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OPTIONS FOR INTEGRATING SECTORAL APPROACHES INTO THE UNFCCC

Richard Baron, Ingrid Barnsley (IEA) and Jane Ellis (OECD)

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The ideas expressed in this paper are those of the author and do not necessarily represent views of the OECD, the IEA, or their member countries, or the endorsement of any approach described herein.

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FOREWORD

This document was prepared by the OECD and IEA Secretariats in Autumn 2008 in response to the Annex I Expert Group on the United Nations Framework Convention on Climate Change (UNFCCC). 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 are those listed in Annex I of 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 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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Questions and comments should be sent to:

Richard Baron
International Energy Agency
9, rue de la Fédération
75739 Paris Cedex 15
France
Email: richard.baron@iea.org

Jane Ellis
OECD Environment Directorate
2, rue André-Pascal
75775 Paris Cedex 16
France
Email: jane.ellis@oecd.org

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Executive Summary

The Bali Action Plan refers to "co-operative sectoral approaches and sector-specific actions" in relation with enhanced post-2012 GHG mitigation, and is one of several contexts in which sectoral approaches are now being considered. This paper explores possible options to advance the integration of sectoral approaches into the UNFCCC regime, as a new means to further mitigation action.

The precise design of sectoral approaches and actions under the UNFCCC is unclear at this stage, although there are three broad categories of possibilities: 1) domestic-oriented approaches, often focused on developing countries, with or without GHG emissions crediting and/or trading; 2) various approaches to technology co-operation; and 3) transnational sectoral agreements. These options overlap in a number of areas. This paper addresses each category in turn, outlining work on the options to date, identifying their pros and cons, and assessing issues associated with the integration of each option into the UNFCCC regime. This includes consideration of negotiation issues, sectoral coverage and implementation issues.

Because not all details may be finalised by the Copenhagen conference in December 2009, the paper presents areas for decisions on possible sectoral approaches; these may be enough for Parties to move forward on this issue in the near term. The paper also includes precise references to the existing language in the Convention and Kyoto Protocol texts, suggesting various possibilities for decisions by Parties in this area, without prejudging their political will or reluctance to do so.

Domestic-oriented approaches

On domestic sectoral efforts in developing countries, possible areas for near-term decisions for a framework agreement include:

- **Crediting:** Can sectoral actions and approaches in developing countries generate carbon credits, and if so, to what extent?

- **Eligibility:** On what basis should sectors be selected or prioritised? Criteria may include cost-effectiveness of mitigation, the lock-in characteristics of sectors, ability to measure and verify emissions, and overall mitigation potential.

- **Link to nationally appropriate mitigation actions:** Can developing country Parties take, among their nationally appropriate mitigation actions (NAMAs), more defined actions or commitments in specific sectors, opening up the possibility to broaden crediting and/or to receive specific support to increase their capacity to reduce emissions?

- **A pilot phase:** Should a pilot phase for the elaboration of domestic sectoral approaches be initiated, starting as early as 2009 and including data collection and discussion of emission goals?

- **Process:** Do Parties wish to elaborate a timeline for countries to submit their proposals for sectoral goals as a basis for possible crediting or other support mechanisms? Alternatively, they may decide on an open-ended approach to the submission but agree on principles to guide the review of sectoral proposals.

Technology co-operation

The paper considers how a sector-by-sector approach could form the organising principle for actions and related support that can be measured, reported and verified. Alternatively, sectoral work programmes could be introduced to indicate priorities for mitigation and technology development. A sectoral look at technologies raises a number of interesting questions including:

- How international support should be allocated?

- Should priorities be set on the basis of relative cost of mitigation, the size of the potential, existing gaps (in countries and sectors) in mitigation, and/or the need to achieve technological breakthroughs?

- Whether and how a new fund could be established for the purpose of technology co-operation.

Transnational agreements

Options for transnational agreements have not been formally proposed. They could include the setting of some global performance standard or a common approach to setting such a standard; a global cap on a sector's emissions; a common methodology for determining sectoral baselines at the country level; a global technology diffusion goal; or a cooperative approach to research and development (R&D). Such an agreement could be developed inside the UNFCCC regime, relying for example on an existing mechanism or as part of a new one, or outside of it

After reviewing potential legal aspects associated with integrating such an approach into the UNFCCC regime, the paper describes how existing international efforts in various industries could influence sectoral approaches within the UNFCCC.

Should Parties decide to consider transnational approaches in specific sectors, certain issues may help structure future discussions:

- How do transnational approaches interact with and complement existing nation-wide commitments by developed countries and other mitigation actions by developing countries?

- How should technical expertise be organised? Could the technology and economic assessment panels of the Montreal Protocol (TEAP) be a model?

- What elements should be covered by a negotiation of transnational approaches? These could include technology co-operation, common methodology for baselines, target types and trade aspects.

Future developments

A number of questions remain unanswered, including which of the various sectoral GHG mitigation option(s) may best be pursued under the UNFCCC. As sound sectoral data would be essential for an objective discussion of goals (binding or not, creditable or not), decisions by COP15 should focus on key principles and processes, including capacity building for the elaboration of such sectoral approaches. Some clarification is also needed on the possible links between sectoral approaches and various financing mechanisms, including on how the carbon market could support sector-wide mitigation activities. A last, important question is: how would sectoral approaches relate to countries' broader commitments regarding enhanced GHG mitigation efforts?

1. Introduction

The possibility of using sector-wide activities to enhance efforts on greenhouse gas (GHG) mitigation is gaining broad support, as reflected in submissions to recent meetings under the UN Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol (FCCC/KP/AWG/2008/L.8). Earlier, the Bali Action Plan (BAP) included a clear reference to international sectoral approaches in the context of enhanced mitigation efforts: "cooperative sectoral approaches and sector-specific actions, in order to enhance implementation of Article 4, paragraph 1(c), of the Convention" (paragraph 1(b)(iv)). Such actions could be undertaken in both developed and developing countries.

Sectoral approaches are a much-researched topic, although the lack of consensus on what these cover still hinders a focused discussion on their potential. Sectoral approaches, interpreted narrowly in this paper as tools to enhance global GHG mitigation, encompass options that could differ in a number of ways:[1]

- **Their nature:** whether sectoral approaches are to be based on a quantitative or qualitative goal, whether they should be complementary or stand-alone measures, binding or not; would participation be mandatory or voluntary, depending on country groupings?

- **Their sectoral focus:** should it be on heavy industry with an emphasis on trade-exposed sectors, or on more domestic activities (e.g. electricity).

- **The type and level of incentives to participate:** e.g. whether or not sectoral approaches generate credits tradable on the global carbon market, whether incentives should cover all or part of emission reductions generated by sectoral actions.

- **The role of accompanying measures:** support for capacity building or technology acquisition.

- **Their geographical scope:** be it national, regional or international, developing and developed countries.

- **Oversight:** how such mechanisms should be supervised (i.e. nationally and/or internationally).

- **Integration:** whether (or to what degree) sectoral approaches should be formally incorporated into the UNFCCC or Kyoto Protocol processes.

There are several research and policy initiatives underway on the possible scope and functioning of sectoral actions. Many of these were tabled in Accra, in the workshop on cooperative sectoral approaches held in August 2008, but have also been raised also in the context of the mechanisms discussion.[2] Several policy research initiatives are also underway to assess their feasibility.

At this juncture, work remains to be done on how sectoral approaches might feasibly and practically fit within the UNFCCC regime. In seeking to move the discussion forward, this paper focuses specifically on possibilities for integrating sectoral approaches to GHG mitigation into the post-2012

[1] Sectoral approach is also understood as *analyses* of mitigation potentials across countries, a potential contribution to the discussion of comparability of efforts. This aspect is not covered here.

[2] See UNFCCC/AWGLCA/2008/CRP.4 and UNFCCC/KP/AWG/2008/L.12. See also Höhne et al., 2008.

climate regime. Drawing on discussions to date, this paper considers three main models for sectoral approaches:

- Sectoral activities in developing countries (with the possible inclusion of crediting or financing).[3]
- Sector-based technology co-operation.
- Transnational sectoral agreements.

Today's perceptions of sectoral approaches may imply possible overlaps and interactions – if they were to co-exist: a transnational approach could include, or feed into, in a discussion of sector-based targets, appropriate policy instruments or the elaboration of sectoral baselines for crediting. Technology co-operation could also support all other options. The paper does not discuss these issues any further, as this would require firmer definitions of the options than are available today.

The following three sections briefly introduce options in the above three categories, and consider issues related to their integration into today's UNFCCC discussions, with a focus on elements that could be brought forward in an agreement by the fifteenth Conference of the Parties (COP15) (and all associated meetings), to be held in Copenhagen. The issues covered include:

- Negotiation issues: how the sectoral approaches would link to the UN regime, the mandate for negotiation and how agreement might need to be reached;
- Coverage and eligibility in terms of sectors and countries to be addressed;
- Implementation issues, such as the institutions and administrative features that may be necessary for implementation; and
- Minimum needed for agreement at COP15.

As the possible options for sectoral efforts in developing countries have already been elaborated more extensively than in relation to either sector-based technology co-operation or transnational sectoral agreements, section 2 deals with the above issues in a more systematic and comprehensive manner than is possible in sections 3 and 4. Section 5 outlines some cross-cutting issues and discusses how the integration of sectoral approaches may interact with other possible aspects of a post-2012 mitigation framework.

2. Domestic Sector-based Efforts in Developing Countries

Domestic sector-based activities provide one possible means to enhance developing country involvement in the global mitigation effort while ensuring consistency with the principle of common but differentiated responsibilities. Clearly, developed countries may also undertake domestic sectoral activities. This section focuses on efforts in developing countries for the sake of simplicity and brevity. There is a wide variety of possible domestic sector-based activities in developing countries, as reflected in the Accra discussions (FCCC/AWGLCA/2008/CRP.4 and FCCC/KP/AWG/2008/L12). Their integration into a future climate regime depends on their structure. This section outlines different possible types of domestic sector-based activities in developing countries and then examines how each of these different actions could be integrated into a post-2012 climate regime.

[3] This paper does not explicitly examine sectoral actions in developed countries.

2.1 A range of options

A range of domestic sector-based activities is proposed by Parties and discussed in the literature, including:[4]

- Non-credited efforts, such as policies and measures or other "nationally appropriate mitigation actions".
- A sectoral crediting mechanism, either through the extension of the Clean Development Mechanism (CDM) or the establishment of a new mechanism.
- Actions where some, but not all, emissions benefits are credited (such as "no-lose" or "non-binding" targets).
- Sector-wide emission commitments that allow the possibility to trade (e.g. under Article 17 of the Kyoto Protocol, or an equivalent in another instrument).

We describe each option in turn (variations on the theme of domestic sectoral approaches are described briefly in Table 1).

