the EU ETS amounts to 13% of the overall cap, while the cap in the second trading period is only 6% lower than comparable 2005 emissions.[50] Accordingly, the amount of JI/CDM credits exceeds by nearly a factor of two the overall 'reduction effort' required by operators under the EU ETS with respect to 2005 emissions and theoretically allows the covered sectors to achieve all emission reductions outside the European Union.[51]

The reasons why the Commission fixed a minimum threshold of 10% of Kyoto units per 'installation', were probably not so much related to the necessity to strike a balance between domestic mitigation measures and investments outside the EU, but to find an acceptable compromise between 'new' and 'old' Member States. Indeed, as most 'new' Member States have no gap to fill with regard to their Kyoto target due to the break-down of their economies in the 1990s, their domestic operators would not have been entitled to have recourse to any JI/CDM credits under the EU ETS according to the first two criteria set out above. Thus, by fixing a minimal threshold of 10%, the Commission ensured that the differences with respect to the use of Kyoto units in the various Member States remained within acceptable boundaries.[52] Indeed, if operators in one Member State can use a significantly higher amount of credits than those in another Member State, the former have a competitive advantage.[53]

Moreover, the Commission probably also tried to reduce the risk of a legal challenge[54] of its decision to reduce significantly the proposed caps of most new Member States.[55] These sometimes significant cuts had been necessary as the 'new' Member States had decided to increase the amount of allowances by 12.7% in the second trading period compared to 2005 emissions.[56] Thus, by allowing the operators of these Member States to have recourse to JI/CDM credits, even though they were on track to meet their targets under the Kyoto Protocol, the Commission was probably trying to compensate for the economic disadvantage resulting from the reduction of their caps.[57] This purpose is evident in particular in the case of Lithuania. This country, which has no compliance problems regarding its Kyoto target, had initially proposed to fix a limit of 10% with respect to the use of JI/CDM credits by its operators. As the Commission had reduced its proposed cap by 47%[58] it allowed, in a second decision on an amended Lithuanian NAP, an increase of the CDM/JI limit up to 20% of its cap – in clear contradiction to its own guidelines.[59]

This strategy of the Commission to limit the legal challenges was, however, not entirely successful. Seven out of ten of the new Member States – but interestingly not Lithuania – started legal proceedings against the decision of the Commission with respect to their NAPs in the second trading period. Slovakia, followed by Poland, the Czech Republic, Hungary, Latvia, Bulgaria and Romania filed a legal complaint with the Court of First Instance in 2007, requesting the annulment of the Commission's decisions.[60]

II. Linking the EU ETS to JI, CDM and post-2012 International Offsets in the Third Trading Period

A. The European and International Legal Framework

The Kyoto Protocol does not envisage any numerical reduction targets after the first commitment period ending in 2012. As a result, in the absence of any new international agreement or national commitments to limit greenhouse gases, the demand for JI and CDM credits runs the risk of decreasing progressively towards the end of the first commitment period of the Kyoto Protocol. To prevent such an outcome the European Union pledged in its Spring Council in 2007[61] to unilaterally reduce its greenhouse gas emissions by 20% by 2020 compared to levels of greenhouse gases in 1990 and to endorse a 30% reduction objective in the case of the conclusion of a comprehensive international agreement on climate change for the period after 2012.

In December 2007, the Conference of the Parties of the UNFCC[62] (COP 13)[63] and of the Kyoto Protocol (MOP3)[64] adopted the 'Bali Action Plan'[65] paving the way for post-2012 negotiations and aiming at the conclusion of such an agreement by the end of 2009 in Copenhagen.[66] Regarding the commitments made, the Bali Action Plan differentiates between those of developed country Parties and developing country Parties. For developed country Parties, the decision calls for 'measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives'. Due to the resistance of the delegations of the US, Canada, Japan and Russia, an indicative range of mitigation commitments by industrialised countries (25–40% reduction compared to 1990 levels) that is considered necessary by the IPCC to stay below a two-degree increase of global mean temperature, however, was not integrated into the text, but relegated to a reference in a footnote.[67]

With regard to developing country Parties, the decision calls for 'nationally appropriate mitigation action … supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner'. Developing countries thus have a clearly worded point of reference that any commitments on their part have to be matched by clearly identifiable support from industrialised countries.[68] This requirement corresponds to a plea constantly being made by developing countries and was again highlighted at the session in Bali by the publication of a paper by the Secretariat of the UNFCCC, which stressed that investment and financial flows of US$ 379.5 billion were necessary for mitigation as well as several tens of billions for adaptation by 2030.[69]

Less than a month after the conference in Bali – in January 2008 – the European Commission put forward a so-called 'climate package',[70] which included a proposal for a third trading period of the EU ETS (ETS-Proposal)[71] and a proposal on the distribution of the emission reduction effort among the Member States (effort-sharing proposal).[72] The ETS-Proposal takes the form of a draft amendment to the ETS-Directive and the effort-sharing proposal constitutes a draft decision. Both proposals are based on Article 251 EC Treaty, which is known as the 'co-decision procedure'.This implies that whereas the Council and the European Parliament discuss the Commission's proposal independently both must approve one another's amendments and agree upon a final text in identical terms.[73]

Whereas the effort-sharing proposal defines the contribution of Member States to meeting the Community's greenhouse gas emission reduction commitment from 2013 to 2020 for greenhouse gas from sources not covered under the ETS-Directive, the ETS-Proposal fixes the cap for the covered sectors during this period. The two proposals also determine the share of carbon credits that may be imported, the effort-sharing proposal with respect to the non-covered sectors[74] and the ETS-Proposal regarding the covered industries. Following the decision of the European Spring Council of 2007, both proposals adopt a two-step approach. They first lay down the rules allowing the EU to reach a 20% reduction target by 2020 and, in the second step, indicate how these rules may be adapted if a global international agreement enters into force.

In its spring session in March 2008 the European Council endorsed the Commission's 'climate package', considering it as 'a good starting point' and stated as its objective 'to secure an ambitious, global and comprehensive post-2012 agreement on climate change at Copenhagen in 2009 consistent with the EU's 2°C objective' that 'ensures scaled-up finance and investment flows for both mitigation and adaptation'.[75]

B. The ETS-Proposal of the European Commission

The Commission's ETS-Proposal[76] replaces the national caps with an EU-wide cap. With respect to the current ETS-Directive the scope is enlarged to include aviation, petrochemicals, ammonia and the aluminium sector as well as two new gases.[77] In the case that no international agreement is adopted, the Commission proposes to impose a 21% reduction in EU ETS sector emissions compared to 2005 by 2020, which corresponds to a reduction of 14% relative to 1990. Emission allowances are to be cut by 1.74% annually, starting from 2013. Compared to the other sectors, which have to reduce their emissions by about 10%, the reduction effort required from the EU ETS sectors is thus twice as important. Taken together, the reduction commitments result in an overall reduction of 14% compared to 2005, which is equivalent to a reduction of 20% compared to 1990.[78]

The Commission proposes to increase auctioning to around 60% of the total number of allowances in 2013. Whereas full auctioning will be the rule from 2013 onwards for the power sector, free allocation will be gradually phased-out on an annual basis between 2013 and 2020 for other sectors. However, certain energy-intensive sectors will continue to get all their allowances for free if they are 'at significant risk of carbon leakage'.[79] Member States are in charge of the auctions and receive all the proceeds. The linkage of the EU ETS with other cap-and-trade systems is allowed provided that the environmental objectives of the EU ETS are not undermined.

1. The Recourse to JI/CDM Credits and Other International Offsets by the Covered Sectors

a. In the Absence of a Global Climate Agreement

According to the ETS-Proposal JI/CDM credits from all types of project established before 2013 and accepted in the Community scheme during 2008 and 2012 may be exchanged for allowances of the third trading period up to the remainder of the level which they were allowed in the second trading period and may be used without restriction in the third trading period.[80] Furthermore, the Commission proposes to allow the use of 'external' credits resulting from projects started in least developed countries from 2013 onwards.[81] The justification for this privileged treatment is that these countries are 'especially vulnerable to the effects of climate change and are responsible only for a very low level of greenhouse gas emissions'.[82] Finally, in the event that the conclusion of an international agreement on climate change is delayed, operators are allowed to have recourse to credits from project activities in third countries with which the Community has concluded agreements.[83] However, once an international agreement on climate change has been reached, only CERs from third countries which have ratified that agreement shall be accepted in the Community scheme.[84]

The reasons given by the Commission for allowing the exchange of CDM and JI credits is that it gives operators certainty that they may use them after the end of the second trading period. Clearly, the Commission also wants to avoid a price collapse similar to the one seen in the first trading period. This risk is all the more real, as the number of JI/CDM credits considerably exceeds the reduction required from operators with respect to their 2005 emissions.[85] Moreover, if the seven Member States which required the annulment of the Commission's decision regarding their NAPs were to win their legal challenge, another significant quantity of allowances would flow into the EU ETS and diminish further the relative scarcity of allowances imposed by the Commission.

b. In the Case of a Global International Climate Agreement

The ETS-Proposal foresees that upon the conclusion of a future international agreement the ETS-Directive should provide for an automatic adjustment of the use of credits from JI/CDM credits and potentially additional types of credits and/or mechanisms envisaged under such an agreement. Operators may use up to half of the additional reduction taking place due to the international agreement CERs, ERUs or other types of credits earned in countries which have concluded the international agreement.[86] Once an international agreement on climate change has been reached, no CERs from third countries which have not ratified that agreement may be accepted as complying with the ETS.

C. The Draft Report of the European Parliament on the ETS-Proposal

The European Parliament entrusted the compilation of the first draft report on the ETS-Proposal to an Irish rapporteur of the Conservative Party, Mrs Avril Doyle, who published it in June 2008.[87] Simultaneously, Satu Hassi, the Finnish rapporteur of the Green Party, finalised her draft report on the Effort-Sharing Proposal.[88] The vote on both reports by the Environmental Committee of the European Parliament is scheduled for 7 October2008.[89]

In line with the Commission the 'Doyle Report' endorses the strategy of the European Council with respect to the overall emission reduction targets, i.e. a reduction of greenhouse gas emissions of 20% or 30% with respect to 1990 levels in the case of the conclusion of an international agreement on climate change.[90] In contrast to the ETS-Proposal, the report suggests that an increase of the reduction commitment would occur only after the ratification of a global international agreement and not as soon as it is concluded.[91]

Regarding the use of international offsets the report stipulates that operators should be allowed to use 'external' credits up to an average of 5% of their emissions during the period from 2013 to 2020, provided they use less credits from CDM and JI projects during the 2008-2012 period than the equivalent of 6,5% of their 2005 emissions and that they do not carry over entitlements from that period. In other words, operators under the ETS have the choice to either use 'external' credits at a level of 5% of their annual greenhouse gas emissions[92] or to bank the credits they had been granted in the second trading period. According to the Doyle Report, this option enables operators to use 'external' credits for almost half of their abatement effort between 2013 and 2020 and would ensure that in the period 2008–2020, operators effectively reduce emissions below those for 2005.

Unlike the Commission's proposal, the report also addresses the growing criticism levelled against the Kyoto Protocol project mechanisms by requiring additional qualitative guarantees with respect to the environmental integrity of international offsets.[93] Accordingly, the rapporteur proposes to accept exclusively JI/CDM credits and/or other 'external' credits provided for by a global climate accord if they come from so-called Gold Standard-type projects.[94] Where bilateral agreements with third countries are concluded, the report further specifies that credits envisaged by these agreements may also come from sustainable forestry activities in developing countries.[95] Finally, the rapporteur suggests that operators may use credits up to a non-specified percentage of their emissions from sustainable actions to reduce deforestation and increase afforestation and reforestation in developing countries, once appropriate provisions on liability, discounting and permanence have been laid down, which are also accepted by a US federal emissions trading system.[96]

Through the simple reference to Gold Standard-type projects, the report deliberately leaves open the exact definition of such projects. To shed some light on its potential meaning it might be useful to recall briefly the aims of the Gold Standard[97] organisation and the requirements it sets out for CDM projects. The Gold Standard is a private foundation supported by NGOs, which was created 'to ensure that carbon markets work for a long term climate solution and that they stimulate local sustainable development'. Applying the standard CDM procedure,[98] the organisation does not itself judge or verify emission reductions, but sets out additional requirements with which a CDM project has to comply if a proponent wants to obtain the Gold Standard label for its project. Its main features are the restriction of eligible projects, the requirement for a sustainability assessment and the stipulation of stricter criteria for the stakeholder consultation process. They will be briefly explained below.

Unlike the CDM rules, which admit nearly all types of projects,[99] only renewables and end-use energy efficiency projects are eligible under the Gold Standard.[100] The reason advanced for this restriction is that these projects 'reduce emissions at the source' and hence contribute to reducing the dependence of developing countries on fossil fuels. As under the CDM rules, projects must lead to real, verifiable reductions in greenhouse gas emission and contribute to the sustainable development of a country hosting a CDM project. The definition of 'sustainability' is, contrary to a normal CDM project, not left to the country hosting a CDM project, but set out in detail by two tools of the organisation, the 'Gold Standard Requirements' and the 'Gold Standard Toolkit'. According to the latter project proponents are asked to assess the risk that their project activities will have severe negative environmental, social and/or economic impacts, and must demonstrate that their project activities have clear sustainable development benefits through a detailed impact assessment. Hence a project has to be scored on environmental, social and technological and economic indicators.[101] To allow for a detailed score to be given, twelve specific environmental, social and economic indicators have to be considered, which together with the scoring form the sustainable development matrix. Furthermore, a sustainability monitoring plan has to be set up to assist in verifying the impact of the project on the sustainable development of the host country.[102] Finally, the 'Stakeholder Consultation Guidelines' set out by the Gold Standard must be respected; these lay down strict criteria for the involvement and information of local stakeholders, in particular NGOs supporting the Gold Standard.

By requiring that credits come from Gold Standard-type projects, the Doyle Report ensures that the Gold Standard is not entrusted a monopoly position with regard to the certification of 'external' credits allowed into the ETS. The question as to which criteria will have to be fulfilled and who is responsible for formalising and controlling them must thus still be answered.

D. Evaluation of the ETS-proposal and the Draft Doyle Report

The Commission's ETS-Proposal addresses many of the issues highlighted for reform during the review process, including the call for an overall EU cap and a global limit on the use of JI/CDM credits in the third trading period. It thus puts an end to the legal uncertainty created by the reference to the 'supplementary criterion' set out by the Marrakesh Accords and the free-riding of certain Member States. Furthermore, by allowing EUAs and CERs to be banked, the ETS-Proposal helps to prevent the potential 'overallocation' in the second trading period leading to a complete price collapse of the EUA and the demand for carbon credits in the international carbon market dying down as the end of the first commitment period of the Kyoto Protocol approaches.[103]

Notwithstanding these improvements, the Commission's proposal has been strongly criticised by NGOs[104] and academics[105] alike for its lack of environmental ambition, the overemphasis on international offsets and the absence of any qualitative criteria ensuring their environmental quality in the case of a global climate agreement.

1. The Lack of Environmental Ambition

The emission reductions, both in the case of the 20% and the 30% reduction scenario, are well below the recommendations of the IPCC regarding the action to be taken by industrialised countries to stabilise global warming at about 2 degrees Celsius above pre-industrial levels.[106] Höhne, for instance, indicates that, to reach this target, industrialised countries would have to reduce their emissions to between 25% and 40% below 1990 levels by 2020 whereas developing countries would have to keep emissions between 15% and 30% below baseline.[107] He concludes thus that an EU target compatible with limiting climate change to 2 degrees Celsius would require reductions of emissions within the EU to at least 30% below 1990 levels plus support for developing countries through CDM or another carbon mechanism of the order of magnitude of an additional 10 percentage points.[108]

The necessity for taking stronger action is, in particular, recognised by the Hassi Report on Effort-Sharing. Recalling that the European Parliament had itself called in October 2006 for a 30% reduction target, the rapporteur proposes to turn 'upside down' the Commission's proposal by using the reduction target of 30%[1] as a starting point and keeping the 20% reduction as a fallback option in the case that no international agreement on climate change is concluded.[109] Hassi finally advocates that the recourse to credits resulting from projects in third countries should, as a rule, not replace the domestic reduction effort but reflect an additional commitment taken by industrialised countries to assist developing countries. She proposes instead that the EU endorses a so-called additional 'external' commitment, which, in the case of the conclusion of a global climate accord, would mandate the EU to assist developing countries in their activities to mitigate climate change.[110]

2. The Emphasis Placed on International Offsets

The important recourse to international offsets by covered sectors, which is contemplated by both the ETS-Proposal and the Doyle Report, is expected to reduce significantly the potential carbon price within the EU ETS.[111] According to Hassi this necessarily entails that innovation within the EU, which reduces its own dependence on fossil fuels, will be slowed down considerably.[112] With regard to the power industry, which is responsible for 24% of the European Union's greenhouse gas emissions,[113] this means in particular that the expected EUA price will be insufficient by itself to trigger a massive switch to renewable energies or to enable the development and large-scale deployment of CCS for fossil-fuel power stations in the next decades.[114] Given that most existing large electricity plants will have to be replaced in the next 10–20 years and that fossil-fuelled power stations have a life-time of approximately 40 years,[115] many analysts hence expect that in the absence of decisive action supporting the deployment of renewable energies[116] and/or nuclear energy in the recently liberalised power industry, the European power industry will be locked into a fuel mix with a high share of fossil fuels[117] for many decades to come.

The significant recourse to international offsets envisaged by the ETS-Proposal is indeed likely to prevent the expected EUA price from increasing sufficiently to ensure a rapid decarbonisation of the power industry as called for by Al Gore[118] to meet the recommendations of the IPCC.[119] It is interesting to note that the Commission once again has recourse to a 50% ceiling for 'external' credits, which echoes the limit initially proposed for the 'Linking Directive' and the ceiling established in its decision in 2006 for the second trading period.[120] Unlike the latter decision the new 50% ceiling does not provide for exceptions in favour of the 'new' Member States and is exclusively applicable to the covered sectors of the ETS in the case of the conclusion of a new global climate accord.

3. The Absence of Qualitative Criteria for International Offsets

The criticism regarding the absence of qualitative requirements regarding the use of international offsets from the ETS-Proposal is rooted in the growing concern about the environmental effectiveness of the CDM mechanism.[121] Its proponents upheld that through this choice the EU is missing an important opportunity to send a clear signal to the stakeholders of the international carbon market that the EU is no longer willing to back projects which do not lead to real and measurable emission reductions and support sustainable development.[122]

Against this argument it may be objected that the decision of the Commission to refrain from requiring qualitative criteria with respect to Kyoto 'units' is inherent to its choice to allow banking of EUAs from the second to the third trading period. Indeed, any restriction of eligible offsets in the third trading period could easily be eluded by the covered sectors through the swapping of CDM/JI credits for EUAs in the second trading period, which can then be banked. The positive effects of the additional qualitative requirements on the environmental integrity of the CDM projects would thus remain quite limited.

Regarding the criticism on the absence of qualitative criteria for 'external' credits in the case of the conclusion of an international climate agreement, the

Commission replied that its proposal does not preclude any decision of the EU to require stricter criteria within the framework of the future climate accord.[123] Moreover, by keeping all options open the EU is ensured more leverage during the international negotiation process and greater room for maneuvre to craft new innovative instruments.

While these arguments are at first sight appealing, the lack of a clear position of the EU on the environmental integrity of 'external' credits has its drawbacks. Indeed, the EU partly forfeits its reputation as a leader in the climate change debate and runs the risk of continuing to finance the 'false' emission reductions of projects that do not foster sustainable development. The proposal of the Doyle Report, restricting the use of 'external' credits to Gold Standard-type credits, represents, in this respect, a good compromise.[124] Even if the proposal remains unsatisfactory in terms of the clarity of its wording, it offers a good starting point for a stricter policy regarding the use of international offsets in a situation where lessons from the international carbon market have still to be learnt.

The reference to the Gold Standard is pertinent, as the requirements of this label, supported by numerous NGOs, do indeed represent an innovative and yet pragmatic way to ensure better environmental quality of greenhouse gas emission offsets. The Gold Standard, however, does not address all criticisms levelled against the CDM mechanism. For instance, the verification of the Gold Standard Requirements is done by the same private entities which are criticised for their insufficient neutrality and sometimes dubious professionalism.[125] Also, there is a lack of control of the work of the Gold Standard organisation by democratic institutions. Finally, a restriction of the CDM mechanisms to renewable energy and end-use energy projects presents, besides the obvious advantages of this kind of projects in limiting the dependence on fossil fuels, also has disadvantages. First, it reduces the scope of this mechanism to discover and address cheap mitigation options and impairs the stability of the international carbon market.[126] Second, the 'additionality'[127] of renewable energy and end-use efficiency projects is often doubtful and subject to gaming.[128] Third, many experts suggest that the offset mechanism does not represent an appropriate instrument to encourage this type of project and that they would be better supported by other instruments such as investment subsidies and/or technical assistance.[129]

Hence, a simple reference to the Gold Standard, as suggested by some NGOs[130] which would entrust this organisation with the control of the environmental quality of offsets allowed into the EU ETS, does not seem advisable at this stage. However, the procedural and material requirements set up by the Gold Standard could offer a good model for the constitution of a European 'label', which would not only set up a 'positive' list of admissible projects, but ensure its sustainability through the formulation of supplemental requirements similar to those set out by the Gold Standard. Such a label, which could be revised from time to time to respond to evolving needs would of course not address all environmental shortcomings of the actual CDM label, but could, combined with a revision of the current CDM procedure, represent a concrete step towards improving the environmental quality of international offsets.

III. Conclusions

The debate on the criteria governing the linkage of the EU ETS with international offsets takes place against the backdrop of the international negotiations on a new global deal on climate change which is expected to be concluded in Copenhagen at the end of 2009. Its general boundaries are set by the unilateral commitment of the EU in 2007 to reduce its greenhouse gas emissions by 20% or by 30% and the Bali Action Plan adopted at the end of 2007, which makes any commitment of developing countries dependent on 'a clearly identifiable support of developed countries, including technology transfer, financing and capacity-building'.[131]

The European view on the appropriateness of linking the EU ETS with the international project mechanisms has changed over the years as the discussion on the numerous interpretations of the 'supplementarity' criteria testifies. Whereas the Commission was initially sceptical as to an integration of Kyoto credits into the EU ETS, fearing lax international rules on CDM and JI,[132] the position has changed due to the pressure from emitters. By the time the 'Linking Directive' was finally adopted, a general shift of attitudes had taken place as the absence of a clear limit for CDM und JI by this Directive attests. A major reason for this change of heart was that companies covered by the EU ETS had made clear that they would remain inflexible regarding the initial amount of EUAs allocated unless they could get access to the CDM.[133]

The collapse of the EUA in 2006, however, somewhat dampened the enthusiasm generated by the successful kick-off of the international carbon market. Moreover, the IPCC stressed that industrialised countries had to step up their domestic reduction effort significantly to stabilise global warming.[134] Further, the analysis of a growing number of academics and observers of the CDM market shows that many CDM projects are not 'additional'[135] and that the mechanism in its current form is unable to mobilise funds on the scale they are needed.[136] Especially in the United States, which is likely to take a firmer grip on climate change after the presidential elections at the end of 2008 and where many states are preparing to set up emission trading schemes, the linking with 'external' credits is intensely debated. Whereas certain critics argue that the recourse to international offsets leads to large transfers of money in favour of China and India which are not matched by any significant emission reductions,[137] others are in favour of their use but call for strict procedural safeguards to ensure their environmental integrity.[138]

In the European Union, the upcoming vote in October 2008 by the Environmental Committee of the European Parliament on the ETS- and Burden-Sharing proposals and later on the vote in the Council is mobilising thousands of stakeholders behind the scenes. The pressure to maintain the current system is important, as the considerable financial interests of both the covered industries of the EU ETS and the stakeholders of the international carbon markets are at stake.[139] Given the wide spectrum of views among the Member States and the European Parliament, the stage is no doubt set again for an intense tug-of-war.[140] It remains to be seen whether the final compromise on the linking issue will ultimately meet the common climate challenge.

References

Anger Niels (2006). Emissions trading beyond Europe: linking schemes in a post-Kyoto world, ZEW Discussion paper n. 6-58.

Barker Terry (2008). Achieving the 2°C Target through carbon trading, Cambridge Centre for Climate Change Mitigation Research and Tyndall Centre for Climate Change Research.

Bygrave Stephen, Bosi Martina (2004). Linking Project-based Mechanisms with Domestic Greenhouse Gas Emissions Trading Schemes, IEA, OECD.

CAN (2008). NGO briefing on the European Commission's legislative proposals on 2020 greenhouse gas effort sharing and the review of the European Emission Trading Scheme at http://www.climnet.org/EUenergy/ET/270208NGOETS_briefing.pdf

De Larragan Javier de Cendra (2006). Linking the project based mechanisms with the EU ETS: the present state of affairs and challenges ahead, p. 99-123, in: Peeters Marjan, Deketelaere Kurt R. eds., EU climate change policy: the challenge of new regulatory initiatives, Edward Elgar Publishing, Cheltenham.

Delbeke Jos (2008). Time to rethink the CDM. Current uncertainty around the Clean Development Mechanism has deeper roots than the EU ETS review and needs longer-term solutions, Environmental Finance, p. 18.

De Sépibus Joëlle (2007a). Scarcity and Allocation of Allowances in the EU Emissions Trading Scheme – A Legal Analysis. NCCR Trade Regulation Working Paper n. 2007/32, at http://ssrn.com/abstract=1088726

De Sépibus Joëlle (2007b). The European Emission Trading Scheme Put to the Test of State Aid Rules. NCCR Trade Regulation Working Paper n. 2007/3, at http://ssrn.com/abstract=1088716

De Sépibus Joëlle (2008). The Liberalisation of the Power Industry in the European Union and its Impact on Climate Change – A Legal Analysis of the Internal Market in Electricity, NCCR Trade Regulation Working Paper n. 10/2008, at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1137823

Driesen David M. (2006). Links Between European Emissions Trading and CDM Credits for Renewable Energy and Energy Efficiency Projects, at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=881830

EEA (2007). Indicator EN27, electricity production by fuel.

Egenhofer Christian, van Schaik Louise, Cornland Deborah (2005). Improving the Clean Development Mechanism, European Climate Platform, CEPS and CLIPORE.

Flachsland Christian, Edenhofer Ottmar, Jakob Michael, Steckel Jan (2008). Developing the International Carbon Market, Linking Options for the EU ETS, Potsdam Institute for Climate Impact Research, Potsdam.

Hægstad Flåm Karoline (2007). A Multi-level Analysis of theEU Linking Directive Process – The Controversial Connection between EU and Global Climate Policy, Fridtjof Nansen Institute.

Hampton Kate (2007). Linking to action in developing countries at http://www.carboninvestors.org/Linking.pdf

Helm Dieter (2008). The Economic Implications of the EU Climate Change Policy, Presentation at the European Central Bank, at http://www.blue-emu.net/presentations/ECB_March_6_2008.pdf

Helme Ned, Movius Diana, Ogonowski Matt, Schmidt Jake (2008). The Dual Markets Approach to Reducing Emissions from Deforestation and Degradation in Developing

Countries, p. 103- 117, in: Egenhofer Christian (ed.), Beyond Bali, Strategic issues of the post-2012 climate change regime.

Höhne Niklas (2008). CDM in the EU Climate Package – Internal vs. external effort effort sharing under the Climate Package -assessing the role of the Clean Development Mechanism, Presented at the Conference 'Effort sharing under the Climate Package – assessing the role of the Clean Development Mechanism', European Parliament, 3 June, 2008, at: http://www.ecologic-events.de/cdm-workshop/download/hoehne_slides.pdf

IPCC (2007). Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate, Technical Summary.

International Rivers (2008). Bad Deal for the Planet. Why Carbon Offsets Aren't Working and How to Create a Fair Global Climate Accord at: http://www.internationalrivers.org/en/node/2826.

Klepper Gernot, Peterson Sonja (2005). Emissions Trading, CDM, JI, and More – The Climate Strategy of the EU, Kiel Working Paper n. 1238.

Kurkowski Susan (2006). Distributing the right to pollute in the European Union: Efficiency, Equity and the Environment, N.Y.U. Environmental Law Journal, v. 14, p. 698- 733.

Langrock Thomas, Sterk Wolfgang (2004). The Supplementarity Challenge: CDM, JI & EU Emissions Trading, Policy Paper 1, Wuppertal Institute for Climate, Environment and Energy.

Lefevere Jürgen (2005). Linking Emissions Trading Schemes: The EU ETS and the 'Linking Directive', p. 511- 533, in: Freestone David, Streck Charlotte eds., Legal aspects of implementing the Kyoto Protocol mechanisms: making Kyoto work, Oxford University Press, Oxford.

Lohmann Larry (2008). Carbon Trading, Climate Justice and the Production of Ignorance: Ten Examples, The Corner House, at: http://www.thecornerhouse.org.uk/summary.shtml?x=561681.

Meijer Ernestine, Werksman Jacob (2005). Keeping it Clean – Safeguarding the Environmental Integrity of the Clean Development Mechanism, in: Freestone David, Streck Charlotte eds. Legal aspects of implementing the Kyoto Protocol mechanisms: making Kyoto work, Oxford University Press, Oxford.

Michaelowa Axel (2004). How Europe embraced the CDM – The role of researchers and interest groups in changing Minds, at http://www.hm-treasury.gov.uk/media/A/C/Michaelowa_(2004n)_How_Europe_embraced.pdf1

Michaelowa Axel (2005). CDM: current status and possibilities for reform, Hamburgisches Weltwirtschaftsinstitut.

Michaelowa Axel (2007). Le mécanisme de développement propre nuit-il à la protection internationale du climat? Revue de politique économique n. 9, p. 20-23.

Michaelowa Axel, Purohit Pallav (2007). Additionality determination of Indian projects, Can Indian CDM project developers outwit the CDM executive Board? Climate Strategies.

Michaelowa Axel, Umamaheswaran, K. (2008), Additionality and Sustainable Development Issues Regarding CDM Projects in Energy Efficiency Sector, HWWA Discussion Paper n. 346.

Muller Adrian (2007). How to make the clean development mechanism sustainable – The potential of rent extraction, Energy Policy, Elsevier, vol. 35(6), pages 3203-3212.

Neuhoff Karsten (2008). Tackling Carbon, How to price carbon for climate policy, University of Cambridge, Electricity Policy Research Group.

Offset Quality Initiative (2008). Ensuring Offset Quality. Integrating High-Quality Offsets into North-American Cap-and-Trade Policy, at: http://www.pewclimate.org/docUploads/OQI-Ensuring-Offset-Quality-white-paper.pdf

Openeurope (2007). Europe's dirty secret: why the EU Emissions trading Scheme isn't working. At: http://www.openeurope.org.uk/research/etsp2.pdf

Ott Hermann E., Sterk Wolfgang, Watanabe Rie (2008). The Bali roadmap: new horizons for global climate policy, Climate Policy, p. 91-95.

Pearson Ben (2006). Market failure: why the Clean Development Mechanism won't promote clean development, at: http://www.sciencedirect.com

Purohit Pallav, Michaelowa Axel (2007). CDM potential of wind power projects in India, HWWI Research, paper 1-8.

Salay Jürgen Salay (2008). 'The Climate Package and the use of CDM, DG Environment, European Commission, presentation for the meeting on 'Effort Sharing Under the Climate Package – Assessing the Role of the Clean Development Mechanism', European Parliament, Brussels, 3 June 2008, at: http://www.ecologic-events.de/cdm-workshop/download/salay_slides.pdf

Schneider Lambert (2007). Is the CDM fulfilling its environmental and sustainable development objectives? An evaluation of the CDM and options for improvement, Oekoinstitut.

Schneider Lambert (2008). Key lessons learned on the CDM and its use in the EU ETS, Briefing paper for a workshop by Ecologic at the European Parliament, 3 June 2008 at: http://www.ecologic-events.de/cdm-workshop/documents/schneider_briefing.pdf

Schüle Ralf, Anger Niels, Beuermann Christine, Braun Marcel, Duckat Renate, Duscha Markus, Hitzeroth Marion, Onigkeit Janina, Sterk Wolfgang (2006). Linking Emission Trading Schemes, Institutional, Economic and Environmental Effects of Policy Scenarios, JET-SET, WP III/06.

Sterk Wolfgang (2007). The Potential Role of the CDM Post-2012, Wuppertal Institute for Climate, Environment and Energy.

The World Bank (2008). State and Trends of the Carbon Market 2008, Washington.

Voigt Christina (2008). Is the Clean Development Mechanism Sustainable? Some Critical Aspects. Sustainable Development Law & Policy, v. 7, n. 2, pp. 15-21, at http://ssrn.com/abstract=1145262.

Wara Michael W, Victor David G. (2008). A Realistic Policy on International Carbon Offsets, wp 74, Stanford University, Standfard, at: http://iis-db.stanford.edu/pubs/22157/WP74_final_final.pdf

Wara Michael W. (2008). Measuring the Clean Development Mechanism's Performance and Potential, available at SSRN: http://ssrn.com/abstract=1086242.

Watanabe Rie, Arens Christof, Mersmann Florian, Ott Hermann E, Sterk Wolfgang (2008). The Bali Roadmap for Global Climate Policy – New Horizons and Old Pitfalls, at http://www.wupperinst.org/de/publikationen/entwd/uploads/tx_wibeitrag/Bali_Roadmap_ClPol_1_08.pdf

Willis Monique, Wider Marijn, Curno Paul, Baker&McKenzie (2006). The Clean Development Mechanism: Special Considerations for Renewable Energy Projects.

WWF (2007). Emission Impossible: access to JI/CDM credits in phase II of the EU, at http://www.yale.edu/envirocenter/renewableenergy/REIL_CDM_paper.pdf

WWF (2008). WWF briefing on the EU Emissions Trading Scheme April 2008, at http://www.wwf.de/downloads/publikationsdatenbank/ddd/28102/

Endnotes

1 The Prisoner's Dilemma results from the fact that all Member States will benefit when emission reductions goals are met but each Member State has an incentive to over-allocate allowances to in-state firms providing them an opportunity to become net sellers to the emissions credit market. See Kurkowski (2006: 716).

2 An EUA is equivalent to one tonne of CO2.

3 Hereafter the 'Commission'.

4 See The World Bank (2008: 9), Openeurope (2007), WWF (2007).

5 The Kyoto Protocol's project mechanisms are the CDM and the JI. CDM stands for clean development mechanism and JI for joint implementation. CDM and JI projects lead to the emission of so-called 'Certified Emission Reductions' (CERs) in the case of the CDM and 'Emission Reduction Units' (ERUs) in the case of JI. They are commonly called the Kyoto 'units' and may be used by the Parties included in Annex B for compliance under the Kyoto Protocol.

6 Article 6 of the Kyoto Protocol.

7 Article 12 of the Kyoto Protocol.

8 Delbeke (2008), Wara (2008), Wara et. al., (2008), Lohmann (2008), International Rivers (2008), Voigt (2008), Schneider (2007), Muller (2007), Michaelowa (2007), Pearson (2006), Egenhofer et. al., (2005), De Larragan (2005), Meijer et. al., (2005), Michaelowa (2005), Bygrave et. al., (2004).

9 See FCCC/CP/2007/6/Add.1, Decision 1/CP.13, Bali Action Plan at http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf#page=3

10 An international offset in this context represents a credit which certifies the reduction, removal, or avoidance of greenhouse gas emissions by a project taking place outside of the European Union and that is used to compensate for greenhouse gas emissions occurring in the European Union. See also for a more general definition of the meaning of an offset the Offset Quality Initiative (2008: 2).

11 Although crucial for the environmental integrity of the ETS, the linkage of the EU ETS with other emission trading schemes will not be examined in this publication. See for a thorough discussion on this subject inter alia Flachsland et. al., (2008), Schüle et. al., (2006), Anger (2006).

12 See Directive 2004/101/EC of the European Parliament and of the Council of 27 October 2004 amending Directive 2003/87/EC establishing a scheme for trading of greenhouse gas emission allowances within the Community, in respect of the Kyoto Protocol's project mechanisms.

13 European Commission (2006). Communication from the Commission to the Council and the European Parliament on the assessment of national plans for the allocation of greenhouse gas emission allowances in the second period of the EU ETS accompanying Commission Decisions of 29 November 2006 on the national allocation plans of Germany etc., COM (2006) 725.

14 European Commission (2008). Proposal for a Directive of the European Parliament and of the Council amending the Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community. COM (2008) 16.

15 European Parliament (2008). Draft report on the proposal for a directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend greenhouse gas emission allowance trading system of the Community of 11th June 2008, Committee on the Environment, Public Health and Food Safety, rapporteur Avril Doyle, (COM (2008)0016–C6-0043/2008–2008/0013(COD), the 'Doyle' report.

16 The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 under the auspices of the United Nations Environment Programme and the World Meteorological Organization for the purpose of assessing 'the scientific, technical and socioeconomic information relevant for the understanding of the risk of human-induced climate change'. To date, the IPCC has issued four comprehensive assessments in 1990, 1996, 2001 and 2007. More than 2500 scientists contributed to these assessments, relying mainly on published and peer-reviewed scientific technical literature. The IPCC shared the 2007 Nobel Peace Prize with former Vice President of the United States Al Gore. See http://www.ipcc.ch.

17 The United Nations Climate Change Conference in Bali at http://unfccc.int/meetings/cop_13/items/ 4049.php.

18 See Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for trading in greenhouse gas emission allowances within the Community and amending Council Directive 96/61/EC.

