ENERGY CHARTER

The Impact of CO_2 Reduction Measures on Energy Trade

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PREFACE

Over the past few years, the linkages between energy and environment have become a topic of major interest. With the entry into force of the Kyoto Protocol in February 2005, the carbon trading mechanisms of the Kyoto Protocol became a functioning part of the international response to concern over climate change. Since most countries of the Energy Charter constituency have ratified the Kyoto Protocol, the implementation of the CO2 reduction measures and the carbon trading mechanisms are becoming increasingly relevant to our member states.

Carbon trading mechanisms were discussed in a broader context in the Secretariat's publication entitled "Carbon Trading and Energy Efficiency" (March 2005). The present report focuses on macroeconomic impacts of CO_2 reduction measures and resulting changes of fuel choice and energy flows. The work benefited from the discussions in the Group on Trade and Transit as well as from comments by member states and the International Energy Agency.

The report starts with an update on the initial EU Emissions Trading System (ETS), the plans to establish similar systems in non-EU countries, and the linkage of project mechanisms with the EU Emission trading system. It goes on to analyse the potential impacts of emissions reductions measures and emission trading on fuel-mix, energy-intensive products and cross-border flows of energy.

The study has been prepared by the Directorate of Trade, Transit and Relation with Non-Signatories of the Energy Charter Secretariat headed by Mr Ralf Dickel. The work was started by Mr Janusz Bielecki and has been completed by Mr Ganbat Lkhagva.

The Study is published under my authority as Secretary General of the Energy Charter Secretariat and is without prejudice to the positions of Contracting Parties or to their rights or obligations under the Energy Charter Treaty or the WTO Agreements.

André Mernier
Secretary General
Brussels, 31 January 2006

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List of Acronyms

CCGT	Combined Cycle Gas Turbine
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
COP	Conference of the Parties
COWI	International Consulting Group based in Denmark
DG TREN	European Commission Directorate-General Transport and Energy
EC	European Commission
ECT	Energy Charter Treaty
EEA	European Environment Agency
EEX	European Energy Exchange
EIA	United States Energy Information Administration
ERU	Emission Reduction Unit
EU	European Union
EU ETS	European Union Greenhouse Gas Emission Trading Scheme
EUA	European Union Allowances
GDP	Gross Domestic Products
GETS	Greenhouse Gas & Energy Trading Simulations
GHG	Greenhouse Gas
HFC	Hydrofluorcarbons
ICCF	International Council for Capital Formation
IEA	International Energy Agency
IETA	International Emissions Trading Association
IPE	International Petroleum Exchange
JI	Joint Implementation
KPI	Kyoto Protocol Implementation
MOU	Memorandum of Understandings
$MtCO_2e$	Million tonnes of carbon dioxide equivalent
NAP	National Allocations Plan
NGACs	NSW Greenhouse Abatement Certificates
NSW	New South Wales
OECD	Organisation for Economic Co-operation and Development
PEEREA	Protocol on Energy Efficiency and Related Environmental Aspects
PFC	Perfluorcarbons
POLES	A Sectoral Model of the World Energy System
PRIMES	Partial Equilibrium Energy Model for Carbon Dioxide
UNFCCC	United Nations Framework Convention on Climate Change
UNICE	Union of Industries of the European Communities
VER	Verified Emission Reductions
WTO	World Trade Organisation

THE IMPACT OF CO_2 REDUCTION MEASURES ON ENERGY TRADE

Executive Summary

After the Kyoto protocol came into effect in the beginning of 2005 the discussion has started to focus on the nexus between use of fossil fuels and resulting emissions of CO_2 as the most important Green House Gas, the impacts of fulfilling the Kyoto commitments and the role of emission trading. While IEA and the EU Commission have been pioneers to address these issues, a role for the Energy Charter might be to highlight the implications for the ECT constituency, especially with a view to energy efficiency and energy trade.

As the Kyoto targets were established without assessment of the benefits (or better: of the damage avoided) by the Kyoto-commitments of industrialized states to reduce GHG emissions, a cost-benefit-analysis is not possible; the issue is to minimize the costs of compliance with the given Kyoto commitments. An important part of the Kyoto concept is to reduce compliance costs by allowing the trading of emission rights, so that emissions can be reduced where it is most economic. Several analyses have been made to assess the compliance costs, the savings by emission trading and to assess other impacts of compliance with Kyoto and of emission trading. The EU's CO_2 emissions trading system, which is a first of its kind became operational at the beginning of 2005. It is an important milestone in the EU's strategy for achieving its Kyoto obligations.

Expected impacts

This paper summarizes the analyses of the expected impacts of CO_2 emissions reduction measures on (i) economic activity, (ii) energy prices, (iii) trade flows and (iv) industrial competitiveness. These impacts depend very heavily on future prices for carbon allowance which are typically projected to stay between 10-30 €/t CO_2.

(i) These analyses show that the EU's costs of compliance with the Kyoto obligations should be rather limited, ranging between 0.1% and 0.5% of GDP by 2012. EU-wide emissions trading for energy-intensive industries may reduce these costs by about one-quarter, which could increase to about one third if all sectors participated in the emissions trading and up to 50% if this trading were extended to all Annex B countries. Some non-EU countries are already undertaking initiatives to establish their own emission trading systems and some of them – notably Norway and Switzerland – may soon link their systems with that of the EU.

(ii) The impacts of emissions trading on the energy sector should also be limited, though not insignificant through 2010. The wholesale electricity prices may increase by about 10-15% and retail electricity prices may increase by 4-6%. Such impacts are viewed as insufficient to affect the levels of activities or the market shares of power companies. However, they may lead to a change of the fuel mix within the merit order, i.e. the order of dispatch of power generation plants of different type and fuel as determined by the difference in marginal costs to produce extra power. So far the fuel efficiency of power generation of the plants and the costs of the fuel used were the main cost elements. Now, the costs of emission trading rights have to be added. The expectation is that with increasing prices for emission trading rights the use of fuels with low carbon intensity

like gas will increasingly be favoured over coal and lignite, and carbon free power generation based on renewables and nuclear will be favoured over fossil fuels. A reversal of the merit order between coal and gas is expected at a price level for emission trading rights of 20 – 35 $/t CO_2.

(iii) More ambitious emissions reduction targets may be pursued after 2012, pushing CO_2 prices much higher. Unless gas prices continue their recent upward trend compared to coal prices, the most inefficient coal power plants would be closed and new investment would be made in upgrading of existing coal plants and building of new highly efficient gas plants. The EU ETS could under these assumptions increase EU imports of gas for power generation, and stimulate cross-border trade in electricity.

(iv) The emissions mitigation measures are expected to reduce somewhat the competitiveness of EU countries compared to the countries with no emissions targets. For energy-intensive goods, the volumes of EU's exports are estimated by some studies to fall by 3 to 5% depending on the speed of technology adaptation and the specific industry examined. Another study estimated that reductions in CO_2 emissions of 2% and 10% respectively by the EU's most energy-intensive industries would have only modest impacts on their costs (a cost increase of 0.7% and 2.4% respectively). The competitiveness of most of these industries against imports from non-EU imports would be maintained by high freight costs.

It should be noted that the above analyses may tend to underestimate the costs and thereby the costs saved by the EU emissions trading as they typically assume that the low prices for allowances observed until early 2005 would continue over the coming years. This assumption may now be in question as the emissions prices have increased substantially since mid 2005 peaking at 30 €/t CO_2 on the heels of escalating oil and gas prices and widening differentials between gas and coal prices. This recent development showed – contrary to common wisdom so far – that high prices of gas relative to coal can favour the use of coal and thereby drive up the prices for emission rights, instead of a mechanism where high prices for emission rights favour the use of gas.

Linking project mechanism

In addition to emissions trading, the EU and other countries intend to use other measures for reaching the Kyoto targets, including in particular the low-cost JI and CDM projects. Thanks to the Linking Directive, EU companies will be able to convert the credits from these projects into allowances that can be used for compliance under the EU ETS. Most experts concur that the contribution of JI and CDM projects will likely be limited to 5-6% of the total volume of emissions reductions until 2012, reducing the compliance costs of EU ETS by about 20% and the allowance price almost by half.

The main suppliers of emission credits under the JI are Russia and Ukraine. However, in order to use their large potential to sell emission allowances they have to create a national system for the assessment of GHG emissions to register emissions allowances and transactions. So far progress in both countries has been slow.

Without competition from non-EU parties on the JI and CDM credits market, the allowance price could fall from 26 €/t CO_2 in the base case (with no linking) to 5 €/t CO_2 with linking. The annual compliance cost for the ETS sectors would be reduced by about 60%.

Second phase of ETS / Post Kyoto

The EU Commission has recently started a comprehensive overview of the ETS scheme and intends to prepare a report by mid-2006. The results of this review are not expected to significantly affect the rules or the scope for the second phase of ETS (2008 – 2012, i.e. the Kyoto period).

The debate is now turning to the post-Kyoto regime i.e. the time after 2012, but the future commitments are not yet agreed and their economic implications remain very uncertain. In early 2005, the EU started drawing up its climate change policy after 2012. The Commission's February 2005 paper proposed a strategy focusing on: (a) encouraging all major world emitters to accept binding targets; (b) including more sectors in emissions reductions; and (c) promoting climate-friendly technologies and market-based instruments such as the EU ETS.

At the March 2005 summit, EU leaders indicated a flexible target of 15-30% emissions reductions for 2020, but only on condition that achieving this target will be cost effective. This underscores the importance of setting future emissions reductions targets at levels that do not imply prohibitively high compliance costs. After all, as one study pointed out, increasing such targets by 50% would lead to 3-5 times higher compliance costs.

Conclusion:

So far the impacts of CO_2 emissions reduction measures and of emission trading regimes on costs of energy use and volumes of energy trade are limited; substantial impacts are concentrated on the competitive position of energy intensive industry like Ammonia- and Aluminium production. However, the CO_2 emissions trading may have significant impacts on the fuel choice for power generation as the price for emission rights becomes a new element, when comparing the costs of power generation between different fuels and technologies. This will especially affect the role of gas in power generation and thus the development of further gas imports. Recent developments of the prices for gas, coal and emission rights suggest that their further development should be followed closely with regard to their implications on gas imports for power generation.

1. Background

The entry into force of the Kyoto Protocol in February 2005 is expected to have substantial implications for the energy sector in the ECT countries. Apart from Canada and New Zealand, all Annex B countries that have ratified the Protocol are also members of the ECT constituency.

There is a strong link between the reductions in greenhouse gas (GHG) emissions and the use of energy: more than 80% of world primary energy demand is covered by fossil fuels the use of which inevitably produces carbon dioxide (CO_2) and other GHG emissions. The introduction of national limits on CO_2 emissions will have substantial impacts on the use of and trade in fossil fuels, given that the prices for emission rights are projected to stay above 15 €/t CO_2 in the coming years.

Over the past few years, the linkages between energy trade and environment have been a topic of increasing interest for the Energy Charter process and, more particularly, for the former Group on Trade. On the basis of the Secretariat's papers, the Group had initially held the discussions on environmentally-motivated restrictions to electricity trade and on the impacts of schemes promoting renewable energy on energy trade.

More recently, the focus of discussions has shifted to the Kyoto Protocol and, especially, to current EU efforts to reduce CO_2 emissions through an EU-wide system of trading emissions allowances. Such a discussion took place in October 2004 on the basis of the Secretariat's report T/81 rev.1. In addition, a broader context to this issue was also discussed in the PEEREA Group on the basis of the Secretariat's publication titled "Carbon Trading and Energy Efficiency".[1] This publication has a much wider scope, as it reviews various Kyoto-based carbon trading mechanisms (including JI and CDM) from a global perspective, and its focus is on energy efficiency and climate policy rather than on macroeconomic impacts of CO_2 reduction measures and resulting changes of energy flows.

