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**LINKING NON-EU DOMESTIC EMISSIONS TRADING SCHEMES WITH THE EU EMISSIONS
TRADING SCHEME**

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English - Or. English

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FOREWORD

This document was prepared by the OECD and IEA Secretariats at the request of the Annex I Expert Group on the United Nations Framework Convention on Climate Change. The Annex I Expert Group oversees development of analytical papers for the purpose of providing useful and timely input to the climate change negotiations. These papers may also be useful to national policy makers and other decision-makers. In a collaborative effort, authors work with the Annex I Expert Group to develop these papers. However, the papers do not necessarily represent the views of the OECD or the IEA, nor are they intended to prejudge the views of countries participating in the Annex I Expert Group. Rather, they are Secretariat information papers intended to inform Member countries, as well as the UNFCCC audience.

The Annex I Parties or countries referred to in this document refer to those listed in Annex I to the UNFCCC (as amended at the 3rd Conference of the Parties in December 1997): Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, the European Community, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, and United States of America. Korea and Mexico, as new OECD member countries, also participate in the Annex I Expert Group. Where this document refers to “countries” or “governments” it is also intended to include “regional economic organisations”, if appropriate.

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TABLE OF CONTENTS

1. INTRODUCTION	9
1.1 The Kyoto framework for international emissions trading as a context for domestic emissions trading schemes.....	11
1.2 The EU Emissions Trading Scheme (EU-ETS)	13
1.3 Some Basic Principles of Emission Trading Scheme Design	14
1.3.1 Legitimacy of tradable units	14
1.3.2 Well-defined boundaries.....	14
2. IMPLICATIONS OF EU-ETS DESIGN FOR LINKING.....	16
2.1 Coverage of the schemes.....	16
2.1.1 Differences in gases covered	16
2.1.2 Difference in sector coverage	17
2.1.3 Direct vs indirect	17
2.1.4 Opt-in and opt-out provisions	18
2.2 Definition and Recognition of Trading Units	19
2.3 Absolute versus Relative Targets.....	22
2.4 Stringency of targets	23
2.5 Allocation Methodology	25
2.6 Compliance Period, Allowance Validity and Banking	26
2.7 Monitoring, Reporting, Verification and Accounting.....	28
2.8 Compliance Framework and Penalties.....	29
2.9 Summary	31
3. DISCUSSION: POSSIBLE IMPLICATIONS OF LINKING ON NEGOTIATIONS.....	34
4. REFERENCES	36

EXECUTIVE SUMMARY

The EU greenhouse gas (GHG) emissions trading Directive explicitly recognises the potential cost-effectiveness benefits of linking the EU emissions trading scheme (EU-ETS) to other greenhouse gas emissions trading schemes. The directive paves the way for agreements to be made for mutual recognition of allowances with third countries listed in Annex B to the Kyoto Protocol that have ratified the Protocol.

Potential economic benefits arise from the creation of a larger emissions trading market. Giving access to a greater range of emissions abatement opportunities should allow GHG targets to be met at lower overall cost. A larger market should also be more liquid and therefore more efficient in allocating resources in the most cost-effective way.

The Kyoto Protocol defines a context for international emissions trading between Parties, which sets a common backdrop against which domestic emissions trading schemes involving private entities are constructed. Nevertheless, entities' participation in international emissions trading and the actual design of any domestic emissions trading schemes is to be decided by each relevant Party. The extent to which domestic schemes are integrated with international emissions trading is therefore a matter of domestic policy. Linking different domestic GHG trading schemes is also a matter to be decided by relevant national authorities.

This paper presents the key design features of the EU-ETS and shows that there is considerable flexibility to link it to other domestic or regional trading schemes even if they have different designs; the EU scheme does not have to act as a blueprint for other schemes. The extent to which the economic benefits are realised will however depend to some extent on differences in the design details of the two schemes to be linked. Schemes with different designs will lead to different economic and environmental outcomes – although they can still be compatible with national governments' commitments to meet Kyoto targets. Some of these different outcomes would occur whether or not the two schemes were to be linked – this paper focuses primarily on the *additional* effects that may be caused by linking. Where appropriate, the paper makes a distinction between linking issues and implications (i) in the context of the Kyoto Protocol's first commitment period (2008-2012); and (ii) in the context of linking prior to the first commitment period or without entry-into-force of the Kyoto Protocol.

Since many of the key design features of the EU emissions trading scheme are now fixed (notwithstanding some important issues to be resolved at the national level), it is possible to identify some of the main practical issues that will arise when considering linking to a third country's domestic scheme, and these are listed below. All of these issues will be important to resolve. Successful linking should be possible between two schemes with different rules for most of these issues, as long as certain technical fixes are put in place (although different rules on mutual recognition of trading units may be more difficult to reconcile – with different implications in a **with Kyoto** scenario and a **pre- or no-Kyoto** scenario). These fixes will probably mean that the benefits of linking are not as great as they would be with full harmonisation of rules, but there should nevertheless be overall efficiency benefits from linking different domestic schemes.

1. *Coverage of schemes.* Differences in coverage of gases and sectors change the cost of abatement, and will affect carbon prices, but should not cause a difficulty in terms of linking schemes. Care has to be taken in accounting procedures to avoid double-counting of emissions when linking schemes based on

direct emissions (i.e. point of source) with schemes that include indirect emissions - e.g. where emissions from electricity production are assigned to the end-users of the electricity. This can be an issue when accounting for the CO₂ emissions from electricity that is traded across an international border. This need for careful accounting also applies to linking upstream and downstream schemes. As long as this is taken into account, there is no technical reason why a successful link could not be made. Voluntary opt-in and opt-out provisions may allow some opportunity for surplus emissions to be introduced into the scheme if these provisions are not sufficiently stringent.

2. *Mutual recognition of trading units.* Any trading scheme must have clarity on what units are included and what are excluded from the scheme. Even if there are restrictions on the use of certain types of unit within one of the domestic schemes (e.g. certain units are restricted from entering into an emissions registry), the supply of this type of unit into the other domestic scheme will affect the overall level of supply in the combined scheme once they are linked. Rules on the eligibility of different units are critical for the functioning of GHG trading schemes and must be agreed jointly if two schemes are to be linked together; otherwise, the total amount of emissions units in the combined scheme could be greater than if the domestic schemes functioned independently (depending on the relative cost to generate different units) This recognition of units is ultimately a political issue, as it depends on the credibility – actual or perceived – and preferences for different units. There are no obvious technical fixes available to link schemes with different recognition of units. However, there may be different implications in the contexts of **with Kyoto** scenario and **pre- or no-Kyoto** scenario. In a **with Kyoto** scenario, the Kyoto Protocol provides a framework for the recognition of common trading units in the international emissions trading context, although Parties are free to decide on the definition of their trading units in their domestic trading schemes (e.g. for domestic policy reasons). As long as all recognized units in both domestic schemes can be used for compliance under the Kyoto Protocol, linking the EU-ETS with another domestic scheme which includes a broader range of Kyoto units would not compromise meeting national emissions commitments under the Kyoto Protocol. Economic implications would depend on the relative cost of generating the different units. In a **pre- or no-Kyoto** scenario, there is likely to be more work required to arrive at a common definition of trading units, although some aspects of the Kyoto mechanisms could well be preserved in some form. A system for the mutual recognition of national allowances would need to be developed to maintain confidence in the environmental effectiveness of GHG trading between different domestic schemes.
3. *Absolute vs relative targets.* Linking of trading schemes is a win-win solution that would be expected to be economically beneficial in both the EU and the linking country whatever the direction of trade. In a scheme with relative targets, emissions would typically be more or less linked to economic growth, so allowed emissions in the combined scheme could therefore grow as a result of linking. In a **with Kyoto** scenario, where the country linking to the EU-ETS has an overall national emissions target and backs up its GHG trading units with Kyoto units or equivalent, there should not be any environmental compromise associated with linking absolute and relative schemes, since any GHG increases will be offset elsewhere in the economy, or through purchase of Kyoto units. In a **pre- or no-Kyoto** scenario, if there are no national targets in the linking scheme, these increases may not be offset by emissions reductions elsewhere. Technical fixes are available to deal with this problem, although they would tend to increase the complexity and consequently reduce the efficiency of the GHG market, and the scale of the potential problem should be assessed in order to decide whether these fixes are necessary. In both with and without Kyoto scenarios, differences in timing of allocation (i.e. *ex-post* vs *ex-ante*) may also reduce the liquidity benefits of linking relative and absolute schemes compared to the case of linking two absolute schemes, although trades in futures could still occur from the start of the period.
4. *Stringency.* Generally, there should not be any technical problem with linking schemes with different stringency, although the relative stringency of schemes may still be an important political point of linking negotiations (e.g. to seek a level playing field throughout the linked schemes). In a **with Kyoto**

scenario, any over-allocation in the domestic trading scheme would have to be compensated by additional reductions elsewhere in order to meet the national target, which would alleviate any environmental concerns relating to the relative stringency of targets between the two schemes. In a *pre- or no-Kyoto* scenario, as long as targets are stringent enough to be beyond business-as-usual, then broadly speaking the environmental performance of the combined scheme would be comparable to the two schemes operating separately. On the other hand, if the stringency of the linking scheme is so low that more allowances are allocated than are required under business-as-usual, then linking could undermine the environmental performance of the combined scheme.

5. *Updating of allocation.* Differences in methodology between two schemes for the *initial* allocation should not cause a difficulty in linking. There could however be some additional gaming opportunities created by linking two schemes that have different rules on *subsequent* allocations in later periods. This is because the subsequent allocations can take account of emissions in the preceding trading period (i.e. updating), and different rules can therefore lead to different incentives for behaviour during the earlier period. It would therefore be advisable to identify the scale of these potential distortions, and address them if they were thought to be significant.
6. *Banking.* Companies in countries that do not allow banking from one trading period to the next will effectively be able to bank via swaps with companies in countries that do allow banking. Harmonisation of banking rules, or some limitations on banking would therefore be advisable in order to reduce concentration of banking in a few countries. Concentration of banking could cause particular difficulties in a *with Kyoto* scenario when moving into the 2008-2012 Kyoto period as banked allowances would need to be converted to AAU-backed allowances. Similar situations could arise in a transition towards a post-2012 commitment period, as is foreseen in the EU Trading Directive. Suitable fixes can be implemented which would allow this problem to be solved without too many detrimental effects on the efficiency of the market. Market efficiency and liquidity benefits could arise through linking the EU-ETS to a scheme that assesses annual compliance on the basis of a single year's worth of allocated allowances.
7. *Monitoring, reporting and verification (MRV).* MRV is fundamentally important to ensuring confidence and underpinning value in the traded units. In theory, national-level guidance such as that provided by IPCC guidelines and good practice guidance provides a common basis for the development of entity-level reporting schemes, and should act to limit the extent to which MRV schemes at the entity level differ from country to country – although differences could still occur in practice. Differences in MRV process or even to some extent accuracy may not matter as long as these differences do not undermine the recognition of other schemes' units and market confidence.
8. *Penalty regime.* The EU scheme's fixed penalty rate does not release installations from the need to cover its full emissions each year with allowances, and there is therefore no direct link between the level of the penalty and the price of allowances on the market. Linking to a scheme with a similar fixed penalty with emissions restoration regime should not be a problem, even if the level of the penalty is different, as it does not distort the market price. Other arrangements could allow for a fixed price to be paid which then releases the emitter from any further liability in relation to those emissions. This would result in a price-cap on the market. It would not be straight-forward to combine the fixed penalty type compliance regime of the EU-ETS with a scheme that has a price cap, without putting in place technical fixes that could ultimately split the market, and reduce the efficiency benefits of linking.