19 Article 9 (1) ETS-Directive.

20 Article 9 ETS-Directive.

21 Article 9 (3) ETS-Directive.

22 See paragraph 19 of the Preamble of the ETS-Directive. Moreover, Article 30 of the Directive stated that the 'use of credits from project mechanisms' was one of the issues to be considered in the review of the Directive. The inclusion of a direct link with the Kyoto mechanisms was, indeed, strongly advocated by both industry and a number of Member States. See for more details on the 'linking' debate preceding the adoption of the original Directive, Lefevere (2005: 516), Hægstad Flåm (2007: 25 ff.), Klepper et. al., (2005).

23 See Lefevere (2005: 517).

24 European Commission (2003). Proposal for a Directive of the European Parliament and of the Council amending the Directive establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms, COM (2003) 403.

25 The conversion was to be done by Member States, which were granted the right to issue one new allowance in exchange for one CER or ERU. Under the proposal Member States kept the freedom to impose other criteria for the conversion of Kyoto credits into allowances. See Lefevere (2005: 524).

26 The 'comitology procedure' in the European Union refers to the committee system, which oversees the acts implemented by the European Commission on behalf of the Council of Ministers. Amendments submitted to this procedure may be decided more quickly than those governed by the normal legislative process. See http://europa.eu/scadplus/glossary/comitology_en.htm.

27 See Lefevere (2005: 521).

28 See Lefevere (2005: 522).

29 See for a thorough analysis of the discussion on the influence of the various stakeholders on the final content of the Linking Directive Hægstad Flåm (2007: 25 ff.).

30 See Directive 2004/101/EC of the European Parliament and of the Council of 27 October 2004 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms. The modalities of the inclusion of the CDM and JI, were, indeed, highly contentious. Whereas industry and certain Member

States pleaded for the full fungibility between CERs, ERUs and EUAs, many environmental NGOs opposed any linking or at least required strict limits for their use within the EU ETS. See Lefevere (2005: 520), Hægstad Flåm (2007: 25ff.)

31 See Article 11a ETS-Directive.

32 See for a discussion on the opportunities and threats of the inclusion of the CDM and JI in the EU ETS Lefevere (2005: 520ff.).

33 On the insistence of the European Parliament a clause has been added, which requests CDM and JI projects regarding dams with a capacity over 20 MW to comply with relevant international guidelines.

34 See Article 11b ETS-Directive.

35 The Marrakesh Accords adopted by the Conference of the Parties (CoP 7) define the modalities of the use of the project-based mechanisms adopted by the Kyoto Protocol. The 'supplementarity' requirement was integrated in the Marrakesh Accords on the insistence of the European Union. See Langrock et. al., (2004:6).

36 The Marrakesh Accords stipulate: 'the use of the mechanisms shall be supplemental to domestic action and that domestic action shall thus constitute a significant effort made by each Party included in Annex I to meet its quantified emission limitation and reduction commitments under Article 3, paragraph 1. See Article 1 Draft Decision-/CMP.1 (Mechanisms) contained in Decision 15 /CP.7. See also Langrock et. al., (2004: 6)

37 European Commission, Communication (2005). 'Further guidance on allocation plans for the 2008-2012 trading period of the EU Emission trading Scheme', COM (2005) 703 final.

38 European Commission (2006). Communication from the Commission to the Council and the European Parliament on the assessment of national allocation plans for the allocation of greenhouse gas emission allowances in the second period of the EU Emissions Trading Scheme accompanying Commission Decisions of 29 November 2006 on the national allocation plans of Germany etc., COM (2006) 725.

39 According to the Kyoto Protocol the 15 'old' Member States of the EU have to reduce a basket of six greenhouse gases by 8% over the period 2008–2012 with respect to their emissions in 1990. As Article 4 of the Kyoto Protocol allows groups of countries to agree on a common reduction target, the EU has subsequently redistributed this target among the different countries in a burden-sharing agreement. The ten 'new' Member States, which joined the EU in 2005, are only liable under the Kyoto Protocol. Malta and Cyprus have no reduction commitments at all.

40 At the meeting of the Environment Council held on 16 and 17 June 1998, the Member States of the European Union agreed to divide the 8% emission reduction for the European Community between the Member States. Each Member State is individually responsible for reaching the specific target set under this agreement.

Member States' targets vary significantly, ranging from a reduction of 21% for Germany and Denmark to an increase of 25% for Greece. The EU burden-sharing agreement was made legally binding through its inclusion in the ratification decision, adopted by the Council on 4 March 2002. See Council Decision 2002/358/EC concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfillment of commitments thereunder.

41 Art. 2.3 par. 4 of the third guidance on the criteria of Annex III reads: 'The level of effort to reduce greenhouse gases a Member State is required to undertake is determined by assessing the amount of reduction it is required to undertake in relation to base year emissions, greenhouse gas emissions in 2004, and projected emissions in 2010.41 In the next step, half of the figure representing the highest effort is calculated. This figure is considered to be the maximum overall amount of JI/CDM credits that a Member State can make use of in addition to domestic action, while respecting its commitments to ensure that the use of the Kyoto mechanisms is supplemental to domestic action.' See European Commission, COM (2006) 725.

42 It has however to be noted that the ceiling does not fix the overall domestic reduction effort of Member States as the latter remain free to engage in international trading of emission allowances, as set out under Article 17 of the Kyoto Protocol.

43 See Article 17 of the Kyoto Protocol.

44 The formulation proposed by the European Union during the negotiations of the Marrakesh Accords was that each party should acquire and surrender no more emission certificates from abroad than the equivalent of 50% of the difference between five times the emissions in one of the years between 1994 and 2002, on the one hand, and its number of assigned units, on the other. See Langrock et. al., (2004: 6).

45 Article 17 of the Kyoto Protocol foresees that Parties included in Annex B may participate in emissions trading for the purposes of fulfilling their commitments under Article 3 of the Kyoto Protocol.

46 Point 2.3 reads: 'In respect of Member States which do not intend to purchase any Kyoto units with government funds, a Member State may allow its operators covered by the Community scheme to make use of CDM/JI credits to the full amount of this limit.' See European Commission, COM (2006) 725.

47 This limit was to be understood as a percentage figure specified as a share of the approved cap for the trading sector. See European Commission, COM (2006) 725.

48 Point 2.3 reads: 'In respect of Member States which intend to purchase Kyoto units with government funds, these purchases are taken into account. The amount of JI/CDM credits that can be used by installations in the Community scheme in that Member State is reduced by the annual average amount of intended or substantiated government purchases.' See European Commission, COM (2006) 725.

49 See European Commission, COM (2006) 725.

50 European Commission (2008a: 15), Ellerman et. al., (2008: 33). With respect to verified emissions in 2007 the reduction represents 7.1%. EU-15 will undertake most of the overall 2008–2012 effort, with a cap set at 8.7% lower than verified 2005 emissions while emissions in EU-12 will be allowed to increase by 3.6% above the 2005 benchmark. See The World Bank (2008: 10).

51 EU ETS emissions have actually grown by an average of 1% per year since 2005, with a more vigorous growth in the Eastern Member States. Thus some analysts revised their forecasts slightly upward with regard to the likely shortfall in the second trading period. See for a view of analysts' expectations on the shortfall of allowances in the second and third trading period The World Bank (2008: 9ff.).

52 As a matter of fact, the approach chosen by the Commission resulted in CDM/JI limits for individual Member States of 10% to 20% of approved caps. See Press release of 13.7.2007, Emissions trading: Commission adopts decisions on amendments to five national allocation plans for 2008-2012, IP/07/1094.

53 See Langrock et. al., (2004: 12).

54 See for an analysis of the legal risks taken by the Commission when reducing the proposed caps for the second trading period de Sepibus (2007a: 18).

55 For instance, the Commission reduced the proposed cap of Lithuania by 47%, of Latvia by 56%, of Estonia by 4 % and of Poland by 26.7%. Overall, the Commission cut by 10.4 % the overall caps originally proposed by the Member States, leading to a maximum of 2.098 million EUAs. See The World Bank (2008: 9 ff.).

56 The NAPs of Bulgaria and Romania are not included in these figures as they have special circumstances due to their having recently joining the EU (in 2007). See Schleich et. al., (2007: 22).

57 See for an analysis of the approval process of the NAPs Ellerman et. al., (2007), Zapfel (2007), de Sepibus (2007a).

58 See European Commission, Decision on the 2nd NAP of Lithuania.http://ec.europa.eu/environment/climat/pdf/nap2006/20061128_lt_nap_en.pdf

59 See European Commission, Decision on the amended 2nd NAP of Lithuania, http://ec.europa.eu/environment/climat/pdf/nap2006/lt_nap_amendment_en.pdf

60 Case T- 32/07, Slovakia v. Commission, OJ C 69 of 24.03.2007, p.29, Action brought on 7 February 2007; Case T-183/07, Poland v. Commission, OJ C 155 of 07.07.2007, p.41, Action brought on 28 May 2007; Case T- 194/07, Czech Republic v. Commission, OJ C 199 of 25.08.2007, p.38, Action brought on 4 June 2007; Case T-221/07, Hungary v. Commission, OJ C 199 of 25.08.2007, p.41, Action brought on 26 June 2007; B T-369/07, Bulgaria v. Commission, Case T-499/07, Action brought on 27 December 2007, Romania v. Commission, T-483/07, OJ C 51 of 23.02.2008, p.57, Action brought on 22 December 2007, Latvia v.

Commission, T-369/07 , OJ C 269 of 10.11.2007, p.66, Action brought on 26 September 2007. See for an analysis of these cases de Sépibus (2007a and b).

61 The reduction objective of 30% is explicitly made subject to the condition that other developed countries commit themselves to comparable emission reductions and economically more advanced developing countries make an adequate contribution. See European Council, 7224/1/07 REV 1. The Conclusions of the European Council were themselves based on a 'climate package' presented by the Commission in January 2007. See European Commission, COM (2007) 2.

62 In December 2007, a Conference held in Bali brought together representatives of over 180 countries and culminated in the adoption of the Bali Roadmap, which charts the course for a new negotiating process designed to tackle climate change, with the aim of completing this by 2009 in Copenhagen. See The United Nations Climate Change Conference in Bali at http://unfccc.int/meetings/cop_13/items/4049.php

63 The COP 13 is the 13th Conference of the Parties of the UNFCCC and includes, in particular, also the US.

64 The MOP 3 is the 3rd Conference of the Parties of the Kyoto Protocol and does not include the US, which has not ratified the Kyoto Protocol.

65 See FCCC/CP/2007/6/Add.1, Decision 1/CP.13, Bali Action Plan at http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf#page=3

66 See for more details on the negotiation process Egenhofer et. al., (2008: 25ff.), Watanabe et. al., (2008: 4ff.), Ott et. al., (2008: 91ff).

67 It is important to note that the Ad hoc Working Group established in Montreal in 2005 under the Kyoto Protocol (AWG-KP) had recognised in August 2007 that the emission scenario with the highest probability to remain under a 2 degrees Celsius level increase of global mean temperature requires Annex I Parties to reduce emissions to between 25 and 40% below 1990 levels by 2020 and that these ranges would be significantly higher if emission reductions were to be undertaken exclusively by Annex I Parties. See FCCC/KP/AWG/2007/L.4, 31 August 2007, par. 7.

68 See Ott et. al., (2008: 93). The claim of developing countries to receive funds and help from industrialised countries is based on the fact that they have emitted less greenhouse gases and thus have less responsibility for climate change than industrialised countries. Moreover, they are less able to finance emissions reductions. See table of per capita emissions in Neuhoff (2008: 60).

69 Watanabe et. al., (2008: 9). In comparison the project-based emission reduction in 2007 amounted to a value of US$ 6 billion in 2007. See The World Bank (2008: 2).

70 The package proposed by the Commission includes a Strategic Energy Technology Plan, European Commission (COM (2007) 723), a Support Scheme of Carbon

Capture and Storage (CCS) (COM (2008) 13/18) and a revision of the Directive promoting the use of renewable energy sources (COM (2008)19).

71 European Commission, COM (2008) 16.

72 European Commission (2008). Proposal for a decision of the European Parliament and the Council on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020, COM (2008) 17..See for a step by step explanation of the co-decision procedure http://ec.europa.eu/codecision/stepbystep/text/index_en.htm.

73 Under the co-decision procedure, a new legislative proposal is drafted by the European Commission. This proposal is then submitted to the European Parliament and the Council, which discuss the proposal independently. In order for the proposal to become law, Council and Parliament must approve each other's amendments and agree upon a final text in identical terms. See for a step by step explanation of the co-decision procedure http://ec.europa.eu/codecision/stepbystep/text/index_en.htm

74 The Commission proposes to allow the annual use by Member States of credits from greenhouse gas emission reduction projects in third countries of up to 3% of each Member State's emissions from sources outside the ETS in 2005.74 This quantity is equivalent to a third of the reduction effort in 2020. Each Member State is allowed to transfer the unused part of this limit to another Member State.

75 European Council (2008). Presidency Conclusions of the European Spring Council of 13/14th March 2008, Nr. 7652/1/08, REV 1, par. 17 ff.

76 European Commission, COM (2008) 16.

77 The two new gases are nitrous oxide and perfluorocarbons. Overall, these sectors represent nowadays about 60% of total greenhouse gas emissions in the EU. See European Commission, Memo 08/34, 23 January 2008.

78 The Commission estimates that EU ETS sectors must contribute more than other sectors because it is cheaper to reduce emissions in the electricity sector than in most other sectors. See European Commission, Memo 08/34, 23 January 2008.

79 This means that there is a threat that companies may relocate to third countries with less stringent climate protection laws.

80 Whereas ERUs from JI projects may be taken into account for emission reductions until 2012, CERs may be taken into account with respect to emission reductions until 2012 but also from 2013 onwards. See Article 11a, par. 2 and 3 ETS-Proposal.

81 These credits may be used until those countries have ratified an agreement with the Community or until 2020, whichever is the earlier. See Article 11, par. 4 ETS-Proposal.

82 This entitlement applies to all least developed countries until 2020 'provided that they have by then either ratified a global agreement on climate change or a bilateral or multilateral agreement with the Community.' See Art. 11a par. 4 ETS-Proposal.

83 See Article 11a par. 5 ETS-Proposal. The agreements concluded by the Community have to provide for the use of credits in the Community scheme from renewable energy or energy efficiency technologies which promote technological transfer and sustainable development. Any such agreement may also provide for the use of credits from projects where the baseline used is below the level of free allocation under the measures referred to in Article 10a of the ETS-Proposal or below the levels required by Community legislation. See Article 11a par. 6 ETS-Proposal.

84 See Art. 11a par. 7 ETS-Proposal.

85 See The World Bank (2008: 9).

86 See Article 28 par. 3 ETS-Proposal.

87 European Parliament (2008). Draft report on the proposal for a directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend greenhouse gas emission allowance trading system of the Community, rapporteur Avril Doyle, (COM(2008)0016 – C6-0043/2008 – 2008/0013(COD)) – 'Doyle Report'.

88 See European Parliament (2008). Draft report on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020, Rapporteur Satu Hassi, (COM (2008)0017 – C6-0041/2008 – 2008/0014(COD)) – 'Hassi Report'.

89 The opinion of the European Parliament is prepared by a rapporteur, who issues a draft report and a draft legislative resolution, which is discussed and amended within the relevant parliamentary committee, then debated in a plenary session, where it is adopted by a simple majority. The parliamentary committee meets several times to study the draft report prepared by the rapporteur. The rapporteur and the members of both the parliamentary committee responsible and any other European Parliament committee may propose amendments to the Commission's proposal. These amendments, together with those proposed by the parliamentary committees asked for an opinion, are put to the vote in the parliamentary committee responsible. Once the report is adopted in the parliamentary committee, it is placed on the agenda of the plenary session and put to the plenary's vote. See http://ec.europa.eu/ codecision/stepbystep/text/index_en.htm

90 For instance, a 20% reduction effort by 2020 compared to 1990, which would be raised to 30% in the case of an international agreement on climate change.

91 Amendment to Article 11a par. 7 ETS-Proposal. See 'Doyle' report, cited above.

92 This possibility is subject to the above mentioned condition.

93 The mechanisms are indeed increasingly criticised by experts and academics for their focus on unsustainable projects incapable of reducing the dependence of developing countries on fossil fuels, their inability to guarantee additional emission reductions and their potential for generating perverse policy incentives. See Wara (2008), Wara et. al., (2008), Lohmann (2008), Schneider (2007), Michaelowa (2007), Pearson (2006).

94 Amendments to Recitals 22, 25, Art. 11a par. 2, 3, 4, 7 of the ETS-Proposal. See Doyle Report, cited above.

95 See Amendment to Article 11a par. 6 of the ETS-Proposal. See Doyle Report, cited above.

96 Amendment to Article 28 – paragraph 4 – subparagraph 1 a (new) of the ETS-Proposal. See Doyle Report, cited above. For a discussion on the inclusion of forest activities by the future climate regime see in particular Helme et. al., (2008: 103 ff.)

97 See cdmgoldstandard.org.

98 See UNFCCC (2005). Decision adopted by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol 30 March 2006, 3/CMP.1 Modalities and procedures for a clean development mechanism as defined in Article 12 of the Kyoto Protocol, FCCC/KP/CMP/2005/8/Add.1.

99 A notable exception is nuclear power. The 'Bonn Agreements' stipulate in particular that developed parties 'have to refrain' from using nuclear power for CDM projects. See UNFCCC (2001). Review of the implementation of commitments and of other provisions of the convention. Preparations for the first session of the conference of the parties serving as the meeting of the parties to the Kyoto Protocol (Decision 8/CP.4). Decision 5/CP.6, Implementation of the Buenos Aires Plan of Action', FCCC/CP/2001/L.7, 24 July.

100 'Renewable energy projects' are defined as the generation and delivery of energy services (e.g. mechanical work, electricity, heat) from non-fossil and non-depletable (landfill gas excluded) energy sources. 'End-use energy efficiency' projects are defined as activities that reduce the amount of energy required for delivering or producing non-energy physical goods or services. See Paragraph III.d.2 and 3 of the 'The Gold Standard Premium Quality Carbon Credits Requirements' (The 'Gold Standard Requirements') published at: http://www.ecofys.com/com/publications/documents/GSV2_Requirements_20080731_2.0.pdf

101 See Annex I of the 'Gold Standard Toolkit'.

102 See Paragraph VII.a of the 'Gold Standard Requirements'.

103 Many stakeholders in the international carbon market, such as the World Bank, were however disappointed by the Commission's Proposal insofar as the use of CERs is so far limited to the use of credits from projects initiated before 2012 or of projects from least developed countries. See The World Bank (2008: 34).

104 WWF (2008), Greenpeace (2008), CAN (2008).

105 Höhne (2008), Schneider (2008).

106 IPCC (2007), Barker (2008).

107 Höhne (2008).

108 Höhne (2008: 2).

109 Hassi justifies this choice on the basis that the 20% target is far too low if the EU wants to make an equitable contribution towards keeping the increase in global warming below 2 degrees Celsius.109 She contends further that it is easier for Member States to 'direct the planning and implementation measures' from scratch with regard to a 30% reduction target, which may, in the case of unsuccessful international negotiations be easily downgraded, whereas it is much more difficult to tighten the reduction effort once an international climate agreement has been concluded. See European Parliament (2008), draft Hassi Report, cited above.

110 See European Parliament (2008), draft Hassi Report, cited above.

111 See for an analysis of the expected EUA price in the various scenarios European Commission (2008), Commission Staff Working Document SEC (2008) 85/3, Impact Assessment, Document accompanying the Package of Implementation measures for the EU's objectives on climate change and renewable energy for 2020.

112 See European Parliament (2008), draft Hassi Report, cited above.

113 See IEA (2006: 171).

114 According to Dieter Helm the most likely outcome of the Commission's ETS-Proposal on the power sector is a large-scale dash-for-gas, the use of more coal and eventually the renewed construction of nuclear power plants. See Helm (2008: 12).

115 See for more information on the investment conditions in the recently liberalised European power market de Sépibus (2008: 37).

116 See for more details on the necessary investments in the power infrastructure in the case of a large deployment of renewable energies de Sépibus (2008: 32).

117 In 2004, conventional thermal energy fuelled by coal, gas and oil emitted most of them, with a share of almost 54% for electricity production. Coal and lignite accounted for 29.5%, gas for 20% and oil for 4.5%. The second-largest source was nuclear energy, which generated 31%, i.e. almost a third of the EU's electricity. Together, these sources contributed about 85% of the total production, leaving the remainder for renewable electricity production. See EEA (2007).

118 In his speech of 17 July 2008, Al Gore called for US power to be fuelled by 100 % from renewable energy sources in ten years. See http://www.wecansolveit.org/pages/al_gore_a_generational_challenge_to_repower_america/

119 According to the IPCC report the CO2 emissions of industrialised countries must be reduced between 50% and 85% to ensure the highest probability of stabilising the global temperature increase between 2 and 2.4 degrees Celsius above pre-industrial levels. See IPCC (2007: 15).

120 European Commission, COM (2006) 725.

121 Wara (2008), Wara et. al., (2008), Lohmann (2008), Schneider (2007), Michaelowa (2007), Pearson (2006).

122 Greenpeace (2008), WWF (2008), See European Parliament (2008). draft Hassi Report, cited above.

123 Oral response of the Commission staff member Jürgen Salay at the hearing of the European Parliament on the Hassi Report in June 2008. See also Salay (2008).

124 A similar proposal is made by Satu Hassi in her draft report on Effort-Sharing, where she argues for limiting the use of Kyoto 'units' and other international offsets to projects on renewable energies and energy efficiency and discounting the credits generated by 50%. See European Parliament (2008), draft Hassi Report, cited above.

125 See for instance Wara et. al., (2008), Schneider (2007).

126 Hampton (2007 :10).

127 The term 'additionality' in this context means that CDM project must lead to emission reductions which would not have occurred in the absence of the project.

128 Michaelowa et. al., (2008), Michaelowa (2007), Purohit et. al., (2007), Michaelowa et. al., (2007), Willis et. al., (2006).

129 See Driesen (2006), Willis et. al., (2006).

130 See WWF (2008).

131 See Ott et. al., (2008: 93). The claim of developing countries to receive funds and help from industrialised countries is based on the fact that they have emitted less greenhouse gases and thus have less responsibility for climate change than industrialised countries. Moreover, they are less able to finance emissions reductions. See table of per capita emissions in Neuhoff (2008: 60).

132 See Michaelowa (2004: 3).

133 See Hægstad Flåm (2007), Michaelowa (2004: 4).

134 IPCC (2007: 15).

135 The term ‚additional' means that the projects do not lead to real emissions reductions, which would have occurred in the absence of the project. See Schneider (2007), Wara (2008), Wara et. al., (2008), Michaelowa (2007).

136 Sterk (2007).

137 Wara et. al., (2008).

138 Offset Quality Initiative (2008).

139 See for instance the report of The World Bank (2008).

140 See, for instance, the harsh bargaining of negotiation process of the Linking-Directive Hægstad Flåm (2007).

4

Links between European Emissions Trading and CDM Credits for Renewable Energy and Energy Efficiency Projects

*David M. Driesen**

This article asks whether the European Union's (EU) Emissions Trading Scheme has encouraged investment in renewable energy and energy efficiency projects in developing countries. So far, it has produced very little investment in either in spite of the EU's decision to allow credits for projects undertaken in developing countries through the Kyoto Protocol's Clean Development Mechanism. This may reflect the relatively high cost of renewable energy and the awkwardness of assessing the additionality of energy efficiency projects. While the literature generally associates emissions trading with innovation, emissions trading does not encourage innovation with high short term costs, even when such innovation has strong positive spillover effects.

* University professor, Syracuse University College of law, E. I. white hall Syracuse, NY. 13244-1030. E-mail: ddriesen@law.syr.edu

Will the European Emissions Trading Scheme (ETS) stimulate energy efficiency and use of renewable energy in developing countries through the Clean Development Mechanism (CDM)? This article addresses this question as a means of critically examining the relationship between the Kyoto mechanisms and sustainable development. The paper's first part explains why the goals of attaining sustainable development and of effectively addressing climate change make this question important. The second part presents a theoretical analysis explaining why the short term cost effectiveness that trading fosters may not coincide with the long-term goals animating the climate change treaty and the sustainable development ideal. This analysis also provides a means of organizing empirical information about supply and demand to evaluate the likelihood that the Kyoto mechanisms will significantly increase developing countries' use of renewables and energy efficiency. The third part examines the demand side of the equation, discussing the extent to which the legal architecture of the European trading program provides room for financing CDM projects. The fourth part examines the question of supply, evaluating the extent to which CDM fosters projects that increase use of renewable energy or enhance energy efficiency. A concluding Section summarizes the results and discusses their broader significance for the evolution of the Kyoto mechanisms.

I. Renewables, Energy Efficiency, Climate Change and Sustainable Development

The Framework Convention on Climate Change (Framework Convention) articulates a goal of avoiding dangerous destabilization of the climate.[1] Achieving this goal may require a shift away from dependence upon fossil fuels.[2] Accordingly, the Kyoto Protocol to the Framework Convention explicitly encourages the "enhancement of energy efficiency" and the "increased use of new and renewable forms of energy."[3] In the long run, effective climate change policy must induce a significant shift away from fossil fuels.

The delegates that adopted the Framework Convention approved a broad agenda for achieving the goal of sustainable development at the same time. This agenda, called Agenda 21, explicitly emphasized the importance of a shift to renewable energy and of energy efficiency.[4]

Improved energy efficiency decreases the need to burn fossil fuels and thereby decreases the emissions associated with that burning. Thus, enhanced energy efficiency comports with a view of sustainable development as linked to reducing the throughput of materials and pollution needed to adequately support a good life.[5]

Increased reliance upon renewable energy is even more crucial to sustainable development. Fossil fuels constitute non-renewable resources. If the present generation exhausts these resources it will leave nothing for future generation, thereby raising an inter-generational equity issue.[6] Sustainable development will require increased consumption and energy use in developing countries in order to meet the basic needs of very large populations of people. To the extent this growth comes from increased use of fossil fuels, it will create serious long-term and short term health and environmental hazards that will undermine the goal of adequately meeting people's basic need for a healthful life with adequate environmental quality.[7]

The drafters of the Kyoto Protocol created the CDM, in part to meet the need for sustainable development.[8] And the European Parliament cited the potential of European demands for credits to aid in achieving sustainable development as a reason to allow use of credits from CDM projects to satisfy the obligations of European polluters regulated under the ETS.[9] Therefore, an evaluation of the CDM's capacity to move developing countries away from fossil fuels provides one measure of CDM's success as an instrument of sustainable development.

Furthermore, developing country success in moving away from a fossil fuel basis for economic development would facilitate evolution of an adequate climate change regime. The Kyoto Protocol constitutes a first step toward meeting the Framework Convention's goal of avoiding dangerous interference with the climate. While the continuation of business as usual in many countries has already rendered this goal impossible to meet, the Kyoto Protocol will prove a partial success if it begins an evolution significantly ameliorating climate change dangers. Developing countries are unlikely to commit to meaningful cuts in greenhouse gas emissions; unless they come to believe that a sustainable path of reducing dependence on fossil fuels is a viable approach. The cost of renewable energy has fallen as its use has increased.[10] Many renewable energy options, however, remain much more costly than fossil fuel options. More deployment of currently expensive renewable energy will increase learning by doing and drop the price, thus making a path away from fossil fuels attractive. If developing countries do not commit to significant cuts in emissions, prospects for meeting long-term goals for ameliorating climate change are bleak. Hence, the question of whether the European trading program will interact with CDM to increase deployment of renewables and realization of energy efficiency matters greatly to the future of climate change policy and sustainable development more generally.

II. An Analysis of Trading and Innovation

Proponents of sustainable development often like to imagine that it comports with free market liberalism.[11] There are some areas where both converge. For example, reduced agricultural subsidies serve both liberalism and sustainable development goals.[12] But in some areas, free markets tend to maximize present consumption without adequately protecting the environment or future generations.

Most of the law and economics literature argues that emissions trading encourages innovation more effectively than traditional regulation.[13] This argument might suggest that trading encourages renewable energy, implying congruence between free market liberalism and sustainable development.

Recent scholarship, however, has cast some doubt on the hypothesis that trading encourages innovation.[14] The acid rain program has delivered cost effective reductions primarily through the use of extremely conventional technology, namely scrubbers and low sulfur coal.[15] It certainly has not encouraged serious movement away from fossil fuels.[16] Indeed a recent study, the most comprehensive one to date, argues that the acid rain program encouraged less innovation than the prior "command and control" programs aimed at reducing US sulphur dioxide emissions.[17] The Montreal Protocol produced a major technological change, the phase-out of ozone depleting substances.[18] While the Protocol authorized limited trading, no trades actually occurred. Clearly, the relationship between trading and innovation is more subtle than the conventional view suggests.

Those equating trading with innovation argue that trading produces innovation by encouraging polluters to go beyond compliance.[19] This is true with respect to sellers of credits. But buyers of credits achieve fewer reductions than they would under a comparably designed traditional performance standard.[20]

Thus, they have less incentive to innovate than they would have under a comparably designed traditional regulation, which would require reductions from all regulated sources.

The assumption that trading produces innovation conflicts with the "induced innovation" hypothesis that economists frequently employ to analyze innovation.[21] This hypothesis assumes that necessity is the mother invention – i.e., that firms will tend to innovate when the cost of employing conventional approaches is high.[22] But trading lowers the cost of employing conventional approaches by allowing polluters to shift reduction obligations to the facilities with the lowest compliance costs. The induced innovation hypothesis would therefore suggest that trading does not encourage more innovation than comparable performance standards without trading.[23]

The Kyoto mechanisms serve the Framework Convention's goal of encouraging cost effectiveness.[24] They create incentives for polluting facilities (or countries) to purchase credits reflecting the cheapest possible approaches to pollution control. This poses an issue, because the cheapest current emission reduction options may not coincide with those offering the greatest long-term environmental benefits or even the lowest longterm economic costs.[25] For example, even if massive investment in deploying solar technology or fuel cells would bring prices down to very low levels over time and provide enormous environmental benefits (less smog, climate change, coal mining, oil drilling, and oil spills), emissions trading will not make such investments economically rational unless the current costs of deploying solar power or fuel cells is less than that of other emission decreasing options.

The emissions trading literature tends to create an image of trading as magic, rather than as a type of regulatory program.[26] Trading encourages buyers to avoid making expensive local reductions by purchasing as many credits as they need to meet regulatory obligations, no more.[27] And it encourages them to buy the cheapest available credits to meet these targets. This means that the sellers can only sell as many cheap credits as the buyers need, and cannot sell credits costing more to generate than the cheapest emission reductions available in the program.

This market preference for a limited amount of cheap available credits means that analyzing the ETS's capacity to support CDM projects reflecting efforts at deploying renewables and enhancing energy efficiency requires analysis of both the demand side (ETS) and the supply side (CDM). Therefore, this article will assess the likely demand for CDM credits emanating from the ETS and the likely supply of credits from renewable energy and energy efficiency projects. Since sellers of credits from these types of projects must compete with sellers of credits from other types of projects and might have to compete with sellers of "hot air" credits, the relative prices of credits will also influence the capacity of trading between the European Union and developing countries to encourage renewables and energy efficiency. Credits from renewable energy and energy efficiency projects compete on the basis of price for the limited demand for credits from buyers seeking only to meet their limited regulatory obligations.

III. European Trading as a Source of Demand

The European Union has developed a regional trading program as part of its effort to meet its Kyoto target.[28] The amount of emission reduction demanded by the program and the percentage of credits allowed from CDM will ultimately establish the maximum potential ETS demand for CDM credits.

The European Commissions' initial ETS proposal favored enforceability and simplicity over cost effectiveness and flexibility. This proposal contemplated trading of carbon dioxide emissions only between well monitored sources within the European Union that assumed caps on their emissions under the program.[29] This approach resembles that of the US acid rain program, which has succeeded largely because it confines itself to a single pollutant emitted from a small group of well-monitored sources, namely large emitting units at electric utilities.[30]

The European Parliament, however, ultimately passed a more liberal proposal that left some potential to imitate the vices of earlier unsuccessful US programs, which allowed trading with uncapped and poorly monitored sources. The EU's 2003 Directive, like the initial proposal, only limits the carbon dioxide emissions of large industrial sources.[31] It does so by requiring two phases of reductions. Polluters subject to the scheme must meet a phase one target in the 2005-2007 time period.[32] They must meet a phase two target by 2012.[33] The

Directive, however, left the choice of targets to national governments within the European Union, subject to some supervision by the European Commission.[34] A recent study commissioned by the World Wildlife Fund has found that the caps of many countries for phase one demand insufficient reductions to change business as usual or adequately contribute to meeting Kyoto targets.[35] This implies weak demand for CDM credits.

While the 2003 Directive followed the European Commission Proposal in targeting a narrow sector and leaving reduction decisions largely to national governments, it departed from the proposal by enlarging the possible sources of credits. First, it allows credits for projects that reduce any one of six greenhouse gases, including some, such as methane, that usually are very difficult to monitor.[36] Second, it opens up the possibility of negotiating mutual recognition of credits with non-EU trading programs.[37] Finally, it envisages some use of CDM and joint implementation credits, but leaves the details to subsequent elaboration.[38]

The European Parliament amended the 2003 Directive in 2004, largely in order to address the linkages between the ETS and the Kyoto mechanisms.[39] This "Linking Directive" sought to "increase the diversity of low-cost compliance options" while safeguarding the "environmental integrity" of the community's trading scheme.[40] It opined that this linkage would increase "demand for CDM credits" and thereby provide aid to "developing countries . . . in achieving their sustainable development goals."[41] Accordingly, it authorized use of credits from CDM projects, called Certified Emission Reductions (CERs) beginning in 2005.[42]

But the Directive punts on the vital issue of the extent to which operators may rely upon CERs to fulfill their obligations under the Directive. It allows each Member State to authorize regulated sources to satisfy a specified "percentage" of their emission reduction obligations through the purchase of CERs.[43] The Linking Directive also suggested that the percentage should be small by requiring compliance with the Kyoto Protocol's "supplementarity obligation", the obligation to use credits only to supplement domestic compliance efforts.[44] But in the same paragraph, it stated that "domestic action will thus constitute a significant element of the effort made," which suggests wider use of CERs, since domestic action can remain a "significant element" even if a small majority of credits comes from CERs.[45] Thus, a crucial paragraph about the extent of reliance on CERs looks like an effort to paper over policy differences on the role of CERs and accordingly yields vague guidance. It tracks fairly similar language found in the Marrakech Accords to the Kyoto Protocol.[46] The European Parliament clearly decided, however, to prohibit credits for projects involving land use or nuclear power.[47] The Linking Directive also discourages the use of large hydropower credits by requiring member states to ensure that relevant international criteria "will be respected" when approving use of these CERs.[48] Hence, the total demand for CERs will be limited by the percentages allocated for CERs in national trading plans under the ETS Directive and by several discrete limitations on problematic projects.

The supplementary concept, then, limits the maximum potential demand for CDM and JI credits. The amount of the limitation depends upon the volume of demand for credits. The demand for credits, in turn, depends on the amount reductions required in the trading scheme and the percentage of reductions allowed for CER. Individual countries, not the EU, make the decisions about precisely how much reduction to demand in the trading program and what percentage of that reduction may come from CERs.

The World Bank has estimated that the annual average demand for all Kyoto credits (including AAUS, CDM, and JI) at 600 to 1150 $MtCO_{2e}$.[49] The ETS regulates sectors representing 46% of European CO_2 emissions.[50] Accordingly, NATSOURCE has estimated that the European Emission Trading Scheme will generate demand for credits of 110 $MtCO_{2ee}$.[51] This amount might prove less than the demand generated by governments and private parties outside of the trading scheme.[52] The NATSOURCE estimate, however, represents total demand for JI and CDM credits, not CDM alone (the topic of this article). Nevertheless, this number represents a reasonable estimate of total potential ETS demand for CDM credits.

These numbers, however, are subject to some caveats. As of this writing the National Allocation Plans do not include firm targets for 2012 or firm numbers limiting the use of credits from the project-based mechanisms for phase II of the ETS. Weak targets will lower demand. Conversely stronger targets will increase demand. Final decisions about what percentages of project based credits to allow into the system will also influence demand emanating from the ETS.

Promoters of renewable energy and energy efficiency projects hoping to sell credits to facility owners regulated under the European ETS will find that their offerings will face competition from other types of both JI and CDM projects. If economic rationality governs the purchase decisions of the regulated industries, they will choose the cheapest available credits from among these offerings, perhaps discounting for risk (if there is any). This competition could reduce actual demand for CDM renewables and energy efficiency credits substantially.

Unfortunately, available data on the prices of CDM credits is quite limited. Many of those involved in projects have attempted to keep pricing data confidential.[53] This raises a transparency concern. One of the chief advantages of trading is that it reveals the actual cost of reductions. Since actual cost usually are lower than projected costs, this information can help spur subsequent actions to clean the environment. On the other hand, operators who have funding for projects not dependent on purchases by CER purchasers would want to hide the low cost of credits they can offer, since the low cost would suggest a lack of additionality in some cases. Transparency is vital both to informing the policy process and to providing a *post-hoc* check on the accuracy of *a priori* additionality determinations. The limited data available does not justify strong conclusions about how various types of approved projects are competing on the basis of price.