Domestic sector-specific activities could comprise non-credited actions and simply provide access to a funding mechanism to assist with the development and implementation of appropriate sector-wide policies; support could include the establishment and monitoring of a baseline. Such a decoupling of developing country mitigation actions from the generation of tradable credits has actually been raised in debates surrounding reducing emissions from deforestation and forest degradation in developing countries (REDD, Karousakis and Corfee-Morlot, 2007), as well as Sustainable Development Policies and Measures (Ellis et. al., 2007). Such an approach could also tie in with any measuring, reporting and verification of actions by developing countries and support by developed countries, as well as other parts of the BAP, in particular those concerning financing and technology collaboration for mitigation.

Extending the CDM to a broader range of installations in a sector or country is one possible domestic sector-based action. Such "sectoral crediting mechanisms" could be established at the sector (or sub-sector) level for one or several countries. Other aspects related to crediting could be the same as the CDM (e.g. an additionality test, a requirement to establish a conservative baseline, crediting to equate to the difference between the baseline and actual emissions, supervision by the CDM Executive Board (EB)). A sectoral crediting mechanism could evolve from existing flexibility mechanisms under the Kyoto Protocol or comprise a new mechanism. Crediting of sector-based actions requires careful scrutiny, as it stands to greatly increase the supply of credits in the international carbon market, an option that is only practical with matching growth on the demand side. In the absence of increased demand, such a mechanism could depress global carbon prices and remove incentives for further mitigation overall. At any rate, how the global carbon market would transit from its current state to a potential addition of sector-wide crediting is a far from trivial question for the post-2012 climate mitigation framework.

The notion of "sectoral no-lose intensity targets" combines elements of sectoral crediting, non-binding targets and indexed targets. Under this approach, credits would be generated by sectoral emission reduction actions if the emissions intensity were under an agreed level during a particular time period (Schmidt et. al., 2005).[5] Only some of the expected GHG benefits of sectoral activities would be

[4] UNFCCC/KP/AWG/2008/L.12. See also Höhne et al., 2008.

[5] A no-lose or non-binding target is seen by some as a particularly appealing means of further engaging major developing country emitters in the near to mid term. Certainly, the difference in a political sense between a binding and non-binding target may be significant, with the latter being easier for states to agree to in the short term. The difference in effect will depend upon the procedures for non-compliance in the case of binding targets. It will also depend on the level of effort required to go below business as usual emissions that both options may

credited, as the no-lose objective would represent a departure from current trends. The exact form of a non-binding approach has not yet been defined (e.g. how to set the baseline, what proportion of GHG benefits to credit, whether international supervision and/or comparability between countries is needed). Some of these characteristics would influence how the mechanism could be integrated into a post-2012 climate regime.

Sector-wide emission commitments could also be established, and could consist of a cap and trade mechanism (i.e. a sectoral target). Such targets could be legally binding (see Baron et. al., 2007, among others). Sectoral targets and how they would be derived should be addressed through negotiations with Parties.

For each of these options, decisions will be needed on which countries are eligible to participate, in which timeframe, and which international processes must be established to support their implementation[6]. The full text of all provisions of the Convention, Protocol and other UNFCCC documents referred to throughout the paper are included in Annex II.

Table 1: Overview of various domestic sectoral proposals and related instruments

	Description
SD-PAMs, NAMA	Under this option a country could undertake mitigation actions in a particular sector, with or without seeking crediting for deemed emission reductions. See also the possibility of *retired CERs* (Müller and Ghosh, 2008), which would rely on the CDM (or evolution thereof) to generate MRV-able mitigation actions without using CERs as offsets.
Sectoral technology approach	A sector / country could agree to an objective on the diffusion of a specific technology or practice (e.g. x% of the capacity in sector y should be fitted with technology z by a given date). Crediting – if emissions outcome can be estimated with accuracy – or other form of financial support could be provided.
Sectoral crediting mechanisms	These mechanisms could seek to cover a large share, if not all of the emissions of a sector within a participating country, depending on industry structures. Under a sectoral CDM, reductions could be credited when sectoral emissions are below a baseline established for the sector as a whole, or when emissions at a company level fall below a defined benchmark. Under a non-binding or no-lose target, the target could be an emission level established at a more ambitious level; there would, ho wever, be no consequence for non-compliance. Emissions below target would generate credits.(Bosi and Ellis 2005, Ward et al. 2008, Helme, 2008b, EU Submission to AWG-KP, 2008)
Binding sectoral targets	Targets (absolute or based on emission intensity) would be negotiated for sectors and bind countries in case of non compliance.

Also based on Höhne et al., 2008.

require, which may differ (i.e. binding targets may be less stringent, and non-binding targets may require deeper cuts).

[6] Thus, for example, country X could be eligible to host CDM projects to 2030, but then be expected to undertake a no-lose approach. The question of which countries could be eligible for which type of sectoral action, and when, is not answered in this paper.

2.2 Integrating domestic sector-based efforts into the UNFCCC regime

2.2.1 Link to UN regime, negotiation mandate and agreement process

Non-credited actions

The most likely consideration of non-credited actions, such as policies or measures, would be under the UNFCCC by the Ad Hoc Group on Long-term Co-operative Action (AWGLCA). BAP paragraph 1(b)(ii) provides a clear basis for such negotiations, and 1(b)(iv) may also be relevant. Clearly, the precise form of such actions, and any related support, may vary considerably. However, obvious opportunities exist to combine consideration of this issue with the measuring, reporting and verifying of developed country support (BAP 1(b)(ii)) and with enhanced sectoral technology collaboration (BAP 1(b)(iv)). Clear connections are also evident with existing provisions of the UNFCCC, namely, Article 4(1)(b), which sets out the commitment of all Parties to "formulate, implement, publish and regularly update … measures to mitigate climate change" and Article 4(1)(c) concerning technology-based collaboration. As such, if non-binding, such actions could simply be recognised by way of a COP decision or decisions, without requiring any kind of Convention amendment or new instrument. This applies equally to the establishment of any related fund for developed country support or to the linking of such actions with any existing fund. However, if reforms are substantial and complex, Parties may choose to develop a Convention amendment or new instrument to set out new principles and structures in moving forward.

Sectoral crediting mechanism

If GHG targets in Annex I/developed countries are to be linked to a sectoral crediting mechanism in developing countries, several options exist for integration.

First, if the sectoral crediting mechanism is to be linked to the Kyoto Protocol and comprise an extension of the CDM, Parties could consider this through several negotiating channels:

- Under the Article 9 review of the Kyoto Protocol, due to take place at the fourth Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (COP/MOP 4) in Poznan, in particular its focus on the scope and effectiveness of the flexibility mechanisms.[7] However, given that this issue has not yet been raised by Parties as one for consideration, it is not a likely option;

- As part of Parties' "further guidance" on the CDM, as developed at previous meetings of the COP/MOP; or

- Under the work programme of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG), in particular the section of the work programme concerning possible means to achieve mitigation objectives (paragraph 17(b), FCCC/KP/AWG/2006/4).

In terms of the agreement process required, it is possible that the Protocol would need to be amended to allow for this kind of crediting, given that Article 12 of the Kyoto Protocol relates specifically to project-based activities.[8] However, this may be unnecessary given previous COP/MOP decisions

[7] Article 9(1) of the Protocol provides for periodic review of Protocol. COP/MOP decision 4/CMP.3 provides in paragraph 6(d) that the Poznan periodic review will consider, among other things, "the scope, effectiveness and functioning of the flexibility mechanisms, including ways and means to enhance an equitable regional distribution of clean development mechanism projects".

[8] Article 12 of the Kyoto Protocol establishes the Clean Development Mechanism. It specifically notes in paragraph 3 (a) and (b) that the mechanism relates to *project activities*.

concerning bundling and programmatic CDM. As such, a COP/MOP decision may suffice – if the definition of "project activities" and/or programmatic CDM is extended to cover whole sectors. Even still, previous COP/MOP decisions will need to be revisited to ensure consistency (such as paragraph 20 of 7/CMP.1, which notes that a national policy or standard is not eligible as a CDM project).

Second, the sectoral crediting mechanism could be linked to the Kyoto Protocol but involve the establishment of a new flexibility mechanism. This may be an attractive option if Parties consider that the additionality principle is unsuited for sector-wide crediting. In this instance, paragraph 17(b) of the AWG's work programme provides a basis for negotiation. The agreement process would either involve a decision of the COP/MOP or an amendment of the Kyoto Protocol. The procedures for Protocol and Convention amendments are set out in the Annex to this paper.

A third option is for a crediting mechanism that is not linked directly to Annex I Kyoto Protocol commitments, but rather to be linked to future commitments or actions by developed countries under the UNFCCC or a new instrument. This option may appeal to Parties if a new system of differentiation is introduced to distinguish between countries in addition to that applied under the Protocol via Annex B. In this instance, a new mechanism could be established under the Convention itself or under a new instrument. In both cases, BAP paragraph 1(b)(v)[9], and arguably also (d)(i) and (e)(ii), provide a basis for negotiation.[10] The agreement process would involve a decision of the COP, an amendment of the Convention, or whatever agreement process for a new instrument that the Parties decide upon.

No-lose approach

Non-binding sectoral targets or actions with crediting could – in theory – be contemplated under Article 10(b)(i) of the Kyoto Protocol, which notes that all Parties shall develop national programmes with mitigation measures, including for the energy, transport, industry, agriculture, forestry and waste management sectors. This option could involve a COP/MOP decision(s), or an amendment to the Protocol. However, in both cases, the more immediate difficulty relates to establishing a basis for negotiation, given that neither the Article 9 Protocol review process, nor the AWG-KP work programme explicitly provide for consideration of enhanced developing country mitigation actions (though this does not preclude their consideration if Parties agree).

As such, this issue may be better addressed by the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWGLCA), in particular under paragraph 1(b)(ii) of the BAP,[11] with the identified actions recognised in a COP decision, or if considered necessary by the Parties, a Convention amendment or new instrument. For details regarding the establishment of the related crediting mechanism, see the above discussion.

Note that this paper focuses only on what amendments would be required to introduce the measures discussed. It is of course acknowledged that, more broadly, the Protocol would need to be amended if it is to provide for a second commitment period beyond 2012.

[9] BAP 1(b)(v): use of markets and other approaches to enhance the cost-effectiveness of and promote mitigation actions.

[10] BAP 1(d): enhanced action on technology development and transfer to support action on mitigation and adaptation, including: (i) the removal of obstacles to, and provision incentives for, scaling up of the development and transfer of technology to developing country Parties.

BAP 1(e): enhanced action on provision of financial resources and investment to support action on mitigation, adaptation and technology co-operation, including: (ii) positive incentives for developing country Parties for enhanced implementation of national mitigation strategies and adaptation action.

[11] BAP 1(b)(ii): nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity building, in a measurable, reportable and verifiable manner.