In addition to these specific issues arising from linking domestic schemes, there are also some broader policy implications of the linking process. Recognition of units may be one area where harmonisation is necessary, and any restrictions on the use of certain trading units in a linked trading scheme could have

important implications for the availability and price for those units in the wider international emissions trading markets which could affect governments' compliance costs.

The bottom-up process for carrying out bi-lateral, tri-lateral and multi-lateral negotiations as the scheme gradually expands membership is not clear and could take various forms. In principle, however, the Party involved in the first bi-lateral negotiations with the EU should have more flexibility than Parties entering later in tri-lateral and multi-lateral negotiations, and this could create an incentive to be first-in-line to negotiate linking. Along with first-mover advantage however, also comes first-mover risk. Balanced against the incentive to be first-in-line is an incentive to wait and see how the EU-ETS evolves, and to learn lessons from its early experience. Nonetheless, incentives to link with the EU-ETS would remain in order to reap the economic benefits from a broader GHG scheme without compromising the overall GHG objectives.

1. Introduction

A greenhouse gas (GHG) emission trading scheme is an economic instrument that enables meeting GHG targets cost-effectively. Such a scheme can reduce the overall cost¹ of complying with an emissions constraint, by taking advantage of differences in marginal abatement costs across different emission sources. Opportunities for cost savings are greatest when mitigation costs differ widely among sources covered by trading schemes, and thus create an economic incentive to link different domestic GHG trading schemes (Baron and Bygrave, 2002). The economic theory of "comparative advantages" demonstrating that countries benefit and prosper economically from international trade, relative to no trade, also applies to the trading of emissions units.

With the adoption of the EU directive (EC 2003b) establishing a scheme for greenhouse gas emissions trading, the EU is set to become the world's largest market for company-level emissions trading, with an allocated volume of allowances expected to be around 1500 MtCO₂, approximately 45% of current EU emissions (IEA 2003). If the EU emissions trading scheme (EU-ETS) proves successful, there may be bilateral interest in linking it to the domestic schemes of other non-EU countries. Several non-EU countries have plans to introduce domestic emissions trading (DET) schemes, and in principle at least, there are benefits to linking such schemes together. The broader the coverage of an emissions-trading scheme, the greater the potential for economic efficiency gains of the scheme in terms of lowering overall compliance costs. In practice, the extent to which these benefits are realised will depend on the details of their design. This paper considers three types of effects from linking:

- **Efficiency of the emissions trading market.** The larger and more liquid a market, the more efficiently it will allocate resources towards the least-cost abatement options.
- **Economic effects.** Linking two schemes should lead to overall economic benefits at the macro level, because it gives the participants access to a broader range of emission reduction opportunities, and lowers the overall cost of compliance, although there may be winners and losers as a result of linking.
- **Environmental performance.** We look at whether linking would lead to an aggregate emissions level which is the same as the two separate schemes, or whether linking causes the aggregate emissions level to be higher or lower than the two separate schemes.

If emissions trading schemes are well functioning and sufficiently liquid, then linking of two domestic emissions trading schemes should result in a single carbon price across the combined scheme. Assuming that the carbon prices in the two separate schemes would have been different if they had remained apart, then linking implies that the price will rise in one scheme, and fall in the other. There will be winners and losers from these changes. Specifically, net sellers in the cheaper scheme will be better off in the linked scheme, whereas net buyers in the cheaper scheme will be worse off in the linked scheme as a result of the relatively higher price. Conversely, net sellers in the more expensive scheme will be worse off in the linked scheme, and net buyers in the more expensive scheme will be better off as a result of the relatively lower

¹ The economic attractiveness of emissions trading schemes does not mean that significant emission reductions can be obtained without costs (e.g. Ellerman et al. 2003). Entities covered by a domestic trading scheme may not wish to rely for too long on purchasing emission reductions from the market, given emission unit supply and price uncertainties. Typically, companies would tend to prefer purchasing emission units as a lower-cost transition strategy until it becomes feasible to shift their own internal operations to lower greenhouse gas emitting options. This can help to avoid economic losses associated with retiring capital prior to the end of its economic life (Bygrave and Bosi, 2004).

price. Nevertheless, total compliance costs in the combined scheme will be lower than if the two schemes functioned independently². Both economies should also benefit overall from such trading.

This paper takes as its starting point that linking is generally positive for the efficiency of the market, has positive overall economic effects, and is broadly neutral for the environment (since DETs are tools to meet pre-set GHG targets). We pay particular attention to those features of DET scheme design that could change these assumptions – i.e. features that could reduce the expected efficiency and economic gains of linking, and could make the overall environmental performance of the combined scheme lower than the separate schemes.

The EU-ETS has fixed many of its design characteristics, although some significant aspects are to be set at the Member State level. Nevertheless, enough is now known about the shape of the scheme to warrant some investigation about the implications of its design for linking to other countries' trading schemes. Such linking is explicitly catered for in the EU Directive (Article 25), although it specifies that such links would be restricted to Annex I countries that have ratified the Kyoto Protocol³.

Uncertainty over the entry-into-force of the Kyoto Protocol does not necessarily prevent progress being made on the establishment and linking of domestic schemes. Domestic emissions trading schemes are by definition domestic policy measures over which national governments have full control. The EU-ETS is now part of EU legislation, and can proceed with or without entry into force of Kyoto. The political decisions by other countries to ratify the Kyoto Protocol have set in motion domestic strategies to meet the Kyoto Protocol targets. In many cases, strategies and efforts to meet these targets are expected to continue irrespective of the fate of the Protocol. Nevertheless, entry or non-entry into force will still be a significant factor in any negotiations between countries wishing to link, since the Protocol, through its legally-binding emission targets and provisions for international emissions trading, would provide an important backdrop to any combined scheme.

This paper explores each of the main design features of the EU-ETS, and for each in turn assesses the implications for linking to another scheme according to the above three considerations (i.e. environmental, efficiency, and economic effects). Section 2 looks at the implications of the design for linking, making a distinction between (i) linking during the Kyoto Protocol's first commitment period (i.e. 2008-2012) and (ii) linking either prior to the start of the first commitment period or in the event of non entry-into force of the Kyoto Protocol⁴. Finally, section 3 provides a summary of the key issues that could arise in negotiations on linking with the EU-ETS. The paper builds on previous work on linking domestic GHG trading schemes (e.g. Haïtes & Mullins 2001, Baron & Bygrave 2002), but applies the analysis specifically to the context of linking a non-EU country's scheme to the EU-ETS.

² Meeting an overall GHG target via emissions trading schemes will lead to lower emission levels (than demanded by the target) in countries/entities with lower marginal abatement costs and higher emission levels in countries/entities with relatively higher marginal abatement costs. From a national government's perspective therefore, linking to another national scheme removes the assurance that emissions reductions will occur within its own national boundary. Although linking should improve the overall efficiency of meeting combined GHG targets, and allows companies a smoother transition towards a low carbon economy, it may have implications for other policy objectives (e.g. complementarity).

³ The 2004 'Linking' Directive opens the door to considering 'the recognition of allowances between the [EU] Community scheme and mandatory GHG emissions trading schemes capping absolute emissions within [countries which have not ratified the Kyoto Protocol]' – but only once the Kyoto Protocol has entered into force.

⁴ At the time of writing this study, the Kyoto Protocol had not entered into force.

1.1 The Kyoto framework for international emissions trading as a context for domestic emissions trading schemes

The Kyoto Protocol establishes, in its Annex B, quantified emission targets for industrialised countries and countries with economies in transition (so-called Annex B Parties) in the form of an absolute emission cap for each Party for the 2008-2012 commitment period. Emissions allowed by each Annex B Party are referred to as assigned amount units (AAUs), whereby one AAU is equal to one metric tonne of carbon dioxide equivalent. Using AAUs from different Annex B Parties for compliance, as well as other Kyoto units, i.e. certified emission reductions (CERs), emission reduction units (ERUs), and removal units (RMUs), is allowed. Article 3.1 of the Protocol in fact stipulates that Parties shall “individually or jointly” ensure that their greenhouse gas emissions do not exceed their assigned amounts, “with a view to reducing their overall emissions [...] by at least 5 percent below 1990 levels⁵ in the commitment period 2008 to 2012”. Each Annex B Party must thus cover its emissions of GHGs by an equivalent amount of Kyoto units.

The Kyoto Protocol, through its Articles 17, 3.10 and 3.11, allows for international emissions trading and the transfers and acquisitions of parts of assigned amount between Annex B Parties to the Protocol. Similarly, the Kyoto Protocol also allows counting emission units generated through the Kyoto Protocol’s project based mechanism (i.e. CERs from Clean Development Mechanism project-based activities and ERUs from Joint Implementation project-based activities) against Annex B Parties’ emissions targets. These provisions should allow for more cost-effective mitigation actions being undertaken, regardless of their location, thereby reducing the overall compliance costs without compromising the overall Kyoto emissions target.

Following the adoption of the Kyoto Protocol, the 2001 Marrakech Accords elaborated modalities, rules and procedures to govern the functioning of international emissions trading. These seek to clarify practical issues surrounding participation in international emissions trading while creating incentives to meet the overall Kyoto Protocol target. The Marrakech Accords also confirm the fungibility of the different Kyoto units for the purpose of compliance with Annex B Parties’ emissions commitments. In other words, every AAU, CER⁶, ERU and RMU⁷, regardless of its origin, is considered equivalent for compliance purposes under the Kyoto Protocol, and can offset one tonne of carbon dioxide equivalent from any Annex B Party’s emissions (as calculated in its GHG emissions inventory).

According to the Marrakech Accords, each Party seeking to participate in international emissions trading must meet the following eligibility criteria (FCCC/CP/2001/13/Add.1):

- 1) be a Party to the Kyoto Protocol;
- 2) calculate and record its assigned amount according to specified modalities;
- 3) have a national system for the estimation of GHG emissions by sources and removals by sinks;

⁵ This assumed participation of all Parties listed in Annex B of the Kyoto Protocol. Since then, the United States and Australia announced that they did not intend to ratify the Kyoto Protocol.

⁶ Unlike other non-forestry related CERs, ‘Temporary CER’ (tCER) and ‘long-term CER’ (lCER) from afforestation or reforestation project activities under the Clean Development Mechanism are of a temporary nature (FCCC/CP/2003/6/Add.2).

⁷ RMUs can be issued by Annex B Parties and used towards compliance with Kyoto targets. Unlike the other Kyoto units, RMUs represent a temporary emission reduction, so Parties that issue RMUs have to account for this non-permanence within their overall national-level cap.

