JET-SET

Joint Emissions Trading as a Socio-Ecological Transformation

Cross-Section Project 4

Ready to Link Up?

Implications of Design Differences for Linking Domestic Emissions Trading Schemes

Wolfgang Sterk, Marcel Braun, Constanze Haug,
Katarina Korytarova, Anja Scholten

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JET-SET

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Science Centre North Rhine-Westphalia / Institute for Culture Studies / Wuppertal Institute for Climate, Environment and Energy	Dr. Ralf Schüle (*Coordination*)	ralf.schuele@wupperinst.org
	Dipl. Vw. Christiane Beuermann	christiane.beuermann@wupperinst.org
	Dipl. Umw. Wiss. Bernd Brouns	bernd.brouns@wupperinst.org
	Dipl. Soz. Tilman Santarius	tilman.santarius@wupperinst.org
	Wolfgang Sterk, M.A.	wolfgang.sterk@wupperinst.org
	Dipl. Geogr. Renate Duckat	renate.duckat@wupperinst.org
	Marcel Braun, M.A.	marcel.braun@wupperinst.org
	Dr. Hermann E. Ott	hermann.ott@wupperinst.org
CESR Center for Environmental Systems Research	Prof. Dr. Joseph Alcamo	alcamo@usf.uni-kassel.de
	Dr. Janina Onigkeit	onigkeit@usf.uni-kassel.de
ZEW Zentrum für Europäische Wirtschaftsforschung GmbH / Centre for European Economic Research	Dipl. Vw. Niels Anger	anger@zew.de
	Prof. Dr. Christoph Böhringer	boehringer@zew.de
	Dr. Ulf Moslener	moslener@zew.de
	Dipl. Wi.-Ing. Marcus Stronzik	stronzik@zew.de
	Dipl. Wi.-Ing. Marion Hitzeroth	hitzeroth@zew.de
ISOE	Dr. Irmgard Schultz	schultz@isoe.de
	Dr. Immanuel Stiess	stiess@isoe.de
ifeu	Dipl. Ing. Markus Duscha	duscha@ifeu.de
	Dipl.-Ing. Hans Hertle	hertle@ifeu.de

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The Research Project "Joint Emissions Trading Systems as a Socio-Ecological Transformation (JET-SET)"

Background

The signing of the Kyoto Protocol in 1997 marks an important milestone for the development and implementation of climate policy within the European Union (EU) and Germany: The implementation of so-called flexible instruments – here in particular the trading of emission certificates between industrialised countries – has since come to play a key role. The development of domestic emissions trading schemes (ETS) adds a new market-based instrument to environmental policy in the EU, which has traditionally been more oriented towards regulatory instruments. Implementing this instrument at the national level entails new societal opportunities as well as risks. Even though there is already a number of studies available from economics and political science, there is still a significant need for information on the ecological, economic, institutional and social impacts of emissions trading. Moreover, there is a strong need for further research on the further development of the EU ETS, both for the first commitment period of the Kyoto Protocol from 2008 to 2012 as well as beyond.

The aim of the **JET-SET** (**J**oint **E**mission **T**rading as a **S**ocio-**E**cological **T**ransformation) project, which is funded by the German Federal Ministry of Education and Research, is to conduct an integrated analysis and assessment of the impacts of emissions trading in the EU and in Germany. The project is coordinated by the Wuppertal Institute and designed as a multi-disciplinary research process.

Objectives of the Research Project

The project's basic **hypothesis** is that the introduction of the EU ETS will lead to far-reaching socio-ecological transformation and learning processes which will, among others,

- change the institutional setting of climate policy at the EU and national level,
- significantly influence the choices and market behaviour of companies,
- affect the public discourse about – and the public perception of – (inter)national climate policy, and
- affect the relationship between society and nature.

In this respect the introduction of an EU emissions trading scheme can be perceived as a transformation process which comprises both social and ecological dimensions and their interrelation.

The **aims** of the project are:

- monitoring the introduction of emissions trading in the EU and in Germany,
- integrated assessment of the economic, ecological and social implications of the EU ETS,
- the elaboration of policy recommendations with respect to the future design of the trading scheme, and
- the conceptual and theoretical embedding of the research results into the inter-disciplinary sustainability research.

Design of the Research Project

The **structure of the research project** reflects *analytical* and *practical-political* elements of socio-economic transformations induced by the introduction of the EU ETS:

In the ***first project phase***, the project partners focused on the currently emerging transformation processes triggered by the EU ETS from an analytical perspective. In line with the aims of the project, four so-called "**Base Projects**" (BPs) dealt with:

- the modifications of institutions within society and politics brought about by the progress of the EU ETS (BP1),
- the modification of business strategies (BP2),
- the changing discourses and public perception of climate policy (BP3), and
- land-use-changes, based on the example of energy crops (BP4).

Furthermore, gender aspects of international climate policy have been analysed. At the end of the first phase, an integrated research concept was developed that serves as the basis for the second project phase.

The ***second project phase*** addresses the potentials and risks related to linking the EU ETS with other emerging domestic trading schemes. Four so called "**Cross-Section Projects**" address the following aspects:

(1) Which countries are currently planning to introduce national greenhouse gas emissions trading schemes and when will these schemes be established?

(2) What are the economic effects (abatement costs, certificate price) of different alternative scenarios („storylines") of linking the EU ETS with other domestic schemes?

(3) What will be the contribution of linking to achieving more ambitious targets for reducing greenhouse gas emissions for the period after 2012?

(4) What are institutional and political preconditions for linking?

The project addresses these questions by an integrated assessment of different alternative policy scenarios of linking domestic emission trading systems (ETS) in four Cross-Section Projects (CSPs):

- Policy scenarios of linking (CSP1)
- Impacts of linking domestic ETS on the distribution of per capita emissions (CSP2)
- Economic and environmental effects (CSP3)
- Implications of design differences (CSP4)

Role of this Paper within the Research Project

This paper has been developed within CSP4. It surveys the current status of the presently evolving domestic emission trading systems and analyses their designs. It emerges that the schemes differ significantly in key design aspects, which gives rise to the question in how far linking might impair rather than enhance the environmental integrity and economic efficiency of trading. The paper outlines what adjustments might be made to allow for linking and what the cost-benefit ratio would be.

Executive Summary

While the EU took the lead with establishing a greenhouse gas (GHG) emissions trading scheme (ETS), many other industrialised countries that have ratified the Kyoto Protocol are also discussing domestic schemes. Norway has already started its own scheme and in Japan the Ministry of the Environment started a small voluntary system in April of this year. Canada and Switzerland have stated intentions to launch mandatory schemes in 2008. Moreover, while the federal governments of Australia and the U.S. have refused to ratify Kyoto, individual states in both countries are discussing the establishment of sub-national trading schemes and there are also several proposals for schemes in the U.S. Congress.

According to economic theory, the efficiency of these trading systems would increase if they were linked with each other. Moreover, from a political point of view linking ETSs would complement the top-down Kyoto regime with a bottom-up process that might serve to bolster the climate regime as a whole. Accordingly, Art. 25 of the EU emissions trading directive mandates the Commission to conclude agreements with non-EU countries in this regard.

However, differences in the designs of the schemes may impair, rather than enhance, their efficiency and the environmental effectiveness. Potential issues include: the GHG and industry sector coverage; the definition and recognition of trading units; the setting of targets and the allocation of trading units; rules for banking and borrowing; monitoring, reporting and verification provisions; and the compliance framework.

Critical Design Issues

Differing **sector or gas coverage** is not a matter of institutional compatibility, nor does it affect the environmental effectiveness of a combined trading scheme. A constellation where one or more gases or categories of sources are included in one scheme but not in the other raises first and foremost questions regarding competitiveness and gaining the necessary political support for linking under these circumstances. However, competitive disadvantages and possible discrimination due to diverging treatment of sectors in two trading regimes are not caused by linking and would also occur in its absence. Differences in sector coverage may actually have a positive effect on economic efficiency since the cost savings emission trading achieves stem from the differences in emissions abatement costs among the participants. Linking systems with diverging sector coverage should thus lead to greater cost savings. Thus, if opposition by stakeholders regarding competitiveness concerns due to unequal treatment of comparable emissions sources can be overcome, differences in the sources covered by two ETSs' coverage should not impede linkages.

Trading systems should ideally have the same quantitative **unit of trading** based on the Kyoto Protocol, namely metric tonnes of CO_2e. Almost all systems considered do in fact rely on this basis. The one exception is the RGGI system which would be based on short tons, which is less than a metric tonne. Linking would therefore require an exchange rate. Another potential obstacle is the provision of the McCain-Liebermann proposal that would require the U.S. Environmental

Protection Agency to determine the global warming potential of the non-CO_2 gases rather than simply adopt the UNFCCC values. It would be desirable for the EPA to continue to use the GWP indices recommended by the International Panel on Climate Change (IPCC) since a common quantitative basis for trading units across different domestic ETSs avoids transaction costs and greatly enhances the legitimacy of trading.

The **recognition of trading units** is likely to be at the centre of linking negotiations. For example, if a particular type of unit, such as credits from carbon sinks, is not recognised in one scheme, companies in another scheme, which accepts this unit, could use them for domestic compliance purposes and then sell their 'regular' domestic allowances to companies in the first scheme. The political decision in the first scheme about which trading units are recognised would thus be bypassed.

While a scheme with a more narrow recognition of units may take adjustment measures such as the introduction of exchange rates, these would increase transaction costs while producing only limited effects. The question would therefore probably rather be to which extent the negotiators from both countries would want to maintain their rules for the recognition of units instead of harmonising them for the purpose of linking. If the inclusion of certain units is considered to be intolerable by a scheme with a more narrow recognition of units, the only option to really keep them out would be not to link to schemes which include them.

This issue is salient in particular with regard to the use of credits from carbon sinks and domestic offset projects, which the EU ETS currently excludes, but which most other schemes plan to include.

The **kind of target adopted** by individual schemes also poses a problem. Two types of targets are conceivable: absolute caps, which limit the total emissions during a specified period; and relative targets, which are defined as emissions per unit of output or activity, such as gross domestic product (GDP) or energy consumption, or per unit of input. Thus, under a system with relative targets, GHG emissions may even increase as long as this is justified by an increase of production or GDP.

Linking two schemes that differ in the way the target is determined may actually impair rather than enhance the liquidity of the combined scheme. Relative targets require that allocation takes place in two steps, an initial allocation based on projected production levels and adjustment *ex post* when the actual production levels are known. This is likely to lead to spikes in liquidity at the moment of adjustment. In the case of linkage, these liquidity shocks will also affect the scheme with absolute targets.

Linking a scheme with relative to a system with absolute targets also raises equity concerns since companies under the system with relative targets in effect receive a subsidy for increasing their output. This incentive may also compromise the environmental effectiveness of a combined regime because output increases will inflate the number of trading units available. Some argue that these emissions would occur anyway regardless of any linkage. However, since at the macro level linking is a win-win situation, the linked economies can be expected to grow marginally quicker than if the two schemes were kept separate and there would thus be more emissions than

if the schemes were kept separate. There are several options to address the problem of different targets, such as introducing exchange rates whereby trading units from the scheme with relative targets would be discounted against units from the scheme with absolute caps. However, all these options would render the system more complex and increase transaction costs.

While the EU ETS and most of the other planned schemes rely on absolute targets, Canada's plans envisage the use of relative targets. Given the problems outlined above, it could be concluded that linking in this case poses more problems than benefits. The most desirable solution from a EU perspective would certainly consist in convincing the Canadian policy makers to introduce absolute instead of relative targets. This would not only ensure the full environmental and economic benefits of emissions trading, but also avoid cumbersome adjustment arrangements. If the relative targets are retained and linking is still to be pursued, the most practical remedy would be for the Canadian system to establish sufficiently stringent relative targets in order to prevent it from undermining the environmental effectiveness of the schemes with absolute targets.

As for the **stringency of targets**, a perfect balance of efforts is very unlikely to be achieved. However, while competitiveness issues would not arise simply as a result of linking – they would also arise if the two schemes operated separately – it is probably a political precondition for linking that all sides demonstrate efforts to establish comparable caps.

The different approaches to target setting in the schemes under development render a comparison of their respective stringency far from straightforward. It seems, however, that all the systems seem set to impose equally weak targets. While this is inadequate from the environmental perspective, it probably means that there will be few competitiveness concerns with respect to linking.

Differences in the **way allowances are distributed** to the companies covered by ETSs have no impact on their environmental effectiveness since this is solely determined by the overall cap. Moreover, after the initial distribution the carbon price will be independent of the method of distribution and be determined by market supply and demand. Beyond an initial transfer of wealth in the case of free allocation, the method of initial distribution should therefore not affect the competitiveness of the entities. Thus, linking schemes with different initial allocation methodologies should not introduce any additional economic distortion into the combined scheme.

However, there might be a problem with regard to Switzerland where the emission target will each year be adjusted to the companies' production growth, with the final adjustment taking place in 2010. The European Commission has rejected such *ex-post* adjustments for the EU ETS and taken Germany to court over this issue. It could therefore hardly defend agreeing to similar provisions in non-EU countries.

Banking allowances from one trading period to the next provides emitters with an incentive to overachieve their targets as they can use the resulting allowances at a later date and it gives them additional flexibility to deal with uncertainties such as future production levels. Potential problems arise from linkages between schemes whose banking provisions are not harmonised. If

a scheme which prohibits banking was linked to a scheme which allows banking, the latter would effectively provide a banking option for all the companies on the combined market.

Borrowing – that is to say, delaying reduction measures into future trading periods where they might be achieved more cost-effectively – is not seen favourably from an environmental perspective. First, borrowing bears the risk that mitigation measures may not be taken in future periods either. Second, companies may have an incentive to rely heavily on borrowing to artificially raise their future compliance cost curve and then argue that they need softer targets because otherwise the costs would be prohibitive. Thus, linking a system without borrowing to a regime that allows borrowing may require restrictive provisions to be taken so as to maintain the environmental effectiveness of the combined trading scheme. One option would be to allow purchases from the scheme with borrowing only after its compliance period has been completed and only from companies that did not borrow, i.e. to allow only ex-post purchases of surplus allowances.

At the moment it seems that all of the emerging schemes are going to allow banking after 2008 so linking should not pose any problems. As for borrowing, a proposed bill for the U.S. by Senators Jon McCain and Joseph Lieberman includes such a provision. Although borrowing in their proposal appears to be allowed only under stringent conditions, the issue certainly deserves further examination for linking.

Monitoring, reporting and verification (MRV) provisions are crucial for achieving a credible ETS since they are the key to determining whether each trading unit corresponds to one tonne of emissions. Slight differences in MRV do not necessarily impact on the effectiveness of a combined trading scheme, but only as long as confidence in the trading units is not undermined by suspicions of under-reporting of emissions. This may be a problem within the EU already, since the Commission's MRV guidelines leave member states and companies substantial leeway for developing specific monitoring methodologies and with regard to the level of accuracy required. Details for the non-EU schemes are in most cases not yet available and thus an assessment is not yet possible. In the long term, complete international harmonisation of requirements would be very desirable in order to ensure the full environmental effectiveness in any combined trading scheme.

From the environmental perspective, the financial **penalties** for non-compliance should be significantly higher than the cost of allowances, as is the case in the EU ETS. A different philosophy is that of the "price cap" where paying the penalty exempts companies from submitting allowances. Yet another option for regulators is to establish a "safety valve". With this mechanism, the regulator commits to selling allowances at a pre-determined price in whatever quantity is demanded once the market price for allowances rises above a certain level. This mechanism limits the cost of the market participants to the safety-valve level but at the cost of missing the environmental target.

Moreover, if a system with strict penalties was linked to a system with a safety valve or where paying the penalty exempts companies from submitting allowances, the safety valve or penalty rate in this system would effectively act as a price cap for the combined system. As long as the market price was higher than the price cap or safety valve level, companies in the price cap /

safety valve system would have an incentive to sell their allowances to companies in the other system until prices were equalised at the price cap or safety valve level. The environmental effectiveness of the combined scheme would thus suffer since total emissions would be higher than if the two schemes were kept separate.

If a link is to be established, there would need to be a limit on the exchange of trading units. The most feasible option with regard to safety valves would probably be to issue additional allowances only to entities covered by the safety valve system and only up to the difference between the initial allocation and the actual emissions. This would not block the access to lower market rate allowances totally, but it would limit the amount of additional allowances being traded. As regards systems with price caps, the most feasible option would probably be to establish a gateway as has been done in the UK ETS, whereby transfers from the price cap system would be blocked once emissions in this system exceeded a certain level. However, there would still be some inflationary effect on emissions. Moreover, the result of these measures would be a split market once the market price reached the safety valve / price cap level, with prices in the safety valve or price cap scheme staying at the safety valve or price cap level respectively and prices in the other scheme rising further, which would reduce the economic benefits of linking.

The Canadian system as well as the Bingaman proposal plans envisage the use of safety valves while the Australian scheme would include a price cap. However, the prospect of a scenario where the environmental effectiveness of the EU ETS has been compromised by linking it to these scheme – but with limited economic benefits – leads to the conclusion that it would be advisable to keep the systems separate.

Trading with Non-Kyoto ratifiers

Politically, the most interesting option would be a link between the EU ETS and the emerging systems in Australia and the U.S. since this would reattach these countries to the international climate protection efforts and might be a first step for them to eventually rejoin the Kyoto regime. However, from 2008 EU Allowances (EUAs) will be backed by the Kyoto Protocol's Assigned Amount Units (AAUs), and the Protocol precludes AAUs from being transferred into non-Parties. Moreover, should the EU become a net importer of units from Australia or the US, emissions in the EU would rise without a corresponding influx of Kyoto units, which would endanger Kyoto compliance.

There are two options to circumvent these problems. The first option would be to establish only a semi-open link between the ETSs where entities from the non-ratifier countries could only purchase but not sell allowances into the EU ETS. Such a link could actually be implemented unilaterally if a non-ratifier's ETS allowed companies to cancel EUAs within the EU ETS and count this toward compliance in their own system. The second option would be to establish a full link through by a "gateway" mechanism. Under such an approach, outgoing EUAs would be stripped of their AAU property. The EUAs could then be sold to the non-ratifier's ETS while the AAUs would be put into a specific account and used to back up incoming allowances. Thus, acquisitions from the non-ratifier's ETS could only be completed if there were sufficient AAUs available in the gateway, that is the EU would remain a net seller.

Conclusions

To sum up, many ETS design features should not pose fundamental problems to linking. The recognition of trading units will probably be a bone of contention between the EU and all other systems. But if this issue can be overcome, many of the emerging non-EU systems should be compatible with the EU ETS. The exceptions are Australia, Canada, Japan and a potential U.S. system along the lines of the Bingaman proposal. The voluntary Japanese system is going to cover only 32 companies and run for only one year and is therefore too limited. As for Canada and the Bingaman proposal, the planned safety valves pose a fundamental obstacle to linking. This problem is further exacerbated by the Canadian system's envisaged relative targets.

For the other systems linking may only be a matter of time. But it can probably be expected that these systems will face a number of delays in implementation and the linking negotiations are also likely to take some time. It therefore seems rather unlikely that any scheme apart from maybe Norway's, which is already up and running, and Switzerland's, for which linking negotiations are already underway, will link to the EU's by 2008. A more realistic date for the other schemes is probably from 2010 onwards.

Introduction

More and more countries are incorporating the instrument of emissions trading into their climate policies. While the European Union (EU) and Norway have already launched their emissions trading schemes (ETSs) and the Japanese Ministry of the Environment has started a small pilot scheme, preparations are also progressing apace in Canada and Switzerland. Moreover, while the federal governments of Australia and the United States have refused to ratify the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC), individual states in both countries are pushing ahead the establishment of sub-national trading schemes. And while in the U.S. Congress has twice rejected the McCain-Lieberman proposal to establish a nation-wide trading scheme, the debate about emissions trading continues to intensify. Discussions have also started in Russia.

Figure 1: Countries with (Emerging) Emission Trading Schemes

Countries are thus breaking the compliance mechanisms of the Kyoto Protocol down to the national level. Under the Kyoto Protocol, every Party listed in Annex B (mainly the traditional "industrialised countries") has taken on a quantified emissions target to limit greenhouse gas (GHG) emissions during the first commitment period from 2008-2012. This target is referred to as the "assigned amount" of emissions and expressed in Assigned Amount Units (AAUs), measured in tonnes of CO_2 equivalent (CO_2e). According to Art. 17 of the Protocol, Annex B Parties whose emissions overshoot their assigned amount can acquire AAUs from other Annex B Parties whose emissions stay below their targets, add them to their assigned amount and thus bring their emission account back into balance. They can do the same with the emission credits generated by the Kyoto Protocol's project-based mechanisms, namely Emission Reduction Units (ERUs) generated by Joint Implementation (JI) projects carried out in Annex B Parties, and Certified Emission Reductions (CERs) generated by Clean Development Mechanism (CDM) projects carried out in Non-Annex B Parties. Finally, they can increase the absorption of carbon

in forests, agricultural soils, and other ecosystems ("carbon sinks") on their territory. The Kyoto Protocol allows the generation of Removal Units (RMUs) for certain human-induced sinks activities undertaken since 1990, which can also be counted towards a country's emission target.

Subsequently, the Marrakesh Accords from 2001 laid down the detailed procedures, modalities and rules governing the functioning of international emissions trading. Significantly, they provide that each Party may authorise legal entities for participation in emissions trading. However, the Party will remain responsible for meeting the national Kyoto cap.[1] Originally, the aim was to establish a global entity-level emissions trading system on the basis of Article 17 of the Kyoto Protocol, as also reflected in the EU Commission's 1998 communication on a post-Kyoto EU strategy (European Commission 1998: 17). However, these discussions at the international level turned out to be very protracted and so the bottom-up initiatives to establish domestic trading schemes highlighted above have come to the fore.