Sectoral targets

At first glance, the logical place for the creation of developing country sectoral GHG targets with emissions trading would be the Kyoto Protocol and its Article 17 provision for emissions trading among Annex I Parties. While Article 17 (and any other relevant portions of the Protocol) could be amended to allow for this, a similar difficulty arises as with the negotiation of non-binding targets. That is that decision 1/CMP.1 provides that the AWG-KP was explicitly established to consider future Protocol Article 3(9) commitments (i.e. binding, quantitative) for Annex I Parties, while the decisions concerning the Article 9 Protocol review do not clearly provide for consideration of enhanced non-Annex I commitments. Drawing on this, many non-Annex I Parties have repeatedly expressed resistance to the establishment of any additional commitments for non-Annex I Parties under the Protocol via the review or AWG-KP process. Yet, there is no reason why Parties could not either create a new negotiating group to address this issue, or extend the scope of the AWG-KP or Article 9 review to do so.

Alternatively, developing country sectoral targets could be considered under the Convention by the AWG-LCA, with paragraph 1(b)(ii) of the BAP (and also 1(b)(iv)[12] and 1(b)(v)) providing a basis for this. Opinions may vary as to whether the nationally appropriate mitigation "actions" referred to in this paragraph could be binding or rather must always be non-binding, but in theory there is nothing in the text to prevent negotiation of binding sectoral targets under this paragraph. In this instance, in terms of agreement, if the sectoral targets are to be non-binding, an ordinary COP decision would likely be adequate. Were the targets to be binding, an amendment of the Convention or a new protocol may be more appropriate though not strictly legally necessary. However, in this case, the issue of how to provide for Party-based emissions trading is unclear, given the separation of post-2012 negotiations by the AWGLCA and AWG-KP, and their differing categorisation of Parties (developing and developed in contrast to non-Annex I and Annex I). The point here is that if this form of emissions trading is to be linked to Annex I Party targets under the Protocol, there will need to be an amendment of the Protocol to provide for this, something that cannot be decided upon by the COP through the AWGLCA.

2.2.2 Coverage and eligibility

If undertaking domestic sectoral approaches opens up the possibility for significant support through various UNFCCC mechanisms, it is legitimate to ask whether such support ought to focus on certain priority sectors, or if developing countries should be able to self-select activities and sectors best suited for such an approach. This is important as it will affect participation in a sectoral approach. For example, not all countries have a direct, major stake in all heavy industry sectors (cement, steel, chemicals, pulp and paper, aluminium, glass, etc).

Other than land use, land-use change and forestry, a sector that is prevalent in the GHG profile of many, if not all, developing countries is electricity. It may be a useful candidate for a domestic sectoral approach, all the more so as national circumstances, access to energy sources and past experience are key influencing factors on its GHG-intensity. A general method to address the sector could be agreed, possibly inspired by some of the CDM methodologies on clean coal, renewables, and end-use efficiency – the IEA 25 energy efficiency recommendations endorsed by the G8 Energy Ministers provide guidance on priority action. Transport is another rapidly growing source of emissions, and one that brings with it other negative externalities. Support could be targeted to policy measures that address these problems while reducing GHG emissions.

While prior agreement on eligible, or priority sectors may provide for greater ease of country comparison, self-selection is likely to ensure that a country has the capability and willingness to

[12] BAP 1(b)(iv): cooperative sectoral approaches and sector-specific actions, in order to enhance implementation of Article 4, paragraph 1(c), of the Convention.

address emissions in a particular sector. If self-selection is allowed, countries could be in a position to pick winners,[13] i.e. sectors more likely to earn credits in the international carbon market.

Regarding eligibility and coverage, some clarification would be needed on the following:

- Should all sectors be eligible for domestic sectoral approaches and if not, how would Parties select among activities? Section 4 covers this issue from an international perspective.

- Should all developing countries be eligible for the same types of approach, or should different country groupings be eligible for different approaches, going from sectoral crediting, to non-binding and then sectoral targets?

- Could any developing country come forward with suggestions for any sector, or should there be a threshold to ensure that the emission reductions from this sector would be significant in terms of the country's total emissions?

- Could a country volunteer part of a sector, e.g. if an industry consists of small, older plants, versus large new and rather modern installations? While this may facilitate participation, care should be given to possible leakage of emissions outside the perimeter agreed for domestic action.

- Are there operational or institutional limitations that would require selecting a set number of options for sectors or Parties to participate?

2.2.3 Implementation issues

The institutional arrangements needed to implement any domestic sectoral approach will depend upon the model adopted. Regardless of the model chosen, however, some kind of international coordinating entity will likely be necessary. This could comprise an Executive Board, established by way of a COP or COP/MOP decision under the Convention or Protocol. The functions of such a board would necessarily vary depending on the eligible form(s) of sectoral approach or action. For example, if the board were to be the repository of a list of non-quantified sectoral actions underway in different countries, the institutional requirements would not need to be very large. In contrast, if such a board were in charge of quantifying (or verifying the quantification of) the effect of particular sectoral approaches, then the institutional requirements could be much greater, and could involve the need for a supervisory body helped by some expert teams as the need arose (Ellis et al. 2007).

In terms of assessing progress with targets, were the sectoral approach to comprise sectoral targets only, it may be sufficient for Parties to provide for some kind of enhanced reporting and review process, similar to that of Annex B Parties' emissions inventories under the Kyoto Protocol. This could also link with any future developments regarding the measuring, reporting and verification of developing country actions. It seems appropriate that before a developing country Party's sector were accepted under the scheme, the Party would need to provide historical GHG data for the proposed sector, together with evidence of capacity to measure future emissions, or to do so with financial and other assistance as appropriate.

Were the sectoral action to include crediting, some kind of designated national entity as well as a national or international entity for verifying reductions would be needed. As noted in Baron and Ellis (2006), a wealth of experience exists in activities carried out under the CDM and Joint Implementation (JI). As such, every effort should be made to draw on this experience and even to extend existing bodies, rather than to create new ones, where possible.

[13] This "adverse selection" problem is common in areas of environmental policy based on voluntary participation.

Box 1: Institutional options for overseeing baseline setting: the case of the Montreal Protocol

Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer have set phaseout schedules for the production and use of a range of ozone-depleting substances (ODS). The timeframe for phaseout varies for production and use, between substances and based on whether a Party is a developed (non-Article 5) or developing (Annex 5) country Party.

Recognising that it may occasionally be necessary to overrun a phase-out schedule, the Protocol provides options for annual exemptions for the continued use of ODS in "essential" or "critical" circumstances. The procedure for permitting critical- and essential-use exemptions, set out in a series of MOP decisions, involves both the Protocol MOP and scientific advisory bodies. While the MOP itself decides by way of an ordinary decision the exemptions that will be allowed each year, the Parties' decision is informed by a relevant scientific body set up under the Protocol. The Technology and Economic Assessment Panel (TEAP) incorporates several "Technical Options Committees" comprising experts in particular ODS and in sectors of the economy that use ODS: chemicals, foams, halons, refrigeration, medical activities and methyl bromide, for example.

A Party seeking an exemption must make a nomination for the exemptions nine months before the meeting at which the decision will be taken. Various MOP decisions set out what information is required in the nomination. The relevant Technical Options Committee of the TEAP then undertakes an assessment of the nomination and provides its own recommendation to the MOP as to what the amount of the exemption should be and why. Various MOP decisions also set out criteria that must be met for all allowed exemptions.

A similar kind of system could be adapted for the setting of developing country sectoral baselines under the UNFCCC. A Party's nomination for a sectoral baseline could be reviewed by an advisory body, such as a committee or expert group established under the Subsidiary Body for Scientific and Technological Advice (SBSTA) or a sectoral mechanism executive board. Then Parties themselves – either in the COP or the COP/MOP as appropriate – could take a final decision based on the recommendation of the advisory body. This is in fact somewhat similar to the way in which the Kyoto Protocol COP/MOP currently takes decisions in relation to recommendations from the CDM EB.

2.3 Minimum needed for agreement at COP15

Questions remain as to whether some developing countries will be in a position to come forward with specific sectors and the information necessary to initiate a discussion over baselines for sectoral approaches by COP15 in December 2009. As domestic sectoral approaches are at a fairly early stage of discussion in the UNFCCC, with many aspects to be further defined before they can be agreed, final decisions in Copenhagen on actions for specific sectors and countries could prove difficult. However, as with the Kyoto Protocol, it may not be necessary to decide all features of sectoral crediting mechanisms, or even sectoral targets themselves, by Copenhagen. What could be of use, however, is an agreement on process and criteria for agreeing baselines and objectives. Parties would then be in a position to elaborate specific actions and mechanisms, to be incorporated into COP or COP/MOP decisions at later meetings.

If domestic sector-based efforts are to be included under the post-2012 framework, by COP15, Parties will need to consider the following:

- **Crediting:** Agree whether or not sectoral actions and approaches in developing countries can generate carbon credits, and if so, to what extent (i.e. whether one credit is generated for each tonne of avoided emissions, or whether some sort of discounting occurs[14]), and whether there should be a "sunset clause" to such crediting. This could be linked to a broader discussion over country/sector differentiation.

[14] See Chung (2007) and Schneider (2008) on the role of CER discounting.

- **Eligibility:** Agree on a set of eligible sectors and/or countries, or on criteria for the future acceptance of such sectors/countries. Such criteria could include: designation of a certain share of global or developing country emissions; length of capital stock lifetime to best target activities subject to lock-in; ability to measure and verify emissions in the sector; and possibility for that sector to make a reasonable contribution to any global GHG stabilisation goal.

- **Link to NAMAs:** Whether developing country Parties can take, among their nationally appropriate mitigation actions (NAMAs), more defined actions or commitments in specific sectors, opening up the possibility to broaden crediting and/or to receive specific support to increase their capacity to reduce emissions.

- **Pilot phase:** Whether to initiate a pilot phase for the elaboration of domestic sectoral approaches, starting as early as 2009. Murray et. al. (2008) provides a more detailed description of the possible steps to elaborate of a full-blown sectoral target at domestic level. The pilot phase could be set up as a data collection exercise for specific sectors and countries, in preparation for a more systematic review of emission baselines and sectoral targets. Developing country Parties could be provided with technological, financial and/or capacity building support in establishing such baselines, as well as in monitoring reductions.

- **Process:** Agree on a timeline for countries to submit their proposals for sectoral baselines as a basis for possible crediting or other support mechanisms. This timeline would seek to inform a global negotiation over sectoral goals, with hopefully a better view on global emission impacts of agreeing particular sectoral approaches and sector baselines. Alternatively, countries could adopt an open-ended approach to the submission of sectoral proposals, with a review process not unlike what the Executive Board does for the Clean Development Mechanism, i.e. assessing sectoral proposals as they come forward.

3. Sector-Based Technology Co-operation

In addition to the range of technology-related activities already in existence under the UNFCCC and Kyoto Protocol[15], the issue of technology is now playing a key role in the post-2012 negotiations. This includes the AWG-KP's consideration of current and future technologies within its analysis of Annex I mitigation potentials (FCCC/KP/AWG/2006/4, paragraph 17(b)(i)). It also includes the AWGLCA's negotiations under three of the pillars of the BAP: mitigation, technology development and transfer, and financing. Given the importance of technology issues in negotiations, particularly for the AWGLCA, it may be useful to streamline an approach to technology through some kind of sectoral structure, rather than continuing to address technology in an open-ended fashion. This section explores this idea.