- 4) have in place a national registry, in accordance with specified requirements;
- 5) have submitted annually the most recent required GHG emissions inventory; and
- 6) have submitted supplementary information on assigned amounts, in accordance with the relevant provisions of the Kyoto Protocol.

National registries are critical for the actual linking of Annex B Parties' AAUs and other Kyoto units. Their purpose is to ensure accurate accounting of the issuance, holding, transfer, acquisition, cancellation and retirement of Kyoto units, as well as their carry-over (i.e. banking)⁸. In fact, at its first session, the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (COP/MOP) – which is to occur once the Kyoto Protocol enters-into-force - is to adopt the design requirements for the technical standards for data exchange between registry systems under the Kyoto Protocol in order to allow international emissions trading to occur in practice as soon as possible.

The Marrakech Accords allow each Party to authorise legal entities to participate in international emissions trading, but specify that it is the Party that remains responsible for the fulfilment of its obligations under the Kyoto Protocol. Whether and which entities are to participate in international emissions trading, and the modalities for their participation are decisions left up to each Annex B Party. Moreover, legal entities may not participate in international emissions trading under the Kyoto Protocol during any period of time in which the authorizing Party does not meet the eligibility requirements or has been suspended.

To reduce the risk that participation in international emissions trading ends up compromising meeting Kyoto commitments, e.g. through over-transfers of AAUs, the Marrakech Accords include an obligation for each Annex B Party to maintain, in its registry, a commitment period reserve (CPR). The CPR is to consist of the appropriate amount of Kyoto units. Whether and how the CPR affects entities' participation in international emissions trading is also up to each Annex B Party to decide.

The Kyoto Protocol and its Marrakech Accords also include provisions and obligations for monitoring, reporting, verification and review, as well as compliance provisions, at the level of Parties, which are all important elements of the framework for international emissions trading. Whilst this provides an important framework, actual methodologies for calculating and reporting entity-level emissions may differ substantially from the national-level reporting protocols.

In summary, the Kyoto Protocol provides the framework and the rules for international emissions trading – as well as a legally-binding emissions target for each Party – thereby facilitating linking domestic trading schemes during the Protocol's 2008-2012 commitment period. But it is left to the discretion of each Annex B party whether and how it may implement a domestic emissions trading scheme for participation by its legal entities⁹, and the extent to which this domestic emissions trading scheme is integrated into the international emissions trading structure.

⁸ Banking from one commitment period to the next is allowed for certified emission units (CERs), Emission reduction units (ERUs) and assigned amount units (AAUS) but not for removal units (RMUs).

⁹ A domestic GHG emissions trading scheme in the context of this study has the following main characteristics: the appropriate government authority decides on the allowable GHG emissions by its entities and allocates, e.g. through grand-fathering or auctioning, allowances accordingly to the entities. However, it is possible that a national government may choose a different means of allowing its entities participate in emissions trading. For example, it would also be possible for a government authority to avoid the allocation process, but impose an obligation to cover all their emissions with Kyoto units which can be purchased on the international market. Linking in this context may warrant further examination.

1.2 The EU Emissions Trading Scheme (EU-ETS)

The EU emissions trading scheme is set to become a major pillar of the EU's approach to climate change mitigation. The Directive 2003/87/EC which establishes the scheme was issued in September 2003, with a planned start date of the scheme of 1 January 2005. The scheme initially specifies two periods, the first from 2005-2007, the second from 2008-2012 (corresponding to the first commitment period of the Kyoto Protocol). Compliance is required on an annual basis within these periods, but the allocation of allowances will be decided separately for the two periods.

For the second period, transfers of EU-ETS allowances between installations in different Member States involve a corresponding adjustment of assigned amount units under the Kyoto Protocol. However, under the EU-ETS, entities are not engaged directly in the international emissions trading regime as set out under the Kyoto Protocol described in the previous section. The allowances that entities will trade between themselves, whilst having a one-for-one equivalence with Kyoto units, will not be fully exchangeable with all Kyoto units, and will be tagged to keep their identity distinct. This allows the EU to use a different definition of what is allowed to be traded within the scheme, and keeps the scheme distinct from international emissions trading.

The Directive sets out some of the key design features of the emissions trading scheme, which are described in more detail in Section 2. One of the key elements defined by the Directive is the unit of trade. This is referred to in the directive as an 'allowance', and covers one tonne of carbon dioxide equivalent. The Directive allows for units to be introduced into the scheme, and converted to EU allowances under certain conditions, notably from JI and CDM projects, and from linked domestic trading schemes. The details of these links are yet to be fully defined. However, the EU-ETS Directive does not mention Kyoto assigned amount units (AAUs), implying that entities in the EU-ETS will not be able to purchase AAUs directly to cover their emissions.

The process of allocation is to be left to the Member States, who should submit National Allocation Plans (NAP) to the EU Commission by the end of March 2004. These NAPs will specify the allowed emissions level for each covered installation in that country. A number of important design details will either be contained in those plans, or will otherwise be determined at the Member State level:

- Allocation methodology
- Treatment of new entrants
- Treatment of plant closure
- Updating of allocation in the second period to account for emission reductions made in the first period
- Rules on banking between the first and the second period
- Nature of the allowance and tax treatment
- Detailed definitions of coverage

These are important issues to resolve in order to determine the impact of the EU-ETS on the covered sectors. Although European Commission guidance has been issued (EC 2003c) to Member States to assist with developing these NAPs, there is nevertheless considerable flexibility in approach on these issues, and it is possible that a variety of approaches will be taken. Where these differences are important in terms of linking to a third country's domestic emissions trading scheme, these are brought out in the discussion.

1.3 Some Basic Principles of Emission Trading Scheme Design

There are many different options for emission trading scheme designs, but some key principles are prerequisites if trading schemes are to achieve environmental goals. These principles can broadly be divided into two groups; the first relates to the legitimacy of the tradable units within the scheme, and the second relates to the boundaries of the scheme (DEFRA 2003). It is useful to keep these principles in mind when considering the potential effects of linking two schemes with different designs to ensure that the combined scheme would also satisfy the principles.

1.3.1 *Legitimacy of tradable units*

In any sound trading system, the commodity to be traded must either have an inherent value of its own (e.g. bananas, oil, etc.), or the units being traded must have legitimacy conferred on them by some other means. For example, national currencies are considered legitimate as they are backed up by government's record on management of the national wealth. In an emissions trading scheme, the units in themselves have no inherent value; they only have value in the context that they can be credited against a target for which non-compliance carries a penalty¹⁰. The legitimacy of the emissions trading units typically requires a number of conditions to be met:

1. Ideally, the units should represent the same quantity throughout the trading system (i.e. 1 tonne CO₂ eq. = 1 tonne CO₂ eq. whatever its source).
2. The rules of the scheme should be sufficiently stable to establish confidence in the value of the units, and ideally allow creation of a forward price curve to allow sound decision making and risk management.
3. The liability against which the units can be redeemed should be well defined. This requires the compliance regime to be well defined.
4. Emissions levels need to be verifiable, using consistent and transparent methodologies for measurement and reporting.
5. The process for issuing units should be clear and predictable, and the registry and systems for tracking transactions should be secure and designed to prevent fraud.

1.3.2 *Well-defined boundaries*

Generally, the more sectors and gases that are covered in an emissions trading scheme, the greater the potential for liquidity and market efficiency, and the lower the total cost of compliance - this is the main rationale for linking different schemes. Nevertheless, the boundary of trading systems needs to be well defined.

As described above, the value of the units in an emissions trading scheme is tied to the ability to use those units to satisfy an emissions target, in the context of some compliance regime. For countries that are bound by a target under the Kyoto Protocol, the obvious boundary for a domestic emissions trading scheme would be the national boundary so as to ensure that emission reductions from the scheme contribute towards the

¹⁰ Experience is developing with the voluntary Chicago Climate Exchange, where no penalty regime has been defined as yet, but the Executive Committee is to decide on consequences in the event of non-compliance. This scheme is sustaining a positive unit price, although it is still early to assess how well such a voluntary scheme will function.

Kyoto target. Alternative approaches can be conceived. One example is the Chicago Climate Exchange, whose membership is self-selecting, and is not limited to the USA. Another alternative to schemes with national boundaries would be a scheme based on multi-national sector-wide targets, where all companies carrying out a particular activity could be included wherever they were located physically.

In isolation, a trading scheme may be able to operate without well-defined boundaries. However, the boundary definitions become very important when considering linking different schemes together. The key issues are:

1. Within the scope of the scheme, coverage of companies / sectors should be complete (subject to possible size thresholds). If companies are allowed to choose particular installations to be included in the scheme, they might only choose those where relatively easy emissions reductions can be made, whilst allowing emissions from their non-covered installations to continue to expand. Such 'cherry-picking' opportunities undermine the environmental effectiveness of the trading scheme.
2. Companies or installations should only be allowed to count emissions reductions once. Particularly in the context of linking two schemes, the avoidance of double-counting of emission reductions is important for maintaining the legitimacy of the trading units. In the case of linking two schemes that are based on national boundaries, this shouldn't pose too much of a problem, as the location of the installations should be well defined. However, trade of products with greenhouse gas implications for installations covered in both the exporting and importing countries' schemes (e.g. energy) would need to be handled with careful accounting measures. Linking national-based schemes to other types of scheme (e.g. sectoral schemes) on the other hand could cause problems with regard to double-counting.
3. If meeting targets under an emissions trading scheme adds to the cost of production, there may be an incentive to move the affected economic activity outside the system. In this case, global emissions may not be reduced, even if the emissions within the trading scheme are reduced. (However, it must be noted that many factors influence decisions on the geographic location of economic activities). These so-called activity leakage¹¹ effects are to some extent unavoidable in an emissions trading system that does not include all countries. However, such activity leakage from a trading scheme can also occur *within* a given country. For example, if companies are allowed to receive credit for plant closure, whilst simply replacing the production capacity with new plant that is either opted-out of the scheme or is given a new free allocation, then the DET scheme would reward actions that do not lead to any emissions reductions. Such 'internal' activity leakage depends on the rules of the DET scheme. Efforts should be made to minimise such perverse incentives, as it undermines the scheme's environmental effectiveness.

¹¹ This is different for the concept of "emissions leakage" associated with non-accounted emissions resulting from a project-based activity.

2. Implications of EU-ETS Design for Linking

In this section, each of the key design elements of the EU-ETS is examined to identify the implications for linking to other (non-EU) domestic emissions trading schemes. For each design element, there are some issues that arise specifically during the Kyoto Protocol commitment period, and others that arise either before the commitment period, or in a situation where the Kyoto Protocol does not enter into force. Both of these cases are explored where relevant.

2.1 Coverage of the schemes

The EU-ETS covers CO₂ emissions from large combustion installations (>20MW_{th} rated input) from all sectors, plus emissions from oil refineries, coke ovens, and the iron and steel, cement, lime, glass, ceramics, and pulp & paper sectors (coverage of these sectors is subject to certain size criteria).

The coverage of the EU-ETS reflects quite closely the coverage of an earlier Directive on Integrated Pollution Prevention and Control (European Council 1996). It is a 'downstream' trading system, in the sense that it covers the point of emission of greenhouse gases.