Economic theory suggests that efficiency would increase if these trading systems were linked with each other. The inclusion of more participants entails a greater diversity of sources and more abatement options. This should in turn lead to improved market liquidity and result in a more efficient allocation of resources towards least-cost abatement measures and thus lead to lower overall compliance costs (Haites/Mullins 2001: iv; Anger et al. 2006).[2] Moreover, while linking is generally considered environmentally neutral as it does not affect the aggregated emissions of both schemes, it does not seem unlikely that enhanced cost-effectiveness may render additional environmental efforts politically acceptable. It may also help to avoid the problem of "leakage" as it prevents entities from relocating production to countries where a less stringent or no emissions reduction scheme at all applies. Linking the emerging domestic ETSs would also be politically significant since thus the top-down approach of the Kyoto Protocol would be underpinned by a bottom-up process which might serve to further strengthen the Kyoto regime via bi- and plurilateral agreements. Accordingly, Article 25 of the EU emissions trading directive provides for agreements to be concluded with non-EU countries in this regard.

The preliminary survey of the currently emerging ETSs in Cross-Section Project 1 (CSP1) of the JET-SET research project developed three scenarios for a future development of global emissions trading (see Table 1). The scenarios are based on the probability of each country developing an ETS and linking it to those of the other countries. The ten-year intervals were chosen due to the requirements of the economic model used in CSP3. The main dividing lines in the scenarios are between the members of the Organisation for Economic Cooperation and Development (OECD) among the Annex B countries, the Eastern European countries with economies in transition and the Annex B countries that have not ratified the Kyoto Protocol.[3]

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[1] Decision 18/CP.7. Modalities, rules and guidelines for emissions trading under Article 17 of the Kyoto Protocol, FCCC/CP/2001/13/Add.2, 21 January 2002, para. 5.

[2] However, despite these gains at the macro level, linking will inevitably create winners as well as losers at the micro level. While net sellers in a domestic emissions trading scheme with low permit prices will benefit from a linkage to a scheme where the allowance price for allowances is higher, the opposite is true for buyers in the first scheme. At the same time, net buyers in the high-price scheme win from linking, whereas sellers in this scheme lose.

[3] For further details on the scenario development, see Schüle et al. 2006.

Table 1: Alternative Scenarios of Linking Domestic ETS

	2010	**2020**
Scenario 1 – „status quo“ (pessimistic scenario)	EU-27 + Norway	EU-27 + Norway
Scenario 2 – „Kyoto“ („realistic“ scenario, status quo + other Annex B countries that have ratified the Kyoto Protocol)	EU-27 + Norway + Canada, Japan, New Zealand, Switzerland	EU-27 + Norway + Canada, Japan, New Zealand, Switzerland + Russia, Ukraine
Scenario 3 – „Annex B“ (optimistic scenario, all Annex B countries of the current Kyoto Protocol)	EU-27 + Norwegen + Canada, Japan, New Zealand, Switzerland + Russia, Ukraine	EU-27 + Norwegen + Canada, Japan, New Zealand, Switzerland + Russia, Ukraine + Australia, USA

However, prior to implementing such linkages it will be necessary to look at the shape of the non-EU systems, given that differences in design might possibly impair rather than enhance the efficiency and environmental effectiveness of a combined trading scheme. This paper will therefore examine the designs of the emerging non-EU systems with a view to identifying potential incompatibilities and proposing means for addressing them where this seems possible. Potential issues relate to the gas and sector coverage of the scheme, the definition and recognition of trading units, the setting of targets, rules for banking and borrowing, monitoring, reporting and verification provisions and the compliance framework.

The paper firstly synthesises the findings of the existing literature on the compatibility or incompatibility of different ETS designs. Secondly, it outlines the designs of the (emerging) ETSs. In the cases of New Zealand, Russia and the Ukraine there was not enough information on the design of a potential ETS for the purposes of this paper. The following therefore focuses on the remaining Annex B countries (EU, Canada, Japan, Norway, Switzerland, Australia and the U.S.) and distinguishes between countries that have ratified the Kyoto Protocol and those that have not. Finally, the different designs are compared with each other and evaluated on the basis of the discussion in the paper’s first part with the aim of identifying potential problems and suggesting possible solutions.

1 Critical Design Issues of Linking Domestic Emissions Trading Schemes

1.1 Coverage of the Scheme

The question regarding the coverage of an emissions trading scheme addresses several distinct issues: the gases targeted, the sectors that are included in the scheme, whether emissions are targeted upstream or downstream, whether direct or indirect emissions are being covered, whether participation is mandatory or voluntary, and finally opt-in and opt-out provisions.

1.1.1 Differences in Gases Covered

Under the Kyoto Protocol, the commitments countries have taken on relate to a basket of the most important greenhouse gases.[4] Nevertheless, a domestic emissions trading regime may choose to regulate solely one or several of them. Coverage of as many gases as feasible seems desirable in order to maximise the environmental effectiveness of the regime and to create more diverse abatement options. Schemes which include more gases may allow participating entities to reach their reduction targets at lower cost since reductions of non-CO_2 greenhouse gases are often more cost-effective than CO_2 emissions reductions (Blyth/Bosi 2004: 16).

However, there are technical difficulties in monitoring and calculating non-CO_2 emissions, which may lead to concerns over the accuracy of the results obtained (Bode 2003: 27). Therefore, when opting for a broader gas coverage it has to be ensured that the emissions of the non-CO_2 gases can be determined adequately in order to secure the legitimacy of the traded units. Nevertheless, as long as confidence in the linked regimes is not undermined by doubts about the accuracy of measurement, differences in gas coverage should not preclude linking. Due to their access to low-cost abatement options, the companies in the more comprehensive scheme will have a comparative advantage over their counterparts in the narrower scheme. However, they will have this advantage irrespective of whether the schemes are linked or not. In fact, linking would probably benefit the companies within the narrower scheme since the low-cost options available in the other scheme would tend to lower the overall price (Blyth/Bosi 2004: 16f).

1.1.2 Sector Coverage

A completely equivalent sector coverage in different schemes is rather unlikely. Countries have differing emissions profiles and may choose accordingly to include a different range of sources in their trading schemes (Baron/Bygrave 2002: 20).

As with differing coverage of gases, a constellation where one or more categories of sources are included in one scheme but not in the other raises first and foremost questions regarding competitiveness and gaining the necessary political support for linking. If companies that are

[4] Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulphur hexafluoride (SF_6). Annex A of the Kyoto Protocol.

competing against each other are covered by the scheme in one country but not in the other, this would certainly give rise to complaints of unfair treatment. However, competitive disadvantages and possible discrimination due to diverging treatment of sectors in two trading regimes are not caused by linking and would also occur in its absence. Differences in sector coverage may actually have a positive effect on economic efficiency since the cost savings emissions trading achieves stem from the differences in emissions abatement costs among the participants. Linking systems with diverging sector coverage should thus lead to greater cost savings. Conversely, such differences do not affect the environmental effectiveness of the combined scheme nor do they raise issues of institutional compatibility. Thus, if opposition by stakeholders regarding competitiveness concerns due to unequal treatment of comparable emissions sources can be overcome, differences in the sources covered by two ETSs should not impede linking (Haites/Mullins 2001: 39).

1.1.3 Upstream versus Downstream

Depending on the point of application of the overall limit on GHG emissions in the production and consumption cycle, regimes can either be designed "upstream" or "downstream". In an upstream system, emissions are accounted for at the point of entry of fossil fuels into a country's energy system, with the producers and importers of fossil fuels being held responsible for meeting an emissions cap. By contrast, a downstream regime targets the end-users of energy – usually large industrial consumers of fossil fuels. Whereas in an upstream scheme the covered entities are held accountable for the emissions their goods will produce once consumed, in a downstream scheme the actors are held responsible for their own emissions.

Upstream design has the advantage of extending coverage to most emitting sources, including diffuse ones. Furthermore, monitoring and transaction costs are likely to be lower due to the limited number of participants in the system (FIELD 2000: 23). However, apart from the fact that market liquidity may be low due to the limited number of participants in the scheme, experts also point to the possibility that upstream entities may simply pass on the costs to consumers, the sensibility of whom to price signals is at least doubtful (Philibert/Reinaud 2004: 23). A downstream system on the other hand necessarily implies a trade-off between the environmental and economic effectiveness of the regime. A high number of participants, desirable from an environmental perspective, would in turn involve high administrative costs (Baron/Bygrave 2002: 15).

Again, differences in coverage should not be a barrier to linking provided that a common unit is used – e.g. tonnes of CO_2e. However, ETSs should be linked in a way that prevents any double-counting or undercounting. For example, if energy products are exported from an upstream scheme (producers and importers) to a downstream scheme (end-users), emissions will be accounted for in both schemes, i.e. double-counted. Hence, exports of these products should be excluded from the upstream system. Yet, this would have to be done even without linking since otherwise fuel exporters would be penalised (Baron/Bygrave 2002: 17).

1.1.4 Direct versus Indirect Emissions

Emissions trading schemes can be either based on limiting direct or indirect emissions. Direct emissions are the emissions at source level, on the site. A scheme accounting for indirect emissions by contrast makes entities responsible for the emissions embedded in a good they consume, e.g. for emissions resulting from the production of the electricity they use.

The problem is that in some sectors indirect coverage in one country may lead to price distortions in another country with direct coverage even if the two schemes are not linked. For example, if electricity is exported from a country where the generator's emissions are capped (direct coverage) to a country where the end-user is accountable for the emissions from the electricity consumed (indirect coverage), the end-user will have to pay twice. This could be solved by excluding emissions from imported energy products from the indirect scheme. A different problem can arise if an electricity producer from an indirect scheme exports to a country with a direct scheme. In this case the producer's emissions would neither be covered in the domestic system (since the electricity was not consumed there), nor in the importing country (because the electricity was not produced there). Thus, a gap in the coverage of emissions would occur unless the consumers in a direct scheme would surrender allowances to the government of the country of origin of the electricity, which is rather impractical. Even more problems would arise if two schemes with indirect coverage were to be linked. In such a scenario, the two systems would have to be harmonised. This might entail a unique carbon coefficient reflecting the average carbon content for a given product from the respective countries and governments transferring allowances to each other based on the inventories in the indirectly covered sector to rectify accounting discrepancies that may appear due to trading (Baron/Bygrave 2002: 18-20).

1.1.5 Voluntary or Mandatory Participation

Participation in an ETS may either be mandatory for all entities in the covered sectors or it may be voluntary. The environmental effectiveness of a voluntary scheme is likely to be lower than that of a mandatory scheme for two main reasons. First, there is bound to be a disequilibrium between offer and demand since participants are likely to accept only relatively weak targets and joining the scheme is hardly attractive for prospective buyers. As a result, the system is likely to be characterised by low liquidity and prices. Secondly, a covered facility may simply shift production and the attendant emissions to another facility that is not covered in order to gain surplus trading units to sell. Moreover, if a voluntary scheme was linked to a mandatory scheme, the price in the combined scheme would tend to be higher than the previous price in the voluntary scheme, which would increase the incentive to shift production outside the ETS. It would also act as an incentive for further prospective net sellers to join the voluntary scheme. If they did so committing only to weak targets, this would further threaten the environmental effectiveness of the combined scheme.

Linking would therefore require that the targets of the participants in the voluntary scheme are guaranteed to be lower than business-as-usual emissions. These targets would also need to be made binding through suitable penalties for non-compliance in order to prevent entities from overselling. Moreover, there would need to be a monitoring system to prevent leakage as well as

a barrier to new entrants to the voluntary system after the linkage has been effected (Choquette 2005: 7f).

1.1.6 Opt-In and Opt-Out Provisions

A further issue that needs to be considered is the existence of opt-in or opt-out provisions. Opt-in means that new gases, sectors or activities can be included in the scheme under certain conditions. Opt-out provisions regulate how installations can be excluded (or withdrawn) from the scheme.

The possibility for non-covered sectors or companies to voluntarily join the scheme may be desirable as it contributes to familiarise potential future participants with the system and increases the supply of allowances (Ellerman et al. 2003: 46). Conversely, generous rules for opt-out raise concerns regarding the environmental performance of the scheme as they might allow net buyers to drop out, leaving only net sellers in the regime. Allowing opt-out may also reduce the scope of the trading scheme and thus decrease its efficiency. To prevent this, restrictions on opting-out should be imposed. In addition, installations leaving the scheme should be covered by other measures in order to maintain environmental effectiveness (Blyth/Bosi 2004: 18f).

1.2 Definition and Recognition of Trading Units

A domestic emission trading system has to define the unit of trade as well as the rules for trading. This also includes the question whether units of other emission trading schemes are eligible for trading in the system. As mentioned above, the unit under the Kyoto Protocol is the AAU, which is substitutable by CERs, ERUs and RMUs. When establishing a domestic emission trading system, a country may either define AAUs as the trading unit or establish its own trading unit, which should be substitutable by AAUs so as to use the overall emission limits imposed by the Kyoto Protocol to guarantee the environmental integrity of the scheme. To be compatible for linking, trading systems should ideally have the same quantitative unit of trading based on the Kyoto Protocol, namely metric tonnes of CO_2e. The country must also decide if and in how far it recognises the units from CDM/JI and from domestic offset mechanisms. It may establish quantitative limits on their use and/or qualitative restrictions, e.g. exclude credits from certain project types.

Linking two schemes with different recognition of external units will affect the total supply of units in the combined scheme. This can have direct and indirect effects on prices. First, if a scheme that recognises external units (Scheme A) is linked to a scheme that does not (Scheme B), the installations in Scheme A can keep the units not eligible in Scheme B for domestic compliance and sell the eligible units to Scheme B. The ineligible units would thus indirectly offset emissions in Scheme B. Secondly, if Scheme A is already linked to a third scheme (Scheme C) which is not yet linked to Scheme B, the units from Scheme C can likewise be used to indirectly offset emissions in Scheme B. The political decision of Scheme B about which units to recognise would thus be bypassed. Moreover, if the price of the external units is lower than that of domestic units, the total amount of emission units in the combined scheme will be greater than if the schemes functioned separately (Blyth/Bosi 2004: 20).

There is therefore a strong case for harmonising the rules for the recognition of certificates. While a scheme with a more narrow recognition of units may take adjustment measures such as the introduction of exchange rates, these would increase transaction costs while producing only limited effects. Scheme B would have no way of telling if an incoming unit from Scheme A was freed up by the use of an external unit which Scheme B does not recognise. The question would therefore probably rather be to which extent the negotiators from both countries would want to maintain their rules for the recognition of units instead of harmonising them for the purpose of linking. If the inclusion of certain units is considered to be intolerable by a scheme with a more narrow recognition of units, the only option to really keep them out would be not to link to schemes which include them.

1.3 Absolute versus Relative Targets

Two kinds of targets for limiting entities' GHG emissions are conceivable in an emissions trading system: absolute targets, which limit the total emissions during a specified period, and relative targets, which are defined as emissions per unit of output or activity, such as GDP or energy consumption, or per unit of input. Thus, under a system with relative targets, overall emissions may even increase as long as this is justified by an increase of production or GDP – the reason which makes this approach generally more attractive to industry (Gielen et al. 2002: 4). However, by the same token relative targets leave national governments with the risk that the overall national Kyoto target might not be reached and that compensating measures might have to be taken in other sectors. Relative targets may also involve higher administrative costs due to the need to determine the appropriate metric – unit of output, value added, energy input or other – and to monitor this metric in addition to GHG emissions (Baron/Bygrave 2002: 24).

Linking two schemes that differ in the way the target is determined may actually impair rather than enhance the liquidity of the combined scheme. Relative targets require that allocation takes place in two steps, an initial allocation based on projected production levels and adjustment *ex post* when the actual production levels are known. This is likely to lead to spikes in liquidity at the moment of adjustment. In the case of linkage, these liquidity shocks will also affect the scheme with absolute targets (Choquette 2005: 6).

Linking a scheme with relative targets to a trading system with absolute targets raises equity concerns. Companies under the system with relative targets have an incentive to increase output since they will receive more allowances the more they produce, whereas companies in the other system have a fixed cap and thus face higher costs for output increases. The incentive to increase output and thus emissions under the scheme with relative targets may also compromise the environmental effectiveness of the combined regime because output increases will inflate the number of certificates available in the scheme with absolute targets (Haites/Mullins 2001: 48f). While one argument is that these emissions would occur anyway, the other suggests that the emissions will be higher in the combined scheme than if the schemes remained separate. Since at the macro level linking is a win-win situation, the linked economies can be expected to grow marginally quicker and there would thus be more emissions than if the two schemes were kept separate (Blyth/Bosi 2004: 22f).

To solve this problem, Fischer (2003) provides four possible policy solutions:

- imposing a tax on trade between the two schemes;
- introducing an exchange rate to adjust for relative allowance values;
- adjusting allocation in the scheme with relative targets to account for changes in expectations of growth levels resulting from linkage of the schemes, and
- tightening the allocation in the absolute scheme.

Another possible solution is a gateway approach as used in the UK emissions trading scheme. Under such a mechanism, allowance transfers from a system with relative targets into the other scheme could occur only as long as the total emissions of the former did not exceed a certain ceiling. Yet this concept has its weaknesses, too: most importantly, it would increase the unpredictability of trading as it may be hard to foresee when the gateway will close and thus diminish the liquidity of the combined market (Butzengeiger et al. 2001: 17).

Even though these options would produce environmental benefits, implementing them would introduce additional complexity into the scheme and reduce the efficiency of the market. These effects have to be analysed and considered thoroughly by governments and policy makers.

1.4 Stringency of Targets

The stringency of targets refers to in how far emissions are to be reduced in comparison to historic or projected emissions. As far as competitiveness and equity at the company and sector level in the two schemes are concerned, it is obvious that a perfect balance of efforts is very unlikely to be achieved. However, while the resulting competitiveness issues are not a consequence of linking but would also arise if the two schemes operated separately, it is probably a political precondition for linking that both sides demonstrate efforts to establish comparable caps. As a related aspect, if two schemes were constructed thus that the companies in one scheme with strict targets could largely satisfy their needs by buying allowances from another scheme with lenient targets, this would violate the supplementarity principle laid down in Article 17 of the Kyoto Protocol, according to which emissions trading should play only a subordinate role vis-à-vis domestic efforts.

It should be noted, though, that imposing weak targets in a system covering the energy and energy intensive industries sectors such as the EU ETS undermines efforts to comply with the Kyoto Protocol at least cost. Imposing weak targets in such a system shifts the obligation to reduce emissions to the non-covered sectors, where emission reductions tend to be more costly overall. Severe problems with regard to environmental effectiveness would arise if the targets in one scheme were above the business-as-usual (BAU) emissions level. In this case, the total emissions in the linked schemes would be higher than if the systems were kept separate (Anger et al. 2006).[5]

1.5 Allocation Methodology

There are two basic types of emissions trading schemes. In cap-and-trade programmes, emission targets are assigned to every source *ex ante*. By the end of the compliance period, these sources have to surrender allowances corresponding to the total amount of emission units they have emitted. By contrast, in baseline-and-credit schemes, emissions are counted against a baseline scenario and entities receive credits *ex post* if their emissions have stayed below the baseline.[6] Under both systems, companies that have over-achieved their targets can sell units to those that have emitted more than allowed.

In a cap-and-trade system, a highly controversial question is the choice of method according to which the allowances are allocated to the participants. There are two basic options, auctioning or free distribution, the latter of which is normally based on historic activity ("grandfathering") or benchmarks.

The way in which the allowances are allocated in a scheme affects the distribution of costs of a trading programme. However, they do not differ in their impact on the environment since this is determined by the amount that is allocated but not by the methodology for distributing this amount (Convery 2001: 8). After the initial allocation, the carbon price will be independent from the method of allocation but be determined by the supply and demand of allowances. Beyond an initial transfer of wealth in the case of free allocation, the method of initial transfer of allowances should therefore not affect the competetiveness of the companies. Thus, linking schemes with different ***initial*** allocation methodologies should not introduce any additional economic distortion in the combined scheme. However, the subsequent allocation rules, which concern potential updating of the allocation in future trading periods, treatment of plant closure and treatment of new entrants, can lead to different distributional effects between the companies in the two schemes (Blyth/Bosi 2004: 25).

In the case of grandfathering, governments may in subsequent trading periods decide to allocate allowances based on the emissions from a new, up-dated base year in the first period. In this

[5] This is essentially the same situation as with the "hot air" problem under the Kyoto Protocol. If countries use the Eastern European countries' surplus AAUs to cover their excess emissions, emissions will be higher than if there was no emissions trading and countries would have to bring their own emissions in line with their Kyoto targets. Anger et al. (2006) explores the situation of Russia allocating its surplus AAUs to actors covered by a domestic ETS.

[6] The baseline does not necessarily have to be but usually is calculated as the estimated amount of emissions which would have occurred in a business-as-usual scenario in the absence of reduction efforts.

scenario, if allowance prices are likely to rise in later periods, companies may choose to avoid emission reductions in the initial phase and instead comply with their targets by purchasing allowances from the market since they can expect that high emissions in the first period will result in a more generous allocation of allowances in the second phase. Linking two schemes where one uses updating and the other does not could result in emissions (and the attendant production) being shifted to the system with updating for the purpose of receiving a more generous allocation. Updating provisions should therefore be harmonised before the systems are linked (Choquette 2005: 9f).

Several approaches are conceivable regarding the issue of plant closure. If a plant shuts down during the first trading period and the base year for allocation is set prior to the beginning of the first period, the closed plant may still receive allowances in subsequent trading periods. If, however, the base year is shifted forward through updating, the closed plants will not be allocated any allowances for the second phase. Differences in the treatment of plant closure and the allocation methodology for new entrants can lead to a distortion of incentives. A company may be tempted to cease production in a country that continues to allocate to closed plants and start up or expand production capacity in countries that will allocate allowances free of charge to new entrants. These incentives would arise irrespective of linking the two schemes and might be only short-term if updating is used. However, linking such schemes should be preceded by careful consideration of the potential impacts (Blyth/Bosi 2004: 26).