The Programme of Work for 2005 envisages further work in this area, with the aim of assessing the potential impacts of this trading system on energy prices and trade flows of energy and energy-intensive products. The specific mandate contained in that Programme reads as follows:

> *"Climate change policies can have repercussions for energy trade, and the Secretariat will continue to monitor the trade-related aspects of these policies, taking into account the guidelines established by the Group on Trade. In 2005, the follow-up work will include updates on the development of emissions trading schemes in the EU and other ECT countries, and the analyses of interface between emissions trading and other measures to implement the Kyoto Protocol (notably the Clean Development Mechanisms and Joint Implementation) and the impact on electricity generation, trade and related energy flows in the light of the trade provisions of the ECT /WTO. This will be done in co-operation with the IEA and the organisations of UNFCCC."*

Consequently, the Secretariat prepared a scoping paper offering proposals on how this activity could be developed in practice. The paper outlined: the objectives and scope, methodology,

[1] Energy Charter Secretariat: "Carbon Trade and Energy Efficiency", March 2005, ISBN 90-5948-033-3

envisioned process, outputs and timetable for this project. It was discussed and approved at the 24-25 May 2005 meeting of the Group and subsequently used as the basis for preparing this report.

2. Introduction

2.1. Objectives

This analysis focuses on the cross-border aspects both within and outside the EU and aims at reaching the following main objectives:

- to provide an update on: the status of National Allocation Plans (NAPs); initial functioning of the EU Emissions Trading System (ETS); and the plans to establish similar systems in some non-EU countries;
- to assess potential impacts of emissions trading on energy prices, the relative role of various fuels, economic activity and investment in energy infrastructure and cross-border flows of energy and energy-intensive products; and
- to comment on current discussions concerning the design of rules for phase 2 of EU emissions trading (2008-2012), and its links with the Clean Development Mechanism (CDM) and Joint Implementation (JI) instruments as well as with emissions trading systems in non-EU countries.

2.2. Scope

The Kyoto Protocol contains legally-binding targets which provide for overall reductions in emissions of six greenhouse gases for the first Commitment Period 2008-2012 compared to the 1990 level. Nonetheless, the initial efforts, including the EU's national allocation plans (NAPs) and trading of allowances, only apply to CO_2 emissions as these account for approximately 80% of all GHG emissions within the EU. No specific allocation plans or trading schemes have yet been developed for the other gases which have no direct link to energy consumption. Therefore, this initial analysis is limited in scope to the impact of reductions in CO_2 emissions.

Secondly, the time horizon is limited to 2012 as the debate on the post-Kyoto commitments is now only starting. Consequently, it is extremely difficult to predict the outcome of future negotiations on the post-Kyoto commitments.

The analyses of the impact of reductions in CO_2 emissions are developed for all EU-25 as the ten new member countries are now bound by the relevant directive and will be fully participating in the trading scheme and associated mechanisms. This poses some analytical and data challenges as most of the initial macroeconomic studies of that impact were limited to EU-15.

The emissions trading initially covers 46% of total CO_2 emissions within the EU (or around 1,440 Mt CO_2). The industries currently covered by that directive are: electricity, iron and steel, glass, cement, pottery and bricks, paper and pulp and oil refining. The focus of the analyses, particularly concerning the first period of 2005-2007, is therefore on these energy-intensive sectors as they will bear the brunt of the obligations to reduce CO_2 emissions. The impacts on other sectors that are not covered by the EU directive are addressed in a more cursory manner.

For the second phase of trading (2008-2012), the paper additionally attempts to assess the impacts of extending EU emission trading to other sectors. It also addresses the links with

other flexible mechanisms (such as JI and CDM) and with future trading systems in ECT countries outside the EU.

2.3. Methodology

This report is based on the Secretariat's review of the relevant literature concerning the EU emissions trading and its possible impacts on energy prices, trade, investment and international competitiveness. This was achieved through internal research and close collaboration and exchange of information with other relevant organizations, including, in particular, the European Commission, the IEA, the UNFCCC and Eurelectric.

The review summarises the results of econometric modelling that has been carried out in the recent years. Such exercises have been commissioned *inter alia* by the European Commission, UNICE/COWI, Eurelectric and the IEA. They used general equilibrium models of the world economy (e.g. PRIMES, POLES or GETS) which determine the prices for each energy form that equalise supply and demand. Such models typically use the concept of a "representative firm" and assume that the emissions trading would be cost-free[2].

These models consider both direct and indirect costs of compliance[3] with the CO_2 emissions reduction obligations (and marginal abatement costs) and attempt to assess their impact on energy prices and, subsequently, on GDP, trade flows and industrial competitiveness. The latter is typically measured as reduced external demand for EU goods and services resulting from higher EU production costs and export prices. These impacts include both short-term reactions (e.g. changes in load factors or slower growth in power consumption) and long-term reactions (e.g. increased imports of electricity or relocation of plants to non-EU countries).

In addition to the overall compliance costs, some of these analyses also examine and quantify the likely cost savings from emissions trading compared to only using national measures. Furthermore, some analyses additionally estimate the so-called CO_2 leakages, that is, the impact of diversion in EU economic activity towards countries without reduction commitments and the resulting reduced need to eliminate emissions within the EU.

The above assessments are reviewed primarily for the EU as an aggregate and do not deal extensively with the substantial differences across these countries. Moreover, where possible, they are discussed separately for the two phases of EU emissions trading. This distinction is necessary since for phase 1 the overall commitments and modalities of implementation are fairly well established whereas for phase 2 they may not be fully known until late 2006.

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[2] In reality, transaction costs would raise the cost of compliance to some extent.

[3] Internalised net costs of EU-25 mitigation policies. External benefits (such as avoided potential damage from climate change) are not considered in these analyses.

3. Recent developments concerning EU ETS

3.1. Key elements of EU ETS

The EU Emissions Trading System (EU ETS) is the world's first large-scale greenhouse gas (GHG) trading programme covering 12,000 installations in 25 countries and six major industrial sectors. It was enacted as one of the policy measures to enable the EU to meet its Kyoto targets. Under the Kyoto Protocol the existing EU-15 countries agreed to collectively meet their commitment of an 8% GHG emissions reduction. The collective target for the EU-15 countries is an 8% reduction in the overall GHG impact of these emissions. The commitments for individual EU member countries are laid out in the EU Burden Sharing Agreement (Council Decision 2002/358/EC) and range from -28% for Luxembourg to +27% for Portugal (see Table 1 below).

Table 1. Burden Sharing Amongst EU Member States

Countries	% Reduction for 2008-2012 period from 1990 emissions
Austria	-13
Belgium	-7.5
Denmark	-21
Finland	0
France	0
Germany	-21
Greece	+25
Ireland	+13
Italy	-6.5
Luxembourg	-28
Netherlands	-6
Portugal	+27
Spain	+15
Sweden	+4
United Kingdom	-12.5
EU-15 TOTAL	**-8.0**
Lithuania	-8
Latvia	-8
Estonia	-8
Slovakia	-8
Czech Republic	-8
Poland	-6
Hungary	-8
Slovenia	-8
AC-10 TOTAL	**-7.1**

Note: Cyprus and Malta are not listed.

Source: EEA, 2004

Since May 2004, the commitment and the EU ETS were extended to ten new EU member countries. The reduction targets for these countries range between 6% and 8% and averages 7.1%. The total amount of GHG emissions of these countries has dropped from 1100 Mt in 1990 to about 750 Mt in 2001, thereby creating an important CO_2 reserve. In the coming years this reserve will be around 250 Mt CO_2 which corresponds to over 15% of CO_2 emissions in

the ETS for EU-15. The participation of the ten new member countries will add to liquidity to the allowance market and will contribute to lower allowance prices during the first trading years.

The cornerstone of the EU strategy is the EU-wide emissions-trading scheme. The legal basis for this scheme was created in July 2003 when the Commission adopted Directive 2003/7787/EC[4] on trading in greenhouse gas emissions. The directive came into force on 23 October 2003 and is discussed in detail, together with the mechanics of the system, in the Secretariat's document T81 rev. 1.

The EU ETS is a 'cap-and-trade' system where a fixed amount of emissions allowances is allocated to companies and installations via the individual countries' National Allocation Programmes (NAPs). The cap is linked to the Kyoto target via the EU burden sharing agreement. Under the scheme, energy and industrial plants are being issued tradable annual allowances for emissions. Companies exceeding their quotas are allowed to buy unused allowances from those doing better at cutting their emissions. The rationale behind the emissions trading is to ensure that the emissions reductions will take place where the abatement costs are the lowest[5].

The EU ETS officially began on January 1, 2005 and consists of the first phase during 2005-2007 and successive 5-year periods, with the second phase of 2008-2012 set to coincide with the Kyoto compliance period. The first phase covers only the emissions of CO_2 whereas the second phase could possibly also cover additional gasses[6].

The emissions trading will initially cover 12,000 installations responsible for 46% of total CO_2 emissions within the EU. The industries currently covered by that directive are: electricity and heat (plants greater than 20 MW capacity), iron and steel, glass, cement, pottery and bricks, paper and pulp and oil refining. Other important energy-intensive industries, such as transport, may be included in the subsequent phases.

During 2005-2007 most permits are given away free, with the possibility to auction 5% of them. Banking of excess allowances for future years is allowed within this first phase whereas banking between the first and the second phase is at the discretion of member states. In cases of "force majeure", such as extremely low winter temperatures, additional emissions allowances can be issued by national authorities. The fines for non-compliance are set at 40 €/t CO_2 in the first phase and at 100 €/t CO_2 afterwards. In addition to paying the fines, the offending firms also have to make up the missed emissions reductions in the following year.

3.2. State of play concerning approval of NAPs

In a Communication COM(2003)830[7] issued on 7 January 2004, the Commission issued guidelines for eleven criteria contained in Annex III to the directive 2003/87/EC and relating to the assessment and approval of national allocation plans. The relationships between these criteria have been categorised in the Communication according to four aspects indicated in

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4 OJ L 275/32

5 Emissions trading does not by itself reduce emissions; it simply provides incentives to find the solutions with the lowest costs achieving the emissions reductions.

6 Recent statements by the European Commission suggest that additional gasses and economic sectors are unlikely to be included before 2012.

7 www.europa.eu.int/eur-lex/en/search/search_oj.html.

Table 2 below. Some of the criteria are of mandatory nature whereas other criteria are optional. Some apply to the total level of allowance allocated and some other only have an effect for sectors or individual installations. One of the obligatory criteria is the consistency between national allocation scheme and the member states' commitment under the Kyoto Protocol. The member states will have some freedom to decide on a path of reductions leading to compliance with the targets. Another mandatory criterion requires that the allocation plans shall include provisions for informing and involving the public.

Table 2. Categorisation of the criteria

	Mandatory (M)/ Optional (O)	**Total level**	**Activity/ Sector**	**Installation Level**
(1) Kyoto commitments	(M)/(O)	+		
(2) Assessment of emissions development	(M)	+		
(3) Potential to reduce emissions	(M)/(O)	+	+	
(4) Consistency with other legislation	(M)/(O)	+	+	
(5) Non-discrimination between companies & sectors	(M)	+	+	+
(6) New entrants	(O)			+
(7) Early action	(O)			+
(8) Clean technology	(O)			+
(9) Involvement of the public	(M)			
(10) List of installations	(M)			+
(11) Competition from outside the EU	(O)		+	

Source: Communication COM(2003)830, p. 3.

Criterion 5 is of particular importance from the point of view of competition and potential distortion of trade. It prohibits national allocation plans from discriminating between companies or sectors in such a way as to unduly favour certain undertakings or activities. The assessment of this criterion is based on normal state aid rules.