However, starting in 2008, the EU Trading directive does allow Member States to include other installations and GHGs, provided these have been approved by the Commission.

There are in fact two broad variations to the initial EU-ETS coverage that could exist in another country's domestic scheme. Firstly, the coverage of gases could be broader, for example including all six Kyoto gases. Secondly, the scope of the scheme could be different. This could encompass a major difference in design (e.g. upstream instead of downstream), or the scheme could still be downstream, but have a different scope of industries included.

2.1.1 Differences in gases covered

For comprehensiveness and cost reasons, six greenhouse gases were included in the Kyoto Protocol. In many countries, the reduction of non-CO₂ greenhouse gases is more cost-effective than the reduction of CO₂ emissions¹². Inclusion of non-CO₂ should therefore allow entities to meet their targets at lower cost. The disadvantage is that non-CO₂ emissions are often harder to calculate, involving greater uncertainties. This is the main reason why they were excluded from the EU-ETS. Inclusion of the additional gases therefore introduces more uncertainty into the system, but as long as they are sufficiently verifiable to maintain the legitimacy of the traded units, i.e. via accepted and transparent methodology, there is no technical reason why two schemes with different coverage of gases should not be linked.

In environmental terms, linking the EU-ETS to a scheme with all six gases would produce the same environmental benefit at lower cost. A difference in coverage of gases should not detrimentally affect the efficiency improvements associated with linking, assuming that any additional measurement efforts were not prohibitively expensive. In terms of economic effects, the inclusion of lower cost abatement options should reduce the overall cost of meeting a given emissions target. There may be some comparative advantage for the companies in the scheme with the wider coverage, since their access to the lower cost

¹² This is perhaps even more pronounced in non-Annex I countries.

options might increase their ability to sell allowances on the wider scheme. But these comparative advantages would occur anyway, irrespective of whether the schemes were linked or not., and the lower overall cost of allowances would also indirectly benefit EU companies.

2.1.2 Difference in sector coverage

The EU-ETS is a downstream scheme, where allowances are allocated to installations based on their direct emissions at point of emission¹³. Other possible designs include upstream schemes that allocate allowances at the point of entry of a fossil fuel into a country's energy system. Differences in sector coverage between two schemes may also arise simply as a result of political decisions in the country about which sectors should be covered by the DET scheme.

Any differences in the stringency of targets for companies inside a trading scheme compared to companies outside a trading scheme would exist whether or not the schemes were linked. Differences in coverage should not therefore be a barrier to linking.

However, it will be important to avoid any double-counting that might arise as a result of linking schemes with different coverage. Problems with double-counting should be avoidable as long as the boundaries of the two schemes to be linked are clearly defined, and there is a proper accounting of emissions in place. For example, GHG emissions associated with the consumption of exported energy products from a country with an upstream scheme should not be counted in the exporting entities' emissions inventory (this would be consistent with IPCC Guidelines on national GHG emissions inventories).

Similarly, it should not be possible for a single installation to participate (either directly or indirectly) in two schemes. For example, a company in an upstream scheme that produces a fuel that is less GHG emitting may claim the emissions reductions associated with the consumption of that fuel in its own domestic market, but should not also be able to claim the reductions associated with consumption of that fuel by companies in the linked downstream scheme.

2.1.3 Direct vs indirect

A possible emissions trading scheme design is to assign the emissions from electricity generation to the end-users of the electricity. Participants in such a scheme therefore count not only the direct emissions from their own site, but also the indirect emissions associated with their electricity consumption (such an approach can also be applied to steam or heat generated off-site).

Linking the EU-ETS to a scheme that includes these indirect emissions is possible, as long as double-counting is avoided by having appropriate accounting procedures. Since the CO₂ associated with electricity production within the EU-ETS is strictly accountable on the site of production, any electricity exports to countries outside the EU will essentially be accounted as carbon-free (as the CO₂ would already be accounted for in the electricity generation stage). This would have the effect of reducing the grid's average emission-factor for electricity consumption in any importing country with an indirect trading scheme. Adjustments would have to be made to the way carbon was accounted for in the indirect scheme if this effect was expected to lead to systematic errors over a long time period.

¹³ Covered activities include Energy activities, productions and processing of ferrous metals, the mineral industry, and industrial plants for the production of (a) pulp from timber or other fibrous materials and (b) paper and board. Details of the type of installation covered in each of these activities is included in Annex I of the Directive.

2.1.4 Opt-in and opt-out provisions

The EU-ETS allows Member States to opt-in, from 2008, activities, installations and greenhouse gases which are not listed in the Directive. From 2005, Member States may opt-in installations that are carrying out activities listed in the Directive, but which are below the size threshold for automatic entry to the scheme. Conversely, the EU-ETS allows Member States to opt-out installations for the first trading period, up to the end of 2007, but there is no opt-out allowed for the second period from 2008-2012.

Opt-in provisions have benefits in terms of increasing the supply of allowances, incentivising abatement in installations/sectors not initially included in a trading scheme, in familiarising participants with the requirements of emissions trading, and reducing compliance costs (Ellerman et al., 2003, Sorrell 2003).

The decision of an installation to opt-in to an emissions trading scheme will depend on three factors: the allocation of allowances it would receive compared to its current emissions, its cost of abatement compared to the market price, and the cost of compliance with any alternative policy that it might face if it stays outside the scheme.

If an installation can voluntarily opt-in to a trading scheme, it will do so *if the total compliance cost of being inside the scheme is lower than the compliance cost of being outside the scheme*. This might be the case for example for an installation that has a significant compliance burden outside of the emissions trading scheme, but whose cost of abatement was significantly lower than the market price in the trading scheme. There would then be an incentive to join if it was given sufficient allowances to allow it to become a net seller in the trading scheme. These incentives could be affected by changes in market prices resulting from linking two schemes. By opting-in, the installation would lower the average abatement costs of sectors within the trading scheme, and would increase the average abatement costs of sectors outside the scheme. If there is a significant degree of opt-in resulting from overly generous permit allocations, all else being equal, this could result in higher overall levels of emission compared to a system without opt-in provisions, since the over-allocation would essentially represent additional emissions that would otherwise not have occurred. The implications of this under a with-Kyoto and without or pre-Kyoto situation are described below.

Likewise, opt-out provisions in an emissions trading scheme allow installations and/or sectors to withdraw or be excluded from that scheme. Where an entity can move to a less stringent compliance regime (which could be a likely motivation for opting-out), all else being equal, this will result in an overall increase in emissions compared to a system without opt-out provisions. The implications of this under a with-Kyoto and without or pre-Kyoto situation is described below.

A purely voluntary opt-out mechanism effectively makes the trading scheme as a whole voluntary. This would lead to a concern that the scheme would only attract net sellers, and would raise concerns about the stringency of targets taken on in such a scheme¹⁴. Some restriction on opting-out would likely therefore be needed in order to make a link with the EU-ETS, to provide assurance that the opting-out installations were covered by some other measures that would ensure environmental integrity of the system, and also that linking two schemes enables the creating of an efficient market.

With Kyoto Scenario

¹⁴ Again, the Chicago Climate Exchange (CCX), a voluntary scheme, has started generating trades in GHG units. It is still too early, however, to assess its environmental performance compared to what would have happened without the scheme.

In the case where countries have to meet an overall national emissions target, an expansion of emissions arising for example from overly generous voluntary opt-in or opt-out procedures, would imply the need to achieve additional reductions in non-covered sectors, or alternatively the need to purchase additional foreign credits. In this case, as long as countries are committed to meeting a target, and the emissions trading scheme units were backed-up with Kyoto units or equivalent, then there should be no environmental concern in linking the EU-ETS to another scheme with different rules on opt-in or opt-out. However, by reducing the scope of the trading scheme, allowing opt-out also has implications for efficiency of the trading scheme.

Pre-Kyoto, or no Kyoto Scenario

If on the other hand there is no effective overall target enforced at the national level, then overly-generous opt-in or opt-out provisions could result in poorer environmental performance. In this case, linking countries may wish to introduce provisions to prevent an allocation above BAU for installations deciding to opt-in, and restrict the extent to which companies can voluntarily opt-out of the scheme.

2.2 Definition and Recognition of Trading Units

The EU-ETS defines an allowance as the unit of trade specifically within the context of the emissions trading directive, i.e. an EU allowance. Each EU allowance – allocated by Member States to installations within their national boundaries - allows the operator of a covered installation to emit one tonne of CO₂ during a specified period. Each year, operators must surrender the number of EU allowances equal to the installations' total emissions. Allowances may be transferred between any persons or legal entities within the European Community, and may be cancelled at any time at the request of the person holding them.

The EU-ETS also recognises the use of other emission units, i.e. units that are eligible towards compliance in the EU-ETS. The recently finalised so-called “Linking” Directive¹⁵ allows CERs from CDM projects and ERUs from JI projects to be used to cover emissions from the EU-ETS installations. The use of these units is subject to a quantified limit to be decided by each Member State - so that the use of the project-based mechanisms is supplemental to domestic action. Moreover, the EU Linking Directive puts restrictions on the use, within the EU-ETS, of CERs and ERUs generated by certain types of project activities. These are CERs and ERUs from nuclear projects¹⁶ as well as from land-use, land-use change and forestry (LULUCF) activities - at least until 2008 (the Commission is to review this issue in 2006).

In addition, under its Article 25, the Directive provides for “the mutual recognition of allowances between the Community scheme and other greenhouse gas emissions trading schemes...”. If and once the EU-ETS links with another country's emissions trading scheme, allowances from that scheme (e.g. country X allowances) could also be used by EU installations' operators for purposes of compliance with the EU-ETS. However, the Directive does not mention the possibility for installations to use AAUs. The implication is that AAUs are therefore not recognised for purposes of compliance of *individual installations* covered by the EU-ETS - although clearly *Member States* may participate in international emissions trading, and thus transfer and acquire AAUs for purposes of meeting their overall national Kyoto commitment.