1.6 Temporal flexibility: Compliance Period, Allowance Validity and Banking

The temporal flexibility built into an emissions trading regime relates to its compliance period, the validity of allowances, and banking and borrowing provisions.

The compliance period is the period for which entities are held accountable for their emissions. The compliance period can differ from the trading period. During trading periods, installations can trade allowances within one domestic emissions trading scheme or between different trading regimes. Some allowances may be valid for part of or the whole trading period, whereas others may be valid for several trading periods.

Differences in the starting dates of trading schemes are neither a matter of institutional compatibility nor do they risk compromising the environmental performance in a combined scheme since the impacts of GHG emissions are felt over the long term. Nor do diverging compliance periods pose a problem since financial markets will make it possible to purchase diverse vintages from various programmes years in advance (Haites/Mullins 2001: 52f). On the contrary, variations in this regard would probably prove beneficial to the liquidity of the combined emissions market. A temporary shortage of allowances in one country before the annual time of compliance determination could thus be satisfied by the purchase of foreign allowances from another part of the linked regime (Blyth/Bosi 2004: 27).

Linking two schemes with different allowance validity can lead to (price) distortions similar to those resulting from linking a scheme with to a scheme without updating, such as speculative transfers of allowances from one scheme to another. An installation might reduce production

activities in a country where allowances have a longer validity and move to a scheme that allocates allowances to new entrants for free in the new trading period. However, as discussed above, such incentives would probably only have a temporary effect. Furthermore, the resulting risk for the scheme with longer allowance validity would be balanced by the enhanced certainty and lower risk and resulting chances to optimise compliance strategies (Blyth/Bosi 2004: 26).

The option to bank allowances from one trading period to the next has generally proved conducive to the successful functioning of an emissions trading scheme. It provides emitters with an incentive to overachieve their targets since they can forward the resulting allowances to a later date and gives them additional flexibility to deal with uncertainties (Ellerman et al. 2003: 37). Potential problems arise from linkages between schemes whose banking provisions are not harmonised. If a scheme which prohibits banking is linked to a scheme which allows banking, the latter would effectively provide a banking option for all the companies on the combined market. This country would then have the responsibility to cover not only the expected emissions from its own installations in the second period with new allowances but also the banked allowances from the previous period. This would be a problem in the case of banking from the pre- into the Kyoto period, since the additional allowances would need to be backed up by AAUs which the country would then be missing for its Kyoto compliance. Conversely, banking within or between Kyoto periods should not be a problem since the banked allowances would be backed up by AAUs so that the government would only reissue the AAUs which it had previously received.

Borrowing, i.e. delaying reduction measures into future trading periods where they might be achieved more cost-effectively, is generally seen critically from an environmental perspective. First, borrowing bears the risk that mitigation measures may not be taken in future periods either, especially in the case of a "toothless" compliance regime or if a participating company ceases to exist before repayment of the borrowed allowances. Second, companies may have an incentive to rely heavily on borrowing to artificially raise their future compliance cost curve and thus obtain softer future targets (Boemare/Quirion 2002: 223). Thus, linking a system without borrowing to a regime that allows borrowing may require restrictive provisions to be taken so as to maintain the environmental effectiveness of the combined trading scheme. Haites and Mullins (2001: 62) propose to protect the environmental effectiveness of a linked scheme by only allowing ex post purchases from companies in the scheme with borrowing that did not make use of this option.

1.7 Monitoring, Reporting, Verification and Accounting

Monitoring, reporting and verification (MRV) provisions are crucial for achieving a credible emission trading system since they are key to determining whether each certificate does in fact correspond to one tonne of emissions. If the system is not sufficiently robust, this may create incentives to underreport annual emissions so as to free up allowances for sale. In consequence, there would be more emissions than determined by the regulator, that is, the environmental target would be missed (U.S. EPA 2003: 2-4, 4-1).

Linking two schemes with differences in the MRV system should not pose any difficulties as long as the system is transparent and robust enough to maintain confidence in the value of the units. Otherwise the mutual confidence in the combined trading system would suffer, with negative

consequences for both its efficiency and environmental performance (Blyth/Bosi 2004: 28). Therefore, efforts to develop credible international standards in this field, as for example the Greenhouse Gas Initiative or by the International Standardisation Organisation (ISO), are of vital importance for the establishment of an international emissions trading system, given the absence of a single authority with the power to enforce compliance (Peterson 2003: 13).

Linking two different schemes also necessitates that their registries are sufficiently harmonised in order to allow for a smooth transfer of allowances between the schemes. This requires common data exchange standards, such as the data exchange standards of the UNFCCC secretariat (Blyth/Bosi 2004: 28).

1.8 Compliance Framework and Penalties

Sanctions that are sufficiently severe to deter non-compliance are a crucial piece in the enforcement chain of environmental regimes. Penalties in ETSs can either be defined in purely financial terms, i.e. as a fixed sum per tonne of excess emissions – or the excess emissions can be deducted from the allowance holdings of the subsequent compliance period, possibly multiplied by a certain factor. Between these two basic choices, a range of hybrid designs are conceivable, with the exclusion of recidivists from the scheme being an option of last resort (Kerr 2001: 88). Generally, the financial penalties for non-compliance should be significantly higher than the cost of allowances (Convery 2001: 7).

The U.S. EPA (2003: 3-24 – 3-25) recommends that, in order to maintain the environmental effectiveness of the scheme, paying a financial penalty should not release companies from the obligation to make up for a shortfall of allowances in the subsequent compliance period. In this case, the financial penalty has no effect on the allowance price but rather acts as a tax on borrowing allowances from future compliance periods. By contrast, in systems where the operator who has to pay a penalty is exempted from the obligation to cover their excess emissions with allowances or other eligible units, the penalty acts as a price cap: operators have no incentive to purchase allowances at prices above the penalty (Blyth/Bosi 2004: 29).

Governments may also introduce a so-called “safety valve”. With this mechanism, the regulator commits to selling allowances at a pre-determined price in whatever quantity is demanded once the market price for allowances rises above a certain level. Environmental groups oppose the safety valve concept as an “easy way out” for industry (Ellerman/Jacoby 2004: 485). Another option would be to give direct financial reimbursements rather than allowances to companies. This would limit access to the benefit to domestic companies but could lead to gaming on the emission trading market since different entities would have different price signals depending on their location (Blyth/Bosi 2004: 30).

Linking two schemes where the penalty does not exempt entities from covering all their emissions with allowances should not cause difficulties even with different levels of penalties as long as the penalties are sufficiently high to ensure overall compliance. By contrast, if such a system was linked to a scheme with a safety valve or where the penalty exempts companies from submitting allowances, the safety valve or penalty rate in this system would effectively act as a price cap for the combined system. As long as the market price was higher than the price cap,

companies in the price cap system would have an incentive to pay the penalty and sell their allowances to companies in the other system until prices were equalised at the price-cap level. The environmental effectiveness of the combined scheme would also suffer since in this case total emissions would be higher than if the two schemes were kept separate (Blyth/Bosi 2002: 29f).

One should also note that the philosophy underlying these two basic designs is rather different. Whereas a price cap system has the objective to limit the costs of the participants and relegates the environmental objective to the back seat, a system without this feature and heavy penalties puts the environmental objective centre stage. From the environmental point of view it seems advisable not to compromise the effectiveness of the latter by linking it to the former.

If a link is to be established, in order to maintain environmental effectiveness there would be a need to limit the exchange of trading units, which could be done in three ways (Blyth/Bosi 2004: 30f):

a) introducing an "exchange rate". However, this option would contravene the principle of fungibility of units across the system and entail complex negotiations for setting the exchange rate;

b) establishing a "gateway" with limited possibility of installations from the scheme without price caps to buy allowances from the price cap scheme once the market price rises above the level of the price cap;

c) issuing additional allowances at the price cap level only to domestic companies and only up to the difference between the initial allocation and the actual emissions. This would not hinder the access to lower market rate allowances totally, but it would limit the amount of the additional allowances being traded.

The third option seems to be the most practicable. It would not apply to a system with a simple price cap, though. In this case, option b) would probably be most feasible. However, there would still be some inflationary effect on emissions. Moreover, all of these three options would split the market once the market price reached the price cap level, with prices in the price cap scheme staying at the price cap level and prices in the other scheme rising further. Taking these adjustment measures would thus reduce the economic benefits of linking.

The prospect of a scenario where a non-price cap scheme has been compromised by linking it to a price cap scheme but without resulting economic benefits reemphasises that it would be advisable to keep the two systems separate.

Finally, diverging compliance regimes in a combined trading scheme may entail the risk of a 'race to the bottom'. Also for this reason harmonisation of the respective features of two regimes should be sought before linking is considered (Peterson 2003: 10).

2 Emissions Trading in Kyoto Ratifier Countries

2.1 The EU Emissions Trading Scheme

The EU ETS is a downstream cap-and-trade system. It started its operation in the beginning of 2005, with a first three-year trial period until 2007. From 2008 onwards, five-year trading periods will coincide with the Kyoto Protocol's commitment periods. According to Article 11 of the EU emissions trading directive ("ET Directive"), EU Allowances (EUAs) are valid for one trading period. One EUA covers the emission of one metric tonne of carbon dioxide equivalent. Compliance in the EU ETS is determined annually. The competent authorities are to hand out EUAs on 28 February of each year. Until 30 April each operator of a covered installation has to deliver an amount of EUAs or other recognised units that covers the amount of CO_2 emission of the installation during the preceding year (Article 12).

Non-compliant installation operators need to pay fines of EUR 40 per excess tonne of CO_2 emissions in the first trading period and EUR 100 in the second. In addition, they are required to surrender a compensating amount of compliance units in the subsequent year. Additional civil and criminal penalties, for example for fraudulent reporting, are left to Member States, under the condition that the relevant legal provisions are notified to the European Commission and that they are effective, proportionate, and dissuasive. Finally, the obligation to publish the names of the offending entities adds a "name and shame" element to the compliance regime (Article 16).

In its sector coverage, the EU ETS is built on the Integrated Pollution Prevention and Control (IPPC) Directive. According to Annex I of the ET Directive, four main categories of activities – energy activities, production and processing of ferrous metals, mineral industry and the production of pulp, paper, and board with a specific production capacity – are regulated, mostly subject to a minimum threshold for output. Installations or parts of installations used for research, development and testing of new products and processes are excluded from the directive.

Although only large installations are included in the scheme, most of the emissions from energy activities and industry are covered. 99 percent of the emissions from power plants for public energy are covered, as well as 95 percent of the emissions from industrial power plants, 90 percent of the emissions from other industrial combustors, 88 percent of the emissions which are not energy-induced and 80 percent of the emissions from district heating (WWF 2003: 145). Typically, the installations included account for about 30 – 50 percent of the national greenhouse gas emissions in Member States, depending on their respective economic structure (Betz et al. 2004: 3). In total, the nearly 12,000 installations covered across the 25 Member States account for about 45 percent of Community-wide CO_2 emissions (European Commission 2005a: 7).

While the ET Directive lists all the six gases included in the Kyoto Protocol in its Annex, it will in its first phase until 2008 address only CO_2 emissions, due to concerns about the accuracy of measurement of other greenhouse gases. The Commission justified this decision, as well as the limited sector coverage, by the need to strike a "balance between simplicity, effectiveness, subsidiarity and transparency" (European Commission 2001: 5). Article 30 of the ET Directive

provides that the Commission is to submit a report to the European Parliament and the Council by 30 June 2006 reviewing the application of the Directive and to recommend whether the EU ETS generally should cover other gases or installations in the future on the basis of experience and in the light of developments in the international context.

The EU ETS provides for both limited opt-in and opt-out of the system. From 2005 onwards Member States can include installations into the scheme that are listed in Annex I but fall below the capacity limits if their decision is approved by the European Commission. Furthermore, from 2008, national governments are allowed to extend the scheme to activities, installations and greenhouse gases not listed in Annex I, again depending on Commission approval (Article 24). Opt-in is frequently used in Scandinavia for combined heat and power installations and sintering installations. Latvia used opt-in for 18 plants with a capacity below the directive's minimal threshold (Betz 2004).

Article 27 of the Directive also allows for the temporary exclusion of certain installations by Member States if the Commission is convinced that these will be subject to equivalent emissions caps, MRV rules and penalties. Several Member States have made use of the opting out option, for example the Netherlands (for installations with emissions below 25 kt CO_2 per year), Belgium (for natural gas compression plants, natural gas transportation, military installations, combustion installation for heating purposes, emergency standby and safety installations for nuclear power) and Great Britain (for installations which are covered by the UK ETS until 2006) (Betz 2004).

The ET Directive does not establish an overall cap on emissions for the covered installations. Instead, Member States are responsible for elaborating National Allocation Plans (NAPs) determining the amount of EUAs to be allocated. According to Articles 9 and 11 of the ET Directive, the Member States are committed to submit a NAP to the Commission and to the other Member states eighteen months before the beginning of each trading period. The NAPs have to be based on objective and transparent criteria, including a set of common rules laid down in Annex III of the Directive. *Inter alia*, they require that the emissions limits imposed on entities must be consistent with the obligations of Member States under the Kyoto Protocol and the EU Burden-sharing Agreement, which redistributes the EU-15's Kyoto target of -8 percent among its Member States, and that installations do not receive more EUAs than they are likely to need. The Commission may return a NAP to the Member State concerned within three months after submission if it concludes that it has violated any of these criteria.

The elaboration of NAPs has been a cumbersome, highly contentious procedure in many Member States. The last of the 25 plans was accepted by the Commission more than one year after the official deadline.[7] The NAPs that were finally approved – major amendments had been demanded by the European Commission in many cases – were immediately subject to widespread criticism among NGOs and academia due to their overly generous allocation of allowances (Ehrhart et al. 2004: 17). These concerns were confirmed when in May 2006 it was revealed that during the

[7] European Commission, *Emissions trading: Commission approves last allocation plan ending NAP marathon*, press release 20.06.2005, IP/05/762, available from http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/762&format=HTML&aged=0&language=EN&guiLanguage=en [accessed 13.07.2005].

ETS's first year many installations had come in under their targets, adding up to a total surplus of more than 40 Mt CO_2.[8] The result was a significant drop of carbon prices.

In conclusion, unless the Member States decide to leave their path towards achieving or over-achieving their Burden Sharing targets, non-trading sectors with higher abatement costs will have to reduce more emissions than suggested by economic efficiency. Alternatively, or in addition to other domestic measures, the Member States will have to spend taxpayers' money and make use of the Kyoto flexible mechanisms (Ehrhart et al. 2004: 17).

The ET Directive sets a general framework how Member States should allocate allowances among the participating installations on their territories, while leaving the details to the national regulators. Article 10 requires them to distribute at least 95 percent of EUAs for free for the phase 2005-2007, a share which decreases to 90 percent for the period 2008-2012. Only very few Member States, among them Denmark (5 percent), Lithuania (1.5 percent) and Ireland (0.75 percent) have actually taken advantage of the possibility of auctioning off up to five percent of their EUAs. Some Member States (e.g. Germany) have already committed themselves to allocating 100 percent of EUAs for free in the second period as well (Ehrhart et al. 2004: 18).

The allocation methodology used in most of the Member States is grandfathering, but some also employ benchmarking. Denmark, for example, has adopted a benchmarking approach taking average specific emissions in a subsector as the basis for allocation. Lithuania uses benchmarking for the allocation to the power and heat sector, while Slovenia has opted for a benchmark correction for industry (Betz et al. 2004: 9).

The decision of how to deal with new entrants and plant closures is left to the Member States. Most of them reserve a specific amount of allowances for new entrants which are to be allocated for free on a "first come, first served" basis, using the "Best Available Technology" standard. Some countries, for example France, intend to use opt-out for new entrants once the reserve is empty (Betz et al. 2004: 29).

EU member states have devised three ways for addressing plant closures. Usually, the allocation is lost if an installation is closed, but a number of Member States, namely Austria, Germany, Italy, and Poland, allow the operator of a closed installation to transfer the allowances to a new installation instead of losing them altogether. Sweden and the Netherlands have decided to leave the allocation unaffected (Åhman et al. 2005: 11).

Member States are to ensure that EUAs can be transferred between persons in the Community and between persons from the Community and persons in third countries. Article 12.1 of the ET Directive obliges the competent authorities to accept the EUAs from other Member States. In Article 25, the Directive further provides that for the recognition of trading units from third countries, agreements with these countries have to be concluded. The Commission is to draw up the necessary guidelines in this regard.

[8] EUROPA – Environment – Climate Change, Community Independent Transaction Log: http://ec.europa.eu/comm/environment/climat/emission/citl_en.htm [accessed 16.05.2006]

Furthermore, the "Linking Directive" allows operators to purchase and use CERs and ERUs subject to certain conditions. The Directive establishes a two-tier approach which is supposed to ensure that the use of project-based credits remains "supplemental" to domestic action in accordance with the Kyoto Protocol. Starting from the trading period 2008-2012, Member States are to set limits in their NAPs up to which entities can use CERs/ERUs for compliance. In a second step, Member States are required to report back to the Commission on how these purchases affect their national commitments and to demonstrate their "supplementarity".

The Linking Directive contains a number of qualitative restrictions on the type of projects whose credits will be eligible in the EU ETS. Thus, in line with the Marrakesh Accords, credits from nuclear facilities are excluded. Moreover, credits from sink projects will not be eligible, at least for the first trading phase, due to concerns about the permanence of the achieved carbon sequestration. Finally, taking into account concerns about possible negative social and environmental consequences of large hydropower projects, credits from these are admitted only if they "respect" the criteria established by the World Commission on Dams (WCD).

Since EUAs are valid for one trading phase, banking within trading periods is possible. Furthermore, Member States had the choice whether or not to replace allowances from the first trading period in the second. Although reissuing certificates is not inter-period banking in the strict sense, its effect amounts to the same (Mortensen 2004: 282). Ultimately, no Member State has allowed banking into phase 2 of the EU ETS, except for France, which provides for a limited banking option based on the difference between allocated quantities and actual emissions (Betz et al. 2004: 13). However, Article 13 of the ET Directive obliges Member States to replace allowances between the subsequent trading phases.

Within trading periods, some sort of borrowing is effectively also possible: whereas operators are allocated the amount of EUAs assigned to them at the end of February of each calendar year, they have to surrender units to demonstrate compliance *ex post* only four months into the next year. Hence, at the time of determining compliance, they dispose of two annual sets of EUAs to cover their emissions – except for the final year of each commitment period where only one is available.

Ensuring consistent MRV procedures across the Community is a considerable challenge, given the complex interaction between supranational policy-making and national implementation in EU environmental policy. Annex IV and V of the ET Directive set out the main principles in this regard. Furthermore, in accordance with Article 14 of the ET Directive, the Commission has elaborated legally binding guidelines for the monitoring and reporting of GHG emissions under the EU ETS. These have been judged "considerably more detailed than comparable past guidance put forward for EU environmental directives" (Kruger/Pizer 2004: 17). The emission reports have to be verified by an independent body, either a state authority or a private certification company. Where the verifier detects discrepancies, Annex V of the ET Directive provides that the operator of the installation in question does not receive any new allowances until he delivers a new and correct report.

The ET Directive provides that each Member State, whether alone or in cooperation with other countries, is required to set up a registry which is to contain all information about the issuance, holding, transfer and cancellation of allowances (Article 19). This registry has to be open to the

public. A designated Central Administrator of the Commission must maintain an independent transaction log to control the registries. In case of irregularities the Administrator will contact the specific Member States (Article 20). An EU regulation concerning the standardisation of national emissions registries across the EU (Registries Regulation) was adopted in December 2004.

Despite these efforts to harmonise MRV across the EU, concerns persist that emissions monitoring as well as third party verification might not meet the same standards in all Member States (Boemare/Quirion 2002: 225; Kruger/Pizer 2004: 17). Only time will show in how far these fears are justified and whether they will actually have an impact on the effective functioning of the EU ETS.

2.2 Canada's Proposed Large Final Emitters System

The implementation of a regulatory emissions reduction regime for large industrial emitters, which account for almost half of Canada's GHG emission (Bramley 2003), has been on the political agenda in Canada for several years already. Two pilot programmes, the Ontario-Quebec Pilot Emissions Reduction Trading (PERT) programme, in operation from 1996-2000, and the Greenhouse Gas Emissions Reduction Trading (GERT) programme, running from 1998-2002, provided first practical experience with emissions trading (Burnett/Montgomery 2002: 2).

At the same time, work on a domestic emissions trading scheme design continued at a theoretical level. A first major study on options for emissions trading in Canada was commissioned by the National Round Table on the Environment and the Economy (NRTEE), an independent advisory body of the federal government, from 1998 onwards (NRTEE 1999). Working groups within the National Climate Change Process (NCCP) carried out further research on this topic.[9] Their results formed the basis for a regulated GHG emission targets-and-trading scheme outlined in the federal government's 2002 Climate Change Plan for Canada, according to which energy-intense sectors including the oil and gas, thermal electricity, mining, and GHG-intensive manufacturing sectors would be subject to "targets for emissions reductions established through covenants with a regulatory or financial backstop," combined with emissions trading (Government of Canada 2002: 29-32).

Throughout 2003 and 2004, Natural Resources Canada elaborated the details of what came to be referred to as the "Large Final Emitters" (LFE) System, including a proposal for a new legislation to authorize the setting of GHG targets in regulations. During that period, the federal government extensively consulted with industry sectors and provincial governments to define quantitative targets. The Government of Canada and the International Emissions Trading Association (IETA) had also agreed in 2003 on a set of principles for the design and functioning of a Canadian carbon market that have had a clear influence on the further debate on emissions trading in Canada (Government of Canada; IETA 2003).