3.1 Organising technology co-operation by sector

As has been consistently noted (e.g. Bradley et. al., 2007), sectors vary in terms of their geographical and company concentration, but also in technology development and ownership.[16] Undertaking expert

[15] More recently, this has included the technology transfer framework first set out in the Marrakesh Accords and updated at COP 13, the technology information system (TT:CLEAR), the work of the Expert Group on Technology Transfer, and related work on innovative financing, technologies for adaptation, SBSTA mitigation workshops and the five-year work programme on adaptation.

[16] Well-cited examples include that of the cement sector, where technology is often owned and developed separately to plants, meaning that all or most companies must buy technology on an open market, and the aluminium sector, where technology tends to be developed and owned by companies, meaning that the

analysis to identify the key sectors where enhanced international co-operation could provide significant mitigation potential, then systematically identifying the particular needs and features of each of those sectors through sectoral task forces or work programmes, could add real value to technology-related efforts to date under the UNFCCC system.[17] Not only does precedent exist within international efforts to address climate change, e.g. in the Asia-Pacific Partnership on Clean Energy and Climate Change. Clear precedent also exists within the wider international environmental arena – take, for example, the "thematic work programmes" under the Convention on Biological Diversity (CBD) or the industry and substance-specific focus of the various technical committees under the Montreal Protocol.[18] Such an approach could be integrated with future discussion on what constitutes measurable, reportable and verifiable (MRV) mitigation actions and support, as further indicated below.

An important aspect of a technology co-operation approach, as recalled in BAP 1.b.iv and Article 4.1.c of the Convention, is that it could address more than simply technology transfer.[19] This is particularly pertinent given the varying ways in which technology is developed and distributed across sectors and given that in some sectors and sub-sectors, the largest players or highest performers sometimes reside in emerging economies.[20] Matters that could be addressed via a sector-specific approach of technology include issues considered in some existing UNFCCC processes and other fora, such as:

- Pooling and financing research and development and work toward technology breakthroughs.

- Promoting deployment, including through access to funds, with the use of a sector-specific approach to finance, with an aim to maximise impact on GHG mitigation. This could be supplemented by identification and promotion of best policy practice, towards a shift from donor-based to domestically-driven technological change.

incentives for sharing research efforts and transferring technology may be more limited. For further information on technology ownership in industry, see Baron et. al. (2007), Appendix 3.

[17] This view is also reflected in the submission of World Bank to the AWGLCA, which suggests targeting equipment and 'categories of activities' with 'high sustainable development and carbon mitigation benefits'.

[18] Acknowledging the particular needs and features of the major biodiversity systems on Earth, the Conference of the Parties to the CBD has established seven thematic programmes of work corresponding to some of these systems (e.g. agricultural biodiversity, forest biodiversity, island biodiversity and mountain biodiversity). Each programme establishes a vision for and principles guiding CBD work in relation to that biodiversity system. It also sets out key issues for consideration, identifies potential outputs, and suggests a timetable and means for achieving these. The implementation of each work programmes depends on the involvement and contribution of Parties, the Secretariat and other relevant organisations – some Parties may play no role in one work programme, while playing a prominent one in others, depending upon their national circumstances and the biodiversity systems in their countries. Implementation of the programmes is also reviewed periodically by the CBD COP and its scientific technical advisory body. The work programmes cover a wide range of activities, from capacity building exercises, to biodiversity assessments and data collection, to adaptive management, to specific activities to reduce threats to biodiversity. For information on the technical committees of the Technology and Economic Assessment Panel under the Montreal Protocol, see text box 1 and the discussion in section 3.2.3.

[19] At the same time, such an approach also appears consistent with the work of the EGTT, which provides for sectoral approaches in its new mandate (decision 3/CP.13): 'For the long-term perspective beyond 2012: develop the terms of reference for elaborating a strategy paper, including sectoral approaches, that could draw on the work undertaken by Parties in processes under the Convention and outside the Convention as well as the results of work undertaken by other international organisations and forums. The strategy paper should be considered by the subsidiary bodies at their thirtieth sessions'.

[20] One of the most efficient aluminium smelter is located in Mozambique – as it is amongst the most recent.

- Capacity building and staff training in sectors, to foster the adoption of new technologies.[21]

- Auditing, data collection and support for the development of technologies for measuring baselines and monitoring GHG emissions (particularly if linked to sectoral targets).

- Trade measures (addressing existing tariffs and non-tariff barriers to clean technology and practices).

A sectoral or sub-sectoral approach in this context would provide a means to address the particular technological needs and features of major GHG-emitting sectors, rather than simply considering individual projects or countries. This provides a real opportunity to identify the means of having the greatest impact on global GHG emissions.

At the same time that important sectors would be addressed individually, a shared institutional structure or set of guiding principles could ensure harmonisation and a systematic consideration of technology needs across sectors in line with UNFCCC principles. One option would be for such an approach to simply form a part of – or provide the organising, or reporting basis for – actions and support that can be measured, reported and verified under BAP paragraph 1(b)(ii). Also, the experience of the Montreal Protocol via its Technology and Economic Assessment Panel (TEAP) and technical options committees could be relevant (see text box 1). While each technical option committee covers a precise ozone-depleting substance or industry sector that uses such substances, all of the committees are themselves formed under the overarching TEAP. The TEAP is made up of all committee members, meets regularly and produces collected reports that combine the work of all committees. The TEAP and its committees are also governed by a single set of principles decided upon by the MOP, all of which ensures coherence with the overall goals of the Montreal Protocol.

There are many options to organise a sector-driven approach to technology co-operation and support. The following issues would need to be resolved to further refine options:

- **Integration:** how would any such approach be integrated with existing technology-related activities under the UNFCCC and Kyoto Protocol? As noted above, direct incorporation of a sectoral approach as an 'organising principle' for actions and support by and for developing countries that can be measured, reported and verified could be one option.

- **Choice of sectors and actions:** should Parties prioritise certain sectors? Once sectors were decided upon, Parties could identify areas where international co-operation could prove most fruitful to accelerate mitigation in these sectors.

- **Methodologies:** how would mitigation potentials and costs be quantified and how should the experiences of industry federations on best available technologies and best policy practice be taken into account. On research and development, an area where consensus and co-operation may be more easily achieved than for activities that immediately affect competitiveness, countries could base their effort on existing technology road maps (e.g. IEA, 2008a).

- **Participation:** as is the case with the current flexibility mechanisms, it is not clear whether all countries would be willing and able to participate in activities in relation to all sectors, or whether the process would be more selective. The BAP certainly does not restrict co-operative sectoral approaches to any particular group of countries.

[21] See Asia Pacific Partnership task force on power generation and relevant documents at: http://www.asiapacificpartnership.org/Powergenreferencematerials.htm, consulted on September 29, 2008.

- **Financing:** Would any funding for sector-specific co-operation be distinct from potential financial flows under existing and possible crediting mechanisms? This may be desirable whenever sectoral co-operation involves activities such as capacity building, monitoring, exchange of best practice, without directly measurable effect on emissions. Further, as is envisioned in the REDD discussion, mitigation may or may not be eligible for crediting; in the latter case, other forms of funding may be made available.

There are of course considerable opportunities for technology transfer and/or collaborative technology research related to climate change mitigation independent from UN climate change regime. Such inter-governmental collaboration exists or is envisaged, in the fields of carbon sequestration, nuclear energy, methane recovery, solar energy, biomass energy, but also in iron and steel (e.g. the IISI CO_2 breakthrough programme, a private-sector initiative grouping several companies); further, the APP task forces provide a public-private forum to exchange technology know-how and evaluate potentials for improving energy and GHG performance.

While these initiatives are not addressed further here, it is noted that such a sectoral approach to technology co-operation may provide a new and enhanced means for engaging industry in the activities of the UNFCCC, through, for example, linking with existing industry-led initiatives.

3.2 Integrating Sector-based Technology Co-operation into the UNFCCC

3.2.1 Link to UN regime, negotiation mandate and agreement process

BAP paragraph 1(b)(iv) provides a clear basis for negotiating some kind of sector-based technology collaboration. This paragraph refers to cooperative sectoral approaches and sector specific actions to enhance implementation of Art 4.1(c) of the UNFCCC. This Article commits all Parties to collaborate on technologies, practices and processes for GHG mitigation in all sectors. As such, paragraph 1(b)(iv) of the BAP ties in with and complements the other mitigation-related provisions of the BAP, particularly 1(b)(i)[22] and (ii), as well linking to BAP provisions on technology and financing (particularly 1(d)(iv) on the effectiveness of mechanisms and tools for technology co-operation in specific sectors).

There are several possible options that exist for integration:

- A sectoral approach to technology co-operation could form the organising principle for actions and related support that can be measured, reported and verified, as well as sectoral targets by developing countries (see discussion in section 2). In this case, the agreement process would form part of whatever wider agreement process was considered by Parties to be relevant for such MRV actions and support, so is not addressed further here.

- Alternatively, a separate mechanism not as directly linked to the specific actions or commitments of Parties could be established, such as sectoral work programmes on technology with established sectoral task forces. All of this could be established under SBSTA (just as the Expert Group on Technology Transfer was created). Such processes could be established by way of COP decisions.

This kind of collaboration could exist without any additional financing, however, given the focus of paragraph 1(b)(iv) on enhancing implementation of Art 4.1(c), and given the general acceptance of the

[22] BAP 1(b)(i): measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, by all developed country Parties, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances.

need for some further assistance for developing countries in scaling up their mitigation efforts, some kind of financing mechanism could be appropriate. Options include:

- One of the existing Convention-related funds could be extended to provide specifically for sector-based technology collaboration. The Special Climate Change Fund (SCCF) appears particularly appropriate, with Parties having referred specifically to UNFCCC Article 4.1 (commitments) in the COP decision establishing this fund.

- A new technology fund could be established. This remains a possibility within the negotiations generally. If this were to happen, sector-based technology collaboration could be one component of this fund.

- Other possibilities include funding for the purchase and cancellation of credits from the carbon market, if Parties deem the market a more effective mechanism to trigger reductions, as opposed to a more managed, project-by-project funding approach. It may, however, not be straightforward to identify the sectoral/technology origin of credits, depending on how such crediting is organised.

- Non-UNFCCC funds, including new multilateral funds such as the World Bank's Clean Technology Fund. Whether and how such funding would interact with UNFCCC commitments remains unclear at this stage.

In all instances, whether a new fund were created or existing one extended, agreement could simply occur by way of a COP decision, as per current precedent. This does not preclude Parties from choosing to mention a fund in a Convention amendment or new instrument as well. The administrative functioning of the fund could be established over time through a set of COP decisions, in accordance with existing precedent.