This means that each year, operators of installations covered by the EU-ETS must show compliance by surrendering sufficient EU allowances, eligible CERs and/or ERUs (up to a certain limit to be defined by

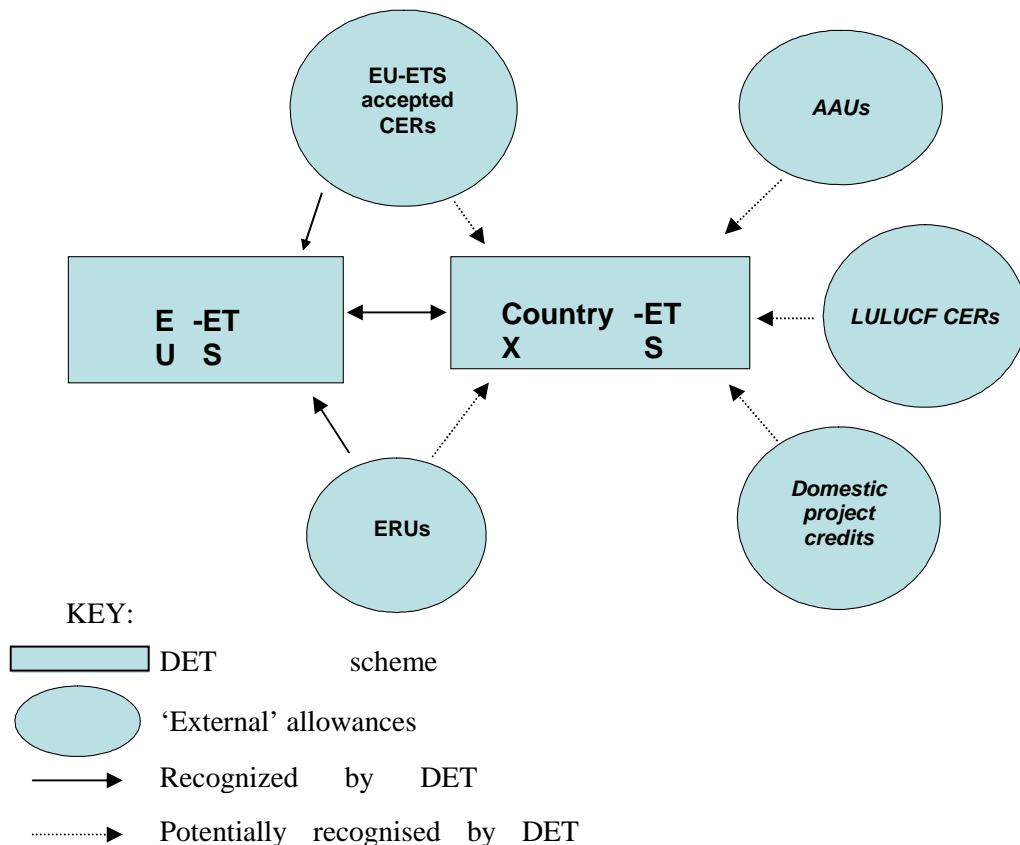
¹⁵ See Bygrave and Bosi (2004) for more discussion on the EU Linking Directive.

¹⁶ The 2001 Marrakech Accords stipulate that Annex I Parties “are to refrain from using CERs generated from nuclear facilities” to meet their Kyoto commitments (Decision 17/CP.7).

each Member State), and/or linked country X-allowances. Linking the EU-ETS with a scheme that has a different recognition of “external” units could have implications for the EU-ETS. As illustrated in Figure 1, the supply of eligible units into the Country X ETS will affect total unit supply in the combined scheme. If total supply into the combined scheme is high relative to the combined demand, prices will tend to drop, whilst if total supply into the combined scheme is low relative to the combined demand, the prices will tend to rise. So, although EU Member States can restrict the flow of particular units into their own scheme, these units could still affect the EU scheme *indirectly* if they enter the linked country-X’s scheme.

For example, units that are eligible in the linking Country-X domestic emissions trading scheme, but not eligible under the EU-ETS (e.g. LULUCF CERs and AAUs in Figure 1), could still be used to offset some of the EU-ETS installations’ emissions, even though they would not physically appear in any EU Member State’s registry. This could occur because Country-X installations could keep their non-EU-ETS-eligible units for their own domestic compliance, and transfer only EU ETS-eligible units to EU installations. Similarly, if the domestic emissions trading scheme of Country-X were itself already linked to a Country-Y domestic trading scheme, the Country-Y allowances scheme could also indirectly affect the EU-ETS by freeing-up Country-X allowances which could then be transferred to the EU-ETS. The total amount of emission units made available in the combined scheme could thus be greater than if the two schemes functioned independently if units not eligible in the EU ETS are cheaper than EU ETS-eligible units.

Figure 1: Example of Linking EU-ETS with a Domestic Trading Scheme with different recognition of units



If the price of “external” credits is low relative to the price of allowances within the domestic trading schemes, there will be a demand for them. The flow of credits into the trading schemes will then depend

on any restrictions that are incorporated into the rules of the schemes. Such restrictions may for example be placed for domestic policy reasons including potential concern over environmental effectiveness of certain allowances, or the need to respect the principle of complementarity as defined in the Kyoto Protocol and the Marrakech Accords. The presence of the Kyoto Protocol provides an important background for the recognition of allowances, so the two scenarios of with and without Kyoto are explored further below.

With Kyoto Scenario

In the period 2008-2012, the transfer of EU allowances between installations in different Member States is backed up by a corresponding adjustment of AAUs under the Kyoto Protocol. Although not specified in the Directive, an equivalent system of backing up a non-EU domestic scheme's allowances (e.g. "country-X allowances") with AAUs would also likely be a pre-requisite for linking with the EU-ETS. This would ensure correlation between the country's overall allowed emissions under the Kyoto Protocol and the trading scheme's allowances, and a common basis for trading.

Under the Kyoto Protocol, some Annex B countries (e.g. several countries with economies in transition) have been allocated emissions commitments that are well above their projected emissions for 2012, leading to what is referred to as "surplus" units, which could be supplied on the international market at a low cost. With the Kyoto Protocol's entry-into-force, these surplus AAUs would be valid – as all other Kyoto units – for the purposes of meeting the Kyoto targets. Linking the EU-ETS with a country-X scheme that recognises all Kyoto units, regardless of their origin, could, as mentioned above, indirectly affect supply of allowances in the EU-ETS; but it would not compromise meeting emissions commitments under the Kyoto Protocol.

According to the principle of fungibility between Kyoto units (i.e. AAUs, CERs, ERUs, RMUs) enshrined in the 2001 Marrakech Accords, these units are all equivalent for purposes of compliance, and there would be no adverse environmental consequences of allowing them into a trading scheme; i.e. the Kyoto target would not be compromised.

Notwithstanding this, as discussed in Section 1.1, the principle of fungibility applies strictly to Parties to the Protocol. In the design of domestic emissions trading schemes, countries may or many not adopt this principle, and due to domestic policy reasons may choose to exert an additional level of control over the types of units to be recognised within their schemes.

An important example is the use of AAUs by entities for compliance purposes in a domestic scheme, which is implicitly excluded from the EU-ETS. Linking the EU-ETS to a scheme where AAUs can be used by entities for compliance purposes may cause difficulties since the supply of these AAUs into the linking scheme would also affect supply in the EU-ETS, even if they were not available directly in the EU-ETS. A decision would then need to be taken as to whether this situation was consistent with whatever domestic policy driver was behind the original restriction of allowance types in the EU-ETS. Similar issues would have to be resolved for any differences in the recognition of allowances between the two schemes.

Pre-Kyoto or without Kyoto scenario

If the Kyoto Protocol does not enter-into-force, the emission units defined by the Protocol will not formally exist. A system for the mutual recognition of national allowances would thus need to be developed in order to maintain the confidence in environmental effectiveness of trading between the two schemes (currently achieved by the correspondence of national allowances with Kyoto Protocol AAUs which is included in the EU Directive). An agreement on linking two schemes in a "without Kyoto scenario" would also likely need to include the recognition of different countries' emissions commitments if they were to

differ from the Kyoto targets. This would be key to evaluating each scheme's respective allowance, in terms of environmental and economic implications (see discussion on stringency of targets).

A similar picture emerges in the context of linking two domestic schemes prior to the start of the Kyoto Protocol's commitment period, as AAUs are not generated prior to 2008.

Even in a without Kyoto scenario, countries may wish to continue having the possibility to generate emission credits through project-based activities abroad, as per the Kyoto Protocol's JI and CDM. In this case, equivalent schemes could then be developed. Given the experience already gained in developing climate mitigation projects, project-based mechanisms equivalent to JI and CDM could feasibly be reconstructed, together with the necessary institutions to generate these – or similar – sources of emission units. The ability to link two domestic trading schemes together would then require mutual recognition of these new project-based units by both the EU and the linking country. In practice, this would probably mean that both sides would have an interest in being involved in the creation and operation of the new mechanisms. AAUs could be replaced by emission units created under national GHG commitments.

2.3 Absolute versus Relative Targets

The EU-ETS sets targets in terms of an absolute level of CO₂ emissions during the compliance period. Other DET schemes may be based on relative targets. These relate emissions to some measure of activity, such as for example emissions per unit of output. Relative targets typically provide more flexibility and lower economic risk for participating companies.

In a relative scheme, the final allocation of allowances to a company can only take place once the final figure for the company's growth is known (although some initial allocation could be made with ex-post adjustments). Linking an ex-post allocation system to the EU-ETS ex-ante allocation scheme would not deliver the same liquidity benefits as linking two schemes that were the same, although the overall effect on liquidity is unlikely to be negative. For example, futures trade could still develop ex-ante.

The other implications of linking a scheme based on absolute targets with one based on relative targets depends to some extent on whether or not there are assurances that overall national targets would be enforced, described below as the '*with Kyoto scenario*' and '*pre or no-Kyoto scenario*'

With Kyoto scenario

In the case where there is an overall target at the national level, implementing a domestic scheme with relative targets transfers some of the compliance risk associated with uncertainty about future growth rates from the trading entities to the national government. Under a relative scheme, the number of allowances that have to be allocated to the trading sectors depends on the level of activity in those sectors.

In times of higher than expected growth, allocation will be higher than expected, and the government will need to make up the shortfall either with emissions reductions from non-covered sectors, or by buying emissions credits from abroad. Conversely, in times of lower than expected growth, allocation to the trading sectors be lower than expected – national governments would then be left with a greater number of allowances that are not allocated to the trading sector and could be used for national compliance purposes. The relative targets are therefore in some sense more risky than absolute targets for governments¹⁷, although if actual economic growth in the relative scheme is close to the expected level over the course of the business cycle, then environmental outcomes will be similar whether the targets are relative or

¹⁷ The actual level of this risk may depend on the specific type of relative targets that are used.

absolute. The decision to take this risk on is a political decision of the government in setting up the domestic scheme.

In a country with an overall national target such as under the Kyoto Protocol, a worse than expected domestic environmental outcome (i.e. where the domestic emissions from the covered sectors are higher than expected) would have to be balanced by purchases of additional credits or emission reductions elsewhere in the economy¹⁸. In this case, the national target would be met, and there would be no detrimental environmental effect, and there should not be any environmental concern about linking of a relative trading scheme to the EU-ETS.

Pre-Kyoto or no-Kyoto scenario

If the country with a relative trading scheme does not enforce an overall national target, then emissions may be allowed to rise in its trading scheme (if growth is higher than expected) without being balanced elsewhere. As a first-order approximation, it could be argued that this growth in emissions would occur anyway, and would not be a direct result of linking the two trading schemes, and therefore this issue should not be a barrier to linking.

However, recent work suggests that since there is feedback between linking emissions trading schemes and the overall economic performance of covered sectors, a direct effect of linking could be to increase overall emissions from a relative scheme. Fischer (2003) analyses the economics of linking relative and absolute schemes, and concludes that emissions will tend to be higher in the combined scheme than in the two separate schemes whatever the direction of trade between the two schemes. This is because linking two trading schemes is a win-win solution: both economies would be expected to grow marginally quicker as a result of linking compared to staying with two separate schemes (e.g. similar to the economic benefits of international trade in other commodities). Since a higher growth rate in the relative scheme will lead to higher emissions, the emissions in the linked scheme would therefore be higher than combined emissions of the two separate schemes. The extent to which this occurs will depend on the sensitivity of economic growth to changes in carbon prices.