Also important in this context is criterion 11 concerning competition from outside the EU. The Commission has explained in the guidelines that this criterion is optional and should only be used in determining the quantity of allowances per activity. The Commission considers this criterion to be applicable exclusively to cases where covered installations belonging to a specific activity would be rendered significantly less competitive directly and predominantly as a result of a major difference in climate polices between the EU and non-EU countries. It added that "incorrect application of this criterion might constitute export aid which is incompatible with the EC Treaty"[8].

[8] Communication COM(2003)830, para 106, p. 22.

The Commission explained in the Communication that it would not reject a plan if all mandatory criteria and mandatory elements of criteria were applied in a correct manner. Furthermore, it would not reject a plan if optional criteria were not applied.

Originally the NAPs of the EU-15 were to be submitted to the Commission by March 31, 2004, whereas the NAPs of the ten new member countries were due by May 1, 2004. These draft NAPs were to be reviewed by the Commission according to a set of 11 criteria contained in Annex III of Directive 2003/87/EC. These criteria and their interpretation were described in some detail in T81 rev. 1. The most important of them have been the consistency of the plans with the overall strategy to meet the Kyoto targets as well as non-discrimination, competition and state aid rules.

For the majority of EU countries, the NAPs envision efforts under the EU ETS that are less than projected business-as-usual emissions but not as deep as the proportional effort required to meet the Kyoto targets. During the review process - which started in March 2004 and ended with the decision on the Greek NAP in June 2005 - the Commission has approved the allocation of about 6.5 billion allowances to more than 11,500 installations for the trading period of 2005-07. It has requested 14 member countries to scale down their over-generous allocations by a total of 290 million allowances (or 4% of the notified number of allowances) and has disallowed intended ex-post adjustments in 13 NAPs.

The current status of implementation of the NAPs is summarised in Table 3 below. The last four draft NAPs were approved between March and June of this year, thereby completing the process of reviews and approvals for the 25 member countries. Nine of these 25 NAPs have been approved conditionally, with the requests for changes related primarily to ex-post adjustments and incomplete lists of installations. The electricity industry has received more than half of total allowances. Compared to business-as-usual scenario, this industry will have a shortfall of allowances of over 100 Mt CO_2 per year, representing an emissions reduction effort of 10%.

Table 3. Status of Implementation of the NAPs[9]

	Date	Status of Approval	Outstanding Issues	Share in EU allowances	CO_2 allowances $MTCO_2$ (2005-2007)	No. of facilities
Austria	07-Jul-04	Conditional		1.50%	99	205
Denmark	07-Jul-04	Yes		1.50%	100.5	378
Germany	07-Jul-04	Conditional	Allowances: ex-post adjustments	22.80%	1497.0	1849
Ireland	07-Jul-04	Yes		1.00%	67.0	143
Netherlands	07-Jul-04	Yes		4.30%	285.9	333
Slovenia	07-Jul-04	Yes		0.40%	26.3	98
Sweden	07-Jul-04	Yes		1.10%	68.7	499
United Kingdom	07-Jul-04	Conditional	Incomplete installation list Provisions for new entrants	11.20%	736.0	1078
Belgium	20-Oct-04	Yes		2.90%	188.8	363
Estonia	20-Oct-04	Yes		0.90%	56.85	43
Finland	20-Oct-04	Conditional	Incomplete installation list	2.10%	136.5	535
France	20-Oct-04	Conditional	Incomplete installation list Allowances: over-allocation	7.10%	469.5	1172
Latvia	20-Oct-04	Yes		0.20%	13.7	95
Luxembourg	20-Oct-04	Yes		0,20%	10.7	19
Portugal	20-Oct-04	Yes		1.70%	114.5	239
Slovak Republic	20-Oct-04	Yes		1.40%	91.5	209
Cyprus	28-Dec-04	Yes		0.30%	16.98	13
Hungary	28-Dec-04	Yes		1.40%	93.8	261
Lithuania	28-Dec-04	Yes		0.60%	36.8	93
Malta	28-Dec-04	Yes		0.10%	8.83	2
Spain	28-Dec-04	Conditional	Incomplete installation list	8.00%	523.3	819
Poland	08-Mar-05	Conditional	Allowances: ex-post adjustments	10.90%	717.3	1166
Czech Republic	12-Apr-05	Yes		4.40%	292.8	435
Italy	25-May-05	Conditional	Allowances: ex-post adjustments	10.60%	697.5	1240
Greece	20-Jun-05	Conditional	Allowances: ex-post adjustments	3.40%	223.2	141
Total				**100.00%**	**6,473.8 (2,157.9 annually)**	**11,428**

Allocating approved allowances to companies via their issuance into an electronic registry account at national level is the final step of the allocation cycle. By 1 July 2005, nine member states have reached this stage and about 50% of the allowances approved were already in circulation. The other EU countries were in the process of finalizing technicalities necessary to launch their national registries and/or revise their allocation plans following demands by the Commission to cut the number of allowances.

3.3. Initial functioning of the EU ETS: Prices and volume of allowances traded

While the EU ETS began formally on January 1, 2005, the first forward market trade was made in February 2003 by Shell Trading and Dutch utility NUON[10]. Through September 2004 the forward market was thin, averaging only 50,000 t CO_2 a month, with prices trending

[9] "The European Union Emissions Trading Scheme (EU-ETS). Insights and Opportunities", Pew Center on Global Climate Change, p. 10 plus the Secretariat's own updates.

[10] The European Union Emissions Trading Scheme (EU ETS). Insights and Opportunities. Pew Center on Global Climate Change, p. 10.

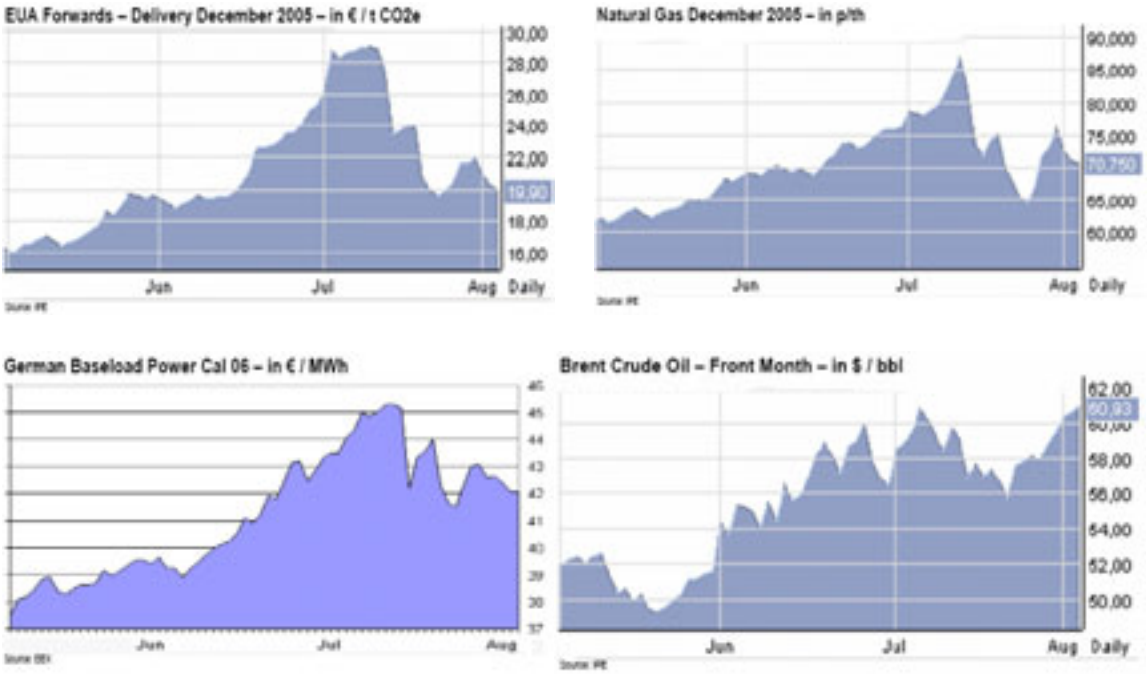
down from 12 to 9 €/t CO_2. However, since then the market volume increased to around 1 Mt CO_2 per month as companies started to map out their compliance strategies in the wake of the ratification of Kyoto by Russia and the imminent start of EU ETS.

New exchanges are appearing and the well-established ones are consolidating. For instance, Austria launched an energy exchange on June 28, 2005. Meanwhile, Amsterdam's European Climate Exchange is joining Paris's Power next to offer spot and futures contracts on the same screen.

Following the official beginning of the EU ETS on January 1, 2005, trading volumes increased rapidly, reaching around 5 Mt CO_2 in January. At the same time the prices softened to 7 €/t CO_2, reflecting partly generous initial allocations of allowances and mild weather. However, since then allowance prices rose sharply to a record high of nearly 30 €/t CO_2 in early July, before falling to around 20 €/t CO_2 in early August (see Figure 1 below).

According to many industry analysts, the sharp rise in emissions prices in June and early July was driven by a combination of factors, including the Commission's decision to reduce some national allocations, limited availability of cheaper credits from JI and CDM mechanisms and, most of all, strong increases in gas prices which mirrored similar increases in oil prices. Since coal prices have not kept pace with gas prices (see Figure 1), this has provided an incentive for European utilities to burn more coal (as the gas-coal price differentials drive the fuel-switching decisions by electricity generators). This in turn forces them to buy more emissions allowances, resulting in much higher prices for these allowances.

Figure 1. Recent price trends for CO_2 allowances, gas, power and oil



Source: Carbon market news 31/2005, (05.08.2005), www.climatecorp.com

This development has caught some experts by surprise as they assumed that in general, a carbon constraint would tend to encourage substitution of coal with gas as a fuel for power generation. Recent IEA study has calculated that if allowance prices exceed 23 €/t CO_2 in the

longer term, it is more economic to replace existing coal-fired capacity with modern CCGT (combined cycle gas turbine) plants[11]. If the CO_2 prices range between €19 and €23, companies have to decide between two options: building a new CCGT plant or running the existing coal plants.

Some analysts now argue that, if emissions prices increase further, it may become more viable for some utilities to stop producing, sell their allowances and move their production outside Europe. Norsk Hydro, the Norwegian energy and metals group, and Corus, the Anglo-Dutch steel group, have already threatened to shut aluminium plants in Germany. This follows a recent closure of an aluminium smelter in Hamburg.

High and rising allowance prices are a clear signal that the demand for emissions is outstripping the supply. This is partly because a lot of companies that might have permits to sell are not yet participating in trading, especially in new EU countries where allocation registries have not yet been set up. Moreover, many small firms do not have credit ratings and credit lines which make larger companies reluctant to trade with them. This shortage may be gradually eased by increased participation of EU companies in ETS and by credits from CDM projects which are now being traded at 7-8 €/t CO_2.

The above issues require closer monitoring and more in-depth analysis as they may have very profound consequences for future energy and power markets.

[11] "Emissions Trading and its Possible Impacts on Investment Decisions in the Power Sector", IEA information paper, p. 9-10, http://www.iea.org/textbase/papers/2003/cop9invdec.pdf

4. Emissions trading schemes in non-EU countries

Apart from the EU, which is the most advanced in developing and implementing the concept of emissions trading, there are several other countries that intend to establish similar trading scheme. More specifically, such Kyoto signatories as Canada, Norway and Japan have recognised their need to set up an ETS. In addition, Australia – which is not a Kyoto signatory – is also attempting to establish a scheme through an agreement of its state and territory governments. This section summarises the role of emissions trading in the environmental policies of the above countries.