3.2.2 Sectoral coverage

The COP might wish to identify a select set of sectors with significant mitigation potential through international technology collaboration. As with sectoral targets in section 2, certain general criteria could be agreed to before a sector would be selected. These could include:

- **Cost-based approach:** decide on the sectors requiring attention, based on the cost-effectiveness of measures that could be taken to curb their emissions.

- **Size:** ensure that funding is guided toward large-scale policy initiatives, as opposed to projects.

- **Gaps:** focus on significant mitigation gaps, both in terms of sectors and countries.

- **Market barriers:** focus on sectors that will require significant technological breakthrough in the medium- long- term, but which are not addressed by today's markets and actors. While this may contradict with a cost-effectiveness principle (cost-based approach, above), Parties need to decide whether they wish to address both today's and tomorrow's technology needs, as these will probably require different selection and cooperative approaches.

3.2.3 Implementation issues

As noted above, it is possible that a sector-based approach based on technology co-operation could simply form part of whatever system is established to ensure that mitigation actions and support can be measured, reported and verified (MRV). If so, the administrative structures would likely form part of whatever wider structures are established for the MRV system, so are not addressed further here.

Even if established separately, the implementation of such an approach would not need to be particularly complex: numerous processes and mechanisms already exist that could simply be drawn on directly, or used as a model. The administrative body could comprise an expert group or committee under the SBSTA or SBI, as per the Expert Group on Technology Transfer. Parties may wish to establish multiple sectoral expert groups or committees, with each one addressing an identified sector, as per the technical options committees of the TEAP under the Montreal Protocol. If so, the SBSTA could provide some form of coordination and consistency across the committees, with the COP or COP/MOP providing ultimate governance (and perhaps also establishing overarching principles to guide the work of all committees).

With regard to funding, experience could similarly be drawn from existing mechanisms. If the fund is to form part of the SCCF or another existing fund, existing structures would likely be sufficient. It may be worthwhile though, to create some kind of expert advisory committees to provide guidance on the fund's work in this area, or the fund could draw on the expertise of any administrative sectoral expert committees established (as noted in the above paragraph). Even if a new fund were to be established, the UNFCCC system now has considerable experience with establishing such funds. Thus, the administrative mechanisms and processes for their establishment could be relatively similar and straightforward. However, if non-UNFCCC funds were somehow included, there would need to be some kind of mechanism to account for these, i.e. better coordination, accounting, etc.

Finally, one further issue that Parties would need to carefully consider is the link (if any) to the Expert Group on Technology Transfer, which though it clearly has a narrow focus, would nonetheless have overlapping work. This is particularly relevant given the COP15 decision regarding the EGTT, which included reference to considering sector-based activities under the EGTT.

3.3 Minimum needed by COP15

It is difficult to define precisely what would be required to reach agreement on a technology-based sectoral approach by COP15, as the definition of a sector-based technology approach could vary widely. One upside to this is that it could provide opportunities to link closely with other aspects of the ultimate post-2012 package, including actions, support and financing that can be measured, reported and verified.

As such, the points noted in both sections 2.3 (for domestic sector approaches) and 4.4 (for transnational agreements) about minimum needed by COP15 are also relevant here. Indeed, a technology-based approach could evolve over time based on a series of COP decisions. Perhaps then all that is needed as a minimum for COP15 is the identification of sectors/countries to pilot such an approach and a decision as to a timeline and some basic guiding principles for the operation of a pilot phase.

4. Transnational Sectoral Approaches

This section first introduces broad options for transnational approaches. It then gives a few examples of ongoing international initiatives, asking whether such activities could be brought to bear in considering sectoral approaches under the UNFCCC, bearing in mind that no formal transnational sectoral proposal has been made within the UNFCCC yet. The section concludes with possible elements that Parties could cover in their decisions at COP15, should they chose to follow this route.

4.1 Options for transnational approaches

Transnational sectoral approaches, as opposed to domestic ones, would seek to apply a similar climate policy framework to a sector across a range of countries. Depending on the specifics of the sector, and

what parts of it determine its contribution to GHG emissions, the approach could take various forms, including:

- A transnational GHG performance standard, a percentage improvement in the performance of a sector in a range of countries, with possible regional variations, or a global cap on the sector's emissions.

- A baseline-and-crediting or emissions trading system based on the above, or on a common methodology to derive country-specific GHG emission performance objectives. This could form the basis for various forms of sectoral crediting described in section 2.

- A transnational technology goal, setting a share of global output or production capacity to be supplied by a given technology over a specific timeframe.

- A cooperative approach to research and development, to provide for equipment allowing radical emission reductions in the longer run.

There are various pros and cons to each of the above, which will not be discussed here, other than to recall principles that may be important for policy-makers as they consider transnational approaches:[23]

- Any transnational agreement could of course be differentiated across countries, reflecting their "common but differentiated responsibilities and respective capabilities".

- No significant reductions can be achieved in a sector without it incurring an implicit or explicit cost for its emissions. While today's best practices could lead to important additional reductions in emissions if they were deployed globally, they have not been developed with GHG mitigation as a goal, nor on the basis of a growing carbon cost. Any sectoral approach would ideally provide for a transition towards full carbon pricing in the designated sector.

- On the other hand, imposing a given technology or GHG performance objective may lead to higher GHG abatement costs than that incurred by other sectors to achieve any globally-agreed objective. For this reason, some kind of inter-sectoral flexibility would be desirable: a sector ought to be able to cover excess emissions through the carbon market, hence preventing excessive costs to achieve its objective.

- The UNFCCC and the Kyoto Protocol make Parties responsible for the direct emissions of all activities operating within their borders (international aviation and maritime sectors being exceptions). Some proposals for transnational approaches appear inconsistent with country-by-country GHG accounting, and would probably require carving the sectoral emissions out of national inventories.[24] There does not seem to be any support for such change among Parties.

Regarding the precise form any such transnational agreement could take, regardless of the choice of approach from above the list, two options could be envisioned:

- Parties could decide to engage in a negotiation of such approaches, including a discussion of targets and mechanisms, under the UNFCCC. For developed countries, the agreement would supplement country goals; for developing countries, it would be (part of) their contribution to the global mitigation effort; or

[23] See Baron et. al. (2007) for a broader discussion of pros and cons related to transnational approaches.

[24] ArcelorMittal, 2007.

- (Some) Parties could decide to negotiate such an agreement outside the UNFCCC, to avoid burdening the Convention's already heavy workload with activities that may be of importance to a relatively small number of countries. Agreed efforts, regarding mitigation and various support thereto, could be reported to Parties to the UNFCCC.

There are differing views whether or not all international mitigation efforts, such as a transnational sectoral approach, and their development, would best be handled within the UNFCCC.

In contrast with domestic sectoral approaches, for which current proposals largely rest on assumptions about how such an approach might work, existing transnational efforts provide models that negotiating Parties could use as bases for more focused UNFCCC discussions on transnational sectoral approaches, including on the various credit-based approaches described earlier. As such, before turning to the specifics of integration issues, the following section outlines existing transnational sectoral efforts taking place outside the UNFCCC and considers how they could support any future transnational sectoral endeavour.

4.2 Existing transnational activities

Some international industry federations and other organisations are actively debating the desirability and the feasibility of transnational, sector-wide agreements to best coordinate the transition of their activities towards a low-GHG profile. Their motivations include the need to ensure the sustainability of activities that are at threat because of their high energy and CO_2 contents, but also to tackle concerns of competitiveness that arise as some parts of the world introduce binding caps (and a cost) while outside competitors do not face such costs.[25] Whether or not competitiveness concerns should feature in the discussion of transnational sectoral agreements under the UNFCCC is likely to be extremely controversial. In any case, negotiations over an agreement on how to proceed with sector-level GHG mitigation at international scale would probably, sooner or later, run into this issue.

Other than the public-private Asia Pacific Partnership on Clean Development and Climate and its sector-specific task forces, other efforts are generally driven by the private sector alone[26]. Their activities range from data gathering on energy and CO_2/GHG performance, benchmarking, research and development, to the development of international policy options. Not all industries are equally advanced in their activities, nor do they work cooperatively on all aspects: aluminium companies do not intend to share their research on ways to reduce electricity use, given the implication on production costs and competitiveness. There is, however, a general recognition among these groups that to become binding, these initiatives require full government endorsement. Some make explicit references to the UNFCCC in that context (CSI, 2008).[27]

Some proposals imply a revamp of global accounting of emissions (e.g. applying global average CO_2 intensities for all inputs to steel making and a comparison of performance on that basis, irrespective of actual onsite, in-country emissions); others propose international frameworks that would require trading on the basis of sectors, and spanning developed and developing countries (see above). The approaches tend to differentiate Parties, sometimes on the basis of their development level, or merely on the basis of the national circumstances of the sector (e.g. fuel mix, availability of raw materials, access to technology). Aluminium may be an exception, as it is a much more global industry when it comes to choices of location for primary smelting, with the exception of the Chinese market. A global, uniform benchmark or standard, opposed by some developing countries in Accra, seems neither

[25] See, for instance, Christmas, 2008 or Reinaud (2008 forthcoming).

[26] See the efforts of the International Aluminium Institute, the International Iron and Steel Institute, and the Cement Sustainability Initiative (Baron et. al., 2007).

[27] See in particular CSI (2008): "To go further, we are calling on G8 members and the UNFCCC to accelerate the creation of the necessary policy framework for effective sectoral approaches".

realistic nor favoured at this stage. A progressive, differentiated evolution towards such goal may be more palatable.

Box 2: International GHG data gathering: the contribution of industry federations

International Aluminium Institute – IAI conducts annual surveys of the industry's perfluorocarbon (PFC) and other direct greenhouse gas emissions, as well as its energy use. The survey covers 64% of global aluminium output in 2007, up from 60% in 2006, and includes installations that are not members of IAI. The survey covers a high share (almost 100%) of the more PFC intensive technologies, and therefore represents around 80% of global PFC emissions. The Institute nonetheless provides estimates of global emissions, based on the median performance of reporting installations within technology classes.

The survey is conducted as part of an effort to eliminate PFC emissions in the long run; by 2020, the industry seeks to reduce emissions of PFC by 93% from 1990 levels; it has already achieved an 87% reduction in 2007. In the context of this new agreement, the IAI requires that companies sign off on their emissions data. Third party verification only takes place at the level of IAI, not for individual plants.

The IAI has also adopted a voluntary goal on smelter electricity usage per tonne of aluminium (10% improvement between 1990 and 2010) and as such has collected information on actual electricity use by installations since 1980. It has recently developed a voluntary goal on energy use per tonne of alumina (10% improvement from 2006 levels by 2020).

Although the IAI surveys only cover around 5-10% of Chinese aluminium production, IAI works with the Asia Pacific Partnership aluminium task force, where work is underway to obtain Chinese data.
IAI does not hold information on aluminium production on a company-by-company basis, but publishes regional data (http://world-aluminium.org/Statistics).