Fischer suggests four possible policy solutions to deal with this problem: (i) a tax on trade between the two schemes, (ii) introducing an exchange rate to adjust for relative allowance values, (iii) adjusting allocation to the rate-based sectors to account for changes in expectations of growth levels resulting from linkage of the schemes, and (iii) tightening the allocation in the absolute scheme. Whilst each of these options could address the environmental concern associated with the effects of linking absolute and relative schemes, they would nevertheless introduce complexity into the scheme, and some of the options could reduce the efficiency of the market. In deciding on the need to introduce such policy measures, governments would need to balance the possible environmental benefits against the potential efficiency losses of introducing such restrictions on trade.

2.4 Stringency of targets

An important consideration in linking another scheme to the EU-ETS is an assessment of the relative stringency of the targets. The Trading Directive does not set the total allocation for covered sectors, nor the

¹⁸ Such a “worse than expected” environmental outcome might for example result from a better than expected economic performance. Higher economic growth usually translates in higher fiscal revenues for governments, which could be used to pay for offsets for the emissions increase. This kind of macroeconomic analysis may merit further consideration.

method of allocation for individual installations. This is the responsibility of each Member State¹⁹. However, the Trading Directive does include some criteria for the national allocation plans. It requires Member States to allocate a total number of allowances that is consistent with their national Kyoto Protocol targets under the Burden Sharing Agreement. In doing so, Member States should take into account other national energy policies, projected emissions levels, as well as technical and economic potential for emissions reductions in the trading sectors compared to non-covered sectors. The total allocation to the trading sectors has to be consistent with the most constraining of these parameters – this means that consistency with the Kyoto targets is a minimum criterion for allocation in the EU-ETS.

Ensuring full equity of efforts at the sectoral or installation level is very unlikely to be achieved between two different schemes. Even within the EU-ETS, there is little attempt to harmonise the allocation at this level, aside from the allocation guidance and criteria developed by the Commission. Companies in different countries will therefore experience a different initial distribution of wealth (via the allocation of allowances), although they will all see the same costs of carbon, so operating costs would be unaffected.

The same considerations apply to the treatment of early action, i.e. emission reductions achieved prior to the start of the scheme. These may be rewarded in a number of ways, for example by taking an early base year from which emission reductions are calculated, or by explicitly rewarding plant with low emissions relative to some benchmark. Differences in approach between different trading schemes will result in a different wealth allocation between companies. This may lead to comparative advantages for companies in one scheme/country relative to their competitors in another scheme/country, although operating costs should be unaffected as all players operating in a same or linked scheme should see the same carbon price.

It is important to note however, that these competitiveness concerns relating to the relative stringency of the schemes do not arise as a result of linking – they would occur anyway, even if the two schemes operated separately. The stringency of targets may be politically important when considering linking of two schemes, but differences in relative stringency will not adversely affect the benefits of linking schemes together.

The only exception to this arises if the stringency of a scheme is so low that the targets set are above business as usual emissions levels. In this case, the combined emissions of the linked schemes would be higher than the emissions of the separate schemes, so linking would lead to a lower environmental performance.

With Kyoto Scenario

Consistency of targets in the covered sectors with national targets would also likely be important for any non-EU Annex I country that has ratified the Kyoto Protocol, and who is developing a domestic emissions trading scheme. The Kyoto targets for each Annex I country were the result of negotiations and while differentiated to take into account different national circumstances, they were not based on any explicit assessment and/or comparison of the relative stringency of each Annex I country's target (i.e. the difficulty/costs in achieving the targets). Nonetheless, in most cases, there would be a strong incentive for the targets set in a domestic emissions trading scheme to be consistent with the Kyoto national target, which should attenuate any environmental concerns relating to the stringency of the overall allocation resulting from linking the EU-ETS with another scheme.

Environmental concerns may still arise, even if there is consistency between the allocation and the national target, in the case of Annex I countries where national targets allow for surplus AAUs. If the supply of

¹⁹ For example, at the time of writing this paper, the U.K. government had published its national allocation plan for the covered facilities within its geographic boundaries.

such surplus AAUs into the market were to become very large, the health of the market could also be brought into question. If cheap surplus allowances were to dominate the market, the price might become very low, suppressing the development of various features that reflect a mature commodities market (e.g. traders, brokers, futures and derivatives markets). If such excess supply were to come from only a few sources, an additional question of market power may also arise.

Pre-Kyoto or no-Kyoto scenario

If the Kyoto Protocol does not enter into force, there might be less assurance that targets set within the two different schemes were consistent with an equitable distribution of effort at the national levels. This would largely depend on governments' commitments to meet the targets adopted under the Kyoto Protocol, whether or not it enters-into-force. The same question arises in linking a scheme prior to 2008. There could be less assurance that suitably stringent targets will be set for the trading scheme, since there are no pre-agreed national-level targets set for this period. This would put additional emphasis on negotiations between countries to ensure a suitable level of stringency was achieved in the combined scheme.

2.5 Allocation Methodology

There are many ways to allocate emission rights, but they broadly fall into two categories – free allocation and auctioning (Harrison & Radov, 2002). The EU Trading Directive specifies a minimum level of free allocation of 95% in the first period, and 90% in the second period of the scheme.

Once a trading scheme is established, the price of carbon is set by the supply and demand for allowances. Whilst the initial *volume* allocated is a crucial determinant of supply, as well as demand, the price should be independent of the *method* of the initial allocation. The price of carbon should in turn determine the additional variable operating costs faced by the companies. Beyond an initial transfer of wealth therefore, the method of allocation will not in principle further affect the profitability of companies in the scheme. Linking schemes with different *initial* allocation methodologies should therefore not introduce any additional economic distortion.

However, differences may arise in *subsequent* allocation rules that do lead to distributional effects – these include updating of allocation in future years, treatment of plant closure, and treatment of new entrants.

The EU-ETS requires Member States to make an initial allocation for the first trading period (2005-2007), and a further allocation for the second trading period (2008-2012). In the second allocation, Member States may take account of emission reductions that have occurred in the first period (for example, the base year used for the allocation might be taken within the 2005-2007 period). This effect is called 'updating', as the allocation can be based on an updated base-year (rather than necessarily using the same base-year as the first trading period).

This potential for updating the basis for allocation can lead to changes in the incentives for companies. For example, if allowances in the second period are allocated on the basis of emissions in the first period, this can lead to an incentive to forego emission reductions in the first period. This would be profitable if the expected allowance price in the second period were higher than allowance prices in the first period. There would then be an incentive to buy allowances to achieve compliance (with maximum emission levels) in the first period, if that increased the likelihood of being issued with additional (more valuable) second period allowances.

Linking two schemes with a different approach to updating could facilitate such gaming by broadening access to the cheaper first period allowances. The effects would be qualitatively similar to linking schemes

with differences in banking rules (see discussion below), because one scheme would allow some transfer of value between periods, and the other would not.

A related issue is the treatment of plant closure. If a plant closes during the first trading period, does it get re-allocated allowances in the second period? If the base year for allocation in the second period is set prior to the commencement of the first trading period, then the closed plants could receive an allocation. On the other hand, updating the basis for allocation to a more recent year would prevent such allocation to closed plants, and would likely be coupled with a change in the scope of the second allocation to include installations that had started up in the first period (new entrants).

Differences in the treatment of plant closure and the allocation methodology for new entrants can lead to a distortion of incentives. At the margins, a company will have an incentive to shut down production in countries that continue to allocate to closed plant, and start up or expand new production capacity in countries that will allocate allowances free of charge to new entrants. However, these distortions in incentive would arise from operation of the different schemes, irrespective of whether they are linked or not, and may be short-lived if allocation in subsequent trading periods is based on an updated base-year (since then new entrants will only be 'new' for a limited period). However, differences in the basis for updating of allocation for a subsequent commitment period, and their implications, would merit consideration when deciding to link with another DET.

2.6 Compliance Period, Allowance Validity and Banking

The EU-ETS specifies two trading periods, the first from 2005-2007, the second from 2008-2012, and allowances are allocated with validity specific to these two periods, although compliance is required on an annual basis. Unused allowances from the first trading period will be cancelled at the beginning of the second period, although Member States may choose to replace these cancelled allowances with second-period allowances (i.e. allowing banking from the first to the second period). There is no harmonisation of the banking rule between Member States, so different approaches may be taken within the EU-ETS.

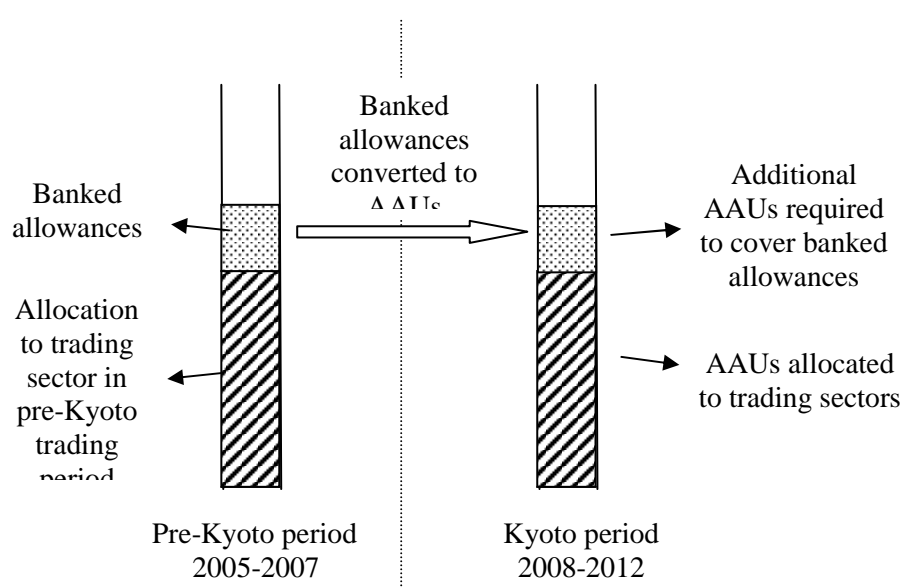
Linking two schemes with a different period of allowance validity would result in similar distortions to those arising from linking a scheme with updating and a scheme without updating of the allocation (as discussed above in the allocation section). The scheme with longer validity period could potentially provide a marginal incentive for companies to reduce activities in that country, and start up new production in the scheme that allocated to new entrants for free in the new trading period. However, as noted above, the duration of such an incentive would likely be short, and the effects are probably small given the wide range of other factors that influence such investment decisions. Such a risk is probably more than balanced by the additional certainty and lower risk involved in operating in a market where there is a longer-term view of the allocation, which provides a greater opportunity to optimise compliance strategies. In a *with Kyoto* scenario, compliance periods would be more likely to be harmonised, as they would be likely to follow the Kyoto scheme.