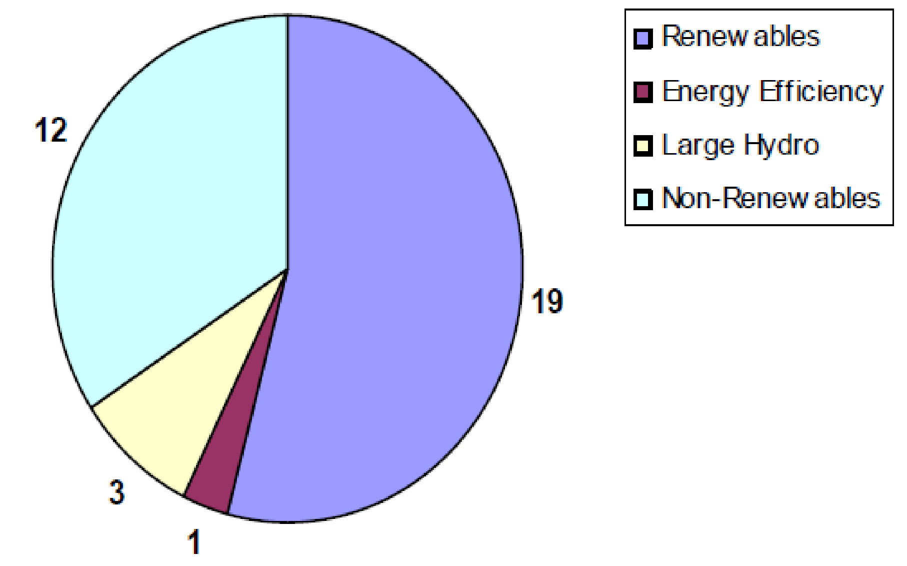
A wild card variable comes from hot air.[54] To the extent that polluters are allowed to purchase credits reflecting hot air, which should be cheap because they cost nothing to produce, demand for renewable or energy efficiency CERs should diminish or disappear altogether. In phase one, some hot air may come into the ETS through countries like Poland, which have caps higher than current emissions under both Kyoto and the ETS. While political rejection of hot air may restrain use of extensive use of these credits, economic rationality will likely push facility owners toward favoring hot air over CERs, unless countries choose to provide tighter restraints on hot air than they apply to CDM, something not required by the Linking Directive.

IV. CDM Projects as a Source of Supply

Examination of CDM projects suggests that project developers have favored endof- the-pipe controls to ameliorate business as usual to projects providing renewable energy and energy efficiency. At first glance, it might appear that the

CDM has done a magnificent job of encouraging renewable energy. After all, 19 of the 35 registered projects as of November 1, 2005, were renewable projects.[55]

Figure 1: Registered Projects # of Projects Based on Type (as of Nov. 1, 2005)

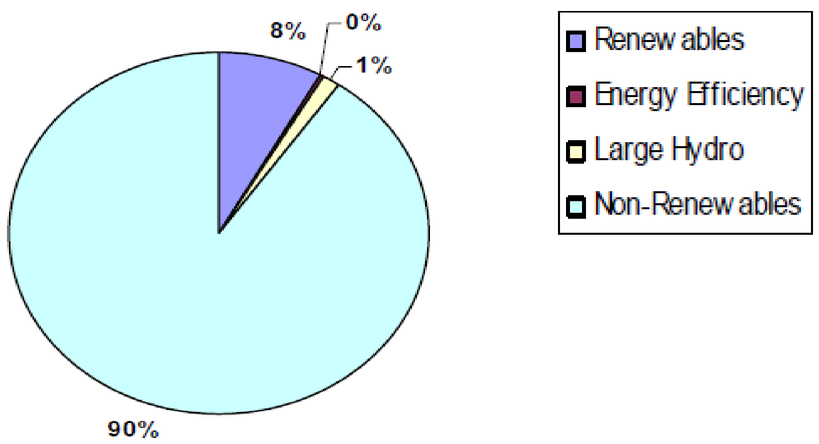


But examining the projects from the more meaningful perspective of how many CERs different types of projects generate yields a very different picture. Approved renewable energy projects CDM are expected to generate only. 7 $MtCO_{2e}$ over the lifetime of the approved projects.

Registered Projects: Type	# of Projects (as of 11/22/05)	Metric Tonnes CO_2 Reductions per Year	% of CERs / Yr
Renewables	19	638,965	8%
Energy Efficiency	1	6,580	0%
Large Hydro	3	104,155	1%
Non-Renewables	12	7,072,276	90%
Total	35	7,821,976	100%

This constitutes less than 10% of the available CDM credits.

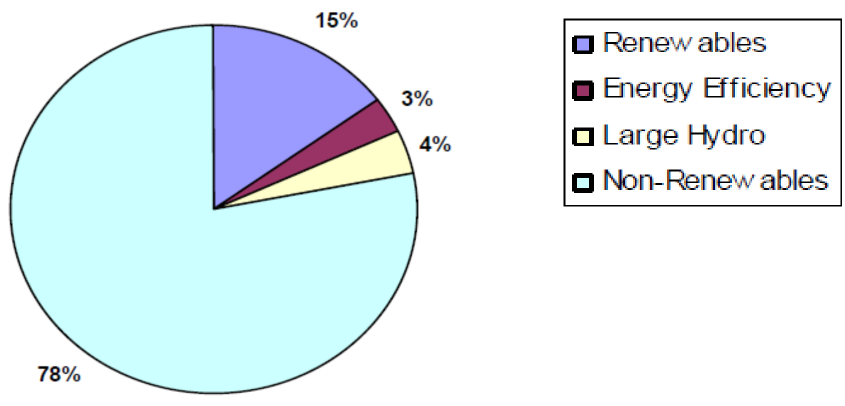
Registered Projects % of CERs Generated Per Year



It also constitutes less than 1% of the European potential demand for project mechanisms credit. As companies must plan to meet the phase one limits of the ETS in the 2005-2007 time period, the current supply could seriously limit the maximum potential European finance of sustainable development supporting CDMs in phase one.

Renewables projects in the pipeline could expand this supply. If all of these projects are approved, renewable project would generate 15% of the total credits.

CER Pipeline % of CERs Generated Per Year (Excluding Registered Projects)



So far, only one small energy efficiency project has received certification. The pipeline contains very few energy efficiency projects as well.

Ben Pearson has suggested several reasons why the CDM program has not generated a large supply of renewable energy credits.[56] The main reason is that renewable energy often costs more than other approaches to generating credits. Consequently, CDM developers have favored projects that contribute little or nothing to meeting sustainable development goals, but efficiently provide large volumes of cheap credits.

Typically, these projects capture or destroy gases with high global warming potential, such as methane and HFC-23.[57] Project developers understand that buyers maximizing cost effectiveness will want the cheapest credits available, not necessarily those that deliver the broadest and most important long-term environmental, economic, and social benefits.

Energy efficiency projects often pay for themselves, but that means that honest oversight will tend to make life difficult for energy efficiency projects. Energy efficiency has terrific potential for cheap reductions in greenhouse gases. But energy efficiency measures typically involve many low volume steps, each generating a small amount of reductions in greenhouse gases indirectly, by lessening demand for electricity generated by fossil fuels. This makes such projects unattractive for prospective purchasers of credits. In addition, because these projects often pay for themselves by generating reduced energy costs over time, serious questions about whether a project is additional, and therefore eligible to generate credits, should make it hard to get these projects approved. Policy interventions, such as information programs to make people aware of the opportunities for energy efficiency, taxes making carbon expensive, and efficiency standards for cars, buildings, and appliances can help. But the CDM, in the past, has generated project credits, not policy interventions. So, it is not surprising that CDM developers have not done much with energy efficiency.

The Conference of the Parties meeting in Montreal in 2005, however, attempted to increase the use of energy efficiency credits by authorizing credits for efficiency projects forming part of a government program to increase efficiency.[58] Assuring that such credits are truly additional will necessarily involve a difficult inquiry into the motives of the policy-makers adopting energy efficiency programs.

One would expect that renewable energy projects, while offering enormous long term benefits, would present difficulties for developers seeking to quantify reductions. Renewable energy projects do not directly reduce emissions, they add energy with little or no added emissions. They reduce emissions indirectly, by displacing more carbon intensive energy supply sources. Hence, estimating the value of credits requires calculation of the amount of energy produced, the associated emissions (if any), and the carbon emissions associated with the energy sources displaced. While this is possible, especially with less innovative projects that make a *priori* calculations of energy production reliable, it is more complicated than calculating the value of credits from a project that simply reduces the impacts of business as usual directly without starting down the path of fundamental change. Again, trading, with its emphasis on *a priori* calculation and low costs, does little to encourage renewable energy.

V. Lessons from CDM's Lack of Impact on Sustainable Development

Currently, only a few European countries seem on track to meet Kyoto limits. Others have significant shortfalls. The European Union and the international community generally will face pressures to make up the shortfall. They will face the question of how and whether to shore up commitments to sustainable development in that context.

Available options include:

- Paper Compliance – Relax oversight of CDM credits to make project approval easier and liberalize their use in the ETS.
- Ratchet down the caps in the ETS.
- Increase the stringency and breadth of non-ETS programs in the EU.
- Limit CDM to track Sustainable Development Goals.
- Non-compliance.

Trading's relationship to sustainable development offers some lessons about how to think through these options.

Trading creates an economic dynamic that can make paper compliance attractive. In the United States, at least, use of emissions trading often leads regulators into the trap of losing sight of long-term goals like sustainable development or even the realization of real verifiable surplus emission reductions. Instead of treating emissions trading as a means to achieve sustainable development, regulators involved in trading tend, over time, to view stimulation of a trading market as an end in itself. They often view impediments to trading, such as regulatory oversight and limits on the use of questionable credits, as "barriers" to trading or "transaction costs."[59] This view tends to lead almost inexorably to efforts to lower the barriers and transaction costs. This perspective will support an approach to encouraging renewables and energy efficiency by making approval and use of those credits easier.

While the lowering of transaction costs might increase the supply of credits, it often does so at a cost in environmental quality.[60] Transaction costs are not usually deadweight losses. They usually purchase something of value. In emissions trading markets, the transaction costs related to governmental oversight of the validity of credits purchase quality.[61] Absent such oversight, buyers, sellers, and brokers may have no interest in the quality of credits, since any credit acceptable to a regulator serves the function motivating the purchase, i.e., satisfying regulatory demand for credits.[62] Any reduction of transaction costs should avoid undercutting important elements of the oversight function.

The European Union can increase demand for CDM credits by adopting stringent regulations in Phase Two for the trading sector. Such an approach may create pressures to expand the use of cheap CDM credits and hot air. If that pressure is not resisted, then risks exist of having the cheapest credits, hot air, crowd out everything else. This will create the appearance, but not the reality, of compliance.

Developing countries and other observes are already skeptical of nations' claims that they are taking meaningful steps to address climate change. If climate policy-makers in developing countries do not believe that the developed countries have taken meaningful local action to address climate change, then they may resist assuming meaningful obligations in the post-Kyoto period. Conversely, if the European Union and other nations currently undertaking compliance with Kyoto targets take meaningful steps toward sustainable development, then the developed country will acquire increased credibility that may enhance developing countries' willingness to make commitments. Similarly, the claims of some US politicians that complying with Kyoto is too costly to be achieved will lose credibility over time, if the EU does comply without reliance on hot air and non-additional project credits. This would aid ongoing efforts by many people in the United States to change the federal government's irresponsible climate change policy.

One way of increasing the use of renewables would be to restrict competing types of CDM credits. This would force buyers to choose options favoring sustainable development, instead of giving primacy to short term cost effectiveness.

Another option involves increasing the reductions from sectors not covered by the ETS Directive or enhancing other policy measures aimed at the Kyoto targets. The EU has under consideration a tax reform aimed at transport; countries have implemented renewable energy portfolio standards; many nations have imposed energy efficiency standards; and some countries have used carbon taxes in a limited fashion. Because trading measures have limited capacity to finance renewables and energy efficiency, increasing the scope and stringency of these more targeted policy measures may better stimulate moves toward sustainable development than tweaking the trading mechanism.

Conclusion

The goal of sustainable development is in some tension with the goal of short term cost effectiveness. The sooner we face up to the tension between free market liberalism and sustainable development, the better the chances for effective climate change policy.

Endnotes

1 *Report of the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change on the Work of the Second Part of its Fifth Session, UN* Conference on Environmental and Development: Framework Convention on Climate Change, 5th Sess., pt. 2, Annex I, UN Doc. A/AC.237/18 (1992) (Part II)/Add.1, 1771 UNTS 108, available at <http://unfccc.int/2860.php> Art. 2 [hereinafter Framework Convention].

2 *See* WORKING GROUP III TO THE SECOND ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 1995 – ECONOMIC AND SOCIAL DIMENSIONS OF CLIMATE CHANGE 241 (James P. Bruce et. al., eds., 1996) (noting that renewable energy sources emit little carbon and that switching to renewables will reduce emissions).

3 *Report of the Conference of the Parties on its Third Session,* Kyoto Protocol to the UN Framework Convention on Climate Change, 3rd Sess., pt. 2, Annex I, UN Doc. FCCC/CP/1997/7 add.1, December 11, 1997, *reprinted without certain technical corrections in* 37 I.L.M. 22 (1998) Art. II, § 1(a)(i),(iv) [hereinafter Kyoto Protocol].

4 *See generally UN* Conference on Environment and Development, Agenda 21, UN Doc. A/CONF.151.26 (1992). For a discussion of the Agenda 21 provisions addressing renewable energy and air pollution generally, *see* David M. Driesen, *Air Pollution*, in STUMBLING TOWARD SUSTAINABILITY 257- 261 (John C. Dernbach ed. 2002) [hereinafter STUMBLING].

5 *See* DAVID M. DRIESEN, THE ECONOMIC DYNAMICS OF ENVIRONMENTAL LAW 89 (2003) (explaining the link between Daly's idea of reduced throughput and technological innovation), HERMAN E. DALY, BEYOND GROWTH (1996) (developing a concept of sustainable development linked to reduction in throughput).

6 *See* Douglas A. Kysar, *Sustainable Development and Private Global Governance,* 83 TEX. L. REV. 2109 , 2118 (2005) (describing the idea of protecting the interests of future generations as "the most widely accepted meaning of sustainable development."); John C. Dernbach, *Synthesis, in* STUMBLING, *supra* note 4, at 5 (explaining that sustainability implies meeting the needs of the present "without compromising the ability of future generations to meet their own needs").

7 *See generally* Rio Declaration on Environment and Development, UN Conference on Environment and Development, UN Doc. A/CONF.151/5 Rev. 1, princ. 1, *reprinted at* 31 I.L.M. 874 (1992) (stating that human beings are entitled to a health and productive life in harmony with nature).

8 *See* Kyoto Protocol, *supra* note 3, Art. 12, Sec. 2 (describing "achieving sustainable development" as part of "the purpose of the clean development mechanism").

9 Council Directive 2004/101/, preamble, Amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading with the Community, in respect to the Kyoto Protocol's project mechanisms. 2004 O.J. (L 338), 18, 18 (EC) [hereinafter, Linking Directive].

10 *See, e.g.,* R. WISER ET. AL., LETTING THE SUN SHINE: AN EMPIRICAL EVALUATION OF PHOTOVOLTAIC COST TRENDS IN CALIFORNIA (LBNL-59282, NREL/TP-620-39300) ii (2006) (discussing a 25% decline in solar energy costs in California since 1998); LESTER R. BROWN, PLAN B: RESCUING A PLANET UNDER STRESS AND A CIVILIZATION IN TROUBLE 158-59, 164 (2003) (discussing drastic decreases in wind and solar costs); Anthony D. Owen, *Renewable Energy: Externality Costs as Market Barriers*, 34 Energy Policy 632, 634 (2006) (documenting sharp declines in the price of renewables between 1980 and 1995). *Cf.* MARK BOLLINGER & RYAN WISER, BALANCING COST AND RISK: THE

TREATMENT OF RENEWABLE ENERGY IN WESTERN NATURAL RESOURCES PLANS iv-v (LBNL 58450) (2005) (noting a sharp increase in the cost of wind power in 2005, but suggesting this increase might be anomalous).

11 *See generally* Kysar, *supra* note 6, at 2114 (discussing the tendency to adapt sustainability to fit the market liberalism framework).

12 *See* id. at 2146 (identifying the elimination of agricultural subsidies as an area where reform would advance both free market liberalism and sustainability).

13 *See,* Robert N. Stavins, *Policy Instruments for Global Climate Change: How Can Governments Address a Global Problem,* 1997 U. CHI. LEGAL F. 293, 302-03; Robert W. Hahn & Robert N. Stavins, *Incentive- Based Environmental Regulation: A New Ear for an Old Idea*, 18 ECOLOGY L. Q. 1, 13 (1991); Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law: The Democratic Case for Market Incentives,* 13 COLUM. J. ENVTL. L. 171, 183 (1988); Daniel J. Dudek & John Palmisano, *Emissions Trading: Why is this Thoroughbred Hobbled?*, 13 COLUM. J. ENVTL. L. 217, 234-35 (1988).

14 *See, e.g.,* David M. Driesen, *Design, Trading, and Innovation, in* MOVING TO MARKETS IN ENVIRONMENTAL PROTECTION: LESSONS AFTER TWENTY YEARS OF EXPERIENCE (Jody Freeman & Charles Kolstad eds. 2006) (forthcoming) [hereinafter, Driesen, *Design*]; Joel F. Bruneau, *A Note On Permits, Standards, and Technological Innovation,* 48 J. ENVTL. ECON. & MAN. 1192 (2004); Juan-Pablo Montero, *Permits Standards, and Technology Innovation,* 44 J. ENVTL. ECON. &MAN. 23 (2002); Juan-Pablo Montero, *Market Structure and Environmental Innovation,* 5 J. APPLIED ECON. 293 (2000); David M. Driesen, *Is Emissions Trading an Economic Incentive Program?: Replacing the Command and Control/Economic Incentive Dichotomy,* 55 WASH. & LEE L. REV. 289, 313-22, 325-38 (1998) [hereinafter, Driesen, *Dichotomy*]. *See also* David A. Malueg, *Emissions Trading Credit and the Incentive to Adopt New Abatement Technology,* 16 J. ENVTL. ECON. &MAN. 52 (1987); W.A. Magat, *Pollution Control And Technological Advance: A Dynamic Model of the Firm,* 5 J. ENVTL. ECON. & MAN. 95 (1978).

15 *See* David M. Driesen, *Does Emissions Trading Encourage Innovation?,* 33 ENVTL. L. REP. (Envtl. L. Inst.) 10094, 10105 (2003) (noting the dominance of these traditional technological options and discussing claims that the acid rain program encouraged innovation). *Cf.* Byron Swift, *Command Without Control: Why Cap-and-Trade Should Replace Rate-Based Standards for Regional Pollutants,* 31 ENVTL. L. REP. (Envtl. L. Inst.) 10330 , 10338 (2001) (claiming that trading encouraged some innovation).

16 A. DENNY ELLERMAN ET. AL.,MARKETS FOR CLEAN AIR: THE US ACID RAIN PROGRAM 130 (2000) (noting that the acid rain program did not produce greater reliance on renewable energy).

17 *See* Margaret R. Taylor, Edward S. Rubin, and David A. Hounshell, *Regulation as the Mother of Innovation: The Case of SO2 Control,* 27 LAW & POL'Y 348, 370 (2005). *Cf.* David Popp, *Pollution Control Innovations and the Clean Air Act of 1990,* 22

J. POL'Y ANALYSIS &MGMT 641 (2003) (agreeing that command and control caused more innovation than trading, but arguing that trading did better at encouraging environmentally superior innovations).

18 *See generally* EDWARD A. PARSON, PROTECTING THE OZONE LAYER: SCIENCE AND STRATEGY (2003).

19 *See* Adam B. Jaffe et. al., *Environmental Policy and Technological Change,* 22 ENVTL. & RESOURCE ECON. 41, 51 (2002); Malueg, *supra* note 14, at 8-9 & n. 33.

20 *See* Malueg, *supra* note 14; Driesen, *Dichotomy, supra* note 14, at 334; DAVID WALLACE, ENVIRONMENTAL POLICY AND INDUSTRIAL INNOVATION: STRATEGIES IN THE USA, EUROPE, AND JAPAN 20 (1995) (explaining that the Malueg model casts doubt on the claim that emissions trading necessarily spurs innovation); Chuhlo Jung et. al., *Incentives for Advanced Pollution Abatement Technology at the Industry Level: An Evaluation of Policy Alternatives,* 30 J. ENVTL. ECON. & MAN. 95, 95 (1996) ("marketable permits may not provide greater incentives than standards, because the incentive effects of marketable permits depend on whether firms are buyers or sellers").

21 Driesen, *Design, supra* note 14.

22 *See* Richard G. Newell et. al., The Induced Innovation Hypothesis and Energy-Saving Technological Change, 114 Q. J. ECON. 941 (1999).

23 Driesen, *Design, supra* note 14, at ___.

24 *See* Framework Convention, *supra* note 1, Art. 3, Sec. 3 (stating that measures to combat climate change "should be cost-effective").

25 *See* David M. Driesen, *Free Lunch or Cheap Fix?: The Emissions Trading Idea and the Climate Change Convention,* 26 B.C. ENVTL. AFF. L. REV. 1, 44 (1998) (explaining this point with a renewable energy example).

26 *Cf.* David M. Driesen, *Markets are Not Magic,* 20 ENVT'L FORUM 19 (Nov.-Dec. 2003).

27 *See* Driesen, *Dichotomy, supra* note 14, at 324-25 (explaining why trading only provides limited incentives for reductions).

28 *See* Council Directive 2003/87, 2003 O.J. (L 275) (EC) [hereinafter ETS Directive].

29 *See* Commission Proposal for a Directive of the European Parliament and Council Establishing A Scheme for Greenhouse Gas Emission Allowance Trading Within the Community and Amending Council Directive 96/61/EC, 2002 O.J. (C 075 E) 9.

30 *See generally* Brennan Van Dyke, *Emissions Trading to Reduce Acid Deposition*, 100 YALE L. J. 2707 (1991).

31 *See* ETS Directive, *supra* note 29, Annex 1.

32 Id., Art. 11, Sec. 1.

33 Id., Art. 11, Sec. 2.

34 Id., Art. 11.

35 *See* ILEX ENERGY CONSULTING, THE ENVIRONMENTAL EFFECTIVENESS OF THE EU ETS: ANALYSIS OF CAPS: A FINAL REPORT TO WWF V-VI (2005).

36 *See* ETS Directive, *supra* note 28, Art. 3 (a), Art. 24.

37 Id. Art. 25.

38 Id. Art. 30.

39 Linking Directive, *supra* note 9.

40 Id., L 338/18.

41 Id.

42 Id. Art. 11a.

43 Id., Art. Sec. 8(c), 338/23.

44 Id. 338/19 (par. 6); Kyoto Protocol, *supra* note 3, Art. 6, Sec. 1(d).

45 *See* Linking Directive, 338/19 (par. 6).

46 *See* Decision 15/CP.7, Principles, nature and scope of the Mechanisms Pursuant to Articles 6, 12, and 17, of the Kyoto Protocol, FCCC/CP/2001/13/Add.2, at 2 (2001).

47 *See* Linking Directive, *supra* note 9, § 2 (adding Art. 11a to the 2003 Directive).

48 Id., § 2(b)(6).

49 *See* E. Haites & S. Seres, *Estimating Market Potential for the Clean Development Mechanism: Review of Models and Lessons Learned,* PCFPLUS REPORT 19 (2004).

50 American Bar Ass'n, *Sustainable Development, Ecosystems, and Climate Change,* ABA ENV'T, ENERGY, & RESOURCES L.: YEAR IN REV. 120, 123 (2004).

51 Gernot Klepper & Sonja Peterson, *Emissions Trading, CDM, JI, and More- The Climate Change Strategy of the EU* 11 (FEEM Working Paper No. 55.05, April 2005). This estimate might be off by 65 MtCO2e in either direction. Id.

52 *See* id.

53 FRANCK LECOCQ & KARAN CAPOOR, STATE AND TRENDS OF THE CARBON MARKET 2005, at 26 (2005), *available at* http://www.ieta.org/ieta/www/pages/getfile.php?docID=899.

54 Frank Lecocq, *State and Trends of the Carbon Market 2005 (Executive Summary),* CARBON MARKET UPDATE 10, 11 (September, 2005) (explaining that the amount of AAU from Russia and the Ukraine are a key uncertainty).

55 *See* http://www.cd.unfccc.int.html (last visited Nov. 4, 2005).

56 *See* Ben Pearson, *CMD is Failing,* 56 TIEMPO 12 (2005).

57 Id. at 12. For a critique of a major HFC-23 project *see Newest Biggest Deal,* DOWN TO EARTH (November 15, 2005), available at http://www.downtoearth.org.in/cover.asp?foldername=20051115&filename=anal&sid=1&sec_id=7 (last visited November 11, 2005). This Article estimates that HFC-23 projects account for 24% of all CERs sold.

58 Decision-/CMP.1: Further Guidance Relating to the Clean Development Mechanism, COP/MOP 1, Montreal UN Climate Change Conference, 5 (2005), *at* http://unfccc.int/files/meetings/cop_11/application/pdf/cmp1_24_4_further_guidance_to_the_cdm_eb_cmp _4.pdf.

59 *See* David M. Driesen & Shubha Ghosh, *The Functions of Transaction Costs: Rethinking Transaction Cost Minimization in a World of Friction,* 47 ARIIZONA L. REV. 61, 92-98 (2005) (discussing the tension between the impetus to reduce transaction costs to encourage trading and the need to preserve effective government oversight to protect environmental quality from poor quality trades).

60 *See id*. at 93-94 (explaining why both buyers and sellers of pollution credits share incentives to exaggerate the value of traded reductions).

61 *Id.* at 93 (explaining that government oversight makes it possible to distinguish good from bad emissions trading transactions).

62 *Id.* at 92-94.

5

Linking Community Forestry Projects in India with International Carbon Markets: *Opportunities and Constraints*

Rohit Jindal and Shailesh Nagar***

The authors highlight the fact that India would benefit tremendously through community forestry projects and the local communities could accrue benefits by selling carbon sequestered by these projects in Kyoto-based markets. However they find that though India is eligible for conducting its business there is no awareness among the public to take up such initiatives. In order to prove that India has the potential to take up such projects he conducted research in two prominent Non-Government Organizations (NGOs) that have well established forestry projects – Seva Mandir and Foundation for Ecological Security. They calculate the carbon sequestration potential for these two NGOs, and identified the likely challenges and areas of concern. The potential gains that the local communities may accrue from sale of carbon credits. Despite all these efforts the authors find that these projects are not taking off as expected,

* Phd candidate – Michiagn State University. Research Associate – World Agroforestry Centre and Sokoine University of Agriculture, Morogoro, Tanzania. E-mail: Jindalro@msu.edu

** Senior Project Officer at Foundation for Ecological Security. E-mail: shailashnagar@gmail.com

due to delayed approval of land use. This is despite the fact that there is huge demand in the market as the first commitment period for mitigating emissions by the parties under Kyoto is coming to an end by 2012. In such circumstances these projects may need alternate avenues for selling carbon sequestration credits, and one such viable market is the Chicago Climate Exchange. CCX is the only largest carbon credit market that takes up community forestry projects. Thus, India with all the potential by joining hands with CCX may gain huge profits in the carbon markets and also expand its supply base by linking up with other member nations.

1. Introduction

Community forestry projects have long been implemented in India with an aim to strengthen rural livelihoods by improving local natural resource base. Until now, the major benefits from these projects were in the form of timber and Non-Timber Forest Products (NTFPs) for the local communities. However, with the ratification of the Kyoto Protocol[1] in 2005, there has been a growing expectation that additional benefits could accrue by selling carbon sequestered by these projects in Kyoto-based markets (Poffenberger et. *al*., 2001). Similarly, many new forestry projects were initiated with the express objective of selling carbon credits in international markets. Examples include TIST, Tamil Nadu[2] and Plan Vivo based Women for Sustainable Development, Karnataka (FAO, 2004). However, due to long delays in approval of land use sequestration projects,[3] the Kyoto-based market for carbon sequestration credits hasn't really taken off (IISD, 2006). With the first commitment period under Kyoto ending in 2012, many of these projects may need alternate avenues for selling carbon sequestration credits. One viable market that has grown in recent years is the voluntary emission reduction programs, particularly the Chicago Climate Exchange.[4]

The Chicago Climate Exchange (CCX) was set up in 2003 to provide an opportunity to business houses and other large entities to voluntarily reduce their carbon emissions. Members can trade in carbon credits to fulfill their yearly emission reduction targets. CCX has been growing rapidly; in 2005 alone, CCX traded 1.43 million tons of carbon dioxide (tCO_2) worth US$ 2.8 million, making it the third largest carbon market in the world (Point Carbon, 2006). This included trade in carbon sequestration credits from land use projects. Since the two larger carbon markets – European Union Emission Trading System and New South Wales GHG Abatement Scheme – are yet to trade in carbon sequestration credits from forestry projects, CCX probably represents the single largest market for such credits. This is a welcome opportunity for community forestry projects in India which can potentially tap into this growing market for carbon credits. Likewise, CCX may also gain from linking up with these projects and expanding its supply base.

However, most researchers and policy makers in India appear to be unaware of CCX or of other voluntary programs that have come up in different parts of the world. Review of recently published literature suggests there are several studies in India that look at eligibility conditions for selling carbon credits in Kyoto markets, but none that explores the same for CCX or for any other voluntary market. What are the main requirements for selling carbon credits in these markets? Do community forestry projects sequester enough carbon to sell in these markets and what price schedules could they expect? Similarly, till date, these voluntary markets have restricted their supply of carbon credits to certain geographic regions. For example, CCX mainly meets its demand for carbon sequestration credits from farmers in the US. With the increase in demand for carbon credits, these markets will need to know more about potential suppliers elsewhere. Who are these suppliers? How many carbon credits can they sell and at what price? Do these suppliers have a long-term commitment to participate in the carbon market?

This article attempts to answer some of these questions from the perspective of community forestry projects in India. For preserving clarity in discussions and with a view towards practical applicability, the article mainly considers the case for selling carbon credits on the CCX. However, wherever necessary, the article also considers broader issues and areas of concern. It is based on an extensive research with two prominent Non-Government Organizations (NGOs) in India that have well established forestry projects – Seva Mandir and Foundation for Ecological Security.

Research data were collected through field visits to selected project sites, followed by open-ended discussions with community representatives, respective NGO staff, and senior officials of the state Forest Department. Secondary data sources consisted of recent reports on carbon markets, particularly CCX, and details on relevant protocols for international carbon sequestration projects. Carbon sequestration potential for the two NGOs was calculated on the basis of their in-house monitoring studies and some recent literature on biomass accumulation rates in India. Finally, critical challenges and areas of concern were identified through a stakeholder workshop in Udaipur, India.

The rest of the article is organized as follows: the next Section provides useful information on forestry interventions of the two NGOs. This is followed by an estimation of annual carbon sequestration potential of these forestry projects and a review additionality, leakage, permanence, and monitoring issues to determine the relative feasibility of selling carbon sequestration credits on CCX. Section four identifies potential gains for local communities from sale of carbon credits. The article ends with a discussion on important areas of concern such as food security and suggests some modifications in the present set up of rules.

2. Forestry Initiatives of Seva Mandir & Foundation for Ecological Security

Seva Mandir is a prominent Indian NGO that works towards development of local communities in more than 580 villages, of Udaipur and Rajsamand districts in southern Rajasthan.[5] It aims to strengthen local livelihoods, build peoples' capabilities and promote sustainable village institutions in these villages (Seva Mandir, 2005). The organization works in partnership with village level institutions, which take responsibility for managing various activities implemented by the organization. Representatives of these institutions are regularly trained to improve their skill levels, and to seek their assistance in implementing different development projects. Since late 1980s, the organization has taken up several forestry initiatives to increase local incomes by improving the natural resource base in the area. The central focus of this work is to reverse the ecological degradation of village common lands,[6] which are often over-exploited and unable to fulfill local needs (Seva Mandir, 2006). Productivity is restored through tree plantations and soil and water conservation measures. Seva Mandir's forestry interventions that can earn carbon sequestration credits include:

i. ***Pastureland development*** on *panchayat* grazing lands. The village institution obtains permission from the local *panchayat*[7] to manage the land for a fixed duration of time (usually five to ten years), after which the permission needs to be re-sought. A boundary wall is constructed around the land to thwart open grazing and to encourage regeneration of rootstock. New plantations are undertaken to improve tree density. All activities are executed as per a management plan prepared by Seva Mandir staff in participation with the local community. Villagers can partake grass, dried tree branches, and bamboo shoots through manual harvesting. Since 1990, the organization has covered 1953 hectares of land[8] under pastureland development, spread over more than 50 villages.

ii. ***Joint Forest Management (JFM)*** on forestlands under the new forest policy (1990), which allows local communities to manage forestlands. Seva Mandir assists village institutions in obtaining permission from the state forest department before constructing a boundary wall and taking up tree plantations. Plantation activities are carried out as per a long-term management plan, prepared in consultation with the forest department. Villagers can harvest grass and other Non-Timber Forest Products (NTFPs) from the forestland, along with a fixed share of final timber harvest. Usually, the productivity of forestlands is higher than *panchayat* lands. The total area covered under JFM activities since 1990 is 715 hectares (ha).

iii. ***Plantations on private lands*** under which individual farmers receive financial and technical support from Seva Mandir to take up tree plantations. The organization usually favors small and marginal farmers over large farmers. Since 1990, 5210 ha of land have been covered under private plantations on patches of land that were usually less than 1 ha in size.

The Foundation for Ecological Security (FES) works towards restoring about 73,000 hectares of degraded lands in ecologically fragile areas across seven states in India.[9] It works in close participation with village communities to prioritize local needs and to plan various natural resource development interventions with them. Its target beneficiaries consist of about hundred thousand rural households, eighty percent of which belong to landless, small and marginal farmer categories. Through its work, FES has been able to generate more than 4.4 million days of employment for these poor households (FES, 2005). A major component of the organization's strategy is to work, as far as possible, on entire landscapes and promote natural regeneration. However, the organization does take up tree plantations, often in areas that are contiguous to naturally regenerating lands. Activities that aid in carbon sequestration include:

i. *Regeneration of panchayat grazing lands and revenue wastelands* through plantation and protection activities. Village communities obtain permission from respective *panchayats* or from the revenue department (in case of revenue wastelands) before initiating the work. Boundary wall is usually constructed to improve the survival rate of saplings by controlling open grazing. FES also prepares a long-term management plan for each project site that encourages sustainability of the intervention. Villagers have access to all NTFPs from regenerated sites, such as grass, firewood, and fruits. Since 1990, FES has worked on 5,808 ha of *panchayat* grazing lands and 18,810 ha of revenue wastelands.

ii. *Joint Forest Management* activities of FES are similar in setup to those of Seva Mandir as they both follow standard guidelines of the forest department, the major difference being that FES works in different agro-ecological zones in the country while Seva Mandir's works in one particular region. The total forest area covered after 1990 is 5,787 ha.

iii. *Watershed development*[10] on contiguous patches of land that include both private and common lands. Watershed development is an integration of several natural resource interventions such as soil and moisture conservation, afforestation and reforestation, and construction of water harvesting structures. Since 1990, FES has implemented watershed development programs over 3,010 ha of land.

3. Feasibility of Linking with Chicago Climate Exchange

CCX a voluntary emission reduction and trading program whose members are required to reduce their carbon emissions by 1% every year below their average annual emissions from 1998-2001. Its members include Ford, DuPont, IBM, Motorola, New Mexico, Chicago, and Universities of Minnesota and Iowa. Members that cannot reduce their own emissions can buy carbon offsets from other members that exceed their reduction targets and from farmers engaged in carbon sequestration.[11] Since its inception in 2003, CCX has traded more than 6.4 million tCO_2, including trade in carbon sequestration credits from land use projects and forestry plantations (called as CCX forest carbon emission offsets). Farmers and local communities can thus make money from their conservation efforts by selling carbon offsets to CCX members. The basic specifications for setting up such forest-offset projects are:

i. Forestation and forest enrichment projects should have been initiated on or after January 1, 1990 on unforested or degraded land.

ii. Forest conservation projects are eligible if taken in conjunction with forestation on a contiguous site.

iii. Demonstration of long-term commitment to maintain carbon stocks in forestry.

iv. Independent third-party verification of carbon stocks (where required).

If the above rules are satisfied, the two forestry projects can potentially sell carbon offsets through CCX on the basis of annual increase in the above-ground living biomass. But first, an estimation of carbon sequestered by them.

3.1 Annual Carbon Sequestration Potential

Carbon sequestration potential is defined as the amount of carbon dioxide (CO_2) fixed by plants through their photosynthetic activity. Although plants fix CO_2 both as aboveground biomass and below-ground soil carbon, CCX rules currently allow for trading in only above-ground biomass contained in live plants. Forestry projects are thus designated on the basis of their annual carbon sequestration potential; projects that sequester less than 2000 tCO_2 per annum as small, between 2000 t CO_2 and 12,500 tCO_2 per annum as medium, and with more than 12,500 t CO_2 per annum as large forestation projects. Size determines monitoring requirements for each project, as discussed below.

Detailed carbon analysis of the two projects was difficult due to time and resource constraints; both NGOs covered large number of project sites that were seldom contiguous. These sites varied with species mix, soil characteristics, mix of planted versus natural regenerating trees, and eventual survival rates of the trees. Although a high proportion of the project sites was believed to be managed in a sustainable manner, working out the exact percentage required an extensive survey in the area. Finally, the specific annual off take in the form of grass harvests, fuelwood and other NTFPs was not known across different sites. The present study therefore relied on recent estimates of biomass accumulations in somewhat similar agro-ecological conditions in India, to arrive at mean values of carbon sequestration for the two selected projects.

Poffenberger et. al., (2002) estimate that the above-ground mean annual growth in degraded forests from protection and plantation was 3 tons C/ha (carbon per hectare).[12] Similarly, Murali et. al., (2002) quote Seebauer (1992) to report a national mean annual increment (MAI) of 3.6 tons C/ha for plantations. Ashish et. al., (2006) arrive at a higher estimate of 5.24 tons C/ha for Rajasthan, but their sample plots also include primary forests under protection, which tend to add an upward skew to their calculations. In comparison, fewer estimates were available for plantations on revenue or *panchayat* lands. A relevant study was found to be conducted by FES itself, which reported an MAI of 1 tons C/ha to 3 tons C/ha (Mondal et. *al.*, 2005). Annual carbon sequestration is usually taken as 0.5 times the MAI (Poffenberger et. *al.*, 2002). By taking lower bounds of the above estimates (to account for various uncertainties described above), the present study estimates that the current carbon sequestration potential of all forestry interventions taken together for Seva Mandir and FES is 16,421 tCO_2 per annum and 77,245 tCO_2 per annum, respectively (see table 1 below; for details see annex 1).