In April 2005, the Climate Change Plan for Canada was replaced by a new plan, "Moving Forward on Climate Change — A Plan for Honouring Our Kyoto Commitment". The LFE system

[9] See *inter alia* Government of Canada, *Using Tradable Emissions Permits to Help Achieve Domestic Greenhouse Gas Objectives. Options Report by the Tradable Permits Working Group* (2000).

remained a key component of the 2005 plan, but the mandate to implement the system was transferred to Environment Canada. Contrary to Natural Resource Canada's approach which would have set a new legislation to authorize the setting of GHG targets through covenants, Environment Canada's opted to regulate LFEs through an existing legislation, the Canadian Environmental Protection Act (CEPA) of 1999. CEPA 1999 is the primary component of a group of inter-related laws, policies and institutions dealing with the prevention and management of risks posed by environmental contaminants. In July 2005, the federal government officially announced its proposal to regulate LFE under CEPA when it published in the *Canada Gazette Part I*, the official newspaper of the Canadian government, a "Notice of intent to regulate greenhouse gas emissions by Large Final Emitters".

However, the election of a new Conservative minority government lead by Prime Minister Stephen Harper in January 2006 has cast considerable doubt over the future direction of Canadian climate change policy. In their electoral platform document, the Conservatives condemned the previous Liberal government for having "sign[ed] ambitious international treaties and sen[t] money to foreign governments for hot air credits." (Conservative Party of Canada 2006: 37) At the time of writing this paper, it is not clear whether the new government will continue to implement the LFE system, with or without changes, thus the following is based on documents published by the previous Liberal government.

According to the Notice of Intent, the proposed LFE system would operate on a baseline-and-credit basis. Hence, emissions allowances would not be allocated *ex ante* by a regulatory authority in accordance with an overall cap. Instead, LFE participants would be able to earn emissions reduction credits *ex post*. The first compliance period would last from 2008 to 2012, in accordance with the Kyoto rules. Truing up would occur at the end of each year, with companies remaining below their target obtaining credits, whereas others would have to surrender additional compliance units to cover their surplus emissions (Government of Canada 2005b: 2491-2496).

Eager to demonstrate that the LFE system would not place an unbearable burden on participating companies, former Minister of Natural Resources Dhaliwal promised in an open letter to the Canadian Association of Petroleum Producers, dated December 18, 2002, "that, during the first commitment period [2008-2012], Canadian companies will be able to meet their emission reduction responsibilities at a price no greater than Can-$15 per tonne."[10] The Notice of Intent suggests that this price assurance mechanism could either be implemented through the creation of specific kind of credits, contributions to a fund at the price of Can-$ 15 (beyond the cap applicable to the Technology Investment Fund, see below) or refund of verified compliance costs exceeding the Can-$ 15 threshold. However, no decision on the concrete form of the mechanism has been taken yet. As for cases of non-compliance beyond the safety valve option, the federal government had proposed a penalty charge of up to Can-$ 200 per excess tonne of emissions (Government of Canada 2005b: 2498).

Upstream design was considered in early discussions on a Canadian permit trading system as an element of a "broad as practical" approach (Government of Canada 2000: 8). However, such a

[10] Letter from Environment Minister Dhaliwal to the Canadian Association of Petroleum Producers, December 2002, available from: www.capp.ca/raw.asp?x=1&dt=NTV&e=PDF&dn=62480 [accessed 09.08.2005].

regime was predicted to lead to inequitable treatment of different sectors and provinces and was criticized because of its heavy reliance on energy price increases to achieve emissions reductions. Thus, the idea was later abandoned in favour of a downstream regime covering direct emissions by the "large final emitters". Large final emitters are companies operating in primary energy production, electricity generation, and selected areas of mining and manufacturing (Government of Canada 2005a: 14). Accounting for about 50 percent of Canada's overall emissions in 2004, the LFE system would cover an almost identical share of total emissions of the country as the EU ETS. With about 700 companies participating in the LFE system, the system in Canada would, however, be much smaller than the EU scheme, even though details about the number of installations that are to be covered are not yet available. [11]

As for gases, the LFE System would cover all six GHGs specified in the Kyoto Protocol. The Notice of Intent announced that the LFE system would be established under Parts 5 and 11 of CEPA (Government of Canada 2005b: 2491). In order to be able to regulate GHGs under Part 5 of the Act, they needed to be added to the list of "toxic substances" in its Schedule 1, which the federal government did in November 2005. At the time of writing, no details were available regarding opt-in or opt-out provisions of the Canadian LFE system.

The scheme would be based on emission intensity targets, a decision the government first announced in its 2002 Climate Change Plan for Canada (Government of Canada 2002: 30). The targets for the LFEs were derived from the "Kyoto gap" that the government acknowledged in the 2002 plan, where the difference between Canada's projected BAU emissions and its Kyoto target was estimated at 240 million tonnes of CO_2e. The government announced that in order to meet this target, LFE companies would be required to reduce their emissions by 55 million tonnes below projected 2010 BAU baselines (Government of Canada 2002: 11). However, in the revised April 2005 plan, this target was subsequently reduced to 45 million tonnes based on an amended BAU scenario, equivalent to 39 million tonnes from the 2002 level (Government of Canada 2005a: 15). This reduction goal has been severely criticised by environmental groups as being "so limited that it places what is likely to be an impossibly large burden on the rest of the [Climate Change] plan" (Canadian Environmental Law Association et al. 2005). The setting of emissions reduction targets beyond 2012 would be undertaken in consultation with all stakeholders (Government of Canada 2005b: 2495).

Emission targets for existing facilities during 2008–12 would be set at 15% below 2010 BAU emissions intensity levels. Fixed process emissions (i.e., emissions caused by a fixed chemical reaction) would be set a BAU levels (i.e., zero percent target). Further adjustments would then be made to ensure that no sectoral target is set at more than 12% below BAU levels (Government of Canada 2005b: 2492f).

New facilities and those undergoing major transformations or expansions would be assigned GHG emission intensity targets "based on" (i.e., "set at the level of") best available technology economically achievable (BATEA) (Government of Canada 2005b: 2494f). Along with the definition of the term, the threshold year of first production after which a facility will be

[11] Natural Resources Canada, "Large final emitters. Background", available from: www2.nrcan.gc.ca/es/es/lfe_e.cfm [accessed 01.11.2005].

considered "new" has not yet been defined, although the notice of intent mentions as possible years 2000 and 2002. Furthermore, it is not clear for how long a facility will be considered "new," as the 2005 plan refers to a federal government commitment made by former Prime Minister Chrétien in his letter to the Canadian Association of Petroleum Producers, dated 25 July 2003, that targets for new facilities "will be locked in for up to ten years from first production,"[12] while according to the Notice of Intent "it is proposed that BATEA-based targets be made applicable for at least 10 years."

Many environmental groups have raised concerns over BATEA targets, as these would allow LFE facilities approved post-2000 or 2002 to be deemed to be operating at BATEA levels, thereby allowing new LFEs to face no form of GHG constraint for "at least 10 years" of operation. Setting BATEA targets at BAU levels therefore shifts all of the responsibility and financial liability for GHG emissions from industry to the government or other parts of society. This is particularly worrisome in the case of new Canadian oil sands projects which are expected to become the single biggest contributor to increasing GHG emissions in Canada (Whitmore; Shariff 2005).

The Canadian government had long indicated that it intended to give LFEs broad flexibility on how to comply with their emissions targets. Thus, according to the Notice of Intent, apart from in-house reductions and credit purchases from other companies whose facilities have surpassed their targets, three other means of compliance would be available to participants in the LFE scheme:

(i) purchase of international units recognized under the Kyoto Protocol, including "greened AAUs" that have yet to be defined. (The government also hinted that the purchase of international credits may be tied to sales of Canadian technology [Government of Canada 2005a: 16, 40]);

(ii) purchase of "domestic offset credits" earned by emission reduction projects in Canada, including carbon sequestration, that fall outside the LFE system (Government of Canada 2005a: 16). The 2002 Climate Change Plan for Canada had planned to limit offsets projects to forestry, agriculture and possibly landfills (Government of Canada 2002: 30). However, the approach endorsed in a technical paper on the design of Canada's domestic Offset System, published in 2005, was much broader, and would allow that offset credits be granted for reductions that Canada cannot count towards its Kyoto target or that may be non-additional. This is the case for reductions occurring from the sequestration of CO_2 in Canada from the United States, from GHG reduction projects implemented during 2006 and 2007, and from forest management sinks (if Canada does not to count these towards its Kyoto target) (Whitmore et al. 2005). Canada's proposed domestic Offset System would also included incentives for nuclear energy projects, demand side management and even reductions of non-covered emissions within the LFE sector itself. Domestic offsets would be rewarded

[12] Government of Canada Privy Council Office. 2003. Letter by the Prime Minister to the Canadian Association of Petroleum Producers. 25 July; www.pco-bcp.gc.ca/default.asp?Language=E&Page=pmarchive&Sub=NewsReleases&Doc=dielwart.20030725_e.htm [accessed 03.07.2005].

with a new kind of credits which would be tradable in the domestic market and which could also be banked (Government of Canada 2005c: 2-8).

(iii) payments into a Technology Investment Fund (TIF) or other "qualifying technology investment vehicle", up to a maximum of 9 MtCO2e/year for all LFEs combined. [13] These funds would then be use to support "development and deployment of innovative domestic technologies to reduce GHG emissions". However, as is noted in the 2005 plan, "investments in the Fund are not expected to generate emission reductions within the Kyoto 2008–2012 timeframe." Thus, investments in the TIF as a compliance option would allow LFEs to borrow emission reductions from the future, financed by the federal government, which would be obliged to secure compensating 2008–12 vintage reductions. Payments to these funds could therefore further weaken the proposed annual emission reduction target for the LFE system from 45 Mt to 36 Mt.[14]

The banking of emissions reduction credits would be possible; this is a promise former Prime Minister Chrétien made in a letter to the Canadian Association of Petroleum Producers in 2003 and that was confirmed in the 2005 plan (41) and the Notice of Intent (Government of Canada 2005b: 2497). However, no further details have been made available. The issue of plant closure has so far not been addressed.

Neither the 2005 plan nor the Notice of Intent refer to the possibility of borrowing in the LFE scheme. Yet, in the 2002 Climate Change Plan for Canada, the government had shown willingness "to discuss an approach whereby a pre-approved commitment over the somewhat longer term could be accepted in lieu of reductions in the nearer term" (Government of Canada 2002: 32). This suggest the possibility of borrowing in the scheme.

In the 2005 Notice of Intent, the Canadian government confirmed its intention to set up a "single, harmonized system for mandatory reporting, including quantification protocols, using internationally accepted protocols where possible" (Government of Canada 2005b: 2499). The establishment of a mandatory greenhouse gas emissions reporting system is currently under way, with reports of the 2004 emissions data that were released in June 2005.[15] It is certainly too early at this stage to assess the quality of the MRV requirements of the LFE system.

No official direction on the LFE system has yet been provided by the new government. However, many public comments made by government officials suggest that a LFE regulation is likely to be implemented. The new Conservative government is expected to release its "made-in-Canada" climate change plan in autumn 2006.

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[13] The Notice of Intent speaks of a cap of "9 MT of compliance in any given year". Yet it is unclear how this might be calculated (Government of Canada 2005b: 2498).

[14] If all of the 9 Mt TIF capacity is used for compliance, LFE, which are responsible for nearly half of Canada's emissions, would only be responsible for achieving about 13 percent of the estimated 270 Mt of reductions needed for Canada to meet its Kyoto commitment.

[15] Government of Canada, Greenhouse Gas Source and Sinks – Data and Reports: www.ec.gc.ca/pdb/ghg/onlineData/dataAndReports_e.cfm [accessed 03.07.2006].

2.3 The Japanese Voluntary Emissions Trading Scheme

When it became apparent in 2000 that the UK and the EU were going to establish greenhouse gas emissions trading schemes in the near future, the Japanese Ministry of the Environment (MoE) decided to conduct an examination on the possible design of a Japanese emissions trading scheme. To this end, it supported a simulation programme with 31 private companies from the Mie prefecture in 2002 (see MoE 2003).

Independently from this so-called Prototype Project, the Ministry of Economy, Trade and Industry (METI) also implemented a pilot project on trading and transacting credits which included 29 projects. However, most companies still opposed the introduction of an emissions trading scheme with absolute caps (Watanabe 2005a: 54f).

Aware of strong opposition from industry and the METI to a compulsory scheme, but also of the imminent start of EU emissions trading, the MoE eventually decided to launch a voluntary emissions trading scheme from 2006. Commonly referred to as the "Japanese Voluntary Emissions Trading Scheme (JVETS)", it is a small-scale experimental project that has the objective to provide private companies with the chance to build experience and to develop technical skills regarding emissions trading procedures. However, also for the MoE a mandatory emissions trading scheme is not an option for the near future, but might be discussed again when the results of the voluntary scheme are available (Shimada 2005: 27). The MoE has in the meantime announced that there will be a second round of the scheme with new participants.[16]

The scheme is designed as a combination of cap-and-trade emissions trading coupled with subsidies. Companies that carry out emissions reduction projects were able to recover one third of the costs, up to a maximum of 200 million yen (ca. EUR 1.4 million), from the government. Companies participating in the voluntary scheme were required to report their emissions from 2002 to 2004, which had to be verified by organisations appointed by the MoE. Subsequently, they were to register the amount which is likely to be achieved by the emission reduction projects. These targets relate to both direct emissions from fossil fuel combustion on the site as well as the indirect emissions of the facilities' electricity consumption (Shimada 2005: 10-15; Watanabe 2005b: 18).

The system's compliance period runs from April 2006 to March 2007. An additional trading period will be given to accommodate participants who did not reach their targets. The companies will be obliged to surrender certificates corresponding to the verified 2006 emissions in June/July 2007.[17]

Participation is facility-based, not company-based. Of the 38 companies and corporate groups that applied for participation in the project, 34 were selected by the MoE – among them for example INAX Corp., Nippon Electric Glass Co., Mitsubishi Gas Chemical Co. and Yamazaki Baking Co.

[16] Japan's Voluntary Emissions Trading Scheme (J-VETS) in 2006: www.et.chikyukankyo.com/english/index2006.html [accessed 17.04.2006].

[17] Japan's Voluntary Emissions Trading Scheme (J-VETS) in 2005: www.et.chikyukankyo.com/english/index2005.html [accessed 17.04.2006].

In the end, the scheme started with 32 companies as two companies withdrew their participation after they had been chosen. Additionally, eight participants are admitted to trade allowances without receiving any subsidies or initial allocation of allowances.[18] Further opt-in or opt-out is not possible.

The basis for selection was the cost-effectiveness of the applicants' emissions reduction plans. In the base years these companies accounted for an average of 1,311,241 tonnes of CO_2 emissions, which is equal to 3 percent of the whole industry sector (Watanabe 2005b: 17). On the other hand, the 34 initial participants accounted only for 0.021 percent of the total Japanese greenhouse gas emissions in 2004 because participation from the major emitting industry sectors (e.g. electricity, steel, petro-chemicals) is very low (Kim/Haites 2005: 39). Altogether, participating companies and corporate groups receive subsidies of 2,596,340,000 yen (ca. EUR 18,600,000) from the Japanese government.[19]

For compliance, participating companies may also use CERs. CERs as well as traded allowances may also be retired instead of being used for compliance.[20] If a company is not able to surrender a sufficient amount of units at the end of the project, the company has to return a percentage of the subsidies received corresponding to the proportion of the shortage. Additionally, the names of those companies will be published (Watanabe 2005c: 3). However, since participation in the JVETS is facility- rather than company-based, the system is prone to leakage through shifting of production and emissions from covered to non-covered facilities. Therefore, faith and social pressure will probably be the main forces driving compliance (Kim/Haites 2005: 40).

The estimated total amount of CO_2 emissions reductions pledged for the year 2006 is 276,380 tonnes of CO_2 which equals about 21 percent of the total emissions from the 34 facilities that the scheme covers. With regard to the officially-recognised total service life of these facilities, the pledges amount to a reduction of 3,750,311 tonnes of CO_2 (Shimada 2005: 9).

The anticipated emissions reduction through the voluntary scheme amounts to about 1.8 percent of the 15 million tonnes of CO_2 the Japanese industry sector has to reduce in order to reach the country's Kyoto Protocol target of -6 percent (Watanabe 2005b: 17). Given the participants' share of 3 percent of the emissions of Japan's industry, aiming for 1.8 percent of its reduction target does not seem to be overly ambitious.

For each participating entity there has to be a person-in-charge for monitoring who is responsible for calculation, submission and storage of emission data, quality control of the data and who will closely cooperate with the verification entities. Monitoring will be based on the record and on on-site measurement (Shimada 2005: 15f).

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[18] Personal communication from Masazumi Hirono, Climate Change Policy Research Group, Global Environment & Sustainable Development Unit, The Institute of Energy Economics, Japan, 15.02.2006.

[19] ClimateBiz – Article – Japan Launches Voluntary Emissions Trading Scheme: www.climatebiz.com/sections/news_detail.cfm?NewsID=28866&Section=Emissions%20Trading&ImageName=hdr_sect_emiss_trade.gif&Section=Emissions%20Trading [accessed 14.02.2006].

[20] Japan's Voluntary Emissions Trading Scheme (J-VETS) in 2005: www.et.chikyukankyo.com/english/index2005.html [accessed 17.04.2006].

The participants' 2006 emissions will be verified by MoE-accredited third party verification entities. Verification will be based on the information from the participating company (company's environment white paper, company charts that show the flow of monitoring and evaluation within the company, maintenance records, calculation formula, receipts and any other kind of documents) and will be ensured by on-site visits. The cost for verification of both base-year and 2006 emissions are covered by the MoE (Shimada 2005: 17).

2.4 The Norwegian Emissions Trading Scheme

The Norwegian emissions trading scheme was established by the Norwegian Greenhouse Gas Emission Trading Act of 17 December 2004. Generally, it is very similar to the EU ETS. It is a cap-and-trade system and will initially run from January 2005 until December 2007. Each installation covered is given an initial quota of allowances. The compliance period is one year. According to Section 13 of the Act, by 1 May of each year installation operators need to transfer allowances corresponding to the volume of CO_2 emissions generated in the previous calendar year to a specified retirement account in the registry. The Act gives no indication as to the future of the scheme beyond 2007.

If by 1 April of any year an operator has not reported their emissions, the pollution control authorities shall suspend the operator's right to transfer allowances until a satisfactory report on emissions has been submitted. Furthermore, the pollution control authorities can exact coercive fines to provide an incentive for the operators to meet their reporting obligations. The fine for excess emissions is to correspond to the equivalent of EUR 40, i.e. the level applicable under the EU ETS, for each tonne of emitted CO_2 for which reporting is mandatory and for which no allowances have been surrendered. In addition, operators are required to surrender a compensating amount of compliance units in the subsequent year. The Act also mandates publication of the names of operators on whom excess emissions fines have been imposed and the volumes of emissions for which no allowances have been surrendered (Sections 19-21).

The Norwegian scheme covers almost the same sectors as the EU ETS: emissions from energy production installations with an installed capacity greater than 20 MW, refining of mineral oil, coke production, production and processing of iron and steel, including roasting and sintering of iron ore, and production of cement, lime, glass, glass fibre and ceramic products. As in the EU ETS, which exempts a large share of the process industry, the Norwegian ETS also covers only a small fraction of the country's process industry. Instead, the Federation of Norwegian Process Industries has entered into a non-binding arrangement with the Ministry of the Environment to reduce emissions voluntarily (Prestrud/Torvanger/Vevatne 2005: 10).

But it is not only the larger part of the Norwegian process industry which is not being covered by the Norwegian ETS. Installations covered by the CO_2 tax that was introduced in 1991 (at present covering about 64 percent of Norwegian CO_2 emissions), CO_2 emissions from the combustion of municipal waste (which is subject to a treatment fee) as well as from hazardous waste that is incinerated in an energy facility are also exempted. In the end, this leaves only 51 installations accounting for about 11 percent of the country's GHG emissions covered by the emissions trading scheme (Prestrud/Torvanger/Vevatne 2005: 10). The government's decision to exclude so many installations from the Norwegian ETS and to keep applying the CO_2 tax instead seems to be

largely based on the fact that the tax generates the equivalent of between 420 and 525 million € annually (Cappelen 2004: 3). There is no provision for opting into or out of the system.

Initially, ETS participants were to receive 95 percent of their demonstrated need in allowances, reflecting, inter alia, best available technology and respective technological possibilities. In March 2005, the 51 covered installations were allocated with in total 20.5 million allowances for the period 2005-2007, while companies had applied for a total of 22.6 million emissions allowances. Installations thus received only 91 percent of the allowances they had requested which was due to adjustments that were in some cases made in the installation calculations (IEA 2005a: 6). 2005 emissions from the covered installations were 6 Mt CO_2e and are expected to rise to just under 8 Mt CO_2e in 2007. This increase is largely due to the construction of the Naturkraft gas-fired power plant in 2007, the transition from oil to gas in district-heating and the pulp and paper industries, and production increases of lime and in the gas terminals (Rosland 2005: 8).

The covered installations are thus capped below the projected business-as-usual level but are still allowed some increase in their emissions. Prestrud, Torvanger and Vevatne (2005: 12) therefore doubt that the Norwegian cap-and-trade scheme as is will be sufficient to reach the Kyoto target by the end of 2012. They also criticise the low coverage of emissions and a lack of transparency. In their view, for the period after 2008 the design of the scheme will have to be altered significantly in order to fulfil the Kyoto commitments.