Differences in banking rules could pose significant problems in linking. A company operating in a scheme that does not allow banking would be able to bank through a third party in a scheme that does allow banking, for example using a contract that would swap existing allowances for allowances in the subsequent period. This may not lead to significant company-level distortion, but could lead to a concentration of banking in those countries that allow it – a possibility that could exist among EU Member States. Another example may be that the majority of EU Member States do not allow banking, while a country wishing to link to the EU-ETS that did allow banking would effectively be providing a banking option for all players on the combined market. The linking country would then face a much higher than expected allocation requirement in the second period, as it would have to cover not only the expected

emissions in the second period, but also the additional banked allowances from the previous period. In a *before or without Kyoto* scenario, this may not matter too much if the allocating country is able to simply allocate more, although in order to maintain effectiveness there would need to be corresponding reduction in allocation from the countries who have effectively exported the credits. The ability to link schemes different banking rules is therefore strongly linked to the allocation methodology in the two different schemes.

In a *with Kyoto* scenario, the accumulation of banking in certain countries could cause a more acute problem, particularly when banking into the 2008-2012 Kyoto commitment period, as a fixed number of AAUs have been assigned to each country by the Kyoto Protocol targets (Figure 2). Similar issues could arise with banking allowances into a post-2012 commitment period.

Figure 2: Banking Allowances into the 2008-2012 Commitment Period



Note on Figure 2: if banking is allowed into the Kyoto period, the banked allowances will need to be covered by additional AAUs. If it is not allowed by all countries, banking could concentrate in those countries that do allow it. Restrictions on banking may then be needed to prevent excessive amounts of AAUs being required by those countries.

In practice, in either with or without Kyoto scenarios, governments seeking to link their trading scheme with another would have an interest in seeking to harmonise, or to implement a restriction on banking before two schemes could be linked. One way to do this would be to only allow companies to bank their own overachievement (i.e. by comparing actual emissions versus their target), and not allowing the banking of purchased credits, although this would have some implications for administrative overheads in implementing the rule.

The EU-ETS has an annual compliance period – i.e. each year, it is determined whether a company holds enough allowances and eligible units to cover its emissions. However, the scheme effectively incorporates a form of borrowing between years within a given trading period, since allowances are allocated to installations *ex-ante* (at the beginning of each calendar year), whereas compliance is determined *ex-post* (up to four months following the end of the previous calendar year). At the time of assessing compliance

therefore, each entity has both the previous year's allowances and the following year's allowances in its account – but this does not apply for the final year of the multi-year trading period.

Whilst there is an incentive for a company to manage its overall holding of allowances over the full 3 or 5 years of the trading period, this effective borrowing could potentially reduce a company's perceived need to trade in the market in the intermediate years. It could for example potentially leave the final truing-up to the end of the trading period (although this could be a risky strategy if pursued by a large proportion of participants, as prices in the final period may then not reflect prices in previous years) and reduce the efficiency of the market. If this occurs, there would be liquidity benefits to linking the EU-ETS to a scheme which did not include this type of borrowing, and which assessed compliance based on annual emissions against a company's holdings of a single year's worth of allocated allowances. Such a link would help to increase the level of trading in intermediate years of a particular trading period, which would improve price discovery, increase the efficiency of the GHG trading market and enable better planning of emission reduction strategies.

2.7 Monitoring, Reporting, Verification and Accounting

Monitoring, reporting and verification (MRV), at the installation level, is fundamentally important to achieving a credible GHG trading system, and creating confidence in the traded units. Actual installation-level MRV systems however are likely to be different for different emission trading schemes, although efforts have been made to standardise them, such as through *The Greenhouse Gas Protocol – a corporate accounting and reporting standard* (WBCSD/WRI, 2001). The question of whether any differences really matter depends on the extent to which these differences affect the legitimacy of the currency in the trading scheme. As long as the MRV system is sufficiently transparent and robust to maintain confidence in the value of the units, then differences in process or even accuracy of MRV regime between two schemes should not cause a problem in linking them together, although streamlining and coordinating the MRV process would bring some efficiency benefits, both for multinational companies and service providers involved in the two schemes. It is also expected that MRV will improve over time.

However, if the MRV process is not sufficiently robust, there may be a perceived opportunity to systematically under-report annual emissions (or over-report base-year emissions), which would undermine confidence in the units. This would damage the efficient operation of the combined trading system with negative environmental implications and could thus be an important consideration in the linking of two schemes. In theory, national-level guidance such as that provided by IPCC guidelines and good practice guidance provides a common basis for the development of entity-level reporting schemes, and should act to limit the extent to which MRV schemes at the entity level differ from country to country – although differences could still occur in practice. Over time, the evolution of entity-level MRV rules and guidelines in different countries could benefit from sharing experiences and might lead to some convergence.

A separate but related issue is the need to develop registries that are sufficiently harmonised as to allow the smooth operation of the market, without creating barriers to transfer of allowances from one scheme to another. This at least implies the need for common data exchange standards (for example building on the data exchange standards for registries being developed by the UNFCCC secretariat for Kyoto parties), and possibly harmonisation on a range of other technical issues. In a *with Kyoto* scenario, there are strong incentives for Parties to achieve compliance with IPCC guidelines and good practice, as well as maintaining data exchange standards for registries, as, for example, non-compliance could result in ineligibility to participate in international emissions trading.

2.8 Compliance Framework and Penalties

As previously discussed, the traded units typically only have value in the context of a compliance framework (or an expected future compliance framework). Under the EU-ETS, no installations may undertake any activity listed in the Directive without holding a permit. Each tonne of CO₂ emitted by a covered installation must then be covered by an allowance (or other eligible units such as CERs and ERUs). Any emissions not covered by an allowance are subject to an excess emissions penalty of €40 per tCO₂ eq. during the first period 2005-2007, and €100 per tCO₂ eq. during the second period 2008-2012. The excess emissions must then be covered by allowances in the following calendar year.

Because payment of the penalty does not release the operator of the installation from the obligation to cover its full emissions each year with allowances or other eligible units, the EU-ETS penalty regime does not act as a cap on allowance prices. It acts instead rather like a tax on borrowing allowances from future years. In this situation, there is no direct link between the level of the penalty and prices on the market.

Linking to another scheme with a similar penalty regime should therefore be straightforward, even if the level of the penalties was different (under a with-Kyoto or without-Kyoto scenario). Unlike a situation where paying the penalty releases the operator from any further obligation, having two different penalty rates in this case does not imply that the lowest penalty rate would apply to all sources, as the penalty rate is effectively de-coupled from the market price in these circumstances. The only condition that would need to be fulfilled to allow straightforward linking, is that the penalties are sufficient to ensure overall compliance. In other words, whilst in any given year, installations may choose to pay the penalty rather than complying with their annual target (e.g. to avoid being subject to a particular price spike, in the expectation of lower prices the following year), the penalty should nevertheless be high enough to ensure that companies do not simply choose to default on their obligations and opt out of the scheme altogether. Ultimately for example, the penalty for continued non-compliance and failure to pay penalties could be removal of the operating licence.

In this regard, it is difficult to conceive a successful link being made between the EU-ETS and a voluntary emissions trading scheme, because of concerns over the stringency of any target and the commitment to compliance that a voluntary participant might be willing to take on in the context of uncertain carbon prices.

Another mechanism that has been considered in domestic emissions trading scheme designs is a price cap or 'safety valve'. As for a penalty, a fixed price can be paid for each excess tCO₂ eq. emitted without an allowance, but in the case of a price cap, the payment releases the operator from any future obligation in regards to these excess emissions. Unlike the EU-ETS penalty, this approach directly fixes an upper limit on the price of allowances in the market. A price cap could be implemented by issuing additional allowances into the trading scheme at the level of the price cap²⁰, which could be offered for sale at certain times during the year. The implications of this depend on whether Kyoto enters into force or not, as described in the sub-sections below.

²⁰ The Canadian government has decided that entities participating in its domestic emissions trading scheme will have access to a mechanism that lets them meet their compliance obligations at CAN\$15 /tCO₂e. While legislation still has to be agreed upon, the government's preferred approach is to implement their "price assurance mechanism" through the use of annual forward contracts. This represents a different approach than a price cap mechanism. Under the Canadian system, firms would need to purchase credits obtained from the contract even if the market price were less than \$15. As well, permits needed for compliance beyond the number contracted for would have to be purchased at the market rate. Delivery of price assurance mechanism units (at CAN\$15) by the government would only apply to the difference between a firm's emissions and the gratis allocation for that year (plus any eligible banked allowances). These credits would not be re-sellable in the open market. See http://www.nrcan-rncan.gc.ca/lfe-ggef/English/papers_en.html.

An alternative approach to issuing additional allowances into the trading scheme is to give direct financial reimbursement to companies that are subject to market prices above the price cap. It should be straightforward to limit such direct reimbursement to domestic companies, since the reimbursement could be made only for units purchased to cover emissions above the allocated amount of allowances. This would reduce the extent to which such benefits could be accessed by all players in the combined trading system. On the other hand, such a reimbursement scheme could lead to gaming on the emissions trading market, since companies would have a different price signal depending on their location. Disconnecting the carbon price from the marginal abatement costs within the participating companies in this way could distort the market and reduce the expected economic benefits of linking the trading schemes.

With Kyoto scenario

Issuance of additional allowances at the level of the price cap by the government operating the trading scheme would be a plausible way to implement a price cap in the context of an isolated domestic trading scheme. If the country itself has an emissions target (e.g. if the government ratified the Kyoto Protocol) these additional allowances would have to be covered either by additional emissions reductions from the non-covered sectors within the country, or by purchase of additional emission units from outside the country.

If such a scheme were to link to the EU-ETS, the fixed-price additional allowances might also be available to EU installations, unless access was somehow restricted. It seems unlikely, however, that any individual country would be prepared to issue additional allowances in this way, as government expenditure would then be directed to reducing compliance costs of foreign companies. Some kind of limit would therefore have to be placed on the issuance of such additional allowances.

Simply limiting the issuance or validity of these additional units to domestic companies would not be sufficient, because they could easily be traded or swapped for other units on the wider market. There would have to be a more wide-ranging limitation on the exchange of the trading units that effectively allowed a price differential to be maintained between the two trading schemes. Three options can be considered.

- One option would be for an ‘exchange rate’ to be introduced in order to maintain the price cap in the linking market, which would imply that an EU-ETS allowance represents a different environmental amount compared to the unit in the linked scheme. However, this would break the principle of fungibility so that 1t CO₂ eq. would no longer equal 1t CO₂ eq. throughout the system. This would reduce the economic efficiency of the system, and would cause a particular problem in accounting for credits from third parties (i.e. CDM and JI credits), which should have a common environmental value in any system. Deciding on the appropriate ‘exchange rate’ could also lead to complex negotiations.
- A second option might be for some type of gateway, whereby installations in the EU-ETS would be restricted from buying allowances from the linked scheme once the market price goes above the level of the price cap. This would avoid the possibility that companies in the linked scheme could simply buy at the level of the price cap, and then sell again at a higher market price. It could be difficult however to determine the conditions under which the gateway should be open. If the inherent price in the scheme with price caps were low before linking, then one might expect the gateway to be open, as additional allowances would not be issued at such a low price. However, if the price in the EU-ETS was higher than the price cap, then opening the gateway and linking the two systems could rapidly raise the average price of the linked market to more than the price cap, which would signal that the gateway should close again.
- A third option would be to only issue additional allowances at the price cap to domestic companies, and only up to an amount that covers the difference between their actual emissions during the year and

their initial allocation. Whilst this constraint would not completely prevent companies taking advantage of access to the lower-than-market-rates allowances, it would at least prevent unlimited selling of the additional allowances into the EU-ETS, and would reduce the liability of the government implementing such price cap. The supply of the additional allowances could be available at the end of the year, when the emissions position of the companies is known. This would effectively allow companies a buy-out mechanism to cover any additional allowances they had to buy over-and-above their initial allocation, and would lead to a different effective price in the two parts of the scheme.