4.1. Norway

Norway is allowed under the Kyoto Protocol to increase its greenhouse gas emissions by 1% compared to the 1990 level. According to the latest estimates, this target will be exceeded by some 25% (10-15 Mt CO_2) under a business-as-usual scenario. Increases are expected especially in the offshore sector (because of the increased production of oil and gas) and in the power sector (because of new plants to meet the power shortage of the country).[12]

The first concrete step towards creating emissions trading in Norway was made in 2002, when the 'White Paper' on climate change issues was accepted by the Parliament with the following provisions:

- A limited quota-based emissions trading system in 2005 - 2007;
- Continued CO_2 tax until 2007 (it is levied since 1991 on two thirds of total emissions);
- A broad-based emissions trading system under the Kyoto Protocol from 2008 onwards; and
- Additional measures, such as encouraging the use of new renewable energy sources (including waste).

[12] "GHG Market 2004", IETA (2004), Chapter 26, p.96

Box. 1. CO_2 taxes in Norway

Norwegian environmental and energy-related taxes have been introduced to reduce environmentally harmful emissions to air and water, and to reduce the amount of waste generated. The CO_2 taxes are the main component, accounting 50% of annual revenue from all green taxes. They were adopted in 1991 and are levied on: mineral oil, petrol, and production of oil and natural gas on the continental shelf. The CO_2 tax on coal and coke was abolished on 1 January 2003, but new taxes were introduced on two greenhouse gases: hydrofluorcarbons (HFC) and perfluorcarbons (PFC).

The rates for CO_2 taxes vary by product as shown in table below.

	Tax –rates per litre oil and petrol, kg. Coal and coke or Sm^3 gas.	Tax-rates per ton CO_2 equivalent in Norwegian Kroner.
Petrol	0,79	341
Mineral oil		
light oil	0,53	199
heavy oil	0,53	169
Paper and pulp industry and fishmeal industry		
light oil	0,27	101
heavy oil	0,27	86
Exemptions		
foreign shipping	0	0
fishing in Norway	0	0
fishing in distant water	0	0
external aviation	0	0
Oil and gas in the North Sea		
Oil	0,79	297
gas	0,79	338

Source: Norwegian Ministry of Finance, http://odin.dep.no/fin/english/topics/p4500279/p4500285/006041-990409/dok-bn.html

The producers and importers of the products that are involved in downstream activities make payments to Norwegian Customs and Excise whereas the petroleum upstream sector makes payments to the Norwegian Petroleum Directorate.

In addition to the CO_2 taxes, there is a range of other green taxes in Norway which apply to beverage packaging, waste, health and environmentally damaging chemicals and pesticides.

Norway had the following options for implementing an ETS:

1. To directly implement the EU ETS Directive as an EEA member country.
2. To set up a Norwegian scheme and link it to the EU ETS under article 25 of the Directive 2003/87/EC.

3. To create a separate scheme not linked to the EU, but accepting allowances bought in the EU (import only).[13]

In June 2004 the Minister of Environment declared the intention not to implement the EU ETS directly, but to align the Norwegian market with the EU ETS and seek mutual recognition under Article 25 of the EU Directive. In the 2005 budget the Government proposes some tax changes with environmental effects, hereunder abolish the exemption from annual weight-based vehicle tax for buses on licensed routes. This will increase revenue by about NOK 45 million accrued.

Expand the environmental differentiation of the annual weight-based vehicle tax for vehicles in excess of 20 tonnes to also include EU emission requirements to be introduced during the course of 2005 and 2008. The change is expected to increase revenue by about NOK 15 million accrued. Emission-free hydrogen cars to be exempted from vehicle registration tax and annual vehicle tax.

During the autumn 2005 the Government has also proposed a trading system with allowances of CO2 gas emissions. The system is similar to the European system, but emissions witch are covered by the CO2-tax is exempted. Together with the greenhouse-tax these mechanisms will cover about 70 pct. of Norway's total greenhouse gases[14].

The proposed law is very similar to the EU scheme, but does not include sectors that are subject to the CO_2 tax (notably offshore and pulp and paper), which reduces the coverage of total emissions.[15] Furthermore, the law focuses mainly on the 2005 - 2007 period, and was therefore criticised by the private sector for the lack of long term predictability.

The main features of the first phase of Norwegian emissions trading are as follows:

- The scheme will apply to entities not paying the CO_2-tax on most of their emissions.
- Participation is mandatory for the units in question.
- The system will cover 10-30 % of Norway's GHG emissions (10% according to IETA report and 30% according to governmental sources).
- The overall ceiling is 80 % of 1990 emissions for the involved sectors.
- The ceiling may be adjusted in case of new entries, expansions or close-downs.
- Allocation of quotas is free of charge, based on historical emissions for 1998-2001.
- New entrants are assured a non-discriminatory treatment.

At the time of writing, Norway was still in formal negotiations with the EU concerning the setting up of its own trading system. The private sector in Norway is against a separate national system, preferring instead direct implementation of the EU ETS Directive which would guarantee full fungibility between the countries. According to some Norwegian executives, there is still a good chance that the negotiations with the EU may end up with Norway implementing the Directive.[16] From 2008 onwards, the government is likely to

[13] ibid, p.96

[14] Finance Department, Ministry of Finance of Norway

[15] ibid, p.97

[16] "Norway may adopt EU ETS rather than going it alone" from www.ieta.org; and "GHG Market 2004", IETA (2004), Chapter 26, p.96

abolish the CO_2 tax and involve the majority of GHG emitting firms in the second phase of the emissions trading scheme.

4.2. Australia

The New South Wales (NSW) Greenhouse Gas Abatement Scheme has been mandatory since January 2003 and has a duration of ten years until 2012. It imposes mandatory GHG benchmarks on all NSW electricity retailers and other parties. Participants are required to reduce their GHG emissions to the level of their benchmark by offsetting their excess emissions through the surrender of abatement certificates. In the first 20 months of operation almost 8 Mt of emissions reductions have been registered and 4.3 million tonnes of project-based abatement certificates have been traded at around 6-7 €/t CO_2.

This is essentially a credit-based emissions trading system where:

- Demand for credits is created through additional licensing requirements for electricity retailers in the State who are required to surrender a certain number of emission certificates each year;
- Supply of credits is enabled by the application of the sector-specific 'Scheme Rules', where any *eligible abatement activity* can create credits.

The allowance credits are called NSW Greenhouse Abatement Certificates (NGACs), and participants are obliged to either surrender credits to comply with their annual obligations, or to pay a penalty that is currently set at \$10.50/t CO_2. This created a price cap for the tradable credits with prices generally staying close to the cap.

The Scheme Rules provide for abatement projects primarily in the electricity sector as well as in industrial and forestry process emissions. The two key objectives pursued in the medium-term are the following:

- Ensure that the Scheme is consistent and capable of interacting with other schemes such as the EU ETS and the flexibility mechanisms under the Kyoto Protocol;
- Actively educate policy developers and administrative bodies in other jurisdictions to allow other schemes to develop.[17]

Although the Australian government did not sign the Kyoto Protocol and does not support mandatory emissions trading, there is an initiative of the state and territory leaders to establish an emissions trading scheme by imposing caps on private sector emissions and by distributing tradable allowances.

The newspaper "The Australian" reported that 'last-minute differences' were overcome at the end of March 2005, and although no timetable and details have been decided yet, the leaders agreed on the establishment of a state and territory-based scheme. The initiative is led by New South Wales and Victoria, and the premiers are committed to publishing in late 2005 a report describing the details of the plan.

[17] "GHG Market 2004", IETA (2004), Chapter 27, p.99 - 104

4.3. Japan

Japan has an obligation under the Kyoto Protocol to cut its greenhouse gas emissions by 6% compared to their 1990 level. According to the IETA, in 2002 GHG emissions had increased to 7.6% over the 1990 level with an annual gap of 168 Mt CO_2.[18]

According to the New Climate Change Program of 2002, Japan's climate change policy until 2012 (including the policy on emissions trading) follows a step-by-step approach and is divided into three terms (2002-04, 2005-07, 2008-2012).[19] In the first term of the climate change program a pilot project on emission trading started in Japan. After working groups held throughout 2003 ensured the collaboration of the private sector and the government in establishing the scheme, emissions trading started in December 2003 with a first trading round, and ended after the fourth trading round in June 2004.

Reportedly, 63 parties from a broad range of industries participated in the project which also included the possibility of gaining credits through project mechanisms and included all GHG (although only CO_2 was mandatory). The total CO_2 emissions traded were 2.4 Mt, and the price of CO_2 increased steadily from $10 in the first transaction period to around $27/t CO_2 in the fourth period.

According to the Ministry of Environment, the goals of the pilot project were not of environmental nature, but focused mainly on paving the way for a broader national scheme intended to:

- Provide private companies with opportunities to build experience and technical skills regarding emission trading procedures;
- Demonstrate that a cross-sectional emissions trading scheme is feasible in Japan; and
- Establish an infrastructure for domestic emission trading.[20]

As part of the second phase of Japan's climate change policy, the government introduced the Voluntary Emissions Trading Scheme (JVETS) in March 2005. The scheme is not mandatory and is more comprehensive than the pilot project, with the number of participants and the environmental impacts expected to be greater.

In the first stage (April 2005 - March 2006) the scheme focuses on a subsidies system for new facilities and their installation as financial incentives are necessary in a voluntary system.[21] In the second 'operational stage' (April 2006 - March 2007) emissions will be traded. Emission allowances will be allocated according to the base year emissions of each participant and at the end of the trading phase the actual reductions will be verified. In June 2007 a final short trading period will take place, and if participants cannot retire allowances corresponding to the actual amount of their emissions, the subsidies received in the first phase will have to be returned.

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[18] Japanese Ministry of Economy, Trade and Industry; found in "GHG Market 2004", IETA (2004), Chapter 25, p.95

[19] **"**Japan's Experiences of Voluntary Approaches for Climate Change Policy" Takafumi Ikuta (2002), Fujitsu Research Institute.

[20] "Evaluation of the Pilot Project of Domestic Emissions Trading Scheme" Global Environment Bureau, Ministry of the Environment, Japan (2004).

[21] The subsidy rate is 1/3 of the installation cost (max. 200 million Yen per site).

According to the IETA report, the government is now considering the implementation of a mandatory emissions trading system from 2007 by imposing emission caps on enterprises "if emissions are not reduced as foreseen".[22]

The latest government estimates indicate that Japan will have to spend €14.3 billion a year to reach its Kyoto targets, as emissions significantly increased since 1990.[23] Consequently, it will become necessary for the country to use such cost-minimising Kyoto mechanisms as international emissions trading, JI and CDM projects. As the largest buyers of emission reductions through the Kyoto project mechanism, Japanese entities represented 41% of the total volume of 142 Mt purchased between January 2003 and May 2004. According to a 2004 report by the World Bank, these figures demonstrate "a growing sense of urgency in Japan, where abatement opportunities might be few and at high costs".[24]

4.4. Switzerland

Switzerland ratified the Kyoto Protocol in July 2003 and is committed to reduce GHG emissions by 8% from the 1990 level. The legal framework for the implementation of flexible mechanisms and the establishment of an emissions trading scheme in Switzerland is set by the CO_2 Law and the Guidelines on voluntary measures to reduce energy consumption and CO_2 emissions[25]. The law is in force since 1 May 2000 and is designed to reduce CO_2 emissions caused by the use of fossil fuels for energy generation. By 2010, CO_2 emissions from these sources are to be reduced by 10% (4-5 Mt CO_2) compared to the 1990 level. Compliance with this target will be determined by the average emissions from 2008 to 2012.

According to CO_2 law, emissions reduction targets can be reached through voluntary action taken by the large companies and groups comprising several consumers. If the targets cannot be achieved through these measures alone, the Federal Government shall impose a tax on fossil fuels (CO_2 tax). The tax rate will depend on the gap between target and actual emissions, but will not exceed 210 Swiss Francs per t CO_2 (Art. 7.2). If the CO_2 tax has to be introduced, the energy-intensive sector may be exempted from it provided that they make a formal commitment to limit their CO_2 emissions (Art. 9).