Table 1: Current Carbon Sequestration from Selected Forestry Projects in India

	Seva Mandir	FES	Total
Area under post-1990 plantations – ha	7,878	33,415	41,293
Annual above-ground biomass growth – t C	8,950	42,096	51,046
Carbon sequestration – tCO_2/annum	16,424	77,245	93,669
Potential annual market value at CCX[13] @ $4/t CO_2.	**$65,697**	**$308,981**	**$374,678**

3.2 Compatibility with CCX rules

This Section evaluates the extent to which FES and Seva Mandir's forestry interventions are compatible with the CCX rules described above. As the calculations in table 1 show, both FES and Seva Mandir have significant number of carbon sequestration credits that can potentially be sold through CCX or other international markets. Since, all these credits pertain to post-1990 plantations on unforested (in case of *panchayat* and revenue lands) or degraded (in case of forestlands) lands, they satisfy the first rule. The second rule is important for plantations on forestlands. Typically, forestlands in India have a residual rootstock that can quickly regenerate through protection (Ravindranath et. *al.*, 2001, Poffenberger et. *al.*, 2002). Therefore, both Seva Mandir and FES encourage regeneration of old trees through construction of a boundary wall and other conservation measures. These organizations also take up new tree plantations on the same forestlands. This qualifies their projects under rule two of CCX, which states that forest conservation is eligible in conjunction with new forestation efforts on contiguous sites. Field visits to some of the project sites reveal that local communities have a long-term commitment to protect and conserve these forestry projects. In addition, self-documented case studies and published reports of the two organizations stress on sustainable management of the forestry interventions undertaken by them (FES, 2005; Seva Mandir, 2005). Therefore, the forestry initiatives of the two organizations also qualify under rule three. Finally, if both organizations decide to market their entire annual carbon sequestration potential through CCX, they would fall under the category of large forestation projects. This requires them to instill independent monitoring and verification procedures. At present, most of the monitoring is done by field staff in conjunction with community representatives. A third-party verification process would therefore induce additional costs for the two organizations. Although, it is difficult to estimate the exact escalation in monitoring costs, it is bound to be substantial due to existence of non-contiguous sites spread over a large area.[14] A useful tool in this regard could be the new decentralized carbon models being developed by some researchers that make use of satellite imagery. However, most of these models are still in the pilot stage and it is difficult to compare their costs with those of conventional monitoring systems.

3.3 Additionality, Leakage and Permanence

The discussion in Section 3.2 indicates that forestry interventions of Seva Mandir and FES qualify to sell carbon sequestration credits on the CCX. However, typically, international trading in carbon sequestration credits also requires fulfilling additionaility, leakage and permanence clauses (UNEP, 2004).

Additionality requires proving that carbon sequestration credits being claimed by a project are additional to any that would occur in absence of the project (UNEP, 2004). Most forestry interventions implemented by the two organizations include construction of boundary wall around the protected site. Field-observation of some of these sites shows that the biomass accumulation rates (and thus the carbon sequestration rates) are significantly higher inside the boundary wall than outside. This indicates that increased rates of carbon sequestration on project sites would not have happened in the absence of the protection measures induced by the project.[15] Thus additionality can be easily verified through site-specific biomass studies in the area.

Leakage requires that project beneficiaries should not cut any trees, neither inside nor outside the project boundary. This is a contentious issue as local communities often depend on forest resources for their livelihood needs such as obtaining fodder for livestock, firewood for energy needs and fruits for selling in nearby markets. To forego these benefits in lieu of the carbon payments would result in shifting of use to another piece of land, which in an overall context would be undesirable. On the other hand, if communities are allowed to harvest a certain percentage of the annual biomass growth in terms of dead and fallen trees, manual harvesting of grass, and mature bamboo poles, they may have a larger stake in protecting the growing trees. Therefore, a balance needs to be attained between short-run carbon sequestration benefits and long-term sustainability of the site.

It is relevant to note here that CCX already incorporates this element by paying for only 80 percent of the eligible forestry offsets. The balance 20 percent is saved in a CCX forest carbon reserve pool, to account for any net losses in the carbon stocks. This 20 percent reserve may thus be sufficient to fulfill the annual biomass needs of the local communities for the selected forestry interventions in India.

Permanence refers to long-term commitment to protect plantations. Current discussion on permanence has also focused on the option of producing temporary carbon credits versus long-term carbon credits (see IISD, 2006; UNEP, 2004). However, in voluntary carbon markets, commitment to protect plantations for about 20 years is usually sufficient to demonstrate permanence. In case of the two forestry projects in India, both have several sites where local communities have been successfully managing their forestry plantations for more than 15 years. In general, however, permanence is inextricably linked to leakage. As discussed above, if communities are allowed to harvest a proportion of the growing biomass for their sustenance needs, then tree plantations are much more likely to be protected for long durations of time.

4. Potential Gains from Trading in Carbon Sequestration Credits

The previous Section shows that forestry interventions undertaken by both Seva Mandir and FES are eligible to sell carbon sequestration credits on CCX. What are potential benefits from this carbon trading from the perspective of local communities, the two NGOs and international carbon investors?

4.1 Sustainable Development Benefits for Local Communities

Sale of carbon sequestration credits can often generate additional incomes for local communities. Recent literature documents livelihood and other development benefits of carbon sequestration projects in several developing countries across Africa and Latin America (e.g. see Jindal et. *al.*, 2006; Rosa *et. al.*, 2003; Smith and Scherr, 2003). Similarly, the two forestry interventions covered under this study in India can contribute towards sustainable development through carbon payments.

As table 1 shows, the total financial value of carbon sequestration credits from FES and Seva Mandir's forestry projects on CCX is $374,678 per annum. Admittedly, not all of this financial value is immediately realizable, as the total availability of carbon sequestration credits from the two projects (93,669 tCO_2/annum) is much more than the current demand on CCX. In fact, only a small percentage of these carbon credits may actually find buyers in international markets. However, even small sales of carbon credits will generate additional incomes for local communities, while creating opportunities for bigger sales in the future. These incomes will be useful in extending local conservation efforts, in reducing livelihood pressure on forests and can provide for sustenance needs of many poor families.

For example, FES is implementing Joint Forest Management program in Chitravas and Rawach villages, in district Rajsam and (Rajasthan). Under this program, the local community obtained an approval from the state forest department to manage 276 ha of forestland. Since 2002, FES has helped the community construct a stone fence around this forest and in planting more than 50,000 trees of indigenous species. These plantations are managed by the village forest protection committee, which has banned all timber felling and allows for only manual cutting of grass and for collection of dead and decaying branches as firewood. The current carbon sequestration potential of this forestry initiative is estimated to be 1,266.2 t CO_2 per annum, with a financial value of $5,064.8 per annum (or Rs.227,907 in the local currency). Discussions with community representatives revealed that this is a significant amount of money. If annual carbon payments were available to them, community members will have an enhanced economic incentive to protect these plantations and in taking up more conservation efforts. Since most farmers in the area were very poor, carbon payments will also provide them with additional sources of income.

4.2 Additional Funding Support for NGOs

Carbon payments also represent opportunities for attracting additional funding support. Many NGOs in India are actively involved in forestry interventions and are in constant need for financial assistance. Seva Mandir, for example, submits regular project proposals to international donor organizations to fund its forestry activities (Seva Mandir, 2006). Similarly, FES receives financial support from National Dairy Development Board, India and from some international organizations. However, this funding support is often limited and may not always meet local requirements.

Carbon markets, on the other hand are growing rapidly (Point Carbon, 2006). The Executive Board of the Kyoto Protocol recently approved the first carbon sequestration project, which is expected to finally boost the Kyoto-based markets for carbon sequestration credits. Similarly, the CCX has shown impressive growth and is now the third largest carbon market in the world. Since its inception in 2003, the carbon price on CCX has increased by an impressive 300 percent. There are thus increasing opportunities to raise money through sale of carbon sequestration credits through CCX and other international markets. A relationship with CCX can in fact help the two Indian NGOs to learn the intricacies of international carbon trading, find more carbon buyers and thus generate additional financial support for their forestry programs. As international carbon rules are still being formulated, these NGOs also have an opportunity to share their own experience of how these rules actually play out in the field and suggest necessary modifications.

4.3 Benefits for CCX and its Members

Chicago Climate Exchange is a voluntary emission reduction program. However, increasing environmental awareness, growing threat of global warming and changing market perceptions have convinced more and more firms to commit for emission reduction programs, leading to increasing demand for carbon credits at CCX. Till date, CCX has mainly met this demand for carbon credits from emission reduction and carbon sequestration programs within the US. However, judging from the recent growth of CCX, demand may outstrip supply in not too distant future. The CCX has therefore started looking for additional suppliers of carbon credits and the two NGOs covered in this study are certainly qualified to fulfill this role.

Striking a relationship with Seva Mandir and FES will thus help CCX to tap into a relatively large supply of carbon sequestration credits. On its part, CCX will also get to experience the particulars of a relationship with grassroots NGOs, which may gain more significance as carbon markets continue to grow. Finally, CCX members can gain satisfaction (and goodwill) from the fact that their carbon payments are able to contribute towards sustainable development initiatives in poor communities.

5. Critical Challenges and Concerns Regarding Carbon Trading

The immediate objective of this study was to assess the feasibility of linking forestry interventions in India with international carbon markets, particularly the CCX. The above discussion shows that carbon trading is not only feasible, it also has several potential gains for the three main stakeholder groups. However, discussions with community representatives, project staff of the local NGOs and senior forest officials also highlighted some important concerns regarding carbon trading.

5.1 Transaction Costs and Need for an Aggregator

Transaction costs include the costs of negotiating, contracting, implementing and monitoring any carbon sequestration project. Although the two NGOs already pay for most of these costs from their existing sources of funds, establishing a carbon payment system will impose additional transaction costs on them. Most important among these will be setting up contracts with CCX and paying for third party monitoring and verification.

One way to bring down these transaction costs is to aggregate carbon credits from individual farmers and then sell them in one lot at the CCX. This can help avoid the cost of setting up individual contracts between CCX and the individual farmers in India. The intermediary organization, i.e. the aggregator, can set up a single contract with CCX on behalf of all the local farmers. However, this aggregator will still need to establish some contracting arrangement with local farmers to ensure that proper protocols are followed. Therefore, the most plausible arrangement at this stage will be for Seva Mandir and FES to form a federation and assume the role of aggregator for their farmers. On its part, CCX will need to impart necessary training to this federation in order to ensure successful carbon trading.

As regards monitoring and verification requirements, both NGOs may need to modify their current system of monitoring through field staff and community representatives. This is not to suggest that this participatory system does not work, but international carbon buyers will desire a more impartial system, such as independent verification. One possible strategy will be to introduce site specific monitoring through hand held GPS (geographical positioning system). These GPS devices are relatively inexpensive, easy to use and can help in more rigorous tracking of carbon plantations.[16]

5.2 Subsistence Farming and Food Security Concerns

Seva Mandir and FES mainly work with small farmers who are only able to meet subsistence needs from their farms. Most poor families derive a substantial proportion of their food requirements from these small farms and by collecting NTFPs from common lands. Long-term carbon plantations with strict guidelines on leakage may thus deprive these poor families from meeting their subsistence needs. Some community representatives even felt that as the population continues to grow, there will be additional demand for agricultural land. However, if most of the land is locked in multi-year carbon commitment, then local communities may be threatened with food insecurity. This is even more pertinent in case of poor communities which may not have secure rights over land. As carbon sequestration services become more valuable, powerful landowners may grab these lands and drive the poor away, further threatening their livelihoods (Kerr et. *al.*, 2006). There is thus a need to balance carbon sequestration activities with local needs for immediate livelihood support.

5.3 Carbon Sequestration on Common Lands

A large proportion of the land in rural India is in the form of village common lands. Some of it is owned by the revenue department and a sizeable proportion by the state forest department. These common lands have a significant potential to earn carbon sequestration credits. At present, village communities need approval from the respective authorities to take up plantations on these common lands. Existing laws and policies such as the JFM policy, state that most NTFPs belong to local communities, while timber benefits are shared between the community and the respective authority. Management rights over such common lands are only approved for a fixed time period, after which the community needs to reapply or the management rights get transferred back to the authority. These norms and procedures thus thwart long-term conservation commitments by the local communities. In addition, there are no provisions for sharing of carbon payments.

For example the Nayakheda village (*panchayat* – Ghodach, district – Rajsamand) initiated an integrated watershed program in early 1990s with financial support from Seva Mandir. Under this program, approval was obtained from the local *panchayat* to take up tree plantations on 29 ha of common pastureland. The villagers also planted trees on 100 ha of individually owned lands. Since then, the village community has actively protected these plantations. The present study estimates that the total carbon being sequestered by these plantations is about 236.6 t CO_2 per annum, with a financial value of $946.4 on the CCX. However, the lease for the common lands ends in 2009 and the *panchayat* has threatened to take over these common lands. There is thus little motivation for the community to invest in more conservation efforts, leave aside maintaining long-term carbon plantations.

There is thus a need to clarify rules on management rights over common lands for local communities in India. On the other hand, as carbon payments become more significant, there is a possibility that state forest department and local *panchayats* may become much more rigid in transferring management rights to local communities. This is a potential area for conflict that needs to be resolved at the earliest. A practical way out may be to share carbon payments between local communities and respective authorities, similar to arrangements on sharing of timber benefits.

5.4 Necessary Modifications in Rules

Kyoto rules for carbon sequestration projects are often perceived as too rigid and difficult to follow (IISD, 2006). There has been a move to simplify these rules, especially for small-scale community forestry projects (UNEP, 2004). In comparison, rules for carbon sequestration projects on CCX are relatively simpler and easy to follow. However, from the perspective of the local communities, some modifications in these rules will make them even more relevant and effective.

The foremost among these is that trading in carbon credits from forestry projects on CCX is presently restricted to North America and some countries in South America. The present study has shown that NGOs in India not only generate significant carbon sequestration credits, but they also meet most of CCX's requirements. In addition, carbon payments to local communities in India will generate substantial developmental benefits, achieving a possible win-win between environment conservation and economic development. As the CCX continues to grow, it is high time for it to initiate relationships in other regions of the world, particularly in India where forestry projects are already well established.

Secondly, the exchange may need to define sustainability more precisely. The present rules call for long-term commitment to conserve forest plantations, but do not clarify the issue of leakage. This article has argued that making small provisions for annual harvesting of biomass should not be termed as leakage and in fact, such exemptions may ensure the permanence of carbon stocks. Finally, CCX only allows for trading in aboveground carbon stored in live matter. However, forest plantations often fix substantial amounts of carbon in the soil, which accumulates as organic matter (Poffenberger et. *al.*, 2002). If trading is allowed for belowground carbon, it may provide a still higher economic incentive for local communities to participate in carbon sequestration activities.[17]

6. Conclusion

Seva Mandir and FES can potentially sell carbon sequestration credits on the CCX and generate additional incomes for their local communities. Establishing a relationship with CCX may in fact open avenues for carbon trading with other international players. A viable strategy in this regard will be to start with simple payment arrangements on small contiguous sites that are easy to monitor and administer. Experience gained during these pilot projects may be handy in expanding the scale of operations when international demand for carbon sequestration credits rises further. Such performance-based payments may also ensure that local communities have a long-term stake in conserving these plantations.

On their part, the carbon markets will need to look at integrated role of forests. Carbon payments can provide economic incentives to local communities for conserving forests and other valuable natural resources. However, these communities also depend on the same resources for their immediate sustenance needs. Achieving a balance between these immediate needs and the long-term priorities of the global society can truly promote sustainable solutions to global warming.

Annex 1

Calculation of Current Annual Carbon Sequestration from Forestry Interventions of Seva Mandir and FES, India

1. All calculations are based on a conservative Mean Annual Increment (green, above ground) of 1 tC/ha for revenue / pasturelands and 2.5 tC/ha for forestlands.
2. Annual carbon sequestration taken as 50% of MAI. Measured in terms of t C/ha.
3. Result from (2) is multiplied with 3.67 to get annual carbon sequestration in terms of tCO_2/ha.
4. Present price on CCX is \$4.40/ tCO_2 (Rs200/tCO_2)

Foundation for Ecological Security (FES)

Total area under post-1990 plantations on forestlands	= 5787 ha
Annual carbon sequestration from forestlands	= 2.5 x 5787 x 0.5 x 3.67
	= 26,547.9 tCO_2/annum
Total area under post-1990 plantations on *Panchayat*/revenue lands/watershed development	= 27,628 ha
Annual carbon sequestration	= 1 x 27628 x 0.5 3.67
	= 50697.4 tCO_2/annum
Total current carbon sequestration from Post-1990 FES's forestry initiatives	= 77,245.3 tCO_2/annum
Potential financial value at CCX @ \$4/tCO_2	= \$308,981 per annum

Seva Mandir (SM)

Total area under post-1990 plantations on forestlands	= 715 ha
Annual carbon sequestration from forestlands	= 2.5 x 715 x 0.5 x 3.67
	= 3280.1 tCO_2/annum
Total area under post-1990 plantations on Panchayat/revenue lands/watershed development	= 7,163 ha

Annual carbon sequestration	= 1 x 7154 x 0.5 3.67
	= 13,144.1 tCO_2/annum
Total current carbon sequestration from Post-1990 SM's forestry initiatives	**= 16,424.2 tCO_2/annum**
Potential financial value at CCX @ \$4/tCO_2	= \$65,697 per annum

Acknowledgement

Acknowledgements to Michigan Agricultural Experiment Station for funding this study. Thanks to the respective staff at FES and Seva Mandir for providing field support and for participating in the brainstorming workshop at Udaipur. Authors also express gratitude for villagers of Chitrwaas, Rawach, and Nayakheda for sharing their views on implications of a carbon payment system. The opinions expressed here are those of authors alone and do not necessarily represent views of respective organizations.

References

Aggarwal, A., R.S. Sharma, B. Suthar, and K. Kunwar. 2006. An ecological assessment of greening of Aravali mountain through Joint Forest Management in Rajasthan, India. *International Journal of Environment and Sustainable Development.* Vol.5 No.1, pp. 35-45.

FAO. 2004. *A review of carbon sequestration projects.* Food and Agriculture Organization of the United Nations, Rome. AGL/MISC/37/2004.

FES. 2005. *Annual Report 2004-05.* Foundation for Ecological Security, Anand, India.

IISD. 2006. Chapter 2: Options for Fostering the Development Dividend, in *Realizing the Development Dividend: Making the CDM work for Developing Countries (Phase II)*. International Institute for Sustainable Development. Draft Paper for the meeting of the Expert Task Force of the IISD Development Dividend Project. Vancouver, March 27-28, 2006.

Jindal, R., B. Swallow, and J. Kerr. 2006. *Status of carbon sequestration projects in Africa: Potential benefits and challenges to scaling up*. WP 26, World Agroforestry Centre, Nairobi.

Kerr, John, C. Foley, K. Chung, and R. Jindal. 2006 (in press). Sustainable Development in the Clean Development Mechanism: Constraints and Opportunities. *Journal of Sustainable Forestry*.

Kerr, J., D. Marothia, K. Singh, C. Ramasamy, and W. Bentley (eds.). 1997. *Natural Resource Economics: Concepts and Applications to India*. New Delhi: Oxford and IBH.

Mondal, D., S. Singh, and J.V. Dhameliya. 2005. *Assessing the value of our forests: Quantification and valuation of revegetation efforts*. Paper submitted for the Fourth Biennial Conference of the Indian Society for Ecological Economics (INSEE), Mumbai, June 3-4, 2005.

Murali, K.S., Indu K. Murthy, N.H. Ravindranath. 2002. Joint forest management in India and its ecological impacts. *Environmental Management and Health*. Vol. 13, No. 5, 2002 pp. 512-528.

Poffenberger, M., E. D'Silva, N.H. Ravindranath, U. Pingle, I. Murthy, and A. Tuttle. 2002. *The Clean Development Mechanism and village-based forest restoration. A case study from Adilabad district, Andhra Pradesh, India*. Community Forestry International, California, USA.

Poffenberger, M. (ed.), N.H. Ravindranath, D.N. Pandey, I.K. Murthy, R. Bist, and D. Jain. 2001. *Communities & Climate Change: The Clean Development Mechanism and Village-based forest restoration in central India. A case study from Harda Forest Division, Madhya Pradesh, India.* Community Forestry International and the Indian Institute of Forest Management.

Point Carbon. 2006. *Carbon 2006*. Hasselknippe, H. and K. Roine eds. (www.pointcarbon.com)

Ravindranath, N.H., P.Sudha, and S. Rao. 2001. Forestry for sustainable biomass production and carbon sequestration in India. *Mitigation and adaptation strategies for global change.* 6: 233-256, 2001. Kluwer Academic Publishers, the Netherlands.

Rosa, H., S. Kandell, and L. Dimas. 2003. *Compensation for Environmental Services and Rural Communities: Lessons from the Americas and Key Issues for Strengthening Community Strategies.* PRISMA, El Salvador. (www.prisma.org.sv)

Seebauer, M. 1992. *Review of Social Forestry Programs in India*. GWB Gesselschaft für Walderhaltung und Waldbewirtschaftung GmbH, Michelstadt.

Seva Mandir. 2005. *Annual Report: 2004-2005*. Udaipur, India.

Seva Mandir. 2006. *Seva Mandir: 5th Comprehensive Plan 2006-2009.* Udaipur, India.

Smith, J., and S. Scherr. 2003. Capturing the Value of Forest Carbon for Local Livelihoods. *World Development*. 31 (12), pp 2143 – 2160.

UNEP. 2004. *CDM Information and Guidebook*. Second edition. Edited by Myung- Kyoon Lee. Contrbutors – J. Fenhann, K. Halsnaes, R. Pacudan, and A. Olhoff. UNEP Riso Centre on Energy, Climate and Sustainable Development, Riso National Laboratory, Denmark.

UNFCCC. 2003. *Caring for Climate: A Guide to Climate Change Convention and the yoto Protocol.* United Nations Framework on Climate Change Convention (UNFCCC), Bonn, Germany. (http://unfccc.int/resource/cfc-guide.pdf)

Endnotes

1 Kyoto Protocol was ratified in 2005 to reduce emission of greenhouse gases into the atmosphere. Under its Clean Development Mechanism, developing countries can sell carbon sequestered by their forests to industrialized countries as carbon credits or carbon offsets. These are units of carbon dioxide that have been absorbed by forests from the atmosphere (UNFCCC, 2003).

2 For details, see www.tist.org

3 Called the LULUCF sector, i.e. land use, land use change and forestry.

4 Other examples include New South Wales Greenhouse gas Abatement Scheme in Australia.

5 For more details see www.sevamandir.org

6 Apart from privately owned lands, there exist several kinds of common lands in Indian villages. Prominent among these are revenue lands (owned by the government revenue department), forestlands (owned by the state forest department), and *panchayat* grazing lands (revenue department owns these lands, but the village *panchayats* are the custodians). For more details on different property regimes in India, see Kerr et. al., (1997).

7 *Panchayats* are democratically elected village councils in India.

8 CCX allows for trading in carbon sequestration credits from afforestation and reforestation activities initiated only after 1990 on previously un-forested lands.

9 These are Gujarat, Rajasthan, Orissa, Madhya Pradesh, Andhra Pradesh, Karnataka and Uttaranchal. More details on FES are available on www.fes.org.in

10 It is relevant to note that Seva Mandir too has a watershed development program, much similar to FES's approach. However, the area covered under forestry sub-component of Seva Mandir's watershed work is reported separately under different forestry heads and is thus included in the above estimates.

11 For details, please see http://www.chicagoclimatex.com

12 1 ton C = 3.67 t CO_2.

13 Price as on October 22, 2006.

14 In case of FES, this would cover different geographic regions that are far apart from each other.

15 Acknowledgements to Esther Duflo at MIT for suggesting this innovative, yet cost-effective means to verify additionality. If accepted, this methodology may help in reducing transaction costs associated with carbon sequestration projects.

16 Indeed, the small holder tree plantation project (TIST), based in India and Tanzania already uses hand help GPS to monitor their carbon plantations before selling carbon credits in international markets. For more details see www.tist.org

17 Important to note that CCX already allows for trading in soil carbon, but it is restricted to grasslands and conservation easements in US.

6

The Commerce Clause Meets Environmental Protection: The Compensatory Tax Doctrine as a Defense of Potential Regional Carbon Dioxide Regulation

*Heddy Bolster**

On December 20, 2005 seven northeastern states announced an agreement to implement the Regional Greenhouse Gas Initiative (RGGI), in an effort to reduce greenhouse gas pollution. In doing so, those states formally committed to implementing the first market-based regulatory program for carbon dioxide emissions trading in the United States. When electricity suppliers begin to import power from outside the regulated region in order to avoid the constraints of the emissions cap, resulting in little or no net decrease in overall emissions associated with the power consumed inside the region the movement of emissions associated with power consumed inside the region is called leakage. The regulatory approaches available to RGGI to fight the problem of leakage may be subject to attack as violations of

* Professor of law, Boston College of law, USA. 262 Danforth St. Portland me 04102, USA.
E-mail: mail: hdb8@hayoo.com

Source: www.bc.edu

the interstate commerce clause of the US Constitution. This Note explores the possibility of using the concepts embodied in the compensatory tax doctrine to defend a regulatory scheme that might be used by RGGI to combat leakage. The compensatory tax doctrine (a three pronged test) embodies the principle that a state regulation that burdens interstate commerce may still survive constitutional scrutiny if it is a compensatory tax designed merely to make interstate commerce bear a burden already borne by intrastate commerce. This Note analyzes the application of commerce clause jurisprudence and the compensatory tax doctrine to the alternatives that RGGI may elect to use to combat the problem of leakage and evaluates the likely success of those options. This Note argues that the RGGI states, and any reviewing court, should draw on compensatory tax doctrine principles in crafting, and supporting, a regulation that imposes burdens on imported electricity equivalent to those imposed on electricity generated inside the region by the regulatory cap.

Introduction

On December 20, 2005, seven northeastern states signed an agreement to implement the Regional Greenhouse Gas Initiative ("RGGI") in an effort to reduce greenhouse gas pollution from power plants.[1] This agreement marked the first formal commitment to implementing a market-based trading program for carbon dioxide ("CO_2") emissions in the United States.[2] In March 2006, California's Environmental Protection Agency released a report summarizing the emissions trading program options that the state was exploring for regulating greenhouse gas emissions.[3] Both the RGGI agreement and the California report, however, identify a particular concern regarding regional cap-and-trade emissions programs – that of "leakage".[4]

Leakage – the movement of emissions from regulated to unregulated regions to avoid caps on emissions – can occur when a cap-and-trade scheme is implemented on a state or regional, rather than national, level.[5] Electricity suppliers begin to import power from outside the regulated region to avoid the constraints of the emissions cap, resulting in little or no net decrease in overall emissions associated with the power consumed inside the region.[6] To combat this problem, the RGGI states and California could limit emissions associated with energy imported into the region.[7] Because limiting interstate imports places burdens on the trade of electricity, however, this approach may be subject to attack under the Interstate Commerce Clause of the US Constitution.[8]

This article explores the possibility of applying the concepts embodied in the compensatory tax doctrine to defend a regulatory scheme that might be employed to combat leakage, focusing on RGGI as the model scheme.[9] The compensatory tax doctrine stands for the principle that even if a state regulation burdens interstate commerce, it may survive constitutional scrutiny if it is a compensatory tax designed merely to make interstate commerce bear a burden already borne by intrastate commerce.[10] Any regulation the RGGI states adopt to address leakage will necessarily impose burdens on interstate commerce because they will have to limit, either directly or indirectly, electricity imports from out of state.[11] This article argues that the RGGI states, and any reviewing court, should draw on compensatory tax doctrine principles in crafting, and supporting, a regulation that imposes burdens on imported electricity.[12]

Part I of this article provides an introduction to the RGGI program and the particular problem of leakage.[13] Part II introduces the potential legal challenges to the program based on the Commerce Clause of the US Constitution, and explores the compensatory tax doctrine as developed by the US Supreme Court.[14] Part III analyzes the application of Commerce Clause jurisprudence and the compensatory tax doctrine to the alternatives that RGGI may use to combat the problem of leakage and evaluates the likely success of those options.[15] Part III concludes that although the compensatory tax doctrine may not be directly applicable to the regulation of emissions leakage, the legal principles it embodies should be used to uphold the regulation.[16] In addition, if RGGI can overcome the legal and political obstacles in its path, it may serve as an effective experiment in the regulation of CO_2 emissions and eventually could be a template for a national regulatory program aimed at slowing global warming.[17]

I. Climate Change and the Regional Greenhouse Gas Initiative

The states participating in RGGI are taking action because they recognize that climate change poses serious risks to human health and global ecosystems.[18] Climate change is a result of global warming, which in turn is caused by the accumulation of greenhouse gases in the earth's atmosphere, principally CO_2.[19] Various scientific models indicate that the average global temperature could rise by up to 7.7 degrees Fahrenheit by the middle of this century.[20] This expected temperature increase could greatly exacerbate shortages of food, water, and energy supplies, and increase the number of refugees around the world – not to mention raise national security concerns relating to nuclear proliferation, terrorism and the potential for war.[21] For this reason, many countries, as well as state and local governments and private economic entities in the United States, are taking action to limit greenhouse gas emissions.[22]

A. The Regional Greenhouse Gas Initiative: Regulatory Structure

The purpose of the RGGI program is to regulate CO_2 emissions using a market-based approach, commonly referred to as cap-and-trade.[23] The cap-and-trade approach allows facilities subject to the regulation to achieve emission reduction targets, and thus avoid potential penalties, in an economically efficient manner.[24] Under the standard cap-and-trade model, the government sets an aggregate cap on the amount of allowable emissions in the region.[25] The cap is then distributed either through allocation or sale to each emitting facility in the form of allowances, where one unit (usually a ton) of pollutant equals one allowance.[26] Each facility must own the same number of allowances as the number of tons of pollutant it emits.[27] The current proposal is to implement the RGGI cap in two phases.[28] Between the years 2009 and 2015, the RGGI states will cap CO_2 emissions at approximately 120 million tons, which is approximately equivalent to the average emissions of the highest three years between 2000 and 2004.[29] In the second phase the cap will be reduced by 10% from 2015 through 2020.[30]

The cap-and-trade approach creates a market for the allowances when a cleaner power facility has more allowances than it needs to cover its emissions.[31] The cleaner facility can then sell its surplus allowances to dirtier facilities that do not have enough allowances to cover their emissions.[32] If the demand for allowances increases, the market price for allowances also will increase.[33] Dirtier facilities then face the choice of either reducing emissions or purchasing allowances because the net emissions from the region cannot exceed the cap.[34] This approach gives facilities flexibility not available to them under traditional command and control regulations; each facility can design its own compliance strategy based on economic efficiency and adjust its strategy over time in response to changes in technology and the market.[35] In fact, the federal government used a cap-and-trade program to regulate the emissions that cause acid rain largely because of the flexibility the approach offers.[36]

Because the federal government has not implemented a national regulatory program for CO_2 emissions, the northeastern states, through RGGI, may act without fear of preemption by existing federal law.[37] This does not mean, however, that RGGI lacks legal obstacles.[38] For example, although each state has the individual authority to regulate CO_2 emissions, each must determine how to fit that regulation within its state regulatory framework.[39] Some states can adopt the RGGI regulations through the rulemaking authority vested in their respective state agencies, while others require enabling legislation to give effect to the RGGI rules.[40] Once the cap-and-trade regulations have been adopted, each RGGI state will monitor and enforce those rules.[41] That enforcement may raise additional challenges – in particular, the problem of leakage.[42]

B. The Problem of Leakage and Regulations that Burden Interstate Commerce

Implementing a cap-and-trade program at the regional level presents problems that do not arise when a similar program is implemented at the national level.[43] The RGGI cap-and-trade program will operate on the supply side – that is, CO_2 emission allowances will be allocated to, and traded among, fossil fuel-fired electricity generators within the region that supply electricity to the grid.[44] Because the emissions cap will apply only to in-region generators, the RGGI plan will not limit emissions from electricity that is imported into the region and used by consumers within RGGI states.[45] Generators outside the capped region will be able to export power freely to the entities inside the region that are responsible for procuring and delivering electric power to consumers without concern for the cap – resulting in emissions leakage.[46] Entities that deliver electricity to the consumer are referred to as Load-Serving Entities ("LSEs").[47]

The leakage problem presents two related problems for regulators in the RGGI region.[48] First, generators outside the RGGI region will have a competitive advantage over generators within the region because they will have little incentive to invest in the cleaner technologies required to achieve the emission cap.[49] As a result, electricity outside the region will become less expensive than electricity produced inside the region.[50] This leads to the second problem.[51] The resulting increase in cheaper, imported electricity will undermine the goal of the program because imported emissions will not count towards the region's emission limits even though they are directly associated with the region's electricity consumption.[52]

As expressed in their Memorandum of Understanding, the RGGI states already are committed to a supply side cap-and-trade program.[53] During the initial phase of the program, the RGGI states have decided not to take direct regulatory action to stem leakage, but have agreed to implement measures to monitor electricity imports and reevaluate whether action is required at a later date.[54] In the meantime, the RGGI states will establish a working group to consider potential options for addressing leakage.[55]

Various options are available to address the problem of leakage.[56] One option is to supplement the initial domestic cap-and-trade program (imposed on in-state electricity generators as a source of emissions) with a second, load-side cap-and-trade regulation imposed on LSEs, but only on the electricity they import into the region.[57] This load-side regulation would treat electricity imports as an additional source of emissions included in the CO_2 emissions cap for the region.[58] LSEs would initially be allocated CO_2 allowances on the same basis as that of in-region generators – LSEs would receive allocations based on historic imports just as generators receive allocations to cover their historic generation.[59] In-state generators would be legally responsible for their own emissions under the first regulation.[60] Under the second regulation, LSEs would be legally responsible for the emissions associated with the electricity they import from states outside the RGGI region and distribute to in-state consumers.[61] The total cap on CO_2 emissions would therefore cover those emissions produced in the region by electricity generators, as well as those emissions produced outside the region that are directly associated with consumer demand for electricity inside the region.[62] The LSEs would engage in the same market for allowances with electricity generators and make operating choices based on economic efficiency.[63]

This regulatory scheme would likely face challenges based on the Interstate Commerce Clause of the US Constitution, however, because the regulation imposed on LSEs would place restrictions only on imported electricity.[64] Electricity generators outside the RGGI region wishing to sell into the region at lower prices likely will challenge the regulation as a violation of the dormant Commerce Clause, which prohibits any state from enacting regulations that discriminate against (or place burdens on) interstate commerce.[65] The RGGI states should thoroughly consider potential Commerce Clause challenges before implementing a cap-and-trade program on electricity imported by LSEs to stem leakage.[66]

II. Commerce Clause Jurisprudence and the Development of the Compensatory Tax Doctrine

The Commerce Clause of the US Constitution provides that "the Congress shall have Power . . . to regulate commerce . . . among the several States".[67] Although phrased as an affirmative grant of power to Congress, the Commerce Clause has long been recognized to have a negative aspect which denies states the power to discriminate against, or burden, interstate commerce.[68] A variety of reasons are given for this negative aspect of the Commerce Clause (called the "dormant Commerce Clause"); two are of particular interest here.[69] First, it prohibits economic protectionism by the states – that is, regulatory measures designed to benefit in-state economic interests by burdening out-of-state competitors.[70] Second, it promotes economic efficiency that would be undone if states were free to place burdens on the flow of commerce across their borders.[71] The Supreme Court has stated that in granting Congress authority over interstate commerce, the Framers sought "to avoid tendencies toward the economic Balkanization that had plagued relations among the colonies and later among the states under the Articles of Confederation".[72]

The first step in evaluating the constitutionality of a state law under dormant Commerce Clause jurisprudence is to determine whether the challenged statute regulates evenhandedly with only "incidental" effects on interstate commerce, or discriminates against interstate commerce either on its face or in practical effect.[73] Where the regulation is "evenhanded" and the effects are "incidental", the statute will be upheld if the regulation passes the *Pike v. Bruce Church*, *Inc.*

balancing test.[74] This test examines whether: (1) the law effectuates a legitimate local purpose, (2) the burden imposed on interstate commerce is not clearly excessive in relation to the putative local benefits, and (3) there are alternative means for promoting the local purpose as well without discriminating against interstate commerce.[75] Where, however, the state regulation is discriminatory, meaning that it provides differential treatment of in-state and out-of-state interests, it is virtually per se invalid.[76] The regulation's proponent will only overcome the per se rule of invalidity if it can show that the regulation advances a legitimate local purpose that cannot be adequately served by reasonable nondiscriminatory alternatives.[77] Facial discrimination by itself may be a fatal defect, and invokes the strictest scrutiny of any purported legitimate local purpose and of the absence of nondiscriminatory alternatives.[78]

The hybrid regulatory approach described above could be challenged as a facially discriminatory regulation because the regulation covering LSEs only regulates emissions associated with imported electricity and therefore expressly treats in-state and out-of-state interests differently.[79] The LSE regulation imposes burdens on electricity crossing state lines only.[80] Therefore it burdens out-of-state generators wishing to sell into the RGGI region, but does not *itself* impose the same burdens on in-state generators.[81] Thus, the regulation would most likely be subject to strict scrutiny under the dormant Commerce Clause.[82]