Cement Sustainability Initiative (World Business Council on Sustainable Development) - The CSI member companies decided in October 2006 to "develop representative statistical information on the energy and CO2 performance of clinker and cement production, worldwide and regionally, to serve the needs of internal and external stakeholders." This data gathering exercise (called "Getting the Numbers Right" or GNR) is based on plant-specific operating and performance data provided by individual participants. PricewaterhouseCoopers (PwC) has designed and manages the database as an independent third party, and is obligated to anti-trust and confidentiality commitments with each of the participants. PwC also conducts checks on incoming data, based on industry norms and historical data. Each participant has access to their own data and aggregated statistical summaries of global and regional performance. Portions of the aggregated output will be available on the CSI website in the near future.

The methodology for data collection is described in the "Cement CO_2 Protocol" (www.wbcsdcement.org); information is available for 1990, 2000, 2005 and 2006. Anti-trust concerns preclude the collection of data less than one year old. At present, the database covers 801 million tons of cement, (produced by more than 50 companies) out of global total above 2 billion tons. Regional coverage varies: over 90% in Europe, down to less than 10% in China and India at present. The data also includes non-CSI members, companies or federations. Interested stakeholders can address queries on the database to the Project Management Committee which serves as the administrative link between PwC and the participants (send requests to pmcgnr@wbcsd.org). 23 queries have been answered to date.

worldsteel – As of 2008, the World Steel Association (formerly known as IISI), has collected data on CO_2 emissions for 56 of its member companies, i.e. 178 sites that amount to 32% of global steel production and 60% of its members' total output. It is seeking broader coverage. Unlike IAI, wordsteel has a long history of collecting production and demand data for various steel products on a country-by-country basis.

4.2.1 What role for such initiatives in negotiating a transnational sectoral approach?

The above initiatives have already gathered significant data on the GHG performance of various sectors at an international level, sometimes based on company-level information (i.e. the initiatives of industry federations) and some on country-wide information (i.e. the work of the APP). While such information may not be enough to establish a country or sector-wide picture of a sector's performance, the data gathering processes enhance our understanding of energy and GHG accounting, which could provide a sound basis for international comparisons.[28]

Given this information, it may be worthwhile for Parties to give further consideration to how such initiatives could be extended or relied on to support either a set of national baselines, or a more generic international approach to a sector at an international scale, while noting of course the reluctance of some developing countries to adopt common standards. Such international initiatives could offer a useful starting point to measure and compare country-specific performance and inform discussions on mitigation potentials across countries. More specifically, existing fora allow for debates on policies and measures that could foster best practice in industry. In discussions with governments, such information could help target policy co-operation to enhance GHG performance, in addition to other co-operation.

However, while all of the above possibilities for transnational sectoral agreements could be of interest to Parties, there is currently no basis on which to "import" private-sector efforts in developing countries into the UNFCCC process, other than through project descriptions and methodologies developed for the CDM. On the other hand, a country interested in pursuing a sectoral approach that has companies operating on its territory that are participating in these private-sector initiatives, could engage with local companies and use existing information as a basis for an international discussion over its intended sectoral effort.

4.3 Integrating (or linking) a transnational sectoral agreement to the UNFCCC regime

This section addresses possible design issues and principles that may be relevant if negotiations for a transnational sectoral approach were to be launched. Given that there are not currently any clear proposals on the table for a transnational sectoral agreement as there are for domestic sector-based activities, this section is less comprehensive and systematic than that in section 2.

4.3.1 Link to UN regime, negotiation mandate and agreement process

Were transnational sectoral agreements to be incorporated into the UNFCCC regime in the near future, they would likely be negotiated under the auspices of the Convention, not the Protocol, given the more limited focus of AWG-KP negotiations. This could change, however, were future versions of the Protocol to include a more nuanced form of division among Parties (beyond simply Annex I and non-Annex I). For now, BAP paragraphs 1(b)(i) and (ii) provide a potential negotiation mandate for transnational sectoral approaches and paragraph 1(b)(iv) may also be relevant.

If a transnational agreement were to take the form of a binding commitment, it could comprise an amendment of the Convention, or a new protocol, in each case possibly with annexes for the sectors and Parties to be covered, as per the format of the Kyoto Protocol. If this were to be a non-binding agreement, then a COP decision or series of decisions would suffice, though Parties may nonetheless choose to make mention of the agreement in a Convention amendment or new protocol as part of the wider post-2012 package agreed to.

[28] The World Bank uses the notion of 'natural aggregators', i.e. groups or institutions that already cover a range of similar activities and could help broaden the reach of mitigation actions.

One of the potential upsides of this form of sectoral approach could be its simplicity, in that only a small number of countries would need to agree to the instrument (see, for example, Bodansky, 2007). However, if the agreement were to take place within the UNFCCC system, all UNFCCC Parties would be entitled to participate in the negotiations. It is possible that some Parties could simply choose not to take part in the negotiations on a transnational sectoral agreement, leaving the details of the agreement to a smaller sub-set of Parties. Moreover, in the case of a new protocol, some Parties could choose not to ratify the instrument meaning that it would not apply to them, yet this would not exclude them from the negotiations concerning that instrument. Beyond the example of the Kyoto Protocol itself (where UNFCCC Parties that are not Parties to the Protocol nonetheless play a more circumscribed role in COP/MOP deliberations), there is plenty of precedent for this kind of activity in other areas of international law. For example the CBD or the UN human rights conventions all have one or more protocols, which have been ratified by a smaller number of Parties than the overarching agreements themselves.

Were an agreement on transnational sectoral approaches to take place outside the UNFCCC system, it is nonetheless possible that some link with the UNFCCC may be desired, either by the Parties to the UNFCCC, the Parties to the external agreement, or both. The UNFCCC, for example, could choose to recognise the extra-Convention efforts of countries that are parties to both the external agreement and to the UNFCCC in developing any new system for GHG mitigation actions that are to be measured, reported and verified. Additionally, were the external agreement to provide for some kind of trading, the Parties to that external agreement might wish to ensure that their trading scheme were consistent with the UNFCCC flexible mechanisms (as has occurred in the case of the EU emissions trading scheme).

4.3.2 Coverage and eligibility

If a transnational sectoral approach is to address some of the concerns noted in section 4.1 (cover a greater number of global GHG emissions, enhance developing country mitigation efforts), then it seems only fitting that any such approach account for a reasonable proportion of global or sectoral GHG emissions. Thus, in negotiating any such agreement, Parties may wish to establish a threshold for a sector's global contribution to GHGs before an agreement for a sectoral approach for that sector is either reached or enters into force. If such an approach were to be taken, it would be necessary to consider how the GHG emissions of the sector would be measured, i.e. whether only direct emissions should be accounted for, or whether indirect emissions from related energy use would also be included.

An alternative or additional way to address the issue of coverage would be for Parties to establish a threshold above which they would consider a negotiation over a given sector to be legitimate or useful. For instance, this threshold would be expressed as share of the sectoral emissions actually covered by those Parties that wish to negotiate multilateral action in the specific activity.

4.3.3 Implementation issues

Given that no clear proposals for a transnational sectoral approach exist at this time, it is not possible to describe in detail the implementing institutions that would be needed for such an approach. However, a few points are noted in relation to an agreement under the UNFCCC.

First, such an agreement would clearly require some process for reporting on and assessing progress with any targets or other goals. If the transnational sectoral goals were non-binding, this reporting process could be modelled on (or even included within) the national communication process under the UNFCCC. If binding, the more comprehensive reporting and review process for Annex B Parties under the Kyoto Protocol provides a more appropriate model. Second, as with the models for sectoral approaches discussed in sections 2 and 3, it is possible that some kind of international coordinating entity with sectoral expertise might be needed, such as an Executive Board or Expert Group

established by way of a COP or COP/MOP decision as appropriate. See sections 2 and 3 for more comprehensive discussion of some institutional possibilities, including options for drawing on experiences under the Montreal Protocol. Finally, were the transnational sectoral agreement to provide for crediting, the discussion in section 2 may be relevant and is not repeated here.

4.4 Minimum needed for agreement at COP15

There is currently no formal or informal proposal for any transnational sectoral agreement within the UNFCCC. However, the previous discussion shows both the existing motivations and concrete outputs (data, training) that are coming out of existing private-sector and public-private initiatives. On this basis, we propose a list of elements that Parties could decide to tackle if they were to establish transnational sectoral agreements within the UNFCCC regime. In addition to those already governing the UNFCCC, principles to guide the integration of a transnational approach could include:

- Coherence and the complementary nature of any sectoral goals with nation-wide commitments by developed countries, and other mitigation actions by developing countries.

- Organisation of sectoral expertise (such as like the TEAP under the Montreal Protocol). This could either relate to any proposal for a transnational agreement, or to the use of existing private-sector information and vehicles in further deliberations over sectoral approaches – e.g. baseline setting.

- A decision on core elements of the negotiation, which could include: technology co-operation, common methodology for GHG baselines, target types, and various trade aspects.

- A decision on the possible variable nature of these agreements, i.e. the possibility that only some Parties, representing a critical mass of the sector's output or GHG emissions, would be needed for the agreement to enter into force.

- Identification of a short list of possible sectors.

- A decision on how to move forward with addressing data gaps in these identified sectors.

5. Cross-cutting and Future Issues

5.1 Timing issues

The post-2012 climate regime is scheduled to be agreed by COP15 at the end of 2009. As part of enhanced GHG mitigation actions to be undertaken under the BAP, developed countries are under pressure to agree to near-term (e.g. to 2020) quantified mitigation commitments (QELROs) or other actions. Developing countries are also to undertake enhanced mitigation action. The level of ambition of any QELROs or other actions agreed to by developed countries as part of a post-2012 climate framework will depend on several factors. These include the costs of domestic and international mitigation options, as well as the "means" by which developed countries can meet their agreed commitments or actions. In theory thus, developed countries would agree to ambitious targets if these targets could be met – at least in part – by carbon credits and/or other actions (such as sector-specific actions) undertaken in other countries.

However, as illustrated in the sections above, many design options for sectoral approaches are now on the table, with very different implications on both overall mitigation and the additional supply of credits on the carbon market. Negotiators are indeed facing several key unknowns when considering the level of their possible future action:

- The acceptability of particular sectoral approaches, or which Parties could commit to what?

- Their eligibility to generate carbon credits under a post-2012 climate framework, and whether this would vary by sector.

- The quantity and cost of credits that might come to the market through sectoral approaches, in addition to existing mechanisms.