In addition to the above voluntary actions and formal commitments, discussions are now being held with some 600 firms on a plan to introduce emissions caps for the 2008-2012 period. The caps will be set using a "bottom-up" approach, based on production and emission scenarios. For small companies, a simplified top-down approach will be applied. Just like in the EU ETS system, the certificates will initially be allocated free of charge. The sectors to be included in the Swiss system are also similar to those in the EU ETS, although the burden for electricity generation will be more limited thanks to greater Swiss reliance on hydro and nuclear power. The authorities are now analysing the possibility of linking the Swiss trading system with other emissions trading schemes, including that of the EU.

Companies will also be able to use JI or CDM credits, but only up to a maximum of 8% of the companies' reduction obligation. The establishment of a national registry is a prerequisite for

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[22] IETA (2005), www.ieta.org/ieta/www/pages/index.php?IdSitePage=630.

[23] Point Carbon (2005), www.pointcarbon.com/article.php?articleID=7060&categoryID=471.

[24] "State and Trends of Carbon Market 2004", World Bank (2004), p. 18,19

[25] http://www.environment-switzerland.ch/swissflex/eng/index.html.

Switzerland's participation in these flexible mechanisms. Such a registry should be operational by the end of 2005.

4.5. Canada

Canada committed itself under the Kyoto Protocol to reduce GHG emissions to 6% below the 1990 level by 2008-2012. The government predicted that in absolute terms this would equal a reduction of 240 Mt from the projected "business as usual" emissions level in 2010. However, the latest estimates suggest that a reduction of 270-300 Mt will be necessary as Canada's emissions are estimated to be 20% above the 1990 level.[26]

The Climate Change Program for Canada (CCPC) of November 2002 delineates the broad framework within which Canada plans to achieve the above objectives and is the basis for future plans regarding climate change. It involves five specific instruments:

- Innovation and Technology Investments;
- Infrastructure Investments;
- A Partnership Fund;
- Covenants and Emissions Trading by Industry; and
- Targeted Measures.

Emission trading is recognised as an instrument with the potential to minimise the costs of emission reductions. It will be adopted as part of the overall program. Nevertheless, CCPC does not specify the rules, the design of national emissions trading system, the sectors involved or a timetable for implementation.

The government and the International Emissions Trading Association (IETA) had signed an MOU which outlined the "principles" for establishing a domestic emissions trading system with the appropriate links to international markets. But since then, there has been no progress in translating those principles into an effective market-based plan. IETA's "GHG market 2004" states that Canada has abandoned the plan of starting an ETS before 2008. This is due to both structural factors (e.g. high and growing energy exports, high economic and population growth rates; cold climate and vast distances) and policy issues (e.g. opposition from oil producing provinces of western Canada and federal elections in 2004).

The Canadian federal budget for 2005 shows an increase in spending on environmental issues by C$3.2 billion over the next five years. The government's plans to meet the Kyoto targets will rely on a multitude of tools including *inter alia* the emission trading, fuel efficiency of motor vehicles and tax reductions for investments in 'green' technology. The emissions trading scheme has not yet been developed and the government delayed the publishing of a more detailed program which was expected for the beginning of April 2005.

As noted by the International Institute for Sustainable Development (IISD) in February 2005, rapidly growing domestic emissions of CO_2 imply that Canada may be faced with the need purchase emission permits internationally, "as it is simply impossible" that a purely domestic strategy will make sure that Kyoto targets are met. In addition to emission trading, Canada will also have to use other project-based Kyoto mechanisms (JI and CDM) which involve higher transaction costs and have not yet been fully tested.

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[26] "Canada's estimated Kyoto costs ever-growing", from www.ieta.org (March 2005).

4.6. Summary

The developments concerning the efforts to establish emissions trading schemes in selected non-EU countries are summarized in the table below. The table shows that these efforts are most advanced in Norway and North South Wales, Australia where the mandatory trading schemes are already in place. At the other end of the spectrum are Switzerland and Canada which have the least concrete plans to establish the emissions trading schemes.

Country	ETS in place	Compatibility with the EU ETS	Start of ETS
Norway	Yes, mandatory	Yes, either by linking the two systems or by implementing the EU Directive	Since January 2005
Australia	Yes, but only in North South Wales	Possibly in the medium term	- Regional scheme since January 2003 - National scheme is under negotiation
Japan	No, only voluntary	No	Planned for 2007
Switzerland	No, but under discussion	Yes, most likely by linking with EU ETS	Planned for 2008-12
Canada	No, but under discussion	No	Not before 2008

The EU's Linking Directive[27] lays out the scope for linking the EU ETS with other emissions trading schemes. Such linkages will be based on bilateral agreements and will aim at promoting liquidity in the EU ETS. No such agreements have yet been concluded and there is no linking policy at this stage. To date, only Norway requested a link between its scheme and the EU ETS. In the longer term, however, it is likely that the trading schemes in other countries will also be linked to the EU ETS. Partly due to their geographical and political proximity, the Norwegian and the Swiss schemes will likely be the first ones to be linked to the EU ETS; the first one possibly in 2006 and the second after 2008.

In order for such linkages to be possible and effective, it is not necessary that the non-EU schemes follow exactly the EU blueprint. A recent paper by the OECD/IEA[28] shows that there is considerable flexibility to link various domestic and regional emissions trading schemes even if they have different designs. The paper argues that successful linking should be possible between two schemes with different rules as long as certain technical fixes are put in place concerning: coverage of schemes, mutual recognition of trading units, targets, stringency, banking of credits or penalties. These fixes, the paper notes, may mean that the benefits of linking are not as great as they would be with full harmonisation of rules, but here should nonetheless be overall efficiency gains from linking various domestic schemes.

[27] 2003/0173(COD).

[28] "Linking non-EU domestic emissions trading schemes with the EU emission trading schemes", W. Blyth and Rossi, IEA, COM/ENV/EPOC/IEA/SLT(2004)6.

5. Project mechanisms and their linkages with EU ETS

The Kyoto Protocol has established three main policy instruments aimed at achieving the reductions in emissions at the lowest possible costs:

- international emissions trading - buying and selling of excess emissions credits among countries;
- Joint Implementation (JI) - investing by Annex B countries and companies in GHG reduction projects in other Annex B countries; and
- Clean Development Mechanism (CDM) – undertaking projects by Annex B countries that reduce emissions in non-Annex B (mainly developing) countries.

On September 14 the Council adopted a European Parliament and Council Directive complementing Directive 2003/87/EC on emissions trading[29], with a view to creating the links between the Flexible Mechanisms of the Kyoto Protocol – Joint Implementation (JI) and the Clean Development Mechanism (CDM) – and the EU emissions trading scheme. The rationale behind these mechanisms is that greenhouse gas emissions are a global problem and that the place where reductions are achieved is less important.

As a result of the Directive, EU companies which carry out emissions reduction projects outside the EU through JI or CDM will be able to convert the credits they earn from these projects into allowances that can be used for compliance under the EU Emissions Trading Scheme. JI projects can be undertaken in other industrialised countries with Kyoto targets, while CDM projects can be hosted by developing countries which have no such targets. Emission reductions from projects are converted into emission credits, which for JI projects take the form of emission reduction units (ERUs) while for CDM projects they are called certified emission reductions (CERs).

The Kyoto Protocol states that credits from CDM projects "obtained during the period from the year 2000 up to the beginning of the first commitment period can be used to assist in achieving compliance in the first commitment period" (2008-2012).[30] The Commission initially decided not to recognise CDM credits in the Community scheme before 2008. But this decision was then withdrawn and the Directive 2004/101/EC states that member states may allow operators to use CDM credits from 2005 when the EU ETS started.[31]

Regarding the JI projects, the Marrakech Accords from 2001 stipulate that they can only generate emission credits to be issued after 2008. Therefore, the option of whether the EU scheme should recognise them from 2005 onwards was ruled out "because this would be technically impossible".[32] The Commission proposed that the new EU member states may choose to let a JI project continue also after their accession to the EU, if a corresponding amount of emissions credits is removed from the allocation of emissions trading allowances.

Companies will be able to use all credits that are issued in accordance with the Kyoto Protocol's rules under the EU emissions trading schemes. While there are no legal limits to

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[29] 2003/0173(COD).

[30] Kyoto Protocol, Article 12 (10).

[31] EU Directive 2004/101/EC, Article 11 (a).

[32] EIA, p.23.

the amount of CDM credits companies can use during the first phase, each member state has to decide ex-ante in the allocation plan for the second phase how many JI and CDM credits it will allow domestic companies collectively to use for compliance during that period. In setting the maximum allowed limits the member states must ensure that a significant reduction in emissions still takes place within the EU, rather than abroad. Moreover, in accordance with the Marrakech Accords, nuclear power and biomass sequestration projects ('carbon sinks') will not be recognised in the EU scheme. The European Commission will review the use of credits from carbon sinks in 2006.

The Marrakesh Accords, which were agreed at COP 6 on 10 November 2001, paved the way for the ratification of the Kyoto Protocol by resolving the outstanding issues left from COP 6. The most important provisions of the Accords related to the CDM and JI mechanisms were as follows:

- the operating rules for CDM projects were established and the members of the CDM Executive Board were nominated;
- unilateral CDM were allowed, thereby enabling the developing countries to undertake CDM projects without an Annex I partner and market the resulting emissions credits;
- eligibility to participate in the mechanisms was made independent of the state of a country's sink inventory or its compliance; and
- full tradability between mechanisms and banking of credits into the second commitment period were accepted.

There are certain requirements and procedures to qualify as a JI or CDM project. Signatories of the Kyoto Protocol have agreed that the "acquisition of emission reduction units shall be supplemental to domestic actions".[33] Within the EU it remains the responsibility of member states to ensure supplementarity to domestic action. Nevertheless, the Community project credits will be closely monitored at the EU level "and, if necessary, limited to ensure that participating sectors also continue to carry out GHG mitigation activities".[34] Another important condition for the issue of credits for the operators of JI and CDM projects in respect of the reductions achieved is that the projects result in real, measurable and long-term climate change benefits.

Both JI and CDM projects have to undergo a certain procedure for being issued emission credits by a UNFCCC body, the Executive Board. A project-specific, transparent and conservative baseline with a rigorous monitoring plan to ensure accurate emission estimates are the basic requirements for all projects. As for JI projects the total emission allowances in both countries do not change, and the involved countries will negotiate the transfer of ERUs, there is less strict control by independent entities. For CDM projects the procedure is more complex, and the main steps are the formal registration by the Executive Board, and the monitoring of the project's emissions before issuing the CERs.

Concerning the CDM projects, in 2005 the number of CDM baseline and monitoring methodologies increased substantially. By 1 January 2006, 25 Large Scale methodologies, 8 Consolidated methodologies and 15 Small Scales methodologies were approved, and 2 methodologies were withdrawn subject to required changes.[35] To date, 12 CDM project

[33] Kyoto Protocol, Article 6 (d)

[34] EIA, p.22

[35] UNFCCC, http://cdm.unfccc.int/methodologies/PAmethodologies

activities have been registered by the CDM Executive Board. The total volume of about 43 Mt CO_2e has been exchanged through CDM or JI projects during the first four month of 2005.[36]

The carbon market is growing steadily. The World Bank reports that a total of 107 Mt CO_2e have been exchanged through projects in 2004, a 38% increase relative to 2003 (78 Mt CO_2e)[37]. In terms of volumes supplied, the largest sources of emission reductions have been HFC_{23} destruction, accounting for 25% of the total for the period of January 2004 to April 2005. Methane-capturing projects and N_2O from animal waste ranked second with an 18% share, followed by hydro, biomass energy and landfill gas to energy projects, each with an 11% share. The demand is concentrated on European buyers who represent 60% of total volume purchased. Among them, the Government of Netherlands and UK private companies are the largest buyer, accounting for 16% and 12% of total demand respectively. The share of Japan – another important buyer - is 21%.[38] On the supply side, Asia is the largest supplier with a share of 45%, followed by Latin America with a share of 35%. Five countries – India, Brazil, Chile, Bulgaria and Romania – represent nearly 70% of the total volume supplied.