All three of the above options will tend to split the market once the market price goes above the level of the price cap, and will therefore reduce the benefits of linking. The most efficient solution would be to harmonise the approach to the penalty regime. If that is not possible, then the third option above probably provides the most practicable way forward.

Pre-Kyoto or no-Kyoto scenario

If the country as a whole does not enforce a national GHG target, then a price-cap could be implemented by issuing additional allowances – in an isolated domestic trading scheme this could be done without having to make corresponding emission reductions elsewhere. Such a system would effectively fix the costs faced by companies – similar to a tax – but the additional allowances issued would effectively inflate the overall emissions from the covered sectors.

Again, there would be a problem with this approach should it come to linking to the EU-ETS. Whilst an inflated emission target for a domestic scheme might be acceptable for a given country, it goes against the principle in the EU-ETS that (for the period 2008-2012) each allowance should be backed by a Kyoto unit or equivalent, representing fixed country-level targets.

2.9 Summary

The implications of linking schemes with different design characteristics have been considered according to three types of effects:

- **Efficiency of the emissions trading market.** Linking of DET schemes improves overall efficiency, because larger markets should be more liquid and more efficient at allocating resources towards cost-effective emissions reductions. However, if the schemes differ in certain elements of their design, it can be difficult to allow a full and free flow of allowances between the schemes without having a detrimental effect on the other two criteria (i.e. environmental or economic). In such cases, restrictions on such flows may need to be considered which might reduce the expected benefits of linking.
- **Economic effects.** It is practically impossible for two separate trading schemes to be developed which treat their participants exactly equally in economic terms. Even within the EU-ETS, there will be different economic impacts on sectors depending on which country they are operating in due to differences in allocation. Differences in economic impact between schemes can arise in a number of ways, and will usually be manifested whether or not the schemes are linked. Usually, linking two schemes leads to overall economic benefits at the macro level, because it gives the participants access to a broader range of emission reduction opportunities, and lowers the overall cost of compliance. Whilst linking may re-distribute the relative benefits of the trading schemes causing competitiveness issues at the micro level, there are relatively few areas where overall detrimental macroeconomic impacts occur specifically because of linking of two schemes.

- **Environmental performance.** In many cases, the emission reductions that would be achieved in a linked emissions trading scheme would be the same as the combined emission reductions of the two schemes operating separately – i.e. linking is usually environmentally neutral. The main motivation for linking is usually economic rather than environmental, although the ability to meet targets at lower cost may encourage additional environmental efforts to be undertaken. However, there are some design features which can lead to a poorer environmental performance if the schemes are linked than if they remain separate.

The following table summarises the main issues arising from linking of schemes to the EU-ETS as highlighted in the previous discussion.

Design Feature	Issues arising from Linking
Coverage of gases and sectors	Care has to be taken with accounting procedures when linking upstream with downstream schemes, and direct with indirect schemes in order to avoid double-counting of emissions. Voluntary opt-in and opt-out provisions can create opportunities for surplus allowances to enter the scheme if the conditions for these provisions are not sufficiently stringent.
Recognition of Allowances	The supply of units into two separate schemes will ultimately affect the total level of supply if the schemes are linked. Since any trading scheme must have clarity on what units are included and what are excluded from the scheme, these rules must be agreed jointly if two schemes are to be linked together. This recognition of allowances is ultimately a political issue, and there are no clear technical fixes available to link two schemes with different recognition of units. Implications may differ in a <i>with Kyoto</i> and in a <i>pre- or no-Kyoto</i> scenario.
Absolute vs relative targets	The environmental performance of a combined absolute and relative scheme should, to first-order approximation, be the same as if the schemes were separate, so there should not be any difficulty in linking them. There may be an effect resulting from the additional economic growth that could occur if the schemes are linked. In a <i>with Kyoto</i> scenario, any additional growth in emissions from the relative scheme would be compensated by emission reductions elsewhere in order to meet the national targets. In a <i>pre- or no-Kyoto</i> , other technical fixes are available, although the scale of this effect should be assessed before deciding whether they are necessary.
Stringency of targets	As long as targets are stringent enough to be beyond business as usual, there should not be any technical problem with linking schemes with different stringency. If stringency is so low that more allowances are allocated than required under business as usual, then linking could undermine environmental action in the combined scheme depending whether or not these allowances were backed up with Kyoto units.
Allocation methodology	Differences in methodology between two schemes for the <i>initial</i> allocation should not cause a difficulty in linking. There could be additional gaming opportunities created by linking two schemes that have different rules on <i>updating</i> allocations in subsequent periods. Harmonising rules on this may help to reduce any distortions introduced by linking.
Compliance periods and banking	Companies in countries that do not allow banking will effectively be able to bank via swaps with companies in countries that do allow banking. Harmonisation of rules on banking, or some limitations on banking would therefore be advisable, particularly in a <i>with Kyoto</i> scenario when moving into the compliance period as banked allowances would need to be converted to AAU-backed allowances. Technical fixes are available to restrict banking in a way which should not be detrimental to the functioning of the market. Market efficiency and liquidity benefits could arise from linking to a scheme that assesses annual compliance based on a single year's worth of allocated allowances.
Monitoring, reporting and verification	MRV is fundamentally important to ensuring confidence and underpinning value in the traded units. Differences in MRV process or even to some extent accuracy may not matter as long as these differences do not undermine market confidence.
Compliance regime and penalties	Linking to a scheme with a similar penalty regime should not be a problem even if the level of the penalty is different. However, it is not straight-forward to combine the fixed penalty type compliance regime of the EU-ETS with a scheme that has a price cap type regime. The market will tend to split if the market price rises above the price cap, reducing the expected benefits of linking.

3. Discussion: Possible Implications of Linking on Negotiations

There are economic advantages to linking trading schemes. The greater the differences in marginal abatement costs between facilities covered by trading schemes, the greater the economic efficiency potential to be gained through linking trading schemes. This was the main rationale for the inclusion of international emissions trading and a common emission unit, AAUs, in the Kyoto Protocol.

Under the Kyoto Protocol, national governments have full jurisdiction on whether, and if so how, they might implement a domestic emission trading scheme— as much as a country that is not Party to the Kyoto Protocol. The European Union has adopted a Directive that will create the world's largest private sector GHG trading scheme. It will cover installations in several GHG-intensive sectors from all Member States, including accession countries that are to join the EU in 2004. Even with such a sizable market, the EU Trading Directive includes a provision (Article 25) for linking with other domestic trading schemes to further increase the scope and coverage of the scheme. Non-EU countries considering managing their GHG commitments via domestic trading schemes would also have an interest to link with the EU-ETS.

The process for linking two domestic schemes is not defined. The EU Directive' Article 25 only specifies that “agreements should be concluded with third countries listed in Annex B of the Kyoto Protocol which have ratified the Protocol for mutual recognition of allowances...”. This section only seeks to point to routes that could be taken to reach an agreement to link domestic trading scheme(s) with the EU-ETS, if and when non-EU Parties and the EU start to discuss linking under Article 25 of the Directive.

A decision could be made to develop the Article 25 linking agreements in a multilateral process involving simultaneously all Annex B Parties that may have an interest in linking to the EU-ETS. This type of process could help ensure that all Annex B Parties are treated equally, but could be a rather complex negotiating process, the greater the number of Parties involved. Moreover, as noted in the analysis above, emissions trading schemes can have very different design features, which could also complicate a multilateral linking decision-making process.

Another possible way to conclude a linking agreement as provided for under the Directive's Article 25 could be through bilateral negotiations between governments. These can have implications on the environmental outcome of trading schemes (e.g. a scheme with a relative target could lead to increases in GHG emissions from covered installations in periods of economic growth) and economic implications for the covered facilities (e.g. the more stringent the target for each installation, the greater their compliance costs).

However, it is important to distinguish between those effects that occur irrespective of linking, and undesired effects that may result directly or be exacerbated by linking of two schemes. In theory, bilateral negotiations over the linking of two schemes should focus on such issues. Of critical importance will be the examination of what units are recognised under each scheme and their respective compliance regimes, as these two design features could have significant implications on the linked schemes, their efficiency and environmental outcome. This will mean that governments wishing to link their schemes together would need to come to a common agreement on what units would be recognised in the linked schemes and on compatible compliance regimes.

Negotiations, by definition, are about compromises, with an uncertain outcome. The greater the number and diversity of interests of negotiating parties, the more complicated the negotiations. Non-EU countries interested in linking their domestic trading scheme with the EU-ETS might have an interest in being first in

line in any linking negotiations with the EU. Once bilateral negotiations on linking two schemes and decisions have been made on eligible units and compliance regimes of the linked schemes, for example, then a third country wishing to link with an “expanded-EU +” scheme might very well need to negotiate with the two parties: the EU and linked country “X”, and no longer only the EU. Indeed, country “X” will also have an interest in any changes that might be considered as a result of linking the “expanded-EU +” trading scheme to country “Y”.

Such a process could occur either in the context of a *with Kyoto* or a *without Kyoto* scenario, although the negotiations would be more complex in a without Kyoto scenario because of the lack of an international framework for the transfer and acquisition of accepted emission currencies, the lack of accepted national emissions targets, as well as no overall compliance regime.

If the EU-ETS proves to be very successful, it is possible that the momentum created by the scheme could carry many of its design features through to a broader linked scheme. On the other hand, as this paper shows, there is considerable flexibility to link the EU-ETS to other schemes with differences in many of the various design aspects.

Nevertheless, the outcome of any linking negotiation could have important implications for the wider international emissions trading regime. For example, the outcome of the decisions on the recognition of various units within the scheme could affect the availability and price of units outside the scheme. Governments considering the purchase or sale of such units to help them manage their national target could thus see their compliance costs or revenues go up or down depending on these outcomes.

The implications for the JI and CDM market will largely depend on relative prices. Features of the EU-ETS and its Linking Directive could have implications on the scope for JI projects in countries included in the expanded-EU+ scheme²¹. If CER prices are lower than marginal abatement costs in the expanded-EU+ scheme, then the implication of restricting use of cheap surplus AAUs would be to increase the market demand for CERs, and therefore increase CDM-project based activities, subject to the effects of any restrictions on their use in an expanded-EU+ scheme (Jepma, 2003).

The above discussion simply seeks to identify some of the key potential market and negotiations implications of linking domestic trading schemes with the EU-ETS. Clearly, a better understanding of all these implications would warrant more in-depth analysis, which could be the subject of future work.

²¹ See Bygrave and Bosi (2004) for more discussion on the implications of the EU-ETS on JI.

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