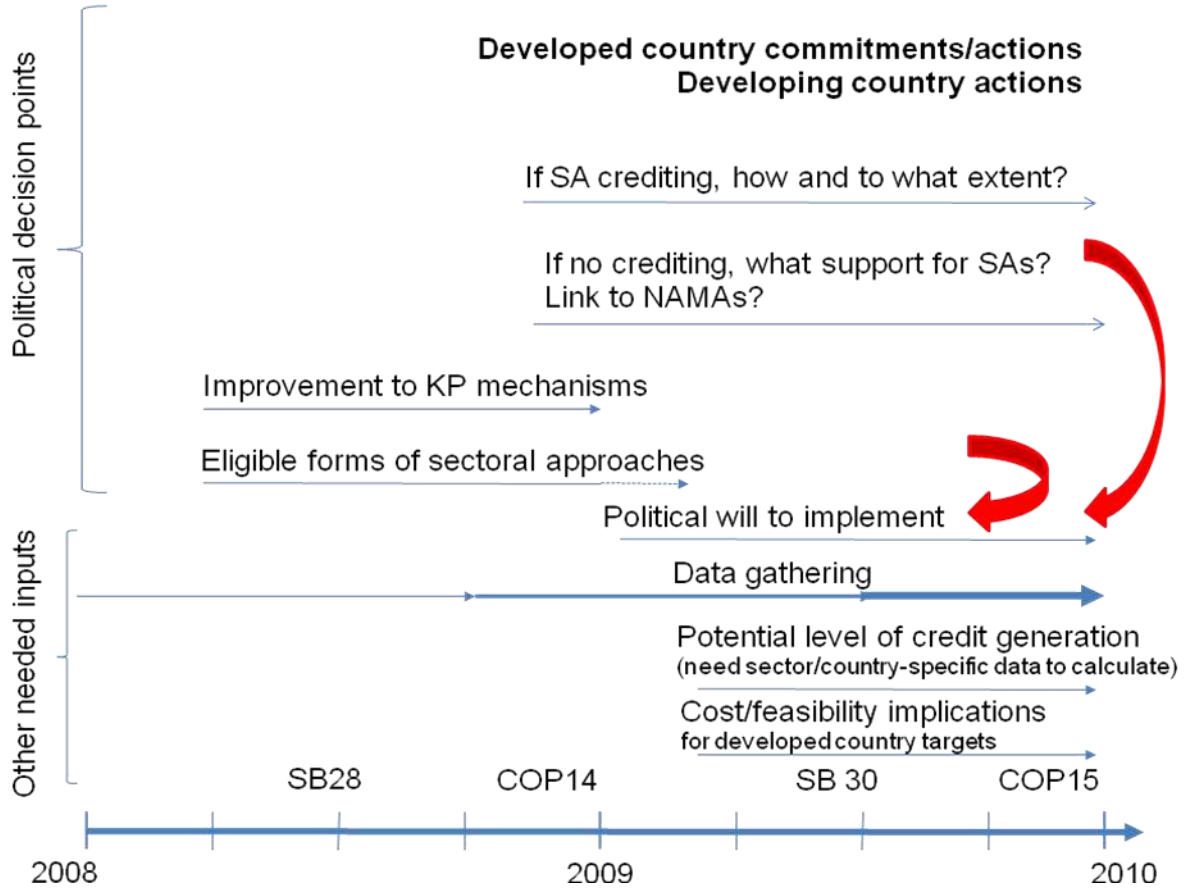
- The ability and willingness of developed countries to use such carbon credits.

Ideally, all these issues would be known when agreeing post-2012 actions, as they "feed in" to the decision on developed country future actions and commitments (Figure 1). However, quantifying the mitigation potential of different types of sectoral actions across sectors and countries, let alone the resulting quantity of credits, would be a very challenging task to accomplish by the end of 2009. Most developing countries have not yet spent time or resources to investigate this option for specific sectors.

Further, data availability in some key countries and sectors is patchy; there is not yet enough data to provide a solid basis for developing the baselines or projections needed to implement certain sectoral approaches. In that context, an agreement if any on the crediting aspect is likely to occur in the absence of a clear supply/demand picture for the global carbon market.[29] Rather it may set up a process to build capacity towards commitments, for those countries pursuing crediting. Other countries may commit, in a binding or non-binding way, on means (e.g. policies) rather than on ends (actual emission reductions), the preparation of which may be less resource and time consuming, although not necessarily less effective to reduce global emissions.

[29] This was arguably the case at the time of the agreement of the Kyoto Protocol, with some analyses finding the CDM as supplying the majority of the international carbon market, while others raised the limits of a project-by-project approach.

Figure 1: **Possible timeline of key elements for decision by COP15 and beyond**



5.2 Capacity to implement sectoral approaches

Different forms of sectoral actions or approaches need different levels of domestic capacity in order to be implemented – scale, and therefore country size would also matter in some cases. An agreement to undertake technology research and development in co-operation with other countries has potentially low capacity requirements (e.g. meetings of research teams at international level, co-funding of an international research centre, etc.). In contrast, developing and implementing a sectoral approach that involved crediting or trading would require dedicating significant government and private sector resources to gather and verify data, evaluate potential, and, after a baseline is agreed, to orchestrate the link to the international architecture and existing mechanisms – the elaboration of the EU ETS gives an illustration of administrative resources that might need to be mobilised.[30]

The capacity to implement a sectoral approach will also depend on the sector: some sectors have good levels of data availability at suitable levels of disaggregation and low levels of uncertainty (e.g. electricity generation), whereas others do not (e.g. deforestation, agricultural soils).

Existing data gathering exercises at industry level also reveal incomplete data coverage. For example, the International Aluminium Institute has been collecting data on PFC emissions from its member companies since 1990. However, until recently, no Chinese companies were members. This is an important data gap, given the importance of China in world aluminium production[31]. Further work is

[30] Crediting on the basis of intensity goals (CO2 and tons of steel or cement, or kWh) also represents an additional administrative cost from a standard emissions cap, as production data would need to be collected and verified as well.

[31] At present, one Chinese company accounting for almost a quarter of Chinese aluminium production is a member (IAI 2008).

likely to be needed before countries have full knowledge of the GHG performance of their sectors, based on verified data. Support, as envisioned under 1(b)(ii) of the BAP, could be used for that purpose.

5.3 Interaction with the carbon market

Some sectoral approaches (i.e. those involving crediting or trading) seek to harness the carbon market. In order to implement such a mechanism, it will need to be consistent with existing Kyoto mechanisms.

There are three areas that are important in this regard:

GHG accounting: it would need to be ensured that any CDM or JI project that continues to generate credits post-2012 is excluded from a sectoral approach, so that projects are accounted for only once. The extent of a challenge that this presents will vary by country and sector, depending how involved it is in the current carbon market, and how sectoral GHG emissions are compiled.[32]

Liability: The attractiveness of different sectoral approaches, as described in FCCC/KP/AWG/2008/L.12, varies greatly. For example, the description of a "no lose" target for a particular sector in a non-Annex I Party includes the concept of "upfront financing, technology and credits", but does not include the concept of reporting and verifying the use of such finance or technology. It does, however, state that there "shall be no consequences" for a Party if it does not meet its approved target.

Interaction with the carbon market: How would such a proposal interact with the carbon market if sales took place but a non-binding target was not met? The host government should either restrict sales until after excess allowances have been proven – i.e. emissions below the non-binding objective – or it should guarantee that the environment does not suffer if sales beyond what is allowed by the non-binding objective and actual emissions (Philibert and Pershing, 2002). There could, in this case, be a consequence for non-compliance, if the government is obliged to acquire units from the international market. More work is needed to fully integrate non-binding objectives in the existing apparatus of international flexibility mechanisms, and elucidate what sort of incentives they could bring to private investors in carbon finance. Because the CDM operates at project level it is not necessarily an adequate guide to how the carbon market would react to a sector-wide crediting mechanism, where indeed crediting of one particular effort hinges on efforts by others, or on the credibility of the government's commitment to ensure net sales only under compliance.

In contrast, language in the BAP on nationally appropriate mitigation actions indicates that consequences for non-achievement of an emissions reductions goal may be a relevant item for consideration. Different sectoral actions and approaches currently under discussion can therefore have very different implications in terms of liability. Their attractiveness to potential investors will therefore also vary.

5.4 Sectoral approaches in the broader mitigation regime

Sectoral approaches must be seen as a "means to an end", i.e. in the context of what they aim to achieve in terms of GHG mitigation, and how they help Parties move towards a truly global mitigation

[32] In order to exclude emissions of CDM projects from a country's inventory, information would need to be collected at the country level on which projects have been approved as CDM projects by the CDM EB and their emissions/emission reductions. These emissions would need to be subtracted from the appropriate sector's emissions. Establishing which is the appropriate sector will be more or less straightforward, depending on the type of CDM project. For example, emissions and emission reductions from a particular cement CDM project could be spread over different parts of a country's GHG inventory (electricity generation, industrial energy use, process emissions). Keeping track of all this information would add to the responsibilities and resource requirements of the country (e.g. to its designated national authority).

effort. The options covered in this paper could differ significantly in terms of the benefits or burden they generate for sectors/countries: an absolute cap on sectoral emissions, if constraining, would result in a net cost, while an extension of CDM to all installations within a sector could greatly increase revenues from credits. Support to sector-specific policies, as could be included under 1(b)(ii) could also result in important co-benefits in host countries. This dimension of sectoral approaches must be put in perspective with the role that countries will assume in the broader mitigation regime. The following questions come to mind as important elements of this discussion:

- How do sector-specific actions or commitments mesh with country-wide commitments that should be adopted at some later stage by all countries? Should sector-specific actions in developing countries be seen as some sort of "stepping stone" to a higher level of future engagement?

- Assuming a gradation of efforts from sector-wide crediting, to non-binding targets and sectoral targets, which countries should be "eligible" for different types of approach?[33]

- Should there be a time-window for sector-wide crediting or, as suggested by BASIC (2006), a finite quota of credits that a country would be allowed to generate via various mechanisms (CDM, sectoral crediting, no-lose target or else), or a discount factor?

What should be the role (magnitude) and nature (offsets, or actual contribution to global mitigation) of crediting mechanisms, given the push to extend their applicability to whole sectors? This issue would be raised explicitly in the case of non-binding targets, which seek to move away from additionality, but envision a meaningful contribution to global mitigation – sectoral caps to facilitate international emissions trading would also bring this issue about.

Last, on a more legal level, the eligibility of countries to participate in various sectoral approaches will also hinge on where these countries belong, in various groupings of relevance under the UNFCCC and Kyoto Protocol (non-Annex I) or the BAP (developing or developed countries).

[33] See Karousakis, Guay and Philibert (2008 draft) for a fuller discussion of the differentiation issue.

6. Concluding Remarks

References to "sectoral approaches" continue to abound in multiple fora, both within and outside the UNFCCC regime. There are many reasons for the interest in sectoral approaches, but it is clear that sectoral approaches are a "means to an end" in terms of GHG mitigation, rather than an end in itself. This paper explores a range of options for the design of sectoral approaches to GHG mitigation and their integration into the climate regime. These include:

- Domestic sector-based efforts (with or without crediting).
- Sector-based technology co-operation.
- Transnational sectoral approaches.

In discussing these three categories of options, the paper does not suggest that any single approach or course of action is preferable in the shorter or longer term. Rather, the paper outlines concrete possibilities for moving forward with the integration of different possible sectoral approaches into the UNFCCC regime, as this has been somewhat lacking in the sectoral approaches debate thus far.