The spread of prices for JI and CDM project-based emission reductions is large due to diversity of projects and contracts terms. The same World Bank source reports that between January 2004 and April 2005 prices for project-based verified emissions reductions (VERs) ranged from \$3.6 to \$5.0/t CO_2e with registration risk on the buyers and certified emissions reductions (CERs) from \$3.00 to \$7.15/t CO_2e with registration risk on the seller[39]. The total value of contracts for the purchase of project-based transactions is estimated at about \$570 million in 2004, and \$110 million in the first four month of 2005.

Figure 2 below illustrates the shares of various regions in JI and CDM emission reductions supply from January 2004 to April 2005. It highlights the above-mentioned uneven geographical spread, with the dominance of Asia and Latin America (see Figure 2 below).

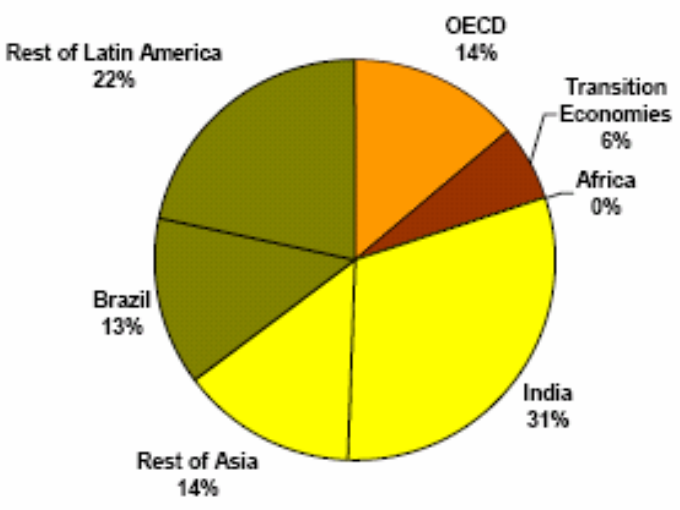
[36] "State and Trends of the Carbon Market 2005", World Bank Carbon Finance Business and International Emissions Trading Association, Washington DC, May 2005, p 20, Table 2.

[37] "State and Trends of the Carbon Market 2005", World Bank Carbon Finance Business and International Emissions Trading Association, Washington DC, May 2005, p.3.

[38] ibid, p 20.

[39] ibid, p 4.

Figure 2. Geographical Location of Emission Reduction Projects (in share of volume supplied)



January 2004-April 2005

Source: "State and Trends of the Carbon Market 2005", World Bank Carbon Finance Business and International Emissions Trading Association, Washington DC, May 2005, p 22

As for the JI projects, Russia and Ukraine have a large potential for abatement at low costs and are therefore expected to host the lion's share of future investments. However, in order to benefit from these investments the two countries will have to establish the inventories of their emissions and the proper registries. The current developments concerning the related measures are briefly summarized in Box 2 below.

Box 2. Developments in Russia and Ukraine concerning the carbon markets

Russian Federation

According to the Kyoto Protocol, Russia is committed not to exceed the 1990 emissions level by 2008-2012. The current emissions are 30% below this target due to a sharp decrease in economic activity in the early 1990s. Therefore, Russia has the potential to benefit significantly from selling emission allowances to other countries.
The efforts to establish a national allocation plan and a registry system have been slow to date. On February 2005, the Russian Government finalized a plan of actions to implement the Kyoto Protocol[40]. This plan consists of four parts:

- Implementation of the policy and measures to reduce emissions and increase absorption of greenhouse gases (Articles 2 and 10 of the Protocol);
- Creation and provision of the functioning of the national system for assessment of emissions from sources and absorption of greenhouse gases (Articles 5 and 7 of the Protocol);
- Provisions on the participation of Russia in the Kyoto mechanisms in accordance with Articles 6, 12 and 17 of the Protocol; and
- Participation in the international activities connected with the implementation of the Protocol.

On 25 May 2005, an Interministerial Committee involving relevant government agencies and ministries was created with a mandate to implement this plan. In order to enable Russia to participate in CDM projects[41] and in emissions trading, the Committee (or another suitable body) will have to develop a clear and transparent system of transactions registration and emissions allowances.

Ukraine

Ukraine ratified the Kyoto Protocol on February 2004 and is now committed as an Annex I party to stabilise its greenhouse gas emissions for the period of 2008-2012 at the 1990 level.

The main government body overseeing climate change issues in Ukraine is the Interministerial Commission for the Implementation of the UNFCCC, which was established under the Executive Order No 583 in April 1999 by the Ukraine Cabinet of the Ministers[42].

Among specific challenges that Ukraine needs to resolve to comply with the Kyoto mechanisms are:

- Creating and maintaining a sustainable inventory system that spans across various economic sectors and government institutions; creating and maintaining a registry of greenhouse gas emissions.
- Developing adequate institutional infrastructure, including a designated office to handle project-based activities. This would involve making decision on the distribution of tasks in fulfilling Ukraine's obligations towards the UNFCCC between relevant ministries and other national stakeholders.
- Adopting appropriate legislative framework and a draft National Action Plan; accordingly amend and update existing National Programs in related sectors.

Slow progress to date in addressing these challenges significantly reduces Ukraine's chances to benefit from the flexible mechanisms, including the CDM projects and trading of emissions with the EU countries.

[40] Russian Climate Change Public Portal, http://www.climatechange.ru/news/news.htm

[41] The first project agreement was signed between subsidiaries of RAO "UES of Russia" and Danish Environmental Protection Agency on the sale of "emissions reductions units" generated as a result of modernization of the power plants in the Khabarovsk Kray and Orenburg Region in accordance with the Kyoto Protocol (source: http://old.rao-ees.ru/en/news/pr_depart/show.cgi?280605rao.htm).

[42] http://www.climate.org.ua/of_doc/com.html.

6. Economic impacts of CO_2 reduction measures

6.1. The macroeconomic impacts of EU ETS

This section summarises the results of recent econometric modeling exercises that attempt to assess the impacts of the costs of compliance (both direct and indirect) with the CO_2 emissions reduction obligations on energy prices, GDP, trade flows and industrial competitiveness. These impacts include both short-term reactions (e.g. changes in load factors or rather changes of the merit order for power plants, slower growth in power consumption and production and trading in emissions allowances) and long-term reactions (e.g. increased imports of electricity, relocation of plants to non-EU countries or investments in JI and CDM instruments).

Such modelling exercises used general equilibrium models of the world economy which determine the prices for each energy form that equalise supply and demand. They are reviewed primarily for the EU as an aggregate and do not deal extensively with the substantial differences across these countries. Moreover, where possible, they are discussed separately for the two phases of EU emissions trading. This distinction is necessary since for phase 1 the overall commitments and modalities of implementation are fairly well established whereas for phase 2 they may not be fully known until late 2006. Moreover, phase 2 will open up the possibilities of linking EU emissions trading with similar systems in other ECT/Annex B countries (e.g. Russia, Ukraine, Japan, Norway, Iceland or Switzerland) and with JI and CDM projects in other ECT countries.

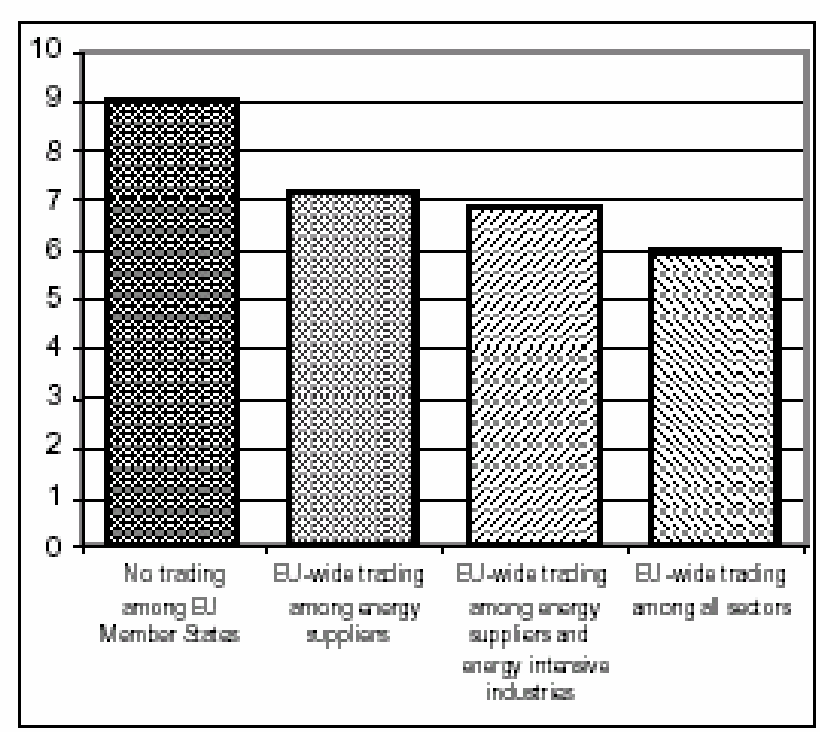
Abatement costs and impacts on GDP

One of the first and most comprehensive evaluations of the abatement costs and the impacts on economic activity was performed in May 2000 by the National Technical University of Athens using the PRIMES Energy Systems Model. The study analysed the economic importance of trading within EU-15, carried out in addition to a cost effective implementation by individual member countries in order to achieve the EU reduction target of 8%. It estimated that the EU-wide emissions trading could reduce the annual compliance costs by 24% in 2010 (from € 9 to € 6.9 billion), if only energy-intensive industries participated in the trading scheme[43]. The price of emissions allowance would be around 33 €/t CO_2 and the volume of emissions exchanges in 2010 would be 41.9 Mt CO_2.

The cost savings would increase to 33% (or € 3 billion annually) if all sectors participated in the trading and up to 49% (or € 4.4 billion annually) if trading were extended to all Annex B countries. In the latter case, the EU would become a net buyer of emissions allowances from other Annex B countries assuming an international price of 7.7 €/t CO_2. The aggregate net purchases for the EU-15 would amount to 150 Mt CO_2 (equivalent to 4.9% of 1990 CO_2 emissions in the EU), and would come mainly from Ukraine and Russia. The above cost estimates are illustrated in Figure 3 below.

[43] The model and the results are described in "The Economic Effects of EU-Wide Industry-Level Emissions Trading to Reduce Greenhouse Gases", E3M Lab, Prof. P. Capros, Dr. L. Mantzos, Institute of Communication and Computer Systems of National Technical University of Athens.

Figure 3. Cost of reaching Kyoto target to EU Member States in 2010 (€ billion)



The study also suggested that, within the EU, Belgium, Finland and the Netherlands have the highest marginal abatement costs (and therefore would be net buyers of allowances) while France and Germany have the lowest marginal abatement costs (and thus would be net sellers).

Another model called POLES has produced similar estimates for the impact of emissions trading on the EU abatement costs through EU-wide trading of emissions allowances as compared to national measures without trading. The results of this model suggest that the abatement costs might be reduced from 0.2% of EU GDP without trading (through national measures only) to 0.15% of EU GDP with EU-wide emissions trading. This would be equivalent to a 25% reduction in the EU cost burden[44]. The analysis also revealed wide variations in the cost burden across various EU regions, with the costs for EU South (excluding France and Italy) being the lowest (only 0.02% of GDP) and the costs for EU North being the highest (nearly 0.5 % of GDP).