A. An Exception to the Dormant Commerce Clause Rule of Invalidity: The Compensatory Tax Doctrine

The US Supreme Court has recognized a narrow exception to the per se rule of invalidity for facially discriminatory regulations, in the form of the compensatory tax doctrine.[83] Under the compensatory tax doctrine, a facially discriminatory regulation may survive strict scrutiny if it is a compensatory tax designed merely to make interstate commerce bear a burden already borne by intrastate commerce.[84] Although often expressed as an independent doctrine unto itself, the compensatory tax doctrine is merely a specific way of justifying a facially discriminatory tax because it achieves a legitimate local purpose that cannot be achieved through nondiscriminatory means.[85]

The Supreme Court laid the groundwork for the compensatory tax doctrine in the 1869 case of *Hinson v. Lott*.[86] In *Hinson*, the state of Alabama imposed a tax on all liquor imported into the state equal to the tax imposed on all liquor distilled within the state.[87] The Supreme Court stated that the tax on imported liquor was merely a complementary provision necessary to make the tax equal on all liquors sold in the state.[88] Therefore, the Court held that this was not an attempt to regulate commerce, but an appropriate and legitimate exercise of the state's taxing power.[89]

Since *Hinson*, the Court has more clearly defined and significantly limited the compensatory tax doctrine through a line of cases beginning in 1937 with *Henneford v. Silas Mason* and culminating in the decision of *Fulton Corp. v. Faulkner* in 1996.[90] Modern application of the compensatory tax doctrine involves a three-part test set out in 1994 in *Oregon Waste Systems v. Department of Environmental Quality of the State of Oregon* and refined in *Fulton Corp.*[91] The three conditions necessary for a valid compensatory tax are: (1) a state must identify the intrastate burden for which the state is attempting to compensate; (2) the tax on interstate commerce must be shown roughly to approximate – but not to exceed – the amount of the tax on intrastate commerce; and (3) the events on which the interstate and intrastate taxes are imposed must be substantially equivalent – that is, they must be substantially similar in substance to serve as mutually exclusive proxies for each other.[92] Given the relatively short life and limited application of the formalized three-part test, it is necessary to examine earlier cases, which address each of the prongs only implicitly, to analyze the compensatory tax doctrine fully.[93]

B. The History of the Compensatory Tax Doctrine

1. *Henneford v. Silas Mason*: Formal Validation of the Compensatory Tax

Nearly seventy years after its decision in *Hinson*, the Supreme Court formally recognized the validity of a "compensating tax" in 1937 in *Henneford v. Silas Mason.*[94] In *Silas Mason*, the State of Washington imposed two taxes, a 2% tax on retail sales and a compensating 2% tax on the privilege to use any article of tangible personal property within the state.[95] The use tax did not apply to articles for which a tax equal to or greater than 2% had already been applied out-of state.[96] The plaintiffs in *Silas Mason* brought machinery, materials and supplies into Washington that were purchased at retail in other states for use on the construction of a dam on the Columbia River.[97] Washington assessed a use tax on the items because they had not been subject to a sales tax out of state.[98]

The Court first acknowledged that the regulatory scheme was discriminatory on its face; the tax would never be payable on items purchased within the State of Washington because those items would be subject to a sales tax.[99] The burden of paying the use tax, however, was imposed equally on residents and non-residents who used their property within the state.[100] The Court noted that when the account was made up, the stranger from afar was subject to no greater burdens as a consequence of ownership than the dweller within the gates.[101] The Court reasoned that while one paid upon one activity or incident, and the other upon another, the sum was the same.[102] This reasoning implied that the sale and use of articles within the state were substantially similar events because the burdens fell on similarly described people – those taxpayers using articles in the state – and the taxes were therefore functionally equivalent.[103] The Court concluded that the scheme was not an unlawful burden on interstate commerce because it did not in fact burden commerce; it did not place a greater burden on goods purchased outside the state than those purchased inside the state.[104] The Court also rejected the proposition that the scheme amounted to protectionism of local retailers.[105] Because the tax was imposed on use, rather than import of the goods, and there was equality in the laying of the tax, there was no protectionism.[106]

2. *Maryland v. Louisiana*: Rejection of the "First-use" Tax

Since the Supreme Court's validation of the compensatory use tax in *Silas Mason*, it has steadfastly refused to apply the compensatory tax doctrine to areas outside the realm of sales and use taxes.[107] For example, in its 1981 decision in *Maryland v. Louisiana*, the Supreme Court struck down a Louisiana "first use" tax imposed on any natural gas imported into the state that was not subject to taxation by another state.[108] In effect this tax meant that only gas from the outer continental shelf (the "OCS") – an area of ocean that lies beyond state, but within federal, boundaries – was subject to the tax.[109] The tax imposed was equal to the severance tax the state imposed on gas producers in the state.[110] Because of numerous tax exemptions and credits, however, the net effect of the tax scheme was to tax OCS gas moving through and eventually out of the state but not to tax Louisiana consumers of OCS gas.[111]

As an initial matter, the Court addressed the State of Louisiana's claim that the taxable "uses" within the state broke the flow of commerce and were wholly local events, subject to state regulation.[112] The Court rejected this reasoning, stating that gas crossing a state line at any stage of its movement to the ultimate consumer was in interstate commerce during the entire journey from the wellhead to the consumer, even though interrupted by certain events within a particular state.[113]

Finding the tax scheme facially discriminatory towards interstate commerce, the Court set out to determine whether it could be upheld as a compensatory tax under *Silas Mason*.[114] The Court held that the compensatory tax doctrine requires identification of the burden for which the state is attempting to compensate.[115] Louisiana claimed that it was attempting to compensate for the burden of the severance tax on local production of natural gas.[116] The Court rejected this argument, stating that although Louisiana has an interest in protecting its natural resources and therefore could impose a severance tax on domestic producers, it had no comparable sovereign interest in being compensated for the severance of resources from land outside its boundaries.[117] Therefore, the first-use tax could not have been designed to meet the same ends as the severance tax – it could not have been designed to protect Louisiana's natural resources.[118] The Court said that the "use" of gas and severance of gas could not be considered "substantially equivalent events", reasoning implicitly that because the burden of the two taxes fell on differently described taxpayers (in-state producers and out-of-state consumers) and did not meet the same ends, the taxes were not functionally equivalent.[119] The Court differentiated these circumstances from the case of sales and use taxes, where a state attempts to ensure uniform treatment of goods to be consumed in the state by imposing taxes on substantially similar events occurring wholly within the state.[120]

The Court concluded that the common thread running through the cases upholding compensatory taxes was equality of treatment between local and interstate commerce.[121] Because the pattern of credits and exemptions principally burdened gas moving out of state, the tax was not a valid compensatory tax.[122]

3. *Armco, Inc. v. Hardesty*: An Emphasis on Substantially Equivalent Events

The Supreme Court zeroed in on the notion of substantially equivalent events in 1984 in *Armco v. Hardesty.*[123] In that case the Court struck down a tax imposed by West Virginia on gross receipts of tangible property sold at wholesale.[124] The Court found the regulation to be facially discriminatory because it exempted local manufacturers from the tax.[125] West Virginia defended the tax, which was 0.27% of the wholesale price, as a compensatory tax for the far higher 0.88% manufacturing tax on local manufacturers.[126] The Court rejected the argument, holding that manufacturing and wholesale were not substantially similar events.[127] The Court noted that the manufacturing tax was not reduced when the goods were sold out of state, providing evidence that the tax was in fact a manufacturing tax and not a proxy for the gross receipts tax imposed on wholesalers from out of state.[128] In addition, the Court found that it would be impossible to determine which portion of the manufacturing tax was attributable to manufacturing and which portion to sales, and therefore it would be impossible to do an accounting to determine whether the tax on intrastate commerce roughly approximated the alleged compensating tax on interstate commerce.[129]

The Court also noted that when the two taxes were considered together, discrimination against interstate commerce persisted because there was no exception in the wholesale tax regulation for manufacturers who had already paid a manufacturing tax in their home state.[130] If the scheme were upheld, manufacturers from out of state would pay both a manufacturing tax and a wholesale tax, while a West Virginia resident would pay only a manufacturing tax.[131] The Court indicated that this would clearly violate the anti-protectionist purposes of the Commerce Clause.[132]

C. The Modern Compensatory Tax Doctrine and the Three-part Test

1. Oregon Waste Systems, Inc. v. Department of Environmental Quality of the State of Oregon: The Three-part Test Established

The Supreme Court set out the three elements of the compensatory tax doctrine distinctly for the first time in 1994 in *Oregon Waste Systems, Inc. v. Department of Environmental Quality of the State of Oregon.*[133] In that case, an Oregon-based solid waste disposal company challenged an Oregon regulation that imposed a $2.25-per-ton surcharge on out-of-state waste disposed of at landfills within Oregon.[134] The Oregon-based company regularly shipped waste from neighboring Washington into Oregon for disposal.[135] The Oregon Supreme Court upheld the surcharge as a compensatory fee with an express nexus to actual costs incurred by state and local governments associated with disposing of the waste.[136] The US Supreme Court reversed and invalidated the surcharge.[137]

The Court held that because the rule was facially discriminatory, it was per se invalid unless it advanced a legitimate local purpose that could not be adequately served by reasonable nondiscriminatory alternatives.[138] The Court began by recognizing the settled principle that interstate commerce may be made to "pay its way" and that "[i]t was not the purpose of the commerce clause to relieve those engaged in interstate commerce from their just share of state . . . burdens".[139] The Court noted that since *Hinson v. Lott* in 1869 the compensatory tax doctrine had been used to express these principles, while also ensuring that no state exacts more than a just share from interstate commerce, which is a central purpose of the Commerce Clause.[140]

The Court set out the first and second prongs of the compensatory tax analysis requiring the state to (1) identify the intrastate burden for which the state is attempting to compensate and (2) show that the burden on interstate commerce roughly approximated, but did not exceed, the burden on intrastate commerce.[141] Applying these two requirements, the Court held that Oregon's failure to identify a *specific* compensating charge on intrastate commerce equal to or exceeding the surcharge was fatal to its claim.[142] Oregon claimed that the surcharge compensated for general taxes paid by Oregon residents who disposed of in-state waste.[143] The Court rejected this claim because it was impossible to determine which portion of the general taxes were attributable to the disposal of waste, and therefore the Court could not determine whether the two burdens were roughly equivalent.[144] Accordingly, the state failed the first two prongs of the analysis.[145]

The Court further stated that even if it were possible to calculate the portion of the general taxes that contributed to an intrastate burden roughly equivalent to the interstate burden, the surcharge would still be invalid because the general tax and the surcharge were not imposed on substantially equivalent events.[146] Thus, the surcharge also violated the third prong of the analysis.[147] Under the "equivalent events" analysis, the Court reasoned that earning income and disposing of waste were even less equivalent than wholesale and manufacturing, which were found not to be substantially equivalent in *Armco.*[148] The court reasoned implicitly that the two taxes were not designed to meet the same ends, because income taxes cover far more than disposal of waste and the two could not be functionally equivalent to each other.[149] Moreover, the fact that Oregon-based shippers of out-of-state waste were charged the surcharge *and* income tax refuted the argument that the events were substantially (or functionally) equivalent.[150] The Court noted that the prototypical example of substantially equivalent events is the sale and use of articles within the state and that the only compensatory taxes upheld had been use taxes on products purchased out of state.[151] The Court refused to weigh comparative burdens imposed on dissimilar events.[152]

2. *Fulton Corp. v. Faulkner*: The Modern Test Summarized

The modern embodiment of the compensatory tax doctrine was summarized most recently in *Fulton Corp. v. Faulkner* in 1996.[153] The case involved an "intangibles tax" on the fair market value of corporate stock owned by North Carolina residents.[154] Residents were entitled to take a deduction equal to the fraction of the issuing corporation's income that was subject to tax in North Carolina.[155] Therefore, if a resident owned stock in an in-state corporation the stock was not subject to the tax because the taxable percentage deduction was 100%, but stock in an out-of-state corporation was subject to the tax.[156] Therefore, the Court first determined that the regulatory scheme was facially discriminatory.[157]

The Supreme Court again recognized that there may be cases where a facially discriminatory tax may be upheld if the combined effect of the multi-tax scheme is to subject intrastate and interstate commerce to equivalent burdens.[158] The Court then reiterated the three conditions necessary for a valid compensatory tax: (1) a state must identify the intrastate burden for which the state is attempting to compensate; (2) the tax on interstate commerce must be shown roughly to approximate – but not to exceed – the amount of the tax on intrastate commerce; and (3) the events on which the interstate and intrastate taxes are imposed must be so substantially similar in substance as to serve as mutually exclusive proxies for each other.[159]

To meet its burden under the first prong, North Carolina argued that the taxable percentage deduction (i.e. the tax on out-of-state stock interests) compensated for the burden of the general corporate income tax paid by corporations doing business in North Carolina.[160] The Court rejected this argument, holding that in addition to merely identifying the intrastate burden for which it seeks to compensate, the state must also show that the intrastate tax serves some purpose for which the state may otherwise impose a burden on interstate commerce.[161] The Court held that because North Carolina had no general sovereign interest in taxing income earned out of state, it would fail the first prong of the analysis unless the state could identify some instate activity or benefit to justify the compensatory tax.[162] North Carolina attempted to cure this deficiency by pointing out that the out-of state corporations benefited from the use of the state's capital markets without paying corporate income tax and that the intangible tax compensated for this loss.[163] The Court declined to create a precedent that would allow the imposition of a tax on entities involved in interstate commerce any time they happened to use facilities supported by general state tax funds.[164]

Under the second prong of the analysis, the Court in *Fulton* addressed the problem of interstate burdens that are imposed as a compensatory measure for generally defined intrastate burdens.[165] The second prong requires that the burden on interstate commerce be shown roughly to approximate, but not exceed, the amount of the burden on intrastate commerce.[166] North Carolina justified the intangibles tax and corresponding taxable percentage deduction as a measure for maintenance of the capital market for the shares of both foreign and domestic corporations.[167] The Court noted that the tax for which the state purported to compensate was a general corporate income tax that paid for a wide range of things, including construction and maintenance of a transportation network, institutions to educate a workforce, and local fire and police protection.[168] The state could not say what percentage of that general tax was allocated to support the capital market and whether that proportion was greater or smaller than the one imposed on interstate commerce by the intangibles tax.[169] The Court emphasized the point made in *Oregon Waste*, namely that it is generally unwilling to make the complex quantitative assessments required by the compensatory tax doctrine when general forms of taxation are involved.[170] The Court confirmed its unwillingness to permit discriminatory taxes on interstate commerce to compensate for charges purportedly included in general forms of intrastate taxation.[171]

In addressing the third prong of the analysis, the Court noted that recent decisions expressed an extreme reluctance to recognize new compensatory categories outside the sales/use tax combination recognized in *Silas Mason.*[172] The third prong requires that the compensating burdens fall on "substantially equivalent events".[173] The Court explained that to meet this requirement the taxed activities must be sufficiently similar in substance to serve as mutually exclusive proxies for each other and that the two taxes must be functionally equivalent.[174] The Court held that actual incidence of the tax upon the same class of taxpayers is a necessary precondition for a valid compensatory tax, reasoning that if the burden falls on differently described entities then the taxes cannot be functionally equivalent.[175] The Court recognized that the ultimate distribution of burdens may be different from the statutory distribution of burdens, particularly when the nominal taxpayer can pass the burden to other parties, such as consumers.[176] The Court held that a state defending a compensatory tax scheme has the burden of showing that, at a minimum, the actual incidence of the two burdens is such that the real taxpayers are within the same class, so that a finding of combined neutrality as to interstate commerce is at least possible.[177]

North Carolina argued that because corporate earnings influence the price of stock, the intangibles tax and the income tax are essentially taxing the same event.[178] The Court held that this was insufficient, and that the difference between the parties on which the taxes fell was of great significance.[179] The Court noted that in *Silas Mason*, the use tax was acceptable because the effect of the regulatory regime was to help in-state retailers to compete on terms of equality with retailers in other states who are exempt from a sales tax or other corresponding burden.[180] In *Silas Mason*, all taxpayers using their property within the state bore an equal burden whether paying a use tax or a sales tax.[181] This equality did not exist in *Fulton* because the allegedly compensating taxes fell on taxpayers who were differently described.[182] The income tax paid by corporations doing business in the state would be reflected in the stock price, and the actual burden of the tax would be borne by other parties such as consumers of the corporations' products.[183] By contrast, the Court stated, it was unlikely that the stock price of corporations doing business outside the state would reflect the impact of the incidence tax because North Carolina investors make up a small portion of the national market.[184] Thus, the economic incidence of that tax would fall on the resident shareholder.[185] The Court noted that the objective of the "equivalent event" requirement is to enable in-state and out-of-state businesses to compete on equal footing.[186] The combination of the two tax schemes violated this objective because the actual incidence of the intangibles tax fell squarely on the shareholder and thus encouraged North Carolina investors to favor investment in corporations doing business within the state.[187] The Court stated that the compensatory tax doctrine is fundamentally concerned with equalizing competition between in-staters and out-of-staters.[188] The Court cautioned, however, that the difficulty in comparing the economic incidence of allegedly complementary tax schemes on different taxpayers and different transactions leads to the conclusion that courts will be unable to evaluate equivalency outside the context of traditional sales/use taxes.[189]

III. Applying Commerce Clause Jurisprudence to the Problem of Leakage

Although addressing climate change at the state and regional levels is certainly suboptimal, it could eventually have important effects on national policy.[190] Individual state actions create a patchwork of policies around the country that is both inefficient for businesses and risky for the acting states, which risk driving business out of state.[191] This patchwork, however, often inspires the regulated community to lobby the federal government for national action.[192] In addition, states can serve as laboratories for experimenting with various regulatory options to determine the best model for national action.[193] RGGI may serve this experimental function well.[194] For these reasons the RGGI states should use every avenue available to them, including the compensatory tax doctrine, to protect the regulatory scheme from invalidation based on the Interstate Commerce Clause.[195]

The compensatory tax doctrine may not be accepted by a court as applicable legal doctrine for emissions regulations because the burden imposed is not in the form of a tax.[196] As the Supreme Court noted in *Oregon Waste, Inc. v. Department of Environmental Quality of the State of Oregon*, however, the compensatory tax doctrine is merely a specific way of justifying a facially discriminatory tax that achieves a legitimate local purpose that cannot be achieved through nondiscriminatory means.[197] The RGGI states should therefore argue for the expansion of compensatory tax doctrine principles to cover important state and regional environmental regulations such as the RGGI program.[198]

A regulatory approach that adequately addresses leakage may require a second regulation imposing a cap on the emissions associated with electricity imported into the region by LSEs.[199] This regulation would be passed after the implementation of the first cap on domestic electricity generators and only if it was determined that leakage was undermining the goals of the program.[200] If the RGGI states decide to use this hybrid regulatory approach to address leakage, they should employ the compensatory tax doctrine to defend the scheme by arguing that the regulation of imported electricity is necessary to further a legitimate local purpose and that the combination of the two regulations is nondiscriminatory in effect.[201] The purpose of the initial emissions regulation imposed on generators is to reduce CO_2 emissions associated with in-state electricity consumption in order to protect the state's interests in public health and welfare and preservation of natural resources.[202] The regulation of imported electricity through LSEs is a compensatory measure designed simply to make interstate commerce bear a burden already borne by intrastate commerce.[203] In other words, the combination of the two regulations merely levels the playing field across all electricity generators serving the region.[204] Because the LSE regulation is necessary to effectuate the purpose of the initial regulation, the combination of the two does not have a discriminatory effect, and is therefore a legitimate compensatory "tax" or burden on interstate commerce.[205]

A. Application of the Compensatory Tax Doctrine to the Hybrid Approach

Under the first step of the dormant Commerce Clause analysis, a court would likely determine that the second regulation imposed on LSEs does not regulate evenhandedly with only incidental effects on interstate commerce.[206] Rather, because the LSE regulation only regulates emissions associated with electricity that crosses state lines while exempting domestically generated electricity, a court would likely determine that the regulation of imported electricity discriminates against interstate commerce on its face.[207]

As noted above, courts review facially discriminatory regulations under a strict scrutiny test based on the assumption that they are per se invalid.[208] To overcome this assumption, the proponent of the regulation must show that the regulation advances a legitimate local purpose that cannot adequately be served by reasonable nondiscriminatory alternatives.[209] This may be shown by applying the principles embodied in the three prongs of the compensatory tax doctrine.[210]

1. Application of the First Prong of the Compensatory Tax Doctrine: Identifying the Intrastate Burden Requiring Compensation

Under the first prong of the compensatory tax doctrine, the RGGI states must identify the intrastate burden for which the regulation of emissions associated with electricity imports seeks to compensate.[211] It is reasonable to assume that a court would accept the assertion that the states adopted the regulation in good faith as compensation for the domestic burden of the emission cap placed on in-state generators, rather than suspecting some ulterior motive.[212] The states will also be required to show that the intrastate burden serves some purpose for which the state may otherwise impose a burden on interstate commerce.[213]

One purpose of the intrastate burden on electricity generators is to protect the RGGI states' natural resources and public health by reducing CO_2 emissions associated with electricity consumption.[214] The RGGI states do not, however, have a sovereign interest in protecting other states' natural resources or public health and safety, and no court has yet held that a state has a legitimate interest in reducing global pollutants outside its borders.[215] Therefore, a court could invalidate the regulation because the intrastate burden that the generator regulation imposes serves a purpose for which the state may not otherwise burden interstate commerce.[216] Similarly, the Court in *Maryland v. Louisiana* rejected the argument that because the state imposed a severance tax on gas extracted from its own soil, it could impose a compensating first-use tax on imported gas.[217] The Court held that Louisiana had no sovereign interest in the severance of resources from land outside its borders, that the alleged compensating tax was invalid, and that the state had to identify an in-state activity in order to justify the first-use tax.[218]

The LSE regulation that the RGGI states may impose, however, is unlike the Louisiana regulation in *Louisiana* because it is necessary to promote the states' legitimate interest while the Louisiana regulation was not.[219] In both *Louisiana* and *Fulton Corp. v. Faulkner*, the Court held that the state must identify an in-state activity or benefit to justify the compensatory levy, a task that neither of the states could do.[220] The RGGI states, on the other hand, may be able to overcome the sovereign interest argument by showing that the regulation of emissions associated with imported electricity is necessary to carry out the purposes of the in-state regulation, and that the two regulations are designed to meet the same end.[221] The RGGI states should argue that the combination of the two regulations serves the legitimate local interest of protecting the natural resources and the health and welfare of their citizens, and that a regulatory scheme that places some burden on interstate commerce is necessary to effectuate that purpose.[222] If the states cannot regulate emissions from imported electricity, then the regulation of domestic emissions will not be effective.[223] This argument thus directly addresses the requirement set out in *Louisiana* that the two regulations be designed to meet the same end, because both regulations are ultimately designed to protect the states' public health and natural resources.[224] Based on this reasoning, the RGGI states could persuade a court that the regulation satisfies the first prong of the compensatory tax doctrine.[225]

2. Application of the Second Prong of the Compensatory Tax Doctrine: Equivalent Burdens on Interstate and Intrastate Commerce

The second prong of the compensatory tax analysis requires that the burden on interstate commerce roughly approximate, but not exceed, the burden on intrastate commerce.[226] The RGGI states will not encounter the problems faced by states that sought to compensate for burdens imposed on intrastate commerce by general forms of taxation as Oregon did in *Oregon Waste* and North Carolina did in *Fulton,* because the LSE regulation compensates for a specific regulation focused on emissions from fossil fuel-fired generators, rather than a generally applicable resident taxation.[227] The complexity of the accounting in the case of emissions trading, however, is sure to raise its own challenges.[228]

It is well-established that pure economic protectionism is not considered a legitimate local purpose under Commerce Clause jurisprudence.[229] Therefore, if a regulation had the effect of putting instate generators at a competitive advantage over out-of-state generators, that regulation would be struck down.[230] It is therefore critical that the RGGI states consider this issue from the beginning of the program if they intend to address the problem of leakage in the future.[231] Even under a regulatory scheme that only targets domestic generators, the RGGI states should set the initial cap on emissions for the region at a level that includes the emissions associated with historic imports on the same basis as historic in-region generation.[232] Under the second regulation, LSEs should receive allowance allocations on the same basis that generators are given allowances.[233] Any inequality in the method by which allowances are distributed to LSEs for their imports as compared to domestic generators could lead a court to detect economic protectionism.[234] The RGGI states must be able to show that the allocation of allowances to imported electricity under the second regulatory measure is nondiscriminatory because it is based on the same historic baseline as the allocation of allowances to domestic generators.[235]

Also critical to the defense of the regulation on imported electricity will be the method by which actual emissions associated with imported electricity and domestic generator emissions will be measured. [236] If the methods used are not the same, then the states will run a greater risk of having the regulation of imported electricity struck down, because the court will not be able to weigh the burdens quantitatively.[237] For example, if the states use actual emission rates for instate generators because they are able to inspect those plants, but use assumed rates based on megawatt-hour output for imported electricity because they are unable to inspect out-of-state plants, a court could find that either the burdens were not equivalent or that it was too cumbersome to attempt to weigh them.[238] For this reason, RGGI should use a common system of assigning CO_2 attributes to electricity for both generators and LSEs.[239]

Both the allocation of allowances and measurement of emissions will likely raise the sort of difficult quantitative questions that the Supreme Court has continually used to strike down compensatory regulations.[240] For example, in *Armco, Inc. v. Hardesty*, the state attempted to impose a wholesale interstate tax to compensate for a manufacturing intrastate tax.[241] The Court complained that it could not determine what part of the manufacturing tax was attributable to manufacturing and what part to sales and therefore it struck down the burden on interstate commerce, even though the burden on intrastate activities was arguably the greater of the two.[242] To survive the second prong of the analysis, the RGGI states must ensure that the accounting of allowances and emissions reveals the actual burdens imposed and that the burden on interstate commerce is no greater than the burden on intrastate commerce.[243]

3. Application of the Third Prong of the Compensatory Tax Doctrine: Substantially Equivalent Events

Under the third prong of the compensatory tax doctrine, the RGGI states would be required to show that the events on which the interstate and intrastate burdens fall are substantially equivalent; that is, they are sufficiently similar in substance to serve as mutually exclusive proxies for each other.[244] The states should be able to show that emissions associated with imported electricity and emissions from domestically generated electricity serve as mutually exclusive proxies for each other because they are functionally equivalent.[245] In *Louisiana*, the Court held that severance of natural gas and import of gas into the state for "use" were not comparable and no equality existed because the state was not ensuring uniform treatment of goods and materials to be consumed in the state.[246] Instead, goods were burdened differently depending on whether or not they were destined for interstate commerce.[247] By contrast, in the case of the regulations imposed on LSEs and in-state generators, the states are attempting to impose a burden on imported electricity equivalent to the burden on domestic electricity to ensure uniform treatment of electricity consumed in the state.[248] This treatment is unlike that in *Louisiana*, but similar to that in *Henneford v. Silas Mason*, where the Court upheld the combination of the sales and use taxes because the regulations ensured uniform treatment of goods and the burden was imposed equally on residents and non-residents making use of goods within the state.[249]

Moreover, the burden of the two regulations falls on the same class of actors – either all generators selling to the state whether resident or non-resident, or ultimately on all consumers within the state – and thus the regulations are functionally equivalent.[250] This is similar to the Court's reasoning in *Hinson v. Lott*, where it upheld a tax on each gallon of liquor imported into the state on the ground that it complemented a tax of equal magnitude on each gallon of liquor distilled in the state and was necessary to equalize competition between in-staters and out-of-staters.[251] Here, as in *Hinson*, the two "taxes" are functionally equivalent and therefore the two events serve as mutually exclusive proxies for each other.[252] The hybrid scheme is unlike the scheme in *Fulton*, where the Court expressly found that the actual incidence of the burdens due to the corporate income tax and the intangibles tax fell on differently described taxpayers.[253] The Court concluded that because one tax fell on domestic corporations while the other fell on individuals investing in out-of-state corporations, the two could not be functionally equivalent and the discriminatory regulation was invalid.[254] By contrast, the burdens of the two regulations here fall on similarly described entities, those serving a state's electricity market and ultimately consumers within the state, and therefore the two burdens are functionally equivalent.[255]

As sensible as this argument seems, the fact remains that the Supreme Court has continuously refused to acknowledge any expansion of the compensatory tax doctrine beyond the sales and use tax category since its 1937 decision in *Silas Mason.*[256] For example, in *Armco* the Court held that manufacturing and wholesale are not substantially similar events, reasoning that the taxes imposed on the two were not functionally equivalent to each other.[257] The Court in *Fulton* stated: "*Hinson* does not alter our conclusion today that Courts will ordinarily be unable to evaluate the economic equivalence of allegedly complementary tax schemes that go beyond traditional sales/use taxes".[258] It appears that the Court is largely unwilling to open the door to allowing facially discriminatory regulations as alleged compensatory regulations outside sales and use taxes because the quantitative evaluations required to determine whether the burdens are equivalent are too cumbersome.[259] The principles embodied in the doctrine, however, are still of value to the RGGI states because they may form the foundation of an argument for upholding the regulation.[260]

For one, there is a critical distinction between the hybrid approach to regulating emissions and each of the allegedly compensatory taxes that the Court has struck down since *Silas Mason.*[261] In every other case the Court has found that the combination of regulations either did in effect, or had the potential to, favor domestic interests over out-of-staters.[262] By contrast, here it is assumed that the RGGI states will design a combination of regulations that do not favor domestically generated electricity over imported electricity.[263] In *Louisiana*, the combined effect of the imposed tax and tax credit scheme was to burden only gas traveling out of state; therefore, the tax was invalidated.[264] In *Fulton*, the regulations had the effect of encouraging North Carolinians to invest in domestic rather than out-of-state companies.[265] By contrast, as was the case in *Silas Mason*, the RGGI regulations would have the effect of burdening all electricity consumed in the state equally and therefore should be upheld.[266]

It is also worth considering the words of the Court in *Armco* when evaluating the manufacturing and wholesale taxes.[267] The Court noted that because no exception existed in the regulation for imported goods already subject to manufacturing tax in another state, the combination of the two regulations could have the effect of favoring domestic goods.[268] If out-of-state generators are subject to emissions caps in their home states, then the LSE regulation will not further burden them because they will already be producing clean electricity and the regulation will not run into the *Armco* problem.[269] Before implementing a hybrid approach, however, the RGGI states must consider whether the regulation on imported electricity requires some exceptions.[270] For example, the regulation should account for other potential burdens associated with CO_2 emissions that are not imposed in the RGGI region but could be imposed in other states, such as CO_2 emissions taxes.[271] Taking this issue into account as well as the Court's approach to compensatory taxes, the RGGI states may be able to avoid invalidation of future attempts to address leakage.[272]

Conclusion

The ultimate solution to the problem of leakage is to implement a nationwide regulatory program for greenhouse gas emissions. Until that time, state regulators must do their best to combat global warming by implementing regional programs and to prevent leakage. If RGGI is committed to a supply-side regulatory scheme, there are several factors that should be considered before implementing a regulation that covers imported electricity through LSEs. In order to meet the requirements of the compensatory tax doctrine, the RGGI states must be able to show with absolute certainty that the combined effect of the regulations is to impose equal burdens on electricity to be consumed within the state – that the burden on interstate commerce is no greater than the burden on intrastate commerce.

The initial carbon dioxide emissions cap should be set at levels that include emissions associated with historic imports as well as historic in-state generation, to avoid difficult accounting of allowances in the second phase of the program. The RGGI states must also determine how to allocate allowances associated with historic imports during the phase of the program that only subjects in-state generators to regulation. The allocation of allowances must not favor in-state electricity generators.

The RGGI states must also determine how carbon emission attributes of imported electricity should be measured. The method used should be the same as the method used for measuring emissions associated with domestically generated electricity, to avoid any differential treatment of in-state and out-of-state generators that could invalidate the regulation.

Even if these precautions are taken by the RGGI states, there is still a substantial likelihood that a court would strike down the regulation of imported electricity through in-state LSEs as a violation of the dormant Commerce Clause. Faced with such a challenge, RGGI states should argue that the principles embodied in the compensatory tax doctrine should be applied to validate the regulatory scheme, because the scheme achieves a legitimate local purpose that cannot be achieved through nondiscriminatory means. First, the regulation of imported electricity compensates for the domestic burden caused by the emission cap placed on in-state generators. Second, the regulatory scheme places equal burdens on both in-state and out-of-state actors by placing them on equal footing with regard to emissions allowances. Third, the emissions associated with imported electricity and emissions from domestically-generated electricity serve as mutually exclusive proxies for each other. A court reviewing the hybrid regulatory scheme should accordingly extend the applicability of this dormant Commerce Clause exception.

In the event that the RGGI program merely regulates in-region generators and does not address the problem of leakage, the program will still be a valuable tool. The action of the RGGI states, in combination with actions taken in other states such as California, may be the catalyst required to set a national movement in motion. At the very least, the RGGI program will inform other regulators around the country of the strengths, weaknesses, and potential pitfalls of a cap-and- trade program for regulating greenhouse gas emissions.

Endnotes

1 *See* Regional Greenhouse Gas Initiative Memorandum of Understanding 12 (Dec. 20, 2005) [hereinafter RGGI MoU], *available at* http://www.rggi.org/docs/mou_final_12_ 20_05.pdf. Greenhouse gases are those gases in the earth's atmosphere that contribute to the "greenhouse effect"; that is, they absorb and reradiate energy from the sun back toward the earth, causing the earth's surface

and lower atmosphere to warm more than they otherwise would. *See* C.C. LEE, Dictionary of Environmental Legal Terms 284 (1st ed. 1996); Environmental Protection Agency, Terms of Environment: Glossary, Abbreviations, and Acronyms, http://www.epa.gov/OCEPAterms/gterms.html (last visited Aug. 29, 2006).

Seven states are participating in the RGGI program: Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont. *See* RGGI MoU, *supra*, at 1, 6–7. The Memorandum of Understanding also contains an explicit provision allowing Massachusetts and Rhode Island to become signatories at any time prior to January 1, 2008, under certain conditions. *See id.* at 8.

2 *See* RGGI MoU, *supra* note 1, at 1–2; Env't Ne., The Regional Greenhouse Gas Initiative: An Overview of the RGGI Program and its Importance 3 (2005) [hereinafter Env't Ne. Overview], http://www.env-ne.org/Program%20Fact%20Sheets/ENE_RGGI_Background.pdf. Market-based regulatory programs are commonly referred to as cap-and-trade programs. *See infra* note 23 and accompanying text. These programs implement an aggregate cap on allowable emissions in a region through government regulation. *See infra* note 25 and accompanying text. The cap is then distributed to polluters in the form of allowances. *See infra* note 26 and accompanying text. Each polluter must own enough allowances to cover its own emissions, but polluters are allowed to buy and sell allowances among each other. *See infra* notes 27–32 and accompanying text.

3 *See generally* Cap and Trade Subgroup, Cal. Climate Action Team, Cap and Trade Program Design Options (2006) [hereinafter California Report], *available at* http://www.climatechange.ca.gov/climate_action_team/reports/2006-03-27_CAP_AND_TRADE.PDF. The Cap and Trade Subgroup's report was appended to the Climate Action Team's more general report evaluating the impact of climate change on California and the options available to the state, which was presented to the California legislature and Governor Arnold Schwarzenegger. *See* Cal. Climate Action Team, Cal. Envtl. Prot. Agency, Climate Action Team Report to Governor Schwarzenegger and the Legislature 5 (2006), *available at* http://www.climatechange.ca.gov/climate_action_team/reports/2006-04-03_FINAL_CAT_REPORT.PDF; *see also* Climate Action Team Reports to the Governor and Legislature, http://www.climatechange.ca.gov/climate_action_team/reports/index.html (last visited Sept. 16, 2006) (listing the Climate Action Team's reports and appendices). On August 30, 2006, California's leaders announced an agreement to enact legislation that would place sharp limits on carbon dioxide emissions within the state. *See* Felicity Barringer, *Officials Reach California Deal to Cut Emissions*, N.Y. Times, Aug. 30, 2006, at A1.

4 *See* California Report, *supra* note 3, at 22; RGGI MoU, *supra* note 1, at 9.

5 *See* California Report, *supra* note 3, at 22.

6 *See id.*

7 *See* Richard Cowart, *Another Option for Power Sector Carbon Cap and Trade Systems – Allocating to Load* 3–4 (Regulatory Assistance Project, 2004), http://www.rggi.org/docs/allocating_to_load.pdf; *see also* California Report, *supra* note 3, at 21–22.

8 *See US* Const. Art. I, § 8, cl. 3 (granting authority to regulate interstate commerce to the federal government); Stacey E. Davis, Ctr. for Clean Air Policy, Policy Options for Reducing Greenhouse Gas Emissions from Power Imports 20 (2005) [hereinafter Policy Options], *available at* http://www.energy.ca.gov/2005publications/CEC-600-2005- 010/CEC-600-2005-010-D.PDF (identifying differential treatment of in-state and out-of-state power as a potential Commerce Clause violation).

9 *See infra* notes 18–272 and accompanying text. The arguments in this Note could also be applied to the regulatory scheme that California is currently adopting. *See supra* note 3.

10 *See* Fulton Corp., v. Faulkner, 516 US 325, 331 (1996) (quoting Assoc. Indus. of Mo. v. Lohman, 511 US 641, 647 (1994)); *see also* Walter Hellerstein, *Complimentary Taxes as a Defense to Unconstitutional State Tax Discrimination*, 39 Tax Law. 405, 406 (1986) (examining compensatory tax doctrine jurisprudence).

11 *See infra* notes 43–66 and accompanying text.

12 *See infra* notes 190–195 and accompanying text.

13 *See infra* notes 18–66 and accompanying text.

14 *See infra* notes 67–189 and accompanying text.

15 *See infra* notes 190–272 and accompanying text.

16 *Id*.

17 *See infra* notes 190–195 and accompanying text.

18 *See* RGGI MoU, *supra* note 1, at 1.