The paper highlights that while a number of issues may need to be decided by COP15, others would not (e.g. quantitative goals for specific sectors, which require gathering relevant, sector-specific data over a range of countries). Establishing a two-stage process could allow Parties to adopt a framework agreement on sectoral approaches at COP15, without seeking to remove all existing uncertainties surrounding such yet-to-be defined options. The ability of sectoral approaches to generate credits, and the resulting volume of credits that could be generated, loom large in this discussion, as this would affect overall mitigation levels, costs, and burden-sharing. Alternative (i.e. non-crediting) forms of financing mitigation efforts, if deemed desirable, should also be considered from the angle of sectors and possible sectoral priorities.

The paper outlines elements of the design of sectoral approaches that could be included in international agreements on the post-2012 climate regime. Agreeing these elements as a first step could help move the international community forward on post-2012 negotiations. These issues were more substantively considered in relation to domestic sectoral approaches in developing countries in section 2. In particular, the following options were explored:

- Non-credited sectoral efforts, such as policies and measures or other "nationally appropriate mitigation actions" developed along sectoral lines.
- A "sectoral crediting mechanism", created by extending the Clean Development Mechanism to a wider (sectoral) scale or by establishing a new mechanism.
- Actions where some, but not all, emissions benefits are credited (such as "no-lose" or "non-binding" targets).
- Sector-wide emission commitments that allow the possibility to trade (e.g. under Article 17 of the Kyoto Protocol, or an equivalent in another instrument).

The paper identifies multiple possibilities for negotiating and agreeing upon the integration of such options into the UNFCCC regime, and for establishing appropriate institutions and processes for implementation. In so doing, it notes that while some new processes and institutions might be needed, plenty of experience exists – both within the UNFCCC regime and beyond, including under the Montreal Protocol – from which Parties can draw on. Moreover, the paper indicates that several important decisions could be taken in Copenhagen to move the issue of domestic sector-based efforts forward. These first phase agreements would not need to include agreements on sectoral goals *per se*, but could include:

- The role of crediting and other support in facilitating sectoral activities.
- Criteria for identifying and prioritising key sectors and activities.
- Any link to other mitigation activities.
- A process to complete discussions of sectoral goals, including a timeline and a possible pilot phase.

These elements could be elaborated further in the coming months. The paper does note, however, that more thought needs to be given to the role of crediting in any such approach, not only in terms of how crediting would impact on the global carbon market, but also potential negotiation difficulties associated with negotiating sectoral crediting under the Convention but linking that crediting to the Kyoto Protocol Annex I mechanisms.

Section 3 of the paper addressed sector-based technology co-operation, one of the aspects of sectoral approaches highlighted in the BAP. The central question here is whether a sector-by-sector focus could help organise UNFCCC work on technology-related co-operation. The paper suggests that in fact, a sector-based approach to technology collaboration could potentially add some value. For instance, having identified key sectors, priorities could be set on the basis of relative mitigation cost, mitigation potential, existing gaps in mitigation efforts, or the need to achieve technological breakthrough. On integration issues for sectoral technology co-operation, as with domestic sectoral approaches, the paper notes that various avenues for negotiating and agreeing on such an approach exist. It also highlights that there are several possibilities concerning the degree to which such an approach could be linked to existing technology-based activities under the UNFCCC and Protocol. The paper further points out that there may be an opportunity to link such an approach to any future agreement on actions and support that are measurable, reportable and verifiable.

Transnational approaches, discussed in section 4, raise questions specific to their multi-Party dimensions, and their possible complexity. In the absence of concrete proposals on transnational approaches, it is useful to look at existing initiatives in the private sector and by public-private partnerships for guidance, such as the APP, including for insights on data availability and existing sector-by-sector knowledge of mitigation options. Beyond simply looking to existing initiatives, however, Parties could also decide in the nearer term on principles to govern future negotiations on transnational approaches.

Ultimately, the paper indicates that multiple avenues exist for exploring various kinds of sectoral approaches through several avenues under the UNFCCC regime. The most important of these avenues are the AWG-KP work programme, and even more so the AWGLCA and related BAP, with the latter explicitly referring to some forms of sectoral approaches. The analysis also highlights that there is no legal basis on which to exclude sectoral approaches from the future mitigation regime - in terms of either negotiation or implementation - provided there is the political will to move in this direction.

The integration of sectoral approaches into the UNFCCC mitigation regime raises important challenges for the negotiations. Among these, the appropriate interaction with countries' broader efforts and the issue of crediting GHG reductions loom large. Some less political, but nonetheless crucial dimensions must also be taken into consideration.

- **Capacity building**: The capacity to implement sectoral approaches is an important issue, and varies depending on the type of sectoral approach, on the sector concerned, and also by country. Capacity building could help resolve many of the gaps regarding data availability – but may not be able to reduce uncertainties in baseline levels, as some activities appear much less tractable when it comes to measuring and projecting emissions. How these issues are resolved, or not, may affect the choice among various sectoral approaches, especially the possibility to generate credits.

- **Selection of sectors**: Should sectoral approaches be restricted to certain activities only, and should Parties focus on sectors that would deliver the most cost-effective mitigation potential, or should they, for instance, focus on areas with important co-benefits? The question of sector eligibility, and of the process to organise the review of sectoral proposals and eventually negotiate objectives, should be addressed quickly and in parallel with the more sensitive issue of differentiation among countries' commitments/actions.

Sectoral approaches remain part of the post-2012 debate. In the near term, Parties seeking to introduce sectoral approaches into the UNFCCC mitigation regime may wish to focus on basic framework issues, as timing seems to preclude a full closure on this approach. Central dimensions to be explored in this interim phase include sectoral coverage and eligibility, process for negotiation of specific targets, a future structure to evaluate various sectoral proposals, and the role of crediting.

Glossary

APP – Asia Pacific Partnership on Clean Energy and Climate Change

AWG-KP – Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol

AWGLCA – Ad Hoc Working Group on Long-term Cooperative Action under the Convention

BAP – Bali Action Plan

CBD – Convention on Biological Diversity

CDM – Clean Development Mechanism

CDM EB – Clean Development Mechanism Executive Board

COP/MOP – Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol

GHG – Greenhouse gas

JI – Joint Implementation

MRV (MRVable) – measurable, reportable and verifiable. Referred to in paragraph 1(b) (i) and (ii) of the Bali Action Plan.

NAMAs – Nationally appropriate mitigation actions. Referred to in paragraph 1(b)(ii) of the Bali Action Plan, in relation to developing countries.

ODS – Ozone-depleting substances

R&D – Research and development

REDD – reducing emissions deforestation and forest degradation in developing countries

SBSTA – Subsidiary Body for Scientific and Technological Advice

TEAP – Technology and Economic Assessment Panel (of the Montreal Protocol)

UNFCCC – United Nations Framework Convention on Climate Change

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Annex I: Procedures for Amending the UNFCCC and Kyoto Protocol

ACTION	PROCEDURES REQUIRED
Amending the UNFCCC (Art 15)	• Any party may propose an amendment • Amendment made at an ordinary COP • Proposed text must be communicated 6 months in advance of that COP • Amendment adopted by consensus or ¾ majority of Parties present and voting • Entry of amendment into force is not automatic
Adopting a Protocol to the UNFCCC (Art 21)	• Adopted at an ordinary COP • Proposed text must be communicated 6 months in advance of that COP • No explicit provision re: means of adoption • Entry into force determined by the Protocol itself
Amending the KP (Art 20)	• Any KP party may propose amendment • Amendment made at an ordinary COP/MOP • Proposed text must be communicated 6 months in advance of that COP/MOP • Amendment adopted by consensus or ¾ majority of Parties present and voting • Entry into force not automatic
Agreeing to a New Commitment Period under the KP	• Subsequent AI commitment periods established by amending Annex B of the KP (Art 3.9) • Amendment and entry into force procedures are the same as those for amending the Protocol itself (Art 20) provided there is written consent of the Annex B party concerned

Annex II: Articles and Provisions Referred to Throughout the Paper

UNFCCC

Article 1: All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall: …

(b) Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change;

(c) Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases not controlled by the Montreal Protocol in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors;

Kyoto Protocol

Article 3(9): Commitments for subsequent periods for Parties included in Annex I shall be established in amendments to Annex B to this Protocol, which shall be adopted in accordance with the provisions of Article 21, paragraph 7. The Conference of the Parties serving as the meeting of the Parties to this Protocol shall initiate the consideration of such commitments at least seven years before the end of the first commitment period referred to in paragraph 1 above.

Article 9(1): The Conference of the Parties serving as the meeting of the Parties to this Protocol shall periodically review this Protocol in the light of the best available scientific information and assessments on climate change and its impacts, as well as relevant technical, social and economic information. Such reviews shall be coordinated with pertinent reviews under the Convention, in particular those required by Article 4, paragraph 2(d), and Article 7, paragraph 2(a), of the Convention. Based on these reviews, the Conference of the Parties serving as the meeting of the Parties to this Protocol shall take appropriate action.

CMP decision 4/CMP.3 on the Article 9 review of the Protocol

Paragraph 6(d): The scope, effectiveness and functioning of the flexibility mechanisms, including ways and means to enhance an equitable regional distribution of clean development mechanism projects.

AWG-KP work programme

AWG-KP work programme (FCCC/KP/AWG/2006/4), analysis of possible means to achieve mitigation objectives, paragraph 17(b):

(i) Analysis of means that may be available to Annex I Parties to reach their emission reduction targets, including: emissions trading and the project-based mechanisms under the Kyoto Protocol; the rules to guide the treatment of land use, land-use change and forestry; the greenhouse gases (GHGs), sectors and source categories to be covered, and possible approaches targeting sectoral emissions; and identification of ways to enhance the effectiveness of these means and their contribution to sustainable development;

(ii) Consideration of relevant methodological issues, including the methodologies to be applied for estimating anthropogenic emissions and the global warming potentials of GHGs.

Bali Action Plan

Paragraph 1: [The COP] decides to launch a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision at its fifteenth session, by addressing, inter alia: ...

(b) enhanced national/international action on mitigation of climate change, including, inter alia, consideration of:

(i) Measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, by all developed country Parties, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances;

(ii) Nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity building, in a measurable, reportable and verifiable manner; …

(iv) Cooperative sectoral approaches and sector-specific actions, in order to enhance implementation of Article 4, paragraph 1(c), of the Convention;

(v) various approaches, including opportunities for using markets, to enhance the cost-effectiveness of, and to promote, mitigation actions, bearing in mind different circumstances of developed and developing countries. …

(d) enhanced action on technology development and transfer to support action on mitigation and adaptation, including, inter alia, consideration of:

(i) Effective mechanisms and enhanced means for the removal of obstacles to, and provision of financial and other incentives for, scaling up of the development and transfer of technology to developing country Parties in order to promote access to affordable environmentally sound technologies; …

(e) enhanced action on the provision of financial resources and investment to support action on mitigation and adaptation and technology co-operation, including, inter alia, consideration of: …

(ii) positive incentives for developing country Parties for the enhanced implementation of national mitigation strategies and adaptation action.