Furthermore, a recent report prepared by COWI for UNICE[45] has also analysed the internalised net costs[46] of EU-25 climate change mitigation policies and provided insight into the overall economic effects of the EU ETS. The main scenario in this study assumes an emissions gap of 689 Mt for EU-25 that is based on emissions growth of 0.89% since 1997. The economic impact of mitigating this gap is estimated at 0.48% of EU GDP with sluggish short-term technology adaptation and 0.36% with easier long term technology adaptation.

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[44] "Preliminary Analysis of the Implementation of an EU-Wide Permit Trading Scheme on CO2 Emissions Abatement Costs. Results from the POLES model", April 2000, p. 3.

[45] "Competitiveness and EU Climate Change Policy", interim report produced by COWI for UNICE, October 2004.

[46] External benefits such as avoided potential damage from climate change are not considered in the analysis.

The impacts of emissions reduction measures on GDP will strongly depend on future prices for carbon allowances which determine overall abatement costs. This is well illustrated by the results of a 2003 study conducted by International Council for Capital Formation (ICCF) on the economic impacts on Italy of implementing its Kyoto Protocol target for 2010 and beyond. The study has estimated that for the year 2010 the impacts on Italian real GDP could range from 0.02% at a carbon price of 20 €/t CO_2 to 0.09% at a price of 50 €/t CO_2 and 0.52% at a price of 100 €/t CO_2 (the latter is the maximum compliance penalty under the EU ETS)[47].

Impacts on electricity prices and power industry

The likely impacts of the EU ETS on energy policy were also assessed by an informal group of experts that was set up by DG TREN of the European Commission in 2003. In its report issued in January 2004[48] the group noted that energy sector is the major player in emissions trading, accounting for about two-thirds of the emissions covered by ETS. The impacts of emissions trading on that sector - including competitive positions and market shares of companies and shares of various energy sources - may be quite significant, particularly in the longer term.

The group is of the view that until 2010 member states are not likely to introduce stringent reduction measures. This combined with low liquidity for trading should result in CO_2 prices remaining below 15 €/t CO_2 and, consequently, the impacts on the energy sector being rather modest. The wholesale electricity prices could increase by 10-15% and retail electricity prices could increase by 4-6%. This impact would not be sufficient to affect the levels of activities or the market shares of power companies, although it could, in some cases, induce a re-organisation of the marginal fuel mix within the merit order (mainly from coal to gas-fired generation).

However, in the longer term (after 2010), more ambitious emissions reduction targets may be pursued, pushing CO_2 prices above 20 €/t CO_2. The wholesale electricity prices could then increase by more than 30%, leading to a substantial shift from coal to gas. The report further suggests that the most amortised inefficient coal power plants could be closed and the new investment would be dedicated to the upgrading of existing coal plants and to building of new highly efficient gas plants. Higher CO_2 prices would also favour investments in low-carbon technologies, including renewable and nuclear energy. The market positions of energy companies might also be affected substantially, depending on their energy supply mix and the levels of market prices.

Moreover, the report suggests that EU ETS could increase EU dependency on imported gas, and stimulate cross-border trade in electricity as well as energy efficiency measures. ETS would also exert additional pressure on the efforts to reassess coal state aids.

The impacts of various CO_2 prices on wholesale energy market are summarized in the group's report as follows:

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[47] "Kyoto and beyond: Economic Impact on Developed Economies", Dr. M. Thorning, ICCF, presentation at the World Climate Change Conference, Moscow, Sept. 29-Oct. 3, 2003, p. 7. http://www.iccfglobal.org/pdf/margo-thorning100103.PDF.

[48] EMEN Report, "Impact of emissions trading scheme on energy policy", 29/01/2004.

CO_2 price (€/t CO_2)	Main Impacts
0 - 15	Small impact on fuel consumption. Scale up of the merit order, but no change in competitive ranking of power producers.
10 - 25	Gas CCGT and coal plants become equally competitive (choice between running one or another)
20 - 35	Reordering of the merit order (gas replacing coal[49]). Closure of most inefficient coal plants. Investment in upgrading of other existing coal plants and in new highly efficient CCGT plants.

Eurelectric's June 2004 report[50] concurs that emissions reductions and trading will contribute to higher electricity prices as a consequence of internalisation of the cost of carbon. It adds, however, that there will be no one-to-one transfer of a specific marginal cost element into power prices because of the changes in the merit order and because high carbon generation is not generally at the margin for all of the year. In the short term, emissions trading will provoke changes in plant merit order, with less carbon-intensive plants being run more frequently due to their increased competitiveness. In the long term, emissions trading will provide incentives for investment in non-carbon (e.g. renewables and nuclear) power generation.

Impacts on industrial competitiveness and 'leakages'

The impacts of emissions reduction measures on the competitiveness of EU's energy-intensive industries were assessed by the above mentioned COWI report. The report concluded that GHG mitigation measures will reduce the competitiveness of EU countries compared to the countries with no emissions targets. For energy-intensive goods, the EU's exports and imports are estimated to fall by 3.8% and 4.3% respectively with easier technology adaptation and 5.1% and 3.1% respectively with sluggish technology adaptation. The study also suggests that, because of diversion of economic activities to countries without reduction commitments the EU reduction efforts (or so-called 'CO_2 leakage') may fall by 18%. The allowance prices are estimated at 17 €/t CO_2 with easier technology adaptation and 26.5 €/t CO_2 with sluggish technology adaptation.

The recent IETA report[51] has also examined the effects of emissions trading on competitiveness. It points out that the most important factors determining these effects include: price elasticity of demand[52]; volume of supply base affected by the ETS; and relative emission and electricity intensities (tonnes of CO_2 emitted per unit of production).

The IETA analyses show that utilities "are the sector with the most value-at-stake", and that the steel and aluminium sectors also face potentially high impacts under the EU ETS (see table below).

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[49] This assertion may be based on the presumption of constant price differentials between gas and coal. This, however, has not been the case in the recent months when gas prices have risen much faster than coal prices.

[50] "The Impact of Emissions Trading on Electricity Prices", Eurelectric, June 2004.

[51] 'GHG Market 2004', IETA, chapter 15 (pp. 54-57) and chapter 17 (pp. 62-64)

[52] Consumer responsiveness to price changes determines whether a firm can raise prices due to the emission reduction costs.

Table 2:
Value at Stake and Relative Importance of Commercial Impacts

Sector	Quantified Value at Stake (%EBIT)	Relative Importance of Carbon Management Driver Category			
		Regulatory	Cost	Revenue	Reputation
Utilities	10-40%	Low	High	High	Medium
Manufacturing	2-5%	Medium	High	Low	Low
Chemicals	5-10%	High	High	Low	Low
Pharmaceuticals	1-2%	Medium	Medium	Low	Medium
Materials & Metals	10-20%	Medium	High	Low	Low
Food & Drink	5-10%	Low	High	Low	Low
Property	1-2%	High	Low	Medium	High
Retail	1-2%	Low	Medium	Low	Medium
Banking and Financial Services	<1%	Low	Low	Medium	Medium
Transport	2-5%	Low	Medium	Medium	High

Source: 'GHG Market 2004', IETA.

Countries with partly regulated electricity prices are estimated to experience the least impact on electricity prices. On the other side, generators in deregulated markets are expected to increase prices in the range of 10–30%. As a result, there will be differences of the impact within the EU, which change the relative competitiveness of countries and industries.

The IEA has also conducted a study of the short to medium-term consequences of emissions trading for four most energy-intensive industries - steel, cement, newsprint and aluminium - from the point of view of international competitiveness[53]. Loss of competitiveness is defined in the study as a loss in output, including reduced demand and production leakages via industry relocation outside the region.

The analysis was based on the assumed average allowance price of 10 €/t CO_2 and was developed for two scenarios of 2% and 10% reductions in CO_2 emissions compared to the industries' needs[54]. The study finds that these reductions would have only modest impacts on

[53] "Industrial Competitiveness under the European Union Emission Trading Scheme", IEA Information Paper, Julia Reinaud, February 2005.

[54] These two scenarios bear no direct relationship to the actual NAPs and therefore their results cannot be interpreted as estimating the impacts of recently initiated EU ETS.

the cost structure of most of these industries, with cost increases ranging between 0.7% and 3.7%. The reductions in operational earnings would be between 2.1% and 29% for the two scenarios. The competitiveness of European heavy industries would be protected from non-EU imports by high freight costs, although some foreign steel products and aluminium could successfully compete in Europe[55].

According to the study, the carbon price of 10 €/t CO_2 would inflate wholesale electricity prices by up to 11% (from €47.12 to €52.13 per MWh)[56]. Electricity is the only sector likely to reflect part or all of the opportunity cost of holding CO_2 allowances. Other sectors may not be in a position to act similarly as they have to compete with producers outside the EU. Furthermore, at the carbon prices exceeding 20 €/t CO_2 there would be significant carbon leakages meaning that emissions reductions achieved domestically would be partly offset by increased emissions from competitors or plants relocated outside the region.

6.2. The impacts of linking with JI and CDM

In July 2003 the Commission published a staff working paper analysing the impact of linking the Kyoto project-based mechanisms to the European emissions trading scheme established by the Directive 2003/87/EC. This study – further referred to as Extended Impact Assessment (EIA)[57] - identifies JI and CDM as project-based mechanisms contributing to achieving the Kyoto targets by the member countries and the single companies.

The projects should enhance the flexibility of firms in achieving their emission objectives as they increase the diversity of compliance options and further increase the possibility to reduce emissions where it is cheapest to do so. At the same time, additional incentives are provided for projects aimed at reducing GHG emissions, and host countries (especially transition and developing countries) can benefit from the investment and technology transfer of such projects.[58]

The EIA argues that as the project mechanisms are optional, their use will clearly result in a lower market price for emission allowances and in lower compliance costs of the Kyoto targets. It acknowledges that the economic impacts are difficult to quantify with certainty and precision, but nonetheless gives some indications about what these impacts are likely to be.

The analysis is based on a quantitative assessment with the POLES model and evaluates the impact of different scenarios regarding the extent of quantitative and qualitative restrictions (see Annex 2 for the assumptions used in the model). In case the project mechanisms are not linked to the EU ETS, the model predicts the annual compliance costs of the scheme to amount to €2.9 billion during the 2008-2012 period. The allowance price is estimated at 26 €/t CO_2, and the annual GHG emissions in the EU would amount to 4,664 Mt CO_2 equivalent.[59]

The study suggests that the contribution of JI and CDM projects will likely be limited to 5-6% of the total emissions reductions until 2012 due to their high transaction costs and risks, long

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[55] The study did not consider competition from regions with low freight costs such as Southern Mediterranean or the impacts on EU's competitiveness in foreign markets.

[56] IEA, p. 43.

[57] 'Summary of the Extended Impact Assessment' (EIA) of the European Commission concerning the Kyoto project mechanisms.

[58] EIA, pp. 4, 6, 8 and 46.