19 *See* Eileen Claussen, *An Effective Approach to Climate Change*, Science, Oct. 29, 2004, at 816; Joint Science Academies' Statement: Global Response to Climate Change 1 (June 7, 2005), http://nationalacademies.org/onpi/06072005.pdf. Carbon dioxide is the most abundant anthropogenic greenhouse gas in the world. Env't Ne. Overview, *supra* note 2, at 1. It is released into the atmosphere when carbon-based fuel is burned. *See id.* In 1780, the level of CO2 in the earth's atmosphere was approximately 280 parts per million ("ppm") and had been for at least 6000 years. *See* Elizabeth Kolbert, *The Climate of Man III: What Can Be Done?*, The New Yorker, May 9, 2005, at 54. As the industrial age took hold, CO2 concentrations began to rise – slowly at first and then more rapidly. *See id.* By the 1970s, the CO2 concentration in the atmosphere was approximately 330 ppm and in 2000 it reached 369 ppm. *Id.*; *see also* Lester R. Brown, *Growing . . . Growing . . . Gone?*, Mother Earth News, Dec.–Jan. 2004, at 70, *available at* http://www.

motherearthnews.com/Nature_and_Environment/2003_December_January/Growing___Growing___Gone_.

20 *See* Elizabeth Kolbert, *The Climate of Man II: The Curse of Akkad*, The New Yorker, May 2, 2005, at 69. This predicted increase in temperature is based on model predictions that show that if we continue to produce greenhouse gases at the rates necessary to meet increasing demand, atmospheric CO2 will reach 500 ppm around the middle of this century. *Id.* There is evidence that CO2 concentrations in the earth's atmosphere were that high about fifty million years ago when crocodiles lived in Colorado and ocean levels were three hundred feet higher than they are today, putting much of today's inhabited land underwater. Kolbert, *supra* note 19, at 54.

21 *See generally* Peter Schwartz & Doug Randall, An Abrupt Climate Change Scenario and Its Implications for United States National Security (2003), *available at* http://www.environmentaldefense.org/documents/3566_AbruptClimateChange.pdf. This report, commissioned by the US Department of Defense, identified these and other consequences as the possible and even likely results of an abrupt climate change event that could be caused by the collapse of the Atlantic conveyor as a result of global warming. *See id.* at 1–3; *see also* RGGI MoU, *supra* note 1, at 1.

22 *See* M.J. Bradley & Associates, *Momentum Builds in the US – What's Filling the Federal Vacuum on Climate Change?*, Envtl. Energy Insights, Apr.–May 2005, at 1–4. Through the Kyoto Protocol, most of the countries in the world, including the United Kingdom, the European Union nations, and Russia, have committed to reducing greenhouse gas emissions to at least 5% below 1990 levels by 2012. *See* Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, 37 I.L.M. 22 (1998); United Nations Framework Convention on Climate Change, Kyoto Protocol: Status of Ratification, http://unfccc.int/files/essential_background/kyoto_protocol/application/pdf/kpstats.pdf (last visited Aug. 31, 2006). On January 1, 2005, the European Union launched a capand-trade program covering CO2 emissions from large industrial polluters that will eventually cover twenty-five countries with a target of reducing CO2 emissions to 8% below 1990 levels by 2012. European Comm'n, EU Action Against Climate Change 3 (2005), http://ec.europa.eu/environment/climat/pdf/emission_trading2_en.pdf; *see also* Joseph A. Kruger & William A. Pizer, *Greenhouse Gas Trading in Europe: The New Grand Policy Experiment*, Env't, Oct. 2004, at 8–23 (analyzing the European Union emissions trading system). Individual states, including New Hampshire, Massachusetts, California, Oregon, and Washington, have made commitments to reducing greenhouse gases. *See* M.J. Bradley & Associates, *supra*, at 2–3. Mayors from 132 US cities have taken the Kyoto pledge of 7% reductions below 1990 levels by 2012, and fifty of the world's largest cities signed onto greenhouse gas emission reductions of 25% by 2030 at the UN World Environment Day conference held in June 2005. *Id.* at 3–4. Additionally, in 2003, various institutional investors representing $2.7 trillion worth of assets formed the Investor Network on Climate Risk to examine the risks of climate change to their portfolios. *Id.* at 1. The group

called on members to invest $1 billion in companies developing clean technologies and to adopt standards for climate risk disclosure. *Id.* at 1–2. In 2005, JPMorgan Chase announced that it would factor CO2 emissions into its lending practices. *Id.* at 2.

23 *See* RGGI MoU, *supra* note 1, at 2.

24 *See* Env't Ne. Overview, *supra* note 2, at 2. To ensure compliance with the cap, the RGGI states will develop a method of enforcement that may be imposed on the regulated facilities. *See* Model Rule § XX-6.5 (Reg'l Greenhouse Gas Initiative 2006), http://www.rggi.org/docs/model_rule_8_15_06.pdf (setting out a model compliance scheme).

25 *See* Env't Ne. Overview, *supra* note 2, at 2; Office of Air and Radiation, US Envtl. Prot. Agency, Tools of the Trade: A Guide to Designing and Operating a Cap and Trade Program for Pollution Control 1-2 (2003) [hereinafter EPA Guide], *available at* http://www.epa.gov/airmarkets/international/tools.pdf.

26 *See* Env't Ne. Overview, *supra* note 2, at 2; EPA Guide, *supra* note 25, at 1-2.

27 *Id*.

28 Memorandum from the RGGI Staff Working Group to RGGI Agency Heads 2 (Aug. 24, 2005) [hereinafter RGGI Staff Memorandum], http://www.rggi.org/docs/rggi_pro posal_8_24_05.pdf.

29 *See id.*; *see also* RGGI MoU, *supra* note 1, at 2. If Massachusetts and Rhode Island join the program, the cap will be increased to approximately 150 million tons. *See* RGGI MoU, *supra* note 1, at 8.

30 RGGI Staff Memorandum, *supra* note 28, at 2.

31 *See* EPA Guide, *supra* note 25, at 1-2 to -3.

32 *See id.* Cap-and-trade is a workable solution in the case of CO2 because CO2 is a uniform pollutant; it has the same atmospheric impact regardless of where the source is located. *See* Env't Ne. Overview, *supra* note 2, at 2. By contrast, localized pollutants such as mercury and particulate matter directly impact the health of the local communities and ecosystems surrounding the emission source. *Id.* This localized impact raises concerns over the creation of "hotspots" of pollution and related social and environmental justice issues. *See* EPA Guide, *supra* note 25, at 2-2. Therefore, for localized pollutants it is usually necessary to implement site-specific command-and-control regulation, which does not allow the flexibility of cap-and-trade programs. *See id*.

33 *See* EPA Guide, *supra* note 25, at 1-2 to -4.

34 *See id.* at 1-2 to -3. Dirtier facilities that exceed the emissions cap may be subject to additional penalties. *See supra* note 24.

35 *See* EPA Guide, *supra* note 25, at 1-2. In addition to investing in non-emitting forms of energy generation such as wind and solar energy, regulated facilities will have an incentive to improve end-use efficiency, transition to cleaner fossil fuels, invest in more efficient generation and transmission technology, and even utilize carbon capture and sequestration techniques to offset their emissions if it is economically efficient to do so. *See id.* at 1-3; *see also* California Report, *supra* note 3, at 24.

36 *See* 42 U.S.C. § 7651(b) (2000) (aiming to reduce emissions of sulfur dioxide and nitrogen oxide through an emissions allocation and transfer system); *see also* California Report, *supra* note 3, at 11–12 (noting the success of the federal government's acid rain reduction program). The largest-scale use of the cap-and-trade model in the United States to date is the federal government's acid rain program under Title IV of the Clean Air Act, but the model has also been used in regional programs. *See* 42 U.S.C. § 7651 (2000); California Report, *supra* note 3, at 11–15. Two regional programs, the Northeast NOx Budget Program and the Regional Clean Air Incentives Program ("RECLAIM"), used a cap-and-trade emissions program to regulate ozone and smog, respectively, with varying degrees of scope and success. *See* California Report, *supra* note 3, at 13–14.

37 *See* Env't Ne. Overview, *supra* note 2, at 3. This statement assumes that RGGI does not attempt to regulate electricity transmission or wholesale transactions per se that are regulated by the Federal Energy Regulatory Commission under the Federal Power Act. *See* 16 U.S.C. § 824 (2000); *see also* Note, *Foreign Affairs Preemption and State Regulation of Greenhouse Gas Emissions*, 119 Harv. L. Rev. 1877, 1878 (2006) (arguing that state regulation of greenhouse gases should not be preempted by the federal foreign affairs power).

38 *See* Peter Glaser, Troutman Sanders LLP, Regional Greenhouse Gas Initiative: A Contrarian Perspective, Presentation to the American Bar Association's Environment, Energy and Resources Section 23 (Jan. 26, 2006), http://www.abanet.org/environ/committees/renewableenergy/teleconarchives/012606/1-26-06GlaserPPT.PPT (contending that the RGGI states face Compact Clause and Commerce Clause hurdles and questioning whether the states have the political will to regulate CO_2 if legislation is required).

39 *See* RGGI MoU, *supra* note 1, at 7.

40 *See id.*

41 *See id.*

42 *See id.* at 9.

43 *See* Policy Options, *supra* note 8, at 4–5, 8 (discussing problems of regulatory programs that do not cap emissions outside the regulating state, including the problem of leakage); Robert R. Nordhaus & Stephen C. Fotis, Pew Ctr. for Global Climate Change, Analysis of Early Action Crediting Proposals 31 (1998), http://www.pewclimate.org/document.cfm?documentID=237 (identifying displacement

of emissions from sources within the program to sources outside the program as a potential problem facing non-national programs).

44 *See* RGGI MoU, *supra* note 1, at 2; Regional Greenhouse Gas Initiative, About RGGI, http://www.rggi.org/about.htm (last visited Aug. 23, 2006); *supra* notes 23–27 and accompanying text.

45 *See* California Report, *supra* note 3, at 22–23; Cowart, *supra* note 7, at 5.

46 *See* California Report, *supra* note 3, at 22–23; Cowart, *supra* note 7, at 5. The program cap will cover all in-region fossil fuel-fired electricity-generating units having a rated capacity equal to or greater than twenty-five megawatts. *See* RGGI MoU, *supra* note 1, at 2. The program may be expanded in the future to include other sources of greenhouse gas emissions and greenhouse gases other than CO2. *See* Regional Greenhouse Gas Initiative, About RGGI, http://www.rggi.org/about.htm (last visited Aug. 23, 2006).

47 *See* California Report, *supra* note 3, at 21; Cowart, *supra* note 7, at 2.

48 *See* California Report, *supra* note 3, at 22–23; Cowart, *supra* note 7, at 5.

49 *Id*.

50 *Id*.

51 *Id*.

52 *Id*.

53 *See* RGGI MoU, *supra* note 1, at 2.

54 *See id.* at 9.

55 *Id.*

56 *See* California Report, *supra* note 3, at 22–24; Cowart, *supra* note 7, at 5. For example, California is exploring a variation of the cap-and-trade approach referred to as allocation-to-load. California Report, *supra* note 3, at 21. Under this approach emission allowances are allocated to electricity providers, or LSEs, rather than to electricity generators. *Id.* Each LSE must hold allowances equal to the emissions created by the electricity it distributes to consumers. *Id.* Under a complete allocation-to-load program, the regulated LSE must hold allowances for all emissions associated with the electricity it sells to consumers, regardless of where the producing generator is located, and the cap applies to total emissions associated with all electricity consumed in the state. *Id.* In this way, imported energy, as well as domestic energy, is accounted for in the cap. *See* California Report, *supra* note 3, at 21–23; Cowart, *supra* note 7, at 5.

57 *Cf.* California Report, *supra* note 3, at 21–23 (discussing the possibility of regulating CO2 emissions through LSEs, rather than generators). This Note does not address

the question of whether individual states have the authority to regulate the emissions associated with imported power purchased by regulated LSEs. *See id.* (discussing existing regulatory authority and additional authority that would require legislative action to regulate all LSEs in California). This question depends heavily on state-specific legal issues. *See id.*; *see also* RGGI MoU, *supra* note 1, at 7.

58 *See* California Report, *supra* note 3, at 21–23; Cowart, *supra* note 7, at 5.

59 *See* California Report, *supra* note 3, at 21–23; Cowart, *supra* note 7, at 5. The current proposed cap for the total RGGI region – approximately 120 million short tons – is based on the average emissions of the highest three years between 2000 and 2004 for each state. *See* RGGI MoU, *supra* note 1, at 2; RGGI Staff Memorandum, *supra* note 28, at 2. Generators and LSEs alike would receive allowances on this same historic basis. *See* California Report, *supra* note 3, at 21–23; Cowart, *supra* note 7, at 5.

60 *See* California Report, *supra* note 3, at 21–23; Cowart, *supra* note 7, at 5.

61 *See* California Report, *supra* note 3, at 21. The assignment of CO2 attributes to imported electricity for the purposes of measuring emissions associated with consumption in the state is a complicated issue that is not addressed in this Note. *See id.* at 23. Several methods are available. *See id.* Before choosing a method, the regulating community must consider the impact that each method could have on the legal analysis presented herein. *See id.*

62 *See id.* at 21–23.

63 *See id.*

64 *See US* Const. Art. I, § 8, cl. 3; Or. Waste Sys., Inc., v. Dep't of Envtl. Quality, 511 US 93, 99 (1994) (holding that state laws placing burdens on interstate commerce are subject to challenge based on the Commerce Clause of the US Constitution); Robert B. McKinstry, Jr., *Laboratories for Local Solutions for Global Problems: State, Local and Private Leadership in Developing Strategies to Mitigate the Causes and Effects of Climate Change*, 12 Penn St. Envtl. L. Rev. 15, 67 (2004) (noting potential Commerce Clause challenges to state and regional regulatory programs).

65 *See US* Const. Art. I, § 8, cl. 3; *Or. Waste*, 511 US at 99; McKinstry, *supra* note 64, at 67.

66 *See infra* notes 190–272 and accompanying text; *see also* Kirsten H. Engel, *The Dormant Commerce Clause Threat to Market-Based Environmental Regulation: The Case of Electricity Deregulation*, 26 Ecology L.Q. 243, 250–52 (1999) (noting the Commerce Clause objections to market-based environmental regulation and arguing that such regulation should be upheld based on the logic of the market participant exception and because it promotes economic efficiency and interstate harmony, and is not motivated by economic protectionism).

67 US Const. Art. I, § 8, cl. 3.

68 *See* Fulton Corp., v. Faulkner, 516 US 325, 330 (1996); Or. Waste Sys., Inc., v. Dep't of Envtl. Quality, 511 US 93, 98–99 (1994).

69 *See Fulton*, 516 US at 330; *Or. Waste*, 511 US at 98–99.

70 *Fulton*, 516 US at 330 (quoting Assoc. Indus. of Mo. v. Lohman, 511 US 641, 647 (1994)).

71 *See Or. Waste*, 511 US at 98–99.

72 Hughes v. Oklahoma, 441 US 322, 325–26 (1979).

73 *See Fulton*, 516 US at 331; *Or. Waste*, 511 US at 99; *Hughes*, 441 US at 336.

74 *See* 397 US 137, 142 (1970).

75 *See id.*

76 *See Fulton*, 516 US at 331; *Or. Waste*, 511 US at 99.

77 *See Or. Waste*, 511 US at 100–01 (quoting New Energy Co., of Ind. v. Limbach, 486 US 269, 278 (1988)); *Hughes*, 441 US at 336; *see also* Maine v. Taylor, 477 US 131, 151– 52 (1986) (upholding a facially discriminatory law banning the importation of out-of-state bait fish into Maine because the fish were subject to parasites completely foreign to Maine baitfish and could jeopardize the health of the Maine fish population, and no nondiscriminatory alternatives existed).

78 See Or. Waste, 511 US at 99; Hughes, 441 US at 337; see also Justin M. Nesbit, Note, Commerce Clause Implications of Massachusetts' Attempt to Limit the Importation of "Dirty" Power in the Looming Competitive Retail Market for Electricity Generation, 38 B.C. L. Rev. 811, 842 (1997) (concluding that an outright ban on imported power would likely be invalidated under the Commerce Clause but that a surcharge on sales of "dirty" electricity could pass the Pike balancing test).

79 *See Fulton*, 516 US at 331; *Or. Waste*, 511 US at 99.

80 *See supra* notes 56–66 and accompanying text; *see also* Armco, Inc., v. Hardesty, 467 US 638, 644 (1984) (finding that wholesale tax imposed only on imported goods burdened interstate commerce).

81 *See supra* notes 56–66 and accompanying text.

82 *See Fulton*, 516 US at 331; *Or. Waste*, 511 US at 99.

83 *See Fulton*, 516 US at 331; *Or. Waste*, 511 US at 102.

84 *See Fulton*, 516 US at 331 (quoting *Lohman*, 511 US at 647).

85 *See Or. Waste*, 511 US at 102.

86 *See* 75 US 148, 153 (1869).

87 *Id.* at 150.

88 *Id.* at 153.

89 *Id.*

90 *See Fulton*, 516 US at 332. *See generally* Henneford v. Silas Mason Co., 300 US 577 (1937).

91 *See Fulton*, 516 US at 332–33; *Or. Waste*, 511 US at 103.

92 *See Fulton*, 516 US at 332–33.

93 *See infra* notes 94–189 and accompanying text.

94 *See Silas Mason*, 300 US at 583–84; *Hinson*, 75 US at 152–53.

95 *Silas Mason*, 300 US at 579.

96 *Id.* at 580–81.

97 *Id.* at 579.

98 *Id.*

99 *See id.* at 581.

100 *See Silas Mason*, 300 US at 583–84.

101 *Id.* at 584.

102 *Id.*

103 *See id.* at 584–85. This reasoning also implied that the State of Washington had a legitimate sovereign interest in taxing the use of property within the state once commerce was at an end. *See id.* at 582.

104 *See id.* at 584–85.

105 *Silas Mason*, 300 US at 586–87.

106 *See id.*

107 *See Fulton*, 516 US at 342 (noting that the court has consistently declined to extend the compensatory exception beyond sales and use taxes); *see also Or. Waste*, 511 US at 105; *Armco*, 467 US at 644; Maryland v. Louisiana, 451 US 725, 760 (1981).

108 451 US at 731, 760.

109 *Id.*

110 *Id.*

111 *Id.* at 733.

112 *Louisiana*, 451 US at 754–55.

113 *Id.* at 755–56.

114 *See id.* at 756, 758.

115 *Id.* at 758.

116 *Id.*

117 *Louisiana*, 451 US at 759.

118 *Id.*

119 *See id.*

120 *Id.*

121 *Id.*

122 *See Louisiana*, 451 US at 759–60.

123 *See* 467 US at 643.

124 *Id.* at 640, 646.

125 *See id.* at 642.

126 *See id.*

127 *Id.* at 643.

128 *Armco*, 467 US at 643.

129 *Id.*

130 *Id.* at 644.

131 *Id.*

132 *See id.*

133 *See Or. Waste*, 511 US at 103.

134 *Id.* at 96–97.

135 *Id.* at 97.

136 *Id.*

137 *Id.* at 98.

138 *Or. Waste*, 511 US at 99.

139 *Id.* at 102 (citations omitted); *see also Louisiana*, 451 US at 753.

140 *See Or. Waste*, 511 US at 102.

141 *See id.* at 103.

142 *Id.* at 104.

143 *Id.*

144 *See id.*

145 *See Or. Waste*, 511 US at 104.

146 *See id.*

147 *See id.* at 103.

148 *See id.* at 105; *Armco*, 467 US at 643.

149 *See Or. Waste*, 511 US at 104–05.

150 *See id.* at 105.

151 *Id.*

152 *See id.*

153 *See* 516 US at 332–33.

154 *Id.* at 327.

155 *Id.* at 327–28.

156 *Id.* at 328.

157 *Id.* at 333.

158 *Fulton*, 516 US at 331.

159 *Id.* at 332–33.

160 *See id.* at 334.

161 *See id.*

162 *Id.*

163 *Fulton*, 516 US at 334–35.

164 *See id.* at 335.

165 *See id.* at 337–38.

166 *Id.* at 336.

167 *See id.* at 338.

168 *See Fulton*, 516 US at 337.

169 *Id.* at 338.

170 *See id.* (citing *Or. Waste*, 511 US at 105 n.8).

171 *Fulton*, 516 US at 338 (quoting *Or. Waste*, 511 US at 105 n.8).

172 *Fulton*, 516 US at 338.

173 *Id.*

174 *See id.* at 339 (quoting *Or. Waste*, 511 US at 103).

175 *See Fulton*, 516 US at 340.

176 *Id.* at 341.

177 *Id.* at 340. The Court noted that a finding that the burden falls on the same class of taxpayers is a condition precedent for a finding that the two taxes are complementary, and declined to decide whether mere incidence is sufficient to compel the conclusion that the two burdens fall on substantially equivalent events. *Id.* at 340 n.6 (citing *Armco*, 467 US at 643).

178 *See Fulton*, 516 US at 339.

179 *Id.* at 340.

180 *See id.* at 340 (citing *Silas Mason*, 300 US at 581).

181 *See Fulton*, 516 US at 340.

182 *See id.*

183 *See id.* at 343.

184 *Id.*

185 *Id.*

186 *Fulton*, 516 US at 340.

187 *See id.* at 343.

188 *See id.* at 342 n.8.

189 *See id.*

190 M.J. Bradley & Associates, *supra* note 22, at 2.

191 *Id.*

192 *See id.* at 4.

193 *See* New State Ice Co., v. Liebmann, 285 US 262, 311 (1932) (Brandeis, J., dissenting) ("There must be power in the states and the nation to remould, through experimentation, our economic practices and institutions to meet changing social and economic needs".); *see also* McKinstry, *supra* note 64, at 15–16 (noting that although states serve as laboratories for environmental policy change and often serve as a template for federal action, they face unique challenges).

194 *See* M.J. Bradley & Associates, *supra* note 22, at 2; *supra* notes 1–8, 18–22 and accompanying text. In addition, if California adopts a different program for reduction of CO2 emissions from that adopted by RGGI, the impact of the two programs on the national regulated community could be significant and force federal action. *See* M.J. Bradley & Associates, *supra* note 22, at 2; *supra* notes 1–8, 18–22 and accompanying text.

195 *See supra* notes 190–194 and accompanying text.

196 *See supra* note 107 and accompanying text.

197 *See* 511 US 93, 102 (1994).

198 *See id; supra* notes 190–194 and accompanying text.

199 *See supra* notes 57–63 and accompanying text.

200 *Id.*

201 *See* Fulton Corp., v. Faulkner, 516 US 325, 342 (1996). There is an obvious distinction between a tax and a regulation limiting CO2 emissions. *See supra* note 107 and accompanying text. The emissions cap does, however, ultimately impose burdens on generators of electricity that wish to participate in interstate commerce with the RGGI states. *See supra* notes 57–66 and accompanying text. This burden on electricity crossing regional borders is analogous to the burden imposed by the traditional taxes considered under the compensatory tax doctrine. *See supra* notes 57–66 and accompanying text.

202 *See* RGGI MoU, *supra* note 1, at 1; Regional Greenhouse Gas Initiative, About RGGI, http://www.rggi.org/about.htm (last visited Aug. 23, 2006).

203 *See* Assoc. Indus. of Mo. v. Lohman, 511 US 641, 647 (1994).

204 *See supra* notes 43–63, 99–102 and accompanying text.

205 *See Fulton*, 516 US at 330–31; *Or. Waste*, 511 US at 99. One weakness of this argument is the availability of the total allocation-to-load regulatory option, which a court could deem to be a reasonable, less discriminatory alternative. *See supra* note 56. Although this regulation could still be subject to a Commerce Clause challenge because it places burdens on interstate commerce of electricity, it likely would not face the strict scrutiny test imposed on facially discriminatory regulations like the regulation that RGGI is now considering. *See supra* notes 73–77 and accompanying

text. Rather, a court would likely find that it regulates evenhandedly with only "incidental" effects on interstate commerce because it does not differentiate between in-state and out-of-state interests. *See* California Report, *supra* note 3, at 23 (noting that the total allocation-to-load approach generally treats in-state and out-of-state interests equally); *supra* notes 73–77 and accompanying text. A strong case could be made that a single load-based emissions cap that included both domestic and imported energy would pass the *Pike* balancing test because: (1) it would effectuate a legitimate local purpose – that of reducing greenhouse gases; (2) the burden imposed on interstate commerce would not be clearly excessive in relation to the putative local benefits; and (3) there are no alternative means for promoting the local purpose as well without discriminating against interstate commerce. *See* Pike v. Bruce Church, Inc., 397 US 137, 142 (1970).

206 *See Fulton*, 516 US at 331; *Or. Waste*, 511 US at 99; Hughes v. Oklahoma, 441 US 322, 336 (1979).

207 *See Fulton*, 516 US at 333 (finding a statute that burdens interstate commerce but not intrastate commerce to be facially discriminatory); *Or. Waste*, 511 US at 100 (stating that a law that taxes interstate activities more heavily is facially discriminatory); *supra* notes 56–63 and accompanying text; *see also* Kirsten H. Engel, *Mitigating Global Climate Change in the United States: A Regional Approach*, 14 N.Y.U. Envtl. L.J. 54, 77–78 (2005) (concluding that an outright ban on importation of electricity would be a facially discriminatory Commerce Clause violation unless it was expressly authorized by Congress).

208 *See supra* notes 73–92 and accompanying text.

209 *Id.*

210 *See supra* notes 83–92 and accompanying text.

211 *See Fulton*, 516 US at 332; *Or. Waste*, 511 US at 103.

212 *See Fulton*, 516 US at 337 (expressing suspicion that the reason given for imposing an allegedly compensatory tax was illusory).

213 *See* Maryland v. Louisiana, 451 US 725, 759 (1981); *see also Fulton*, 516 US at 334 (holding that North Carolina could not impose a tax on foreign corporations compensating for the burden of income tax on domestic corporations because North Carolina had no sovereign interest in taxing the income of a foreign corporation).

214 *See* RGGI MoU, *supra* note 1, at 1.

215 *See Louisiana*, 451 US at 759; *cf.* Massachusetts v. EPA, 415 F.3d 50, 54–56 (D.C. Cir. 2005), *cert. granted*, 126 S. Ct. 2960 (2006). In *Massachusetts v. EPA*, Judge Randolph, writing for a three-judge panel of the US Court of Appeals for the District of Columbia Circuit, assumed without deciding that a state has standing to bring an action based on the generalized grievance of harms associated with global

warming. 415 F.3d at 54–56. Judge Sentelle, dissenting in part but concurring in the judgment, stated that the state did not have standing because it did not assert a specific harm associated with CO2 emissions. *Id.* at 59– 60 (Sentelle, J., dissenting in part but concurring in the judgment). Judge Tatel, dissenting, stated that the state did have standing, in part because it had successfully shown injury caused by global warming. *Id.* at 64 (Tatel, J., dissenting).

216 *See Louisiana*, 451 US at 759.

217 *See id.*

218 *See id.*

219 *See id.* at 759; *supra* notes 43–63 and accompanying text.

220 *See Fulton*, 516 US at 334; *Louisiana*, 451 US at 759.

221 *See Or. Waste*, 511 US at 99; *Louisiana*, 451 US at 759.

222 *See* Maine v. Taylor, 477 US 131, 151–52 (1986) (upholding a facially discriminatory law banning the importation of out-of-state bait fish into Maine because the fish were subject to parasites completely foreign to Maine baitfish and could jeopardize the health of the Maine fish population, and no nondiscriminatory alternatives existed).

223 *See supra* notes 43–52 and accompanying text.

224 *See Louisiana*, 451 US at 759.

225 *See supra* notes 211–224 and accompanying text.

226 *See supra* notes 141–145, 165–171 and accompanying text.

227 *See Fulton*, 516 US at 338; *Or. Waste*, 511 US at 104–05; *supra* notes 141–145, 165– 171 and accompanying text.

228 *See* Armco, Inc., v. Hardesty, 467 US 638, 643 (1984) (striking down an allegedly compensatory tax, in part because the court could not determine which part of the tax was meant to be compensatory); California Report, *supra* note 3, at 21, 23 (discussing the current lack of a robust emissions-tracking system for LSEs); *see also Fulton*, 516 US at 338; *Or. Waste*, 511 US at 104–05.

229 *See Or. Waste*, 511 US at 106 (citing Wyoming v. Oklahoma, 502 US 437, 454 (1992) and New Energy Co., of Ind. v. Limbach, 486 US 269, 275 (1988)); Henneford v. Silas Mason, 300 US 577, 586 (1937).

230 *See Or. Waste*, 511 US at 106; *Silas Mason*, 300 US at 586.

231 *See* California Report, *supra* note 3, at 21–23. Because the initial phase of the program will only regulate in-region generators, the RGGI states must determine how to allocate the allowances associated with historic imports so as to avoid

allocation problems later in the event that the regulation of imported electricity is required. *See id.* If the RGGI states allocate the entire cap of allowances including those associated with historic imports to generators during the initial phase of the program and leakage becomes a problem, then there will be the serious issue of reallocating those allowances associated with historic imports to the newly regulated LSEs. *See id.*; *cf. Armco*, 467 US at 645 (rejecting an allegedly compensatory tax in part because it was unclear which part of the tax was intended to be compensatory).

232 *See* California Report, *supra* note 3, at 22–23; Cowart, *supra* note 7, at 5.

233 *Id*.

234 *See Fulton*, 516 US at 338; *Or. Waste*, 511 US at 104–05.

235 *Id*.

236 *Id.*.

237 *See Fulton*, 516 US at 342; *Or. Waste*, 511 US at 105; *Armco*, 467 US at 643.

238 *See Armco*, 467 US at 643 (striking down an allegedly compensatory tax in part because the court could not determine what portion of the tax compensated for the in-state burden); California Report, *supra* note 3, at 23 (noting the various difficulties associated with tracking emissions).

239 *See Fulton*, 516 US at 342; *Or. Waste*, 511 US at 105; *Armco*, 467 US at 643. There is currently not a robust tracking system for LSEs to monitor emissions associated with electricity they deliver to customers. *See* California Report, *supra* note 3, at 23. Options for developing a tracking system include relying on average emissions and requiring power contracts to include emissions data for electricity delivered. *Id.*

240 *See supra* notes 129, 142–144, 168–171 and accompanying text.

241 *See* 467 US at 643.

242 *See Armco*, 467 US at 643; *see also Or. Waste*, 511 US at 104–05 (refusing to engage in the type of quantitative assessments that the compensatory tax doctrine requires). 243 *See Silas Mason*, 300 US at 584; *see also Fulton*, 516 US at 342; *Or. Waste*, 511 US at 105; *Armco*, 467 US at 643.

243

244 *See Fulton*, 516 US at 332–33.

245 *See id.*

246 *See supra* notes 114–122 and accompanying text.

247 *Id*.

248 *See supra* notes 114–122 and accompanying text.

249 *See Silas Mason*, 300 US at 584; *cf. Louisiana*, 451 US at 725.

250 *See Fulton*, 516 US at 339–40.

251 *See supra* notes 86–89 and accompanying text.

252 *See supra* notes 86–89 and accompanying text; *see also Fulton*, 516 US at 339; *Or. Waste*, 511 US at 103.

253 *See supra* notes 173–189 and accompanying text.

254 *Id*.

255 *See supra* notes 173–189 and accompanying text; *see also Silas Mason*, 300 US at 584.

256 *See Fulton*, 516 US at 338 (emphasizing the Court's reluctance to extend the compensatory tax doctrine beyond the context of sales and use taxes).

257 *See supra* notes 123–132 and accompanying text.

258 *Fulton*, 516 US at 342 n.8.

259 *See Fulton*, 516 US at 342; *Or. Waste*, 511 US at 105; *Armco*, 467 US at 643.

260 *See supra* notes 210–255 and accompanying text.

261 *See infra* notes 262–266 and accompanying text.

262 *See Fulton*, 516 US at 343; *Or. Waste*, 511 US at 106; *Armco*, 467 US at 644; *Louisiana*, 451 US at 759.

263 *See supra* notes 226–243 and accompanying text.

264 *See Louisiana*, 451 US at 759.

265 *See Fulton*, 516 US at 343.

266 *See Silas Mason*, 75 US at 154–55; *supra* notes 56–63 and accompanying text.

267 *See Armco*, 467 US at 644.

268 *See id.*

269 *See id.*

270 *See id.*

271 *See id.*; *supra* notes 56–63 and accompanying text.

272 *See supra* notes 206–266 and accompanying text.

7

Balancing Cost and Emissions Certainty: An Allowance Reserve for Cap-and-Trade

Brian C. Murray, Richard G. Newell** and William A. Pizer****

On efficiency grounds, the economics community has to date tended to emphasize price-based policies to address climate change – such as taxes or a "safety-valve" price ceiling for cap-and-trade – while environmental advocates have sought a more clear quantitative limit on emissions. This paper presents a simple modification to the idea of a safety valve: a quantitative limit that we call the allowance reserve. Importantly, this idea may bridge the gap between competing interests and potentially improve efficiency relative to tax or other price-based policies. The last point highlights the deficiencies in several previous studies of price and quantity controls for climate change that do not adequately capture the dynamic opportunities within a cap-and-trade system for allowance banking, borrowing, and intertemporal arbitrage in response to unfolding information.

* Director for Economic Analysis, Nicholas Institute, and Research Professor, Nicholas School of the Environment, Duke University. 1616 p st. NW Washington, D.C. 20036. E-mail: forester@rff.org.

** The Gendell Associate Professor of Energy and Environmental Economics, Nicholas School of the Environment, Duke University- Research Associate at the National Bureau of Economic Research. E-mail: bcmurray@duke.edu

*** Senior Fellow at Resources for the Future. E-mail: billy.pizer@gmail.com

Source: www.nber.org.

Introduction

The economic debate over using taxes versus cap-and-trade to control pollution emissions revolves around the relative merits of using prices versus quantities as the policy instrument. A cap-and-trade system fixes the quantity of emissions allowed but leaves the market price of emissions rights uncertain. In contrast, a tax fixes the price of emissions at the tax rate but leaves the quantity of emissions uncertain. This trade-off raises essential questions for policy design: which form of uncertainty is a greater burden to society? What can be done to minimize that burden or maximize net benefits? A sizable economics literature has addressed these questions, dating back to Weitzman (1974) and others.

Taxes and cap-and-trade are, in some sense, extreme examples of the alternative market based approaches that are available to correct an emissions externality. The government stipulates that emitters must obtain the "right to emit." These rights (typically called allowances or permits) are either supplied with infinite elasticity at a fixed price (the tax) or with zero elasticity at a fixed supply (the cap). A key alternative – initially suggested by Roberts and Spence (1976) and later developed in the context of climate policy by Pizer (2002) – is the idea of a "safety valve," in which a cap-and-trade system is coupled with a price ceiling at which additional allowances can be purchased (in excess of the cap). So long as the allowance price is below the safety-valve price, this hybrid system acts like cap-and-trade, with emissions fixed but the price left to adjust. When the safety-valve price is reached, however, this system behaves like a tax, fixing the price but leaving emissions to adjust. Given the importance attached by many stakeholders and policymakers to containing the costs of any US climate policy, this approach has received considerable attention in the US debate over climate change regulation (e.g., Samuelsohn 2008), and has come to be known as the "cost-containment" issue (Pizer and Tatsutani 2008).

Cap-and-trade with a safety valve represents one of many possible mechanisms that lie between the two extremes of a pure price or a pure quantity instrument. It offers a more malleable supply curve for emissions allowances, containing both vertical and flat segments. This paper discusses a second mechanism that includes features of both price and quantity instruments. We believe this approach, which we call an *allowance reserve*, is particularly promising. The basic idea goes one step beyond the safety valve: while the safety valve stipulates that an unlimited number of allowances be made available at the specified safety-valve price, the allowance reserve stipulates both a ceiling price at which cost relief is provided and a maximum number of allowances to be issued in exercising that relief. Much like a safety-valve mechanism can mimic either a pure price or pure quantity control, depending on how the cap and safety valve price are set, an allowance reserve can mimic a pure price, pure quantity, or safety-valve approach, depending on how the ceiling price and volume are set.

Three motivations underlie our interest in this mechanism. The first two are largely practical in nature, while the third hints at a new twist on the conditions underlying optimality, in contrast to the traditional "prices versus quantities" perspective. The first motivation is simple: as we describe below, the safety valve represents a special case of the allowance reserve where the volume of available allowances is very large or unlimited. Thus, an allowance reserve has the capacity to do as well if not better than the safety valve in terms of matching public interest described below as a blend of economic efficiency and political feasibility. That is, political economy conditions suggest that public interest may be better served with an allowance reserve because it is more likely to sustain a coalition that will enable welfare-enhancing policy to be enacted.

Second, the reserve mechanism addresses one problem with a safety valve. Although most cap-and-trade programs permit allowance banking, which can help equilibrate present value prices across different time periods and increase dynamic efficiency, allowance banking coupled with a safety valve creates a dynamic problem. Suppose the cap needs to be tightened and as a result the safety-valve price is expected to increase dramatically at some point in the future. With an ordinary safety valve, an expectation of much higher prices in the future would lead rational firms to buy as many allowances as possible at the current, low safety-valve price in order to save them for use later when prices are high. Absent a mechanism to limit such purchases, they could effectively overwhelm efforts to tighten the future cap, thereby undermining long-term environmental policy goals. An allowance reserve would address this potential problem by placing an upper limit on the available number of extra allowances.