According to Section 8 of the Act, all allowances are grandfathered free of charge on the basis of each installation's average capped CO_2 emissions in the base years 1998 to 2001. If a certain year shows atypical emissions, the law allows omitting this particular year. Norwegian pollution control authorities annually issue operators with the number of allowances to which they are entitled by 15 March of each year. If at the time of issuance the conditions on which the original allocation decision was based have changed, the number of allowances to be issued may be revised.

Regarding new entrants, the Act states that for installations that started or will start operating between 1 January 2001 and 31 December 2007 allocation will be based on the potential, including the technological and economic potential, for reducing emissions of CO_2, particularly through the use of the best available technology. Potential plant closures are not reflected (IEA 2005a: 6).

Apart from allowances installations may also use CERs, except for CERs from nuclear and sink projects, while CERs from hydro power projects above 20 MW must follow a special procedure. As an interim arrangement, until a full link to the EU ETS has been established, Norway has implemented a unilateral link by which use of EU Allowances will be accepted against the proof of voluntary cancellation in an EU country registry. There is also an option in the Act to allow the use of allowances issued based on domestic projects outside the scope of the ETS. This option has so far not been implemented (IEA 2005a: 10). As in the EU, intra-period banking and borrowing of allowances is possible.

According to Section 16 of the Act, by 1 March of each year operators have to report to the Norwegian pollution control authorities on CO_2 emissions during the previous calendar year to

which the duty to surrender allowances applies. The pollution control authorities will then control and verify the reports on CO_2 emissions submitted by each operator. Similar to the EU Directive, the pollution control authorities need to check whether installations' emissions inventories meet the requirements stated in the regulations by 1 April of each year.

All information on the allocation, issue, holding, transfer, surrender, and cancellation of allowances will be contained in the Norwegian Emissions Trading Registry and be open to the public (Section 11). The registry is administered by the pollution control authorities. The Norwegian registry is based on the UK GRETA software and should therefore be fully compatible with the EU system (IEA 2005a: 10).

From the outset, Norwegian policy makers were interested in linking their domestic ETS to the EU ETS and negotiations have been going on for a long time.[21] However, Norway preferred to negotiate a link according the Art. 25 of the EU Directive while the European Commission was of the opinion that as a member of the European Economic Area (EEA), Norway must link by adopting the EU Directive (Kim/Haites 2005: 53). Adopting the EU Directive would mean including the Norwegian offshore installations, which are currently covered by a relatively high CO_2 tax of around EUR 37 per tonne. While the Norwegian Oil and Gas Industry Association therefore wanted to cancel the tax and include the offshore installations in the ETS, the Norwegian government feared that this would result in a lower cost of emissions for the offshore installations and thus higher emissions. Another factor was probably that the government did not want to forego the tax revenues (Cappelen 2004: 3). However, at the end of March 2006 the Norwegian government agreed to accept the EU Directive and incorporate it in the EEA agreement. The issue is pending approval by the other EEA members Iceland and Liechtenstein.[22]

2.5 The Swiss Emissions Trading Scheme

The core element of Swiss climate policy is the "CO_2 Act" that has been in force since May 2000. Article 2 sets goals for emission reductions until 2010: An overall target of -10 percent for fossil fuels, subdivided in two partial targets of -15 percent for combustible fuels and -8 percent for motor fuels. These goals were to be achieved in a two-stage process. The first stage was to be policies on energy, transport, the environment, and finance (which were not further specified in the Act) as well as voluntary measures by industry. Only if these turned out to be insufficient, a CO_2 tax was to be introduced.

In 2004, emission projections indicated that it was unlikely that Switzerland would achieve its Kyoto target (and the targets set out in the CO_2 Act) with the measures so far implemented and planned – according to the projections only a reduction of about 4 percent would have been achieved by 2010 (Prognos AG 2005). On 20 October 2004, the federal council of Switzerland therefore introduced four measures to reduce CO_2 emissions into the "*Vernehmlassung*", the first step of the legislative process which consists of a stakeholder consultation. Three of the measures

[21] Environmental Finance – EU ETS – June 2005, The measures of success: www.environmental-finance.com/2005/0505may/EUETS.htm [accessed 11.02.2006].

[22] MD – Norway accept EU Emissions Trading Directive: http://odin.dep.no/md/english/news/news/022001-070218/dok-bn.html [accessed 03.07.2006].

were based on a CO_2 tax while the fourth option called for a so-called „climate cent" („Klimarappen") for transport fuels (UVEK 2004).

Based on the outcomes of the *Vernehmlassung*, on 23 March 2005, the Federal Council of Switzerland proposed to introduce a CO_2 tax on combustibles. From 2006 on, 35 Swiss Francs (ca. EUR 23) were to be paid per tonne of CO_2 emitted by fossil fuels combusted for energy generation (combustible fuels) (BAFU 2005a: 1-2; IEA 2005b: 1). However, the National Council, one of the Swiss houses of parliament, decided on 21 June in favour of a phased approach. According to this decision, the tax would be introduced at the level of 12 Swiss Francs (ca. EUR 7.60) in 2008 and might be increased to 24 and finally 35 Francs if emissions do not decrease.[23] The decision is pending approval by the other house of parliament.

According to Article 9 of the CO_2 Act, large companies, groups of consumers of combustible fuels and motor fuels as well as energy-intensive companies can be exempt from the CO_2 tax if they assume a legally binding absolute target for their energy-related CO_2 emissions for 2008–2012. They may then meet these targets via emissions trading. The Federal Council has in the meantime also passed ordinances setting out further details of the ETS (CO_2 Ordinance) and regulating the crediting of certificates from abroad (CO_2 Crediting Ordinance).

According to Article 11 of the CO_2 Ordinance, emission allowances equalling the amount of CO_2 emitted in the preceding year are to be retired by 1 June of each year from 2009 to 2013. Article 9 of the CO_2 Act stipulates that in the event of non-compliance, companies have to pay the CO_2 tax retroactively for each tonne of CO_2 emitted since exemption from the tax was granted, plus interest. This penalty has to be paid if a company has not submitted its allowances by August 2013. Moreover, the tax authorities may at any time demand a security deposit.

The scheme will include only CO_2 emissions. So far, the Swiss authorities do not plan to introduce a cap for the other five Kyoto gases as trends in the most significant source sectors indicate compatibility with the Kyoto target.[24] The Swiss authorities expect their emissions trading scheme to cover almost 40 per cent of industry's total CO_2 emissions, equalling five million tonnes of CO_2 (IEA 2005b: 1).

Absolute emission targets will be set individually for each company (or a group of companies) for the year 2010. Allowances will be allocated free of charge in line with these targets. According to Article 9 of the CO_2 Law and Article 6 of the CO_2 Ordinance, emission targets will be calculated using a bottom-up approach: each company's potential to reduce emissions will be assessed from a technical and economic viewpoint on the basis of projected production and emissions, taking into account any CO_2 reduction measures already implemented. The emission target is set for 2010 but must be met at an average for each year between 2008 and 2012. According to Article 7 of the Ordinance, the emission target will each year be adjusted to the companies' production growth, with the final adjustment taking place in 2010.

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[23] news.ch - CO_2-Abgabe soll in Etappen eingeführt werden: http://www.news.ch/CO2+Abgabe+soll+in+Etappen+einfuehrt+werden/244896/detail.htm [accessed 28.06.2006]

[24] Federal Office for the Environment – Reduction of energy-related CO_2 emissions: www.umwelt-schweiz.ch/buwal/eng/fachgebiete/fg_klima/politik/CO2-Red/ [accessed 18.04.2006].

Large emitters (> 250.000 t CO_2 per annum) negotiate their targets directly with government officers. Others apply via the privately run Energy Agency for the Economy. Applications are subject to a formal audit procedure consisting of desk reviews and random visits. Targets have been agreed with about 300 entities operating among others in the cement, ceramics, glass, pulp & paper, limekilns, chemical industry, sugar mills, food & beverage, appliances producers, graphic arts industry, textile finishing, foundries, aluminium, steel, plastics, solvents and machine industry. Applications of some 200 entities more are in the pipeline (IEA 200b: 1).

The CO_2 Crediting Ordinance provides for the use of CERs, ERUs and allowances from other domestic emission trading schemes. Individual companies are allowed to cover up to 8 percent of their emission target with these external units. Companies for which it is technically not possibly or economically not feasible to reach their targets with internal measures, which may in particular be new plants with state of the art technology, may cover up to 30 percent of their target with certificates from abroad. Sink projects using genetically modified organisms or invasive alien species are excluded.

Banking is not foreseen as according to the Swiss authorities transferring certificates into future periods cannot be dealt with before the legal framework for future Kyoto compliance periods has been set (BAFU 2005a: 5). However, as certificates are allocated for a period of five years, banking and also borrowing will be possible within the trading period between 2008 and 2012.

Currently, Switzerland is establishing a national registry for emission allowances and transactions to enable Switzerland to participate in the flexible mechanisms. Switzerland uses the registry software developed by the French CDC and will put it online once the ITL is functioning. The registry will be administrated by the Swiss Federal Office for the Environment. Switzerland has developed an internet-based system which companies need to use for the reporting and monitoring of their emissions. For each compliance year the data need to be submitted by 1 June of the following year (BAFU 2005a: 5).

3 Emissions Trading in Non-Ratifier Countries

3.1 The Australian State-Level Scheme

Although Australia signed the Kyoto Protocol, according to which it would have to keep its emissions to 108 percent of 1990 levels by 2008-2012, it has not ratified the Protocol. Still, the Federal Government claims that Australia is on track to meeting this target based on the current national policies and measures to combat climate change described in the National Greenhouse Strategy 2002 (NGS) (AG 2004). It has to be noted, though, that it has been the decrease in land clearing since 1990 rather than effective emission reduction measures that helped Australia keep its emissions near to its Kyoto target trend (Hunt 2004).

While the federal government is reluctant to adopt legally binding targets at the national level, several individual states and territories are setting their own climate change agenda. New South Wales (NSW) started an emissions trading scheme in 2003, the NSW Greenhouse Gas Abatement Scheme (GGAS).[25] The system is mandatory for NSW electricity retailers and certain other entities (such as electricity generators and large customers). Each participant has to reduce their average emissions of GHGs from the electricity it supplies or consumes to a pre-set individual benchmark level. The scheme covers all six Kyoto gases and allows for the use of credits from carbon sequestration through forestry, use of renewable energy certificates created under the mandatory federal renewable energy scheme, and through demand side abatement credits created through activities that result in reduced consumption of electricity (IETWG 2004: 21; NSW 2002: 10-12). The Australian Capital Territory (ACT) adopted the GGAS scheme under its Electricity (Greenhouse Gas Emissions) Act in 2004, and GGAS commenced in the ACT in January 2005.

Based on the success of the NSW ETS, and in the absence of national leadership on greenhouse policy, state and territory governments have established a National Emissions Trading Taskforce[26] to investigate a national emissions trading scheme (IETWG 2004: 1). The Taskforce was established in March 2004 and comprises representatives from all Australian states and territories. Its main task is to develop an agreed model for an emissions trading scheme for consideration by Australian State and Territory Governments. The model is intended to provide a framework for Australian states and territories to reduce emissions, assist in meeting Australia's Kyoto Protocol target, and position Australia for a carbon-constrained future and emission reductions beyond 2012 (IETWG 2004: 1).

It has to be noted that even though all states and territories are represented, they do not share the same level of enthusiasm. Queensland, for example, is not fully convinced that such a national scheme would work without the support of the Commonwealth. Still, Queensland will participate

[25] See Greenhouse Gas Abatement Scheme: www.greenhousegas.nsw.gov.au [accessed 16.07.2005].

[26] Originally known as the Inter-jurisdictional Emissions Trading Working Group, it was renamed the National Emissions Trading Taskforce in November 2005.

on investigating the mechanism for the State-based ETS.[27] Similarly, Western Australia has not committed to the total implementation of the scheme.[28]

The Taskforce issued a report to the First Ministers[29] of the Australian States and Territories in December 2004 which identified ten design propositions for further investigation.[30] The Taskforce subsequently released a stakeholder consultation paper in September 2005, on which 65 submissions were received.[31] Further analytical work is currently ongoing as the Taskforce prepares a Green Paper for submission to the State and Territory Governments in mid-2006.

The scheme would place an absolute cap on total emissions. The trading unit, the permit, would be equivalent to one tonne of CO_2e (IETWG 2004: 9). The Taskforce has proposed that the penalty for non-submission of permits should be sufficient to provide an incentive for compliance but participants could choose to pay the penalty rather than buy permits, i.e. in the absence of a requirement to make good any shortfall of permits, the penalty would act as a price cap. The level of the penalty will be determined by taking into account the results of economic modelling on the expected marginal cost of abatement for the participants in the scheme and considering the penalty levels and costs of abatement in other schemes (IETWG 2004: 6, 19f).

The system would be designed to cover all six Kyoto gases, although initially it would address only the emissions from the stationary energy sector (the emissions from electricity generation, oil refining, gas processing and all combustion emissions associated with the use of coal and gas in non-transport uses), which produce mostly CO_2 and some methane and nitrous oxide.[32] The decision to cover all six Kyoto gases is based on the assumption that the additional administrative cost of covering all six gases compared to a limited coverage is relatively small, plus broader coverage allows the potential for low cost abatement through reductions in emissions of synthetic greenhouse gases. Thus, it is supposedly simpler to address all six gases in the legislative process from the start, thereby helping to avoid administrative complications (e.g. need to adopt additional regulations) when the scheme is enlarged to other sectors (and thus other gases than CO_2, CH_4 and N_2O) at a later stage. A threshold size for the installations covered by the scheme will be determined. Fugitive emissions would most likely also be covered. The liability for emissions from electricity production would be placed on electricity generators, whereas the liability points for gas and coal need to be further analysed (IETWG 2004: 14-16). The question of opt-in and opt-out has so far not been addressed.

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[27] States, territories set up carbon trading scheme, 31/03/2005, ABC News Online: www.abc.net.au/news/newsitems/200503/s1335179.htm [accessed 04.07.2005].

[28] PM - States forge carbon trading scheme, 31 March 2005: www.abc.net.au/pm/content/2005/s1335611.htm [accessed 04.07.05].

[29] The Premiers of the six States and the Chief Ministers of the two self-governing mainland Territories.

[30] Emissions Trading, National Emissions Trading Taskforce: www.cabinet.nsw.gov.au/greenhouse/emissionstrading [accessed 04.07.05].

[31] www.emissionstrading.nsw.gov.au/background.pdf [accessed 16.07.06] and www.emissionstrading.nsw.gov.au/submissions [accessed 16.07.06].

[32] www.emissionstrading.nsw.gov.au/presentation.pdf [accessed 16.07.06]

The cap that is to be imposed on the stationary energy sector has not yet been determined. The Taskforce states that it has to be developed in a manner that corresponds to the overall national target and should also take into account the responsibility for emissions abatement by sectors that are not covered by the scheme, such as transport or waste management (IETWG 2004: 12).

The Taskforce suggested that the allocation of the permits would be conducted as a combination of administrative allocation (free of charge or at a fixed price) and auctioning. Administrative allocation should be used as a transitional measure to assist industry in adjusting to the ETS, but auctioning is seen as a more efficient and equitable form of permit allocation since all entities would face the same price. In addition, auctioning is capable of creating revenue, which could be used to support affected assets (such as energy-intensive industries in trade-exposed sectors), employees and households. Further research will determine the optimal mix of allocation approaches in the ETS (IETWG 2004: 6, 18-23).

The report of the Taskforce considers the inclusion of mechanisms that recognise voluntary early action of entities before the commencement of trading as well as mechanisms to accommodate new entrants on the market without them being disadvantaged by the permit allocation system (IETWG 2004: 25). No mention is made of how to deal with plant closures.

The compliance period is still to be decided, but it is proposed that both short-term and long-term permits be used. While short-term permits would be issued only for one year, long-term permits would entitle the holders to emit one tonne of CO_2 in each year for a longer period of time. The purpose of the long-term permits is to provide certainty for long-term planning of corporate investments into reduction technologies, the payback period of which is relatively long. However, these permits would create a risk for governments because if the number of long-term permits were higher than compatible with future international obligations on GHG emissions, the governments would have to buy the permits back from the companies. Further research by the Taskforce will determine a suitable ratio between numbers of short- and long-term permits, with a view to finding a balance between economic certainty for industry and governmental liability. The possibility of banking and borrowing under the new Australian ETS will be also considered by the Taskforce (IETWG 2004: 18-20).

The future scheme would allow for the generation of offset credits from abatement activities in the non-covered sectors. The report of the Taskforce does not state whether the scheme would recognise CERs or ERUs, but it mentions that the offsets regime should be comparable and compatible with internationally accepted tradable carbon commodities. The report states that it has to be ensured that the offsets can be easily measured and that they are additional, i.e. that the offsets create emission reductions beyond the business-as-usual projections. The system for acknowledgement of offsets from forest carbon sequestration can draw from the experience of the NSW Greenhouse Benchmarks Scheme. It was also recommended that for the purpose of determining the additionality of a project, the CDM approach should be used (IETWG 2004: 21f).

Details on the MRV and accounting provisions of the envisaged system are not yet available.

3.2 Emissions Trading in the U.S.

3.2.1 The U.S. Emissions Trading Debate

With almost a quarter of the world's primary energy consumption and a similar share of CO_2 emissions from fossil fuels, the United States of America should be centre stage in the efforts to reduce GHG emissions in the global battle against climate change (Tjernshaugen 2005: 1). However, from the early 1990s, concerns about the potential cost of emissions mitigation were a dominant theme in the U.S. domestic debate. A signatory to the Kyoto Protocol in 1997, where its influence was felt for example in the inclusion of the flexible mechanisms and offsets from sinks, the U.S. attitude has since shifted from "benign neglect to opposition" (Ott 2002: 262). President Bush closed the door to U.S. ratification of the Kyoto Protocol, which the U.S. had signed in 1997.[33]

The Bush administration has since adopted a climate strategy largely based on voluntary business commitments and funding of energy technology research,[34] development and demonstration, declining to adopt any mandatory approach to emissions reductions. However, climate change is a subject of major public concern in the U.S. no less than in Europe (Brewer 2003), a fact which is reflected by the multitude of initiatives taken at state, regional and local level.[35] Apart from adopting renewable portfolio standards, a growing number of U.S. states, and most recently also more than 150 American cities including New York, have set targets for limiting GHG emissions and on 6 December 2005 194 mayors representing over 40 million American citizens signed the "US Mayors Climate Protection Agreement" to implement the commitments of the Kyoto Protocol within their cities on their own account.[36] Furthermore, several North-Eastern states have joined forces in the Regional Greenhouse Gas Initiative (RGGI), aiming to establish a regional cap-and-trade programme for power plants, which, as RGGI advocates argue, could subsequently "serve as a model for a future national GHG cap-and-trade program" (Kruger/Pizer 2005: 1) (see section 3.2.4).

But also at the national level climate protection activities are on the rise. For the last three years, one focus of the debate has been a bipartisan bill, the Climate Stewardship Act, which would establish a mandatory cap-and-trade system for greenhouse gas emissions at the federal level. Introduced by Senators McCain and Lieberman for the first time in 2003, the Bill was then rejected by a relatively narrow majority of 43-55 and was resubmitted in 2005 as the Climate Stewardship and Innovation Act ("Climate Stewardship Act of 2005"). This modified version, which complements the original bill by a section on the promotion of alternatives to conventional

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[33] G. Bush, *President Announces Clear Skies & Global Climate Change Initiatives*, 14.2.2002, available from: www.whitehouse.gov/news/releases/2002/02/20020214-5.html [accessed 17.11.2004].

[34] For the latest of these technology-based initiatives, the „Climate Change Technology Program" (CCTP) see: www.climatetechnology.gov/stratplan/draft/index.htm [accessed 03.08.2005].

[35] For an account, see U.S. Climate Action Network, *The Good, the Bad and the Ugly: A Guide to U.S. Climate Policy* (2004) U.S. Climate Action Network Report, available from: www.climatenetwork.org/uscanweb/gbufull.pdf [accessed 03.07.2005].

[36] See www.ci.seattle.wa.us/mayor/climate [accessed 03.08.2005].

fossil fuel power generation, such as money for the construction of new nuclear power plants, was discussed in the Senate in June 2005 as one of numerous amendments to a wide-ranging energy bill. However, it failed again, receiving merely 38 votes this time, when the Senate passed only the weakest of three suggested options regarding this part of the energy bill, a proposal which favoured voluntary incentives for industry to cut GHG emissions over mandatory targets. Despite this renewed defeat, any future and possibly more successful proposal on US GHG emissions trading is likely to be influenced by the McCain-Lieberman initiative.

The second of the three suggested options relating to the energy bill, which did, however, also not pass, was the "Climate and Economy Insurance Act of 2005" drafted by Democratic Senator Jeff Bingaman of New Mexico. It was based on the report "Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges" (NCEP 2004) published in December 2004 by the National Commission on Energy Policy, a bipartisan group founded in 2002 by the William and Flora Hewlitt Foundation. Bingaman's proposal did not formally get out of committee, but with the co-sponsorship of Senate Energy Committee Chairman Pete Domenici and the support of several other Senators Bingaman also introduced a "Sense of the Senate" resolution on climate change, a nonbinding resolution stating that climate change is at least in part caused by human activity and must be addressed by mandatory policies that reduce greenhouse gas emissions while growing the American economy and engaging the developing world. This "Sense of the Senate" resolution was approved by a 53-44 vote.[37] It "put the United States Senate on record for the first time that the Senate believes mandatory controls will be necessary to reduce greenhouse gas emissions" (Bingaman 2005). Commentators furthermore noted an important shift in the attitude of Congress towards climate change, "from debating whether we should do something to what we intend to do", according to Fred Krupp, president of the non-governmental organization *Environmental Defense*.[38] This is a shift of opinion in particular as compared to the 1996 "Byrd-Hagel Resolution"[39] approved by a 95-0 vote that effectively kept the USA out of the Kyoto Protocol. A day after the decision and the debate on the Act, Senator Domenici announced that the Senate Energy Committee would hold hearings on Bingaman's proposal.