[59] ibid, pp. 29, and 30.

approval procedures and the lack of institutional capacity in many potential host countries[60]. Assuming a 6% (or 100 Mt CO_2) contribution, the use of JI and CDM projects would reduce the compliance costs of the EU ETS by 20% (from € 2.9 billion to € 2.4 billion annually) and the allowance price by 46% (from 26 € to 14 €/t CO_2). Furthermore, the EU market will benefit from more liquidity and from export opportunities for technology vendors.[61]

Linking without quantitative restrictions would allow to maximise the economic benefits as the full cost-minimising potential of project mechanisms could be exploited. But the assessment states that such a scheme could also retard technological development as low prices for emissions would reduce the incentives to develop new technologies for reducing emissions and increasing energy efficiency. This could result in foregone economic benefits in the medium-term. Moreover, the substantial outsourcing of emissions would reduce the environmental co-benefits for the EU.[62]

The impact of linking project mechanisms strongly depends on whether non-EU parties to the Kyoto Protocol will also use JI and CDM credits. The EIA estimated that if there is no competition from outside the EU for project credits, the compliance costs will be €1.1 billion with an allowance price of €5. With competition from outside these figures nearly double, as the costs rise to €2 billion and the allowance price rises to €11.[63]

Another analysis that was commissioned by DG Environment and performed by KPI arrives at similar estimates of the impact of linking JI and CDM with EU ETS until the year 2010. The important caveats underlying these analyses are that: nuclear projects and carbon sinks are not taken into account and that the U.S. is assumed to stay out of the Kyoto Protocol. The analyses are based on the Marginal Abatement Cost curves produced by the POLES model.

The general conclusion of that report is that allowing project credits into the EU trading system will lower allowance prices and costs for ETS compliance. More specifically, without any competition from the European non-trading sector (NTS) and the other Annex B countries on JI and CDM credits market, the allowance price could fall from 26 €/t CO_2 in the base case (with no linking) to 5 €/t CO_2 with linking[64]. The annual compliance cost for the ETS sector would be reduced by about 60% from €2.9 billion to €1.1 billion. The reductions acquired by EU ETS through JI and CDM would represent in this case 12.7% of the initial allocation to ETS participants.

The study further argues that it seems reasonable to expect that other Annex B countries will also carry out JI and CDM projects in order to generate project credits. The taking account of this competition on the ETS market would entail more than doubling of the allowance price to 10.5 €/t CO_2 and would almost double the annual compliance costs for the EU ETS to €2 billion. The share of acquired JI and CDM credits in relation to the initial allocation would drop in this case to 8%. Another case considered in the study imposed a 6% limit on the imports of credits by the EU ETS, leading to slightly higher allowance price of 14.5 €/t CO_2 and also higher annual compliance cost of €2.4 billion.

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60 ibid, p. 9.

61 ibid, p.28

62 ibid, pp.21, 22 and 28.

63 ibid, pp.30 and 31. These estimates assume that the EU member states do not use credits.

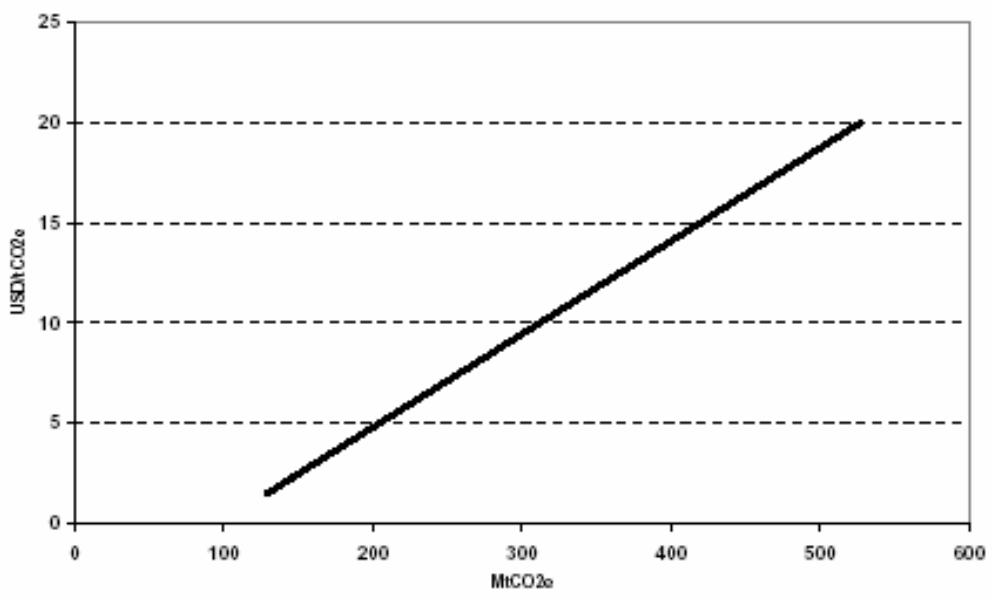
64 "KPI Technical Report: Impacts of Linking JI and CDM Credits to the European Emission Allowance Trading Scheme", May 2003, p. 13.

In all cases, China is expected to be the greatest supplier of JI and CDM credits, accounting for 47% of the total. The second most important region for project-based emission reductions is the Former Soviet Union with around 14% of the total, followed by India with around 11%.

According to EMEN report mentioned earlier, linking projects will likely be limited in numbers and will not have a major impact on the implementation of the ETS. This is due to the lack of clarity on the rules on JI and CDM from the UNFCCC and the fact that these projects are often very burdensome, long and complicated.

The COWI report also suggests that the amount of credits from JI and CDM projects that are available during the period of 2008-2012 will be rather limited. This is due to high transaction costs and regulatory risks as well as long lead times and the lack of institutional capacity. The report reproduces the following cost curve of JI and CDM that was developed by the World Bank, IEA and IETA. The curve shows that at a CO_2 price of 10 \$/t CO_2 the JI and CDM projects could yield around 300 Mt CO_2.

Figure 4. Assumed cost curve of JI and CDM that can be implemented in 2010.



The impact of linking project-based mechanisms with emissions trading schemes is also addressed in a June 2004 paper by OECD/IEA[65]. The paper concludes that such linking expands coverage (gases/sources), leads to an increase in compliance options for covered entities, a reduction in compliance costs and improved market liquidity. However, it can also lead to various challenges in terms of accounting, data, measurement, monitoring and managing overall compliance with GHG commitments. One challenge of particular importance is potential double-counting of emissions reductions. This could be avoided, for instance, by determining upfront what portions of a sector's GHG reductions can be met through emissions trading and through project-based activities respectively.

[65] "Linking project-based mechanisms with domestic greenhouse gas emission trading schemes", S. Bygrave (OECD) and M. Bosi (IEA), June 2004.

In summary, the above analyses clearly demonstrate the positive impact of linking the Kyoto project mechanisms to the EU ETS. This linking will result in lower abatement costs and lower allowance prices. Nevertheless, the impact is difficult to quantify and strongly depends on the one hand on the competition for projects from other countries, and on the other on the extent to which project credits will actually be used in the EU.

Since the infrastructure projects have long lead times (typically 3-7 years from identification, through licensing, financing and construction to the first certification of emission reductions), such projects would have to become operational by 2007 at the latest in order to deliver a significant proportion of emission reductions by 2012. Therefore, the window of opportunity for these projects may soon be closing.

7. The way forward

7.1. The EU's mid-2006 review of ETS

The Commission has recently started a comprehensive overview of the ETS scheme with substantial stakeholder involvement and a report in mid-2006. The review will take account of:

- the extension of the scheme to other gases and sectors;
- the effects of the system on competitiveness;
- the impact on electricity prices; and
- the harmonisation of national methods of allocating CO_2 emissions.

The review will have to be approved by the Council and the European Parliament. Since this legislative procedure may take several years and since NAPs for the second phase of trading (2008-12) are due by 30 June 2006, the resulting conclusions will not significantly affect the rules or the scope for that phase. However, the emissions reductions targets will likely be more stringent in order to meet the Kyoto obligations by 2012 and the NAPs may be more harmonised across the EU countries in terms of the methods of allocating CO_2 emissions.

Concerning the extension of ETS to other sectors, the Commission launched in May 2005 an internet consultation on potential policy measures to reduce the impact of air transport on climate change. This reflects a growing debate on how the aviation sector could contribute to the EU's climate change strategy. A Communication on this issue is expected later this summer. The Environment Commissioner Stavros Dimas cautioned on 2 June that aviation may not be included in the second trading period of the scheme "for practical reasons".

7.2. Initial EU debate on post-Kyoto regime

In early 2005, the EU started drawing up the main aspects of its climate change policy after 2012 as part of its commitment under Kyoto. In its 9 February paper titled "Winning the battle against climate change" [66], the Commission proposed a strategy focusing on the following core elements:

- persuading all major world emitters (including the U.S. and rapidly emerging economies such as China and India) to commit to a binding scheme;
- including more sectors in emissions reductions, including transport as well as tackling the deforestation; and
- promoting climate-friendly technologies and market-based instrument such as EU ETS.

This draft paper did not define precise targets for reducing greenhouse gas emissions. At a meeting in March 2005, the EU Council of Ministers went further by suggesting ambitious emissions reduction targets of 15-30% by 2020 and 60-80% by 2050. The ministers also requested a global approach to the issue and invited the Commission to study the costs and benefits of future action and the competitiveness aspects of the future EU strategy. The summit of EU leaders on 22-23 March 2005 only accepted the flexible targets for 2020. The summit conclusions stated that a 15-30% cut in GHG emissions "should be considered" for

[66] EurActiv, 10 February 2005.

2020, but only "in the light of future work on how the objective can be achieved, including the cost-benefit aspects"[67].

The issue of compliance costs therefore seems to be gaining more prominence in the post-Kyoto debate. These costs are clearly a function of the severity of the targets for emissions reductions. This relationship is confirmed and quantified by Eurelectric's series of Greenhouse Gas & Energy Trading Simulations (GETS) that were designed to test the potential efficacy of trading GHG emissions allowances in contributing to meeting the emissions-reduction targets. The latest of these simulations (GETS4) estimated that increasing all targets by 50% would lead to 3-5 times higher compliance costs[68]. The study also finds that if the EU-25 goes it alone in committing to its share of a 550 ppm CO_2 target for the 2013-22 periods, its compliance costs would triple. Furthermore, if Russia did not participate in the post-Kyoto regime, compliance costs and prices for allowances would double, with a negligible impact on GHG emissions. This is because Russia is a major potential supplier of zero ('hot air') and low cost allowances.

7.3. G8 Summit in Gleneagles

The climate change issue was on top of agenda of the G8 Summit held on 6-8 July 2005 in Gleneagles, Scotland. The leaders of G8 nations issued a joint communiqué and a Gleneagles Plan of Action on Climate Change, Clean Energy and Sustainable Development[69]. In the communiqué, the leaders declared that "climate change is a serious and long-term challenge that has the potential to affect every part of the globe" and that human activities "contribute in large part to increases in greenhouse gases associated with the warming of the Earth's surface." They agreed that globally, emissions must slow, peak and then decline, moving towards a low carbon economy.

The leaders agreed to launch, and invited other countries to join, a Dialogue on Climate Change, Clean Energy and Sustainable Development to "address the strategic challenge of transforming our energy systems to create a more secure and sustainable future." The Dialogue is to monitor implementation of the commitments made in the Gleneagles Plan of Action and "share best practice between participating governments," with a report due at the 2008 G8 Summit hosted by Japan.

The Plan of Action adopted by the G8 leaders identifies a range of urgent actions to meet the facing challenges and focuses on ways to promote energy efficiency, research and development, information exchange and cooperation. The leaders also reaffirmed their commitment to the UN Framework Convention on Climate Change and agreed to "move forward in that forum the global discussion on long-term co-operative action to address climate change" at the UN Climate Change Conference later this year in Montreal.

The leaders of Brazil, China, India, Mexico and South Africa also participated in the Summit. In a joint declaration, they called for stronger efforts by developed countries to reduce emissions and to provide financial and technical assistance to developing countries.

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[67] EurActiv, 24 March, 2005.

[68] Eurelectric, web news article "Eurelectric unveils GETS4 conclusions, puts forward "post-2012" climate policy principles", www.eurelectric.org/news/articles/art152.htm.

[69] Source: http://www.renewableenergyaccess.com/rea/news/story?id=34309.

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