Finally, and most importantly at a fundamental level, most economic analysis of price and quantity controls under uncertainty does not adequately capture the dynamic nature of the regulatory process suggested by the preceding paragraph. In particular, as new information arises – about the benefits, costs, or global commitment to solving the problem of climate change – expectations about the likely long-term emissions level and emissions price will evolve. Therefore, in order to achieve dynamic efficiency, prices need to adjust regularly so that current prices continue to reflect discounted expected future prices. A cap-and-trade program with banking, borrowing, and eventual adjustment of the cap can achieve that result *if* economic agents have sufficient foresight and capacity to form rational expectations about the longer term (Newell et. al., 2005). This factor alone identifies an important advantage of dynamic cap-and-trade with banking and borrowing over other approaches. Nonetheless, these conditions may not hold – or at least are not assured – particularly in the early years of a program when cost uncertainty would be high, a significant bank would not yet have developed, and market actors would still be struggling to understand the new market. An allowance reserve could be used to help the market toward such an equilibrium by anchoring initial prices near or below the ceiling price.

We focus here on the importance for climate policy design of uncertainty in the costs and benefits of greenhouse gas mitigation. There are of course other important design factors to consider, including the degree to which the policy raises revenue (e.g., through taxes or allowance auctions), how those revenues are used (e.g., reducing other taxes, additional spending), and the stringency of the policy (i.e., the cap or tax level). Nonetheless, most of these other elements can be designed largely independently of the instrument choice of cap-and-trade versus a tax.

The remainder of this paper is organized into several sections. The next section provides background on market-based emissions regulation, including the current policy debate about price versus quantity instruments, and discusses the allowance reserve idea in more detail. This is followed by a discussion of the advantages of a reserve-based approach and how it addresses some key practical problems with the current suite of alternatives. We then discuss the issue of optimality in a dynamic context where policies evolve over time, making the case that (1) cap-and-trade with banking and borrowing could approach optimality with sufficient intertemporal flexibility, and (2) absent the institutions or foresight necessary for such optimality, the allowance reserve may be a useful way to help move market outcomes in the correct direction. We end with a discussion of the remaining issues that surround practical implementation of the allowance reserve, including establishing the ceiling price, reserve size, and release mechanisms. We present conclusions in the final section.

Market-based Emissions Regulation and the Reserve-based Approach

Market-based emissions regulation works by requiring emitters to hold emissions allowances and then establishing a mechanism for supplying those allowances. The two simplest supply mechanisms are (1) a tax that fixes the price associated with purchasing allowances and (2) cap-and-trade, which establishes a fixed supply of allowances, either auctions or gives them away for free, and then allows trading until the allowances are used to cover emissions. The tax is typically referred to as a price-based approach and cap-and-trade as a quantity-based approach to emissions control.[1]

A key point, highlighted by Weitzman (1974), is that price and quantity controls lead to distinctly different outcomes when there is uncertainty about costs. While emissions are constant under cap-and-trade, price varies; in contrast, under a tax, price is constant but emissions vary. Weitzman (1974) derived conditions under which one or the other policy is preferred in expected efficiency terms based on the relative slopes of the curves for the marginal cost and marginal benefits of emissions control. Since then, many papers have found that for climate change policies, the marginal benefits of mitigation (or marginal damages from emissions) are relatively flat over the relevant range of annual emissions, and, using a somewhat modified Weitzman argument, that price-based policies are therefore preferred in terms of economic efficiency (Kolstad 1996; Pizer 2002; Hoel and Karp 2002; Newell and Pizer 2003). Note that the quantity policy (i.e., cap-and-trade) modeled in these papers corresponds to annual emissions targets without banking or borrowing, a matter we return to below.

Of course, the perfectly inelastic (cap-and-trade) and perfectly elastic (tax) emissions allowance supply curves are the two simplest extremes of a wide range of policies the government could use to provide emissions allowances to the market. Roberts and Spence (1976) examined one alternative: coupling cap-and-trade with a price floor and ceiling. This approach generates three types of outcomes depending on the realized demand: (1) when demand is low, the price is set by the floor, and the quantity of allowances is below the cap; (2) when demand is moderate, the quantity of allowances is determined by the cap, and the price is somewhere between the floor and ceiling; and (3) when demand is high, the price is set by the ceiling, and emissions are above the cap.[2] Depending on the choice of design parameters (i.e., cap, floor, ceiling), the policy also has the ability to mimic either a tax (if the price ceiling or cap level is sufficiently low) or pure cap-and-trade (if the floor is low and the ceiling high). Owing partly to the previously mentioned authors' emphasis on price-based policies and partly to the politics of wanting to have both certainty about prices and stringent emissions limits, there has been a significant emphasis on policy with a relatively low, stringent cap level and low price ceiling. This approach, where the price ceiling is referred to as a "safety valve," has garnered considerable attention and political support over the past five years as climate policy proposals have made their way to Congress (Samuelsohn 2008). The price floor, though it has received less attention in the federal policy debate, is being implemented in the Regional Greenhouse Gas Initiative cap-and-trade program in the Northeastern US states.

Representing the allowance reserve idea requires only a slight adjustment to the Roberts and Spence (1976) supply schedule (see the right panel of Appendix Figure 2). The price ceiling that previously allowed an unlimited volume of allowances to be purchased now also has a quantitative limit, which is the "allowance reserve." Basically, we have simply added another kink in the allowance supply schedule and made it more flexible in its ability to balance price and quantity goals. Indeed, the first-best policy would be to specify an allowance supply schedule that mimicked the marginal damages from higher emissions. In this sense, the allowance reserve offers a well-defined improvement over the alternative policies developed so far, each of which remains a special case. In essence, the reserve can be deployed in a way that reflects something closer to the increasing marginal social cost of emissions.

When implemented, all market-based policies require us to identify a group of regulated entities whose direct emissions or embodied emissions (for upstream regulation of fuels) are measured and reported on a regular basis, typically annually. Under a tax policy, those entities are then required to pay a specified tax ($/ton) applied to the measured amount of emissions. Under cap-and-trade, they are required to acquire and surrender allowances.

A key feature in virtually all proposed greenhouse gas cap-and-trade programs is banking, under which unused allowances in one year can be used in subsequent years. With banking, there can be an incentive to reduce emissions early – particularly during a gradual phasedown of emissions targets – and it is not necessary for the market to meet the target exactly each year. If that were the case, there would be a danger that requiring emissions to match the number of allowances exactly would result in either too few allowances – causing the price to skyrocket – or too many allowances – causing the price to plummet. The former occurred in the California NO_x RECLAIM market; the latter occurred in Phase I of the EU Emissions Trading Scheme (ETS) for greenhouse gases. Both systems significantly restricted banking and borrowing across compliance periods. In the EU ETS, the main culprit was that banking was not allowed between Phase I (pre-Kyoto) and Phase II (Kyoto). That, combined with a generous allocation, eventually led to an excess supply of allowances and drove the price to zero at the end of Phase I. In contrast, systems that have allowed banking (and possibly borrowing) have tended to have much smoother price behavior as the price at the end of one period tends to match the price at the beginning of the next due to allowance fungibility across periods and market arbitrage.

What about more complex policies? The price floor in the Roberts and Spence (1976) hybrid policy could be implemented in two ways. If the allowances associated with the cap are all distributed for free, the only alternative is for the government to agree to buy any allowances that regulated entities are willing to sell at the specified floor price. If, however, some of the allowances are auctioned, the price floor could be implemented by specifying a minimum price in the auction. In this way, allowances only enter the market if the price meets or exceeds the floor; otherwise, less than the full volume of allowances are sold.

The price ceiling, or safety valve, could be implemented by having the government agree to sell additional allowances at the specified ceiling price. However, there has been a wrinkle in such legislative proposals (e.g., S. 1766 in the 110th Congress, the "Bingaman–Specter" bill); that is, unlike ordinary allowances, these additional allowances are not bankable and must be used in the year they are released. This places an implicit limit on the volume of safety-valve allowances that might be sold in any year, namely the total volume of emissions for that year. Thus, under such proposals, one could in principle use safety-valve allowances to meet all of one's current-year emissions obligations and bank ordinary allowances for the future. Another wrinkle in the safety-valve provision of S. 1766 is that the safety valve is only available during one month each year, while firms are doing final balancing of their emissions and allowance holdings. This avoids a potential run on the safety valve while Congress might be debating whether to raise the level or remove the safety valve altogether in the future – a debate that would hopefully be completed during the eleven-month period when the safety valve is unavailable. We return to this issue below, as it is not obvious that such a sequence of events is likely.

The allowance reserve takes the price ceiling idea a step further. As just described, an unlimited nonbankable safety-valve could allow the release of up to one year's worth of emissions at any one time. The allowance reserve, however, could limit the use of this safety valve to a significantly smaller amount. The appropriate size of the reserve will ultimately depend on the stringency of the cap, the ceiling price, and the degree of remaining price volatility that is acceptable. A reserve of perhaps ten to twenty percent of the annual cap would reflect the range of emissions reductions sought by many current proposals over the first decade, coupled with varying assumptions about the price ceiling. The issue of how to choose the reserve size is further addressed later in this article.

This raises an important question: how does the government allocate the extra allowances from a reserve if demand exceeds reserve supply at the ceiling price? There are several ways to do this. These are outlined in detail below, but perhaps the most compelling is analogous to the price-floor approach, but instead auctions the reserve allowances with a minimum price that is equal to the ceiling price (versus the floor price). The result would be: (1) no sales, (2) sales less than the limit, at the ceiling price, or (3) sales equal to the limit, at or above the ceiling price. Thus, the allowance reserve does not guarantee the ceiling price in the same way as an explicit price ceiling or safety valve. On the other hand, as discussed in the next section, it has several practical and theoretical advantages.

Advantages of an Allowance Reserve

Representing Marginal Damages Across Cumulative Emissions

Based on analyses of marginal damages from emissions, the research cited above finds that the allowance supply schedule for emissions should be roughly flat over the relevant range of annual greenhouse gas emissions. This would seem to suggest that the allowance reserve idea offers no efficiency improvement over either a tax-based or safety-valve approach. Yet that research does not consider the marginal benefit function over cumulative greenhouse gas limits (or in turn the shape of the associated allowance supply schedule) over longer time horizons. Indeed, it seems almost certain that when viewed over many decades of cumulative emissions, the marginal damage of the first ton abated would be higher than the marginal damage of the last.

In this case, the additional kink in allowance supply represented by the reserve approach, cumulated over many years, should be able to better represent an upward sloping marginal damage function and deliver an outcome that is more efficient than the tax-based and safetyvalve approaches.

Of course, given the tremendous uncertainty and time scale concerning climate change (Weitzman 2008), we must be cautious about economic analyses of the level and shape of the climate mitigation benefit function. Moreover, we believe there are yet other reasons to expect that traditional price and quantity comparisons are problematic in a dynamic setting – an issue we return to in the next section.

Expanding Political-economic Flexibility

Another important concern is that most environmental advocates have opposed any pricebased approach, including the safety-valve variant. In an October 8, 1997, letter to the President in advance of negotiations on the Kyoto Protocol, seventeen environmental advocacy groups indicated their opposition to a safety valve mechanism.[3] More recently, however, these groups have expressed openness to the idea of a quantity-limited safety valve captured in the allowance reserve approach. Leading environmental advocacy groups, including some of those who signed the 1997 letter opposing a safety valve, supported an amended version of the America's Climate Security Act (S. 3036) in 2008, which included the allowance reserve idea (Eilperin and Mufson 2008). In this way, a simple interpretation of the allowance reserve – that its additional flexibility can better represent public interest – may be the most relevant argument when "public interest" includes not just economic views of optimality but also the perspective of key stakeholders. In other words, one very practical advantage of the allowance reserve idea is that it may be able to bridge differences between environmental advocates seeking a cap on emissions and industrial interests concerned about costs, in much the same way that some viewed the safety valve more than a decade ago (Kopp et. al., 1997). Operating under the presumption that failure to enact a climate policy at all would lower social welfare, all else equal, a design element such as an allowance reserve that can break an impasse, can enhance overall efficiency relative to the status quo.

Addressing Concerns over Ability to Achieve Long-term Targets

There is a second practical reason for considering the allowance reserve over the pure safety-valve idea: How would one otherwise deal with evolving expectations of stricter targets and higher prices? That is, despite the attempt to structure current proposals with targets through 2050, it seems almost inevitable that revisions will occur after a decade or so. In anticipation of tightening future caps, current prices would rise assuming that current allowances could be banked for future compliance obligations, which are now anticipated to be more expensive. For example, the US sulfur dioxide trading program was revised in 2005 – fifteen years after passage of the 1990 amendments establishing the program – in a way that lowered allowed emissions by fifty percent in 2010 and seventy percent in 2015 (US EPA 2005). In response, as shown in Figure 1, the price of allowances began a significant run-up in 2004 as debate began in earnest over tightening the emissions cap under the program through the Clean Air Interstate Rule. By 2005, the rules were finalized, with a halving of the emissions limit set to begin in 2010. Allowance prices peaked soon after. By 2008, the prices had settled down to roughly double their predebate level, with a May decline in part reflecting legal challenges to the rulemaking (Argus Media 2008) or possibly expectations that climate change regulation will depress future SO_2 allowance prices. All of this has happened years in advance of the actual change in emissions limits. So clearly market participants do act in anticipation of future target stringency.

All of this points to a potential problem with the ordinary safety valve when it is coupled with banking and evolving expectations of stricter targets. Under these circumstances, as firms and individuals become convinced that future prices will be well above the current safety valve, they will want to make use of the safety valve as much as possible, acquiring emissions allowances cheaply now that will quickly become more valuable in the future. Or, if safety valve allowances cannot be banked, will allow regulated entities to preserve more valuable ordinary allowances for the future. That is, even without the ability to bank safety-valve allowances, there is a real possibility of accumulating multiple years' worth of allowances if people become convinced of the impending change many years in advance. The SO_2 trading program, for example, saw more than a year's worth of allowances accumulated early in the program without a safety valve, owing to the relatively easy targets from 1995 through 1999 and anticipation of stricter targets legislated for 2000.

The accumulation of a large bank of allowances – perhaps more than an entire year's worth of allowances – poses two related problems. The first is superficial: from an appearance standpoint, people may see a run on the safety valve, and a large accumulation of allowances from it, as a systemic failure. The second is related, but more substantive: a particularly large bank could begin to thwart efforts to cut emissions in the future. This is not an issue in the SO_2 program because emissions reductions are relatively large compared with historic emissions – fifty percent in the 1990 amendments, starting in 2000, and fifty percent again in 2010 under the Clean Air Interstate Rule. One year's worth of banked allowances would be used up in two years following a fifty percent cut (were facilities to try avoiding their fifty percent cut in emissions). In contrast, CO_2 emissions reductions are anticipated to occur more slowly as entirely new technologies cutting across many sectors must be brought into use. A relatively tough target might mean a ten to twenty percent reduction from baseline within the first decade, in which case a bank on the order of one year of allowances could delay such a change for five to ten years without reducing emissions. We emphasize only that this could (but not necessarily would) be a problem because, even in the worst case, the tougher target could be designed with the bank in mind, in much the same way that programs with offset credits from uncapped sources often seek a tougher target than would be practical if those offset opportunities did not exist. Further, there is little evidence concerning how large of an allowance bank firms might accumulate (it could, in fact, be much larger than one year's worth of allowances), how fast they might spend it down, and in turn how much this might affect any future tightening of the cap.

The allowance reserve tackles both potential problems head on by simply limiting the volume of extra allowances entering the market and therefore limiting the potential for these extra allowances to contribute to an excessively large bank. As noted above, existing legislative proposals for a safety valve limit the released volume to the annual emissions level. With emissions reductions of perhaps ten to twenty percent per decade, this seems far more than is necessary to deal with anything except the desire to bank. In this case, an annual allowance reserve limit of about ten to twenty percent of the cap should be sufficient to address short-term uncertainty while leaving longer-term expectations free to drive near-term prices.

Optimal Policy in a Dynamic Setting

Most of the literature comparing price and quantity policies has ignored the aforementioned dynamic feature: that policies will inevitably be revised as new information arises and policymakers revisit the issue – what we might call dynamic price and quantity policies (i.e., policies that are updated over time). Newell et. al., (2005) emphasize that such revisions can be used to make a dynamic quantity policy mimic an unadjusted price policy. Here we suggest that a dynamic quantity policy might do better, even when the price policy is dynamic as well, particularly in a world where future damages depend only on cumulative emissions and not on their time path, as is roughly true for greenhouse gases. The key is intertemporal flexibility coupled with foresight about these revisions. As we elaborate below, the allowance reserve may in turn help foresight to drive near-term prices – in this case a desirable, even optimal, feature.

To illustrate this point that dynamic quantity policies may do better than dynamic prices, let's imagine a simple world with three time periods: when current policy is set (period 0), when that policy takes effect and firms respond (period 1), and some period in the future when policy can be revised (period 2). Importantly, improved information on costs, benefits, and participation is arriving each period, so that there is a better notion of the optimal policy in period 1 (when no policy adjustment is possible) and an even better notion in period 2.

For simplicity, we could assume that period 2 involves complete knowledge of costs and benefits and is also the last period of relevant activities. In any case, with better information in period 2, one can revise either a price or quantity policy to deliver improved outcomes in period 2 because there will be a better sense of how to balance costs and benefits compared to period 0.

Assuming revised price and quantity controls are equally efficient in period 2, the question of comparing various policies hinges on what happens in period 1 when firms respond to policies set in period 0, but with improved knowledge about costs and benefits as well as foresight about period 2. Consider the first-best outcome. Based on the working assumption that damages depend only on cumulative emissions, efficiency would lead us to minimize the expected present value of the total emissions abatement costs associated with achieving the cumulative emissions limit decided in period 2. This leads to a simple efficiency condition that the marginal cost (i.e., emissions price) each period should equal the present value of expected long-run marginal costs (see the Technical Appendix for a mathematical formulation of this first order condition and the arguments that follow.) That is, it would be optimal to choose period 1 emissions such that marginal costs in period 1 are equal to the (discounted) expected marginal costs of meeting the cumulative target through the revised period 2 cap. Given the limited information available when period 1 emissions must be chosen, the cumulative cap will not be known exactly, but with additional information relative to period 0, expectations of the period 2 cap should be revised from the expectations in period 0 when the policy is set. Now that we understand the first-best outcome conditional on available information, we can examine how dynamic price and quantity policies compare in period 1.

Specifically, consider two policies set in period 0 and revised in period 2: a tax and a cap-and-trade program, where the cap-and-trade program allows banking (and borrowing, if necessary).

Performance of a Tax Program

An optimizing government that is setting the period 1 tax in period 0 would choose a tax level that equates the present value of expected marginal costs across the periods given the information it has at the time, thereby minimizing expected total costs as seen in period 0. The important point is that in period 1, firms would then choose to emit an amount such that their marginal costs – given the resolution of cost uncertainty in period 1 – are equal to the tax which was set in period 0. Firms will not match their marginal costs to the expected period 2 marginal costs (updated with new information on both costs and mitigation benefits in period 1) because there is no incentive to do so. Specifically, there is no ability to shift compliance obligations from the period with high (expected, discounted) costs to the one with low (expected, discounted) costs in a tax-based system. The emissions outcome in the first period would therefore not generally satisfy the previously mentioned efficiency condition because expectations about period 2 marginal costs will have changed between periods 0 and 1, but no responsive action will be taken by the affected parties.

This type of result is inherent in the classic Weitzman framework where policies are fixed prior to uncertainty being revealed. Neither a price nor (a nonbankable) quantity policy is optimal ex post because neither exactly matches realized (or updated expectations about) marginal costs and marginal benefits. Both instruments are generally inefficient in such a setting, so the issue becomes one of choosing the instrument with the lowest deadweight loss. Even when period 1 brings about expected changes in period 2 tax rates, there is virtually no incentive to deviate from the otherwise standard behavior setting period 1 marginal costs equal to the fixedin- period-0 tax. The only possible incentive to deviate arises if changed expectations about future tax rates affects investment in long-lived emissions abatement capital that would be subject to the future tax.

Performance of a Cap-and-trade System

The question is can cap-and-trade in a dynamic setting with banking and borrowing do any better? To find out, let's imagine that instead of a tax the government sets a period 1 cap in period 0, firms decide how much to emit during period 1 and bank or borrow until period 2, and everyone expects that in period 2 the government will set a period 2 cap to deliver the ultimate, optimized-with-complete-information-in-period-2, cumulative emissions target (or, more generally, a cap based on better information in period 2). Note that in period 2 the government can enforce any emissions level by accommodating or absorbing the bank or allowance debt acquired by firms in period 1. With this information in period 1, a cost-minimizing firm would form its best expectation of period 2 marginal costs and choose period 1 emissions such that marginal costs in period 1 would equal the discounted value of the expected period 2 marginal cost, regardless of the first period cap.

Thus, a cap-and-trade system with banking, borrowing, and an expectation of eventual adjustment of the emissions target can achieve the best possible outcome given the information that is known in period 1 even though policy is set in period 0. What drives this result?

Why Dynamic Cap-and-trade can Deliver a Better Outcome

The key is intertemporal flexibility and foresight. Through dynamic market arbitrage, whereby firms equate (present value) prices in periods 1 and 2 for the perfectly fungible allowances, the cap-and-trade system allows the information revealed about benefits, costs, and future expected targets to be transmitted to markets today. That is, knowing that new information on costs and benefits gained during the first period of the policy will lead to adjustment of future caps, firms have an incentive to adjust emissions during period 1 so that they can bank (or borrow) more (or less) now in order to equate marginal costs over the two periods. The existence of an intertemporal market for emissions allowances – something that is absent with a tax – provides the vehicle for doing this. Note that in terms of the efficiency condition, benefit information is transmitted through expectations about the cumulative target, while cost information is transmitted through both the cost function itself and expectations about the cumulative target.

The tax instrument, in contrast, only provides market incentives for adjusting emissions in response to information revealed about period 1 costs in a simple way that keeps marginal costs equal to the fixed-in-period-0 tax (and does not respond at all to changes in expectations about benefits or future targets). With a tax instrument, even if firms correctly anticipate a higher marginal cost or tax in the future, they cannot arbitrage against this outcome by over complying now and banking residual allowances for use in the future. This undermines their ability to efficiently manage costs. Taxes (like the cap) can of course be adjusted over time, but during the period between adjustments there will be inefficiently high or low levels of abatement and costs.

Interestingly, this incentive structure differs in a fundamental way from the classic Weitzman setting. In that static setting, only the tax (or price) policy provides incentives for firms to change behavior, only in response to new cost information, and only in a simple way that keeps marginal costs constant. The quantity policy in that case does not transmit any new information – firms must simply meet the target and have no flexibility to adjust by banking or borrowing.

Neither policy transmits any new information about benefits or future targets. In contrast, in the dynamic cap-and-trade setting that is relevant here, firms do have an incentive to adjust under the quantity policy in response to both new cost and new benefit information because of adjusted expectations about future targets and marginal costs. While both policies can eventually be adjusted to achieve the desired target, the dynamic cap-and-trade policy provides a mechanism for firms to respond during the first period, when policy is fixed, while the tax does not.

All of this suggests that for a cumulative emissions problem like greenhouse gases, a capand- trade program with sufficient banking and borrowing can in principle deliver a better outcome than taxing emissions. This conclusion has been recognized to some degree for some time (Jacoby and Ellerman 2003). Extending prior research on optimal banking and borrowing (Rubin 1996, Kling and Rubin 1997) to a stochastic instrument choice context, Newell et. al., (2005) rigorously showed how intertemporal banking and borrowing would allow firms to smooth abatement costs across time, thereby offsetting the traditional disadvantage of cap-andtrade relative to taxes. They also suggested several practical mechanisms for implementing such an approach, including an allowance reserve. What is new here, we believe, is that this is the first time conventional economics has suggested cap-and-trade can be better than tax-based approaches based on Weitzman-like efficiency grounds, with appropriate dynamic modifications. The key, as discussed above, is that most previous analyses have either ignored or underappreciated both the evolution of information and the dynamic nature of policymaking that are core features of a long-term problem like climate change – as well as the common feature of banking in most trading programs.

How can an Allowance Reserve Enhance Efficiency?

The discussion and results above raise the question: why do we need an allowance reserve at all if cap-and-trade with sufficient banking and borrowing can be optimal (given available information)? There are at least three reasons. First, the allowance reserve does nothing to upset this result. Indeed, the main point is that the period 1 cap does not really matter so long as there are rational expectations about future caps. Second (and somewhat countering the first point), it may be important for the government to send signals concerning its current expectations about the long-term cap and expected price. This means that not only is the period 1 cap important; so are expectations (in period 0) of future marginal costs and allowance prices in period 2, which also depend on future targets and benefits. The ceiling price in the allowance reserve mechanism is one way the government can signal an initial expectation about the correct current and future prices.

A third and important reason for considering an allowance reserve is the concern that borrowing – a key mechanism for dealing with unexpectedly high costs in the short-term – may not work as we have assumed. Borrowing may not be implemented or it may be constrained in ways that limit its usefulness. To date, market-based policies have included only limited borrowing mechanisms. For example, the corporate average fuel economy (CAFE) program for light-duty vehicles allows a firm to undercomply in a given model year if it repays the borrowed credits within the subsequent three model years. Meanwhile, there are examples of exceptionally high prices early in a borrowing-constrained cap-and-trade program as market participants anticipated or experienced a shortage of allowances. These include both the NO_x State Implementation Plan (SIP) Call in the United States and the EU ETS. In the context of an emissions phasedown of the type discussed for greenhouse gas policy, a well-designed allowance reserve would change the market dynamics so that high prices tap the reserve and alter the market from tending to borrow allowances in the short term to either meeting demand or potentially banking allowances.

Implementation Issues

We turn next to a number of important practical issues surrounding the implementation of an allowance reserve. Most immediate are determining the appropriate ceiling price at which the reserve can be drawn down and the size of the reserve. Additional issues include whether the reserve expands or attempts to maintain the cumulative cap, how reserve allowances are introduced to the market, and whether the reserve design parameters would be managed by an executive board or decided through legislation.

Ceiling Price and Reserve Size

The most challenging implementation questions are the ceiling price at which the reserve can be tapped and the size of the reserve. In principle, the ceiling price should be related to the marginal benefit of emissions reduction to ensure that allowance prices – an indicator of marginal abatement costs – stay in line with marginal benefits. As noted early on, however, the marginal benefits of greenhouse gas reduction are not likely to be well-defined and are affected by some factors beyond policymakers' control, including the extent to which other countries undertake emissions reductions. Thus policymakers may be more likely to focus on choosing a target ceiling price that is simply "not too high," meaning that it does not create seemingly excessive hardship for the overall economy. Or, if there is a range of likely allowance prices and economic impacts associated with a chosen emissions limit, the ceiling price might be set at the upper end of the predicted range, assuming policymakers and stakeholders are comfortable with both the cap and the price range.

If the allowance reserve is intended to credibly meet near-term demand at the ceiling price, then the ceiling price and the size of the reserve are interrelated. A low ceiling price will require a larger reserve to credibly deliver that price. A greater number of near-term events (e.g., weather, economic fluctuations) would be likely to come up against a low ceiling price and therefore require a larger reserve to meet that near-term demand. Alternatively, if the ceiling price is set high, the reserve plays a lesser role and can be smaller, as the circumstances under which it is likely to be used become more rare. The size of the reserve essentially determines its power to keep the allowance price at or below a given ceiling price; a larger reserve is necessary to ensure lower prices. A distinct issue – not directly addressed here – is whether the allowance reserve might be capped not only annually, but also cumulatively over time and/or phased out.

One might argue that if the reserve is going to work as advertised – by providing strong and reliable relief against a run-up in prices driven by near-term events – it should be large enough to meet demand at the specified ceiling price under most foreseeable circumstances. The reserve could be set up to accommodate, for example, all conceivable demand shifts and still maintain the ceiling price by providing enough additional allowances to meet demand at that price. This could be informed by a convincingly large number of modeling scenarios that exogenously set the allowance price equal to the candidate ceiling price. The possible shortfall of allowances at that price (the difference between the emissions projected at that price and the proposed cap) would provide an estimate of the reserve size necessary to maintain that price and cover potential shortfalls.

Another possibility – if the program is expected to lean heavily on offsets (i.e., emissions reductions from outside capped sources) to achieve the cap – is to size the reserve to match the expected offset supply in the event that such offsets fail to materialize. The Regional Greenhouse Gas Initiative, for example, allows additional use of offsets at certain allowance price thresholds. However, the availability of cost-effective offset opportunities is only one source of cost uncertainty, so its importance would have to be evaluated alongside other sources of uncertainty.

Finally, in determining an upper bound for the size of the allowance reserve, it would not make sense to have the allowance reserve be larger than the difference between the target and the highest business-as-usual emissions forecast. An indefinite reserve of that size would be capable of lowering allowance prices to zero under the most pessimistic conditions, and therefore in practice it would go underused since reserve allowances would only be released at a price at or above the ceiling price.

Maintaining the Cumulative Cap vs. Establishing a Range

Because uncertainty about costs and allowance demand is likely to be highest at the beginning of a cap-and-trade program, we presume the reserve would be in place from the program's inception. Before trading can begin, the government must allocate allowances to regulated entities either through free allocation or an auction. The existence of a reserve means that a separate allocation must also be made to a reserve account. There are two options for creating this reserve account: (1) create it from future allocations that, if never used, go back to the future allocation, which would maintain the cumulative cap over time; or (2) create it from allowances that, if never used, would vanish, which would establish a range of possible cumulative emissions outcomes that depend on the degree to which the reserve is tapped. It is also possible to construct a combination of these two options, with some reserve allowances drawn from the future and others not. If the cap-and-trade policy includes a price floor, as suggested above, reserve allowances could also come from any allowances that remained unused in prior periods. And, revenue from the sales of reserve allowances could finance offset purchases. Both of these options are variants that lie somewhere between maintaining the cumulative cap and creating a range of possible cumulative emissions outcomes.

Based on recent policy proposals, a US cap-and-trade program would likely establish an allowance cap that starts in the near term with allowance quantities that are perhaps five to ten percent below current emissions levels. The cap would then be scheduled to decline over several decades until a substantial reduction in annual emissions is achieved. Recent proposals have called for reductions on the order of fifty to eighty percent below current levels by 2050, or about ten to twenty percent per decade. It is unlikely that all of the allowances over an almost forty year period would be allocated up front. Therefore, the unallocated future allowances could serve as a source of reserve allowances. Again, if the objective is to maintain the long-term cap, and if these reserve allowances are in fact drawn down, this implies that future caps (unless modified in the future) will be that much tighter.

A policy that seeks to maintain the same cumulative cap, even as the allowance reserve is tapped, would likely create expectations of higher future prices if the reserve allowances are used now to lower current prices (rather than banked to comply with the now tighter future cap). Such behavior would make sense if current prices are high compared to long-term expectations because borrowing – which would be desired to arbitrage long-term low prices against shortterm high prices – is either constrained or unpalatable. However, most recent economic modeling of cap-and-trade proposals shows a strong tendency toward allowance banking in the early years of a program (EIA 2008, EPA 2008, Murray and Ross 2007, Paltsev et. al., 2007). In this case, allowances from the reserve should not be necessary to offset near-term shocks (which the banked allowances can address) and, if the reserve is tapped, it should not depress current prices. With allowances already being banked to reflect future scarcity, any allowances moved from the future to the present via the reserve would tend to be added to the current bank and returned to the future. It is only in the situation when firms are constrained in some way that is not well-captured by the referenced modeling results – particularly by a near-term shock before a bank can be built coupled with an explicit or implicit limit on individual borrowing – that system-wide borrowing from future allocations would represent a relaxation of that constraint, thereby lowering prices and containing costs.

An alternative approach would be to establish the reserve with allowances that, if unused, would vanish. Here, the cumulative cap is a range and tapping the reserve more clearly loosens the emissions constraint. The lower bound of the cumulative cap defines the aspirational target of the policy if the reserve is never tapped and the price remains below the ceiling price. The upper end of the range, defined by the cumulative effect of tapping the reserve, reflects the maximum allowable cumulative emissions. Based on the earlier discussion of how one would set the size of the reserve, this should be sufficient to maintain the ceiling price unless future expectations drive prices higher.

Just as the approach of system-wide borrowing from future allocations may make more sense if there is strong societal commitment to a specific cumulative cap (and a willingness to accept the cost consequences), the cap-range approach may make more sense if there is strong societal commitment to maintaining incremental costs below the ceiling price (and a willingness to accept the emissions consequences). Of course, in either case the long-term cap will undoubtedly be adjusted in the future; the main issue here is how the specification of a default cumulative cap (be it larger or smaller) may affect future expectations and indeed future action. Both approaches address short-term constraints with an appropriately chosen ceiling price and reserve size. However, the future borrowing approach, which maintains a predetermined cumulative cap, may create higher future price expectations and induce more mitigation than the range approach with the same aspirational cap. On the other hand, the caps are not exogenous to the choice of design; a range approach where the aspirational cap is significantly more aggressive than the cap under the future borrowing approach could create even higher price expectations.

Introducing Reserve Allowances to the Market

Given the structure of the allowance reserve approach, use of the reserve must involve, at a minimum, payment to the government of the ceiling price for any tapped reserve allowances. Otherwise there can be no assurance that the cap only expands when the ceiling price is reached as there is no other way to ensure that the market is really willing to pay that much. More generally, there are a variety of ways to increase the cap in response to high prices. Newell et. al., (2005) mention several approaches, including the announcement of an allowance split that makes each outstanding allowance worth more than one ton. However, this and other approaches that do not require payment to the government of the ceiling price have trouble maintaining the ceiling price without issuing too many or too few allowances. We therefore focus on two other options, which are somewhat equivalent.

The first approach, described briefly above, introduces reserve allowances into the market via a supplemental reserve auction prior to the end of the period when firms must balance their emissions and allowances (i.e., the true-up period). Here the government offers a fixed number of allowances (i.e., the reserve size) to the market via an auction with a minimum price equal to the ceiling price. If, at the time of the supplemental auction, the market expects the ordinary allowances to meet demand at a market price below the ceiling price, then presumably the allowances would remain in the reserve unsold. If, on the other hand, allowance demand is sufficient to push prices up to or above the ceiling price, then there should be some willingness to purchase reserve allowances at the ceiling price. If the reserve size is sufficient to meet demand at the ceiling price, then there should be enough allowances for both the allowance market price and the reserve auction price to equilibrate at the ceiling price.

However, if the demand for additional allowances at the ceiling price exceeds the reserve auction quantity, the auction process would lead to prices being bid up until the market clears at some price above the ceiling price. In this case, the allowance reserve does not guarantee a ceiling price in the same way as an explicit price ceiling or an unlimited safety valve. It puts only so much weight on addressing cost concerns, leaving some guaranteed maximum level of emissions intact. As noted earlier, the case when the ceiling price is exceeded should correspond to a situation when (discounted) long-term price expectations exceed the ceiling price, not when there is only a near-term disruption or shortage (unless the reserve size is too small).

Another approach, based on well-known financial instruments, is to have the government provide financial contracts (call options) that would give the holder the right, but not the obligation, to buy a certain quantity of allowances at the ceiling price (i.e., the strike price) during the true-up period each year.[4] In fact, as pointed out by Unold and Requate (2001), a series of such options – of different size and with different strike prices – could be used to replicate any known marginal damage function or desired allowance supply function. Such options could be auctioned (like ordinary allowances) or they could come attached to ordinary allowances on a pro rata basis.[5] The option's value, whether auctioned or given away, would be determined by the ceiling (strike) price and expectations of whether, when, and with what eventual market price it would be exercised. In the event that allowance prices exceeded the ceiling (strike) price level, options holders would begin to exercise their option rights, but would stop once prices fell back below the ceiling price level. One substantive difference with the reserve auction discussed above is the timing of the allocation of reserve allowances or options for reserve allowances, with the allocation of options most likely occurring sooner. Whether this would be an advantage or disadvantage requires further analysis. Another difference is that under the option approach, the difference between the market and ceiling price – if there is one – goes to the option holder, and options could be either auctioned or allocated for free. This feature suggests that options could be allocated in a way to help ensure that legislation passes, but can also create wasteful rent-seeking behavior.

An Allowance Reserve Board or Legislative Specification?

While some envision a reserve or other cost-containment program with key design parameters specified in legislation, an alternative is to delegate that responsibility to an independent executive board. Specific reserve design elements might be better managed by an independent executive board because, over time, there would be a clear need to update policy in response to new information and Congress may not respond in a timely manner. Indeed, part of the motivation for the reserve in the first place is a recognition that the drivers of long-term prices will evolve over time, that policymakers will be slow to adjust parameters, and that borrowing may not be a fully effective or implemented element, which is required for dynamic efficiency. While a suitably designed mechanism would, in principle, allow the market to operate for long periods of time without revision (driven by the expectation of an eventual revision), it is certainly possible that Congressional inaction might challenge that capacity. Therefore, governance by an independent board may be useful.

As discussed in Newell et. al., (2005), an important remaining issue would be the precise governing mandate for such a board, the tools available to it, and the degree to which it operated subject to legislated rules versus having complete discretion. There has been a tendency to draw an analogy with the US Board of Governors of the Federal Reserve, along with parallels between its dual mandate of managing growth versus inflation and the dual objectives of climate protection versus containing costs. However, there are a variety of differences (Pizer and Tatsutani 2008), and this remains an active area of discussion.