On 2 February 2006, Senators Bingaman and Domenici published a white paper that lays out some of the key questions and design elements with regard to their proposed greenhouse gas emissions trading scheme (Domenici/Bingaman 2006). The aim was to provide a venue for national debate about the implementation of a national emissions trading scheme and to gauge chances of their proposal (or a revised version) passing in the Senate. A hearing on the matter on 4 April yielded diverging views. Some utilities, such as Exelon Corp., expressed themselves in favour of a mandatory trading system, arguing that they needed regulatory certainty for their

[37] Earlier on the same day, the above mentioned McCain-Lieberman proposal had been rejected by 60 to 38 votes.

[38] cited in D. Kirkpatrick, 'Senate Passes Amendment to Combat Climate Change', *New York Times*, 22.06.2005.

[39] Byrd-Hagel Resolution: 105th Congress, 1st Session, Senate Resolution 98, Expressing the sense of the Senate regarding the conditions for the United States becoming a signatory to any international agreement on greenhouse gas emissions under the United Nations Framework Convention on Climate Change, Report No. 105-54.

investment decisions. Others, such as Southern Co., countered that a mandatory system was unnecessary since business was already moving to cut emissions on its own initiative.[40]

Senator Dianne Feinstein of California, also a member of the Energy Committee, put out a further proposal for a nationwide emissions trading system in March. Other such initiatives were offered in the House by Representative Tom Udall and by Representatives Wayne Gilchrest and John Olver. The latter largely mirrors the McCain-Lieberman proposal.[41] However, since it is not clear which direction the discussion is going to take the following only discusses the proposals by McCain-Lieberman and Bingaman as well as the RGGI system.

3.2.2 The U.S. Climate Stewardship Act

The McCain-Lieberman proposal adopts an approach based on absolute targets: starting in 2010, covered entities would be required to submit one tradable allowance for every metric tonne of CO_2e they emit. In contrast to the other schemes discussed in this paper, entities would not have to demonstrate compliance *ex post* for the preceding calendar year by surrendering an amount of allowances equivalent to their emissions. Instead, Section 302 requires the administrator of the scheme, the U.S. Environmental Protection Agency (EPA), to assess "at various times during each year" whether a specific entity met the requirements of the Act. Yet, penalties would only be imposed once an entity had failed to comply for one year. If so, companies would be charged a penalty of thrice the market value of allowances per excess tonne of emissions. The reference date for the determination of the penalty would be the last day of the year in question (Section 372).

The Act includes all greenhouse gases listed in the Kyoto Protocol. Section 3(3) leaves the determination of the specific global warming potential (GWP)[42] of non-CO_2 gases to the EPA.

As to the sources covered by the system, the Act adopts a broad definition, including all "electricity, transportation, industry and commercial sectors", subject to a minimum threshold of 10.000 tonnes of annual emissions of CO_2e (Sections 3(4) and 3(5)). Whereas this definition captures all large industrial sources, the minimum emissions requirement would effectively exempt most of the commercial sector from participation in the scheme (Paltsev et al. 2003: 2). The scheme envisioned follows a hybrid approach, incorporating features of both an upstream and a downstream trading system. Thus, while the proposed regime would cover direct emissions from the combustion of natural gas, oil and refined oil products except for transportation fuels, it provides for upstream coverage of Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), Sulfur Hexafluoride (SF_6), and of transportation fuels. Producers and importers of these three greenhouse gases would have to submit allowances for each tonne of CO_2e they produce or

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[40] Science News Article, Reuters.co.uk, Senate panel takes baby steps on climate change: http://today.reuters.co.uk/news/newsArticle.aspx?type=scienceNews&storyID=2006-04-04T213838Z_01_N04403907_RTRIDST_0_SCIENCE-ENERGY-CONGRESS-CLIMATE-DC.XML [accessed 19.04.2006].

[41] Amanda Griscom Little: Heating Bills, Spring brings a new crop of climate bills in Congress, 21 Apr 2006: www.grist.org/news/muck/2006/04/21/griscom-little/index.html?source=daily [accessed 23.04.2006].

[42] GWP is a measure of how much a given mass of greenhouse gas is estimated to contribute to global warming. It is a relative scale which compares the gas in question to that of the same mass of CO_2 whose GWP is set at 1.

import. Petroleum refiners and importers would be required to do the same for every unit of petroleum sold that will lead to one metric tonne of CO_2e emissions if used for transportation. The amount of emissions accruing to the transport sector would be determined by the EPA. The inclusion into the scheme of the transport sector, which accounts for an ever increasing share of greenhouse gas emissions, allows for the total coverage of emissions to be as high as 90 percent of CO_2 and 80 percent of total GHG emissions (Paltsev et al. 2003: 2).

The Act adopts a restrictive approach towards voluntary entry and exit. No provision is made for voluntary opt-in into the scheme, and Section 305 of the Bill provides that exemptions from participation are only granted where EPA considers that accurate measurement or estimation of the emissions from a particular source category is impossible.

The Act would impose an annual emissions cap of 5896 million tonnes CO_2e on all covered entities, reduced by the amount of emissions from non-covered entities in the covered sectors (Section 331). This numerical limit corresponds to the total U.S. greenhouse gas emissions for the year 2000 less the exempt sectors and the emissions from U.S. territories (U.S. EPA 2002). While the Climate Stewardship Act of 2003 had endorsed a further reduction commitment to 1990 levels for a second commitment period starting from 2015, this provision was dropped in the amended version of 2005. The latter does not include multi-year compliance periods. Instead, the overall emissions target set in the Act would be reviewed at least biennially, with a specific review of the level of stabilisation chosen scheduled for 2008 (Section 334).

The scheme would incorporate a complex allocation system that combines grandfathering and auctioning elements with rewards for early action and accelerated participation. The bill provides that the Secretary of Commerce would determine the share of allowances that would be distributed for free to each covered sector by the EPA. The Secretary would have to base his decision on a number of allocation factors set out in Section 332. These criteria include the distributive effect of the allocation on household income as well as on corporate income, taxes, and asset value. Furthermore, the Secretary would have to consider the effects in terms of economic efficiency, the ability of covered entities to pass compliance costs on to their customers, the planned decrease of emissions in the covered sector over time, and the objective to maintain the international competitiveness of U.S. manufacturing.

The remaining amount of certificates would be auctioned via the Climate Change Credit Corporation (CCCC), an independent non-profit corporation that would be established under Subtitle 3 of the bill, prior to the start of trading in 2010. The proceeds of the auction would be used *inter alia* for easing the transition for dislocated workers, assisting in the adaptation of wildlife habitat to climate change, and for technology deployment programmes.

However, before the allocation of allowances between the CCCC and the EPA would take place, participants having registered emissions reductions prior to 2010 would receive an amount of allowances equivalent to the achieved reductions. Likewise, companies could arrange "accelerated participation agreements" with the EPA in which they would commit themselves to reduce their emissions to 1990 levels by 2010 and would thus obtain additional certificates for the first trading period "in order to recognize the additional emissions reductions required" prior to the general allocation between the EPA and the CCCC. In both cases, the allowances allocated

would be deducted from the overall cap of 5896 million tonnes CO_2e, thus ensuring the environmental effectiveness of the target (Sections 335f). A sufficient amount of allowances would be held back for new entrants (Section 333(b)). The bill does not address the issue of plant closures.

The proposed U.S. scheme would accord considerable temporal flexibility to companies on how to comply with their targets. It would allow for unlimited banking of allowances for installations who have over-complied with their targets. According to Section 303, borrowing would equally be possible for "anticipated reductions in emissions that are attributable to the realization of capital investments", for which the entity has concluded a binding contract and applied for all necessary permits. Furthermore, the anticipated reductions would not have to become operational within the calendar year in course, but would have to start within five years after the year in which the credit is used. The maximum borrowing period for emissions reduction credits would be five years, and an interest rate of ten percent multiplied by the number of years applies, i.e. the company would have to submit that amount *more* allowances in the year from which the credit was taken. Failure to actually achieve the credited reduction in the required timeframe would result in the allowance requirement for the year being increased by the credit amount plus the interest.

In Section 3(16), the Act endorses a wide definition of sequestration projects, including not only agriculture and forestry, but also "any other appropriate method of capture, long-term separation, isolation or removal of greenhouse gases from the atmosphere, as determined by the administrator". A reporting requirement is included in Section 371 of the Bill in order to dissipate concerns about the permanence of the sink projects. Thus, every five years, an entity using a registered net increase in sequestration for compliance would have to submit information to the EPA that would allow it to "determine, using the methods and standards created under section 204, whether that net increase in sequestration still exists." Furthermore, the alternative compliance option included in Section 302(b)(3), which would allow for the use of emissions reductions generated "by a person that is not a covered entity", subject to the recognition of the latter by the EPA, opens the door to a large variety of domestic offsets options.

Covered entities would also be able to submit tradable allowances from another nation's domestic emission trading scheme if the Secretary of Commerce had determined that the scheme was complete, accurate and transparent (which would have to be reviewed every five years), that the other nation had adopted enforceable limits on its GHGs, and that the submitted allowance had been cancelled in the other nation's market (Section 302(b)(1)).

The McCain-Lieberman proposal limits the use of alternative means of compliance to fifteen percent of the total allowance submission requirement of a covered installation. This cap would apply to the total sum of allowances purchased from foreign emissions trading markets, registered net increases in sequestration, other GHG reductions registered by persons that are not covered entities, and allowances borrowed from future commitment periods (Section 302).

The Act contains detailed rules regarding monitoring, reporting and accounting requirements, which would conform to the internationally recognised (presumably UNFCCC) standards (Lieberman 2005). The central instrument for this purpose would be the "National Greenhouse

Gas Database", consisting of an inventory for GHG emissions and a registry for GHG reductions and sequestration projects. Its principal tasks would involve the collection, verification, and analysis of GHG emissions by entities. The EPA would be required to develop the necessary regulations in this regard as well as the necessary measurement and verification methods and standards no later than two years after the entry into force of the Act. Covered entities would have to submit annual reports on their GHG emissions from 2009 onwards. This system is also to prevent double counting of emissions, which might ensue due to the hybrid nature of the system (Sections 201-204).

3.2.3 The U.S. Climate and Economy Insurance Act

According to Section 512 of the Bingaman proposal, the initial allocation period would begin on 1 January 2010 and end on 31 December 2019, to be followed by subsequent allocation periods of five years each from 1 January 2020 on. For each year, covered entities would have to submit allowances, denominated in metric tonnes of CO_2e, to the Secretary of Energy by 31 March of the subsequent year (Sections 513(c), 515(c)).

However, the Secretary would also accept payment of the "safety valve price" for a calendar year in lieu of submission of an allowance (Section 1516). This mechanism would effectively cap the market price at the level of the safety valve price since entities would have no incentive to pay prices exceeding this level. The safety valve price would initially be US-$ 7 per tonne of CO_2e, and would increase by 5 percent each year (Section 512(13)). The revenues would accrue to a Climate Change Trust Fund that would finance climate change adaptation and technology deployment activities (Section 1526(a)(2)). If a regulated entity failed to submit allowances or pay the safety valve price, it would be liable to pay an amount equal to three times the safety valve price for each allowance not submitted. Not paying the penalty would result in civil and criminal penalties (Section 1523(a)).

The proposed scheme would cover upstream greenhouse gas emissions from fuel producers and other entities including manufacturers, importers and emitters of non-fuel GHGs. More precisely, the scheme would cover owners or operators of natural gas pipelines, petroleum refineries, coal mines with a production of more than 10.000 short tons per year, natural gas processing plants, and fuel importers, called "regulated fuel distributors", as well as producers or importers of HFCs, PFCs, SF_6 or Nitrous Oxide (N_2O), cement or lime producers, aluminium smelters, and underground coal mines emitting more than 35.000.000 cubic feet of methane within a year ("non-fuel regulated entities") (Section 512(8) and (11)). Fuel distributors would have to submit allowances based on the quantity of covered fuels they produced or imported, while non-fuel entities would have to submit allowances based on their non-fuel related GHG emissions. The Secretary of Energy would also be able to include entities that are not regulated fuel distributors if this is necessary to ensure that allowances are submitted for all covered fuels. Moreover, the Secretary would be able to exempt non-fuel regulated entities if measuring or estimating their GHG emissions was not feasible (Section 515).

For each year from 2010 on, the Secretary of Energy would set an absolute annual cap which would be calculated on the basis of emission intensity targets. Emissions intensity is defined as the total amount of covered GHG emissions divided by the forecast GDP. By the end of 2006, the

U.S. Department of Energy would have to calculate the target cap for each calendar year from 2010 through 2019 by, firstly, projecting the emissions intensity expected for 2009 (based on projections of GDP and GHG emissions by the Energy Information Administration), secondly, reducing that amount annually by 2.4 percent to arrive at the emissions intensity target for each year through 2019, and, thirdly, multiplying the year's emissions intensity target by the GDP forecast for that year to arrive at an absolute emissions cap. In 2016, the Department of Energy would calculate the target caps for 2020 through 2024 using the same procedure, but with a 2.8 percent emission intensity reduction instead of 2.4 percent (Section 513). A Congressional interagency group might modify this procedure no later than from 2014 on, a review that would be repeated every five years (Section 1521).

According to the National Commission on Energy Policy, for the period from 2010-2019 these targets would slow emission growth from the currently projected 1.5 percent per year to 0.4 percent per year (NCEP 2004: 21). Thus, the scheme would allow a moderate rise of GHG emissions at least for the next thirteen years. According to a U.S. Energy Information Administration's business-as-usual scenario, GHG emissions in the U.S. are expected to grow from 7.8 billion metric tonnes of CO_2e in 2010 to 9.1 billion tonnes in 2020 (U.S. EIA 2004: 62). In contrast, the proposal would lead to emissions of 8.1. billion tonnes CO_2e in 2020, about 11 percent or 1 billion tonnes below business-as-usual levels – not taking into account additional allowance sales via the safety valve. Including the safety valve option as planned in the Bingaman proposal, emission abatement in 2020 is expected to be approximately 540 Mt CO_2e, a 6 percent reduction compared to the BAU forecast. GHG emissions in the U.S. would still be higher in 2020 than at the start of the Bingaman scheme in 2010, though. After 2020, the introduction of the 2.8 percent reduction per year target would finally lead to a slow decrease of GHG emissions (NCEP 2004: 22).[43]

The lion's share of allowances would be grandfathered. In 2010, 91 percent of allowances would be grandfathered for free. The Secretary of Energy would establish and submit to Congress procedures for the allocation of allowances to the regulated entities. These procedures would be based on the criteria of historical or updated greenhouse gas emissions, mitigation of significant and disproportionate burdens, avoidance of windfalls, mitigation of barriers to entry to the system and administrative simplicity. One percent of the allowances available for grandfathering would be allocated to organisations that provide retraining, educational support or other assistance to workers that would be affected by the Act. After 2013, grandfathered allowances would gradually drop to 87 percent of the overall amount of allowances to be available in 2020. Simultaneously, in 2010, 5 percent of allowances would be auctioned. The amount of auctioned allowances would gradually rise to 10 percent between 2013 and 2020. The rest of the allowances would be reserved for offsets (3 percent each year) and for early action (1 percent each year) (Section 1514). The revenues from auctioning would be deposited in the Climate Change Trust Fund (Section 1526(a)(2)).

As for new entrants, the National Commission on Energy Policy had proposed that auctioning should be foreseen to accommodate new entrants, to stimulate the market in emission allowances

[43] An EIA analysis of the bill and emissions trajectory can be found at: www.eia.doe.gov/oiaf/servicerpt/bingaman/index.html [accessed 03.07.2006].

and to fund research and development of new technologies (NCEP 2004: 21). However, so far neither this issue nor the issue of plant closures is addressed by the bill.

Entities would be allowed to use issued allowances not only for the calendar year for which they would be issued but also for any subsequent calendar year, i.e. unlimited banking would be possible (Section 513(c)). The proposal also envisages an offset system to generate credits that could be submitted in lieu of allowances. Credits would be distributed to entities that geologically sequester combustion-related carbon dioxide, that export covered fuels or non-fuel GHGs, use covered fuels as feedstocks, or otherwise destroy non-fuel GHGs (Section 1518).

Section 1522 of the draft bill would mandate the Secretary of Energy to establish monitoring, reporting, verification and accounting procedures.

Finally, Congress would review the progress of actions by other key countries every five years to determine the appropriate level of continued efforts by the United States (Section 1521).

3.2.4 The Regional Greenhouse Gas Initiative (RGGI)

RGGI is a cooperative effort by U.S. American states from the Northeast and Mid-Atlantic to establish a regional cap-and-trade programme. In 2000, RGGI states reported GHG emissions of 577 million metric tonnes of CO_2 equivalent. This amounts to 14 percent of total US GHG emissions and to about 3.2 percent of emissions worldwide (Environment Northeast 2005).

The initiative began in April 2003 when New York's Governor George Pataki sent letters to 11 governors from Maine to Maryland, inviting their states to participate in discussions on the development of a regional cap-and-trade programme. By July 2003, the governor had received positive responses from eight of those governors, namely those from Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New Jersey, Rhode Island and Vermont. Maryland, the District of Columbia and Pennsylvania became "observers" in the process, as did the Eastern Canadian Provinces. [44]

After two years of discussions and regular input by stakeholders, the RGGI Staff Working Group published a Package Proposal that suggested design options for a future emissions trading regime in the participating Northeastern states (RGGI 2005a). On 20 December 2005, the governors of Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York and Vermont signed a Memorandum of Understanding setting out core rules of the programme. The governors of Massachusetts and Rhode Island refused to sign but may become signatories at any time before 1 January 2008 without an amendment to the Memorandum of Understanding. Additional states may become signatories by amendment (RGGI 2005c).

[44] Regional Greenhouse Gas Initiative (RGGI) – About RGGI: www.rggi.org/about.htm.

Massachusetts legislators are currently moving forward legislation that would overturn the governor's decision and join the state to the system.[45] Maryland joined RGGI in April 2006 as the result of a similar initiative.[46]

On 23 March 2006 a "Draft RGGI Model Rule" was published for public comment which serves as the basis for the following description. According to this document, the scheme would start on 1 January 2009 (Section XX-1.5(c)(3)). A "control period" would be three years long but would be extended by one year for each occurrence of a "Stage Two Trigger Event" (see following), up to a maximum of six years (Section XX-1.2(m)). Allowances to cover a year's emissions would need to be submitted by 1 March of the following year (Section XX-1.2(m)).

Allowances would be denominated in short tons of CO_2 (Section XX-1.2). Furthermore, the Draft RGGI Model Rule provides for a complicated system for the recognition of offsets. From the start of the programme, offset allowances are to be issued for the following "Initial Offset Types": landfill gas capture and combustion, SF_6 capture and recycling, afforestation and natural gas/home heating oil/propane end-use energy efficiency projects. "Additional Offset Types" are to be added to the programme over time.

Normally, if the offset project was located inside a signatory state, allowances would be issued on the basis of one allowance per short ton of CO_2e reduced while projects located in U.S. states other than the signatory states would be issued allowances on the basis of one allowance per two short tons of CO_2e reduced (Section XX-10.7(a)). Sources would be allowed to cover up to 3.3 percent of their reported emissions with offset allowances (Section XX-6.5(a)(3)).

However, Section XX-1.2(ay) sets a "Stage One Threshold Price" at US-$ 7, adjusted by the Consumer Price Index and the number of years expired since 2005. A "Stage One Trigger Event" would occur if the average regional spot price for allowances equalled or exceeded the Stage One Threshold Price for a period of twelve months, not counting a "Market Settling Period" of 14 months after the start of the scheme. A further "Stage Two Threshold Price" is set at US-$ 10, adjusted by the Consumer Price Index and the number of years expired since 2005. A "Stage Two Trigger Event" would occur if after the Market Settling Period the average regional spot price for allowances equalled or exceeded the Stage Two Threshold Price for a period of twelve months.

If there was a Stage One Trigger Event during the ongoing control period, the scope for the use of offsets would be expanded: allowances would subsequently be awarded to projects anywhere in the US, Canada and Mexico, would be awarded on the basis of one allowance per short ton of CO_2e reduced, and the amount a source would be allowed to use would increase to 5 percent (Section XX-10.7(a), Section XX-6.5(a)). If there was a Stage Two Trigger Event during the ongoing control period, the scope would be further expanded: offset allowances would subsequently also be awarded if companies retired CDM/JI credits or allowances from foreign emission trading systems (Sections XX-10.3(b) and XX-10.7(a)). If there were two Stage Two

[45] Amanda Griscom Little: Mass Backward, Mass. lawmakers pushing to join climate pact, despite Romney's objections, 26 Jan 2006: www.grist.org/news/muck/2006/01/26/romney/ [accessed 19.4.2006].

[46] Planet Ark: Maryland Joins States Breaking With Bush on CO_2: www.planetark.org/dailynewsstory.cfm/newsid/35945/story.htm [accessed 19.4.2006].

Trigger Events in immediate succession, the amount a source would be allowed to use would increase to 5 percent for the first three years of the compliance period, rising to 20 percent for the fourth year till the end of the compliance period (Section XX-6.5(a)(3)). These limits and the conditions for the issuance of offset allowances would be reset to their original values at the start of the following compliance period.

Section XX-6.6 provides for unlimited banking. There is no mention of borrowing. By way of penalty, the administrator would have the authority to automatically deduct allowances from the budget source's compliance account for the next control period at a rate of three allowances for each short ton of excess emissions. Offset allowances would not qualify for deduction. The deduction would not affect the liability for other penalties states might impose (Section XX-6.5(d)).

Initially, the programme would cover CO_2 emissions from stationary fossil-fuel fired electric power plants of all participating states. More specifically, according to Section XX-1.4 of the Draft RGGI Model Rule it would cover all units with an installed capacity of 25 megawatts or greater. The participating states would be able to exempt units that sell less than 10 percent of their electrical output to the grid. Sources that burn biomass for more than 50 percent of their total fuel would also be exempted (Section XX-1.2(af)). At a later date, the RGGI scheme might be extended to include greenhouse gases other than CO_2 as well as other sources of GHG emissions. However, the inclusion of other kinds of sources or gases would not be considered in depth before the implementation of the initial CO_2 cap-and-trade programme for power plants has succeeded (RGGI 2005b). The Draft RGGI Model Rule has no opt-in or opt-out provisions.

According to the Staff Working Group's Proposal, CO_2 emissions were to first be stabilised at about 150 million short tons from 2009 through 2015, which is roughly equal to the average emissions in the highest three years between 2000 and 2004. This stabilisation was to be followed by a 10 percent reduction between 2015 and 2020 (RGGI 2005a: 2). Due to the defection of Massachusetts and Rhode Island, the Memorandum of Understanding sets the initial target for 2009 to 2014 at 121,253,550 short tons. Starting in 2015, the budget would decline by 2.5 percent per year so that the budget for 2018 will be 10 percent below the initial target (RGGI 2005c: 2f).

Data to assess the stringency of this target is not readily available. According to Murrow (2004: 3) 2003 emissions from RGGI plants were equal to 1990 emissions. Thus, the scheme would aim to stabilise emissions at the Kyoto baseline level from 2009 through 2015 and reduce them 10 percent below the Kyoto baseline between 2015 and 2020. Unfortunately, the figure he gives for 1990 and 2003 emissions is about 130 rather than 150 million short tons of CO_2. Still, stabilising emissions at current levels should require a reduction of emissions relative to power output since electricity generation is expected to increase (DePalma 2005).

Allocation provisions would vary from state to state. As a general rule, 25 percent of allowances are to be allocated to a consumer benefit or strategic energy purpose account. These allowances would be sold or distributed to raise funds for promoting energy efficiency, renewable or non-carbon emitting energy technologies, mitigating electricity consumer impacts of the ETS, stimulating or rewarding investments in the development of innovative carbon emission abatement technologies or covering administrative costs of the ETS. States might establish set-

asides for new entrants and other purposes. Companies would be able apply for "early reduction CO_2 allowances" (ERAs) for actions in the "early reduction period" from 2006 to 2008 that both improve heat rates and result in absolute emission reductions in comparison to the baseline period from 2003 to 2005 (Section 5.3). The allocations for the years 2009, 2010, 2011, and 2012 would be determined by 1 January 2009. For each succeeding year the allocation would be determined three years in advance (Section 5.2).

The regulatory agency would establish a system to track emissions and allowances that would receive emissions data, allowance allocations and effectuate allowance transfers (Section XX-7). Section XX-8 of the Draft RGGI Model Rule requires covered sources to install systems to monitor CO_2 concentration, stack gas flow rate, O_2 concentration, heat input and fuel flow rate by 1 January 2009. Companies failing to meet this date would need to determine and report the maximum potential CO_2 emissions. Sources' monitoring systems would need to be certified by the regulatory authority. Emission reports would need to be filed quarterly.

4 Prospects for Linking

4.1 Design Issues

4.1.1 Coverage of the Schemes

As for **sector coverage**, the analysis indicates that most of the systems considered address a quite similar range of emitters as the EU ETS, namely the large stationary sources in the energy and industry sectors. The coverage of the proposed McCain-Lieberman and Bingaman schemes is clearly more comprehensive. Yet this finding does not necessarily represent an obstacle to linking. Differing **sector coverage** is not a matter of institutional compatibility, nor does it affect the environmental effectiveness of a combined trading scheme. Likewise, the potential differences in the **gases covered** by the EU ETS and some of the other trading schemes, namely the Canadian, Australian, McCain-Lieberman and Bingaman schemes, would probably not constitute an obstacle to linking as long as confidence in the traded units is not undermined by perceived inaccuracies in the measurement of non-CO_2 emissions. A constellation where one or more gases or categories of sources are included in one scheme but not in the other raises first and foremost questions regarding competitiveness and gaining the necessary political support for linking under these circumstances. However, competitive disadvantages and possible discrimination due to diverging treatment of sources in two trading regimes are not caused by linking and would also occur in its absence. Therefore, competitiveness concerns should not prevent linkages that have otherwise beneficial consequences.

However, the hybrid upstream-downstream approach chosen by the Climate Stewardship Act of 2005 and the upstream system of the Climate and Economy Insurance Act might entail some difficulties. **Linking an upstream with a downstream system** such as the EU ETS could potentially lead to double-counting of emissions. HFCs, PCFs, SF_6 and transport fuels that are produced in the U.S. and subsequently exported to the EU would first be accounted for at the production stage under the U.S. system, and then possibly for a second time, at the point of release to the atmosphere, under the EU ETS if the latter had by the time of linking extended its coverage to these gases and sectors. Section 301a of the Climate Stewardship Act of 2005 seeks to prevent this dilemma by specifying that importers or producers would only be required to hold allowances for every unit of CO_2 equivalent "that will ultimately be emitted in the United States". Section 1518 of the Climate and Economy Insurance Act provides that offset credits would be distributed to exporters of covered fuels, HFCs, PCFs, SF_6 and N_2O. These provisions should ensure that double counting problems would not arise.

To date, no details are available regarding **opt-in or opt-out** provisions in the Canadian and Australian systems. Thus, no conclusions can be drawn regarding the compatibility of the future rules with the EU trading scheme. In Japan, the participants are determined *ex ante* without the possibility of opting in or out. In Norway, Switzerland and the RGGI system, there is no provision for opting into or out of the system. If the EU Directive is incorporated into the EEA agreement, provisions in the EU and in Norway will be the same.

As to the Climate Stewardship Act of 2005 and the Climate and Economy Insurance Act, both adopt a restrictive approach towards voluntary entry and exit. No provision is made for voluntary opt-in into the scheme, and exemptions from participation are only granted where accurate emissions measurement or estimation is impossible. Under the EU system, both opt-in and opt-out are subject to stringent conditions and depend upon approval by the European Commission. Moreover, given the temporary restriction of possible exemptions to the first trading phase until 2007, this provision will no longer apply by the time linking agreements to other permit trading schemes will be established. Likewise, the provisions in the McCain-Lieberman and Bingaman proposals rather enhance confidence in the trading schemes as they seek to prevent units from inadequately measured emissions sources from entering the system. Therefore, the rules regarding opt-in and opt-out should not complicate negotiations on a potential link between the EU-ETS and a scheme based on the provisions of the Climate Stewardship Act of 2005 or the Climate and Economy Insurance Act.

4.1.2 Definition and Recognition of trading units

Almost all schemes discussed in this paper denominate their trading units as equalling 1 tonne of CO_2e emissions and would therefore be equivalent. The only exception is the RGGI system which would denominate allowances in short tons of CO_2 which is less than a metric tonne. A full link to the EU ETS would therefore require an exchange rate. A further obstacle might be the provision of the Climate Stewardship Act which would leave the determination of the specific global warming potential of non-CO_2 gases to the U.S. Environmental Protection Agency (EPA). It would be desirable for the EPA to continue to use the GWP indices recommended by the International Panel on Climate Change (IPCC) since a common quantitative basis for trading units across different domestic ETSs avoids transaction costs and greatly enhances the legitimacy of trading.

The recognition of units is a subject which is likely to be at the centre of negotiations on linking between the EU ETS and other ETSs. External units that are eligible in one scheme will automatically impact on the overall supply of units in a combined system. Even if a particular type of unit is not recognised in one scheme, entities in another scheme that accepts this unit can use it for domestic compliance purposes and sell their "regular" domestic allowances to entities in the first scheme. The case for harmonising the rules for the recognition of certificates is strong since any conceivable adjustment measures, such as the introduction of exchange rates, would increase transaction costs while producing only limited effects. The question would therefore probably rather be to which extent the negotiators from both countries would want to maintain their rules for the recognition of units instead of dropping them for the purpose of linking.

Several aspects will need to be considered when conceiving a link between the EU ETS and the Canadian LFE system. Canada's very liberal approach towards unit recognition will need to be rendered compatible with the more stringent EU approach. Canada plans to accept "greened" AAUs, which the EU excludes. Difficulties also arise from the treatment of sink projects, which the EU has excluded from use in the EU ETS for the first commitment period. Canada, on the other hand, does not share the EU concerns in this regard and will admit sink projects as domestic offsets and probably also in the CDM/JI framework. Furthermore, the "Canadian technology element" suggested in the Climate Change plan would most likely have to be dropped, as the EU

would not be particularly keen on endorsing such a "protectionist" criterion for CDM/JI project eligibility. Likewise, the possibility to gain credits from investments in the TIF may be subject to criticism from the EU side, especially since the Climate Change Plan explicitly states that it is unlikely to contribute to emissions reductions before 2012 (Government of Canada 2005a: 16). The TIF would thus inflate emissions in the combined scheme in exchange for unclear future climate benefits.

A last issue that may give rise to controversy is the possibility for Canadian firms to purchase credits from domestic offsets, a concept which has been a cornerstone of the Canadian climate policy strategy for several years. Even though the EU ETS Directive currently does not allow for domestic offsets as a means of compliance, this may – given the support of a number of Member States for this approach – change with the current review of the Directive. Thus, this compliance option in the Canadian scheme may not be as much of a problem as one would initially suspect. Yet the fact that a major part of these offsets would likely be achieved through sink projects in agriculture and forestry – which were purposely excluded from use in the Linking Directive – may be more of a bone of contention.

A link between the EU ETS and the proposed Australian and U.S. schemes would equally raise complex questions. Again, it seems doubtful whether the EU would accept the use of domestic offsets, considering the strong endorsement of biomass and geological sequestration as a compliance means. Furthermore, the fifteen percent cap on the use of credits from alternative means of compliance in the McCain-Lieberman scheme may also be subject to controversy, depending on how the current discussions on where to set the cap in the EU conclude. The Bingaman proposal does not foresee a cap on the amount of external units to be used, which would be likely to raise competitiveness concerns in the EU.

By contrast, under the RGGI system sources would be able to use offsets up to 3.3 percent of reported emissions only, which might in stages rise to a maximum of 20 percent, depending on the development of the price for allowances. While the former is low, the latter is a rather high mark. Moreover, the complex staged system for including ever more offsets envisaged by the Draft RGGI Model Rule probably requires further scrutiny on general terms as well. The aim of this system is to inject ever more supply into the market the higher CO_2 prices rise and thus keep prices down. However, this means that the balance between supply and demand is never fixed, which may result in increased uncertainty and therefore reduced liquidity in the market. Having said that, though, it may be questioned how attractive this system actually is for offset suppliers outside the RGGI states since they cannot be sure if and to what extent their projects are going to yield marketable allowances. The increase in supply aimed at might therefore in practice be rather small.

Linking with the current Japanese system would also necessitate some discussion since the JVETS also recognises CERs from sink projects and does not cap the amount of external credits that may be used. By contrast, Switzerland excludes credits generated by sink projects using genetically modified organisms and invasive alien species, which are among the most controversial project types. Moreover, the official comment to the CO_2 Crediting Ordinance states that Switzerland might exclude sink credits altogether if their recognition proved to be a barrier to linking the Swiss to the EU ETS (BAFU 2005b: 4). The Swiss cap, which allows companies to

cover up to 8 percent of their emission target with external units – with the exception of companies for which it is technically not possible or economically not feasible to reach their targets with internal measures and which may therefore cover up to 30 percent of their target with certificates from abroad – should also be in line with any cap set within the EU. The case of Norway which presently excludes sink projects should be even easier, in particular if the EU Directive is incorporated into the EEA agreement.

4.1.3 Absolute versus Relative Targets

A comparison of the types of targets chosen indicates that whereas this aspect would not require particular attention when linking the EU ETS to the schemes in Japan, Norway, Switzerland, Australia, the McCain-Lieberman or Bingaman scheme and RGGI as all these rely or probably will rely on absolute emissions targets, a link between the EU and the Canadian system which envisages relative targets would raise concerns in terms of both equity and environmental effectiveness.

The equity argument is of relevance in sectors where Canadian and EU companies are competing against each other since Canadian companies would face less costs for increasing production. While this problem would exist also in absence of a linkage between the two schemes, linking the Canadian system to the EU ETS would most likely lead to higher overall emissions in the combined trading scheme. Since Canadian entities would receive additional allowances when increasing their output, this would also affect the overall amount of available allowances and thus the environmental effectiveness of the combined scheme. Some experts argue that this may not necessarily be a problem since in order to comply with their Kyoto commitments, both Canada and the EU Member States would have to seek to offset the increase in emissions in the scheme by reducing emissions in uncovered sectors or the government would have to purchase Kyoto units abroad (Blyth/Bosi 2004: 23). The environmental effectiveness of the trading system itself would nevertheless suffer.

As outlined in section 1.3, there are five options to address the problems arising from a link between schemes with absolute and relative targets: [i] a tax on allowance transfers between the systems, [ii] adjustment for relative allowance values through an exchange rate, [iii] adjustment of the allocation in the scheme with relative targets by taking account of changes in projected growth levels due to the linkages, [iv] imposition of more stringent caps in the absolute target scheme, or [v] establishment of a gateway. However, any of these options would render the system more complex and increase transaction costs.

On the whole, the most desirable solution from a EU perspective would certainly consist in convincing the Canadian policy makers to introduce absolute caps instead of relative targets. This would not only ensure the full environmental and economic benefits of emissions trading, but also avoid cumbersome adjustment arrangements. However, if this is not possible, EU negotiators should at least insist on the setting of sufficiently stringent performance-based standards in Canada in order to maintain the environmental effectiveness of the EU ETS.

4.1.4 Stringency of Targets

The differences in approach to target-setting in the schemes considered render a comparison of their respective stringency far from straightforward. However, some tentative conclusions shall be drawn in the following. First of all, all schemes which have already set targets have done so in a way that is much less ambitious than what would be desirable from an environmental perspective.

In the EU ETS, Member States have mostly given in to pressure from industrial lobby groups and allocated overgenerous amounts of allowances for the first commitment period. However, it may be hoped that the Commission will apply stricter standards in its review of the second round of NAPs, once the initial trial period is over.

As to the Canadian LFE system, it would commit LFE companies – projected to be responsible for half of the country's GHG emissions by 2010 – to a reduction objective (39 million tonnes) which accounts for a mere 16 percent of the estimated overall reduction requirement (240 million tonnes). This is clearly inadequate and will certainly not suffice to meet Canada's Kyoto target, especially since transport emissions are growing sharply and options to achieve significant short-term emissions reductions in the residential sector are limited (David Suzuki Foundation 2005).

In Japan, the anticipated emission reduction through the voluntary scheme amounts to about 1.8 percent of the 15 million tonnes of CO_2 the Japanese industry sector has to reduce in order to reach the country's Kyoto Protocol target of -6 percent. However, given the participants' share of 3 percent of the emissions of Japan's industry, aiming for 1.8 percent of its reduction target does not seem to be overly ambitious.

In Norway, companies are actually allowed a slight increase of emissions.

With regard to the McCain-Lieberman proposal, one glance at its GHG emissions statistics shows that the choice of 2000 emissions as the level where emissions shall be capped imposes very modest obligations on the covered entities. Whereas emissions had been growing by about fourteen percent between 1990 and 2000 (U.S. EPA 2002: 24; 2005: 70), 2000 remains the emissions all-time-high and figures have more or less stagnated since. Given growth predictions of about 1.5 percent per year until 2025, stabilising emissions from covered entities at 2000 levels would represent an achievement (U.S. EIA 2005). However, this objective is by far weaker than the seven percent reduction target from a 1990 baseline that the Clinton administration had initially agreed to when signing the Kyoto Protocol in 1997.

The target envisaged by the U.S. Climate and Economy Insurance Act is even weaker. For the next fifteen years, the scheme would allow a further rise of GHG emissions. Only after 2020, the introduction of the 2.8 percent reduction of emission intensity per year target would finally lead to a slow decrease of GHG emissions.

By contrast, the RGGI scheme has retained 1990 as base year and aims to stabilise emissions at this level from 2009 through 2015. It has therefore set a more ambitious goal compared to its national counterparts. This would still not be enough to meet the Kyoto target, but under Kyoto the U.S. would not have to meet its target completely through domestic action. Stabilising

emissions at the 1990 level, while insufficient from the environmental perspective, would actually be quite an achievement if compared to many of the other Annex B Parties.[47]

One can therefore conclude that all the systems considered so far envisage imposing equally weak targets. While this is clearly inadequate from a climate protection point of view, it probably also means that there will be little competitiveness concerns with respect to linking.

4.1.5 Allocation Methodology

As outlined in section 2.5, linking schemes with different initial methodologies for allocation should not result in any additional distortion of competition. Even linking the EU cap-and-trade system to the Canadian baseline-and-credit schemes does not pose any particular difficulty *a priori*, even though EU companies would have to wait longer to purchase Canadian credits, given that these would only be awarded *ex post*. However, competitive distortions would not arise as neither EU nor Canadian entities will be forced to pay for the lion's share of their allowances.

Japan is a special case since there the targeted emission reductions are subsidised by the government, which may be considered an unfair advantage by the participants of other ETSs. However, the economic burden imposed by the systems depends not only on the size of the subsidy but also on the stringency of the target. Moreover, competitive distortions will occur anyway due to the mere existence of the schemes, irrespective of linking (Choquette 2005: 17, Fn 37). Nevertheless, this feature of the Japanese system may prove a significant political obstacle to linking.

An obstacle also exists with regard to Switzerland where the emission target will each year be adjusted to the companies' production growth, with the final adjustment taking place in 2010. As a result, the balance between supply and demand will be subject to change during the first three years of the schemes operation, which impairs its stability and predictability. There is also a danger that *ex-post* adjustments might lead to a more generous allocation and thus undermine a scheme's environmental effectiveness. The European Commission therefore rejected provisions for *ex-post* adjustments in Member States' NAPs and reaffirmed this position in its guidance for the second phase of the EU ETS (European Commission 2005b: 16). The Commission has gone to court with Berlin over the provisions for ex-post adjustments in the first German NAP.[48] It could therefore hardly defend agreeing to similar provisions in non-EU countries.

Norway currently also has a provision for ex-post adjustments, but this issue will probably disappear if the EU Directive is incorporated into the EEA agreement.

Rules for subsequent allocation, which may include updating, rules for plant closures and new entrants could have distributional effects if not harmonised. A company may be tempted to cease

[47] See, for example, UNFCCC: Key GHG Data. Greenhouse Gas Emissions Data for 1990 – 2003 submitted to the United Nations Framework Convention on Climate Change, Bonn: United Nations Framework Convention on Climate Change, 2005.

[48] EuGeI verhandelt über Emissionshandel, 22.05.2006: http://www.emissionshandel-fichtner.de/news.html [accessed 03.07.2006]

production in a country that continues to allocate to closed plants and start up or expand production capacity in countries that will allocate allowances free of charge to new entrants. These incentives would arise irrespective of linking the two schemes and might be only short-term if updating is used. However, linking such schemes should be preceded by careful consideration of the potential impacts.

At the moment, it seems as if all schemes where this issue has already been decided are going to allocate allowances to new entrants for free, usually based on a best existing technology benchmark. Therefore, there should be no competitive distortion in this regard. There is hardly any information on how plant closures will be dealt with in the emerging schemes, but the EU Member States alone have already come up with three different procedures. Either the allocation is lost if an installation is closed, or the operator of a closed installation is allowed to transfer the allowances to a new installation, or the allocation is left unaffected. The EU will therefore be an interesting test case of the impact different plant closure rules may have.

4.1.6 Compliance Period, Allowance Validity and Banking

Except for Australia, where there are no details available, all schemes considered allow banking. Thus a constellation where one country would effectively provide a banking option for all players on the combined market is unlikely to occur. Commitment periods would be harmonised in accordance with the Kyoto timetable in Canada, Switzerland, the EU and probably also Norway, whereas the Bingaman, McCain-Lieberman and RGGI schemes would operate according to different schedules. Nevertheless, as outlined in section 2.6, the differences in starting date and compliance timeframe are neither a matter of institutional compatibility nor do they risk compromising the environmental performance in a combined scheme. The only exception is probably Japan. Since each phase of JVETS runs for one year only and the participants differ each time, the political effort to negotiate a linkage is probably not worthwhile.

By contrast, the inclusion of borrowing in the McCain-Lieberman scheme might be a bone of contention in negotiations about a linkage to the EU ETS. On the surface, borrowing appears to be tied to rather stringent conditions under the Climate Stewardship Act of 2005 but this issue certainly deserves further examination.

4.1.7 Monitoring, Reporting, Verification and Accounting

Generally speaking, slight differences in the measurement and reporting of emissions do not necessarily impact on the effectiveness of a combined trading scheme. However, this is only true as long as confidence in the trading units is not undermined by suspicions on frequent under-reporting of emissions or by emissions reduction credits of doubtful origin that inflate the supply of allowances in the combined scheme. In any case, harmonised emissions registries represent a precondition for any linkage as they permit allowances to be transferred smoothly across the combined schemes.

In most cases, there are not yet detailed regulations for monitoring, reporting and verification so that no judgement on their compatibility is possible. In the long term, complete harmonisation of

MRV requirements would be very desirable in order to ensure the full environmental effectiveness of the combined trading scheme. The improvement of monitoring methodologies and some degree of convergence through best practice exchanges is likely to facilitate such a development (Blyth/Bosi 2004: 28).