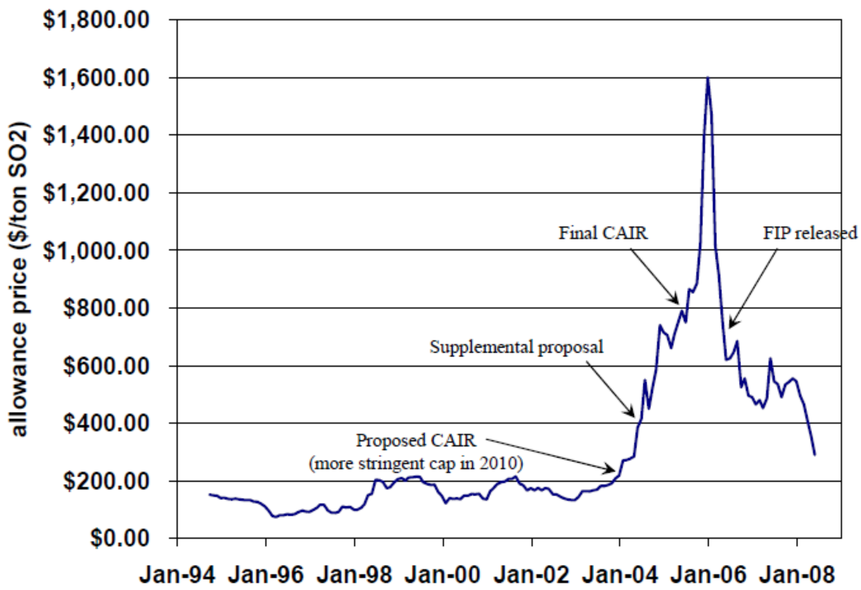
Conclusions

While much of the debate in the literature on the economics of climate change regulation has focused on comparing pure price and pure quantity mechanisms – i.e., taxes versus cap-andtrade – these policies are increasingly being viewed as too extreme to meet both practical and political needs. This article has presented recent and perhaps provocative new arguments suggesting that a sufficiently flexible cap-and-trade system can in theory do at least as well as and potentially better than a tax (despite previous literature pointing the other direction). However, it is unlikely that the required flexibility to borrow allowances from the future and the associated requirement for rational expectations in dynamic allowance markets would be ensured in practice. All of this recommends a hybrid mechanism. Roberts and Spence (1976) first suggested the idea of a cap-and-trade system with both a floor and ceiling price. We have taken their idea one step further and suggest that the ceiling price could come with a quantitative limit: what we call the allowance reserve.

We have argued that the allowance reserve addresses certain shortcomings of the Roberts and Spence idea, including the need for more flexibility in the elements of policy design to balance competing political interests. It also solves a possibly thorny technical problem that arises when the Roberts and Spence idea is applied in a dynamic world that includes banking and a need to update policies – which has the potential to lead to a run on the price ceiling. But perhaps most fundamentally, it supports the idea of a flexible cap-and-trade system that seeks to achieve an intertemporal optimum.

A number of additional details remain to be resolved, most notably setting the ceiling price and reserve size and how an allowance reserve would be institutionalized. Other issues tend to be primarily cosmetic or of a more general nature applicable to any market-based policy. In summary, the allowance reserve may help solve several previously insurmountable challenges in the current debate over climate policy design. This paper demonstrates that the notion of capand- trade with an allowance reserve is more than simply a political solution. Rather given the considerable uncertainties we face now over the costs and benefits of greenhouse gas mitigation, the institutional difficulties faced by firm-level borrowing mechanisms, and the need for marketbased institutions that will react to the unfolding of new information over time, a cap-and-trade system with an allowance reserve is well supported by an economic view of efficient long-term climate policy.

Figure 1: Historic Prices in the Sulfur Dioxide Allowance Market



Note: CAIR: Clean Air Interstate Rule; FIP: Federal Implementation Plan.

Technical Appendix

Consider an effort to seek: min $C_1(q_1)+C_2(Q-q_1)$ where q_t is the emissions each period t, Q is the ultimate cumulative emissions goal (unknown until period 2), C_t is the cost of emissions level q_t(which, unknown until period t, is positive if q_t is below some baseline level and zero otherwise), and the cost functions include adjustment for discounting to the present.

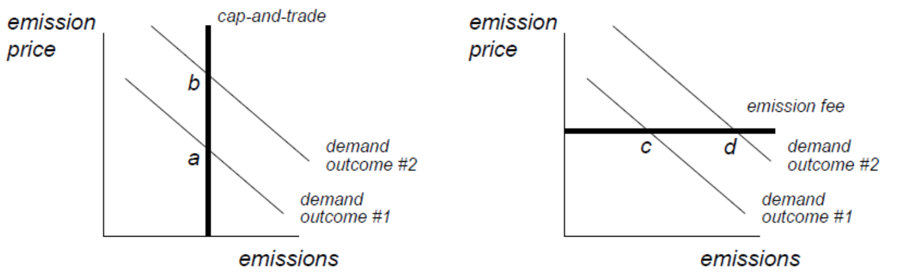
Given the ultimate resolution of uncertainty in period 2, we know costs in period 2 are $C_2(Q-q_1)$ and it would therefore be optimal to choose q_1 such that $C'_1(q_1) = C'_2(Q-q_1)$ With the information available when q_1 has to be chosen, the best practical outcome would be $C'_1(q_1) = E_1[C'_2(Q-q_1)]$, where E_1 reflects the expectation formed in period 1 about the costs and target set in period 2.

An optimizing government setting a period 1 tax, t_1, in period 0 would choose $t_1 = E_0[C'_1(q_1)]$ where q_1 satisfies $E_0[C'_1(q_1)] = E_0[C'_2(Q-q_1)]$, thereby minimizing expected costs as seen in period 0. Firms would then choose to emit q_1 such that $t_1 = C'_1(q_1)$, given the resolution of cost uncertainty in period 1. This outcome for $q1$ would not generally satisfy the efficiency condition, $C'_1(q_1) = E_1[C'_2(Q-q_1)]$ because $E_1[C'_2(Q-q_1)]$ will not generally equal $E_0[C'_2(Q-q_1)] = t_1 = C'_1(q_1)$ under the tax.

Now imagine the government instead sets a cap q_1 in period 0 and a second period cap $\bar{q}_2$ to deliver the ultimate objective $Q = \bar{q}_1 + \bar{q}_2$. Note that with second period cap $\bar{q}_2$, if firms have banked $\bar{q}_1 - q_1$ at the end of period 1, in period 2 emissions would be $Q - q_1$ and marginal costs would be $C'_2(Q-q_1)$. In this setting, a cost-minimizing firm would choose q_1 such that $C'_1(q_1) = E_1[C'_2(Q-q_1)]$ regardless of the first period cap.

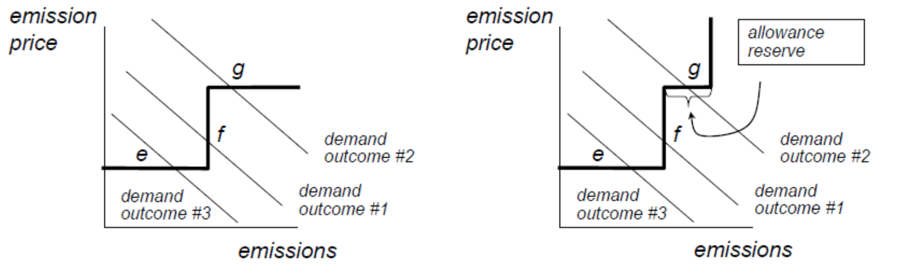
Appendix

Figure 1: Emissions and Price Outcomes under Cap-and-Trade versus Emissions Fee/Tax



Allowance supply under cap-and-trade *Allowance supply under emissions fee*

Figure 2: Emissions and Price Outcomes under Hybrid Price–Quantity Policies



Allowance supply based on Roberts and Spence (1976) *Allowance supply with allowance reserve*

About the Author

Brian C. Murray is the Director for Economic Analysis, Nicholas Institute, and Research Professor, Nicholas School of the Environment, Duke University. Richard G. Newell is the Gendell Associate Professor of Energy and Environmental Economics, Nicholas School of the Environment, Duke University, a University Fellow at Resources for the Future, and a Research Associate at the National Bureau of Economic Research. William A. Pizer is a Senior Fellow at Resources for the Future. Senior authorship is not assigned. The research was supported in part by a grant from the Swedish Foundation for Strategic Environmental Research (MISTRA). The authors acknowledge Joseph Aldy, Jon

Anda, Jason Grumet, Suzanne Leonard, Tim Profeta, Nicole St. Clair, Robert Stavins, Tracy Terry, an anonymous referee, and participants at the Resources for the Future workshop, "Managing Costs in a US GHG Trading Program," (Pizer and Tatsutani 2008) for their insights and suggestions on this issue.

References

Argus Media. 2008. Markets Slowed by CAIR Concerns. *Argus Air Daily*, May 30, 15 (104).

Eilperin, Juliet, and Steven Mufson. 2008. Climate Bill Underlines Obstacles to Capping Greenhouse Gases. *Washington Post*, June 1, A12.

Energy Information Administration (EIA). 2008. Energy Market and Economic Impacts of S. 2191, the Lieberman–Warner Climate Security Act of 2007. April. Report SR/OIAF/2008-01. Washington, DC: EIA.

Hoel, Michael, and Larry Karp. 2002. Taxes versus Quotas for a Stock Pollutant. *Resource and Energy Economics* 24: 367–384.

Jacoby, H.J., and A.D. Ellerman. 2003. The Safety Valve and Climate Policy. *Energy Policy* 32(4): 481–491.

Kerr, Suzi and Richard G. Newell. 2003. Policy-Induced Technology Adoption: Evidence from the U.S, Lead Phasedown. *Journal of Industrial Economics* 51(3):271-343.

Kling, C., and J. Rubin. 1997. Bankable Permits for the Control of Environmental Pollution. *Journal of Public Economics* 64(1): 101–15.

Kolstad, C.D. 1996. Learning and Stock Effects in Environmental Regulation: The Case of Greenhouse Gas Emissions. *Journal of Environmental Economics and Management* 31(1): 1–18.

Kopp, Raymond, Richard Morgenstern, and William Pizer. 1997. Something for Everyone: A Climate Policy that Both Environmentalists and Industry Can Live With.*Weathervane*. Washington, DC: Resources for the Future. http://www.weathervane.rff.org/SomethingForEveryone.pdf.

Murray, Brian, and Martin Ross. 2007. The Lieberman–Warner America's Climate Security Act: A Preliminary Assessment of Potential Economic Impacts. Policy Brief NI PB 0704. Durham, NC: Nicholas Institute for Environmental Policy Solutions, Duke University.

Newell, Richard G., and William A. Pizer. 2003. Regulating Stock Externalities under Uncertainty. *Journal of Environmental Economics and Management* 45: 416–432.

Newell, Richard G., William A. Pizer, and Jiangfeng Zhang. 2005. Managing Permit Markets to Stabilize Prices. *Environmental and Resource Economics* 31: 133–157.

Paltsev, Sergey, John M. Reilly, Henry D. Jacoby, Angelo C. Gurgel, Gilbert E. Metcalf, Andrei P. Sokolov, and Jennifer F. Holak. 2007. Assessment of US Cap-and-Trade Proposals. Report 146. Cambridge, MA: MIT Joint Program on the Science and Policy of Global Change.

Pizer, William A. 2002. Combining Price and Quantity Controls to Mitigate Global Climate Change. *Journal of Public Economics* 85(3): 409–434.

Pizer, William A. and Marika Tatsutani. 2008. Managing Costs in a US Greenhouse Gas Trading Program: A Workshop Summary. Discussion paper 08-23. Washington, DC: Resources for the Future.

Roberts, M.J., and M. Spence. 1976. Effluent Charges and Licenses under Uncertainty. *Journal of Public Economics* 5(3–4): 193–208.

Rubin, J.D. 1996. A Model of Intertemporal Emission Trading, Banking, and Borrowing. *Journal of Environmental Economics and Management* 31: 269–286.

Samuelsohn, Darren. 2008. Behind "Safety Valve" Debate Resides 30+ Years of History. *ClimateWire,* March 11.

US Environmental Protection Agency. 2005. Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone (Clean Air Interstate Rule); Revisions to Acid Rain Program; Revisions to the NOX SIP Call. *Federal Register* 70(91): 25162–25405.

US Environmental Protection Agency. 2008. EPA Analysis of the Lieberman–Warner Climate Security Act of 2008: S. 2191 in 110th Congress. http://www.epa.gov/climatechange/downloads/s2191_EPA_Analysis.pdf.

Unold, Wolfram, and Till Requate. 2001. Pollution Control by Options Trading. *Economics Letters* 73: 353–358.

Weitzman, Martin L. 1974. Prices vs. Quantities. *Review of Economic Studies* 41(4): 477–491.

Weitzman, Martin L. 2008. On Modeling and Interpreting the Economics of Catastrophic Climate Change. Forthcoming *Review of Economics and Statistics*.

Endnotes

1 These two allowance supply approaches are shown in Appendix Figure 1 along with two alternative outcomes for emissions demand.

2 These outcomes are shown, respectively, as e, f, and g in Appendix Figure 2.

3 See Samuelsohn (2008) and link to letter at http://www.eenews.net/features/documents/2008/02/21/document_cw_01.pdf. Specifically, they stated "this proposal would weaken, if not eliminate any incentive for private sector innovation and investment in clean technologies." Although one can understand the reluctance of environmental groups to embrace policies allowing greater emissions, the argument against the safety valve based on innovation incentives is flawed. Curtailing the possibility of very high allowances prices would not "eliminate" the incentive for clean technology innovation and adoption, although it would curtail the incentive to do so for very expensive technologies that would only be competitive

above the safety valve price. Assuming the safety valve price is set appropriately, however, this is desirable because environmental policies should not, from an economic perspective, seek to promote technology at any cost. Rather policies should induce an *efficient* amount of innovation and adoption, consistent with societal willingness to pay (Kerr and Newell 2003).

4 If the execution date is not constrained in this way, it would create a very important difference: the effective annual reserve could accumulate over time if options accumulate, unexercised, year- after- year. If options can be executed well before the true-up period, reserve allowances could enter the system based on early expectations of high prices which, by the time the true up period arrives, have been revised.

5 See presentation by Jon A. Anda at the Carbon Market Insights Americas Conference. October 29–31, 2007, New York, NY. Available at: www.pointcarbon.com/events/recentevents/cmiamericas07.

8

Greenhouse Gas Emissions Charges and Credits on Agricultural Land: What can a Model Tell Us?

Joanna Hendy, Suzi Kerr** and Troy Baisden****

Using the simulation model Land Use in Rural New Zealand version 1 – climate (LURNZv1-climate), we simulate the effects of an agricultural land-use emissions charge and a reward for native forest and scrub regeneration. Our results are preliminary and at this stage should be considered illustrative. We find that, on its own, an agricultural emissions charge based on solely on land use would be disruptive and may not be very effective in reducing emissions. In addition, we find that including an additional policy that rewards regenerating forest and scrub without a similar reward for plantation forestry might negatively impact on plantation forestry, increasing emissions growth in the short-run. We are currently developing a second version of LURNZ-climate, which will be more robust and thus lend more weight to our future results.

* Motu Economic and Public Policy Research. E-mail: jo.hendy@motu.org.nz

** Director and senior fellow, Motu economic and public policy research, level 1. 97 Cubu Street, Post.Box. 24390, Wellington, New Zealand. E-mail: Suzi.kerr@motu.org.nz

*** Landcare Research baisden. E-mail: T@landcareresearch.co.nz

1. Introduction

Policies designed to mitigate greenhouse gas emissions through the Kyoto Protocol have the potential to create political firestorms. In 2003, the government proposed the ill-fated "fart" tax – this small research levy ignited a damaging political firestorm despite representing a charge of only 25 cents per tonne carbon dioxide equivalent. This levy pales in comparison to the price of European Union Allowances, which have exceeded NZ$50 per tonne in March and April 2006 before falling back dramatically. Was the outrage all hot air? We use the simulation model Land Use in Rural New Zealand – climate (LURNZ–climate) to explore the impacts of high emissions charges (NZ$50 per tonne) on productive land uses including dairying, sheep and beef agriculture, and forestry. The results demonstrate the potential connections between greenhouse gas mitigation policies across sectors. We examine the large economic and potentially quite small emissions impacts that could result from exposing agriculture to the international emissions price. We also examine the land use and emissions implications of proposed policies that would give landowners emissions credits for regenerating indigenous forest and scrub. In the absence of a parallel policy for production forestry, the results are surprising and potentially disappointing for proponents of biodiversity.

2. About LURNZ-climate

To examine the impacts of devolving Kyoto credits and liabilities for emissions and sinks to land owners, economists at Motu Economic and Public Policy Research, and scientists at institutes including Landcare Research, AgResearch, Scion/Ensis (Forest Research), and NIWA have combined their efforts to develop LURNZ-climate. Based on economics and natural science, LURNZ-climate is a computer model that simulates the effect of climate change related government policies on rural land use in New Zealand. LURNZ-climate predicts land-use change at a fine spatial scale over the whole country, producing dynamic paths of rural land-use change and maps of rural land use across New Zealand. In addition, LURNZ-climate calculates the greenhouse gas implications of land-use change. With the development of LURNZ-climate, New Zealand now has the capacity to empirically investigate the potential impacts of policies designed to alter land-use decisions, including policies such as a charge to farmers in proportion to the amount of methane and nitrous oxide their livestock emit and a reward for regenerating indigenous forest and scrub.

The first version of LURNZ-climate, LURNZv1-climate, is now operational. LURNZv1-climate models land-use change on 25ha grid-cells in a grid covering New Zealand for four major rural land uses: dairy farming, sheep/beef farming, plantation forestry, and regenerating indigenous forest and scrub. In addition, LURNZv1-climate calculates the emissions impacts of these land uses for the three most important land use related greenhouse gases: methane, nitrous oxide, and carbon dioxide.

We built the LURNZv1-climate database by collecting and enhancing existing datasets describing land characteristics, including land cover, land use, economics, governance, geophysical variables and greenhouse gas data. The database also includes data on greenhouse gas emissions and removals related to each land use. The land use and cover variables come from the Ministry for the Environment's Land Cover Data Base (LCDB), which is based on satellite measurements of land cover, and agricultural surveys and censuses. The economic variables include commodity prices, yields, revenues and expenditures, costs of land use transitions, amenities, and land values. The governance variables include maps of conservation and Maori owned land. The geophysical variables include existing maps such as land-use capability, soil, climate, slope, and land-usespecific productivity indices developed specifically for this project. The greenhouse gas data include methane and nitrous oxide emissions for dairy, sheep, and beef livestock, and fertiliser, and measures of removal of carbon dioxide from the atmosphere by plantation forestry and regenerating indigenous forest and scrub. They come from the data collected for the 2002 National Inventory report (Brown and Plume, 2004) with additional information from Landcare Research (Hendy and Kerr, 2005).

The land use component of the model is based upon a micro-economic theoretical model that assumes landowners choose the land use that will give them the highest economic return, depending on potential returns, conversion costs, and relative uncertainties associated with the different land uses. To develop LURNZv1, we derived hypotheses from this theory and then statistically tested them against actual data. In doing this, we estimated the relationship between national level land use and prices, interest rates, area of non-rural land, and the average trend in all unobserved factors such as costs and relative uncertainties, using 29 years of historical data; this process is explained in more detail in Kerr and Hendy (2006). LURNZv1 uses these estimated relationships to predict short run land-use adjustment to economic shocks and long run equilibrium land use at the national level. LURNZv1 then uses spatial algorithms to map predicted changes across New Zealand, based on the assumption that, in response to an economic shock, it is marginal land that will change land use first. LURNZv1 is explained in more detail in Hendy, Kerr, and Baisden (2006).

The greenhouse gas module in LURNZv1-climate includes functions that project land-use related greenhouse gas emissions per unit of economic activity. The functions are simple; are based on readily available data and strong science; are consistent with the national inventory in 2002; evolve so that implied net emissions approximately match past inventory totals (1990-2002); and can be linked easily to a variety of models so they can be used in simulations. Combined with simple projections of the intensity of land-use for each land-use type, the greenhouse gas module calculates emissions associated with one hectare of each land use. This is explained in more detail in Hendy and Kerr (2005) and Hendy and Kerr (2006). Finally, combining the predictions of land-use change with the projections of land-use emissions per hectare, LURNZv1-climate calculates the emissions implications of land-use change.

For the remainder of this Article we discuss results produced from LURNZv1-climate. Given that the relationships driving the land-use responses in LURNZv1-climate are still under development, the underlying mechanisms of the model will be examined further before results can be considered robust in terms of timing or magnitude. Thus, the results presented should be taken as qualitative illustrations of issues arising from the modelled policies.

3. Charging Farmers for their Land-use Emissions

As a signatory to the Kyoto Protocol, the government is obliged to reduce New Zealand's annual emissions to the 1990 level during the 2008-2012 period or buy assigned amount units on the international market to make up the difference. Although agricultural emissions have been rising at a much slower rate than New Zealand's overall emissions, in which growth is driven largely driven by the transport sector, agricultural land use emissions, caused mostly by methane produced by grazing animals and nitrous oxide derived from animal excrement, constitute approximately half of New Zealand's overall greenhouse gas emissions (Brown and Plume, 2004). Therefore, reducing land-use emissions could significantly help New Zealand to meet its target and contribute efficiently to controlling greenhouse gases. A potential policy to help encourage emission reductions would be to charge farmers in proportion to the amount of emissions that their animal production produces. This would lead farmers to reduce area in livestock and particularly in dairy, reduce stocking rates and, if possible, change farm management to reduce emissions per animal. Current methane and nitrous oxide monitoring technology makes accurate animal or farm-scale monitoring of emissions impossible. The proposed policy related payments only to livestock numbers, which can be monitored. Because of current limitations in LURNZ, we model an even simpler policy where the government simply charges farmers in proportion to their land area in each land use, and assumes that each farm emits an average amount per hectare. This is a less flexible policy because farmers cannot change their stocking rates in response to the charge. We therefore underestimate the size of the likely response to a charge based on livestock numbers.

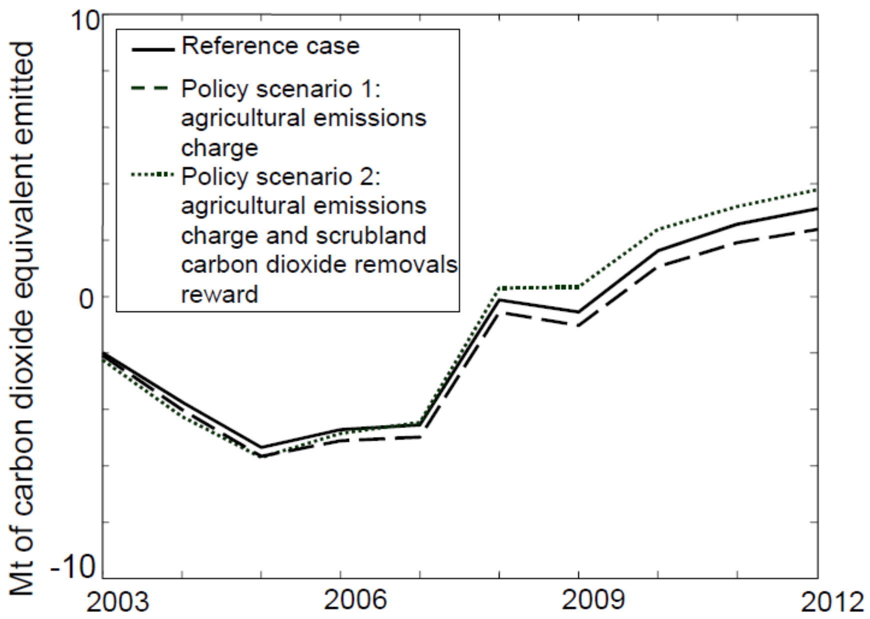
If dairy farmers were charged $50 for every tonne of carbon dioxide equivalent emitted in 2002, based on average values, their income would decrease 60 cents for each kilogram of milk solids that they produced. On average in 2002, farmers received $5.31 per kilogram of milk solids, so this charge would have equated to an 11% reduction in revenue. If sheep/beef farmers were charged the same amount per tonne of carbon dioxide equivalent, they would pay 85 cents for every kilogram of combined meat and wool, equivalent to a 22% reduction in revenue. The impact of these revenue reductions can be measured against net profits, which were $126,469 for dairy farms and $113,303 for sheep/beef farms when averaged over the last five years (New Zealand. Ministry of Agriculture and Forestry, 2001-2005a and 2001-2005b). This charge would have reduced net profits by $48,693 for the average dairy farm and $38,116 for the average sheep/beef farm. These impacts would directly lower land values and hence farmer wealth.

The charge would also affect people other than farmers, as the indirect effects would spread out through the economy. Farmers, who would have to pay the huge cost, would likely reduce their spending. This would negatively affect their communities, in particular including laying off farm workers or lowering their wages. Farm workers in return would reduce their own expenditure. Thus, the effects of the charge would flow on through the economy. Sin et. al., (2004) found that the areas likely to be hardest hit by an emissions charge would be Gore and MacKenzie in the South Island, and Taihape, Waipukurau, Te Kuiti and Dannevirke in the North Island. The effect on the economy as a whole may not be large after an initial period of adjustment if the revenue from the charge were recycled into other tax cuts, but the transfers of income between people and the dislocation in some communities would be significant.

In response to such a policy, some marginal land is likely to change to a lower emitting land use. If, for example, sheep/beef farming on a parcel of marginal land is no longer profitable, the land is likely to enter plantation forestry or a state, which we refer to as regenerating forest and scrub, in which no economic activity is discernable. It is also likely that some land will move from dairy to sheep/beef (or not convert to dairy as soon – if dairy prices and conversions continue to be high). For example, facing such a charge, farms considering converting to dairy would find that the difference between their current returns in sheep/beef farming and the returns they could potentially earn in dairy would be reduced. This is because dairy farming has higher emissions per hectare than sheep/beef farming so they face a higher charge. For some farms on the margin for conversion to dairy, this effect might be large enough to make sheep/beef more profitable than dairy, and so these farms might choose not to convert and thereby reduce New Zealand's total emissions. In all cases, the resulting land-use changes will result in lower emitting land use, achieving the goal of the policy. However, the costs to enterprises and rural economies may be sufficiently large that the policy is not currently justified, relative to other policies that would induce emissions reductions in other sectors.

To examine the impact of a NZ$50 per tonne of carbon dioxide equivalent charge on New Zealand agriculture, we ask, how big would the corresponding emissions reductions be? To answer this, we first need to know what would have happened if no policy was introduced. To tell us this, we simulate a reference case scenario. The reference case gives us a line against which we can measure the effectiveness of the policy, allowing us to observe the magnitude of the policy effect and discern whether the policy is achieving its intended result.

Figure 1: Emissions under Different Policy Scenarios



For our reference case, we project changes in land use and emissions from 2003 to 2012, using Ministry of Agriculture and Forestry forecasts of commodity prices and assuming that both the interest rate and the area of non-rural land are constant. Based on this scenario, LURNZv1 projects that by 2012 dairy area will expand by 1.2% (18,000ha), sheep/beef area will contract by 2.8% (199,000ha), plantation forestry will expand by 17.4% (273,000ha), and regenerating forest and scrub will contract by 5.5% (92,000ha) compared to 2002. The solid line in the figure shows the corresponding agricultural emissions for the reference case over the period. The emissions are calculated as total methane and nitrous oxide emissions from dairy, sheep, and beef livestock, and fertiliser use, net of carbon dioxide removed by plantation forests and regenerating indigenous forest and scrub.

To find out how much the charge would reduce emissions, we model the charge as a reduction in the commodity price that farmers receive, assuming that farmers will respond to the charge in the same way as a commodity price shock. From 2003 onwards, we reduce the commodity prices relative to those we used in the reference case by the equivalent of 60 cents for milk solids and 85 cents for meat and wool; these reductions correspond to a charge of $50 per tonne of carbon dioxide equivalent. We expect that, when compared to the reference case, dairy would expand less, sheep/beef would contract more, plantation forests would expand more, and regenerating forest and scrub would contract less. As a result, we expect that the rise in emissions would be reduced and indeed this is the case. The dashed line in the figure shows net emissions associated with this scenario.

We find that dairy area contracts by 1% with the policy, whereas in the reference case it expanded by 1.2%. Sheep/beef area contracts by 0.3 percentage points more than in the reference case, plantation forestry stays about the same, and regenerating forest and scrub contracts by 3.8 percentage points less than in the reference case. The land-use change caused by the policy reduces the annual growth rate in emissions during 2003 – 2012 from about 0.5 million tonnes of carbon dioxide equivalent per year in the reference case to about 0.4 million tonnes of carbon dioxide equivalent per year.

The lower emissions rate from a charge based on land use equates to a 6% relative reduction in emissions over the first commitment period. This is a small reduction for a large emissions price. The result therefore suggests that an emissions tax levied on agriculture will result in relatively small reductions in emissions, relative to reductions in the profitability of farming that are likely to flow through the economy. Thus, a policy levying an emissions charge on agriculture based on emissions per hectare remains a relatively poor policy option, presuming that significant impacts on land values rural workers and rural communities cannot be addressed. It is possible however, that the current model underestimates the magnitude of change that could be achieved through slightly more targeted policies. A more sophisticated policy, such as a policy where the government monitored livestock numbers and fertiliser use within each land use, could give more dimensions along which farmers could reduce their emissions.

4. Rewarding Farmers for Regeneration of Marginal Land

The Government might be able to induce a greater reduction in emissions and at the same time reduce the impact on farmers, if the government rewarded the regeneration of indigenous forest and scrub on marginal land. The Government has developed a policy called the Permanent Forest Sinks Initiative (PFSI) that would provide such an alternative. In addition to lowering agricultural emissions by reducing the land area in agriculture, the PFSI would encourage landowners to sequester carbon in forest biomass (Trotter et. al., 2005). Reversion of native forest also has other benefits, including on biodiversity (Hall, 2001) and water quality. These are not considered further here.

We simulate the effect of awarding farmers $50 for every tonne of carbon dioxide equivalent that is removed from the atmosphere by native forest regeneration from 2003 to 2012 as well as charging them for their livestock emissions as in the previous simulation. For this policy, farmers would be rewarded in proportion to the national average rate of carbon dioxide removals for every hectare that they set aside.

Under this scenario, if farmers set aside land in 2003, the annualized net present value over the next ten years would be $53 per hectare per year, assuming a 6% discount rate. This value can be compared with annual costs due to emissions charges of $149 and $433 per hectare annually in sheep/beef and dairy farming, respectively. These different charges and rewards alter relative returns, and we expect that some marginal dairy land would convert to sheep/beef land, and some marginal sheep/beef land would be allowed to regenerate native vegetation. Thus, in this scenario, there is potential to reduce emissions even more, with more land changing toward lower emitting land uses.

Surprisingly, this does not happen. When we compare net emissions in this scenario to net emissions from the previous scenario, which only includes the emissions charge, we find that introducing the reward actually increases emissions growth. In fact, not only does the policy result in greater emissions than the case of the emissions charge on its own, it results in greater emissions than the reference case. We find that this policy results in annual emissions growth during 2003 – 2012 greater than the reference case by about 0.1Mt of carbon dioxide equivalent; this is illustrated by the dotted line in the figure.

The reason for this unexpected result is that regenerating forest and scrub compete with plantation forestry for land. Regenerating forest and scrub expansion has occurred at the expense of plantation forestry expansion and consequently, plantation forestry area expands at a slower rate in this scenario than in the previous scenarios. Net emissions increase because young regenerating forest and scrub remove much less carbon dioxide from the atmosphere than young plantation forests. This is a short-term problem; in the long run, removals by naturally regenerating vegetation surpass those by plantation forestry. However, this effect would actually make meeting our obligations for the first Kyoto commitment period more difficult.

This result suggests that the PFSI has the potential to achieve a 'perverse' result during 2008–2012, by actually making New Zealand's net position under the Kyoto Protocol worse. Rather than suggesting that the PFSI is poor policy, this result emphasizes that even policies with the potential to produce multiple environmental benefits such as the PFSI must be considered as part of an overall picture. In this case, the PFSI would be enhanced if plantation forestry were rewarded for carbon sequestration as well. Our preliminary results suggest that the government should consider also rewarding plantation forestry particularly if they want short-term emission gains.

Similarly, the impacts of levying a charge on land use related emissions from agriculture would ideally be examined in the context of carbon charges or emissions trading in the fossil fuel sector. This is not possible with any current model.

5. Summary

These illustrative simulations demonstrate that LURNZv1-climate is a useful tool for analysing potential greenhouse gas mitigation policies intended to reward or tax emissions resulting from land use activities. Our first simulation indicates that an agricultural emissions charge based simply on land use would be highly disruptive and may not be very effective in reducing emissions. Our second simulation shows that the inclusion of a reward for regenerating forest and scrub without a similar reward for plantation forestry might negatively impact on plantation forestry, increasing emissions growth in the short-run. This demonstrates the potential for policies to have unintended, and potentially perverse impacts when policies are not aligned across sectors.

The model results illustrate the importance of careful empirical analysis of potential policies, and emphasize the need for tools such as LURNZ that are applicable to New Zealand's unique situation. The results presented here are preliminary in that they illustrate the probable scale and direction of policy impacts but the exact size of those impacts may not be robust. We are currently developing a second version of LURNZ-climate, which will be much more robust, and thus lend more weight to our future results.

Finally, when developing LURNZv1-climate we used publicly available data whenever it was available. We did this to support our aim of making both LURNZ-climate and the LURNZ-climate database freely available for research purposes whenever possible. We hope others will use our data and model to explore these issues further. For more information, please visit www.motu.org.nz/land_use_nz.htm.

Acknowledgements

This research is part of Motu's "Land Use, Climate Change and Kyoto" research programme, which is carried out in collaboration with Landcare Research and others. This research programme is funded by a grant from the Foundation for Research, Science and Technology. We would like to thank participants of Motu's "Land Use, Climate Change and Kyoto: Human dimensions research to guide New Zealand policy" research workshops between 2002 and 2005, for their input into the development of the fundamental project, which this report relies on. Any remaining errors or omissions are the responsibility of the authors.

References

Brown, Len and Helen Plume. 2004. "New Zealand's Greenhouse Gas Inventory 1990–2002: The National Inventory Report and Common Reporting Format Tables", National Inventory Report, New Zealand Climate Change Office, Wellington.

Hall, Graeme M. J. 2001. "Mitigating an Organization's Future Net Carbon Emissions by Native Forest Restoration", *Ecological Applications*, 11:6, pp. 1622-33.

Hendy, Joanna and Suzi Kerr. 2005. "Greenhouse Gas Emissions Factor Module: Land Use in Rural New Zealand-Climate Version 1", *Motu Working Paper 05-10*, Motu Economic and Public Policy Research, Wellington, NZ.

Hendy, Joanna and Suzi Kerr. 2006. "Land Use Intensity Module: Land Use in Rural New Zealand-Climate Version 1", *Draft Motu Working Paper*, Motu Economic and Public Policy Research, Wellington, NZ.

Hendy, Joanna; Suzi Kerr and Troy Baisden. 2006. "The Land Use in Rural New Zealand (LURNZ) Model: Version 1 Model Description", *Draft Motu Working Paper*, Motu Economic and Public Policy Research, Wellington, NZ.

Kerr, Suzi and Joanna Hendy. 2006. "Drivers of Rural Land Use in New Zealand: Estimates from National Data", *Draft Motu Working Paper*, Motu Economic and Public Policy Research, Wellington, NZ.

New Zealand. Ministry of Agriculture and Forestry. 2001-2005a. "Dairy Monitoring Report", MAF Policy, Ministry of Agriculture and Forestry, Wellington.

New Zealand. Ministry of Agriculture and Forestry. 2001-2005b. "Sheep and Beef Monitoring Report", MAF Policy, Ministry of Agriculture and Forestry, Wellington.

Sin, Isabelle; Emma Brunton, Joanna Hendy and Suzi Kerr. 2005. "The Likely Regional Impacts of an Agricultural Emissions Policy in New Zealand: Preliminary Analysis", *Motu Working Paper 05-08*, Motu Economic and Public Policy Research, Wellington, NZ.

Trotter, Craig M.; Kevin R. Tate, Neal A. Scott, Jacqueline A. Townsend, R. Hugh Wilde, Suzanne M. Lambie, Mike Marden and Ted Pinkney. 2005. "Afforestation/Reforestation of New Zealand Marginal Pasture Lands by Indigenous Shrublands: the Potential for Kyoto Forest Sinks", *Annals of Forest Science*, 62:8, pp. 865-71.

List of Cases

Armco, Inc., v. Hardesty, 467 US 638, 644 (1984).

Assoc. Indus. of Mo. v. Lohman, 511 US 641, 647 (1994).

Fulton Corp., v. Faulkner, 516 US 325, 331 (1996).

Henneford v. Silas Mason Co., 300 US 577 (1937).

Hughes v. Oklahoma, 441 US 322, 325–26 (1979).

Maine v. Taylor, 477 US 131, 151–52 (1986).

Maryland v. Louisiana, 451 US 725, 760 (1981).

New Energy Co., of Ind. v. Limbach, 486 US 269, 278 (1988).

New State Ice Co., v. Liebmann, 285 US 262, 311 (1932).

Or. Waste Sys., Inc., v. Dep't of Envtl. Quality, 511 US 93, 98–99 (1994).

Index

Snap Shot

Clean Development Mechanism and Law

Due to massive industrialization there is increase in huge quantities of atmospheric concentrations of carbon dioxide, methane, and nitrous oxide in the atmosphere which are escalating the temperature of Earth causing global warming and climate change. In this regard various regulatory measures are initiated by the States through legislations and policies encouraging, Carbon dioxide Capture and Storage (CCS) technology, cap and trade, carbon tax, CDM sequestrisation. Most of the States desire flexibility in achieving cost-effective emission reductions, and find CDM as the best option. In consequence there is huge demand for these projects in carbon markets across the globe. Though the projects and schemes are considered feasible for the developed countries, the developing countries and environmental NGO's fear environmental degradation. There is enormous pressure for framing a comprehensive international regulatory framework to deal with key issues like leakage, permanence, boundary issues and allocation of liabilities in CCS technology.

This book provides contemporary attempts of various developed Nations in successfully implementing CDM sequestrisation schemes and Joint Implementation projects It would be of great use to the students, research scholars, faculty in Environmental Law, Environmental science, entrepreneurs, corporate entities, regulatory authorities, policy makers, CDM and joint implementation project developers.