4.1.8 Compliance Framework and Penalties

Comparing the compliance provisions in the schemes examined, it is the envisaged price caps and safety valve mechanisms in Canada, Australia and the Bingaman proposal that would pose most difficulties when linking is considered. As long as the market price was higher than the price cap or safety valve level, companies in the price cap / safety valve systems would have an incentive to pay the penalty or use the safety valve respectively and sell their allowances to companies in the other systems until prices were equalised. Thus, "the lowest safety valve price among the trading partners would set the international emissions price" (Ellerman/Jacoby 2004: 487). This danger is even more salient when considering the relatively low price level at which the Canadian PAM and the Bingaman safety valve would kick in. The carbon price in the EU ETS, while currently at a low, has for most of the scheme's existence significantly exceeded the announced thresholds.[49] From the climate protection point of view, it therefore seems advisable to keep the EU ETS separate from these systems.

If political considerations such as deepening international climate change cooperation are deemed to outweigh these concerns, it would be advisable to at least restrict use of the safety valve or price cap to the difference between an installation's allocation and its actual emissions. Moreover, the Canadian safety valve should become operational only at the time of the annual determination of compliance (Blyth/Bosi 2004: 30f). These provisions would prevent entities from using the safety valve or price for domestic compliance while selling unused "regular" certificates abroad. Whether the Canadian PAM would operate in the form of a rebate on compliance costs, contributions to a fund or through a specific kind of credits would not really make a difference as long as these two requirements were met. The most feasible option to address the Australian price cap would probably be to establish a gateway whereby transfers from Australia to the EU would be blocked once the emissions in the Australian system exceeded a certain level.

However, even if the Australian, Canadian and U.S. governments were to adopt these safeguards, EU companies, to which this compliance option is not available, would find themselves disadvantaged in comparison to their competitors. A split market in a combined scheme, as soon as the market price surpassed the price cap / safety valve levels, would be another inevitable consequence: Australian, Canadian and U.S. entities could rely on the safety valves / price caps, whereas EU companies would have no other option but to purchase allowances at the price determined by the market. This would certainly reduce the benefits from linking (Blyth/Bosi 2004: 31). It would therefore be highly desirable if policy-makers in these three countries dropped their respective safety valve and price cap plans.

Negotiations should be less complicated in the cases of the McCain-Lieberman and RGGI schemes. While these envisage a compliance regime exclusively relying on financial penalties,

[49] For current prices, see www.pointcarbon.com.

the EU ETS requires the compensating surrendering of allowances in the following calendar year. Still, both mechanisms do not act as a price cap and the rates are clearly of deterring character. The envisaged penalties should thus provide a sufficiently strong disincentive, contributing to maintaining the environmental effectiveness of the combined scheme.

There should be no problems in the cases of Norway and Switzerland, either. The Norwegian penalty is explicitly equivalent to that in the EU and is guaranteed to continue to be so if the EU Directive is incorporated into the EEA agreement. And while the Swiss CO_2 tax rate of initially 12 Swiss Francs (ca. EUR 7.60), which may rise up to 35 Swiss Francs (ca. EUR 23), might be considered to be rather low if compared to historic EUA prices, non-compliant companies would have to pay not only for their excess emissions but for each tonne of CO_2 emitted since exemption from the tax was granted, plus interest, which would probably amount to a fairly prohibitive sum.

Japan is a special case. On the one hand participation is voluntary, but on the other hand there is a penalty attached to non-compliance which is independent of the market price. Moreover, as in the EU, the names of non-compliant companies are to be published, which is probably a strong further disincentive to non-compliance. The Japanese compliance system should therefore be compatible with the EU one.

4.2 Trading with a Kyoto Non-Ratifier

Linkages between domestic ETSs cannot be regarded in isolation from the international climate regime. Domestic emissions trading represents a key tool for countries to meet the emissions reduction objective they committed to in the Kyoto Protocol. Article 3.1 provides that Parties shall "individually or jointly" ensure that their greenhouse gas emissions do not exceed their assigned amounts. Within the EU ETS, from 2008 onwards transfers of EU Allowances will in fact be transfers of AAUs.[50] The same will probably be the case for the emerging ETS of other Annex B Parties. Thus, even if the EU would fulfil its Kyoto target only by purchasing allowances from abroad which are backed up by AAUs, it would still comply with its obligations under the Protocol. The situation would be different, however, with regard to a link between the EU ETS and a trading system of a Kyoto non-ratifier.

At this point it appears useful to differentiate between the terms "trade" and "transfer" of allowances in emissions trading. As de Witt Wijnen points out, "everyone can trade Kyoto units; but when trade leads to a transfer of allowances, the transfer can be made, as a general rule, only by Parties to the Kyoto Protocol" (de Witt Wijnen 2005: 412).

[50] The EU Registry Regulation sets out the details in this regard: From 2008, EU allowances will be issued by converting the corresponding amount of AAUs through adding a specific EU allowance code to the AAU serial number. Subsequently, at the annual surrendering of allowances, EU allowances will be reconverted into AAUs and retired for the purpose of compliance with the Kyoto Protocol. (European Commission, *Commission Regulation for a standardised and secured system of registries pursuant to Directive 2003/87/EC of the European Parliament and of the Council and Decision No 280/2004/EC of the European Parliament and of the Council* (EU 'Registry Regulation'), 2216/2004/EC, 21 December 2004, Art. 45 and 59).

With regard to allowance transfers between the EU and non-ratifiers two kinds of transactions must be distinguished: transfers of EUAs into the scheme of the non-ratifier as opposed to transfers of allowances from the non-ratifier into the EU ETS.

In line with the difference between "trade" and "transfer" outlined above, it would generally be possible for entities from the non-ratifier to purchase EUAs provided that they have been authorised for trading by an Annex B Party and dispose of an account in an EU Member State. This would apply, for example, to entities covered by the EU ETS that are subsidiaries of U.S. companies (Fauteux 2002: 2). A crucial problem would, however, occur in the second step – the transfer of EUAs from the EU Member State registries into the registry of the non-ratifier. The Kyoto requirement that transfers of Kyoto units (and EUAs would have to be considered as such, given their equivalence to AAUs stipulated in the EU Registry Regulation) may only occur between Annex B Parties to the Kyoto Protocol would prevent this kind of transaction. It could only be completed if an EUA was stripped of its AAU property when exiting the Kyoto system. However, this would also be problematic since the transferring country would then dispose of a free AAU which it could use to cover emissions in the non-ETS sectors while the EUA could be used to cover emission in the non-Kyoto Party, that is the certificate would be counted twice. The AAU would thus have to be cancelled to ensure the system's environmental effectiveness.

In any case, even in the absence of a mechanism of this kind and without the transfer of certificates to the non-ratifiers, it may be attractive for their companies to hold EUAs. This could be either in anticipation of a later accession of their country to the Kyoto Protocol or merely for speculative purposes (Zhang 2003: 14). However, these scenarios would not represent a real linkage between ETSs. Thus, harmonisation of ETS design would a priori appear unnecessary (Bodansky 2002: 2).

As to the other direction of allowance transactions in a combined ratifer-non-ratifier scheme – the transfer of allowances from the non-ratifiers into the EU ETS – difficulties would arise since the allowances from the non-ratifier would not be backed up by AAUs. In this case, if the EU turned out to be a net importer of allowances, this would inflate emissions in the EU without a corresponding acquisition of AAUs and could thus bring the EU into non-compliance with the Protocol.

There are two options to circumventing these problems.

- The first option would be to establish only a semi-open link between the ETSs where entities from the non-ratifier countries could only purchase but not sell allowances into the EU ETS. Such a link could actually be implemented unilaterally if a non-ratifier's ETS allowed companies to cancel EUAs within the EU ETS and count this toward compliance in their own system. Norway has already set up such a mechanism pending the negotiation of a full link to the EU ETS and the Draft RGGI Model Rule also envisages the unilateral use of EUAs. If allowances were to be actually transferred, a gateway mechanism would need to be set up by which outgoing EUAs would be stripped of their AAU property, which would then have to be cancelled to safeguard the system's environmental effectiveness.

- A full link between the EU's and a non-ratifier's ETS would require a similar gateway. Under such an approach, the AAUs stripped from the outgoing EUAs would be put into a specific account and used to back up incoming allowances. Thus, acquisitions from the non-ratifier's ETS could only be completed if there were sufficient AAUs available in the gateway and it would be ensured that the EU would remain a net seller (Wit et al. 2005: 82; Zhang 2003: 17). Such a gateway would certainly diminish the benefits from linking. Nevertheless, it is the only means to avoid that the EU's ability to comply with its Kyoto target is compromised by an inflation of its allowance pool.

Finally, EU policy-makers could also adopt a position insisting that ratification of the Kyoto Protocol is a precondition to any linkage. While such an attitude would be understandable given the added difficulties in linking in the absence of ratification, it largely underestimates the political importance such a move would have for the progress of the international climate regime as a whole (Zhang 2003: 16). Thus, as a short- to medium-solution, the "gateway" approach appears to be the only viable option for establishing a full link to a non-ratifier's trading scheme.

Conclusions

This paper has sought to analyse the many design elements that need to be considered when linking the EU ETS to the emerging systems in other countries. On the whole, linkages are certainly easier the more the designs of the respective regimes resemble each other. Furthermore, the need for harmonisation varies widely with regard to different design elements. Some design options may raise equity issues and stir opposition from concerned stakeholders. However, they are unlikely to adversely affect the overall effectiveness of the linked regimes. The point of imposition, the allocation method, and gas and sector coverage in the respective schemes belong to this category. The fact that the McCain-Lieberman proposal enshrines a hybrid upstream-downstream design and adopts a different approach to allowance allocation, for instance, does *a priori* not represent an obstacle to a link to the EU-ETS.

Other aspects have important implications for the equity, the economic and the environmental effectiveness in a combined scheme. With a view to linking the EU ETS to the Canadian LFE scheme, the state-based Australian scheme, or a federal U.S. scheme along the lines of the Bingaman proposal, the envisaged price caps and safety valves are inflationary devices that put shielding the participants from costs ahead of the environmental objective. Through linking, the price caps / safety valves would effectively cap prices for the combined system and emissions would probably be higher than if the EU ETS continued to operate separately. From the climate protection point of view it is therefore not advisable to link the EU ETS to these systems as long as these features are retained.

If political considerations like deepening international climate change cooperation are deemed to have precedence, at least the price caps and safety valves would have to be operationalised such as to restrict the supply to the amount needed by companies in Canada, Australia and the U.S. to meet their emissions. Moreover, the Canadian PAM should become operational only at the time of the annual determination of compliance so as to prevent entities from using the safety valve for domestic compliance while selling unused “regular” credits abroad. The most feasible option to address the Australian price cap would probably be to establish a gateway whereby transfers from Australia to the EU would be blocked once the emissions in the Australian system exceeded a certain level.

However, even if the Canadian, Australian and U.S. governments were to adopt these safeguards, EU companies, to which this compliance option is not available, would find themselves disadvantaged in comparison to their competitors. A split market in a combined scheme as soon as the market price surpassed the respective thresholds would be another inevitable consequence. For Canada, the problem is further exacerbated by the fact that linking may lead to marginally higher economic growth in the Canadian system and thus higher emissions in a linked system, due to Canada’s relative targets. Altogether, the prospect of a scenario where the environmental effectiveness of the EU ETS has been compromised by linking it to these schemes – but with limited economic benefits – leads to the conclusion that it would be advisable to keep the systems separate.

An U.S. scheme along the lines of the McCain-Lieberman proposal or the RGGI scheme would offer better prospects for linkage between the U.S. and the EU. If implemented, both would be mandatory schemes based on absolute targets and with prohibitive penalties for non-compliance, which are among the most critical features to be compatible with the EU ETS. Having said that, the offset component envisaged by these two systems may give rise to complex negotiations, especially given their strong focus on sequestration. The complex staged system for including ever more offsets envisaged by the Draft RGGI Model Rule would probably be subject to special scrutiny. In effect, it means that the balance between supply and demand is never fixed, which may result in increased uncertainty and therefore reduced liquidity in the market. However, since this uncertainty also applies to the offset suppliers, the increase in supply aimed at might in practice be rather small. Also the borrowing option in the McCain-Lieberman system would have to be further scrutinised.

Linking the EU ETS to Switzerland also poses some problems. One issue that might give rise to controversy appears to be the inclusion of sink credits in the Swiss system but it seems as if this is negotiable. The second issue is the envisaged ex-post adjustments of allocation in the Swiss system, which the European Commission has rejected for the EU ETS. It could hardly defend going to court with Germany over this issue while agreeing for non-EU states to have a similar provision. Linking might therefore depend on in how far Switzerland feels able to drop this provision.

Linking to Norway is practically a given. The only obstacle that remains is the agreement of Iceland and Liechtenstein to incorporate the EU Directive into the EEA agreement.

The Japanese system is a special case in that it is the only one among the schemes considered in this paper that is voluntary. However, this need not necessarily be an obstacle to linking since there is a penalty for non-compliance which is decoupled from the market price and there is no possibility to opt into the scheme. However, the scheme's small size and short duration of one year for each phase probably render the political effort to negotiate a linkage not worthwhile.

Finally, complete harmonisation of design features is indispensable in very few aspects. This includes a tracking system to record allowance transactions across the schemes as well as a common unit for trading. As to the former, parties to the Kyoto Protocol are required to set up national registries, which have to abide by detailed guidelines in order to secure their compatibility. Therefore, no problems would arise in the case of a linkage between the EU and Canada, Japan, Norway and Switzerland. Yet if Australia or the U.S. wished to link to the EU ETS or another Kyoto ratifier, their schemes would also have to conform to the international requirements.

As far as the need for a common unit of trading is concerned, almost all systems considered rely on the same quantitative basis, one metric tonne of CO_2e. The one exception is the RGGI system which would be based on short tons. Linking would therefore require an exchange rate. Another potential obstacle is the provision of the McCain-Liebermann proposal that would require the EPA to determine the global warming potential of the non-CO_2 gases rather than simply adopt the UNFCCC values.

Apart from the contentious issue of credits from sink projects, allowance trading between the countries that have ratified the Kyoto Protocol would pose little difficulty as transfers of domestic units could be backed up by the Kyoto Protocol's AAUs. By contrast, a link to the non-ratifiers Australia or the U.S. would require gateway mechanisms to avoid that the EU's ability to meet its Kyoto target is compromised by a net inflow of allowances from these countries. While the challenges arising from this are considerable, the political importance of linking to the non-ratifiers could be tremendous.

Apart from the palpable practical benefits that linking ETSs supposedly entails, its importance for the evolution of the international climate regime must not be underestimated. First of all, linking to an Australian or U.S. trading scheme might represent a vital first step to re-engage these countries in the international efforts to mitigate climate change. Such a linkage might serve to create a highly desirable momentum which could eventually lead the way to a climate regime post-2012. This would be especially important with regard to the U.S., the world's largest GHG emitter. Even if a linkage could not be conceived with a federal U.S. scheme, which is unlikely to command the necessary majority in Congress in the near future, linking to a regional trading scheme would equally be of great significance. There seems to be a growing consensus that the most likely approach to international emissions trading for the U.S. would be to first develop a national programme and then negotiate links with other countries, rather than adoption of the Kyoto Protocol (Kruger/Pizer 2004: 4). A link of the EU ETS to the RGGI scheme would be a crucial sign of political support and might help to boost further state-level activity in the U.S. in this field. The recently published RGGI proposal recognises this potential since already at this early implementation stage it explicitly states that EUAs will be eligible for compliance purposes under the scheme if the price of RGGI allowances reaches a predefined level. Hopefully, this impetus from the regional level will in the longer term also contribute to the urgently required shift in Washington's climate strategy.

Second, early linkages between ETSs will be crucial for the development of entity-based international emissions trading, which would provide an institutional substructure to the Party-based international emissions trading based on Article 17 of the Kyoto Protocol. As Egenhofer and Fujiwara point out, "if IET materialises only slowly or not at all [...], linking would be a substitute – at least to some extent – for a top-down emissions trading scheme established by international negotiation." (Egenhofer/Fujiwara 2004: 10-11)

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Contact:
Wolfgang Sterk
Tel. +49-(0)202 2492-149 (-129 Secretariat)
Email
wolfgang.sterk@wupperinst.org
Wuppertal Institute for Climate, Environment and Energy GmbH
Döppersberg 19 - 42103 Wuppertal - Germany

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Annex: Domestic ETS at a Glance

	European Union	Canada	Japan	Norway	Switzerland	Australia	USA (Climate Stewardship Act)	USA (Climate and Economy Insurance Act)	USA (RGGI)
Coverage: **a) Gases**	initially only CO_2	presumably all six Kyoto gases	CO_2 mandatory, others recommended	initially only CO_2	only CO_2	all six Kyoto gases	all six Kyoto gases	all six Kyoto gases	initially only CO_2 (others later)
b) Sectors	emissions from energy production installations with an installed capacity greater than 20 MW, refining of mineral oil, coke production, production and processing of iron and steel, including roasting and sintering of iron ore, and production of cement, lime, glass, glass fibre and ceramic products	ca. 700 companies from the oil and gas sector, electricity generation, mining and manufacturing	companies from all sectors allowed	emissions from energy production installations with an installed capacity greater than 20 MW, refining of mineral oil, coke production, production and processing of iron and steel, including roasting and sintering of iron ore, and production of cement, lime, glass, glass fibre and ceramic products	large companies, groups of consumers of combustible fuels and motor fuels as well as energy-intensive companies with annual emissions of at least 250.000 metric tonnes of CO_2 having committed to an emissions target	stationary energy installations	installations from all sectors (except residiential and agricultural sectors), minimum threshold at 10.000 tonnes of annual CO_2 equivalent emissions	fuel producers and other entities including manufacturers, importers and emitters of non-fuel GHGs	stationary electric power plants (others later)

	European Union	Canada	Japan	Norway	Switzerland	Australia	USA (Climate Stewardship Act)	USA (Climate and Economy Insurance Act)	USA (RGGI)
c) Voluntary or Manda-tory	Mandatory	Mandatory	Voluntary	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory
d) Opt-in, opt-out	limited opt-in and opt-out possible	no details available	not possible	not possible	not possible	no details available	No opt-in, opt-out only possible if granted by EPA	no opt-in opt-out possible for non-fuel regulated entities if granted by Secretary of Energy	no details available
Definition and recognition of trading units	EU Allowances measured in metric tonnes of CO_2e, non-LULUCF, CERs/ERUs	Credits measured in metric tonnes of CO_2e, 'green' AAUs, CERs/ERUs, domestic offset credits, TIF contributions (and PAM credits)	Allowances measured in metric tonnes of CO_2e, CERs	Allowances measured in metric tonnes of CO_2e, CERs, EUAs	Allowances measured in metric tonnes of CO_2e, CERs, ERUs, excluding those from projects using genetically modified or invasive alien species, allowances from other trading systems	Permits measured in metric tonnes of CO_2e, domestic offset credits	Allowances measured in metric tonnes of CO_2e, sequestration credits, domestic offset credits, allowances borrowed from future years, foreign allowances from a linked scheme	Allowances measured in metric tonnes of CO_2e	Allowances measured in short tons, offset credits from RGGI states, limited EUAs, CERs, ERUs

	European Union	Canada	Japan	Norway	Switzerland	Australia	USA (Climate Stewardship Act)	USA (Climate and Economy Insurance Act)	USA (RGGI)
Absolute vs. relative targets	absolute targets	relative targets	absolute targets	absolute targets	absolute targets	absolute targets	absolute targets	absolute targets	absolute targets
Allocation methodology	mostly free distribution	baseline-and-credit system: free distribution	free distribution	free distribution, ex-post adjustment	free distribution, ex-post adjustment till 2010	partly free distribution, partly auctioning	partly free distribution, partly auctioning	91 percent free distribution in 2010 decreasing to 87 percent in 2020 5 percent auctioning in 2010 increasing to 10 percent in 2020 reserve of 3 percent for offsets and 1 percent for early action	25 percent auctioning, remaining 75 percent at discretion of states
Trading period	Phase I: 2005-2007 Phase II: 2008-2012	first trading period 2008-2012	April 2006-March 2007	Phase I: 2005-2007 (Phase II: 2008-2012)	2008-2012	no details available	starting date: 2010, no trading periods	first phase from 2010-2019, from 2020 five year periods	3 year periods starting 2009
Compliance period	annual compliance determination	annual compliance determination	until end of project phase (July 2007)	annual compliance determination	annual compliance determination	no details available	several checks per year	annual compliance determination	no details available

	European Union	Canada	Japan	Norway	Switzerland	Australia	USA (Climate Stewardship Act)	USA (Climate and Economy Insurance Act)	USA (RGGI)
Banking / borrowing	banking possible (except Phase I to Phase II) de facto borrowing possible within trading periods	banking possible borrowing not clear	unlimited banking possible	banking and borrowing possible within trading periods	banking and borrowing possible within compliance period	no details available	unlimited banking possible borrowing possible subject to certain conditions	unlimited banking possible borrowing not clear	unlimited banking possible borrowing unlikely
Compliance framework and penalties	EUR 40 (100) per excess tonne for 2005-2007 (2008-2012) plus surrendering of additional allowances in the next calendar year publication of names of non-compliant operators	safety valve at Can-$15 penalties of $200 per excess tonne of emissions	repayment of all or parts of subsidies from the government publication of names of non-compliant operators	corresponding to EU ETS (EUR 40) per excess tonne plus surrendering of additional allowances in the next calendar year publication of names of non-compliant operators	retroactive payment of CO_2 tax plus interest	no details available, will probably include price cap	thrice the market value per excess tonne of emissions	safety valve at US-$7 increasing annually by 5 percent penalties of thrice the price of safety valve per excess tonne of emissions	thrice the market value per excess tonne of emissions